

Fishery Management Report No. 06-67

**Fishery Management Report for Sport Fisheries in the
Upper Tanana River Drainage in 2005**

by

James F. Parker

December 2006

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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December 2006

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PREFACE

This report is written to make fisheries management information available to the State Board of Fisheries, Fish and Game Advisory Committees, and the public. As a means to assist Board of Fisheries members in acquiring information in a timely manner for proposals that will be addressed at the February 2007 meeting, Appendix A has been constructed (page 90). This table guides the reader to specific information contained within text, table, and graphic format that, hopefully will be useful in evaluating regulatory proposals. Management strategies developed in this report are a result of biological assessment (current and prior research projects), and input from user groups. Reviews of these strategies are done on an annual basis and research is prioritized during the area review process prior to each field season. Other information in this report includes a description of the fisheries regulatory process, the geographic boundary of the area, angler access information, and fish stocking information within the upper Tanana River Management Area. Division of Sport Fish operations are fully funded by sport anglers and recreational boaters through contributions to the Federal Aid in Sport Fish Restoration and the Fish and Game general fund. A minimum of 15% of the state's Federal Aid appropriation must be used to improve recreational boating access and facilities.

ABSTRACT

This document provides a wide array of information regarding the recreational angling opportunities that exist within Region III, specifically those within the Upper Tanana Management Area (UTMA). Information specific to the proposals that the Board of Fisheries will address at the February 2007 meeting are contained within numerous sections of this report. Summaries of major fisheries within the area are detailed, including descriptions of recent performances, Alaska Board of Fisheries regulatory actions, social and biological issues, descriptions of ongoing research and management activities, and fish stocking information within the upper Tanana River Management Area.

Key Words: Tanana River, Upper Tanana River Management Area, Delta River, Delta Clearwater River, Goodpaster River, Chisana River, sport fisheries, commercial, subsistence, coho salmon, king salmon, burbot, lake trout, Arctic grayling, northern pike, stocking waters.

INTRODUCTION

The Alaska Board of Fisheries (BOF) divides the state into regulatory areas for the purpose of organizing the sport fishing regulatory regime by drainages and fisheries. These areas (not to be confused with Regional management areas) are described in Title 5 of the Alaska Administrative Code (5 AAC). Sport Fish Division of the ADF&G divides the state into three administrative regions with boundaries roughly corresponding to groups of the BOF regulatory areas (Figure 1). Region I is Southeast Alaska. Region II covers portions of South-central Alaska, Kodiak, Southwestern Alaska, and the Aleutian Islands. Region III includes two of the BOF fishery regulatory areas. They are the Upper Copper and Upper Susitna regulatory area and the Arctic-Yukon-Kuskokwim regulatory area.

Region III is the largest geographic region, encompassing the majority of the landmass of the state of Alaska (Figure 1). The region contains over 1,251,300 km² (485,000 mi²) of land, some of the state's largest river systems (the Yukon, the Kuskokwim, the Colville, the Noatak, and upper Copper River and upper Susitna River drainages), thousands of lakes, and thousands of miles of coastline and streams. Regional coastline boundaries extend from Sheldon Point in the southwest, around all of western, northwestern and northern Alaska to the Canadian border on the Arctic Ocean. Region III as a whole is very sparsely populated, with the most densely populated center located in the Tanana River valley. Fairbanks (population about 31,000) is the largest community.

For administrative purposes Sport Fish Division has divided Region III into six management areas. They are: the Northwestern Management Area (Norton Sound, Seward Peninsula and Kotzebue Sound drainages); the Arctic-Yukon Management Area (the North Slope drainages and the Yukon River except the Tanana River drainage); the Kuskokwim Management Area (the entire Kuskokwim drainage and Kuskokwim Bay), the Upper Copper/Upper Susitna Management Area (the Copper River drainage and the Susitna River drainage above the Oshetna River); Upper Tanana Management Area (UTMA, the Tanana River drainage upstream from Banner Creek and the Little Delta River); and, Lower Tanana Management Area (LTMA, the Tanana River drainage downstream from Banner Creek and the Little Delta River; Figure 2). Area offices for the six areas are located in Nome, Fairbanks, Bethel, Glennallen, Delta Junction, and Fairbanks, respectively.

The Tanana River drainage is divided into two separate management areas because it contains population centers that result in a large amount of angling effort on local fishery resources. Intensive, stock-specific studies are required in the Tanana drainage to provide biological and

fishery management information because of higher fishery exploitation rates. This report details the management activities in the Upper Tanana Management Area.

The BOF is the seven-member board that sets fishery regulations, allocates fishery resources, and approves or mandates fishery conservation plans for the State of Alaska. Board members are appointed by the Governor and must be confirmed by the legislature. Board members are appointed for a term of 3 years. Under the current operating schedule, the BOF considers fishery issues for regulatory areas or groups of regulatory areas on a 3-year cycle. The BOF meetings are usually in the winter, between early October and late March. Statewide fisheries issues are considered at statewide BOF meetings. The BOF receives regulation proposals and management plans from ADF&G, local advisory committees, and the public (any individual or organization can submit a proposal to the BOF). The last BOF meeting for the AYK regulatory area was in January 2004. During its deliberations the BOF receives input and testimony through oral and written reports from staff of the ADF&G, members of the general public, representatives of local fish and game Advisory Committees, and special interest groups such as fishermen's associations and clubs.

Under the Alaska National Interest Lands Conservation Act (ANILCA) the federal government requires that the subsistence use of fish and game by rural residents has priority over other uses. This is unconstitutional under Alaskan state law, which requires equal access to resources for all residents. Because the state is not in compliance with the federal law, managers of federal lands in Alaska are obligated by ANILCA to implement subsistence priority on federal lands and waters.

The Federal subsistence management includes a system of 10 federally-funded Regional Advisory Councils (RAC's) that provide recommendations to the Federal Subsistence Board (FSB) to ensure rural priority for fish and game use on federal lands statewide. The RAC's make recommendations to the FSB, which upon approval, codifies them into federal law. The federal government implemented their subsistence fisheries management program and started accepting proposals in October 1999.

The ADF&G has emergency order (EO) authority (5 AAC 75.003, 2004) to modify time, area, and bag/possession limit regulations. Area managers implement EOs to deal with conservation issues that are not controlled by existing regulations. In this way, managers deal with conservation issues until resolved or until the BOF can take up the issue. EOs are also the mechanism by which "in-season" management of fisheries is accomplished. In-season management is usually in accordance with a fisheries management plan approved by the BOF.

The Region III Sport Fish Division staff biologists are organized into a research group and a management group. The management group consists of a management supervisor, a regional management biologist, an area management biologist for each of the six management areas, one or more assistant area management biologists, and two stocked waters biologists. The area managers evaluate fisheries, propose and implement management strategies through plans and regulations to meet Divisional goals. These area managers interact with the BOF, Advisory Committees, and the general public. The stocked waters biologists plan and implement the Regional stocking program for recreational fisheries.

The research group consists of a research supervisor, six research biologists, and various field assistants. The research biologists plan and implement fisheries research projects in order to

provide information needed by the management group to meet Divisional goals. The duties of the management and research biologists overlap somewhat.

This report summarizes fisheries information for 2005 and preliminary information from 2006. This report is organized into two major sections. Section I provides an overview of the Upper Tanana Management Area. Included, is an area description, BOF activities, and information pertaining to management, stocking, research, and access program activities conducted. Section II provides a more detailed summary of important fisheries and has special management concerns identified during the reporting period. Included in these summaries are: a fishery description, fishery management objective, a description of recent performance of the fishery; a description of recent BOF actions related to the fishery, a discussion of social or biological issues that may be associated with each fishery, a summary of current research and management activities related to each fishery, and a outlook for the 2007 fishing season.

SECTION I: MANAGEMENT AREA OVERVIEW

The Tanana River flows in a generally northwest direction for some 917 km. The Tanana drainage is split into the Upper Tanana and Lower Tanana management areas because of the intensive effort and high sport fishery exploitation levels in this region of Alaska. In 2005, sport-fishing effort in the Tanana River drainage was 93,398 angler-days being 50.9% of the total effort in Region III and 3.8% of the State of Alaska total (Table 1; Jennings et al. *In prep b*).

UPPER TANANA RIVER MANAGEMENT AREA DESCRIPTION

The boundary between the Lower Tanana Area and the Upper Tanana Management Area is at Milepost 295 Richardson Highway (Figure 3). The Upper Tanana Management Area is defined by the Matanuska-Susitna, Denali, and Fairbanks North Star borough boundaries on the west, the Alaska portion of the White River to the east, and the Tangle Lakes System (Delta River) along the Denali Highway and the headwaters of the Nabesna River at the end of the Nabesna Road to the south. Communities located within the Upper Tanana drainage are Big Delta, Delta Junction, Fort Greely, Dot Lake, Tanacross, Mansfield, Tok, Tetlin, Northway, and Nabesna. The Upper Tanana Area affords unique fishing opportunities from lake trout fisheries in the high elevation lakes found along the Denali Highway to the only known Dolly Varden populations in the Tanana River drainage in the streams along the Tok Cutoff. In addition, numerous spring-fed waters near Delta Junction provide critical habitat for the largest coho salmon spawning concentrations in the Yukon River drainage. Because spring-fed systems do not freeze, spawning coho provide the latest-season open water fishing opportunity in the region. Following spawning in adjacent streams in June adult Arctic grayling migrate to feed in these spring-fed waters because of the abundant aquatic invertebrate found there. These Arctic grayling are larger than found in other systems and attract anglers to the Delta Clearwater and Richardson Clearwater rivers.

ALASKA BOARD OF FISHERIES AND ADVISORY COMMITTEES

Sport fishing regulations are established by the BOF. Public input concerning regulation changes is provided through direct testimony to the BOF and through participation in local fish and game advisory committees. Advisory committee meetings allow the opportunity for direct public interaction with department staff. In this way, the public can ask questions and staff can provide clarification to proposed regulatory changes. Fifty-five proposals regarding changes to

the AYK subsistence, commercial, personal use, and sport fishing regulations have been submitted to the BOF for the 2006-2007 cycle, eighteen of which are directed at sport fisheries in the Tanana River drainage, nine specific to the UTMA fisheries.

The Boards Support Section provides administrative and logistical support for the BOF and Fish and Game advisory committees. There are two advisory committees in the Upper Tanana Area that represent resource users: Delta and Upper Tanana/Forty Mile. These two committees meet on a monthly or bi-monthly schedule throughout the fall and winter months. There is a third Advisory Committee in Paxson that addresses fishery issues both in the Tanana and Upper Copper rivers.

To address conservation emergencies between BOF meetings, the Upper Tanana Area manager has EO authority to modify time, area, and bag/possession limit regulations. No EOs were issued during 2005 in the Upper Tanana Area.

Regulations for Tanana drainage sport fisheries are found in Chapter 70 of Title 5 of the Alaska Administrative Code. Regulations for specific waters in the Upper Tanana Area are found under the Tanana River portion (5 AAC 70.015, 2004) of the Arctic-Yukon-Kuskokwim Area.

FEDERAL SUBSISTENCE REGIONAL ADVISORY COUNCIL

The Upper Tanana Area is within the Eastern Interior Regional Advisory Council region (includes Game Management Units 12, 20 and 25). The Eastern Interior RAC met in Fairbanks on March 21-22, 2006. The RAC drafted four proposals to the FSB and the state BOF that attempts to allow more escapement of Chinook salmon thru the lower Yukon River Commercial fishery. These proposals are to initiate discussion of a genetic diversity problem (diminished size of Chinook) that is perceived but not much data has been collected to corroborate the theory.

During its January 2006 meeting, the FSB did not adopt a proposal (FP06-03) to limit mesh depth of subsistence nets in the Yukon River. This proposal had been submitted by the Eastern Interior RAC. The FSB adopted proposal FP06-02 which was a customary and traditional use determination of the Tanana River drainage to include residents of Mentasta Lake, Chistochina and Slana. This allows residents in those areas to take fish without a fishing license or regard to state bag and possession limits. The possibility of unlimited subsistence harvest opportunity creates a concern that overexploitation may occur on limited sport fisheries in this area, even on stocked lakes.

Federal lands within the Upper Tanana Area are: 1) Tetlin Refuge (730,000 acres; Figure 3) which includes much of the Nebesna and Chisana rivers; 2) Delta River Wild and Scenic River Corridor (37,000 acres, 62 river miles); 3) the Tangle Lakes Archaeological District (460,000 acres); and, 4) the headwaters of the Chisana and Nabesna rivers are within the Wrangle-St. Elias National Preserve adjacent to the Tetlin National Refuge.

FISHERY RESOURCE INVENTORY

There are 17 fish species known in the Upper Tanana Area, of which 10 are species commonly targeted by sport anglers. They include: Chinook salmon *Oncorhynchus tshawytscha*, coho salmon *O. kisutch*, chum salmon *O. keta*, Arctic grayling *Thymallus arcticus*, burbot *Lota lota*, lake trout *Salvelinus namaycush*, Dolly Varden *S. malma*, round whitefish *Coregonus cylindraceum*, least cisco *C. sardinella*, humpback whitefish *C. pidschian*, and northern pike *Esox lucius*. Rainbow trout *O. mykiss* are not native to the drainage, but have been stocked in

several locations. Arctic char *S. alpinus*, coho salmon, Arctic grayling and lake trout have also been stocked in selected waters of the Upper Tanana area.

STATEWIDE HARVEST SURVEY DESCRIPTION

Recreational angling effort in the Tanana drainage has been estimated since 1977 using a statewide mail-out survey (Howe et al. 1995, 1996, 2001a-d; Jennings 2004, 2006 a-b, *In prep* a-b; Mills 1979- 1981a-b, 1982-1994; Walker et al. 2003) administered by Research and Technical Services (RTS) of the Sport Fish Division. The survey is designed to provide estimates of effort, harvest, and catch on a site-by-site basis. The standard questionnaire used annually since 1977 was mailed to 22,500 households containing at least one individual who purchased a 2005 sport fishing license or who held a valid permanent identification card for sport fishing. Approximately 12,100 surveys were sent to non-resident license purchasers and the remainder to Alaskan residents. Each household was asked for information in 2005 on number of licensee's, on participation (number of anglers, trips, and days fished), and number of fish caught and number of fish kept (harvested) by species and site. An estimate was generated for catch and harvest for each species and participation by site. Confidence intervals for estimates were calculated using the percentile method of bootstrap re-sampling with 1,000 replications.

Guidelines (Mills and Howe 1992) for evaluating the utility of the estimates are: 1) other than to document that sport fishing occurred, estimates based on fewer than 12 responses should not be used; 2) estimates based on 12-29 responses can be useful in indicating relative order of magnitude and for assessing long-term trends; and; 3) estimates based on 30 or more responses are generally usable. For larger fisheries SWHS harvest estimates have been consistent with onsite creel surveys (Mills and Howe 1992). For the most part, use of SWHS data has replaced onsite creel surveys. Because of the time delay to obtain results, estimates cannot be used for in-season management and are not recommended for compliance with regulatory and management policies, quotas, and guidelines (Walker and Bingham 2002).

RECREATIONAL ANGLER EFFORT, HARVEST AND CATCH

Historically, the majority of sport effort in Region III (or AYK) has occurred in the Tanana River drainage (Table 1). From 2000 to 2004, sport fishing effort in Tanana drainage portion of the AYK Region ranged from 46.9% - 53.7%, averaging 49.8% (Table 1). In 2005, angler-days of effort in the Tanana River drainage was 85% of the recent five year average (Table 1).

Numbers of anglers for the Upper Tanana Management Area (UTMA) are derived as a proportion of the total number of Tanana drainage anglers. The ratio is determined from the sum of anglers partitioned from each management area (Lower and Upper Tanana River drainage) and multiplied to the number of anglers from the Tanana drainage. This is required because numbers of anglers do not equal sum of sites, due to some anglers fishing at more than one site (Walker and Bingham 2002).

From the most recent 5-year average (2000-2004), the number of anglers in the UTMA averaged 33% of the entire Tanana Drainage while the number of trips averaged 25% and the average number of angler-days averaged 29,762 or 28% of the Tanana River drainage (Table 2). The number of angler-days in 2005 was 29,309, slightly below (98.5%) the five-year average (Table 2). From 2000-2004, the average harvest of 26,535 fish in the UTMA was 39% (Table 2) of the Tanana drainage total. In 2005, the harvest was only 62.7% of the five-year average. Catch rates

also declined in 2005 though at a lower level than harvest when compared to the five-year average (81.2%; Table 2).

From 2000 - 2004, recreational anglers in the Tanana River drainage harvested an average of 68,217 fish, accounting for an average of 2.1% of the annual estimated statewide recreational fish harvest and 46.9% of the total estimated AYK harvest for the same period (Table 3). Sport harvest of all species since 1977 in the Tanana drainage reached a peak in 1988 when over 198,000 fish were harvested (Mills 1989). Harvest in the Tanana River drainage reached its lowest amount (43,196) in 2005 and was only 63.3% of the 2000 - 2004 average of 68,217 (Tables 3). As harvest declined in the Tanana River drainage, statewide harvest has increased slightly (Table 3).

Arctic grayling have been the most harvested species in the Tanana drainage until 1988 (Parker and Viavant 2000; Table 4). Since then rainbow trout have dominated harvests. Rainbow trout accounted for an average of 46.9% of the total Tanana drainage harvest over the past five years (Table 4) and 41.3% of the total Tanana drainage harvest in 2005 (Table 4). The average harvest in the Tanana River drainage have declined from the past 10-year average of 75,938 to the recent 5-year average of 68,217 fish (Table 4). The harvest of rainbow trout in 2005 is only 46.9% of the five-year average (Table 4). A total of 6,336, or 35.5% of the total Tanana drainage rainbow trout harvest were harvested in the UTMA in 2005 (Table 5). From 2000-2004 the combined average harvest of rainbow trout and landlocked coho salmon stocked in area lakes accounted for 64.5% of total harvest in the Tanana drainage (Table 4). This indicates a significant reversal in the role of the stocking program in the interior. In 2005, combined, Chinook salmon, chum salmon, whitefish, sheefish, and other fish species accounted for less than one percent of the total Upper Tanana area harvest in 2005 (Table 5).

Estimates of the number of fish caught and released by recreational anglers fishing Tanana drainage waters became available for the first time during 1990. In 2005, a total of 244,711 fish were caught in the Tanana drainage (Tables 5 & 6) of which 95,361 (39.0%; Table 5 & 7) were caught in the UTMA. The proportion of fish caught in the UTMA in 2005 (39.0%; Table 5) is slightly above the recent five-year average of 37% (Table 2).

In 2005, Tanana River drainage anglers kept only 17.7% of their catch (Table 6). Since 1999, it appears there is a trend where anglers are releasing more of their catch; prior to 1999, anglers kept 23.6% of their catch (Parker 2001a). Recreational anglers in the UTMA kept 17.4% of their catch in 2005, similar to 17.7% of the catch harvested overall in the Tanana River drainage (Tables 6 and 7).

In 2005, Arctic grayling were caught in the greatest numbers in the Upper Tanana River drainage while more rainbow trout were harvested than any other species (Table 7). In 2005, the catch of Arctic grayling was 55,943 and 17,355 rainbow trout were caught. The harvest rate is much greater for rainbow trout in the UTMA (36.5%) compared to 9.4% for Arctic grayling (Table 7). UTMA burbot which are typically harvested, rather than released, were harvested at a rate of 74.8% (Table 7), nearly the same as in the entire Tanana River drainage 77.1% (Table 6).

MANAGEMENT AND RESEARCH ACTIVITIES

The management staff in Region III began drafting Fishery Management Plans in 1992 for each significant fishery. Each of the plans, including those listed below for the Upper Tanana area, was finalized in 1993. Managers use the plans as annual planning and evaluation tools. Each

January the management staff discusses the trends and objectives of each fishery and any management actions or research needs based upon these plans. To date two of these plans have been updated. Revised plans were completed in November, 2002 for the Delta Clearwater River Arctic grayling and Goodpaster River fishery. A draft plan for Quartz Lake was submitted for review in March 2005. The Upper Tanana area Plans and the date finalized are as follows:

1. Quartz Lake Stocked Lake Sport fishery, June 1992, *draft revision March 2005*;
2. Small Stocked Lakes Sport Fishery, June 1992;
3. Delta Clearwater River Coho salmon fishery, April 1993;
4. George Lake sport fishery, April 1993;
5. Volkmar Lake, April 1993;
6. Tangle Lake System sport fishery, May 1993;
7. Delta Clearwater River Arctic grayling sport fishery, June 1993, *revised November 2002*;
8. Fielding Lake sport fishery, June 1993;
9. Goodpaster River sport fishery, June 1993, *revised November 2002*;
10. Richardson Clearwater River sport fishery, June 1993;
11. Shaw Creek sport fishery, June 1993; and,
12. Tanana River Burbot sport fishery, June 1993.

COMMERCIAL SALMON HARVESTS

In 2004, starting September 24th, three 48-hour commercial openings in District 5A and 6 occurred because the biological escapement goal of 136,000 fall chums was met. Strong numbers of coho salmon were also reported and were the target of ensuing commercial and subsistence fisheries.

Tanana River stocks of chum, Chinook, and coho salmon provide commercial fisheries in the Tanana River district. In 2005, 310,492 salmon were caught commercially in the entire Yukon River drainage (Table 8). Coho salmon are generally caught during the commercial opening on fall chum salmon. In 2004, due to a higher than average run, more coho salmon were caught than fall chum salmon in the Tanana River. In 2005, the number of coho salmon caught in the lower Yukon (District 1) was the most caught since 1997. The Commercial Fish Division strategy is to have later commercial openings to allow for the biological escapement goal (BEG) of 136,000 fall chums to be met and allow for harvest on coho salmon. In recent years as a result of large returns, coho salmon were targeted by commercial and subsistence fisheries. The 2005 Yukon River fall chum salmon commercial harvest of 178,987 and 58,347 coho salmon were the highest harvests since 1996 (Table 8; F. Bue, Commercial Fisheries Biologist, ADF&G, Fairbanks; personal communication).

The Tanana River from its confluence of the Gerstle River to the Little Delta River is crucial habitat for returning fall chum salmon. Alluvial aquifers associated with porous floodplain gravels store water and stabilize winter flows in this area near Delta Junction. All the large aquifers are located on the south side of the Tanana River. Groundwater seeps into the Tanana River, provide spawning habitat for fall chum and coho salmon, which are the last salmon

species to spawn during the year. In 2005, an estimated 28,132 spawning fall chum salmon were counted near the mouth of the Delta River (B. Busher, Commercial Fisheries Biologist, ADF&G, Fairbanks; personal communication).

SUBSISTENCE AND PERSONAL USE SALMON HARVESTS

In the Yukon River drainage subsistence salmon fishing occurs in the Yukon River, while subsistence and personal use salmon fishing occurs in the Tanana River (personal use fishing occurs only in the Fairbanks non-subsistence area). In 2005, the estimated subsistence and personal use salmon harvest in the Tanana River was 48,411 fish or 18.1% of the Yukon River total salmon harvest (subsistence and personal use; Table 10). Better than expected Chinook and fall chum salmon returns in 2005 to the Yukon River drainage met escapement goals for the first time since 1997. In 2005, the number of coho salmon caught in the Tanana River subsistence and personal use fisheries was 20,169 fish or 72.4% of the total Yukon coho harvest and 42% of all species caught in the upper Yukon River (Table 10). Subsistence fishing is closed in the Tanana River within the Fairbanks Non-subsistence use area (5 AAC 99.015, 1993). In the closed area, however, salmon can be taken under the authority of a personal use permit. The BOF in 1994 closed the Delta River to all forms of fishing including subsistence spearing for chum carcasses, citing that the spawning area should be left undisturbed.

Prior to 2001, personal use fish could only be harvested using gillnets or fish wheels within a portion of the Tanana River near Fairbanks. The BOF in 2001 allowed the use of dip-nets and hoop-nets as legal gear in the personal use fishery. The justification for use of such gear was to allow the release of non-targeted species unharmed.

Goodpaster River Chinook Salmon

The furthest major upriver Chinook salmon spawning system in the Tanana River drainage is the Goodpaster River. Chinook salmon enter the river in July. Teck-Pogo, a mining corporation on the Goodpaster River, contracted an enumeration project to monitor spawning escapement of Goodpaster River Chinook salmon. Tanana Chiefs Conference (TCC) operated a counting tower on the North Fork Goodpaster River from July 1 to July 31, 2006. A total of 2,440 Chinook salmon were counted (Table 9). (M. Smith, Fisheries Biologist, Tanana Chiefs Conference, Fairbanks; personal communication). In addition, an aerial survey was flown on August 1, 2006 to duplicate aerial surveys conducted by Northern Ecological Services (John Morsell) from 1998-2003 (Table 9). The aerial count was 884 under good counting conditions. From 1998-2003, escapement indices via helicopter surveys averaged 1,717 fish. The average escapement of Chinook salmon to the North Fork Goodpaster River from 2004 – 2006 estimated by counting tower is 2,409 fish (Table 9).

Although some Chinook spawning occurs in the South Fork Goodpaster River, the North Fork is thought to contain most all the spawning salmon. During the aerial survey in 2006, only three Chinook salmon were counted from the West Fork of the South Fork to its confluence with the Goodpaster River. Salmon spawning habitat does not occur in the South Fork until about half the distance from the Goodpaster to the West Fork. The lower South Fork is a sandy or mud bottom and meanders heavily, while the upper South Fork has good spawning gravel.

The Goodpaster River is accessible only by boat or airplane due to its remoteness there is a relatively small sport fishery on the Goodpaster River. There was an estimated average of 743

angler-days from 2000-2004 assumed to be primarily directed at Arctic grayling. Currently, the entire Goodpaster River is closed to fishing for Chinook salmon.

Proposals 175 and 176, submitted by the Fairbanks and Delta Fish and Game Advisory Committees this Board cycle, ask that catch-and-release fishing for Chinook salmon be allowed in the Goodpaster River downstream of the South Fork. If adopted by the BOF, this fishery would be considered remote in contrast to the major Chinook salmon fisheries of the Tanana River Valley (the Chena and Salcha River fisheries).

ECONOMIC VALUE OF SPORT FISHERIES

Howe (1987) reported an average expenditure of \$75 per day for anglers fishing Arctic grayling and coho salmon on the Delta Clearwater River based upon an economic study conducted in 1985. Current findings put that expenditure value much higher. Duffield et al. (2001a) partitioned the angling public into different populations showing that non-resident anglers to Region III pay an average of \$2,152 per angling trip, residents from Region I and II pay \$192 and residents of Region III pay \$122 per trip. Four studies have been conducted to determine the economic values of sport fisheries in Region III. These include Arctic grayling fisheries in 1996 (Duffield et al. 2001a), salmon fisheries in 1997 (Duffield et al. 2001b), burbot, pike, and lake trout in 1998 (Duffield et al. 2001c), and major stocked waters in the Tanana Valley during 1995 (Duffield et al. 2001d). The purpose of these studies was to estimate net economic values for sport fishing in Region III but also to estimate value by different areas within the region. The Tanana portion of Region III had 117,011 angler trips in 1996 for an estimated total net economic value (NEV) of \$15,718,895 or nearly 55% of the regions total (Duffield et al. 2001a). The net economic value per fishing trip (NEV) is the amount of money a person would be willing to pay to take the trip in addition to what they actually did pay. The Arctic grayling portion of the NEV for the Tanana River drainage in 1996 was \$3,529,662 or 22.5% of the total value of the Tanana River (Duffield et al. 2001a).

