July 14, 2017

STAFF ANALYSIS
EMERGENCY SPECIAL ACTION
FSA17-05

ISSUES

Fishery Special Action Request FSA17-05, submitted by Dave Cannon of Aniak, was received on July 6, 2017, and requests that the Federal Subsistence Board (Board) take three actions: (1) rescind the in-season fisheries management authority of the Yukon Delta National Wildlife Refuge (Refuge) Manager for the remainder of the 2017 fishing season; (2) take over in-season management of the fishery based on conservation principles of Chinook Salmon stocks as identified in sections 815(1) and 816(b) in Title VIII of the Alaska National Interest Land Claims Act (ANILCA); and (3) extend 3-KS-01-17 beyond August 10, 2017 to include management of the Chum, Sockeye, and Coho Salmon fishery.

On July 7, 2017, staff clarified the intent of the special action with the proponent, and he revised his request to the following:

(1) immediately rescind the in-season fisheries management authority of the Refuge Manager for the remainder of the 2017 salmon season;

(2) immediately close Refuge waters of the Kuskokwim River mainstem and salmon-bearing tributaries to the harvest of Chinook Salmon as necessary to ensure healthy populations and the viability of Chinook Salmon populations in the Kuskokwim River drainage. Federally qualified subsistence users may take fish other than Chinook Salmon with dip nets, beach seines, fish wheels, and rod and reel. Fish wheels are required to have a live box with no less than 45 cubic feet of water and must be checked at least every 6 hours. Fish wheels must be equipped with a chute and must be closely attended while in operation. All authorized gear types must return Chinook Salmon to the water alive. Fishing with gillnets is prohibited.

(3) close Refuge waters to the harvest of Coho Salmon except by Federally qualified subsistence users to ensure the continuation of subsistence uses of Coho Salmon.

Subsequent to the Board receiving this special action request, the Federal in-season manager re-opened Refuge waters to the harvest of Chinook Salmon on July 7, 2017 (Special Action 3-KS-07-17).

Additionally, the Alaska Department of Fish and Game opened subsistence fishing in the Kuskokwim River main stem within Refuge waters July 8, 2017, until further notice (3-S-WR-10-17). Gillnets are restricted to 6-inch or less mesh, 45 meshes deep, and 25 fathoms in length. Salmon-bearing tributaries remain closed to the use of gillnets, and Chinook Salmon caught with other legal gear must be released to the water alive.

DISCUSSION

The proponent said that with the Alaska Department of Fish & Game's (ADF&G) season-long indicator projects showing that this year is possibly the weakest Kuskokwim River Chinook salmon run on record, that management decisions to date appear to have been based more on social concerns rather than sound conservation principles. For instance, on July 1 and July 3, the U.S. Fish and Wildlife Service (USFWS) allowed two subsistence opportunities that harvested an estimated 1,700 Chinook Salmon even though both the USFWS and ADF&G acknowledged that the lower end of the drainage-wide escapement goal of 65,000 fish may not be met. This, coupled with a general downward trend in Chinook Salmon numbers, could jeopardize the viability of the Chinook salmon population in the Kuskokwim River drainage. Nothing in Title VIII of ANILCA allows subsistence use that is inconsistent with the viability of populations of fish and wildlife.

The proponent continues that area managers only recently determined that Chinook Salmon run timing is later than expected. Consequently, the intent of the special action is first to allow for conservation measures to remain in place to avoid incidental harvest of Chinook Salmon. However, the hope is to allow people the opportunity to harvest Sockeye and Chum Salmon with fish wheels or dip nets, techniques that will allow the live release of Chinook Salmon.

The proponent said that ADF&G recently announced that a commercial processor has expressed an intention of operating a Coho Salmon fishery on the Kuskokwim River in August, yet many Federally qualified subsistence users have expressly indicated they intend to focus their subsistence efforts at that time because they intentionally did not fish during the earlier openings in order to conserve the Chinook Salmon.

The second intent of the special action, therefore, is to provide opportunity for Federally qualified subsistence users to harvest Coho Salmon to meet unfilled needs due to earlier voluntary and management restrictions.

The applicable Federal regulations are found in 36 CFR 242.19(a) and 50 CFR 100.19(a) (Emergency Special Actions) and state that:

> *. . . In an emergency situation, if necessary to ensure the continued viability of a fish or wildlife population, to continue subsistence uses of fish or wildlife, or for public safety reasons, the Board may immediately open or close public lands for the taking of fish and wildlife for subsistence uses, or modify the requirements for take for subsistence uses, or close public lands to take for nonsubsistence uses of fish and wildlife, or restrict the requirements for take for nonsubsistence uses.*

Existing Federal Regulation

> *§100.10(d)(6) The Board may delegate to agency field officials the authority to set harvest and possession limits, define harvest areas, specify methods or means of harvest, specify permit*

requirements, and open or close specific fish or wildlife harvest seasons within frameworks established by the Board.

Kuskokwim Area – Fish

§100.27(e)(4)(ii) For the Kuskokwim area, Federal subsistence fishing schedules, openings, closings, and fishing methods are the same as those issued for the subsistence taking of fish under Alaska Statutes (AS 16.05.060), unless superseded by a Federal Special Action.

Proposed Federal Regulation

§100.27(e)(4)(ii) For the Kuskokwim area, Federal subsistence fishing schedules, openings, closings, and fishing methods are the same as those issued for the subsistence taking of fish under Alaska Statutes (AS 16.05.060), unless superseded by a Federal Special Action.

Unless re-opened by the Federal Subsistence Board, the Kuskokwim River mainstem and salmon-bearing tributaries that are within and adjacent to the exterior boundaries of the Yukon Delta National Wildlife Refuge are closed to the harvest of Chinook Salmon.

Unless re-opened by the Federal Subsistence Board, the Kuskokwim River mainstem and salmon-bearing tributaries that are within and adjacent to the exterior boundaries of the Yukon Delta National Wildlife Refuge are closed to the harvest of Chum, Sockeye, and Coho Salmon except by Federally qualified subsistence users. Federal subsistence fishing schedules, openings, closings, and fishing methods will be determined by the Federal Subsistence Board.

Unless superseded by Federal special action issued by the Federal Subsistence Board, in the Kuskokwim River mainstem and salmon-bearing tributaries that are within and adjacent to the exterior boundaries of the Yukon Delta National Wildlife Refuge, fishing with gillnets is prohibited. Federally qualified subsistence users may take fish other than Chinook Salmon with dip nets, beach seines, fish wheels, and rod and reel. Fish wheels are required to have a live box with no less than 45 cubic feet of water and must be checked at least every 6 hours. Fish wheels may be equipped with a chute and must be closely attended while in operation. All authorized gear types must return Chinook Salmon to the water alive.

Existing State Regulations

Kuskokwim Area – Subsistence Fishing

5 AAC 01.270. Lawful gear and gear specification and operation

(a) Salmon may be taken only by gillnet, beach seine, a hook and line attached to a rod or pole, handline, or fish wheel subject to the restrictions set out in this section and 5 AAC 01.275, except that salmon may also be taken by spear in the Holitna River drainage.

Emergency Order 3-S-WR-01-17

Until further notice:

Subsistence fishing with gillnets is closed in the Kuskokwim River mainstem and the following salmon-bearing tributaries:

> *The Kwethluk River drainage including its confluence with Kuskokuak Slough and downstream to ADF&G regulatory markers located at the downstream mouth of the slough.*
>
> *The Kasigluk and Kisaralik River drainages including Old Kuskokuak Slough to ADF&G regulatory markers at the confluence of Old Kuskokuak Slough with Kuskokuak Slough.*
>
> *The Tuluksak River drainage including its confluence with the Kuskokwim River and downstream approximately 1-mile to ADF&G regulatory markers.*
>
> *The Aniak River drainage to ADF&G regulatory markers at its confluence with the Kuskokwim River.*

Subsistence fishing with hook and line for Chinook Salmon is closed. Any Chinook Salmon caught must be returned alive to the water.

Fish wheels are required to have a live box with no less than 45 cubic feet of water and must be checked at least every 6 hours. Fish wheels may be equipped with a chute and must be closely attended while in operation. All Chinook Salmon must be returned alive to the water.

Subsistence fishing with dip nets and beach seines is open. Any Chinook Salmon caught in a dip net or beach seine must be returned immediately to the water alive.

Emergency Order 3-S-WR-10-17

Subsistence fishing in the Kuskokwim River Drainage, from the Yukon Delta NWR boundary at the mouth of the Kuskokwim River up to the mouth of the Holitna River (Sections 1–4), will be allowed from 12:01 p.m. Saturday, July 8, 2017 until further notice. Gillnets are restricted to 6-inch or less mesh, 45 meshes deep, and 25 fathoms in length.

The waters of the Kuskokwim River from a line formed between two points lat 61° 35.264′ N, long 159° 33.459′ W and lat 61° 35.611′ N, long 159° 33.260′W upstream to a line formed between two points lat 61° 35.308′ N, long 159° 29.167′ W and lat 61° 34.731′ N, long 159° 28.939′W (Figure 1) will be closed to subsistence fishing with gillnets from 12:01p.m. Saturday, July 8, 2017 until further notice.

Emergency Order 3-S-WR-10-17 does not supersede the tributary closures listed in emergency order 3-S-WR-01-17.

Extent of Federal Public Waters

For purposes of this analysis, the phrase "Federal public waters" is defined as those waters described under 50 CFR 100.3(b)(4). The affected area consists of those waters of the Kuskokwim River drainage that are within and adjacent to the exterior boundaries of the Yukon Delta National Wildlife Refuge (Refuge), including District 1 and portions of District 2 of the Kuskokwim Fishery Management Area. The waters are generally described as the lower Kuskokwim River drainage from the mouth upriver to and including about 30 miles of the Aniak River (**Map 1**).

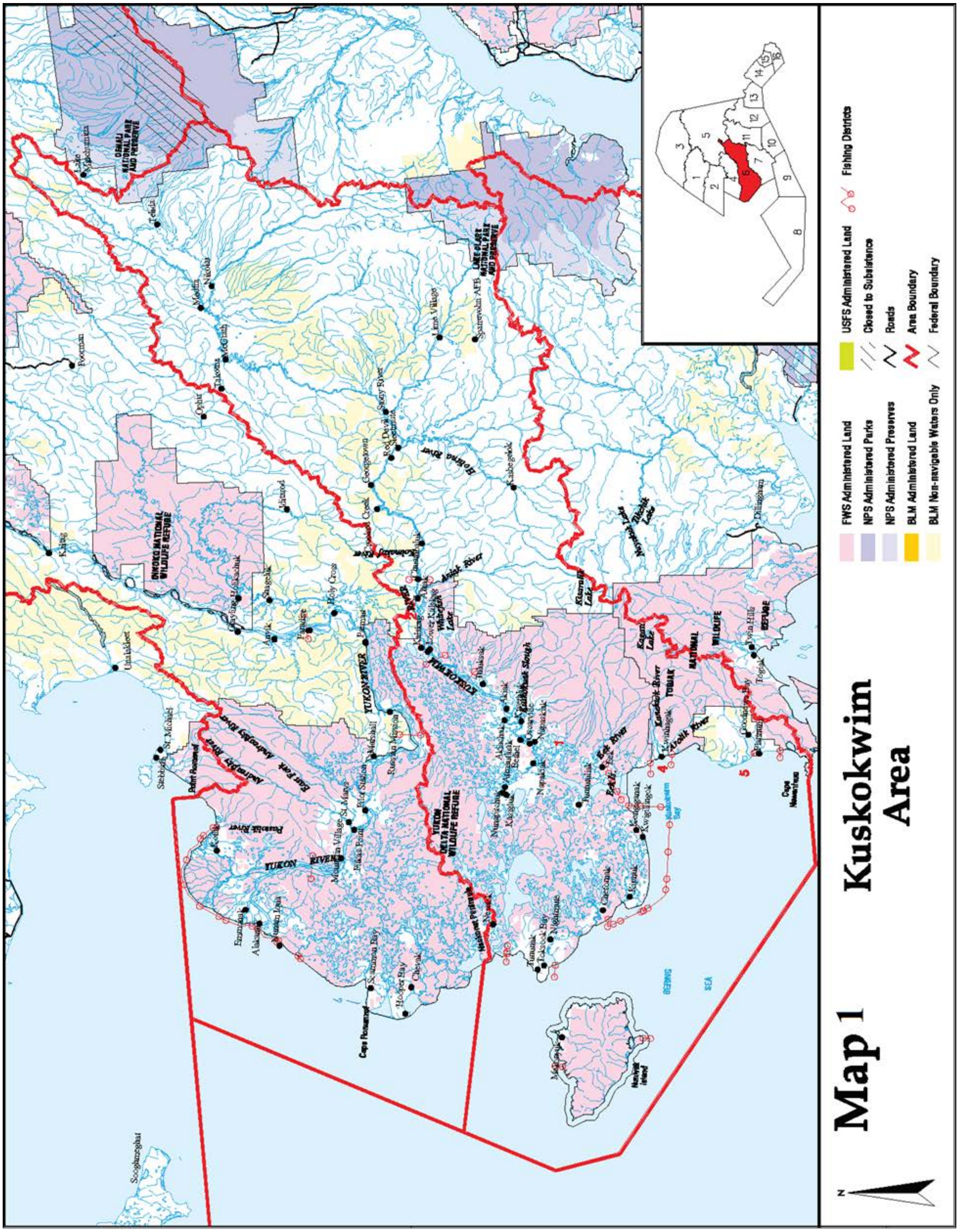
Customary and Traditional Use Determinations

Residents of the Kuskokwim Area, except those persons residing on United States military installations located on Cape Newenham, Sparrevohn USAFB, and Tatalina USAFG, have a customary and traditional use determination for salmon (50 CFR 100.24). The area includes 40 villages. Presented from south to north, the villages are: Newtok, Tununak, Toksook Bay, Nightmute, Mekoryuk, Chefornak, Kipnuk, Kwigillingok, Kongiganek, Platinum, Goodnews Bay, Quinhagak, Tuntutuliak, Eek, Napakiak, Napaskiak, Kasigluk, Nunapitchuk, Atmautluak, Oscarville, Bethel, Kwethluk, Akiachak, Akiak, Tuluksak, Lower Kalskag, Kalskag, Aniak, Chuathbaluk, Napaimute, Crooked Creek, Georgetown, Red Devil, Sleetmute, Stony River, Lime Village, Takotna, McGrath, Telida, and Nikolai.

Current Events

On May 19, 2017, the Board approved Temporary Special Action Requests FSA17-03 and FSA17-04 with modification. (The analysis of FSA17-04 is **Appendix A**.). Beginning on June 12, 2017, Federal public waters of the Kuskokwim River drainage were closed to the harvest of Chinook Salmon except by Federally qualified subsistence users identified in a Section 804 Subsistence Users Prioritization analysis. The Board determined there was a need to restrict the harvest of Chinook Salmon for the conservation of healthy populations and to protect the continuation of subsistence uses as mandated under ANILCA Section 815. Those eligible to harvest Chinook Salmon under Federal regulations were the following: Federally qualified subsistence users residing in the Kuskokwim River drainage and the coastal communities of Chefornak, Kongiganek, Kipnuk, and Kwigillingok. Further, the Board said the Federal in-season manager, beginning June 12, may provide harvest opportunity for Chinook Salmon subsistence fisheries using openings, closures, and gear restrictions developed in consultation with the Kuskokwim River Inter-Tribal Fish Commission pursuant to the Memorandum of Understanding between the U.S. Fish and Wildlife Service and the Commission.

State actions between May 20 and June 12 closed the river and salmon producing tributaries to the use of gillnets, and only dip nets, beach seines, fish wheels, and rod and reel have been allowed so that Chinook Salmon could be live released. Additionally, the State of Alaska provided three opportunities for the use of 4 inch or less mesh size gillnets between May 20 and June 12. On June 12, the Federal in-season manager provided one 12-hour in-river fishing opportunity for Federally-qualified users with 6-inch mesh drift gillnets where an estimated 5,500 salmon were harvested between Tuntutuliak and Akiak (i.e., that portion of the Refuge where a large majority of subsistence harvest occurs), of which approximately 2,360 were Chinook Salmon (**Figure 1, Table 1**). On June 24, the Federal in-season manager provided a


Map 1
Kuskokwim Area
FWS Administered Land
NPS Administered Parks
NPS Administered Preserves
BLM Administered Land
BLM Non-navigable Waters Only
USFS Administered Land
Closed to Subsistence
Roads
Area Boundary
Federal Boundary
Fishing Districts

second 12-hour in-river fishing opportunity for Federally-qualified users where an estimated 33,500 salmon were harvested between Tuntutuliak and Akiak, of which approximately 4,560 were Chinook Salmon (**Figure 1, Table 1**). A 6-hour in-river fishing opportunity was provided on July 1, where an estimated 30,190 total salmon were harvested between Tuntutuliak and Akiak, of which approximately 990 were Chinook Salmon, and on July 3, an additional 12-hour in-river opportunity was provided when an estimated 17,950 total salmon were harvested between Tuntutuliak and Akiak, of which approximately 690 were Chinook Salmon (**Figure 1, Table 1**). During the June 12 opportunity, a total of 523 drift boat trips were estimated to have participated. During subsequent opportunities, this number decreased continuously with only 250 drift boat trips estimated to have participated during the July 3 opportunity (**Figure 2, Table 2**). These estimates do not include the Subsistence harvest that occurred by Federally qualified subsistence users in the villages of Tuluksak, Lower Kalskag, Kalskag, and Aniak. Subsequent to the Board receiving this special action request, the Federal in-season manager announced that previously issued special actions would be rescinded, and that Refuge waters would re-open to the harvest of Chinook Salmon on July 7, 2017 (Special Action 3-KS-07-17). On July 6 the Refuge estimated that 90% of the Chinook Salmon run had passed the Bethel test fishery and that the run timing was average to ½ day late. The Chum and Sockeye Salmon to Chinook Salmon ratio on this date was about 105:1 in the Bethel Test Fishery and approximately 3:1 at the Aniak test fish site. The Federal in-season manager determined that there were no additional reasonable measures necessary to conserve Chinook Salmon within Refuge waters at this time.

The ADF&G opened subsistence fishing in the Kuskokwim River main stem within Refuge waters July 8, 2017, until further notice (3-S-WR-10-17). Gillnets are restricted to 6-inch or less mesh, 45 meshes deep, and 25 fathoms in length. Salmon-bearing tributaries remain closed to the use of gillnets, and Chinook Salmon caught with other legal gear must be released to the water alive. The ADF&G said "At the Bethel Test Fishery, the ratio of chum and sockeye salmon to Chinook salmon has averaged roughly 30:1 over the last ten days. Subsistence harvest reports from Wednesday's Working Group meeting and harvest estimates provided by USFWS from the last two fishing periods in federal waters indicate that the vast majority of harvest is comprised of chum and sockeye salmon. Restrictions to gillnets and other gear types will mitigate the incidental harvest of Chinook salmon and allow subsistence fishers the ability to harvest the more abundant chum and sockeye salmon."

As of July 7, 2017, there was one commercial buyer registered for the Kuskokwim River drainage. A recent radio news broadcast quoted the buyer as saying he expects to arrive in the area by the second or third week of August, at the latest (Cotsirilos 2017).

Harvest History

See fisheries special action analysis for FSA17-04 (**Appendix A**) for a detailed overview of the harvest history for the four primary salmon species of interest to this special action request. The background includes information regarding historical subsistence and commercial harvest. Information specific to the 2017 season is provided below.

Refuge staff estimated that 87,120 salmon have been harvested between Tuntutuliak and Akiak during the four opportunities provided in 2017. The total harvest is comprised of approximately 8,600 Chinook Salmon, 54,410 Chum Salmon, and 24,100 Sockeye Salmon (**Figure 3, Table 1**). The estimates do not include the subsistence harvest that occurred by Federally qualified subsistence users in the villages of Tuluksak, Lower Kalskag, Kalskag, and Aniak, as the majority of harvest generally occurs between Tuntutuliak and Tuluksak. The time and costs associated with sampling subsistence harvests in season increase dramatically if the Refuge were to include these up-river communities when conducting these surveys. Therefore, these estimates are considered a minimum, with the total likely higher that the numbers presented in this analysis.

Biological Background

See fisheries special action analysis for FSA17-04 (**Appendix A**) for a detailed overview of the biological background for the four primary salmon species of interest to this special action request. The background includes information regarding run size, escapement, in-season run timing and composition, and population assessments as available. Information specific to the 2017 season is provided below.

Run-Size

Estimates of drainage-wide run size are produced by the Chinook Salmon run-reconstruction model, which utilizes multiple sources of data such as weir and aerial escapement indices, commercial catch and effort, mark-recapture estimates, and harvest (Liller and Hamazaki 2016). The run-size for Chinook Salmon in the Kuskokwim River for 2017 will not be known until later in 2017 or early 2018.

In-season Chinook Salmon data collected from the Bethel Test Fishery and the Bethel Sonar Project in 2017 seem to indicate that the Chinook Salmon run-size in the Kuskokwim River for 2017 will be one of the lowest on record. As of July 11, 2017, the estimated Chinook Salmon run-size past the Bethel area, as monitored by the Bethel Sonar Project, is 56,800 (95% CI: 42,000 – 71,500) (**Figure 4, Table 3**). This is the first year of the sonar project so great care must be taken in extrapolating Chinook Salmon run-size past Bethel from this project until multiple years of data are available for comparison. As of July 12, 2017, the Bethel Test Fishery has a cumulative catch-per-unit-effort (CPUE) of 328 Chinook Salmon, which is the second lowest cumulative CPUE on record from 2008 to 2016, with only 2013 Chinook Salmon cumulative CPUE being lower (237) (**Figure 5, Table 4**).

The predicted end of season cumulative CPUE for Chinook Salmon at the Bethel Test Fishery appears to be between the 2012 end of season cumulative CPUE and the 2013 end of season cumulative CPUE. If the linear relationship between cumulative end of season CPUE for Chinook Salmon at the Bethel Test Fishery and the Chinook Salmon total run-size as estimated by the Chinook Salmon run-reconstruction model holds true (**Figure 6**), the 2017 Chinook Salmon run-size could be between 90,000 and 100,000 fish. However, estimating total run-sizes from the Bethel Test Fishery should be taken with extreme caution when comparing previous run sizes with the current year. There was substantial harvest on the total run below the Bethel Test Fishery during all prior Chinook Salmon seasons that did not occur during the 2017 season. Because of this, the 2017 Chinook Salmon run size estimate based on Bethel Test Fishery CPUE is likely skewed high. In order to take account for the effects of harvest in this

relationship, one can subtract harvest below Bethel from the total run-size estimates, regressing the relationship between total run-size past Bethel with the end of season cumulative CPUE at the Bethel Test Fishery, and then adding on the predicted 2017 harvest below Bethel back to the resulting run-size past Bethel prediction to get the estimated total run-size (**Figure 7**). If the end of season cumulative CPUE is between 300 and 400 Chinook Salmon, the resulting run-size past Bethel would be 56,000 - 81,243, with the estimated total run-size being 63,000 - 92,000 Chinook Salmon; this is assuming that the estimated harvest below Bethel is within the confidence limit bounds of the estimated Chinook Salmon harvest (6,880 – 10,510). Once again, extreme caution should be taken in these run-size predictions based of the relationship between end of season cumulative CPUE and total run-sizes of Chinook Salmon because of the large amounts of prediction uncertainty, given that the Bethel Test Fishery does not always catch a constant fraction of the Chinook Salmon run that passes through the Bethel Test Fishery on a yearly basis.

Based on projections by Refuge staff, 97% of the Chinook Salmon run has passed Bethel as of July 12, 2017 (**Figure 8, Table 5**), with around 1-2% of the run expected to pass Bethel within the next five days.

Although it is still very early, Coho Salmon have not been encountered in any salmon project as of July 12, 2017. The Bethel test fishery generally catches their first Coho Salmon during mid-July, with fish starting to arrive at the escapement projects shortly thereafter. Any information about historical Coho Salmon run-sizes can be found in FSA17-04 (**Appendix A**). In addition, no forecast for Coho Salmon run-size is available.

Escapement

The ADF&G and USFWS monitor Chinook Salmon escapement throughout the Kuskokwim River drainage with a variety of weir and aerial surveys. Two of the weirs monitored in the Kuskokwim River that are within the Refuge are on the Kwethluk and Tuluksak Rivers. The Kwethluk River Chinook Salmon escapement goal was established in 2013 and is 4,100-7,500 Chinook Salmon (Sustainable Escapement Goal). In 2015 the escapement for the Kwethluk River was 8,163 Chinook Salmon, the first time the escapement goal had been met since 2007 (Webber et al. 2016a). However, the escapement was still below the previous 12 year average observed during 1992, 2000, 2002-2004, 2006-2011, and 2013 (Miller et al. 2015). The Tuluksak River does not have an escapement goal at this time.

As of July 11, Chinook Salmon passage at the Kwethluk River weir was 2,179, which is approximately 24 fish below the ten year averages for the system (**Figure 8, Table 6**). As of July 11, Chinook Salmon passage at the Tuluksak River weir is 226 fish, which is 100 fish above the ten year average for the system (**Figure 10, Table 7**). It is still too early to make any determinations on end of season escapement for either of the river systems.

Median passage of Chinook Salmon at the Kwethluk River weir was between July 6 and July 17 for recorded years between 2000 and 2014, with the latest 75% percentile passage recorded occurring on July 26 (Webber et al. 2016a). Median passage of Chinook Salmon at the Tuluksak River weir was between July 4 and July 22 for recorded years between 1991 and 2015, with the latest 75% percentile passage recorded occurring on July 28 (Webber et al. 2016b). Stream life expectancy is approximately 31 days following weir passage based on the days between median passage and median carcass passage at the

Kwethluk River weir (Miller et al. 2007). The stream life expectancy in the Tuluksak River is 20 days post weir passage based on the same methods (Plumb et al. 2007).

As of July 12 2017, no Coho Salmon have been monitored passing either the Kwethluk and Tuluksak River weir projects. During the last 5 years, the earliest Coho Salmon have returned to the Kwethluk and Tuluksak River weirs were July 14 and July 17 respectively. Historical information of Coho Salmon escapements can be found in FSA17-04 (**Appendix A**).

In-Season Run Timing, Species Composition

In-season management relies heavily on in-river abundance via test fisheries and pre-season forecasts in order to inform harvest decisions that control subsistence opportunities. The main in-river abundance indicator used in-season is the Bethel Test Fishery. The Bethel Test Fishery has been operated upstream of Bethel since 1984, and provides a long term data set on species composition, relative abundances, and run-timing. There are complications with using data from the test fishery to help in-season management because in-river abundance during the season is confounded with such things as run timing and water level, as well as the test fishery being located upstream of where much of the Chinook Salmon harvest takes place. There is a large amount of variation in historical run timing, which complicates in-season predictions of run abundance. For information on historical run-timing as measured by the Bethel Test Fishery see FSA17-04 (**Appendix A**). Compared to 2012, which was a later than average run, and 2013, which had average run timing, the 2017 Chinook Salmon run appears to be later than average based on the Bethel test fishery (**Figure 11**).

Relative species composition can be measured by the Chum and Sockeye Salmon to Chinook Salmon ratio at the Bethel Test Fishery. As of July 11, this ratio was 35.2 to 1, with the previous five days ratios being between 57.1 and 380 to 1 (**Figures 12, 13, Tables 8 and 9**). These ratios indicate that the relative contribution of Chinook Salmon to the total in-river abundance has been very low over the last few days, which is typical for this time of year.

Effects of the Request

If the special action request was approved, the in-season fisheries management authority of the Refuge Manager would be rescinded for the remainder of the 2017 salmon season. Salmon subsistence fishing schedules, openings, closings, and fishing methods would be determined by the Board and their respective federal staff. Although attainable, this might result in delaying in-season management action.

If the special action request was approved, Refuge waters of the Kuskokwim River mainstem and salmon-bearing tributaries would close to the take of Chinook Salmon. The effect on Chinook Salmon would be to allow more Chinook Salmon to escape into the spawning areas of the Kuskokwim River drainage, thereby expanding the efforts to maintain healthy populations of Chinook Salmon in the drainage.

If the special action was approved, Refuge waters of the Kuskokwim River mainstem and salmon-bearing tributaries would close to the take of Chum and Sockeye Salmon except by Federally qualified subsistence users. Federally qualified subsistence users would not be allowed to use gillnets. They

would be allowed to use only dip nets, beach seines, fish wheels, and rod and reel to harvest fish other than Chinook Salmon. Nonsubsistence uses, including commercial and sport fishing for salmon, would not be allowed in Refuge waters. The effect on Chinook Salmon would be to allow more Chinook Salmon to escape into the spawning areas of the Kuskokwim River drainage, thereby expanding the efforts to maintain healthy populations of Chinook Salmon in the drainage.

If the special action was approved, Refuge waters of the Kuskokwim River mainstem and salmon-bearing tributaries would close to the take of Coho Salmon except by Federally qualified subsistence users. Federally qualified subsistence users would be allowed to use all legal gear to take salmon. Conversely, nonsubsistence uses, including commercial and sport fishing for salmon, would not be allowed to harvest salmon.

If the special action was not approved, Refuge waters of the Kuskokwim River mainstem would remain open to the harvest of all salmon under current State regulations, including sport fisheries, and may include future commercial fishing opportunities. Specified Salmon bearing tributaries would remain closed to the harvest of Chinook Salmon and also to the harvest of any fish using gill nets. This may contribute to missing the lower bound of the Chinook Salmon drainage wide escapement goal, along with the individual tributary goals for the Kwethluk, George, and Kogrukluk Rivers. The effect on subsistence uses may be decreased availability of Coho Salmon, and possibly Chum Salmon, if a commercial salmon fishery is permitted by the ADF&G.

LITERATURE CITED

Cotsirilos, T. 2017. Silver Salmon Buyer Coming to Kuskokwim Bay. KYUK Radio, July 6, 2017. Bethel, AK. http://kyuk.org/post/silver-salmon-buyer-coming-kuskokwim-bay

Liller Z., H., Hamazaki T. 2016. Kuskokwim River Chinook Salmon Run Reconstruction, 2015, Alaska Department of Fish and Game, Regional Information Report 3A16-03, Anchorage, AK.

Miller, S. J., J. K. Boersma, K. C. Harper. 2015. Abundance and Run Timing of Adult Pacific Salmon in the Kwethluk River, Yukon Delta National Wildlife Refuge, Alaska, 2014. Alaska Fisheries Data Series Number 2015-6. U.S. Fish and Wildlife Service, Kenai, Ak.

Miller, S. J., K. C. Harper, and D. G. Spencer. 2007. Abundance and Run Timing of Adult Pacific Salmon in the Kwethluk River, Yukon Delta National Wildlife Refuge, Alaska, 2006. Alaska Fisheries Data Series Number 2007-9. U.S. Fish and Wildlife Service, Kenai, AK.

Plumb, M. P., K. C. Harper, and D. G. Spencer. 2007. Abundance and Run Timing of Adult Pacific Salmon in the Tuluksak River, Yukon Delta National Wildlife Refuge, Alaska, 2006. Alaska Fisheries Data Series Number 2007-4. U.S. Fish and Wildlife Service, Kenai, AK.

Shelden, C. A., T. Hamazaki, M. Horne-Brine, and G. Roczicka. 2016. Subsistence salmon harvests in the Kuskokwim area, 2015. ADF&G, Fishery Data Series No. 16-55, Anchorage. http://www.adfg.alaska.gov/sf/Publications/index.cfm?ADFG=main.mainSearchSubmit

Webber, P. A., J. K. Boersma, and K. C. Harper. 2016a. Abundance and Run Timing of Adult Pacific Salmon in the Kwethluk River, Yukon Delta National Wildlife Refuge, Alaska, 2015. Alaska Fisheries Data Series Number 2016-7. U.S. Fish and Wildlife Service, Soldotna, AK.

Webber, P. A., J. K. Boersma, and K. C. Harper. 2016b. Abundance and Run Timing of Adult Pacific Salmon in the Tuluksak River, Yukon Delta National Wildlife Refuge, Alaska, 2015. Alaska Fisheries Data Series Number 2016-5. U.S. Fish and Wildlife Service, Soldotna, AK.

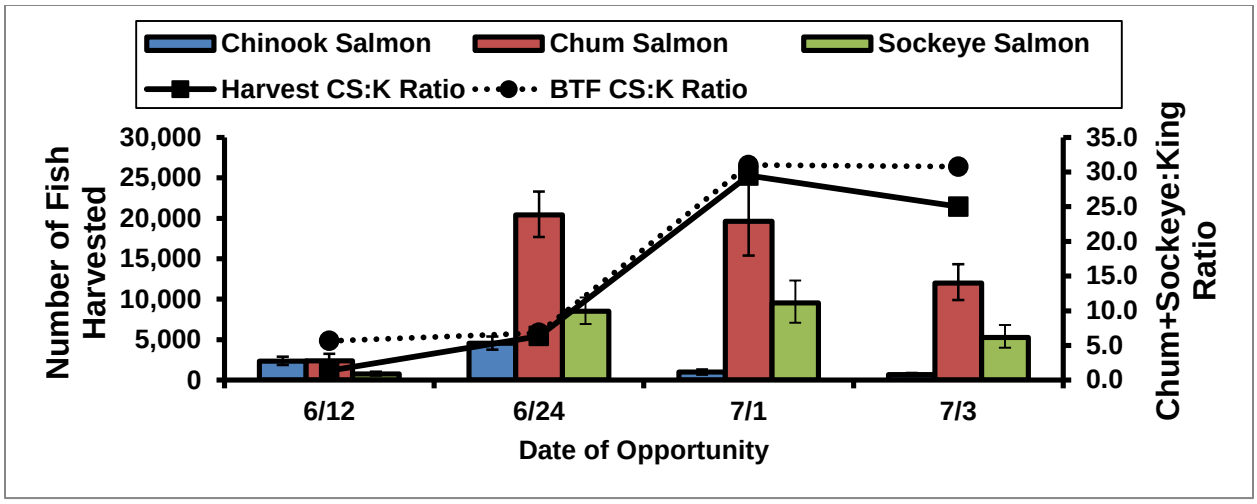


Figure 1. Total salmon harvested within Refuge waters by species and date of opportunity. The lines plotted on the secondary axis are the Chum and Sockeye to Chinook ratio as estimated by harvest (solid line, black squares) and catch at the Bethel Test Fishery (dotted line, black circles). Error bars represent the 95% confidence intervals for estimated harvest by species and date of opportunity.

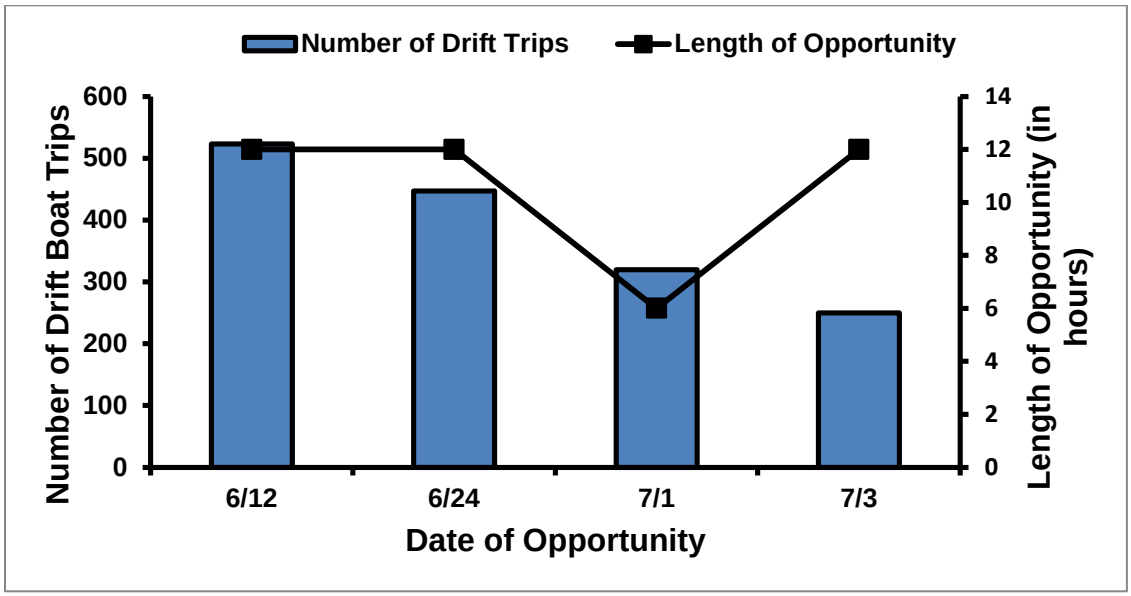


Figure 2. Estimated number of drift boat trips for each fishing opportunity provided for in 2017 with Refuge waters. Second axis has length of the opportunity in hours for each fishing opportunity provided for in 2017 plotted with solid line and black squares.

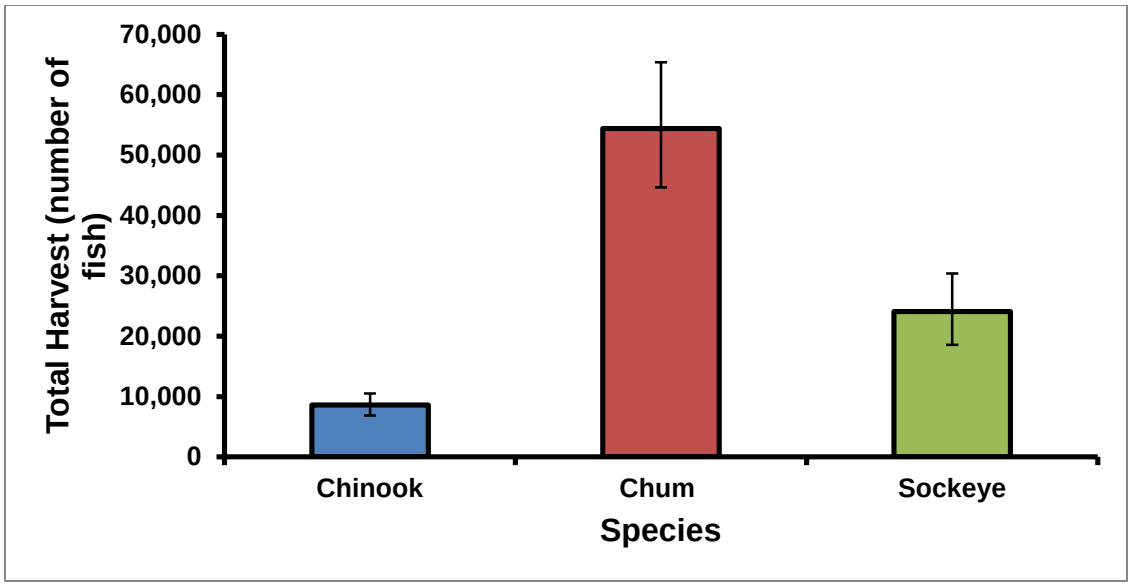


Figure 3. Total salmon harvested within Refuge waters by species from the 4 fishing opportunities in 2017. Error bars represent the 95% confidence intervals for estimated harvest by species.

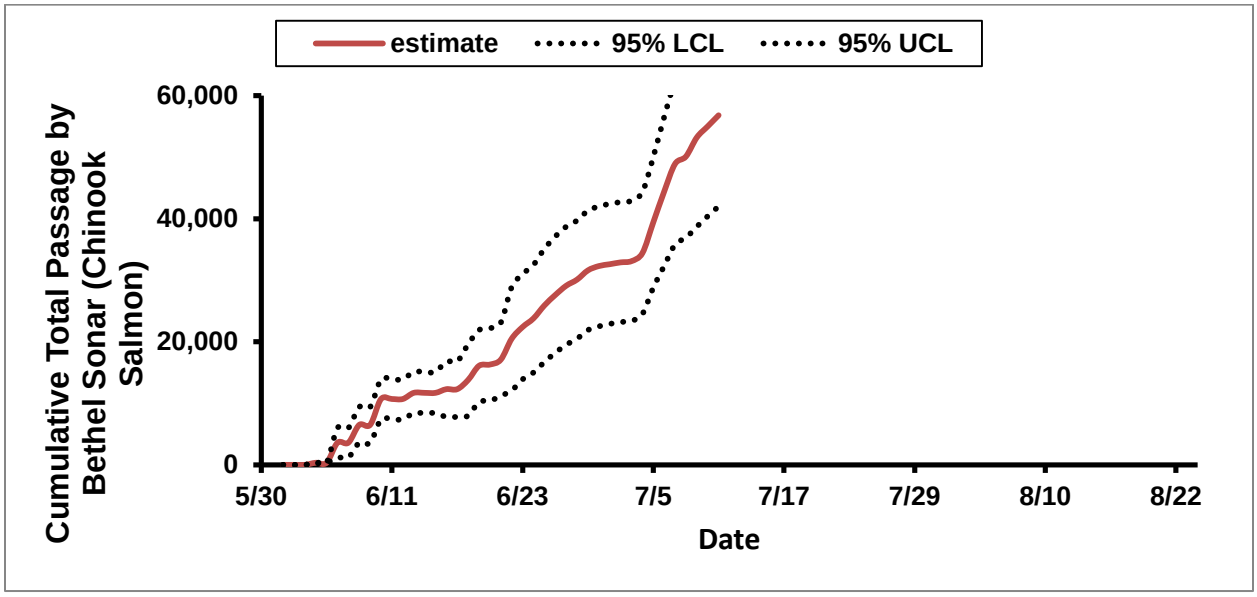


Figure 4. Total cumulative Chinook Salmon passages estimates through July 11, 2017, as measured at the Bethel Sonar. Dotted lines represent 95% confidence intervals around total cumulative passage estimate.

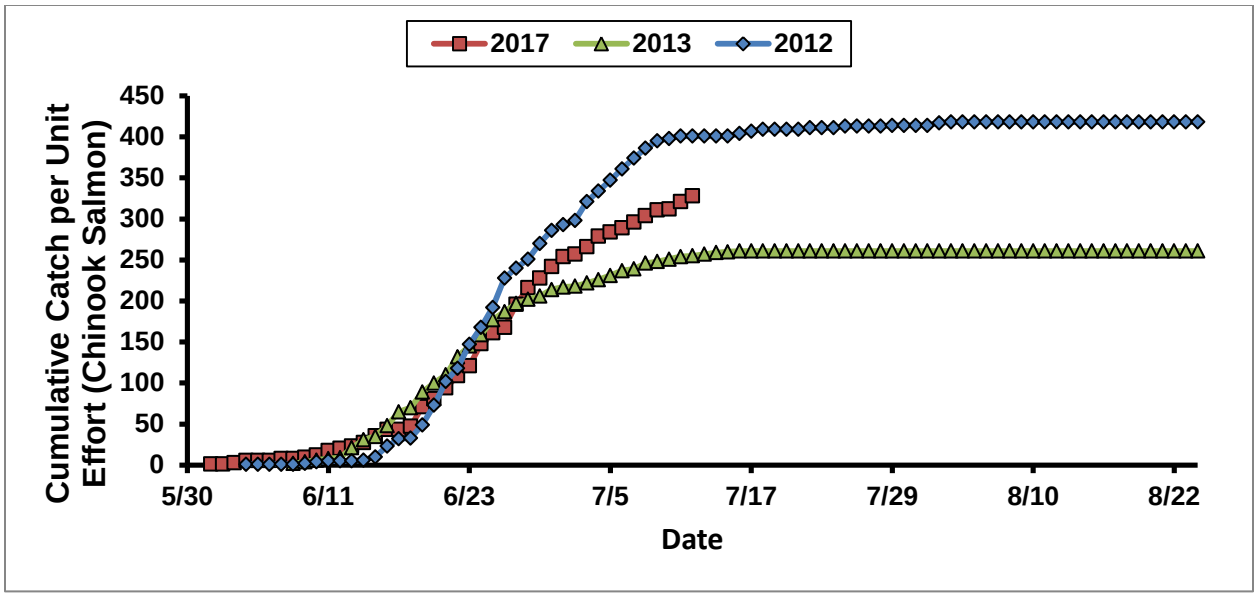


Figure 5. Cumulative catch per unit effort for Chinook Salmon monitored through July 12 at the Bethel Test Fishery for 2012, 2013, and 2017.

