

PILLAR CREEK HATCHERY ANNUAL MANAGEMENT PLAN, 2004



By

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and  
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Regional Information Report<sup>1</sup> No. 4K04-40

Alaska Department of Fish and Game  
Division of Commercial Fisheries  
211 Mission Road  
Kodiak, AK 99615

August 2004

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## **ACKNOWLEDGMENTS**

We acknowledge the KRAA Director, Larry Malloy and all KRAA permanent and seasonal personnel that staff Pillar Creek Hatchery. We also acknowledge the ADF&G salmon managers, project biologists, and field staff that contribute to Pillar Creek Hatchery programs including Kevin Brennan, Len Schwarz, Donn Tracy, Jeff Wadle, Steve Schrof, Rob Baer, Greg Watchers, and Steve Thomsen. We also thank Lucinda Neel for her publication expertise, Jim McCullough, Matt Foster, and Kally Spalinger who provided editorial comments, and Patti Nelson, the Division of Commercial Fisheries Finfish Regional editor.

## **PROJECT SPONSORSHIP**

The Kodiak Regional Aquaculture Association (KRAA) funds the general operation of the Pillar Creek Hatchery and the facility's stocking and evaluation programs. The Alaska Department of Fish and Game, Division of Sport Fish, the Kodiak Sport Fish Association, and the Kodiak Association of Charterboat Operators provided partial funding for the chinook salmon project. The Division of Commercial Fisheries provides material and financial support for the management of returning adult runs enhanced or rehabilitated by hatchery stocking projects. The use of the M/V K-Hi-C to assist with the monitoring of fisheries is appreciated.

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**PILLAR CREEK HATCHERY ANNUAL MANAGEMENT PLAN  
EXECUTIVE SUMMARY, 2004.**

New Projects for 2004: Stocking sockeye salmon (S.L.) at Jennifer (2004,2005), Ruth (2004, 2005), and Little Kitoi (2004) Lakes.

Cost Recovery Harvests for 2004: NONE

Project (stocking location)	Broodstock	2004 Projected Enhanced Return	2004 Planned Stocking	Goals	
				2004 Eggs	2005 Juveniles
<b>Sockeye:</b>					
Hidden Lake	Afognak Lake early run	32,200	64,100	850,000	400,000
Little Waterfall Lake	Afognak Lake early run	30,000	16,600	425,000	200,000
Big Waterfall Lake	Afognak Lake early run	8,000	16,600	212,000	100,000
Crescent Lake	Afognak Lake early run	3,600	22,750	425,000	200,000
<b>Total</b>	<b>Afognak Lake early run</b>	<b>73,800</b>	<b>120,050</b>	<b>1,912,000</b>	<b>900,000</b>
Malina Lake	Malina Lake early run	1,300 <sup>a</sup>	0	0	0
Laura Lake	Laura Lake early run	2,700 <sup>a</sup>	0	0	0
Spiridon Lake	Saltery Lake late run	337,000	2,700,000	4,840,000	3,000,000
Ruth Lake	Saltery Lake late run	2,800	100,000	242,000	150,000
Jennifer Lake	Saltery Lake late run	0	540,000	565,000	350,000
Little Kitoi Lake	Saltery Lake late run	0	110,000	0	0
<b>Total</b>	<b>Saltery Lake late run</b>	<b>339,800</b>	<b>3,450,000</b>	<b>5,647,000</b>	<b>3,500,000</b>
<b>Total Sockeye</b>		<b>417,600</b>	<b>3,570,050</b>	<b>7,559,000</b>	<b>4,400,000</b>

-Continued-

Executive Summary, 2004 (page 2 of 2)

Project (stocking location)	Broodstock	2004 Projected Enhanced Return	2004 Planned Stocking	Goals	
				2004 Eggs	2005 Juveniles
<b>Coho:</b>					
Mayflower Lake	Buskin Lake	400	12,900	9,300	6,500
Island Lake	Buskin Lake	1,500	56,700	32,100	22,500
Dark Lake	Buskin Lake	500	19,000	10,700	7,500
Mission Lake	Buskin Lake	800	35,200	17,900	12,500
Potato Patch Lake	Buskin Lake	600	24,800	13,600	9,500
Southern Lake	Buskin Lake	landlocked	7,000	5,000	3,500
Margaret Lake	Buskin Lake	landlocked	10,500	5,000	3,500
Monashka Creek	Buskin Lake	0	6,800	0	10,000
<b>Total Coho</b>	<b>Buskin Lake</b>	3,800	172,900 <sup>b</sup>	93,600	65,500 <sup>c</sup>
<b>Chinook:</b>					
Monashka Creek	Karluk River	200	12,300	200,000 <sup>d</sup>	110,000

<sup>a</sup> Does not refer to total run; only the portion that is a result of enhancement (stocking).

<sup>b</sup> Includes a total of 42,803 BR 02 smolt releases in the spring of 2004. Fish Transport Permits only allow for stocking of 75,500 juvenile coho in 2004; FTPs will be amended to allow the release of the 97,400 remaining coho.

<sup>c</sup> Total does not include proposed release of 10,000 smolts at Monashka Creek; these smolt releases are dependent upon chinook rearing numbers - if hatchery rearing capacity allows for coho smolt production, then fingerling releases will be reduced accordingly.

<sup>d</sup> The 2004 egg take should result in a release of 100,000 smolts in 2006.

## ABSTRACT

Pillar Creek Hatchery (PCH) was constructed in 1990 as a cooperative project between the Alaska Department of Fish and Game (ADF&G) and the Kodiak Regional Aquaculture Association (KRAA). The hatchery is located on the road system north of the city of Kodiak and has a capacity to incubate 20 million salmon eggs and rear up to 16 million juvenile fish. Currently, the hatchery incubates and rears single stocks of chinook *Oncorhynchus tshawytscha* and coho *O. kisutch* salmon and two stocks of sockeye salmon *O. nerka*.

A total of 120,050 early-run juvenile sockeye salmon (Afognak Lake broodstock) will be released in 2004. Of these, 64,100 will be released into Hidden Lake, 22,750 into Crescent Lake, and 16,600 each into Little and Big Waterfall Lakes. Prior releases of this early-run stock are expected to produce 73,800 adult sockeye salmon returning in June 2004. About 1,912,000 eggs will be collected from Afognak Lake sockeye salmon broodstock in 2004 for incubation at PCH. After emergence and rearing at the hatchery, a total of 900,000 juveniles will be released in 2005 as a result of the 2004 egg take. These releases will include 400,000 into Hidden Lake, 200,000 into Little Waterfall Lake, 100,000 into Big Waterfall Lake, and 200,000 into Crescent Lake.

Although the sockeye salmon rehabilitation programs at Malina Lake and Pauls Bay (Laura Lake) have been completed, an estimated 1,300 adult sockeye salmon are expected to return to Malina Lake and 2,700 adults to the Pauls Bay system in 2004 from prior stockings. Future egg takes are not planned for either of these lakes.

Approximately 3,450,000 late-run juvenile sockeye salmon (Saltery Lake broodstock) will be released in 2004. The majority of these fish will be released into Spiridon Lake (2,700,000) with smaller releases into Ruth (100,000), Jennifer (540,000), and Little Kitoi (110,000) Lakes. Prior releases (Saltery Lake broodstock) are expected to produce 337,000 adult sockeye salmon returning to Spiridon Lake and 2,800 returning to Ruth Lake in late June through early August 2004. About 5,647,000 Saltery Lake sockeye salmon eggs will be collected in 2004 for stocking Spiridon (3,000,000), Ruth (150,000), and Jennifer (350,000) Lakes in 2005.

A total of about 172,900 juvenile coho salmon (Buskin Lake broodstock) will be released in 2004. In March 2004, 43,000 coho smolts (brood year 2002) were released into five road system lakes and Monashka Creek. Another 130,000 fingerlings will be released into these five lakes, plus two additional lakes in July 2004. The maximum numbers specified on Fish Transport Permits 04A-005, 04A-0006, and 04A-0013 are being amended (one time only) to allow for the additional releases in excess of the permitted number of 75,500 coho salmon. Prior releases of this coho salmon stock are expected to produce a return of 3,800 adult coho salmon in late August and September 2004. The Buskin River coho salmon egg take in 2004 will target about 94,000 eggs for the release of about 65,500 juveniles in 2005. A portion of these juveniles may be reared an additional year to produce smolts for release into Monashka Creek in 2006. The latter release will be dependent upon the 2004 chinook salmon egg take and resultant juvenile rearing numbers.

About 12,300 smolts from the 2002 Karluk River chinook salmon egg take will be released into Monashka Creek in 2004 (110,000 smolts from the 2003 egg take will be released in 2005). About

200 adult chinook salmon are expected to return to Monashka Creek in 2004. Approximately 200,000 eggs will be collected from Karluk River chinook salmon in 2004 and should result in approximately 100,000 smolts released into Monashka Creek in 2006.

There are no cost recovery projects planned for this facility in 2004; however, an “unplanned cost recovery operational plan” (UCROP) has been prepared by KRAA and will be implemented to prevent straying if, for any reason, sockeye salmon cannot be harvested at the terminal harvest areas.

## INTRODUCTION

Pillar Creek Hatchery (PCH) was constructed in 1990 as a cooperative project between the Alaska Department of Fish and Game (ADF&G) and the Kodiak Regional Aquaculture Association (KRAA; McCullough et al. 2001; McCullough and Clevenger 2002; Honnold and Clevenger 2003). The hatchery is located on the Kodiak road system about seven miles north of the City of Kodiak (Figures 1 and 2). PCH was intended to increase salmon production for the Kodiak Management Area by using barren-lake systems to stock juvenile sockeye salmon *Oncorhynchus nerka* and coho salmon *O. kisutch* to produce adult returns for commercial seine and gillnet, subsistence, and recreational fisheries (KRAA 1998). In addition, hatchery programs were expected to supplement wild stocks in attempts to rehabilitate diminished runs. PCH has the capacity to incubate 20 million salmon eggs and rear up to 16 million juveniles of a variety of life stages (fry, fingerlings, presmolt, and smolt). The facility is operated primarily by funds provided by KRAA and to a lesser extent by the ADF&G Division of Sport Fish, the Kodiak Sport Fish Association (KSFA), and the Kodiak Association of Charterboat Operators (KACO). The KSFA and KACO provide funding for the egg take and rearing portion of a chinook salmon *O. tshawytscha* enhancement project.

The primary project facilitated by PCH is the stocking of sockeye salmon into Spiridon Lake (Figure 1). This project utilizes Spiridon Lake as a nursery lake to produce smolts, which (after leaving the lake) return as adults and are harvested in the common property sockeye salmon fishery. A conservative stocking strategy has been adopted in order to minimize the impacts of rearing juvenile salmon on the standing crop of macrozooplankton in the lake (Honnold 1997). The recommended stocking levels vary from year to year based on the inseason zooplankton biomass estimates, availability of broodstock, and hatchery rearing space.

Late-run Upper Station sockeye salmon were used in the initial development stage of the Spiridon Lake project to develop a brood source returning to Little Kitoi Lake near the Kitoi Bay Hatchery (KBH; Figure 1). The sockeye salmon run to Little Kitoi Lake, as a result of estuary releases of underyearlings and smolts, did not provide sufficient adults for broodstock (Honnold and Aro 2003; *in press*).

As a result, the brood source was changed to the Saltery Lake stock in 1994. This change was approved for one year by the U.S. Fish and Wildlife Service (FWS) pending investigations to determine if the stock was appropriate for use as a long term broodstock for the Spiridon Lake project (ADF&G 1994). While investigations were conducted (1995 and 1996), Upper Station sockeye salmon were again used as the broodstock for the project. The investigations by ADF&G and the FWS indicated that the Saltery Lake stock would be preferred for Spiridon Lake stocking (Honnold 1997; Honnold et al. 1999). The earlier run timing of Saltery Lake sockeye salmon (about three weeks earlier than the late-run Upper Station sockeye stock) was expected to improve returns to Little Kitoi Lake and make broodstock collection easier. Additionally, the earlier run timing was expected to reduce the incidental harvest of Spiridon River pink *O. gorbuscha* and chum *O. keta* salmon stocks during the terminal fishery targeting returns to Spiridon Lake.

The approval to use Saltery Lake stock as the long-term brood source for Spiridon Lake was granted in 1997 by the Commissioner of ADF&G, representatives of the FWS, Kodiak Regional Planning Team, and KRAA. Saltery Lake stock will continue to be the brood source for the Spiridon Lake project in 2004. Little Kitoi Lake has been stocked with Saltery Lake sockeye salmon stock from KBH annually since 1999 and this stocking will continue in 2004 (Honnold and Aro *in press*). Depending on the magnitude of the adult sockeye return, an egg take may occur at Little Kitoi Lake in 2004 for the first time since the brood source was changed. If returns are not sufficient to meet a substantial portion of the egg take goals, broodstock from Saltery Lake will again be collected and used for stocking Spiridon, Jennifer, and Ruth Lakes and continuing broodstock development at Little Kitoi Lake.

PCH also provides early-run juvenile sockeye salmon for stocking several barren lakes in the Kodiak area. Hidden, Little Waterfall, Big Waterfall, and Crescent Lakes will be stocked with Afognak Lake sockeye salmon juveniles in 2004. Stocking of Afognak Lake sockeye salmon has been discontinued at Little Kitoi and other Kitoi Bay area lakes to simplify broodstock development (McCullough et al. 2000; Figure 1).

Lake fertilization (1991-2001) and sockeye salmon stocking (1992-1999) projects were conducted at the Malina Lake system during 1991 to 2001 to restore adult production to levels adequate to consistently achieve escapement goals (Schrof and Honnold 2003; Figure 1). Juveniles (Malina Lake broodstock) were released by PCH into this early-run system, which increased ensuing adult returns. Sockeye salmon escapement goals were achieved from 1999 through 2002 (Wadle 2004). Stocking was planned prior to the 2000-2002 seasons, but escapement levels were sufficient to forego egg takes. Planning for egg takes was discontinued after 2002 and the stock is now considered to be rehabilitated (McCullough and Clevenger 2002).

A similar restoration project was conducted at Laura Lake, which was also fertilized (1993-2001) and supplemented with sockeye fry (1994-1996 and 1999) of Laura Lake origin (Figure 1). In 1996, 1997, and 1999 through 2002 sockeye salmon eggs were not collected at Laura Lake due to adequate adult escapement. As a result of reaching escapement goals for four consecutive years, both lake fertilization and egg takes were discontinued after 2002 and the stock was considered rehabilitated (McCullough and Clevenger 2002).

Buskin Lake coho salmon were reared to the fingerling life stage at PCH annually from 1995 to 2003 for road system stocking to enhance recreational fishing opportunities (Figure 2). In addition, Buskin Lake coho salmon eggs were used for several classroom incubation programs in Kodiak area schools. Due to reduced numbers of chinook salmon fry rearing at PCH, additional rearing space for coho salmon was available in 2003. This allowed for the release of coho salmon smolts in five lakes and Monashka Creek in 2004. We propose continuing these stocking programs in 2004. The release of coho smolts will continue to be dependent upon the number of chinook salmon reared at PCH.

A permit alteration request (PAR) was approved for the PCH Basic Management Plan in January 2000 (McCullough et al. 2000). The PAR provides for the development of a chinook salmon enhancement project for the Kodiak road system to increase recreational fishing opportunities (Figure 2). Chinook salmon eggs were collected for the first time from the Karluk River in 2000.

These eggs were incubated and reared to smolt size at PCH and the resultant smolts (60,400) were released into Monashka Creek in the spring of 2002. This project was continued with egg takes occurring at Karluk River during 2001 to 2003 and the release of smolts in 2003. Currently PCH is rearing 12,300 juvenile chinook salmon from brood year 2002, which will be released into Monashka Creek in 2004. An additional 110,000 chinook salmon fry from the 2003 egg take are being reared for release as smolts in 2005. We propose continuing the chinook salmon project in 2004 with an egg-take goal (200,000) designed to produce about 100,000 smolts (current rearing capacity at PCH) for release in 2006.

PCH will continue to adhere to all measures for protecting natural salmon stocks including genetics guidelines, policies and guidelines for health and disease control, and the prevention of straying. The latter may require the implementation of “unplanned cost recovery” fisheries in the event enhanced returns of adults cannot be efficiently harvested.

## **2004 SOCKEYE SALMON RELEASES**

Below we describe stock-specific sockeye salmon releases planned for 2004. Appendices A through E describe PCH past, present, and proposed sockeye salmon egg takes and releases.

The stocking levels for 2004 were adjusted after analysis of the 2003 limnological and zooplankton data collected at each lake and because of rearing limitations at PCH. Specifically, late-run (Saltery Lake broodstock) egg-to-fry survival was greater than anticipated, resulting in more fry than expected. Limnology data collected from Spiridon Lake did not support increasing stocking levels from those described in the Pillar Creek Hatchery Annual Management Plan, 2003 (Honnold and Clevenger 2003). Consequently, we evaluated other barren lake systems as potential release sites for the extra fry. Limnology data supported re-establishing Ruth Lake as a stocking location and also indicated that Jennifer Lake would be an appropriate release site in 2004.

All sockeye will be transported by air to the remote lakes specified. Stocking of fry and fingerlings will correspond to the timing of each lake's plankton bloom (as determined by inseason limnology sampling). Fry and fingerlings will be released at the lake surface. Presmolts are scheduled for release by air dropping in mid October. Air dropping survival will be evaluated (initial and delayed mortality) at Little Kitoi Lake (Figure 1), where a small release of sockeye salmon presmolts will be dropped into net pens (see Special Studies/Research Section).

### ***Early-Run Sockeye Salmon: Afognak Lake Donor Stock***

Approximately 120,000 early-run Afognak Lake stock presmolts will be released in 2004 (Table 1). Releases will occur in October with 64,100 stocked into Hidden Lake, 16,600 into Little Waterfall Lake, 16,600 into Big Waterfall Lake, and 22,750 into Crescent Lake (Figure 1). Stocking levels are altered from the numbers indicated in the 2003 PCH Annual Management Plan (Honnold and Clevenger 2003) due to low escapement levels that limited the egg-take goal. Historically, this is the lowest level of stocking at these systems (Appendix B).

Adult returns from these releases are expected to total about 12,000 fish (Tables 1 and 2). Approximately 1,400 “jacks” (age 1.1 fish) will return in 2006, with the remaining returns expected in 2007 (3,974 fish) and 2008 (6,291 fish). The largest returns are expected at Hidden Lake (6,205) and Crescent Lake (2,202), while the smallest returns are expected at Little Waterfall (1,607) and Big Waterfall (1,607) Lakes. The run timing of these returns should be similar to Afognak Lake sockeye salmon (brood source) escapement, with runs beginning in late May, peaking just before mid June, and substantially declining by early July (Figure 3).

### ***Late-Run Sockeye Salmon: Saltery Lake Donor Stock***

Spiridon Lake will be stocked with about 2,700,000 juvenile Saltery Lake sockeye salmon in 2004 (Table 3; Figure 1). Of these, 2,000,000 will be released as fry in June, 300,000 as fingerlings in August, and 400,000 as presmolts in October. Releases in 2004 will be substantially less than most of the releases in the 1990s and 2000, but will represent a 1,300,000 fish increase from the number stocked in 2003 (Appendix E).

We expect about 159,000 adult salmon to return as a result of the releases into Spiridon Lake in 2004 (Tables 2 and 3). A small number of jacks will return in 2006 and some older age fish will return in 2009; however, the majority of returns should occur in 2007 (62,071) and 2008 (90,059).

Approximately, 540,000 Saltery Lake stock juvenile sockeye salmon will be stocked into Jennifer Lakes in 2004 (Table 4; Figure 1). Releases will include 300,000 fry in June, 200,000 fingerlings in July, and 40,000 presmolts in October. These are the first Saltery Lake stock sockeye salmon releases into Jennifer Lakes; late-run Upper Station sockeye salmon were previously released into this system (Appendices A and E).

About 31,000 adults are expected to return from 2004 sockeye salmon releases into Jennifer Lakes (Tables 2 and 4). The majority these adults should return in 2007 (11,152) and 2008 (18,678).

Ruth Lake has not been stocked with juvenile sockeye salmon since 2000 (Appendix E); however, Saltery Lake stock will once again be released into the lake in 2004 (Table 5; Figure 1). Fry (60,000) will be released in June and presmolts (40,000) will be released in October.

Ruth Lake releases in 2004 are expected to produce about 8,000 adult returns from 2006 to 2009, with the majority returning in 2007 (3,584) and 2008 (3,874; Tables 2 and 5).

Little Kitoi Lake will be stocked with 110,000 Saltery Lake stock juvenile sockeye salmon in 2004 (Table 5; Figure 1). These fish will be dropped by air into net pens in August (70,000 fingerlings) and October (40,000 presmolts) as part of a mortality evaluation project (see Special Studies/Research Section).

Releases into Little Kitoi Lake in 2004 will produce approximately 10,000 adults, primarily returning in 2007 (4,172) and 2008 (5,025; Tables 2 and 5).

The run timing of returns from the stocking of Spiridon, Jennifer, Ruth, and Little Kitoi Lakes should be similar to the escapement timing of Saltery Lake sockeye salmon, with the run beginning in mid June, peaking in early to mid July, and ending in mid to late August (Figure 4).