Non-resident anglers are an important element of the fishing population in interior waters. In 1996, non-residents provided 34% of the total NEV while residents of Region III excluding the Seward Peninsula and Northwest Alaska, comprised nearly 54%, and the remaining value (22%) came from residents of Region I and II. Broken down by species, salmon has the highest NEV for the region, followed by Arctic grayling. Once value has been placed on fisheries we can discern if the public benefit outweighs our management and research cost. In 1996, the net economic value of fishing *all* species was \$28,809,984 with cost of management and research at \$1,371,904 for a cost-benefit ratio of 21, indicating the benefit far outweighs the program cost (Duffield et al. 2001a).

STOCKING PROGRAM INVENTORY

Stocking serves to divert angling pressure away from wild stocks and maintains or creates new angling opportunities. Rainbow trout are the dominant game fish stocked in the Tanana drainage, and are also the most harvested species (17,829) in the Tanana drainage during 2005 (Table 6). Other species stocked are Arctic char, Arctic grayling, Chinook and coho salmon. In the UTMA, there are 53 lakes in the stocking inventory for 2005 and 2006.

A regional stocked waters management plan was developed and passed by the BOF in 2004. The plan provides the department and BOF the tools to manage stocked waters based on opportunity asked for by the public. Stocked waters are divided into three management categories;

high yield, conservative yield, and special management. In addition, water bodies are further stratified into sub categories based on size of drainage, ease of access, and proximity to human populations (large, urban, rural, and remote).

Quartz Lake is the only high yield lake in the UTMA; it is the largest lake both in size (600 acres) and recreational opportunity. There were 85,038 rainbow trout and 84,168 coho salmon stocked in Quartz Lake in 2006. The remaining 52 lakes are considered “urban high yield”, “rural high yield”, and “remote high yield” lakes. These lakes are stocked either annually, or, in the case of the more remote lakes, every other year.

ACCESS PROGRAM

The Wallop-Breaux amendment to the Federal Aid in Sport Fish Restoration Act mandates that at least 15% of the federal funds collected from taxes on sport fishing equipment be used by the states for the development and maintenance of boating access facilities. This mandate is fulfilled by the ADF&G Sport Fish Access Program, which consists of two parts. The first part, the boating access coordination program, involves large capital improvement projects, such as boat ramps, parking areas, fishing docks, and land acquisition, which are subject to public review under the National Environmental Policy Act.

The second portion of the program is called the small access site maintenance program. The small access program is an ongoing, annually funded program. Activities include placing and maintaining signs at lake and river angling-access sites, constructing and maintaining pedestrian and off-road vehicle (ORV) trails to fishing sites and providing portable toilets, picnic tables, and trash removal at heavily used roadside sites. The program also secures permanent right-of-ways on public and private land to ensure continued public access to fishing sites, maintains access roads to boating or angling sites that might not otherwise be maintained, constructs and maintains outhouses and tent platforms at remote angling sites, provides public-use ice-fishing houses for rental at several large stocked lakes, and produces and prints publications informing anglers about fishing and boat launching opportunities. In September 2005, the George Lake boat was repaired, the bottom of the existing ramp had been badly undermined. In 2006, preliminary investigations were made concerning a public boat ramp at Shaw Creek. The history of major and small access projects completed in the Tanana drainage from 1988 to 1994 can be found in Burr et al. (1998).

BIOLOGICAL AND SOCIAL ISSUES IN THE UPPER TANANA AREA

Ground-based Midcourse Missile Defense

The Ground-based Midcourse Missile Defense (GMD) Test and Evaluation (T&E) program began construction in August of 2001. The test-bed was operational in December 2004. Further construction including additional missile silos will be phased in over the next few years as the program continues toward completion. Construction of the project employs several hundred personnel and has relocated Army national guardsmen to Fort Greely to operate the GMD. This has led to an expansion of recreational use, especially fishing on stocked lakes in the Upper Tanana area. Currently the Sport Fish Division is stocking additional catchable size fish into the Fort Greely lakes along Meadows Road. This strategy appears to be working as fishing pressure is contained closer to the work project. Heavy use of the lakes has occurred from 2004 to 2006 (Jeff Mason, LCTA Coordinator - Donnelly Training Area, USARMY, Delta Junction, personal communication).

Environmental Assessment “Range Expansion Projects Donnelly Training Area, Alaska”.

U.S. Army Alaska (USARAK) is proposing to construct a combined arms collective training facility (CACTF), a battle area complex (BAX), and a collective training range (CTR) at Donnelly training area. These projects would support proposed implementation of a “Stryker Brigade Combat Team”. The environmental assessment suggests the proposed CACTF and BAX be located within Donnelly East Training Area (93,000 acres). The proposed CTR would be located within Donnelly West Training Area (531,000 acres). The proposed action includes possible changes in range orientation and/or location within the general Eddy Drop zone study area (CACTF and BAX) and the general North Texas Study Area (CTR). Another alternate site could accommodate a combination of facilities is the Donnelly Drop Zone Study Area, near Donnelly Dome.

There is considerable opposition by the community for a facility at the Eddy Drop Zone location because of close proximity to Delta Junction. The City of Delta has sued the Army to include the concerns the city has that were not included in the EIS. The Army indicates this is their preferred option, however if they choose another option it would likely be development of North Texas Study Area. This proposal in the EIS would close Meadows Road and therefore exclude public access to 14 lakes stocked by ADF&G. These lakes are important recreational opportunities to the public and especially to the army, missile defense, and construction workers. These lakes absorb increasing demands for recreational fishing, close to the base, without expanding into other already heavily used fisheries in the area. Fortunately, the Army complied with the City’s requests and mitigated requests for fire breaks and dikes for flood issues. The department has formally filed comments to the Army through the DNR.

State Land Selection-Denali Block/Tangle Lakes Area

The Denali Block is the unofficial name given to about five million acres of largely federal land along the Denali Highway between Paxson and Cantwell. There has been a great deal of exploration in this area in recent years. These explorations have shown the potential for a significant deposit of rare minerals of the platinum group. The eastern end of the Denali Block includes the Tangle Lakes archaeological district. Specifically, the district includes 226,000 acres between mileposts 17 and 37 along the Denali Highway which is also within the Upper Tanana Management Area. In 2001, DNR asked BLM to transfer approximately 235,000 acres to the state, including much of the archaeological district. This would mean that many of the mineral rents would come to the State of Alaska, but also the state will now have the responsibility to manage recreational use. This area includes the Tangle Lake System which is rich in sport fishing opportunity and annually averages 5,000 angler-days of use. The Delta River National Wild Scenic River Corridor is excluded from the state’s conveyance and will continue to be managed by BLM. DNR will establish a special-use area over the portions of the Archaeological District to protect the historical and recreational value. DNR also will eliminate conflict with property rights to the minerals and surface disturbance. Also DNR will afford the same protections that BLM provided for the use of off-road vehicles in the area.

In August 2006, Anglo-American made an announcement that they were pulling out of Area 1 (132,000 acres) of the Denali Block. This is the largest of the three areas and does include most of the sensitive recreational areas such as the Tangle Lakes and Delta River corridor. BLM and

ADF&G are planning a cooperative research project for 2007 to establish baseline data on Arctic grayling in the Upper Delta River.

Shallow Natural Gas Lease Applications

The Division of Oil and Gas (DOG) received 100 applications for Shallow Natural Gas Leases in June 2000. These leases were located near Nenana, Fairbanks, and Delta Junction. In Delta Junction a large section of land (452,000 acres) was available for leasing. Waters affected by the leases include those in Table 11. Conditions for exploration of gas reserves were outlined by ADF&G Habitat Division. Most of the exploratory work is expected to be done during the winter, wells will be drilled to 3,000 feet, detonation of charges, and ice road construction is involved.

Pogo Mine

Gold exploration has led to the development of large-scale mining operations in the Tanana River drainage. The Pogo mine site on the Goodpaster River includes nearly 200 square miles of claims. The areas surrounding these claims are watersheds that influence important fish streams, and there are concerns about water quality and access issues to this large mine. A permanent road from the Richardson Highway from the mouth of Shaw Creek to the mine was completed by June 2004. The Camp Creek Fire in the summer of 2004 burned nearly 200,000 acres in Shaw Creek and Upper Goodpaster River. A final feasibility study was issued in May 2004. A 2,500 ton/day underground mine and mill operation is currently under construction with startup planned for the first quarter of 2006.

Beginning in 1998, Teck-Pogo Inc., developers of the mine site, have annually funded (\$11,500) a long-term population study on spawning Arctic grayling in the lower Goodpaster River. In 2003 and 2004, these monies were directed towards a study of the summer resident Arctic grayling population in 27 miles of the North Fork Goodpaster River (between Barbara Creek to Indian Creek Goodpaster River).

Federal Subsistence

There are a number of management concerns regarding federal subsistence management of fisheries in the state. These include enforceability of dual sets of regulations, public confusion over jurisdiction, potential increases in subsistence harvests related to customary trade, loss of sport fishing opportunity, and the lack of mechanisms for cooperative management of stocks supporting both subsistence and sport harvests.

INFORMATION AND EDUCATION PROGRAM

Sport Fish Division has provided information and education services to anglers, educators, interest groups, and the general public since statehood (Greiner 2001). In the Upper Tanana area, a Fish & Wildlife technician in Delta Junction is available to give the public information on sport fisheries. Information provided includes a large wall map of the area with lakes and access areas marked, pamphlets, brochures, and maps. The program also provides aquatic education at the local elementary school. In addition, another informational brochure was developed in 2002 to include stocked lakes on the "Coal Mine Road" and the Delta Clearwater River Arctic grayling/coho salmon sport fisheries. In 2006, as a result of high demand the informational brochure for "Fishing the stocked Lakes of Fort Greely" was updated and republished. The Area Management Biologist (AMB) assists to provide coho salmon eggs from the Delta Clearwater

River to several school districts. Schools from Fairbanks to Tok participate in this aquatic educational program. The coho eggs are raised and hatched in classroom incubators. A fish transport permit (FTP) is required for collection and return of these fish to the Delta Clearwater River. In October 2006, live coho salmon were taken from the Delta Clearwater River to Fairbanks to expose more schools to the program.

SECTION II: UPPER TANANA AREA RECREATIONAL EFFORT

The SWHS estimates the number of angler-days of sport fishing effort expended by recreational anglers fishing Alaskan waters as well as the catch and harvest of important sport species. The survey is designed to provide estimates of effort and harvest on a site-by-site basis; however, it does not provide estimates of effort directed towards a particular species. In 2005, a total of 37,486 anglers took 57,846 trips for a total of 93,398 angler-days reported for the Tanana drainage (Table 1). Of the Tanana drainage total in 2005, 29,309 angler-days of effort were reported in the Upper Tanana area or 31% of the total (Table 2). This estimate was obtained by sorting all waters reported in the Tanana drainage by Lower Tanana and Upper Tanana management areas. It is estimated that 23,166 anglers fished the Tanana drainage in 2005 and 33% (7,691) of them fished the Upper Tanana area (Table 2). In 2005, anglers took a total of 57,846 trips in the Tanana drainage and 30% (17,230) of those trips were in the Upper Tanana area (Table 2). Anglers in the Upper Tanana area harvested 39% (16,631; Table 2) of the total Tanana drainage harvest of 43,196 (Table 3). Effort data between the two management areas has only been extracted since 1996 and is consistent, averaging 28% from 2000 to 2004 (Table 2).

SECTION III: COHO SALMON

BACKGROUND AND HISTORICAL PERSPECTIVE

All five species of salmon enter the Yukon River. Coho salmon ranks third behind chum and Chinook salmon in importance to the Yukon River commercial and subsistence fisheries. Timing of coho salmon entering the Yukon River overlaps with that of the fall chum salmon run, however, the peak of the coho salmon run is approximately two weeks later than that of the chum salmon run. Because of this overlap, coho salmon are typically caught incidentally in the commercial fall chum salmon fishery.

Coho salmon migrate to spawn in small spring-fed tributaries unique in to the south side of Tanana River drainage. Such springs are known to exist in the Nenana River drainage and the south side of the Tanana River near Big Delta, specifically, Five-mile Creek, Richardson Clearwater River, Providence Creek, Blue Creek and the Delta Clearwater River.

The Delta Clearwater River (DCR) is one of several spring-fed tributaries to the Tanana River and supports the largest documented spawning run of coho salmon in the Yukon River (Parker 1991). The DCR is about 20 miles in length, is road accessible (Figure 5), and is the largest recreational fishery for coho salmon in the Tanana River drainage (ADF&G 1993). Effort estimates for just coho salmon are not available from the SWHS; however data from mail-out surveys conducted in 1994 and 1995 indicate that 72% of the effort for the Delta Clearwater was directed at Arctic grayling in 1995 (Howe and Fleischman 2001). From 2000 to 2004, an average of 674 Coho salmon were harvested in the DCR of the 6,268 caught annually (Table 12). In 2005, the harvest of 267 fish was only 40 percent of the 5-year average (Table 12).

Annual escapement index counts of coho salmon are accomplished by a boat survey. Escapement counts are completed on 17.5 miles of navigable water from an elevated platform on a riverboat. Aerial helicopter surveys have been done to estimate escapement into non-navigable portions of the river from 1995 to 1998 (Stuby 1999; Table 13). As a result of the aerial surveys, an additional 21.3% is added to the boat count for coho salmon spawning in the non-navigable portions of the river (Table 13). The average total escapement of coho salmon in the Delta Clearwater River from 1994-2005 is 41,973 (Table 13).

Yukon River drainage commercial and subsistence harvests increased from 41,976 in 2004 to 86,487 in 2005 (Table 14). This larger harvest was likely responsible for the decrease in escapement to the Delta Clearwater River in 2005. There is potential for continued reduced coho salmon escapements to the DCR as fall chum salmon runs improve and later upriver harvest windows remain open for coho salmon. One can surmise from the data that the declining fall chum salmon fisheries in previous years have resulted in increased returns of coho salmon to the DCR. Before reaching the DCR, coho salmon travel about 1,700 km from the ocean and pass through six different commercial fishing districts in the Yukon and Tanana rivers (Parker 1991). Subsistence and personal use fishing also occurs in each district.

Coho salmon are the last of the salmon species to enter the Yukon River and begin to enter the DCR in mid-September. The peak of the run is by mid-October. Property owners living near the spring have reported coho salmon spawning as late as January. The springs provide favorable over-wintering habitat for coho salmon that rear in the river for 1-3 years. Carcass sampling over several years showed that an average of 79% of the returning coho salmon were 4-years of age, 14% were 3 years and the remaining 7% were 5-years of age (Parker 1991). The majority of the coho fingerlings rear in the DCR for 3-years before smolting, and spend 1-year in the ocean before returning.

Preliminary boat counts are made in September, and if it appears that the escapement goal may not be met, the sport fish bag limit is reduced or the fishery is closed by EO. The present bag limit is three coho salmon per day and three in possession. This is the last open-water fishery of the year attracting both local and non-local anglers who want the opportunity to catch a salmon (ADF&G 1993). Anglers fish from shore or by boat near the State Park campground and boat launch at river mile 8.5. Coho salmon are caught from mid-September through October with rod and reel using various spoons or large spinners. Only 0.8% of the total escapement was harvested in 2005 by sport anglers (Table 14).

RECENT FISHERY PERFORMANCE

The coho salmon fishery on the DCR is relatively new, growing in popularity since 1984. Angler effort on the DCR has been relatively consistent over the years. In the mid-eighties the Arctic grayling population and fishery began to decline about the same time coho escapements increased. For a number of years angler effort remained consistent however, more effort appeared to be directed on coho salmon when grayling abundance was at its lowest point. As the Arctic grayling population rebounded, the angler effort appears to again be directed primarily at grayling (Table 12).

Initially coho salmon harvest rates were high, with exploitation up to 16% in 1990. Beginning in 1992, coho salmon harvests dropped below 1,000 until 2003 when 1,272 coho salmon were harvested and 14,665 were caught, the catch in 2003 is the largest ever recorded (Table 12). The majority of coho salmon are released; the quality of the salmon flesh is not as desirable as fish

caught at the mouth of the Tanana River. This demonstrates that anglers remain interested in participation and less in keeping their catch.

The biological escapement goal (BEG) for the DCR is 9,000 coho salmon (ADF&G 1993). The boat-count escapement index in 2006 was 15,950 with an expanded count of 20,262 (includes tributaries not counted by boat; Table 13). In addition to coho salmon, 2,375 chum salmon were estimated in the lower one mile of the Delta Clearwater River and Clearwater Lake outlet. The number of chum salmon observed indicates a strong escapement. Arctic grayling have changed their migratory behavior in response to large runs of coho salmon by remaining in the DCR until later in the year. In 2006, about 9,750 Arctic grayling were estimated from mile 15 down to the mouth of the DCR.

Aerial counts for coho salmon in the non-navigable portions of the DCR were conducted from 1994 to 1998. These counts comprised 21.9%, 23.8%, 19%, 17.1%, and 20.0% (averaging 21.3%) of the expanded escapement respectively (Evenson 1995-1996, 1997a; Stuby and Evenson 1998; and Stuby 1999). In 2006, coho salmon escapement in the spring areas was estimated at 4,312 for a total escapement of 20,262 (Table 13).

Average total escapement (expanded count) over the past five years (2000-2004) has been 59,725 (Table 14). Large escapements of coho salmon to the DCR may be attributed to above average run strength or below average harvests in the commercial, subsistence, and personal use fisheries during recent years and large parent-year escapements (Table 14).

MANAGEMENT OBJECTIVES

Escapement estimates of coho salmon in the DCR have steadily increased since 1972. In 1993, ADF&G set an escapement goal of 9,000 for the DCR based on the average historical boat survey escapements from 1972 to 1992 (ADF&G 1993). These boat counts were conducted on the navigable portion of the river upstream approximately 17.5 river miles from the confluence with the Tanana River. The average expanded count from 1995 to 2004 in the DCR is 38,410 fish (Table 14).

It is unknown what proportion of coho salmon caught in the lower river Yukon are DCR stock. Recent examination of the 29 years of escapement and recruitment data and applying various proportions of harvest provided an estimated maximum sustained yield for the DCR coho salmon stock of between 9,500 and 11,800 fish. The DCR sport harvests of coho salmon have remained well below this level and it is assumed that current harvests of the DCR stock in all Yukon River fisheries is sustainable.

The department monitors the escapement between mid-September and early October to determine if an in-season management action is necessary. A management objective of 1/3 (3,000 fish) of the escapement goal being in the lower eight miles of river would be required for no action to occur. Preliminary coho salmon escapement for the DCR can be determined upon Yukon River sonar counts and Nenana test wheels catches, alerting the manager if a problem exists. With these data and a preliminary river count, the department has reasonable tools to predict if the coho salmon sport fishery needs to be closed to the retention of coho salmon.

FISHERY MANAGEMENT

Unless there are lower-river fisheries that target coho salmon in the future, additional sport harvests could be sustained in the DCR coho salmon sport fishery. Harvest rates are low and

more anglers are practicing catch-and-release. In years of high returns an EO could implement an increase in the bag limit, but few anglers are likely to take advantage of it. In 2005 large numbers of anglers were on the river in late September and October, many using boats to fish the river, but harvest in 2005 were the lowest since 2000. In 2006, there were more than 3,000 fish in the first week of October and fish wheel catches on the lower Tanana River indicating an above average run. No management actions were taken on DCR coho salmon in either 2005 or 2006.

FISHERY OUTLOOK

In 2004 and 2005, large numbers of coho salmon returned to the DCR. However, in 2006 there was a significant decrease in the run size because of large harvests in the lower river. The next several years' escapement runs will be based upon high parent escapement runs. These large anticipated runs should allow targeted commercial and subsistence fishing, as occurred in 2004 and 2005, to harvest the coho salmon surplus.

BOARD OF FISHERY ACTIONS

Until recently, there was no management plan allowing directed coho salmon commercial fishing in the Yukon-Northern Area. The fall season is managed based on the timing and stock status of fall chum salmon. In 2000, the BOF authorized the Yukon River Coho Salmon Plan. In that plan the department can allow a directed coho fishery when the coho run is above average, when the fall chum salmon return is more than 625,000 fish.

CURRENT ISSUES

The management of directed coho salmon fishing during the fall season is complicated by an overlapping run of fall chum salmon stocks. When fall chum salmon stocks are below the escapement goal of 625,000, then downriver fisheries are closed and regardless of coho salmon run strength, no fisheries are normally directed on coho salmon largely due to coho salmon being the last species to enter the Yukon system. Indications from the Yukon River sonar, test fishing indices, and subsistence reports are that there is under-utilized coho salmon fishing opportunity in the Tanana River.

ONGOING AND RECOMMENDED RESEARCH AND MANAGEMENT ACTIVITIES

The preliminary lower DCR survey (mid-September) and peak DCR coho salmon survey are done on an annual basis to manage for the 9,000 fish escapement goal.

Stock composition of coho salmon harvested in down-river fisheries is unknown. Historical harvests of coho salmon in the Yukon and Tanana rivers are fairly large in comparison to the documented escapement levels in the DCR and other coho salmon streams. It is believed that exploitation levels on the DCR stock were substantial. In 2005, the entire Yukon River coho salmon fishery harvest of 86,487 and the DCR coho escapement was 39,603 (Table 14).

Aerial surveys of other important coho salmon producing streams in the area should be conducted. For example, baseline information should be gathered on the Richardson Clearwater River. An estimated 8,626 coho salmon were counted on the Richardson Clearwater River by aerial survey in October 2004.

SECTION IV: ARCTIC GRAYLING

BACKGROUND AND HISTORICAL PERSPECTIVE

Arctic grayling are the most widely distributed species of fish sought by anglers in the Arctic-Yukon-Kuskokwim Region. Arctic grayling are ecologically diverse, and populations vary greatly in abundance, size structure, and productivity. In order to provide a framework for evaluating regulations and management objectives, the Board of Fish directed the department to develop a management plan for Arctic grayling. The plan was adopted at the 2004 BOF meeting and is intended to simplify and standardize regulations, establish criteria and thresholds for management decisions, and to direct research needs (5 AAC 70.055, 2004). The plan is based on three categories; Category I fisheries are managed under revised regional background regulations and are the most liberal (Swanton and Wuttig *In prep*). Category II is a transitional grouping in which fisheries are managed more conservatively in order to maintain certain characteristics of the stock or fishery. Fisheries may be placed in Category II while existing regulations are being evaluated or when research findings or public input indicates that more conservative regulations are appropriate. The Special Management Areas (Category III) would be managed to maintain, enhance, or develop characteristics of the Arctic grayling fisheries most desired by the public or with the most conservative measures possible to preserve the integrity of the Arctic grayling stocks (Swanton and Wuttig *In prep*).

In the UTMA, all Arctic grayling fisheries are managed as Category I with the exception of the Delta Clearwater River which is a Category III, special management area. Bodies of water with Arctic grayling fisheries in order of importance in the UTMA include: Delta Clearwater River, Tangle Lakes System, Fielding Lake, Delta River, Goodpaster River, Tok River drainage and the Richardson Clearwater River. The Delta Clearwater River will be emphasized in this report given the upcoming Board of Fisheries meeting and a proposal related to this river.

The Delta Clearwater River (DCR) is the largest of several spring-fed streams near Delta Junction (Figure 5). These clear springs maintain cool water temperatures in the summer and provide ideal habitat for adult Arctic grayling. In rapid-runoff rivers such as the Goodpaster River, grayling spawn during the early spring. When spawning is complete, some adults leave for summer feeding waters such as the DCR. Grayling are not known to spawn in the DCR. It is unclear how grayling recruit to spring-fed systems; however fidelity to the DCR and other spring systems is strong. The abundance of grayling populations within donor streams will determine how many fish migrate to spring systems. The majority of the DCR Arctic grayling population is fish age-5 and older. Based upon catch-at-age estimates of abundance, the DCR grayling population declined from 1984 to 1996 (Figure 6). Abundance declined to a low of 2,750 fish in 1996 (Ridder 1998a). The population has increased since 1996, likely a result of restrictive regulations, to 6,891 fish in 2000 (Gryska 2001). Catch rates have ranged from 4,665 fish in 1997 to 19,922 in 2005 (Table 15).

Average exploitation on the DCR grayling population from 1977 through 1990 was 37.6% (Figure 6). As indicated by the steady decline in Arctic grayling abundance, this high exploitation level probably exceeded sustainability due to fluctuations in abundance of grayling from up to eight nearby rivers that summer in the DCR. In 1995 and 1996, the bag and possession limit was reduced to two fish by EO, resulting in an exploitation rate of 25%. However, the population continued to decline. In 1997, an EO was issued for catch-and-release angling only. The BOF implemented a catch-and-release only regulation in 1998.

The DCR has been transformed into a trophy catch-and-release Arctic grayling fishery however; there are anglers who still desire to harvest grayling. For the time being the BOF allowed a small level of harvest in 2000 with a regulation to allow a daily bag limit of one fish, less than 12 inches, from June 9 to July 10. Models estimated that a harvest of 1,000 small fish would be sustainable but these harvests have not occurred (Roach *unpublished*). For this reason the Delta Fish and Game Advisory Committee submitted **Proposal 125** for the 2007 BOF meeting requesting and extension of the time allowed to harvest grayling.

RECENT FISHERY PERFORMANCE

Angler effort declined in the DCR as the grayling population declined. Angler effort from 1977-1986 averaged 6,500 angler days, a majority of which is believed to target Arctic grayling (Ridder 1999). In 2005, Arctic grayling effort on the DCR (4,504 days) was above the five year average (2000-2004) of 4,252 angler days (Table 15).

A harvest of 65 Arctic grayling was reported in 2005 (grayling <12 inches; Table 15) in the DCR. In 2005, a record 19,922 grayling were caught in the DCR. Grayling catch rates averaged 13,193 grayling from 2000-2004 and 11,349 from 1995-2004, a significant increase in recent years. In 2005, the catch of 19,922 was 151% greater than the 5-year average (Table 15). In 2005, of the 19,922 grayling caught 2,985 were less than 12 inches. Small fish are available to anglers in the DCR however; they apparently have little desire to harvest them.

MANAGEMENT OBJECTIVES

Objectives were updated in 2003 from those made in 1993 (Parker 2003) and will be used by ADF&G to manage the recreational fishery in the foreseeable future. The management objectives for the Delta Clearwater River Arctic grayling recreational fishery are:

1. To maintain a fishery in which at least 40% of the measurable population of Arctic grayling exceeds 14 inches in length (TL).

In 1999, 48% of the estimated population (> 10.5 inches TL) was 14 inches (TL) or greater (Ridder and Gryska 2000). In 2000, 54% of the estimated population (> 10.5 inches TL) was 14 inches or greater (Gryska 2001). Based upon these size compositions in the DCR and the public desire to maintain the presence of large fish, it is reasonable to manage this fishery in such a way which ensures that over 40% of the measurable population will be of fish greater than 14 inches. Current regulations passed by the BOF in 2000 are based on maintaining or increasing the current numbers of large fish.