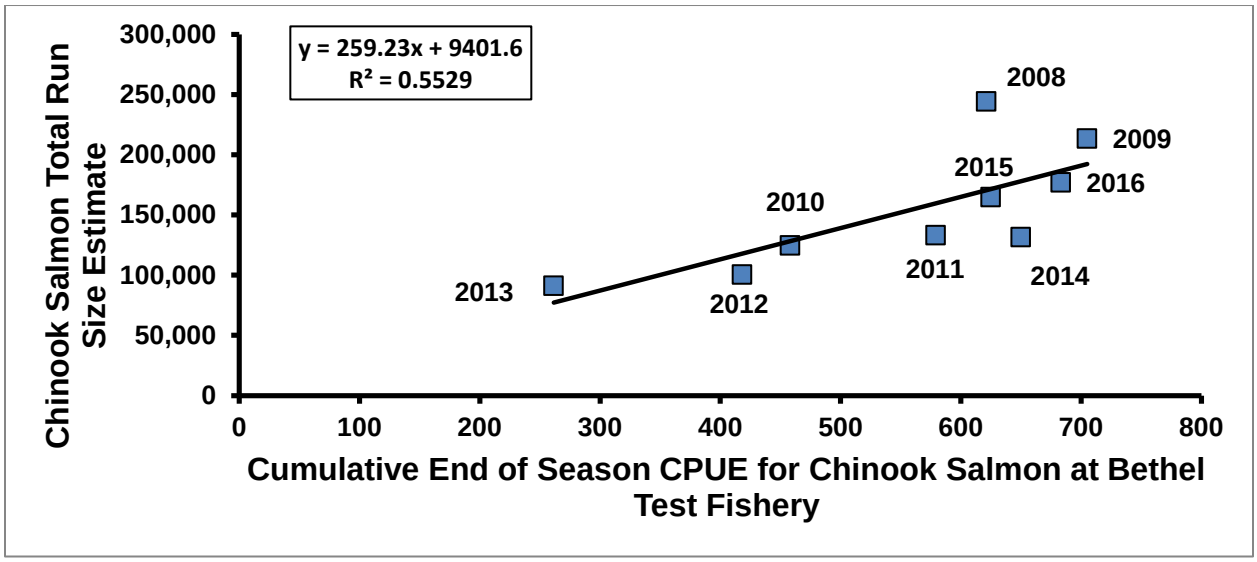


Figure 6. Relationship between Cumulative End of Season CPUE for Chinook Salmon at Bethel Test Fishery and Chinook Salmon Total Run Size Estimate as produced by Chinook Salmon Run Reconstruction Model (Liller et al. 2016).

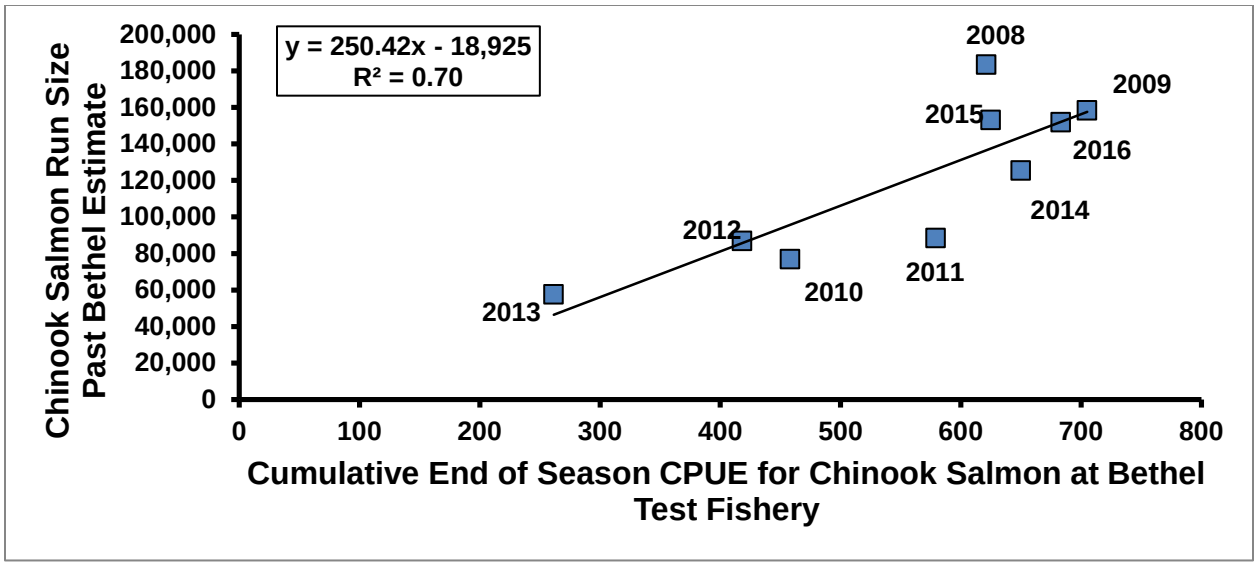


Figure 7. Relationship between Cumulative End of Season CPUE for Chinook Salmon at Bethel Test Fishery and Chinook Salmon run-size past Bethel Estimate.

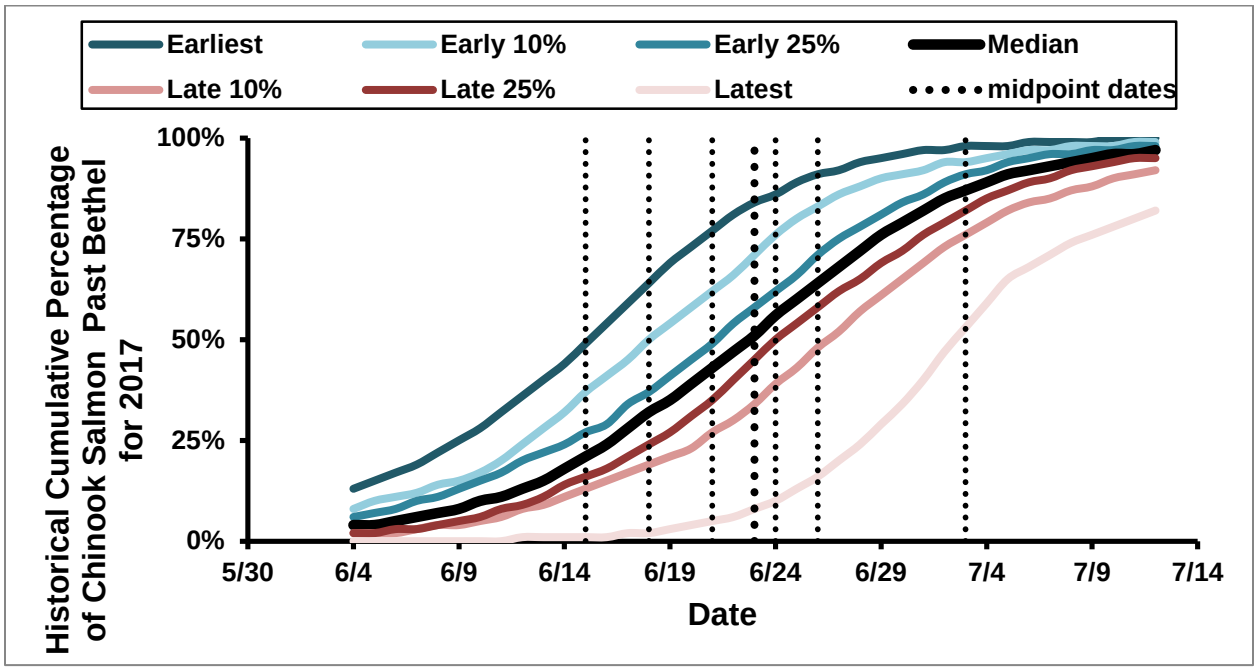


Figure 8. Historical cumulative percentage of Chinook Salmon past Bethel for 2017 with various run-timing scenarios. Vertical dotted lines represent the dates at which 50% of the Chinook Salmon run was estimated to have passed Bethel given various run-timing scenarios.

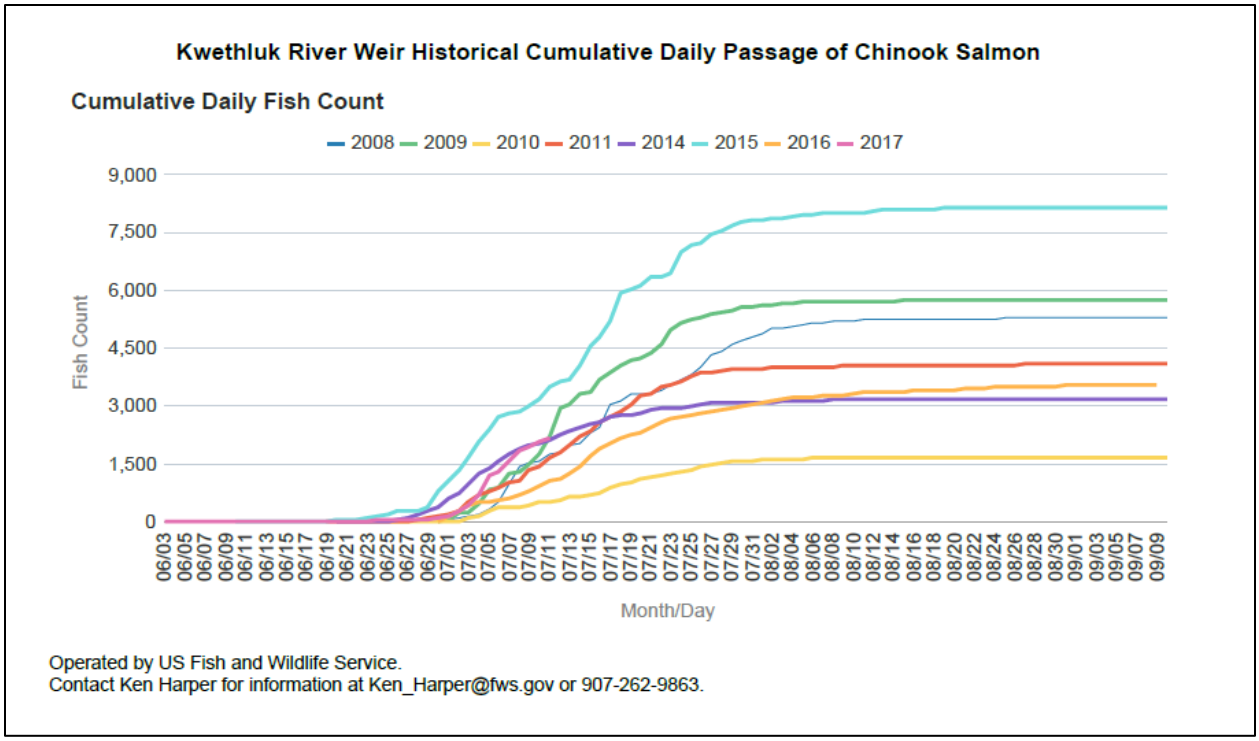


Figure 9. Historical cumulative daily passage of Chinook Salmon at the Kwethluk River Weir from 2008 to 2017.

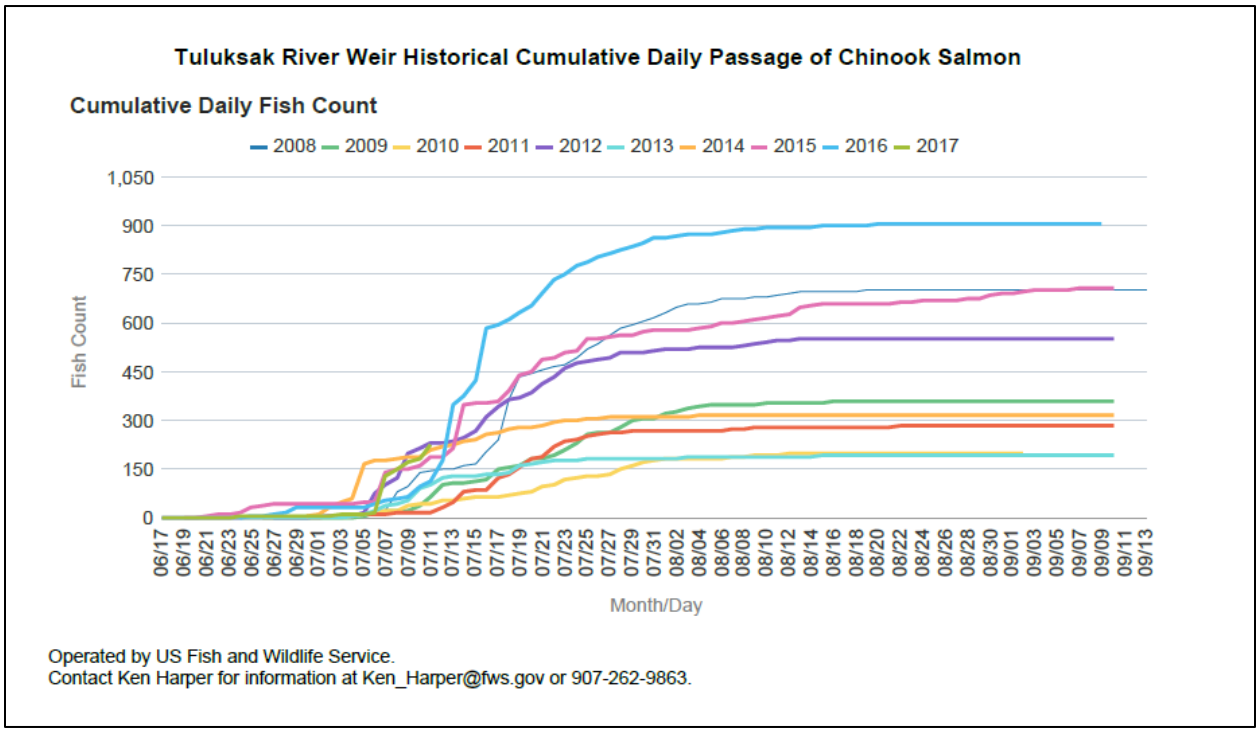


Figure 10. Historical cumulative daily passage of Chinook Salmon at the Tuluksak River Weir from 2008 to 2017.

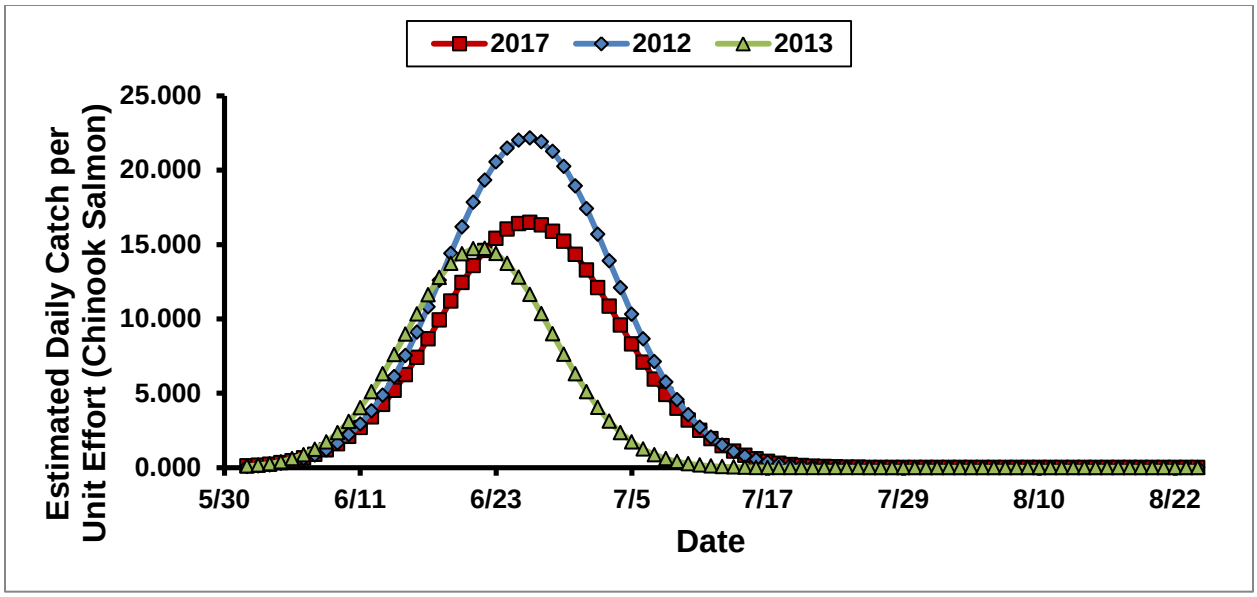


Figure 11. Estimated daily catch per unit effort for Chinook Salmon as monitored at the Bethel Test Fishery for 2012, 2013, and 2017. Curves are estimated using non-linear version of Gaussian distribution.

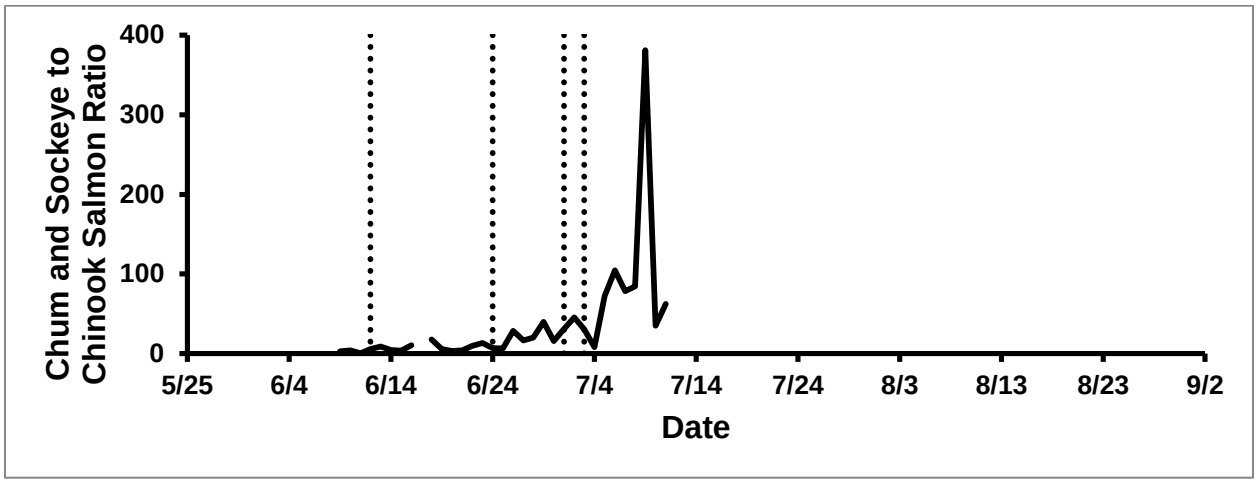


Figure 12. Chum and Sockeye Salmon to Chinook Salmon ratio for the Bethel Test Fishery in 2017, through July 12. Dotted vertical lines represent the date in which fishing opportunities were provided in 2017.

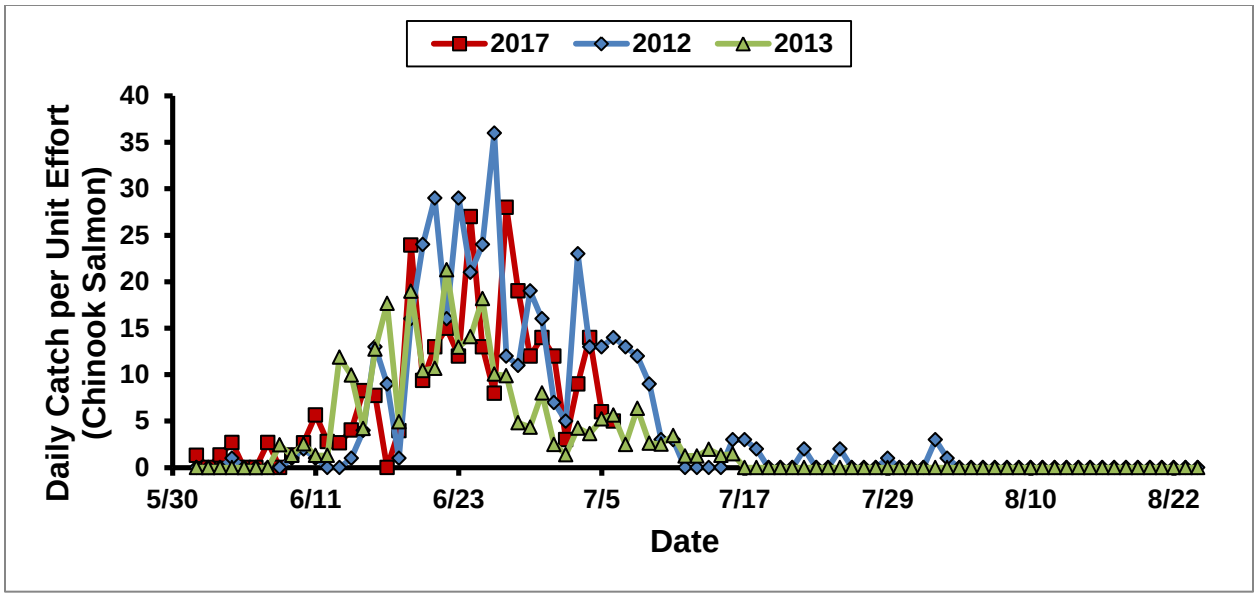


Figure 3. Daily catch per unit effort for Chinook Salmon as monitored at the Bethel Test Fishery for 2012, 2013, and 2017.

Table 1. Estimates of salmon harvest by fishing opportunity by species within Refuge waters for 2017.

Date	All Salmon	LCL	UCL	Chinook	LCL	UCL	Chum	LCL	UCL	Sockeye	LCL	UCL
6/12	5,510	4,430	6,720	2,360	1,880	2,890	2,370	1,670	3,240	780	530	1,070
6/24	33,470	29,290	37,910	4,560	3,780	5,410	20,410	17,680	23,310	8,500	6,920	10,220
7/1	30,190	24,290	37,030	990	700	1,340	19,640	15,380	24,490	9,550	7,100	12,300
7/3	17,950	15,550	20,550	690	520	870	11,990	9,900	14,340	5,270	4,000	6,800
Total	87,120	73,560	102,210	8,600	6,880	10,510	54,410	44,630	65,380	24,100	18,550	30,390

Table 2. Length of fishing opportunity and estimated number of drift trips within Refuge waters for 2017.

Date	Length of Opportunity	Number of Drift Trips
6/12	12	523
6/24	12	447
7/1	6	320
7/3	12	250
Total	42	1,540

Table 3. Cumulative estimates of salmon passage from the 2017 sonar operation through July 11.

Cumulative Chinook Salmon at Bethel Sonar			
Date	**Total Passage**	**95% LCL**	**95% UCL**
6/1	0	0	0
6/2	0	0	0
6/3	0	0	0
6/4	342	342	342
6/5	342	342	342
6/6	3,600	1,200	6,000
6/7	3,600	1,200	6,000
6/8	6,500	3,600	9,400
6/9	6,500	3,600	9,400
6/10	10,700	7,400	13,900
6/11	10,700	7,400	13,900
6/12	10,700	7,400	13,900
6/13	11,700	8,400	15,100
6/14	11,700	8,400	15,100
6/15	11,700	8,400	15,100
6/16	12,300	7,800	16,800
6/17	12,300	7,800	16,800
6/18	13,800	8,000	19,600
6/19	16,100	10,200	21,900
6/20	16,300	10,400	22,200
6/21	17,100	11,200	23,100
6/22	20,500	12,100	28,900
6/23	22,400	13,900	31,000
6/24	23,800	15,000	32,500
6/25	25,900	16,700	35,100
6/26	27,600	18,200	37,100
6/27	29,100	19,500	38,700
6/28	30,100	20,500	39,700
6/29	31,600	21,900	41,300
6/30	32,300	22,500	42,000
7/1	32,600	22,900	42,400
7/2	32,900	23,200	42,700
7/3	33,100	23,400	42,900
7/4	34,400	24,500	44,300
7/5	39,400	28,800	50,000
7/6	44,400	32,300	56,500
7/7	48,900	35,800	62,100
7/8	50,100	36,900	63,200

Table 3 Continued.

Date	Total Passage	95% LCL	95% UCL
7/9	53,200	38,700	67,700
7/10	55,000	40,400	69,600
7/11	56,800	42,000	71,500

Table 4. Cumulative CPUE from Bethel Test Fishery for Chinook Salmon through July 6.

Date	2012	2013	2017
6/1			1
6/2			1
6/3			3
6/4	1		5
6/5	1		5
6/6	1		5
6/7	1		8
6/8	1	2	8
6/9	2	4	9
6/10	4	6	12
6/11	5	8	18
6/12	5	9	21
6/13	5	21	23
6/14	6	31	27
6/15	10	35	36
6/16	23	48	43
6/17	32	65	43
6/18	33	70	47
6/19	49	89	71
6/20	73	100	81
6/21	102	110	94
6/22	118	132	109
6/23	147	145	121
6/24	168	159	148
6/25	192	177	161
6/26	228	187	168
6/27	240	197	196
6/28	251	202	216
6/29	270	206	228
6/30	286	214	242
7/1	293	217	254
7/2	298	218	257
7/3	321	222	266
7/4	334	226	279
7/5	347	231	284
7/6	361	237	289
7/7	374	239	296
7/8	386	246	304
7/9	395	248	311

Table 4 Continued.

Date	2012	2013	2017
7/10	398	251	312
7/11	401	254	321
7/12	401	255	328

Table 5. Percentage of Chinook Salmon run complete according to various historical run timing scenarios on July 6, 2017.

Date	Timing	Historical Midpoint	Historical Cumulative Percentage	Forecasted Midpoint
7/12	**Earliest**	6/15	100%	6/15
7/12	**Early 10%**	6/18	99%	6/17
7/12	**Early 25%**	6/21	98%	6/19
7/12	**Median**	6/23	97%	6/21
7/12	**Late 25%**	6/24	95%	6/23
7/12	**Late 10%**	6/26	92%	6/25
7/12	**Latest**	7/3	82%	6/27

Table 6. Daily Chinook Salmon escapement for 2017at the Kwethluk River weir through July 11, as well as summary statistics for Chinook Salmon escapement at the Kwethluk River weir.

Kwethluk River Weir Chinook Salmon Escapement						
Date	**Lowest**	**Average**	**5 year average**	**10 year average**	**Highest**	**2017**
6/26	0	93	173	72	327	64
6/27	0	236	185	79	1,528	64
6/28	0	398	253	112	2,322	67
6/29	2	580	318	128	2,860	68
6/30	8	779	380	168	5,460	91
7/1	18	1,074	620	278	7,774	136
7/2	32	1,430	787	386	9,257	277
7/3	81	1,749	1,020	527	9,951	432
7/4	135	2,141	1,280	704	11,804	684
7/5	292	2,530	1,439	961	12,700	1,197
7/6	360	2,984	1,617	1,144	13,621	1,286
7/7	361	3,285	1,714	1,376	13,960	1,582
7/8	372	3,614	1,815	1,584	14,968	1,870
7/9	405	4,123	1,930	1,755	17,294	1,957
7/10	522	4,540	2,037	1,979	19,489	2,061
7/11	526	4,858	2,232	2,203	20,436	2,197
Season Total	1,668	9,073	4,968	5,575	28,605	

Table 7. Daily Chinook Salmon escapement for 2017at the Tuluksak River weir through July 11, as well as summary statistics for Chinook Salmon escapement at the Tuluksak River weir.

Tuluksak River Weir Chinook Salmon Escapement						
Date	**Lowest**	**Average**	**5 year average**	**10 year average**	**Highest**	**2017**
6/26	0	5	15	7	41	4
6/27	0	7	13	7	42	4
6/28	0	14	14	7	80	4
6/29	0	25	19	8	149	4
6/30	0	33	16	8	180	4
7/1	0	43	19	10	255	5
7/2	0	52	24	15	259	8
7/3	2	96	27	17	511	10
7/4	3	141	31	22	665	10
7/5	5	174	55	38	744	10
7/6	10	216	74	51	896	16
7/7	12	271	104	69	1,018	131
7/8	16	304	113	81	1,078	150
7/9	17	355	131	95	1,483	171
7/10	17	409	152	112	1,592	183
7/11	17	444	169	126	1,621	226
Season Total	193	1,005	538	461	2,918	

Table 8. Chum and Sockeye to Chinook ratios from the Bethel Test Fishery through July 11, as well as the harvest ratios for each fishing opportunity within Refuge waters.

Date	CS:K Ratio (BTF)	CS:K Ratio (Harvest)
6/1		
6/2		
6/3		
6/4		
6/5		
6/6		
6/7	0.7	
6/8		
6/9	3.0	
6/10	4.3	
6/11	0.5	
6/12	5.7	1.3
6/13	9.0	
6/14	4.5	
6/15	3.9	
6/16	10.4	
6/17		
6/18	18.0	
6/19	6.0	
6/20	3.5	
6/21	4.2	
6/22	9.7	
6/23	13.4	
6/24	6.8	6.3
6/25	6.7	
6/26	28.9	
6/27	16.8	
6/28	20.1	
6/29	40.1	
6/30	15.6	
7/1	31.0	29.5
7/2	45.7	
7/3	30.8	25.0
7/4	8.2	
7/5	72.6	
7/6	104.6	
7/7	78.4	
7/8	84.6	

Table 9 Continued.

Date	CS:K Ratio (BTF)	CS:K Ratio (Harvest)
7/9	381.0	
7/10	35.2	
7/11	62.6	

Table 10. Daily CPUE from the Bethel Test Fishery for Chinook Salmon through July 12.

Date	2012	2013	2017
6/1	0	0	1
6/2	0	0	0
6/3	0	0	1
6/4	1	0	3
6/5	0	0	0
6/6	0	0	0
6/7	0	0	3
6/8	0	2	0
6/9	1	1	1
6/10	2	3	3
6/11	1	1	6
6/12	0	1	3
6/13	0	12	3
6/14	1	10	4
6/15	4	4	8
6/16	13	13	8
6/17	9	18	0
6/18	1	5	4
6/19	16	19	24
6/20	24	10	9
6/21	29	11	13
6/22	16	21	15
6/23	29	13	12
6/24	21	14	27
6/25	24	18	13
6/26	36	10	8
6/27	12	10	28
6/28	11	5	19
6/29	19	4	12
6/30	16	8	14
7/1	7	3	12
7/2	5	1	3
7/3	23	4	9
7/4	13	4	14
7/5	13	5	6
7/6	14	6	5
7/7	13	3	7
7/8	12	6	7
7/9	9	3	8

Table 9 Continued.

Date	2012	2013	2017
7/10	3	3	1
7/11	3	3	9
7/12	0	1	7

APPENDIX A

FEDERAL SPECIAL ACTION 17-04

STAFF ANALYSIS
TEMPORARY SPECIAL ACTION
FSA17-04

ISSUES

Fishery Special Action Request FSA17-04, submitted by the Akiak Native Community, a Federally recognized tribe, requests that the Federal Subsistence Board (Board) close Federal public waters of the Kuskokwim River drainage to the harvest of salmon except by Federally qualified subsistence users, further reduce the pool of eligible harvesters based on the Alaska National Interest Lands Conservation Act (ANILCA) Section 804 Subsistence User Prioritization analysis that was implemented in 2016, and implement an allocation strategy among eligible users.

On April 18 and 20, 2017, Akiak clarified that an allocation strategy is not requested. Based on information provided at Kuskokwim River Inter-Tribal Fish Commission meetings, the proponent said it is likely the 2017 Chinook Salmon harvest goal will be higher than in 2016 (possibly 50,000 Chinook Salmon in 2017 versus 40,000 Chinook Salmon in 2016), and harvestable surpluses of this size do not require a permit system. Rather, the proponent states that such a harvestable surplus can be managed through timing and gear restrictions, as was done in 2016 (Williams 2017, pers. comm.).

DISCUSSION

In its request, the Tribe states:

> As in 2016 federal management of Chinook salmon, restricting this fishery to federally qualified subsistence users during the 2017 Kuskokwim River fishing season, is necessary to provide for the priority and opportunity for customary and traditional subsistence uses of Chinook salmon, to ensure ability to engage in social and cultural uses of Chinook salmon, and to ensure the healthy conservation of Chinook salmon stocks in light of anticipated low Chinook salmon run forecasts in 2017. Chinook salmon play a crucial role in our Tribe's social and cultural practices. Without federal management, the Tribe's ability to harvest Chinook for customary and traditional subsistence uses, and our social and cultural reliance on and use of this resource, will be compromised by other regulatory requirements that do not prioritize subsistence uses or our cultural and social needs.
>
> It is also essential that there is a management strategy for Kuskokwim chum, red and silver salmon stocks that is consistent with ensuring conservation, rebuilding and the opportunity for subsistence uses of Kuskokwim Chinook salmon. The Tribe requests federal management of all Kuskokwim salmon stocks as necessary to ensure conservation, important cultural practices, and subsistence uses of the Chinook stocks.

The proponent requests the Board to adopt the Section 804 Subsistence User Prioritization that it adopted in 2016. In 2016, the Board directed the Manager of the Yukon Delta National Wildlife Refuge to re-open Federal public waters, when practicable, to the harvest of Chinook Salmon and Chum Salmon by only a prioritized group of Federally qualified subsistence users based on three criteria in Section 804 of ANILCA, which were residents of the drainage and four coastal communities of Chefornak, Kipnuk, Kongiganek, Kwigillingok. Presented from south to north, eligible residents included residents of the following 32 villages: Chefornak, Kipnuk, Kongiganek, Kwigillingok, Tuntutuliak, Eek, Napakiak, Napaskiak, Kasigluk, Nunapitchuk, Atmautluak, Oscarville, Bethel, Kwethluk, Akiachak, Akiak, Tuluksak, Lower Kalskag, Kalskag, Aniak, Chuathbaluk, Napaimute, Crooked Creek, Georgetown, Red Devil, Sleetmute, Stoney River, Lime Village, Takotna, Nikolai, Telida, and McGrath. Only residents of the drainage and residents of Chefornak, Kipnuk, Kongiganek, Kwigillingok would be allowed to harvest Chinook Salmon during Federal openings.

For the purposes of this analysis, Federal public waters are those waters within and adjacent to the exterior boundaries of the Yukon Delta National Wildlife Refuge, hereafter, referred to as Refuge waters.

The applicable Federal regulations are found in 50 CFR 100.19(b) (Temporary Special Actions) and state that:

> *. . . After adequate notice and public hearing, the Board may temporarily close or open public lands for the taking of fish and wildlife for subsistence uses, or modify the requirements for subsistence take, or close public lands for the taking of fish and wildlife for nonsubsistence uses, or restrict take for nonsubsistence uses.*

Existing Federal Regulation

> **Kuskokwim Area—Fish**
>
> *§100.27(e)(4)(ii) For the Kuskokwim area, Federal subsistence fishing schedules, openings, closings, and fishing methods are the same as those issued for the subsistence taking of fish under Alaska Statutes (AS 16.05.060), unless superseded by a Federal Special Action.*

Proposed Federal Regulation

> *§100.27(e)(4)(ii) For the Kuskokwim area, Federal subsistence fishing schedules, openings, closings, and fishing methods are the same as those issued for the subsistence taking of fish under Alaska Statutes (AS 16.05.060), unless superseded by a Federal Special Action.*
>
> ***Unless re-opened by the Yukon Delta National Refuge Manager, Federal public waters in that portion of the Kuskokwim River drainage that are within and adjacent to the exterior boundaries of the Yukon Delta National Wildlife Refuge are closed to the harvest of salmon except by Federally qualified subsistence users that are residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok and Kongiganek. Federal subsistence fishing schedules, openings, closures, and fishing methods will be determined by the Refuge Manager.***

Existing State Regulations

Kuskokwim Area—Subsistence Fishing

5 AAC 01.255. Description of districts, subdistricts, and sections

(a) Districts and subdistricts are as described in 5 AAC 07.200.

(b) During times of king salmon conservation, the Kuskokwim River may be divided into the following sections by emergency order:

> *(1) Section 1: from a line at the Yukon Delta National Wildlife Refuge boundary at the mouth of the Kuskokwim River at 59_ 59.96' N. lat., 162_ 30.46' W. long. to 59_ 59.95' N. lat., 162_ 11.15' W. long. to the confluence of the Johnson River and Kuskokwim River;*
>
> *(2) Section 2: from the confluence of the Johnson River and Kuskokwim River to a line between ADF&G regulatory markers located approximately one-half mile upstream of the Tuluksak River mouth;*
>
> *(3) Section 3: from a line between ADF&G regulatory markers located approximately one-half mile upstream of the Tuluksak River mouth to a line between ADF&G regulatory markers at the Yukon Delta National Wildlife Refuge boundary near Aniak;*
>
> *(4) Section 4: from a line between ADF&G regulatory markers at the Yukon Delta National Wildlife Refuge boundary near Aniak to a line between ADF&G regulatory markers located downstream of the Holitna River mouth;*
>
> *(5) Section 5: from a line between ADF&G regulatory markers located downstream of the Holitna River mouth to the headwaters of the Kuskokwim River.*

5 AAC 01.270. Lawful gear and gear specifications and operation

(a) Salmon may be taken only by gillnet, beach seine, a hook and line attached to a rod or pole, handline, or fish wheel subject to the restrictions set out in this section and 5 AAC 01.275, except that salmon may also be taken by spear in the Holitna River drainage.

5 AAC 07.365. Kuskokwim River Salmon Management Plan

***

(c) In the king salmon fishery,

> *(1) when the projected escapement of king salmon is below the drainagewide escapement goal range, the commissioner shall close, by emergency order, the commercial, sport, and subsistence king salmon fisheries;*

(2) when the projected escapement of king salmon is within the drainagewide escapement goal range, the commissioner shall open and close fishing periods, by emergency order, as follows:

(A) the commissioner shall close, by emergency order, the commercial, sport, and subsistence king salmon fisheries, and after June 11, to the extent practicable, the commissioner shall open, by emergency order, at least one fishing period per week for a directed subsistence king salmon fishery to provide harvest opportunity on surplus king salmon in excess of escapement needs,

(B) after June 11, fishing may be opened for commercial and sport fisheries to provide harvest opportunity on surplus king salmon in excess of escapement and subsistence needs;

(C) notwithstanding (c)(2)(A) of this section, before June 12 the commissioner shall open, by emergency order, at least one subsistence fishing period per week with four-inch or smaller mesh gillnets; the gillnet may only be operated as a set gillnet and no part of the set gillnet may be more than 100 feet from the ordinary high water mark;

(3) when the projected escapement of king salmon exceeds the drainagewide escapement goal range,

(A) the commissioner shall close, by emergency order, the commercial, sport, and subsistence king salmon fisheries, and after June 11, the directed subsistence king salmon fishery will be open seven days per week; and

(B) after June 11, the commercial and sport fisheries will be managed to provide harvest opportunity on surplus king salmon in excess of escapement and subsistence needs.

(C) notwithstanding (c)(3)(A) of this section, before June 12 the

commissioner shall open, by emergency order, at least one subsistence fishing period per week with four-inch or smaller mesh gillnets; the gillnet may only be operated as a set gillnet and no part of the set gillnet may be more than 100 feet from the ordinary high water mark;

(4) notwithstanding the provisions of (2) and (3) of this subsection, if the department determines there is a harvestable surplus of king salmon, the commissioner may open, by emergency order, a subsistence king salmon fishery during which

(A) king salmon may be taken only by a person 60 years of age or older; and

(B) a person authorized to take king salmon under this paragraph may not authorize a proxy to take or attempt to take king salmon under AS 16.05.405 or 5 AAC 01.011, but the participant may be assisted by family members within the second degree of kindred; in this subparagraph, "within the second degree of kindred" has the meaning given in 5 AAC 92.990(a).

(d) In the subsistence fishery, in the Kuskokwim River drainage, in the waters of the mainstem of the river and other salmon spawning tributaries, unless otherwise specified by the department,

(1) the subsistence salmon net and fish wheel fisheries will be open seven days per week, except that if the commissioner determines that it is necessary in order to achieve escapement goals, the commissioner may alter fishing periods, by emergency order, based on run abundance;

(2) the commissioner may implement one or more of the gear limitations as described in 5 AAC 01.270(n) during times the commissioner determines that it is necessary for the conservation of king salmon;

(A) the gillnet mesh size may not exceed four inches until sockeye and chum salmon abundance exceeds the king salmon abundance;

(B) a gillnet may not exceed 25 fathoms in length, except that a longer gillnet may be used if no more than 25 fathoms of the gillnet is in a fishing condition and the remainder of the gillnet is tied up or secured so that it is not in the water in a fishing condition;

(C) a person may fish for salmon with a dip net, as defined in 5 AAC 39.105, and all king salmon caught by a dip net must be returned immediately to the water unharmed;

(3) actions to conserve king salmon may be applied to the entire Kuskokwim River, its sections, or tributaries, consistent with harvest trends and variability in abundance of king salmon available for harvest as the run progresses upstream;

(4) the commissioner may alter the subsistence hook and line bag and possession limits specified in 5 AAC 01.295, by emergency order, if the commissioner determines that inseason information indicates it is necessary for conservation purposes.

(e) In the commercial fishery,

(1) the guideline harvest level for king salmon and sockeye salmon is as follows:

(A) 0 - 50,000 king salmon;

(B) 0 - 50,000 sockeye salmon;

(2) only the waters of District 1 may be opened during the first commercial salmon fishing period;

(3) the commissioner shall open and close the Kuskokwim River commercial salmon fishery, by emergency order, if inseason information indicates a run strength that is large enough to provide for a harvestable surplus and a reasonable opportunity for subsistence uses and for nonsubsistence fisheries;

(4) the department shall provide, to the extent practicable, at least 24 hours advance notice of the opening of Districts 1 and 2 commercial fishing periods;

(5) Districts 1 and 2 commercial fishing periods are from 12:00 p.m. through 6:00 p.m.; when longer fishing periods are allowed, the extra time is to be divided before 12:00 p.m. and after 6:00 p.m.;

(6) the department shall manage the commercial fishery to ensure there is no significant impact on escapement or allocations of salmon species as a result of incidental harvest in commercial fisheries directed at other salmon species;

(7) in June and when king salmon are abundant, the department shall manage the commercial fishery conservatively to ensure king salmon escapement goals are achieved and reasonable opportunity for subsistence uses is provided in consideration of harvest trends and abundance of king salmon available for the subsistence fishery, as follows:

(A) when the projected escapement of king salmon is within the drainagewide escapement goal range,

(i) the first opening may not occur until after June 23;

(ii) only the waters of Subdistrict 1-B may be opened during the first commercial fishing period;

(iii) at least 72 hours must pass between the first Subdistrict 1-B opening and the first Subdistrict 1-A opening;

(B) when the projected escapement of king salmon exceeds the drainagewide escapement goal range, the commercial fishery will be managed to provide harvest opportunity on surplus king salmon in excess of escapement and subsistence needs;

(8) when chum salmon abundance exceeds king salmon relative abundance, the department shall manage, to the extent practicable, the commercial salmon fishery based on chum salmon run strength;

(9) when coho salmon abundance exceeds chum salmon abundance, the department shall manage, to the extent practicable, the commercial salmon fishery based on coho salmon run strength;

(10) a person may not sell salmon roe taken in Districts 1 and 2.