### **2004 COHO SALMON RELEASES: BUSKIN LAKE DONOR STOCK**

PCH released about 43,000 juvenile coho salmon in March and April 2004 including 12,055 smolts into Island Lake, 10,391 smolts into Mission Lake, 4,126 smolts into Dark Lake, 5,930 smolts into Potato Patch Lake, 3,501 smolts into Margaret Lake, and 6,800 smolts into Monashka Creek (Table 6; Figure 2). The latter smolts were held in a holding pool in Monashka Creek for about a week to allow the fish to imprint before their release. In addition, we plan to release an additional 130,000 coho salmon fingerlings into the same lakes, plus Mayflower and Southern Lakes, in July 2004 (Table 7; Figure 2). If chinook salmon egg-take goals are not met in 2004 and additional rearing space is available at PCH, the latter releases may be reduced to provide for the rearing of 10,000 coho salmon smolts for stocking into Monashka Creek in 2005. Appendix F describes the history of coho salmon egg takes from Buskin Lake and subsequent juvenile releases.

The coho smolts stocked in March 2004 were transported from PCH by a truck-mounted transport tank to each stocking location. The remaining 2004 releases will be stocked similarly with the exception at Southern Lake, where fingerlings will be transported by aircraft.

A small number of Buskin Lake coho salmon eggs (up to 500 per school) will be used for educational programs in the Kodiak Island Borough school system. The current school program uses eggs that are not part of the PCH operations.

Smolt releases in 2004 are expected to produce about 5,000 adult returns in 2005 (Tables 2 and 6). About 7,500 adults should return in 2007 from the 2004 fingerling releases. If smolts are released into Monashka Creek in 2005, approximately 1,300 adults should return in 2007. The run timing should be similar to the escapement timing of Buskin Lake coho, with fish beginning to return in mid August, peaking in mid September, and declining by late September (Figure 5).

### **2004 CHINOOK SALMON RELEASES: KARLUK RIVER DONOR STOCK**

In May 2004 about 12,000 chinook salmon smolts will be released into Monashka Creek, which is located along the Kodiak Island road system (Table 8; Figure 2). A truck-mounted transport tank will transport the smolts from PCH to the stocking location at Monashka Creek. The smolts will be held in a holding pool in Monashka Creek (or a raceway adjacent to the creek) for about a week to allow the fish to imprint before their release. Appendix G describes the history of Karluk River chinook salmon egg takes and subsequent smolt releases.

Approximately 300 adult chinook salmon are expected to return from 2004 releases with the majority (178) returning in 2008 (Table 8). The run timing should be similar to escapement timing

of Karluk River chinook salmon, with fish returning in late May, peaking in mid June, and declining by early July (Figure 6).

### **BROODSTOCK NUMBERS, ESCAPEMENT GOALS, AND EGG-TAKE GUIDELINES**

In 2004 we propose collecting the following broodstock for egg takes: 1,600 Afognak Lake early-run sockeye salmon, 4,301 Saltery Lake late-run sockeye salmon, 47 Buskin Lake coho salmon, and 80 Karluk River chinook salmon (Table 9). Escapement goal ranges for these systems are: 40,000-60,000 sockeye salmon at Afognak Lake, 15,000-30,000 sockeye salmon at Saltery Lake, 5,300-8,300 coho salmon at Buskin River, and 3,600-7,300 chinook salmon at Karluk River.

Egg-take guidelines in 2001 initially only allowed the collection of broodstock at the desired levels at a system when the lower bound of the escapement goal range was met or exceeded. Provisions for broodstock collections when escapements were below the lower bound of the range were not included in the egg-take guidelines. Consequently, after inseason discussions, the KRPT and the ADF&G agreed that if the spawning escapement for the Afognak Lake sockeye salmon and Karluk River chinook salmon was less than the lower escapement goal, 1% of the spawning escapement could be taken to allow for the continuation of enhancement projects (McCullough et al. 2001). Further discussions in 2001 and 2002 extended this egg-take guideline to all species and stocks in the Kodiak archipelago through 2003.

We propose revising the egg-take guidelines in 2004 as follows:

- 1) Egg takes will be prohibited when escapements are less than or equal to 50% of the lower bound of the escapement goal range for a given system (Table 9).
- 2) Broodstock removals will not reduce escapements below 50% of the lower bound of the escapement goal range for a given system (Table 9); broodstock removals will be reduced accordingly if necessary (Appendices H and I).
- 3) Broodstock removals for sockeye salmon egg takes may be contingent upon specific “replacement requirements” to compensate for the adults that were removed from the spawning population.
- 4) Replacement requirement is defined as the number of juvenile sockeye salmon of the specific stock needed for “backstocking” into each system (Appendices J and K).
- 5) Replacement will be required when escapements are over the 50% of the lower bound of the escapement goal range to just under (one fish) the lower bound of the escapement goal range, including broodstock removals, for a given system. For example, the lower bound of the escapement goal range for Afognak Lake is 40,000 sockeye salmon and we propose using 1,600 for broodstock. Thus,  $50\% * 40,000 + 1 = 20,001$  and  $40,000 - 1 + 1,600 = 41,599$ , so replacement backstocking will be required if the escapement is from 20,001 to 41,599 sockeye salmon in 2004. If the escapement is less than or equal to 20,000 fish, the egg take will be prohibited.
- 6) Backstocking options will be based upon productivity parameters for each sockeye salmon system and are intended to replace potential lost production from adult removals (i.e., the

number of juveniles backstocked will produce the approximate number of adults that the spawners would have produced had they not been removed).

- 7) Guidelines for backstocking, as recommended by ADF&G geneticists, will be adhered to (Appendix L).
- 8) Specific backstocking options based on proposed broodstock removal in 2004 include 129,000 0.4-g fry or 64,500 3.0-g fingerlings or 32,500 10-g presmolts into Afognak Lake (Appendix J) and 468,000 0.4-g fry or 234,000 3.0-g fingerlings or 117,000 10-g presmolts into Saltery Lake (Appendix K).
- 9) Backstocking of sockeye salmon presmolts is recommended to lessen lake grazing pressure and to provide for easy identification of returning adults (through unique scale patterns).
- 10) Replacement will be optional for coho or chinook broodstock removals due to the small numbers of adults needed for egg takes and the anticipation of escapement requirement being met at the Buskin River (coho) and Karluk River (chinook) systems (L. Schwarz, Alaska Department of Fish and Game, Kodiak, personal communication). If these runs are weak in 2004, replacement for broodstock removal may occur and, if needed, backstocking options will be developed.

#### **2004 SOCKEYE SALMON EGG TAKES (2005 STOCKING)**

Egg-take goals for 2004 and stocking levels for 2005, as described below for each broodstock, are based on the evaluation of the rearing capacity of each lake. This evaluation was based on zooplankton data collected in 2003 and may be adjusted in season as a result of limnological analysis of zooplankton data collected at each lake in 2004. Rearing limitations at PCH (i.e., how many juveniles of each life stage can be successfully cultured) may also result in modifications to stocking levels in 2005.

#### ***Early-Run Sockeye Salmon: Afognak Lake Donor Stock***

We propose collecting a total of 1,910,000 Afognak Lake sockeye salmon eggs (1,600 adults) in 2004, which should provide for stocking about 900,000 juveniles in 2005 (Table 10). These fish will be released into Hidden (200,000 fry and 200,000 presmolts), Little Waterfall (200,000 presmolts), Big Waterfall (100,000 presmolts), and Crescent (200,000 presmolts) Lakes.

The escapement levels at Afognak Lake in 2004 will determine the number of broodstock available for an egg take (Table 9; Appendix H). If escapement levels preclude or do not allow the egg-take goal to be met at Afognak Lake, Malina Lake sockeye salmon may be used as an alternative broodstock for the aforementioned stocking projects. The egg-take guidelines previously described will be adhered to regardless of the egg-take location (Table 9). Similar worksheets as described for Afognak Lake for determining broodstock numbers allowed and for calculating “replacement” options (if necessary) will be developed for Malina Lake if the need arises (Appendices H and J).

### ***Late-Run Sockeye Salmon: Saltery Lake Donor Stock***

PCH plans to collect about 5,600,000 Saltery Lake sockeye salmon eggs (3,763 adults) in 2004 (Table 11). The 2005 stocking goal is 3,500,000 juveniles, of which 3,000,000 (2,500,000 fry and 500,000 presmolts) will be released into Spiridon Lake, 350,000 (200,000 fry and 150,000 presmolts) into Jennifer Lakes, and 150,000 (50,000 fry and 100,000 presmolts) into Ruth Lake.

As described above for early-run sockeye salmon (Afognak Lake Donor Stock), the egg-take at Saltery Lake will be based upon the level of escapement available for broodstock collection (Table 9; Appendix I). There are no other “wild” late-run stocks available for alternate egg takes if escapement levels preclude or do not allow the egg-take goal to be met at Saltery Lake. Little Kitoi Lake sockeye salmon returns, as a result of broodstock development at Kitoi Bay Hatchery, may be available for broodstock collection; however, we do not anticipate that egg-take goals can be reached at the level of escapement expected at Little Kitoi Lake in 2004 (Honnold and Aro *in press*).

### **2004 COHO SALMON EGG TAKES (2005 STOCKING)**

About 94,000 Buskin Lake coho salmon eggs (47 adults) will be collected in 2004, which will provide approximately 66,000 fingerlings for stocking into seven road system lakes in 2005 (Table 12). The 2005 releases of fingerlings may be reduced at some lakes; some fingerlings may be reared to the smolt stage for release into Monashka Creek in 2006.

We do not expect that Buskin River coho salmon escapement levels will preclude or reduce broodstock collection in 2004, due to the small number (47) of broodstock needed to attain egg take goals (Table 9) and the anticipated magnitude of the 2004 coho salmon escapement (L. Schwarz, Alaska Department of Fish and Game, Kodiak, personal communication). However, alternate broodstocks for coho stocking projects have not been identified and adherence to egg-take guidelines may result in reducing egg-take goals or not collecting eggs in 2004. Replacement requirements have not been identified for the Buskin River coho salmon stock, but may be developed in 2004.

### **2004 CHINOOK SALMON EGG TAKES (2006 STOCKING)**

We propose collecting 200,000 Karluk River chinook salmon eggs (80 adults) in 2004 and releasing the resulting smolts (approximately 100,000) into Monashka Creek in 2006 (Table 8).

The chinook salmon run to the Karluk River is expected to meet escapement requirements in 2004 (L. Schwarz, Alaska Department of Fish and Game, Kodiak, personal communication) and should allow broodstock goals (80) to be reached. Alternate broodstocks and replacement requirements have not been identified for chinook salmon; egg-take guidelines could restrict or

preclude an egg take in 2004 (Table 9). Replacement requirements have not been identified for the Karluk River chinook salmon stock, but may be developed in 2004.

## **SOCKEYE SALMON HARVEST AND MANAGEMENT**

Runs to systems as a result of PCH stocking are estimated to total 417,600 sockeye salmon in 2004 (Table 13). The majority of these fish (337,000) will be a result of Spiridon Lake stocking. Hidden, Little Waterfall, Big Waterfall, Crescent, Spiridon, and Ruth Lakes are barriered systems without native salmon runs. Salmon may be present in the lake outlet stream from marine waters to the salmon barrier. All sockeye salmon returning to these systems will be available for harvest. Malina and Laura Lakes have anadromous salmon runs; hatchery produced fish will intermingle with naturally produced fish. Directed fisheries may occur to harvest surplus Malina and Laura Lakes sockeye salmon, depending on the escapements to each system.

### ***Harvest of Returns to Hidden Lake***

The Foul Bay (Hidden Lake; Figure 7) harvest strategy is designed to allow for the harvest of sockeye salmon produced from the Hidden Lake enhancement project and to provide for the protection of wild salmon stocks returning to, or passing through, the Northwest Afognak Section of the Afognak District (Figure 8). The run timing of Hidden Lake returns should be similar to the timing of Afognak Lake sockeye salmon (brood source) escapement, with runs beginning in late May, peaking in early June, and declining substantially by early July (Figure 3).

Hidden Lake sockeye salmon runs will be harvested in the Foul Bay THA, which includes the area of Foul Bay east of 152°47.20' W long. (Figure 7; 5 AAC 18.375). By regulation the only legal gear type for the THA is seine gear. Because a harvestable surplus of enhanced sockeye salmon is expected in the THA, continuous fishing periods will be allowed by the ADF&G beginning 5 June (Brennan et al. 2004). The fishery directed at the Hidden Lake sockeye salmon run is not expected to impact pink salmon escapement; the fishery occurs prior to the arrival of most of the pink salmon. There is no escapement requirement for sockeye salmon in Hidden Creek as the lake is inaccessible due to a large barrier falls. The sockeye salmon harvest is expected to occur primarily in the Foul Bay THA; however, some Hidden Lake sockeye salmon may be harvested in the Northwest Afognak Section (Figure 8). The fishing effort directed on Hidden Lake returns usually ends by early July. In the event effort continues into July, any sockeye salmon from this enhancement project harvested from 6 July through 25 July in the Northwest Afognak Section will count towards the 15,000 sockeye salmon fishery threshold (5 AAC 18.363; Brennan et al. 2004). All of the sockeye salmon harvested in the Foul Bay THA will be attributed to the Hidden Lake enhancement project.

The ADF&G recognizes that some incidental harvest of wild stocks could occur in the Foul Bay THA while the fishery is managed to harvest the Hidden Lake sockeye salmon run. The ADF&G may adjust the size of the THA to minimize the harvest of wild stocks and to target the Hidden Lake sockeye salmon. To date, age and scale pattern analysis of the harvests have indicated a minimal wild stock bycatch (Schrof et al. 2000; Schrof and Honnold 2003). A reduction in the size of the THA is not expected in 2004 (K. Brennan, Alaska Department of Fish and Game, Kodiak, personal communication).

Since 1995 a weir has been installed annually on Hidden Lake Creek to ensure that the majority of Hidden Lake sockeye salmon are harvested in the common property fishery. Large build-ups of sockeye salmon have never been observed in front of the weir either before or during the commercial fishery. Based on these observations, the ADF&G has decided that the weir will not be necessary in 2004. Further, the field camp associated with weir operation and fishery evaluation efforts will not be manned in 2004; evaluation tasks will continue, but will be based from the department vessel K-Hi-C anchored in Foul Bay in early June.

### ***Harvest of Returns to Crescent Lake***

The purpose of the Crescent Lake stocking project is to provide additional sockeye salmon for harvest in the Settler Cove (Crescent Lake) area without compromising wild stock escapements, primarily Barabara Lake sockeye salmon (Figure 9). The run timing of Crescent Lake returns should be similar to the escapement timing of Afognak Lake sockeye salmon (brood source), with runs beginning in late May, peaking in early June, and declining substantially by early July (Figure 3).

The harvest of Crescent Lake sockeye salmon is expected to occur during fishing periods targeting early-run sockeye, pink, and chum salmon in the Central Section of the Northwest Kodiak District (Figure 8). During 2004 the fishery will open in the Central Section of the Northwest Kodiak District on 5 June and again on 9 June for 33-hour periods (Brennan et al. 2004). Additional fishing time is dependent on the run strength of early-run Karluk Lake sockeye salmon (5 AAC 18.362). The Settler Cove THA, which includes all waters of Settler Cove west of 152°50.80' W long. (Figure 9; Alaska Administrative Code Chapter 18.375: 5 AAC 18.377), could open in 2004 if large numbers of sockeye salmon are not harvested during normal commercial fishery openings and are observed in the Settler Cove area. All fish in the THA will be available for harvest; residents of Port Lions utilize all inriver escapement for subsistence purposes.

### ***Harvest of Returns to Little and Big Waterfall Lakes***

The Waterfall Bay harvest strategy allows for the harvest of enhanced sockeye salmon returning to Waterfall Bay and provides safeguards for wild salmon escapements (Figure 10). The run timing of returns to Waterfall Bay should be similar to the escapement timing of Afognak Lake sockeye salmon (brood source), with runs beginning in late May, peaking in early June, and declining substantially by early July (Figure 3).

The sockeye salmon harvest is expected to occur in the Waterfall Bay THA within the Perenosa Bay Section (Figure 10). The Waterfall Bay THA was modified by the Alaska Board of Fisheries (BOF) in 1999 to include waters near the stream terminus of Big Waterfall Creek (5 AAC 18.376). By regulation, the only legal gear type for the Waterfall Bay THA is seine gear. A THA is required to provide for an orderly harvest of enhanced sockeye salmon (5 AAC 18.376). Since escapement and broodstock are not required, all returning enhanced sockeye salmon will be available for harvest. Because a harvestable surplus of enhanced sockeye salmon is forecasted, continuous fishing will be allowed beginning 5 June (Brennan et al. 2004).

The ADF&G recognizes that an incidental harvest of wild salmon could occur in the Waterfall Bay THA while the fishery is managed to harvest the enhanced Little and Big Waterfall Lakes sockeye salmon. The ADF&G may adjust the size of the THA open to commercial fishing to avoid harvesting wild stocks. Wild early-run stocks that could potentially be in the THA include Pauls (Laura) and Portage Lake sockeye stocks; all of the aforementioned lakes are located in Perenosa Bay (Figure 10). To date, scale pattern and age analysis of harvest samples have indicated minimal wild stock harvest (Schrof et al. 2000). A reduction in the size of the Waterfall THA is not expected in 2004 (K. Brennan, Alaska Department of Fish and Game, Kodiak, personal communication).

Unlike the sockeye salmon returning to Foul Bay, fish returning to Waterfall Bay tend to migrate into the confluence of Little Waterfall Creek. Thus, a fish barrier will be installed in 2004 near the terminus of Little Waterfall Creek to ensure that all returning sockeye salmon will be harvested. This barrier has been installed prior to the start of the terminal fishery each year since 1995 (Honnold and Clevenger 2003). Although there have been concerns that the barrier may cause straying (Honnold et al. 1998), studies have conclusively demonstrated that the barrier net at the Waterfall Bay THA does not cause adverse straying affects to nearby systems with natural salmon runs (Wadle and Honnold 2000; Baer and Honnold 2002). The ADF&G will continue to allow the use of the barrier net as long as effort to harvest fish remains aggressive as in most prior years. If a fishery does not occur, the net may be removed to allow returning sockeye salmon access to Little Waterfall Creek. A fish barrier will not be used in the terminus of Big Waterfall Creek; all returning adults that are not harvested will have unimpeded access to freshwater upstream of the barrier falls.

### ***Harvest of Returns to Malina Lake***

Returns to Malina Lake as a result of a prior PCH sockeye salmon stocking project (Appendix C) are expected to be minimal (Table 13). However, natural production, based on recent year escapements, appears to be stable and the 2004 sockeye salmon run should provide the minimum escapement requirement (10,000 salmon; Nelson and Lloyd 2001) and some level of harvest. A portion of this run will be harvested during fishing periods in the Southwest Afognak and, to a lesser extent, the Northwest Afognak Section of the Afognak District (Figure 8). The first commercial fishing period in 2004 for the entire Southwest Afognak Section will be on 14 June (Brennan et al. 2004). Additional fishing periods in June will depend on the Karluk Lake sockeye salmon runs. In 2002 the BOF approved a THA at the terminus of Malina Creek to harvest salmon surplus to escapement requirements (statistical area 251-12; Figure 11). Commercial fishing within

the Malina THA will begin on 5 June and, if escapement requirements are being met, may remain open continuously (Brennan et al. 2004). A weir was installed and operated to enumerate the Malina Lake escapement from 1992 to 2002, but was not operated in 2003. Aerial and foot surveys were used to monitor the sockeye salmon escapement in 2003. A weir will be utilized again in 2004 and inseason closed water adjustments for the Malina Lakes system will occur if it appears that the upper escapement goal of 20,000 will be exceeded (Brennan et al. 2004). Escapement counts typically begin in mid to late May, peak in early to mid June, and sharply decline by July (Figure 12).

### ***Harvest of Returns to Laura Lake***

In 2002, the BOF approved a new section in Perenosa Bay (Pauls Bay Section, statistical area 251-85), modified the management plan, and adjusted the closed waters area at the terminus of Pauls Creek (Figure 10). For the Laura (Pauls) Lake system, surplus sockeye salmon will be harvested during fishing periods in the Perenosa Bay and Pauls Bay Sections of the Afognak District (Figures 8 and 10). The Pauls Bay Section will remain closed if it appears that the minimum sockeye salmon escapement (20,000) will not be reached (Brennan et al. 2004). A weir will be operated at the outlet of Pauls Lake (Laura Lake is upstream of Pauls Lake) from late May through mid June to enumerate the escapement. Escapement counts typically begin in early June, peak by mid month, and decline by July (Figure 13). A fair number of sockeye salmon continue entering the system in July and into August.

### ***Harvest of Returns to Spiridon Lake***

The Spiridon Lake sockeye salmon management plan, 5 AAC 18.366, is designed to allow for the harvest of enhanced sockeye salmon returning to Spiridon Lake (Brennan et al. 2004; Figure 14) and to provide adequate protection for escapements of wild salmon stocks returning to streams in the area (Spiridon River sockeye, pink, chum, and coho salmon; stream number 254-401). The intent of this stocking project is to provide enhanced sockeye salmon in traditional commercial fishing areas in the Northwest Kodiak District (Figure 8). Sockeye salmon returns in 2004 are expected to begin in late June and continue into mid-August (Figure 4).

Harvests of Spiridon Lake sockeye salmon are expected to occur during openings targeting Karluk Lake sockeye and west-side pink and chum salmon stocks (Brennan et al. 2004). A THA, however, is required to provide for an orderly harvest of enhanced sockeye salmon that have migrated past the traditional commercial fishing areas of the Northwest Kodiak District. The Spiridon Lake THA has included all waters of Telrod Cove since 1995 (5 AAC 18.366; Figure 14). A continuous fishing period will be announced by the ADF&G when enhanced sockeye salmon are documented within the THA (Brennan et al. 2004). By regulation, the only legal gear type for the Spiridon Bay THA is seine gear. A series of barrier falls prevents salmon from entering Spiridon Lake, but sockeye salmon returning to Telrod Cove have access to Telrod Creek (Figure 14). Closed water markers ensure that intertidal habitat is not disturbed during fishing operations.