2. To allow a harvest not to exceed 900 fish less than 12 inches in length.

In addition to maintaining large fish in the DCR the BOF regulations adopted in 2001 were designed to allow a small harvest of fish less than 12 inches. Simulations show that a harvest of 900 fish or fewer is sustainable in the DCR (Roach *Unpublished*). Simulations also indicated that the current length structure would only be affected minimally, by a harvest of fewer than 900 fish that are less than 12 inches (Roach *Unpublished*). The number of fish harvested can be estimated from the SWHS. Specifically, the current regulations allow for a harvest of one fish per day, less than 12 inches TL in size, from July 10 to August 9th. The timing of the open season was intended to avoid potentially high harvests during the 4th of July weekend. The largest harvest since 2001 was in 2004, when 111 Arctic grayling were harvested (Table 15). The average harvest from 2001 to 2005 was 55 Arctic grayling less than 12 inches. The low

harvest of small fish can be explained by the evident preference to release fish. In 2005, anglers caught over 2,985 small grayling but only 65 were harvested.

3. To prosecute the fishery in such a way as to provide for a minimum catch rate of one Arctic grayling per angler-day.

Data to determine angler-days of effort, and catch are compiled from the SWHS. Angler-days on the DCR ranged from 2,161 in 1997 to 6,261 in 1995 (Table 15). The average number of angler-days from 2000 to 2004 was 4,252 with an average catch rate of 3.1 fish per angler-day. This is one of the highest estimated catch rates anywhere in the Interior. If catch rates fall below a threshold level of one fish per day, and then the department would determine cause and seek a remedy if possible.

FISHERY MANAGEMENT

Following the implementation of catch-and-release regulations and without the opportunity to harvest Arctic grayling, fish effort in the DCR initially experienced a decline (Parker and Viavant 2000; Clark and Ridder 1994). More recently, fishing effort has increase. Since harvest is very small it is likely that anglers are attracted to the catch-and-release quality of the fishery. The catch in 2005 (19,922) is the highest on record and is considerably higher than the last 10-year average (11,349; Table 15). One can conclude the reputation of the DCR as a trophy grayling fishery is spreading. More visitors from across Alaska have participated here knowing large grayling exist, and enjoying catch-and-release only opportunities. These anglers have been enthusiastic about the quality of the fishery with many commenting that the regulations should remain the same.

It is assumed that the Arctic grayling regulations in the DCR will not need to be changed if all three objectives mentioned above are being met. To determine if objective 1 is met length and age composition of the measurable population will be estimated every 3 years through stock assessment. Whether objectives 2 and 3 are met will be assessed through estimates of harvest, catch, and effort obtained from the Statewide Harvest Survey. When any one of the objectives are not met, the department will evaluate whether additional assessment is necessary and determine if there is a need to propose a change in regulation during the next regulatory cycle.

FISHERY OUTLOOK

An increase in the numbers of recruits to the DCR was observed for the first time in four years in 1997 and 1998 (Parker and Viavant 2000). Prior to 2006, the most recent abundance estimate was in 2000. In 2000, the population was 7,591 fish over 12 inches (270 mm; SE=895; Gryska 2001). In 2006, the preliminary abundance of Arctic grayling over 12 inches in the DCR was 14,799 (SE=2,625). Even if the true estimate were on the low end of the range, it is significantly higher than the high end estimate of 9,345 in 2000.

Based on recent stock assessment in the DCR, large fish across several older age classes migrate into the population and inhabit choice habitat areas. If large sized fish continue to occupy the DCR, and continue to increase in numbers, it is theorized that the capacity of the system will soon be reached, and smaller fish will be excluded. Based on per recruit analysis, sustainable harvest from the DCR can range from 11 to 22% depending on the desired population structure. If the mortality rate for small fish is greater than replacement, abundance will drop but the large-fish component could be maintained with only a few fish growing across the large-size categories.

BOARD OF FISHERY ACTIONS

The BOF adopted a proposal at the December 1997 meeting for the DCR fishery. This proposal changed Arctic grayling regulations in the DCR to catch-and-release only and allow only unbaited, single-hook artificial lures from January 1 through August 31. Unbaited, artificial lures are permitted the remainder of the year to allow the use of this gear during the coho salmon fishery. This regulation includes the Delta Clearwater River and the Clearwater Lake drainage to avoid enforcement issues.

The BOF adopted a proposal during the January 2001 meeting to allow a one fish daily bag and possession limit. The open season for Arctic grayling is July 10-August 9, catch-and-release only from August 10-July 9. The maximum size limit of Arctic grayling is 12 inches (total length) or less. Gear restrictions remained the same. This proposal was adopted due to large public support to allow some harvest opportunity for Arctic grayling in the Delta Clearwater River. A complete chronological review of regulation changes on the DCR can be found in Appendix B1.

In 2004 the BOF adopted a management plan for Arctic grayling fisheries within the Arctic-Yukon-Kuskokwim Region (Swanton & Wuttig, *In prep*). The plan outlines the distribution, biological attributes and populations of Arctic grayling throughout the region. In addition, the plan divides Arctic grayling fisheries in the region into four categories: high exploitation fisheries, large-fish fisheries, low exploitation fisheries, and, restoration fisheries. These stocks of fish are managed for long-term sustained yield through the application of simple regulatory and monitoring policies under three management approaches: 1) regional; 2) conservative; and 3) special management. The DCR falls under the special management approach of the Arctic grayling plan whereas, the fishery is managed to provide high catch levels and a desired size composition.

CURRENT ISSUES

Concerns about enforcement have been raised from the public who feel that violations will increase when harvest is allowed with restrictive bag, size, and season limits. Catch rates are very high in the DCR averaging over 13,000 over the past five years (Table 15). The catch rate is nearly that of the 2006 estimated population size indicating many fish may be caught multiple times given the relative small amount of access to the river. The high catch is probably responsible for some level of mortality, although probably low (McKinley 1993), but even a low hooking mortality rate, say 5% could be significant (660 fish) with such high catch rates.

ONGOING AND RECOMMENDED RESEARCH AND MANAGEMENT ACTIVITIES

Management activities should ensure protection of aquatic habitat for healthy fish production. In 1999, the National Resource Conservation Service (NRCS) implemented a watershed project that was designed to prevent sediment-bearing waters from the Granite Mountains from entering the DCR. The first phase of construction was completed in the summer of 2000. Some major and minor modifications to the project were done in 2002-2003. Ongoing plans for the watershed are pending because of flaws in the engineering of the dikes.

Mapping of habitat area and determining means to monitor changes caused by boats to the riparian habitat are types of studies that may be implemented in the near future.

SECTION V: NORTHERN PIKE

BACKGROUND AND HISTORICAL PERSPECTIVE

Much of the effort directed towards pike in the Tanana drainage is non-consumptive fishing. Only 14% of the total catch of northern pike in the Tanana drainage was harvested in 2005 (Table 6). The major northern pike sport fisheries for the Upper Tanana area occur in George, Volkmar and Healy lakes, and also the Goodpaster and Volkmar rivers (Table 16). George Lake, the largest pike fishery in the Upper Tanana area, is accessed by boat, snowmachine, and float and snow-ski equipped airplane, allowing the fishery to occur year-round. Volkmar Lake is accessed primarily by snowmachine, but also by float and ski equipped airplane, and the fishery there occurs primarily in the winter. There are several lakes and creeks in the Tetlin National Wildlife Refuge that also have abundant pike resources but do not show up in the SWHS. There are no road accessible pike fisheries in the Upper Tanana area, and with the exception of Scottie and Moose creeks and Deadman Lake near the Canadian Boarder. Most of these remote Northern pike fisheries are accessed by plane or boat, and primarily fished during open-water. Other lakes in the Upper Tanana area with pike populations are Sand, "T", Mansfield, Dog, Island, Tetlin, Takomahto, Jatahmund, Island, and Wellesley lakes.

Although effort is not estimated by species targeted, it is thought that the majority of the effort at George and Volkmar lakes is directed toward northern pike. Lately, total fishing effort at George and Volkmar lakes has been more variable, particularly at George Lake. Low snowfall, low creek levels, and open water on the Tanana River during the winter make access to these lakes difficult.

Anglers use hook-and-line gear all year to harvest northern pike. In addition, spears are used during the ice-cover months. Anglers fishing in lakes are very successful in the spring when pike have concentrated for spawning (Hallberg and Bingham 1992). In 1993, 549 households responded to a northern pike survey to gather information on the distribution of participation and harvest, and kinds of gear used by successful pike anglers. Results showed that 84% of participation and 82% of the harvest occur in the open-water months (Bingham and Parker 1995). Open-water fishing occurs slightly more on rivers (51%) than on lakes (49%). Only 14% of the total participation occurred during the ice-covered season, of which 86% of effort was on lakes. Winter anglers harvested 40% of their pike using spears (Bingham and Parker 1995). Stock assessment of northern pike populations in the Tanana drainage were conducted primarily between 1987 and 1994. Specifically, assessments were conducted at George Lake from 1987 through 1991 and at Volkmar Lake from 1985 through 1994 and in 2000.

The George Lake northern pike fishery will be emphasized in this section to provide information pertinent to **Proposal 128**. This proposal, submitted for the February 2007 BOF meeting, requests a reduction in the bag and possession limit of northern pike at George Lake.

George Lake is a semi-remote lake located about 35 miles southeast of Delta Junction (Figure 8) and about 5 miles northeast of the Alaska Highway. Although George Lake supports populations of burbot and Arctic grayling, the recreational fishery is believed to be directed predominantly at northern pike. George Lake is accessible during the open water season by either float-equipped aircraft, or by boat via the Tanana River and George Creek. George Lake is accessed in the winter by snow machines and ski-equipped aircraft. All of the shoreline is privately owned; the Healy Lake and Dot Lake Native Corporations own all but about 15 acres

of the shoreline. The lake is large, over 4,500 acres, but shallow, maximum depth is only 35 feet. The lake has one major inlet, six smaller inlets, and a navigable outlet, George Creek, which flows to the south into the Tanana River. Near shore waters are shallow with large beds of aquatic vegetation. George Lake is typically ice-free from late-May to mid-October. Fish species present include northern pike, burbot, Arctic grayling, humpback whitefish, least cisco, round whitefish, longnose suckers, and slimy sculpins.

RECENT FISHERY PERFORMANCE

Harvests for northern pike in the UTMA have varied greatly since 1996 ranging from 636 to 2,060 fish per year (Table 16). Harvests over the last five years averaged 5,786 in the Tanana River drainage, of these 16.1% or 931 northern pike were harvested in the UTMA waters. The UTMA 5-year average catch of 6,482 northern pike is consistent with the 10-year average catch of 6,718. Same can be said of harvests in the UTMA where the 5-year average of 931 fish is similar to the 10-year average of 1,069 fish (Table 16). The 2005 harvest of 853 northern pike in George Lake was 216% higher than the five-year average of 396 fish.

George Lake recreational fishing effort and harvests have been monitored since 1977 through the use of the Statewide Harvest Survey. Since 1977, fishing effort has ranged from 377 angler-days in 2004 to 1,957 angler-days in 1986 (Table 17). Effort may be greater in some years because water level is high enough to allow anglers boat access into George Creek, the only open water access to the lake. Northern pike catch in George Lake increased dramatically as more anglers were able to access the lake via boat in 2000 and 2001, but fell off again in 2002 because the outlet was nearly dry. In 2003, catches again improved at George Lake because the outlet was boat accessible during the spring. Catch of northern pike in George Lake have been consistent averaging 3,346 over the past 10 years and 3,814 over the past 5 years. In 2005 the catch of 4,527 northern pike was higher (119%) than the 5-year average of 3,814. Harvests of burbot, Arctic grayling and whitefish in George Lake are also found in Table 17.

Fishing pressure at George Lake is heaviest from June 1, when the season opens, through mid-July. Little ice fishing occurs before late-December or early-January because of ice conditions on the Tanana River preventing snow-machine access. The ice fishery lasts until the end of March. During the ice fishery, northern pike and burbot are taken with hook and line gear as well as with spears. ADF&G has issued between 1 and 6 ice house permits per year for George Lake since the early 1980s.

MANAGEMENT OBJECTIVES

The management objective since 1993 is to ensure harvests and incidental mortality of northern pike by the recreational fishery is sustainable. The department will attempt to limit harvest in northern pike lakes to 10-20% annually. Currently, no formal abundance or exploitation-based management objectives exist for George Lake.

FISHERY MANAGEMENT

Recreational fishery harvests of northern pike from George Lake have been sustainable. Abundance estimates from 1998-1992 show the average population of northern pike to be 10,300 over 18 inches in size and exploitation rates during that time averaged about 12% (Table 18). The total fishing mortality (harvest plus an estimated 10% hooking mortality applied to catch after harvest is subtracted) has averaged about 789 over the last 10 years (Table 17).

The sport fishing regulation of only one fish in the daily bag and possession limit of five fish to be 30 inches or larger potentially affects only about 6% of the northern pike population in George Lake (based on the 2006 abundance estimate). The regulation helps maintain a few large northern pike in the population and prevents anglers from unduly targeting on these large fish, thereby spreading the availability of these large fish among as many anglers as possible.

A substantial level of catch-and-release fishing for northern pike occurs at George Lake. In a 1991 study of the mortality to northern pike after these fish were captured with sport tackle and released, ADF&G concluded that catch and release mortality of northern pike was under 10% (Burkholder 1992). Based on current abundance, harvest and catch levels of northern pike in George Lake, it appears that catch-and-release fishing practices are not having a negative affect upon the northern pike population.

A management objective of 9,180 fish \geq 18 inches TL (450 mm FL) is considered the minimum threshold at which any regulatory changes that restrict harvest may be supported by the department. This is based on the most recent 5-year SWHS reporting period (2001-2005) for fish. This conservative threshold was calculated based upon the highest reported harvest within the past 5 years (862; Table 18) and applying a 10% mortality rate on the highest catch within the past 5 years (10% of 5,146 or 515) for a total fishing mortality of 1,377. This harvest of 1,377 was expanded by a sustainable exploitation rate of 15% to give the management objective.

The department conducted a northern pike estimate in May 2006 and determined the population size was 16,178 fish 18 inches and greater with an additional 4,268 fish between 12 and 18 inches. The population estimate exceeds the department's objective for a sustainable fishery on George Lake.

A comparison of lengths to 1987 indicates a higher proportion of larger fish in the population. In 1987, 48% (8,495) fish were over 18 inches and in 2006, 79% were over 18 inches in size (Clark et al, 1988). In 2006, it was estimated there were 1,013 pike over 30 inches in length or about 6% of the population over 18 inches in length. In 1987, only 300 fish over 30 inches in length were estimated or about 3.4% of the population.

FISHERY OUTLOOK

Based on recent population estimates, the northern pike population in George Lake is thought to be healthy. Higher lake water levels over the past 2-years is providing access in George Creek for anglers to fish the early season, whereas in the previous 10 years drought like conditions have left the creek nearly dry and nearly impassable to get up. During the late 1980s and 1990s George Lake had a reputation of supporting a large population of small fish (e.g., 20 in). Recently anglers and the local Fish and Game Advisory Committee have expressed their satisfaction in the improved quality of their fishing experience at George Lake because of good catch rates, particularly of larger-sized fish (e.g., >24 in).

BOARD OF FISHERY ACTIONS

During the 1997 meeting the BOF reduced the bag and possession limit in Volkmar Lake to one fish with no size limit. The intent of this bag limit reduction was to reduce effort and harvest to acceptable levels. Several proposals relating to northern pike in the Tanana drainage were considered by the BOF during the 1997 AYK meeting. The Board adopted a department proposal to remove the area-wide spring spawning closure for flowing waters (except the Tolovana drainage) and relax the drainage-wide spawning closure to increase the season by 20

days (moving the spring closure from April 1 to April 21), with the exception of popular fisheries such as Harding, George (including its outlet), and Volkmar lakes.

In 2001, the BOF adopted a proposal for the Chisana River drainage upstream from the Northway bridge that reduced the northern pike daily bag and possession limit to two fish, with only one fish over 30 inches. This regulation will provide protection to stocks of fish in streams that cross the Alaska Highway from the Canadian border to Northway.

CURRENT ISSUES

Access to George Lake is difficult because of the Tanana River crossing. In 1994, a road construction company using the George Lake property paved the access road to the river and made a launch skirt that will help recreational users to launch their boats. This launch is still considered very dangerous and is used at the boater's own risk. Property around George Lake is privately owned. Sport Fish Division purchased about ten acres for public camping and has built four tent platforms. In 2005, additional concrete was put down to stabilize the ramp.

During the late 1980s and 1990s George Lake had a reputation of supporting a large population of small fish (e.g., 20 in). Recently anglers and the local Fish and Game Advisory Committee have reported on the improved quality of their fishing experience at George Lake because catch rates, particularly of larger-sized fish (e.g., >24 in), have been good. However, anglers have also expressed concerns about current levels of harvest relative to sustainability and its impact on maintaining the fisheries current characteristics. The local Advisory Committee submitted a **proposal 128** to reduce the bag limit of northern pike in George Lake from 5 to 3.

In a second proposal regarding pike fishing, and the George Lake winter fishery, the Delta Advisory Committee submitted statewide **proposal 240** to establish minimum spear size requirements. Spear fishing through the ice is popular with some anglers and provides additional fishing opportunity. There have been public inquiries to regulate the size of spear heads for the winter spear fishery to minimize strikes in which fish are lost. There is concern about inadequate spearhead size and weight being used by fishermen. The intent of this proposal is to reduce injury and associated fishing mortality to northern pike during the winter spear fishery.

ONGOING AND RECOMMENDED RESEARCH AND MANAGEMENT ACTIVITIES

The northern pike population in the George Lake will be considered healthy if current management objectives are met. Management data that are needed include; 1) periodic estimates of the spawning population of George Lake; and 2) estimate of harvest of northern pike in George Lake to derive exploitation rates. Estimates of harvest can be obtained for George Lake from the SWHS. Anecdotal information suggests that the winter fishery is increasing. Further evaluation of the winter fishery can be determined by on site investigations, as was done during the winter of 2006.

Creel census began February 9 till the end of the pike season March 31, 2006. Most of the winter fishery was examined as access prevented crossing the Tanana River in January and information from cabin owners who verified the conditions. A creel technician was posted for all but two days of the week. The following are minimum catch and harvest statistics but are very close to the actual numbers as reports from anglers fishing when the clerk was not present were also collected.

The total number of people into George Lake from 2/9/ - 3/31/06 was 311. A total of 187 people were known fishermen, of which 185 were interviewed. A total of 474 northern pike were caught and 237 harvested. Of the 185 people interviewed 56 were cabin owners and 129 were not. A total of 190 fish were measured, the average length of all fish was 26.4 inches or 671 mm Fork Length. A total of 164 pike were positively identified by sex. The total number of females was 133 or 81.1% fish sampled and 31 or 18.9% were males. The average length of 133 females was 27.1 inches and of the 31 males was 24.6 inches.

Two opinion questions were asked of anglers. The first was if the quality of fishing pike was excellent, good, fair or poor. A total of 116 angler were asked this question, 9 or 7.8% said it was excellent, 47 (40.5%) said good, 55 (47.4%) said fair, and 5 or 4.3% said poor. Anglers were also asked if they approve, disapprove, or had no opinion about the current pike regulations. A total of 113 anglers responded of which 85 or 75% said they approved, 25 (22%) disapproved, and 3 (3%) had no opinion. Of those who disapproved of the regulations suggested a reduction in the bag limit. A majority indicated a bag limit of 3 with only one over 30 inches.

SECTION VI: LAKE TROUT

BACKGROUND AND HISTORICAL PERSPECTIVE

Since 1986, over-harvest may have occurred on lake trout populations in the Upper Tanana drainage. Today restrictive regulations exist on many lakes. Specific life history features (slow growth, delayed maturity and non-consecutive spawning) combined with the short growing season at higher altitudes increases the vulnerability of the species to over-harvest (Burr 1987). The impact of even modest fishing pressure can be significant.

Lakes containing lake trout in the Upper Tanana area include Fielding, Two Bit, Landmark Gap, Glacier, Sevenmile, 14-Mile, and the Tangle lakes system. There are two lakes, the Tangle Lakes and Fielding Lake in the UTMA that have lake trout related **Proposals (126, 127, 130, 134, & 133)**. These two fisheries will be the focus in this lake trout section. In addition, **Proposal 137** establishes a Lake Trout Management Plan for lake trout fisheries in the AYK which manages this species with uniform regulations across Interior Alaska.

RECENT FISHERY PERFORMANCE

Tanana River drainage lake trout harvest in 2005 was 15% of the statewide harvest (Jennings et al *In prep* b). In 2005, 52.5% of the Tanana drainage lake trout harvest and 70.7% of the catch occurred in the Upper Tanana River Management area (Table 5). The Tangle lakes system is the most popular lake trout fishing site in the Tanana River drainage. In 2005, the number of lake trout harvested there was 224 and a catch of 2,327 fish (Table 19). The 2005 lake trout harvest is below the recent 5-year average of 317 fish. However, the catch of 2,327 in 2005 exceeds the average of 1,458 fish caught from 2000-2004 (Table 19). The amount of angler effort in the Tangle Lake System averaged 4,708 angler-days over the past 5 years and has been relatively consistent annually (Table 20).

In Fielding Lake, harvests have increased over the past 5 years; the average harvest is 43 lake trout with a high of 112 in 2005. Catch rates are also increasing, the 5-year average is 281 with 862 lake trout caught in 2005 (Table 21). In Fielding Lake there was a low of 525 angler days in 2001 and has been gradually increasing to 1,248 angler-day in 2005.

MANAGEMENT OBJECTIVES

The objectives for lake trout fisheries are based upon a harvest guideline to prevent excessive harvest and allow recovery of heavily fished populations. The current harvest guideline for Fielding Lake with a 26 inch minimum length limit is 78 fish annually (Burr 2006). Over the years due to high harvest and low abundance a more conservative approach was required for Fielding Lake and current regulations are the most restrictive in the UTMA. For the Tangle lakes system the current harvest guideline with an 18 inch minimum length is 221 fish (Burr 2006).

FISHERY MANAGEMENT

In 2003, management staff put together a framework to develop a Regional Lake Trout Management plan. The objective of the plan is to keep harvests of lake trout below defined MSY levels. The lake area model (LA model) is the primary tool for determining if fishing mortality estimated from the SWHS from specific lakes were acceptable. Estimates of MSY from the LA model are likely conservative and are imprecise because of the wide confidence about the regression of observed yields in terms of weight and imprecision in the harvest estimates. The LA model will be used as a benchmark and regulatory actions will be introduced when harvests have exceeded the target threshold.

Fielding Lake is a popular fishing destination for Arctic grayling, lake trout and burbot. From 2000-2004, the number of angler-days on Fielding Lake averaged 806 days and harvests of lake trout average 43 fish per year (Table 21). Restrictive regulations were imposed on lake trout in Fielding Lake during the 2001 BOF meeting which included raising the minimum limit from 22" to 26", establishing a spawning closure in October, and allowing only single hooks in attempts to reduce hooking mortality. These restriction were effective in reducing harvest for 2 years but have increased over the sustainable yield from 2003 - 2005. The remaining options the Lake Trout Management Plan (LTMP) recommends in this situation is to go to no bait, seasonal closure, or catch and release fishing only.

A sustainable lake trout harvest for Fielding Lake is about 78 fish for fish over 26 inches per year based upon the LA model. Catch of lake trout has also increased each year over the past 5 years averaging 281 fish with a high catch in 2005 of 862 fish. An additional 24 fish ($281 \text{ catch} - 43 \text{ harvest} = 238 \times 10\%$) is added to the average 5-year harvest of 43 fish (total of 68) to account for hooking mortality. Given the low abundance of lake trout and the high proportion that are caught and released, the continued use of bait in this fishery likely will result in total lake trout mortality exceeding the estimated sustained yield.

In the Tangle Lake System average harvest from 2000-2004 is 335 lake trout (Table 20), greater than 18 inches. The catch rates in the Tangle Lakes System are high and a 10% hooking mortality on catch is combined with harvest. Average catch rates over the past 5 years is 1,458 fish or an additional mortality of 112 fish ($1,458 - 335 = 1,123$; Table 20). The hooking mortality combined with harvest is about 447 fish per year. A sustainable lake trout yield for the Tangle Lakes System is about 521 fish per year for fish greater than 18 inches based upon an estimated annual yield.

FISHERY OUTLOOK

During the 2001 BOF meeting the department did not support a bait restriction in Fielding Lake because it would eliminate the opportunity to catch burbot. Given the data there are few other options short of eliminating lake trout harvest altogether. A winter fishery for lake trout occurs on Fielding Lake but ADF&G has no information to indicate if closing it, would significantly reduce the harvest of lake trout.

BOARD OF FISHERY ACTIONS

In 1987, the board restricted the daily bag and possession limit to two fish per day with no size limit. With continued fishing pressure at Fielding and Tangle lakes, it was necessary to add additional restrictions. These regulations required lake trout harvested in Fielding and Tangle lakes to equal or exceed 18 inches in total length. Continued high harvest of lake trout in the Tangle Lakes caused a reduction in the daily bag and possession limit to one fish per day and a minimum length limit of 18 inches. Another change to reduce harvest occurred on Fielding Lake in July 1993, when the minimum size limit was changed by emergency regulation from 18 to 22 inches on Fielding. This regulation was effective in reducing the harvest in Fielding Lake averaging 210 fish from 1977–1996, to an average of 39 from 1994–2000 (Table 21).

The BOF in January 2001 raised the minimum size limit to 26 inches and established a spawning closure for Fielding Lake during the month of September. In addition, a single-hook restriction when fishing for lake trout or burbot was established.

CURRENT ISSUES

Lake trout populations such as those in Fielding and the Tangle lakes in the Upper Tanana area need protection during spawning when lake trout are very susceptible to fishing. The BOF closed fishing in Fielding Lake during September to prevent lake trout fishing during the spawning period. In Fielding Lake effort decreased to its all time low of 525 angler days in 2001, perhaps as a result of restrictive fishing regulations. Since 2001, effort has been on the rise, partially because of renewed interest in winter fishing through the ice. In recent years there has been large numbers of recreational users in this area with snowmobiles. Some of these people have also spent time fishing in addition to other recreational activities.

Proposal 127 submitted by the Department requests the elimination of the use of bait in Fielding Lake to reduce lake trout harvest. This proposed regulation is the next course of action recommended in the Lake Trout Management Plan. Given the low abundance of lake trout and the high proportion that are caught and released, the continued use of bait in this fishery likely will result in total lake trout mortality exceeding the estimated sustained yield. Other proposals relating to Fielding Lake (**Proposals 126, 133, and 134**) attempt to offer other possible options in lieu of a no bait regulation however, the Department cannot offer data to suggest that any of them would adequately address the need to reduce lake trout harvest as would the no-bait restriction.

The current 18-inch minimum length limit for lake trout in the Tangle Lakes System is unnecessary to restrict harvests to sustainable levels, and is not an appropriate length limit to protect spawning-age fish from harvest. The Regional Lake Trout Management Plan recommends that the minimum length limit, if needed, be 24 inches, which would protect most fish through at least one spawning cycle. Because current harvests are below the estimated

sustained yield, having a minimum length limit is unnecessary. **Proposal 130** submitted by the Department requests the elimination of the 18 inch minimum size limit in the Tangle Lakes system.

