STAFF ANALYSIS
FSA20-01/02/03

ISSUES

Temporary Fishery Special Action Request FSA20-01, submitted by the Akiak Native Community, requests that the Federal Subsistence Board (Board) take the following actions:

- Close Federal public waters of the Kuskokwim River drainage to the harvest of Chinook Salmon except by Federally qualified subsistence users possessing a community harvest permit between June 1, 2020 and July 1, 2020;

- Reduce the pool of eligible harvesters based on an Alaska National Interest Lands Conservation Act (ANILCA) Section 804 Subsistence User Prioritization that was implemented in 2017; and

- Consult with 33 communities named in the 2014 Office of Subsistence Management Section 804 Subsistence User Prioritization analysis to establish an appropriate harvest allocation of Chinook Salmon to be distributed among communities within the Kuskokwim River drainage.

Temporary Special Action Request FSA20-02, submitted by the Organized Village of Kwethluk, requests the following from the Board:

- Close Federal public waters of the Kuskokwim River drainage to the harvest of Chinook Salmon except by Federally qualified subsistence users between June 1, 2020 and July 1, 2020; and

- Reduce the pool of eligible harvesters within the Kuskokwim River drainage based on an ANILCA Section 804 Subsistence User Prioritization analysis.

Temporary Special Action Request FSA20-03, submitted by Lamont Albertson, requests the following from the Board:

- Close Federal public waters of the Kuskokwim River drainage to the harvest of Chinook Salmon except by Federally qualified subsistence users at the beginning of the 2020 Kuskokwim Chinook Salmon run;

- Conduct an ANILCA Section 804 Subsistence User Prioritization analysis to reduce the pool of eligible harvesters; and

- Request that the Federal in-season manager continue to implement emergency special actions that uphold the conservation mandates under Section 815(1) and (3) of ANILCA by following the model from 2019, where the Federal in-season manager worked with the Kuskokwim River Intertribal Fish Commission, the Alaska Department of Fish and Game, and other stakeholders to determine when harvest opportunities should be provided.

DISCUSSION

The applicable Federal regulations are found in 50 CFR 100.19(b) and 36 CFR 242.19 (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.*

FSA20-01

The proponent states that Chinook Salmon subsistence harvest within the Kuskokwim River drainage has declined precipitously within the past decade. The last time an Amount Necessary for Subsistence was achieved for Chinook Salmon was in 2009. The harvest outlook for Chinook Salmon for 2020 should trigger the responsibility of the Board to restrict the taking of Chinook Salmon for subsistence uses on public lands of Alaska per the responsibilities specified in Section 802 of ANILCA. Failing to first restrict Chinook Salmon harvest to Federally qualified subsistence users forgoes the Board's additional responsibility to restrict within subsistence users when necessary (ANILCA Section 804).

The proponent request that the Board take action to manage the waters within the Yukon Delta National Wildlife Refuge for subsistence harvest of Chinook Salmon in order to fulfill the duties and responsibilities set forth in ANILCA.

The proponent believes an allocation model similar to the one employed in 2015 will work to ensure the viability of Chinook Salmon populations as well as continued opportunities for Federally qualified subsistence uses of Chinook Salmon. Allocation of Chinook Salmon harvest to Federally qualified subsistence users beginning June 1, 2020, will not preclude meeting Chinook Salmon escapement goals within the Kuskokwim River drainage. Additionally, allocation will ensure the continued opportunity for subsistence uses by Alaska Natives, which includes subsistence uses of Chinook Salmon. As Congress recognizes, subsistence is “essential to Native physical, economic, traditional, and cultural existence'” (ANILCA Section 801(1)).

FSA20-02

The proponent states that Chinook Salmon subsistence harvest within the Kuskokwim River drainage has declined precipitously within the past decade. The last time an Amount Necessary for Subsistence was achieved for Chinook Salmon on the Kuskokwim River was in 2009. The harvest outlook for Chinook Salmon for 2020 should trigger the responsibility of the Board to restrict the taking of Chinook Salmon for subsistence uses on public lands of Alaska per the responsibilities specified in Section 802 of ANILCA. Failing to first restrict Chinook Salmon harvest to Federally qualified subsistence users forgoes

the Board's additional responsibility to restrict within subsistence users when necessary (ANILCA Section 804).