The ADF&G recognizes that some incidental harvest of wild stocks could occur in this area while the fishery is managed to harvest the enhanced Spiridon Lake sockeye salmon. The restricted size of the THA coupled with the run timing (Saltery Lake sockeye salmon broodstock) of returns to Spiridon Lake, however, are expected to reduce the incidental harvest of wild salmon stocks, specifically those returning to Spiridon River (pink and chum salmon) and Telrod Creek (pink salmon).

The THA will be monitored by ground crews beginning in mid June and continuing until early August or when the THA is closed to fishing.

### ***Harvest of Returns to Ruth Lake***

The Ruth Lake enhanced sockeye salmon run will be harvested incidentally in 2004 during pink, chum, and coho salmon fisheries in the Kitoi, Izhut, and Duck Bay Sections of the Afognak District (Figure 8; Brennan et al. 2004; Honnold and Aro *in press*). The run timing is expected to be similar to that described for Spiridon Lake runs, since Saltery Lake sockeye salmon were used as broodstock (Figure 4).

### ***Harvest Reporting***

Spiridon Lake THA, Foul Bay THA, Waterfall Bay THA, Malina Creek THA, Pauls Bay (Laura Lake), and Kitoi Bay Area (Ruth Lake) salmon harvest information will be monitored through daily verbal processor reports and the ADF&G fish ticket database. On-site estimates of harvest and the collection of age and sex composition data from returning sockeye salmon will be collected by field personnel at each of these locations.

Harvest information from the Crescent Lake sockeye salmon run will be monitored through the ADF&G fish ticket database and subsistence permit reports. The harvest contribution from this project will be determined by assigning all sockeye salmon harvested in the Settler Cove THA as originating from Crescent Lake. The run timing and location of the fishery (THA) provides for an isolated harvest of returning adults. The subsistence harvest will be assigned through the ADF&G subsistence use reporting system.

## **ADDITIONAL MEASURES FOR WILDSTOCK PROTECTION**

### ***Unplanned Cost Recovery***

At this time, the PCH does not require Special Harvest Areas (SHA) for cost recovery harvests. There may be situations that arise that will require cost recovery of salmon from the enhancement projects (economic, broodstock, environmental disasters, or price dispute considerations).

In 2002, large numbers of returning early-run sockeye salmon amassed in the Foul Bay, Waterfall Bay, and Malina Creek THAs as a result of a lack of early season commercial fishing activity due to price disputes. The scheduled opening occurred on 9 June, but fishing did not commence until 16 June. The 2002 Pillar Creek Hatchery Management Plan (McCullough and Clevenger 2002) stated that *“if large numbers of salmon return to enhancement sites prior to 9 June or if commercial fishing activities do not occur within 48 hours of the initial fishery opening, the Kodiak Management Biologist and the KRAA will implement a harvest strategy to reduce the risk of straying salmon. The harvest strategy will include the removal of barrier nets or weirs to allow the enhanced salmon free access to freshwater. When fishing activity commences the barrier net or weir will be re-installed. The KRAA will help administer any special harvest operations in a similar manner as was implemented for the Kitoi Bay special cost recovery project in 1989. In that instance, as many fish as possible were harvested in as short a period as feasible to maintain an orderly fishery.”* The preceding plan was delayed due to KRAA and fishers concerns about the 48-hour deadline. The ADF&G reviewed the historical escapement timing (Figure 3) of the Afognak Lake (broodstock for Hidden and Waterfall Lakes stocking) stock and determined that the removal of the barrier net and weir could be delayed until a specific harvest plan was ready to be implemented without increasing the risk of straying. However, since 50% of the Afognak Lake sockeye salmon run typically returns by 15 June, the ADF&G recommended that the barriers be removed no later than 15 June if fish were still returning and no later than 20 June if the runs declined. The fishery dispute was settled and fishing commenced on 16 June, alleviating the need to remove the barriers or conduct a special fishery.

The KRAA drafted an unplanned cost recovery operational plan (UCROP) for cost recovery fisheries in the THAs in 2003 (Honnold and Clevenger 2003). The UCROP proposed that the THAs previously described be designated as SHAs in 2003 (L. Malloy, Kodiak Regional Aquaculture Association, Kodiak, personal communication). SHA designations did not occur in 2003; however, proposals will be submitted to the BOF in 2005 for such designations to be included in regulation. If unplanned cost recovery fisheries are necessary in 2004, the Commissioner may authorize SHA designations. The KRAA-funded ADF&G crews will be located at any cost recovery site to monitor and document the fisheries and to address any straying concerns.

### ***Genetics Policy***

The ADF&G Genetics policy, as described in the 1998 Pillar Creek Hatchery AMP (Honnold et al. 1998), will be followed in 2004 for all projects.

### ***Policies and Guidelines for Health and Disease Control***

The State of Alaska Pathology Review Committee policy and guidelines (McGee 1995), as described in the 1998 Pillar Creek Hatchery AMP (Honnold et al. 1998), will be followed in 2004 for all projects.

## SPECIAL STUDIES/RESEARCH

The 1994 to 1997 Spiridon Lake sockeye salmon runs were reconstructed using scale pattern analysis to delineate Spiridon Lake fish in the Northwest Kodiak District or in the Southwest Afognak Section commercial harvests (Nelson and Barrett 1994; Nelson and Swanton 1996; Nelson and Swanton 1997; Nelson 1999). The runs from 1998 to 2003, however, have not been formally reconstructed due to the run timing differences between the original late-run Upper Station broodstock (stocked from 1991 to 1994 and 1996 to 1997) and the Saltery Lake broodstock (stocked in 1995 and from 1998 to 2002). Stock separation techniques used when only the late-run Upper Station stock fish returned (1994 to 1997) were not appropriate for application to the mixed stock runs (1998 to 2002) or for future runs when only the Saltery Lake fish return (P. Nelson, Alaska Department of Fish and Game, Kodiak, personal communication). This is primarily due to the increased number of both local and non-local stocks present in the Northwest Kodiak District during the earlier Saltery Lake broodstock run timing (P. Nelson, Alaska Department of Fish and Game, Kodiak, personal communication).

The average proportion of the Spiridon-bound sockeye salmon harvested in the Spiridon Lake THA from 1994 to 1997 (41%) was applied to the 1998 through 2003 THA harvest to reconstruct the recent Spiridon Lake sockeye salmon contribution to the harvest in the SW Afognak Section and Northwest Kodiak District (Schrof and Honnold 2003). This method of run reconstruction will be used for the 2004 and future Spiridon Lake sockeye salmon runs until a new method of stock separation is developed and implemented to identify the Saltery Lake stock returns (P. Nelson, Alaska Department of Fish and Game, Kodiak, personal communication).

Smolt abundance will be estimated and samples collected for age and condition during their emigration from Spiridon Lake as a check on stocking density and to assist with run forecasts (ADF&G 2004). Spiridon Lake will also be monitored by tow-netting and hydroacoustics to evaluate juvenile sockeye salmon population trends.

Very few smolts (about 263,000) emigrated from Spiridon Lake in 2003 compared to previous average (about 900,000) emigrations (Sagalkin et al., Alaska Department of Fish and Game, unpublished memorandum). Although stocking levels have declined (Appendix E), we expected about twice as many smolts to emigrate in 2003. A hydroacoustic survey conducted at Spiridon Lake in 2003, after the smolts had emigrated, indicated minimal numbers still rearing in the lake (G. Watchers, Alaska Department of Fish and Game, Kodiak, personal communication). These data suggested three possible reasons for the poor 2003 emigration: 1) smolts emigrated early, before the typical smolt enumeration operation began, 2) there was poor rearing survival, or 3) there was a mortality event during stocking. The first reason seems unlikely, based on the average smolt emigration timing (Schrof and Honnold 2003), the low number of smolts emigrating early in 2003 when the enumeration project started, and the absence of any dead smolts below the falls when field personnel surveyed the drainage upon arriving at the smolt trapping site. The second reason is also unlikely, based on limnology data collected from Spiridon Lake in 2002 and the large, robust smolts that emigrated in 2003 (Sagalkin et al., Alaska Department of Fish and Game, unpublished memorandum). Thus, we suspect higher than expected mortality occurred during the aerial release of presmolts in 2002. This suspicion was further supported by on-site observation of

2003 presmolt releases. Mortality was observed and appeared greater for larger presmolts (R. Baer, Alaska Department of Fish and Game, Kodiak, personal communication).

The 2003 presmolt release mortality observations were difficult to quantify. Thus, in 2004, we plan to more thoroughly evaluate aerial stocking mortality. Presmolts will be aerially dropped over several net pens anchored in Little Kitoi Lake in order to capture fish as they are stocked. Release methods will parallel those that occurred in 2002 and 2003 at Spiridon Lake (i.e., number released per flight, height at release, etc.). One lot of fish (6.0 g) will be released in August and another lot (13.0 g) in October (Table 5). Hatchery personnel will be on site during each release to enumerate the numbers collected in each net pen, and document the mortality and condition of the fish. The fish will be held for about a week to document delayed mortality. Scale samples will be collected from the presmolts prior to release.

Smolts will also be sampled for condition and age at all other systems stocked with juvenile sockeye salmon. Stocked lakes will also be sampled to evaluate zooplankton abundance and water quality parameters.

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Table 1. Pillar Creek Hatchery early-run sockeye salmon egg takes (Afognak Lake broodstock) in 2003, resultant juvenile releases planned in 2004, projected adult production, and fish transport permit information.

<b>Parameter</b>	Early-run Sockeye	Early-run Sockeye	Early-run Sockeye	Early-run Sockeye	Totals
<b><u>Egg take</u></b>					
<b>eggs</b>	190,789	49,409	49,409	67,714	357,321
<b>adults</b>	143	37	37	51	268
<b><u>Releases</u></b>					
<b>location</b>	Hidden Lake	Little Waterfall Lake	Big Waterfall Lake	Crescent Lake	
<b>number</b>	64,100	16,600	16,600	22,750	120,050
<b>size (g)</b>	13.0	13.0	13.0	13.0	
<b>lifestage</b>	Presmolt	Presmolt	Presmolt	Presmolt	
<b>date</b>	15-Oct-04	15-Oct-04	15-Oct-04	15-Oct-04	
<b><u>Projected Returns</u></b> <sup>a</sup>					
<b>2006</b>	724	188	188	257	1,357
<b>2007</b>	2,122	549	549	753	3,974
<b>2008</b>	3,359	870	870	1,192	6,291
<b>total</b>	6,205	1,607	1,607	2,202	11,621
<b><u>Fish Transport Permit (FTP)</u></b> <sup>b</sup>					
<b>number</b>	99A-0054	97A-0076	04A-0032	04A-0034	
<b>expires</b>	31-Dec-08	31-Dec-08	31-Dec-09	31-Dec-09	
<b>max. no.</b>	200,000	200,000	250,000	275,000	
<b>lifestage</b>	Presmolt	Presmolt	Presmolt	Presmolt	

Table 2. Salmon survival and age assumptions used to estimate returns for Pillar Creek Hatchery stocking projects.

Species	Broodstock <sup>a</sup>	Stocking		Survival <sup>b</sup> Stocking-to- adult return	Age-at-return Proportions <sup>b</sup>							
		Life Stage <sup>c</sup>	Size (g)		1.1	1.2	2.1	1.3	2.2	1.4	2.3	1.5
Sockeye	AL/ML	F	0.4	4.5%	0.07	0.22	0.04	0.36	0.11			0.17
Sockeye	AL/ML	FG	3.0	6.5%	0.07	0.22	0.04	0.36	0.11			0.17
Sockeye	AL/ML	PS	8.0-13.0	10.0%	0.11	0.33		0.52				
Sockeye	SL	F	0.4	4.5%	0.01	0.31	0.01	0.39	0.24			0.05
Sockeye	SL	FG	3.0-6.0	6.5%	0.01	0.31	0.01	0.39	0.24			0.05
Sockeye	SL	PS	8.0-13.0	12.5%	0.02	0.55		0.44				
Coho	BL	FG	3.0-5.0	6.5%				1.00				
Coho	BL	PS	8.0	10.0%	1.00							
Coho	BL	S	15.0	12.5%	1.00							
Chinook	KR	S	30.0	2.5%	0.02	0.13		0.22		0.58		0.05

Table 3. Pillar Creek Hatchery late-run sockeye salmon egg takes (Saltery Lake broodstock) in 2003, resultant juvenile releases planned for Spiridon Lake in 2004, projected adult production, and fish transport permit information.

<b>Parameter</b>	Late-run Sockeye	Late-run Sockeye	Late-run Sockeye	Totals
<b><u>Egg take</u></b>				
eggs	3,203,422	480,513	640,684	4,324,620
adults	2,245	337	449	3,030
<b><u>Releases</u></b>				
location	Spiridon Lake	Spiridon Lake	Spiridon Lake	
number	2,000,000	300,000	400,000	2,700,000
size (g)	0.4	6.0	13.0	
lifestage	Fry	Fingerlings	Presmolt	
date	01-Jun-04	15-Aug-04	15-Oct-04	
<b><u>Projected Returns</u></b> <sup>a</sup>				
2006	450	98	800	1,348
2007	28,620	6,201	27,250	62,071
2008	55,980	12,129	21,950	90,059
2009	4,860	1,053	0	5,913
total	89,910	19,481	50,000	159,391
<b><u>Fish Transport Permit (FTP)</u></b> <sup>b</sup>				
number	04A-0040	99A-0059	04A-0040	
expires	31-Dec-09	31-Dec-08	31-Dec-09	
max. no.	7,000,000	7,000,000	1,000,000	
lifestage	Fry	Fingerling	Presmolt	

<sup>a</sup> Projected returns are calculated from Table 2 survival and age assumptions.

<sup>b</sup> FTP 97A-0071 - for 9.8 million green eggs, expiring 31Dec-08, authorizes egg take for these projects.

Table 4. Pillar Creek Hatchery late-run sockeye salmon egg takes (Saltery Lake broodstock) in 2003, resultant juvenile releases planned for Jennifer Lakes in 2004, projected adult production, and fish transport permit information.

<b>Parameter</b>	Late-run Sockeye	Late-run Sockeye	Late-run Sockeye	Totals
<b><u>Egg take</u></b>				
eggs	480,513	320,342	64,068	864,924
adults	337	224	45	606
<b><u>Releases</u></b> <sup>a</sup>				
location	Jennifer Lakes	Jennifer Lakes	Jennifer Lakes	
number	300,000	200,000	40,000	540,000
size (g)	0.4	3.0	13.0	
lifestage	Fry	Fingerlings	Presmolt	
date	01-Jun-04	15-Jul-04	15-Oct-04	
<b><u>Projected Returns</u></b> <sup>b</sup>				
2006	68	65	80	213
2007	4,293	4,134	2,725	11,152
2008	8,397	8,086	2,195	18,678
2009	729	702	0	1,431
total	13,487	12,987	5,000	31,474
<b><u>Fish Transport Permit (FTP)</u></b> <sup>c</sup>				
number	04A-0036	04A-0036	04A-0036	
expires	31-Dec-09	31-Dec-09	31-Dec-09	
max. no.	400,000	400,000	250,000	
lifestage	Fry	Fingerling	Presmolt	

<sup>a</sup> Releases into Jennifer Lake were not planned at time of 2003 egg take; analysis of end of season limnology data suggested that proposed stocking at Spiridon Lake was too high; thus, "extra" fish were proportioned between Jennifer, Ruth, and Little Kitoi Lakes based on 2003 limnology data.

<sup>b</sup> Projected returns are calculated from Table 2 survival and age assumptions.

<sup>c</sup> FTP 97A-0071 - for 9.8 million green eggs, expiring 31Dec-08, authorizes egg take for these projects.

Table 5. Pillar Creek Hatchery late-run sockeye salmon egg takes (Saltery Lake broodstock) in 2003, resultant juvenile releases planned for Ruth and Little Kitoi Lakes in 2004, projected adult production, and fish transport permit information.

<b>Parameter</b>	Late-run Sockeye	Late-run Sockeye	Late-run Sockeye	Late-run Sockeye	Totals
<b><u>Egg take</u></b>					
eggs	96,103	64,068	112,120	64,068	336,359
adults	67	45	79	45	236
<b><u>Releases</u></b> <sup>a</sup>					
location	Ruth Lake	Ruth Lake	Little Kitoi Lake	Little Kitoi Lake	
number	60,000	40,000	70,000	40,000	210,000
size (g)	0.4	13.0	6.0	13.0	
lifestage	Fry	Presmolt	Fingerlings	Presmolt	
date	01-Jun-04	15-Oct-04	15-Aug-04	15-Oct-04	
<b><u>Projected Returns</u></b> <sup>b</sup>					
2006	14	80	23	80	196
2007	859	2,725	1,447	2,725	7,756
2008	1,679	2,195	2,830	2,195	8,900
2009	146	0	246	0	392
total	2,697	5,000	4,545	5,000	17,243
<b><u>Fish Transport Permit (FTP)</u></b> <sup>c</sup>					
number	04A-0039	04A-0039	04A-0037	04A-0037	
expires	31-Dec-09	31-Dec-09	31-Dec-09	31-Dec-09	
max. no.	300,000	300,000	100,000	150,000	
lifestage	Fry	Presmolt	Fingerlings	Presmolt	

<sup>a</sup> Releases into Jennifer Lake were not planned at time of 2003 egg take; analysis of end of season limnology data suggested that proposed stocking at Spiridon Lake was too high; thus, "extra" fish were proportioned between Jennifer, Ruth, and Little Kitoi Lakes based on 2003 limnology data.

<sup>b</sup> Projected returns are calculated from Table 2 survival and age assumptions.

<sup>c</sup> FTP 97A-0071 - for 9.8 million green eggs, expiring 31Dec-08, authorizes egg take for these projects.

Table 6. Pillar Creek Hatchery coho salmon egg takes (Buskin Lake broodstock) in 2002, resultant juvenile releases at Road System Lakes in 2004, projected adult production, and fish transport permit information.

<b>Parameter</b>	Coho	Coho	Coho	Coho	Coho	Coho	Totals
<b><u>Egg take</u></b>							
eggs	17,180	14,809	5,880	8,451	4,989	9,691	61,000
adults	8	7	3	4	2	5	30
<b><u>Releases</u></b>							
location	Island Lk.	Mission Lk.	Dark Lk.	P. Patch Lk.	Margaret Lk.	Monashka Ck.	
number	12,055	10,391	4,126	5,930	3,501	6,800	42,803
size (g)	12.7	12.7	13.5	13.5	13.9	14.2	
lifestage	smolt	smolt	smolt	smolt	smolt	smolt	
date	04-Mar-04	04-Mar-04	09-Mar-04	10-Mar-04	16-Apr-04	30-Apr-04	
<b><u>Projected Returns</u></b> <sup>a</sup>							
2005	1,507	1,299	516	741	0	850	4,913
2006	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0
total	1,507	1,299	516	741	landlocked	850	4,913
<b><u>Fish Transport Permit (FTP)</u></b> <sup>b</sup>							
number	04A-0006	04A-0006	04A-0006	04A-0006	04A-0013	04A-0007	
expires	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-08	
max. no.	22,500	12,500	7,500	9,500	3,500	10,000	
lifestage	any	any	any	any	any	smolt	

<sup>a</sup> Projected returns are calculated from Table 2 survival and age assumptions.

<sup>b</sup> FTP 93A-0105 - for 150,000 green eggs, expiring 31Dec-03, authorized egg take for these projects.

Table 7. Pillar Creek Hatchery coho salmon egg takes (Buskin Lake broodstock) in 2003, resultant juvenile releases planned for Road System Lakes in 2004 (Monashka Creek in 2005), projected adult production, and fish transport permit information.

<b>Parameter</b>	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Totals
<b><u>Egg take</u></b>									
<b>eggs</b>	14,059	7,570	48,666	27,036	16,222	20,548	7,570	10,898	141,671
<b>adults</b>	7	4	24	13	8	10	4	5	70
<b><u>Releases</u></b>									
<b>location</b>	Mayflower Lk.	Southern Lk.	Island Lk.	Mission Lk.	Dark Lk.	P.Patch Lk.	Margaret Lk.	Monashka Cr. <sup>a</sup>	
<b>number</b>	12,901	6,947	44,656	24,809	14,885	18,855	6,947	10,000	130,000
<b>size (g)</b>	3.0	3.0	3.0	3.0	3.0	3.0	3.0	15.0	
<b>lifestage</b>	Fingerling	Fingerling	Fingerling	Fingerling	Fingerling	Fingerling	Fingerling	Smolt	
<b>date</b>	15-Jul-04	15-Jul-04	15-Jul-04	15-Jul-04	15-Jul-04	15-Jul-04	15-Jul-04	15-May-05	
<b><u>Projected Returns</u></b> <sup>b</sup>									
<b>2006</b>	0	0	0	0	0	0	0	1,250	1,250
<b>2007</b>	839	0	2,903	1,613	968	1,226	0	0	7,547
<b>total</b>	839	landlocked	2,903	1,613	968	1,226	landlocked	1,250	8,797
<b><u>Fish Transport Permit (FTP)</u></b> <sup>c</sup>									
<b>number</b>	04A-0006	04A-0005	04A-0006	04A-0006	04A-0006	04A-0006	04A-0013	04A-0007	
<b>expires</b>	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-08	
<b>max. no.</b>	6,500	3,500	22,500	12,500	7,500	9,500	3,500	10,000	
<b>max. no.</b> <sup>d</sup>	<b>13,000</b>	<b>7,000</b>	<b>57,000</b>	<b>35,500</b>	<b>19,500</b>	<b>25,000</b>	<b>10,500</b>		
<b>lifestage</b>	any	any	any	any	any	any	any	smolt	

<sup>a</sup> Coho smolt may be reared and then released at Monashka Creek depending upon chinook salmon smolt production. Fingerling releases will be reduced. Possible 05 release not included in total releases for all locations.