(f) In the sport fishery,

(1) if the commissioner restricts the fishery, by emergency order, for conservation purposes, the restrictions must be based on the level of abundance;

(2) in the Aniak River drainage, the king salmon fishery is open from May 1 through July 25, with a bag and possession limit of two fish, 20 inches or greater in length, with an annual limit of two fish, 20 inches or greater in length; the sockeye, pink, chum, and coho salmon fisheries are open year round, with a combined daily bag and possession limit of three fish, of which no more than two fish may be king salmon;

(3) actions to conserve king salmon will only be implemented when king salmon are present, consistent with migratory timing as the run progresses upstream.

Note: On March 8, 2017, the Alaska Board of Fisheries adopted 5 AAC 07.365(c)(2) and 5 AAC 07.365(c)(3) to the management plan. The new language, effective April 22, 2017, is included above (Alaska Lieutenant Governor's Office 2017).

Relevant State Regulations

See **Appendix A**.

Extent of Federal Public Waters

For purposes of this analysis, the phrase "Federal public waters" is defined as those waters described under 50 CFR 100.3(b)(4). The affected area consists of those waters of the Kuskokwim River drainage that are within and adjacent to the exterior boundaries of the Yukon Delta National Wildlife Refuge (Refuge), including District 1 and portions of District 2 of the Kuskokwim Fishery Management Area. The waters are generally described as the lower Kuskokwim River drainage from the mouth upriver to and including about 30 miles of the Aniak River (**Map 1**).

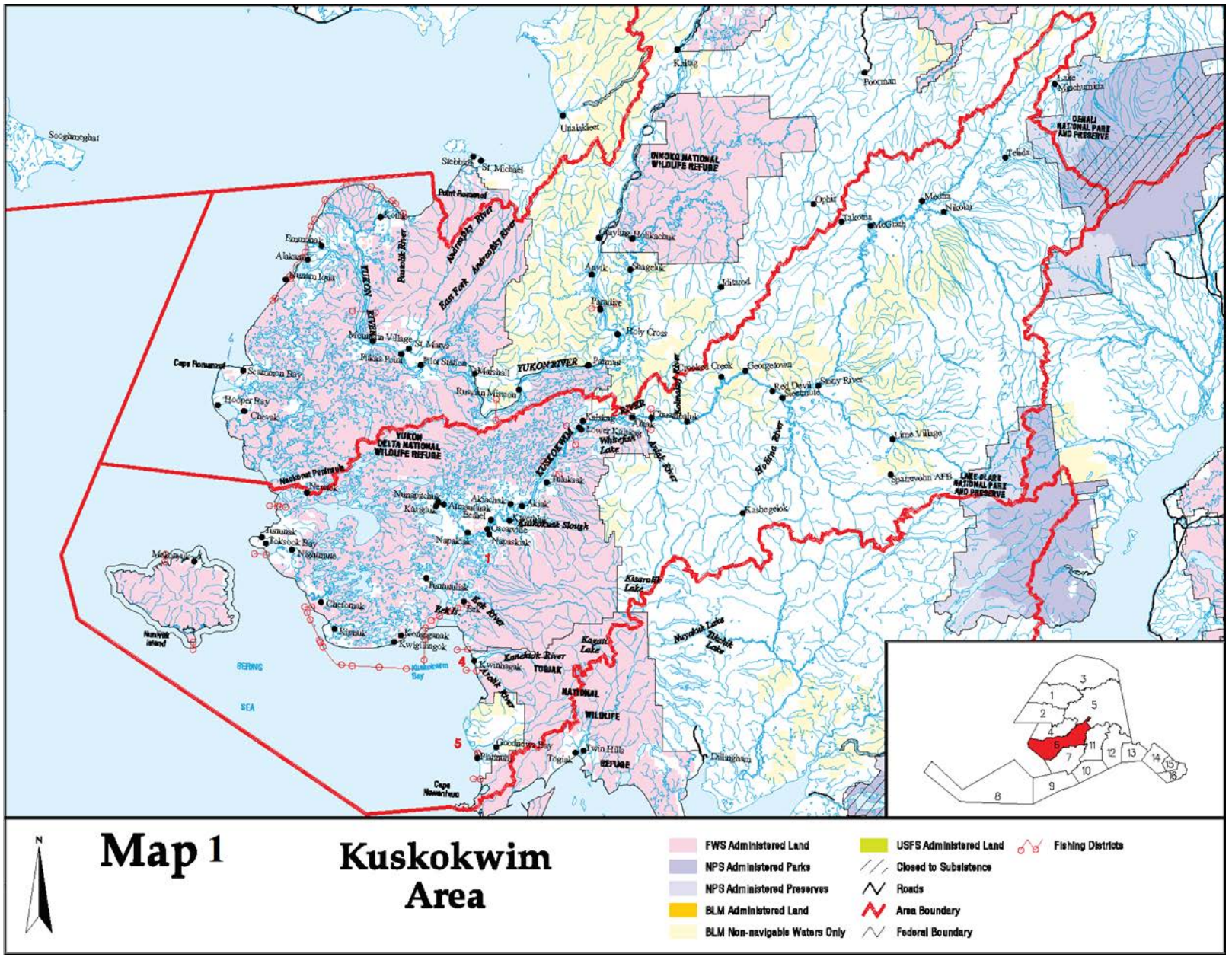
Customary and Traditional Use Determinations

Residents of the Kuskokwim Area, except those persons residing on United States military installations located on Cape Newenham, Sparrevohn USAFB, and Tatalina USAFG, have a customary and traditional use determination for salmon (50 CFR 100.24). The area includes 40 villages. Presented from south to north, the villages are: Newtok, Tununak, Toksook Bay, Nightmute, Mekoryuk, Chefornak, Kipnuk, Kwigillingok, Kongiganek, Platinum, Goodnews Bay, Quinhagak, Tuntutuliak, Eek, Napakiak, Napaskiak, Kasigluk, Nunapitchuk, Atmautluak, Oscarville, Bethel, Kwethluk, Akiachak, Akiak, Tuluksak, Lower Kalskag, Kalskag, Aniak, Chuathbaluk, Napaimute, Crooked Creek, Georgetown, Red Devil, Sleetmute, Stony River, Lime Village, Takotna, McGrath, Telida, and Nikolai.

Regulatory History

The Kuskokwim River drainage salmon subsistence fishery was open continuously until 1977 when State managers began closing it for periods before, during, and after commercial fishing openings. Currently, the subsistence fishery is closed for six hours before, during, and three hours after each commercial fishing period (Tiernan and Poetter 2015). Legal gear in the Federal salmon subsistence fishery are gillnets, beach seines, fish wheels, dip nets, and rod and reel, and, within the Holitna drainage only, spears are allowed.

The following is a summary of the management of salmon subsistence fisheries in the Kuskokwim River drainage since 1993. The summary is of State management actions unless otherwise noted. **Appendix B** describes all in-season Federal special actions and in-season State emergency orders issued during the 2014, 2015, and 2016 salmon seasons.


Map 1
Kuskokwim Area
FWS Administered Land
NPS Administered Parks
NPS Administered Preserves
BLM Administered Land
BLM Non-navigable Waters Only
USFS Administered Land
Closed to Subsistence
Roads
Area Boundary
Federal Boundary
Fishing Districts
YUKON DELTA NATIONAL WILDLIFE REFUGE
OINOKO NATIONAL WILDLIFE REFUGE
DENALI NATIONAL PARK AND PRESERVE
LAKE CLARK NATIONAL PARK AND PRESERVE
TOGIAK NATIONAL WILDLIFE REFUGE
YUKON RIVER
KUSKOKWIM RIVER
BERING SEA
Kalskag
Lower Kalskag
Aniak
Crooked Creek
Georgetown
Red Devil
Stony River
Lime Village
Sparrevohn AFB
Kasigluk
Nunapitchuk
Atmautluak
Napakiak
Napaskiak
Oscarville
Bethel
Tuntutuliak
Eek
Quinhagak
Goodnews Bay
Platinum
Twin Hills
Togiak
Dillingham
Unalakleet
Koyuk
Stebbins
St. Michael
Emmonak
Alakanuk
Scammon Bay
Hooper Bay
Chevak
Nunam Iqua
Mountain Village
St. Marys
Pilot Station
Marshall
Russian Mission
Pitka's Point
Paimiut
Holy Cross
Anvik
Shageluk
Grayling
Holikachuk
Iditarod
Ophir
Takotna
McGrath
Medfra
Nikolai
Telida
Lake Minchumina
Kaltag
Pooman
Nelson Island
Nunivak Island
Toksook Bay
Nightmute
Chefornak
Kipnuk
Kongiganak
Kwigillingok
Kwethluk
Tuluksak
Akiak
Akiachak
Kasigluk
Bethel
Oscarville
Napakiak
Napaskiak
Eek
Eek River
Kanektok River
Arolik River
Kisaralik Lake
Kasigluk Slough
Holitna River
Kuskokwim River
Whitefish Lake
Aniak River
Kolmakof River
Stony River
Point Romanof
Andreafsky River
East Fork Andreafsky River
Pastolik River
Yukon River
Cape Romanof
Cape Newenham
Kuskokwim Bay
Nelson Island
Nunivak Island
Kasigluk
Nunapitchuk
Atmautluak
Akiachak
Akiak
Tuluksak
Lower Kalskag
Kalskag
Aniak
Crooked Creek
Georgetown
Red Devil
Stony River
Lime Village
Sparrevohn AFB
Kasheglok
Oscarville
Napaskiak
Napakiak
Bethel
Tuntutuliak
Eek
Quinhagak
Goodnews Bay
Platinum
Twin Hills
Togiak
Dillingham
Unalakleet
Koyuk
Stebbins
St. Michael
Emmonak
Alakanuk
Scammon Bay
Hooper Bay
Chevak
Nunam Iqua
Mountain Village
St. Marys
Pilot Station
Marshall
Russian Mission
Pitka's Point
Paimiut
Holy Cross
Anvik
Shageluk
Grayling
Holikachuk
Iditarod
Ophir
Takotna
McGrath
Medfra
Nikolai
Telida
Lake Minchumina
Kaltag
Pooman
Nelson Island
Nunivak Island
Toksook Bay
Nightmute
Chefornak
Kipnuk
Kongiganak
Kwigillingok
Kwethluk
Tuluksak
Akiak
Akiachak
Kasigluk
Bethel
Oscarville
Napakiak
Napaskiak
Eek
Eek River
Kanektok River
Arolik River
Kisaralik Lake
Kasigluk Slough
Holitna River
Kuskokwim River
Whitefish Lake
Aniak River
Kolmakof River
Stony River
Point Romanof
Andreafsky River
East Fork Andreafsky River
Pastolik River
Yukon River
Cape Romanof
Cape Newenham
Kuskokwim Bay
Nelson Island
Nunivak Island
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In 1993, for the first time the subsistence fishery in the Kuskokwim River was closed for a period because of low Chum Salmon returns. From 1997 through 2001 Kuskokwim River returns of Chinook and Chum Salmon were low (Tiernan and Poetter 2015).

In 1999, Federal salmon subsistence fishery management was authorized by the Board. Openings, closures, and methods have been the same as those issued under State regulations, unless superseded by Federal regulations (§___100.27(e)(4)(ii)).

In 2000, the Alaska Board of Fisheries expanded to the lower Kuskokwim River drainage the legal use of rod and reel in the salmon subsistence fishery (Burkey et al. 2001).

In 2000, because of low runs of Chinook and Chum Salmon, on July 8 the salmon subsistence fishery was restricted to the use of 6-inch or less mesh gillnets, and hook and line fishermen were limited to one Chinook Salmon per day. The Federal in-season manager issued an emergency special action with similar effect (Burkey et al. 2001).

In 2001, the Alaska Board of Fisheries passed the Kuskokwim River Rebuilding Plan (5 AAC 07.365, Tiernan and Poetter 2015). Additionally, the salmon subsistence fishery was limited by "windowed," or rolling, closures implemented sequentially up the river in a step-wise progression consistent with salmon run timing. Throughout the Chinook and Chum Salmon runs, the drainage was closed to the harvest of salmon, except by hook and line, from three days per week (upper river) to five days per week (lower and middle river), during which gillnets were restricted to 4-inch or less mesh size (Whitmore et al. 2004).

From 2002 through 2003, during the Chinook Salmon run, the Kuskokwim River drainage was closed to the harvest of Chinook Salmon, except by hook and line, three days a week in rolling closures, during which gillnets were restricted to 4-inch or less mesh size (Whitmore et al. 2004).

From 2004 through 2006, three day per week rolling closures to the harvest of Chinook Salmon, during which gillnets were restricted to 4-inch or less mesh size, were discontinued after June 16 (in 2005 and 2006) and June 20 (in 2004), and upriver areas were never closed to the harvest of salmon (Dull and Shelden 2007, Martz and Dull 2006, Martz and Whitmore 2005).

From 2007 through 2009, the salmon subsistence fishery was not restricted, and it closed only around commercial fishing periods in the Kuskokwim River (Tiernan and Poetter 2015).

In 2010, from June 10 through July 31, due to conservation concerns, the Federal in-season manager closed the Tuluksak and Kwethluk rivers to the harvest of Chinook Salmon with gillnets, during which gillnets were restricted to 4-inch or less mesh size in the Tuluksak and Kwethluk rivers (Brazil et al. 2011).

In 2011, from June 1 through July 25 the harvest of Chinook Salmon using hook and line gear or gillnets, during which gillnets were restricted to 4-inch or less mesh size, was closed in the following important salmon rearing tributaries: Kuskokuak Slough, including all waters of the Kisaralik, Kasigluk, and Kwethluk river drainages; and the Tuluksak River drainage. District 1 of the Kuskokwim River main stem

closed to the harvest of salmon from June 16 through June 19 and June 23 through June 29. The Federal in-season manager closed Refuge waters to the harvest of salmon for three days from June 30 through July 2 because of continuing concerns for the conservation of Chinook Salmon (Brazil et al. 2013).

In 2012, from June 1 through July 25 the harvest of Chinook Salmon using hook and line gear or gillnets, during which gillnets were restricted to 4-inch or less mesh size, was closed in Kuskokuak Slough, including all waters of the Kisaralik, Kasigluk, and Kwethluk river drainages, and the Tuluksak, Aniak, and George river drainages. In the mainstem, during the Chinook Salmon run, the harvest of salmon was restricted for 12 consecutive days by the use of rolling closures from the Kuskokwim River mouth to the headwaters followed by six days of rolling open fishing periods when 6-inch or less mesh size gillnets were allowed. After six-day periods when there were no closures, harvest of salmon was again prohibited in rolling closures until a date between June 30 (in the lower river) and July 14 (at the headwaters); however, the harvest of salmon with hook and line gear remained closed until later in the summer (Elison et al. 2015).

In 2013, the Alaska Board of Fisheries passed the Kuskokwim River Salmon Management Plan (5 AAC 07.365). The harvest of Chinook Salmon in the drainage using hook and line gear was closed in Kuskokuak Slough, including all waters of the Kisaralik, Kasigluk, and Kwethluk river drainages; and the Tuluksak, Aniak, and George river drainages; and gillnets were restricted to 4-inch or less mesh size. Gillnets were limited to 6-inch or less mesh size in the lower river beginning June 28 and in the middle river beginning July 3 in order to conserve Chinook Salmon. All restrictions were lifted by July 15 (Tiernan and Poetter 2015).

Salmon Management in 2014

On April 17, 2014, the Board approved Temporary Special Action Request FSA14-03 from the Napaskiak Tribal Council and closed Refuge waters to the harvest of Chinook Salmon and further reduced the pool of eligible harvesters based on an ANILCA Section 804 Subsistence User Prioritization analysis. The analysis identified residents of the Kuskokwim River drainage and four coastal communities, Kwigillingok, Kongiganek, Kipnuk, and Chefornak (32 of 40 communities in the customary and traditional use determination), as having the highest customary dependence on Chinook Salmon in the Kuskokwim River drainage and therefore the only Federally qualified subsistence users eligible to harvest Chinook Salmon in 2014 (FWS 2014).

On May 20, 2014, the Federal in-season manager closed Refuge waters from the mouth of the Kuskokwim River upriver to Tuluksak to the harvest of Chinook Salmon by all users, and on May 27 continued the closure from the Tuluksak to the Aniak River. Gillnets were restricted to 4-inch or less mesh size. Limited harvests of Chinook Salmon were allowed, primarily through Federal Social and Cultural Permits that allowed harvests of up to 100 Chinook Salmon per community using most gear types (**Appendix B**).

From June 24 through July 18, 2014, the State managed subsistence fisheries for salmon other than Chinook Salmon. Chum and Sockeye Salmon subsistence fishing opportunity (with 6-inch or less mesh gillnets) continued during periods opened sequentially upriver. By July 3, 2014, all State restrictions to

the use of 6-inch or less mesh gillnets to the harvest of Chum or Sockeye Salmon were rescinded. All subsistence salmon fishing restrictions were lifted by August 4, 2014.

The 2014 fishing season was the first that dip nets could be used as a legal salmon subsistence fishing gear type under State regulations in the Kuskokwim River drainage to provide an alternative method for subsistence opportunity during times of Chinook Salmon conservation. The State allowed subsistence fishing with dip nets beginning June 14, with additional opportunity provided sequentially upriver as run timing dictated. All Chinook Salmon caught in a dip net were required to be immediately released unharmed.

In late July 2014, Special Action Requests FSA14-09, 10, 11, 12, 13, and 14 were submitted by the Lower Kalskag Tribe, Kuskokwim Native Association, and Napaimute, Crooked Creek, Aniak, and Kalskag tribes, respectively. They requested the Board ensure reasonable opportunity and priority use of subsistence resources and exert Federal jurisdiction for fisheries management on the Kuskokwim River for the remainder of the 2014 fishing season. In 2014, the Board deferred action on the six special action requests based on State action that temporarily suspended commercial fishing in the Kuskokwim River after July 21 until a run assessment indicated there would be a harvestable surplus of Coho Salmon available for harvest (ADF&G 2014a).

In 2014, commercial fishery openings occurred in the Kuskokwim River on July 14, 18, and 21 and August 11, 14, 18, 20, and 26 (ADF&G 2017).

Salmon Management in 2015

In February and March 2015, five separate Temporary Special Action Requests FSA15-02, 03, 05, 07, and 08 were submitted by Akiak, Napakiak, Akiachak, Chuathbaluk, and Lower Kalskag tribal councils, respectively. All requested that the Board close Refuge waters to the harvest of all salmon except by Federally qualified subsistence users, further reduce the pool of eligible harvesters based on the ANILCA Section 804 Subsistence User Prioritization analysis that was implemented in 2014, and implement an allocation strategy among eligible users. Several requested implementation of an interim tribal co-management system for the 2015 season. At its work session on April 16, 2015, the Board deferred action on all the special action requests until such time, during the season, the Chair determined it necessary for Federal involvement (FWS 2015a).

On May 6, 2015, the Board adopted the ANILCA Section 804 Subsistence User Prioritization for the harvest of Chinook Salmon only, and left the final decision concerning whether or not to close Refuge waters to the harvest of Chinook Salmon to the Federal in-season manager (FWS 2015b).

On May 16, 2015, the Federal in-season manager issued a special action. From May 21 through July 20, 2015, the Federal in-season manager closed Refuge waters from the Kuskokwim River mouth to its confluence with the Tuluksak River and salmon tributaries (Eek, Kwethluk, Kasigluk, Kisaralik, and Tuluksak rivers) to the harvest of Chinook Salmon except by Federally qualified subsistence users identified in the ANILCA Section 804 Subsistence User Prioritization analysis. Gillnets were restricted to 4-inch mesh size and could be used only three days a week (**Appendix B**).

From June 5 through July 20, 2015, Refuge waters were closed to the harvest of all fish except by Federally qualified subsistence users. Refuge waters were closed to the harvest of Chinook Salmon by all users. Gillnets were restricted to 4-inch mesh size and could be used only three days a week. On June 7, 2015, the Kwethluk, Kasigluk, Kisaralik, Tuluksak, and Aniak Rivers and their salmon tributaries within Refuge waters were closed to the use of gillnets.

From June 10 through June 30, 2015, the Federal in-season manager opened the Kuskokwim River, the Eek River, and salmon tributaries of the Eek River to the harvest of Chinook Salmon using most legal methods by only Federally qualified subsistence users in possession of a Federal Community Harvest Permit. The drainage-wide harvest quota was 7,000 Chinook Salmon. Specific community allocations were based on each community's share of the average total subsistence harvest of Kuskokwim River Chinook Salmon over 20 years (1990–2009). Designated fishermen were assigned to harvest salmon for each participating community and salmon were distributed to Federally qualified subsistence users.

The Federal in-season manager realized that village allocations were not going to meet subsistence needs, but hoped they would provide an opportunity to harvest a small number of Chinook Salmon and allow for some customary and traditional cultural practices associated with the Chinook Salmon fishery. The Community Harvest Permit Program was voluntary and communities did not have to participate. If a community wished to participate, the tribal council was tasked with ensuring that all Federally qualified users within each community had fair access to Chinook Salmon that were harvested under the permit. The permit was issued to a community representative, identified by the tribe, who was responsible for overseeing the community fishery. A limited number of fishermen were designated to catch a community's allocation of Chinook Salmon. Only those who were identified as designated fishermen in possession of a designated fishing permit could harvest Chinook Salmon under the program. This opportunity was permitted from June 10–30, with no other time or gear restrictions. The Community Harvest Permit expired and became invalid once the community harvest quota was achieved or on July 1, whichever came first (FWS 2015c).

In Bethel, the Natural Resource Department of Orutsararmiut Native Council, the Federally recognized Tribe in Bethel, organized allocations of Chinook Salmon to over 100 summer fish camps used by Bethel residents who were identified in the Section 804 Subsistence User Prioritization analysis. Designated fishermen harvested salmon that were then distributed to Federally qualified subsistence users by to Federally qualified subsistence users without access to fish camps who requested an allocation. Additionally, Orutsararmiut Native Council organized the distribution of Chinook Salmon to Federally qualified subsistence users in upriver communities beyond the Refuge boundary who were unable to legally harvest Chinook Salmon except from Refuge waters.

From June 18 through June 21, 2015, Refuge waters from the Kuskokwim River mouth to its confluence with the Tuluksak River and salmon tributaries were closed to the use of gillnets except by Federally qualified subsistence users using 4-inch or less mesh gillnets to harvest nonsalmon fishes or in possession of a Community Harvest Permit.

From July 2 through July 20, 2015, the harvest of Chinook Salmon in Refuge waters remained closed except by Federally qualified subsistence users. Salmon fishing opportunity continued during periods that opened sequentially upriver. All subsistence salmon fishing restrictions were lifted by August 4.

On August 20, 2015, Lisa Feyereison, of Crow Village, and David G. Diehl, of Aniak, submitted Special Action Request FSA15-17. They requested that the Board "take action necessary to assume management of coho salmon to provide reasonable certainty that (1) the established coho escapement goal within the Federal management unit will be achieved and; (2) reasonable opportunity and priority use of subsistence salmon resources necessary to meet customary subsistence needs throughout the watershed per ANILCA Section 804 occurs." The proponents stated that because of the restrictions placed on the Chinook Salmon fishery earlier in the summer by State and Federal in-season managers, it was important that Federally qualified subsistence users be given opportunity to harvest Coho Salmon to make up for the low numbers of Chinook Salmon they were allowed to harvest. Additionally, the proponents stated that it was likely that the Coho Salmon escapement goal would not be achieved in the Kwethluk River. In 2015, action on FSA15-17 was deferred based on State action that temporarily suspended commercial fishing in the Kuskokwim River after August 10 because Coho Salmon escapements at weir projects were below average (ADF&G 2015, FSB 2016).

In 2015, due to a weak Chum Salmon return, a commercial fishery period did not occur in the Kuskokwim River until August 10. Commercial periods also occurred on August 17 and August 21, 2015. There were a total of three commercial fishing periods (ADF&G 2017).

Salmon Management in 2016

On March 31, 2016, Temporary Special Action Request FSA16-01 was by submitted by the Akiak Tribal Council. It requested that the Board close Federal public waters of the Kuskokwim River drainage to the harvest of salmon except by Federally qualified subsistence users, further reduce the pool of eligible harvesters based on ANILCA Section 804 Subsistence User Prioritization analysis that was implemented in 2015, and implement an allocation strategy among eligible users, similar to the one implemented in 2015, for Chinook, Chum, Sockeye, and Coho salmon.

On June 1, 2016, the Board approved the special action with modification, closing Federal public waters of the Kuskokwim River drainage to the harvest of Chinook and Chum salmon except by Federally qualified subsistence users identified in a Section 804 Subsistence User Prioritization analysis. The Board determined there was a need to restrict the harvest of Chinook and Chum salmon for the conservation of healthy populations and to continue subsistence uses. Those eligible to harvest Chinook and Chum salmon under Federal regulations were the following: Federally qualified subsistence users residing in the Kuskokwim River drainage and the coastal communities of Chefornak, Kongiganek, Kipnuk, and Kwigillingok. Additionally, the Board determined the Federal inseason manager would provide harvest opportunity for Chinook and Chum salmon subsistence fisheries with a combination of management tools including area, timing, and gear restrictions developed in consultation with the Kuskokwim River Inter-Tribal Fish Commission pursuant to the Memorandum of Understanding between the U.S. Fish and Wildlife Service and the Commission (FWS 2016).

The Federal in-season manager, along with Refuge staff and in collaboration with the Kuskokwim River Inter-Tribal Fish Commission and other management entities, designed and implemented a management strategy based on subsistence fishery harvest target of 40,000 Chinook salmon (subject to further revision should in-season assessment information suggest a larger harvest would be warranted). It was decided that the use of fishing time, area, and gear restrictions would provide an adequate means to manage the fishery. These "block openings" provided limited harvest opportunity, with periods between openings allowing for harvest estimation (Staton and Coggins 2016).

On June 3, the Federal in-season manager closed Refuge waters to the harvest of Chinook and Chum salmon by Federally qualified subsistence users (**Appendix B**).

On June 12 the Federal in-season manager allowed in Refuge waters a 12-hour opening, a 24-hour opening on June 16, a 72-hour opening on June 21, and a 72-hour opening on June 29 for the harvest of Chinook and Chum salmon by Federally qualified subsistence users identified in the Section 804 Subsistence User Prioritization analysis.

On June 12, the Federal in-season manager also closed to the use of gillnets the Eek, Kwethluk, Kasigluk, Kisaralik, Tuluksak, and Aniak Rivers as well as their salmon tributaries within the Refuge boundary.

On June 21, the Federal in-season manager opened the Kalskag and Lower Kalskag areas to the harvest of Chinook and Chum Salmon by Federally qualified subsistence users identified in the Section 804 Subsistence User Prioritization using all legal gear; however, gillnets were restricted to 6-inch or less mesh sizes.

On July 7, the Federal in-season manager rescinded all previously issued special actions.

This was the first year State regulations mandated the entire drainage close to the harvest of Chinook Salmon through June 11. On June 12, the State opened the drainage above the Holitna River to most legal gear; gillnets were restricted to 6-in or less mesh sizes. On June 16, the drainage above the Refuge boundary was similarly opened.

In 2016, salmon commercial fishing was opened on July 29 and August 12; however, no commercial salmon processors were available in the area and the opportunity was for catcher/sellers only (ADF&G 2016a and 2016b).

<u>January 2017 Federal Subsistence Board Meeting</u>

In January 2017, the Board considered Fisheries Proposal FP17-05, which was submitted by Lamont Albertson and requested that Federal subsistence management plans, strategies, fishing schedules, openings, closings and fishing methods for the Kuskokwim Area be issued independently by the Federal Subsistence Management Program in consultation with appropriate agencies and entities. The proposed regulation would have removed language stating that the Federal subsistence fishing regulations for the Kuskokwim Area are the same as issued for the subsistence taking of fish under Alaska statutes unless superseded by Federal special action.

The proponent discussed during the meeting the critical need to have a pre-season management strategy in place that clearly identifies the conditions under which the Federal Subsistence Management Program will assume management of Chinook Salmon runs or other declining fish stocks in the future. The proponent commented that the current special action request approach is not working efficiently and we need to move away from it, stating further that waiting until May to determine how the management program is going to be executed in the summer is just way too late. At the end his presentation to the Board, the proponent made a concluding comment requesting that if the Board decided to defer action on FP17-05, that it keep in mind that the Kuskokwim River Inter-Tribal Fish Commission did not want to be left waiting until the last minute to see who would control the fishery than have to go through the internal mechanisms required for a special action request in April or May (FSB 2017).

The Board deferred action on Proposal FP17-05 until the next regulatory cycle so that the collaborative management aspects of the Kuskokwim River Partnership Project could be fully implemented. The Board acknowledged that both the Yukon-Kuskokwim Delta and Western Interior Alaska Subsistence Regional Advisory Councils supported this proposal and the Board supported the intent of the proposal to better define the collaborative strategy for fisheries on the Kuskokwim River.

The Board further noted that some aspects of the proposal could be addressed through an updated delegation of authority letter for the Federal in-season manager. The Board stressed that revising this letter would be an important next step and should be a priority moving forward to address the proponent's concerns regarding collaborative development of in-season management plans and strategies on an annual basis, in accordance with the goals and objectives of the Kuskokwim River Partnership Project and the Memorandum of Understand between the U.S. Fish and Wildlife Service and the Kuskokwim River Inter-Tribal Fish Commission (**Appendix C**).

Current Events

Salmon management on the Kuskokwim River was a topic of discussion during the first pre-season management strategy meeting between the Yukon Delta Wildlife National Refuge and Kuskokwim River Inter-Tribal Fish Commission occurred on March 16, 2017, and the second pre-season management strategy meeting between the Refuge and Commission occurred on April 5, 2017. The discussions are summarized below.

Additionally, it should be noted a commercial salmon processor may be present in the area during the 2017 salmon season. In 2016, salmon commercial fishing opportunity occurred on only two occasions and for only catcher/sellers.

<u>March 2017 Pre-season Management Strategy Meeting</u>

On March 16, 2017, Yukon Delta National Wildlife Refuge staff, members of the Kuskokwim River Inter-Tribal Fish Commission, and Alaska Department of Fish and Game (ADF&G) staff met for initial discussions on pre-season management strategies for Kuskokwim River Chinook Salmon. The ADF&G staff presented the 2016 total run-size estimate, the 2016 harvest estimate, and the 2016 escapement estimate. They also presented the 2017 pre-season run-size forecast for Kuskokwim River Chinook

Salmon. Commission staff presented information about their pre-season management strategy, precautionary fisheries management, and uncertainty in stock assessments (the same information presented in Special Action Request FSA17-03). It is important to note that the special action request that is the subject of this analysis was submitted before the ADF&G provided the run forecast information for 2017. The discussion is ongoing and no decisions were reached by the conclusion of this meeting.

April 2017 Pre-season Management Strategy Meeting

On April 5, 2017, Yukon Delta National Wildlife Refuge staff, members of the Kuskokwim River Inter-Tribal Fish Commission and ADF&G staff met to follow up on discussions they had during the pre-season meeting in March. Discussions included working with an escapement objective of 100,000 Chinook Salmon, a predicted run-size of 150,000 Chinook Salmon, and a harvest objective of 50,000 Chinook Salmon for the 2017 Chinook Salmon season.

Public Hearing

A public hearing was held April 18, 2017, at the Yupiit Piciryarait Cultural Center in Bethel, for the public to provide testimony on two special action request FSA17-03 and FSA17-4.

Sixteen people from Kwigillingok, Tuntutuliak, Bethel, Kwethluk, Akiak, and Aniak testified. Five people supported FSA17-04. One of these people said the Section 804 Subsistence User Prioritization included all drainage residents, implying no one would be left out, and collaborative management in 2016 led to people living in the upper river (including two communities within the Refuge boundary, Lower Kalskag and Kalskag) being allowed to harvest Chinook Salmon continuously. He noted that the low escapement of Chinook Salmon in 2013 may have an effect on run size this year, and therefore, caution should be taken for the sake of future runs. The ADF&G said harvest restrictions should focus on Chinook Salmon only unless there are reasons to include other salmon. Another person said people rely on Chum, Sockeye, and Coho Salmon, Pike, Whitefish, and Blackfish, and they dry, smoke, and freeze it, and put in pits in the ground, describing the heavy reliance on fish in Kuskokwim communities. He said the Yup'ik word for food *neqa* is also the word for fish. Another person said to listen to tribes in the upper river talk about the importance of Coho Salmon to them when opportunity to harvest enough Chinook Salmon has not been provided. One person said he was not sure harvest of Coho Salmon should be closed to non-Federally qualified uses and did not support the use of the 2015 allocation strategy, instead pointing to the success of the harvest strategy used in 2016. One person said he supported the closure to the harvest of Chinook Salmon and was leaning towards supporting the closure for other salmon species, especially Coho Salmon.

Three people did not say outright that they supported or did not support the special action request, but they did have opinions on their opportunities to harvest salmon in June 2017. Two people said there should be no closure to the harvest of Chinook Salmon by drainage residents. One person supported some closures to the harvest of Chinook Salmon by drainage residents, and one of these testifiers added that nonsalmon-bearing tributaries of the Kuskokwim River should not be closed, which would allow people to set nets within several hundred yards of these stream mouths in order to harvest Chinook Salmon that stray into these tributaries. One person said only that he has been taught and his experience tells him that

June is the only month with enough dry weather days for people to be able to dry and smoke salmon. Two other people repeated that optimum salmon drying weather is the month of June when drying conditions are good, and July is a time when there are more flies and is not the time to process fish.

Cultural Knowledge and Traditional Practices

People who are members of 40 Federally-recognized tribes live in the Kuskokwim Fishery Management Area. The majority of people in the area are *Yup'ik* Eskimos. *Yup'ik* people self-recognize as belonging to a number of confederations of villages: *Qaluyaarmiut* on Nelson Island, *Nunivavaarmiut* on Nunivak Island, *Canineqmiut* along the coastal area from the mouth of the Kuskokwim River to Nelson Island, and *Kusquqvagmiut* in the lower and middle Kuskokwim River drainage. *Deg Hit'an* (or Ingalik), Upper Kuskokwim, and *Dena'ina* Athabascan peoples live in the villages along the middle and upper Kuskokwim River drainage (Oswalt 1980, Fienup-Riordan 1984).

Many forces of change have influenced people's subsistence uses of salmon. One is the increased use of motorized boats, snowmachines, and airplanes that replaced dog sleds as the primary mode of transportation. Many families no longer find it necessary to harvest wild resources in order to feed the dogs that were once owned by almost every family. In the Kuskokwim River drainage, Kuskokwim Bay, and adjacent coastal area, people fed their dogs with mainly Chum and Sockeye Salmon that were harvested later than Chinook Salmon. These circumstances have changed and fewer families now own dogs, thereby greatly reducing subsistence harvests of Chum and Sockeye Salmon since the 1960s (Ikuta et al. 2013).

Most non-Natives living in the Kuskokwim Fishery Management Area reside in the regional hubs of Federal and State governments, transportation, trade, and services: Bethel, Aniak, and McGrath. Historically, non-Natives entered the area to mine, trade, missionize, homestead, and recreate. Some villages' sites were staging areas for these activities (Fienup-Riordan 1983, 1984, Kilbuck 1988, Oswalt 1990, Oswalt and Vanstone 1967).

The population of the Kuskokwim Fishery Management Area almost tripled in the 50 years between 1960 and 2010 (ADCCED 2014). In 1960, the U.S. Bureau of the Census estimated that 6,776 people lived in the area. In 2010, an estimated 17,454 people living in 4,894 households were described as permanent residents of the villages in the Kuskokwim Fishery Management Area by the U.S. Bureau of the Census (**Table 1**).

Harvest History

<u>Chinook Salmon</u>

Commercial

The beginnings of the commercial salmon fishery on the Kuskokwim started in the 1800s (Brown 1983, Oswalt 1990). The exportation of salmon commercially harvested from the Kuskokwim area has occurred since about 1935 (Pennoyer et al. 1965); however, the fishery did not mature until statehood.

During the 1960s and 70s commercial salmon fisheries in the Kuskokwim area were considered experimental and were managed using adaptive fisheries management. The directed Chinook Salmon commercial fishery was formally closed in 1987 to insure subsistence needs were met, but incidental catch in the Chum and Sockeye Salmon fisheries was still allowed (Schindler et al. 2013). Incidental harvest of Chinook Salmon in the Chum and Sockeye fisheries is limited to 50,000 fish (Hamazaki et al. 2012).

Commercial Chinook Salmon harvest in the Kuskokwim River averaged 23,000 per year during the 1960s and peaked in the 1980s with an average annual harvest of around 39,000 fish. From the 1990s to present commercial harvest of Chinook Salmon has dropped drastically from a peak of around 53,000 fish in 1990 to 0 fish in 2016. The average harvest during this period was around 9,800 Chinook Salmon (**Table 2, Figure 1**).

Subsistence

The Kuskokwim River Chinook Salmon subsistence fishery is the largest in Alaska. Since 2009, the harvest of Chinook Salmon has been restricted during most years. From 1976 to 2009, annual subsistence harvest averaged 74,530 fish, with a range of 67,620 fish in 2000 to 109,778 fish in 1990 (**Table 2, Figure 1**). Since 2009, the annual subsistence harvest has gone down, including the lowest annual harvest on record in 2014 of 11,234 fish (**Table 2, Figure 1**). The most recent five-year (2011–2016), ten-year (2006–2016), 20-year (1996–2016), and overall (1976–2016) average annual subsistence harvest for Chinook Salmon is: 31,677 fish, 56,244 fish, 67,814 fish, and 68,052 fish, respectively (**Table 3**) (Liller and Hamazaki 2016). Annual harvest estimates by village 2005–2015 are reported in **Table 4**. The majority of harvest occurred in the lower river. The majority of the human population of the drainage was also in the lower river (see **Table 1**).

In 2016, Refuge staff designed and implemented a management strategy based on subsistence fishery harvest target of 40,000 Chinook Salmon (subject to further revision should in-season assessment information suggest a larger harvest would be warranted). The Federal in-season manager in consultation with the State decided that the use of fishing time, area, and gear restrictions would provide an adequate means to manage the fishery. These “block openings” allowed for limited harvest opportunity, with periods between openings allowing for harvest estimation (Staton and Coggins 2016).

There were four subsistence fishery opportunities for targeted Chinook Salmon subsistence harvests during June 2016. Refuge staff, the Kuskokwim River Inter-Tribal Fish Commission, the Orutsararmiut Native Council, and several other villages on the Kuskokwim River collected data to produce in-season salmon harvest estimates from Refuge waters. They estimated the total subsistence salmon harvest was 80,443 (49,883 – 122,070) during four fishing opportunities between June 12 and July 2, 2016. Most salmon harvested were Chinook (28,019; 18,878 – 39,774) followed closely by Chum (27,398; 16,157 – 43,146), and Sockeye (25,026; 14,848 – 39,150) (Staton and Coggins 2016).

Chum Salmon

Commercial

Kuskokwim Fishery Management Area Chum Salmon commercial harvests increased from the 1960s to the 1970s and subsequently peaked in the 1980s when about 560,000 fish were caught annually. The decadal annual commercial harvests of Chum Salmon average about 330,000 fish in the 1990s and since the early 2000s have averaged about 60,000 fish. The Chum Salmon commercial fishery dropped off during the early 2000s due to little processor interest coupled with very low prices (Clark et al. 2006). This was followed by a period of increased commercial harvest from 2009 to 2013, then a substantial decrease following the record low Chinook Salmon abundances in 2013. From 2005 to 2014, the average Chum Salmon harvest in the Kuskokwim area was 131,816 fish, with the most recent harvest in 2015 being 21,068 fish (ADF&G 2017). In 2015, there were no directed Chum Salmon commercial opportunities in the Kuskokwim River, with only 507 Chum Salmon estimated to be harvested in the commercial fishery incidental to fishing for Coho Salmon (ADF&G 2017). In 2016, salmon commercial fishing was allowed on July 29 and August 12; however, no commercial salmon processors were available in the area and the opportunity was for catcher/sellers only (ADF&G 2016a and 2016b).

Subsistence

From 1990 to 2015, the subsistence harvest of Kuskokwim River Chum Salmon has averaged 68,736 fish, with a range of 37,770 in 1997 to 100,786 fish in 1996 (Shelden et al. 2016). The recent five-year average (2010–2014) subsistence harvest was 60,212 fish. In 2015, the estimated subsistence harvest was 40,872 fish. Kuskokwim River Chum Salmon subsistence harvest by village and sections of the Kuskokwim River can be found in **Table 5**.

Sockeye Salmon

Commercial

Inriver commercial harvest of Sockeye Salmon has likely been occurring since the early 1900s (Pennoyer et al. 1965). Commercial harvest of Sockeye Salmon was considered incidental to Chum Salmon commercial harvest in the Kuskokwim River from 1987 to 2003; however, in 2004, a guideline incidental harvest level of 0–50,000 Sockeye Salmon was established. District 4 and 5 commercial fisheries target Sockeye Salmon (ADF&G 2017). Commercial harvest of Sockeye Salmon from the Kuskokwim area increased from the 1960s through the 1990s with decadal annual averages increased from 5,000 fish in the 1960s to 15,000 fish in the 1970s to 110,000 fish in the 1980s to 160,000 in the 1990s. Annual commercial harvest of Sockeye Salmon since 2000 has average about 70,000 fish (Clark et al. 2006). From 2005 to 2014, the average Sockeye Salmon harvest in the Kuskokwim area was 120,940 fish, with the most recent harvest in 2015 being 56,260 fish (ADF&G 2017). In 2015, limited commercial harvest opportunity was provided by ADF&G, due to overlapping run-timing with Chinook and Chum salmon and the need to conserve those species. Only 130 Sockeye Salmon were harvested in the Kuskokwim River commercial fishery in 2015 (ADF&G 2017). In 2016, salmon commercial fishing was allowed on

July 29 and August 12; however, no commercial salmon processors were available in the area and the opportunity was for catcher/sellers only (ADF&G 2016a and 2016b).

Subsistence

From 1990 to 2015, the subsistence harvest of Kuskokwim River Sockeye Salmon has averaged 42,387 fish, with a range of 31,290 in 1995 to 52,213 fish in 2008 (Shelden et al. 2016). The recent five-year average (2010–2014) subsistence harvest was 43,426 fish. In 2015, the estimated subsistence harvest was 36,781 fish. Kuskokwim River Sockeye Salmon subsistence harvest by village and sections of the Kuskokwim River can be found in **Table 6**.

Coho Salmon

Commercial

Kuskokwim River Coho Salmon are harvested primarily in the commercial fishery. In recent years the Coho Salmon commercial fishery has accounted for the largest number of salmon harvested in the Kuskokwim Area. Coho Salmon are targeted in all three commercial fishing districts (Kuskokwim River, Goodnews Bay, and Quinhagak) and those fisheries occur late July thorough August (ADF&G 2017).

Kuskokwim Area Coho Salmon commercial harvests increased each decade, from about 40,000 fish in the 1960s to 150,000 in the 1970s to 500,000 in the 1980s to about 550,000 fish in the 1990s. Annual commercial harvests since the early 2000s have averaged about 300,000 Coho Salmon (Clark et al. 2006). From 2005 to 2014, the average Coho Salmon harvest in the Kuskokwim Area was 175,940 fish, with the most recent harvest in 2015 being 148,349 fish (ADF&G 2017). In 2015 there were three commercial openings (August 10, 17, and 21), during which 65,000 Coho Salmon were harvested in the Kuskokwim River (ADF&G 2017). In 2016, salmon commercial fishing was allowed on July 29 and August 12; however, no commercial salmon processors were available in the area and the opportunity was for catcher/sellers only (ADF&G 2016a and 2016b).