ONGOING AND RECOMMENDED RESEARCH AND MANAGEMENT ACTIVITIES

The last population estimate for lake trout in Fielding Lake was in 1999, based on current harvest levels and concerns regarding the lake trout population assessment should be considered in the near future.

SECTION VII: BURBOT

BACKGROUND AND HISTORICAL PERSPECTIVE

Before new regulations were put into effect, burbot fishing in lakes occurred primarily in Fielding, Harding, and Tangle lakes. Now very little harvest occurs in these lakes. Since 1987, bag limits in these lakes were reduced to two fish daily, and the use of setlines was eliminated. Burbot stocks in the Tanana River are exploited most heavily near population centers such as Fairbanks, Delta Junction, and near Northway. Burbot movements within the Tanana River tend to minimize effects of concentrated local fishing effort, and stocks in the Tanana River appear to be lightly exploited (Evenson 1997b).

RECENT FISHERY PERFORMANCE

The 2005 estimated harvest of burbot in the Tanana River drainage by sport anglers was 2,487 (Table 22). In 2005, 41% of the burbot harvest came from the Upper Tanana area portion of the Tanana River (Tables 5 & 22). The Tanana River is split into three statistical areas; Lower, middle, and upper Tanana River. In 2005, only 124 burbot were harvested in the lower section, 1,623 harvested in the middle section and 124 harvested in the upper section (Jennings et al. *In prep b*). The middle section is in both the Fairbanks and Upper Tanana areas. The middle section begins in Nenana, ends at Delta Junction and includes popular areas near the mouth of the Chena River and near Shaw Creek. It was estimated based on the relative size of the respective fisheries that about 70% of the burbot harvest is taken in the Fairbanks area while 30% occurs in the Upper Tanana area (Parker and Viavant 2000). In 2005, the Tanana River component of burbot harvest in the UTMA was 773 (Table 22). In 2005, anglers harvested 77% of the burbot they caught for the entire Tanana River drainage (Table 6) and that proportion (75%) was slightly lower in the UTMA (Table 7).

Harvest from area lakes has declined since 1987 when restrictions on number of hooks, set lines, and seasons for many lakes were enacted. From 1981-1984 harvests of burbot at Fielding Lake averaged 330 per year and caused a decline in the adult population. Due to low recruitment, a cycle of high and low abundance has occurred thereafter (Parker 2001b). In 1994 the department issued an EO to close the taking of burbot until further notice. The population has since stabilized and in 2001 there was opportunity under restrictive regulations to harvest a burbot in Fielding Lake for the first time in 7 years and harvests from the SWHS were reported beginning in 2003 with 11 fish harvested (Table 22). In 2005, 25 burbot were harvested in Fielding Lake and 149 in George Lake.

MANAGEMENT OBJECTIVES

The Management objective for the Tanana River and Tanana drainage lakes is to ensure harvests and incidental mortality of burbot are less than 10% of the population size. Lake burbot populations, particularly in the Upper Tanana area, have very restrictive regulations to prevent over-harvest.

1. **In Fielding Lake maintain a population size of 1,000 adult burbot > 18 inches in size.**

Simulations show an optimum population size of about 1,000 burbot over 18 inches in size and that 10% exploitation can be sustained. The population was last estimated at 750 fish > 18 inches in 2000.

2. **In Fielding Lake maintain a harvest level on the adult burbot population not to exceed 10%.**

Annual harvests of burbot under 75 fish should be sustainable. Burbot harvests are obtained from the SWHS, if harvests are greater than 100, further restrictions will be required.

FISHERY MANAGEMENT

Sustainable levels of harvest in small, high elevation lakes such as Fielding and the Tangle lakes are thought to be low and if harvests should reach 100 fish per year, impacts upon the population should be investigated.

FISHERY OUTLOOK

Abundance and an index of abundance have been estimated for burbot in Fielding Lake since 1985. For 1999, the estimated abundance of fully recruited burbot (>450 mm TL) in Fielding Lake was 598 (SE = 62). The index of abundance for 2000 was 760 fish (Parker 2001b). The population currently can sustain a small <75 per year harvest. In the past 5 years anglers have reported harvesting from 0 to 30 burbot in Fielding Lake (Table 22).

BOARD OF FISHERY ACTIONS

In 2001, the BOF allowed a daily bag and possession limit of one burbot in Fielding Lake. In addition, a lake trout proposal was adopted with changes that affect burbot fishing as well. It allowed use of bait on a single hook only when fishing for burbot, and burbot fishing is closed from September 1-30. Regulations on Fielding Lake have changed from a 10 fish bag limit to total closure to a very conservative bag restriction on one fish. Before the BOF in 2007 is a proposal (127) to further restrict the lake trout fishery by not allowing bait. This would impact burbot fishing as most anglers use bait.

CURRENT ISSUES

Exploitation rates of burbot in the Tanana River are not considered excessive. However, low productivity in most of the lakes may result in over-exploitation. Burbot stock assessments carried out by ADF&G during the late 1980s indicated that the uppermost river section near Northway supported the lowest density of large burbot among the river sections sampled (Evenson 1991). Subsistence and personal use fisheries for burbot are known to occur in the upper Tanana, but harvests in these fisheries may be under reported. Current estimates of stock status or of total harvest for the upper Tanana drainage are unavailable. However, since this part

of the river showed low relative abundance of burbot compared to other river sections and has seasonally intense effort and harvest, there is concern for local depletion.

Population density of burbot in lakes declined dramatically in the early 1980s due to unsustainable rates of sport fishing exploitation. Stock assessment studies in the 1980s conducted in lakes of the upper Susitna/upper Copper River basin and the Tanana River drainage (Lafferty et al. 1992), confirmed that several lake stocks in the Tanana drainage showed evidence of high exploitation. More recent stock assessment studies conducted in lakes of the Tanana River drainage demonstrate the detrimental effects of long-term high exploitation rates (Parker 2001b).

ONGOING AND RECOMMENDED RESEARCH AND MANAGEMENT ACTIVITIES

The Tanana River burbot populations near the Northway area should be investigated because of seasonal depletion. Since the department is unaware of what kind of fishery occurs on this resource, an attempt to estimate harvest from all fisheries on this stock is recommended.

SECTION VIII: STOCKED WATERS

BACKGROUND AND HISTORICAL PERSPECTIVE

The ADF&G stocks game fish in 48 lakes in the Upper Tanana Management Area (UTMA). The stocking program is designed to provide additional fishing opportunities near communities and popular recreational destinations where fish resources and angling opportunity are limited and where fishing effort and harvest are highest. Remote lakes also are stocked to provide opportunities for anglers who want a more challenging experience or those who want to enjoy more tranquil settings. Lakes in the stocking program range in size from a few acres to several hundred acres and are accessible by road, trail, ATV or aircraft. Most of the fisheries are year-round and half of the angling effort on some lakes occurs during winter.

In January 2004, the BOF adopted a Regional Stocked Waters Management Plan (SWMP; ADF&G 2006). The SWMP created three management approaches; regional (high yield), conservative, and special management. Almost all stocked lakes in Region III are categorized under the regional approach. The BOF directs the department to manage the stocked waters according to a framework designed to meet public demand and provide diversity of opportunity. The department may manage specific fisheries to provide or maintain qualities desired by the angling public.

The regulations adopted by the board are designed to maintain the characteristics of each fishery category. Waters stocked in the AYK, Upper Copper River and Upper Susitna River Areas are classified as high yield (with a daily bag and possession limit of 10 fish in combination and only one fish over 18 inches). This is a region wide regulation for stocked waters with two categories of exceptions; conservative yield and special management. Dune Lake is the only lake that is categorized under the Plan as Conservative Yield, with combined bag limit of 5 fish, of all species combined, only one over 18”), and under special management, there are six lakes under this category (Little Harding Lake, Harding Lake, Summit Lake, Monte Lake, Donnelly Lake, and Rainbow Lake) where the bag limit is 1 fish over 18 inches (ADF&G 2006).

Stocked waters may be reclassified into a different category only by the board through proposals from the public, department, or board and if the proposals meet the criteria established for the

proposed category. Requests for reclassification and special management will be submitted to the board during the appropriate cycle.

Currently, ADF&G provides diverse year-round sport fishing in the UTMA for rainbow trout, coho salmon, Arctic grayling, and Arctic char. Goals of the fish-stocking program in the UTMA are to:

- reduce harvest pressure on wild stocks;
- provide angling opportunity for increasing numbers of anglers;
- diversify angling opportunity by stocking popular species and species not typically found along the road system; stock a variety of lakes; and, improve access;
- Rehabilitate depleted wild stocks when required.

Meeting public demand for recreational fishing opportunities in Alaska while at the same time maintaining and protecting the wild fishery resources has become increasingly complex. Today, Alaska is experiencing increased tourism and continued forest, mineral, and petroleum development. All of these activities impact Alaska's wild fish stocks and the fisheries that depend on them.

Stocking serves to divert angling pressure away from fragile wild stocks and maintain angling opportunities for increasing numbers of anglers. Accordingly, stocking has become a vital component of the statewide sport fish program. Results from angler opinion surveys of Tanana drainage residents conducted by ADF&G in 1985 and in 1988 indicated that about 80% of the respondents approved of stocking fish as a means to improve fishing.

RECENT FISHERY PERFORMANCE

From 1996 through 2005, the stocking program in the UTMA generated from 9,390 to 23,126 angler-days annually and averaged 14,817 angler-days (Table 23). From 1996-2005 harvests of stocked fish ranged from 8,143 to 32,187 averaging 21,029 fish. From 1996-2005 catch of stocked fish ranged from 23,320 to 95,263 fish averaging 56,992 fish. In 2005, days of effort on stocked waters were 39% of the total estimated fishing effort for both stocked and wild species in the UTMA. From 1996-2005 the ratio of stocked fish harvested verses wild fish averaged 47% and ranged from 36% to 60% of the total annual harvest in the UTMA. Effort, harvest, and catches have generally declined over the past 10 years (Table 23).

Rainbow trout have averaged 67% of the harvest and 64% of the catch over the last 10 years of stocked fish in the UTMA (Table 23). Coho and Chinook salmon (landlocked silvers and kings) were next significant in numbers of fish caught and harvested followed by Arctic char, Arctic grayling, and lake trout in decreasing order.

In 2005, the average catch rate per angler-day of effort for stocked fish in the UTMA was 2.5 fish and the recent 10-year average was 3.8 fish (Table 23). Fish stockings for 2004 through 2006 are summarized in Table 24 and projected fish stockings for 2007 and 2008 are summarized in Table 25.

ADF&G will continue to stock lakes that provide fishing opportunities and where stocked fish exhibit good survival and growth, or provide put and take fisheries. New lakes will be evaluated as candidates in the stocking program based on public requests for new fisheries.

MANAGEMENT OBJECTIVES

Quartz Lake Sport Fishery

Quartz Lake is the largest stocked lake fishery in the UTMA. Quartz Lake is about 15 miles north of Delta Junction along the Richardson Highway. ADF&G currently stocks Quartz Lake (1,500 acres) with rainbow trout, landlocked silver (coho) salmon and king (Chinook) salmon, and Arctic char. By stocking a variety of game fish species into Quartz Lake, ADF&G provides a diversity that is attractive to anglers. The availability of stocked game fish in roadside lakes creates year-round fishing opportunity that is otherwise unavailable in interior Alaska.

More restrictive regulations have been implemented to protect wild stocks in the UTMA. As fishing and harvest pressures upon these stocks have increased, the stocking of hatchery fish has become an increasingly effective management option for meeting the demand for recreational fishing opportunities in the UTMA. Quartz Lake and the other stocked lakes absorb effort that might otherwise be directed toward wild stocks in the Tanana drainage that are vulnerable to over-fishing.

Quartz Lake supports both a winter ice fishery and an open-water fishery. Creel surveys conducted by ADF&G indicate that about half of the annual fishing effort occurs during the open water period (May through September) and the other half occurs when the lake is covered with ice (October through April). Due to recent changes by the BOF the Quartz Lake fishery is managed less as a consumptive fishery, allowing anglers to harvest fewer fish (10 in combination) and only one large (> 18 inches) fish in the daily bag limit of any of the stocked species. Daily bag and possession limits are:

Species	Daily Bag and Possession Limit	Size Limit
All species	10 in combination	Only 1 fish >18 inches

Objectives

1. Provide 12,000 annual angler days or more of sport fishing effort.
2. Provide diverse sport angling opportunities through the annual or alternate year stocking of rainbow trout, coho salmon, and Arctic char.
3. Maintain an annual mean catch rate in excess of two sport fish per angler-day while allowing anglers to keep the portion of their catch they so desire.

Actions

1. Biennially stock 9,500 subcatchable Arctic char.
2. Annually stock 12,800 catchable rainbow trout.
3. Annually stock 5,000 catchable chinook salmon.
4. Annually stock 30,000 fingerling coho salmon.
5. Annually stock 150,000 fingerling rainbow trout.
6. Annually stock 30,000 subcatchable rainbow trout.

Fish stockings for 2004 through 2006 are summarized in Table 26 and projected fish stockings for 2007 and 2008 are summarized in Table 27. ADF&G has recently changed the number and size of fish that are stocked to reflect changes to hatchery production and low survival of fingerling rainbow trout.

Evaluations

1. Sport fishing effort and harvest will be estimated through the SWHS.
2. Performance or status of stocking cohorts may be evaluated through on-site creel surveys and/or field sampling.

Fishery Statistics

During the period 1996 through 2005, the annual effort on stocked species ranged from 5,696 to 17,569 angler-days and averaged 10,168 angler-days (Table 28). In 2005, the number of days fished (5,696) was 56% lower than the 10-year average of 10,168 showing a decline in participation at Quartz Lake. Harvest in 2005 is 37% below the 10-year average and catch is 40% below the 10-year average.

In 2005, anglers chose to keep fewer fish (1.1 fish/day) than recent 10-year average (1.6 fish/day; Table 28). In 2005, the catch rate for Quartz Lake was about 3.0 fish per angler-day of effort and exceeded the objective of two fish per angler-day. Since 1995, about 62% of the catch and 63% of the harvest was comprised of rainbow trout (Table 28). Coho and Chinook salmon (landlocked silvers and kings) were next highest in numbers of fish caught and harvested followed by Arctic char.

Upper Tanana Urban Lakes Sport Fishery Enhancement

The Alaska Department of Fish and Game has recently begun stocking catchable size fish in lakes and ponds in urban areas such as Delta Junction. Urban lakes are close to and easily accessible to a large number of anglers. Fishing effort per surface acre for these lakes is often greater than that for larger but more distant rural lakes. The urban fishing program will provide fishing opportunity and different fish species to anglers who don't have the time or ability to travel to more distant lakes and rivers.

Currently in the UTMA, only Big "D" Pond is in the "Urban-High Yield" fishing classification. The department characterizes this lake as being within short driving distance from a population center and accessed via the road system. These systems receive multiple stockings throughout the year with catchable size fish to accommodate higher levels of angling pressure. The current level of fishing effort at Big "D" Pond is not high enough to be reported in the Statewide Harvest Survey but the fishery is popular with local residents. In response to public request, the department will continue to search for other lakes in the upper Tanana Valley to include in the urban fishing program.

Daily bag and possession limits for stocked fish in Urban Lakes are:

Species	Daily Bag and Possession Limit	Size Limit
All species	10 in combination	Only 1 fish > 18 inches

Objectives

1. Manage important native fish populations according to sustained yield principles.
2. Provide sport angling diversity by stocking a mix of fish species.
3. Publicize and promote the fishing opportunities available to anglers.
4. Improve public access where needed.

Actions

Fish stockings in 2004 through 2006 for Big Delta Pond are summarized in Table 29 and projected fish stockings for 2007 and 2008 are summarized in Table 30.

Evaluations

1. Sport fishing effort and harvest will be estimated through the Statewide Harvest Survey.
2. Population status may be assessed by periodic on-site sampling or as a component of research projects.

Fishery Statistics

ADF&G could not estimate effort, catch, and harvest for Big “D” Pond because either none of the fishery participants received a Statewide Harvest Survey questionnaire or fewer than 12 participants responded to the questionnaire.

Upper Tanana Rural Lakes Sport Fishery

The Alaska Department of Fish and Game has been stocking small rural lakes in the upper Tanana Valley for more than 20 years. Rural lakes are characterized as located outside of major population centers with either road or short (< 5 mile) access. These systems receive a single stocking of fish per year and area exposed to moderate or low angler pressure. This program provides increased fishing opportunities and offers a diversity of species in rural areas where minimal or no opportunities exist for sport fishing. It also diverts effort from wild populations in areas for which the department has conservation concerns.

The rural small lakes stocking program is intended to provide fishing opportunities and diversify the game species and fishing experiences available to anglers. This program has created seasonal and year-round fishing opportunities in waters that do not normally support popular game fish. Most of the rural lakes in the UTMA area are less than 100 surface acres and they receive a lot of fishing pressure relative to their size. Recently, anglers have expressed their concern that more of the lakes are not producing sufficient numbers of catchable fish from stockings of fingerlings to meet demand.

Daily bag and possession limits for stocked fish in lakes are:

Species	Daily Bag and Possession Limit	Size Limit
All Species	10 in combination	Only 1 fish > 18 inches

Objectives

1. Manage important native fish populations, when present, according to sustained yield principles.
2. Provide a minimum of 6,000 angler-days of sport fishing effort.
3. Provide sport angling diversity by stocking a mix of game fish.
4. Publicize and promote the fishing opportunities available to anglers.
5. Improve public access where needed.

Actions

Fish stocking schedule for specific lakes are listed in Table 31. Fish stockings for 2004 through 2006 are summarized in Table 32 and projected fish stockings for 2007 and 2008 are summarized in Table 33.

Evaluations

1. Sport fishing effort and harvest will be estimated through the SWHS.
2. Population status may be assessed by periodic on-site sampling or as a component of research projects.

Fishery Statistics

From 1996 through 2005, annual effort on stocked species ranged from 1,233 to 5,353 angler-days and averaged 3,379 angler-days (Table 34). In 2005, the level of effort and catch was slightly above the 10 year average and harvest was 50% below the 10-year average. Since 1996, about 68% of the catch and 75% of the harvest of stocked game fish was made up of rainbow trout. Arctic grayling was next significant in numbers of fish caught and harvested, followed by Arctic char, coho and Chinook salmon (landlocked silvers and kings), and lake trout in decreasing order (Table 34). Average catch rate for stocked fish in rural lakes in the UTMA was about 3.2 fish per angler-day of effort.

Upper Tanana Remote Lakes Sport Fishery Enhancement

The Alaska Department of Fish and Game stocks remote lakes in the upper Tanana Valley to provide fishing opportunities for popular game species in locations where fishing opportunities do not exist or are limited. Remote lakes are defined by access either by a long trail or via fixed wing aircraft. These lakes are generally stocked once per year, or in some cases alternate years. These lakes vary in size from 14 to 320 acres. Generally, the remote lakes are stocked with fingerlings (2-4 inches) because smaller fish are easier and less expensive to transport than larger fish. Aircraft or ATVs are used to transport the fish to these lakes for stocking. All of the remote lakes can produce sufficient numbers of catchable fish from fingerling stockings to sustain the existing fisheries. Because these lakes are more difficult to reach the level of effort and harvest is less than that for comparable size lakes near the road system. For this reason these lakes generally have larger fish and more of them.

Daily bag and possession limits for stocked fish in lakes are:

Species	Daily Bag and Possession Limit	Size Limit
All species	10	Only 1 fish > 18 inches

Objectives

1. Manage important native fish populations, when present, according to sustained yield principles.
2. Provide a minimum of 1,000 angler-days of sport fishing effort.
3. Provide sport angling diversity by stocking a mix of game fish.
4. Publicize and promote the fishing opportunities available to anglers.
5. Improve public access where needed.

Actions

Fish stocking schedule for specific lakes are listed in Table 35. Stockings for 2004 through 2006 are summarized in Table 36 and projected stockings for 2007 and 2008 are summarized in Table 37.

Evaluations

1. Sport fishing effort and harvest will be estimated through the SWHS.
2. Population status may be assessed by periodic on-site sampling or as a component of research projects.

Fishery Statistics

During the period 1996 through 2005, annual effort on stocked species ranged from 296 to 1,458 angler-days and averaged about 872 angler-days (Table 38). The number of anglers and the amount of effort has generally been on the decline. Most of the catch and harvest in remote lake have been for rainbow trout. Arctic grayling contribute more often than other species to the remainder of the catch and harvest. Average annual catch rate for stocked fish in remote lakes in the UTMA is about 3.6 fish per angler-day of effort (Table 38).

FISHERY MANAGEMENT

The Division of Sport Fish strategy is to stock species most suited to a particular lake's physical characteristics and at a size to account for lake productivity, harvest pressure, and to minimize transport costs. Rainbow trout and Arctic grayling do well in most lakes in the UTMA and support summer fisheries. Coho and Chinook salmon also do well in most lakes and provide an aggressive fish during winter when other species are less active. Arctic char and lake trout are long lived and grow to large size which makes them attractive to anglers. In some lakes more than one species is stocked to provide diversity and to take advantage of different seasonal behavior. The most popular combination is rainbow trout and coho salmon.

The state hatcheries in Anchorage are able to provide different size fish from sac-fry (1 inch) to catchable (6-10 inches), and even excess brood fish (12-18 inches). Because lakes have different capabilities for producing catchable fish, ADF&G requests different size fish to meet certain stocking objectives and to minimize the costs for maintaining a fishery. Fingerling coho salmon are stocked in Quartz Lake because the lake produces sufficient numbers of catchable fish from fingerling stockings. However, recent population assessments in Quartz Lake have shown that the survival of rainbow trout fingerlings from August through June is less than 1%. For this reason, ADF&G is now stocking catchable rainbow trout and rearing rainbow trout fingerlings in small ponds to a larger size before stocking the fish into Quartz Lake. Also, to increase the

survival of fingerling rainbow trout ADF&G also reduced the number of coho salmon stocked into Quartz Lake. In other lakes stocked with combinations of rainbow trout and coho salmon, such as Dune Lake, ADF&G captured few Age-1 rainbow trout that were stocked as fingerlings. In contrast, the survival of rainbow trout fingerlings is better in lakes such as Koole Lake and Rainbow Lake, which are stocked with only rainbow trout.

In small roadside lakes such as Little Lost Lake, Rich 81, and Big Delta Pond, ADF&G stocks catchable rainbow trout. Several of the small lakes receive a lot of fishing pressure relative to their size. As a result, they can't produce sufficient numbers of catchable fish (from stockings of fingerlings) to meet angler demand. ADF&G also stocks some of the high use lakes early in spring and again one or more times during summer to provide sufficient numbers of fish throughout the year. Prior to altering the stocking strategy, anglers were expressing frustration with these fisheries because by spring there were too few large fish remaining in the lakes.

ADF&G generally stocks remote lakes with fingerlings because smaller fish are easier and less expensive to transport by aircraft compared to larger fish. All the remote lakes produce sufficient numbers of catchable fish from fingerling stockings to sustain the existing fisheries. Because remote lakes are more difficult to reach, the level of effort and harvest is less than that for comparable size lakes near the road system. Generally, the remote lakes produce larger fish and more of them for the same reasons.

Recently the Department started stocking catchable rainbow trout in lakes near Delta Junction that winter-kill either annually or occasionally. Lakes such as Little Lost Lake and Bolio Lake do not always support fish through winter. By stocking such lakes with catchable size fish ADF&G has created annual fisheries. The Department's goal is to stock only enough fish to support the spring and summer fishing season because any fish left in the lake may not survive through winter. This recent change to the stocking program has increased the number of lakes that can be stocked and increased angler opportunity.

Stocking Products

The state fish hatcheries at Ft. Richardson and Elmendorf Air Force Base near Anchorage produce rainbow trout, Arctic grayling, Arctic char, coho and Chinook salmon. Lake trout are no longer produced by the Anchorage fish hatcheries. Fish are transported by truck to the stocking location or to staging areas where they are transferred to off road vehicles or aircraft for transport to more remote locations.

Rainbow Trout

Rainbow trout is the primary hatchery product used in lake stocking. All rainbow trout are from a captive brood stock maintained at Fort Richardson Hatchery. The brood stock is descended from wild Swanson River rainbow trout. The stocking program uses two types of rainbow trout: 1) mixed sex diploid fish which are normal fish capable of reproduction; and 2) all-female triploid fish which are female fish not capable of reproduction (sterile).

The department generally stocks three sizes of rainbow trout. Catchable rainbow trout are 1 year old and are about 6-10 inches. Fingerling rainbow trout are usually 2 to 4 months old and are 2-3 inches. Rainbow trout fry are less than 2 months old and usually weighed less than a gram. Sub-catchable rainbow trout are 6 months to 1 year old and are 4-6 inches but they are no longer produced.

Arctic Grayling

All stocked Arctic grayling are from eggs taken from wild stocks in the Chena River (Tanana River drainage) and either Moose Lake or Meier's Lake (Gulkana River drainage). Only the Chena River stock is used in the UTMA. No captive brood stock is maintained in the hatchery. ADF&G produces only fingerling Arctic grayling for stocking. These fish are usually 2 to 4 months old and are 2-3 inches. Catchable Arctic grayling are no longer produced due to poor rearing conditions at Elmendorf Hatchery.

Arctic Char

A brood stock of Arctic grayling is now kept at Fort Richardson Hatchery. The brood stock is descended from the wild population in Lake Aleknagik, Bristol Bay. The hatchery currently produces two sizes of Arctic char. Catchable Arctic char are 1½ years old and are 6-10 inches. Subcatchable Arctic char are 6 months old and are 5-7 inches.

Coho Salmon

All coho salmon used for lake stocking are from eggs taken from hatchery-produced adults. Brood stock use may vary depending on availability. Only fingerlings are now produced for stocking in lakes. These fish are 2 to 4 months old and are 2-4 inches. Fingerling coho salmon will be produced only when there is sufficient rearing space.

Lake Trout

Lake trout are no longer produced at the two Anchorage hatcheries.

Egg Takes

The Region III stocking program currently assists the hatcheries with egg takes by capturing and holding fish until they are ready for spawning. When Clear Hatchery was closed in 1997, staff in the Fairbanks regional office assumed responsibility for conducting egg takes in the Tanana drainage and the Upper Copper/Upper Susitna drainages. Other assumed responsibilities included locating wild donor stocks, evaluating the population status of the donor stocks, and collecting and holding adults until they were ready for artificial spawning.

Net-Catch Sampling

ADF&G has numerous requests from anglers for current information on the species and size of fish in lakes in the UTMA. Anglers use this information to plan fishing trips. Every other year ADF&G staff usually samples fish populations in 4 to 6 lakes in the UTMA. Most of these lakes are stocked so there are usually no conservation concerns driving the need for information on these fish populations. However, anglers are interested in the species and the size of the fish in these lakes. ADF&G also uses this information to update information in the *Guide to Stocked Waters*, the Internet web site, and informational leaflets. An additional benefit is that biologists are able to observe the fish populations in several lakes and get a rough idea of their status. From these observations the biologist can decide if a fish population needs further investigation and plan a study to address a specific concern.

Lake Mapping and Limnology

Each year ADF&G inspects and maps a number of lakes. The actual number of lakes that are visited depends on the time available, the priority of other projects and for some lakes if aircraft or ATVs are available. When a lake is mapped, ADF&G staff obtains depth data that are later

used to produce bathymetric maps for anglers and to describe morphology and other lake characteristics for fishery managers. When ADF&G staff is at these lakes they often combine several activities such as net sampling (described above), water chemistry assays, dissolved oxygen and temperature profiles, inspect barriers, and evaluate land-locked status.