<sup>b</sup> Projected returns are calculated from Table 2 survival and age assumptions.

<sup>c</sup> FTP 04A-0004 - for 200,000 green eggs, expiring 31Dec-13, authorized egg take for these projects.

<sup>d</sup> FTPs will be amended for 2004 (one year only) to increase maximum stocking numbers to accommodate 2004 fingerling releases along with prior BY 02 smolt releases (see Table 6).

Table 8. Karluk River chinook salmon egg takes (2000-2004), Monashka Creek releases (2002-2006), projected returns (2003-2011), and Fish Transport Permit (FTP) information.

Year	Egg Take <sup>a</sup>		Releases			Adult Returns <sup>b</sup>								Total Return		
	Eggs	Adults	Number	Size (g)	Date	2003	2004	2005	2006	2007	2008	2009	2010		2011	
2000	125,000	48	60,400	30.0	May-02	30	196	332	876	76						1,510
2001	86,000	34	34,000	21.0	May-03		17	111	187	493	43					850
2002	147,000	59	12,300	30.0	May-04			6	40	68	178	15				308
2003	172,300	70	110,000	20.0	May-05				55	358	605	1,595	138			2,750
2004	200,000	80	100,000	20.0	May-06					50	325	550	1,450	125		2,375
Total Run:						30	213	449	1,158	1,044	1,151	2,160	1,588	125		
FTP		max. no	max. no													
00A-0010		60 pairs	300,000		expires 6/30/06											

<sup>a</sup> In 2000, 2001, and 2003 equal numbers of females and males were used; in 2002, 25 females and 34 males were used.

<sup>b</sup> Projected returns are calculated from Table 2 survival and age assumptions..

Table 9. Donor stock, broodstock numbers, escapement goal range, egg-take guidelines, and egg-take replacement criteria for 2004 egg takes.

Species	Donor Stock	Broodstock Numbers	Escapement Goal Range	Egg-take Guidelines - Escapement		Egg-take Replacement Criteria	
				<b>Egg take Prohibited</b> Escapement is $\leq$ :	<b>Full Egg take Allowed</b> Escapement is $>$ : <sup>a</sup>	Replacement Required Escapement is: <sup>b</sup>	Replacement Requirement <sup>c</sup>
Sockeye	Afognak Lake	1,600	40,000-60,000	20,000	21,600	20,001 - 41,599	32,250 presmolt
Sockeye	Saltery Lake <sup>d</sup>	4,301	15,000-30,000	7,500	11,801	7,501 - 19,300	117,000 presmolt
Coho	Buskin Lake	47	5,300-8,300	2,650	2,697	none	none
Chinook	Karluk Lake	80	3,600-7,300	1,800	1,880	none	none

<sup>a</sup> Full egg take refers to removal of proposed broodstock numbers. If escapements are less than this guideline, then broodstock removals will be reduced (Appendix H, I) to maintain escapements at or above 50% of the lower bound of the escapement goal range.

<sup>b</sup> 50% of lower bound of escapement goal range plus one (lower number) to the lower bound of escapement goal range minus one plus broodstock numbers (upper number). For example, for Afognak Lake - lower number is  $50\% * 40,000 + 1 = 20,001$ ; upper number is  $40,000 - 1 + 1,600 = 41,599$ .

<sup>c</sup> Refers to the number of juvenile fish necessary to replace lost production from the removal of adults used for broodstock (from Appendices J, K).

<sup>d</sup> Broodstock numbers include 538 adults for Kitoi Bay Hatchery projects (Honnold and Aro *in press*).

Table 10. Proposed Pillar Creek Hatchery early-run sockeye salmon egg takes (Afognak Lake broodstock) in 2004, juvenile releases in 2005, projected adult production, and fish transport permit information.

<b>Parameter</b>	Early-run Sockeye	Early-run Sockeye	Early-run Sockeye	Early-run Sockeye	Early-run Sockeye	Totals
<b><u>Egg take</u></b> <sup>a</sup>						
<b>eggs</b>	424,444	424,444	424,444	212,222	424,444	1,910,000
<b>adults</b>	356	356	356	178	356	1,600
<b><u>Releases</u></b>						
<b>location</b>	Hidden Lake	Hidden Lake	Little Waterfall Lake	Big Waterfall Lake	Crescent Lake	
<b>number</b>	200,000	200,000	200,000	100,000	200,000	900,000
<b>size (g)</b>	0.4	12.0	12.0	12.0	12.0	
<b>lifestage</b>	Fry	Presmolt	Presmolt	Presmolt	Presmolt	
<b>date</b>	15-May-05	15-Oct-05	15-Oct-05	15-Oct-05	15-Oct-05	
<b><u>Projected Returns</u></b> <sup>b</sup>						
<b>2007</b>	657	2,260	2,260	1,130	2260	7,910
<b>2008</b>	2,367	6,620	6,620	3,310	6,620	23,170
<b>2009</b>	4,203	10,480	10,480	5,240	10,480	36,680
<b>2010</b>	1,485	0	0	0	0	0
<b>total</b>	8,712	19,360	19,360	9,680	19,360	67,760
<b><u>Fish Transport Permit (FTP)</u></b> <sup>c</sup>						
<b>number</b>	99A-0053	99A-0054	97A-0076	04A-0032	04A-0034	
<b>expires</b>	31-Dec-08	31-Dec-08	31-Dec-08	31-Dec-09	31-Dec-09	
<b>max. no.</b>	500,000	200,000	200,000	250,000	275,000	
<b>lifestage</b>	Fry	Presmolt	Presmolt	Presmolt	Presmolt	

<sup>a</sup> Afognak Lake sockeye salmon is the primary broodstock for early-run stocking projects; Malina Lake sockeye is proposed as an alternative broodstock in 2004 if egg take criteria allowing an Afognak Lake egg take are not met (see Table 9).

<sup>b</sup> Projected returns are calculated from Table 2 survival and age assumptions.

<sup>c</sup> FTP 99A-0051 - for 4.1 million green eggs, expiring 31Dec-08, authorizes egg take for these projects.

Table 11. Proposed Pillar Creek Hatchery late-run sockeye salmon egg takes (Saltery Lake broodstock) in 2004, juvenile releases for Spiridon, Jennifer, and Ruth Lakes in 2005, projected adult production, and fish transport permit information.

<b>Parameter</b>	Late-run Sockeye	Late-run Sockeye	<b>Totals</b>	Late-run Sockeye	Late-run Sockeye	<b>Totals</b>	Late-run Sockeye	Late-run Sockeye	<b>Totals</b>	<b>Late-run Totals</b>
<b>Egg take</b>										
<b>eggs</b>	4,032,258	806,452	<b>4,838,710</b>	322,581	241,935	<b>564,516</b>	80,645	161,290	<b>241,935</b>	<b>5,645,161</b>
<b>adults</b> <sup>a</sup>	2,688	538	<b>3,226</b>	215	161	<b>376</b>	54	108	<b>161</b>	<b>3,763</b>
<b>Releases</b>										
<b>location</b>	Spiridon Lake	Spiridon Lake	<b>Spiridon Lake</b>	Jennifer Lakes	Jennifer Lakes	<b>Jennifer Lakes</b>	Ruth Lake	Ruth Lake	<b>Ruth Lake</b>	
<b>number</b>	2,500,000	500,000	<b>3,000,000</b>	200,000	150,000	<b>350,000</b>	50,000	100,000	<b>150,000</b>	<b>3,500,000</b>
<b>size (g)</b>	0.4	12.0		0.4	12.0		0.4	12.0		
<b>lifestage</b>	Fry	presmolt		Fry	presmolt		Fry	presmolt		
<b>date</b>	15-May-05	15-Oct-05		15-May-05	15-Oct-05		15-May-05	15-Oct-05		
<b>Projected Returns</b> <sup>b</sup>										
<b>2007</b>	563	1,000	<b>1,563</b>	45	300	<b>345</b>	11	200	<b>211</b>	<b>2,119</b>
<b>2008</b>	35,775	34,063	<b>69,838</b>	2,862	10,219	<b>13,081</b>	716	6,813	<b>7,528</b>	<b>90,446</b>
<b>2009</b>	69,975	27,438	<b>97,413</b>	5,598	8,231	<b>13,829</b>	1,400	5,488	<b>6,887</b>	<b>118,129</b>
<b>2010</b>	6,075	0	<b>6,075</b>	486	0	<b>486</b>	122	0	<b>122</b>	<b>6,683</b>
<b>total</b>	112,388	62,500	<b>174,888</b>	8,991	18,750	<b>27,741</b>	2,248	12,500	<b>14,748</b>	<b>217,376</b>
<b>Fish Transport Permit (FTP)</b> <sup>c</sup>										
<b>number</b>	04A-0040	04A-0040		04A-0036	04A-0036		04A-0039	04A-0039		
<b>expires</b>	31-Dec-09	31-Dec-09		31-Dec-09	31-Dec-09		31-Dec-09	31-Dec-09		
<b>max. no.</b>	7,000,000	1,000,000		400,000	250,000		300,000	300,000		
<b>lifestage</b>	Fry	Presmolt		Fry	Presmolt		Fry	Presmolt		

<sup>a</sup> Totals adults do not include an additional 538 fish that will be utilized for Kitoi Bay Hatchery projects (Honold and Aro *in press*)

<sup>b</sup> Projected returns are calculated from Table 2 survival and age assumptions.

<sup>c</sup> FTP 99A-0071 - for 9.8 million green eggs, expiring 31Dec-08, authorizes egg take for these projects.

Table 12. Pillar Creek Hatchery coho salmon egg takes (Buskin Lake broodstock) in 2004, resultant juvenile releases planned for Road System Lakes in 2005 (Monashka Creek in 2006), projected adult production, and fish transport permit information.

<b>Parameter</b>	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Totals
<b><u>Egg take</u></b>									
eggs	9,286	32,143	10,714	17,857	13,571	5,000	5,000	<sup>a</sup>	93,571
adults	5	16	5	9	7	3	3	<sup>a</sup>	47
<b><u>Releases</u></b>									
location	Mayflower Lk.	Island Lk.	Dark Lk.	Mission Lk.	P.Patch Lk.	Southern Lk.	Margaret Lk.	Monashka Cr.	<sup>a</sup>
number	6,500	22,500	7,500	12,500	9,500	3,500	3,500	10,000	65,500
size (g)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	15.0	
lifestage	Fingerling	Fingerling	Fingerling	Fingerling	Fingerling	Fingerling	Fingerling	Smolt	
date	15-Jul-05	15-Jul-05	15-Jul-05	15-Jul-05	15-Jul-05	15-Jul-05	15-Jul-05	15-May-06	
<b><u>Projected Returns</u></b>									
2007	0	0	0	0	0	0	0	1,250	1,250
2008	423	1,463	488	813	618	0	0	0	3,803
total	423	1,463	488	813	618	landlocked	landlocked	1,250	5,053
<b><u>Fish Transport Permit (FTP)</u></b>									
number	04A-0006	04A-0006	04A-0006	04A-0006	04A-0006	04A-0005	04A-0013	04A-0007	
expires	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-13	31-Dec-08	
max. no.	6,500	22,500	7,500	12,500	9,500	3,500	3,500	10,000	
lifestage	any	any	any	any	any	any	any	smolt	

<sup>a</sup> Coho smolt may be reared and then released at Monashka Creek depending upon chinook salmon smolt production. Fingerling releases will be reduced. Possible 06 release not included in total releases for all locations.

<sup>b</sup> Projected returns are calculated from Table 2 survival and age assumptions.

<sup>c</sup> FTP 04A-0004 - for 200,000 green eggs, expiring 31Dec-13, authorized egg take for these projects.

Table 13. Estimated 2004 sockeye salmon runs as a result of Pillar Creek Hatchery stocking projects.

Lake Stocked	Broodstock <sup>a</sup>	Lake Type	Harvest Location	Estimated Enhanced Run			
				Point	Range		
Hidden	Afognak Lake (ER)	Barriered	Foul Bay THA	32,200	13,000	to	72,300
Big & Little Waterfall	Afognak Lake (ER)	Barriered	Waterfall Bay THA	38,000	25,000	to	72,200
Crescent	Afognak Lake (ER)	Barriered	Settler Cove THA <sup>b</sup>	3,600	800	to	15,100
Malina	Malina Lake (ER)	Anadromous	Malina Creek THA <sup>c</sup>	1,300	1,000	to	1,600
Laura	Laura Lake (ER)	Anadromous	Perenosa Bay	2,700	2,200	to	3,200
Spiridon	Saltery Lake (LR)	Barrier	Spiridon Lake THA <sup>d</sup>	337,000	178,000	to	421,000
Ruth	Saltery Lake (LR)	Barrier	Kittoi, Duck, Izhut Bays	2,800	1,500	to	5,100
Total Early Run:				77,800	42,000	to	164,400
Total Late Run:				339,800	179,500	to	426,100
Total Both Runs:				417,600	221,500	to	590,500

<sup>a</sup> ER = early run; LR = late run

<sup>b</sup> Some fish may be harvested in the Central Section of the Northwest Kodiak District.

<sup>c</sup> Some fish will likely be harvested in Southwest and Northwest Sections of the Afognak District.

<sup>d</sup> Fish will also be harvested in traditional commercial fishing areas in the Northwest Kodiak District.

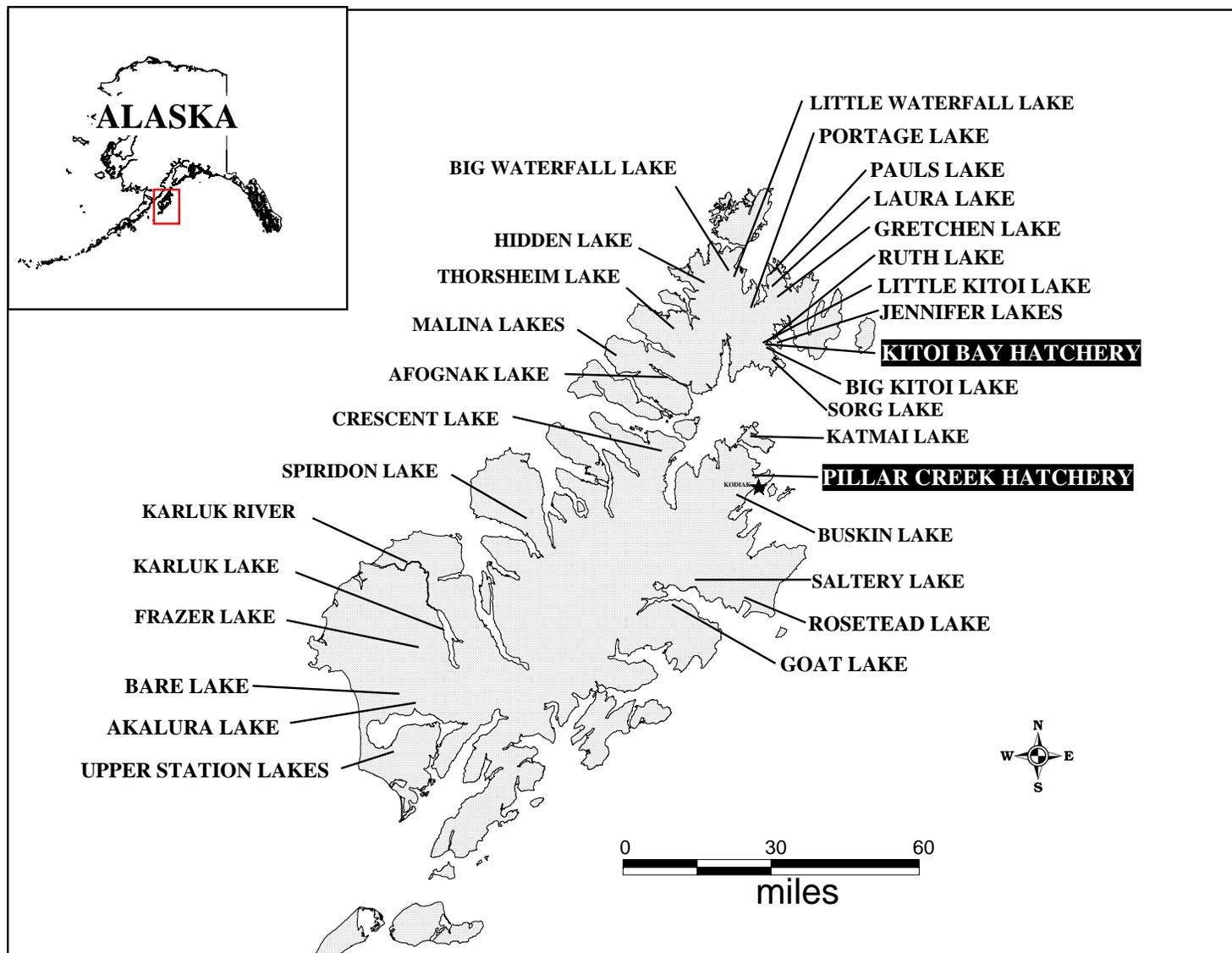


Figure 1. Locations of sockeye salmon enhancement and rehabilitation projects on Kodiak and Afognak Islands, 2004.

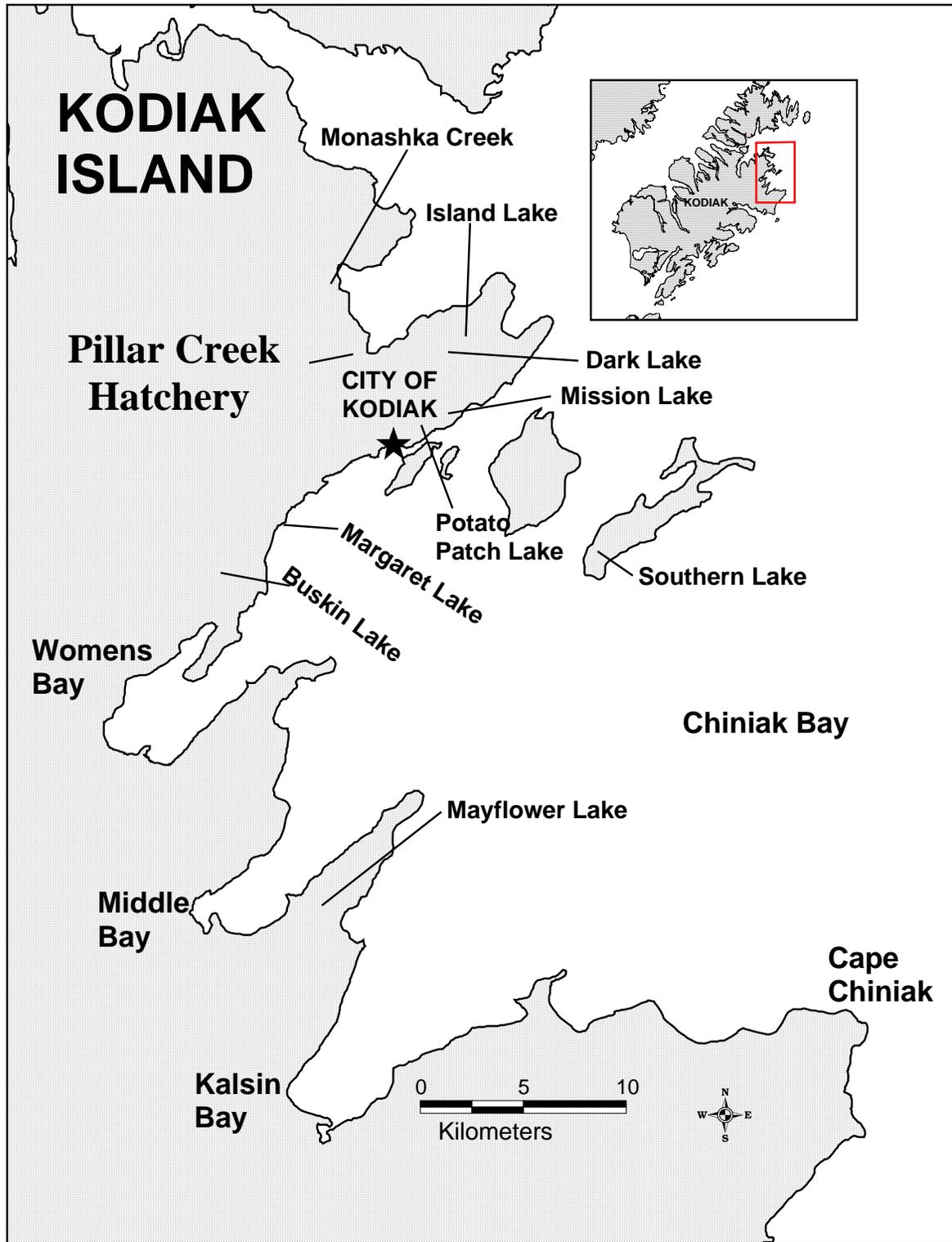


Figure 2. Locations of Kodiak Island road system lakes stocked with coho and chinook (Monashka Creek) salmon.