The proponent requests that the Board take action to manage the waters within the Yukon Delta National Wildlife Refuge for subsistence harvest of Chinook Salmon and other salmon species, in order to fulfill the duties and responsibilities set forth in ANILCA. Such action will also uphold the Board to give priority preference to Federally qualified subsistence users by allowing fishing period openers of at least four total 12-hour openers once per week in June using 6 inch or less mesh-size drift or set nets with gear length restrictions in consultations with tribes.

The proponent states that it is the Organized Village of Kwethluk's opinion that the U.S. Fish and Wildlife Service is capable of co-managing the entire Kuskokwim River subsistence fishery. Allowing harvest of Chinook and other salmon species by Federally qualified subsistence users between June l and July l, 2020, will not preclude meeting Chinook Salmon escapement goals within the Kuskokwim River drainage. Additionally, it will ensure the continued opportunity for subsistence uses by Alaska Natives, which includes subsistence uses of Chinook and other salmon species. As Congress recognizes, subsistence is “essential to Native physical, economic, traditional, and cultural existence” (ANILCA Section 80I(1)).

FSA20-03

The proponent states that based on new information regarding a set of risk factors, including critical sources of uncertainty and the decade-long decline presented below, that there is a lack of justifiable evidence to support a pre-season decision that the 2020 run of Kuskokwim Chinook Salmon will be, or is highly likely to be, sufficient to support the harvest demands of all user groups authorized by the State on Federal public lands and waters without endangering the health of these populations. The burden of proof rests not on Federally qualified rural residents, but rather on the Federal Subsistence Management Program to provide assurances that Federal direct or delegated management actions under Title III and VIII of ANILCA, or decisions to not take action:

1) Are evidenced-based and informed by sound science and transparent, independent analysis; and
2) Are precautionary in that, when a given action is associated with a high degree of uncertainty or poses risk to the viability of the population of Chinook Salmon or priority subsistence uses, priority should be given to conserving the viability of the population and the continuation of subsistence uses which do not jeopardize that population of Chinook Salmon.

The proponent states that Kuskokwim Chinook Salmon populations have suffered a multi-year period of very low productivity and abundance. Alaska Board of Fisheries current Amounts Necessary for Subsistence (ANS) determination for this fishery is 67,200–109,800. Subsistence harvests of Kuskokwim River Chinook Salmon have fallen below the lower limit of the ANS range since 2011, representing an 8-year trend in harvest demonstrating that reasonable opportunities for subsistence uses have not been provided due to lower salmon returns and restricting fishing opportunities for conservation purposes. The 2019 run, the first significant increase in a decade, remains a single year outlier until additional years of total run data suggest otherwise.

The proponent further states that of the four risk factors listed below, the first three risk factors all function as drivers of decline, negatively impacting the abundance and/or productivity of the stocks. This makes it critical that the staff analysis include assessment of the cumulative effects among these multiple risk factors. The first two risk factors below can be assessed quantitatively but are not accounted for in the current management reference points being used by the Federal or State managers (spawner/recruit analysis informing the current escapement goal range). The fourth risk factor - uncertainty - can be a driver of decline when it fuels risk-prone management actions.