Statewide Stocking Plan: Region III Update

The 5-year stocking plan for Region III is updated each year in response to public comment, changes in Fishery Management Plans and hatchery production, and to comply with current policies. Comments received from the public and current policies are reviewed to determine what changes will be required to update the stocking plan each year. The updated stocking plan for Region III is submitted to the Sport Fish regional office in Anchorage in November for inclusion into the draft Five Year Statewide Stocking Plan for Recreational Fishing. After a comment period the finalized plan is usually published and available by 1 February.

Fish Transport Permits

Each fish stocking and egg take requires a Fish Transport Permit (FTP). The Five Year Stocking Plan, regional management plans, and active FTPs are crosschecked prior to stocking or taking eggs to determine if an active FTP exists. Any FTP needed for stocking or for an egg take is submitted for approval. Lists of active, expired, and pending FTPs for the UTMA are maintained at the Sport Fish regional office in Fairbanks.

Hatchery Review

Fish hatchery management and operational plans for Ft. Richardson and Eielson Air Force Base hatcheries are reviewed to ensure the plans account for the correct number, size, species, brood stock, and other special requirements for fish requested through the Five Year Stocking Plan and regional management plans. Requests from the various regions are checked against hatchery production capabilities to determine if requests are feasible. Hatchery and stocking managers discuss options to decrease impact of egg takes on wild donor stocks and to make the stocking program more efficient.

Pamphlets

Pamphlets about stocked waters in the UTMA are updated each year with information collected on fish populations such as the species present and their size. Other information includes recent stocking histories, location and bathymetric maps, and available facilities.

BOARD OF FISHERY ACTIONS

In January 2004, the BOF adopted a Regional Stocked Waters Management Plan (SWMP). The SWMP created three management approaches; regional (high yield), conservative, and special management. Almost all stocked lakes in the Region are categorized under the SWMP as regional. The BOF directs the department to manage the stocked waters according to a framework designed to meet public demand and provide diversity of opportunity. The department may manage specific fisheries to provide or maintain qualities desired by the angling public.

The regulations adopted by the board are designed to maintain the characteristics of each fishery category. Waters stocked in the AYK, Upper Copper River and Upper Susitna River Areas for the first time will be classified high yield (with a daily bag and possession limit of 10 fish in combination and only one fish over 18 inches). The board recognizes region wide regulations

for stocked waters and two categories of exceptions, conservative yield (One lake, Dune Lake, is categorized under the conservative approach, with combined bag limit of 5 fish, of all species combined, only one over 18”), and special management (where a bag limit of 1 fish over 18 inches) waters in this category are: Little Harding Lake, Harding Lake, Summit Lake, Monte Lake, Donnelly Lake, and Rainbow Lake).

Stocked waters may be reclassified into a different category only by the board through proposals from the public, department, or board and if the proposals meet the criteria established for the proposed category. Requests for reclassification and special management can be submitted to the BOF during the appropriate cycle as **proposal 135** submitted for the 2007 meeting is seeking to reclassify Koole Lake into the conservative management category.

Koole Lake is 320 acres in size and is classified as a “remote” landlocked stocked lake in the upper Tanana Valley. Anglers access Koole Lake by float plane during the open-water months and by snow machine after freeze-up. The 5-year stocking plan currently has Koole Lake stocked every other year with 24,500 Rainbow trout.

Koole Lake is currently managed under the regional management approach to provide and maintain a fishery that provides for a reasonable expectation of high catch rates and harvesting a daily bag limit. Stock assessment in 2004 estimated the abundance of rainbow trout greater than age-3 at 1,305 fish.

A model of the Koole Lake rainbow trout population indicated that an annual abundance of 1,000 to 2,000 age-2 and older Rainbow trout is needed to sustain this fishery. For 2005, the expected population abundance for Koole Lake is 700 age-2 fish, which is below the management objective for the fishery. This estimated abundance being below the objective is likely a result of no stocking occurring in 2002 and 2003 due to a regional realignment of annual stocking levels. The rainbow trout population in 2006 should meet management objectives for abundance and length-age as stocking levels return to the every other year schedule. The public has submitted **proposal 135** to put this lake into the “conservative” management category.

Under the AYK Stocked Water Management Plan, it is under the purview of the BOF to reclassify a water body if it meets the criteria for a different classification. If future stocking levels are maintained as outlined in the 5-year stocking plan, the Koole Lake fishery could sustain either the regional or conservative management approach.

CURRENT ISSUES

Sport Fish Region III staff has pursued establishing a full size fish hatchery in Fairbanks for stocking lakes in the interior. Fish production at Fort Richardson and Elmendorf hatcheries are dependant on surface and ground water supplies as well as waste heat from military power plants. Both power plants at Fort Richardson and Elmendorf Air Force Base were shut down. Boilers have been installed at the Fort Richardson hatchery to heat water for the Broodstock, incubation, smolt, and fingerling programs. The rainbow trout catchable program at the Elmendorf Air Force Base hatchery has been curtailed.

It appears that angler behavior at Quartz Lake has changed in recent years. Anglers are targeting rainbow trout for harvest (from 10,000 in 1997 to 20,000 in 1999) while releasing more of their catch of coho salmon. Stock assessments showed that fewer rainbow trout survive to age-1. It is theorized that greater numbers of coho salmon create high mortality on the fingerling rainbow trout. The number of surviving rainbow trout is less than 1% and is insufficient to support the fishery.

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TABLES AND FIGURES

Table 1.-Number of angler-days of sport fishing effort expended by recreational anglers fishing the Tanana River drainage (TRD), Statewide, and Region III waters, 1977-2005.

YEAR	TRD	Statewide	% BY	Region III	% BY
	Effort	Effort	TRD	Effort	TRD
1977	99,919	1,198,486	8.3%	123,161	81.1%
1978	119,364	1,285,063	9.3%	145,492	82.0%
1979	98,514	1,364,739	7.2%	126,096	78.1%
1980	131,494	1,488,962	8.8%	160,266	82.0%
1981	115,099	1,420,172	8.1%	148,886	77.3%
1982	150,530	1,623,090	9.3%	198,791	75.7%
1983	144,981	1,732,528	8.4%	199,125	72.8%
1984	145,142	1,866,837	7.8%	199,041	72.9%
1985	135,745	1,943,069	7.0%	186,883	72.6%
1986	144,814	2,071,412	7.0%	194,713	74.4%
1987	155,346	2,152,866	7.2%	217,109	71.6%
1988	173,706	2,311,291	7.5%	233,559	74.4%
1989	185,715	2,264,079	8.2%	239,626	77.5%
1990	184,887	2,453,284	7.5%	245,629	75.3%
1991	155,662	2,456,328	6.3%	219,922	70.8%
1992	120,848	2,540,374	4.8%	181,852	66.5%
1993	160,117	2,559,408	6.3%	220,972	72.5%
1994	148,633	2,719,911	5.5%	239,626	62.0%
1995	201,389	2,787,670	7.2%	270,141	74.5%
1996	150,227	2,006,528	7.5%	201,166	74.7%
1997	119,699	2,079,514	5.8%	238,856	50.1%
1998	112,025	1,856,976	6.0%	227,841	49.2%
1999	160,427	2,499,152	6.4%	304,522	52.7%
2000	121,785	2,513,617	4.8%	241,574	50.4%
2001	91,135	2,261,941	4.0%	194,138	46.9%
2002	108,462	2,259,091	4.8%	220,276	49.2%
2003	99,934	2,219,398	4.5%	206,705	48.3%
2004	116,486	2,473,961	4.7%	217,041	53.7%
2005	93,398	2,463,929	3.8%	183,535	50.9%
10-year Average 1995-2004	128,157	2,295,785	5.6%	232,226	55.2%
5-Year Average 2000-2004	107,560	2,345,602	4.6%	215,947	49.8%
2005 as % of 5-year average	86.8%	105.0%		85.0%	

Source: Data from: Mills 1979-1981a-b, 1982 - 1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006 a-b, *In prep a-b*.

Table 2.-Number of anglers, trips, effort, harvest and catch in the Upper Tanana River drainage (UTMA) and proportion of the Tanana River drainage from 1997 – 2005.

Year	Number of anglers in UTMA Area	Percent of Tanana drainage	Number of trips in UTMA Area	Percent of Tanana drainage	Number of days (effort) in UTMA Area	Percent of Tanana drainage	Total harvest in UTMA area	Percent of Tanana drainage	Total catch in UTMA area	Percent of Tanana drainage
1996	10,022	28%	24,713	23%	35,616	24%	39,791	39%	144,084	29%
1997	7,075	22%	20,394	23%	30,536	26%	30,009	40%	125,366	28%
1998	9,664	31%	20,054	25%	31,412	28%	37,561	51%	148,258	34%
1999	9,637	31%	22,839	24%	46,809	29%	38,103	46%	161,328	37%
2000	8,306	33%	19,693	26%	34,956	29%	39,316	44%	138,658	37%
2001	7,775	36%	17,696	31%	28,150	31%	23,112	47%	94,747	40%
2002	7,763	36%	16,145	26%	31,145	29%	31,941	37%	141,838	36%
2003	8,540	34%	16,211	25%	29,036	29%	22,267	38%	121,585	38%
2004	6,778	27%	13,662	20%	25,523	22%	16,040	28%	90,254	29%
2005	7,691	33%	17,230	30%	29,309	31%	16,631	39%	95,358	39%
5-year Average 2000-2004		33%		25%		28%		39%		36%
	7,832		16,681		29,762		26,535		117,416	
2005 as % of 5-year Average	98.2%		103.3%		98.5%		62.7%		81.2%	

Source: Mills 1979-1981a-b, 1982 -1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b *In prep* a-b.

Table 3.-Number of fish harvested by recreational anglers fishing the Tanana River drainage (TRD), Statewide, and Region III waters, 1977-2005.

Year	TRD Harvest	Statewide Harvest	% TRD of Of Alaska Harvest	Region III Harvest	% TRD of Region III Harvest
1977	88,938	2,300,322	3.87%	115,071	77.29%
1978	129,789	2,339,472	5.55%	166,037	78.17%
1979	129,042	2,502,213	5.16%	174,057	74.14%
1980	146,981	2,627,312	5.59%	206,550	71.16%
1981	179,986	2,528,056	7.12%	232,329	77.47%
1982	179,122	2,828,706	6.33%	274,541	65.24%
1983	176,110	3,086,280	5.71%	273,751	64.33%
1984	178,299	3,115,966	5.72%	245,083	72.75%
1985	183,190	3,096,044	5.92%	241,109	75.98%
1986	149,202	3,163,433	4.72%	216,826	68.81%
1987	139,907	3,207,138	4.36%	201,677	69.37%
1988	198,533	3,483,306	5.70%	264,371	75.10%
1989	188,045	3,213,867	5.85%	253,437	74.20%
1990	128,680	3,033,301	4.24%	174,175	73.88%
1991	152,774	3,311,513	4.61%	221,164	69.08%
1992	84,787	3,234,048	2.62%	131,486	64.48%
1993	105,711	2,989,720	3.54%	151,551	69.75%
1994	97,913	3,350,749	2.92%	152,676	64.13%
1995	84,848	2,909,979	2.92%	118,473	71.62%
1996	101,229	3,336,773	3.03%	137,479	73.63%
1997	75,108	3,294,273	2.28%	140,473	53.47%
1998	74,376	3,163,194	2.35%	181,071	41.08%
1999	82,730	3,400,793	2.43%	169,675	48.76%
2000	89,119	3,354,901	2.66%	174,147	51.17%
2001	49,197	3,078,100	1.60%	119,797	41.07%
2002	86,796	3,216,432	2.70%	164,463	52.78%
2003	58,057	3,052,136	1.90%	129,029	45.00%
2004	57,918	3,332,948	1.74%	140,292	41.28%
2005	43,196	3,235,176	1.34%	109,956	39.28%
10-year Average 1995-2004	75,938	3,213,953	2.36%	147,490	51.49%
5-year Average 2000-2004	68,217	3,206,903	2.1%	145,546	46.9%
2005 as % of 5-year average	63.32%	100.88%		75.55%	

Source: Mills 1979-1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, *In prep* a-b.

Table 4.-Number of fish by species harvested by recreational anglers fishing Tanana River drainage waters, 1977-2005.

Year	SALMON					NON-SALMON								Total
	Chinook	Coho ^b	Coho ^c	Chum	R. Trout	L. Trout	Char ^c	A. Grayling	N. Pike	Whitefish	Burbot	Sheefish	Other	
1977	100	94	7,151	300	5,992	1,471	877	57,793	9,345	3,378	1,547	158	732	88,938
1978	163	139	22,412	158	6,406	603	524	83,275	7,838	6,573	1,383	234	81	129,789
1979	515	25	36,073	219	5,186	946	364	70,243	7,975	5,159	1,979	279	79	129,042
1980	941	67	25,733	483	19,584	1,264	524	80,150	9,452	5,987	2,700	96	0	146,981
1981	763	45	57,294	595	24,571	1,721	572	75,288	9,941	4,873	4,122	93	108	179,986
1982	984	52	43,374	698	26,186	3,104	482	81,753	9,822	8,643	3,887	127	10	179,122
1983	1,048	147	34,255	649	20,664	2,937	293	92,363	10,225	8,311	5,040	157	21	176,110
1984	338	831	29,245	585	34,022	2,104	350	83,626	9,607	11,658	5,556	338	39	178,299
1985	1,356	796	41,042	1,255	33,432	2,984	1,230	63,560	12,090	20,230	4,795	420	0	183,190
1986	781	1,374	24,061	693	31,270	713	200	45,981	11,934	26,810	5,142	72	171	149,202
1987	502	1,231	26,566	620	31,824	652	36	38,480	9,471	26,435	3,855	235	0	139,907
1988	853	2,237	32,342	491	78,345	2,221	909	52,569	11,986	11,775	3,733	982	0	198,443
1989	963	1,596	18,614	1,134	74,675	1,932	913	54,823	11,330	16,935	4,357	643	130	188,045
1990	439	1,719	13,943	55	64,143	896	830	28,414	7,348	6,891	3,799	169	34	128,680
1991	630	2,345	22,125	588	72,024	1,978	2,891	33,778	12,476	739	2,739	158	303	152,774
1992	118	1,115	14,019	690	37,547	993	2,088	14,983	6,184	3,246	3,620	184	0	84,787
1993	1,573	278	15,734	371	49,693	1,939	3,873	17,658	7,712	984	5,717	100	79	105,711
1994	1,871	1,165	10,350	260	33,400	1,582	1,799	24,741	16,299	940	5,165	166	175	97,913
1995	2,488	1,116	8,198	985	35,625	887	2,736	16,089	10,620	493	4,934	310	367	84,848
1996	3745	1354	13,640	1,880	48,975	877	3,261	15,198	8,327	412	3,203	231	126	101,229
1997	1,953	1,229	6,824	456	33,833	832	2,530	16,570	3,328	1062	6,348	35	108	75,108
1998	447	604	11,614	70	38,292	524	3,996	11,687	2,870	853	3,291	24	104	74,376
1999	1,001	451	8,637	474	48,226	1,145	4,851	11,523	2,925	235	3,148	114	0	82,730
2000	178	310	16,945	97	49,690	1,133	4,009	8,560	3,467	385	3,740	220	385	89,119
2001	667	1,122	10,197	29	19,919	445	3,368	7,074	4,207	785	1,297	9	78	49,197
2002	478	541	17,693	307	38,562	709	6,645	12,987	3,436	1,086	4,009	92	251	86,796
2003	2153	1,317	6,680	63	26,292	862	4,854	10,084	2,947	167	2,561	59	18	58,057
2004	1,319	716	8,459	98	25,554	646	4,111	6,773	4,895	1,485	3,446	177	239	57,918
2005	483	267	3,056	144	17,829	1,082	2,752	10,061	4,624	114	2,487	129	168	43,196

-continued-

Table 4.-Page 2 of 2.

Year	SALMON				NON-SALMON										Total
	Chinook	Coho ^b	Coho ^c	Chum	R. Trout	L. Trout	Char ^c	A. Grayling	N. Pike	Whitefish	Burbot	Sheefish	Other		
	Averages														
10 year (1995-2004)	1,443	876	10,889	446	36,497	806	4,036	11,655	4,702	696	3,598	127	168	75,938	
5 year (2000-2004)	959	801	11,995	119	32,003	759	4,597	9,096	3,790	782	3,011	111	194	68,217	
2005 as % of 5-year	50%	33%	25%	121%	56%	143%	60%	111%	122%	15%	83%	116%	87%	63%	
% of total 5-yr. harvest	1.4%	1.2%	17.6%	0.2%	46.9%	1.1%	6.7%	13.3%	5.6%	1.1%	4.4%	0.2%	0.3%		

Source: Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, *In prep* a-b.

^a Harvests occurring on naturally occurring Coho salmon stocks.

^b Stocked landlocked Coho salmon.

Table 5.-Number of fish by species harvested and caught by recreational anglers fishing Tanana River drainage waters, including the proportion within the Upper Tanana area in 2005.

Species	Tanana River Harvest	Upper Tanana area Harvest	% UTMA Harvest	Tanana River Catch	Upper Tanana area Catch	% UTMA Catch
Salmon:						
Chinook	483	25	5.5%	1,633	25	0.2%
Coho ^a	267	267	100.0%	2,844	2,830	99.5%
Coho ^b	3,056	1,002	32.8%	11,972	2,973	24.8%
Chum	144	0	0.0%	1,372	686	50.0%
Non-Salmon:						
Rainbow Trout	17,829	6,336	35.5%	46,646	17,355	37.2%
Lake Trout	1,082	569	52.5%	5,164	3,651	70.7%
Char ^c	2,752	463	16.8%	7,904	1,453	18.4%
Arctic Grayling	10,061	5,242	52.1%	128,377	55,943	43.5%
Northern Pike	4,624	1,646	35.2%	33,900	8,299	24.4%
Whitefish	114	60	36.0%	682	455	20.2%
Burbot	2,487	1,021	40.8%	3,226	1,370	42.3%
Sheefish	129	0	0.0%	454	0	0.0%
Other Fish	168	0	0.0%	537	321	59.8%
Total	43,196	16,631	38.5%	244,711	95,361	39.0%

Source: Jennings et al., *In prep* b.

^a Anadromous salmon.

^b Landlocked coho and Chinook salmon

^c Includes Arctic char and Dolly Varden.

Table 6.-Number of each game species caught and harvested (kept), and percent harvested by recreational anglers fishing Tanana River drainage (TRD) waters during 2005.

Species	TRD Catch	TRD Harvest	Percent Harvested
<i>Salmon:</i>			
Chinook	1,633	483	29.6%
Coho ^a	2,844	267	9.4%
Coho ^b	11,972	3,056	25.5%
Chum	1,372	144	10.5%
<i>Non-Salmon:</i>			
Rainbow trout	46,646	17,829	38.2%
Lake Trout	5,164	1,082	21.0%
Char ^c	7,904	2,752	34.8%
Arctic grayling	128,377	10,061	7.8%
Northern pike	33,900	4,624	13.6%
Whitefish	682	114	16.7%
Burbot	3,226	2,487	77.1%
Sheefish	454	129	28.4%
Other fish	537	168	31.3%
Total	244,711	43,196	17.7%

Source: Jennings et al., *In prep* b.

^a Anadromous salmon.

^b Landlocked coho and Chinook salmon

^c Includes Arctic char and Dolly Varden.

Table 7.-Number of each game species caught, harvested (kept), and percent harvested by recreational anglers fishing the Upper Tanana area portion of the Tanana River drainage in 2005.

Species	Catch	Harvest	Percent Harvested
<i>Salmon:</i>			
Chinook	25	25	100.0%
Coho ^a	2,830	267	9.4%
Coho ^b	2,973	1,002	33.7%
Chum	686	0	0.0%
<i>Non-Salmon:</i>			
Rainbow trout	17,355	6,336	36.5%
Lake Trout	3,651	569	15.6%
Char ^c	1,453	463	31.8%
Arctic grayling	55,943	5,242	9.4%
Northern pike	8,299	1,646	19.8%
Whitefish	455	60	30.5%
Burbot	1,370	1,021	74.8%
Sheefish	0	0	0.0%
Other fish	321	0	0.0%
Total	95,361	16,631	17.4%

Source: Jennings et al., *In prep* b.

^a Anadromous salmon.

^b Landlocked coho and Chinook salmon

^c Includes Arctic char and Dolly Varden.

Table 8.-Commercial salmon harvest (preliminary) in Tanana River drainage and percent of Yukon River drainage harvest in 2005 (F. Bue, Commercial Fisheries Biologist, ADF&G, Fairbanks; personal communication).

Species	2005		
	Tanana	Yukon	%
	Total	Total	Tanana
Chinook	453	31,952	1%
Summer chum	8,986	41,206	22%
Fall chum	49,478	178,987	28%
Coho	21,831	58,347	37%
Total	80,748	310,492	26%

Table 9.-Estimated abundance, highest counts during aerial surveys, and aerial survey conditions for Chinook salmon escapement in the Goodpaster River, 1998 - 2006.

Year	Estimated Abundance ^a	SE	Estimation Method ^b	Aerial Survey Count	Condition ^c	Survey Completed by
1998			Helicopter	477	Good	Teck-pogo
1999			Helicopter	1,743	Good	Teck-pogo
2000			Helicopter	2,175	Good	Teck-pogo
2001			Helicopter	1,457	Good	Teck-pogo
2002			Helicopter	1,440	Excellent	Teck-pogo
2003			Helicopter	3,004	Fair	Teck-pogo
2004	3,674	106	Tower	480	-	Tanana Chiefs and Teck-pogo
2005	1,113	54	Tower	-	-	Tanana Chiefs
2006	2,440	98	Tower	884	Good	Tanana Chiefs and ADF&G
Average	1,947					

^a Details of Aerial survey estimates can be found in memo's from John Morsell of Northern Ecological Services to Teck Resources, Inc., 3520 International Street, Fairbanks, AK 99701 and tower counts are from email communications with Mike Smith of Tanana Chiefs Conference, Fairbanks, AK

^b Helicopter indicated aerial surveys using helicopter, Tower indicates tower-counts.

^c During these aerial surveys, conditions were judged on a scale of "poor, fair, good, excellent" unless otherwise noted.

Table 10.-Subsistence and personal use salmon harvest (preliminary) in the Tanana River drainage and percent of Yukon River drainage harvest in 2005 (B. Busher, Commercial Fish Biologist, ADF&G, Fairbanks; personal communication).

Species	2005		
	Tanana River Salmon	Yukon River Salmon	%
	Harvest Total	Harvest Total	Tanana
Chinook	2,169	53,249	4.1%
Summer chum	2,133	93,127	2.3%
Fall chum	23,940	92,471	25.9%
Coho	20,169	27,871	72.3%
Total	48,411	266,718	18.1%

Table 11.-Location of gas lease sale area, waters and species of fish impacted and fisheries information.

Sale Area	Water Body	Species	Activity
East of L. Delta	Little Delta River	AG	Fish distribute seasonally throughout the drainage, summer residence in clear spring tributaries.
	Delta Creek	AG, WF, SS	Fish distribute seasonally throughout the drainage, summer residence in clear spring tributaries.
	Kiana Creek (Between Little Delta River and Delta Creek)	AG, WF	Important Arctic grayling spawning stream
	100 mile Creek (Tributary to Delta Creek, 15.5 miles above mouth)	AG	Arctic grayling migrate to 100-Mile Creek for summer feeding and migrate out to Tanana for the winter
	Koole Lake	RT	Stocked every other year
	Richardson Clearwater River	AG, SS, WF	Important Arctic grayling fishery, coho, chum salmon spawning stream.
	Rainbow Lake	RT	Stocked every other year.
	Clear Creek	AG, WF, SS, CS	Arctic grayling summer residence, silver salmon spawning.
	Delta River	AG, CS, SS	Important chum salmon spawning stream first two miles of river. Silver salmon. Arctic grayling on clear spring seeps.
East of Delta River	Delta Clearwater River	AG, BB, WF, CS, SS	Important Arctic grayling fishery, silver and chum salmon spawning stream, high resident population of round whitefish.

Table 12.-Delta Clearwater River, coho salmon escapement effort, harvest and catches from the Statewide Harvest Survey, 1977-2006.

Year	Coho Salmon Escapement ^a	Angler-Days ^b	Coho Harvest	Coho Exploitation	Coho Catch	% Released
1977	4,793	6,798	31	0.6%		
1978	4,798	6,873	126	2.6%		
1979	8,970	8,398	0	0.0%		
1980	3,946	4,173	25	0.6%		
1981	8,563	4,553	45	0.5%		
1982	8,365	4,175	21	0.3%		
1983	8,019	5,698	63	0.8%		
1984	11,061	3,611	571	5.2%		
1985	5,358	6,790	722	13.5%		
1986	10,857	2,867	1,005	9.3%		
1987	22,300	3,123	1,068	4.8%		
1988	21,600	3,092	1,291	6.0%		
1989	12,600	2,500	1,049	8.3%		
1990	8,325	2,263	1,375	16.5%	3,271	58
1991	23,900	2,605	1,721	7.2%	4,382	61
1992	3,963	1,765	615	15.5%	1,555	60
1993	10,875	2,307	48	0.4%	1,695	97
1994	62,675	3,028	509	0.8%	3,009	83
1995	20,100	4,758	463	2.3%	5,195	91
1996	14,070	2,602	983	7.0%	2,435	60
1997	11,525	1,642	866	7.5%	4,174	79
1998	11,100	2,595	603	5.4%	2,350	74
1999	10,975	4,564	76	0.7%	1,634	95
2000	9,225	2,118	255	2.8%	1,911	87
2001	46,875	3,736	816	1.7%	5,393	85
2002	38,625	3,664	517	1.3%	5,311	90
2003	102,800	4,805	1,272	1.2%	14,665	91
2004	37,550	2,686	511	1.4%	4,061	87
2005	31,175	3,603	267	0.9%	2,639	90
2006	15,950					
Average						
10-year (1995-2004)	30,285	3,317	636	2.1%	4,713	87
5-year (2000-2004)	47,015	3,402	674	1.4%	6,268	89
2005 as % of 5-year average	66.3%	105.9%	39.6%		42.1%	

Source: Mills 1979-1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, *In prep* a-b.

^a Estimates of escapement from river boat only.

^b ADF&G Coho Management plan Delta Clearwater River.

Table 13.-Boat count surveys and aerial surveys of the non-navigatable portion of the Delta Clearwater River for 1994-1998 and expanded counts including 1999-2006.

Year	Boat Count Escapement	Aerial Count Tributaries	Total Count	Percent in Tributaries
1994	62,675	17,565	80,240	21.9%
1995	20,100	6,283	26,383	23.8%
1996	14,070	3,300	17,370	19.0%
1997	11,525	2,375	13,900	17.1%
1998	11,100	2,775	13,875	20.0%
1999	10,925	2,967 ^a	13,942 ^b	21.3% ^c
2000	9,225	2,494 ^a	11,719 ^b	21.3% ^c
2001	46,875	12,013 ^a	58,888 ^b	21.3% ^c
2002	38,625	10,441 ^a	49,066 ^b	21.3% ^c
2003	102,800	27,791 ^a	130,591 ^b	21.3% ^c
2004	37,550	10,551 ^a	48,101 ^b	21.3% ^c
2005	31,175	8,428 ^a	39,603 ^b	21.3% ^c
2006	15,950	4,312 ^a	20,262 ^b	21.3% ^c
Average 1994-2005	33,054	8,915	41,973	

^a Expansion factor (21.3%) to applied to average boat survey counts.