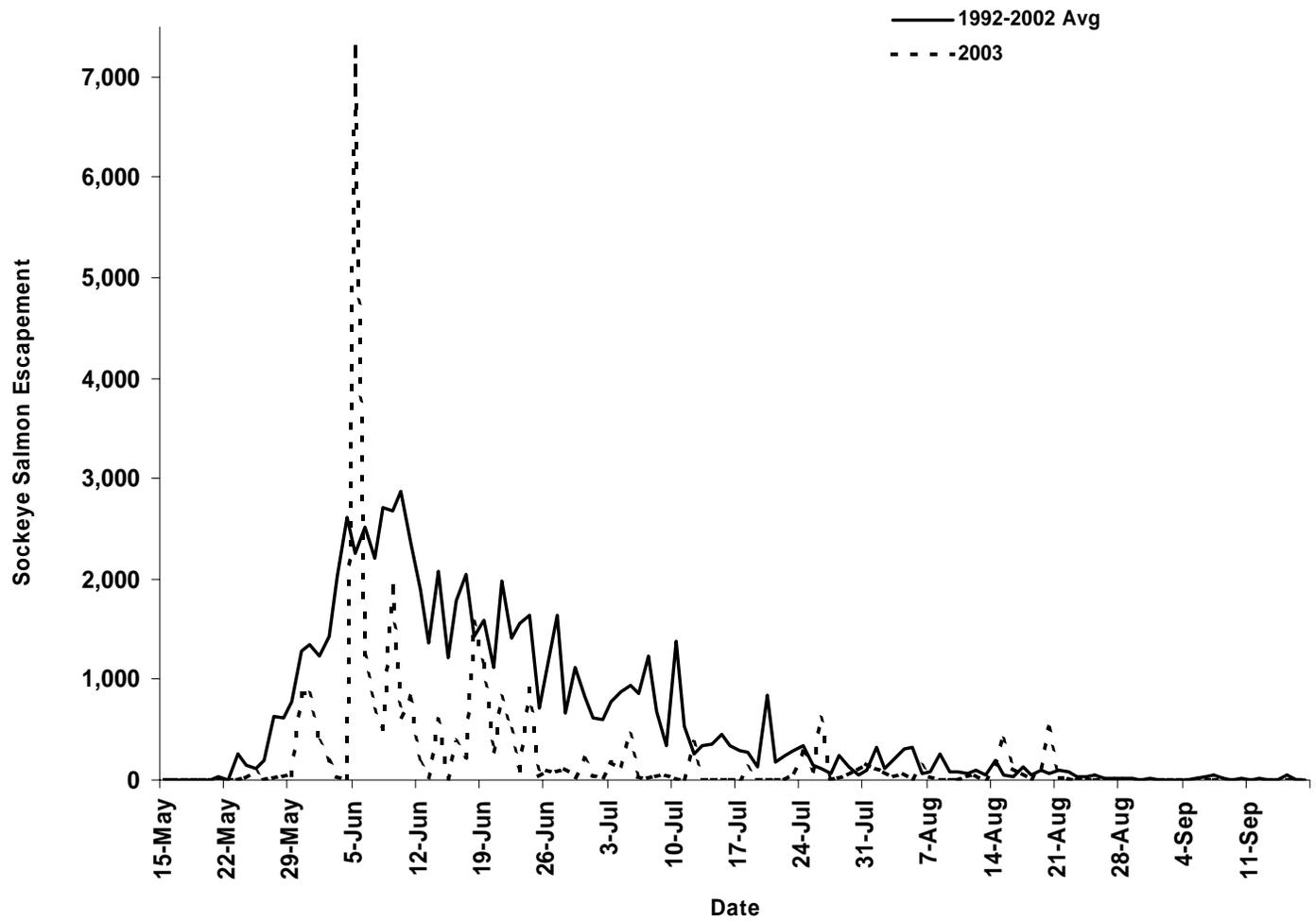


Figure 3. Afognak Lake (Litnik) sockeye salmon average escapement timing (1992-2002) compared to the 2003 escapement timing.

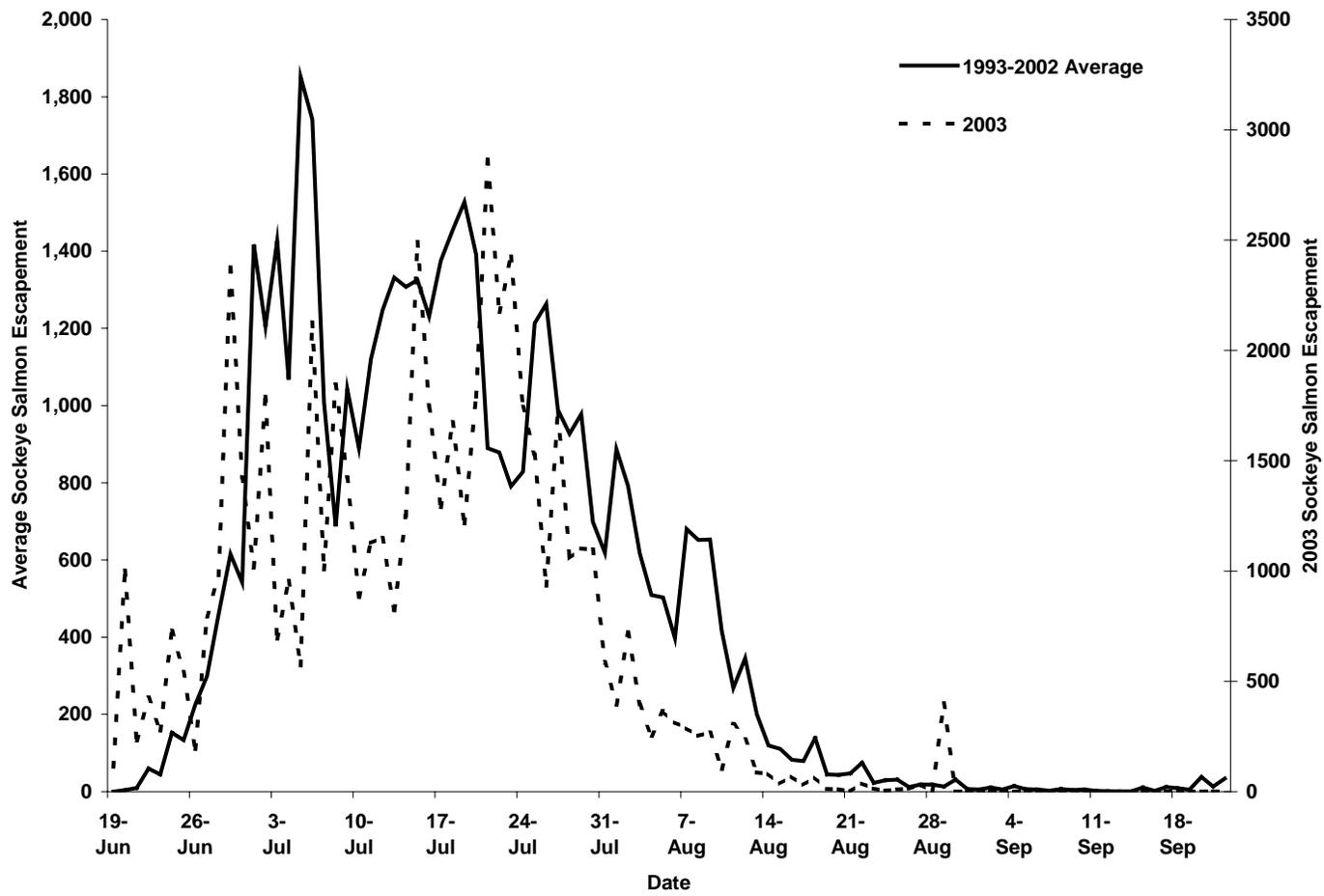


Figure 4. Saltery Lake sockeye salmon average escapement timing (1993-2002) compared to the 2003 escapement timing

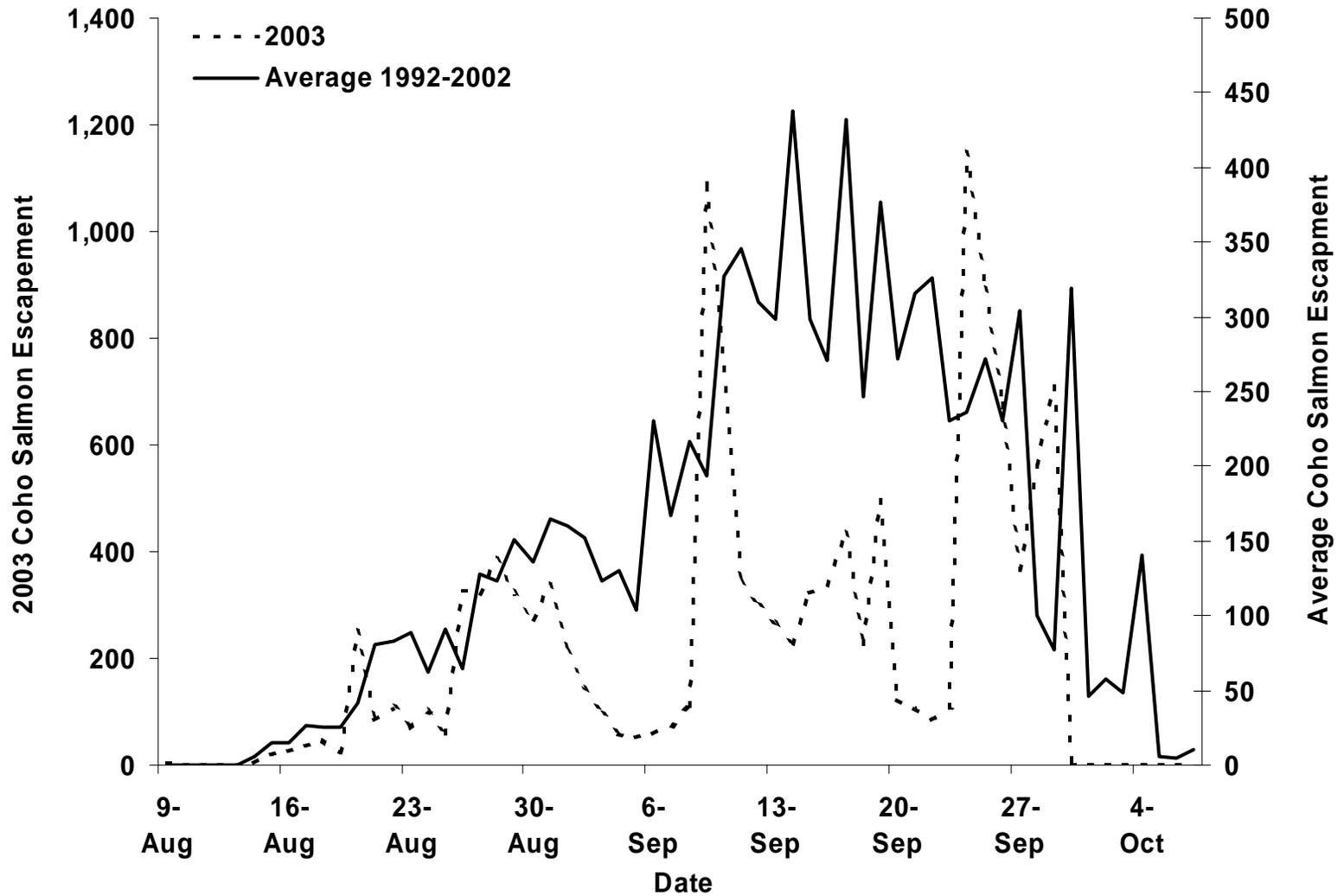


Figure 5. Buskin River coho salmon average escapement timing (1992-2002) compared to the 2003 escapement timing.

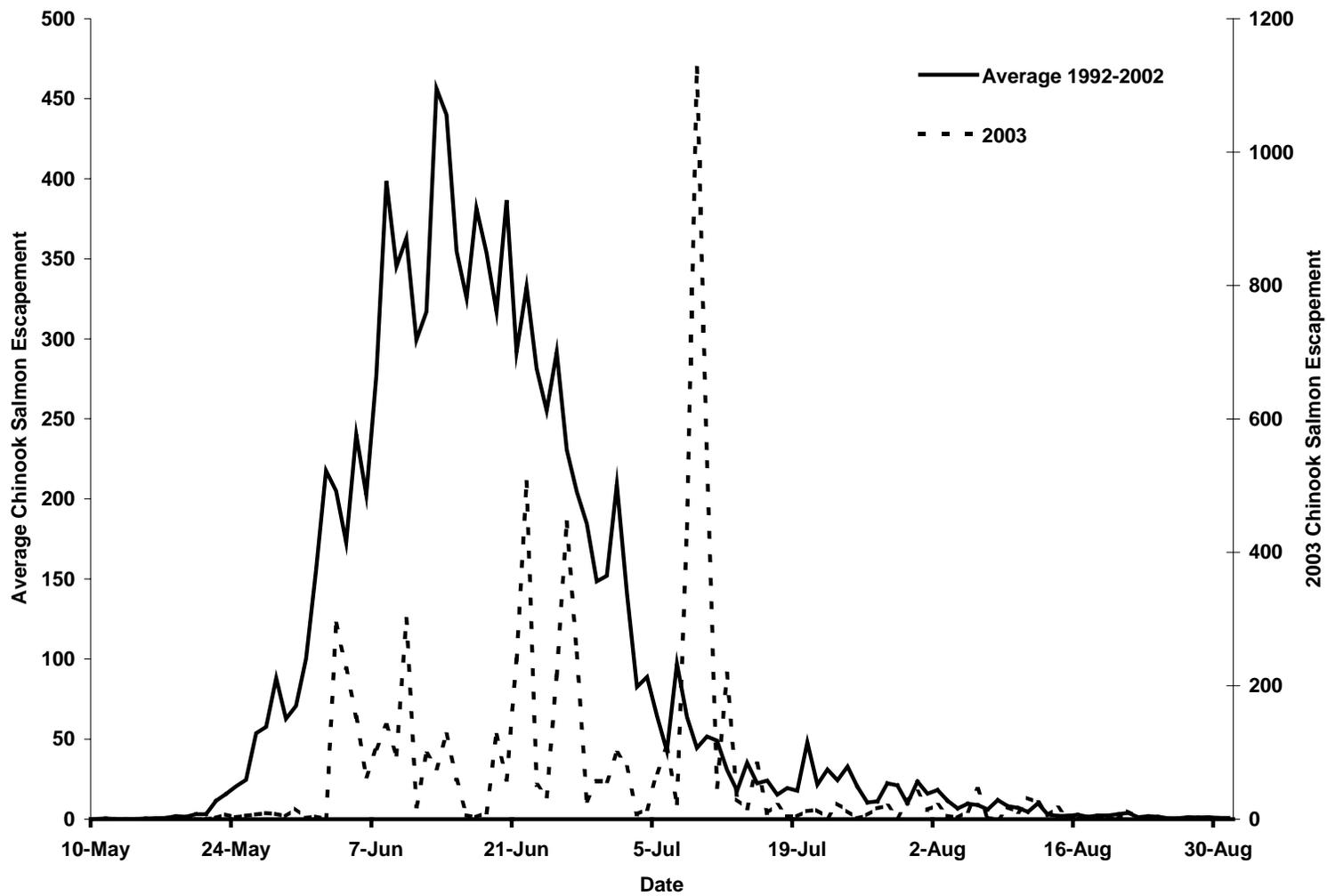


Figure 6. Karluk River chinook salmon average escapement timing (1992-2002) compared to the 2003 escapement timing

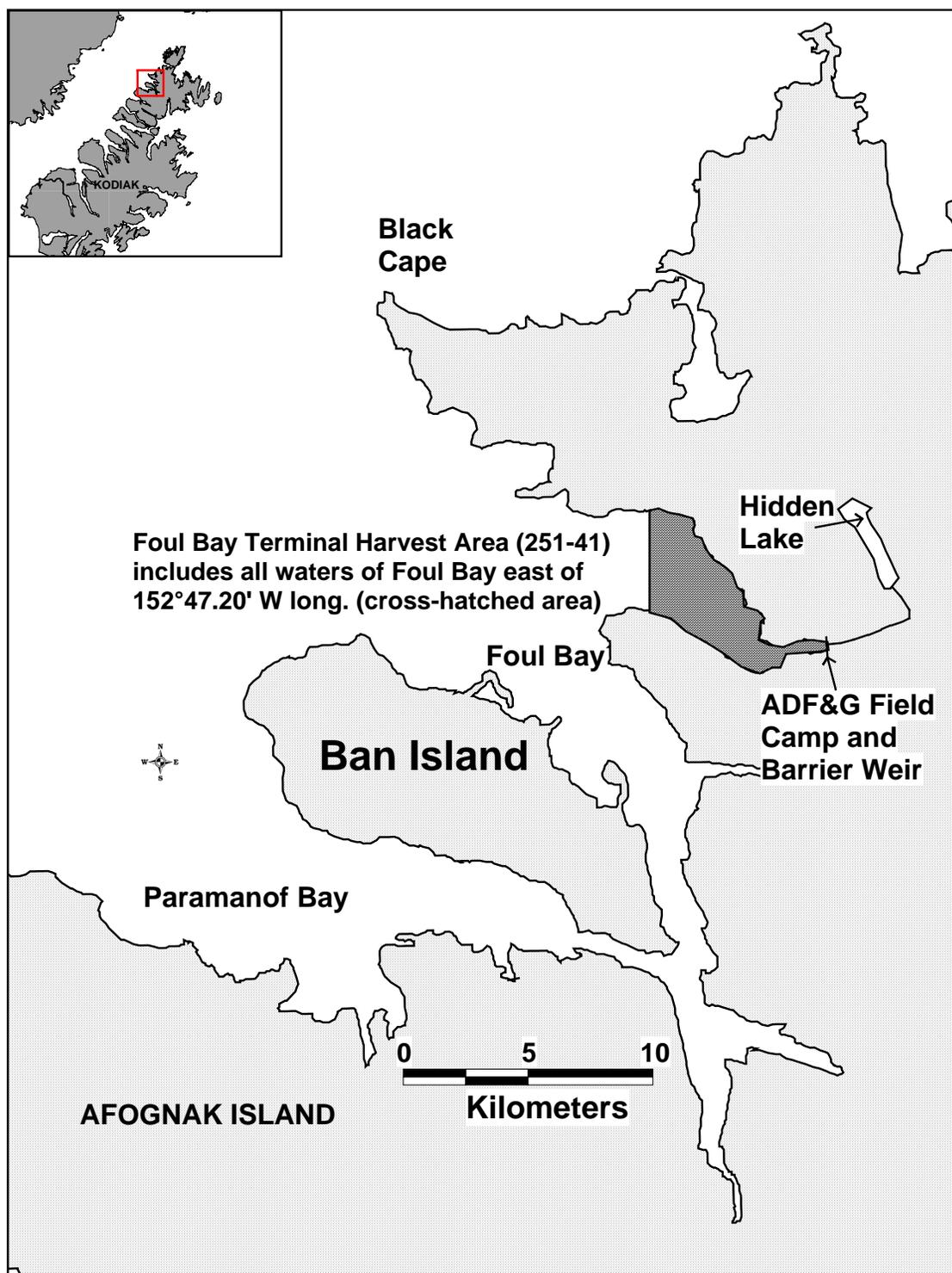


Figure 7. Location of the Foul Bay terminal harvest area, ADF&G field camp and fish weir at Hidden Creek.

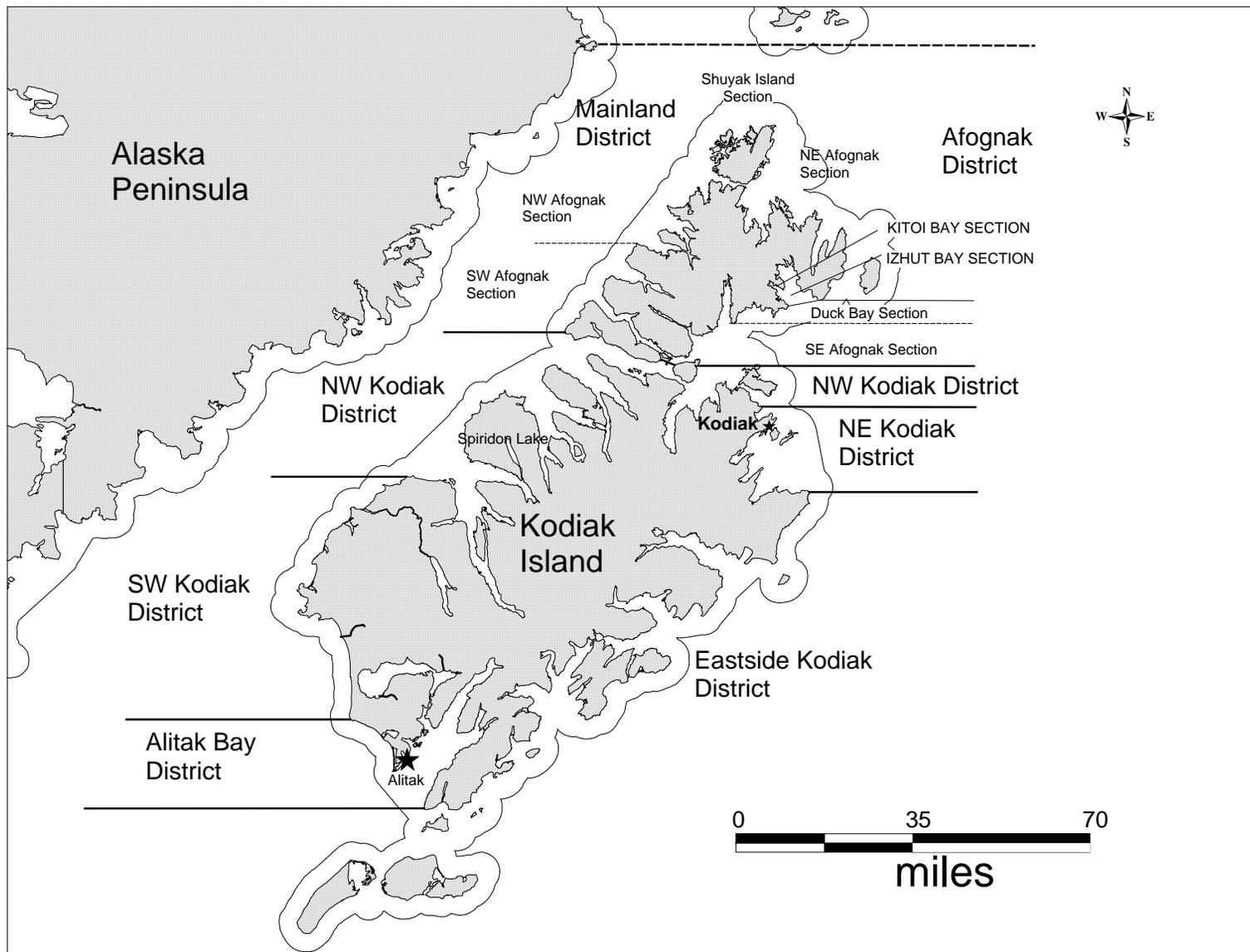


Figure 8. Map of the Kodiak Management Area depicting commercial fishing districts and selected sections.