1. Risks to stock diversity from high harvest rates are not currently accounted for: The mandate for protecting population diversity is found in Title III of ANILCA and in the Alaska Board of Fisheries, Sustainable Salmon Policy. A new paper by Connors et al (2019) identifies several Kuskokwim Chinook Salmon sub-stocks that are currently less productive and therefore at risk of unintentional overharvest under higher exploitation rates within the mainstem mixed-stock fishery.
2. Significant decline in body size and caloric value of Chinook Salmon is not currently accounted for: The observed decline in the body size and the reduced proportion of female Kuskokwim River Chinook Salmon across the time series results in: 1) a decline in both the number and average size of spawned eggs; 2) the reduced caloric value of the smaller size of subsistence salmon harvested in recent years requires additional Chinook Salmon to provide the same caloric value from thirty years ago. Two different teams of scientists who are currently analyzing trends and implications of declining salmon will have results relevant to this special action request in spring 2020.
3. Impacts of climate driven heat stress on migrating salmon: During recent years heat events and freshwater temperatures have significantly exceeded species thresholds (above 18 degree C/ 65 degree F). This is known to cause heat stress and mortality of migrating salmon with the potential to cause fish to die before spawning, or to die with eggs retained, which can bias biological reference points. Heat stress is an especially problematic driver of decline because much of its impact on migrating salmon likely occurs after the fish have been counted.
4. Critical sources of uncertainty fuel risk: The Kuskokwim Chinook Salmon preseason forecast and in-season management operate under a very high degree of uncertainty, which translates into risk. The proponent does not contest the methods used to estimate the 2019 total run and escapement numbers, however is concerned that the true uncertainty associated with the performance of the prior year forecast method when applied to the Kuskokwim Chinook Salmon data set may actually be significantly higher than the level of uncertainty being assigned to it, an important question to be evaluated. Due to its high degree of uncertainty, use of the 2019 total run estimate by the Federal Subsistence Management Program to justify 2020 preseason or any in-season harvest management decisions poses unacceptably high risks to the viability of populations and the harvest needs of the priority consumptive uses. (As an example of how uncertainty can pose conservation risks, see the outcomes of the 2013 Kuskokwim Chinook Salmon run when a highly optimistic forecast drove a high harvest rate on this declined stock, resulting in a failure to meet any tributary or drainage-wide escapement goals.) Both State policy (Sustainable Salmon Policy) and Federal policy (Magnuson-Stevens Fishery Conservation & Management Act), supported by contemporary fishery science, mandate that in

the face of uncertainty, precautionary approaches be applied to management of salmon and marine fisheries.

The Federal in-season manager is hereafter referred to as the Yukon Delta National Wildlife Manager or Refuge Manager.

Closing Federal Public Lands and Waters

Sections 804, 815, and 816 of ANILCA describe three types of closures to the harvest of a fish stock or wildlife population on Federal public lands and waters. If the population of Kuskokwim Chinook Salmon was sufficient to support the harvest demands of all user groups without endangering the health of the resource, then all uses authorized by the State (such as State managed subsistence, sport, and commercial fishing) would be allowed on Federal public lands and waters.

If necessary for the conservation of a healthy populations or to continue subsistence uses of Kuskokwim Chinook Salmon, Section 815(3) of ANILCA and 36 CFR 243.14(b) 50 CFR 100.14(b) of Federal regulations authorize closures on the taking of Kuskokwim Chinook Salmon for nonsubsistence uses (such as State managed subsistence, sport, and commercial fishing) on Federal public lands and waters. When implemented, all harvesting authorized by the State would be closed. Special Action Requests FSA20-01, 02, and 03 ask the Board to implement this type of closure.

If nonsubsistence uses of a resource were eliminated on Federal public lands and waters, but it remained necessary to further restrict the taking of Kuskokwim Chinook Salmon on Federal public lands and waters by subsistence users in order to protect the continued viability or to continue subsistence uses of Kuskokwim Chinook Salmon, the Board would take the next step and establish a priority among subsistence users, authorized in Section 804 of ANILCA and 36 CFR 243.17 50 CFR 100.17. Special Action Requests FSA20-01, 02, and 03 ask the Board to implement this type of closure.

Existing Federal Regulation

§___.27(e)(4) Kuskokwim Area—Fish

(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), except the use of gillnets with 6-inch or less mesh size is allowed before June 1 in the Kuskokwim River drainage, unless superseded by a Federal Special Action.

Proposed Federal Regulation

§___.27(e)(4) Kuskokwim Area—Fish

(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.

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 Chinook Salmon, except by Federally qualified subsistence users that are residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok and Kongiganek, effective on June 1, 2020 through July 1, 2020.[1] Federal subsistence fishing schedules, openings, closures, and fishing methods will be determined by the Yukon Delta National Wildlife Refuge Manager. Additionally, a community-based allocation system will be implemented amongst the limited pool of Federally qualified subsistence users.[2]

Relevant Federal Regulations

For other relevant Federal regulations see **Appendix A.**

Existing State Regulations

Kuskokwim Area—Subsistence Fishing

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-

[1] Special Action Requests FSA20-01 and 02 request these dates.
[2] Special Action Request FSA20-01 requests an allocation system.