^b Total Delta Clearwater River escapement total using a expansion factor of 21.3%.

^c 1994-1998 average expansion factor.

Table 14.-Commercial, subsistence, personal use, sport fish coho salmon harvests for the Tanana and Yukon rivers from 1977-2005, and total Yukon coho harvest as a percent of Delta Clearwater River (DCR) total escapement.

Year	Commercial Fish		Subsistence and Personal Use		Tanana Sport	Tanana Total	Yukon Total	DCR Coho Escapement	Harvest as % of DCR Escapement
	Yukon	Tanana	Yukon	Tanana	Harvests	Harvests	Harvests		
1977	38,863	1,284	16,333	4,030	94	5,408	55,290	6,089	908%
1978	26,152	3,066	7,787	4,709	139	7,914	34,078	6,095	559%
1979	17,165	2,791	9,794	4,612	25	7,428	26,984	11,395	237%
1980	8,745	1,226	20,158	5,163	67	6,456	28,970	5,013	578%
1981	23,680	2,284	21,228	9,261	45	11,590	44,953	10,878	413%
1982	37,176	7,780	35,894	7,418	52	15,250	73,122	10,627	688%
1983	13,320	6,168	23,895	6,932	63	13,163	37,278	10,187	366%
1984	81,940	7,688	49,020	14,785	662	23,135	131,622	14,052	937%
1985	57,672	11,762	32,264	11,761	796	24,319	90,732	6,807	1333%
1986	47,255	441	34,468	13,321	1,349	15,111	83,072	13,793	602%
1987	0	0	48,678	24,195	1,231	25,426	49,909	28,330	176%
1988	86,612	13,972	70,826	31,348	1,818	47,138	159,256	27,441	580%
1989	83,353	16,084	41,714	19,572	1,577	37,233	126,644	16,007	791%
1990	45,511	11,549	44,623	18,768	1,648	31,965	91,782	10,576	868%
1991	106,686	6,268	37,388	21,561	2,345	30,174	146,419	30,362	482%
1992	7,979	6,556	51,980	17,554	1,115	25,225	61,074	5,035	1213%
1993	0	0	15,812	4,304	278	4,582	16,090	13,816	116%
1994	4,452	120	41,775	26,489	1,111	27,720	47,338	80,240	59%
1995	47,013	5,826	28,794	19,219	1,101	26,146	76,908	26,383	292%
1996	55,982	3,803	30,602	15,091	1,341	20,235	87,925	17,370	506%
1997	35,320	0	24,295	11,945	1,338	13,283	60,953	13,900	439%
1998	1	0	18,130	7,481	762	8,243	18,893	13,875	136%
1999	1,601	0	21,038	9,541	451	9,992	23,090	13,942	166%
2000	0	0	14,939	5,150	261	5,411	15,200	11,719	130%
2001	0	0	22,156	9,034	1,122	10,156	23,278	59,547	39%
2002	0	0	15,509	9,519	541	10,060	16,050	49,067	33%
2003	25,243	15,119	24,128	11,461	1,314	27,894	50,685	130,591	39%
2004	20,232	18,649	21,028	12,022	716	31,387	41,976	47,701	88%
2005	58,349	21,831	27,871	20,169	267	42,267	86,487	39,603	218%
2006								20,262	
Average									
10 year (1995-2004)	18,539	4,340	22,062	11,046	895	16,281	41,496	38,410	108%
5 year (2000-2004)	20,765	11,120	19,552	9,437	791	16,982	29,438	59,725	67%
2005 as % of 5-year	257%	129%	143%	214%	34%	249%	294%	66%	

^a Data from Fred Bue and William Busher, Yukon Area, Fall Chum and Coho Salmon Fishery Season Summary, 2005. ADF&G informational letter. Fairbanks, Alaska.

^b Total Delta Clearwater River escapement total using a expansion factor of 21.3%.

Table 15.-Number of Arctic grayling harvested and caught by recreational anglers fishing the Delta Clearwater River from 1977-2005.

Year	Angler-days	Harvest Grayling <12"	Harvest Grayling >12"	Total Harvest Grayling	Catch of Grayling <12"	Catch of Grayling >12"	Total Catch Grayling
1977	6,881	...	...	6,118	...	...	...
1978	7,210	...	...	7,657	...	...	...
1979	8,398	...	...	6,492	...	...	...
1980	4,240	...	...	5,680	...	...	...
1981	4,673	...	...	7,362	...	...	...
1982	4,231	...	...	4,779	...	...	...
1983	5,867	...	...	6,546	...	...	...
1984	5,139	...	...	4,193	...	...	...
1985	8,722	...	...	5,809	...	...	...
1986	10,137	...	...	2,343	...	...	...
1987	5,397	...	...	2,005	...	...	...
1988	5,184	...	...	2,910	...	...	...
1989	5,368	...	...	3,016	...	...	...
1990	4,853	...	...	1,772	...	...	12,424
1991	5,594	0	2,165	2,165	3,033	4,965	7,998
1992	3,756	0	797	797	2,669	3,417	6,086
1993	4,909	0	437	437	3,074	2,638	5,712
1994	3,984	375	1,036	1,411	4,269	5,037	9,306
1995	6,261	0	926	926	1,620	4,354	5,974
1996	3,424	0	1,218	1,218	3,354	5,624	8,978
1997	2,161	0	54	54	2,980	1,685	4,665
1998	3,415	0	0	0	4,842	11,293	16,135
1999	5,705	0	0	0	2,444	9,328	11,772
2000	2,647	0	0	0	2,339	6,351	8,690
2001	4,670	47	44	91	3,554	9,020	12,574
2002	4,580	51	0	51	3,180	9,733	12,913
2003	6,006	0	0	0	3,729	13,847	17,576
2004	3,357	111	0	111	5,805	8,407	14,212
2005	4,504	65	75	140	2,985	16,987	19,922
Average							
10 year (1996-2004)	4,223	21	224	245	3,385	7,964	11,349
5 year (2000-2005)	4,252	42	9	51	3,721	9,472	13,193
2005 as % of 5-year	106%	156%	852%	277%	80%	179%	151%

Source: Mills 1979-1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, *In prep* a-b.

Table 16.-Sport harvest and catch for northern pike in selected waters within the Upper Tanana River drainage (UTMA), from 1977-2005.

Year	George Lake		Healy Lake		Deadman Lake		Volkmar		Tanana River		Other waters		Tanana Drainage		UTMA Total	
	Harvest	Catch ^a	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1977	1,227											3,511		9,345		
1978	1,392											2,287		7,838		
1979	2,018											2,240		7,975		
1980	1,395											3,232		9,452		
1981	2,236						648					4,687		9,941		
1982	1,635						777					4,842		9,822		
1983	1,322						430		115			2,502		10,225		
1984	1,700						428		65			2,806		9,490		
1985	2,670						503		208			2,799		12,066		
1986	3,076				24		657		617		984		11,854			
1987	2,229		462		145		224		225		2,139		9,405			
1988	1,837		982		182		255		1,328		2,856		11,823			
1989	882		1,393		160		180		521		2,301		11,170			
1990	945	3,950	152	743	490	895	84	84	422	1,637	2,130	19,294	7,348	37,524		
1991	1,262	4,996	387	1,101	119	119	565	1,011	0	0	3,518	7,169	12,476	30,009		
1992	529	2,861	43	333	415	1170	231	1,256	0	0	2,476	13,637	6,148	32,250		
1993	422	2,620	232	705	0	0	320	432	0	0	2,359	16,727	7,712	51,272		
1994	948	4,377	63	143	484	807	323	1,928	1,184	6,333	3,009	22,165	16,299	88,702		
1995	531	1,582	10	66	0	0	1,084	1,801	734	3,366	4,143	19,629	10,620	53,963		
1996	1,289	4,487	0	355	129	268	9	230	434	2,262	2,646	22,232	8,327	52,993	2,060	10,623
1997	302	1,940	41	117	153	599	84	598	234	1,250	1,178	6,245	3,328	23,879	1,035	4,965
1998	418	2,995	27	449	121	350	34	480	137	832	816	5,305	2,870	18,385	857	5,419
1999	344	3,380	0	330	122	424	18	85	194	1,272	1,125	6,711	2,925	17,786	1,016	7,044
2000	259	4,957	86	248	123	432	10	10	192	1,138	2,026	7,548	3,467	20,520	704	7,134
2001	610	5,146	0	0	0	0	40	390	13	929	2,403	10,412	14,187	20,512	1,012	7,584
2002	223	2,149	39	255	0	0	127	304	103	809	2,080	10,952	3,436	25,146	1,380	5,542
2003	738	4,097	0	449	0	546	24	339	120	993	721	9,517	2,947	26,591	924	6,611
2004	149	2,723	45	151	76	754	30	603	362	799	1,862	9,173	4,895	36,710	636	5,538
2005	853	4,484	24	1,091	23	1,079	12	282	308	1,363	1,369	11,030	4,606	33,594	1,622	8,198
Average																
10 year (1995-2004)	486	3,346	25	242	72	337	146	484	252	1,365	1,900	10,772	5,700	29,649	1,069	6,718
5 year (2000-2004)	396	3,814	34	221	40	346	46	329	158	934	1,818	9,520	5,786	25,896	931	6,482
2005 as % of 5-year	216%	118%	71%	495%	58%	311%	26%	86%	195%	146%	75%	116%	80%	130%	174%	126%

Source: Mills 1979-1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, *In prep* a-b.

a Information available from 1990-2005 only. Anglers may have harvested or released fish tallied as "catch."

Table 17.-Estimates of effort, harvest, and catch for northern pike and other species in the George Lake, from the Statewide Harvest Survey, 1977-2005.

Year	Angler Days	Total Northern Pike Harvest	Northern Pike Harvest <18 "	Northern Pike Harvest >18 "	Northern Pike Catch	Northern Pike Catch <18"	Northern Pike Catch >18"	Burbot Harvest	Burbot Catch	Grayling Harvest	Whitefish Harvest
1977	854	1,227						5		0	12
1978	1,271	1,392						0		27	0
1979	903	2,018						64		9	9
1980	1,057	1,395						0		17	0
1981	1,351	2,236						68		6	0
1982	989	1,635						31		0	0
1983	860	1,322						105		0	0
1984	1,254	1,700						143		65	65
1985	1,127	2,670						105		0	70
1986	1,957	3,076						32		134	0
1987	1,467	2,229						0		0	0
1988	964	1,837						0		0	0
1989	610	882						20		10	0
1990	1,540	945			3,950			34	34	17	0
1991	1,931	1,264	1,086	178	5,096	4,684	312	11	11	24	182
1992	1,067	529	446	83	2,861	2,657	204	110	110	23	0
1993	772	442	316	126	2,620	2,339	281	43	43	59	0
1994	594	948	835	113	4,377	3,962	415	52	73	0	0
1995	708	531	415	116	1,582	1,360	222	220	220	81	0
1996	577	1,289	1,093	196	4,487	4,203	284	0	0	0	0
1997	629	302	254	48	1,940	1,665	275	64	90	0	0
1998	829	603	344	74	2,995	2,661	334	8	8	136	0
1999	1,417	344	307	37	3,380	3,195	185	0	13	0	0
2000	734	259	168	91	4,957	4,015	942	0	0	0	0
2001	1,128	610	584	26	5,146	5,067	79	0	0	69	0
2002	700	223	203	20	2,149	1,897	252	0	0	0	7
2003	716	738	516	222	4,097	3,781	316	47	47	12	0
2004	377	149	149	0	2,723	2,512	211	0	0	0	0
2005	1,939	862	762	100	4,527	4,236	291	149	248	16	0
Average											
10-year (1995-04)	782	505	403	83	3,346	3,036	310	34	38	30	1
5-year (2000-04)	731	396	324	72	3,814	3,454	360	9	9	16	1
2005 as % of 5-year	265%	218%	235%	139%	119%	123%	81%	1585%	2638%	99%	0%

Source: Mills 1979-1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, *In prep* a-b.

Table 18.-Abundance, harvest, and exploitation of adult (>18 inches) George lake Northern Pike (1987-1992 and 2006).

Year	N. Pike Abundance ^a	George Lake Harvest ^b	George Lake Catch ^b	10% catch Mortality Plus harvest	Exploitation of Assessed Pike population
1987	8,495	2,229	...	...	...
1988	16,680	1,837	...	...	...
1989	12,354	882	...	...	...
1990	8,107	945	3,950	1,246	15.4%
1991	10,939	1,264	5,096	1,647	15.1%
1992	7,001	529	2,861	762	10.9%
Average					
1987-1992	10,336	1,281	3,969	1,218 ^c	11.8% ^d
2006	16,178	853	4,236	1,191	7.4%

^a Spring abundance for George Lake for fish > 18 inches or ≥ 450 mm FL, using the Peterson (1987-1991) and estimates (Pearse and Burkholder 1993).

^b (Mills 1988-1993) catch rates were not reported until 1990.

^c Average is based on years 1990-1992 only.

^d Exploitation based on average harvest of 913 fish for years 1990-1992.

Table 19.-Sport harvest and catch for lake trout in selected lakes within the Upper Tanana River drainage, from 1977-2005.

Year	Fielding Lake		Tangle Lake		Delta River		Stocked Lakes		Other Tanana Lakes		Total Tanana Waters	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1977									1,471		1,471	
1978			416						187		603	
1979									518		946	
1980			603						661		1,264	
1981	295		864						562		1,721	
1982	346		1,079						1,679		3,104	
1983	294		2,109				21		10		2,937	
1984	169		636		234		26		91		2,104	
1985	347		2,376						70		2,984	
1986	136		409						32		713	
1987	127				54				254		652	
1988	364		127				1,247		428		2,221	
1989	195		478		11		283		293		1,932	
1990	186	321	236	523	51	169	135		153	1,234	896	2,433
1991	295	870	472	988	44	44	443	811	399	1,301	1,978	4,162
1992	170	247	208	1,488	15	23	285	547	54	1,834	993	4,656
1993	276	939	597	2,668	0	9	564	1,814	370	1,108	1,939	7,414
1994	52	213	416	1,357	0	0	817	1,729	165	556	1,582	4,415
1995	44	486	246	928	0	7	227	508	193	1,127	887	3,314
1996	42	260	235	2,519	0	0	44	163	414	1,603	877	5,199
1997	55	270	240	3,132	0	0	76	248	371	1,049	832	5,161
1998	19	302	290	1,222	0	25	0	77	171	799	524	2,736
1999	43	279	484	2,034	14	81	14	298	501	981	1,145	4,480
2000	18	221	376	1,626	0	0	153	407	568	1,500	1,133	4,012
2001	12	106	112	591	0	0	15	67	262	1,105	445	2,304
2002	0	137	414	2,464	48	157	50	239	149	1,222	709	4,816
2003	83	423	505	1,631	68	90	126	384	37	549	860	3,595
2004	101	520	270	976	30	91	0	284	173	1,466	646	3,816
2005	112	862	224	2,327	0	0	128	331	570	937	1,082	5,164
Average												
10-year (1995-2004)	42	300	317	1,712	16	45	71	268	284	1,140	806	3,943
5-year (2000-2004)	43	281	335	1,458	29	68	69	276	238	1,168	759	3,709
2005 as % of 5-year	262%	306%	67%	160%	0%	0%	186%	120%	240%	80%	143%	139%

Table 20.-Sport harvest and catch of Arctic grayling and lake trout by recreational anglers fishing the Tangle Lakes System and Delta River from 1978-2005.

Year	Tangle Lakes above Wildhorse Creek					Delta River Below Wildhorse Creek				
	Angler	Arctic Grayling		Lake Trout		Angler	Arctic Grayling		Lake Trout	
	Days	Harvest	Catch	Harvest	Catch	Days	Harvest	Catch	Harvest	Catch
1978	7,711	5,786		416						
1979	5,864	3,466		428						
1980	8,168	5,522		603						
1981	5,530	6,858		864						
1982	9,502	9,590		1,079						
1983	5,513	7,794		2,088						
1984	3,954	4,829		636		293	481		11	
1985	5,601	5,029		2,376		521	831		234	
1986	5,122	4,781		409		624	798		0	
1987	2,530	2,467		0		367	212		0	
1988	2,656	3,711		127		775	158		54	
1989	3,991	3,136		478		526	964		0	
1990	5,228	2,853	12,322	236	523	958	304	4,051	51	169
1991	6,407	4,917	16,021	472	988	679	575	2,458	44	44
1992	4,791	2,608	14,953	208	1,488	790	429	2,833	15	23
1993	8,937	3,741	23,327	597	2,668	1,142	476	8,600	0	9
1994	7,525	5,668	26,475	416	1,357	1,040	549	6,695	0	0
1995	7,678	2,449	14,001	246	928	1,186	254	4,033	0	7
1996	4,250	3,213	21,061	235	2,519	654	291	3,215	0	0
1997	5,455	4,152	29,041	240	3,132	553	770	4,112	0	0
1998	4,689	3,045	19,180	290	1,222	410	160	5,562	0	0
1999	4,670	1,804	15,683	484	2,034	1,023	640	5,924	14	81
2000	5,410	2,020	18,574	376	1,626	551	243	2,813	0	0
2001	4,033	1,738	12,970	112	591	296	104	905	0	0
2002	4,994	2,686	25,768	414	2,464	663	121	5,600	48	157
2003	5,367	2,438	23,931	505	1,631	554	101	1,398	68	90
2004	3,737	1,251	15,007	270	976	598	45	1,391	30	91
2005	4,299	1,825	18,695	224	2,327	847	259	2,593	0	0
Average										
10-year (1995-2004)	5,028	2,480	19,522	317	1,712	649	273	3,495	16	43
5-year (2000-2004)	4,708	2,027	19,250	335	1,458	532	123	2,421	29	68
2005 as % of 5-year	91%	90%	97%	67%	160%	159%	211%	107%	0%	0%

Source: Mills 1979-1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, *In prep* a-b.

Table 21.-Summary of sport harvest and catch of Arctic grayling, burbot, and lake trout in Fielding Lake^a in the Tanana River drainage, from 1981-2005.^b

Year	Angler Days ^a	Harvest Lake Trout	Catch of Lake Trout	Lake Trout Abundance ^c	Burbot Harvest	Catch of Burbot	Burbot Abundance ^d	Harvest Arctic Grayling	Catch of Grayling
1981	1,369	295			249			1,913	
1982	2,764	346			365			3,044	
1983	1,737	294			367			2,035	
1984	871	169			0			935	
1985	1,023	347			0		325	1,023	
1986	1,682	136			32		334	1,329	
1987	1,032	127			12		234	910	
1988	1,728	364			36		426	1,492	
1989	1,664	195			0		581	1,283	
1990	1,255	186	321		0	0	698	1,097	2,802
1991	1,572	295	870		0	0	617	1,284	3,815
1992	1,910	170	247		51	51	347	548	2,585
1993	1,827	276	939		32	32	337	1,055	7,670
1994	2,129	52	213		73	73	445	1,244	8,901
1995	3,575	44	486		0	0	447	944	3,811
1996	960	42	222		0	0	483	599	3,114
1997	1,259	55	245		0	0	405	1,133	1,612
1998	1,602	19	341		0	25	421	851	2,165
1999	1,154	43	279	264	0	15	598	645	3,050
2000	827	18	221		0	48		705	2,594
2001	525	12	106		0	0		424	2,028
2002	826	0	137		0	0		587	2,932
2003	840	83	423		11	11		351	1,989
2004	1,010	101	520		30	30		491	2,802
2005	1,248	112	862		25	55		623	4,437
Average 10-year (1995-2004)	1,258	42	298		4	13		673	2,610
5-year (2000-2004)	806	43	281		8	18		512	2,469
2005 as % of 5-year	155%	262%	306%		305%	309%		122%	180%

^a Information available from 1981-2004 only.

^b Mills 1979-1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, In prep a-b.

^c Population estimate of abundance of lake trout 22 inches (legal size limit) and larger (Parker et al. 2001).

^d Population estimates of abundance of burbot 18 inches total length and larger (Parker 2001b).

Table 22.-Sport harvest and catch of burbot in selected waters of the Upper and Lower Tanana River drainage, from 1977-2005.

Harvest Year	Fielding Lake		Tangle Lakes		George Lake		Shaw Creek		Tanana River		Other Lakes		UTMA waters		Tanana Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1977					5							829		834		1,547
1978			72									832		904		1,383
1979			88		64							966		1,118		1,979
1980			229									1,285		1,514		2,700
1981	249		194		68							2,257		2,768		4,122
1982	365		105		31							1,887		2,388		3,887
1983	367		84		105				2,623			722		3,901		5,040
1984			39		143		415		1,921			1,325		3,843		5,556
1985			70		105		175		1,365			665		2,380		4,795
1986	32		104		32		120		2,948			945		4,181		5,142
1987	13						607		2,362			394		3,376		3,855
1988	36								2,419			709		3,164		3,733
1989					20		170		2,305			340		2,835		4,357
1990			17	51	34		354	726	1,789	1,975	743	1,468	2,937		3,799	5,116
1991			23	23	11	11	45	45	1,601	1,950	519	587	2,199		2,739	3,574
1992	51	51	17	34	110	110	161	161	1,717	2,148	236	295	2,292		3,620	4,373
1993	32	32	11	21	43	43	161	161	3,156	3,627	600	664	4,003		5,717	6,657
1994	73	73	31	31	52	73	93	114	3,194	4,048	818	989	4,261		5,165	6,397
1995	0	0	0	70	220	220	138	172	3,302	4,421	80	114	3,740		4,934	6,966
1996	0	0	0	0	0	0	24	81	720	1,241	228	353	972	1,675	3,203	5,310
1997	0	0	52	52	64	90	52	180	2,058	2,458	206	515	2,432	3,295	6,348	8,340
1998	0	25	0	0	8	8	71	79	863	1,292	247	316	1,189	1,720	3,291	4,579
1999	0	15	8	28	0	13	127	127	761	994	178	254	1,074	1,431	3,148	4,572
2000	0	48	0	0	0	0	557	582	867	1,305	248	431	1,672	2,366	3,740	5,720
2001	0	0	29	29	0	0	72	72	378	562	36	36	515	699	1,297	1,487
2002	0	0	22	22	0	0	168	183	824	1,059	275	323	1,289	1,565	4,009	4,869
2003	11	11	9	19	47	47	32	32	1,079	1,355	11	11	1,189	1,475	2,561	3,332
2004	30	30	0	0	0	0	0	0	645	818	0	0	675	848	1,829	4,591
2005	25	50	0	34	149	248	50	62	773	905	24	71	1,021	1,370	2,487	3,226
Averages																
10-year (1995-2004)	4	13	12	22	34	38	124	151	1,150	1,551	151	235	1,475	1,675	3,436	4,977
5-year (2000-2004)	8	18	12	14	9	9	166	174	759	1,020	114	160	1,068	1,391	2,687	4,000
2005 as % of 5-year	305%	281%	0%	243%	1585%	2638%	30%	36%	102%	89%	21%	44%	96%	99%	93%	81%

Table 23.-Effort, harvest, and catch statistics by species for stocked fisheries in the UTMA 1996-2005.

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Ave. "96-05
	Effort^a										
Number of anglers	9,980	7,128	7,696	8,461	7,259	6,180	5,952	3,424	2,493	2,797	6,137
Days fished (SW effort) ^a	21,482	12,278	13,613	23,126	17,243	12,642	15,800	10,528	12,065	9,390	14,817
Days fished (UTMA effort)	35,616	30,536	31,412	46,809	34,956	28,150	31,145	29,036	25,523	24,141	31,732
Percent of stocked water effort	60%	40%	43%	49%	49%	45%	51%	36%	47%	39%	47%
	Harvest^a										
Rainbow trout	16,328	12,394	19,303	21,914	19,854	9,063	17,762	9,657	8,046	6,336	14,066
Coho/Chinook salmon	6,724	3,129	6,710	6,533	10,720	5,123	8,684	2,010	1,939	1,002	5,257
Arctic grayling	381	322	123	135	33	720	387	175	97	193	257
Arctic char	767	688	1,409	2,356	1,498	1,575	2,268	1,668	723	355	1,331
Lake trout	61	111	7	300	82	37	144	126	56	257	118
Total	24,261	16,644	27,552	31,238	32,187	16,518	29,245	13,636	10,861	8,143	21,029
Harvest / effort	1.1	1.4	2.0	1.4	1.9	1.3	1.9	1.3	0.9	0.9	1.4
	Catch^a										
Rainbow trout	35,003	32,652	49,049	63,723	48,663	24,461	44,606	26,230	25,057	17,355	36,680
Coho/Chinook salmon	15,597	9,207	15,924	18,201	29,026	11,429	23,816	7,052	4,862	2,973	13,809
Arctic grayling	3,046	1,939	3,097	3,145	1,059	3,333	3,294	991	1,833	1,262	2,300
Arctic char	2,351	1,342	3,400	9,200	3,507	2,323	6,001	4,923	3,089	1,236	3,737
Lake trout	162	370	136	994	340	218	886	390	677	494	467
Total	56,159	45,510	71,606	95,263	82,595	41,764	78,603	39,586	35,517	23,320	56,992
Catch / effort	2.6	3.7	5.3	4.1	4.8	3.3	5.0	3.8	2.9	2.5	3.8

^a Mills 1979-1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, *In prep* a-b.

Table 24.—Summary of stocking activities for the UTMA, 2004-2006.

Species	Broodstock	Catchable	Subcatchable	Fingerling	Total
2004					
Arctic grayling				9,000	9,000
Arctic char			8,105	13,829	21,934
Chinook salmon		6,000			6,000
Coho salmon				35,877	35,877
Rainbow trout		29,388		564,092	593,480
Total	0	35,288	8,105	622,798	666,291
2005					
Arctic grayling				5,950	5,950
Arctic char			12,986		12,986
Chinook salmon		5,805			5,805
Coho salmon				51,392	51,392
Rainbow trout		18,939		120,122	245,567
Total	0	24,744	12,986	106,506	321,700
2006					
Arctic grayling				52,592	52,592
Arctic char			2,076		2,076
Coho salmon				70,826	70,826
Rainbow trout		29,477		94,273	94,273
Total	0	9,232	3,000	195,331	207,563

Table 25.—Summary of projected game fish stockings for the UTMA, 2007-2008.

Species	Lifestage	Target Size (in)	2007 Projected		2008 Projected	
			Number of Lakes	Number of Fish	Number of Lakes	Number of Fish
Arctic char	Subcatchable	5-6	0	0	17	24,825
Chinook salmon	Catchable	6-8	2	6,000	2	6,000
Arctic grayling	Fingerling	2-3	7	9,000	1	2,000
Coho salmon	Fingerling	2-4	3	42,600	2	31,500
Rainbow trout	Fed Fry ^a	1½	3	180,000	3	180,000
Rainbow trout	Fingerling	2	7	177,600	29	278,200
Rainbow trout	Catchable	5-6	8	21,100	8	21,100
Rainbow trout	Broodstock	12-16	2	75	1	40
Total			32	378,775	63	479,340

^a Fed fry fish are placed in rearing ponds for rapid growth, and then removed in the fall to other lakes.