Subsistence

From 1990 to 2015, the subsistence harvest of Kuskokwim River Coho Salmon has averaged 36,850 fish, with a range of 24,667 in 1998 to 57,560 fish in 2014 (**Table 7**). The recent five-year average (2010–2014) subsistence harvest was 34,019 fish. In 2015, the estimated subsistence harvest was 33,939 fish. Kuskokwim River Coho Salmon subsistence harvest by village and sections of the Kuskokwim River can be found in **Table 8**.

Recent Salmon Subsistence Fishery Harvest Trends

Restrictions on the harvest of Chinook Salmon in the subsistence fishery began in 2001. From 2001 through 2006, the subsistence fishery was closed during "windowed," or rolling, closures implemented sequentially up the river in a step-wise progression, consistent with Chinook Salmon run timing, from three to five days per week. In 2001, the windowed closures continued throughout the Chum Salmon run (Whitmore et al. 2004). The Chinook Salmon subsistence fishery was not closed from 2007 through 2009.

In 2010, only lower river Chinook Salmon-bearing tributaries were closed. In 2011, only lower river Chinook Salmon-bearing tributaries were closed until after June 16 when several drainage-wide closures occurred. In 2012, the Chinook Salmon subsistence fishery opened for only six days. In 2013, only lower river Chinook Salmon-bearing tributaries were closed until after June 28 when several drainage-wide closures occurred. Since 2014, the Chinook Salmon subsistence fishery has been closed except for limited harvests allowed through the distribution of Federal permits in 2014 and 2015, or limited Federal subsistence fishing opportunities in 2016 (**Figure 2**).

With these regulatory changes in mind, a comparison of Chinook Salmon subsistence harvest to the subsistence harvests of other salmon species in the Kuskokwim River shows that subsistence harvest trends have differentiated themselves since 2011 (**Figure 3**). In general, before 2011, Chum Salmon subsistence harvest increased with Chinook Salmon subsistence harvest, Sockeye Salmon subsistence harvest stayed relatively constant with Chinook Salmon subsistence harvest, and Coho Salmon subsistence harvest slightly increased with Chinook Salmon subsistence harvest (**Figure 3**). These trends abruptly stop in 2011, as Chinook Salmon harvest dropped while subsistence harvest of other salmon species stayed relatively constant (**Figure 3**).

Given this differentiated pattern in harvest since 2011, another pattern appears when looking at the average harvest composition by species. From 1990 to 2015, Chinook Salmon subsistence harvest accounted for 33% of the total salmon species harvested (**Table 9**). However, since 2011, Chinook Salmon subsistence harvest has only accounted for 18% of the total salmon harvested, which is about a 15% deviation from historical long-term subsistence harvest composition (**Table 9, Table 10**). During this same time period, the subsistence harvest composition of other salmon species increased from 67% to 82% (**Table 9**). Comparing how Chinook Salmon subsistence harvest has deviated from the historical long-term harvest species composition (1990-2015) indicates that since 2011, the subsistence harvest composition of other salmon species has been above average, while Chinook Salmon subsistence harvest composition has been well below average (**Table 10**, **Figure 4**).

Biological Background

Prior to 2013, Kuskokwim River salmon fisheries were managed according to the State of Alaska Kuskokwim River Salmon Management Rebuilding Plan (5 AAC 07.365). This plan managed salmon stocks within the Kuskokwim River drainage for a sustained yield that was large enough to meet escapement goals, provide for amounts reasonably necessary for subsistence uses (ANS), and provide for fisheries other than subsistence. In January 2013, the Alaska Board of Fisheries revised the Kuskokwim River Salmon Management Plan. The Management Plan states,

> *It is the intent of the Board of Fisheries that the Kuskokwim River salmon stocks shall be managed in a conservative manner consistent with the Policy for the Management of Sustainable Salmon Fisheries under 5 AAC 39.222 to meet escapement goals and the subsistence priority.*

Pursuant to current Federal regulations, Federal subsistence fisheries in the Kuskokwim Area are managed the same as the State-managed subsistence fisheries unless superseded by a Federal Special Action.

Chinook Salmon

Run-Size

Estimates of drainage-wide run size are produced by the Chinook Salmon run-reconstruction model and includes multiple sources of data such as weir and aerial escapement indices, commercial catch and effort, mark-recapture estimates, and harvest (Liller and Hamazaki 2016).

Chinook Salmon abundance in the Kuskokwim River system has been highly variable with cyclical (~10 years) peaks around 400,000 and valleys around 100,000–150,000. The last peak run-size occurred in 2004 with an estimated size of 408,387 Chinook Salmon. Run-sizes have dropped steadily from that peak until reaching an all-time low of 93,109 salmon in 2013. Since 2013, the population appears to be on an increasing trend with the 2014 estimated run-size at 140,667, the 2015 estimated run-size at 172,055, and the 2016 estimated run-size at 176,916 Chinook Salmon (**Table 2**, **Figure 5**) (Liller and Hamazaki 2016).

Direct estimates of total run-size for Kuskokwim River Chinook Salmon are available 2003–2007 and 2014–2016 through extensive mark-recapture surveys performed by ADF&G. The mark-recapture projects from 2003 to 2007 and in 2014 were performed above Kalskag during above average run abundances, while the 2015 and 2016 projects were performed in the lower Kuskokwim River just above Eek during below average run abundances. Methods for estimating escapement to unmonitored tributaries downriver of the tag site also were changed in 2015 and 2016 (Liller 2017). From 2003 to 2007, direct estimates ranged from 242,000 to 423,000 Chinook Salmon, while 2014–2016 estimates ranged from 78,585 to 128,751 Chinook Salmon (**Table 11**). A direct comparison illustrates that the estimates from the run reconstruction model are, on average, 47% larger (approximately 48,000 fish) compared to the estimate of total run based on mark–recapture methods. Smaller total run estimates are produced for all years (1976–2016) when the 2014–2016 mark–recapture information is included as additional scalars. The difference between the 2016 base model (i.e., without 2014–2016 mark–recapture) and the model run including the 2014–2016 mark–recapture information averages approximately 30,000 fish.

The current run-size results do not include the 2014–2016 mark-recapture estimates into the run-reconstruction model (Liller 2017). It is important to note that the inclusion of the independent run-size estimates is the only input data source that scales the model to total numbers of Chinook Salmon. Given that the 2014-2016 estimates of total-run size were done in times of smaller run-sizes for Chinook Salmon in the Kuskokwim River, the input of the new data shift the run-reconstruction estimates downward in magnitude, while past trends/patterns remain the same.

The inclusion of the 2014-2016 mark-recapture information into the Chinook Salmon run-reconstruction makes end-of-season management evaluation complicated. The drainage-wide escapement goal for Chinook Salmon in the Kuskokwim River was set in 2013 with only 2003-2007 mark-recapture information to scale the run-size estimates. As stated before, the 2003-2007 mark-recapture projects were done during average to above average run-size years for Chinook Salmon. This means that the scale of the drainage-wide escapement goal would be different (i.e., higher) than that of the run-size estimates produced from the run-reconstruction model with the inclusion of the mark-recapture information from

2014-2016. The only way to produce an updated drainage-wide escapement goal that is on the same scale as the run-reconstruction estimates with 2014-2016 mark-recapture information included, a new spawn-recruit analysis would need to be performed with run-size estimates that include the 2014-2016 mark-recapture information.

The run reconstruction approach that ADF&G has been using for Chinook Salmon in the Kuskokwim River drainage is currently undergoing rigorous peer review including an independent review panel funded through the Arctic-Yukon-Kuskokwim Salmon Sustainability Initiative (AYKSSI), which consists of various well-regarded academic professionals in the fisheries assessment field. In addition, an interagency review is being conducted by the Kuskokwim River Interagency Chinook Salmon Run Reconstruction Model Development Team, which includes members from the Kuskokwim River Inter-Tribal Fish Commission, U.S. Fish and Wildlife Service, the Quantitative Fisheries Laboratory at Auburn University, and ADF&G Commercial Fisheries Division staff. The conclusion of these reviews are anticipated to result in an updated run reconstruction model to be utilized in future management decisions, such as setting the new escapement goal(s) for Chinook Salmon. The preliminary timeline for completion of this review is August 2018, with the expectation of using the new model as part of an escapement review process anticipated at the 2019 Alaska Board of Fisheries meeting.

Escapement

The ADF&G and U.S. Fish and Wildlife Service monitor Chinook Salmon escapement throughout the Kuskokwim River drainage with a variety of weir and aerial surveys. Six weirs are utilized as data sources in the run-reconstruction model: two in the lower river (Kwethluk, Tuluksak) and four in the upper river (George, Kogrukluk, Tatlawiksuk, and Takotna). The ADF&G discontinued the Takotna weir in 2014. Two other weirs in the drainage not used as data inputs in the run-reconstruction model (Salmon River of the Aniak drainage, Salmon River of the Pitka Fork drainage). In addition to the weir projects, 14 aerial index surveys are utilized as inputs into the run-reconstruction model: three in the lower river (Kwethluk, Tuluksak, and Kisaralik) and 11 in upper river (Salmon-Aniak, Kipchuk, Aniak, Holokuk, Oskawalik, Holitna, Cheeneetnuk, Gagaryah, Pitka, Bear, and Salmon-Pitka).

Escapement estimates follow the same general trend as total run estimates with cyclical peaks and valleys. Average high escapement years were around 300,000 Chinook Salmon, while average low escapements were around 100,000 Chinook Salmon. The last peak was in 2004 with an escapement of around 308,000 fish. After the last peak, the Chinook Salmon escapement dropped to a record low in 2013 of around 46,000 fish. Since the record low, escapement has steadily increased although it appears as though the rate of increased escapement is slower than escapement cycles in the past despite heavy restrictions to harvest (**Table 2, Figure 5**) (Liller and Hamazaki 2016). However, in 2017, age-4 Chinook Salmon that were spawned during the record low escapement class of 2013 will be returning to spawn. On average, age-4 Chinook Salmon make up around 20% of the brood composition (**Table 12**). This will provide the first glimpse of how harvest restrictions since 2013 have influenced the run.

In 2012, Federal and State in-season fisheries managers, with concurrence from the Kuskokwim River Salmon Management Working Group (Working Group), agreed on a drainage-wide escapement goal of 127,000 fish (OSM 2015).

For the 2013 Chinook Salmon fishing season, with a new sustainable escapement goal (SEG) in place (65,000–120,000 fish), in-season fisheries managers, with concurrence from the Working Group, agreed on managing the fishery with an escapement goal of 85,000 fish. Due to run timing and the return being compressed, few restrictions were placed on Chinook Salmon subsistence harvesting throughout the 2013 fishing season. This resulted in the lowest escapement on record (an estimated 45,621 fish) (**Table 2, Figure 5**) (OSM 2015).

In 2014, the Kuskokwim River Chinook Salmon forecast was for a return of 71,000–116,000 fish. In-season fishery managers, with concurrence from the Working Group, agreed to start the fishing season closed to the harvest of Chinook Salmon. At the time, an estimated drainage-wide run size was predicted to be 135,000 Chinook Salmon, resulting in an escapement of 123,987 fish, which was slightly above the upper limit of the SEG (120,000 fish). However, two weir projects in the Kwethluk and Kogrukluk rivers failed to reach their tributary-specific escapement goals (OSM 2015).

In 2015, the Kuskokwim River Chinook Salmon forecast was 96,000–163,000 fish. At the time, an estimated drainage-wide run size was 172,000 Chinook Salmon, which resulted in an escapement of approximately 155,000 Chinook Salmon. The estimated escapement was near average and larger than the SEG of 65,000–120,000 Chinook Salmon (OSM 2015).

In 2016, the Kuskokwim River Chinook Salmon forecast was 125,000–219,000 fish. The Federal in-season manager, in collaboration with the Kuskokwim River Inter-Tribal Fish Commission, set a fundamental escapement objective of at least 100,000 Chinook Salmon. Coinciding with that decision, the Working Group set an escapement objective of 85% of the upper bound of the SEG (65,000–120,000 fish), which was approximately 102,000 Chinook Salmon. The estimated total run size in 2016 for Chinook Salmon in the Kuskokwim River was around 177,000 fish, which resulted in an estimated escapement of around 145,000 fish. Once again, the level of escapement was well over the upper bound of the SEG of 120,000 Chinook Salmon.

The 2017 Kuskokwim River Chinook Salmon forecast is 132,000–222,000 fish, which projects to allow enough fish for escapement and subsistence harvest (Poetter 2017, pers. comm.).

In-Season Run Timing and Composition

In-season management relies heavily on in-river abundance via test fisheries, creel surveys, effort counts, and pre-season forecasts in order to inform harvest decisions that control subsistence opportunities. The main in-river abundance indicator used in season is the Bethel Test Fishery. The Bethel Test Fishery has been operated upstream of Bethel since 1984 and provides a long term data set on species composition, relative abundances, and run-timing. There are complications with using data from the test fishery to help in-season management because in-river abundance during the season is confounded with run-timing, as well as the test fishery being located upstream of where much of the Chinook Salmon harvest takes place.

There is a large amount of variation in historical run-timing, which complicates in-season predictions of run abundance. All of these factors highlight the importance of the pre-season forecast during the early stages of in-season management.

Chinook Salmon enter the Kuskokwim River beginning in late May and continue through early August. The Bethel Test Fishery starts operating around the end of May and continues till late August. The cumulative catch of Chinook Salmon at the test fishery can best be described by a sigmoidal shaped curve (i.e., logistic), which than can be utilized to generalize run-strength, run-timing, and species composition (**Figure 6, Figure 7**). From 1984 to 2016, the estimated dates at which 50% of the Chinook Salmon run has passed the Bethel Test Fishery (D50) ranges from June 14 to July 2, with an average of June 22 ± 4 days (**Table 13, Figure 6 and 7**). Past research has shown that Chinook Salmon migrating to the upriver portions of the drainage tend to migrate earlier in this range than Chinook Salmon migrating to the middle or lower portions of the drainage (Stuby 2007). This pattern is supported by recent telemetry research on Chinook Salmon in the Kuskokwim River (Liller 2017, pers. comm.).

Chinook Salmon are the main salmon species moving in the Kuskokwim River in the beginning of the season; however, the composition of the run slowly transitions to Chum and Sockeye Salmon (**Figure 8**). From 1984 to 2016, the average date at which the proportions of Chinook Salmon is equal to that of Chum Salmon plus Sockeye Salmon at the Bethel test fishery (1:1 ratio) is June 13 (**Figure 8**). The overall composition of catch by species at the Bethel test fishery is dominated by Chum and Sockeye Salmon, which on average account for 93% of the catch, while Chinook Salmon account for only 7% of the total catch (**Table 14, Figure 8**).

Population Assessment

The output from the run-reconstruction, along with estimates of harvest and age composition from harvest and escapement is then fed into a Bayesian State Space spawn-recruit analysis (Hamazaki et al 2012). The spawn-recruit analysis produces drainage-wide estimates of productivity, carrying capacity, and age, and recruitment variation. These estimates and the uncertainty around them are then used to derive biological reference points that are used to develop drainage-wide escapement goals for the Kuskokwim River (SEG: 65,000 – 120,000), as well as goals for selected tributaries (Kwethluk, George and Kogrukluk).

Chum Salmon

Run-Size

Accurate and reliable estimates of drainage-wide run size are not available for Kuskokwim River Chum Salmon. Shotwell and Adkinson (2004) developed a statistical model that utilized a majority of the datasets available at the time to estimate historic annual Chum Salmon abundance for the Kuskokwim River. However, the estimated annual historical abundances calculated by this study have been shown to be biased toward the low end due to reliance of the estimates on questionable whole-river abundance estimates generated from 1993-1995 from a sonar project operated near Bethel (Bue et al. 2008).

During the development of this statistical model, a series of mark-recapture projects were conducted by ADF&G in 2002 and 2003 to estimate total inriver abundance upstream of Kalskag, as well as radio telemetry studies in the Holitna River drainage in 2001 and 2004 (Kerkvliet et al. 2003, 2004).

Following the completion of the mark-recapture studies and increases in monitoring capacities throughout the Kuskokwim River drainage, an ADF&G study to develop a formal Kuskokwim River Chum Salmon run-reconstruction was funded in 2007 through the Office of Subsistence Management's Fisheries Resource Monitoring Program (Project 07-302). However, after a year of development, investigators determined in early January 2008 that there was insufficient information to achieve the study's objectives. The tagging methodology used during the 2002 and 2003 mark-recapture abundance estimates had major issues, which led to the significant biases in the estimated inriver abundances. Due to these issues, the study was terminated (Bue et al. 2008). Since the project's termination, there has been no attempt at a drainage-wide run-reconstruction assessment.

Given the lack of a drainage-wide assessment, the Kuskokwim River Chum Salmon run is monitored in-season via the Bethel Test Fishery. The relative strength of a run is assessed by comparing the cumulative, end of the season catch per unit effort (CPUE) of any one year to the CPUE of one or more other years. However, it is very important to note that caution should be used to compare cumulative CPUE amongst years, especially comparisons between years without subsistence fishing restrictions and years with subsistence fishing restrictions. This is because the Bethel Test Fishery is located upstream of where a majority of the salmon harvest occurs, so any restrictions to harvest via regulations would influence in-season run abundances, which confounds relative strength of run assessments.

The end of season cumulative CPUE at the Bethel Test Fishery for Chum Salmon (1984–2016) ranges from 549 to 18,192 fish, with an average of 5,341 ± 3,767 fish. The most recent 5-year average (2011–2016) of cumulative CPUE for Chum Salmon is 5,992 ± 2,472 fish. The last peak in cumulative CPUE occurred in 2011 with a total of 10,028 Chum Salmon, which decreased steadily until reaching a low in 2015 of 2,945 Chum Salmon. The 2015 end of season cumulative CPUE for Chum Salmon was 2,945 fish, which is the 11th lowest end of season cumulative CPUE observed since 1984. The 2016 end of season cumulative CPUE for Chum Salmon slightly increased to approximately 4,000 fish, which is still a below average CPUE as compared to the overall long-term average. A complete statistical summary table of end of season cumulative CPUE at the Bethel Test Fishery for Chum Salmon can be seen in **Table 15**.

Escapement

The escapement of Kuskokwim River Chum Salmon is monitored at six weirs located on the Kwethluk, Tuluksak, George, Kogrukluk, Tatlawiksuk Salmon (tributary of the Aniak) rivers. There is no assessment of drainage-wide escapement sizes for Chum Salmon in the Kuskokwim River.

The Kogrukluk River has the longest data set, starting in 1990, and is the only tributary with an established escapement goal for Chum Salmon; a range of 15,000–49,000 fish. The annual escapement has been greater than the lower bound of the goal range every year since 2001. The upper bound of the goal range has been exceeded in six of the past 10 years (ADF&G 2016c).

From 2006 to 2015, Chum Salmon escapement in the Kogrukluk River ranges from 30,736 to 194,887 fish, with an average escapement of 71,371 fish. The Kogrukluk River escapement goal was achieved the past three years, with escapements for 2014, 2015, and 2016 being between 30,000 and 44,000 Chum Salmon (ADF&G 2017).

The Aniak River used to be monitored for Chum Salmon via a sonar and even had an sustainable escapement goal set for it of 222,000 – 480,000 fish; however, the sonar project was discontinued in 2012. Instead, ADF&G shifted resources to operating a weir project on the Salmon River, which is a tributary of the Aniak River. This allowed monitoring of all salmon species, rather than just Chum Salmon escapements (ADF&G 2012).

The Tuluksak River does not have an established escapement goal. From 2006 to 2015, the Chum Salmon escapement in the Tuluksak River ranged from 5,868 – 35,696 fish, with an average of 13,717 fish. The escapement has steadily dropped since 2005 (35,696 fish) to the lowest on record in 2016 (5,868 fish). The last three years of Chum Salmon escapement in the Tuluksak River have been the three lowest escapements on record (ADF&G 2017)

The Kwethluk River does not have an established escapement goal. From 2006 to 2015, the Chum escapement in the Kwethluk River ranged from 17,941 – 54,913 fish, with an average of 28,452 fish. The weir did not operate or provided incomplete counts in 2005, 2012, and 2013. Outside of 2006 and 2007, the Chum Salmon escapement in the Kwethluk has been either near average or below average in comparison to the overall average from 2005-2016 (ADF&G 2017).

The Tatlawiksuk River does not have an established escapement goal. From 2006 to 2015, the Chum Salmon escapement in the Tatlawiksuk River ranged from 10,008 – 88,202 fish, with an average of 39,158 fish. The last peak in Chum Salmon escapement on the system occurred in 2011 (88,202 fish), but since then has rapidly declined to a low of 9,238 fish in 2016. The 2016 Chum Salmon escapement in the Tatlawiksuk River is the smallest on record from 2005 to 2016 (ADF&G 2017).

The George River does not have an established escapement goal. From 2006 to 2015, the Chum Salmon escapement in the George River ranged from 7,944 – 61,531 fish, with an average of 31,987 fish. The last peak in Chum Salmon escapement occurred in 2011 (46,650 fish) with a stepwise decrease in escapement levels since then (2012-2013: ~35,000 fish, 2014-2016: ~17,500 fish) (ADF&G 2017).

The Salmon River (of the Aniak) does not have an established escapement goal. Recent escapement monitoring started in 2006. From 2006 to 2015, the Chum Salmon escapement in the system ranged from 2,890 – 42,825 fish, with an average of 12,951 fish. The highest escapements on record were in the first two years of the project (2006: 42,825 fish, 2007: 25,340 fish), but since then escapements decreased dramatically with the lowest escapement on record being 2016 (589 fish) (ADF&G 2017).

In-season Run-Timing and Composition

Chum Salmon start moving past the Bethel Test Fishery near the middle of June, with the earliest capture date at the test fishery being on June 1. On average, early July (July 3 – July 6) is the time at which 50%

of the run has passed the Bethel Test Fishery (**Figure 7**). From the beginning of June until early July, Chum Salmon transition to become the dominating salmon species captured at the Bethel Test Fishery during the summer. From 1984 to 2016, Chum Salmon, on average, account for 68% of the yearly catch composition at the Bethel Test Fishery during the summer in comparison to Chinook Salmon and Sockeye Salmon, which account for 7% and 25%, respectively (**Figure 8**).

Population Assessment

Given the lack of drainage-wide run-size estimates of Kuskokwim River Chum Salmon, there has not been an analysis of stock productivity to evaluate the effectiveness of fisheries management actions. This analysis can only occur when accurate and reliable drainage-wide run-size estimates of Kuskokwim River Chum Salmon are available.

Sockeye Salmon

Run-Size

Similar to Chum Salmon, accurate and reliable estimates of drainage-wide run size are not available for Kuskokwim River Sockeye Salmon; however, just like with Chum Salmon attempts were made to develop annual drainage-wide estimates of abundance.

In 2009, an ADF&G project was funded by the Alaska Sustainable Salmon Fund (Project No. 45920) in order to develop estimates of the number of Sockeye Salmon that returned to the Kuskokwim River annually 1985–2012 through a statistical model that combines data collected from mark-recapture investigations with historical escapement data. The project was not successful at estimating total numbers of Sockeye Salmon. A statistical model was completed; however, an accurate reconstruction of annual run-size required independent estimates of abundance for scaling purposes. The mark-recapture portion of this project was conducted 2010–2012 to provide independent estimates of abundance for scaling the statistical model. The mark-recapture portion of the project was not successful in 2010 and 2012 due to high water conditions, which prevented the sufficient recapture of tagged fish. The tagging study was successful in 2011, but had significant biases that could not be corrected (Alaska Sustainable Salmon Fund 2015). Since 2012, there has not been any attempt at providing independent estimates of abundance through mark-recapture projects; however, ADF&G has worked to develop a sonar project in the Kuskokwim River that will be used to monitor all salmon species, which will be fully implemented in 2017.

Given the lack of a drainage-wide assessment, the Kuskokwim River Sockeye Salmon run is monitored in-season via the Bethel Test Fishery. The relative strength of a run is assessed by comparing the cumulative, end of the season CPUE of any one year to the cumulative CPUE of one or more other years. However, it is very important to note that caution should be used to compare cumulative CPUE amongst years, especially comparisons between years without subsistence fishing restrictions and years with subsistence fishing restrictions. This is because the Bethel Test Fishery is located upstream of where a majority of the salmon harvest occurs, so any restrictions to harvest via regulations would influence in-season run abundances, which confounds relative strength of run assessments.

The end of season cumulative CPUE at the Bethel Test Fishery for Sockeye Salmon (1984–2016) ranges from 569 to 3,019 fish, with an average of 1,539 ± 588 fish. The most recent 5-year average (2011–2016) of cumulative CPUE for Sockeye Salmon is 1,634 ± 541 fish. The most recent two years (2015 and 2016) end of season cumulative CPUEs have been the largest on record since 2005 with totals of 2,157 and 2,444 Sockeye Salmon, respectively. A complete statistical summary table of end of season cumulative CPUE at the Bethel Test Fishery for Sockeye Salmon can be seen in **Table 16**.

Escapement

The escapement of Kuskokwim River Sockeye Salmon is monitored at six weirs located on the Kwethluk, Tuluksak, George, Kogrukluk, Tatlawiksuk, and Salmon (tributary of the Aniak) rivers. There is an additional weir that monitors Kuskokwim River Sockeye Salmon located on the outlet of Telaquana Lake.

The Kogrukluk River has the longest data set and is the only tributary with an established escapement goal for Sockeye Salmon; a range of 4,400–17,000 fish. From 2006 to 2015, Sockeye Salmon escapement in the Kogrukluk River ranges from 6,362 to 61,382 fish, with an average escapement of 18,532 fish. In 2016 the upper bound of the escapement goal range was exceeded by almost 3,000 Sockeye Salmon with a total of 19,950 fish. The annual escapement has been greater than the lower bound of the goal range every year since 2001. The upper bound of the goal range has been exceeded in six of the past 10 years (ADF&G 2017).

The Tuluksak River does not have an established escapement goal. From 2006 to 2015, the Sockeye Salmon escapement in the Tuluksak River ranged from 130 – 985 fish, with an average of 470 fish. In 2016, Sockeye Salmon escapement in the Tuluksak River was 1,509 fish, which is the highest escapement levels measured in the system since 2006 and is more than triple the 2006-2015 average escapement levels (ADF&G 2017).

The Kwethluk River does not have an established escapement goal. From 2006 to 2015, the Sockeye Salmon escapement in the Kwethluk River ranged from 2,031 to 8,975 fish, with an average of 6,448 fish. The weir did not operate or provided incomplete counts in 2005, 2012, and 2013. The 2016 Sockeye Salmon escapement was 20,495, which is the highest observed escapement level in the weirs recorded history. Similar to the Tuluksak River Sockeye Salmon escapement, the Kwethluk River Sockeye Salmon in 2016 is more than triple the 2006–2015 average escapement (ADF&G 2017).

The Tatlawiksuk River does not have an established escapement goal. From 2006 to 2015, the Sockeye Salmon escapement in the Tatlawiksuk River ranged from 0 – 39 fish, with an average of 24 fish. (ADF&G 2017). Sockeye Salmon escapement in 2016 for the Tatlawiksuk River was 240, which was ten times higher than the average Sockeye Salmon escapement from 2006-2015 (ADF&G 2017).

The George River does not have an established escapement goal. From 2006 to 2015, the Sockeye Salmon escapement in the George River ranged from 43 – 156 fish, with an average of 104 fish. (ADF&G 2017). The 2016 Sockeye Salmon escapement for the river was 2,778 fish, which is the highest on record dating back to 2005 (ADF&G 2017).

The Salmon River (of the Aniak) does not have an established escapement goal. Recent escapement monitoring started in 2006. From 2006 to 2015, the Sockeye Salmon escapement in the system ranged from 894 – 7,086 fish, with an average of 2,008 fish. The highest escapements on record were in the first two years of the project (2006: 7,086 fish, 2007: 2,189 fish), but since then escapements have decreased with the lowest escapement on record being 2016 (185 fish) (ADF&G 2017).

The Telaquana River weir has been operated cooperatively by ADF&G and the National Park Service since 2010. The system is by far the biggest contributor of Sockeye Salmon in the Kuskokwim River drainage. From 2010 to 2015, Sockeye Salmon escapement in the Telaquana River ranged from 22,994 – 91,164 fish, with an average of 50,764 fish. The last two years of the project have seen the largest numbers of Sockeye Salmon escapement with 91,164 fish and 82,435 fish, respectively (ADF&G 2017).

In-season Run-Timing and Composition

Sockeye Salmon start moving past the Bethel Test Fishery in early June, with the earliest capture date at the test fishery being on June 1. On average, late June (June 27 – June 30) is the time at which 50% of the run has passed the Bethel Test Fishery (**Figure 7**). During the latter half of June, on average, Sockeye Salmon overtake Chinook Salmon as the second most numerable species of salmon in the Kuskokwim River at the Bethel Test Fishery (**Figure 8**).

Population Assessment

Given the lack of drainage-wide run-size estimates of Kuskokwim River Sockeye Salmon, there has not been an analysis of stock productivity to evaluate the effectiveness of fisheries management actions. This analysis can only occur when accurate and reliable drainage-wide run-size estimates of Kuskokwim River Sockeye Salmon are available.

Coho Salmon

Run-Size

Estimates of drainage-wide run size are produced by the Coho Salmon run-reconstruction model and utilize multiple sources of data such as weir escapement indices, commercial catch and effort, mark-recapture estimates, and harvest (Schaberg and Liller 2015).

Estimates of Coho Salmon abundance in the Kuskokwim River system are available from 2000 – 2015 (Schaberg and Liller 2015, ADF&G 2016c). Coho Salmon runs range from 499,951 – 2,699,102 fish with an average run size around 1,000,000 ± 550,000 Coho Salmon. The last peak in Coho Salmon run sizes occurred in 2014 with approximately 1,435,689 fish (**Table 7, Figure 9**). The 2016 estimates of Coho Salmon have yet to be published by ADF&G.

Estimates of total inriver abundance for Kuskokwim River Coho Salmon are available from 2001-2004 and 2008-2009 via mark-recapture projects conducted near Kalskag. From 2001 to 2004, direct

estimates ranged from 603,414 to 2,024,571 Coho Salmon, while 2008–2009 were 963,058 and 714,481 Coho Salmon (**Table 17**).

Escapement

The escapement of Kuskokwim River Coho Salmon is monitored at six weirs located on the Kwethluk, Tuluksak, George, Kogrukluk, Tatlawiksuk, and Salmon (tributary of the Aniak) rivers.

Estimates of drainage-wide escapement are produced by the Kuskokwim River Coho Salmon run-reconstruction model (Schaberg and Liller 2015). From 2000 to 2015, drainage-wide escapement for Coho Salmon ranges from 407,065 to 2,375,943 fish with the average over the time series being 810,398 ± 497,276 fish. The last peak in drainage-wide escapement occurred in 2014 with an estimated 1,435,689 Coho Salmon, while the 2015 estimate was 919,421 (**Table 7, Figure 9**). Drainage-wide escapement estimates for Coho Salmon are not available for 2016.

In-season Run-Timing and Composition

Coho Salmon are the last of the major salmon species to migrate into the Kuskokwim River with the earliest capture date at the Bethel Test Fishery being July 6. A complete statistical summary table of end of season cumulative CPUE at the Bethel Test Fishery for Coho Salmon can be seen in **Table 18**. On average, early August (August 7 – August 9) is the time at which 50% of the run has passed the Bethel Test Fishery (**Figure 7**). Because of the date at which the majority of the Coho Salmon passes through the Bethel Test Fishery, the composition of the run is almost all Coho Salmon. Caution should be taken in interpreting Bethel Test Fishery data for Coho Salmon because the test fishery operations generally cease by August 24, which means late-run Coho Salmon might not represent the entire run of Coho Salmon during years with late-run timing.

Population Assessment

Currently, the only assessment for Kuskokwim River Coho Salmon is ADF&G's run-reconstruction model (that includes creation of a brood table). The run-reconstruction provides new information for the formulation of fisheries management strategies for Coho Salmon in the Kuskokwim River, but does not provide an assessment of stock productivity, unlike the spawn-recruit assessment used for Kuskokwim River Chinook Salmon. The data is adequate to assess spawner-recruit dynamics, which could then be used to develop drainage-wide escapement goals (Schaberg and Liller 2015). However, to date, a spawn-recruit assessment has yet to be completed or published by any entity.

Section 804 Subsistence User Prioritization Analysis

Section 804 of ANILCA and 50 CFR 100.17 of Federal regulations mandate that the taking on Federal public lands of fish and wildlife for nonwasteful subsistence uses shall be accorded priority over the taking on such lands of fish and wildlife for other purposes. Section 804 of ANILCA and Federal regulation 50 CFR 100.17 further require that whenever it is necessary to restrict the taking of populations of fish and wildlife on such lands for subsistence uses in order to protect the continued viability of such

populations or to continue subsistence uses, such a priority shall be implemented through appropriate limitations based on the application of the following three criteria: (1) customary and direct dependence upon the populations as the mainstay of livelihood, (2) local residency, and (3) the availability of alternative resources. All residents of the Kuskokwim Fishery Management Area have a customary and traditional use determination for all salmon in the Kuskokwim River drainage. The area includes 40 villages (see **Table 1**).

Section 804 Subsistence User Prioritization analyses for salmon in the Kuskokwim River drainage was written 2016 in response to a special action request similar to this one (FSA16-01). The Board adopted the conclusions of that analyses. The standing of communities regarding the three criteria has not changed substantially. Therefore, the analysis for FSA16-01 is referenced here. The summary and conclusion follow.

Summary

Residents of 32 communities in the Kuskokwim River drainage and the coastal villages of Kwigillingok, Kongiganek, Kipnuk, and Chefornak are known to rely on salmon from the Kuskokwim River drainage as a mainstay of livelihood and the subsistence economy. Twenty-eight communities are situated in the Kuskokwim River drainage and therefore have the highest degree of local residency to the salmon runs there. As alternatives to Kuskokwim salmon, wild resources available for harvest include nonsalmon fishes, marine mammals, and moose. Coastal communities are better situated regarding their ability to harvest marine fishes and seals, lower Kuskokwim River communities appear to be better situated to harvest nonsalmon fishes, and headwater communities are better situated to harvest moose.

Conclusion

Residents of the Kuskokwim River drainage, including 28 communities, and additionally Kwigillingok, Kongiganek, Kipnuk, and Chefornak have the highest customary dependence on salmon from the Kuskokwim River drainage than do other communities after consideration of the three criteria in ANILCA Section 804. The 32 villages consist of an estimated 14,739 people living in 4,226 households. Presented from south to north, the area includes the following villages: Chefornak, Kipnuk, Kongiganek, Kwigillingok, Tuntutuliak, Eek, Napakiak, Napaskiak, Kasigluk, Nunapitchuk, Atmautluak, Oscarville, Bethel, Kwethluk, Akiachak, Akiak, Tuluksak, Lower Kalskag, Kalskag, Aniak, Chuathbaluk, Napaimute, Crooked Creek, Georgetown, Red Devil, Sleetmute, Stoney River, Lime Village, Takotna, Nikolai, Telida, and McGrath.

The villages have similar characteristics. Most are situated within or adjacent to the Kuskokwim River drainage. Most harvest salmon at higher levels than other resources (such as nonsalmon fishes, land mammals, marine mammals, birds and eggs, and plants); they generally harvest salmon in large quantities to dry and smoke during June; they are not situated near alternative salmon runs; and they generally are not situated near alternative resources that can be harvested, processed, and preserved in numbers large enough to replace Chinook Salmon as a mainstay of livelihood.

Effects of the Request

If this special action request was approved, the Board would close Refuge waters to the harvest of salmon except by Federally qualified subsistence users identified in the Section 804 Subsistence User Prioritization analysis. This would mean salmon fishing schedules, openings, closures, and methods would be determined by the Federal in-season manager in consultation with the Kuskokwim River Inter-Tribal Fish Commission and other fishery managers including State, tribal interests, and the Office of Subsistence Management. State subsistence, sport, and commercial fisheries that target salmon would not be allowed in Refuge waters. It should be noted that the Board can dictate on what date the closure would begin.

The Federal in-season manager would maintain the closure of the harvest of salmon by non-Federally qualified users until it was clear that Federal management of salmon harvests was no longer necessary to either protect the viability of salmon species or to protect the continuation of subsistence uses.

If this special action request was not approved by the Board, the subsistence fishery would be closed pre-season to the harvest of Chinook Salmon until at least June 11. State regulations now mandate that the directed Chinook Salmon fishery be closed through June 11 every year. Because the Chinook Salmon run-size forecast (132,000–222,000 fish) has been determined to be above the sustainable escapement goal, or SEG, range (65,000–120,000 fish) but may not be large enough to also provide for an unrestricted subsistence fishery, the State would open by emergency order after June 11 at least one subsistence fishing period per week, to the extent practicable, to provide opportunity to harvest Chinook Salmon in excess of escapement needs. The State sport fishery targeting Chinook Salmon would likely open after June 11 if the harvestable surplus was determined to be within the amounts reasonably necessary for subsistence uses, or ANS, range of 67,228–109,778 fish. The State has not yet indicated its forecast of Chinook Salmon harvestable surplus.

If this special action request was not approved by the Board, the Federal in-season manager, in consultation with the Kuskokwim River Inter-Tribal Fish Commission and other fishery managers, could close Refuge waters to the harvest of some or all salmon species except by Federally qualified subsistence users. This would mean salmon fishing schedules, openings, closures, and methods would be determined by the Federal in-season manager in consultation with the Commission and other fishery managers. State subsistence, sport, and commercial fisheries that target salmon would not be allowed in Refuge waters. The Federal salmon subsistence fishery would be managed to harvest surplus salmon relative to escapement needs.

LITERATURE CITED

ADCCED (Alaska Dept. of Commerce, Community, and Economic Development). 2014. Community Information. http://commerce.alaska.gov/cra/DCRAExternal/community/Details/129b1918-7c91-47da-a1f7-202cea468f9a, retrieved January 28, 2014. Division of Community and Regional Affairs. Juneau, AK.

ADF&G (Alaska Department of Fish and Game). 2014a. Commercial Fishing Suspended. Kuskokwim River Salmon Fishery Announcement #18. News Release July 22. Division of Commercial Fisheries. Bethel, AK.

ADF&G. 2014b. Kuskokwim River Salmon Management Working Group Information Packet, June 17, 2014. Division of Commercial Fisheries, Anchorage, AK.
http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareakuskokwim.kswg#2014

ADF&G. 2014c. Kuskokwim River Salmon Management Working Group Meeting Audio, June 17, 2014. Division of Commercial Fisheries, Anchorage, AK.
http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareakuskokwim.kswg#2014

ADF&G. 2014d. Kuskokwim River Salmon Management Working Group Information Packet, July 2, 2014. Division of Commercial Fisheries, Anchorage, AK.
http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareakuskokwim.kswg#2014

ADF&G. 2014e. Kuskokwim River Salmon Management Working Group Information Packet, August 2, 2014. Division of Commercial Fisheries, Anchorage, AK.
http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareakuskokwim.kswg#2014

ADF&G. 2015. 2015 Preliminary Kuskokwim Area Salmon Season Summary. Division of Commercial Fisheries News Release, October 20. Anchorage,
AK. http://www.adfg.alaska.gov/static/applications/dcfnewsrelease/628087106.pdf

ADF&G. 2016a. 2016 Kuskokwim River Salmon Fishery New Release 1, Alaska Board of Fisheries Actions: Kuskokwim Area. February 17. Division of Commercial Fisheries. Juneau, AK.

ADF&G. 2016b. 2016 Kuskokwim River Chinook Salmon Outlook. News Release, April 14. Division of Commercial Fisheries. Anchorage,
AK. http://www.adfg.alaska.gov/static/applications/dcfnewsrelease/652424562.pdf

ADF&G. 2016c. Kuskokwim River Salmon Management Working Group. April 20 Meeting Information Packet. http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareakuskokwim.kswg#/2013. Accessed April, 2016. Division of Commercial Fisheries. Anchorage, AK.

ADF&G. 2017. Regulation Announcements, News releases, and Updates: Commercial, Subsistence, and Personal Use Fishing. On line database. http://www.adfg.alaska.gov/index.cfm?adfg=cfnews.main. Juneau, AK.

Alaska Lieutenant Governor's Office. 2017. Order certifying the changes to regulations of the Alaska Board of Fisheries. March 8, 2017. Online Public Notices. Governor's Office, Regulations filed by the Lieutenant Governor. Alaska Administrative Code: Title 5, Board of Fisheries, March 2017
Meeting. https://aws.state.ak.us/OnlinePublicNotices/Notices/Attachment.aspx?id=107384, retrieved April 28, 2017.

Alaska Public Media. 2017. Commercial silver fishing could return to the lower Kuskokwim this summer. April 5. http://www.alaskapublic.org/2017/04/05/commercial-silver-fishing-could-return-to-the-lower-kuskokwim-this-summer/

Alaska Sustainable Salmon Fund. 2015. July 2015 Completion Report for Kuskokwim River Sockeye Salmon Phase 2. Project Number 44706. Anchorage, AK.

Brazil, C., D. Bue, H. Carroll, and T. Elison. 2011. 2010 Kuskokwim area management report. ADF&G, Fishery Management Report No. 11-67, Anchorage, AK.

Brazil, C., D. Bue, and T. Elison. 2013. 2011 Kuskokwim area management report. ADF&G, Fishery Management Report No. 13-23, Anchorage, AK.

Brown, C. M. 1983. Alaska's Kuskokwim River region: a history. Draft report. Bureau of Land Management, Anchorage, AK.

Bue, B. G., D. B. Molyneaux, and K. L. Schaberg. 2008. Kuskokwim River chum salmon run reconstruction. Alaska Department of Fish and Game, Fishery Data Series No. 08-64, Anchorage.

Burkey Jr., C., M. Coffing, J. Menard, D. B. Molyneaux, P. Salomone, and C. Utermohle. 2001. Annual Management Report for the subsistence and commercial fisheries of the Kuskokwim Area, 2000. ADF&G, Division of Commercial Fisheries, Regional Information Report 3A01-34, Anchorage, AK.

Dull, B. S., and C. A. Shelden. 2007. Lower Kuskokwim River inseason subsistence salmon catch monitoring, 2006. ADF&G, Fishery Management Report No. 07-50, Anchorage, AK

Clark, J.H., A. McGregor, R.D. Mecum, P.Krasnowski, and A.M. Carroll. 2006. The commercial salmon fishery in Alaska. Alaska Department of Fish and Game, Alaska Fishery Research Bulletin Volume 12 Issue 2, Juneau, AK.

Elison, T., A. Tiernan, and D. Taylor. 2015. 2012 Kuskokwim area management report. ADF&G, Fishery Management Report No. 15-29, Anchorage, AK.

Fienup-Riordan, A. 1983. The Nelson Island Eskimo: Social structure and rural distribution. Alaska Pacific University Press, Anchorage, AK.

Fienup-Riordan, A. 1984. Regional groups on the Yukon-Kuskokwim Delta. Pages 63–93 in Etudes Inuit Studies, Vol. 8.

FSB (Federal Subsistence Board). 2016. Transcripts of Federal Subsistence Board proceedings. January 16, 2016. FWS Office of Subsistence Management. Anchorage, AK.

