Fishery Data Series No. 16-06

Characterization of the 2012 and 2013 Salmon Runs in the Kuskokwim River Based on the Test Fishery at Bethel

by

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and

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January 2016

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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ABSTRACT

Annual abundance indices and run timing of adult Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, chum *O. keta*, and coho *O. kisutch* salmon returning to the Kuskokwim River have been assessed by the Bethel test fishery since 1984. In 2012, the Bethel test fishery operated from June 2 through August 26 and in 2013, from June 1 through August 24. A series of timed drifts using 5.375-inch (13.6 cm) and 8.0-inch (20.3 cm) stretch mesh gillnets were made at 3 stations across the river channel. Each series of drifts began approximately 1 hour following each high tide throughout the fishing season. Mean tidal catch per unit effort (CPUE) was calculated for each species and served as an index of abundance. The cumulative mean tidal CPUE was compared to information from earlier years to determine relative salmon abundance and run timing to help direct subsistence and commercial management decisions. The final cumulative CPUE index for 2012 was 418 Chinook; 1,171 sockeye; 6,890 chum; and 2,440 coho salmon. The final cumulative CPUE index for 2013 was 261 Chinook; 1,146 sockeye; 5,708 chum; and 2,865 coho salmon. The 2013 relative abundance indices were below the 2002–2012 averages for all monitored species of salmon. Run timing of Chinook salmon peaked on 26 June in 2012 and on 22 June in 2013; sockeye salmon peaked on 1 July in 2012 and on 28 June in 2013; chum salmon peaked on 7 July during 2012 and 2013; and coho salmon peaked on 11 August in 2012 and on 9 August in 2013.

Key words: Chinook salmon *Oncorhynchus tshawytscha*, sockeye salmon *O. nerka*, chum salmon *O. gorbuscha*, coho salmon *O. kisutch*, Bethel salmon test fishery, run timing, relative abundance, commercial fishery, subsistence fishery, stocks of concern, escapement, drift gillnet, index, water level, age, sex, and length (ASL) composition, catch per unit effort, CPUE, Kuskokwim River.

INTRODUCTION

Kuskokwim River salmon fisheries are currently managed according to the *Kuskokwim River Salmon Management Plan* (5 AAC 07.365) (Management Plan) adopted by the Alaska Board of Fisheries (BOF) in January 2013. The purpose of this plan is to provide guidelines for management of the Kuskokwim River fishery that will result in the sustained yield of salmon stocks large enough to meet escapement goals, provide amounts reasonably necessary for subsistence, and provide for fisheries other than subsistence. The management of this salmon fishery is confounded by unknown variables such as run size and migratory timing, harvest of mixed stocks, overlapping multi-species salmon runs, allocation issues, and the immense size of the Kuskokwim River drainage (Figure 1). To address these management objectives, managers rely on subsistence harvest reports, index summaries from test fishery catch per unit effort (CPUE), commercial harvest catch rates, and reports from weirs and aerial survey programs. This information is used to attempt to adequately characterize inseason migratory timing, run strength, and escapement of Pacific salmon *Oncorhynchus* spp. in the Kuskokwim River drainage.

The Bethel test fishery (BTF) provides a CPUE index that fishery managers compare to previous years' indices to evaluate inseason salmon run timing and relative abundance. The current year CPUE index when compared to prior year indices along with associated subsistence reports, weir, sonar, and aerial survey data, are used to assess salmon run strength. Comparison of CPUE data between years should be approached cautiously due to an array of factors affecting salmon catchability at the test fishery site. Such factors include, but are not limited to, water level and clarity, water temperature, height of the flooding tides, weather conditions, river channel morphology and hydrology, fish size relative to gillnet mesh size, net saturation effects, and test-fish crew technique.

The location of the BTF within the Kuskokwim River drainage is important to salmon managers for providing some of the first information on the development of salmon runs in a given year. Historically managers relied on test fisheries, commercial catch statistics, and informal reports

from subsistence and sport fishermen to gauge inseason salmon run abundance. In 1987, the directed Chinook salmon, commercial fishery was discontinued in the Kuskokwim River to provide for a sustainable subsistence harvest and maintain an average spawning escapement (Francisco et al. 1989). In the absence of a June commercial fishery, early inseason salmon run assessment information was primarily limited to test fishery data and informal subsistence harvest reports.

FISHERY DESCRIPTION

Mixed stocks of Chinook *O. tshawytscha*, sockeye *O. nerka*, chum *O. keta*, and coho *O. kisutch* salmon that return to the Kuskokwim River are subjected to subsistence and periodic commercial fishing. Prior to 2004, the commercial fishery was directed towards chum and coho salmon. Sockeye salmon, generally less abundant, were considered incidental in the commercial harvest until 2004, when the BOF accepted a proposal for a commercial harvest guideline level of up to 50,000 sockeye salmon for the Kuskokwim River (Whitmore et al. 2008). Chinook salmon are the principal target species of subsistence fishermen; however, chum, sockeye, and coho salmon also contribute significantly to the subsistence harvest. Harvests of pink salmon *O. gorbuscha* are negligible, in part, because of the lack of both commercial markets and interest by subsistence fishermen.

PROJECT BACKGROUND

From 1966 through 1983, ADF&G conducted a set gillnet test fishery in the lower portion of the Kuskokwim River near an abandoned fish camp called Kwegooyuk. At that site, the river was approximately 5 to 7 km (3 to 4 mi) wide and had 2 major channels, 1 channel along the east shore and 1 along the west shore. The river channels were separated by soft sandy shoals that were mostly flooded at high tide. It was also difficult to predict which side, east shore or west shore, would be the "main" river channel in a given year, and it appears this may have alternated several times during the history of the Kwegooyuk test fishery project (Huttunen 1984). In that expansive body of water, the Kwegooyuk test fishery gillnets, 27 fathoms (49 m) in length, were set from the east shore just upstream of the lower boundary of District 1 and fished 24 hours a day (Molyneaux 2003; Figure 2).

The goals of the Kwegooyuk test fishery were to describe run timing and provide an index of abundance for Chinook, sockeye, and chum salmon, similar to the present day BTF. Managers believed that run timing was adequately described by the Kwegooyuk test fishery, but the project did not provide a satisfactory index of run abundance. This problem was attributed to fluctuations in the migratory route of salmon between the east river and west river channels as influenced inseason by changes in weather patterns and tidal stages, and between seasons by alterations in river channel morphology. The Kwegooyuk test fishery was also a poor predictor of Chinook and chum salmon catches in the District 1 commercial fishery (Huttunen 1984). Due to the remoteness of the test fishery site, daily catches of fish could not be sold or distributed to the public for subsistence uses. This made discarding of the daily catches difficult or impossible, resulting in unavoidable waste that was not acceptable to ADF&G, local residents, and the industry (Molyneaux 2003).

In an effort to provide a more reliable index of relative abundance and run strength, and to provide a better avenue for the sale of test fishery catches, a drift gillnet test fishery program near Bethel was evaluated in July 1983. This program ran concurrently with the Kwegooyuk test

fishery. The focus was on the use of drift gillnets in a narrower river channel of the mainstem Kuskokwim River near Bethel. The objectives of the 1983 drift gillnet test fishery were to assess the feasibility of collecting run timing and abundance information for coho salmon. The new site was in the mainstem Kuskokwim River about 5 km (3 mi) upstream from Bethel, just above the boundary line separating Subdistricts 1-A and 1-B (Figure 2). The river was approximately 1 km (0.5 mi) wide at the new location and had a single major channel that allowed drift gillnets to collect CPUE information at selected stations across the entire channel width. Small channels circumvent the site (Steamboat, Straight, Church, and Napaskiak sloughs), but their influence on the test fishery was assumed negligible (Figure 3). The new test fishery site was also conveniently located in close proximity to local fish processors for the timely distribution and sale of daily catches. Conclusions from the 1983 program evaluation were that the drift gillnet test fishery at Bethel was viable and offered a more reliable means of monitoring salmon run timing and abundance than the Kwegooyuk test fishery. The Kwegooyuk set gillnet program was then discontinued after 1983 and replaced with a multiple-mesh drift gillnet project referred to as the Bethel test fishery (Huttunen 1984).

Operating at a point upriver of most commercial and subsistence harvest meant that instead of indexing total run abundance, the original objective of the test fishery was to provide an index of abundance for salmon at a point midway in the commercial fishing district. This distinction was important because downriver commercial and subsistence harvests could not be accounted for in the test fishery indices. The variability in the annual exploitation rates of the subsistence and commercial fishery are affected by many factors, including management actions, changes in gear efficiency, regulations designed to alter harvest efficiency, variability in fishing patterns (length of openings and frequency of openings), changes in water level, river entry patterns of salmon, and the occurrence of commercial fishermen strikes. Therefore it was only appropriate to use the test fishery CPUE as an indicator of salmon abundance and run timing at Bethel when compared to CPUE information from previous years to help direct subsistence and commercial fishery management decisions. Inseason assessment during 2012 and 2013 was limited to historical comparisons of Chinook salmon CPUE data from 2008 to 2011 because a change in catchability was identified with a new web type utilized in BTF gillnet manufacturing.

Since 1999, with the decline of salmon abundance and weak commercial salmon markets, the harvest of salmon from the Kuskokwim River has become more stable. Commercial fishery openings occur more often in late June or early July, well past the majority of the Chinook and sockeye salmon runs and near the peak of the chum salmon return. Salmon harvests taken in June are primarily for the purpose of subsistence use; targeting Chinook, sockeye, and some chum salmon. Subsistence harvests have remained relatively stable for the past 15 years (Brazil et al. 2011). Given a stable harvest, the Bethel test fishery has evolved into a tool used by fishery managers to gather insight into salmon run abundance.

OBJECTIVES

1. Determine a tidal mean index expressed as CPUE and a cumulative daily CPUE index for Chinook, sockeye, chum, and coho salmon at the Bethel test fishery site from June 1 through August 24.
2. Estimate relative run abundance and timing of Chinook, sockeye, chum, and coho salmon at the Bethel test fishery site by comparison of historical test fishery information.

TASKS

1. Collect age, sex, and length (ASL) data from all Chinook salmon caught in the test fishery in order to provide a general characterization of the composition of the run.
2. As part of a separate sockeye salmon study, drift an 11.6 cm drift gillnet after BTF operations and collect ASL, girth, and genetic samples from sockeye salmon.

METHODS

FIELD OPERATIONS

The methods and location used in the 2012 and 2013 BTF operations were similar to those used since 1984 (Huttunen 1985). Following each high tide, a series of gillnet drifts (drift session) were conducted at 3 stations in the Kuskokwim River approximately 5 km (3 mi) upstream of Bethel, where Straight Slough diverges from the main river channel (Figure 3). A 3-person crew performed drifts using a 6.1 m (20 ft) skiff and two 90 m (50 fathom) drift gillnets, one each consisting of 8.0 inch and 5.375 inch mesh. Each drift session began approximately 1 hour after the published high slack tide (high tide) for Bethel to ensure all drifts were conducted in water flowing downstream. If weather conditions and high tide magnitude caused a delay in the ebbing of the tide, the time drift sessions began was delayed. Two drift sessions were completed daily. During each drift session, 2 of the 3 drift stations were fished once with the 8.0-inch and once with the 5.375-inch mesh gillnet for a total of 4 drifts per session. A drift schedule was used to determine the sequence drift stations were to be fished and mesh sizes to be fished (Appendix A1). This design dictates that 1 of the 3 stations was fished twice during each drift session, once with each mesh size. The duration of each drift was approximately 20 min and the mean fishing time was calculated as half the time it took to deploy and retrieve the gillnet, plus the time the gillnet was fully deployed. The distance of each drift varied depending on water and channel conditions, but the distance was generally less than 3 km (2 mi). To avoid conflicting with commercial fishermen, the test fishery did not operate when commercial fishing was in progress in Subdistrict 1-A (Figure 2).

The river channel is approximately 12 m (36 ft) deep at the main channel and 320 m (1,050 ft) wide as measured near the downriver end of the test fishery site (Figure 4). Gillnets used in the test fishery generally sampled the upper half of the water column; however, at Station 1 the inshore end of the gillnet dragged along a section of sand bar (Figure 4). At Station 3 the crew deployed the inshore end of the gillnet approximately 8 m (24 ft) offshore to avoid snags along the channel edge. As the Station 3 drift progressed, it typically moved towards the center of the channel and overlapped with Station 2.

Drift sessions began the second tide on June 2 and continued through the second tide on August 26 during the 2012 season. Drifting began June 1 and continued through the second tide on August 24 during 2013. Through July 15 in both years, 2 different mesh sizes were used in the test fishery; the first 2 drifts of the drift session were conducted with the 8.0-inch mesh gillnet, and the second 2 drifts were performed with the 5.375-inch mesh gillnet. Different mesh sizes were used because the larger mesh catches larger Chinook salmon, whereas the smaller mesh is more effective on smaller Chinook and other salmon species. Beginning July 16 the use of the 8.0-inch mesh gear was discontinued for the remainder of the season because, typically, by mid-July the Chinook salmon migration in the lower Kuskokwim River is essentially over.

Until 1990, 4 drifts continued to be conducted at the 3 stations after mid-July using only the 5.375-inch mesh gillnet. The fishing schedule was used to determine the drift sequence as well as the station that received the duplicate drift. Results of the duplicated drifts were then averaged. However, Molyneaux (1991) found the duplicated fourth drift was unnecessary and it was discontinued beginning in 1990. Prior to 2001, the test fishery had an outlet for the disposal of the catch through sales to local processors. Beginning in 2001, because of continuing poor Chinook and chum salmon returns, a reduction of commercial fishing during June and July, and a decline in the salmon market, sales to local processors became sporadic. The disposal of BTF caught salmon became an increasing problem. In 2003, inseason adjustments to the standard operating procedures were made as to when the use of the 8.0-inch mesh gear was discontinued for the remainder of the season. The change in procedures became necessary due to a trend of increasing Chinook and chum salmon abundance and the inability to sell chum salmon to local processors or distribute them to subsistence users or local charities. Additional procedural adjustments were made in the use of the 5.375-inch mesh gillnet by fishing only 2 of the 3 stations per drift session during the period of high chum salmon abundance. This procedure was a change from pre-2003 years when the use of the 5.375-inch gear was increased to fishing all 3 stations. Further adjustments to the fishing schedule have been made in recent years by discontinuing operations for a period of consecutive tides to address the chum salmon catch disposal problem. Restrictive management actions over the past 4 years have subsequently made distribution of BTF catch to subsistence salmon users more reliable and eased concerns of fish disposal. In 2012 and 2013, the 5.375-inch mesh gillnet fished all 3 stations beginning July 16.

The 8.0-inch and 5.375-inch mesh gillnets were 35 meshes (6.7 m) and 45 meshes (5.8 m) in depth. The webbing was manufactured by Momoi Fishing Net MFG. Co., LTD.[1] and both nets were hung at a 2:1 ratio to a finished length of 50 fathoms (90 m). The 8.0-inch mesh webbing was MT-83, a multi-fiber mono twist 1.5 X 16 strand twine, and the color code was R-46R (medium brown/green). The 5.375-inch webbing was MST-33, a multi-fiber mono super twist 1.5 X 8 strand twine, and the color code was SH-3 (light green).

The catch for each drift was tallied by species and by station. At the end of each drift session, the catch was either donated to charities or individuals desiring the fish for subsistence purposes. The data were entered into a Microsoft Excel™ computer program for analysis and recorded in the Bethel office log.

TEST FISHING INDEX

The actual salmon catch for each drift was converted to a drift CPUE and then averaged, producing a tidal CPUE to enhance the comparability of catch results. This was accomplished by converting the number of fish caught in the variable net length and mean fishing time of each drift to the number of fish that would be caught by 100 fathoms (180 m) of net fished for 60 minutes. This standardization of net length and fishing time has been used in many gillnet test fisheries conducted by ADF&G (Meacham 1978; Waltemeyer 1983).

[1] Product names used in this report are included for scientific completeness, but do not constitute a product endorsement.

Denote that

i = date of test fishery

t = tide of test fishery

s = test fishery strata (location)

m = mesh of the net used

$f_{i,t,s,m}$ = length of the net used

$t1_{i,t,s,m}$ = time of starting net deployment

$t2_{i,t,s,m}$ = time of net fully deployed

$t3_{i,t,s,m}$ = time of starting net retrieval

$t4_{i,t,s,m}$ = time of net fully retrieved

$C_{i,t,s,m}$ = the number of fish by species caught by each drift

$n_{i,t}$ = total number of drift deployed per tide per day

n_i = the number of tides test fished per day

For each drift, mean fishing minutes were calculated as

$$\overline{T}_{i,t,s,m} = \frac{1}{2}(t3_{i,t,s,m} + t4_{i,t,s,m} - t2_{i,t,s,m} - t1_{i,t,s,m}), \quad (1)$$

and its standardized drift CPUE ($I_{i,t,s,m}$) per 100 fathom net length and 60 minutes of fishing effort was calculated as

$$I_{i,t,s,m} = 100 \times 60 \cdot \frac{C_{i,t,s,m}}{f_{i,t,s,m} \cdot \overline{T}_{i,t,s,m}}. \quad (2)$$

Daily per tide CPUE was calculated as

$$I_{i,t} = \frac{\sum_s \sum_m I_{i,t,s,m}}{n_{i,t}}. \quad (3)$$

For calculation of per tide CPUE, both 8.0-inch and 5.375-inch mesh nets were used for Chinook salmon, and only 5.375-inch mesh nets were used for sockeye, chum, and coho salmon.

Standardized daily CPUE per 2 tides calculated as

$$I_i = 2 \cdot \frac{\sum_t I_{i,t}}{n_i}. \quad (4)$$

AGE, SEX AND LENGTH COMPOSITION

Chinook salmon ASL data collected from BTF have been sporadic over the years. Declining commercial fishing activity in the Kuskokwim River in the late 1990s and early 2000s had

precluded ASL sample collection for Chinook salmon. As a result, collection of ASL data from BTF was implemented in 2001 through 2007. ASL data collection was discontinued in 2008, 2009, and 2010 due to time and fiscal constraints. Chinook salmon ASL data collection was resumed in 2011 through 2013.

ASL sampling of Chinook salmon was conducted for all drifts and for all drift sessions. All Chinook captured were sampled during the time when the next sequential drift was conducted, although during periods of high catches additional time was taken between drifts to sample. After sampling, these fish were then placed in a tote located in the boat.

Standard sampling procedures as described by Molyneaux et al. (2010) were followed to remove a minimum of 3 scales from the preferred area of the fish. Scales were mounted on labeled gum cards and each card was identified with a unique card number. Sex was positively determined by slitting the belly of each fish sampled and visually examining the gonads. Length was measured to the nearest millimeter from the mideye to tail fork using standardized calipers. Upon completion of each drift session, sex-length data were transferred to the Excel file. Scale cards and logged data were analyzed and published by Kuskokwim research staff in Bethel and Anchorage. Original ASL scale cards, scale acetates, and sex-length data logs were archived at the ADF&G office in Anchorage.

CLIMATOLOGICAL AND STREAM OBSERVATIONS

Climatological conditions were recorded during the first drift of each drift session. Cloud cover was estimated by percent sky covered; observed precipitation was noted; wind direction was noted and speed was estimated in miles per hour; air and surface water temperatures were recorded in degrees Celsius; water clarity was measured in meters using a standardized Secchi disk. The daily water surface temperature value recorded in an Excel worksheet was the lowest value for all high tides for that day. The daily value for depth of water clarity recorded in an Excel file worksheet was the highest value for all tides for that day. Although this information is not used in the assessment of salmon run abundance and run timing, collection of data has continued as part of the sampling routine.

RESULTS

OPERATIONS

During the 2012 season, BTF operated from the second tide on June 2 through the second tide on August 26, and the first salmon were caught on June 4 (Table 1). During the 84-day period, 165 high tides occurred and 579 drifts caught 321 Chinook, 399 sockeye, 2,730 chum and 1,255 coho salmon (Table 1). Chinook, sockeye, and chum salmon migrations have primarily all passed the BTF site before the project was concluded, but catches of coho salmon persisted through the final drift session. During the project's operational period, 5 days had only 1 high tide occurring during that day, 3 tides were missed because of unfavorable weather conditions, 1 tide was missed for observance of the July 4 holiday, and 4 tides were missed due to simultaneously scheduled commercial fishing periods. The standard operating dates for BTF are from June 1 through August 24. In 2012, BTF ceased operation 2 days later than normal on August 26 (Table 1).

During the 2013 season BTF operated from June 1 through August 24, and the first salmon were caught on June 8 (Table 2). During the 85 day period, 164 high tides occurred and 579 drifts

caught 201 Chinook, 462 sockeye, 2,615 chum, and 1,767 coho salmon (Table 2). Chinook, sockeye, and chum salmon migrations have primarily all passed the BTF site before the project was concluded, but catches of coho salmon persisted up through the final drift session (Table 2). During the project operational period, 6 days had only 1 high tide occurring during that day, 1 tide was missed due to boating incident that resulted in crew members going overboard without injury, and 1 tide was missed due to a simultaneously scheduled commercial fishing period (Table 2).

ABUNDANCE INDICES AND RUN TIMING

Chinook Salmon

The first Chinook salmon in 2012 was caught on June 4. The peak daily CPUE index (daily index) of 36 occurred on June 26, and the cumulative daily CPUE index (cumulative index) through July 15 was 401. Based on the cumulative index, the central 50% of the run passed the BTF site between June 21 and July 3, with the midpoint occurring 4 days later than normal on June 26, (Table 1; Appendix B3). Daily indices tracked below the 4-year average throughout the majority of the return (Figure 5; Appendix B1). The season total cumulative index of 419 was the lowest since 2008 (Appendix B2.)

The first Chinook salmon in 2013 was caught on June 8. The peak daily CPUE index (daily index) of 21 occurred on June 22, and the cumulative daily CPUE index (cumulative index) through July 15 was 260. Based on the cumulative index, the central 50% of the run passed the BTF site between June 17 and June 27, with the midpoint occurring on June 22 (Table 2; Appendix B3). Daily indices tracked below the 5-year average throughout the majority of the return (Figure 6; Appendix B1). The season total cumulative index of 261 is the lowest for the observational period of 2008–2013 (Appendix B2).

Sockeye Salmon

The first sockeye salmon in 2012 was caught in on June 17. The peak daily CPUE index of 105 occurred on July 6, and the cumulative CPUE index through July 31 was 1,170. Based on the cumulative CPUE index, the central 50% of the sockeye salmon run passed the BTF site between June 27 and July 6, with the midpoint of passage occurring on July 1 (Table 1). The season total cumulative index of 1,171 was below the 10-year average of 1,719 (Appendix C2). The central 50% of the sockeye salmon passage fell within the 10-year average range of dates (June 22 to July 3), and the midpoint occurred 3 days later than normal on June 4. On average, 90% of the run are passed the BTF site by July 8 (Appendix C3). Daily indices were generally below the 10-year average with the exception of a peak around the first week of July (Figure 7; Appendix C1).

The first sockeye salmon in 2013 was caught on June 13. The peak daily CPUE index of 145 occurred on June 24, and the cumulative index through July 31 was 1,146. Based on the cumulative CPUE index, the central 50% of the sockeye salmon run passed the BTF site between June 24 and July 3, and the midpoint occurred by June 28 (Table 2). Daily indices were generally below the 10-year average (Figure 8; Appendix C1). The cumulative index of 1,146 was below the average of 1,669, the second lowest cumulative index in the last 10 years (Appendix C2). The central 50% of the sockeye salmon passage fell within the 10-year average range of dates (June 24 to July 5) and the midpoint of passage occurred 1 day earlier than normal on June 28. On average, 98% of the sockeye salmon run has passed the BTF site by July 15 (Appendix C3).