Table 26.—Summary of stocking activities for Quartz Lake, 2004-2006.

Species	Broodstock	Catchable	Subcatchable	Fingerling	Total
2004					
Arctic char				9,504	9,504
Chinook salmon		5,000			5,000
Coho salmon				33,189	33,189
Rainbow trout		18,128	34,849	236,410	289,387
Total		23,128		279,103	332,080
2005					
Arctic char			9,536		9,536
Coho salmon				33,189	33,189
Rainbow trout		18,128	76,296	236,410	289,387
Total		18,128	44,385	269,599	332,112
2006					
Coho Salmon				84,168	84,168
Rainbow trout		8,742	29,352	76,296	114,390
Total		8,742	29,352	160,464	198,558

Table 27.—Summary of projected game fish stockings for Quartz Lake, 2007-2008.

Species	Lifestage	Target Size (in)	2007 Projected	2008 Projected
Arctic char	Subcatchable	5-6	0	9,500
Coho salmon	Fingerling	3-4	30,000	30,000
Chinook salmon	Catchable	6-8	5,000	5,000
Rainbow trout	Fingerling	2	150,000	150,000
Rainbow trout	Catchable	6-8	12,800	12,800

Table 28.—Effort, catch, and harvest statistics by species for Quartz Lake 1996-2005.

	Year										
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Average
	Effort^a										
Number of anglers	6,853	4,445	5,821	6,140	4,628	4,113	4,432	4,005	2,560	2,927	4,592
Number of days fished	14,163	6,956	10,175	17,820	11,047	8,325	12,477	7,169	7,852	5,696	10,168
	Harvest^a										
Rainbow trout	11,687	8,496	14,335	19,066	14,358	6,060	13,207	7,076	5,097	4,852	10,423
Coho/Chinook salmon	6,724	2,999	5,526	6,018	9,866	5,080	8,684	1,892	1,902	947	4,964
Arctic char	330	313	1,201	2,321	1,066	1,509	1,700	1,292	697	355	1,078
Total	18,741	11,808	21,062	27,405	25,290	12,649	23,591	10,260	7,696	6,154	16,466
Harvest rate (harvest/effort)	1.3	1.7	2.1	1.5	2.3	1.5	1.9	1.4	1.0	1.1	1.6
	Catch^a										
Rainbow trout	23,051	19,729	36,416	54,463	32,358	14,821	34,849	16,846	16,522	13,120	26,218
Coho/Chinook salmon	15,404	8,902	13,320	16,740	27,464	10,715	23,699	6,464	4,820	2,830	13,036
Arctic char	706	497	2,726	8,859	2,502	1,847	4,393	3,966	2,617	935	2,905
Total	39,161	29,128	52,462	80,062	62,324	27,411	62,941	27,276	23,959	16,885	42,161
Catch rate (catch / effort)	2.8	4.2	5.2	4.5	5.6	3.3	5	3.8	3.1	3.0	4.1

^a Mills 1979-1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, *In prep* a-b.

Table 29.-Summary of stocking activities for small urban lakes in the UTMA 2004-2006.

Species	Broodstock	Catchable	Subcatchable	Fingerling	Total
2004					
Rainbow trout		1,460			1,460
2005					
Rainbow trout		750			750
2006					
Rainbow trout		0			0

Table 30.-Summary of projected game fish stockings for small urban lakes in the UTMA, 2007-2008.

Species	Lifestage	Target Size (in)	2007 Projected		2008 Projected	
			Number of Lakes	Number of Fish	Number of Lakes	Number of Fish
Rainbow trout	Catchable	5-6	1	1,500	1	1,500

Table 31.-Actions for rural stocked lakes in the UTMA.

Lake	Lake Size in Acres	Species	Stocking Years
Richardson Highway			
81 Mile Rich. H. Pit	3	Rainbow	Annual
Bluff Cabin Lake	72	Rainbow	Even Years
Donnelly Lake	65	Char, Rainbow	Even Years, Even Years
Little Lost Lake (<i>at Quartz</i>)	102	Rainbow	Annual
Rapids Lake	5	Rainbow	Even Years
Shaw Pond	3	Char, Rainbow	Even Years, Annual
Meadows Road			
Bolio Lake	138	Rainbow, Grayling	Annual, Annual
Bullwinkle Lake	4	Rainbow	Even Years
Chet Lake	8	Char, Rainbow	Even Years, Even Years
Doc Lake	3	Rainbow	Even Years
Ghost Lake	5	Char, Rainbow	Even Years, Even Years
"J" Lake	15	Char, Grayling	Even Years, Odd Years
Luke Lake	8	Grayling	Odd Years
Mark Lake	18	Char, Coho,Rainbow	Even Years, Annual, Even Years
Nickel Lake	5	Char, Rainbow, Grayling,	Even Years, Even Years,Odd Years
No Mercy Lake	3	Rainbow	Even Years
North Twin Lake	20	Rainbow	Even Years
Sheefish Lake	8	Char	Even Years
South Twin Lake	20	Rainbow	Annual Years
Weasel Lake	8	Rainbow	Even Years
Coal Mine Road			
Backdown Lake	6	Char, Rainbow	Even Years, Even Years
Brodie Lake	5	Char, Grayling, Chinook	Even Years, Odd Years,Annual
Coal Mine Road #5	13	Rainbow	Even Years
Dick's Pond	5	Char	Even Years
Ken's Pond	5	Char, Rainbow	Even Years, Even Years
Last Lake	5	Char, Rainbow	Even Years, Even Years
Paul's Pond	5	Grayling	Odd Years
Rangeview Lake	5	Char, Grayling	Even Years, Odd Years
Rockhound Lake	3	Rainbow	Even Years
Alaska Highway			
Craig Lake	17	Rainbow	Odd Years
Donna Lake	58	Rainbow	Odd Years
Four Mile Lake	100	Char, Rainbow	Even Years, Even Years
Hidden Lake (<i>Tetlin R.</i>)	20	Rainbow	Odd Years
Jan Lake	45	Coho, Rainbow	Odd Years, Even Years
Lisa Lake	50	Rainbow	Odd Years
Little Donna Lake	30	Rainbow	Odd Years
Robertson Lake #2	15	Rainbow	Even Years

Table 32.—Summary of stocking activities for small rural lakes in the UTMA 2004-2006.

Species	Broodstock	Catchable	Subcatchable	Fingerling	Total
2004					
Arctic grayling				9,000	9,000
Coho salmon				1,532	1,532
Rainbow trout		10,118		276,282	286,400
Chinook salmon		1,000			1,000
Arctic char			4,605	4,325	8,930
Total		11,118	4,605	291,139	306,862
2005					
Arctic grayling				5,950	5,950
Coho salmon				16,810	16,810
Rainbow trout		1,300		129,266	130,566
Chinook salmon		5,805			5,805
Arctic char			3,450		3,450
Total		7,105	3,450	152,026	162,581
2006					
Arctic char			2,076		2,076
Arctic Grayling				51,587	51,587
Rainbow trout		490		75,035	75,035
Total		490	2,076	126,622	128,698

Table 33.-Summary of projected game fish stockings for small rural lakes in the UTMA, 2007-2008.

Species	Lifestage	Target Size (in)	2007 Projected		2008 Projected	
			Number of Lakes	Number of Fish	Number of Lakes	Number of Fish
Arctic char	Subcatchable	5-6	0	0	14	8,925
Arctic grayling	Fingerling	3	7	9,000	1	2,000
Coho salmon	Fingerling	2-4	1	9,000	2	5,100
Chinook salmon	Catchable	5-6	2	12,600	1	1,500
Rainbow trout	Fed fry ^a	1	3	180,000	3	180,000
Rainbow trout	Fingerling	2-4	5	27,600	20	64,200
Rainbow trout	Catchable	6-8	6	8,300	6	8,300
Rainbow trout	Broodstock	12-16	2	75	1	40

^a Up to 180,000 fed fry will be released into rearing ponds on Fort Greely in the summer, recaptured in the fall, and transferred to Quartz Lake.

Table 34.-Effort, catch, and harvest statistics by species for small rural lakes in the UTMA 1996-2005.

	Year										Average 1996-05
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
Effort											
# of Anglers on Rural Lakes	2,418	1,998	1,243	1,634	2,037	1,640	3,183	1,772	763	858	1,755
Effort on Rural waters	5,353	4,018	2,477	3,916	4,806	1,233	2,859	2,881	2,817	3,425	3,379
UTMA effort on all Stocked Lakes	21,482	12,278	13,613	23,126	17,243	12,642	15,800	10,528	12,065	9,390	14,817
% effort of Rural stocked waters	25%	33%	18%	17%	28%	10%	18%	27%	23%	36%	23%
Harvest											
Rainbow trout	3,729	2,723	2,952	1,384	3,408	1,306	5,836	2,153	2,167	1,363	2,702
Coho/Chinook salmon	0	120	1,180	515	778	16	632	118	0	55	341
Arctic grayling	353	260	110	20	13	173	1,459	151	97	161	280
Arctic char	403	337	206	35	379	13	395	376	13	0	216
Lake trout	47	90	7	142	77	11	142	126	0	225	87
Total	4,532	3,530	4,455	2,096	4,655	1,519	8,464	2,924	2,277	1,804	3,626
Harvest rate (harvest / effort)	0.8	0.9	1.8	0.5	1.0	1.2	3.0	1.0	0.8	0.5	1.1
Catch											
Rainbow trout	8,760	9,512	7,102	5,528	10,434	5,836	7,408	8,249	6,208	3,948	7,299
Coho/Chinook salmon	193	215	2,465	1,452	1,446	632	60	588	0	143	719
Arctic grayling	2,081	1,448	2,563	2,761	838	1,459	1,941	898	1,833	619	1,644
Arctic char	1,523	807	513	341	952	395	1,550	822	446	301	765
Lake trout	148	297	131	748	285	142	448	386	284	446	332
Total	12,705	12,279	12,774	10,830	13,955	8,464	11,407	10,943	8,771	5,457	10,759
Catch rate (catch / effort)	2.4	3.1	5.2	2.8	2.9	6.9	4.0	3.8	3.1	1.6	3.2

Source: Mills 1979-1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, *In prep* a-b.

Table 35.-Actions for remote stocked lakes in the upper Tanana Valley.

Lake	Lake Size in Acres	Species	Stocking Years
Forest Lake	25	Rainbow	Even Years starting in 2004
Fourteen Mile Lake	90	Rainbow	Even Years starting in 2004
Koole Lake	320	Rainbow	Even Years starting in 2004
Monte Lake	90	Rainbow	Even Years starting in 2004
Rainbow Lake	96	Rainbow	Even Years starting in 2004
South Johnson Lake	14	Rainbow	Even Years starting in 2004
Square Lake	100	Char	Even Years starting in 2004

Table 36.-Summary of stocking activities for small remote lakes in the UTMA 2004-2006.

Species	Broodstock	Catchable	Subcatchable	Fingerling	Total
2004					
Arctic char			3,500		3,500
Coho salmon				1,156	1,156
Rainbow trout				48,400	48,400
2005					
Coho salmon				4,967	4,967
Rainbow trout				8,941	8,941
2006					
Arctic grayling			1,005		1,005
Coho salmon				10,105	10,105
Rainbow trout				45,500	45,500

Table 37.-Summary of projected game fish stockings for small remote lakes in the UTMA, 2007-2008.

Species	Lifestage	Target Size (in)	2007 Projected		2008 Projected	
			Number of Lakes	Number of Fish	Number of Lakes	Number of Fish
Arctic char	Subcatchable	5-6	0	0	2	6,400
Rainbow trout	Fingerling	2-4	0	0	7	64,000

Table 38.-Effort, catch, and harvest statistics by species for remote lakes in the UTMA 1996-2005.

	Year										Average 1996-05
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
Effort											
# of Anglers on Remote Lakes	577	583	543	593	507	307	239	289	376	130	414
Effort on Remote waters	1,458	1,096	815	1,183	1,214	555	385	347	1,396	269	872
UTMA effort on all Stocked Lakes	21,482	12,278	13,613	23,126	17,243	12,642	15,800	10,528	12,065	9,390	14,817
% effort of Remote stocked waters	7%	9%	6%	5%	7%	4%	2%	3%	12%	3%	6%
Harvest											
Rainbow trout	730	1,130	1,857	1,414	1,975	1,210	637	396	122	121	959
Coho/Chinook salmon									37	0	19
Arctic grayling								24	0	32	19
Arctic char						33	0	0	13	0	9
Lake trout	0	0	0	55	0	16	8	0	56	32	17
Total	730	1,130	1,857	1,469	1,975	1,259	645	420	228	185	990
Harvest rate (harvest / effort)	0.5	1.0	2.3	1.2	1.6	2.3	1.7	1.2	0.2	0.7	1.1
Catch											
Rainbow trout	2,708	3,253	5,265	3,519	5,613	2,941	2,161	991	2327	287	2,907
Coho/Chinook salmon								0	42	0	14
Arctic grayling								93	0	643	245
Arctic char						33	37	67	26	0	33
Lake trout	0	0	0	137	0	48	317	2	393	48	95
Total	2,708	3,253	5,265	3,656	5,613	3,022	2,515	1,153	2,788	978	3,095
Catch rate (catch / effort)	1.9	3.0	6.5	3.1	4.6	5.4	6.5	3.3	2.0	3.6	3.6

Source: Mills 1979-1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, *In prep* a-b.

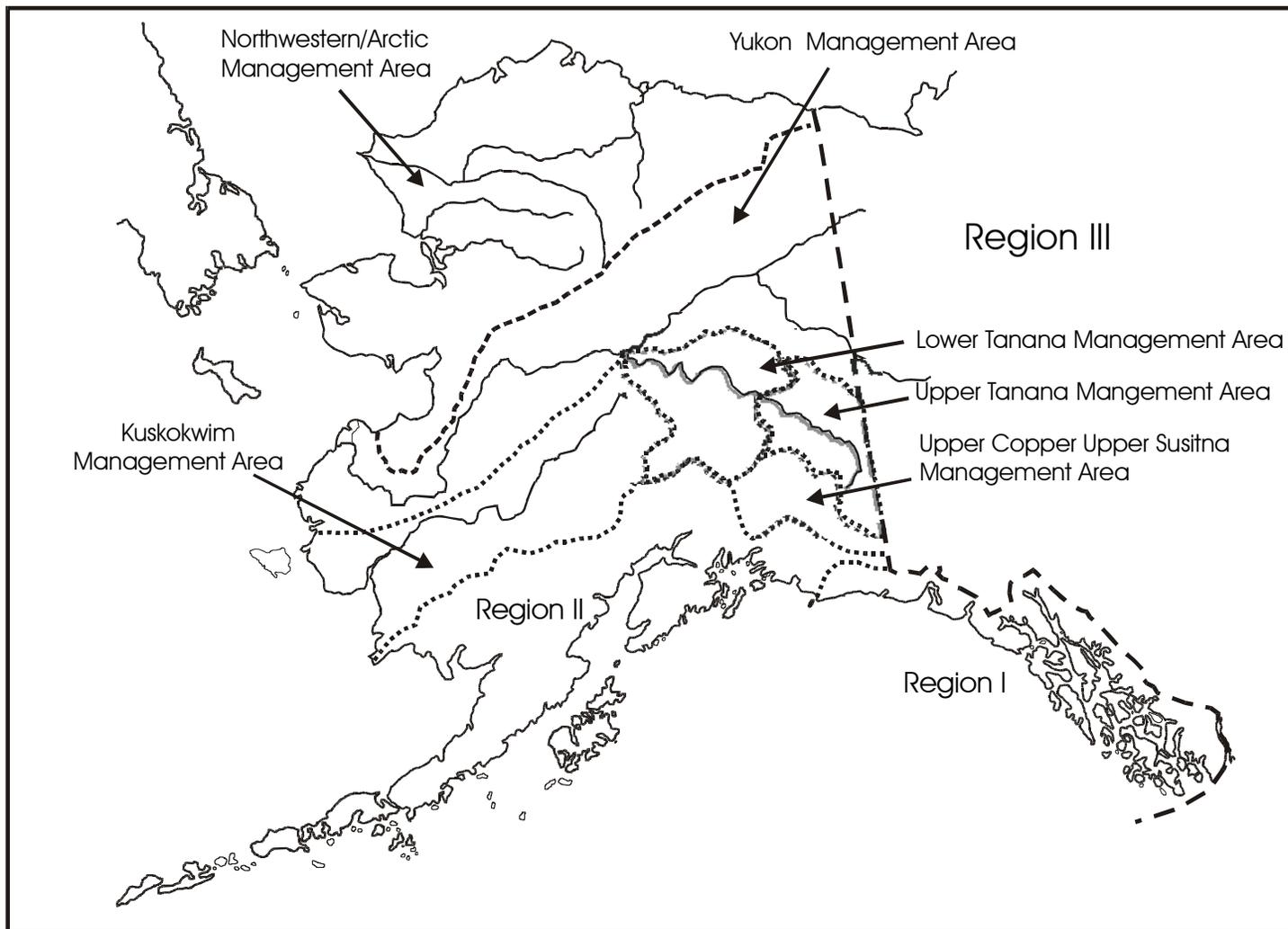


Figure 1.-Map of the sport fish regions in Alaska and the six Region III management areas.

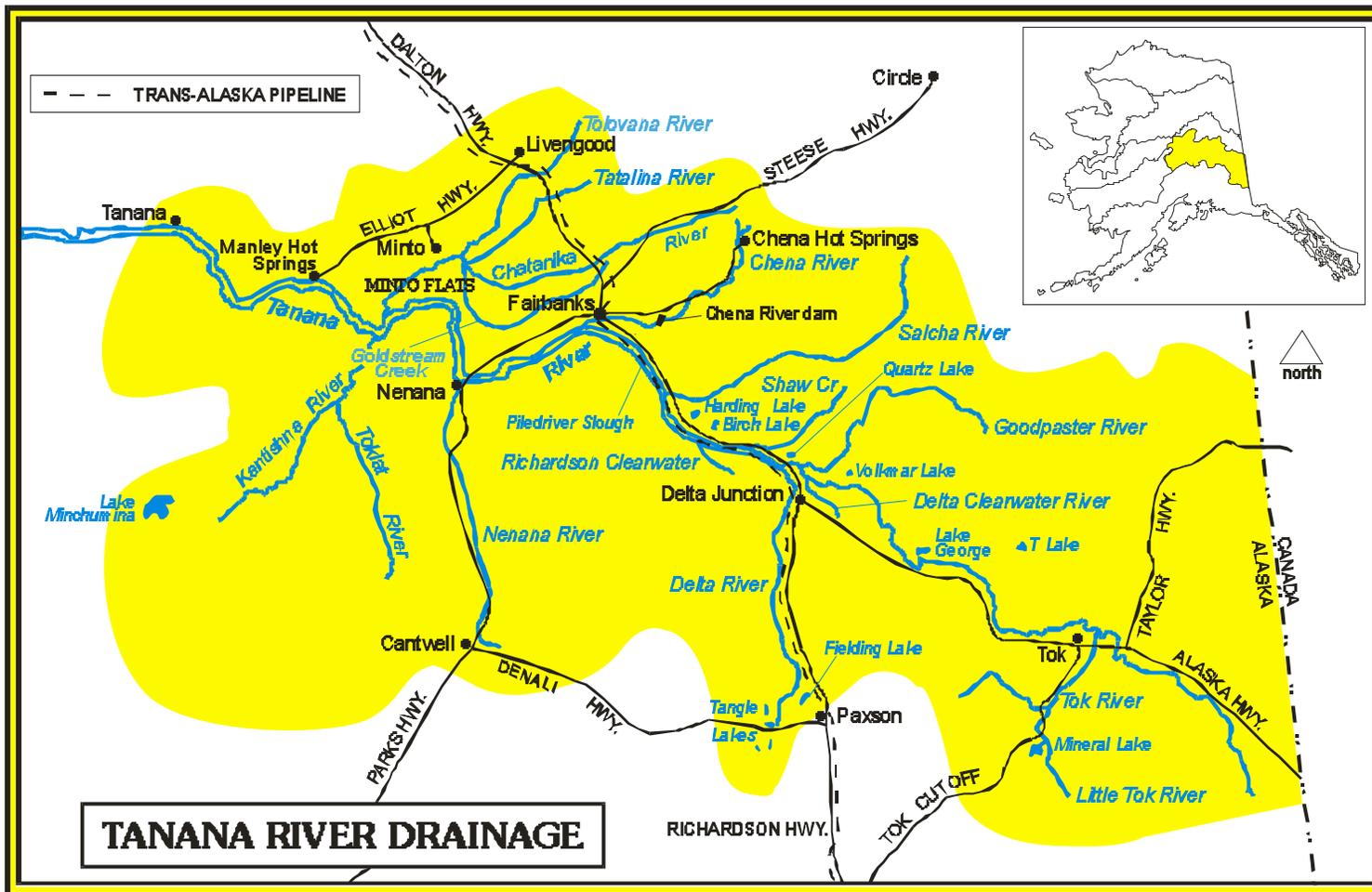


Figure 2.-Map of the Tanana River drainage.

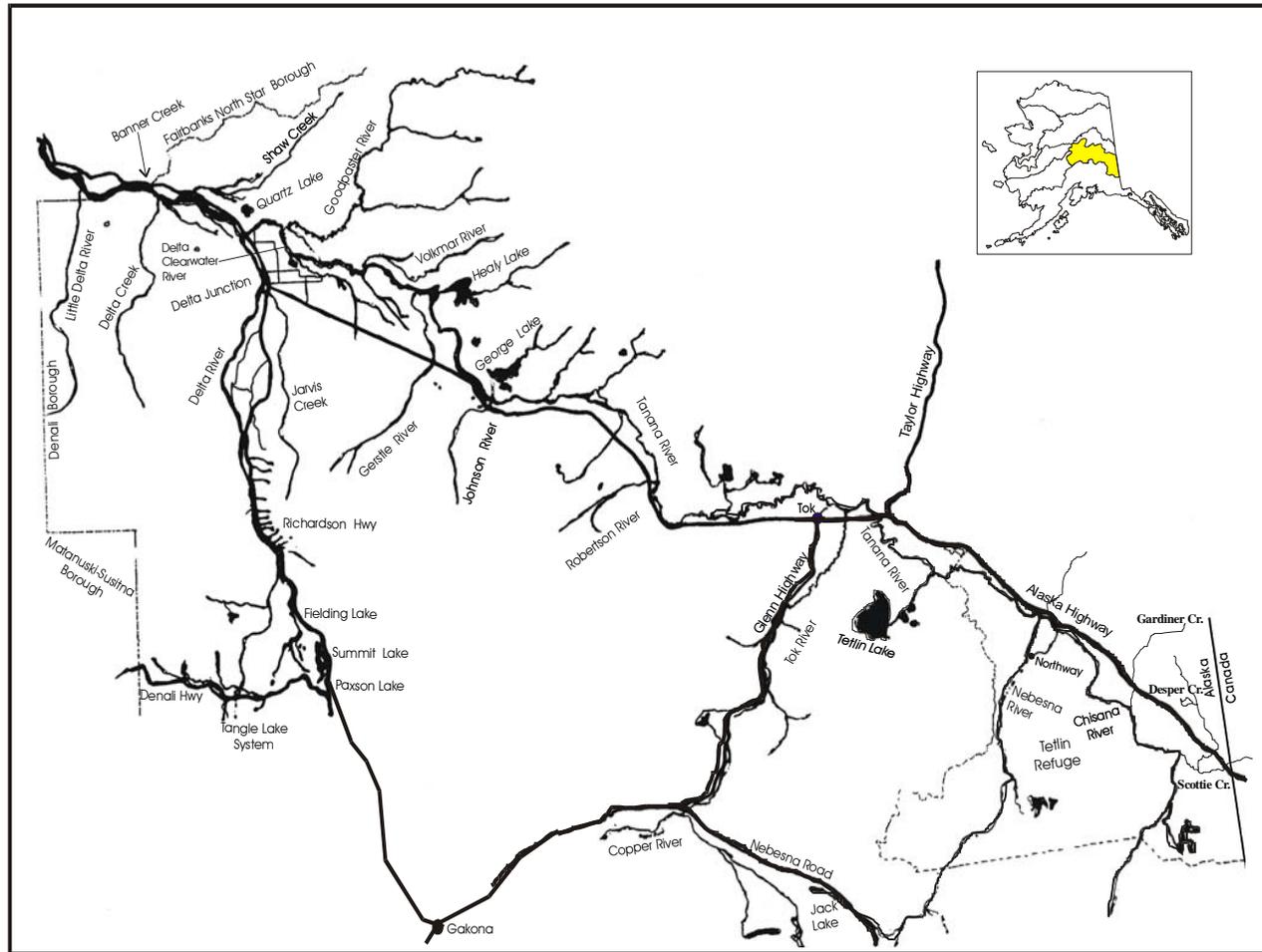


Figure 3.-Map of the Upper Tanana Management Area within the Tanana River drainage.

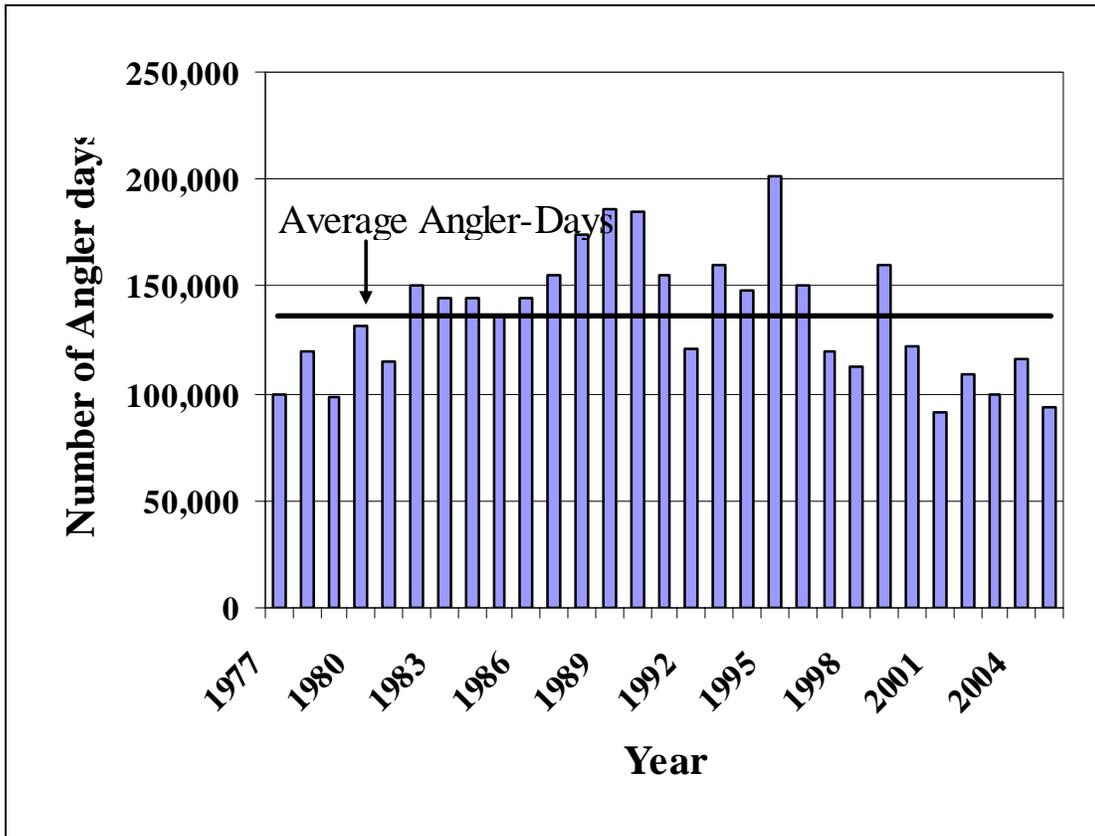


Figure 4.-Angler effort in the Tanana River drainage from 1977 – 2005 (Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Jennings et al. 2004, 2006 a-b, In prep a-b).