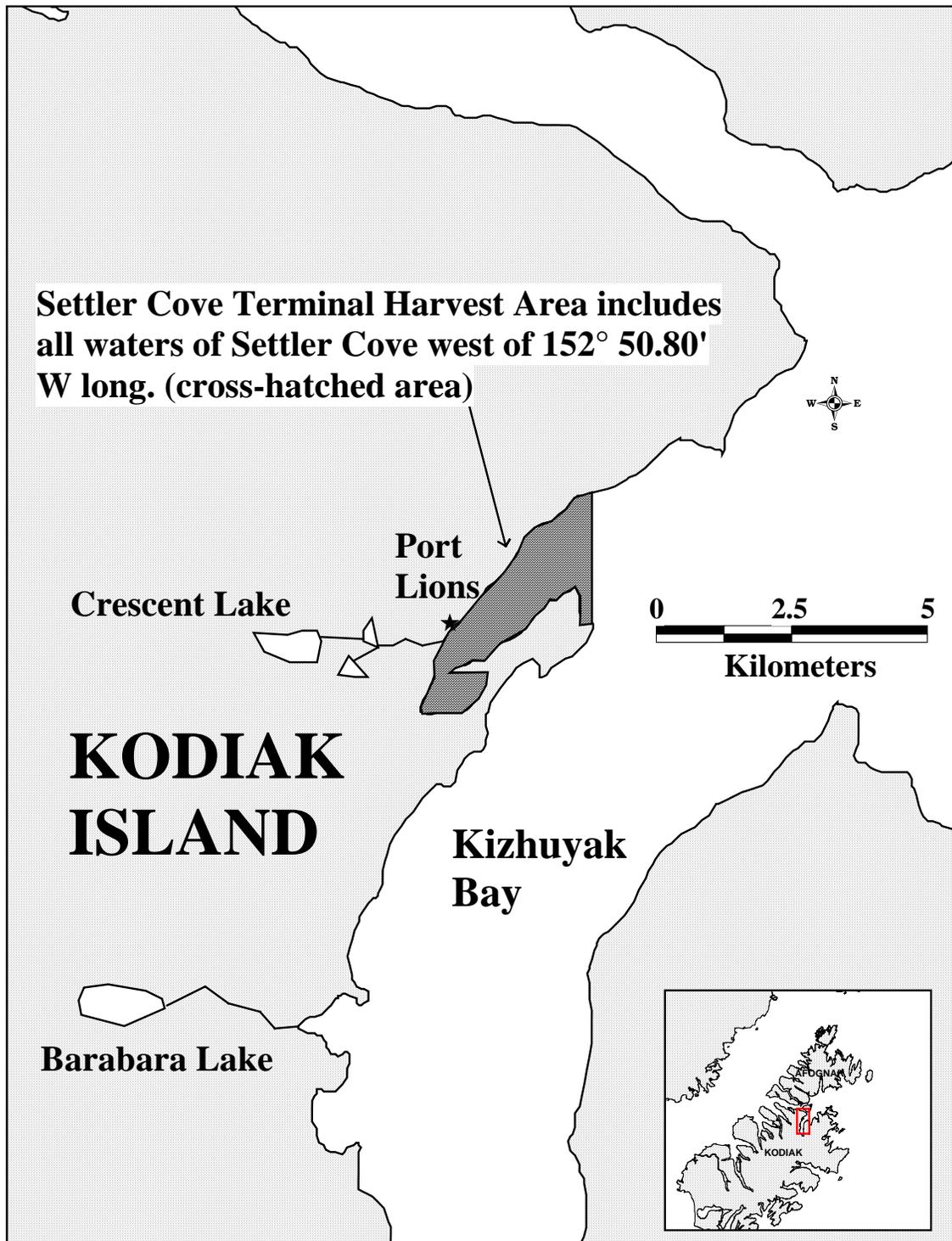


Figure 9. Settler Cove (Crescent Lake) terminal harvest area boundaries in Kizhuyak Bay.

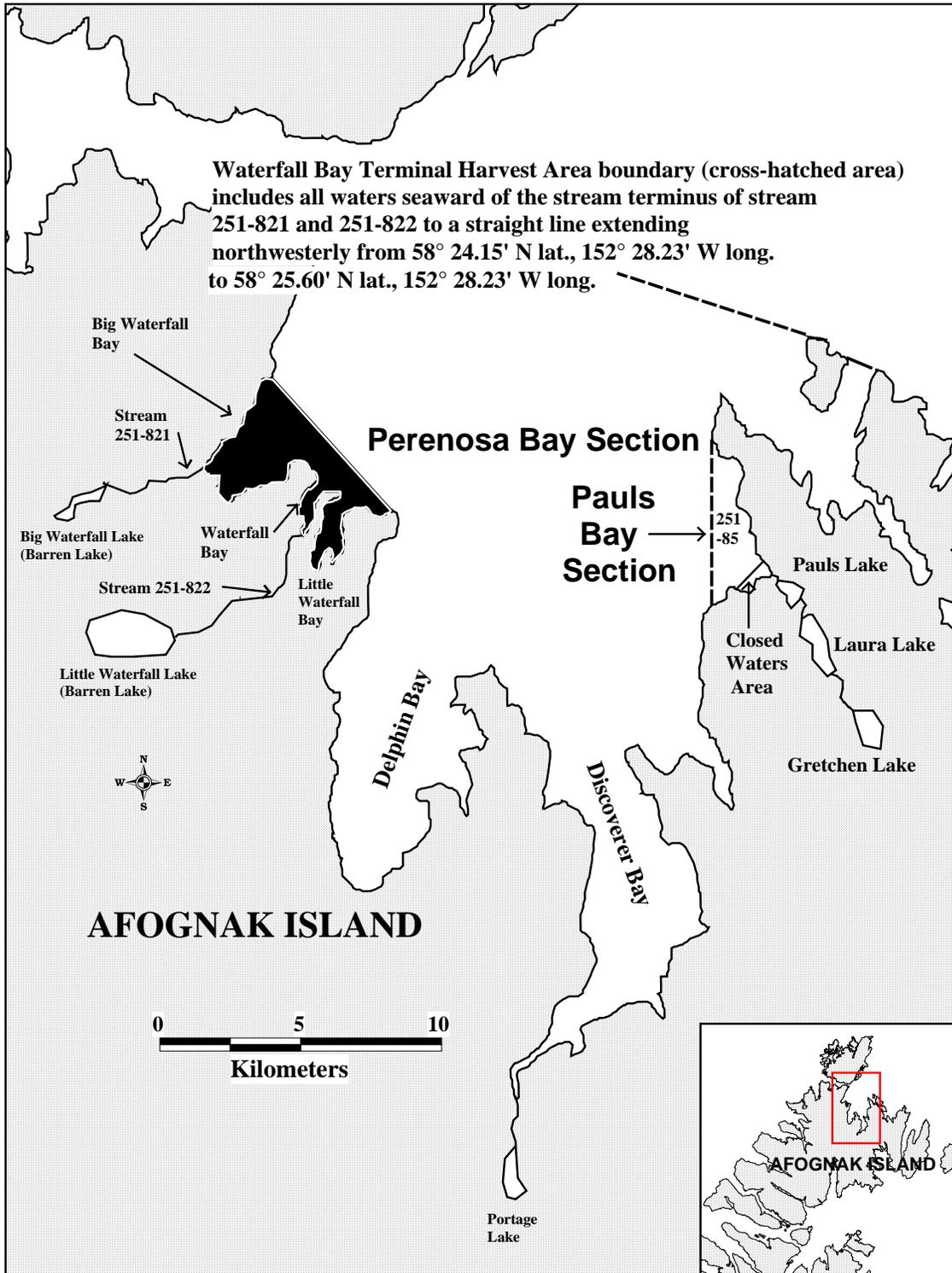


Figure 10. Waterfall Bay (Little and Big Waterfall Lakes) terminal harvest area and rehabilitation systems and the Pauls Bay Section in Perenosia Bay.

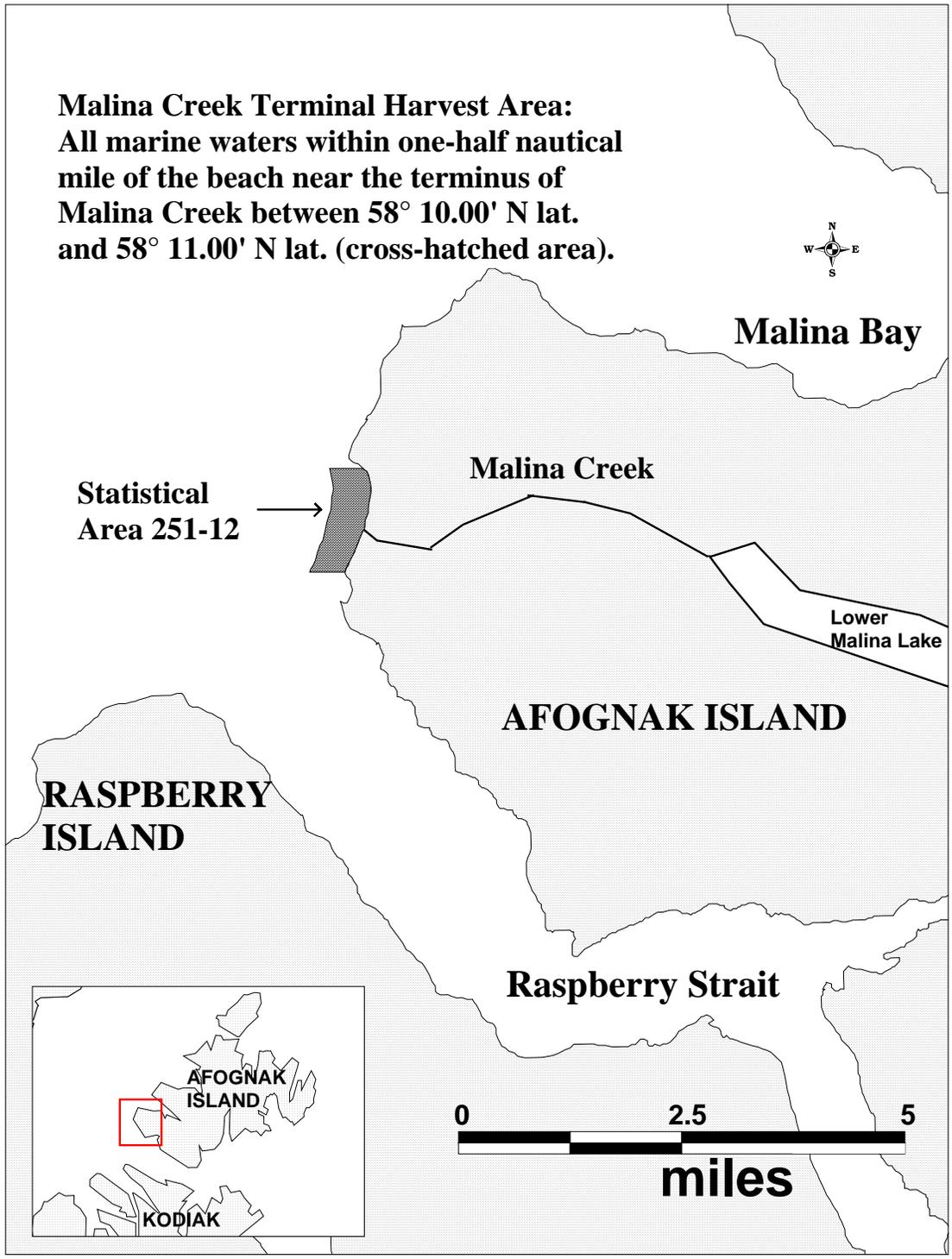


Figure 11. Location of the Malina Creek terminal harvest area.

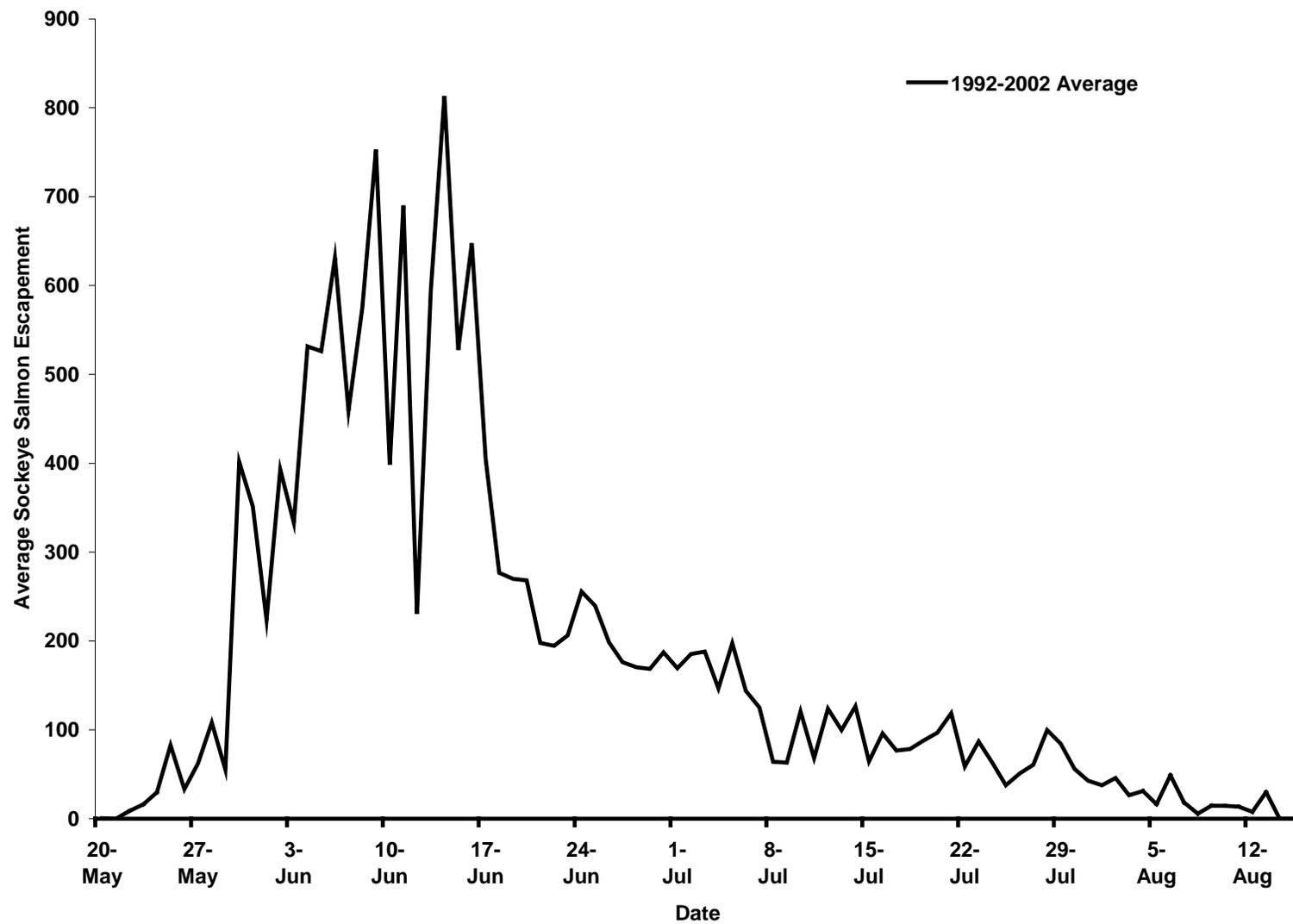


Figure 12. Malina Lake sockeye salmon average escapement timing (1992-2002).

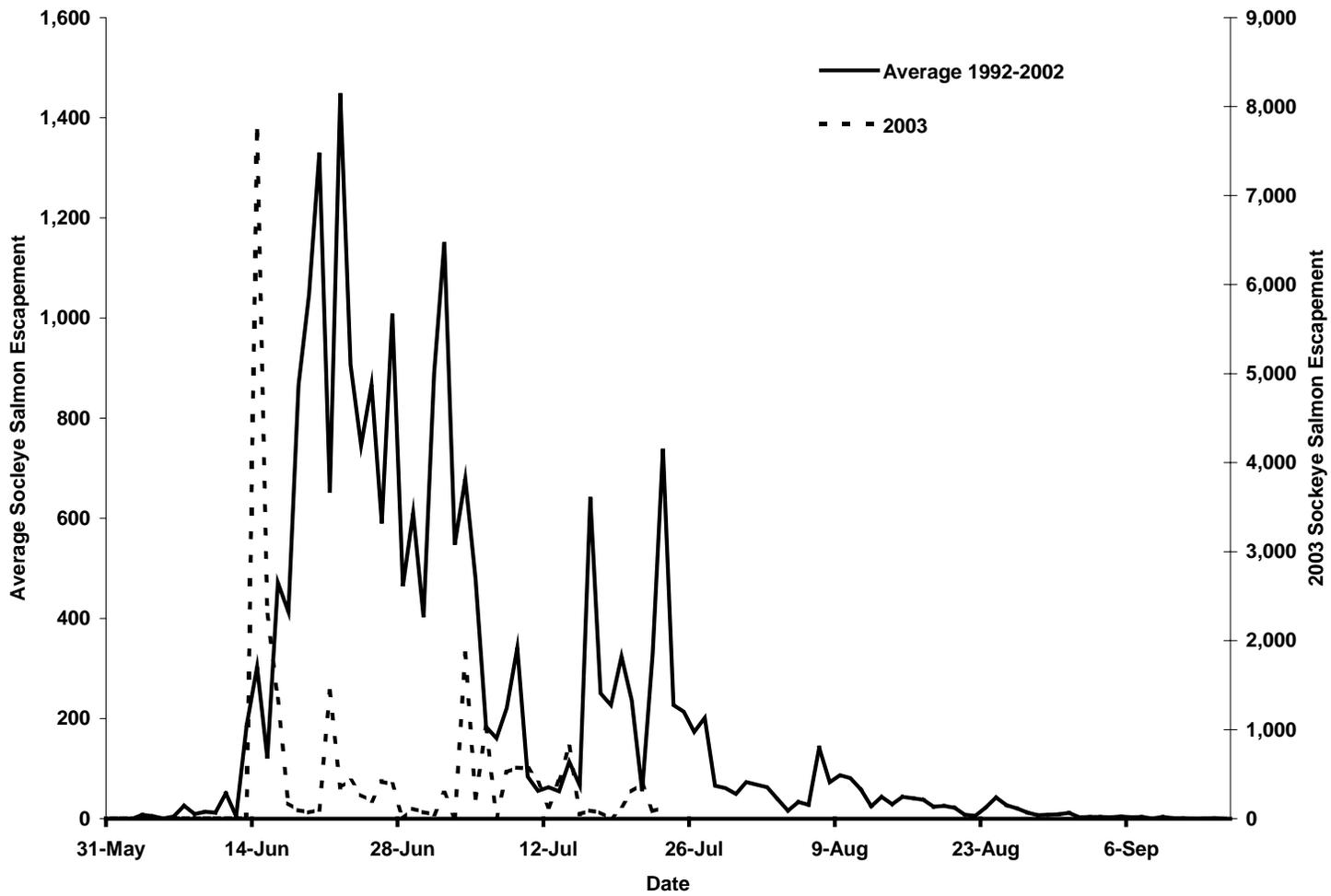


Figure 13. Laura (Pauls) Lake sockeye salmon average escapement timing (1992-2002) compared to the 2003 escapement timing.