FWS (U.S. Fish and Wildlife Service). 2014. 2014 Kuskokwim Area Outlooks and Pre-season Management Strategy for Federal Waters within the Boundaries of the Yukon Delta National Wildlife Refuge. Federal Subsistence Board News Release, May 6, 2014. Office of Subsistence Management. Anchorage, AK. https://www.doi.gov/subsistence/regions/kuskokwim_archive_2014

FWS. 2015a. Federal Subsistence Board Discusses Special Actions Regarding the Kuskokwim and Yukon Rivers. Federal Subsistence Board News Release, April 17, 2015. Office of Subsistence Management. Anchorage, AK. https://www.doi.gov/sites/doi.gov/files/migrated/subsistence/news/general/upload/NR-4-17-15-FSB-Work-Session-Results.pdf

FWS. 2015b. Federal Subsistence Board Adopts Section 804 Determination along the Kuskokwim River. Federal Subsistence Board News Release, May 6, 2015. Office of Subsistence Management. Anchorage, AK. https://www.doi.gov/sites/doi.gov/files/migrated/subsistence/news/general/upload/FINAL-NR5-6-15-Federal-Subsistence-Board-804.pdf

FWS. 2015c. Kuskokwim River Chinook Salmon Fishing Updates. http://www.fws.gov/refuge/yukon_delta/resource_management/kuskokwim_salmon_updates.html, accessed April 15, 2016. Yukon Delta National Wildlife Refuge, Bethel, AK.

FWS. 2015d. 2015 Kuskokwim Area Salmon Fishery. Federal Subsistence Board News Release 6, June 6. Yukon Delta National Wildlife Refuge, Bethel, AK. http://www.fws.gov/refuge/yukon_delta/resource_management/kuskokwim_salmon_updates.htmlF

FWS. 2016. Federal Subsistence Board Adopts New Regulations for Kuskokwim River Drainage Salmon. Federal Subsistence Board News Release, June 1, 2016. On file, Office of Subsistence Management. Anchorage, AK.

Hamazaki T., M. J. Evenson, S.J. Fleischman, and K. L. Schaberg 2012. Spawner-Recruit analysis and escapement goal recommendation for Chinook salmon in the Kuskokwim River Drainage, Alaska Department of Fish and Game, Fishery Manuscript Series No. 12-08, Anchorage, AK.

Ikuta, H. 2012. Options for amounts reasonably necessary for subsistence uses of salmon: Kuskokwim Area; prepared for the January 2013 Anchorage Alaska Board of Fisheries meeting. ADF&G Division of Subsistence Special Publication No. BOF 2012–7, Fairbanks, AK.

Ikuta, H., A.R. Brenner; A. Godduhn, editors. 2013. Socioeconomic patterns in subsistence salmon fisheries: historical and contemporary trends in five Kuskokwim River communities and overview of the 2012 season. ADF&G, Division of Subsistence Technical Paper No. 382. Anchorage, AK.

Kerkvliet C. M., T. Hamazaki, K. E. Hyer, D. Cannon. 2003. A mark-recapture experiment to estimate the abundance of Kuskokwim River sockeye, chum, and coho salmon, 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A03-25, Anchorage.

Kerkvliet, C. M., J. Pawluk, T. Hamazaki, K. E. Hyer, and D. Cannon. 2004. A mark-recapture experiment to estimate the abundance of Kuskokwim River sockeye, chum, and coho salmon, 2003. Alaska Department of Fish and Game, Division of Commercial Fisheries Regional Information Report 3A04-14, Anchorage.

Kilbuck, J. 1988. The Yup'ik Eskimos as described in the travel journals and ethnographic accounts of John and Edith Kilbuck who served with the Alaska mission of the Moravian church, 1985-1900. Edited by A. Fienup-Riordan. The Limestone Press. Kingston, Ontario.

Joseph, A. 2016. Fishery technician. Personal communication: by telephone May 18. Orutsararmiut Native Council Natural Resources Department, Bethel, AK

Lewis, B., W.S. Grant, R.E. Brenner, and T. Hamazaki. 2015. Changes in size and age of Chinook salmon (*Oncorhynchus tshawytscha*) returning to Alaska. PloSONE 10(7): e0132872.

Liller, Z. 2017. Fisheries Biologist. Personal communication: email from March 2017. Alaska Department of Fish and Game

Liller Z., H., Hamazaki T., 2016. Kuskokwim River Chinook Salmon Run Reconstruction, 2015, Alaska Department of Fish and Game, Regional Information Report 3A16-03, Anchorage, AK.

FSB. 2017. Transcripts of Federal Subsistence Board proceedings. January 11, 2017. Office of Subsistence Management, USFWS. Anchorage, AK.

Martz, M., and B. S. Dull. 2006. Lower Kuskokwim River inseason subsistence salmon catch monitoring, 2005. ADF&G, Fishery Management Report No. 06-44, Anchorage, AK.

Martz, M., and C. Whitmore. 2005. Lower Kuskokwim River inseason subsistence salmon catch monitoring, 2004. ADF&G, Fishery Management Report No. 05-27, Anchorage, AK.

OSM. 2015. Staff Analysis FSA15-02/03/05/07/08. https://www.doi.gov/sites/doi.opengov.ibmcloud.com/files/uploads/FSA15-02_03_07_08.pdf. Office of Subsistence Management, USFWS. Anchorage, AK. 86 pp.

Oswalt W.H. 1980. Historic settlements along the Kuskokwim River, Alaska. Alaska State Library Historical Monograph No. 7. Alaska Dept. of Education Division of State Libraries and Museums. Juneau, AK.

Oswalt. W.H. 1990. Bashful no longer: An Alaskan Eskimo ethnohistory, 1778–1988. University of Oklahoma Press, Norman, OK, and London.

Oswalt, W.H and J.W. VanStone. 1967. The ethnoarcheology of Crow Village, Alaska. Smithsonian Institution. Bureau of American Ethnology Bulletin 199, Washington, D.C.

Pennoyer, S., K. R. Middleton, and M. E. Morris, Jr. 1965. Arctic-Yukon-Kuskokwim area salmon fishing history. Alaska Department of fish and Game, Div. of Commercial Fisheries, Informational Leaflet No. 70, Juneau, AK.

Poetter, A. D., A. Tiernan, and C. Lipka. 2017. 2015 Kuskokwim area management report. Alaska Department of Fish and Game, Fishery Management Report No. 16-38, Anchorage.

Poetter, Aaron. 2017. Area Fisheries Manager. Personal communication: email from March 2017. Alaska Department of Fish and Game.

Schaberg, K. L., and Z. W. Liller. 2015. Estimates of the historic run and escapement for the coho salmon stock returning to the Kuskokwim River, 2000-2012. ADF&G, Fishery Data Series No. 15-18, Anchorage, AK.

Schindler, D., Krueger, C., Bisson, P., Bradford, M., Clark, B., Conitz, J., Howard, K., Jones, M., Murphy, J., Myers, K., Scheuerell, M., Volk, E., and Winton, J. 2013. Arctic–Yukon–Kuskokwim Chinook salmon research action plan: evidence of decline of Chinook salmon populations and recommendations for future research [online]. Prepared for the AYK Sustainable Salmon Initiative (Anchorage, AK). Available from http://www.aykssi.org/wp-content/uploads/AYK-SSI-Chinook-Salmon-Action-Plan-83013.pdf.

Shelden, C. A., T. Hamazaki, M. Horne-Brine, G. Roczicka, M. Thalhauser, and H. Carroll. 2014. Subsistence salmon harvests in the Kuskokwim Area, 2011-2012. ADF&G, Fishery Data Series No. 14-20. Anchorage, AK.

Shelden, C. A., T. Hamazaki, M. Horne-Brine, and G. Roczicka. 2016. Subsistence salmon harvests in the Kuskokwim area, 2015. ADF&G, Fishery Data Series No. 16-55, Anchorage. http://www.adfg.alaska.gov/sf/Publications/index.cfm?ADFG=main.mainSearchSubmit

Shotwell, S. K., and M. D. Adkison. 2004. Estimating indices of abundance and escapement of Pacific salmon for data-limited situations. Transactions of the American Fisheries Society 133:538-558.

Staton, B., and L. Coggins. 2016. In-season harvest and effort estimates for 2016 Kuskokwim River subsistence salmon fisheries during block openers. On file, Yukon Delta National Wildlife Refuge, Bethel, AK. 23 pages.

Stuby, L. 2007. Inriver abundance of Chinook salmon in the Kuskokwim River, 2002-2006. Alaska Department of Fish and Game, Fishery Data Series No. 07-93, Anchorage.

Tiernan, A., and A. Poetter. 2015. 2013 Kuskokwim area management report. ADF&G, Fishery Management Report No. 15-46, Anchorage, AK.

Whitmore, C., S. L. McNeil, and L. K. Brannian. 2004. Kuskokwim River inseason subsistence salmon catch monitoring, 2001-2003. ADF&G, Division of Commercial Fisheries, Regional Information Report 3A04-27, Anchorage, AK.

Williams, M. 2017. Akiak IRA Council, personal communication: telephone and email. Akiak, AK.

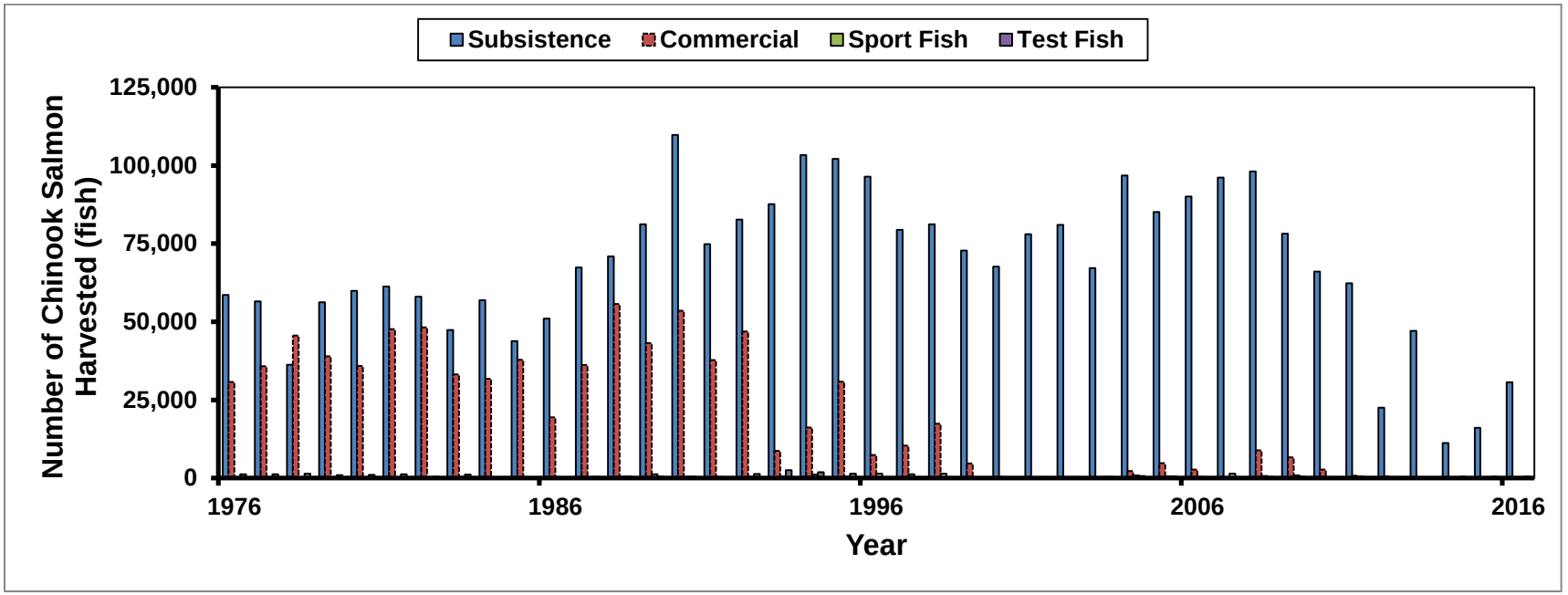

Figure 1. Number of Chinook Salmon harvested in the Kuskokwim River from 1976 to 2016 for Subsistence, Commercial, Sport Fish, and the Bethel Test Fishery (Liller and Hamazaki 2016).

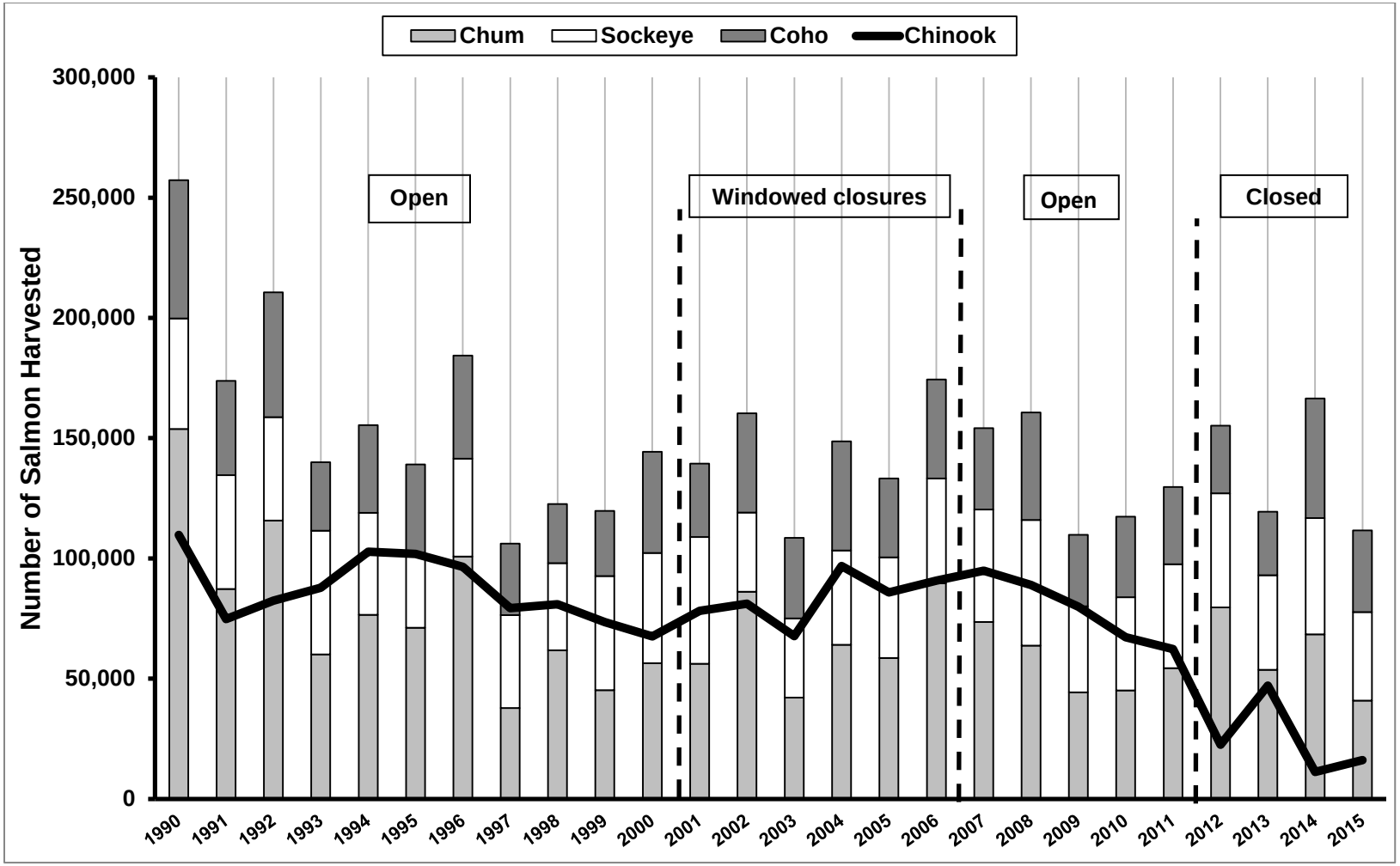

Figure 2. Chinook Salmon subsistence fishery closures, 1990–2015 (Source: Shelden et al. 2016). In 2010, only lower river Chinook Salmon-bearing tributaries were closed. In 2011, only lower river Chinook Salmon-bearing tributaries were closed until after June 16 when several drainage-wide closures occurred. In 2012, the Chinook Salmon subsistence fishery opened for only six days. In 2013, only lower river Chinook Salmon-bearing tributaries were closed until after June 28 when several drainage-wide closures occurred. Since 2014, the Chinook Salmon subsistence fishery has been closed except for limited harvests..

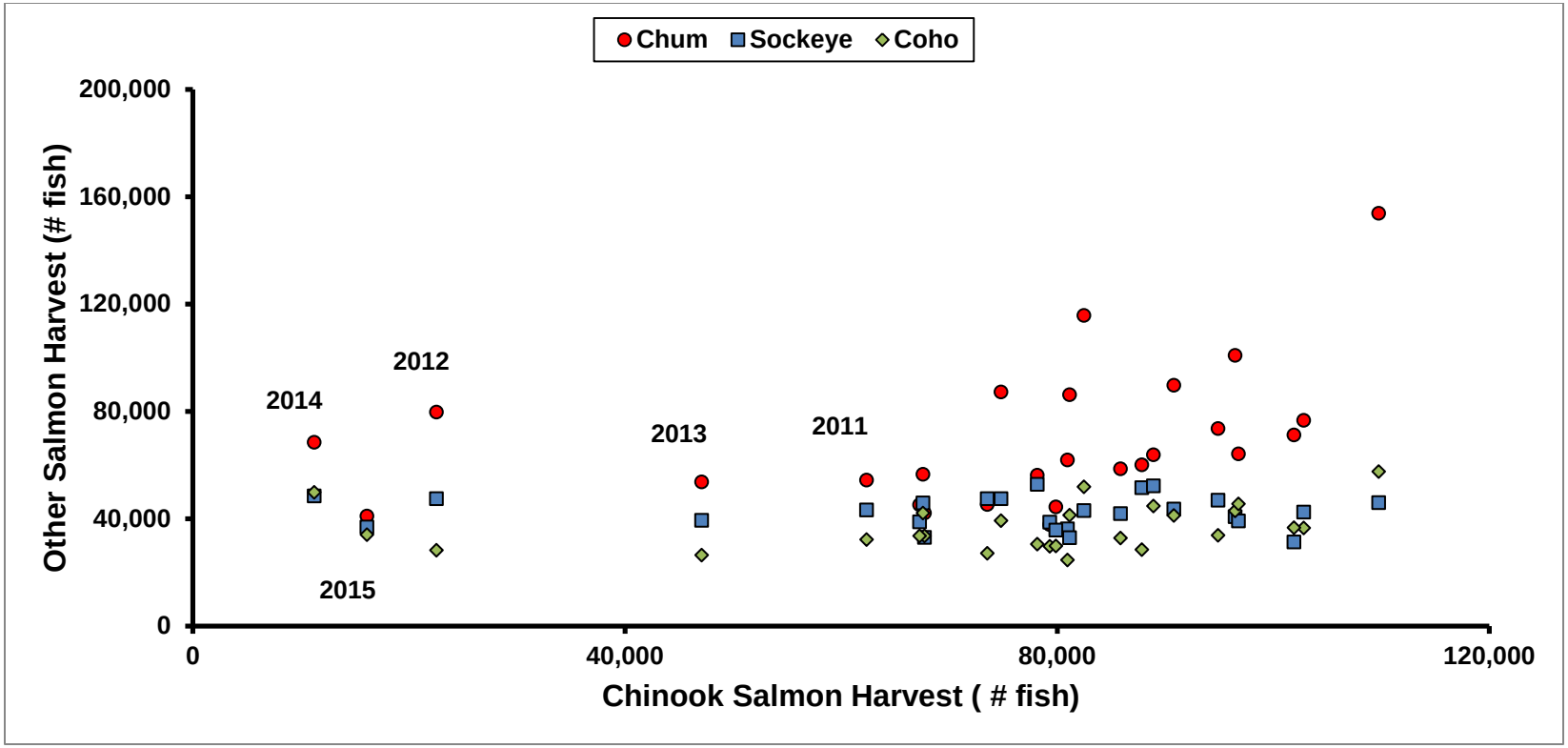

Figure 3. Trends in Chinook Salmon subsistence harvest as compared to Chum, Sockeye, and Coho salmon subsistence harvest in the Kuskokwim River from 1990-2015. Data from Shelden, Hamazaki, Horne-Brine, and Roczicka 2016.

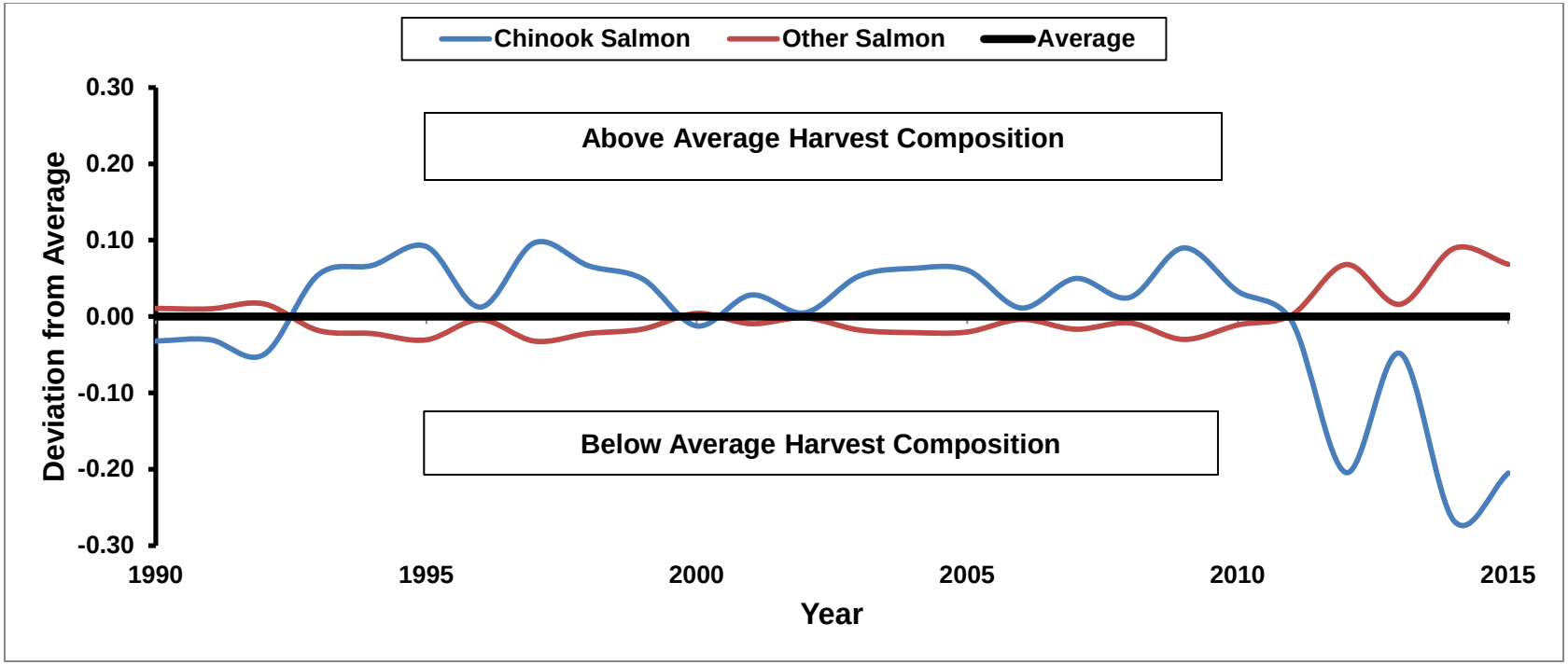

Figure 4. Deviations in Chinook Salmon and Other Salmon subsistence harvest compositions in the Kuskokwim River from long-term (1990-2015) subsistence harvest compositions. Deviations are calculated as the difference between the 1990-2015 average species subsistence harvest composition and each individual year's subsistence harvest composition (i.e., residuals). The black line represents average species subsistence harvest composition in a standardized form. Anything above the black line would be considered a positive deviation from the long-term average, which means above average harvest composition, while anything below the black line would be considered a negative deviation from the long-term average, meaning below average harvest composition. Data from Shelden, Hamazaki, Horne-Brine, and Roczicka 2016.

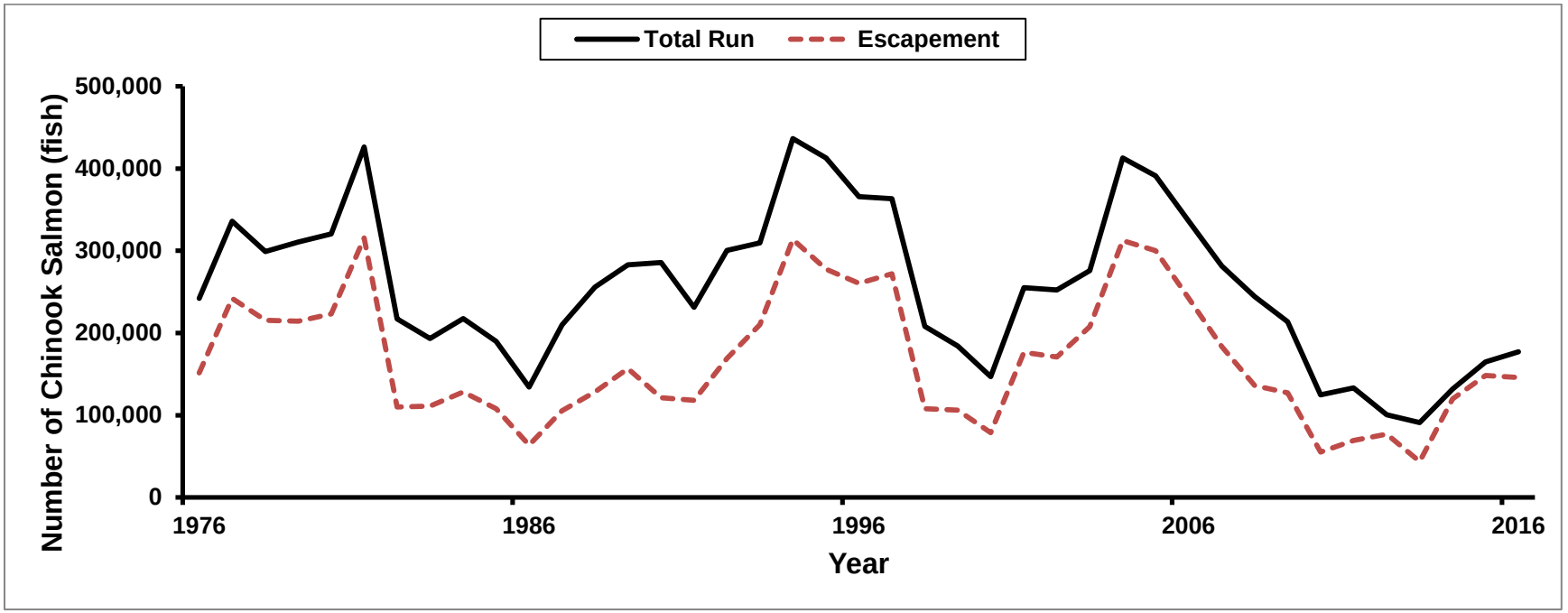

Figure 5. Estimates of Kuskokwim River Chinook Salmon total run-sizes and escapements from 1976 to 2016. Estimates are produced from the Kuskokwim River Chinook Salmon Run-Reconstruction Model (Hamazaki and Liller 2016), using recently updated data (through 2016) provided by Zachary Liller (2017, pers. comm.).

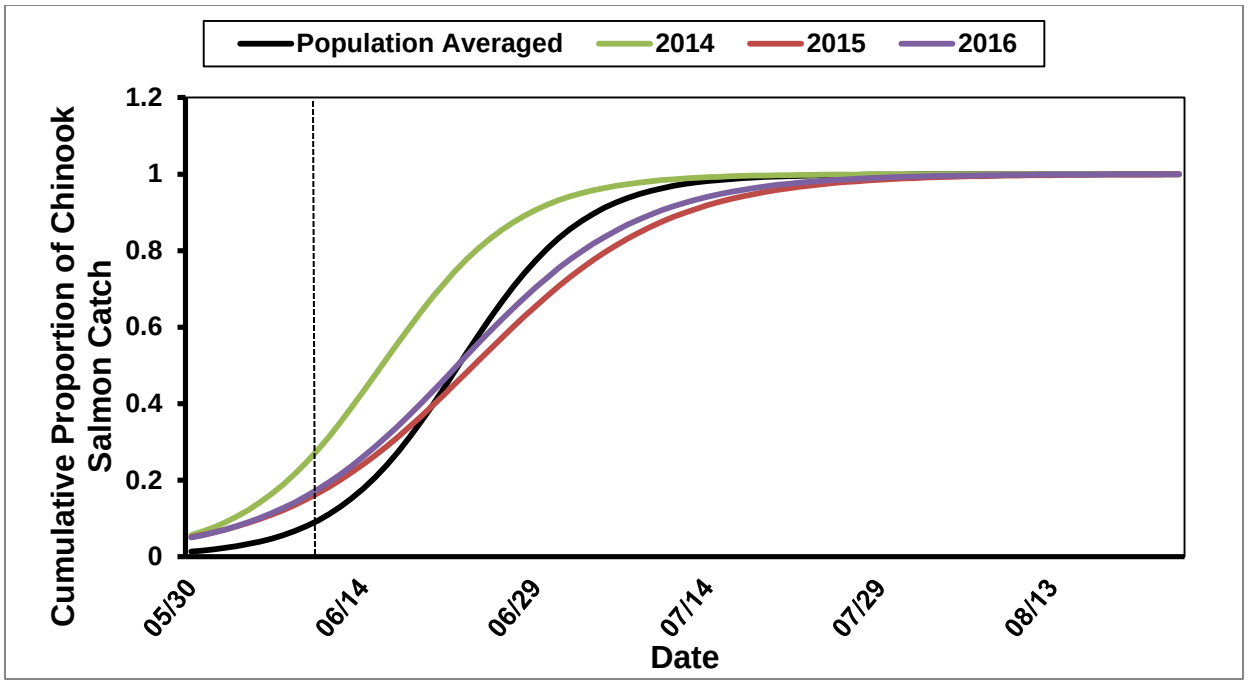

Figure 6. Estimated average of the cumulative proportion of Chinook Salmon catch collected by date at the Bethel Test Fishery from 1984 to 2016. The most recent three years of the cumulative proportion of catch at the Bethel Test Fishery is also plotted for comparison purposes. Dates were estimated using non-linear version of the logistic equation. The dashed line represents June 12, which is the date set the Kuskokwim River Salmon Management Plan by which the commissioner shall open, by emergency order, at least one fishing period per week for directed subsistence Chinook Salmon fishery to provide harvest opportunity on surplus Chinook Salmon in excess of escapement needs.

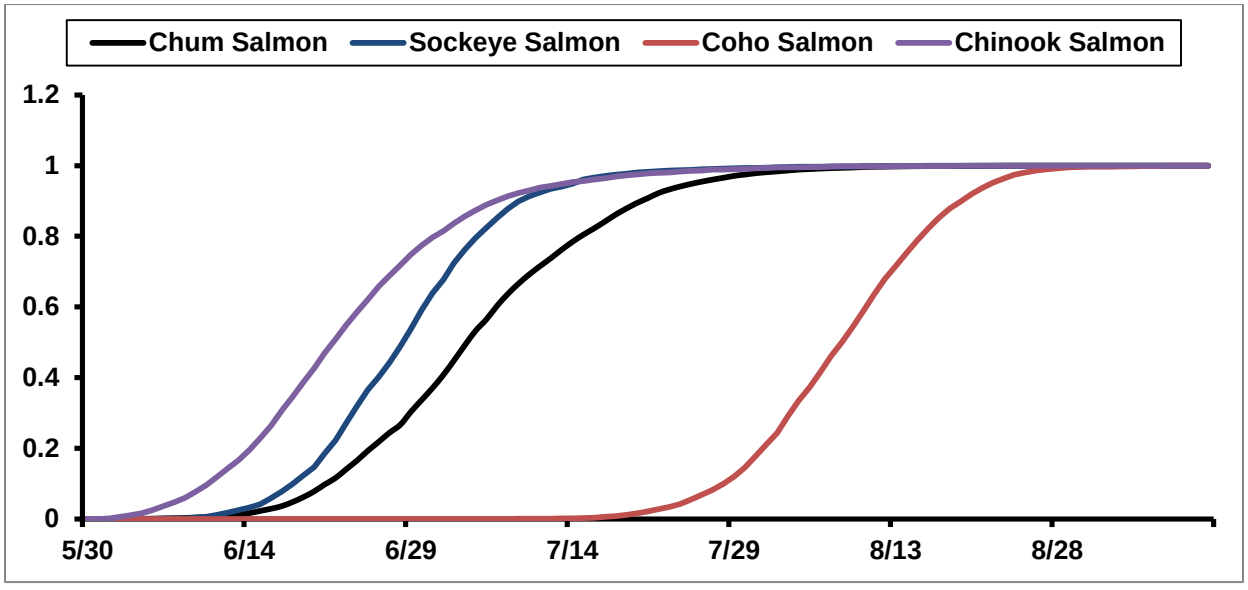

Figure 7. Average of the cumulative proportion of all salmon species catch collected by date at the Bethel Test Fishery from 1984 to 2016.

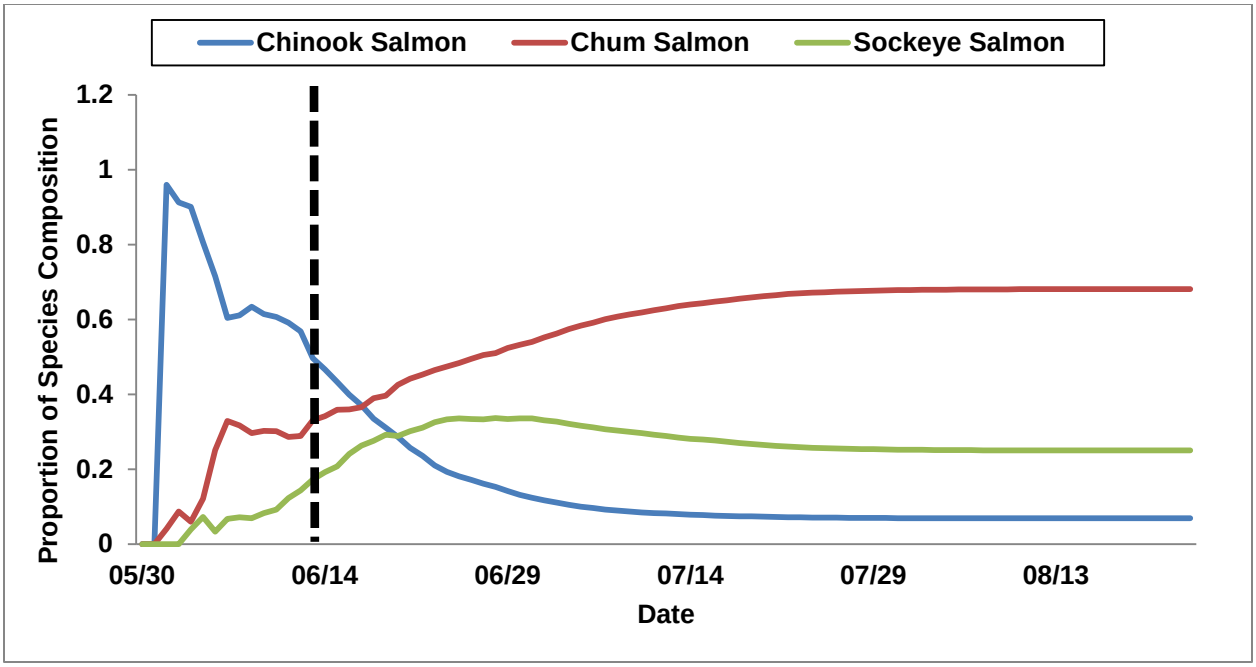

Figure 8. Average proportion of catch composition for Chinook, Chum, and Sockeye Salmon by date caught at the Bethel Test Fishery from 1984 to 2016. Vertical dashed line represents the date at which the ratio of Chinook Salmon to Chum and Sockeye Salmon is 1:1, which occurs on June 13.

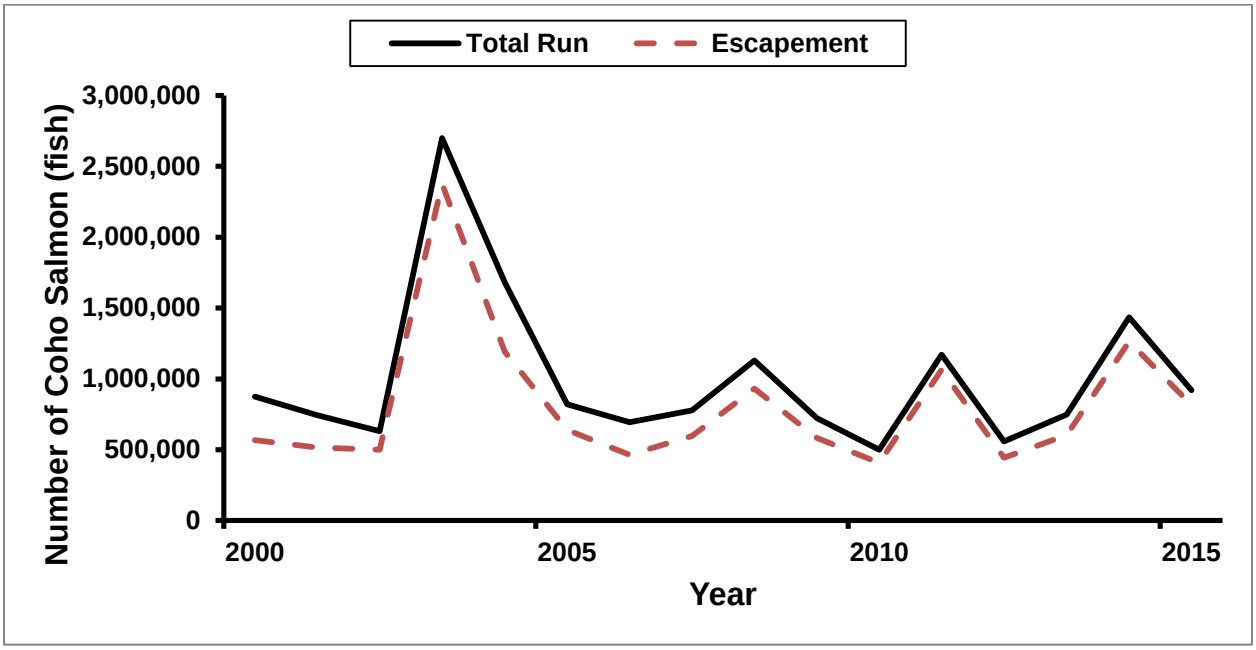

Figure 9. Estimates of Kuskokwim River Coho Salmon total run-sizes and escapements from 2000 to 2015 (Schaberg and Liller 2015, ADF&G 2016c).

Table 1. The number of people living at the 40 communities in the customary and traditional use determination for salmon in the Kuskokwim River drainage, 1960-2010, based on U.S. Bureau of the Census estimates.

Community	1960	1970	1980	1990	2000	2010	2010 number of households
South Kuskokwim Bay and Coast							
Platinum	43	55	55	64	41	61	19
Goodnews Bay	154		168	241	230	243	76
Quinhagak	228	340	412	501	555	669	165
Newtok	129	114	131	207	321	354	70
Tununak	183	274	298	316	325	327	84
Toksook Bay		257	333	420	532	590	125
Nightmute	237	127	119	153	208	280	59
Mekoryuk	242	249	160	177	210	191	70
Chefornak	133	146	230	320	394	418	92
Kipnuk	221	325	371	470	644	639	153
Kwigillingok	344	148	354	278	338	321	82
Kongiganek		190	239	294	359	439	94
Subtotal	**1,914**	**2,225**	**2,870**	**3,441**	**4,157**	**4,532**	**1,089**
Lower Kuskokwim River Drainage							
Tuntutuliak	144	158	216	300	370	408	96
Eek	200	186	228	254	280	296	91
Napakiak	190		262	318	353	354	96
Napaskiak	154	259	244	328	390	405	94
Oscarville	51	41	56	57	61	70	15
Kasigluk	244		342	425	543	569	113
Nunapitchuk	327	526	299	378	466	496	124
Atmautluak			219	258	294	277	63
Bethel	1,258	2,416	3,576	4,674	5,471	6,080	1,896
Kwethluk	325	408	454	558	713	721	192
Akiachak	229	312	438	481	585	627	183
Akiak	187	171	198	285	309	346	90
Tuluksak	137	195	236	358	428	373	92
Subtotal	**3,446**	**4,672**	**6,768**	**8,674**	**10,263**	**11,022**	**3,145**
Central Kuskokwim River Drainage							
Lower Kalskag	122	183	246	291	267	282	75
Kalskag	147	122	129	172	230	210	60
Aniak	308	205	341	540	572	501	166
Chuathbaluk		94	105	97	119	118	36
Subtotal	**577**	**604**	**821**	**1,100**	**1,188**	**1111**	**337**
Upper Kuskokwim River Drainage							
Napaimute							
Crooked Creek	92	59	108	106	137	105	38
Georgetown							
Red Devil	32	25	48	42	46	29	11
Sleetmute	152	81	39	53	48	23	12
Stony River	122	109	107	106	100	86	36
Lime Village	40		48	38	50	52	22
Subtotal	**438**	**274**	**350**	**345**	**381**	**295**	**119**
Headwaters							
Takotna	75	74	62	51	61	54	20
McGrath	241	279	355	528	401	346	147
Telida							
Nikolai	85	112	91	109	100	94	37
Subtotal	**401**	**465**	**508**	**688**	**562**	**494**	**204**
TOTAL	**6,776**	**8,240**	**11,317**	**14,248**	**16,551**	**17,454**	**4,894**

Black cell=no information available. Source: ADCCED 2014

Table 2. Estimates of Kuskokwim River Chinook Salmon run-size, escapement, and harvest n from 1976 to 2016. Total Run and Escapement are estimated from the Kuskokwim River Chinook Salmon Run-Reconstruction Model (Hamazaki and Liller 2016), with 2016 preliminary estimates using recently updated data (through 2016) provided by Zachary Liller (pers. comm.).