Chum Salmon

The first chum salmon in 2012 was caught on June 6. The peak daily CPUE index of 400 occurred on July 11 and the cumulative CPUE index through July 31 was 6,791. Based on the cumulative CPUE index, the central 50% of the chum salmon run passed the BTF site between June 29 and July 14, and the midpoint of passage occurred on July 6 (Table 1). Daily indices tracked with the 10-year average except for a period from June 1 to June 10 when they were below average (Figure 9; Appendix D1). The total cumulative CPUE index of 6,893 was below the 10-year average of 9,225, and the fifth highest cumulative CPUE index since 2002 (Appendix D2). The central 50% of the chum salmon passage range of dates was 2 days later than the 10-year average range of dates of June 29 to July 14. The midpoint of passage occurred 2 days later than normal on July 8.

The first chum salmon in 2013 was caught on June 13. The peak daily CPUE index of 476 occurred on July 9 and the cumulative CPUE index through July 31 was 5,584. Based on the cumulative CPUE index, the central 50% of the chum salmon run passed the BTF site between July 2 and July 11, and the midpoint of passage occurred on July 7 (Table 2). Daily indices tracked with the 10-year average until June 25 where indices generally were below average (Figure 10; Appendix D1). The cumulative CPUE index of 5,701 was below the 10-year average of 9,235, and the third lowest cumulative CPUE index since 2003 (Appendix D2). The central 50% of the chum salmon passage range of dates fell within the 10-year average range of dates of June 30 to July 15. The midpoint of passage occurred 1 day later than normal on July 7. On average, 95% of the chum salmon run are passed the BTF site by July 25 (Appendix D3).

Coho Salmon

The first coho salmon in 2012 was caught on July 16 and catches continued through the last drift session of the season on August 26. The peak daily CPUE index of 153 occurred on August 17 and the cumulative CPUE index on August 26 was 2,440. Based on the cumulative CPUE index the central 50% of the run passed the BTF site between August 4 and August 16, and the midpoint of passage occurred on August 11 (Table 1). Daily indices generally tracked below the 10-year average except for 4 days (August 16–August 19) when indices were generally above average (Figure 11, Appendix E1). The cumulative CPUE index of 2,440 was below the 10-year average of 4,170, and the second lowest cumulative index since 2002 (Appendix E2). The central 50% of the coho salmon passage was 4 days later than the 10-year average range of dates of July 31 to August 12, and the midpoint of passage occurred 4 days later than the 10-year average date of August 7 (Appendix E3).

The first coho salmon in 2013 was caught on July 9 and catches continued through the last drift session of the season on August 24. The peak daily CPUE index of 249 occurred on August 10 and the total cumulative CPUE index was 2,865. Based on the cumulative CPUE index the central 50% of the run passed the BTF site between August 4 and August 14, and the midpoint of passage occurred on August 9 (Table 2). Daily indices generally tracked below the 10-year average (Figure 12; Appendix E1). The cumulative CPUE index of 2,865 was below the 10-year average of 3,970, and the third lowest cumulative CPUE index since 2003 (Appendix E2). The central 50% of the coho salmon passage was 2 days later than the 10-year average range of dates of July 31 to August 12, and the midpoint of passage occurred 2 days earlier than the 10-year average date of August 7 (Appendix E3).

CLIMATOLOGICAL AND STREAM OBSERVATIONS

Surface water temperature and water clarity measurements were recorded from June 2 through August 26 in 2012 (Appendix F1 and F2). Of the 165 high tides that occurred during the project's operational period, observations and measurements were not made for 18 of those tides. Water temperatures ranged from 9° to 15°C with an average temperature of 14°C, matching the 10-year average. Water temperatures tracked below average for the majority of the project's operational period, beginning August 10, water temperatures tracked at or below recent 10-year average temperatures for the remainder of the season (Figure 13; Appendix F1). Daily water clarity ranged from 0.1 to 0.7 m with an average clarity of 0.4 m. Water clarity tracked generally above the 10-year average (Figure 14; Appendix F2).

Surface water temperature and water clarity measurements were recorded from June 1 through August 24 in 2013 (Appendix F1 and F2). Of the 164 high tides that occurred during the project's operational period, observations and measurements were not made for 4 of those tides. Water temperatures ranged from 7° to 19°C with an average temperature of 14°C, matching the 10-year average. Water temperatures tracked above average for the majority of the project's operational period except for a 12 day period beginning July 1 through July 12, when temperatures where below the 10-year average (Figure 13; Appendix F1). Daily water clarity ranged from 0.1 to 0.4 m with an average clarity of 0.2 m. Water clarity tracked generally below the 10-year average except for a 10 day period beginning July 15 when clarity tracked at and above the 10-year average (Figure 14; Appendix F2).

DISCUSSION

The 2012 and 2013 Chinook salmon returns were characterized by the low estimated total runs and spawning escapements drainagewide. Sockeye, chum, and coho salmon abundances were average to slightly below average. BTF operations were conducted effectively and provided consistent data when compared to Kuskokwim river tributary escapement monitoring projects.

ABUNDANCE INDEX

Chinook Salmon

Inseason assessment of Chinook salmon for 2012 and 2013, as indicated by the cumulative CPUE indices from the BTF, suggested run abundance to be below average when compared to most recent 5-year cumulative CPUE indices and are the 2 lowest cumulative indices since 2008 (Figure 15; Appendix B2).

Postseason evaluation of BTF suggests the cumulative index for Chinook salmon, when compared to most recent 5-year cumulative indices, worked moderately well as an inseason indicator of abundance. In years of record low runs use of BTF for run timing information becomes problematic. The 2013 run appeared to be similar to 2012 in the early season with slightly later run timing. The appearance of late run timing masked the actual scenario of a record low abundance, which may have affected management actions. The Chinook salmon cumulative indices were consistent with years of poor escapements drainagewide as documented by the escapement monitoring projects.

Sockeye Salmon

Inseason assessment of sockeye salmon, as indicated by the cumulative CPUE indices, suggested run abundance to be average in 2012 and slightly below average in 2013 when compared to most recent 10-year cumulative BTF indices. The 2012 and 2013 sockeye salmon cumulative indices tracked within the range of most recent 10-year cumulative indices, most similar to 2010, though the cumulative CPUE indices were the third lowest in 2012 and second lowest in 2013 when compared to the most recent 10 years (Figure 16; Appendix C2).

Postseason evaluation of BTF suggests the cumulative index for sockeye salmon, when compared to most recent 10-year cumulative indices, worked well as an inseason indicator of relative abundance.

Chum Salmon

Inseason assessment of chum salmon relative abundance, as indicated by the BTF cumulative index, suggested run abundance to be average in 2012 and 2013 when compared to most recent 10-year cumulative indices. Throughout the 2012 season the chum salmon cumulative index tracked closely with the 2002 return. The 2013 chum salmon cumulative index tracked similar to but less than the 2008 index. (Figure 17; Appendix G4).

Postseason evaluation of the BTF project suggests the cumulative index for chum salmon worked well as an inseason indicator of abundance. The 2012 and 2013 chum salmon passage at escapement monitoring projects confirmed that the cumulative index for chum salmon provided by BTF worked well as an indicator of relative abundance.

Coho Salmon

Inseason assessment of coho salmon relative abundance for 2012 and 2013, as indicated by the BTF cumulative indices, suggested late run timing and possible low abundance early in the season when compared to recent 10-year cumulative indices. The cumulative index tracked similar to 2005 and 2010, final cumulative indices were slightly above 2010 which is the lowest index in the recent 10-year comparison (Figure 18; Appendix G5).

Postseason evaluation of the Bethel test fishery project suggests the cumulative index for coho salmon worked well as an inseason indicator of abundance. The 2012 and 2013 coho salmon escapement passage at the Kuskokwim River escapement monitoring projects confirmed that the cumulative index for coho salmon was indicative of slightly below average abundance and slightly below average escapements drainagewide.

CONCLUSION

Kuskokwim River subsistence and commercial fishery managers have found the BTF project to be successful at providing an index of the relative abundance and migratory timing of salmon runs. Fishery managers require timely inseason assessment of salmon run abundance. Due to the distance between areas of harvest and escapement project locations throughout the Kuskokwim drainage, escapement projects provided limited usefulness early in the salmon runs. As runs progress, a relationship may be seen between inseason CPUE information and escapement project information. In the absence of June commercial catch statistics, the early season indicators are limited to test fisheries and reports (both formal and informal) from subsistence fishermen.

Recommendations regarding the interpretation of inter-annual comparison of BTF information in future reports include the following:

- Continue the development of a relationship between BTF CPUE indices and escapement at weir projects to use as an inseason assessment tool for managing the Kuskokwim River Chinook salmon fishery and annually evaluate this relationship through regression analysis.
- Consider the magnitude of fish removal and harvest effort both upstream and downstream of the BTF site as this removal may influence interpretation of the cumulative test fishery CPUE indices of relative abundance and run timing.
- Continue cooperative monitoring of the BTF site bathometry for assessment of changes to catchability and effectiveness of operations.

As one of the salmon stock assessment programs for the Kuskokwim River, this test fishery has evolved into the primary inseason salmon management tool. Consistency in methods, completeness of a historical database, frequency of operation, and timeliness of results contribute to the success of this program. BTF by itself is an imperfect tool and requires a measure of subjectivity by experienced staff to interpret the information effectively. When used in conjunction with other inseason assessment tools, the test fishery can provide managers with insight into salmon run abundance and migratory timing on the Kuskokwim River.

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TABLES AND FIGURES

Table 1.–Catch, daily mean tidal catch per unit effort (CPUE), cumulative mean tidal CPUE, and percent passage for the Bethel test fishery, 2012.

	Chinook				Sockeye				Coho				Chum			
Date	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage
6/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/4	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6/5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6/6	0	0	1	0	0	0	0	0	0	0	0	0	1	3	3	0
6/7	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0
6/8	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0
6/9	1	1	3	1	0	0	0	0	0	0	0	0	0	0	3	0
6/10	1	2	4	1	0	0	0	0	0	0	0	0	2	5	8	0
6/11	1	1	6	1	0	0	0	0	0	0	0	0	0	0	8	0
6/12	0	0	6	1	0	0	0	0	0	0	0	0	0	0	8	0
6/13	0	0	6	1	0	0	0	0	0	0	0	0	3	8	16	0
6/14	1	1	7	2	0	0	0	0	0	0	0	0	3	8	24	0
6/15	3	4	11	3	0	0	0	0	0	0	0	0	0	0	24	0
6/16	10	13	24	6	1	3	3	0	0	0	0	0	1	3	27	0
6/17	7	9	33	8	3	9	12	1	0	0	0	0	7	15	42	1
6/18	1	1	34	8	1	3	14	1	0	0	0	0	7	15	57	1
6/19	12	16	50	12	6	17	32	3	0	0	0	0	19	42	98	1
6/20	17	24	74	18	6	13	45	4	0	0	0	0	25	72	170	2
6/21	24	29	103	25	17	38	83	7	0	0	0	0	101	216	386	6
6/22	15	16	119	28	6	11	95	8	0	0	0	0	91	166	552	8
6/23	23	29	148	35	22	52	146	12	0	0	0	0	68	152	704	10
6/24	19	21	168	40	21	48	194	17	0	0	0	0	45	93	798	12
6/25	21	24	192	46	14	31	225	19	0	0	0	0	88	191	989	14
6/26	31	36	228	54	22	44	269	23	0	0	0	0	75	121	1,110	16
6/27	11	12	240	57	31	63	333	28	0	0	0	0	137	276	1,386	20
6/28	9	11	252	60	9	36	369	32	0	0	0	0	45	109	1,495	22
6/29	13	19	271	65	34	97	466	40	0	0	0	0	101	306	1,801	26
6/30	13	16	286	68	16	51	516	44	0	0	0	0	114	387	2,189	32
7/1	5	7	293	70	24	80	597	51	0	0	0	0	47	162	2,350	34
7/2	4	5	298	71	16	53	650	55	0	0	0	0	101	303	2,653	38
7/3	16	23	321	77	11	40	690	59	0	0	0	0	25	103	2,756	40

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Table 1.–Page 2 of 3.

Date	Chinook No. caught	Chinook Daily mean tidal CPUE	Chinook Cumulative mean tidal CPUE	Chinook Percent passage	Sockeye No. caught	Sockeye Daily mean tidal CPUE	Sockeye Cumulative mean tidal CPUE	Sockeye Percent passage	Coho No. caught	Coho Daily mean tidal CPUE	Coho Cumulative mean tidal CPUE	Coho Percent passage	Chum No. caught	Chum Daily mean tidal CPUE	Chum Cumulative mean tidal CPUE	Chum Percent passage
7/4 [a]	2	13	334	80	5	37	727	62	0	0	0	0	63	242	2,998	43
7/5	10	13	347	83	18	52	778	66	0	0	0	0	90	241	3,239	47
7/6	11	14	362	86	35	105	884	75	0	0	0	0	60	184	3,423	50
7/7	9	13	375	90	26	104	988	84	0	0	0	0	106	272	3,695	54
7/8	8	12	387	92	14	47	1,035	88	0	0	0	0	52	184	3,879	56
7/9	5	9	395	94	9	31	1,066	91	0	0	0	0	58	199	4,078	59
7/10	2	3	398	95	8	34	1,100	94	0	0	0	0	54	197	4,275	62
7/11	4	3	401	96	5	21	1,121	96	0	0	0	0	148	400	4,675	68
7/12	2	0	401	96	4	15	1,136	97	0	0	0	0	22	61	4,736	69
7/13	0	0	401	96	2	6	1,142	97	0	0	0	0	52	153	4,889	71
7/14	0	0	401	96	1	0	1,142	97	0	0	0	0	86	259	5,148	75
7/15 [b]	1	0	401	96	4	14	1,156	99	0	0	0	0	53	170	5,317	77
7/16	1	3	404	97	2	5	1,161	99	1	2	2	0	91	170	5,487	80
7/17	1	3	408	97	0	0	1,161	99	1	2	4	0	99	215	5,702	83
7/18	1	2	410	98	1	2	1,163	99	1	2	6	0	70	155	5,858	85
7/19 [a]	0	0	410	98	1	1	1,164	99	1	2	8	0	72	177	6,035	88
7/20	0	0	410	98	0	0	1,164	99	1	3	12	0	104	206	6,240	91
7/21	0	0	410	98	0	0	1,164	99	1	3	15	1	45	107	6,347	92
7/22	1	2	412	98	0	0	1,164	99	3	7	22	1	36	89	6,436	93
7/23	0	0	412	98	1	2	1,166	100	11	15	37	2	77	107	6,543	95
7/24	0	0	412	98	0	0	1,166	100	12	19	57	2	20	33	6,576	95
7/25	1	2	413	99	0	0	1,166	100	17	26	83	4	19	30	6,606	96
7/26 [a]	0	0	413	99	0	1	1,167	100	10	37	120	5	36	71	6,677	97
7/27	0	0	413	99	1	2	1,168	100	25	45	165	7	21	37	6,715	97
7/28	0	0	413	99	0	0	1,168	100	6	10	175	7	8	13	6,728	98
7/29 [a]	1	1	415	99	1	2	1,170	100	19	54	229	10	2	17	6,745	98
7/30	0	0	415	99	0	0	1,170	100	41	67	296	13	14	24	6,769	98
7/31	0	0	415	99	0	0	1,170	100	11	21	317	13	12	23	6,791	99
8/1	0	0	415	99	0	0	1,170	100	22	39	355	15	8	15	6,806	99
8/2	2	3	417	100	0	0	1,170	100	55	78	434	18	13	19	6,825	99
8/3 [a]	0	1	419	100	0	0	1,170	100	44	127	561	24	6	22	6,847	99
8/4	0	0	419	100	0	0	1,170	100	36	61	622	27	5	8	6,855	99
8/5	0	0	419	100	1	1	1,171	100	73	123	745	32	6	9	6,864	100
8/6	0	0	419	100	0	0	1,171	100	51	85	830	35	2	3	6,867	100
8/7	0	0	419	100	0	0	1,171	100	45	78	907	39	2	3	6,870	100

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Table 1.–Page 3 of 3.

	Chinook				Sockeye				Coho				Chum			
Date	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage
8/8	0	0	419	100	0	0	1,171	100	47	80	988	42	1	2	6,872	100
8/9 [a]	0	0	419	100	0	0	1,171	100	14	64	1,051	45	0	0	6,872	100
8/10	0	0	419	100	0	0	1,171	100	55	102	1,153	49	1	2	6,874	100
8/11	0	0	419	100	0	0	1,171	100	14	27	1,181	50	0	0	6,874	100
8/12	0	0	419	100	0	0	1,171	100	61	112	1,292	55	0	0	6,874	100
8/13	0	0	419	100	0	0	1,171	100	67	110	1,403	60	1	2	6,876	100
8/14	0	0	419	100	0	0	1,171	100	58	97	1,500	64	4	6	6,882	100
8/15	0	0	419	100	0	0	1,171	100	56	101	1,601	68	2	4	6,886	100
8/16	0	0	419	100	0	0	1,171	100	76	136	1,737	74	1	2	6,888	100
8/17	0	0	419	100	0	0	1,171	100	95	153	1,890	81	0	0	6,888	100
8/18 [a]	0	0	419	100	0	0	1,171	100	45	149	2,039	87	0	0	6,888	100
8/19	0	0	419	100	0	0	1,171	100	42	83	2,122	90	0	0	6,888	100
8/20	0	0	419	100	0	0	1,171	100	40	66	2,187	93	1	2	6,890	100
8/21	0	0	419	100	0	0	1,171	100	20	59	2,247	96	0	0	6,890	100
8/22	0	0	419	100	0	0	1,171	100	28	51	2,297	98	0	0	6,890	100
8/23	0	0	419	100	0	0	1,171	100	21	50	2,347	100	1	2	6,892	100
8/24 [a]	0	0	419	100	0	0	1,171	100	5	29	2,376	100	0	1	6,893	100
8/25 [a]	0	0	419	100	0	0	1,171	100	8	36	2,411	100	0	0	6,893	100
8/26	0	0	419	100	0	0	1,171	100	16	28	2,440	100	0	0	6,893	100
Total	321	419			399	1,171			1,255	2,440			2,730	6,893		

Note: The boxes represent the central 50% of the run and the shaded cells represent the median passage date of the run.

[a] Estimated CPUE index used to represent data missing from one tide not fished on that date.

[b] The use of the 8.0 inch mesh gillnet was discontinued after July 15.

Table 2.–Catch, daily mean tidal catch per unit effort (CPUE), cumulative mean tidal CPUE, and percent passage for the Bethel test fishery, 2013.

	Chinook				Sockeye				Coho				Chum			
Date	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage
6/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/8	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0
6/9	1	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0
6/10	2	3	6	2	0	0	0	0	0	0	0	0	0	0	0	0
6/11	1	1	8	3	0	0	0	0	0	0	0	0	0	0	0	0
6/12	1	1	9	3	0	0	0	0	0	0	0	0	0	0	0	0
6/13	10	12	21	8	1	3	3	0	0	0	0	0	2	4	4	0
6/14	7	10	31	12	1	3	6	0	0	0	0	0	0	0	4	0
6/15	2	4	35	13	4	9	15	1	0	0	0	0	3	10	14	0
6/16	7	13	48	18	7	22	37	3	0	0	0	0	8	23	37	1
6/17	13	18	65	25	4	8	45	4	0	0	0	0	4	11	48	1
6/18	4	5	70	27	6	11	56	5	0	0	0	0	10	21	69	1
6/19	16	19	89	34	20	46	102	9	0	0	0	0	21	46	115	2
6/20	8	10	100	38	11	22	123	11	0	0	0	0	10	24	139	2
6/21	10	11	110	42	21	39	162	14	0	0	0	0	44	95	235	4
6/22	19	21	132	50	9	17	179	16	0	0	0	0	36	79	313	5
6/23	8	13	145	55	14	34	213	19	0	0	0	0	92	197	511	9
6/24	11	14	159	61	58	145	358	31	0	0	0	0	57	158	669	12
6/25	14	18	177	68	42	103	461	40	0	0	0	0	46	136	805	14
6/26	7	10	187	72	11	31	492	43	0	0	0	0	21	77	881	15
6/27	8	10	197	75	17	39	531	46	0	0	0	0	44	98	979	17
6/28	4	5	202	77	32	70	601	52	0	0	0	0	12	28	1,007	18
6/29	3	4	206	79	5	13	614	54	0	0	0	0	6	13	1,020	18
6/30	7	8	214	82	27	60	674	59	0	0	0	0	179	277	1,297	23
7/1	2	3	217	83	13	38	712	62	0	0	0	0	24	52	1,349	24
7/2	1	1	218	83	23	58	770	67	0	0	0	0	84	204	1,553	27
7/3	3	4	222	85	27	89	860	75	0	0	0	0	87	258	1,812	32

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Table 2.–Page 2 of 3.

Date	Chinook No. caught	Chinook Daily mean tidal CPUE	Chinook Cumulative mean tidal CPUE	Chinook Percent passage	Sockeye No. caught	Sockeye Daily mean tidal CPUE	Sockeye Cumulative mean tidal CPUE	Sockeye Percent passage	Coho No. caught	Coho Daily mean tidal CPUE	Coho Cumulative mean tidal CPUE	Coho Percent passage	Chum No. caught	Chum Daily mean tidal CPUE	Chum Cumulative mean tidal CPUE	Chum Percent passage
7/4	3	4	226	86	20	53	913	80	0	0	0	0	124	304	2,116	37
7/5	4	5	231	88	6	22	935	82	0	0	0	0	141	380	2,496	44
7/6	4	6	237	91	17	55	990	86	0	0	0	0	85	230	2,726	48
7/7	2	3	239	91	5	20	1,009	88	0	0	0	0	167	419	3,145	55
7/8	5	6	246	94	5	14	1,023	89	0	0	0	0	72	179	3,324	58
7/9	2	3	248	95	19	39	1,062	93	1	2	2	0	249	476	3,800	67
7/10	2	3	251	96	2	5	1,067	93	0	0	2	0	189	433	4,233	74
7/11	3	3	254	97	6	18	1,085	95	0	0	2	0	50	130	4,363	76
7/12	1	1	255	98	9	22	1,107	97	0	0	2	0	75	191	4,554	80
7/13	1	1	257	98	4	10	1,117	98	1	2	4	0	19	44	4,599	81
7/14 [a]	1	2	259	99	1	1	1,119	98	0	0	4	0	12	46	4,644	81
7/15 [b]	1	1	260	99	3	7	1,126	98	9	22	26	1	23	54	4,698	82
7/16	1	1	261	100	6	9	1,135	99	10	16	42	1	66	104	4,803	84
7/17	0	0	261	100	1	2	1,137	99	5	8	50	2	16	27	4,829	85
7/18	0	0	261	100	0	0	1,137	99	4	6	56	2	111	154	4,983	87
7/19 [a]	0	0	261	100	1	2	1,139	99	8	21	77	3	46	128	5,111	90
7/20	0	0	261	100	1	2	1,141	100	8	13	90	3	66	107	5,218	91
7/21	0	0	261	100	2	3	1,144	100	13	21	111	4	79	117	5,336	94
7/22	0	0	261	100	0	0	1,144	100	17	28	139	5	70	95	5,431	95
7/23	0	0	261	100	0	0	1,144	100	10	17	156	5	25	44	5,475	96
7/24	0	0	261	100	0	0	1,144	100	11	19	175	6	18	29	5,504	96
7/25	0	0	261	100	0	0	1,144	100	16	28	203	7	21	36	5,541	97
7/26	0	0	261	100	0	0	1,144	100	15	26	228	8	3	5	5,546	97
7/27	0	0	261	100	0	0	1,144	100	13	23	252	9	6	11	5,556	97
7/28	0	0	261	100	1	2	1,146	100	39	65	317	11	8	13	5,570	98
7/29	0	0	261	100	0	0	1,146	100	23	41	358	12	8	14	5,584	98
7/30	0	0	261	100	0	0	1,146	100	12	21	379	13	0	0	5,584	98
7/31	0	0	261	100	0	0	1,146	100	21	37	416	15	0	0	5,584	98
8/1	0	0	261	100	0	0	1,146	100	27	47	463	16	2	4	5,587	98
8/2	0	0	261	100	0	0	1,146	100	36	60	523	18	5	9	5,596	98
8/3	0	0	261	100	0	0	1,146	100	63	102	624	22	9	15	5,611	98
8/4	0	0	261	100	0	0	1,146	100	110	169	793	28	10	15	5,626	99
8/5	0	0	261	100	0	0	1,146	100	165	234	1,027	36	13	20	5,647	99

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Table 2.–Page 3 of 3.