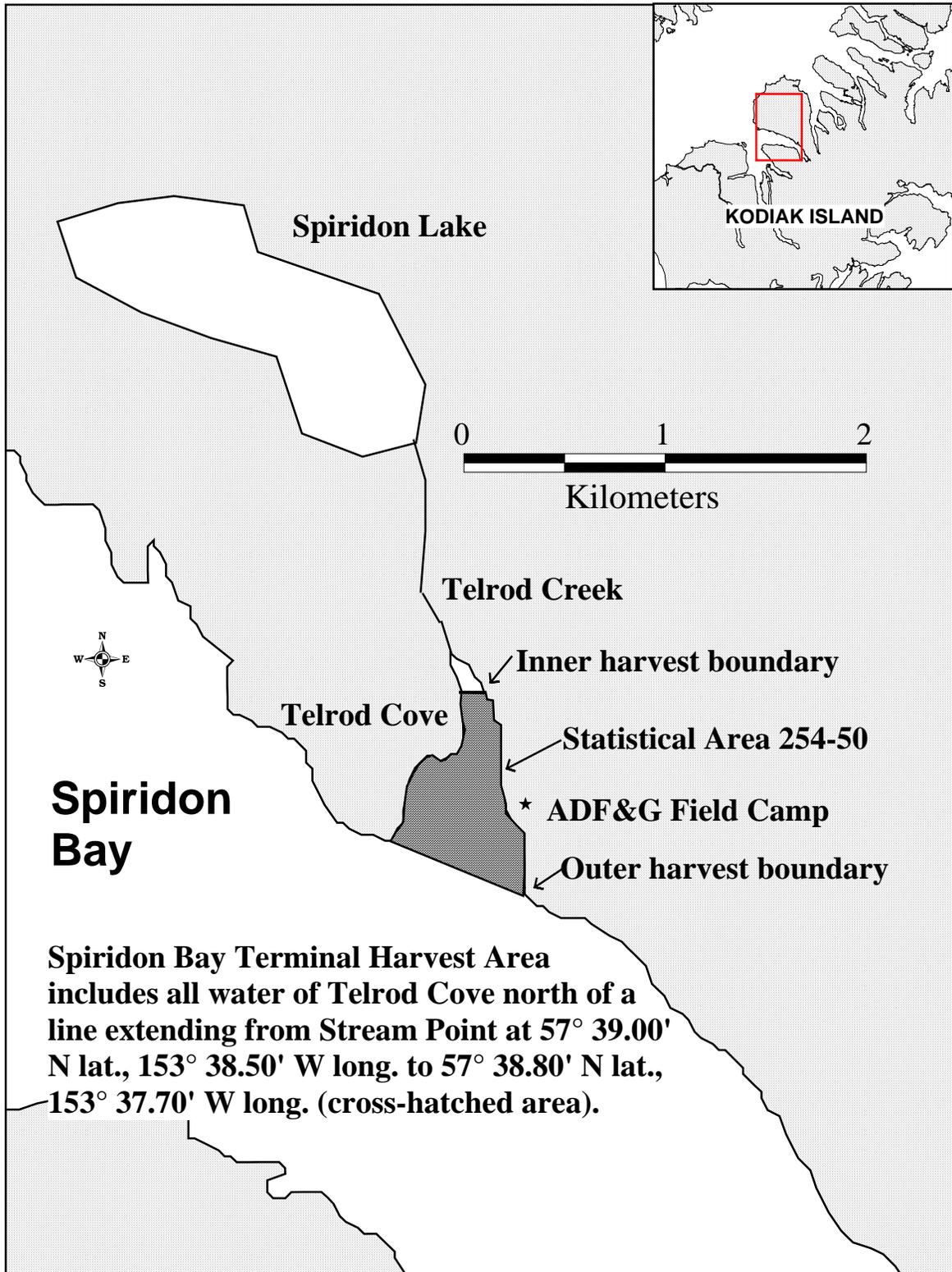


Figure 14. Spiridon Lake (Telrod Cove) terminal harvest area boundaries, and ADF&G camp location in Telrod Cove.

## **APPENDIX**

Appendix A. Sockeye salmon egg takes at Upper Station Lakes, 1988-1996.<sup>a</sup>

Brood Year	Adult Salmon	Eggs (millions)	Hatchery <sup>b</sup>	Number Stocked	Year Stocked	Stocking Location
1988	120	0.2	KBH	143,725	1989	Kitoi Bay
1989	3,000	5.0	PCH & KBH	249,346	1990	Spiridon Lake
				1,312,728	1990	Little Kitoi Bay
				578,932	1990	Little Kitoi Lake
1990	3,700	4.5	PCH	3,480,000	1991	Spiridon Lake
				1,250,000	1991	Little Kitoi Bay
1991	3,800	4.3	PCH	2,200,000	1992	Spiridon Lake
		2.3	KBH	1,463,000 <sup>c</sup>	1992	Little Kitoi Bay
1992	6,816	9.8	PCH	4,246,000	1993	Spiridon Lake
				52,418	1993	Little Kitoi Lake
				326,500	1994	Little Kitoi Bay
				180,000	1993	Jennifer Lake
1993	5,551	7.8	PCH	5,676,000	1994	Spiridon Lake
				370,000	1994	Jennifer Lake
				1,672,710	1994	Little Kitoi Bay
1994	200	0.3	PCH	200,000	1995	Jennifer Lake
	200	0.3	KBH	266,952	1995	Little Kitoi Lake
1995	3,668	6.2	PCH	4,844,000	1996	Spiridon Lake
		0.7	KBH	587,435	1997	Little Kitoi Bay
1996	4,810	9.8	PCH	6,700,000	1997	Spiridon Lake
				458,000	1997	Jennifer Lake

<sup>a</sup> Additional egg-takes are not planned.

<sup>b</sup> Pillar Creek Hatchery (PCH) and Kitoi Bay Hatchery (KBH).

<sup>c</sup> An additional 182,000 fry of Afognak Lake stock were stocked into Little Kitoi Bay from Kitoi Bay Hatchery.

Appendix B. Pillar Creek Hatchery sockeye salmon egg takes at Afognak Lake, 1991-2004.

Brood Year	Adult Salmon	Eggs (millions)	Number Stocked	Year Stocked	Stocking Location
1991	2,076	2.6	260,000	1992	Hidden Lake
			399,000	1992	Crescent Lake
			493,000	1992	Little Waterfall Lake
			96,000	1992	Big Waterfall Lake
			464,000	1992	Afognak Lake
			182,000	1992	Little Kitoi Bay
1992	1,890	2.7	554,600	1993	Hidden Lake
			202,000	1993	Crescent Lake
			205,000	1993	Little Waterfall Lake
1993	2,169	3.4	250,000	1994	Hidden Lake
			314,000	1994	Crescent Lake
			150,000	1994	Little Waterfall Lake
			183,000	1994	Little Kitoi Lake
			311,000	1994	Afognak Lake
			293,000	1994	Little Kitoi Bay
			3,500	1995	Little Kitoi Lake
			97,800	1995	Little Waterfall Lake
1994	1,190	1.6	98,650	1995	Hidden Lake
			90,200	1995	Crescent Lake
			100,000	1995	Little Waterfall Lake
			112,900	1995	Little Kitoi Lake
1995	1,440	2.2	390,800	1996	Hidden Lake
			427,000	1996	Crescent Lake
			82,300	1996	Little Waterfall Lake
			146,000	1996	Sorg Lake
			50,600	1996	Little Kitoi Lake
			528,000	1996	Afognak Lake
1996	1,700	2.2	455,200	1997	Hidden Lake
			432,000	1997	Crescent Lake
			246,800	1997	Little Waterfall Lake
			125,800	1997	Little Kitoi Lake
			328,300	1997	Afognak Lake
1997	1,600	2.4	340,400	1998	Hidden Lake
			571,000	1998	Crescent Lake
			237,300	1998	Little Waterfall Lake
			422,700	1998	Afognak Lake
1998	1,060	1.6	310,000	1999	Hidden Lake
			273,000	1999	Little Waterfall Lake
			42,000	1999	Big Waterfall Lake
			371,700	1999	Crescent Lake

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Brood Year	Adult Salmon	Eggs (millions)	Number Stocked	Year Stocked	Stocking Location
1999	1,350	1.8	504,400	2000	Hidden Lake
			358,800	2000	Little Waterfall Lake
			124,400	2000	Big Waterfall Lake
			206,000	2000	Crescent Lake
2000	1,420	2.1	315,500	2001	Hidden Lake
			310,000	2001	Little Waterfall Lake
			224,300	2001	Big Waterfall Lake
			331,500	2001	Crescent Lake
2001	290	0.4	51,600	2002	Hidden Lake
			46,100	2002	Little Waterfall Lake
			44,300	2002	Big Waterfall Lake
			33,600	2002	Crescent Lake
2002	180	0.3	31,000	2003	Hidden Lake
			72,500	2003	Little Waterfall Lake
			0	2003	Big Waterfall Lake
			36,500	2003	Crescent Lake
2003	268	0.4	64,100	2004	Hidden Lake
			16,600	2004	Little Waterfall Lake
			16,600	2004	Big Waterfall Lake
			22,750	2004	Crescent Lake
2004 <sup>a</sup>	1,600	1.9	400,000	2005	Hidden Lake
			200,000	2005	Little Waterfall Lake
			100,000	2005	Big Waterfall Lake
			200,000	2005	Crescent Lake

<sup>a</sup> Egg-take to be determined no later than August 1, 2004, pending limnology evaluation and escapement level.

Appendix C. Pillar Creek Hatchery sockeye salmon egg takes at Malina Lake, 1991-1998.

Brood Year	Adult Salmon	Eggs (millions)	Number Stocked	Year Stocked	Stocking Location
1991	120	0.141	85,000	1992	Malina Lake
1992	1,005	1.410	318,000	1993	Malina Lake
1993	644	0.930	547,000	1994	Malina Lake
1994	350	0.475	53,500	1995	Malina Lake
1995	400	0.590	426,300	1996	Malina Lake
1996	454	0.791	390,400	1997	Malina Lake
1997	470	0.800	350,500	1998	Malina Lake
1998 <sup>a</sup>	550	0.710	406,000	1999	Malina Lake
2004 <sup>b</sup>	1,600	1.9	400,000	2005	Hidden Lake
			200,000	2005	Little Waterfall Lake
			100,000	2005	Big Waterfall Lake
			200,000	2005	Crescent Lake

<sup>a</sup> Escapement goal was achieved from 1999 to 2002 and no additional rehabilitation egg-takes are planned.

<sup>b</sup> Alternative broodstock for early-run stocking projects (Afognak Lake is the primary broodstock). 2004 egg take will only occur if egg take goals cannot be achieved using Afognak Lake sockeye salmon; egg-take goal to be determined after inseason limnology evaluation and escapement results.

Appendix D. Pillar Creek Hatchery sockeye salmon egg takes at Laura Lake, 1993-1998.

Brood Year <sup>a</sup>	Adult Salmon	Eggs (millions)	Number Stocked	Year Stocked	Stocking Location
1993	218	0.30	117,000	1994	Laura Lake
1994	53	0.06	16,000	1995	Laura Lake
1995	170	0.20	182,000	1996	Laura Lake
1998	251	0.35	172,000	1999	Laura Lake

<sup>a</sup> Egg takes did not occur in 1996, 1997, and from 1999 to 2003 due to sufficient escapements; no additional egg takes are planned.

Appendix E. Sockeye salmon egg takes at Saltery Lake, 1994-2004.

Brood Year	Adult Salmon	Eggs (millions)	Hatchery <sup>a</sup>	Number Stocked	Year Stocked	Stocking Location
1994	4,238	7.60	PCH	4,599,000	1995	Spiridon Lake
1995	122	0.20	PCH	150,000	1996	Ruth Lake
1996	103	0.20	PCH	147,000	1997	Ruth Lake
1997	2,700	4.00	PCH	3,340,000	1998	Spiridon Lake
			PCH	100,000	1998	Ruth Lake
			KBH	106,658	1999	Little Kitoi Lake
1998	2,560	4.30	PCH	3,564,000	1999	Spiridon Lake
			PCH	66,500	1999	Ruth Lake
			KBH	98,737	1999	Little Kitoi Lake
			KBH	74,463	2000	Little Kitoi Lake
			KBH	23,756	2000	Little Kitoi Bay
1999	4,318	6.80	PCH	4,397,100	2000	Spiridon Lake
			PCH	78,700	2000	Ruth Lake
			KBH	154,039	2000	Little Kitoi Lake
2000	2,582	4.80	PCH	1,700,600	2001	Spiridon Lake
			PCH	0	2001	Ruth Lake
			KBH	282,089	2001	Little Kitoi Lake
2001	845	1.57	PCH	1,182,000	2002	Spiridon Lake
			PCH	0	2002	Ruth Lake
			KBH	212,418	2002	Little Kitoi Lake
2002	2,000	3.30	PCH	1,417,500	2003	Spiridon Lake
			PCH	0	2003	Ruth Lake
			KBH	102,822	2003	Little Kitoi Lake
			KBH	190,000	2004	Little Kitoi Lake

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Appendix E. (page 2 of 2)

Brood Year	Adult Salmon	Eggs (millions)	Hatchery <sup>a</sup>	Number Stocked	Year Stocked	Stocking Location
2003	4,175	5.96	PCH	2,700,000	2004	Spiridon Lake
			PCH	100,000	2004	Ruth Lake
			PCH	540,000	2004	Jennifer Lake
			PCH	110,000	2004	Little Kitoi Lake
			KBH	0	2004	Little Kitoi Lake
			KBH	300,000	2005	Little Kitoi Lake
2004 <sup>b</sup>	4,300	6.5	PCH	3,000,000	2005	Spiridon Lake
			PCH	150,000	2005	Ruth Lake
			PCH	350,000	2005	Jennifer Lake
			PCH	0	2005	Little Kitoi Lake
			KBH	100,000	2005	Little Kitoi Lake
			KBH	400,000	2006	Little Kitoi Lake

<sup>a</sup> Pillar Creek Hatchery (PCH), Kitoi Bay Hatchery (KBH).

<sup>b</sup> Egg-take goal to be determined after inseason limnology evaluation and escapement results.

Appendix F. Pillar Creek Hatchery coho salmon egg takes, 1991-2004.

Brood Year	Adult Salmon	Green Eggs	Number Stocked	Year Stocked	Stocking Location
<u>Monashka Creek stock:</u>					
1991	25	60,100	52,000	1992	Monashka Creek
1992	6	10,500	9,000	1993	Monashka Creek
<u>Buskin River stock:</u>					
1993 <sup>a</sup>	78	156,000	136,200	1994	Kodiak Road System Lakes <sup>b</sup>
1994	56	98,000	76,140	1995	"
1995	85	120,000	28,000	1996	"
1996	65	177,000	148,200	1997	"
1997	65	153,000	134,500	1998	"
1998	102	158,000	128,000	1999	"
1999	40	91,000	63,800	2000	"
2000	60	112,000	73,400	2001	"
2001	60	146,000	110,000	2002	"
2002	40	80,500	48,300	2003	"
	30	61,000	42,800	2004	Kodiak road system lakes <sup>b</sup> ; Monashka Creek
2003	70	142,000	130,000	2004	"
			10,000	2005	Monashka Creek
2004	47	94,000	65,500	2005	
			up to 10,000 <sup>c</sup>	2006	Monashka Creek

<sup>a</sup> Prior to 1993, Kitoi Bay Hatchery supplied juvenile coho salmon for stocking the road system lakes.

<sup>b</sup> Road system lakes include: Mayflower, Island, Dark, Mission, Potato Patch, Pony, and Southern Lake on Long Island; Margaret Lake replaced Pony Lake after 2003.

<sup>c</sup> Smolt releases will only occur if rearing space becomes available due to less chinook salmon available to rear than anticipated; extra eggs will not be taken for coho smolt rearing (releases at other locations will be reduced in order to rear smolt).

Appendix G. Pillar Creek Hatchery chinook salmon egg takes at Karluk River, 2000-2004.

Brood Year	Adult Salmon	Number of Eggs	Number Stocked	Year Stocked	Stocking Location
2000	48	124,818	60,400	2002	Monashka Creek
2001	34	86,120	34,000	2003	Monashka Creek
2002	59	147,000	12,300	2004	Monashka Creek
2003	70	172,300	110,000	2005	Monashka Creek
2004	80	200,000	100,000	2006	Monashka Creek

Appendix H. Worksheet for determining sockeye salmon broodstock numbers allowed, based on escapement levels at Afognak Lake, 2004.

50% Lower Bound EGR	2004 Escapement	<b>Broodstock Allowed</b>	50% Lower Bound EGR	2004 Escapement	<b>Broodstock Allowed</b>	50% Lower Bound EGR	2004 Escapement	<b>Broodstock Allowed</b>
20,000	21,600	<b>1,600</b>	20,000	21,280	<b>1,280</b>	20,000	20,960	<b>960</b>
20,000	21,590	<b>1,590</b>	20,000	21,270	<b>1,270</b>	20,000	20,950	<b>950</b>
20,000	21,580	<b>1,580</b>	20,000	21,260	<b>1,260</b>	20,000	20,940	<b>940</b>
20,000	21,570	<b>1,570</b>	20,000	21,250	<b>1,250</b>	20,000	20,930	<b>930</b>
20,000	21,560	<b>1,560</b>	20,000	21,240	<b>1,240</b>	20,000	20,920	<b>920</b>
20,000	21,550	<b>1,550</b>	20,000	21,230	<b>1,230</b>	20,000	20,910	<b>910</b>
20,000	21,540	<b>1,540</b>	20,000	21,220	<b>1,220</b>	20,000	20,900	<b>900</b>
20,000	21,530	<b>1,530</b>	20,000	21,210	<b>1,210</b>	20,000	20,890	<b>890</b>
20,000	21,520	<b>1,520</b>	20,000	21,200	<b>1,200</b>	20,000	20,880	<b>880</b>
20,000	21,510	<b>1,510</b>	20,000	21,190	<b>1,190</b>	20,000	20,870	<b>870</b>
20,000	21,500	<b>1,500</b>	20,000	21,180	<b>1,180</b>	20,000	20,860	<b>860</b>
20,000	21,490	<b>1,490</b>	20,000	21,170	<b>1,170</b>	20,000	20,850	<b>850</b>
20,000	21,480	<b>1,480</b>	20,000	21,160	<b>1,160</b>	20,000	20,840	<b>840</b>
20,000	21,470	<b>1,470</b>	20,000	21,150	<b>1,150</b>	20,000	20,830	<b>830</b>
20,000	21,460	<b>1,460</b>	20,000	21,140	<b>1,140</b>	20,000	20,820	<b>820</b>
20,000	21,450	<b>1,450</b>	20,000	21,130	<b>1,130</b>	20,000	20,810	<b>810</b>
20,000	21,440	<b>1,440</b>	20,000	21,120	<b>1,120</b>	20,000	20,800	<b>800</b>
20,000	21,430	<b>1,430</b>	20,000	21,110	<b>1,110</b>	20,000	20,790	<b>790</b>
20,000	21,420	<b>1,420</b>	20,000	21,100	<b>1,100</b>	20,000	20,780	<b>780</b>
20,000	21,410	<b>1,410</b>	20,000	21,090	<b>1,090</b>	20,000	20,770	<b>770</b>
20,000	21,400	<b>1,400</b>	20,000	21,080	<b>1,080</b>	20,000	20,760	<b>760</b>
20,000	21,390	<b>1,390</b>	20,000	21,070	<b>1,070</b>	20,000	20,750	<b>750</b>
20,000	21,380	<b>1,380</b>	20,000	21,060	<b>1,060</b>	20,000	20,740	<b>740</b>
20,000	21,370	<b>1,370</b>	20,000	21,050	<b>1,050</b>	20,000	20,730	<b>730</b>
20,000	21,360	<b>1,360</b>	20,000	21,040	<b>1,040</b>	20,000	20,720	<b>720</b>
20,000	21,350	<b>1,350</b>	20,000	21,030	<b>1,030</b>	20,000	20,710	<b>710</b>
20,000	21,340	<b>1,340</b>	20,000	21,020	<b>1,020</b>	20,000	20,700	<b>700</b>
20,000	21,330	<b>1,330</b>	20,000	21,010	<b>1,010</b>	20,000	20,690	<b>690</b>
20,000	21,320	<b>1,320</b>	20,000	21,000	<b>1,000</b>	20,000	20,680	<b>680</b>
20,000	21,310	<b>1,310</b>	20,000	20,990	<b>990</b>	20,000	20,670	<b>670</b>
20,000	21,300	<b>1,300</b>	20,000	20,980	<b>980</b>	20,000	20,660	<b>660</b>
20,000	21,290	<b>1,290</b>	20,000	20,970	<b>970</b>	20,000	20,650	<b>650</b>

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Appendix H. (page 2 of 2)

50% Lower Bound EGR	2004 Escapement	Broodstock Allowed	50% Lower Bound EGR	2004 Escapement	Broodstock Allowed	50% Lower Bound EGR	2004 Escapement	Broodstock Allowed
20,000	20,640	<b>640</b>	20,000	20,350	<b>350</b>	20,000	20,060	<b>60</b>
20,000	20,630	<b>630</b>	20,000	20,340	<b>340</b>	20,000	20,050	<b>50</b>
20,000	20,620	<b>620</b>	20,000	20,330	<b>330</b>	20,000	20,040	<b>40</b>
20,000	20,610	<b>610</b>	20,000	20,320	<b>320</b>	20,000	20,030	<b>30</b>
20,000	20,600	<b>600</b>	20,000	20,310	<b>310</b>	20,000	20,020	<b>20</b>
20,000	20,590	<b>590</b>	20,000	20,300	<b>300</b>	20,000	20,010	<b>10</b>
20,000	20,580	<b>580</b>	20,000	20,290	<b>290</b>	20,000	20,000	<b>0</b>
20,000	20,570	<b>570</b>	20,000	20,280	<b>280</b>	20,000		
20,000	20,560	<b>560</b>	20,000	20,270	<b>270</b>	20,000		
20,000	20,550	<b>550</b>	20,000	20,260	<b>260</b>	20,000		
20,000	20,540	<b>540</b>	20,000	20,250	<b>250</b>	20,000		
20,000	20,530	<b>530</b>	20,000	20,240	<b>240</b>	20,000		
20,000	20,520	<b>520</b>	20,000	20,230	<b>230</b>	20,000		
20,000	20,510	<b>510</b>	20,000	20,220	<b>220</b>	20,000		
20,000	20,500	<b>500</b>	20,000	20,210	<b>210</b>	20,000		
20,000	20,490	<b>490</b>	20,000	20,200	<b>200</b>	20,000		
20,000	20,480	<b>480</b>	20,000	20,190	<b>190</b>	20,000		
20,000	20,470	<b>470</b>	20,000	20,180	<b>180</b>	20,000		
20,000	20,460	<b>460</b>	20,000	20,170	<b>170</b>	20,000		
20,000	20,450	<b>450</b>	20,000	20,160	<b>160</b>	20,000		
20,000	20,440	<b>440</b>	20,000	20,150	<b>150</b>	20,000		
20,000	20,430	<b>430</b>	20,000	20,140	<b>140</b>	20,000		
20,000	20,420	<b>420</b>	20,000	20,130	<b>130</b>	20,000		
20,000	20,410	<b>410</b>	20,000	20,120	<b>120</b>	20,000		
20,000	20,400	<b>400</b>	20,000	20,110	<b>110</b>	20,000		
20,000	20,390	<b>390</b>	20,000	20,100	<b>100</b>	20,000		
20,000	20,380	<b>380</b>	20,000	20,090	<b>90</b>	20,000		
20,000	20,370	<b>370</b>	20,000	20,080	<b>80</b>	20,000		
20,000	20,360	<b>360</b>	20,000	20,070	<b>70</b>	20,000		

Appendix I. Worksheet for determining sockeye salmon broodstock numbers allowed, based on escapement levels at Saltery Lake, 2004.