Kuskokwim River Drainage							
Year	Total Run	Escapement	Harvest				
			Subsistence	Commercial	Sport	Test Fish	Total
1976	245,329	154,782	58,606	30,735	-	1,206	90,547
1977	338,176	244,469	56,580	35,830	33	1,264	93,707
1978	299,019	215,547	36,270	45,641	116	1,445	83,472
1979	311,204	214,902	56,283	38,966	74	979	96,302
1980	321,672	224,704	59,892	35,881	162	1,033	96,968
1981	419,938	309,539	61,329	47,663	189	1,218	110,399
1982	218,591	111,590	58,018	48,234	207	542	107,001
1983	193,762	111,617	47,412	33,174	420	1,139	82,145
1984	220,692	131,516	56,930	31,742	273	231	89,176
1985	192,439	110,512	43,874	37,889	85	79	81,927
1986	130,055	59,443	51,019	19,414	49	130	70,612
1987	210,681	106,438	67,325	36,179	355	384	104,243
1988	254,865	127,102	70,943	55,716	528	576	127,763
1989	281,490	155,337	81,175	43,217	1,218	543	126,153
1990	283,562	119,376	109,778	53,502	394	512	164,186
1991	231,330	118,182	74,820	37,778	401	149	113,148
1992	302,850	171,577	82,654	46,872	367	1,380	131,273
1993	307,004	207,493	87,674	8,735	587	2,515	99,511
1994	435,138	312,508	103,343	16,211	1,139	1,937	122,630
1995	413,280	278,362	102,110	30,846	541	1,421	134,918
1996	374,318	268,807	96,413	7,419	1,432	247	105,511
1997	367,935	276,554	79,381	10,441	1,227	332	91,381
1998	209,650	109,434	81,213	17,359	1,434	210	100,216
1999	192,505	114,675	72,775	4,705	252	98	77,830
2000	150,096	81,863	67,620	444	105	64	68,233
2001	257,513	179,038	78,009	90	290	86	78,475
2002	256,781	175,120	80,982	72	319	288	81,661
2003	276,103	208,001	67,134	158	401	409	68,102
2004	408,387	307,746	96,788	2,305	857	691	100,641
2005	392,014	301,011	85,090	4,784	572	557	91,003
2006	336,315	242,477	90,085	2,777	444	352	93,658
2007	284,132	186,015	96,155	179	1,478	305	98,117
2008	247,483	139,387	98,103	8,865	708	420	108,096

Table 2 (Continued).

Kuskokwim River Drainage							
Year	Total Run	Escapement	Harvest				
			Subsistence	Commercial	Sport	Test Fish	Total
2009	217,806	131,537	78,231	6,664	904	470	86,269
2010	126,515	57,081	66,056	2,732	354	292	69,434
2011	138,025	73,994	62,368	747	579	337	64,031
2012	105,104	81,612	22,544	627	0	321	23,492
2013	93,109	45,621	47,113	174	0	201	47,488
2014	140,667	128,932	11,234	35	0	497	11,766
2015	172,055	155,464	16,124	8	0	472	16,604
2016	177,007	145,809	30,676	0	0	522	31,198

Table 3. Summary statistics (average, standard deviation, minimum, first quartile, median, third quartile, and maximum) of Chinook Salmon subsistence harvest on the Kuskokwim River by time periods (overall, five year, ten years, twenty years) in comparison to ANS range set by the Alaska Board of Fisheries in 2013.

Chinook Salmon Harvest in Comparison to ANS in Kuskokwim River Subsistence Fishery							
Time Period	**Average**	**SD**	**Minimum**	**1st Quartile (25%)**	**Median (50%)**	**3rd Quartile (75%)**	**Maximum**
Overall (1976-2016)	68,052	23,319	11,234	56,432	67,620	83,872	109,778
Five Year (2011-2016)	31,677	21,927	11,234	14,902	26,610	50,927	62,368
10 Year (2006-2016)	56,244	33,161	11,234	22,544	62,368	90,085	98,103
20 Year Average (1996-2016)	67,814	26,369	11,234	54,741	78,009	87,588	98,103
ANS (set in 2013)	88,500	-	65,000	77,850	87,400	99,150	109,800

Table 4 . Estimated number of Chinook salmon harvested for subsistence, Kuskokwim River drainage, based on the annual postseason survey, 2005 to 2015.

CHINOOK SALMON													
KUSKOKWIM RIVER DRAINAGE													
Community	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2010-2014 average**	**2005-2014 average**
Kongiganak[a]	1,536	1,729	*1,865*	2,233	1,243	1,456	1,208	287	*641*	*964*	-	911	1,292
North Kuskokwim Bay	1,536	1,729	1,865	2,233	1,243	1,456	1,208	287	641	964	0	911	1,292
Tuntutuliak	4,545	4,469	4,614	*4,266*	3,067	3,261	3,032	1,123	2,448	574	1,668	2,088	2,984
Eek	3,133	*2,501*	*2,512*	*2,966*	1,982	1,761	1,378	1,004	1,188	665	850	1,199	1,773
Kasigluk[b]	*5,242*	*4,905*	*5,167*	*2,471*	2,464	3,014	2,823	552	2,919	205	438	1,903	2,724
Nunapitchuk[b]	4,103	4,121	4,661	*4,234*	3,468	2,548	3,559	845	2,563	287	1,051	1,960	2,921
Atmautluak[b]	1,927	*1,758*	1,890	*1,298*	1,567	1,088	1,236	234	1,592	108	514	852	1,197
Napakiak[b]	3,060	5,125	3,245	1,903	2,387	1,674	1,963	457	1,588	311	917	1,199	2,073
Napaskiak[b]	4,485	5,877	6,392	4,555	5,372	4,333	3,360	1,108	2,939	422	816	2,432	3,818
Oscarville[b]	1,069	1,052	1,360	1,351	754	618	694	51	585	68	120	403	726
Bethel[b]	28,293	27,805	30,422	27,800	26,170	26,157	25,093	7,321	17,246	3,089	4,918	15,781	21,234
Kwethluk[b]	6,089	7,258	6,466	8,451	7,130	4,440	2,467	1,709	3,192	959	900	2,553	4,675
Akiachak[b]	5,411	5,561	7,621	9,719	7,361	4,470	3,852	2,862	3,585	1,033	1,103	3,160	5,118
Akiak[b]	3,860	4,423	4,297	4,090	3,247	3,625	2,455	1,218	*1,449*	530	610	1,855	2,815
Tuluksak	2,655	2,372	*3,266*	2,937	3,212	2,057	1,230	651	732	404	231	1,015	1,873
Lower Kuskokwim	73,872	77,228	81,914	76,040	68,181	59,046	53,142	19,135	42,026	8,655	14,136	36,401	53,930
Lower Kalskag[b]	1,417	3,494	1,937	1,748	2,525	1,030	1,260	459	744	283	351	755	1,498
Upper Kalskag[b]	2,533	1,569	1,383	2,435	1,696	1,496	1,772	562	1,317	258	334	1,081	1,388
Aniak[b]	1,977	2,412	3,417	3,100	2,130	2,262	2,214	993	1,440	344	542	1,451	2,035
Chuathbaluk	913	887	*973*	772	877	551	409	103	155	90	90	262	535
Middle Kuskokwim	6,840	8,362	7,710	8,055	7,228	5,339	5,655	2,117	3,656	975	1,317	3,548	5,455
Crooked Creek	948	*736*	*647*	488	608	240	402	124	145	*35*	*78*	189	381
Red Devil	181	232	301	148	258	33	186	225	77	83	52	121	171
Sleetmute	522	750	861	933	693	272	242	132	96	58	137	160	449
Stony River	*311*	*288*	*530*	514	704	189	134	151	*51*	24	25	110	287
Lime Village[a]	*171*	*103*	*95*	*29*	*75*	*47*	*118*	*29*	43	*32*	-	54	63
McGrath[b]	*910*	689	495	288	600	262	829	68	95	173	75	285	389
Takotna	*8*	0	*10*	*0*	*8*	*0*	0	0	*0*	*0*	*3*	0	2
Nikolai	564	696	471	184	298	402	450	276	283	235	301	329	366
Telida[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Kuskokwim	3,615	3,494	3,409	2,584	3,244	1,445	2,361	1,005	790	640	671	1,248	2,108
Kuskokwim River[d]	85,863	90,812	94,898	88,912	79,896	67,286	62,366	22,544	47,113	11,234	16,124	42,108	62,785
Quinhagak	3,505	5,163	4,686	3,125	3,312	2,793	2,588	2,396	3,143	3,723	3,082	2,929	3,437
Goodnews Bay	869	713	*647*	898	569	480	834	389	413	431	220	509	597
Platinum	74	45	*66*	42	61	17	62	24	39	46	11	38	45
South Kuskokwim Bay	4,448	5,921	5,399	4,065	3,942	3,290	3,484	2,809	3,595	4,200	3,313	3,476	4,078
Total Estimated	90,311	96,733	100,297	92,977	83,838	70,576	65,850	25,353	50,708	15,434	19,437	45,584	66,863

Source: Shelden, Hamazaki, Horne-Brine, and Roczicka 2016.

Note: Dashes indicate harvest was not estimated; bold indicates Bayesian estimates.

[a] Villages not surveyed in 2015. Harvest was not estimated due to lack of recent data.

[b] 2015 estimate includes a tally of Chinook salmon harvested under the USFWS issued permits.

[c] The 2015 Bethel estimate contains both the permit numbers from Bethel and the seasonal village of Napaimute.

[d] Kuskokwim River Total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 5. Estimated number of Chum Salmon harvested for subsistence, Kuskokwim River drainage, based on the annual postseason survey, 2005 to 2015.

CHUM SALMON													
KUSKOKWIM RIVER DRAINAGE													
Community	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2010-2014 average**	**2005-2014 average**
Kongiganak[a]	1,960	2,420	***2,353***	1,755	1,420	2,522	2,809	***1,638***	***1,397***	***1,915***	-	2,056	2,019
Bay	1,960	2,420	2,353	1,755	1,420	2,522	2,809	1,638	1,397	1,915	0	2,056	2,019
Tuntutuliak	3,568	4,024	3,350	***3,375***	3,330	2,439	1,865	2,614	2,180	***2,967***	2,143	2,413	2,971
Eek	**877**	***1,075***	***783***	***788***	782	721	486	1,552	1,232	1,182	1,023	1,035	948
Kasigluk	***4,194***	***5,461***	***4,309***	***1,502***	1,857	2,338	2,029	3,261	2,197	3,612	2,080	2,687	3,076
Nunapitchuk	4,167	5,150	**6,619**	***4,705***	3,468	3,223	4,257	5,312	2,977	5,213	3,631	4,196	4,509
Atmautluak	1,940	***2,337***	2,193	*2,177*	1,665	1,386	1,864	2,701	2,409	3,327	2,165	2,337	2,200
Napakiak	3,238	8,143	3,628	1,313	1,638	1,759	1,546	1,711	1,185	2,392	1,508	1,719	2,655
Napaskiak	2,205	4,323	3,032	2,400	1,451	3,110	1,783	3,216	2,589	3,171	2,173	2,774	2,728
Oscarville	686	1,151	932	847	534	352	402	599	490	599	350	488	659
Bethel	14,273	20,953	16,540	15,853	10,055	9,575	15,324	26,872	12,506	18,017	10,958	16,459	15,997
Kwethluk	4,328	6,328	6,291	5,729	4,111	3,112	3,484	3,849	3,825	4,318	2,230	3,718	4,538
Akiachak	2,428	4,333	4,782	6,856	2,872	2,856	3,205	4,150	3,417	4,744	2,085	3,674	3,964
Akiak	3,528	3,095	4,141	3,522	1,350	1,163	2,421	***2,925***	2,212	2,982	2,348	2,341	2,734
Tuluksak	2,183	3,094	***3,202***	2,920	1,570	3,180	2,697	2,585	3,062	2,274	1,747	2,760	2,677
Lower Kuskokwim	47,615	69,466	59,803	51,988	34,683	35,214	41,363	61,347	40,281	54,798	34,441	46,601	49,656
Lower Kalskag	997	4,703	1,997	1,004	930	691	1,643	3,284	1,214	1,458	1,233	1,658	1,792
Upper Kalskag	1,201	2,469	294	2,432	329	391	1,599	1,930	1,534	1,038	642	1,298	1,322
Aniak	2,952	3,722	4,108	2,830	2,602	2,515	2,391	5,667	2,880	4,695	1,395	3,630	3,436
Chuathbaluk	530	1,451	***1,541***	593	937	535	686	796	935	805	342	751	881
Kuskokwim	5,680	12,345	7,940	6,859	4,798	4,132	6,319	11,677	6,563	7,996	3,612	7,337	7,431
Crooked Creek	1,064	1,513	***813***	352	519	539	862	610	***1,803***	391	383	841	847
Red Devil	214	41	186	188	244	122	434	516	981	284	48	467	321
Sleetmute	422	1,475	818	373	367	524	689	1,004	542	633	337	678	685
Stony River	***324***	***790***	***540***	1,247	771	338	516	***491***	***27***	***89***	44	292	513
Lime Village[a]	***573***	***316***	***419***	***297***	***405***	***314***	***499***	419	909	295	-	487	445
McGrath	***470***	999	464	676	825	944	476	885	598	642	7	709	698
Takotna	*4*	0	***0***	***0***	***0***	***0***	0	***0***	***12***	***0***	**0**	2	2
Nikolai	230	308	223	54	292	440	349	1,044	513	1,356	2,000	740	481
Telida[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Kuskokwim	3,301	5,442	3,464	3,187	3,423	3,221	3,825	4,970	5,386	3,690	2,819	4,218	3,991
River[b]	58,555	89,674	73,560	63,789	44,324	45,089	54,316	79,631	53,627	68,398	40,872	60,212	63,096

Source: Shelden, Hamazaki, Horne-Brine, and Roczicka 2016.

Note: Dashes indicate harvest was not estimated; bold indicates Bayesian estimates.

[a] Villages not surveyed in 2015. Harvest was not estimated due to lack of recent data.

[b] Kuskokwim River Total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 6. Estimated number of Sockeye Salmon harvested for subsistence, Kuskokwim River drainage, based on the annual postseason survey, 2005 to 2015.

SOCKEYE SALMON													
KUSKOKWIM RIVER DRAINAGE													
Community	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2010-2014 average**	**2005-2014 average**
Kongiganak[a]	1,103	1,464	***960***	1,502	1,018	1,869	1,266	***1,307***	***1,031***	***1,230***	-	1,341	1,294
Bay	1,103	1,464	960	1,502	1,018	1,869	1,266	1,307	1,031	1,230	0	1,341	1,294
Tuntutuliak	2,145	1,834	1,763	***2,120***	932	2,068	1,274	1,516	1,183	***1,774***	1,999	1,563	1,607
Eek	1,033	***684***	***558***	***834***	1,019	1,241	664	1,490	1,319	1,450	1,111	1,233	1,029
Kasigluk	***1,634***	***2,248***	***1,786***	***1,041***	1,215	1,441	1,269	1,451	1,470	1,990	1,442	1,524	1,546
Nunapitchuk	1,821	1,871	2,147	***2,549***	1,538	1,902	2,223	2,396	1,806	2,059	2,851	2,077	2,055
Atmautluak	1,444	***1,012***	1,041	***1,250***	624	731	827	1,623	1,316	1,531	1,173	1,206	1,106
Napakiak	2,122	1,845	1,962	1,244	917	1,183	1,351	1,141	1,105	1,573	1,179	1,271	1,369
Napaskiak	1,344	1,784	1,738	2,620	1,579	1,979	1,587	2,065	2,069	2,514	2,022	2,043	1,993
Oscarville	278	778	712	677	332	250	228	323	347	679	282	365	481
Bethel	14,297	12,816	13,902	15,247	11,272	11,103	16,946	18,282	12,616	14,828	11,951	14,755	14,112
Kwethluk	2,457	2,770	3,536	4,920	2,432	2,534	2,357	2,884	2,705	5,921	1,955	3,280	3,340
Akiachak	2,372	2,661	3,269	4,354	2,407	2,433	2,647	3,443	2,594	3,047	2,551	2,833	2,984
Akiak	1,920	2,000	3,695	2,881	1,290	1,161	2,576	***1,818***	1,731	2,418	1,855	1,941	2,174
Tuluksak	987	2,247	***1,845***	2,133	1,691	2,483	1,699	1,380	1,541	622	1,037	1,545	1,738
Lower Kuskokwim	33,854	34,550	37,955	41,869	27,248	30,509	35,648	39,812	31,802	40,406	31,408	35,635	35,533
Lower Kalskag	439	1,434	780	1,583	1,044	507	802	891	977	1,040	487	843	1,006
Upper Kalskag	945	563	417	1,000	369	460	938	770	662	839	718	734	669
Aniak	1,015	692	1,261	1,585	923	1,165	1,168	1,375	1,466	1,578	2,407	1,350	1,246
Chuathbaluk	369	508	***484***	363	564	403	300	297	480	481	382	392	431
Kuskokwim	2,768	3,197	2,942	4,531	2,900	2,535	3,208	3,333	3,585	3,938	3,994	3,320	3,352
Crooked Creek	693	544	***523***	220	329	302	243	234	***514***	391	303	337	367
Red Devil	272	510	318	359	477	475	502	511	270	151	88	382	397
Sleetmute	673	1,181	1,303	1,164	684	1,024	693	715	362	541	497	667	852
Stony River	***688***	***746***	***1,019***	1,476	977	372	303	***469***	447	137	91	346	661
Lime Village[a]	***1,368***	***1,216***	***1,406***	***659***	***1,080***	***932***	***739***	780	***831***	***888***	-	834	948
McGrath	***454***	149	375	417	965	650	630	233	538	451	0	500	490
Takotna	***1***	0	***1***	***3***	***3***	***2***	0	***2***	***2***	***3***	0	2	2
Nikolai	10	20	14	13	66	65	13	0	0	236	400	63	47
Telida[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Kuskokwim	4,160	4,365	4,960	4,310	4,581	3,822	3,123	2,945	2,964	2,798	1,379	3,130	3,763
River[b]	41,885	43,577	46,817	52,213	35,747	38,735	43,245	47,396	39,382	48,372	36,781	43,426	43,943

Source: Shelden, Hamazaki, Horne-Brine, and Roczicka 2016.

Note: Dashes indicate harvest was not estimated; bold indicates Bayesian estimates.

[a] Villages not surveyed in 2015. Harvest was not estimated due to lack of recent data.

[b] Kuskokwim River Total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 7. Estimates of Kuskokwim River Coho Salmon run-size, escapement, and harvest from 1981 to 2015 (Schaberg and Liller 2015, ADF&G 2016c).

Kuskokwim River Drainage							
Year	Total Run	Escapement	Harvest				
			Subsistence	Commercial	Sport	Test Fish	Total
1981				211,251			211,251
1982				447,117			447,117
1983				196,287	1,375		197,662
1984				623,447	1,442		624,889
1985				335,606	136		335,742
1986				659,988	1,222	280	661,490
1987				399,467	1,767	586	401,820
1988				524,296	927	1,206	526,429
1989			52,917	479,856	2,459	1,901	537,133
1990			57,560	410,332	581	1,279	469,752
1991			39,252	500,935	1,003	1,188	542,378
1992			52,299	666,170	1,692	10,109	730,270
1993			28,485	610,739	980	8,084	648,288
1994			36,609	724,689	1,925	7,830	771,053
1995			36,823	471,461	1,497	6,620	516,401
1996			43,173	937,299	3,423	3,013	986,908
1997			29,816	130,803	2,408	1,103	164,130
1998			24,667	210,481	2,419	607	238,174
1999			27,409	23,593	1,998	343	53,343
2000	875,447	567,210	42,341	261,379	1,689	2,828	308,237
2001	742,976	515,962	31,089	192,998	1,204	1,723	227,014
2002	631,145	500,566	42,602	83,463	2,030	2,484	130,579
2003	2,699,102	2,375,943	33,259	284,064	3,459	2,377	323,159
2004	1,679,812	1,191,700	45,450	435,407	4,996	2,259	488,112
2005	819,739	639,004	33,378	142,319	3,539	1,499	180,735
2006	694,283	464,617	41,408	185,598	1,474	1,186	229,666
2007	777,552	597,110	35,332	141,049	2,504	1,557	180,442
2008	1,130,279	931,753	48,841	142,862	3,839	2,984	198,526
2009	723,807	583,283	30,058	104,546	3,526	2,394	140,524
2010	499,951	407,065	32,106	58,031	1,729	1,020	92,886
2011	1,170,785	1,064,277	29,500	74,108	1,693	1,207	106,508
2012	559,219	443,296	25,400	86,389	2,879	1,255	115,923
2013	747,646	604,162	26,409	114,069	1,147	1,767	141,625
2014	1,435,689	1,264,159	49,736	117,588	1,059	2,880	168,383
2015	919,421	816,266	33,939	65,034	N/A	1,615	98,973

Table 8. Estimated number of Coho Salmon harvested for subsistence, Kuskokwim River drainage, based on the annual postseason survey, 2005 to 2015.

COHO SALMON													
KUSKOKWIM RIVER DRAINAGE													
Community	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2010-2014 average**	**2005-2014 average**
Kongiganak[a]	740	657	883	***557***	561	483	613	***356***	***412***	***561***	-	485	582
Bay	740	657	883	557	561	483	613	356	412	561	0	485	582
Tuntutuliak	1,074	948	703	1,620	***359***	698	250	565	450	***794***	362	551	746
Eek	378	773	***459***	***661***	***176***	315	280	612	483	555	629	449	469
Kasigluk	1,304	***3,070***	***1,753***	***867***	***629***	1,043	430	303	418	851	446	609	1,067
Nunapitchuk	807	692	1,752	508	***286***	195	407	319	226	1,305	1,154	490	650
Atmautluak	530	254	***424***	262	***67***	36	263	383	203	176	311	212	260
Napakiak	742	2,363	1,244	1,006	420	877	927	402	634	740	1,117	716	936
Napaskiak	602	1,640	639	903	786	1,029	471	269	772	1,153	1,353	739	826
Oscarville	60	175	180	62	67	12	43	38	37	128	25	52	80
Bethel	12,994	18,810	12,972	15,839	12,895	20,426	18,141	13,280	12,662	19,364	12,277	16,775	15,738
Kwethluk	3,048	1,245	1,624	7,262	4,333	1,495	1,097	1,013	1,555	4,422	1,677	1,916	2,709
Akiachak	1,817	1,714	2,355	4,311	1,790	1,181	1,440	714	1,106	1,845	1,924	1,257	1,827
Akiak	1,847	379	1,325	1,358	661	475	505	***455***	454	1,501	1,423	678	896
Tuluksak	484	498	1,131	***635***	857	330	163	341	473	808	623	423	572
Lower Kuskokwim	25,687	32,561	26,561	35,293	23,326	28,112	24,417	18,694	19,473	33,642	23,321	24,868	26,777
Lower Kalskag	319	1,415	515	76	318	96	684	1,107	529	907	419	665	597
Upper Kalskag	594	1,799	381	2,350	181	92	998	360	636	938	384	605	833
Aniak	2,032	1,018	3,003	2,883	2,223	2,533	2,215	3,365	3,102	9,566	7,705	4,156	3,194
Chuathbaluk	346	727	419	***525***	96	76	109	179	319	291	166	195	309
Kuskokwim	3,291	4,959	4,318	5,834	2,818	2,797	4,006	5,011	4,586	11,702	8,674	5,620	4,932
Crooked Creek	312	401	289	***952***	283	87	297	149	***255***	198	275	197	322
Red Devil	331	171	193	307	126	88	130	238	318	792	214	313	269
Sleetmute	581	671	360	228	403	458	426	784	219	993	752	576	512
Stony River	468	***322***	***336***	***552***	634	201	333	***358***	120	177	77	238	350
Lime Village[a]	372	***132***	***443***	***695***	***210***	***146***	***596***	117	***384***	***226***	-	294	332
McGrath	799	***894***	279	247	1,175	1,053	1,331	2,257	523	1,189	173	1,271	975
Takotna	8	***0***	8	***6***	***28***	***20***	3	***22***	***0***	***0***	53	9	9
Nikolai	166	407	95	53	203	135	20	214	119	256	400	149	167
Telida[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Kuskokwim	3,037	2,998	2,005	3,040	3,062	2,188	3,136	4,139	1,938	3,831	1,944	3,046	2,937
River[b]	32,755	41,175	33,766	44,724	29,767	33,580	32,172	28,200	26,409	49,736	33,939	34,019	35,228

Source: Shelden, Hamazaki, Horne-Brine, and Roczicka 2016.

Note: Dashes indicate harvest was not estimated; bold indicates Bayesian estimates.

[a] Villages not surveyed in 2015. Harvest was not estimated due to lack of recent data.

[b] Kuskokwim River Total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 9. Average subsistence harvest composition for Kuskokwim River Chinook Salmon, Chum Salmon, Sockeye Salmon, Coho Salmon, and Chum plus Sockeye plus Coho Salmon by three time periods (1990-2015, 1990-2010, and 2011-2015). Data from Shelden, Hamazaki, Horne-Brine, and Roczicka 2016.

Average Harvest Composition by Time Period			
Species	**1990-2015**	**1990-2010**	**2011-2015**
Chinook Salmon	33%	37%	18%
Chum Salmon	30%	29%	35%
Sockeye Salmon	20%	18%	26%
Coho Salmon	17%	16%	21%
Chum+Sockeye+Coho Salmon	67%	63%	82%

Table 10. Deviation of subsistence harvest composition from 1990-2015 average subsistence harvest composition for Kuskokwim River Chinook Salmon, Chum Salmon, Sockeye Salmon, Coho Salmon, and Chum plus Sockeye plus Coho Salmon by two time periods (1990-2010 and 2011-2015). Data from Shelden, Hamazaki, Horne-Brine, Roczicka 2016.

Harvest Composition Deviation from 1990-2015 Average by Time Period		
Species	**1990-2010**	**2011-2015**
Chinook Salmon	4%	-15%
Chum Salmon	-1%	5%
Sockeye Salmon	-2%	6%
Coho Salmon	-1%	4%
Chum+Sockeye+Coho Salmon	-4%	15%

Table 11. Comparison of mark-recapture estimates and run-reconstruction output for Kuskokwim River Chinook Salmon for year 2003-2007 and 2014-2016. Numbers inside parentheses represent lower and upper 95% confidence intervals. Run-reconstruction estimate does not include 2014-2016 mark-recapture estimates as data input.

Year	Mark-Recapture Estimate	Run-Reconstruction Estimate
2003	241,617(169,871-313,363)	275,834 (233,604 - 325,698)
2004	422,657 (283,025 - 562,289)	412,965 (346,503 - 492,176)
2005	345,814 (254,337 - 437,291)	391,193 (333,637 - 458,678)
2006	396,248 (273,062 - 519,434)	336,298 (280,117 - 403,746)
2007	266,219 (201,637 - 330,801)	281487 (243,325 - 325,633)
2014	78,585 (63,052 - 94,118)	131,674 (99,377 - 174,466)
2015	122,383 (112,295 - 132,471)	164,906 (123,895 - 219,491)
2016	128,751 (105,697 - 151,805)	177,007 (134,477 - 232,986)

Table 12. Bayesian state-space spawner recruit model results for Kuskokwim River Chinook Salmon as presented in Hamazaki et al. 2012. First five parameters are Ricker stock-recruitment parameters: ln(α), α, β, φ, σ_R^2 which are measures of productivity, carrying capacity, brood year correlation, and brood year variation. Last five parameters are for age structure: D and π (age), which represent stability of age structure and proportions of age for the stock. Numbers in parentheses represent 95% credible intervals for the Baseline and 95% confidence intervals for the Traditional analysis.

Parameters	Baseline (95% CRI)	Traditional (95% CI)
ln(α)	2.07 (1.91-2.48)	1.98 (1.74,2.21)
α	7.91 (4.58,11.90)	7.21 (5.60,9,28)
β (10^{-5})	1.13 (0.77,1.45)	0.97 (0.82,1.11)
φ	0.304 (-0.59,0.92)	NA
σ_R^2	0.19 (0.10,0.30)	0.27 (0.24,0.34)
D	137 (63,370)	NA
π [age 4]	0.19 (0.17,0.22)	NA
π [age 5]	0.38 (0.35,0.41)	NA
π [age 6]	0.39 (0.36,0.42)	NA
π [age 7]	0.03 (0.02,0.05)	NA

Table 13. Estimates of the date at which 50% of the Chinook Salmon run has passed the Bethel Test Fishery. Julian day represents the number of days passed starting at January 1. Dates were estimated using non-linear version of the logistic equation, with Year modeled as a random effect.

Year	Julian Date	D50
1984	174	06/23
1985	183	07/02
1986	173	06/22
1987	173	06/22
1988	171	06/20
1989	174	06/23
1990	176	06/25
1991	176	06/25
1992	172	06/21
1993	168	06/17
1994	170	06/19
1995	172	06/21
1996	165	06/14
1997	171	06/20
1998	175	06/24
1999	181	06/30
2000	171	06/20
2001	174	06/23
2002	170	06/19
2003	169	06/18
2004	173	06/22
2005	174	06/23
2006	175	06/24
2007	178	06/27
2008	175	06/24
2009	173	06/22
2010	173	06/22
2011	174	06/23
2012	178	06/27
2013	174	06/23
2014	167	06/16
2015	175	06/24
2016	173	06/22
Average (1984-2016)	173	06/22
SD	4	-

Table 14. Average proportion of Chinook Salmon caught in comparison to average proportion of Chum and Sockeye Salmon caught at the Bethel test fishery from 1984 to 2016.

Date	King	Chum+Sockeye
	Population Average	
05/30	0.00	0.00
05/31	0.00	0.00
06/01	0.96	0.04
06/02	0.91	0.09
06/03	0.90	0.10
06/04	0.81	0.19
06/05	0.72	0.28
06/06	0.60	0.40
06/07	0.61	0.39
06/08	0.63	0.37
06/09	0.61	0.39
06/10	0.61	0.39
06/11	0.59	0.41
06/12	0.57	0.43
06/13	0.50	0.50
06/14	0.47	0.53
06/15	0.43	0.57
06/16	0.40	0.60
06/17	0.37	0.63
06/18	0.33	0.67
06/19	0.31	0.69
06/20	0.29	0.71
06/21	0.26	0.74
06/22	0.24	0.76
06/23	0.21	0.79
06/24	0.19	0.81
06/25	0.18	0.82
06/26	0.17	0.83
06/27	0.16	0.84
06/28	0.15	0.85
06/29	0.14	0.86
06/30	0.13	0.87
07/01	0.12	0.88
07/02	0.12	0.88
07/03	0.11	0.89

Table 14 (cont.)

Date	King	Chum+Sockeye
	Population Average	
07/04	0.11	0.89
07/05	0.10	0.90
07/06	0.10	0.90
07/07	0.09	0.91
07/08	0.09	0.91
07/09	0.09	0.91
07/10	0.08	0.92
07/11	0.08	0.92
07/12	0.08	0.92
07/13	0.08	0.92
07/14	0.08	0.92
07/15	0.08	0.92
07/16	0.08	0.92
07/17	0.08	0.92
07/18-8/24	0.07	0.93

Table 15. Summary Statistics of end of season cumulative CPUE by time period at the Bethel Test Fishery for Chum Salmon from 1984-2016.

Summary Statistics for Chum Salmon End of Season Cumulative CPUE at Bethel Test Fishery							
Time Period	**Average**	**SD**	**Minimum**	**1st Quartile (25%)**	**Median (50%)**	**3rd Quartile (75%)**	**Maximum**
Overall (1984-2016)	5,341	3,767	549	2,602	4,801	6,846	18,192
5 Year (2011-2016)	5,992	2,472	2,945	3,735	6,042	7,678	10,028
10 Year (2006-2016)	7,563	3,108	2,945	5,739	6,894	10,028	13,927

Table 16. Summary Statistics of end of season cumulative CPUE by time period at the Bethel Test Fishery for Sockeye Salmon from 1984-2016.

Summary Statistics for Sockeye Salmon End of Season Cumulative CPUE at Bethel Test Fishery							
Time Period	**Average**	**SD**	**Minimum**	**1st Quartile (25%)**	**Median (50%)**	**3rd Quartile (75%)**	**Maximum**
Overall (1984-2016)	1,539	588	569	1,160	1,477	1,760	3,019
Five Year (2011-2016)	1,634	541	1,148	1,165	1,443	2,229	2,444
10 Year (2006-2016)	1,643	426	1,148	1,367	1,520	2,139	2,444

Table 17. Total In-River Abundance Estimates for Kuskokwim River Coho Salmon for year 2001-2004 and 2008-2009. Numbers inside parentheses represent lower and upper 95% confidence intervals (Schaberg and Liller 2015).

Year	Total In-River Abundance
2001	706,296 (642,493 – 896,892)
2002	603,414 (546,298 – 785,349)
2003	1,654,173 (1,449,026 – 2,500,529)
2004	2,024,571 (1,811,785 – 2,581,274)
2008	963,058 (848,856 – 1,299,578)
2009	714,481 (605,985 – 927,998)

Table 18. Summary Statistics of end of season cumulative CPUE by time period at the Bethel Test Fishery for Coho Salmon from 1984-2016.

Summary Statistics for Coho Salmon End of Season Cumulative CPUE at Bethel Test Fishery							
Time Period	**Average**	**SD**	**Minimum**	**1st Quartile (25%)**	**Median (50%)**	**3rd Quartile (75%)**	**Maximum**
Overall (1984-2016)	3,283	1,412	423	2,342	3,148	4,381	7,183
Five Year (2011-2016)	3,242	813	2,439	2,626	3,044	3,827	4,697
10 Year (2006-2016)	3,451	1,047	2,029	2,688	3,231	4,495	5,497

APPENDIX A

RELEVANT STATE REGULATIONS

Kuskokwim Area—Subsistence Fishing

5 AAC 01.260. Fishing seasons and periods

(a) Unless otherwise specified in this section, 5 AAC 01.275, or 5 AAC 07.365, finfish, except rainbow trout, may be taken in the Kuskokwim Area at any time.

(b) In the waters of Districts 1 and 2 and those waters of the Kuskokwim River between Districts 1 and 2, salmon may be taken at any time, except that the commissioner may, by emergency order, close the subsistence fishing periods in the waters of Districts 1 and 2 and those waters of the Kuskokwim River between District 1 and 2 and reopen those waters to commercial fishing. In Subdistricts 1-A and 1-B, the commissioner may, by emergency order, reopen fishing periods where subsistence fishing will be allowed in portions of waters adjacent to the waters of Subdistricts 1-A or 1-B open to commercial fishing under this subsection.

(c) In Districts 4 and 5, salmon may be taken at any time, except that from June 1 through September 8, salmon may not be taken for 16 hours before, during, and six hours after each commercial salmon fishing period in each district.

(a) 5 AAC 01.270. Lawful gear and gear specifications and operation

(a) Salmon may be taken only by gillnet, beach seine, a hook and line attached to a rod or pole, handline, or fish wheel subject to the restrictions set out in this section and 5 AAC 01.275, except that salmon may also be taken by spear in the Holitna River drainage, Kanektok River drainage, Arolik River drainage, and the drainage of Goodnews Bay.

(b) The aggregate length of set gillnets or drift gillnets in use by any individual for taking salmon may not exceed 50 fathoms.

(c) Fish other than salmon may be taken only by set gillnet, drift gillnet, beach seine, fish wheel, pot, longline, fyke net, dip net, jigging gear, spear, a hook and line attached to a rod or pole, handline, or lead.

(d) Each subsistence gillnet operated in tributaries of the Kuskokwim River must be attached to the bank, fished substantially perpendicular to the bank and in a substantially straight line. (e) In that portion of the Kuskokwim River drainage from the north end of Eek Island upstream to the mouth of the Kolmakoff River, no part of a set gillnet located within a tributary to the Kuskokwim River may be set or operated within 150 feet of any part of another set gillnet.

(f) A gillnet may not obstruct more than one-half the width of any fish stream and any channel or side channel of a fish stream. A stationary fishing device may not obstruct more than one-half the width of any salmon stream and any channel or side channel of a salmon stream.

(g) Repealed 5/19/2004.

(h) The maximum depth of gillnets is as follows:

(1) gillnets with six-inch or smaller mesh may not be more than 45 meshes in depth;

(2) gillnets with greater than six-inch mesh may not be more than 35 meshes in depth. (i) Halibut may be taken only by a single hand-held line with no more than three hooks attached to it.

(j) Subsistence set and drift gillnets operated in Whitefish Lake in the Ophir Creek drainage may not exceed 15 fathoms in length.

(k) A person may not operate more than one subsistence set or drift gillnet at a time in Whitefish Lake in the Ophir Creek drainage. A person operating a subsistence set or drift gillnet shall check the net at least once every 24 hours.

(l) Repealed 5/29/2001.

(m) Notwithstanding (b) and (j) of this section, during times when the commissioner determines it to be necessary for the conservation of chum salmon, the commissioner, by emergency order, may close the fishing season in any portion of the Kuskokwim Area and immediately reopen the season in that portion during which the following gear limitations apply:

(1) a gillnet used to take fish

(A) must be of seven and one-half inch or greater mesh or four-inch or less mesh;

(B) for a gillnet of four-inch or less mesh, may not exceed the length specified by the commissioner in the emergency order;

(C) for a gillnet of seven and one-half inch or greater mesh, may not exceed the length specified in (b) and (j) of this section;

(2) for fish wheels:

(A) a fish wheel used to take fish must be equipped with a livebox that is constructed so that it contains no less than 45 cubic feet of water volume while it is in operation;

(B) the livebox of a fish wheel must be checked at least once every 12 hours while the fish wheel is in operation, and all chum salmon in the livebox must be returned alive to the water;

(C) repealed 6/17/2001; (3) beach seine gear: any chum salmon taken in beach seine gear must be returned alive to the water.

(n) Notwithstanding (b) and (j) of this section, during times when the commissioner determines that it is necessary for the conservation of king salmon, the commissioner, by emergency order, may close the fishing season in any portion of the Kuskokwim Area and immediately reopen the season in that portion during which one or more of the following gear limitations may be implemented:

(1) for gillnets;

(A) a gillnet mesh size may not exceed six inches;

(B) a gillnet mesh size may not exceed four inches and the gillnet may only be operated as a set gillnet; no part of a set gillnet may be more than 100 feet from the ordinary high water mark;

(C) a gillnet may not exceed the length specified by the commissioner in the emergency order, except that a longer gillnet may be used if no more than the specified length of the gillnet is in a fishing condition and the remainder of the gillnet is tied up or secured so that it is not in the water in a fishing condition;

(2) for fish wheels:

(A) except as provided in (B) of this paragraph, a fish wheel used to take fish must be equipped with a livebox that is constructed so that it contains no less than 45 cubic feet of water volume while it is in operation; the livebox of a fish wheel must be checked at least once every six hours while the fish wheel is in operation, and all king salmon in the livebox must be returned alive to the water;

(B) a person may operate a fish wheel without a livebox only if (i) the fish wheel is equipped with a chute that returns fish captured by the fish wheel to the water alive; (ii) the person closely attends the fish wheel while it is in operation; and (iii) the person returns all king salmon caught to the water alive;

(3) for beach seine gear: any king salmon taken in beach seine gear must be released immediately and returned alive to the water;

(4) for dip nets: a person may fish for salmon with a dip net, as defined in 5 AAC 39.105, and all king salmon caught in a dip net must be released immediately and returned alive to the water.

(o) For the purposes of this section, a "livebox" is a submerged container, that is attached to a fish wheel and that will keep fish caught by the fish wheel alive.

(p) A beach seine may not exceed (1) 50 fathoms in length; (2) 100 meshes in depth; (3) a mesh size of three and one-half inches stretched measure.

5 AAC 01.284. Limitations on subsistence fishing with hook and line gear

During times when the commissioner determines it to be necessary for the conservation of salmon, the commissioner may, by emergency order, close the fishing season for salmon, and immediately reopen the season during which restrictions apply to the waters, seasons, bag, possession, and size limits, and method and means for subsistence fishing for salmon with a hook and line attached to a rod or pole. The provisions of this section do not apply to fishing through the ice.

5 AAC 01.295. Aniak River bag and possession limits

From June 1 through August 31, when subsistence fishing with a hook and line attached to a rod or pole, in that portion of the Aniak River drainage upstream of Doestock Creek, (1) the bag and possession limit is as specified by species in 5 AAC 71.010, except that the bag and possession limit for king salmon is two fish, with no size and annual limits; and (2) rainbow trout may not be retained.

5 AAC 07.200. Fishing districts, subdistricts, and sections

(a) District 1 consists of that portion of the Kuskokwim River upstream from a line from Apokak Slough at 60ø 08.50' N. lat., 162ø 12' W. long. to the southernmost tip of Eek Island to Popokamiut at 60ø 04' N. lat., 162ø 28' W. long., to a line between ADF&G regulatory markers located at the mouth of Bogus Creek.

> *(1) Subdistrict 1-A consists of that portion of District 1 upstream from a line between ADF&G regulatory markers located at the downstream end of Steamboat Slough to a line between ADF&G regulatory markers located at the mouth of Bogus Creek;*
>
> *(2) Subdistrict 1-B consists of that portion of District 1 upstream from a line from Apokak Slough at 60ø 08.50' N. lat., 162ø 12' W. long. to the southernmost tip of Eek Island to the Popokamiut at 60ø 04' N. lat., 162ø 28' W. long. to a line between ADF&G regulatory markers located at the downstream end of Steamboat Slough.*
>
> > *(A) Lower Section consists of that portion of Subdistrict 1-B upstream from a line from Apokak Slough at 60ø 08.50' N. lat., 162ø 12' W. long. to the southernmost tip of Eek Island to Popokamiut at 60ø 04' N. lat., 162ø 28' W. long. to a line between ADF&G regulatory markers located at approximately 60ø 28' N. lat., 162ø 18' W. long. and 60ø 28' N. lat., 162ø 21' W. long.;*

(B) Upper Section consists of that portion of Subdistrict 1-B not included in Lower Section.

(b) District 2 consists of that portion of the Kuskokwim River from the ADF&G regulatory markers located just below the upstream entrance to the second slough on the west bank of the Kuskokwim River downstream of Lower Kalskag, approximately seven and one-half miles downstream of Lower Kalskag, to ADF&G regulatory markers at the downstream edge of Chuathbaluk.

APPENDIX B

FEDERAL SPECIAL ACTIONS AND STATE EMERGENCY ORDERS 2014, 2015, AND 2016, KUSKOKWIM RIVER DRAINAGE SALMON SUBSISTENCE FISHERY

Appendix Table B-1. Federal special actions, Kuskokwim River drainage, 2014.

2014 KUSKOKWIM RIVER DRAINAGE		
SUBSISTENCE FISHING		
Federal Special Actions	**Effective Date**	**Action**
SA 3-KS-01-14	May 20–July 18, 2014	Federal public waters of the Kuskokwim drainage are closed to the harvest of Chinook salmon except by residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek.
SA 3-KS-02-14	May 20–July 14, 2014	Mouth upriver to Tuluksak is closed to the harvest of Chinook salmon by all users.
SA 3-KS-03-14	May 27–July 18, 2014	Tuluksak upriver to Refuge boundary at Aniak is closed to the harvest of Chinook salmon by all users
SA 3-KS-04-14	June 11–June 30, 2014	Federal public waters of the Kuskokwim drainage are closed to the harvest of Chinook salmon except by residents of communities issued Social and Cultural Permits fishing with gillnets 6-inch or less mesh size not exceeding 50-fathoms long and 45-meshes deep.
SA 3-KS-05-14 (see EO 3-S-WR-07-14)	June 20, 2014	Mouth upriver to Tuluksak is closed to the harvest of Chinook salmon except by residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek fishing with gillnets 6-inches or less mesh size not exceeding 50-fathoms long and 45-meshes deep, for 4 hours.
SA 3-KS-06-14	June 20–July 14, 2014	Below the southern tip of Eek Island is closed to the harvest of Chinook salmon except by residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek fishing with gillnets 6-inch or less mesh size not exceeding 50-fathoms long and 45-meshes deep.
SA 3-KS-07-14	June 24–July 14, 2014	For the Kuskokwim area, Federal subsistence fishing schedules, openings, closings, and fishing methods are the same as those issued for the subsistence taking of fish under Alaska Statutes (AS 16.05.060). Two Special Actions remain in effect, 3-KS-01-14 and 3-KS-04-14, unless superseded by a Federal Special Action.

Appendix Table B-2. State emergency orders, Kuskokwim River drainage, 2014.