	Chinook				Sockeye				Coho				Chum			
Date	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	No. caught	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage
8/6	0	0	261	100	0	0	1,146	100	84	144	1,171	41	6	10	5,657	99
8/7	0	0	261	100	0	0	1,146	100	25	44	1,215	42	1	2	5,658	99
8/8	0	0	261	100	0	0	1,146	100	42	69	1,284	45	3	5	5,663	99
8/9	0	0	261	100	0	0	1,146	100	89	139	1,423	50	0	0	5,663	99
8/10	0	0	261	100	0	0	1,146	100	172	249	1,672	58	5	7	5,671	99
8/11	0	0	261	100	0	0	1,146	100	153	243	1,916	67	1	2	5,672	99
8/12	0	0	261	100	0	0	1,146	100	55	92	2,008	70	4	7	5,679	100
8/13	0	0	261	100	0	0	1,146	100	31	55	2,063	72	1	2	5,681	100
8/14	0	0	261	100	0	0	1,146	100	74	121	2,185	76	1	2	5,682	100
8/15	0	0	261	100	0	0	1,146	100	14	26	2,210	77	1	2	5,684	100
8/16	0	0	261	100	0	0	1,146	100	65	104	2,315	81	1	2	5,686	100
8/17	0	0	261	100	0	0	1,146	100	65	104	2,419	84	1	2	5,687	100
8/18	0	0	261	100	0	0	1,146	100	55	93	2,512	88	3	5	5,693	100
8/19	0	0	261	100	0	0	1,146	100	66	112	2,624	92	3	5	5,698	100
8/20	0	0	261	100	0	0	1,146	100	25	45	2,669	93	2	3	5,701	100
8/21	0	0	261	100	0	0	1,146	100	29	49	2,717	95	1	2	5,703	100
8/22	0	0	261	100	0	0	1,146	100	40	68	2,785	97	0	0	5,703	100
8/23	0	0	261	100	0	0	1,146	100	28	50	2,834	99	2	4	5,706	100
8/24	0	0	261	100	0	0	1,146	100	18	31	2,865	100	1	2	5,708	100
Total	201	261			462	1,146			1,767	2,865			2,615	5,708		

Note: The boxes represent the central 50% of the run and the shaded cells represent the median passage date of the run.

[a] Estimated CPUE index used to represent data missing from one tide not fished on that date.

[b] The use of the 8.0 inch mesh gillnet was discontinued after July 15.

Figure 1.–Map of Kuskokwim Management Area including commercial fishing Districts W-1, W-2, W-4, and W-5.

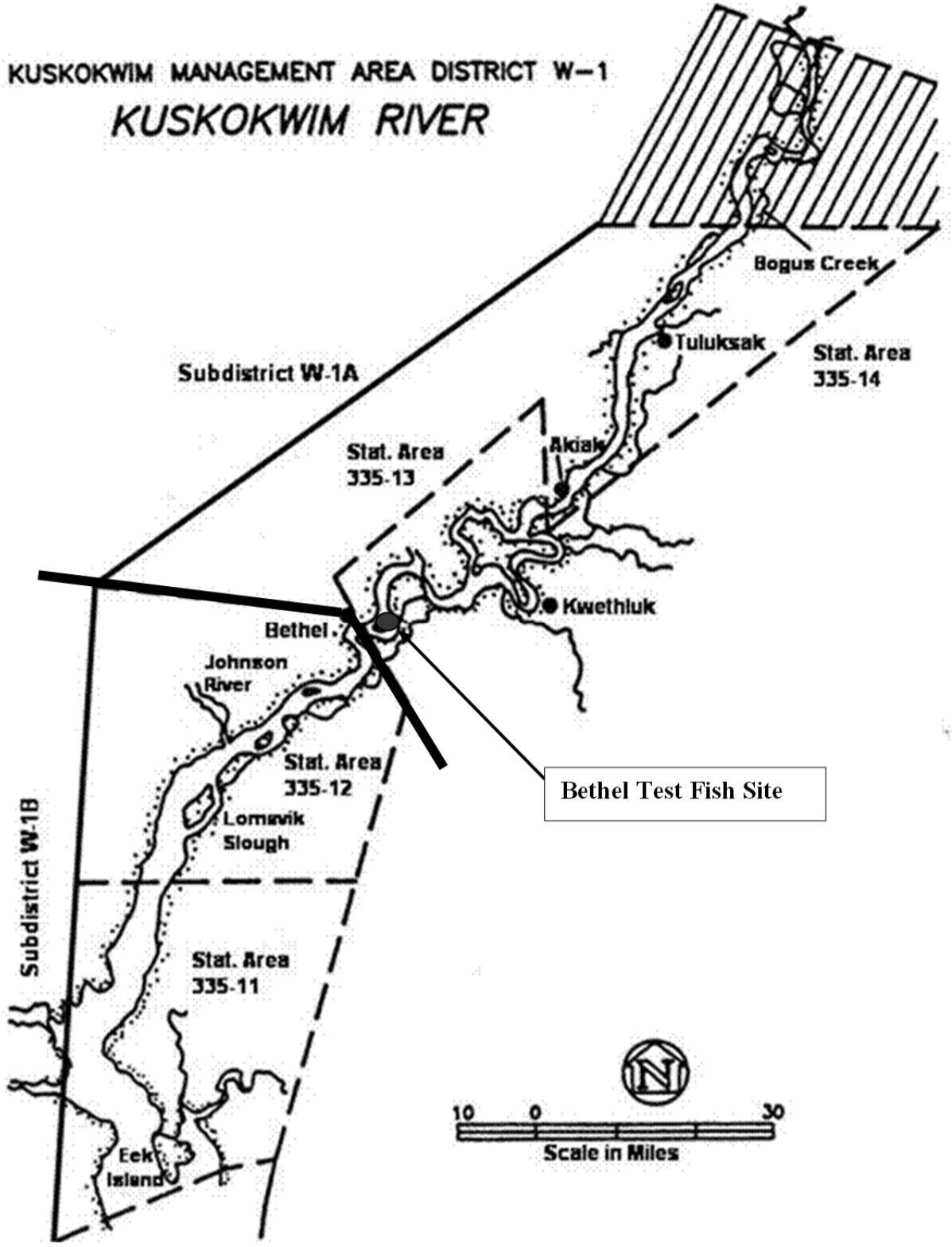

Figure 2.–District 1 (also known as District W-1), the Kuskokwim commercial salmon management area.

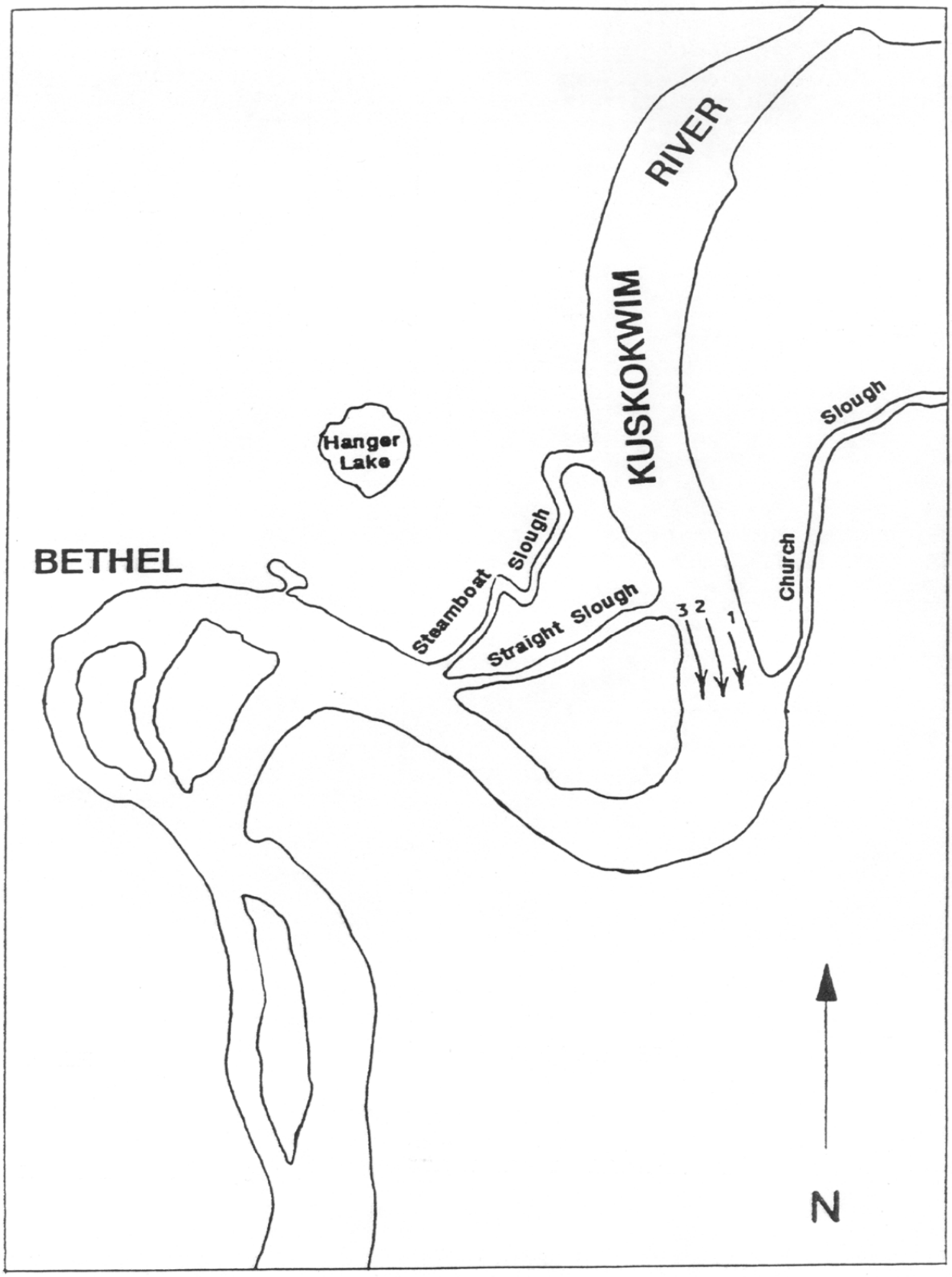

Figure 3.–Bethel test fishery drift Stations 1, 2, and 3.

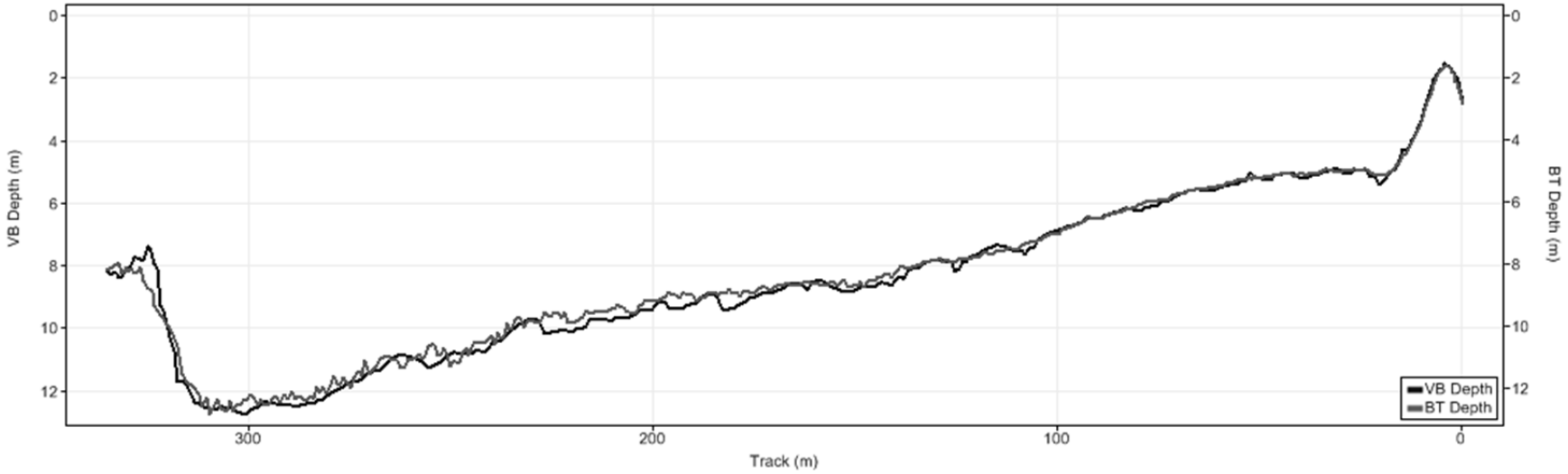

Figure 4.–Typical profile of the Kuskokwim River 4 miles upstream of Bethel, illustrating the area covered by gillnets used in the Bethel test fishery.

Note: Bottom profile depicted was measured in 2013; recorded from the east bank to the west bank by USFW.

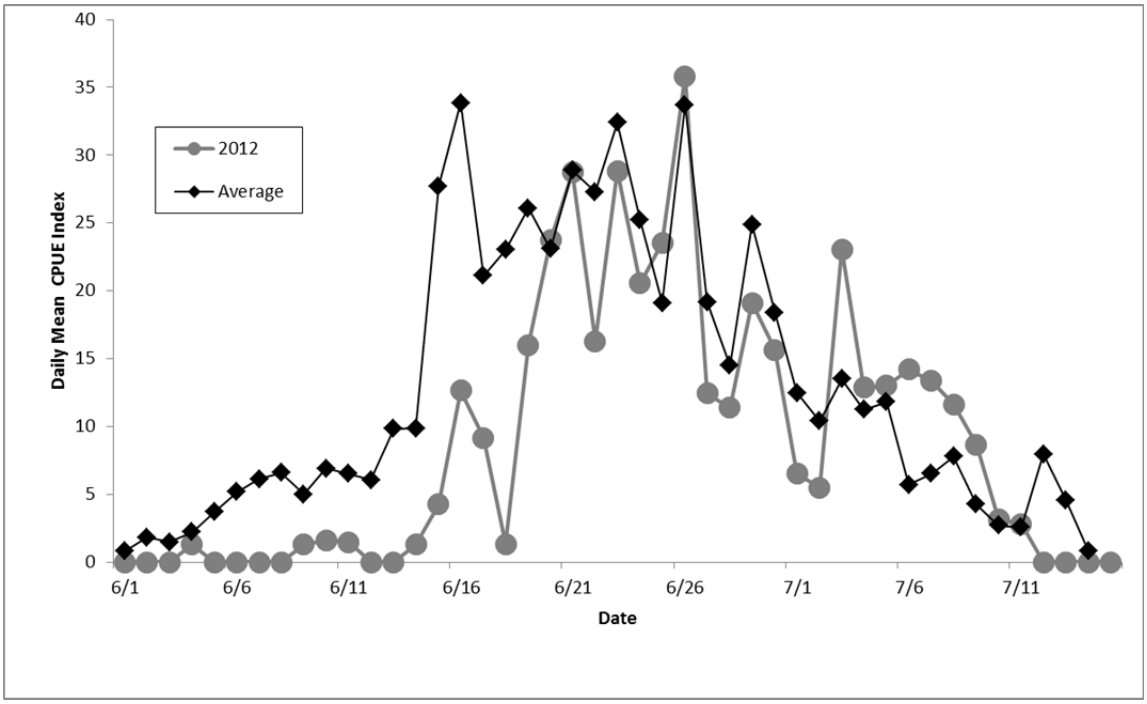

Figure 5.–Chinook salmon daily mean tidal catch per unit effort (CPUE) indices for mean 2008–2011, and 2012, Bethel test fishery.

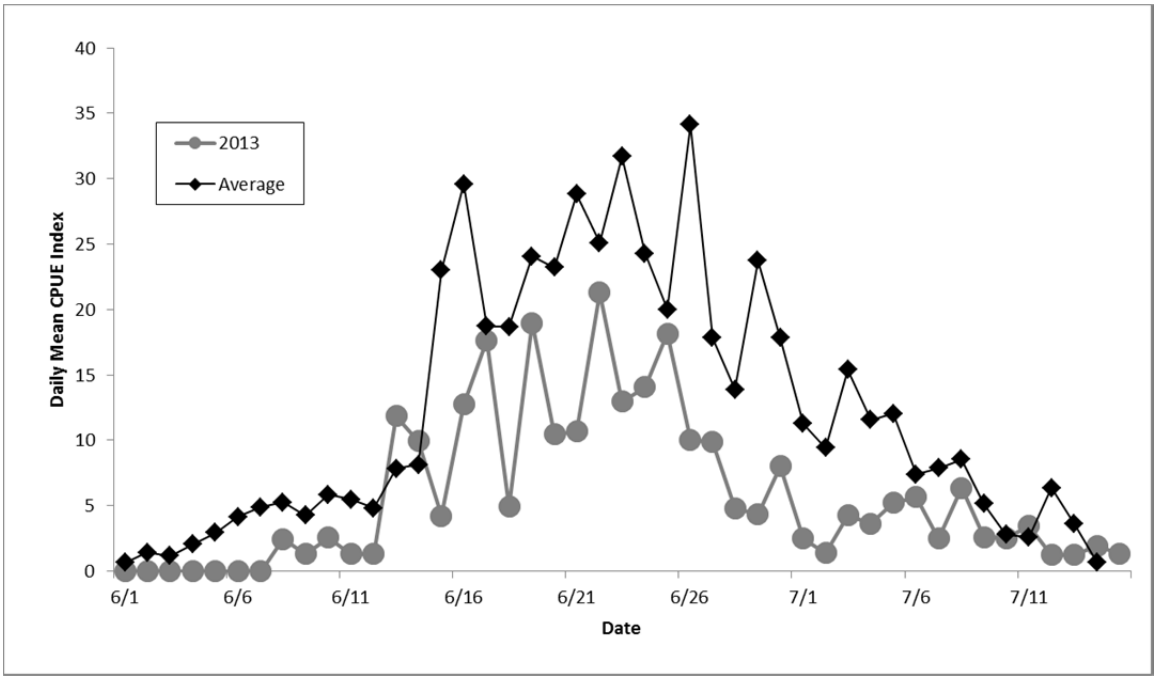

Figure 6.–Chinook salmon daily mean tidal catch per unit effort (CPUE) indices for mean 2008–2012, and 2013, Bethel test fishery.

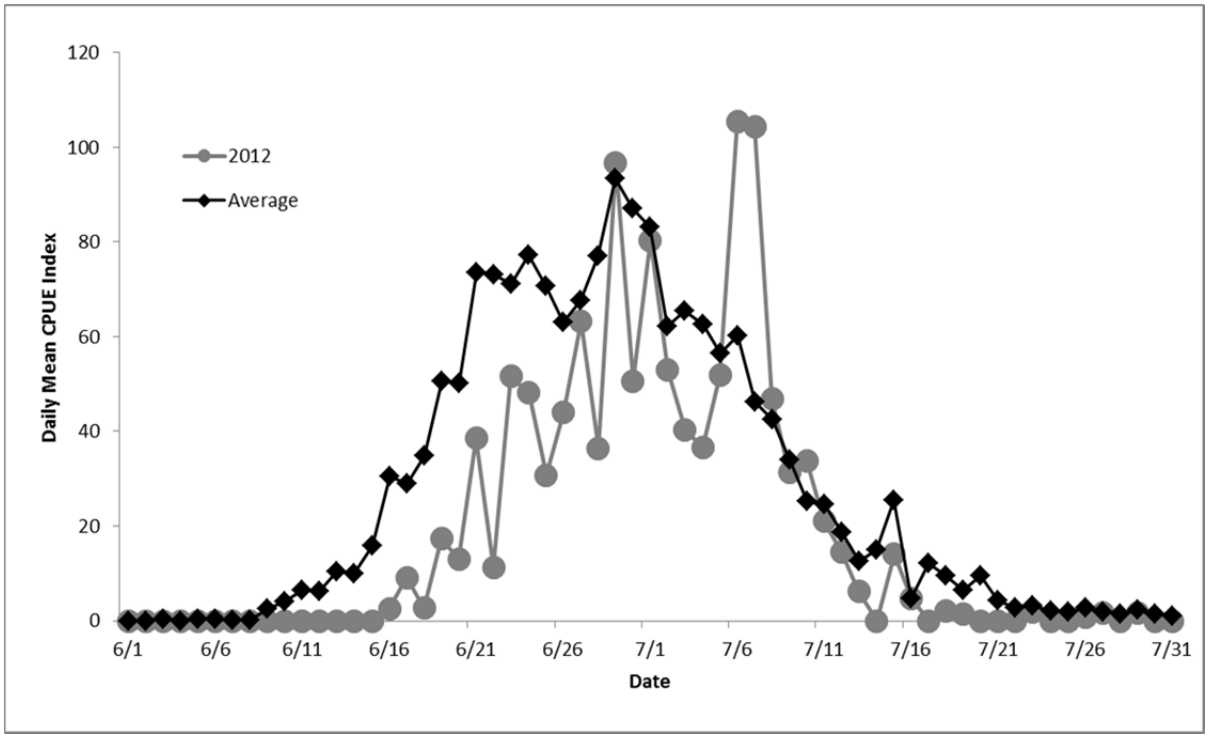

Figure 7.–Sockeye salmon daily mean tidal catch per unit effort (CPUE) indices for mean 2002–2011, and 2012, Bethel test fishery.