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.

Note*:* The Alaska Board of Fisheries at its March 2020 meeting added "6" [inch] or less bank-oriented set gillnets as a legal gear type in addition to the current 4" or less set gillnet gear type. This would only be used after the front-end closure. Second, in the top tier of the management plan, when king salmon abundance is projected to be above the drainagewide escapement goal, the once weekly bank-oriented set gillnet periods during the frontend closure are fished with 6" or less mesh. If the projection is within the escapement goal range, the once weekly bank-oriented set net periods during the front end will still be fished with 4" or less mesh" (ADF&G 2020c).

Relevant State Regulations

For other relevant State regulations see **Appendix B.**

Extent of Federal Public Waters

For purposes of this analysis, the phrase "Federal public waters" is defined as those waters described under 36 CFR 242.3 and 50 CFR 100.3. 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 (see **Map 1**). These waters are hereafter referred to as Refuge waters.

Customary and Traditional Use Determinations

Residents of the Kuskokwim Area, except those persons residing on United States military installations located on Cape Newnham, Sparrevohn USAFB, and Tatalina USAFB, have a customary and traditional use determination for salmon (36 CFR 242.24 and 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 State's subsistence fishery is closed for six hours before, during, and three hours after each commercial fishing period (Tiernan and Poetter 2015). Legal gear types in the Federal salmon subsistence fishery are gillnets, beach seines, fish wheels, dip nets, and rod and reel. Within the Holitna drainage, spears are also 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.

In 1993, the subsistence fishery in the Kuskokwim River was closed for the first time because of low Chum Salmon returns.

In 1999, the Federal Subsistence Board adopted regulations for Federal subsistence management in the area. Openings, closures, and methods have been the same as those issued under State emergency orders, unless superseded by Federal regulations (§___.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). Also in 2000, due to low runs of Chinook and Chum Salmon, the salmon subsistence fishery was restricted to the use of 6-inch or less mesh gillnets on July 8, and hook and line fishers 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). 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 were implemented until June 16 (in 2005 and 2006) and June 20 (in 2004), during which gillnets were restricted to 4-inch or less mesh size. There were no closures to the harvest of salmon in the upriver areas during these years (Martz and Whitmore 2005, Martz and Dull 2006, Dull and Shelden 2007).

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

Federal subsistence fisheries management was first initiated in 2010. During that year, from June 10 through July 31, the Federal in-season manager closed the Tuluksak and Kwethluk rivers to the harvest of Chinook Salmon with gillnets due to conservation concerns. During this time 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 (restricted at the time to 4-inch or less mesh size) was closed in the following 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 subsistence 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 was closed, while gillnets were restricted to 4-inch or less mesh size. Areas were 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 (Ellison et al. 2015).

In 2013, the Alaska Board of Fisheries adopted the Kuskokwim River Salmon Management Plan (5 AAC 07.365). Additionally, 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. 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

See **Appendix C** for Federal special actions and State emergency orders issued in 2014.

On April 17, the Board approved Temporary Special Action Request FSA14-03, submitted by the Napaskiak Tribal Council, which 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 subsistence users eligible to harvest Chinook Salmon in 2014 (FWS 2014).

On May 20, the Federal in-season manager closed Refuge waters from the mouth of the Kuskokwim River upriver to Tuluksak River to the harvest of Chinook Salmon by all users, and on May 27 continued the closure from the Tuluksak River 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.

From June 24 through July 18, 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, 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.

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 dip nets were required to be immediately released unharmed.

In late July, 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 Tribal councils, 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 within the Refuge boundaries for the remainder of the 2014 fishing season. 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

See Appendix C for a Federal special actions and State emergency orders issued in 2015.