2014 KUSKOKWIM RIVER DRAINAGE		
SUBSISTENCE FISHING		
State Emergency Orders	**Effective Date**	**Action**
Board of Fisheries (3/17/14)	Emergency regulation that was adopted into permanent regulations	Dip nets are legal gear for harvesting salmon other than Chinook salmon during times of Chinook salmon conservation. A dip net is a bag-shaped net supported on all sides by a rigid frame; the maximum distance between any two points on the net frame may not exceed 5 feet; the bag of the frame must be at least one-half the distance of the maximum frame opening; the webbing of the net may not exceed 4.5-inches stretch mesh.
Board of Fisheries (3/17/14)	Emergency regulation that was adopted into permanent regulations	Only gillnets less than 25 fathoms are legal gear during times of Chinook salmon conservation. Gillnets may be over 25-fathoms in total length, but must be tied and/or bagged in such a way that only 25-fathoms can be used to fish.
EO 3-KS-01-14 Sport fishing	May 1, 2014	All waters of the Kuskokwim–Goodnews Area are closed to sport fishing for Chinook salmon. Only one unbaited, single-hook, artificial lure may be used. All Chinook salmon caught unintentionally in the Kuskokwim-Goodnews Area while fishing for other species may not be removed from the water and must be released immediately.
EO 3-S-WR-01-14	June 1, 2014	Aniak River upriver to Holitna River, fishing for Chinook salmon is closed. Fishing for non-salmon species with gillnets is restricted to 4-inch or less mesh size not exceeding 60-feet long and 45 meshes deep.
	June 4, 2014	Holitna River upriver to headwaters, fishing for Chinook salmon is closed. Fishing for non-salmon species with gillnets is restricted to 4-inch or less mesh size not exceeding 60-feet long and 45 meshes deep.
EO 3-S-WR-02-14	June 1, 2014	Marine waters near the Kuskokwim River mouth (Ishkowik River to the northern boundary of District W-4 at Weelung Creek) are closed to salmon fishing.
EO 3-S-WR-03-14	June 3, 2014	Naskonat Peninsula to Ishkowik River (coastal waters including Nelson Island), fishing for salmon is restricted to gillnets with 6-inch or less mesh size.
	June 10, 2014	Aniak River upriver to Holitna River, fishing for Chinook salmon with a hook and line attached to a rod or pole is closed.

Continued on next page.

Appendix Table B-2. State emergency orders, Kuskokwim River drainage, 2014 (*continued from previous page*).

2014 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Orders	**Effective Date**	**Action**
EO 3-S-WR-05-14	June 14–30, 2014	Mouth to Tuluksak, fishing with dip nets will be allowed for 12 hours daily, from 9:00 a.m. to 9:00 p.m. Any king salmon caught in a dip net must be returned immediately to the water unharmed.
	June 17–30, 2014	Tuluksak to Refuge boundary at Aniak, fishing with dip nets will be allowed for 12 hours daily, from 9:00 a.m. to 9:00 p.m. Any king salmon caught in a dip net must be returned immediately to the water unharmed. This section does not include the slough (locally known as Utak Slough) on the northwest side of the Kuskokwim River adjacent to the Tuluksak River mouth.
EO 3-S-WR-06-14	June 19, 2014 until further notice	Aniak River to headwaters, fishing with dip nets will be allowed for 12 hours daily, from 9:00 a.m. to 9:00 p.m. Any Chinook salmon caught in a dip net must be returned immediately to the water unharmed.
	June 19, 2014 until further notice	Aniak River to headwaters, fishing with fish wheels will be allowed. Fish wheels are required to have a live box with no less than 45 cubic feet of water, must be checked at least every 6 hours, and all Chinook salmon must be returned to the water alive.
EO 3-S-WR-07-14 (see SA 3KS-05-14 and 3-KS-06-14)	June 20, 2014	Johnson River downriver to southern tip of Eek Island, fishing for chum and sockeye salmon is allowed with gillnets 6-inch or less mesh size not exceeding 50-fathoms long and 45-meshes deep, for 4 hours.
	June 20, 2014	Marine waters near the Kuskokwim River mouth (Ishkowik River to the northern boundary of District W-4 at Weelung Creek), fishing for chum and sockeye salmon is allowed with gillnets 6-inch or less mesh size not exceeding 50-fathoms long and 45-meshes deep, until further notice.
EO 3-S-WR-08-14	June 24, 2014 until further notice	Johnson River downriver to southern tip of Eek Island, fishing for chum and sockeye salmon will be allowed with gillnets with 6-inch or less mesh size not exceeding 50-fathoms long and 45-meshes deep, until further notice from 8:00 a.m. until 4:00 p.m.
	June 24, 2014	Tuluksak downriver to Johnson River, fishing for chum and sockeye salmon will be allowed with gillnets with 6-inch or less mesh size not exceeding 25-fathoms long and 45-meshes deep from 10:00 a.m. until 2:00 p.m. (4 hours). This section includes the slough (locally known as Utak Slough) on the northwest side of the Kuskokwim River adjacent to the Tuluksak River mouth.

Continued on next page.

Appedix Table B-2. State emergency orders, Kuskokwim River drainage, 2014 (*continued from previous page*).

2014 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Orders	**Effective Date**	**Action**
EO 3-S-WR-09-14	June 24, 2014 until further notice	*Aniak River downriver to southern tip of Eek Island, fishing will remain open to gillnets with 4-inch or less mesh size not exceeding 60-feet long and 45 meshes deep. Fishing for Chinook salmon with a hook and line attached to a rod or pole will remain closed until further notice* [already closed].
EO 3-S-WR-10-14	June 27, 2014 until further notice	Johnson River to southern tip of Eek Island, fishing for chum and sockeye salmon will be allowed with gillnets 6-inch or less mesh size not exceeding 50-fathoms long.
	June 27, 2014	Tuluksak downriver to Johnson River, fishing for chum and sockeye salmon will be allowed with gillnets with 6-inch or less mesh not exceeding 50-fathom long from 10:00 a.m. until 6:00 p.m. (8 hours).
	June 27, 2014	Tuluksak upriver to Chuathbaluk, fishing for chum and sockeye salmon will be allowed with gillnets 6-inch or less mesh size not exceeding 50-fathoms long from 10:00 a.m. until 6:00 p.m. (8 hours).
EO 3-S-WR-11-14	June 30, 2014 until further notice.	Tuluksak downriver to Johnson River, fishing for chum and sockeye salmon will be allowed with gillnets with 6-inch or less mesh size not exceeding 50-fathoms long.
	June 30, 2014 until further notice.	Tuluksak upriver to Chuathbaluk, fishing for chum and sockeye salmon will be allowed with gillnets with 6-inch or less mesh size not exceeding 50-fathoms long.
	June 30, 2014	Chuathbaluk upriver to Holitna River, fishing for chum and sockeye salmon will be allowed with gillnets with 6-inch or less mesh size not exceeding 50-fathoms long from 10:00 a.m. to 6:00 p.m.
EO 3-S-WR-12-14	June 30–July 12, 2014	Mouth upriver to Chuathbaluk, fishing with dip nets will be allowed, 24 hours per day, from 9:00 p.m. Monday, until 9:00 p.m. Saturday. Any king salmon caught in a dip net must be returned immediately to the water unharmed.
EO 3-S-WR-13-14	July 1, 2014 until further notice	Naskonat Peninsula to Ishkowik River (coastal waters including Nelson Island), fishing with gillnets with unrestricted mesh size will be allowed.

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Appendix Table B-2. State emergency orders, Kuskokwim River drainage, 2014 (*continued from previous page*).

2014 KUSKOKWIM RIVER DRAINAGE		
SUBSISTENCE FISHING		
State Emergency Orders	**Effective Date**	**Action**
EO 3-S-WR-14-14	July 3, 2014 until further notice	Chuathbaluk upriver to Holitna River, fishing for chum and sockeye salmon will be allowed with gillnets with 6-inch or less mesh size not exceeding 50-fathoms long.
	July 3, 2014 until further notice	Holitna River upriver to headwaters, fishing for chum and sockeye salmon will be allowed with gillnets with 6-inch or less mesh size not exceeding 50-fathoms long.
	July 3, 2014 until further notice	Chinook salmon fishing with hook and line gear with a daily bag limit of 3 and no possession, season, or size limits will be allowed.

Appendix Table B-3. Federal special actions, Kuskokwim River drainage, 2015.

2015 YUKON DELTA NATIONAL WILDLIFE REFUGE KUSKOKWIM RIVER DRAINAGE–SUBSISTENCE FISHING		
Federal Special Actions	**Effective Date**	**Action**
SA 3-KS-01-15	May 21–July 20, 2015	All waters within and adjacent to the Refuge boundary are closed to the harvest of **Chinook Salmon** except by residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek.
SA 3-KS-02-15	May 21–28, 2015	The mouth of the Kuskokwim River upriver to Tuluksak and its salmon tributaries within and adjacent to the Refuge boundary are closed to the harvest of **Chinook Salmon** by all users. Salmon tributaries are the Eek, Kwethluk, Kasigluk, Kisaralik, and Tuluksak rivers and their salmon tributaries. Gillnets must be set and are restricted to 4-inch or less mesh size not exceeding 60-feet long and 45-meshes deep, only 72 hours/week, 6:00 am Thur.–6:00 am Sunday.
SA 3-KS-03-15	May 28–July 20, 2015	The Kuskokwim River and its salmon tributaries within and adjacent to the Refuge boundary are closed to the harvest of **Chinook Salmon** by all users (**Appendix Figure B-1**).
SA 3-KS-04-15	June 7–July 20, 2015	Kwethluk, Kasigluk, Kisaralik, Tuluksak, and Aniak rivers and their salmon tributaries within and adjacent to the boundaries of the Refuge are closed to the use of **gillnets** by all users (**Appendix Figure B-2**). Nonsalmon tributaries are Birch Creek, Akulikutak River, Columbia Creek, and Reindeer Slough 100-yards upstream from their confluences with salmon tributaries.
SA 3-KS-05-15 supersedes SA 3-KS-03-15	June 5–July 20, 2015	All waters within and adjacent to the Refuge boundary are closed to the harvest of **all fish** except by residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek. The Kuskokwim River and its salmon tributaries within and adjacent to the Refuge boundary are closed to the harvest of **Chinook Salmon** by all users. Gillnets must be set and are restricted to 4-inch or less mesh size not exceeding 60-feet long and 45-meshes deep, only 72 hours per week, 6:00 am Thur.–6:00 am Sunday (**Appendix Figure B-2**).

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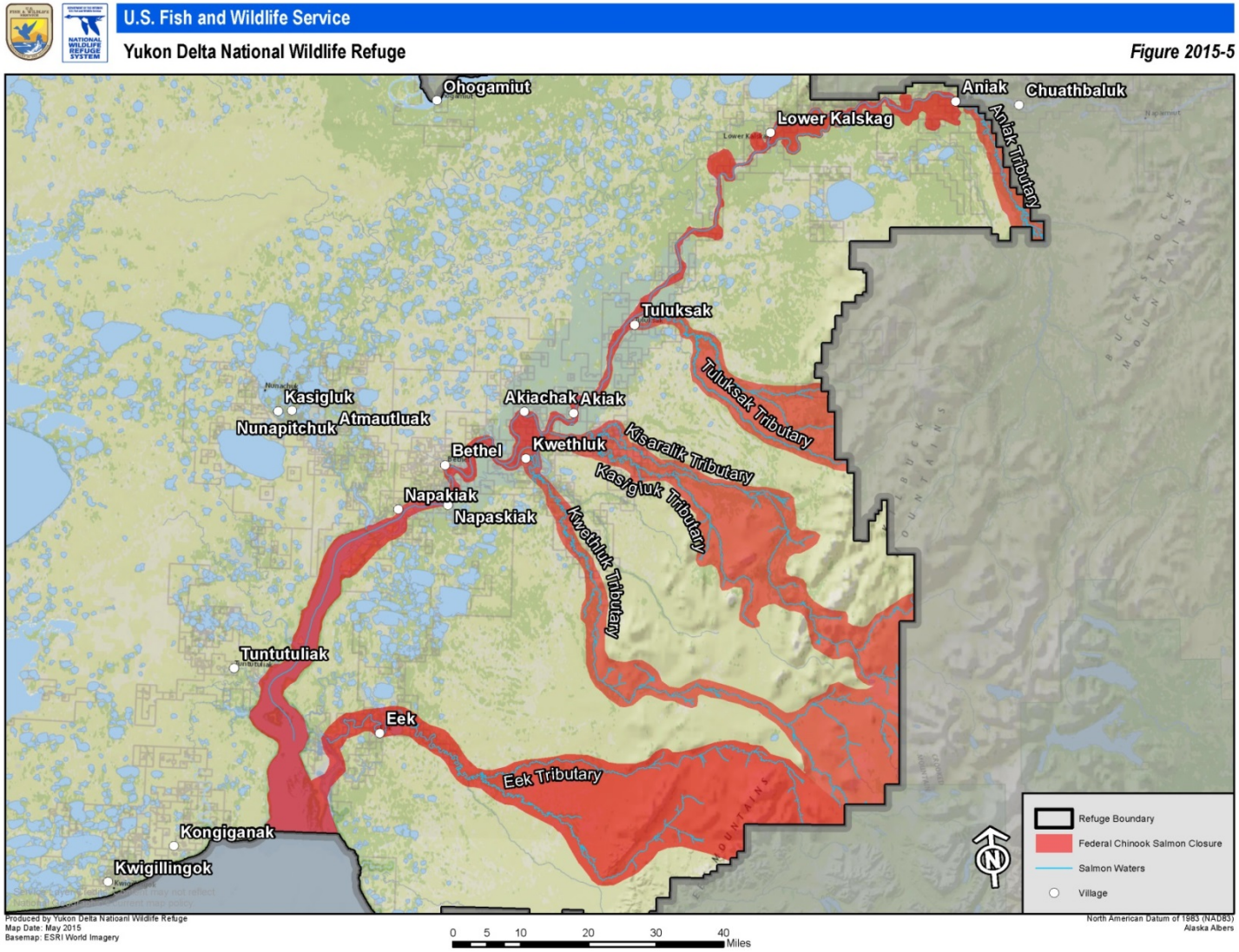
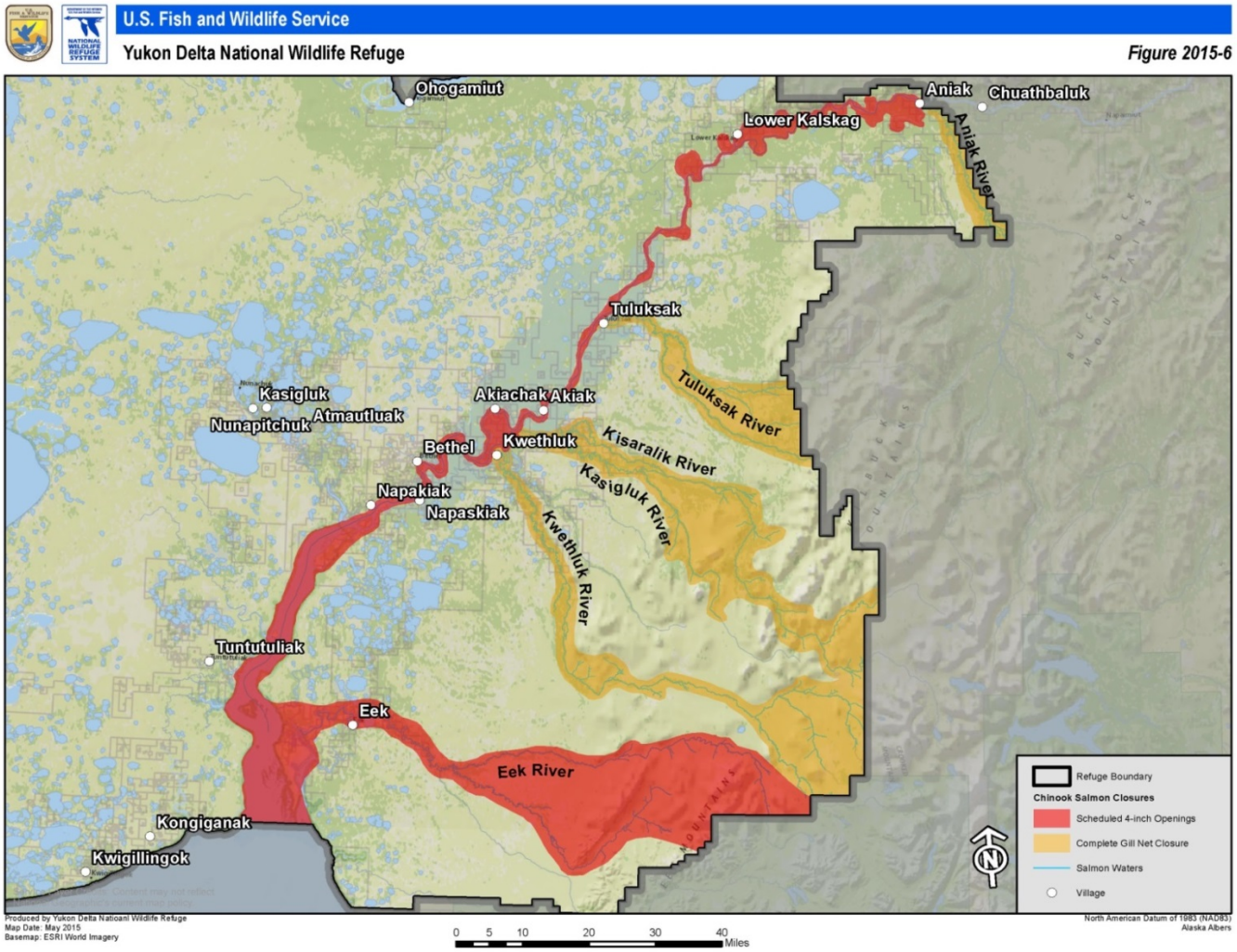


Appendix Figure B-1. Federal Special Action SA 3-KS-03-15 closure to the harvest of Chinook Salmon by all users.



Appendix Figure B-2. Federal Special Actions SA 3-KS-04-15 (closure to gillnets) and SA 3-KS-05-15 (scheduled openings to 4-inch mesh nets).

Appendix Table B-3. Federal special actions, Kuskokwim River drainage, 2015 (*continued from previous page*).

2015 YUKON DELTA NATIONAL WILDLIFE REFUGE KUSKOKWIM RIVER DRAINAGE–SUBSISTENCE FISHING		
Federal Special Actions	**Effective Date**	**Action**
SA 3-KS-06-15	June 10–30, 2015	Unless superseded by subsequent Special Action, waters within and adjacent to the Refuge boundary are closed to the harvest of **Chinook Salmon** except by Federally qualified subsistence users in possession of a Federal Community Harvest Permit. Dates and harvest limits will be described on each permit. Chinook Salmon may be targeted using dip-nets, beach seines, fish wheels, and gillnets. Gillnets are restricted to 6-inch or less mesh, not exceeding 300-feet long, and 45-meshes deep, and shall be drift net only. Chinook Salmon fishing is only permitted in the Kuskokwim River, the Eek River, and salmon tributaries of the Eek River. This permit is not valid on the Kwethluk, Kasigluk, Kisaralik, Tuluksak, and Aniak rivers and their salmon tributaries.
SA 3-KS-07-15 supersedes SA 3-KS-05-15	June 18–July 20, 2015	Waters within and adjacent to the Refuge boundary are closed to the harvest of **all fish** except by residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek. The Kuskokwim River and its salmon tributaries within and adjacent to the Refuge boundary are closed to the harvest of **Chinook Salmon** by all users. The Kuskokwim River and its salmon tributaries downstream of Tuluksak within and adjacent to the boundaries of the Refuge are closed to the use of **gillnets** by all users (**Appendix Figure B-3**). The closure does not affect the Chinook Salmon harvest opportunity with Federal Community Harvest Permits (SA 3-KS-06-15).
SA 3-KS-08-15	June 18–21, 2015	Federal public waters of the Kuskokwim River drainage upriver from the Tuluksak River are closed to the harvest of **nonsalmon fishes** except by Federally qualified subsistence users using 4-inch or less mesh set gillnets not exceeding 60-feet long and 45-meshes deep, only 72 hours per week, 6:00 am Thur.–6:00 am Sunday (**Appendix Figure B-3**).

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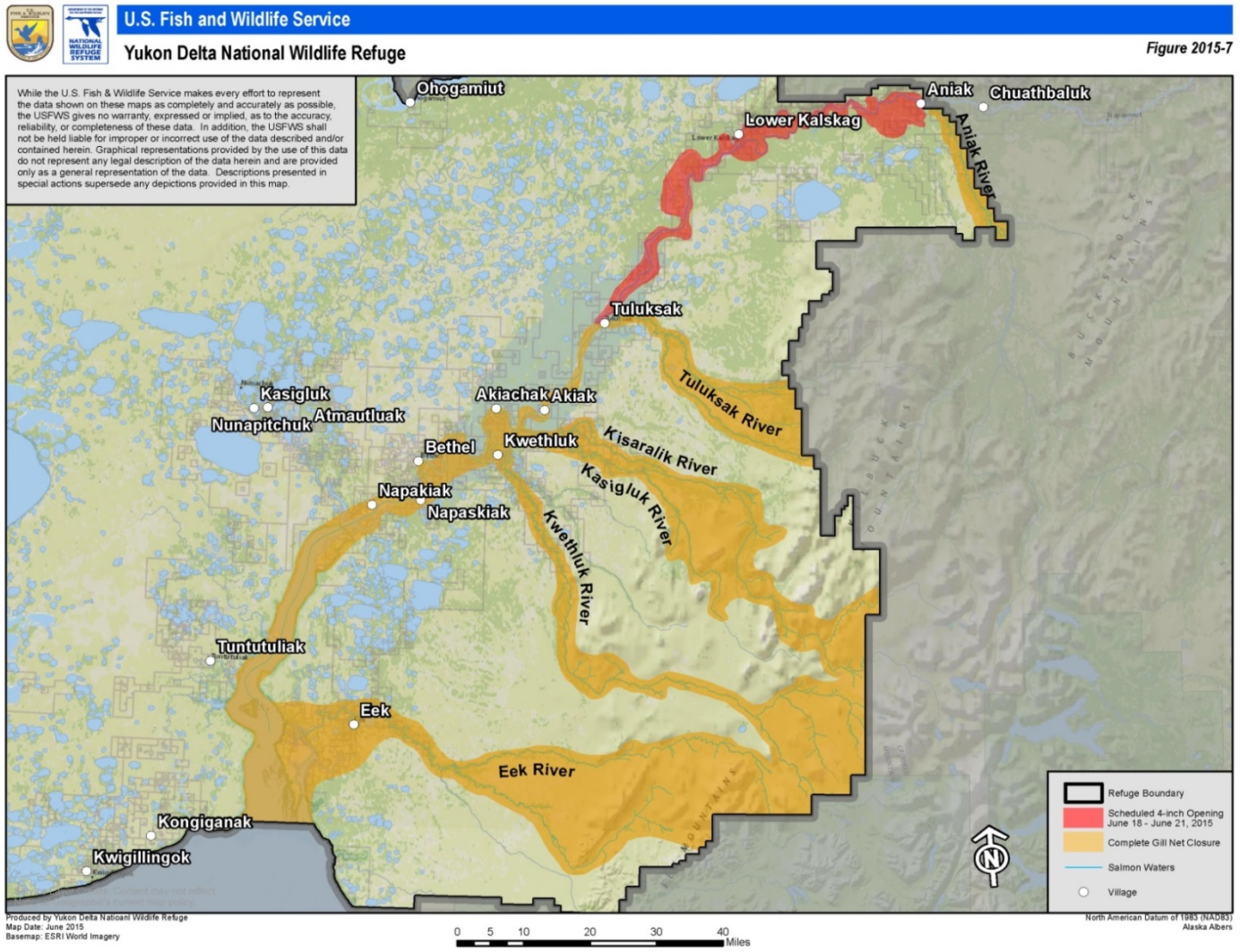

Appendix Figure B-3. Federal Special Actions SA 3-KS-07-15 (closure to gillnets) and SA 3-KS-08-15 (scheduled opening to 4-inch mesh nets).

Appendix Table B-3. Federal special actions, Kuskokwim River drainage, 2015 (*continued from previous page*).

2015 YUKON DELTA NATIONAL WILDLIFE REFUGE KUSKOKWIM RIVER DRAINAGE–SUBSISTENCE FISHING		
Federal Special Actions	**Effective Date**	**Action**
SA 3-KS-09-15 supersedes SA 3-KS-08-15	June 22–July 20, 2015	Waters within and adjacent to the Refuge boundary are closed to the harvest of **all fish** except by residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek. The closure does not affect the Chinook Salmon harvest opportunity with Federal Community Harvest Permits (SA 3-KS-06-15). Waters within and adjacent to the Refuge boundary are closed to the harvest of **Chinook Salmon** except by Federally qualified subsistence users on Monday June 22, 4:00 pm–8:00 pm. Only drift gillnets with 6-inch or less mesh, not exceeding 300-feet long and 45-meshes deep may be used. Fishing is only permitted in the Kuskokwim River below the mouth of the Johnson River, excluding the Eek River and its salmon tributaries, within and adjacent to the Refuge boundary (**Appendix Figure B-4**). Except for users with a Federal Community Harvest Permit or participating in a temporary opening, all **gillnets** are prohibited in the Kuskokwim River and its salmon tributaries within and adjacent to the Refuge boundary. Subsistence fishing in the Kuskokwim River and its salmon tributaries by Federally qualified subsistence users is open with all other legal subsistence gear, which are dip net, beach seine, fish wheel, or rod and reel. However, Chinook Salmon must be immediately released.

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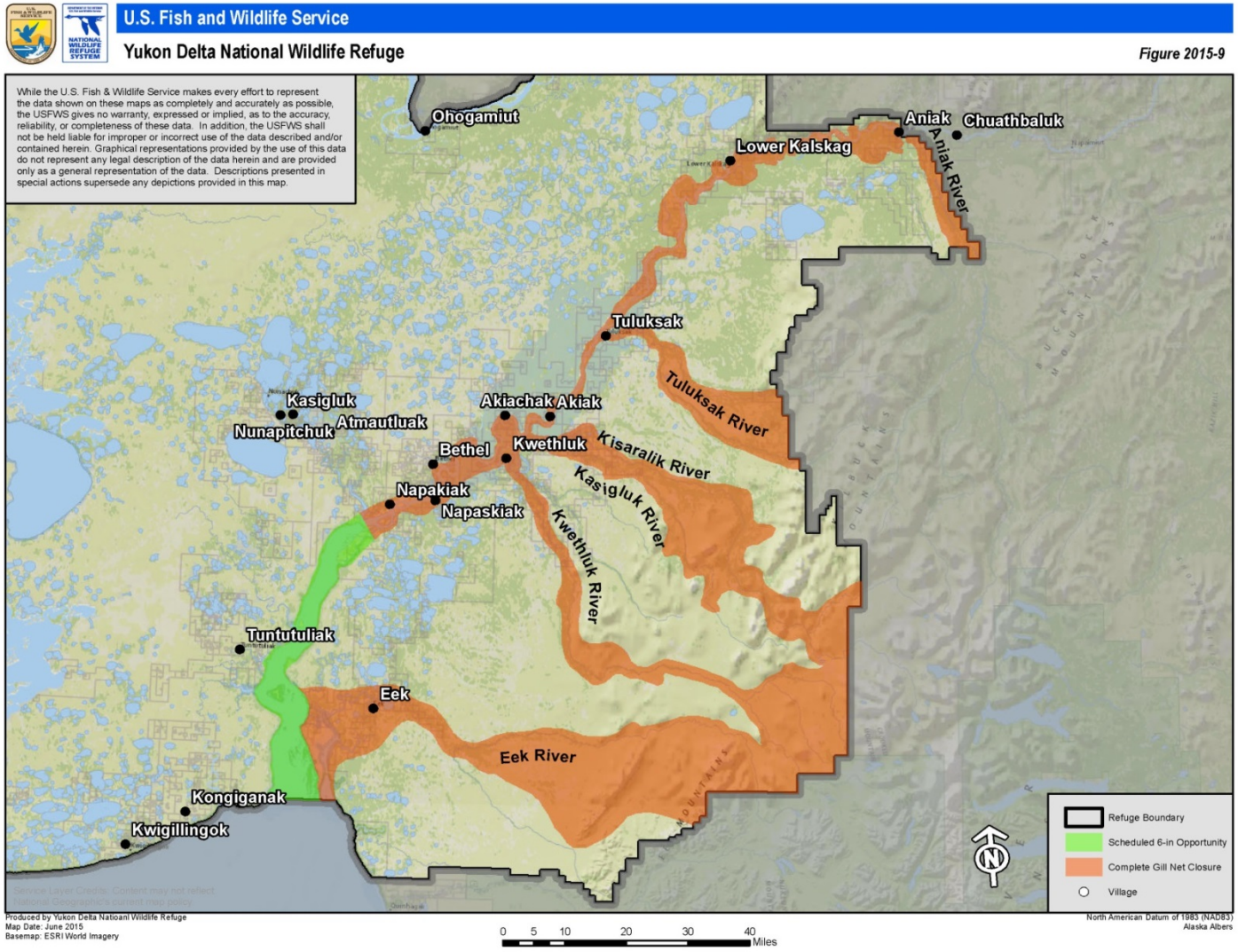

Appendix Figure B-4. Federal Special Actions SA 3-KS-09-15 (scheduled opening to 6-inch mesh nets).

Appendix Table B-3. Federal special actions, Kuskokwim River drainage, 2015 (*continued from previous page*).

2015 YUKON DELTA NATIONAL WILDLIFE REFUGE KUSKOKWIM RIVER DRAINAGE–SUBSISTENCE FISHING		
Federal Special Actions	**Effective Date**	**Action**
SA 3-KS-10-15 supersedes SA 3-KS-09-15	June 26–July 20, 2015	Waters within and adjacent to the Refuge boundary are closed to the harvest of **all fish** except by residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek. The Kuskokwim River and its salmon tributaries within and adjacent to the Refuge boundary are closed to the harvest of **Chinook Salmon** except: The Kuskokwim River below the mouth of the Johnson River is open to the harvest of Chinook Salmon by Federally qualified subsistence users Friday June 26, 2:00 pm–10:00 pm. The Kuskokwim River between Kuskokuak Slough and the Johnson River are open to the harvest of Chinook Salmon by Federally qualified subsistence users Friday June 26, 6:00 pm–10:00 pm. Only drift gillnets with 6-inch or less mesh, not exceeding 300-feet long and 45-meshes deep may be used (**Appendix Figure B-5**). The closures do not affect the Chinook Salmon harvest opportunity with Federal Community Harvest Permits (SA 3-KS-06-15). Except for users with a Federal Community Harvest Permit or fishing in a temporary opening, all gillnets are prohibited in the Kuskokwim River and its salmon tributaries within and adjacent to the Refuge boundary. The Kuskokwim River and its salmon tributaries are closed to the harvest of all fish except Federally qualified subsistence users using all other legal subsistence gear, which are dip net, beach seine, fish wheel, or rod and reel. However, Chinook Salmon must be immediately released.

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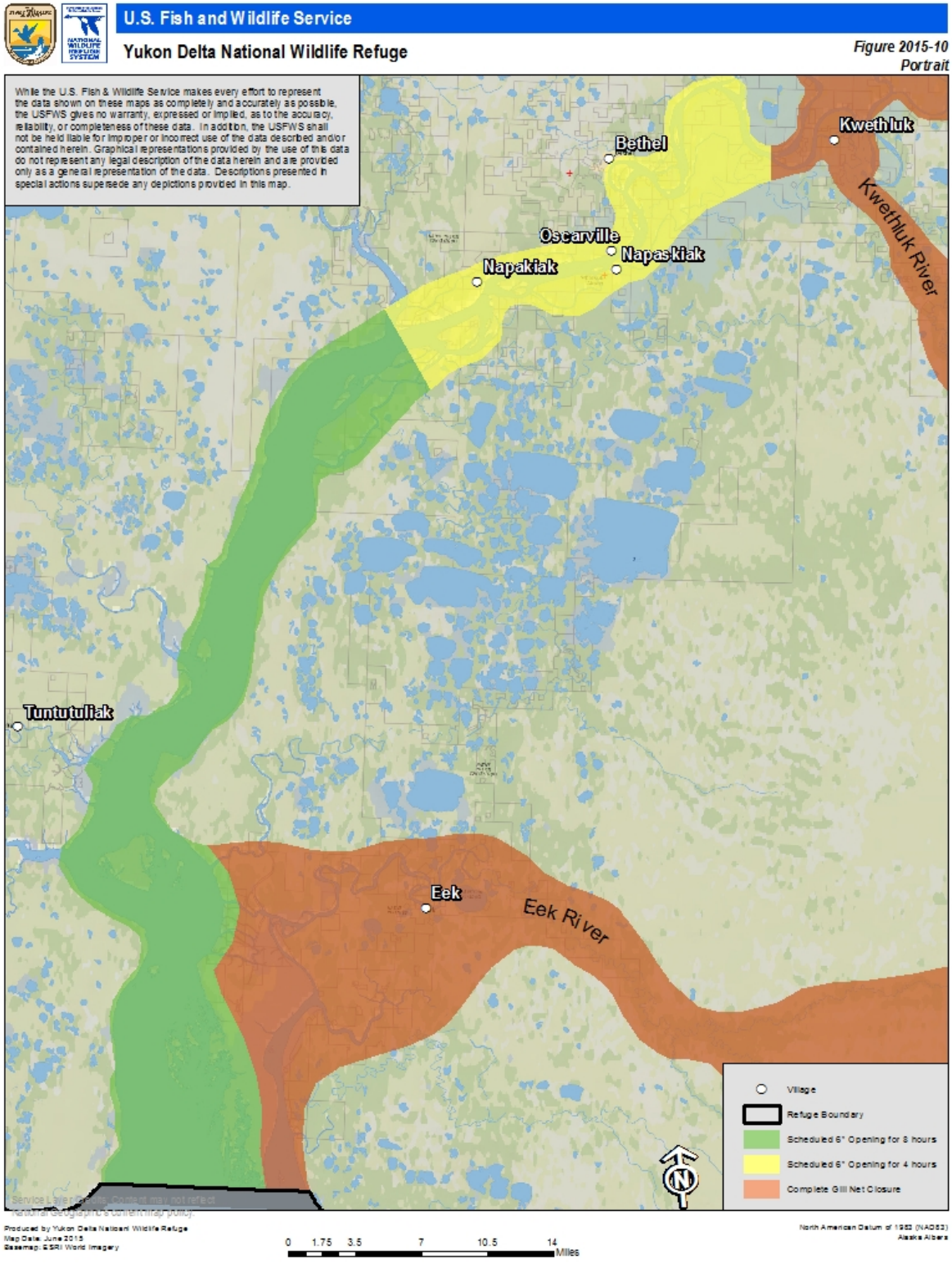

Appendix Figure B-5. Federal Special Actions SA 3-KS-10-15 (scheduled opening to 6-inch mesh nets).

Appendix Table B-3. Federal special actions, Kuskokwim River drainage, 2015 (*continued from previous page*).

2015 YUKON DELTA NATIONAL WILDLIFE REFUGE KUSKOKWIM RIVER DRAINAGE–SUBSISTENCE FISHING		
Federal Special Actions	**Effective Date**	**Action**
SA 3-KS-11-15 supersedes SA 3-KS-10-15	June 30–July 20, 2015	The Kuskokwim River and its salmon tributaries within and adjacent to the Refuge boundary are closed to the harvest of **all fish** except by Federally qualified subsistence users The Kuskokwim River and its salmon tributaries within and adjacent to the Refuge boundary are closed to the harvest of **Chinook Salmon** except: The Kuskokwim River below the mouth of the Johnson River is open to the harvest of all fish by Federally qualified subsistence users Tuesday June 30, 2:00 pm–6:00 pm. The Kuskokwim River between the Johnson River and the Aniak River are open to the harvest of all fish by Federally qualified subsistence users Tuesday June 30, 6:00 pm–6:00 pm. Only drift gillnets with 6-inch or less mesh, not exceeding 300-feet long and 45-meshes deep may be used. Except for users with a Federal Community Harvest Permit or fishing in a temporary opening, all gillnets are prohibited in the Kuskokwim River and its salmon tributaries within and adjacent to the Refuge boundary. The Kuskokwim River and its salmon tributaries are closed to the harvest of all fish except Federally qualified subsistence users using all other legal subsistence gear, which are dip net, beach seine, fish wheel, or rod and reel. However, Chinook Salmon must be immediately released.
SA 3-KS-12-15	July 2, 2015	For the Kuskokwim Fishery Management Area, Federal subsistence fishing schedules, openings, closings, and fishing methods are the same as those issued for the subsistence taking of fish under Alaska Statutes.

Appendix Table B-4. State emergency orders, Kuskokwim River drainage, 2015

2015 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Actions**
EO 3-KS-01-15	April 1–July 25, 2015	The Kuskokwim River drainage and Kuskokwim Bay tributaries are closed to sport fishing for **Chinook Salmon** Wednesday, April 1 through Saturday, July 25, 2015. All Chinook Salmon caught while fishing for other species may not be removed from the water and must be released immediately. In addition, anglers may use only one unbaited, single-hook, artificial lure in the entire Kuskokwim-Goodnews Area.
EO 3-S-WR-01-15	June 4, 2015, until further notice	From the Aniak River upriver to the Holitna River fishing for **salmon** is closed. Fishing for nonsalmon species with gillnets is restricted to 4-inch or less mesh size not exceeding 60-feet long and 45-meshes deep, setnets only: 6:00 a.m. Thursday, June 4 until 6:00 a.m. Sunday, June 7; 6:00 a.m. Thursday, June 11 until 6:00 a.m. Sunday, June 14; 6:00 a.m. Thursday, June 18 until 6:00 a.m. Sunday, June 21; 6:00 a.m. Thursday, June 25 until 6:00 a.m. Sunday, June 28. Subsistence fishing with hook and line for Chinook Salmon is closed; any Chinook Salmon caught must be returned alive to the water. Subsistence fishing with dip nets is allowed; any Chinook Salmon caught in a dip net must be returned immediately to the water alive. Subsistence fishing with fish wheels is allowed; fish wheels are required to have a live box with no less than 45 cubic feet of water and must be checked at least every 6 hours; fish wheels can be equipped with a chute and must be closely attended while in operation; any Chinook Salmon caught must be returned alive to the water.
EO 3-S-WR-02-15	June 7, 2015 until further notice	The Aniak River is closed to the use of all **gillnets**. All other legal subsistence fishing gear is allowed (beach seine, hook and line, handline, or fishwheel); any Chinook Salmon caught must be returned alive to the water.
EO 3-S-WR-03-15	May 28, 2015 until further	Marine waters near the Kuskokwim River mouth (Ishkowik River to the northern boundary of District W-4 at Weelung Creek), fishing for **salmon** is closed.

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Appendix Table B-4. State emergency orders, Kuskokwim River drainage, 2015 (*continued from previous page*).

2015 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Action**
EO 3-S-WR-04-15	June 11–July 2, 2015	From the Holitna River mouth to the headwaters of the Kuskokwim River subsistence salmon fishing is closed. Subsistence fishing for **nonsalmon fish** is restricted to the use of set gillnets with 4-inch or less mesh size not exceeding 60-feet long and 45-meshes deep: 6:00 a.m. Thursday, June 11 until 6:00 a.m. Sunday, June 14; 6:00 a.m. Thursday, June 18 until 6:00 a.m. Sunday, June 21; 6:00 a.m. Thursday, June 25 until 6:00 a.m. Sunday, June 28; 6:00 a.m. Thursday, July 2 until 6:00 a.m. Sunday, July 5. Subsistence fishing with hook and line for **Chinook Salmon** is closed; any Chinook Salmon caught must be returned alive to the water. Subsistence fishing with dip nets is allowed; any Chinook Salmon caught in a dip net must be returned immediately to the water alive. Subsistence fishing with fish wheels is allowed; fish wheels are required to have a live box with no less than 45 cubic feet of water and must be checked at least every 6 hours; fish wheels can be equipped with a chute and must be closely attended while in operation; any Chinook Salmon caught must be returned alive to the water.
EO 3-S-WR-05-15	June 20, 2015	From the Aniak River to the headwaters of the Kuskokwim River is open to subsistence **salmon** fishing with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 10-fathoms long, for Alaska residents 60 years of age or older, Saturday June 20, 2:00 p.m.–6:00 p.m. An Alaska resident 60 years of age or older must be present while fishing activities are being conducted but may be assisted by family members within the second degree of kindred. A gillnet longer than 10 fathoms may be used as long as only 10 fathoms is in a fishable condition and the remainder of the gillnet is either tied up or secured so that it is not in the water in a fishing condition.
EO 3-S-WR-06-15	June 27, 2015	From the Aniak River to the headwaters of the Kuskokwim River is open to subsistence **salmon** fishing with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 10-fathoms long, Saturday June 27, 12:00 p.m.–6:00 p.m.
EO 3-S-WR-07-15	June 27, 2015	The Kuskokwim River and its tributaries from the Holitna River to the headwaters is open to subsistence fishing with a hook and line for **Chinook Salmon**, Saturday June 27 for 24 hours,. The Chinook Salmon harvest limit for this hook and line opportunity is 5 fish.

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Appendix Table B-4. State emergency orders, Kuskokwim River drainage, 2015 (*continued from previous page*).

2015 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Action**
EO 3-S-WR-08-15	July 1, 2015	The Kuskokwim River from the Aniak River to the headwaters of the Kuskokwim River is open to subsistence **salmon** fishing with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 10-fathoms long, Wednesday, July 1, 12:00 p.m.–8:00 p.m.
EO 3-S-WR-09-15	July 1, 2015	The Kuskokwim River and its tributaries, from the Holitna River to the headwaters of the Kuskokwim River, is open to subsistence fishing with a hook and line for **Chinook Salmon**, Wednesday, July 1, 12:01 a.m.–11:59 p.m. The Chinook Salmon bag limit for this hook and line opportunity is 5 fish.
EO 3-S-WR-10-15	July 1, 2015 until further notice	Subsistence fishing on the Stony River upstream of the confluence with the Stink River is unrestricted.
EO 3-S-WR-11-15	July 2, 2015 until further notice	The Kuskokwim River drainage from the mouth of the Kuskokwim River to the Aniak River subsistence fishing for **Chinook Salmon** with hook and line is closed. Any Chinook Salmon caught must be released alive to the water. Subsistence fishing with fish wheels is allowed. Fish wheels are required to have a live box with no less than 45 cubic feet of water, must be checked at least every 6 hours. Fish wheels can be equipped with a chute and must be closely attended while in operation. All Chinook salmon must be returned alive to the water. Subsistence fishing with dip nets is closed. Subsistence fishing with **gillnets** is closed in the Kwethluk, Kasigluk, Kisaralik, Tuluksak, and Aniak river drainages and the Kuskokwim River.
EO 3-S-WR-12-15	July 4, 2015	The Kuskokwim River from the mouth of the Kuskokwim River to the mouth of the Johnson River is open to subsistence salmon fishing with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 50-fathoms long, Saturday, July 4, 12:00 p.m.–8:00 p.m. From the Johnson River to Tuluksak with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 25-fathoms long, Saturday, July 4, 4:00 p.m.–8:00 p.m. From the Tuluksak to the Holitna River with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 25-fathoms long, Saturday, July 4, 12:00 p.m.–8:00 p.m.
EO 3-S-WR-13-15	July 4, 2015 until further notice	The Kuskokwim River and its tributaries from the Holitna River to the headwaters of the Kuskokwim River is open to subsistence fishing with a hook and line for Chinook Salmon. The Chinook Salmon limit for this hook and line opportunity will be 3 fish per day, 6 in possession.