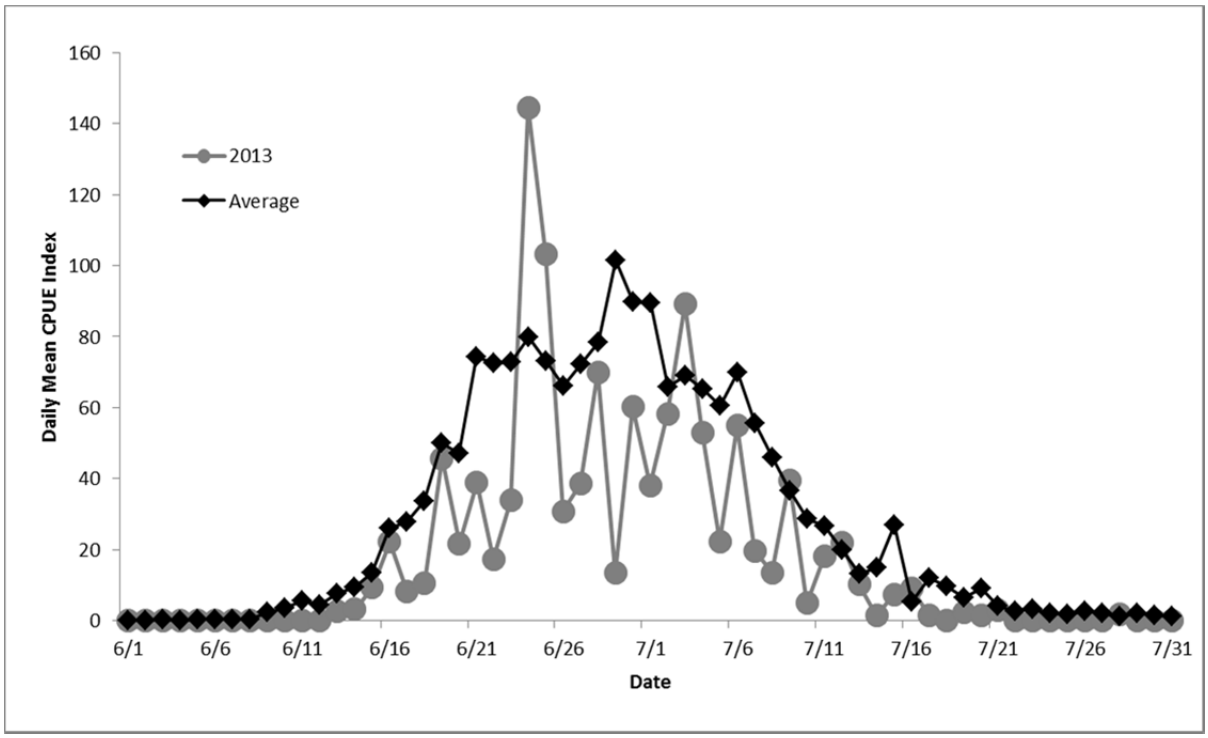

Figure 8.–Sockeye salmon daily mean tidal catch per unit effort (CPUE) indices for mean 2003–2012, and 2013, Bethel test fishery.

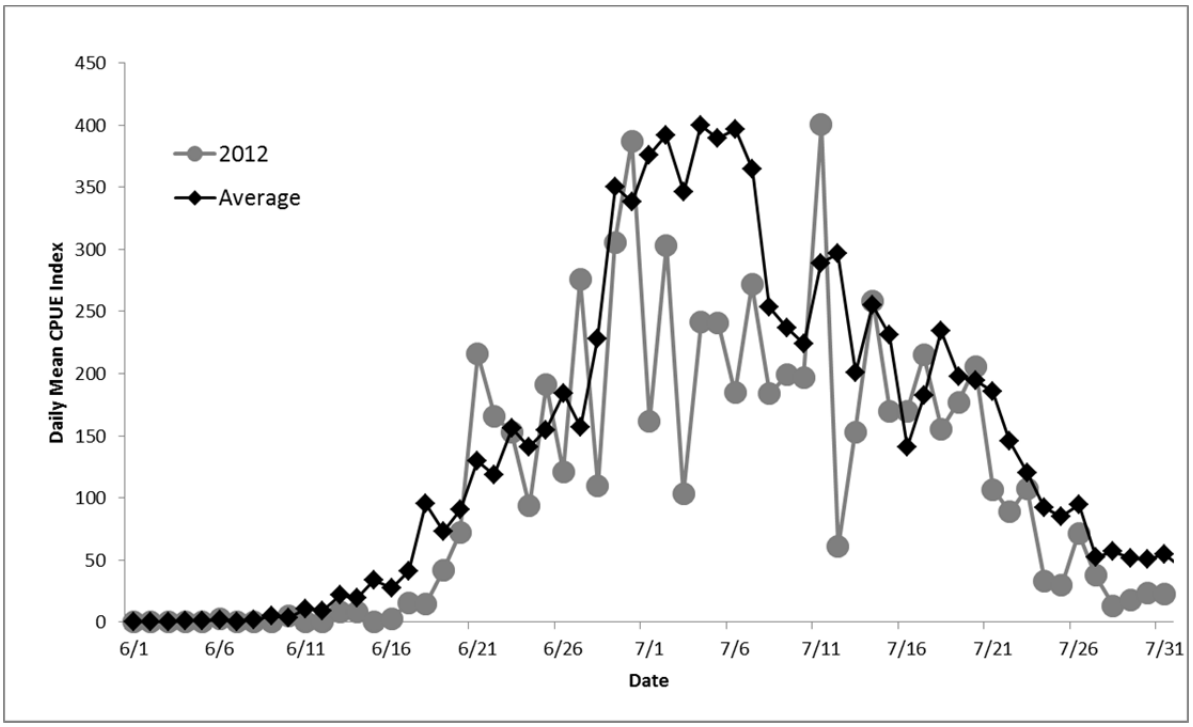

Figure 9.–Chum salmon daily mean tidal catch per unit effort (CPUE) indices for mean 2002–2011, and 2012, Bethel test fishery.

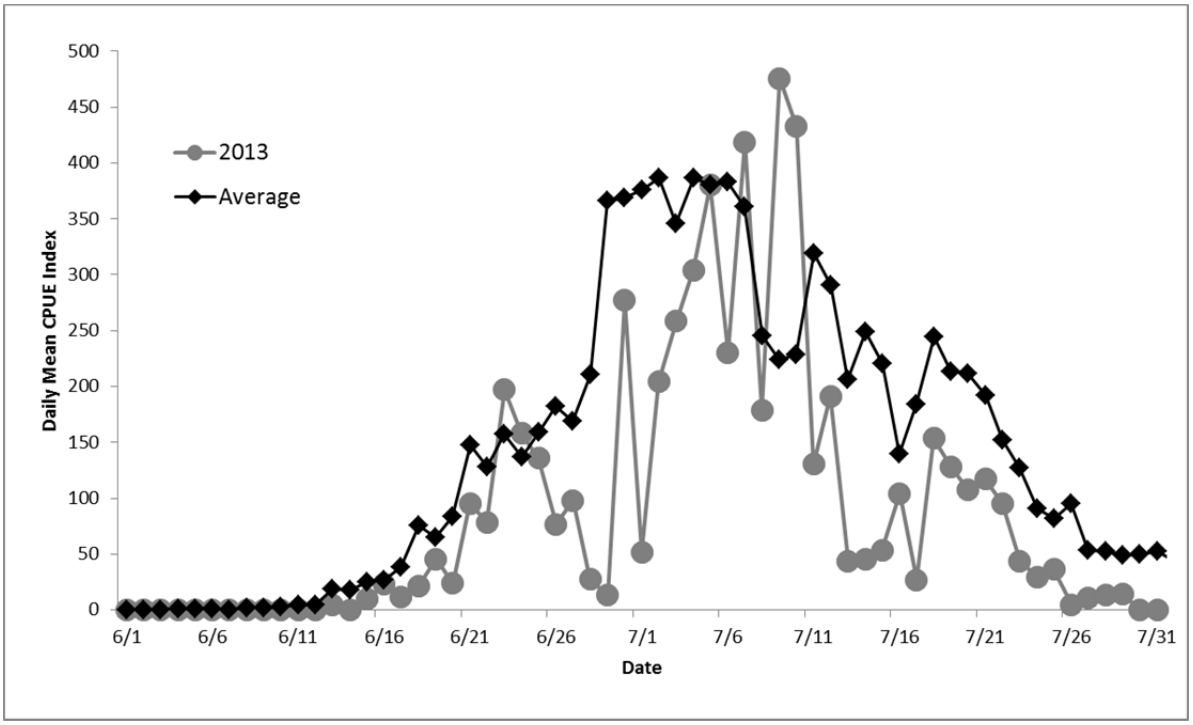

Figure 10.–Chum salmon daily mean tidal catch per unit effort (CPUE) indices for mean 2003–2012, and 2013, Bethel test fishery.

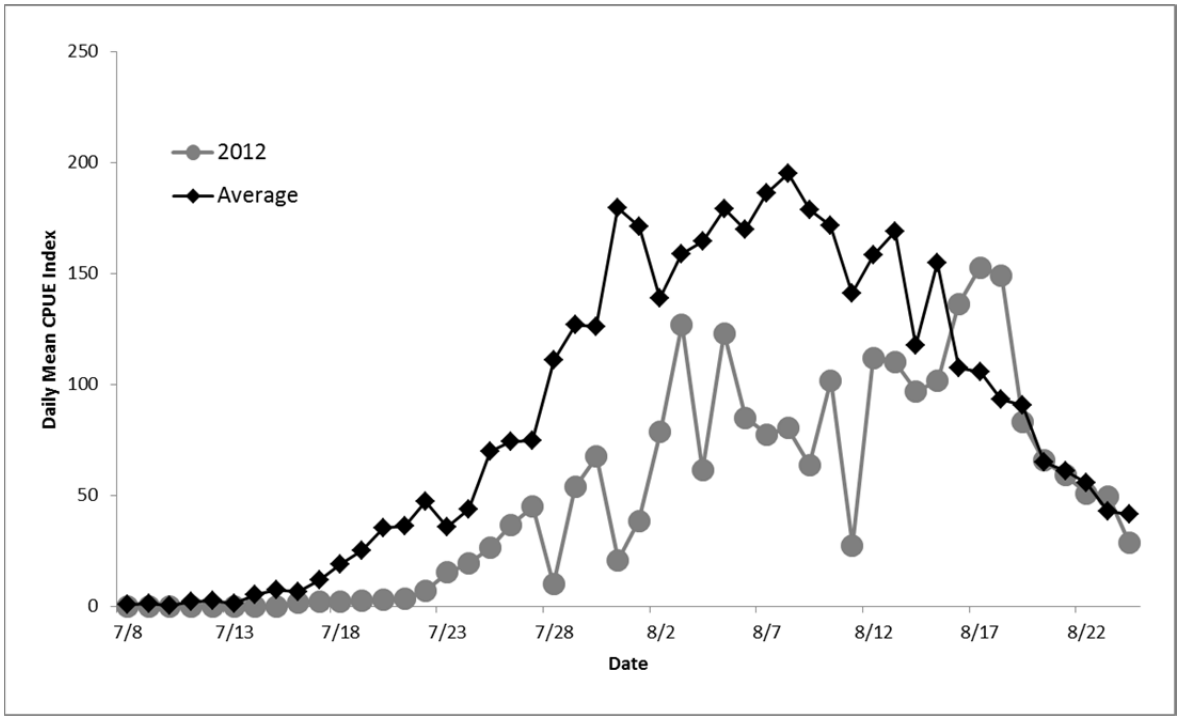

Figure 11.–Coho salmon daily mean tidal catch per unit effort (CPUE) indices for mean 2002–2011, and 2012, Bethel test fishery.

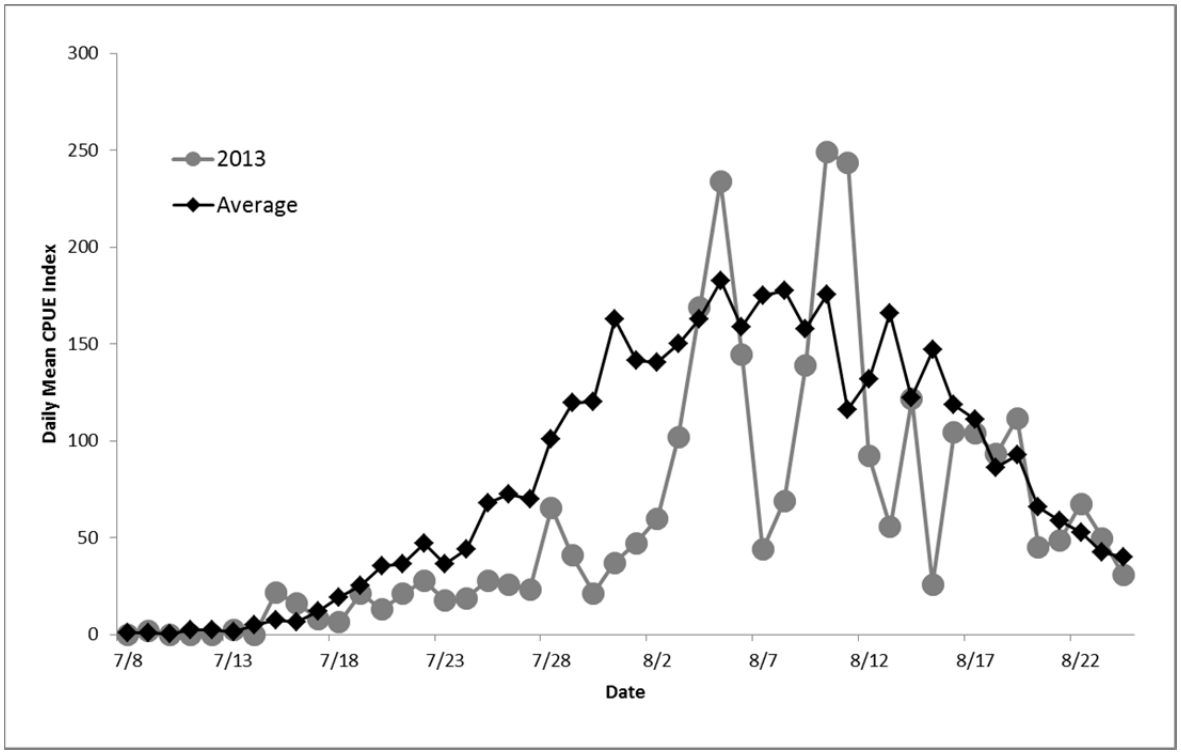

Figure 12.–Coho salmon daily mean tidal catch per unit effort (CPUE) indices for mean 2003–2012, and 2013, Bethel test fishery.

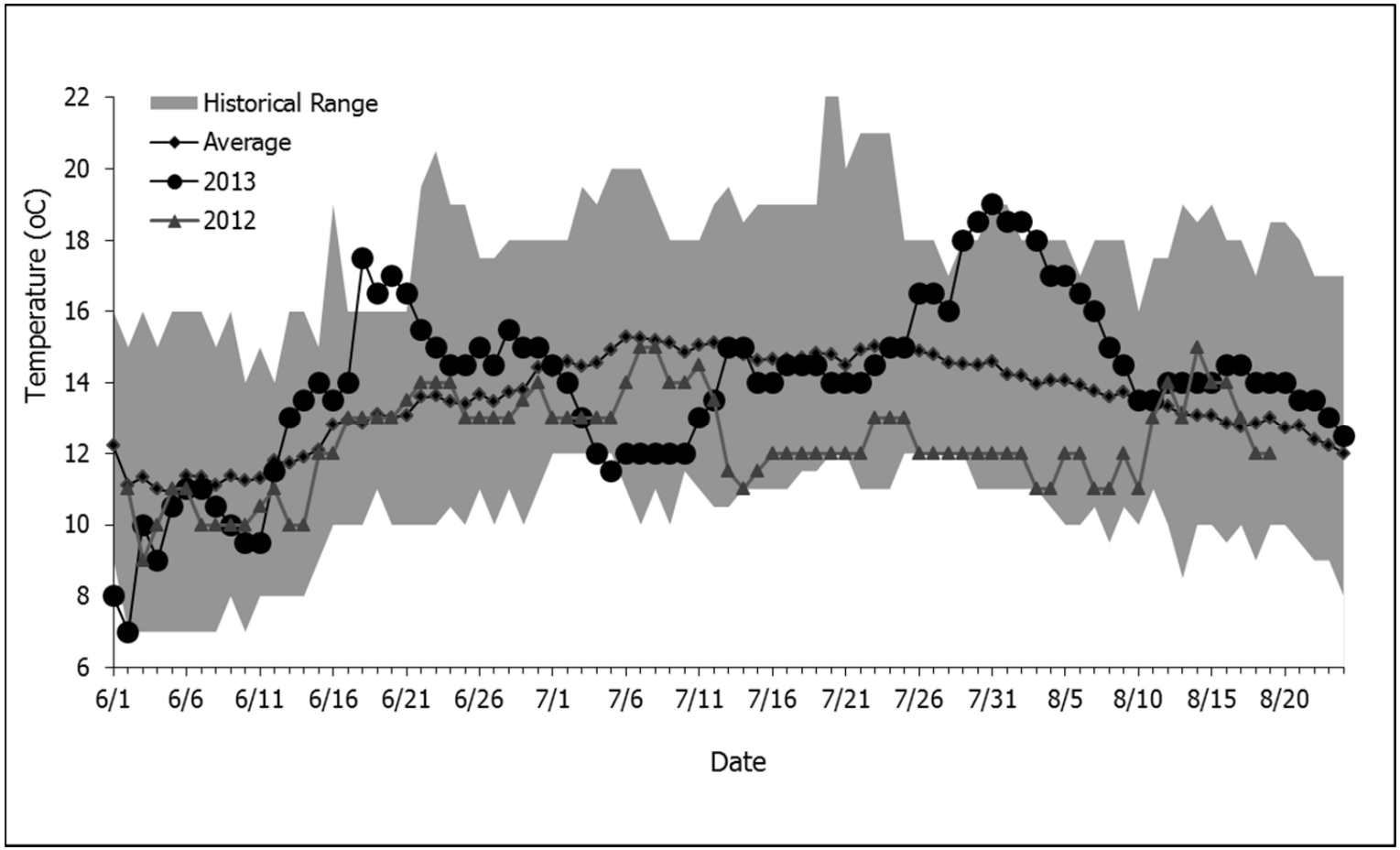

Figure 13.–Historical daily surface water temperature of the Kuskokwim River at the Bethel test fishery site, 2004–2013.

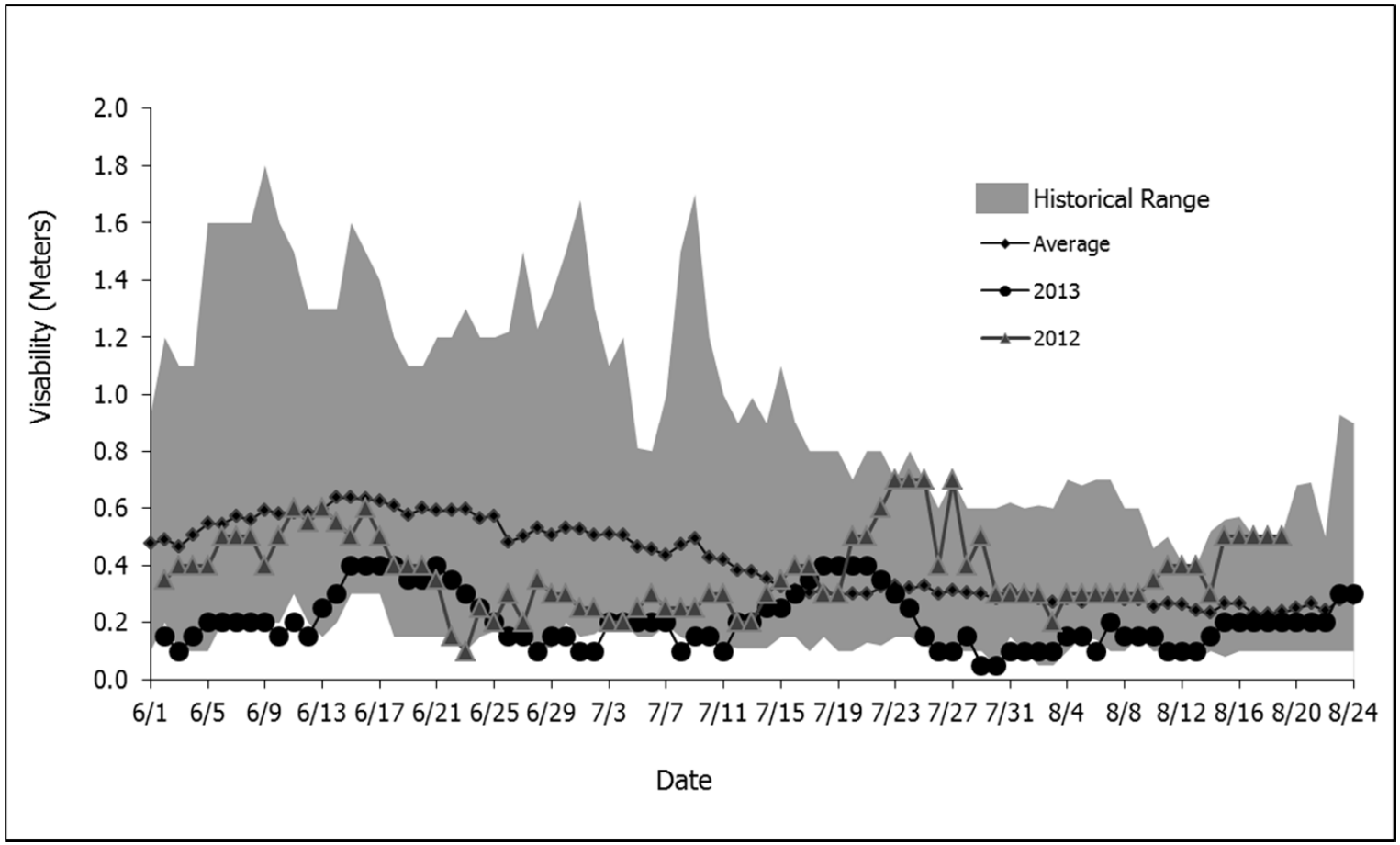

Figure 14.–Historical daily water clarity measurements of the Kuskokwim River at the Bethel test fishery site, 2004–2013.

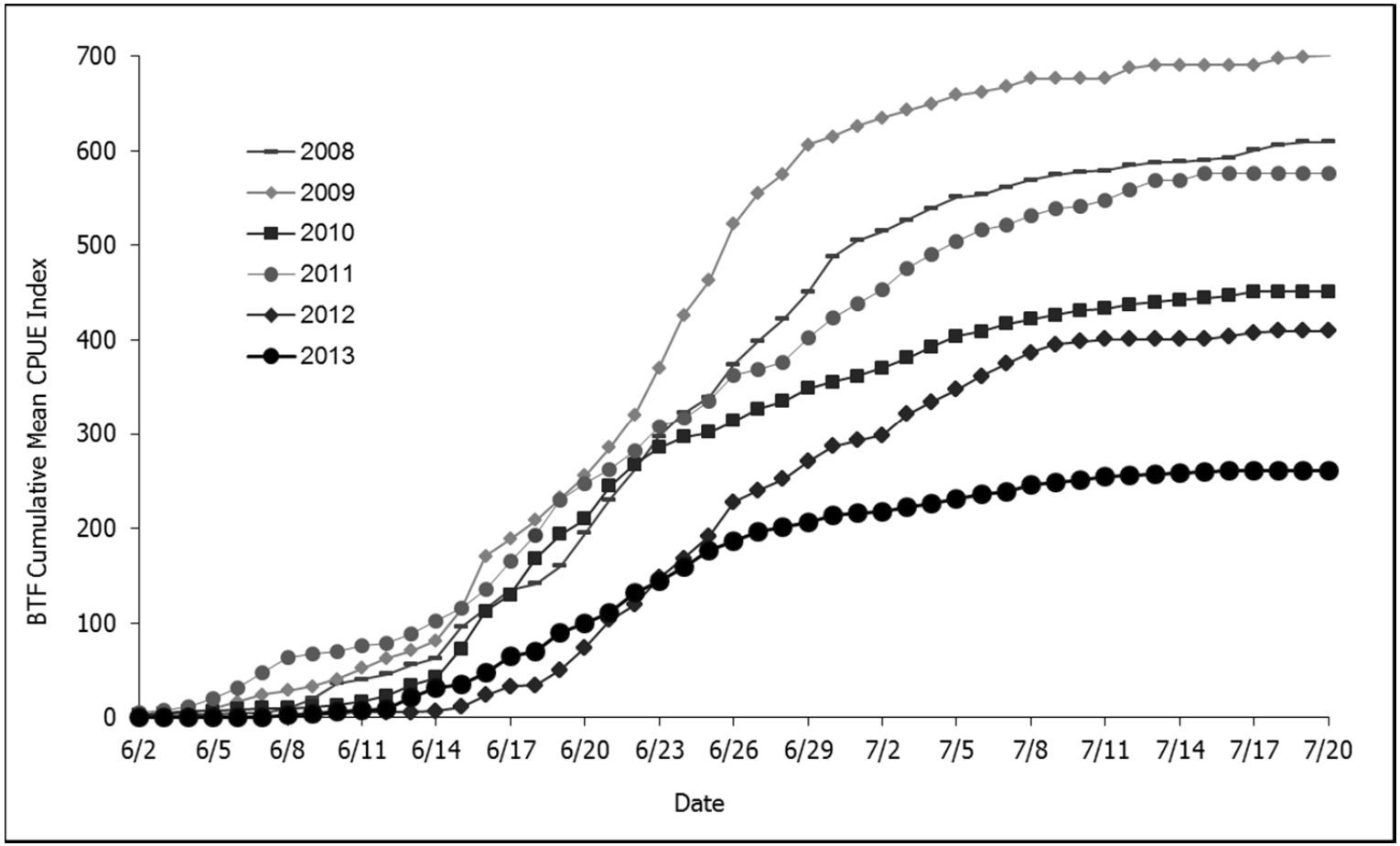

Figure 15.–Chinook salmon cumulative mean tidal CPUE indices for years 2008–2013, Bethel test fishery.