In February and March, 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 by nonsubsistence 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, 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, the Board approved the ANILCA Section 804 Subsistence User Prioritization for the harvest of Chinook Salmon only, including a Bethel allocation strategy based on Section 804 (see **Appendix D**), 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, the Federal in-season manager issued a special action to close 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 from May 21 through July 20. The closure restricted everyone from harvesting Chinook Salmon except for Federally qualified subsistence users identified in the ANILCA Section 804 Subsistence User Prioritization analysis including the Bethel allocation strategy based on Section 804 (see **Appendix D**). Gillnets were restricted to 4-inch mesh size and could be used only three days a week.

From June 5 through July 20, the Federal in-season manager closed Refuge waters 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, 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, 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 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 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 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 (see **Figure F**). Designated fishermen harvested salmon that were then distributed to subsistence users without access to fish camps who requested an allocation. Additionally, Orutsararmiut Native Council organized the distribution of Chinook Salmon to 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, 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 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, the harvest of Chinook Salmon in Refuge waters remained closed except by subsistence users. Salmon fishing opportunity continued during periods that opened sequentially upriver. All Chinook Salmon subsistence fishing restrictions were lifted by August 4.

On August 20, 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 Salmon escapement goal within the Federal management unit will be achieved, and (2) that 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 it was important that subsistence users be given opportunity to harvest Coho Salmon to make up for the low numbers of Chinook Salmon they were allowed to harvest earlier in the season due to restrictions by State and Federal in-season managers. Additionally, the proponents stated that it was likely that the Coho Salmon escapement goal would not be achieved in the Kwethluk River. 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 below average Chum Salmon return, a commercial fishery period was not authorized in the Kuskokwim River until August 10. Commercial periods also occurred on August 17 and August 21, for a total of three commercial fishing periods for the season (ADF&G 2017).

Salmon Management in 2016

See **Appendix C** for a Federal special actions and State emergency orders issued in 2016.

On March 31, the Akiak Native Community submitted Temporary Special Action Request FSA16-01. It requested the Board to 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 ANILCA Section 804 Subsistence User Prioritization analysis implemented in 2015, and employ an allocation strategy among eligible users, similar to the one implemented in 2015, for Chinook, Chum, Sockeye, and Coho salmon.

The Alaska Department of Fish and Game (ADF&G) closed subsistence fishing with gillnets starting on May 20.

On June 1, 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 by non-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 in-season 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 Fisheries Commission pursuant to the Memorandum of Understanding between the U.S. Fish and Wildlife Service and the Commission (**Appendix E**) (FWS 2016).

On June 3, the Federal in-season manager closed Refuge waters to the harvest of Chinook and Chum Salmon by subsistence users. The Federal in-season manager opened Refuge waters for 12 hours on June 12, 24 hours on June 16, 72 hours on June 21, and another 72 hours on June 29 for the harvest of Chinook and Chum Salmon by those subsistence users identified in the Section 804 Subsistence User Prioritization analysis.

On June 12, the Federal in-season manager closed the Eek, Kwethluk, Kasigluk, Kisaralik, Tuluksak, and Aniak Rivers as well as their salmon tributaries within the Refuge boundary to the use of gillnets. On June 21, the Federal in-season manager rescinded the closure to the subsistence harvest of Chinook and Chum Salmon in the Kalskag and Lower Kalskag areas. On July 7, the Federal in-season manager rescinded previously issued special actions.

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).

Salmon Management in 2017

See **Appendix C** for Federal special actions and State emergency orders issued in 2017.

On March 1, Lamont Albertson, the Executive Director of the Kuskokwim River Inter-Tribal Fisheries Commission, submitted Temporary Special Action Request FSA17-03. It requested that the Board approve a pre-season management strategy that would close Federal public waters in the Kuskokwim River drainage to the harvest of Chinook Salmon except by Federally qualified subsistence users if the forecast run size was less than a target identified by the Kuskokwim River Inter-Tribal Fisheries Commission.

On March 14, the Akiak Native Community submitted Temporary Special Action Request FSA17-04. It requested that the Board close Federal public waters of the Kuskokwim River drainage to the harvest of salmon except by Federal qualified subsistence users, further reduce the pool of eligible harvesters based on the ANILCA Section 804 Subsistence User Prioritization analysis that was implemented in 2016, and implement an allocation strategy among eligible users. The Akiak Native Community clarified at a later date that an allocation strategy was not requested and that the harvestable surplus of Chinook Salmon did not seem to require a permit system, but could rather be managed through timing and gear restrictions, as was done in 2016.