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Appendix Table B-4. State emergency orders, Kuskokwim River drainage, 2015 (*continued from previous page*).

2015 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Action**
EO 3-S-CS-01-15	July 6–August 31, 2015	The Kuskokwim River drainage is closed to sport fishing for Chum Salmon. Only unbaited, single-hook, artificial lures may be used in the Kuskokwim-Goodnews Area. All Chum Salmon caught unintentionally while fishing for other species may not be removed from the water and must be released immediately.
EO 3-S-CS-02-15 supersedes EO 3-S-CS-01-15	July 10–Aug. 31, 2015	The Kuskokwim River drainage (**excluding Kuskokwim Bay**) is closed to sport fishing for Chum Salmon. Only unbaited, single-hook, artificial lures may be used in the Kuskokwim-Goodnews Area. All Chum Salmon caught unintentionally while fishing for other species may not be removed from the water and must be released immediately.
EO 3-S-WR-14-15	July 8, 2015	The Kuskokwim River from the mouth of the Kuskokwim River to the mouth of the Johnson River is open to subsistence salmon fishing with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 50-fathoms long, Wednesday, July 8, 9:00 a.m.–9:00 p.m. From the Johnson River to Tuluksak with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 50-fathoms long, Wednesday, July 8, 5:00 p.m.–9:00 p.m. From Tuluksak to the headwaters of the Kuskokwim River with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 50-fathoms long, Wednesday, July 8, 9:00 a.m.–9:00 p.m. The waters of the Kuskokwim River from Aniak downstream to a line formed between two points lat 61° 35.076' N, long 159° 32.527' W and lat 61° 35.263' N, long 159° 32.088' W is closed to subsistence fishing with gillnets Wednesday, July 8, 9:00 a.m.–9:00 p.m. (**Appendix Figure B-6**).
EO 3-S-WR-15-15	July 8, 2015 until further notice	Subsistence fishing in the Stony River and its tributaries is unrestricted. The Chinook salmon limit for subsistence hook and line is 3 fish per day, 6 in possession.
EO 3-S-WR-16-15	July 8, 2015 until further notice	From the Holitna River to the headwaters of the Kuskokwim River (excluding the Holitna and Swift rivers), subsistence fishing is allowed with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 50-fathoms long. The use of dip nets for subsistence salmon fishing is discontinued in the Kuskokwim River drainage from the Holitna River to the headwaters of the Kuskokwim River. The use of a live box or chute is not required while operating a fish wheel from the Holitna River to the headwaters of the Kuskokwim River.

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Appendix Figure B-6. State of Alaska Emergency Order EO 3-S-WR-14-15 (closed area in front of Aniak).

Appendix Table B-4. State emergency orders, Kuskokwim River drainage, 2015 (*continued from previous page*).

2015 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Action**
EO 3-S-WR-17-15	July 11, 2015	From the Johnson River to the mouth of the Kuskokwim River subsistence salmon fishing is allowed with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 50-fathoms long Saturday, July 11, 9:00 a.m.–9:00 p.m. From the Johnson River to Tuluksak subsistence salmon fishing is allowed with 6-inch or less mesh gillnets, 45 meshes deep, and not to exceed 50-fathoms long Saturday, July 11, 10:00 a.m.–2:00 p.m. From Tuluksak to the Holitna River subsistence salmon fishing is allowed with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 50- fathoms long Saturday, July 11, 9:00 a.m.–9:00 p.m.
EO 3-S-WR-18-15	July 11, 2015	The waters of the Kuskokwim River from Aniak downstream to a line formed between two points lat 61° 35.076' N, long 159° 32.527' W and lat 61° 35.263' N, long 159° 32.088' W (**Appendix Figure B-6**) is closed to subsistence fishing with gillnets Saturday, July 11, 9:00 a.m.–9:00 p.m.
EO 3-S-WR-19-15	July 11, 2015 until further notice	The use of dip nets for subsistence salmon fishing is discontinued in the Kuskokwim River drainage from Aniak to the Holitna River.
EO 3-S-WR-20-15	July 13 and 15, 2015	From the Johnson River to the mouth of the Kuskokwim River subsistence salmon fishing is allowed with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 50-fathoms long Monday, July 13, 9:00 a.m.–9:00 p.m., and Wednesday, July 15, 2015, 9:00 a.m.–9:00 p.m. From the Johnson River to Tuluksak subsistence salmon fishing is allowed with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 50-fathoms long, Monday, July 13, 1:00 p.m.–7:00 p.m., and Wednesday, July 15, 3:00 p.m.–9:00 p.m. From Tuluksak to the Holitna River subsistence salmon fishing is allowed with 6-inch or less mesh gillnets, 45-meshes deep, and not to exceed 50-fathoms long, Monday, July 13, 9:00 a.m.–9:00 p.m., and Wednesday, July 15, 9:00 a.m.–9:00 p.m.
EO 3-S-WR-21-15	July 13 and 15, 2015	The waters of the Kuskokwim River from Aniak downstream to a line formed between two points lat 61° 35.076' N, long 159° 32.527' W and lat 61° 35.263' N, long 159° 32.088'W (**Appendix Figure B-6**) is closed to subsistence fishing with gillnets Monday, July 13, 9:00 a.m.–9:00 p.m., and Wednesday, July 15, 9:00 a.m.–9:00 p.m.

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Appendix Table B-4. State emergency orders, Kuskokwim River drainage, 2015 (*continued from previous page*).

2015 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Action**
EO 3-S-WR-22-15	July 13, 2015 until further notice	Marine waters near the Kuskokwim River mouth (Ishkowik River to the northern boundary of District W-4 at Weelung Creek) are open to subsistence fishing.
EO 3-S-WR-23-15	July 15, 2015 until further notice	Subsistence salmon fishing with gillnets is allowed in the Kuskokwim River from the mouth of the Kuskokwim River to the Holitna River, with 6-inch or less mesh gillnets.
EO 3-S-WR-24-15	July 15, 2015 until further notice	The use of a live box or chute is not required while operating a fish wheel from the mouth of the Kuskokwim River to the Holitna River.
EO 3-S-WR-25-15	July 15, 2015 until further notice	The waters of the Kuskokwim River from Aniak downstream to a line formed between two points lat 61° 35.076' N, long 159° 32.527' W and lat 61° 35.263' N, long 159° 32.088' W (**Appendix Figure B-6**) is closed to subsistence fishing with gillnets.
EO 3-S-WR-26-15	August 4, 2015	The following restrictions to the Kuskokwim River subsistence salmon fishery are rescinded: gillnet use in the Kwethluk, Kasigluk, Kisaralik, Tuluksak, and Aniak rivers (EO 3-S-WR-11-15); 6-inch or less mesh requirements for subsistence gillnets (EO 3-S-WR-16-15; EO 3-S-WR-23-15; EO 3-S-WR-25-15); closed waters at the mouth of the Aniak (EO 3-S-WR-25-15); and restrictions to hook and line bag and possession limits for Chinook salmon (EO 3-S-WR-01-15, 3-S-WR-02-15, EO 3-S-WR-11-15).

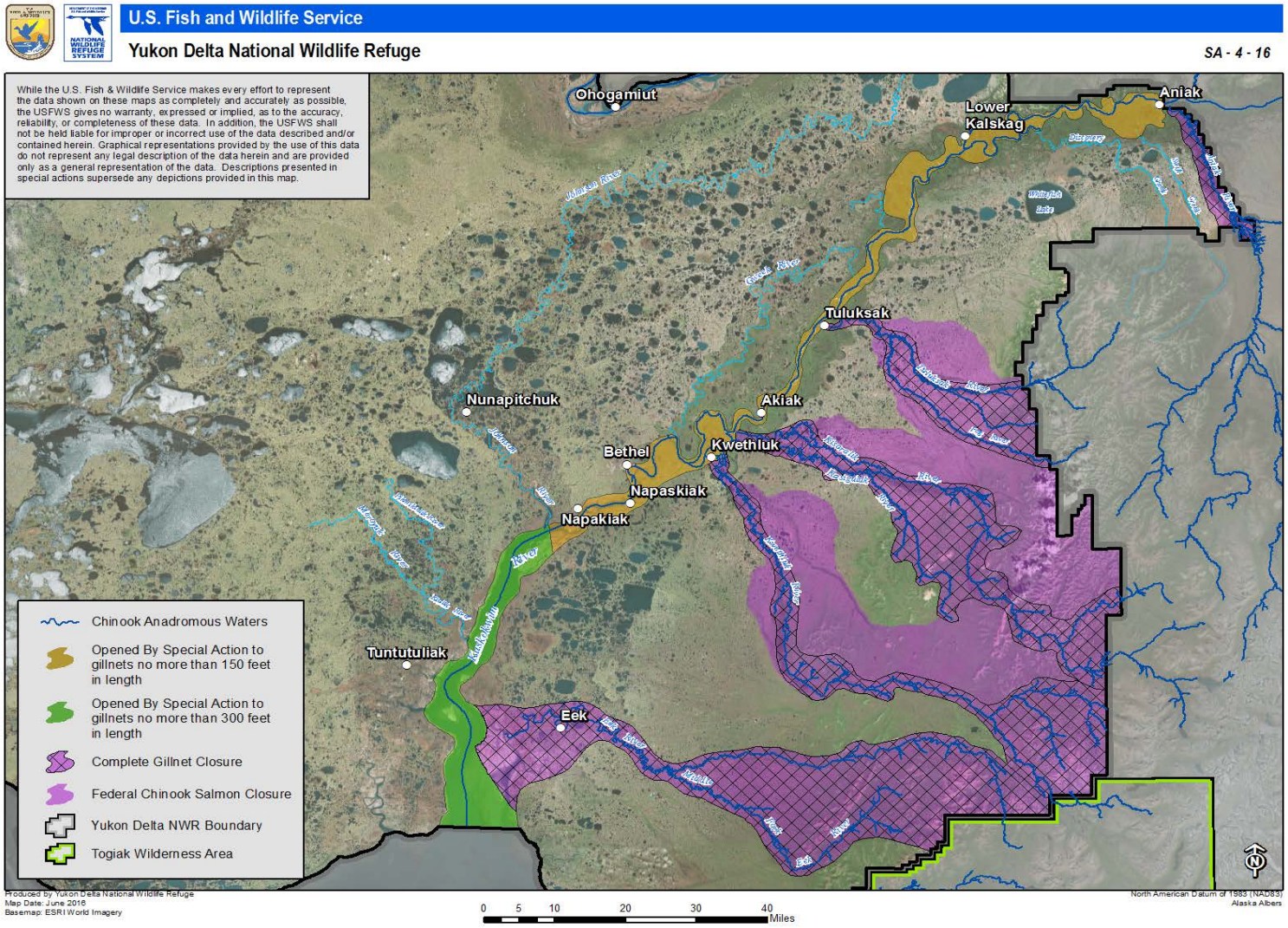
Appendix Table B-5. Federal special actions, Kuskokwim River drainage, 2016.

2016 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
Federal Special Actions	**Effective Date**	**Action**
SA 3-KS-01-16	June 1, 2016- June 12, 2016	All waters within and adjacent to the Refuge boundary are closed to the harvest of **Chinook and Chum Salmon** except by Federally qualified subsistence users that are residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek.
SA 3-KS-01a-16	June 3, 2016-July 7, 2016	Federal waters of the Kuskokwim River are closed to the harvest of **Chinook and Chum Salmon** by Federally qualified users. Fishing openings, closings, and fishing methods for Federally qualified subsistence users will be announced by subsequent Federal Special Actions.
SA 3-KS-02-16	June 12, 2016	Federal public waters of the Kuskokwim River drainage are open to the harvest of **Chinook and Chum Salmon** by Federally qualified subsistence users that are residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek. Legal gear includes drift and set gillnets restricted to 6-inch or less mesh size, not exceeding 45-meshes deep, 300-feet long from the Refuge boundary at the mouth of the Kuskokwim to the Johnson River, and 150-feet long from the Johnson River to the Refuge boundary at Aniak. Harvest allowed for 12 hours only from June 12, 2016 from 12:01 pm (noon) until 11:59 pm (midnight).
SA 3-KS-03-16	June 12, 2016-July 7, 2016	The use of gillnets for fishing on the Eek, Kwethluk, Kasigluk, Kisaralik, Tuluksak, and Aniak Rivers as well as their salmon tributaries are closed within the boundaries of the Refuge (**Appendix Figure B-7**).
SA 3-KS-04-16	June 16, 2016- June 17, 2016	Federal public waters of the Kuskokwim River drainage are open to the harvest of **Chinook and chum salmon** by Federally qualified subsistence users that are residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek. Legal gear includes drift and set gillnets, hook and line, fish wheels, dip nets, beach seines and all other gear types identified in Federal subsistence regulations. Gillnets restricted to 6-inch or less mesh size, not exceeding 45-meshes deep, 300-feet long from the Refuge boundary at the mouth of the Kuskokwim to the Johnson River, and 150-feet long from the Johnson River to the Refuge boundary at Aniak (**Appendix Figure B-7**). Harvest allowed for 24 hours only from June 16, 2016 from 12:01 pm (noon) until June 17, 2016 at 11:59 am (noon).

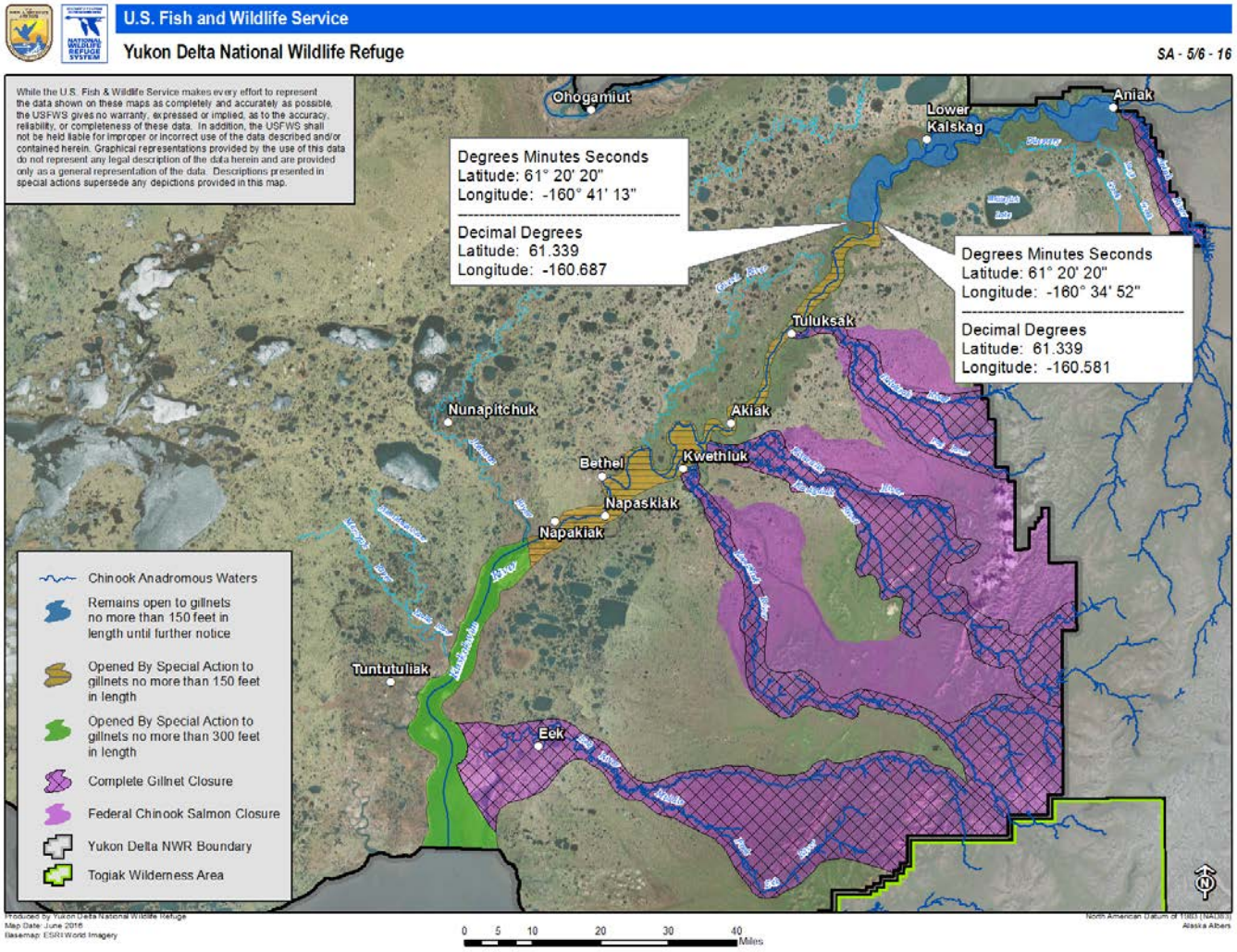
Continued on next page.

Appendix Table B-5. Federal special actions, Kuskokwim River drainage, 2016 (*continued from previous page*.)

2016 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
Federal Special Actions	**Effective Date**	**Action**
SA 3-KS-05-16	June 21, 2016-July 7, 2016	Federal public waters of the Kuskokwim River from a line downstream of Kalskag at the south edge of Uknavik Slough and then due east to the edge of the bluff line to the Refuge boundary at Aniak (**Appendix Figure B-8**) are open to harvest of **Chinook and chum salmon** by Federally qualified subsistence users that are residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek until further notice. Legal gear includes drift and set gillnets, hook and line, fish wheels, dip nets, beach seines and all other gear types identified in Federal subsistence regulations. Gillnets restricted to 6-inch or less mesh size, not exceeding 45-meshes deep, and 150-feet long
SA 3-KS-06-16	June 21, 2016-June 24, 2016	Federal public waters of the Kuskokwim River drainage are open to the harvest of **Chinook and chum salmon** by Federally qualified subsistence users that are residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek. Legal gear includes drift and set gillnets, hook and line, fish wheels, dip nets, beach seines and all other gear types identified in Federal subsistence regulations. Gillnets restricted to 6-inch or less mesh size, not exceeding 45-meshes deep, 300-feet long from the Refuge boundary at the mouth of the Kuskokwim to the Johnson River, and 150-feet long from the Johnson River to the Refuge boundary at Aniak (**Appendix Figure B-8**). Harvest allowed for 72 hours only from June 21, 2016 from 12:01 pm (noon) until June 24, 2016 at 11:59 am (noon).
SA 3-KS-07-16	June 29, 2016-July 2, 2016	Federal public waters of the Kuskokwim River drainage are open to the harvest of **Chinook and chum salmon** by Federally qualified subsistence users that are residents of the Kuskokwim drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek. Legal gear includes drift and set gillnets, hook and line, fish wheels, dip nets, beach seines and all other gear types identified in Federal subsistence regulations. Gillnets restricted to 6-inch or less mesh size, not exceeding 45-meshes deep, 300-feet long from the Refuge boundary at the mouth of the Kuskokwim to the Johnson River, and 150-feet long from the Johnson River to the Refuge boundary at Aniak (**Appendix Figure B-8**). Harvest allowed for 72 hours only from June 29, 2016 from 12:01 pm (noon) until July 2, 2016 at 11:59 am (noon).
SA 3-KS-08-16	July 7, 2016-present	For the Kuskokwim River drainage, all previously issued special actions were rescinded.



Appendix Figure B-7. Federal Special Actions SA 3-KS-04-16, temporary harvest of Chinook and Chum salmon by Federally qualified subsistence users and SA-3-KS-03-16, temporary closure of rivers in Refuge boundary.



Appendix Figure B-8. Federal Special Actions SA 3-KS-05-16, SA 3-KS-06-16, and SA 3-KS-07-16, temporary harvest of Chinook and Chum salmon by Federally qualified subsistence users.

Appendix Table B-6. State emergency orders, Kuskokwim River drainage, 2016.

2016 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Actions**
EO 3-KS-01-16	May 1, 2016- July 25, 2016	The Kuskokwim River drainage and tributaries are closed to sport fishing for **Chinook Salmon** Sunday May 1, 2016 through Monday July 25, 2016. All Chinook Salmon caught while fishing for other species may not be removed from the water and must be released immediately. In addition, anglers may use only one unbaited, single-hook, artificial lure in the entire Kuskokwim Area.
EO 3-S-WR-01-16	May 20, 2016-June 12, 2016; June 1, 2016-June 12, 2016	On May 20, subsistence fishing with gillnets is closed in the Kuskokwim River drainage from the Yukon Delta National Wildlife Refuge boundary at the mouth of the Kuskokwim River to the ADF&G markers downstream of the Holitna River mouth until further notice. Subsistence fishing with hook and line for **Chinook salmon** is closed in this area to further notice. Subsistence fishing with fish wheels, dip nets, and beach seines are allowed in this area until further notice, but all **Chinook salmon** caught must be immediately be released alive. Subsistence fishing with gillnets is closed beginning on June 1 in the Kuskokwim River upstream from the ADF&G markers near the Holitna River mouth to the headwaters of the Kuskokwim River, the Kwethluk River drainage including its confluence with Kuskokuak Slough and downstream to ADF&G regulatory markers located at the downstream mouth of the slough, the Kasigluk and Kisaralik river drainages including Old Kuskokuak Slough to ADF&G regulatory markers at the confluence of Old Kuskokuak Slough with Kuskokuak Slough, the Tuluksak River drainage including its confluence with the Kuskokwim River and downstream approximately one mile to ADF&G regulatory markers, and the Aniak River drainage to ADF&G regulatory markers at its confluence with the Kuskokwim River until further notice. Beginning on June 1, Subsistence fishing with hook and line for Chinook salmon is closed to further notice on the Kuskokwim River above the ADF&G markers downstream of the Holitna River mouth until further notice. Subsistence fishing with fish wheels, dip nets, and beach seines are allowed in this area until further notice, but all Chinook salmon caught must be immediately be released alive.

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Appendix Table B-6. State emergency orders, Kuskokwim River drainage, 2016 (*continued from previous page*).

2016 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Actions**
EO 3-S-WR-02-16, EO 3-S-WR-03-16	June 12, 2016-June 14, 2016; June 12, 2016 until further notice	The area from the YDNWR border at Aniak to the mouth of the Holitna River (not including the Aniak River) is open to subsistence fishing with 6-inch or less mesh, 25-fathoms (150 ft.) long or less gillnets for 48 hours from June 12, 12:00 pm (noon)-June 14, 12:00 pm (noon). The area from the mouth of the Holitna River to the Kuskokwim River headwaters is open to subsistence fishing with 6-inch or less mesh gillnets from June 12, 2016 at 12:00 pm (noon) until further notice. Subsistence fishing is also allowed with beach seines, dip nets, and hook and line from the YDNWR boundary at Aniak to the Kuskokwim River headwaters from June 12, 2016 at 12:00 pm (noon) until further notice.
EO 3-S-WR-04-16	June 16, 2016 until further notice	The area from the YDNWR border at Aniak to the headwaters of the Kuskokwim River (not including the Aniak River) is open to subsistence fishing with 6-inch or less mesh from 12:00 pm (noon) June 16, 2016 until further notice.
EO 3-S-WR-5-16	July 7, 2016 until further notice	Subsistence fishing is allowed for qualified Alaska residents from the YDNWR boundary at the mouth of the Kuskokwim River to the headwaters of the Kuskokwim River until further notice. Gillnets must be 6-inch or less mesh. Subsistence fishing with gillnets is closed in the following areas: • The Kwethluk River drainage including its confluence with Kuskokuak Slough and downstream to ADF&G regulatory markers located at the downstream mouth of the slough. • The Kasigluk and Kisaralik river drainages including Old Kuskokuak Slough to ADF&G regulatory markers at the confluence of Old Kuskokuak Slough with Kuskokuak Slough. • The Tuluksak River drainage including its confluence with the Kuskokwim River and downstream approximately one mile to ADF&G regulatory markers. • The Aniak River drainage to ADF&G regulatory markers at its confluence with the Kuskokwim River. • The Eek River. • The waters of the Kuskokwim River from the Yukon Delta NWR boundary at Aniak downstream to a line formed between two points lat 61° 35.076' N, long 159° 32.527' W and lat 61° 35.263' N, long 159° 32.088' W (Figure 3).

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Appendix Table B-6. State emergency orders, Kuskokwim River drainage, 2016 (*continued from previous page*).

2016 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Actions**
EO 3-S-WR-6-16	July 27, 2016-Until further notice	Effective 9:00 a.m. Wednesday, July 27, 2016, the following restrictions to the Kuskokwim River subsistence salmon fishery are rescinded: • Gillnet use in the Kwethluk, Kasigluk, Kisaralik, Tuluksak, Aniak and Eek Rivers; • 6-inch or less mesh requirements for subsistence gillnets; and • The closed waters at the mouth of the Aniak River.
EO 3-S-WR-7-16	July 29, 2016	Subdistrict 1-A will open to commercial **salmon** fishing for 6 hours from 2:00 p.m. until 8:00 p.m. Friday, July 29, 2016. This area is defined as that portion of District 1 upstream of regulatory markers located at Bethel to ADF&G regulatory markers at the mouth of Bogus Creek. As there are no commercial salmon processors registered in the Kuskokwim Management Area, this opportunity is being provided for those individuals registered with the department as catcher/sellers.
EO 3-S-WR-8-16	August 12, 2016	Subdistrict 1-A will open to commercial **salmon** fishing for 6 hours from 2:00 p.m. until 8:00 p.m. Friday, August 12, 2016. This area is defined as that portion of District 1 upstream of regulatory markers located at Bethel to ADF&G regulatory markers at the mouth of Bogus Creek. As there are no commercial **salmon** processors registered in the Kuskokwim Management Area, this opportunity is being provided for those individuals registered with ADF&G as catcher/sellers.

APPENDIX C

MOMORANDUM OF UNDERSTANDING BETWEEN THE U.S. FISH AND WILDLIFE SERVICE AND THE KUSKOKWIM RIVER INTER-TRIBAL FISH COMMISSION

MEMORANDUM OF
UNDERSTANDING BETWEEN
UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE ALASKA REGION

AND

KUSKOKWIM RIVER INTER-TRIBAL FISH COMMISSION

This Memorandum of Understanding (MOU) is entered into in order to formalize the fishery management partnership between the United States Department of the Interior (Department), U.S Fish and Wildlife Service (Service) and the Kuskokwim River Inter-Tribal Fish Commission (hereinafter referred to as "Commission").

ARTICLE I – BACKGROUND AND OBJECTIVES

In his address to the Alaska Federation of Natives Convention in October 2014, and to the National Congress of American Indians in February 2015, Deputy Secretary Mike Connor announced plans to develop a meaningful Partnership Project that could be implemented administratively, with the goal of more meaningfully integrating Kuskokwim Tribes and Federally qualified users into Federal fisheries management on the Kuskokwim River drainage. Development of this MOU is one component of the Kuskokwim River Partnership Project. It formalizes a management partnership that begins to address the long-standing desire of Alaska Native Tribes in the Kuskokwim Drainage to engage as co-managers of fish resources.

The Association of Village Council Presidents (AVCP) and Tanana Chiefs Conference (TCC) are regional Tribal organizations whose membership includes all of the federally recognized tribes in the Kuskokwim drainage. The AVCP and TCC were instrumental in the establishment of the Commission and in the development of this MOU. Both AVCP and TCC have adopted resolutions that support the Commission's participation in the Kuskokwim River Partnership Project through the signing of this MOU.

The Partnership Project sets forth a two-part structure to meaningfully integrate Kuskokwim Tribes and Federally qualified users into the decision-making process for fisheries management on Federal public waters of the Kuskokwim River drainage. The MOU represents one component of a two part structure that will implement the 2014 directive from the Deputy Secretary to establish a demonstration project for the Kuskokwim River Drainage that integrates Alaska Natives into Federal fishery management into the decision-making process. The MOU builds upon the experience and success gained from consultations between the Commission and the Yukon Delta National Wildlife Refuge Manager related to Federal in-season fishery management decisions for the 2015 season, and will provide an opportunity to advance issues that are critical to the Commission and Federally qualified users in future years. The second component of the Partnership Project is a proposal cooperatively developed by the Commission, the Office of Subsistence Management (OSM), and the Service which was submitted to the two Regional Advisory Councils (Councils) in the Kuskokwim River drainage for a subcommittee jointly chartered by the two Councils. The goals of the proposal include providing a meaningful role for the Commission in the Federal subsistence management process and developing unified recommendations for fishery management for the Kuskokwim River drainage.

The Department of the Interior and the Service also share a mutual concern with the Commission for the

conservation of fish resources and their habitats and ensuring the opportunity for the continuation of the subsistence way of life. Both are engaged in fish management strategies and programs and desire to develop and maintain a cooperative relationship which will be in the best interests of the Parties and the resource.

Additionally, the Department, Service, and Commission share the goal of meaningfully integrating the tribal governments located in Kuskokwim River drainage, through their membership and participation in the Commission, as broadly as possible, into the management of Federal public waters in the Kuskokwim River drainage fisheries.

The Parties share the goal of effective and timely communication of all information and consultation and collaboration for in-season fishery management actions;

ARTICLE II - AUTHORITY

The following authorities support the MOU:

- Alaska National Interest Lands Conservation Act (ANILCA) Title VIII
- Alaska Native Claims Settlement Act
- Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments"
- Secretarial Order 3317, Department of Interior Policy on Consultation with Indian Tribes (December 2011)
- Secretarial Order 3335 "Reaffirmation of the Federal Trust Responsibility to Recognized Indian Tribes and Individual Indian Beneficiaries"
- U.S. Fish and Wildlife Service Native American Policy (1994)
- Federal Subsistence Board regulations 36 CFR 242 and 50 CFR 100

The Federal Subsistence Board (Board) is vested with authority delegated by the Secretaries of the Interior and Agriculture to manage subsistence uses and resources on the Federal public lands in Alaska. The Board may delegate specific regulatory authority related to the in-season management of fish species for the Federal public waters in the Kuskokwim Area. The manager of the Yukon Delta National Wildlife Refuge (Refuge) is currently delegated this authority. The Letter of Delegation from the Board to the Refuge manager is attached as an appendix.

The Department has a government-to-government relationship and trust responsibility with the Federally recognized tribes in the Kuskokwim River Drainage and is committed to implementing programs that further tribal self-determination. The Federally recognized Kuskokwim River Tribes are the governing bodies for the tribal members who are residents of these rural communities in the Kuskokwim River Drainage. The Kuskokwim River Tribes established the Commission for the purpose of engagement in the management of Kuskokwim River fisheries.

ARTICLE III - STATEMENT OF WORK

This MOU formalizes an agreement for substantive consultation between the Federal in-season manager and the Commission prior to in-season management decisions and actions. The MOU also acknowledges the collaborative development of a proposal by the Parties for a fisheries subcommittee jointly chartered by the Western Interior and Yukon-Kuskokwim Delta Regional Advisory Councils (Councils).

THE SERVICE AGREES:

1. The Federal in-season manager will consult with the Commission for the purpose of collaboratively making fisheries management decisions with the integration and application of Commission knowledge, information, and management strategies.

2. All relevant data and information will be provided by the Service to the Commission at the earliest practicable time before consultation.

3. The Federal in-season manager will serve as the primary point of contact for the agency.

4. To engage the Commission as partners in the development and implementation of fishery management projects for the Kuskokwim River drainage, such as research, monitoring, harvest surveys, subsistence studies, test fisheries, and other programs, and to enter into cooperative funding agreements with the Commission to support such capacity building to the degree funding is available from the Service or the Department.

5. To provide a timely written justification to the Commission when the Refuge manager is unable to reach consensus with the Commission regarding Kuskokwim Fisheries in-season management decisions. The justification will include an explanation of how the Commission's traditional and scientific information and position were integrated and considered in the management decision.

THE COMMISSION AGREES:

1. To maintain its status as a tribal organization with membership open to all of the Federally recognized Tribes in the Kuskokwim River drainage, that the Commission represents a significant majority Kuskokwim tribes representing all segments of the drainage, and that the Commission is authorized by its member tribes to engage in the management activities formalized through this MOU.

2. To recognize the Refuge Manager at Yukon Delta National Wildlife Refuge as the Federal in-season manager to the extent such authority has been delegated by the Board, including delegated authority to issue emergency special actions for the management of fish within the Federal public waters of the Kuskokwim River drainage. The scope of delegation set by the Board and limited by 36 CFR 242.10(d)(6) and 50 CFR 100.10(d)(6).

3. To provide all relevant data and information to the Service at the earliest practicable time before consultation, including local and traditional observations and knowledge and regional customary and traditional fishing practices.

4. To inform the Kuskokwim River Villages about in-season and other fishery management plans and actions.

5. To meaningfully engage in consultations with the Service to collaboratively manage fish in the Kuskokwim River drainage.

6. To designate an in-season consultation committee composed of the fewest number of Commissioners that can adequately represent the member tribes, understanding that the lower, middle, and upper regions of the watershed will be equitably represented.

7. To assist the Service with communication and outreach of critical biological and regulatory information to Commission members throughout the year.

THE PARTIES MUTUALLY AGREE:

1. To engage in consultation and collaboration throughout the year to coordinate planning for management actions regarding fish resources on Federal public waters of the Kuskokwim River, and to facilitate development of a unified management strategy that is informed by traditional ways of knowing and science that is biologically, environmentally and culturally sound.

2. Each party will engage in consultation and collaboration with an open mind and without committing to a special action before consultation occurs between the Parties. The Parties will notify each other, in a timely manner, of discussions with other management agencies and provide a summary of the information exchanged.

3. Both parties acknowledge the dynamics of in-season management and that in certain instances, due to the need for a timely decision, immediate consultation and collaboration may not be possible or will need to be abbreviated. Both parties will, in good faith, minimize the instances when abbreviated consultations occur and will meet soon thereafter to discuss the management action taken and modifications that may be necessary.

4. The Service and Commission will contribute to and support a Technical Advisory Body (TAB) that consists of fisheries biologists/scientists, social scientists, and traditional knowledge experts. The TAB will meet as requested by the Service or Commission, freely exchange information, and strive to cooperatively develop a unified presentation of information for consideration during negotiation, consultation and collaboration.

5. The Federal in-season manager and the Commission will negotiate for the purpose of striving to reach consensus on in-season management decisions. The parties expect that consensus will be reached for a large majority of issues. If consensus cannot be reached by negotiation, the Commission may take one or more of the actions below:

A. The Commission may request that a conference call or meeting occur with the Service Regional Director/Deputy Regional Director, the Assistant Regional Director of OSM, the Federal in-season manager, and, at the request of the Commission, the Bureau of Indian Affairs Regional Director or Deputy Regional Director, in a timely fashion to engage knowledgeable experts and key decision makers in a discussion for the purpose of achieving a mutually beneficial compromise. This strategy is consistent with the *qasgiq* model, a Yup'ik problem-solving framework, similar to a collaborative decision-making framework widely practiced among Federal agencies known as operational leadership. The Federal in-season manager maintains delegated authority. Members of the TAB may be requested to attend the meeting.

B. The Commission may submit a Special Action Request with urgency to the Board in an effort to address a concern. The Service agrees to request that the Commission's Special Action Request be addressed with urgency.

C. The Commission may submit a request to the Board to reconsider an in-season management action.

6. To support the development and establishment of a joint subcommittee appointed by the Councils. The

goal for the Subcommittee is to develop recommendations to the Councils on the initiation, review, and evaluation of proposals for regulations, policies, management plans, special actions (in-season management), and other matters or potential impacts relating to management, conservation, and subsistence users of fish in the Kuskokwim River Area, or for fisheries which have impacts on Kuskokwim River Area stocks. Fishery proposals developed by the Subcommittee and forwarded to the Board by both Councils as recommendations will be entitled to deference in accordance with Section 805 of ANILCA and Board policy.

7. If the Councils choose not to establish a Subcommittee that incorporates the substance of the Parties' proposal, the Parties will jointly develop a proposal for the Department of the Interior under the authority of ANILCA Section 805(a) or other legal authority that incorporates the objectives of the Subcommittee.

8. To send the same representatives to attend consultations. The parties may send an alternate to consultations only when necessary, recognizing this should only occur on a very limited basis.

9. To develop supplemental memoranda of understanding between the Commission and the Refuge, as may be required to implement the objectives of the Partnership Project as it develops.

10. To attend and meaningfully participate in consultations during in-season fisheries management and at other times when requested by either Party, and to promote a professional, productive, and collaborative atmosphere, while avoiding confrontational speech or behaviors.

11. To actively encourage and seek the participation of the State of Alaska fishery managers in the consultation and collaboration process.

12. To jointly develop a proposal to the Board for an abbreviated process that will, to the degree practicable, provide an opportunity for timely relief when a request is submitted to reconsider an in-season management action.

ARTICLE IV - TERMS OF AGREEMENT

1. This MOU shall become effective upon the signature of the Service and the Commission.

2. This MOU shall continue until terminated by the Service or the Commission. A party may terminate this MOU by providing sixty (60) days advance written notice to the other party. Upon notice of termination, the Parties will meet promptly to discuss the reasons for the notice and to try to resolve their differences.

3. Amendments to this MOU may be proposed by the Service or the Commission and shall become effective upon the signature of the Parties.

4. If the Board changes the delegation of authority for the Kuskokwim River Federal in-season manager, this MOU will be carried forward and amended to reflect the new delegation.

5. Any significant change in the scope of Federal public lands or tribal lands in the Kuskokwim region will require a re-evaluation and possible amendment of this MOU.

6. This MOU shall be re-evaluated by the Parties after two (2) years from the date of execution.

ARTICLE V - KEY OFFICIALS

A. Key officials are essential to ensure maximum coordination and communication between the Parties and the work being performed. They are:

For the Commission:

Mike Williams, Chair KRITFC Bethel, AK 99559
Mwilliams19522004@yahoo.com
Telephone: 907-765-2061

For the Refuge:

Refuge Manager
Yukon Delta National Wildlife Refuge
State Highway
Box 346
Bethel, Alaska 99559
Telephone: 907-543-3151
Facsimile: 907-543-4413

ARTICLE XI - SIGNATURES

IN WITNESS WHEREOF, the parties hereto have executed this MOU on the date(s) set forth below.

FOR THE KUSKOKWIM RIVER INTER-TRIBAL FISH COMMISSION:
Executive Council:

_____. Date: _____
Unit 1, Nick Petruska: Nikolai, Telida, McGrath, Takotna

_____. Date: _____
Unit 2, Tim Zaukar: Stony River, Lime Village, Sleetmute, Red Devil, Georgetown, Crooked Creek

_____. Date: _____
Unit 3, Gerald Kameroff: Napaimute, Chuathbaluk, Aniak, Upper Kalskag, Lower Kalskag

_____. Date: _____
Unit 4, James Nicori: Tuluksak, Akiak, Kwethluk, Akiachak

_____. Date: _____
Unit 5, Greg Roczicka: Bethel

_____. Date: _____
Unit 6, Golga Frederick: Oscarville, Napaskiak, Napakiak, Atmauthluak, Kasigluk, Nunapitchuk

_____. Date: _____
Unit 7, James Charles: Tuntutuliak, Eek, Kongiganak, Kwigillingok, Chefornak, Kipnuk, Quinhagak

Officers:

_____. Date: _____
Mike Williams, KRITFC Chair

_____. Date: _____
Nick Kameroff, KRITFC Vice-Chair

_____. Date: _____
Charlene Erik, KRITFC Secretary

FOR THE U.S. DEPARTMENT OF INTERIOR U.S. FISH AND WILDLIFE SERVICE:

_____. Date: _____
Geoffrey Haskett, USFWS Director - Alaska Region

_____. Date: _____
Vernon Born, Manager - Yukon Delta National Wildlife Refuge

SUPPORTING AGENCIES/ORGANIZATIONS:

_____. Date: _____
Myron Naneng, President – Association of Village Council Presidents

_____. Date: _____
Victor Joseph, President – Tanana Chiefs Conference

WITNESSES:

_____. Date: _____

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INTERAGENCY STAFF COMMITTEE RECOMMENDATION
EMERGENCY SPECIAL ACTION
FSA17-05

Support Fisheries Emergency Special Action FSA17-05 **with modification** to immediately close Refuge waters of the Kuskokwim River salmon-bearing tributaries to the harvest of Chinook Salmon by all users until August 30. This closure may be rescinded by the in-season manager before August 30 based on Chinook Salmon escapement indices.

The modified regulation should read:

> **Kuskokwim Area – Fish**
>
> *§___100.27(e)(4)(ii) For the Kuskokwim area, Federal subsistence fishing schedules, openings, closings, and fishing methods are the same as those issued for the subsistence taking of fish under Alaska Statutes (AS 16.05.060), unless superseded by a Federal Special Action.*
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> ***Unless re-opened by the Yukon Delta National Wildlife Refuge Manager, Kuskokwim River salmon-bearing tributaries that are within and adjacent to the exterior boundaries of the Yukon Delta National Wildlife Refuge, which include the Eek, Kwethluk, Kasigluk, Kisaralik, Tuluksak, and Aniak rivers, as well as the Old Kuskokuak Slough where the Kisaralik and Kasigluk drain and the Kuskokuak Slough between the lower confluence with the Kuskokwim River and the upper confluence with the Kwethluk River are closed to the harvest of Chinook Salmon until August 30. This Special Action may be rescinded by the in-season manager based on in-season escapement indices.***

Justification

Despite early forecasts of a Chinook Salmon run size within the escapement goal range, the 2017 run may not meet the lower bound of the escapement goal (65,000 fish) and may be one of the lowest runs on record. Previous in-season Federal management actions, completed in consultation with the Kuskokwim River Inter Tribal Fish Commission (KRITFC), Regional Advisory Council representatives and the State of Alaska, have focused on conserving Chinook Salmon throughout the entire Kuskokwim drainage. Currently, the ratio of Chum and Sockeye Salmon to Chinook Salmon is consistently high (>30:1 over the past 15 days, and sometimes exceeding 100:1) in the mainstem of the Kuskokwim River at the Bethel Test Fishery, and the majority of the Chinook Salmon run has now passed Bethel. It is estimated that 97% of the run is complete based on historical average run timing. Subsequently, Chinook Salmon conservation should now focus on protection of the species within specific tributaries where Chinook Salmon are now staging, migrating, or already on their spawning grounds.

The closure to the harvest of Chinook Salmon by all users in salmon bearing tributaries in Federal public waters is needed to assure the continued viability of Kuskokwim River Chinook Salmon consistent with ANILCA §816. The 75th percentile of Chinook Salmon passage at the Kwethluk River weir has been as

late as July 20, and average stream residency post-weir passage is approximately four weeks, suggesting that the majority of spawning will take place by the end of August. Based on this historic spawning data, August 30 was subsequently identified as a potential date when the Chinook Salmon closure could end. This date may be adjusted based on the continual evaluation of in-season biological data and input from the KRITFC, Regional Advisory Council representatives, the State of Alaska, and the Kuskokwim River Salmon Management Working Group.

Tributaries closed to harvest of Chinook Salmon will remain open to the take of other salmon species by all users by means other than gillnet. Gillnet use is currently prohibited by State regulations in the salmon bearing tributaries identified in this recommendation. This will allow for the harvest of other species using selective gear types while also protecting the Chinook Salmon stocks. Current gillnet gear restrictions for all users (use of nets with 6 inch or less mesh size) on the main stem of the Kuskokwim River minimize Chinook Salmon harvest while allowing for subsistence harvest of other salmon species that are currently more abundant and not of conservation concern. Coho Salmon have yet to enter the Kuskokwim River system and should not be pre-maturely regulated until biological information is available to evaluate their status, as pre-season abundance estimates are not generated.