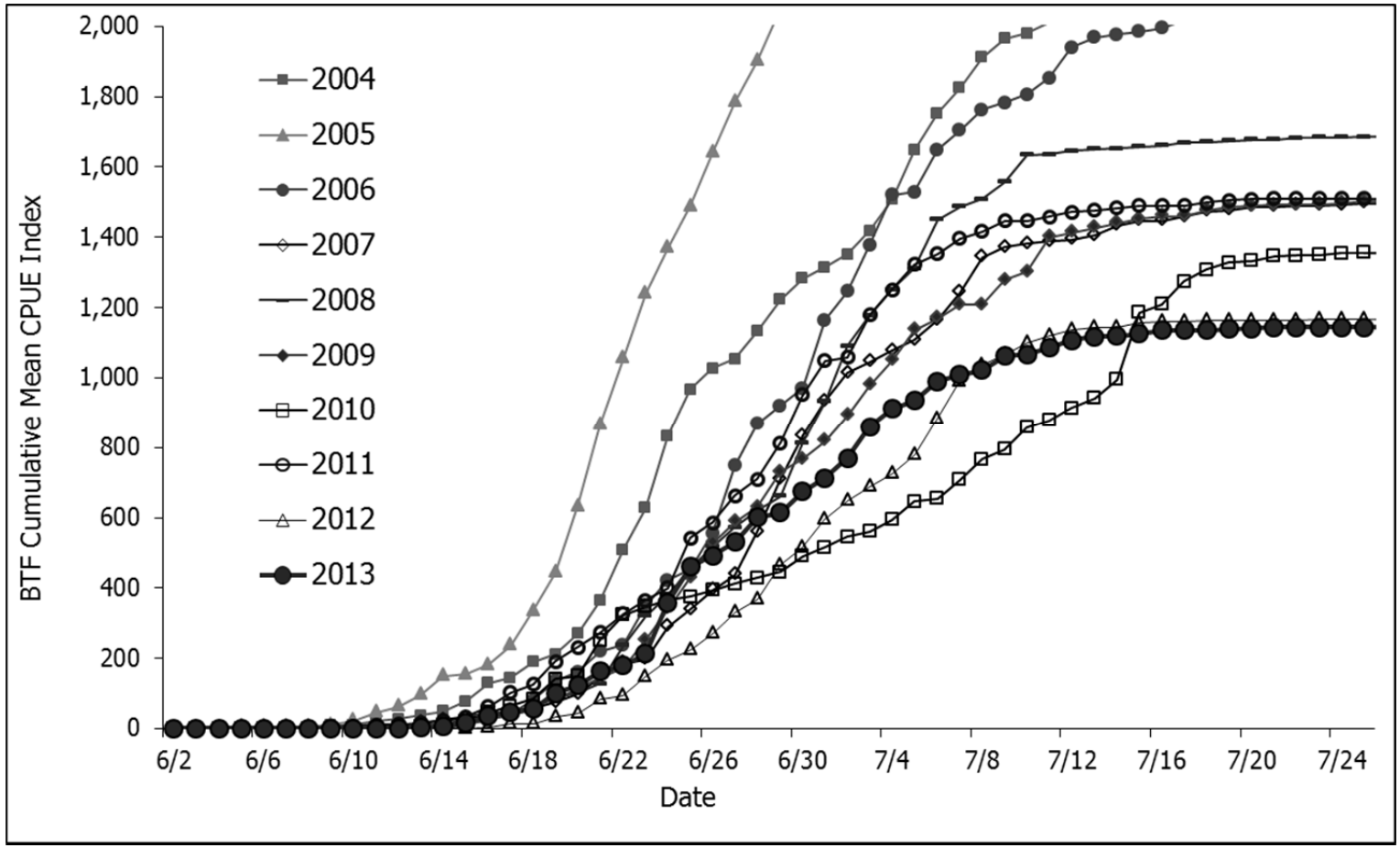

Figure 16.–Sockeye salmon cumulative mean tidal CPUE indices for years 2004–2013, Bethel test fishery.

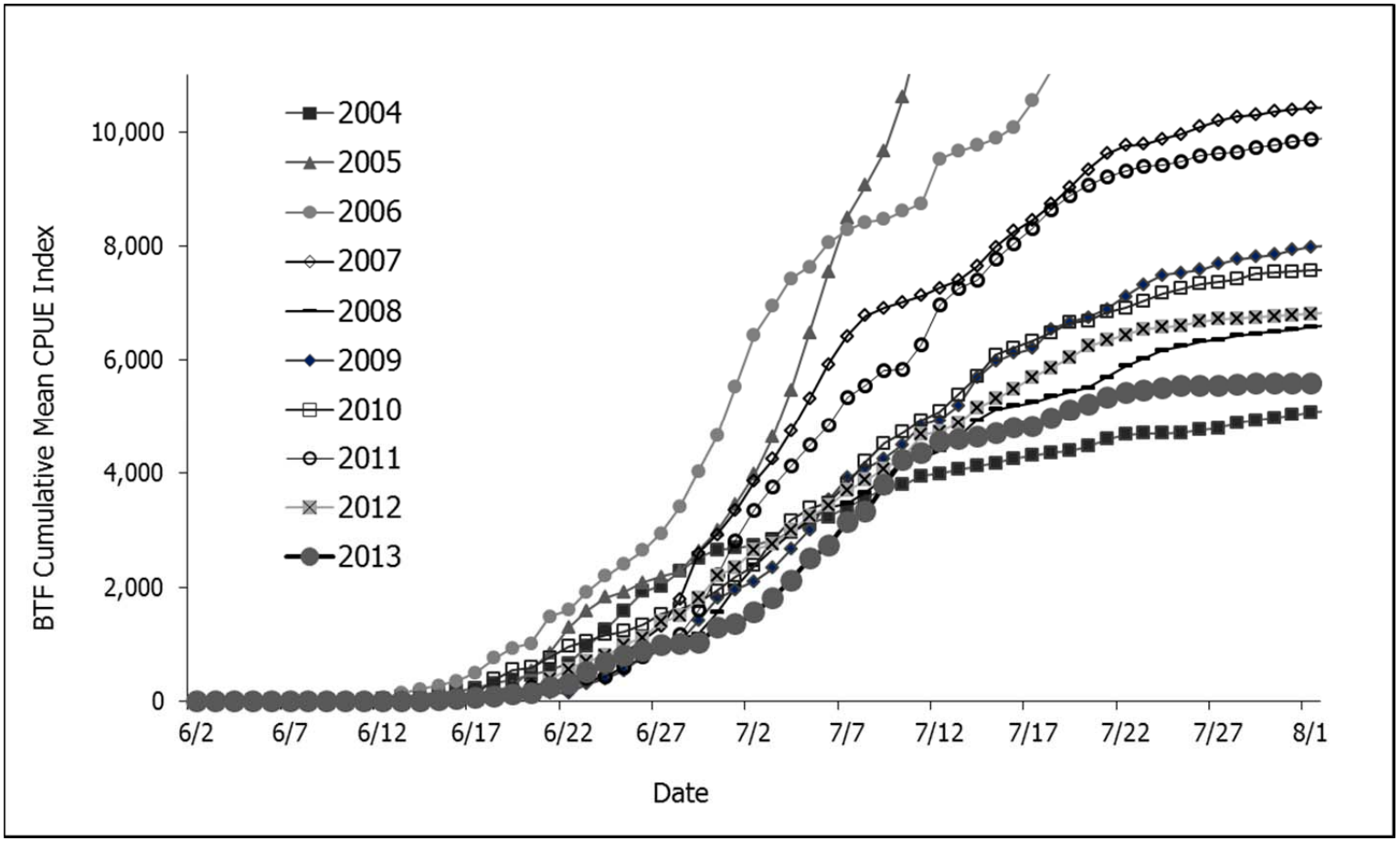

Figure 17.–Chum salmon cumulative mean tidal CPUE indices for years 2004–2013, Bethel test fishery.

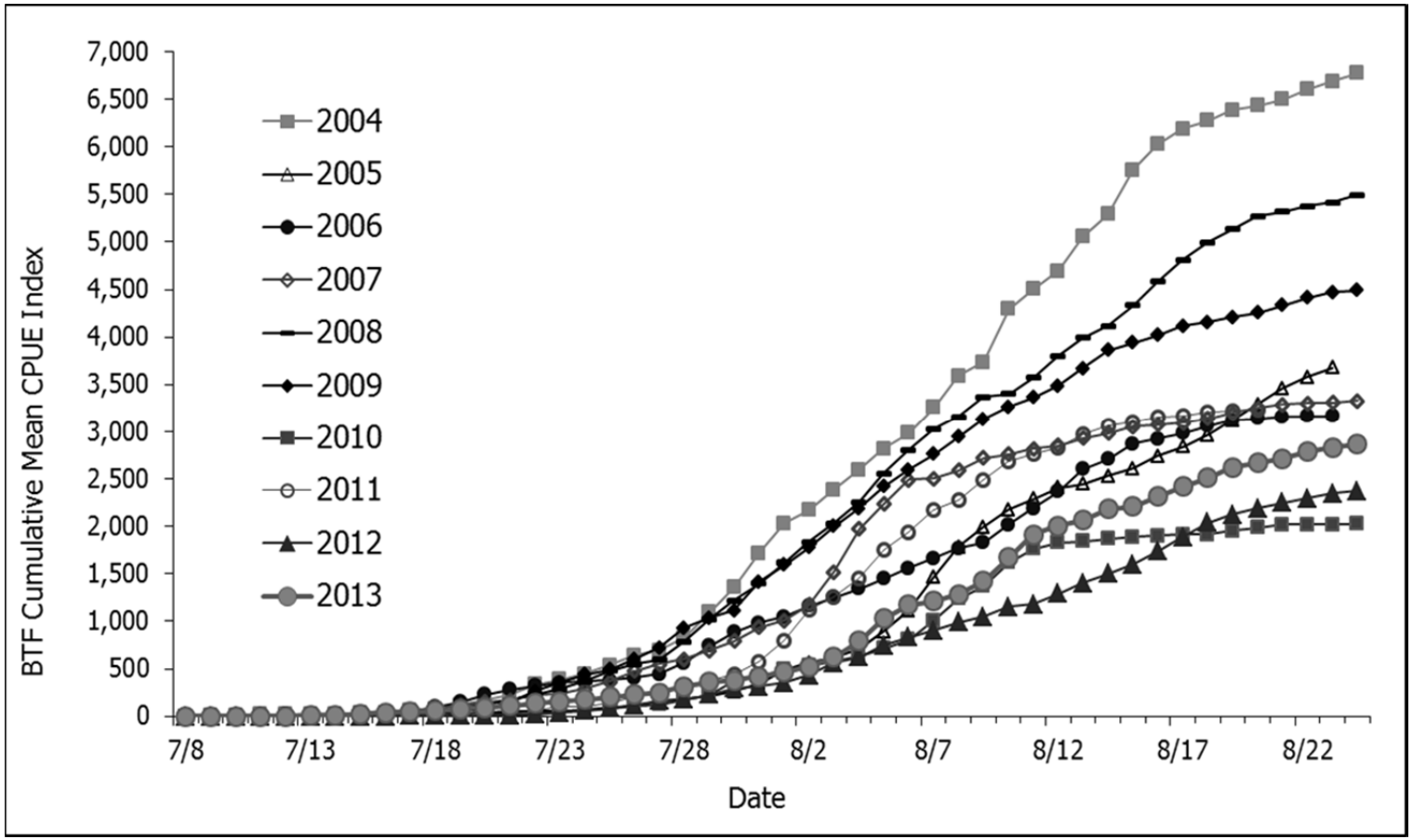

Figure 18.–Coho salmon cumulative mean tidal CPUE indices for years 2004–2013, Bethel test fishery.

APPENDIX A: BETHEL TEST FISHERY DRIFT SCHEDUALE

Appendix A1.–Drift schedule used to determine the sequence of mesh sizes to be fished during each tidal drift series of the Bethel test fishery, 2012 and 2013.

1 June to 15 July				
Drift schedule		Station number		
A	Tide	1	2	3
	1	8.0 (1)		8.0 (2)
			5 3/8 (3)	5 3/8 (4)
		4 5/8 (5)	4 5/8 (6)	
	2	8.0 (1)	8.0 (2)	
		5 3/8 (4)		5 3/8 (3)
			4 5/8 (5)	4 5/8 (6)
	3		8.0 (1)	8.0 (2)
		5 3/8 (3)	5 3/8 (4)	
		4 5/8 (6)		4 5/8 (5)
	4	8.0 (1)	8.0 (2)	
			5 3/8 (4)	5 3/8 (3)
		4 5/8 (5)		4 5/8 (6)
	5		8.0 (1)	8.0 (2)
		5 3/8 (3)		5 3/8 (4)
		4 5/8 (6)	4 5/8 (5)	
	6	8.0 (1)		8.0 (2)
		5 3/8 (4)	5 3/8 (3)	
			4 5/8 (6)	4 5/8 (5)

July 16 to July 25				
Drift schedule		Station number		
B	Tide	1	2	3
	1	5 3/8 (1)	5 3/8 (2)	5 3/8 (3)
		4 5/8 (4)	4 5/8 (5)	4 5/8 (6)
	2	5 3/8 (3)	5 3/8 (1)	5 3/8 (2)
		4 5/8 (6)	4 5/8 (4)	4 5/8 (5)
	3	5 3/8 (2)	5 3/8 (3)	5 3/8 (1)
		4 5/8 (5)	4 5/8 (6)	4 5/8 (4)
	4	5 3/8 (1)	5 3/8 (3)	5 3/8 (2)
		4 5/8 (4)	4 5/8 (6)	4 5/8 (5)
	5	5 3/8 (2)	5 3/8 (1)	5 3/8 (3)
		4 5/8 (5)	4 5/8 (4)	4 5/8 (6)
	6	5 3/8 (3)	5 3/8 (2)	5 3/8 (1)
		4 5/8 (6)	4 5/8 (5)	4 5/8 (4)

July 16 to August 26				
Drift schedule		Station number		
C	Tide	1	2	3
	1	5 3/8 (1)	5 3/8 (2)	5 3/8 (3)
	2	5 3/8 (3)	5 3/8 (1)	5 3/8 (2)
	3	5 3/8 (2)	5 3/8 (3)	5 3/8 (1)
	4	5 3/8 (1)	5 3/8 (3)	5 3/8 (2)
	5	5 3/8 (2)	5 3/8 (1)	5 3/8 (3)
	6	5 3/8 (3)	5 3/8 (2)	5 3/8 (1)

APPENDIX B: HISTORICAL CHINOOK SALMON DATA

Appendix B1.–Historical daily mean tidal catch per unit effort for Chinook salmon catches in the Bethel test fishery, 2008–2013.

Date	2008	2009	2010	2011	2012	2013	Average 2008–2012
6/1	0	0	0	3	0	0	1
6/2	3	0	3	2	0	0	1
6/3	0	1	1	3	0	0	1
6/4	0	3	3	3	1	0	2
6/5	0	6	0	9	0	0	3
6/6	1	7	1	11	0	0	4
6/7	0	7	1	16	0	0	5
6/8	6	4	0	16	0	2	5
6/9	10	5	1	4	1	1	4
6/10	16	7	1	3	2	3	6
6/11	4	12	4	5	1	1	5
6/12	6	10	6	3	0	1	5
6/13	10	8	11	10	0	12	8
6/14	7	10	8	14	1	10	8
6/15	33	33	31	15	4	4	23
6/16	19	57	39	20	13	13	30
6/17	20	18	18	29	9	18	19
6/18	7	20	38	27	1	5	19
6/19	18	24	25	37	16	19	24
6/20	35	23	17	18	24	10	23
6/21	36	30	34	15	29	11	29
6/22	32	35	23	20	16	21	25
6/23	36	50	18	26	29	13	32
6/24	25	56	11	8	21	14	24
6/25	16	37	5	18	24	18	20
6/26	35	59	12	28	36	10	34
6/27	24	33	13	6	12	10	18
6/28	23	20	8	7	11	5	14
6/29	29	31	13	26	19	4	24
6/30	37	8	7	21	16	8	18
7/1	17	12	7	14	7	3	11
7/2	10	8	8	15	5	1	9
7/3	12	8	11	23	23	4	15
7/4	12	7	11	14	13	4	12
7/5	12	9	12	14	13	5	12
7/6	3	3	5	13	14	6	7
7/7	8	6	8	4	13	3	8
7/8	7	9	5	10	12	6	9
7/9	5	0	4	8	9	3	5
7/10	3	0	5	3	3	3	3
7/11	1	0	2	7	3	3	3
7/12	5	11	4	11	0	1	6
7/13	3	3	3	10	0	1	4
7/14	1	0	2	0	0	2	1
7/15	1	0	2	8	0	1	2

Note: Date with no data indicates day when the project was not operational.

Appendix B2.–Historical cumulative mean tidal catch per unit effort for Chinook salmon catches in the Bethel test fishery, 2008–2013.

Date	2008	2009	2010	2011	2012	2013	Average 2008–2012
6/1	0	0	0	3	0	0	1
6/2	3	0	3	5	0	0	2
6/3	3	1	4	8	0	0	3
6/4	3	4	7	11	1	0	5
6/5	3	10	7	20	1	0	8
6/6	4	17	8	31	1	0	12
6/7	4	24	10	47	1	0	17
6/8	10	28	10	63	1	2	23
6/9	20	33	11	67	3	4	27
6/10	36	40	13	70	4	6	33
6/11	40	52	17	75	6	8	38
6/12	46	62	23	78	6	9	43
6/13	56	71	34	88	6	21	51
6/14	63	81	42	102	7	31	59
6/15	96	114	73	116	11	35	82
6/16	115	171	112	136	24	48	112
6/17	135	189	130	165	33	65	130
6/18	142	209	168	192	34	70	149
6/19	160	232	193	229	50	89	173
6/20	195	255	210	247	74	100	196
6/21	230	286	244	262	103	110	225
6/22	262	320	267	283	119	132	250
6/23	298	371	285	308	148	145	282
6/24	323	426	297	317	168	159	306
6/25	339	463	302	335	192	177	326
6/26	374	522	314	363	228	187	360
6/27	399	555	327	369	240	197	378
6/28	422	575	335	376	252	202	392
6/29	451	606	349	402	271	206	416
6/30	488	615	355	423	286	214	434
7/1	505	626	362	438	293	217	445
7/2	515	635	370	453	298	218	454
7/3	527	643	381	476	321	222	470
7/4	539	650	393	490	334	226	481
7/5	551	659	404	505	347	231	493
7/6	554	662	409	517	362	237	501
7/7	562	668	417	521	375	239	509
7/8	569	676	422	531	387	246	517
7/9	575	676	426	539	395	248	522
7/10	578	676	431	542	398	251	525
7/11	579	676	433	548	401	254	528
7/12	585	688	438	559	401	255	534
7/13	587	691	440	569	401	257	538
7/14	589	691	443	569	401	259	538
7/15	590	691	445	576	401	260	541

Note: Date with no data indicates day when the project was not operational.

Appendix B3.–Historical percent passage of Chinook salmon at the Bethel test fish site, 2008–2013.

Date	2008	2009	2010	2011	2012	2013	Average 2008–2012
6/1	0	0	0	1	0	0	0
6/2	0	0	1	1	0	0	0
6/3	0	0	1	1	0	0	1
6/4	0	1	2	2	0	0	1
6/5	0	1	2	3	0	0	1
6/6	1	2	2	5	0	0	2
6/7	1	3	2	8	0	0	3
6/8	2	4	2	11	0	1	4
6/9	3	5	2	12	1	1	5
6/10	6	6	3	12	1	2	5
6/11	6	7	4	13	1	3	6
6/12	7	9	5	14	1	3	7
6/13	9	10	7	15	1	8	9
6/14	10	12	9	18	2	12	10
6/15	15	16	16	20	3	13	14
6/16	18	24	24	24	6	18	19
6/17	22	27	28	29	8	25	23
6/18	23	30	36	33	8	27	26
6/19	26	33	42	40	12	34	30
6/20	31	36	46	43	18	38	35
6/21	37	40	53	45	25	42	40
6/22	42	45	58	49	28	50	45
6/23	48	53	62	53	35	55	50
6/24	52	60	64	55	40	61	54
6/25	54	66	65	58	46	68	58
6/26	60	74	68	63	54	72	64
6/27	64	79	71	64	57	75	67
6/28	68	82	73	65	60	77	69
6/29	72	86	76	70	65	79	74
6/30	78	87	77	73	68	82	77
7/1	81	89	79	76	70	83	79
7/2	83	90	80	78	71	83	81
7/3	85	91	83	82	77	85	83
7/4	87	92	85	85	80	86	86
7/5	88	93	88	87	83	88	88
7/6	89	94	89	89	86	91	89
7/7	90	95	90	90	90	91	91
7/8	91	96	92	92	92	94	93
7/9	92	96	92	93	94	95	94
7/10	93	96	94	94	95	96	94
7/11	93	96	94	95	96	97	95
7/12	94	97	95	97	96	98	96
7/13	94	98	95	98	96	98	96
7/14	94	98	96	98	96	99	97
7/15	95	98	96	100	96	99	97
7/16	95	98	97	100	97	100	97
7/17	96	98	98	100	97	100	98
7/18	97	99	98	100	98	100	98
7/19	98	99	98	100	98	100	98
7/20	98	99	98	100	98	100	98

Note: The boxes represent the central 50% of the run and the shaded cells represent the median passage date of the run.

APPENDIX C: HISTORICAL SOCKEYE SALMON DATA

Appendix C1.–Historical daily mean tidal catch per unit effort for sockeye salmon catches in the Bethel test fishery, 2003–2013.

Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
6/1	0	0	0	0	0	0	0	0	0	0	0	0
6/2	0	0	0	0	0	0	0	0	0	0	0	0
6/3	0	0	3	0	0	0	0	0	0	0	0	0
6/4	0	0	0	0	0	0	0	0	0	0	0	0
6/5	0	0	3	0	0	0	0	0	0	0	0	0
6/6	0	0	0	0	0	0	0	0	3	0	0	0
6/7	0	0	0	0	0	0	0	0	1	0	0	0
6/8	0	0	0	0	0	0	1	0	0	0	0	0
6/9	5	8	5	0	0	0	3	0	0	0	0	2
6/10	18	3	11	0	0	0	0	0	3	0	0	4
6/11	14	11	24	0	0	0	3	0	3	0	0	5
6/12	9	5	17	3	3	0	3	3	3	0	0	4
6/13	8	11	33	0	14	3	3	3	3	0	3	8
6/14	14	11	53	0	5	3	0	0	9	0	3	9
6/15	29	28	5	8	8	29	2	15	9	0	9	13
6/16	79	53	27	13	6	11	15	26	29	3	22	26
6/17	103	15	55	19	14	3	3	19	40	9	8	28
6/18	56	44	100	38	10	14	28	19	24	3	11	34
6/19	111	23	108	56	14	25	24	58	65	17	46	50
6/20	72	58	190	24	24	15	27	7	41	13	22	47
6/21	67	94	232	58	49	26	33	102	42	38	39	74
6/22	61	145	190	20	39	109	25	72	52	11	17	72
6/23	24	119	183	111	11	84	80	24	39	52	34	73
6/24	48	205	131	72	93	60	89	19	35	48	145	80
6/25	53	133	119	32	48	74	89	8	143	31	103	73
6/26	22	61	151	102	55	63	99	19	43	44	31	66
6/27	43	27	145	192	43	54	60	17	77	63	39	72
6/28	158	79	116	121	123	46	42	17	46	36	70	78
6/29	214	89	151	51	150	42	100	18	103	97	13	101
6/30	89	60	151	51	123	153	37	45	139	51	60	90
7/1	100	32	94	194	101	120	52	24	97	80	38	89
7/2	66	38	66	83	79	159	73	30	10	53	58	66
7/3	33	66	75	132	32	86	87	16	122	40	89	69
7/4	33	89	72	142	31	74	70	33	72	37	53	65
7/5	32	140	70	8	30	61	88	51	72	52	22	60
7/6	26	106	72	122	58	138	33	9	29	105	55	70
7/7	14	72	60	54	79	37	39	53	43	104	20	56
7/8	8	87	58	58	99	22	0	58	21	47	14	46
7/9	13	53	43	21	29	49	69	29	30	31	39	37
7/10	12	15	29	23	10	76	24	63	0	34	5	29
7/11	13	31	15	47	8	3	98	20	11	21	18	27
7/12	7	3	10	87	5	10	14	36	13	15	22	20
7/13	16	12	10	27	11	4	14	28	5	6	10	13
7/14	20	7	10	8	29	2	13	53	7	0	1	15

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Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
7/15	10	3	6	8	13	5	11	191	8	14	7	27
7/16	2	0	0	10	0	3	9	24	0	5	9	5
7/17	0	4	8	23	11	8	0	66	0	0	2	12
7/18	0	4	8	8	15	3	16	34	8	2	0	10
7/19	0	8	11	6	3	3	9	19	6	1	2	7
7/20	4	7	11	41	11	3	4	6	3	0	2	9
7/21	4	12	3	5	0	0	3	13	2	0	3	4
7/22	0	3	2	12	3	5	0	2	0	0	0	3
7/23	1	5	4	16	0	2	2	2	0	2	0	3
7/24	5	5	0	2	1	0	2	5	0	0	0	2
7/25	2	0	0	2	5	2	6	2	0	0	0	2
7/26	0	7	4	2	0	2	5	5	0	1	0	3
7/27	0	0	9	4	0	0	3	4	0	2	0	2
7/28	0	0	2	4	0	3	2	2	0	0	2	1
7/29	0	0	9	4	3	2	1	2	0	2	0	2
7/30	2	0	8	2	0	0	0	2	0	0	0	1
7/31	2	0	4	2	3	0	0	0	0	0	0	1
8/1	0	0	2	2	5	0	0	0	0	0	0	1
8/2	0	0	5	6	2	0	0	0	0	0	0	1
8/3	0	5	4	0	2	2	2	0	0	0	0	1
8/4	0	3	3	0	2	2	5	0	4	0	0	2
8/5	0	4	7	2	2	2	0	0	0	1	0	2
8/6	0	0	2	1	2	7	0	0	0	0	0	1
8/7	0	0	5	0	0	0	0	0	0	0	0	0
8/8	0	0	4	0	0	0	0	0	1	0	0	0
8/9	0	0	0	0	0	0	0	2	2	0	0	0
8/10	0	0	2	0	0	0	0	0	0	0	0	0
8/11	0	0	0	0	1	0	0	0	0	0	0	0
8/12	0	0	0	0	2	0	0	0	0	0	0	0
8/13	0	0	0	0	0	0	0	0	0	0	0	0
8/14	0	0	2	0	0	0	0	0	0	0	0	0
8/15	0	0	0	0	0	0	0	0	0	0	0	0
8/16	0	0	0	0	2	0	0	0	0	0	0	0
8/17	0	0	0	0	0	0	0	0	0	0	0	0
8/18	0	0	4	0	0	2	0	0	0	0	0	1
8/19	0	1	0	0	0	0	0	0	0	0	0	0
8/20	0	3	0	0	0	2	0	0	0	0	0	0
8/21	0	0	3	0	0	0	0	0		0	0	
8/22	0	0	0	0	0	0	0	0		0	0	
8/23	0	0	0	0	0	0	0	0		0	0	
8/24	0	0			0	0	0	0		0	0	

Note: Date with no data indicates day when the project was not operational.

Appendix C2.–Historical cumulative mean tidal catch per unit effort for sockeye salmon catches in the Bethel test fishery, 2003–2013.

Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
6/1	0	0	0	0	0	0	0	0	0	0	0	0
6/2	0	0	0	0	0	0	0	0	0	0	0	0
6/3	0	0	3	0	0	0	0	0	0	0	0	0
6/4	0	0	3	0	0	0	0	0	0	0	0	0
6/5	0	0	6	0	0	0	0	0	0	0	0	1
6/6	0	0	6	0	0	0	0	0	3	0	0	1
6/7	0	0	6	0	0	0	0	0	4	0	0	1
6/8	0	0	6	0	0	0	1	0	4	0	0	1
6/9	5	8	11	0	0	0	4	0	4	0	0	3
6/10	24	11	22	0	0	0	4	0	7	0	0	7
6/11	38	22	46	0	0	0	7	0	10	0	0	12
6/12	46	27	63	3	3	0	10	3	13	0	0	17
6/13	54	38	96	3	17	3	13	6	15	0	3	25
6/14	67	49	149	3	23	6	13	6	24	0	6	34
6/15	97	77	154	11	31	34	16	21	33	0	15	47
6/16	176	130	181	24	36	45	31	46	62	3	37	73
6/17	279	145	236	42	50	48	34	65	102	12	45	101
6/18	335	189	336	81	60	62	61	84	126	14	56	135
6/19	446	212	444	136	74	87	86	142	191	32	102	185
6/20	518	270	634	160	98	102	113	149	231	45	123	232
6/21	585	364	866	219	147	128	146	251	274	83	162	306
6/22	646	509	1,056	239	186	237	171	323	326	95	179	379
6/23	670	628	1,239	350	197	320	251	347	365	146	213	451
6/24	718	833	1,370	422	290	381	340	366	400	194	358	531
6/25	771	966	1,489	454	338	455	429	375	543	225	461	604
6/26	793	1,027	1,640	556	393	518	528	394	586	269	492	671
6/27	836	1,055	1,785	748	436	572	588	411	664	333	531	743
6/28	994	1,133	1,901	869	560	619	629	428	709	369	601	821
6/29	1,207	1,222	2,052	920	710	660	729	446	813	466	614	923
6/30	1,296	1,283	2,204	971	833	813	766	491	952	516	674	1,012
7/1	1,395	1,315	2,298	1,164	934	933	818	515	1,048	597	712	1,102
7/2	1,462	1,352	2,365	1,247	1,014	1,092	892	545	1,058	650	770	1,168
7/3	1,495	1,418	2,440	1,379	1,046	1,178	979	561	1,180	690	860	1,237
7/4	1,528	1,507	2,512	1,520	1,077	1,251	1,048	594	1,252	727	913	1,302
7/5	1,560	1,647	2,583	1,528	1,107	1,312	1,136	645	1,324	778	935	1,362

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Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2013–2012
7/6	1,586	1,753	2,655	1,650	1,165	1,450	1,169	655	1,353	884	990	1,432
7/7	1,600	1,825	2,715	1,704	1,243	1,487	1,209	708	1,396	988	1,009	1,488
7/8	1,608	1,912	2,773	1,763	1,343	1,509	1,209	766	1,417	1,035	1,023	1,533
7/9	1,621	1,965	2,816	1,784	1,371	1,557	1,277	795	1,448	1,066	1,062	1,570
7/10	1,633	1,980	2,845	1,807	1,381	1,634	1,302	858	1,448	1,100	1,067	1,599
7/11	1,646	2,010	2,860	1,854	1,389	1,636	1,400	879	1,459	1,121	1,085	1,625
7/12	1,652	2,013	2,870	1,941	1,394	1,647	1,414	914	1,472	1,136	1,107	1,645
7/13	1,668	2,025	2,880	1,968	1,405	1,650	1,428	942	1,476	1,142	1,117	1,658
7/14	1,688	2,032	2,890	1,976	1,434	1,653	1,441	995	1,483	1,142	1,119	1,673
7/15	1,699	2,035	2,896	1,985	1,447	1,658	1,452	1,186	1,491	1,156	1,126	1,700
7/16	1,700	2,035	2,896	1,995	1,447	1,661	1,461	1,209	1,491	1,161	1,135	1,706
7/17	1,700	2,039	2,904	2,018	1,459	1,669	1,461	1,275	1,491	1,161	1,137	1,718
7/18	1,700	2,043	2,912	2,026	1,473	1,672	1,476	1,309	1,499	1,163	1,137	1,727
7/19	1,700	2,052	2,923	2,031	1,477	1,674	1,485	1,328	1,505	1,164	1,139	1,734
7/20	1,704	2,059	2,934	2,073	1,488	1,677	1,489	1,333	1,508	1,164	1,141	1,743
7/21	1,708	2,071	2,937	2,077	1,488	1,677	1,493	1,346	1,510	1,164	1,144	1,747
7/22	1,708	2,074	2,939	2,089	1,490	1,682	1,493	1,348	1,510	1,164	1,144	1,750
7/23	1,709	2,079	2,943	2,105	1,490	1,684	1,495	1,350	1,510	1,166	1,144	1,753
7/24	1,713	2,084	2,943	2,107	1,492	1,684	1,497	1,355	1,510	1,166	1,144	1,755
7/25	1,715	2,084	2,943	2,109	1,497	1,685	1,502	1,357	1,510	1,166	1,144	1,757
7/26	1,715	2,092	2,948	2,111	1,497	1,687	1,507	1,362	1,510	1,167	1,144	1,760
7/27	1,715	2,092	2,956	2,115	1,497	1,687	1,511	1,366	1,510	1,168	1,144	1,762
7/28	1,715	2,092	2,958	2,118	1,497	1,691	1,513	1,368	1,510	1,168	1,146	1,763
7/29	1,715	2,092	2,967	2,122	1,499	1,692	1,514	1,370	1,510	1,170	1,146	1,765
7/30	1,716	2,092	2,974	2,124	1,499	1,692	1,514	1,371	1,510	1,170	1,146	1,766
7/31	1,718	2,092	2,979	2,125	1,502	1,692	1,514	1,371	1,510	1,170	1,146	1,767
8/1	1,718	2,092	2,980	2,127	1,507	1,692	1,514	1,371	1,510	1,170	1,146	1,768
8/2	1,718	2,092	2,986	2,133	1,508	1,692	1,514	1,371	1,510	1,170	1,146	1,769
8/3	1,718	2,097	2,990	2,133	1,510	1,694	1,516	1,371	1,510	1,170	1,146	1,771
8/4	1,718	2,100	2,992	2,133	1,512	1,696	1,521	1,371	1,514	1,170	1,146	1,773
8/5	1,718	2,104	2,999	2,135	1,514	1,697	1,521	1,371	1,514	1,171	1,146	1,774
8/6	1,718	2,104	3,001	2,136	1,515	1,704	1,521	1,371	1,514	1,171	1,146	1,776
8/7	1,718	2,104	3,006	2,136	1,515	1,704	1,521	1,371	1,514	1,171	1,146	1,776
8/8	1,718	2,104	3,009	2,136	1,515	1,704	1,521	1,371	1,515	1,171	1,146	1,776

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Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2013–2012
8/9	1,718	2,104	3,009	2,136	1,515	1,704	1,521	1,374	1,517	1,171	1,146	1,777
8/10	1,718	2,104	3,011	2,136	1,515	1,704	1,521	1,374	1,517	1,171	1,146	1,777
8/11	1,718	2,104	3,011	2,136	1,516	1,704	1,521	1,374	1,517	1,171	1,146	1,777
8/12	1,718	2,104	3,011	2,136	1,518	1,704	1,521	1,374	1,517	1,171	1,146	1,777
8/13	1,718	2,104	3,011	2,136	1,518	1,704	1,521	1,374	1,517	1,171	1,146	1,777
8/14	1,718	2,104	3,013	2,136	1,518	1,704	1,521	1,374	1,517	1,171	1,146	1,778
8/15	1,718	2,104	3,013	2,136	1,518	1,704	1,521	1,374	1,517	1,171	1,146	1,778
8/16	1,718	2,104	3,013	2,136	1,520	1,704	1,521	1,374	1,517	1,171	1,146	1,778
8/17	1,718	2,104	3,013	2,136	1,520	1,704	1,521	1,374	1,517	1,171	1,146	1,778
8/18	1,718	2,104	3,017	2,136	1,520	1,706	1,521	1,374	1,517	1,171	1,146	1,778
8/19	1,718	2,105	3,017	2,136	1,520	1,706	1,521	1,374	1,517	1,171	1,146	1,778
8/20	1,718	2,108	3,017	2,136	1,520	1,708	1,521	1,374	1,517	1,171	1,146	1,779
8/21	1,718	2,108	3,019	2,136	1,520	1,708	1,521	1,374		1,171	1,146	
8/22	1,718	2,108	3,019	2,136	1,520	1,708	1,521	1,374		1,171	1,146	
8/23	1,718	2,108	3,019	2,136	1,520	1,708	1,521	1,374		1,171	1,146	
8/24	1,718	2,108			1,520	1,708	1,521	1,374		1,171	1,146	
Total	1,718	2,108	3,019	2,136	1,520	1,708	1,521	1,374	1,517	1,717	1,146	1,771

Note: Date with no data indicates day when the project was not operational.

Appendix C3.–Historical percent passage of sockeye salmon at the Bethel test fishery site, 2003–2013.

Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
6/1	0	0	0	0	0	0	0	0	0		0	0
6/2	0	0	0	0	0	0	0	0	0	0	0	0
6/3	0	0	0	0	0	0	0	0	0	0	0	0
6/4	0	0	0	0	0	0	0	0	0	0	0	0
6/5	0	0	0	0	0	0	0	0	0	0	0	0
6/6	0	0	0	0	0	0	0	0	0	0	0	0
6/7	0	0	0	0	0	0	0	0	0	0	0	0
6/8	0	0	0	0	0	0	0	0	0	0	0	0
6/9	0	0	0	0	0	0	0	0	0	0	0	0
6/10	1	1	1	0	0	0	0	0	0	0	0	0
6/11	2	1	2	0	0	0	0	0	1	0	0	1
6/12	3	1	2	0	0	0	1	0	1	0	0	1
6/13	3	2	3	0	1	0	1	0	1	0	0	1
6/14	4	2	5	0	1	0	1	0	2	0	0	2
6/15	6	4	5	1	2	2	1	2	2	0	1	2
6/16	10	6	6	1	2	3	2	3	4	0	3	4
6/17	16	7	8	2	3	3	2	5	7	1	4	5
6/18	20	9	11	4	4	4	4	6	8	1	5	7
6/19	26	10	15	6	5	5	6	10	13	3	9	10
6/20	30	13	21	8	6	6	7	11	15	4	11	12
6/21	34	17	29	10	10	7	10	18	18	7	14	16
6/22	38	24	35	11	12	14	11	23	21	8	16	19
6/23	39	30	41	16	13	19	16	25	24	12	19	23
6/24	42	40	45	20	19	22	22	27	26	17	31	28
6/25	45	46	49	21	22	27	28	27	36	19	40	33
6/26	46	49	54	26	26	30	35	29	39	23	43	36
6/27	49	50	59	35	29	34	39	30	44	28	46	40
6/28	58	54	63	41	37	36	41	31	47	32	52	45
6/29	70	58	68	43	47	39	48	32	54	40	54	50
6/30	75	61	73	45	55	48	50	36	63	44	59	55
7/1	81	62	76	55	61	55	54	38	69	51	62	60
7/2	85	64	78	58	67	64	59	40	70	55	67	64
7/3	87	67	81	65	69	69	64	41	78	59	75	69
7/4	89	72	83	71	71	73	69	43	83	62	80	72
7/5	91	78	86	72	73	77	75	47	87	66	82	76
7/6	92	83	88	77	77	85	77	48	89	75	86	80
7/7	93	87	90	80	82	87	79	52	92	84	88	83
7/8	94	91	92	83	88	88	79	56	93	88	89	86

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Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
7/9	94	93	93	84	90	91	84	58	95	91	93	88
7/10	95	94	94	85	91	96	86	62	95	94	93	90
7/11	96	96	95	87	91	96	92	64	96	96	95	91
7/12	96	96	95	91	92	96	93	67	97	97	97	92
7/13	97	96	95	92	92	97	94	69	97	97	98	93
7/14	98	97	96	93	94	97	95	72	98	97	98	94
7/15	99	97	96	93	95	97	95	86	98	99	98	96
7/16	99	97	96	93	95	97	96	88	98	99	99	96
7/17	99	97	96	94	96	98	96	93	98	99	99	97
7/18	99	97	96	95	97	98	97	95	99	99	99	97
7/19	99	98	97	95	97	98	98	97	99	99	99	98
7/20	99	98	97	97	98	98	98	97	99	99	100	98

Note: The boxes represent the central 50% of the run and the shaded cells represent the median passage date of the run.

APPENDIX D: HISTORICAL CHUM SALMON DATA

Appendix D1.–Historical daily mean tidal catch per unit effort for chum salmon catches in the Bethel test fishery, 2003–2013.

Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
6/1	0	0	0	0	0	0	0	0	0	0	0	0
6/2	0	3	0	0	0	0	0	0	0	0	0	0
6/3	0	0	0	0	0	0	0	0	0	0	0	0
6/4	0	5	0	0	0	0	0	4	3	0	0	1
6/5	0	3	0	3	0	0	3	3	0	0	0	1
6/6	0	0	0	6	0	0	1	0	0	3	0	1
6/7	0	0	0	0	3	0	0	0	0	0	0	0
6/8	0	3	0	3	0	6	1	0	3	0	0	2
6/9	0	8	0	0	0	3	3	0	6	0	0	2
6/10	6	0	0	3	6	0	0	3	6	5	0	3
6/11	3	3	13	20	3	3	0	0	5	0	0	5
6/12	3	9	12	6	0	6	3	6	0	0	0	4
6/13	5	37	14	92	12	0	3	11	8	8	4	19
6/14	14	39	11	77	11	3	6	6	9	8	0	18
6/15	19	34	38	56	23	21	21	19	21	0	10	25
6/16	28	35	8	84	17	25	28	35	3	3	23	27
6/17	25	50	35	149	19	14	5	47	22	15	11	38
6/18	5	81	57	248	17	14	16	253	50	15	21	76
6/19	40	61	64	179	28	11	8	156	64	42	46	65
6/20	50	79	285	85	119	55	6	46	42	72	24	84
6/21	29	98	307	470	86	29	30	176	35	216	95	147
6/22	8	112	444	113	64	74	14	190	95	166	79	128
6/23	36	300	299	321	99	73	152	95	43	152	197	157
6/24	20	301	229	272	126	100	96	114	19	93	158	137
6/25	21	322	101	223	208	161	135	61	164	191	136	159
6/26	37	343	159	235	234	156	251	115	172	121	77	182
6/27	26	88	106	294	234	168	121	184	194	276	98	169
6/28	121	257	91	462	475	179	125	89	202	109	28	211
6/29	295	242	358	629	806	77	379	126	441	306	13	366
6/30	268	139	358	629	328	373	393	193	616	387	277	369
7/1	328	36	466	870	424	461	159	265	590	162	52	376
7/2	324	47	527	907	520	367	145	182	541	303	204	386
7/3	320	83	667	500	391	302	236	461	397	103	258	346
7/4	382	146	814	487	484	273	324	334	377	242	304	386
7/5	444	156	1,013	205	577	244	336	207	377	241	380	380
7/6	270	106	1,065	425	613	194	530	99	349	184	230	383
7/7	225	168	955	225	487	81	386	324	486	272	419	361
7/8	95	166	559	131	361	188	167	402	202	184	179	246
7/9	57	173	601	59	139	249	173	320	269	199	476	224
7/10	54	67	948	141	97	310	246	192	31	197	433	228
7/11	61	144	1,295	135	116	42	353	224	421	400	130	319
7/12	45	49	759	776	134	136	82	149	714	61	191	290
7/13	43	68	477	137	128	241	256	296	268	153	44	207
7/14	66	60	477	103	247	304	495	327	150	259	46	249

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Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
7/15	66	53	218	128	340	194	289	374	374	170	54	221
7/16	35	80	46	191	281	63	147	124	261	170	104	140
7/17	19	55	363	463	195	61	76	124	265	215	27	184
7/18	80	55	401	557	276	97	339	148	342	155	154	245
7/19	80	30	406	521	286	85	128	170	247	177	128	213
7/20	68	76	514	562	322	73	76	35	184	206	107	212
7/21	87	128	341	368	277	182	153	150	131	107	117	192
7/22	31	83	276	298	142	200	225	73	103	89	95	152
7/23	71	19	267	231	27	130	199	125	91	107	44	127
7/24	107	3	154	40	94	148	171	138	24	33	29	91
7/25	101	11	177	167	79	71	37	82	66	30	36	82
7/26	75	44	194	136	135	78	54	76	87	71	5	95
7/27	38	38	42	61	99	29	99	35	55	37	11	53
7/28	33	88	20	66	70	77	81	54	24	13	13	53
7/29	29	50	62	69	37	28	49	88	65	17	14	49
7/30	27	45	118	59	63	43	39	36	43	24	0	50
7/31	31	49	157	46	31	28	76	10	76	23	0	52
8/1	5	55	155	25	26	55	55	13	29	15	4	43
8/2	5	19	76	14	23	16	36	13	33	19	9	26
8/3	0	30	91	26	83	13	33	9	11	22	15	32
8/4	4	8	137	27	38	10	38	9	14	8	15	29
8/5	0	7	89	18	22	18	28	11	17	9	20	22
8/6	0	3	33	19	27	18	32	9	15	3	10	16
8/7	0	11	49	20	4	17	20	7	28	3	2	16
8/8	2	16	40	11	7	8	9	4	13	2	5	11
8/9	2	5	24	2	7	7	7	6	18	0	0	8
8/10	2	10	2	17	7	2	14	8	3	2	7	7
8/11	4	5	12	8	3	5	7	2	0	0	2	5
8/12	4	4	19	0	4	7	9	2	1	0	7	5
8/13	4	10	4	2	7	5	15	0	5	2	2	5
8/14	4	8	21	7	1	4	3	4	4	6	2	6
8/15	4	7	19	2	4	2	0	2	0	4	2	4
8/16	4	6	10	2	0	5	7	0	2	2	2	4
8/17	3	8	3	1	0	9	4	0	0	0	2	3
8/18	3	0	9	0	2	9	2	0	2	0	5	3
8/19	3	0	5	0	0	0	2	0	0	0	5	1
8/20	3	0	11	2	0	0	0	0	0	2	3	2
8/21	3	3	15	1	0	0	2	0		0	2	3
8/22	3	3	0	0	0	7	4	0		0	0	2
8/23	3	1	0	0	0	2	2	0		2	4	1
8/24	3	1			0	0	2	0		1	2	1

Note: Date with no data indicates day when the project was not operational.