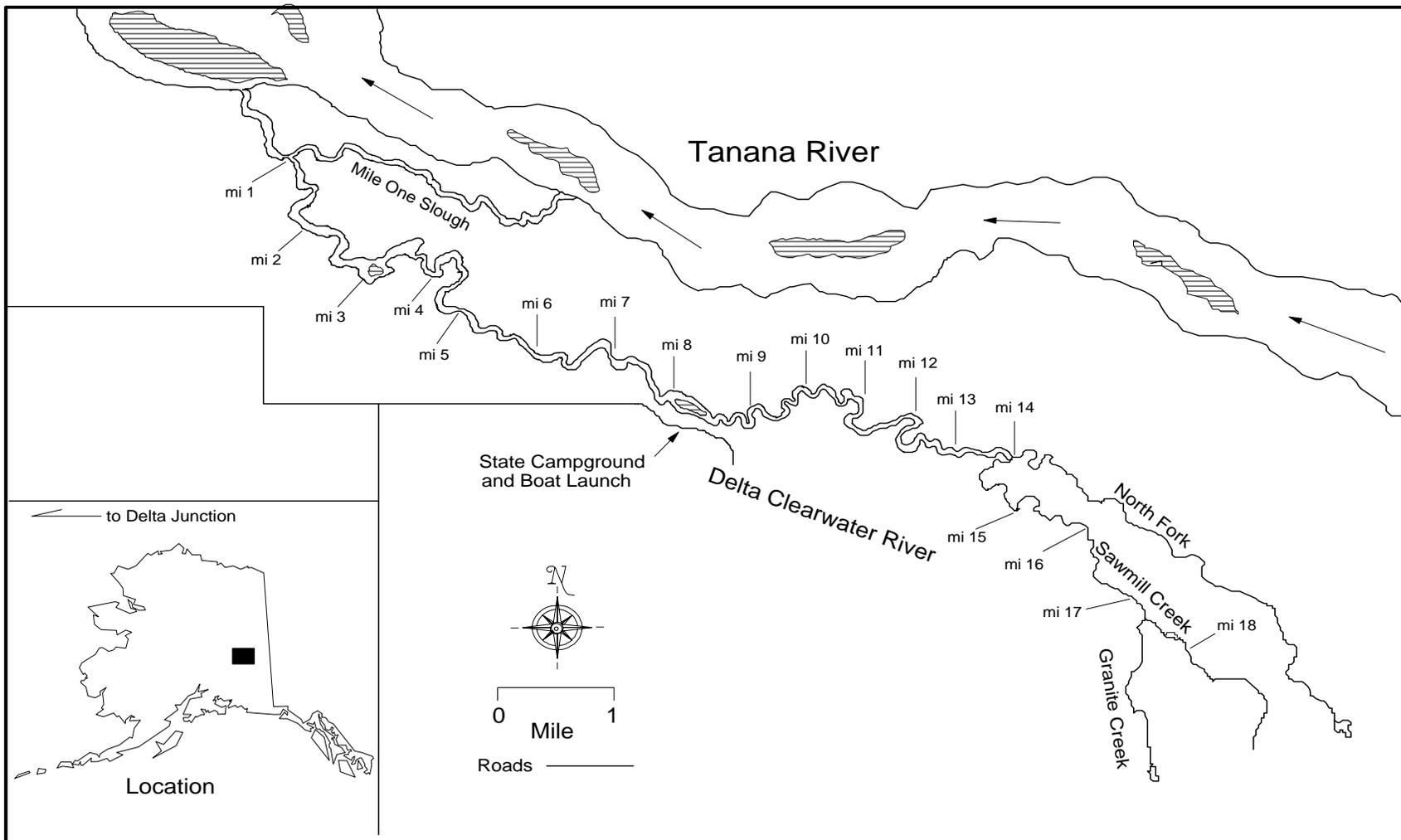


Figure 5.-Map of the Delta Clearwater River.

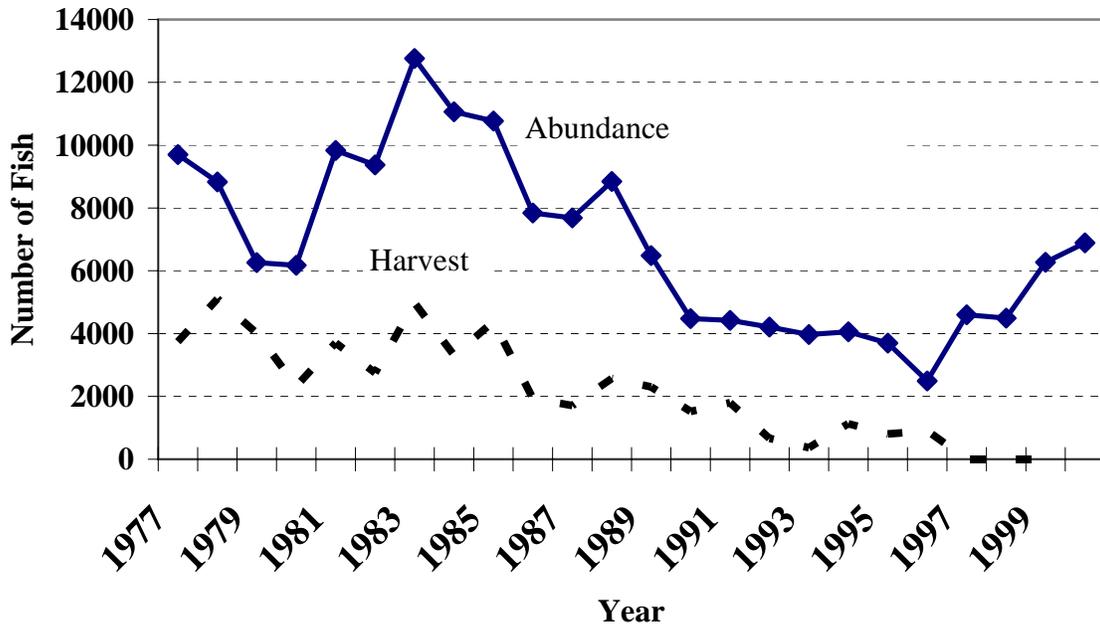


Figure 6.-Abundance of age-5 Arctic grayling in the Delta Clearwater River from 1977-2000. Estimates for 1977 - 1990 are from CAGEAN modeling (Appendix C1; Clark and Ridder 1994) and reflect population at start of fishing season. Estimates for 1996 - 1999 are from mark-recapture experiments and reflect the population in July (Ridder 1998b; 1999a; Ridder and Gryska 2000; and Gryska 2001). Harvest Data from Mills (1979-1994), Howe et al. (1995, 1996, 2000a-d), and Walker et al. (2003).

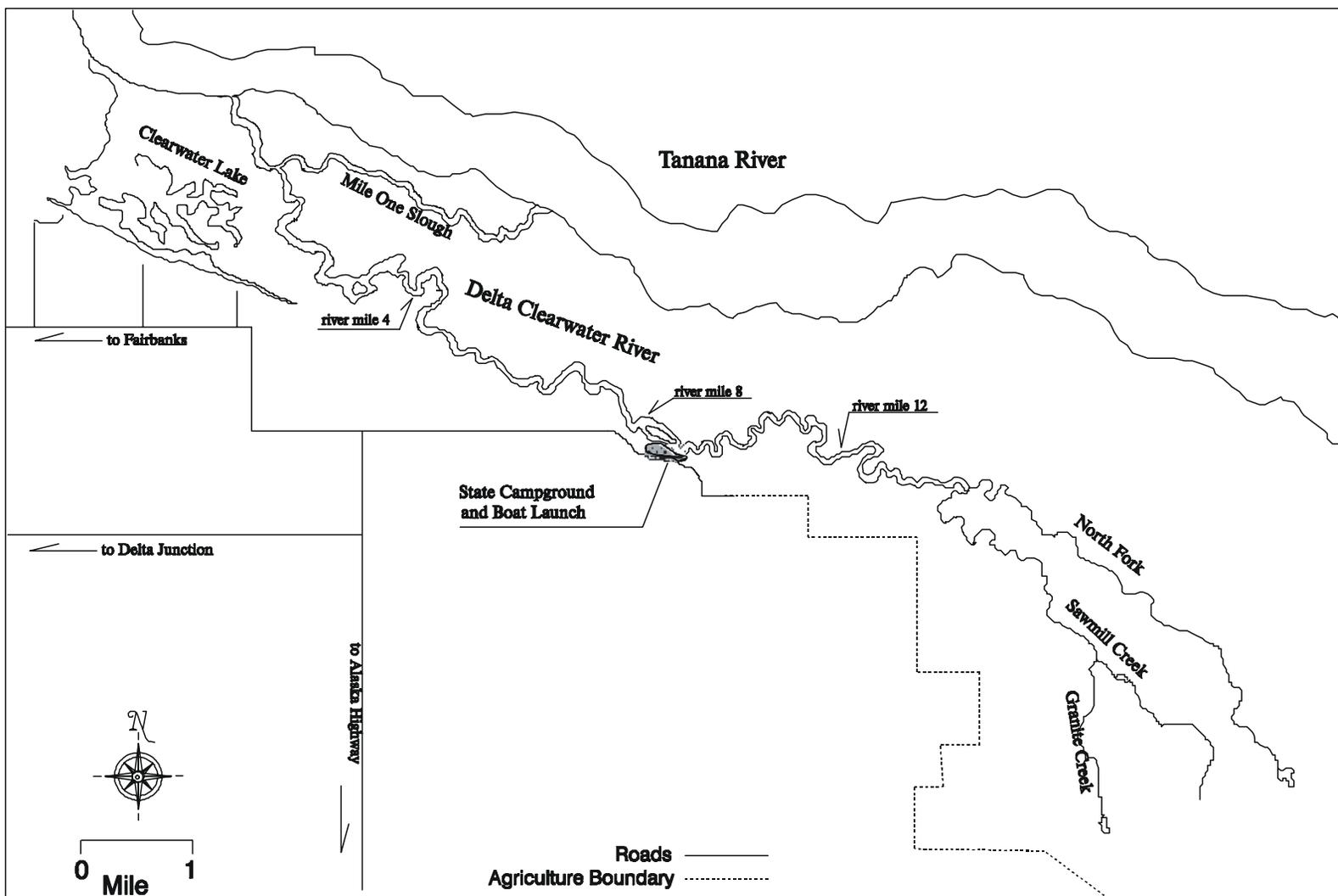


Figure 7.-Map of Delta Clearwater River and Clearwater Lake, all included in special catch-and-release waters regulations made by BOF in 1997.

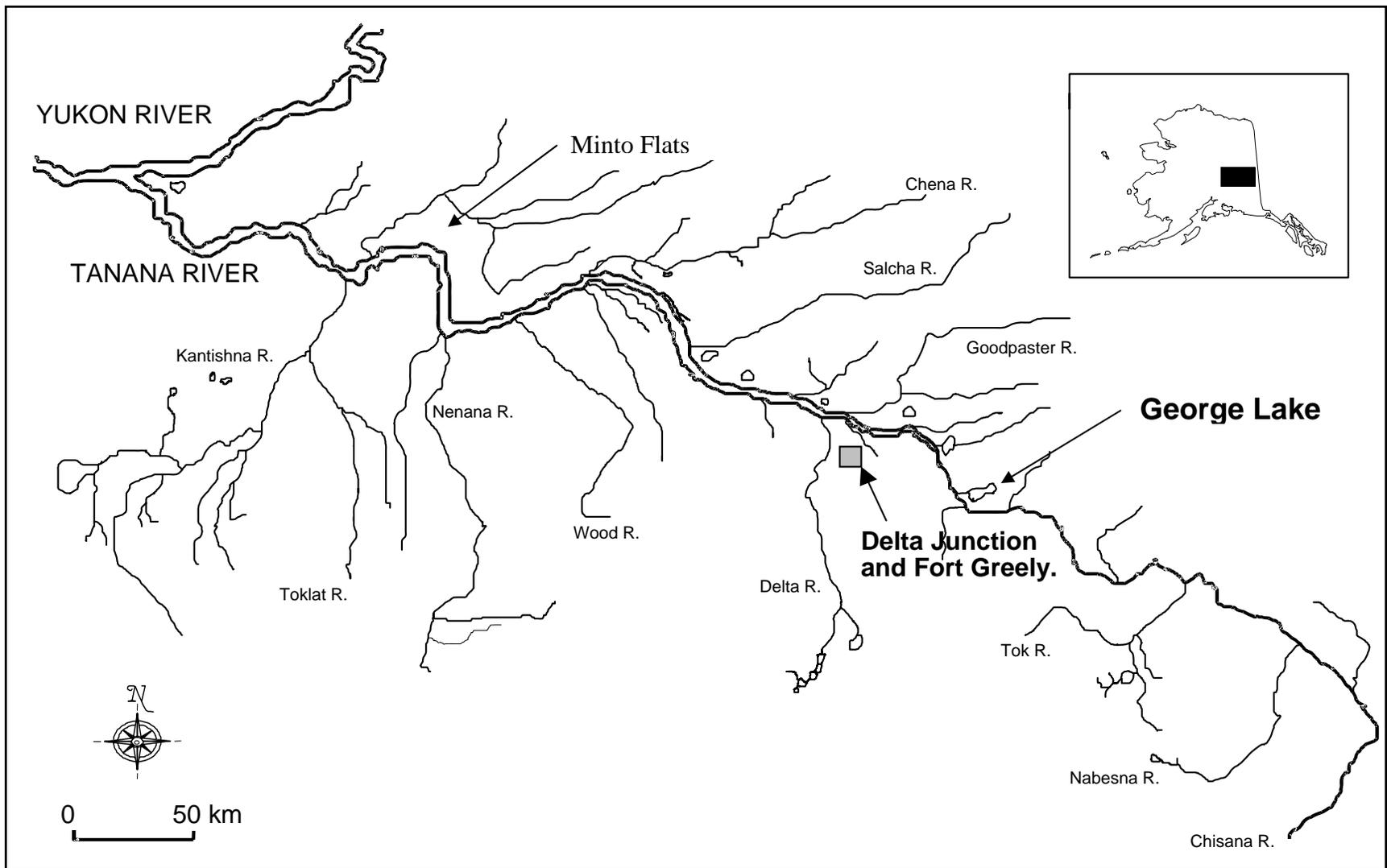


Figure 8.-Map of the Tanana River drainage and location of George Lake.

APPENDIX A

Appendix A1.—Reference information specific to 2007 Board of Fisheries proposals.

Proposal(s)	Reference Text	Page	Tables	Page	Figures	Page
126, 127, 130, 133, 134, 137	Lake Trout Sport Fisheries	25	19, 20, 21	65, 66, 67		
128, 240	Northern Pike Sport Fisheries	21	16, 17, 18	62, 63, 64	8	88
125	Arctic Grayling Sport Fisheries	18	15, Appendix B1	61, 94	5, 6, 7	85, 86, 87
135	Stocked Lake Sport Fishery	36, 40	35, 36, 37, 38, Appendix A2	79, 80, 91		
175, 176	King Salmon Sport Fishery	8	9	56		

Appendix A2.-Stocking records for Upper Tanana area lakes, 2006.

Location	Species	Stocking Date	Number Stocked	Average Length	Size
Backdown L	Rainbow Trout	28-Aug-06	755	1.9	Fingerlings
Backdown L	Rainbow Trout	30-Aug-06	600	1.9	Fingerlings
Bluff Cabin L	Rainbow Trout	28-Aug-06	6,614	1.9	Fingerlings
Bolio L	Grayling	11-Sep-06	47,070	1.9	Fingerlings
Brodie L	Grayling	5-Sep-06	850	2.3	Fingerlings
Brodie L	Grayling	5-Sep-06	65	2.3	Fingerlings
Bullwinkle L	Rainbow Trout	30-Aug-06	800	1.9	Fingerlings
Chet L	Arctic Char	30-Aug-06	250	3.3	Fingerlings
Chet L	Rainbow Trout	5-Sep-06	1,600	1.9	Fingerlings
Coal Mine #5	Rainbow Trout	30-Aug-06	2,000	1.9	Fingerlings
Craig L	Rainbow Trout	21-Aug-06	1,350	1.8	Fingerlings
Doc L	Rainbow Trout	30-Aug-06	500	1.9	Fingerlings
Donna L	Rainbow Trout	21-Aug-06	7,600	1.8	Fingerlings
Donnelly L	Rainbow Trout	28-Aug-06	6,141	1.9	Fingerlings
Four Mile L	Rainbow Trout	21-Aug-06	10,275	1.8	Fingerlings
Ghost L	Arctic Char	30-Aug-06	300	3.4	Fingerlings
Ghost L	Rainbow Trout	30-Aug-06	1,000	1.9	Fingerlings
J L	Arctic Char	30-Aug-06	150	3.3	Fingerlings
Jan L	Rainbow Trout	21-Aug-06	8,000	1.8	Fingerlings
Kenna L	Rainbow Trout	21-Aug-06	1,500	1.8	Fingerlings
Kens Pond	Rainbow Trout	5-Sep-06	1,000	1.9	Fingerlings
Koole L	Coho Salmon	18-Jul-06	10,105	2	Fingerlings
Koole L	Grayling	5-Sep-06	1,005	2.3	Fingerlings
Koole L	Rainbow Trout	6-Jul-06	3,000	3.8	Fingerlings
Koole L	Rainbow Trout	5-Sep-06	18,000	1.9	Fingerlings
L Donna L	Rainbow Trout	21-Aug-06	4,000	1.8	Fingerlings
Last L	Arctic Char	5-Sep-06	376	3.3	Fingerlings
Last L	Rainbow Trout	5-Sep-06	1,000	1.9	Fingerlings
Lisa L	Rainbow Trout	21-Aug-06	9,000	1.9	Fingerlings
Little Lost L	Rainbow Trout	6-Jun-06	490	9.8	Catchable
Luke L	Grayling	30-Aug-06	900	2.3	Fingerlings
Mark L	Arctic Char	30-Aug-06	200	3.4	Fingerlings
Mark L	Rainbow Trout	30-Aug-06	2,000	1.9	Fingerlings
Meadows #1	Rainbow Trout	11-Sep-06	1,275	2.1	Fingerlings
Meadows #2	Rainbow Trout	11-Sep-06	1,275	2.1	Fingerlings
Meadows #3	Rainbow Trout	11-Sep-06	1,275	2.1	Fingerlings
Meadows #4	Rainbow Trout	11-Sep-06	1,275	2.1	Fingerlings

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Location	Species	Stocking Date	Number Stocked	Average Length	Size
Monte L	Rainbow Trout	21-Aug-06	10,000	1.8	Fingerlings
N Twin L	Rainbow Trout	30-Aug-06	2,000	1.9	Fingerlings
Nickel L	Arctic Char	30-Aug-06	100	3.3	Fingerlings
Nickel L	Grayling	30-Aug-06	900	2.3	Fingerlings
Nickel L	Rainbow Trout	5-Sep-06	1,000	1.9	Fingerlings
No Mercy L	Rainbow Trout	30-Aug-06	600	1.9	Fingerlings
Paul's Pond	Grayling	5-Sep-06	901	2.3	Fingerlings
Quartz L	Coho Salmon	14-Jun-06	84,168	1.7	Fingerlings
Quartz L	Rainbow Trout	21-Apr-06	15,122	3.5	Fingerlings
Quartz L	Rainbow Trout	21-Apr-06	21,670	3.3	Fingerlings
Quartz L	Rainbow Trout	6-Jun-06	8,742	9.8	Catchable
Quartz L	Rainbow Trout	6-Jul-06	39,504	3.8	Fingerlings
Rainbow L	Rainbow Trout	6-Jul-06	2,000	3.8	Fingerlings
Rainbow L	Rainbow Trout	5-Sep-06	12,500	1.9	Fingerlings
Rangeview L	Grayling	5-Sep-06	901	2.3	Fingerlings
Rapids L	Rainbow Trout	28-Aug-06	1,000	1.7	Fingerlings
Robertson L #2	Rainbow Trout	21-Aug-06	500	1.8	Fingerlings
Rockhound L	Rainbow Trout	30-Aug-06	600	1.9	Fingerlings
Sheefish L	Arctic Char	30-Aug-06	700	3.4	Fingerlings

APPENDIX B

Appendix B1.-Summary of Arctic grayling estimates and standard errors within the Delta Clearwater River, 1977-2000.^a

Year	N[150]	SE[N150]	N[240]	SE[N240]	N[270]	SE[N270]	N[Age 5+] ^a	SE[Age 5+]	Recruitment	
									N[Age 5] ^a	SE[Age 5]
1977	Nd	---	nd	---	Nd	---	9,702	1,234	5,862	1,335
1978	Nd	---	nd	---	Nd	---	8,826	1,279	4,461	1,484
1979	Nd	---	nd	---	Nd	---	6,258	885	4,134	1,146
1980	Nd	---	nd	---	nd	---	6,175	832	3,467	856
1981	Nd	---	nd	---	nd	---	9,829	1,461	6,907	1,640
1982	Nd	---	nd	---	nd	---	9,369	1,159	4,554	1,173
1983	Nd	---	nd	---	nd	---	12,760	1,746	7,828	1,999
1984	Nd	---	nd	---	nd	---	11,063	1,276	4,931	1,295
1985	Nd	---	nd	---	nd	---	10,767	1,388	4,458	1,267
1986	Nd	---	nd	---	nd	---	7,840	1,148	2,724	708
1987	Nd	---	nd	---	nd	---	7,684	1,289	3,571	933
1988	Nd	---	nd	---	nd	---	8,845	1,962	1,957	578
1989	Nd	---	nd	---	nd	---	6,482	1,751	2,420	601
1990	Nd	---	nd	---	nd	---	4,477	1,766	2,301	619
1991	Nd	---	nd	---	nd	---	nd	---	1,754	686
1992	Nd	---	nd	---	nd	---	nd	---	2,219	1,066
1993	Nd	---	nd	---	nd	---	nd	---	945	692
1994	Nd	---	nd	---	nd	---	nd	---	1,179	1,491
1995	Nd	---	nd	---	nd	---	nd	---	Nd	---
1996	Nd	---	3,000	370	2,750	340	2,490	310	670	100
1997	9,000	920	7,420	920	6,490	800	4,600	590	810	140
1998	nd	---	5,570	780	4,740	480	4,500	630	1,820	300
1999	nd	---	6,977	401	6,684	211.3	6,271	369	1,760	140
2000	nd	---	8,045	946	7,634	900	6,891	821	1,748	255
Average	N/A	---	6,203	---	5,660	---	7,622	---	3,153	---

^a Estimates for 1977 - 1990 are from CAGEAN modeling (Clark and Ridder 1994) and reflect population at start of fishing season. Estimates for 1996 - 1999 are from mark-recapture experiments and reflect the population in July (Ridder 1998b; 1999a; Ridder and Gryska 2000; and Gryska 2001).

nd = no data
N/A = non applicable

Appendix B2.-Recreational fishing effort, harvest and catch of Arctic grayling, coho salmon, chum salmon and whitefish in the Delta Clearwater River from the Statewide Harvest Survey, 1977-2005.

Year	Angler Days	Harvest Grayling <12"	Harvest Grayling >12"	Total Harvest Grayling	Harvest Coho	Harvest Chum Salmon	Harvest Whitefish	Catch of Grayling <12"	Catch of Grayling >12"	Total Catch Grayling	Catch Coho	Catch Chum Salmon
1977	6,881	...	...	6,118	31	19	28	...	...	...	...	...
1978	7,210	...	...	7,657	126	59	0	...	...	...	...	...
1979	8,398	...	...	6,492	0	0	53	...	...	...	...	...
1980	4,240	...	...	5,680	25	25	29	...	...	...	...	...
1981	4,673	...	...	7,362	45	0	203	...	...	...	...	...
1982	4,231	...	...	4,779	21	21	94	...	...	...	...	...
1983	5,867	...	...	6,546	63	63	262	...	...	...	...	...
1984	5,139	...	...	4,193	571	182	325	...	...	...	...	...
1985	8,722	...	...	5,809	722	174	1,015	...	...	...	...	...
1986	10,137	...	...	2,343	1,005	246	208	...	...	...	...	...
1987	5,397	...	...	2,005	1,068	42	66	...	...	...	...	...
1988	5,184	...	...	2,910	1,291	0	1,114	...	...	...	...	...
1989	5,368	...	...	3,016	1,049	29	34	...	...	...	...	...
1990	4,853	...	...	1,772	1,375	0	0	...	...	12,424	3,271	55
1991	5,594	0	2,165	2,165	1,721	98	91	3,033	4,965	7,998	4,382	98
1992	3,756	0	797	797	615	68	294	2,669	3,417	6,086	1,555	289
1993	4,909	0	437	437	48	0	0	3,074	2,638	5,712	1,695	101
1994	3,984	375	1,036	1,411	509	0	10	4,269	5,037	9,306	3,009	66
1995	6,261	0	926	926	463	72	0	1,620	4,354	5,974	5,195	441
1996	3,424	0	1,218	1,218	937	0	0	3,354	5,624	8,978	2,435	110
1997	2,161	0	54	54	794	0	0	2,980	1,685	4,665	4,174	57
1998	3,415	0	0	0	479	0	0	4,842	11,293	16,135	2,350	0
1999	5,705	0	0	0	76	0	14	2,444	9,328	11,772	1,634	203
2000	2,647	0	0	0	255	12	36	2,339	6,351	8,690	1,911	12
2001	4,670	47	44	91	816	0	0	3,554	9,020	12,574	5,393	65
2002	4,580	51	0	51	517	0	20	3,180	9,733	12,913	5,311	23
2003	6,006	0	0	0	1,272	0	0	3,729	13,847	17,576	14,665	50
2004	3,357	111	0	111	511	0	0	5,805	8,407	14,212	4,061	42
2005	4,504	65	75	140	267	0	0	2,985	16,987	19,922	2,639	0

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Year	Angler Days	Harvest Grayling <12"	Harvest Grayling >12"	Total Harvest Grayling	Harvest Coho	Harvest Chum Salmon	Harvest Whitefish	Catch of Grayling <12"	Catch of Grayling >12"	Total Catch Grayling	Catch Coho	Catch Chum Salmon
Means												
1977-2005	5,216	43	450	2,555	575	42	147	3,325	7,512	10,934	3,980	101
2001-2005	4,623	55	24	79	677	0	4	3,851	11,599	15,439	6,414	36

Source: (Mills 1979-1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Jennings 2006 a-b (data 2002 & 2003; data 2004 and 2005, *In prep* a-b).