50% Lower Bound EGR	2004 Escapement	<b>Broodstock Allowed</b>	50% Lower Bound EGR	2004 Escapement	<b>Broodstock Allowed</b>	50% Lower Bound EGR	2004 Escapement	<b>Broodstock Allowed</b>
7,500	11,801	<b>4,301</b>	7,500	11,001	<b>3,501</b>	7,500	10,201	<b>2,701</b>
7,500	11,776	<b>4,276</b>	7,500	10,976	<b>3,476</b>	7,500	10,176	<b>2,676</b>
7,500	11,751	<b>4,251</b>	7,500	10,951	<b>3,451</b>	7,500	10,151	<b>2,651</b>
7,500	11,726	<b>4,226</b>	7,500	10,926	<b>3,426</b>	7,500	10,126	<b>2,626</b>
7,500	11,701	<b>4,201</b>	7,500	10,901	<b>3,401</b>	7,500	10,101	<b>2,601</b>
7,500	11,676	<b>4,176</b>	7,500	10,876	<b>3,376</b>	7,500	10,076	<b>2,576</b>
7,500	11,651	<b>4,151</b>	7,500	10,851	<b>3,351</b>	7,500	10,051	<b>2,551</b>
7,500	11,626	<b>4,126</b>	7,500	10,826	<b>3,326</b>	7,500	10,026	<b>2,526</b>
7,500	11,601	<b>4,101</b>	7,500	10,801	<b>3,301</b>	7,500	10,001	<b>2,501</b>
7,500	11,576	<b>4,076</b>	7,500	10,776	<b>3,276</b>	7,500	9,976	<b>2,476</b>
7,500	11,551	<b>4,051</b>	7,500	10,751	<b>3,251</b>	7,500	9,951	<b>2,451</b>
7,500	11,526	<b>4,026</b>	7,500	10,726	<b>3,226</b>	7,500	9,926	<b>2,426</b>
7,500	11,501	<b>4,001</b>	7,500	10,701	<b>3,201</b>	7,500	9,901	<b>2,401</b>
7,500	11,476	<b>3,976</b>	7,500	10,676	<b>3,176</b>	7,500	9,876	<b>2,376</b>
7,500	11,451	<b>3,951</b>	7,500	10,651	<b>3,151</b>	7,500	9,851	<b>2,351</b>
7,500	11,426	<b>3,926</b>	7,500	10,626	<b>3,126</b>	7,500	9,826	<b>2,326</b>
7,500	11,401	<b>3,901</b>	7,500	10,601	<b>3,101</b>	7,500	9,801	<b>2,301</b>
7,500	11,376	<b>3,876</b>	7,500	10,576	<b>3,076</b>	7,500	9,776	<b>2,276</b>
7,500	11,351	<b>3,851</b>	7,500	10,551	<b>3,051</b>	7,500	9,751	<b>2,251</b>
7,500	11,326	<b>3,826</b>	7,500	10,526	<b>3,026</b>	7,500	9,726	<b>2,226</b>
7,500	11,301	<b>3,801</b>	7,500	10,501	<b>3,001</b>	7,500	9,701	<b>2,201</b>
7,500	11,276	<b>3,776</b>	7,500	10,476	<b>2,976</b>	7,500	9,676	<b>2,176</b>
7,500	11,251	<b>3,751</b>	7,500	10,451	<b>2,951</b>	7,500	9,651	<b>2,151</b>
7,500	11,226	<b>3,726</b>	7,500	10,426	<b>2,926</b>	7,500	9,626	<b>2,126</b>
7,500	11,201	<b>3,701</b>	7,500	10,401	<b>2,901</b>	7,500	9,601	<b>2,101</b>
7,500	11,176	<b>3,676</b>	7,500	10,376	<b>2,876</b>	7,500	9,576	<b>2,076</b>
7,500	11,151	<b>3,651</b>	7,500	10,351	<b>2,851</b>	7,500	9,551	<b>2,051</b>
7,500	11,126	<b>3,626</b>	7,500	10,326	<b>2,826</b>	7,500	9,526	<b>2,026</b>
7,500	11,101	<b>3,601</b>	7,500	10,301	<b>2,801</b>	7,500	9,501	<b>2,001</b>
7,500	11,076	<b>3,576</b>	7,500	10,276	<b>2,776</b>	7,500	9,476	<b>1,976</b>
7,500	11,051	<b>3,551</b>	7,500	10,251	<b>2,751</b>	7,500	9,451	<b>1,951</b>
7,500	11,026	<b>3,526</b>	7,500	10,226	<b>2,726</b>	7,500	9,426	<b>1,926</b>

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Appendix I. (page 2 of 2)

50% Lower Bound	2004	Broodstock	50% Lower Bound	2004	Broodstock	50% Lower	2004	Broodstock
EGR	Escapement	Allowed	EGR	Escapement	Allowed	Bound EGR	Escapement	Allowed
7,500	9,401	1,901	7,500	8,676	1,176	7,500	7,951	451
7,500	9,376	1,876	7,500	8,651	1,151	7,500	7,926	426
7,500	9,351	1,851	7,500	8,626	1,126	7,500	7,901	401
7,500	9,326	1,826	7,500	8,601	1,101	7,500	7,876	376
7,500	9,301	1,801	7,500	8,576	1,076	7,500	7,851	351
7,500	9,276	1,776	7,500	8,551	1,051	7,500	7,826	326
7,500	9,251	1,751	7,500	8,526	1,026	7,500	7,801	301
7,500	9,226	1,726	7,500	8,501	1,001	7,500	7,776	276
7,500	9,201	1,701	7,500	8,476	976	7,500	7,751	251
7,500	9,176	1,676	7,500	8,451	951	7,500	7,726	226
7,500	9,151	1,651	7,500	8,426	926	7,500	7,701	201
7,500	9,126	1,626	7,500	8,401	901	7,500	7,676	176
7,500	9,101	1,601	7,500	8,376	876	7,500	7,651	151
7,500	9,076	1,576	7,500	8,351	851	7,500	7,626	126
7,500	9,051	1,551	7,500	8,326	826	7,500	7,601	101
7,500	9,026	1,526	7,500	8,301	801	7,500	7,576	76
7,500	9,001	1,501	7,500	8,276	776	7,500	7,551	51
7,500	8,976	1,476	7,500	8,251	751	7,500	7,526	26
7,500	8,951	1,451	7,500	8,226	726	7,500	7,501	1
7,500	8,926	1,426	7,500	8,201	701			
7,500	8,901	1,401	7,500	8,176	676			
7,500	8,876	1,376	7,500	8,151	651			
7,500	8,851	1,351	7,500	8,126	626			
7,500	8,826	1,326	7,500	8,101	601			
7,500	8,801	1,301	7,500	8,076	576			
7,500	8,776	1,276	7,500	8,051	551			
7,500	8,751	1,251	7,500	8,026	526			
7,500	8,726	1,226	7,500	8,001	501			
7,500	8,701	1,201	7,500	7,976	476			

Appendix J. Worksheet for calculating sockeye salmon "replacement" options for adult removals from Afognak Lake, 2004.

Lost Production Estimates						Backstocking Options (1 only)			Returns from Backstocking by Option		
Adults Removed (all age)	Potential Females	Potential Eggs	Potential Emergent Fry	Potential Smolt (4 g, 80 mm)	Potential Adult Return	Spring Fry (0.4 g)	Summer Fingerling (3.0 g)	RECOMMENDED <sup>a</sup> Fall Presmolt (8-10 g)	Spring Fry (0.4 g)	Summer Fingerling (3.0 g)	RECOMMENDED <sup>a</sup> Fall Presmolt (8-10 g)
300	134	333,750	23,363	4,906	491	25,000	12,500	6,250	500	500	500
350	156	389,375	27,256	5,724	572	29,000	14,500	7,250	580	580	580
400	178	445,000	31,150	6,542	654	33,000	16,500	8,250	660	660	660
450	200	500,625	35,044	7,359	736	37,000	18,500	9,250	740	740	740
500	223	556,250	38,938	8,177	818	41,000	20,500	10,250	820	820	820
550	245	611,875	42,831	8,995	899	45,000	22,500	11,250	900	900	900
600	267	667,500	46,725	9,812	981	49,000	24,500	12,250	980	980	980
650	289	723,125	50,619	10,630	1,063	53,000	26,500	13,250	1,060	1,060	1,060
700	312	778,750	54,513	11,448	1,145	57,000	28,500	14,250	1,140	1,140	1,140
750	334	834,375	58,406	12,265	1,227	61,000	30,500	15,250	1,220	1,220	1,220
800	356	890,000	62,300	13,083	1,308	65,000	32,500	16,250	1,300	1,300	1,300
850	378	945,625	66,194	13,901	1,390	69,000	34,500	17,250	1,380	1,380	1,380
900	401	1,001,250	70,088	14,718	1,472	73,000	36,500	18,250	1,460	1,460	1,460
950	423	1,056,875	73,981	15,536	1,554	77,000	38,500	19,250	1,540	1,540	1,540
1000	445	1,112,500	77,875	16,354	1,635	81,000	40,500	20,250	1,620	1,620	1,620
1050	467	1,168,125	81,769	17,171	1,717	85,000	42,500	21,250	1,700	1,700	1,700
1100	490	1,223,750	85,663	17,989	1,799	89,000	44,500	22,250	1,780	1,780	1,780
1150	512	1,279,375	89,556	18,807	1,881	93,000	46,500	23,250	1,860	1,860	1,860
1200	534	1,335,000	93,450	19,625	1,962	97,000	48,500	24,250	1,940	1,940	1,940
1250	556	1,390,625	97,344	20,442	2,044	101,000	50,500	25,250	2,020	2,020	2,020
1300	579	1,446,250	101,238	21,260	2,126	105,000	52,500	26,250	2,100	2,100	2,100
1350	601	1,501,875	105,131	22,078	2,208	109,000	54,500	27,250	2,180	2,180	2,180
1400	623	1,557,500	109,025	22,895	2,290	113,000	56,500	28,250	2,260	2,260	2,260
1450	645	1,613,125	112,919	23,713	2,371	117,000	58,500	29,250	2,340	2,340	2,340
1500	668	1,668,750	116,813	24,531	2,453	121,000	60,500	30,250	2,420	2,420	2,420
1550	690	1,724,375	120,706	25,348	2,535	125,000	62,500	31,250	2,500	2,500	2,500
<b>1600</b>	<b>712</b>	<b>1,780,000</b>	<b>124,600</b>	<b>26,166</b>	<b>2,617</b>	<b>129,000</b>	<b>64,500</b>	<b>32,250</b>	<b>2,580</b>	<b>2,580</b>	<b>2,580</b>
1650	734	1,835,625	128,494	26,984	2,698	133,000	66,500	33,250	2,660	2,660	2,660
1700	757	1,891,250	132,388	27,801	2,780	137,000	68,500	34,250	2,740	2,740	2,740
1750	779	1,946,875	136,281	28,619	2,862	141,000	70,500	35,250	2,820	2,820	2,820
1800	801	2,002,500	140,175	29,437	2,944	145,000	72,500	36,250	2,900	2,900	2,900
Assumptions: 1. "jack" % = 11% 2. Fecundity = 2500 3. Egg-to-emergence = 7% 4. Fry-to-smolt = 21% 5. Smolt-to-adult = 10% = ~1.6 Return per spawner						Highlighted indicates proposed adult removals in 2004 and replacement stocking recommended for 2005.			Assumptions: 1. Fry-to-adult - 2% 2. Fingerling-to-adult - 4% 3. Presmolt-to-adult - 8% Note: survivals are less than for Table 2 to account for interactions w/resident fish and smaller presmolt stocking size.		

<sup>a</sup> Presmolt stocking is recommended because late fall stocking should reduce competition for food with resident fish (majority should emigrate the following spring) and growth characteristics from scale patterns can be used to identify these fish when they return as adults.

Appendix K. Worksheet for calculating sockeye salmon "replacement" options for adult removals from Saltery Lake, 2004.

Lost Production Estimates						Backstocking Options (1 only)			Returns from Backstocking by Option		
Adults Removed (all age)	Potential Females	Potential Eggs	Potential Emergent Fry	Potential Smolt (4 g, 80 mm)	Potential Adult Return	Spring Fry (0.4 g)	Summer Fingerling (3.0 g)	RECOMMENDED <sup>a</sup> Fall Presmolt (8-10 g)	Spring Fry (0.4 g)	Summer Fingerling (3.0 g)	RECOMMENDED <sup>a</sup> Fall Presmolt (8-10 g)
1500	738	2,214,000	154,980	32,546	3,255	160,000	80,000	40,000	3,200	3,200	3,200
1600	787	2,361,600	165,312	34,716	3,472	171,000	85,500	42,750	3,420	3,420	3,420
1700	836	2,509,200	175,644	36,885	3,689	182,000	91,000	45,500	3,640	3,640	3,640
1800	886	2,656,800	185,976	39,055	3,905	193,000	96,500	48,250	3,860	3,860	3,860
1900	935	2,804,400	196,308	41,225	4,122	204,000	102,000	51,000	4,080	4,080	4,080
2000	984	2,952,000	206,640	43,394	4,339	215,000	107,500	53,750	4,300	4,300	4,300
2100	1,033	3,099,600	216,972	45,564	4,556	226,000	113,000	56,500	4,520	4,520	4,520
2200	1,082	3,247,200	227,304	47,734	4,773	237,000	118,500	59,250	4,740	4,740	4,740
2300	1,132	3,394,800	237,636	49,904	4,990	248,000	124,000	62,000	4,960	4,960	4,960
2400	1,181	3,542,400	247,968	52,073	5,207	259,000	129,500	64,750	5,180	5,180	5,180
2500	1,230	3,690,000	258,300	54,243	5,424	270,000	135,000	67,500	5,400	5,400	5,400
2600	1,279	3,837,600	268,632	56,413	5,641	281,000	140,500	70,250	5,620	5,620	5,620
2700	1,328	3,985,200	278,964	58,582	5,858	292,000	146,000	73,000	5,840	5,840	5,840
2800	1,378	4,132,800	289,296	60,752	6,075	303,000	151,500	75,750	6,060	6,060	6,060
2900	1,427	4,280,400	299,628	62,922	6,292	314,000	157,000	78,500	6,280	6,280	6,280
3000	1,476	4,428,000	309,960	65,092	6,509	325,000	162,500	81,250	6,500	6,500	6,500
3100	1,525	4,575,600	320,292	67,261	6,726	336,000	168,000	84,000	6,720	6,720	6,720
3200	1,574	4,723,200	330,624	69,431	6,943	347,000	173,500	86,750	6,940	6,940	6,940
3300	1,624	4,870,800	340,956	71,601	7,160	358,000	179,000	89,500	7,160	7,160	7,160
3400	1,673	5,018,400	351,288	73,770	7,377	369,000	184,500	92,250	7,380	7,380	7,380
3500	1,722	5,166,000	361,620	75,940	7,594	380,000	190,000	95,000	7,600	7,600	7,600
3600	1,771	5,313,600	371,952	78,110	7,811	391,000	195,500	97,750	7,820	7,820	7,820
3700	1,820	5,461,200	382,284	80,280	8,028	402,000	201,000	100,500	8,040	8,040	8,040
3800	1,870	5,608,800	392,616	82,449	8,245	413,000	206,500	103,250	8,260	8,260	8,260
3900	1,919	5,756,400	402,948	84,619	8,462	424,000	212,000	106,000	8,480	8,480	8,480
4000	1,968	5,904,000	413,280	86,789	8,679	435,000	217,500	108,750	8,700	8,700	8,700
4100	2,017	6,051,600	423,612	88,959	8,896	446,000	223,000	111,500	8,920	8,920	8,920
4200	2,066	6,199,200	433,944	91,128	9,113	457,000	228,500	114,250	9,140	9,140	9,140
<b>4300</b>	<b>2,116</b>	<b>6,346,800</b>	<b>444,276</b>	<b>93,298</b>	<b>9,330</b>	<b>468,000</b>	<b>234,000</b>	<b>117,000</b>	<b>9,360</b>	<b>9,360</b>	<b>9,360</b>
4400	2,165	6,494,400	454,608	95,468	9,547	479,000	239,500	119,750	9,580	9,580	9,580
4500	2,214	6,642,000	464,940	97,637	9,764	490,000	245,000	122,500	9,800	9,800	9,800
Assumptions: 1. "jack" % = 1.6% 2. Fecundity = 3000 3. Egg-to-emergence = 7% 4. Fry-to-smolt = 21% 5. Smolt-to- adult = 10% = ~2.1 Return per spawner						Highlighted indicates proposed adult removals in 2004 and replacement stocking recommended for 2005.			Assumptions: 1. Fry-to-adult - 2% 2. Fingerling-to-adult - 4% 3. Presmolt-to-adult - 8% Note: survivals are less than for Table 2 to account for interactions w/resident fish and smaller presmolt stocking size.		

<sup>a</sup> Presmolt stocking is recommended because late fall stocking should reduce competition for food with resident fish (majority should emigrate the following spring) and growth characteristics from scale patterns can be used to identify these fish when they return as adults.

Appendix L. Guidelines for "replacement " stocking (backstocking) of sockeye salmon as applicable to adult removals from Afognak and Saltery Lakes in 2004.

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(The following text is from Dan Moore, Fishery Biologist, Division of Commercial Fisheries, SW Genetics, Anchorage)

There are currently about 12 "backstocking" projects (including Saltery and Afognak) statewide. Eight are in the south central/Kodiak area and 8 of the 12 are sockeye projects. Only two (Saltery and Afognak) will be conducted as a replacement for broodstock removed for other enhancement projects.

Backstocking is a high risk practice with regards to viability of the wild stock. Deleterious effects can include changed run timing, change in adult size, reduced spawning success and other reductions in fitness.

(The literature is rich with examples of supplementation/backstocking projects that have not had the results hoped for by the managers. To be fair, these are mostly from the lower 48 but then we have not examined our projects to the extent they have outside. We do not want to repeat these mistakes.)

Specific guidelines:

- 1) Collect eggs from throughout the duration of the run in proportion to their occurrence in the natural population. Also spawn adults randomly with respect to age and size.

(Randomizing selection of spawning pairs during the egg take will maximize genetic variability. Selecting individuals for anthropogenic reasons may decrease the genetic viability of the population. Propagating eggs from only one portion of the return could select for that particular segment of the population and result in shifts in the timing of subsequent returns of adults, their age and size composition.)

- 2) When taking eggs from a system with multiple spawning locations do not combine the different populations (e.g. inlet and outlet spawners).

(The separate populations may exhibit different return timings, different rheotactic responses and may be adapted to specific temperature regimes and other environmental parameters in their spawning environments. )

- 3) When returning progeny to an egg take site containing wild fish, the progeny should not exceed a 1:1 wild/cultured ratio. This applies to all life stages. Return the progeny to the egg take site.

(The 1:1 ratio may not apply in certain rehabilitation projects, determined on a case by case basis. No examples of this scenario come to mind.)

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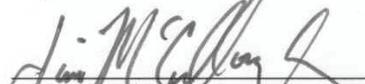
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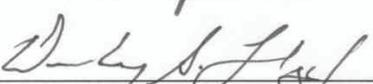
  
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Gary Byrne: Pillar Creek Hatchery Manager  
Date 7/9/04

  
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Steve Honnold: Regional Resource Development Biologist, CFD  
Date 7/9/04

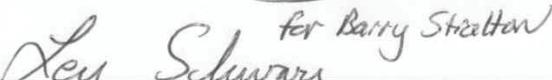
  
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Patti Nelson: Regional Finfish Research Supervisor, CFD  
Date 7/9/04

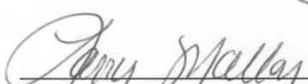
  
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Kevin Brennan: Area Finfish Management Biologist, CFD  
Date 7/9/04

  
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Jim McCullough: Regional Finfish Management Supervisor, CFD  
Date 7/9/04

  
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Denby Lloyd: Regional Supervisor, CFD  
Date 7/9/04

  
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Len Schwarz: Area Biologist, Sport Fish  
Date 7/9/04

  
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Barry Stratton: Sport Fish Regional Supervisor  
Date 7/9/04

  
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Larry Malloy: Executive Director, KRAA  
Date 7/13/04

**The 2004 Hatchery Management Plan for PCH is hereby approved:**

  
\_\_\_\_\_  
Kevin Duffy: Commissioner, ADF&G  
Date 8/4/2004  
*David Bedford Deputy*

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