Appendix D2.–Historical cumulative mean tidal catch per unit effort for chum salmon catches in the Bethel test fishery, 2003–2013.

Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
6/1	0	0	0	0	0	0	0	0	0	0	0	0
6/2	0	3	0	0	0	0	0	0	0	0	0	0
6/3	0	3	0	0	0	0	0	0	0	0	0	0
6/4	0	8	0	0	0	0	0	4	3	0	0	1
6/5	0	11	0	3	0	0	3	6	3	0	0	3
6/6	0	11	0	9	0	0	4	6	3	3	0	4
6/7	0	11	0	9	3	0	4	6	3	3	0	4
6/8	0	14	0	12	3	6	6	6	6	3	0	6
6/9	0	22	0	12	3	9	9	6	11	3	0	10
6/10	6	22	0	15	8	9	9	9	17	8	0	13
6/11	8	25	13	35	11	12	9	9	22	8	0	23
6/12	11	34	25	41	11	18	12	15	22	8	0	32
6/13	17	71	38	133	23	18	14	26	31	16	4	53
6/14	30	110	49	210	34	20	20	31	39	24	4	72
6/15	49	144	87	266	57	41	42	50	60	24	14	103
6/16	77	179	95	350	74	66	69	86	63	27	37	131
6/17	103	229	131	499	94	80	75	133	85	42	48	170
6/18	108	310	188	747	110	94	91	386	135	57	69	264
6/19	148	371	252	927	138	106	99	542	199	98	115	331
6/20	198	450	537	1,012	258	161	105	588	241	170	139	418
6/21	226	547	844	1,482	343	190	135	764	276	386	235	544
6/22	235	659	1,288	1,595	407	264	149	954	371	552	313	653
6/23	270	959	1,587	1,916	506	337	301	1,049	414	704	511	807
6/24	291	1,260	1,817	2,188	632	437	397	1,163	433	798	669	955
6/25	312	1,583	1,918	2,412	840	598	532	1,224	597	989	805	1,109
6/26	349	1,926	2,077	2,646	1,075	753	783	1,340	769	1,110	881	1,297
6/27	375	2,014	2,183	2,941	1,308	921	904	1,524	963	1,386	979	1,441
6/28	496	2,271	2,273	3,402	1,783	1,099	1,028	1,613	1,165	1,495	1,007	1,650
6/29	791	2,514	2,631	4,031	2,589	1,176	1,407	1,738	1,607	1,801	1,020	1,958
6/30	1,059	2,653	2,989	4,660	2,917	1,550	1,800	1,931	2,223	2,189	1,297	2,235
7/1	1,387	2,690	3,455	5,530	3,341	2,010	1,959	2,196	2,812	2,350	1,349	2,554
7/2	1,711	2,736	3,982	6,437	3,861	2,377	2,104	2,378	3,353	2,653	1,553	2,899
7/3	2,031	2,819	4,650	6,937	4,252	2,680	2,339	2,838	3,750	2,756	1,812	3,221
7/4	2,413	2,965	5,464	7,424	4,736	2,953	2,663	3,172	4,127	2,998	2,116	3,608
7/5	2,857	3,120	6,477	7,629	5,314	3,197	3,000	3,380	4,504	3,239	2,496	3,968
7/6	3,127	3,226	7,542	8,053	5,927	3,391	3,530	3,478	4,854	3,423	2,726	4,334
7/7	3,352	3,395	8,496	8,278	6,414	3,471	3,917	3,802	5,340	3,695	3,145	4,656
7/8	3,447	3,561	9,055	8,409	6,775	3,660	4,083	4,205	5,542	3,879	3,324	4,896
7/9	3,503	3,733	9,656	8,468	6,914	3,909	4,256	4,524	5,811	4,078	3,800	5,108
7/10	3,558	3,800	10,604	8,609	7,011	4,219	4,502	4,716	5,843	4,275	4,233	5,343
7/11	3,618	3,945	11,899	8,743	7,127	4,260	4,855	4,940	6,264	4,675	4,363	5,620
7/12	3,663	3,993	12,658	9,519	7,261	4,396	4,937	5,089	6,978	4,736	4,554	5,873
7/13	3,706	4,061	13,135	9,656	7,389	4,637	5,193	5,385	7,245	4,889	4,599	6,083
7/14	3,772	4,122	13,612	9,759	7,636	4,941	5,688	5,712	7,395	5,148	4,644	6,340

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Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
7/15	3,838	4,175	13,830	9,887	7,976	5,135	5,977	6,087	7,769	5,317	4,698	6,535
7/16	3,873	4,254	13,876	10,078	8,257	5,198	6,124	6,210	8,031	5,487	4,803	6,672
7/17	3,893	4,309	14,239	10,541	8,452	5,259	6,200	6,334	8,296	5,702	4,829	6,844
7/18	3,973	4,364	14,640	11,098	8,728	5,355	6,538	6,482	8,637	5,858	4,983	7,050
7/19	4,052	4,395	15,047	11,619	9,014	5,441	6,667	6,652	8,884	6,035	5,111	7,228
7/20	4,120	4,471	15,560	12,181	9,337	5,514	6,742	6,686	9,069	6,240	5,218	7,407
7/21	4,207	4,599	15,901	12,549	9,613	5,696	6,895	6,836	9,200	6,347	5,336	7,581
7/22	4,238	4,681	16,177	12,847	9,755	5,896	7,120	6,909	9,303	6,436	5,431	7,718
7/23	4,309	4,700	16,445	13,078	9,782	6,026	7,319	7,034	9,394	6,543	5,475	7,831
7/24	4,416	4,703	16,598	13,118	9,876	6,174	7,490	7,172	9,418	6,576	5,504	7,922
7/25	4,516	4,714	16,775	13,284	9,955	6,245	7,527	7,253	9,484	6,606	5,541	8,002
7/26	4,592	4,758	16,969	13,421	10,090	6,322	7,581	7,329	9,572	6,677	5,546	8,088
7/27	4,630	4,797	17,011	13,481	10,189	6,352	7,679	7,364	9,627	6,715	5,556	8,136
7/28	4,663	4,884	17,031	13,547	10,259	6,429	7,760	7,419	9,651	6,728	5,570	8,191
7/29	4,692	4,935	17,094	13,616	10,296	6,456	7,809	7,507	9,715	6,745	5,584	8,237
7/30	4,719	4,980	17,211	13,675	10,359	6,499	7,848	7,542	9,759	6,769	5,584	8,283
7/31	4,750	5,029	17,368	13,721	10,390	6,527	7,924	7,552	9,835	6,791	5,584	8,331
8/1	4,755	5,084	17,523	13,746	10,416	6,582	7,979	7,565	9,864	6,806	5,587	8,371
8/2	4,760	5,103	17,599	13,760	10,439	6,598	8,015	7,579	9,896	6,825	5,596	8,392
8/3	4,760	5,133	17,690	13,786	10,522	6,611	8,048	7,588	9,908	6,847	5,611	8,423
8/4	4,764	5,140	17,827	13,814	10,561	6,621	8,086	7,597	9,922	6,855	5,626	8,451
8/5	4,764	5,147	17,916	13,832	10,583	6,639	8,113	7,607	9,939	6,864	5,647	8,471
8/6	4,764	5,149	17,948	13,851	10,609	6,658	8,146	7,617	9,954	6,867	5,657	8,486
8/7	4,764	5,161	17,998	13,871	10,613	6,675	8,166	7,623	9,982	6,870	5,658	8,500
8/8	4,765	5,177	18,038	13,883	10,620	6,683	8,174	7,627	9,994	6,872	5,663	8,511
8/9	4,767	5,182	18,062	13,884	10,627	6,690	8,182	7,633	10,012	6,872	5,663	8,518
8/10	4,769	5,192	18,064	13,902	10,634	6,692	8,196	7,641	10,014	6,874	5,671	8,526
8/11	4,772	5,197	18,077	13,910	10,637	6,696	8,203	7,643	10,014	6,874	5,672	8,531
8/12	4,776	5,200	18,096	13,910	10,641	6,704	8,212	7,645	10,015	6,874	5,679	8,536
8/13	4,779	5,211	18,099	13,912	10,648	6,709	8,227	7,645	10,020	6,876	5,681	8,541
8/14	4,783	5,219	18,121	13,919	10,649	6,713	8,230	7,649	10,025	6,882	5,682	8,546
8/15	4,786	5,226	18,139	13,921	10,653	6,714	8,230	7,651	10,025	6,886	5,684	8,550
8/16	4,790	5,232	18,149	13,923	10,653	6,720	8,238	7,651	10,027	6,888	5,686	8,554
8/17	4,793	5,240	18,153	13,924	10,653	6,729	8,241	7,651	10,027	6,888	5,687	8,557
8/18	4,796	5,240	18,162	13,924	10,654	6,737	8,243	7,651	10,028	6,888	5,693	8,559
8/19	4,800	5,240	18,166	13,924	10,654	6,737	8,245	7,651	10,028	6,888	5,698	8,560
8/20	4,803	5,240	18,177	13,925	10,654	6,737	8,245	7,651	10,028	6,890	5,701	8,562
8/21	4,806	5,242	18,192	13,926	10,654	6,737	8,247	7,651		6,890	5,703	8,565
8/22	4,809	5,245	18,192	13,926	10,654	6,744	8,250	7,651		6,890	5,703	8,566
8/23	4,812	5,247	18,192	13,926	10,654	6,746	8,252	7,651		6,892	5,706	8,567
8/24	4,815	5,248			10,654	6,746	8,254	7,651		6,893	5,708	7,166
Total	4,815	5,257	18,192	13,926	10,654	6,746	8,254	7,651	10,028	6,893	5,708	7,166

Note: Date with no data indicates day when the project was not operational.

Appendix D3.–Historical percent passage of chum salmon at the Bethel test fish site, 2003–2013.

Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
6/1	0	0	0	0	0	0	0	0	0		0	0
6/2	0	0	0	0	0	0	0	0	0	0	0	0
6/3	0	0	0	0	0	0	0	0	0	0	0	0
6/4	0	0	0	0	0	0	0	0	0	0	0	0
6/5	0	0	0	0	0	0	0	0	0	0	0	0
6/6	0	0	0	0	0	0	0	0	0	0	0	0
6/7	0	0	0	0	0	0	0	0	0	0	0	0
6/8	0	0	0	0	0	0	0	0	0	0	0	0
6/9	0	0	0	0	0	0	0	0	0	0	0	0
6/10	0	0	0	0	0	0	0	0	0	0	0	0
6/11	0	0	0	0	0	0	0	0	0	0	0	0
6/12	0	1	0	0	0	0	0	0	0	0	0	0
6/13	0	1	0	1	0	0	0	0	0	0	0	0
6/14	1	2	0	2	0	0	0	0	0	0	0	1
6/15	1	3	0	2	1	1	1	1	1	0	0	1
6/16	2	3	1	3	1	1	1	1	1	0	1	1
6/17	2	4	1	4	1	1	1	2	1	1	1	2
6/18	2	6	1	5	1	1	1	5	1	1	1	3
6/19	3	7	1	7	1	2	1	7	2	1	2	3
6/20	4	9	3	7	2	2	1	8	2	2	2	4
6/21	5	10	5	11	3	3	2	10	3	6	4	6
6/22	5	13	7	11	4	4	2	12	4	8	5	7
6/23	6	18	9	14	5	5	4	14	4	10	9	9
6/24	6	24	10	16	6	6	5	15	4	12	12	10
6/25	6	30	11	17	8	9	6	16	6	14	14	12
6/26	7	37	11	19	10	11	9	18	8	16	15	15
6/27	8	38	12	21	12	14	11	20	10	20	17	17
6/28	10	43	12	24	17	16	12	21	12	22	18	19
6/29	16	48	14	29	24	17	17	23	16	26	18	23
6/30	22	51	16	33	27	23	22	25	22	32	23	27
7/1	29	51	19	40	31	30	24	29	28	34	24	31
7/2	36	52	22	46	36	35	25	31	33	38	27	36
7/3	42	54	26	50	40	40	28	37	37	40	32	39
7/4	50	57	30	53	44	44	32	41	41	43	37	44
7/5	59	59	36	55	50	47	36	44	45	47	44	48
7/6	65	61	41	58	56	50	43	45	48	50	48	52
7/7	70	65	47	59	60	51	47	50	53	54	55	56
7/8	72	68	50	60	64	54	49	55	55	56	58	58
7/9	73	71	53	61	65	58	52	59	58	59	67	61
7/10	74	72	58	62	66	63	55	62	58	62	74	63
7/11	75	75	65	63	67	63	59	65	62	68	76	66
7/12	76	76	70	68	68	65	60	67	70	69	80	69
7/13	77	77	72	69	69	69	63	70	72	71	81	71
7/14	78	79	75	70	72	73	69	75	74	75	81	74
7/15	80	80	76	71	75	76	72	80	77	77	82	76
7/16	80	81	76	72	77	77	74	81	80	80	84	78
7/17	81	82	78	76	79	78	75	83	83	83	85	80
7/18	83	83	80	80	82	79	79	85	86	85	87	82
7/19	84	84	83	83	85	81	81	87	89	88	90	84
7/20	86	85	86	87	88	82	82	87	90	91	91	86
7/21	87	88	87	90	90	84	84	89	92	92	94	88
7/22	88	89	89	92	92	87	86	90	93	93	95	90
7/23	90	90	90	94	92	89	89	92	94	95	96	91
7/24	92	90	91	94	93	92	91	94	94	95	96	92

Note: The boxes represent the central 50% of the run and the shaded cells represent the median passage date of the run.

APPENDIX E: HISTORICAL COHO SALMON DATA

Appendix E1.–Historical daily mean tidal catch per unit effort for coho salmon catches in the Bethel test fishery, 2003–2013.

Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
7/8	1	0	0	0	5	0	0	0	0	0	0	1
7/9	2	9	0	0	0	0	0	0	0	0	2	1
7/10	0	3	0	0	0	0	0	0	0	0	0	0
7/11	3	5	0	3	0	6	5	0	0	0	0	2
7/12	5	0	0	16	0	0	3	0	0	0	0	2
7/13	5	6	0	0	0	0	1	0	0	0	2	1
7/14	25	5	0	0	15	3	0	0	3	0	0	5
7/15	38	3	2	1	7	8	0	0	14	0	22	7
7/16	21	3	0	7	13	14	4	3	0	2	16	7
7/17	17	22	5	22	24	22	0	0	5	2	8	12
7/18	50	22	6	50	19	16	21	0	4	2	6	19
7/19	50	42	13	50	39	25	16	3	13	2	21	25
7/20	100	54	16	78	28	34	29	2	11	3	13	35
7/21	113	55	2	54	20	40	61	6	10	3	21	36
7/22	44	109	7	40	51	63	124	17	8	7	28	47
7/23	61	48	6	31	16	55	91	11	27	15	17	36
7/24	82	63	18	13	51	80	81	24	11	19	19	44
7/25	225	92	16	18	82	114	55	15	36	26	28	68
7/26	160	106	20	26	110	70	114	24	58	37	26	72
7/27	228	47	46	37	72	46	115	21	40	45	23	70
7/28	160	136	29	118	54	190	211	47	56	10	65	101
7/29	91	265	34	179	92	235	106	58	82	54	41	120
7/30	116	262	43	143	93	196	75	145	59	67	21	120
7/31	242	365	82	99	146	177	306	48	141	21	37	163
8/1	98	314	142	62	72	223	175	67	223	39	47	142
8/2	65	139	74	111	163	221	184	43	324	78	60	140
8/3	66	216	62	92	348	192	223	49	126	127	102	150
8/4	45	211	93	94	456	224	190	53	202	61	169	163
8/5	35	219	177	103	258	306	228	80	295	123	234	182
8/6	50	163	220	113	257	247	176	91	183	85	144	159
8/7	75	274	354	108	15	225	167	208	244	78	44	175
8/8	211	339	317	99	84	132	185	230	99	80	69	178
8/9	228	145	211	60	129	210	186	129	213	64	139	157
8/10	71	554	180	192	44	29	134	246	202	102	249	175
8/11	95	210	112	173	59	172	97	146	67	27	243	116
8/12	197	189	120	176	29	228	122	69	74	112	92	132
8/13	301	363	38	231	80	189	187	10	147	110	55	166
8/14	206	233	85	106	53	126	193	31	90	97	121	122
8/15	229	468	81	167	70	219	76	18	40	101	26	147
8/16	202	268	128	48	24	248	79	12	44	136	104	119
8/17	254	167	100	62	19	233	96	12	15	153	104	111
8/18	115	79	126	82	45	181	41	0	43	149	93	86
8/19	215	112	160	58	57	137	55	38	11	83	112	93
8/20	68	48	170	19	55	139	45	35	11	66	45	66

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Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
8/21	18	64	171	18	39	49	80	30		59	49	59
8/22	52	105	115	4	16	55	74	2		51	68	53
8/23	34	88	99	0	7	37	61	4		50	50	42
8/24	51	81			13	81	23	2		29	31	40
8/25		75								36		55
8/26		119								28		74
8/27		70										70
8/28		64										64
8/29		81										81

Note: Date with no data indicates day when the project was not operational.

Appendix E2.–Historical cumulative mean tidal catch per unit effort for coho salmon catches in the Bethel test fishery, 2003–2013.

Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
7/8	1	0	0	0	5	0	0	0	0	0	0	1
7/9	2	9	0	0	5	0	0	0	0	0	2	2
7/10	2	11	0	0	5	0	0	0	0	0	2	2
7/11	5	16	0	3	5	6	5	0	0	0	2	4
7/12	11	16	0	18	5	6	8	0	0	0	2	6
7/13	16	23	0	18	5	6	10	0	0	0	4	8
7/14	41	27	0	18	20	8	10	0	3	0	4	13
7/15	78	30	2	19	26	16	10	0	16	0	26	20
7/16	99	33	2	26	39	30	14	3	16	2	42	26
7/17	116	56	7	48	63	52	14	3	22	4	50	38
7/18	166	78	13	98	82	68	35	3	26	6	56	57
7/19	217	120	26	148	120	93	51	5	39	8	77	83
7/20	316	173	41	226	148	127	80	7	50	12	90	118
7/21	429	228	44	280	169	167	141	13	60	15	111	155
7/22	473	337	51	320	219	231	265	30	68	22	139	201
7/23	534	385	57	352	235	285	356	40	95	37	156	238
7/24	616	447	74	365	286	365	436	64	106	57	175	282
7/25	841	539	90	382	368	480	491	79	142	83	203	350
7/26	1,001	645	110	408	478	550	606	103	200	120	228	422
7/27	1,229	692	156	445	550	596	721	124	240	165	252	492
7/28	1,389	828	185	563	605	785	931	170	296	175	317	593
7/29	1,479	1,093	219	742	697	1,020	1,037	229	378	229	358	712
7/30	1,596	1,354	262	885	790	1,216	1,112	374	437	296	379	832
7/31	1,838	1,720	344	985	936	1,393	1,418	421	578	317	416	995
8/1	1,936	2,034	486	1,047	1,008	1,616	1,593	488	802	355	463	1,137
8/2	2,001	2,173	561	1,158	1,171	1,837	1,777	531	1,126	434	523	1,277
8/3	2,067	2,389	622	1,250	1,519	2,030	2,000	580	1,252	561	624	1,427
8/4	2,112	2,599	715	1,344	1,975	2,253	2,190	634	1,454	622	793	1,590
8/5	2,147	2,819	892	1,447	2,234	2,560	2,418	713	1,749	745	1,027	1,772
8/6	2,197	2,982	1,112	1,560	2,491	2,806	2,595	804	1,932	830	1,171	1,931
8/7	2,272	3,255	1,466	1,668	2,506	3,032	2,762	1,011	2,177	907	1,215	2,106
8/8	2,483	3,594	1,783	1,767	2,590	3,163	2,946	1,242	2,276	988	1,284	2,283
8/9	2,711	3,740	1,994	1,827	2,719	3,373	3,132	1,371	2,489	1,051	1,423	2,441
8/10	2,782	4,294	2,174	2,019	2,762	3,402	3,266	1,616	2,691	1,153	1,672	2,616
8/11	2,877	4,505	2,286	2,193	2,821	3,573	3,363	1,762	2,758	1,181	1,916	2,732
8/12	3,074	4,694	2,406	2,369	2,850	3,801	3,485	1,831	2,832	1,292	2,008	2,863
8/13	3,375	5,057	2,444	2,601	2,931	3,990	3,672	1,840	2,979	1,403	2,063	3,029
8/14	3,581	5,290	2,529	2,707	2,983	4,115	3,865	1,871	3,069	1,500	2,185	3,151
8/15	3,810	5,758	2,610	2,874	3,053	4,334	3,940	1,889	3,109	1,601	2,210	3,298
8/16	4,012	6,026	2,737	2,921	3,077	4,582	4,019	1,901	3,153	1,737	2,315	3,417
8/17	4,266	6,193	2,837	2,984	3,096	4,815	4,115	1,913	3,168	1,890	2,419	3,528
8/18	4,380	6,272	2,963	3,065	3,140	4,995	4,156	1,913	3,212	2,039	2,512	3,613
8/19	4,596	6,385	3,123	3,123	3,197	5,133	4,211	1,951	3,223	2,122	2,624	3,706
8/20	4,663	6,433	3,292	3,142	3,252	5,272	4,256	1,986	3,234	2,187	2,669	3,772
8/21	4,682	6,497	3,464	3,160	3,291	5,320	4,336	2,016		2,247	2,717	3,890
8/22	4,734	6,602	3,579	3,164	3,307	5,376	4,411	2,018		2,297	2,785	3,943
8/23	4,768	6,690	3,678	3,164	3,314	5,413	4,472	2,022		2,347	2,834	3,985
8/24	4,819	6,771			3,328	5,494	4,495	2,024		2,376	2,865	4,187
8/25		6,846								2,411		4,629
8/26		6,965								2,440		4,702
8/27		7,035										7,035
8/28		7,099										7,099
8/29		7,180										7,180
Totals	4,819	7,180	3,678	3,164	3,328	5,494	4,495	2,024	3,234	2,440	2,865	

Note: Date with no data indicates day when the project was not operational.

Appendix E3.–Historical percent passage of coho salmon at the Bethel test fish site, Bethel test fishery, 2003–2013.

Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2003–2012
7/8	0	0	0	0	0	0	0	0	0	0	0	0
7/9	0	0	0	0	0	0	0	0	0	0	0	0
7/10	0	0	0	0	0	0	0	0	0	0	0	0
7/11	0	0	0	0	0	0	0	0	0	0	0	0
7/12	0	0	0	1	0	0	0	0	0	0	0	0
7/13	0	0	0	1	0	0	0	0	0	0	0	0
7/14	1	0	0	1	1	0	0	0	0	0	0	0
7/15	2	0	0	1	1	0	0	0	1	0	1	0
7/16	2	0	0	1	1	1	0	0	1	0	1	1
7/17	2	1	0	2	2	1	0	0	1	0	2	1
7/18	3	1	0	3	2	1	1	0	1	0	2	1
7/19	5	2	1	5	4	2	1	0	1	0	3	2
7/20	7	3	1	7	4	2	2	0	2	0	3	3
7/21	9	3	1	9	5	3	3	1	2	1	4	4
7/22	10	5	1	10	7	4	6	1	2	1	5	5
7/23	11	6	2	11	7	5	8	2	3	2	6	5
7/24	13	7	2	12	9	7	10	3	3	2	6	6
7/25	18	8	2	12	11	9	11	4	4	4	7	8
7/26	21	10	3	13	14	10	14	5	6	5	8	10
7/27	26	10	4	14	17	11	16	6	7	7	9	11
7/28	29	12	5	18	18	15	21	8	9	7	11	14
7/29	31	16	6	23	21	19	23	11	12	10	13	17
7/30	33	20	7	28	24	22	25	18	14	13	13	20
7/31	39	26	9	31	28	26	32	21	18	13	15	24
8/1	41	30	13	33	30	30	36	24	25	15	16	28
8/2	42	32	15	37	35	34	40	26	35	18	18	30
8/3	43	36	17	40	46	37	45	29	39	24	22	34
8/4	44	39	19	42	60	42	49	31	45	27	28	38
8/5	45	42	24	46	67	47	54	35	54	32	36	42
8/6	46	45	30	49	75	52	58	40	60	35	41	46
8/7	48	49	40	53	76	56	62	50	67	39	43	51
8/8	52	54	48	56	78	58	66	61	70	42	45	57
8/9	57	56	54	58	82	62	70	68	77	45	50	62
8/10	58	64	59	64	83	63	73	80	83	49	59	67
8/11	60	67	62	69	85	66	75	87	85	50	68	72
8/12	64	70	65	75	86	70	78	91	88	55	71	76
8/13	71	76	66	82	88	74	82	91	92	60	73	80
8/14	75	79	69	86	90	76	86	93	95	64	77	82
8/15	80	86	71	91	92	80	88	93	96	68	78	86
8/16	84	90	74	92	93	85	90	94	97	74	82	88
8/17	89	93	77	94	93	89	92	95	98	81	85	91
8/18	92	94	81	97	95	92	93	95	99	87	89	93
8/19	96	95	85	99	96	95	94	96	100	90	93	95
8/20	98	96	90	99	98	97	95	98	100	93	94	97
8/21	98	97	94	100	99	98	97	100	100	96	96	98
8/22	99	99	97	100	100	99	99	100	100	98	98	99
8/23	100	100	100	100	100	100	100	100	100	100	100	100

Note: Boxes represent the central 50% of the run; shaded cells represent the median passage date of the run.

APPENDIX F: HISTORICAL CLIMATOLOGICAL DATA

Appendix F1.–Historical daily surface water temperature (C) of the Kuskokwim River at the Bethel test fishery site, 2003–2013.

												2003–2012 Summary		
Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Mean	Min.	Max.
6/1	13	14	16	12	11 [a]	12 [a]	10	13	11	10 [a]	8	13	10	16
6/2	12	12	12	12	11 [a]	12	10	12	11	11	7	12	10	12
6/3	12	12	13	11	11 [a]	11	10	12	12	9	10	11	9	13
6/4	11	12	13	11	11 [a]	11	10	12	11	10	9	11	10	13
6/5	11	13	10	10	11 [a]	11	10	13	11	11	11	11	10	13
6/6	11	14	12	12	11 [a]	10	10	13	12	11	11	12	10	14
6/7	10	14	11	11	11 [a]	11	10	13	11	10	11	11	10	14
6/8	12	14	11	10	11	11	10	13	12	10	11	11	10	14
6/9	12	14	13	10	11	10	10	13	11	10	10	11	10	14
6/10	10	14	14	11	11	11	11	12	12	10	10	12	10	14
6/11	11	13	11	10	12	11	12	14	12	11	10	12	10	14
6/12	12	14	12	10	13	10	13	12	12	11	12	12	10	14
6/13	12	15	12	9	13	11	14	9	11	10	13	11	9	15
6/14	12	15	12	10	13	12	14	10	11	10	14	12	10	15
6/15	14	14	13	11	12	12	14	9	11	12	14	12	9	14
6/16	14	15	13	12	13	12 [a]	14	11	12	12	14	13	11	15
6/17	16	14	13	13	12	13	15	11	12	13	14	13	11	16
6/18	15	15	13	13	12	12	14	11	13	13	18	13	11	15
6/19	15	14	16	14	12	12	14	12	13	13	17	13	12	16
6/20	14	14 [a]	14	15	14	12	14	12	13	13	17	13	12	15
6/21	13	15	15	14	13	12	14	12	14	14	17	14	12	15
6/22	15	20	16	15	13	13	13	15	11	14	16	14	11	20
6/23	15	21	16	14	14	13	14	15	12	14	15	15	12	21
6/24	11	19	16	14 [a]	13	13	12	13	13	14	15	14	11	19
6/25	11	19 [a]	16	14	14	14	12	15	12	13	15	14	11	19
6/26	13	15	17	15	14	14 [a]	13	16	11	13	15	14	11	17
6/27	13	15 [a]	18	15	14	14	13	14	13	13	15	14	13	18
6/28	15	17	18	15 [a]	13	14 [a]	13 [a]	15	12	13	16	14	12	18
6/29	14	17	17	15 [a]	14	13	12	14	12	14	15	14	12	17
6/30	15	17 [a]	17	14	14	13	14	15	12	14	15	14	12	17
7/1	14	18	17	13	14 [a]	14	13	15	12	13	15	14	12	18
7/2	14 [a]	18	17	14	14	14	17	16	12	13	14	15	12	18
7/3	12	18	17 [a]	14	14	13	17 [a]	16	13	13	13	14	12	18
7/4	12 [a]	17	17 [a]	14 [a]	14 [a]	13	17 [a]	16 [a]	12	13	12	14	12	17
7/5	15	17	17 [a]	16	14	13	17 [a]	15	12	13	12	15	12	17
7/6	14	17 [a]	19	16	16	15	16	15	12	14	12	15	12	19
7/7	15	16	19	15	16 [a]	14	16	15	12	15	12	15	12	19
7/8	15 [a]	17	18	17	16	14	16	15	12	15	12	15	12	18
7/9	15	18	18 [a]	17	17	14 [a]	17	15	12	14	12	16	12	18
7/10	15	18	12	17	16	14	17	15	13	14	12	15	12	18
7/11	15	17	16	16	16 [a]	15	18	16	13	15	13	16	13	18
7/12	15	19	16 [a]	18	18	14	17	15	12	14	14	16	12	19
7/13	17	18	16 [a]	20	17	14	19	15	12	12	15	16	12	20
7/14	16	18 [a]	15	19	16	12	17	16	11	11	15	15	11	19
7/15	17	19	14	15	13	11	18	16	11	12	14	14	11	19
7/16	15	19	14	14	15	12	17	15	11	12	14	14	11	19

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Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2003–2012 Summary Mean	Min.	Max.
7/17	15	19 [a]	17	15	15	11	17	15	12	12	15	15	11	19
7/18	15 [a]	19 [a]	17	14	15	12	16	15	12	12	15	15	12	19
7/19	15 [a]	18	16	16	16	12 [a]	16	15	13	12	15	15	12	18
7/20	15 [a]	24	14	15	15	12	14	14	13	12	14	15	12	24
7/21	15	18	15	15	15	12	15	13	12	12	14	14	12	18
7/22	17	19	15 [a]	18	14	12	15	14	11	12	14	15	11	19
7/23	16	19	15 [a]	16	14	12	15	14	13	13	15	15	12	19
7/24	15	17	15 [a]	17	14	13	15	13	13 [a]	13	15	15	13	17
7/25	15	18	15 [a]	16	15	13	16	13	13 [a]	13	15	15	13	18
7/26	16	17	18	16	15	12	15	13	14	12	17	15	12	18
7/27	14	17	18	16	16	13	14	13	15	12	17	15	12	18
7/28	14 [a]	17	17	16 [a]	16	12	14	13	15	12	16	14	12	17
7/29	15	14	18	14	16	12	14	13	15	12	18	14	12	18
7/30	15 [a]	17	18	14	15	14	14	13	14	12	19	14	12	18
7/31	15	19	17	13	15	14	13	13	13	12	19	14	12	19
8/1	14	13	16	14	15	13	13	14	13	12	19	14	12	16
8/2	13	16	17	14	14	13	13	14	13	12	19	14	12	17
8/3	13	12	17	13 [a]	15	13	13	14	12	11	18	13	11	17
8/4	12	16	17	14	14	14	14	14	12	11	17	14	11	17
8/5	13	16	16	14	14	14	13	14	12	12	17	14	12	16
8/6	14	16	16	14	14	14	13	14	12 [a]	12	17	14	12	16
8/7	14 [a]	16	15	13	14	14	14	13	11	11	16	13	11	16
8/8	14 [a]	16	16	14	14	14	15	13	11 [a]	11	15	14	11	16
8/9	15	16 [a]	16	13	14	14	15	13	11	12	15	14	11	16
8/10	15	16 [a]	16	14	14	14	12	12	12	11	14	14	11	16
8/11	15	16	18	15	14	14	12	12	11	13	14	14	11	18
8/12	15	16	18	13	14	15	15	11	10	14	14	14	10	18
8/13	15	16	19	13	14 [a]	15	9	12	10	13	14	14	9	19
8/14	15	16	19	13	14	14	10	12	10	15	14	14	10	19
8/15	14	17	19	14	14 [a]	14	15	12	10	14	14	14	10	19
8/16	13	18	18	13	15	14	10	12	10	14	15	14	10	18
8/17	12	17	18	13 [a]	15	14	10	12	10	13	15	13	10	18
8/18	11	17	17	13	14	14	13	12	11	12	14	13	11	17
8/19	13	19	17	12	15	14	13	11	11	12	14	14	11	19
8/20	11	19	16	13	14	14	13	12	11	12 [a]	14	13	11	19
Average	14	16	16	14	14	13	14	13	12	12	14	14	11	17
Min.	10	12	10	9	11	10	9	9	10	9	7	11	9	12
Max.	17	24	19	20	18	15	19	16	15	15	19	16	13	24

Note: Value entered was lowest value for that day.

[a] Indicates an estimate due to no observation.

Appendix F2.–Historical daily water clarity measurements of the Kuskokwim River at the Bethel test fish site, 2003–2013.

												2003–2012 Summary		
Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Mean	Min.	Max.
6/1	0.8	0.5	0.5	0.4	0.9	0.5 [a]	0.5	0.5	0.4	0.4 [a]	0.1 [a]	0.6	0.4	0.9
6/2	0.9	0.4	0.4	0.3	0.8	0.5	0.5	0.4	0.7	0.4	0.2	0.5	0.3	0.9
6/3	0.6	0.4	0.4	0.4	0.7	0.7	0.5	0.5	0.6	0.4	0.1	0.5	0.4	0.7
6/4	0.4	0.4	0.5	0.4	0.9	0.6	0.6	0.5	0.7	0.4	0.2	0.5	0.4	0.9
6/5	0.6	0.3	0.5	0.3	0.8	0.7	0.4	0.5	0.5	0.4	0.2	0.5	0.3	0.8
6/6	0.3	0.2	0.5	0.4	0.8	0.7	0.4	0.6	0.6	0.5	0.2	0.5	0.2	0.8
6/7	0.5	0.4	0.6	0.3	0.9	0.7	0.5	0.7	0.5	0.5	0.2	0.6	0.3	0.9
6/8	0.6	0.4	0.5	0.5	1.0	0.8	0.4	0.7	0.5	0.5	0.2	0.6	0.4	1.0
6/9	0.6	0.5	0.5	0.4	1.0	0.7	0.7	0.7	0.4	0.4	0.2	0.6	0.4	1.0
6/10	0.5	0.5	0.6	0.4	1.0	0.7	0.5	0.7	0.4	0.5	0.2	0.6	0.4	1.0
6/11	0.7	0.4	0.6	0.3	1.0	0.7	0.7	0.7	0.3	0.6	0.2	0.6	0.3	1.0
6/12	0.4	0.5	0.5	0.4	0.9	0.7	0.6	0.6	0.3	0.6	0.2	0.6	0.3	0.9
6/13	0.7	0.4	0.5	0.4	0.8	0.8	0.8	0.7	0.3	0.6	0.3	0.6	0.3	0.8
6/14	1.0	0.6	0.6	0.5	1.0	1.1	0.9	0.6	0.3	0.6	0.3	0.7	0.3	1.1
6/15	0.8	0.9	0.6	0.4	1.2	0.6	0.7	0.4	0.4	0.5	0.4	0.6	0.4	1.2
6/16	0.7	0.6	0.6	0.4	1.1	0.8	0.7	0.5	0.6	0.6	0.4	0.7	0.4	1.1
6/17	0.7	0.4	0.6	0.4	1.1	0.9	0.6	0.6	0.5	0.5	0.4	0.6	0.4	1.1
6/18	0.6	0.4	0.6	0.5	1.1	0.9	0.6	0.5	0.9	0.4	0.4	0.6	0.4	1.1
6/19	0.5	0.3	0.5	0.5	1.0	0.7	0.5	0.5	0.8	0.4	0.4	0.6	0.3	1.0
6/20	0.5	0.3 [a]	0.7	0.6	1.0	0.7	0.5	0.5	0.7	0.4	0.4	0.6	0.4	1.0
6/21	0.3	0.4	0.7	0.5	1.2	0.7	0.5	0.5	1.2	0.4	0.4	0.6	0.3	1.2
6/22	0.2	0.6	0.3	0.7	1.2	0.7	0.5	0.6	1.2	0.2	0.4	0.6	0.2	1.2
6/23	0.2	0.6	0.2	0.6	1.3	0.8	0.4	0.6	1.1	0.1	0.3	0.6	0.1	1.3
6/24	0.2	0.6	0.2	0.6 [a]	1.0	0.9	0.4	0.8	1.2	0.3	0.3	0.6	0.2	1.2
6/25	0.3	0.6 [a]	0.2	0.7	1.1	0.7	0.5	0.8	1.1	0.2	0.2	0.6	0.2	1.1
6/26	0.3	0.6	0.2	0.6	0.7	0.4	0.4	0.8	0.5	0.3	0.2	0.5	0.2	0.8
6/27	0.3	0.6	0.2	0.4	1.0	0.4	0.4	0.7	0.4	0.2	0.2	0.4	0.2	1.0
6/28	0.3	0.6 [a]	0.1	0.4 [a]	0.9	0.4 [a]	0.4	0.9	0.5	0.4	0.1	0.5	0.1	0.9
6/29	0.3	0.4	0.1	0.4 [a]	0.7	0.5	0.5	0.9	0.5	0.3	0.2	0.5	0.1	0.9
6/30	0.3	0.4 [a]	0.1 [a]	0.6	0.7	0.3	0.6	1.2	0.4	0.3	0.2	0.6	0.3	1.2
7/1	0.3	0.3	0.2	0.4	0.7 [a]	0.4	0.5	1.2	0.4	0.3	0.1	0.5	0.2	1.2
7/2	0.3 [a]	0.3	0.2	0.5	0.5	0.4	0.5 [a]	1.0	0.5	0.3	0.1	0.5	0.2	1.0
7/3	0.3	0.2	0.2 [a]	0.5	0.5	0.4	0.5 [a]	1.1	0.5	0.2	0.2	0.5	0.2	1.1
7/4	0.3	0.2	0.2 [a]	0.5 [a]	0.5 [a]	0.4 [a]	0.5 [a]	1.1 [a]	0.5 [a]	0.2	0.2	0.5	0.2	1.0
7/5	0.3	0.2	0.2 [a]	0.5	0.5	0.4	0.5 [a]	0.8	0.5	0.3	0.2	0.5	0.2	0.8
7/6	0.2	0.2 [a]	0.3	0.4	0.5	0.3	0.7	0.8	0.5	0.3	0.2	0.4	0.2	0.8
7/7	0.3	0.2	0.3	0.5	0.5 [a]	0.4	1.0	0.7	0.4	0.3	0.2	0.4	0.2	1.0
7/8	0.3 [a]	0.2	0.2	0.4	0.5	0.5	1.0	0.7	0.4	0.3	0.1	0.5	0.2	1.0
7/9	0.3	0.1	0.2 [a]	0.4	0.5	0.5 [a]	1.2	0.7 [a]	0.4	0.3	0.2	0.5	0.1	1.2
7/10	0.2	0.1	0.3	0.3	0.8	0.5	1.2	0.4	0.6	0.3	0.2	0.5	0.1	1.2
7/11	0.1	0.2	0.2	0.3	0.8 [a]	0.6	1.0	0.6	0.4	0.3	0.1	0.4	0.1	1.0
7/12	0.1	0.2	0.2 [a]	0.2	0.6	0.6	0.9	0.3	0.4	0.2	0.2	0.4	0.1	0.9
7/13	0.2	0.2	0.2 [a]	0.3	0.6	0.5	1.0	0.4	0.5	0.2	0.2	0.4	0.2	1.0
7/14	0.1	0.2 [a]	0.2	0.3	0.5	0.5	1.2	0.5	0.4	0.3	0.3	0.4	0.1	0.7
7/15	0.2	0.2	0.2	0.2	0.5	0.4	0.4	0.4	0.5	0.4	0.3	0.3	0.2	0.5
7/16	0.2	0.2	0.2	0.2	0.4	0.3	0.4	0.4	0.5	0.4	0.3	0.3	0.2	0.5

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Date	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2003–2012 Summary Mean	Min.	Max.
7/17	0.2	0.2 [a]	0.3	0.3	0.4	0.3	0.3	0.4	0.5	0.4	0.4	0.3	0.2	0.5
7/18	0.2	0.2 [a]	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.3	0.2	0.4
7/19	0.2 [a]	0.2	0.2	0.2	0.3	0.3	0.2	0.3	0.4	0.3	0.4	0.3	0.2	0.4
7/20	0.2 [a]	0.2	0.2	0.2	0.3	0.3	0.2	0.5	0.5	0.5	0.4	0.3	0.2	0.5
7/21	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.5	0.5	0.5	0.4	0.3	0.2	0.5
7/22	0.1	0.2	0.3 [a]	0.3	0.5	0.3	0.2	0.3	0.5	0.6	0.4	0.3	0.1	0.6
7/23	0.2	0.2	0.3 [a]	0.3	0.5	0.3	0.2	0.4	0.3	0.7	0.3	0.3	0.2	0.7
7/24	0.2	0.2	0.3 [a]	0.3	0.3	0.3	0.2	0.4	0.3 [a]	0.7	0.3	0.3	0.2	0.7
7/25	0.1	0.2	0.3 [a]	0.3	0.5	0.4	0.2	0.3	0.3 [a]	0.7	0.2	0.3	0.1	0.7
7/26	0.2	0.2	0.3	0.4	0.6	0.4	0.2	0.2	0.3 [a]	0.4	0.1	0.3	0.2	0.6
7/27	0.1	0.2	0.2	0.4	0.6	0.4	0.2	0.1	0.4	0.7	0.1	0.3	0.1	0.7
7/28	0.1 [a]	0.3	0.3	0.4 [a]	0.6	0.4	0.2	0.2	0.4	0.4	0.2	0.3	0.2	0.6
7/29	0.2	0.3	0.4	0.4	0.6	0.4	0.1	0.2	0.4	0.5	0.1	0.3	0.1	0.6
7/30	0.2 [a]	0.3	0.3	0.3	0.6	0.4	0.2	0.2	0.5	0.3	0.1	0.3	0.2	0.6
7/31	0.2	0.2	0.3	0.5	0.6	0.6	0.2	0.2	0.4	0.3	0.1	0.3	0.2	0.6
8/1	0.2	0.3	0.3	0.4	0.5	0.6	0.2	0.2	0.5	0.3	0.1	0.3	0.2	0.6
8/2	0.1	0.3	0.2	0.5	0.4	0.6	0.3	0.2	0.4	0.3	0.1	0.3	0.1	0.6
8/3	0.1	0.3	0.3	0.5 [a]	0.4	0.6	0.3	0.2	0.4	0.2	0.1	0.3	0.1	0.6
8/4	0.1	0.2	0.3	0.4	0.4	0.7	0.3	0.2	0.3	0.3	0.2	0.3	0.1	0.7
8/5	0.2	0.2	0.3	0.5	0.4	0.7	0.3	0.2	0.3	0.3	0.2	0.3	0.2	0.7
8/6	0.1	0.3	0.3	0.3	0.4	0.7	0.3	0.2	0.3 [a]	0.3	0.1	0.3	0.1	0.7
8/7	0.1 [a]	0.3	0.4	0.3	0.4	0.7	0.3	0.2	0.3 [a]	0.3	0.2	0.3	0.2	0.7
8/8	0.1 [a]	0.2	0.4 [a]	0.4	0.4	0.6	0.3	0.3	0.3 [a]	0.3	0.2	0.3	0.2	0.6
8/9	0.2	0.2 [a]	0.3	0.5	0.3	0.6	0.3	0.3	0.2	0.3	0.2	0.3	0.2	0.6
8/10	0.2	0.2 [a]	0.4	0.4	0.3	0.5	0.2	0.3	0.2	0.4	0.2	0.3	0.2	0.5
8/11	0.2	0.3	0.3	0.4	0.2	0.5 [a]	0.2	0.3	0.2	0.4	0.1	0.3	0.2	0.5
8/12	0.3	0.3	0.4	0.4	0.2	0.3	0.2	0.3	0.2	0.4	0.1	0.3	0.2	0.4
8/13	0.2	0.3	0.4	0.4	0.2	0.3	0.1	0.2	0.2	0.4	0.1	0.3	0.1	0.4
8/14	0.1	0.2	0.5	0.5	0.1	0.4	0.2	0.2	0.2	0.3	0.2	0.3	0.1	0.5
8/15	0.3	0.2	0.4	0.6	0.1	0.4	0.2	0.2	0.2	0.5	0.2	0.3	0.1	0.6
8/16	0.3	0.2	0.4	0.6	0.1	0.4	0.2	0.2	0.2	0.5	0.2	0.3	0.1	0.6
8/17	0.3	0.2	0.4	0.6 [a]	0.1	0.3	0.2	0.2	0.2	0.5	0.2	0.3	0.1	0.5
8/18	0.3 [a]	0.2	0.3	0.5	0.1	0.3	0.2	0.2	0.2	0.5	0.2	0.3	0.1	0.5
8/19	0.2	0.2	0.4	0.4	0.2	0.5	0.2	0.2	0.2	0.5	0.2	0.3	0.2	0.5
8/20	0.2	0.2	0.3	0.3	0.1	0.7	0.2	0.2	0.3	0.5 [a]	0.2	0.3	0.1	0.7
Average	0.3	0.3	0.3	0.4	0.6	0.5	0.4	0.5	0.5	0.4	0.2	0.4	0.2	0.8
Min.	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.3	0.1	0.4
Max.	1.0	0.9	0.7	0.7	1.3	1.1	1.2	1.2	1.2	0.7	0.4	0.7	0.4	1.3

Note: The value entered is the largest value for the day.

[a] Indicates an estimate due to no observation.