On May 3, the Federal in-season manager closed Federal public waters in the Kuskokwim River drainage to the use of all gillnets by all users, effective June 12 to August 10, to provide for escapement of Chinook Salmon.

On May 19, the Board met via teleconference (and in a subsequent email poll on May 22 to clarify the intent of the Board action) and approved Temporary Special Action Requests FSA17-03 and FSA17-04 with modification. The actions closed Federal public waters of the Kuskokwim River drainage on June 12 to the harvest of Chinook 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 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 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 in-season 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 Fisheries Commission, pursuant to the Memorandum of Understanding between the U.S. Fish and Wildlife Service and the Commission (**Appendix E**). These Temporary Special Actions were to expire when the Federal in-season manager re-opened Federal public waters of the Kuskokwim River drainage to the harvest of Chinook Salmon by non-Federally qualified users, or when they were superseded by subsequent special actions, or at the end of the regulatory year on March 31, 2018, whichever came first. This Board action superseded the previous special action issued by the Federal in-season manager on May 19 (FWS 2017a).

The Federal in-season manager issued another special action on May 24, following the Board actions taken on the previous temporary special action requests, to close Federal public waters of the Kuskokwim River mainstem and salmon bearing tributaries (including Eek, Kwethluk, Kasigluk, Kisaralik, Tuluksak, and Aniak Rivers) to the harvest of Chinook Salmon by all Federally qualified subsistence users. The special action was effective from June 12 until August 10.

Refuge waters were closed to subsistence gillnet fishing starting on May 25. Two days after this closure, ADF&G provided a 12 hour subsistence fishing opportunity with 4-inch or less set gillnets to harvest nonsalmon species and incidentally retain any Chinook Salmon harvested. On June 1, the closure extended to the Holitna River mouth, which was then followed up by a second 12 hour subsistence

fishing opportunity on June 3. On June 4, the entire Kuskokwim River was closed to subsistence fishing with gillnets. On June 10, ADF&G provided the last 12-hour subsistence opportunity with 4-inch or less set gillnets. In total, three four-inch set gillnet opportunities, totaling 36 hours, were allowed during the early season Chinook Salmon fishery closure in 2017.

On June 12, the Federal in-season manager opened Refuge waters for 12 hours for the harvest of Chinook Salmon by those Federally qualified subsistence users identified in the Section 804 subsistence User Prioritization analysis. Drift or set gillnets were limited to six inch or less mesh and could not exceed 45 meshes in depth. Nets from the Refuge boundary at the Kuskokwim River mouth to the Johnson River could not exceed 50 fathoms (300 feet), while nets upriver from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length.

On June 24, the Federal in-season manager opened Refuge waters for 12 hours for the harvest of fish other than Chinook Salmon. Additionally, Federally qualified subsistence users identified in the Section 804 Subsistence User Prioritization analysis could retain any Chinook Salmon incidentally harvested in gillnets. These same restricted openings were repeated for 6 hours on July 1, and for 12 hours on July 3. Drift or set gillnets were limited to six inch or less mesh and could not exceed 45 meshes in depth. Nets could not exceed 25 fathoms (150 feet) in length.

On July 7, the Federal in-season manager rescinded previously issued special actions, opening Federal public waters of the Kuskokwim River drainage to the harvest of Chinook Salmon by nonsubsistence users.

In 2017, a very limited Coho Salmon commercial fishery was allowed on July 30, August 14, and August 17 resulting in well below average harvests. Participants included those commercial fishermen who had registered with the department as catcher/sellers and had secured their own markets (ADF&G 2018).

Salmon Management in 2018

See **Appendix C** for Federal special actions and State emergency orders issued in 2018.

On February 5, the Yukon Delta National Wildlife Refuge submitted Temporary Special Action Request FSA18-01. It requested the Board to close Federal public waters of the Kuskokwim River Drainage to the harvest of Chinook Salmon except by Federally qualified subsistence users, and further reduce the pool of eligible harvesters based on the ANILCA section 804 user prioritization analysis that was implemented in 2017. The requested actions would have an effective starting date of June 12, 2018 and last until August 30, 2018, unless the Federal in-season manager reopens Federal public waters of the Kuskokwim River drainage to the harvest of Chinook Salmon by non-Federally qualified users or when they are superseded by subsequent special actions.

On March 28, the Akiak Native Community (a Federally recognized Tribe) submitted Temporary Fishery Special Action Request FSA18-03. The request asked the Board to close Federal public waters of the Kuskokwim River drainage to the harvest of Chinook Salmon except by subsistence users, and further reduce the pool of eligible harvesters based on ANILCA 804 Subsistence User Prioritization analysis that

was implemented in 2015. They requested this action to be in place from May 20 through June 30. Additionally, they requested a community-based allocation system similar to the one used in 2015 to be implemented amongst the limited pool of Federally qualified subsistence users. The Board took no action on FSA18-03.

On June 7, the Federal in-season manager issued an emergency special action that closed the harvest of Chinook Salmon in Federal public waters of the Kuskokwim River main stem and the following salmon spawning tributaries: Eek River, Kwethluk River drainage including its confluence with Kuskokuak Slough and downstream to ADF&G regulatory markers located at the downstream mouth of the slough; Kasigluk and Kisaralik river drainages including Old Kuskokuak Slough to ADF&G regulatory markers at the confluence of Old Kuskokuak Slough with Kuskokuak Slough; Tuluksak River Drainage including its confluence with the Kuskokwim River and downstream approximately 1-mile to ADF&G regulatory markers; and the Aniak River drainage to ADF&G regulatory markers at its confluence with the Kuskokwim River. The Federal in-season manager also closed non-salmon spawning tributaries within 100 yards of their confluence with the main stem Kuskokwim River. The effective dates were June 12 to July 15, and the justification was to provide for escapement of Chinook Salmon.

In addition, on June 7, the Federal in-season manager issued a second emergency special action opening Refuge waters of the Kuskokwim River main stem except the waters of the Kuskokwim River main stem from the Yukon Delta National Wildlife Refuge (Refuge) boundary at Aniak downstream to a line formed from the northwest corner of the runway, due north to a point on the southwest corner of a sandbar for 12 hours allowing the harvest of Chinook Salmon by those Federally qualified subsistence users identified in the Section 804 subsistence User Prioritization analysis for June 12 and June 16. Drift or set gillnets were limited to six inch or less mesh and could not exceed 45 meshes in depth. Nets from the Refuge boundary at the Kuskokwim River mouth to the Johnson River could not exceed 50 fathoms (300 feet) in length, while nets upriver from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length. Salmon bearing tributaries remained closed to the harvest of Chinook Salmon. The first 100 feet of the non-salmon bearing tributaries, which had been closed by earlier action, were also opened to Chinook Salmon harvest during the 12 hour opportunities.

On June 22, the Federal in-season manager issued a third emergency special action opening Refuge waters of the Kuskokwim River main stem except the waters of the Kuskokwim River main stem from the Refuge boundary at Aniak downstream to a line formed from the northwest corner of the runway, due north to a point on the southwest corner of a sandbar for 12 hours allowing the harvest of Chinook Salmon by those Federally qualified subsistence users identified in the Section 804 subsistence User Prioritization analysis for June 24, 2018. Drift or set gillnets were limited to six inch or less mesh and could not exceed 45 meshes in depth. Nets from the Refuge boundary at the Kuskokwim River mouth to the Johnson River could not exceed 50 fathoms (300 feet), while nets upriver from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length. Salmon bearing tributaries remained closed to the harvest of Chinook Salmon. Again, the first 100 feet of the non-salmon bearing tributaries were open to Chinook Salmon harvest during the 12 hour opportunity.

Also on June 22, the Federal in-season manager reopened opportunity for Federally qualified subsistence users identified in the section 804 Subsistence User Prioritization analysis to harvest Chinook Salmon on Federal public waters of the Kuskokwim River Main Stem from a line downstream of Kalskag at the south edge of Uknavik Slough, due east to the edge of the bluff line to the Refuge boundary at Aniak beginning on June 24, until superseded by subsequent emergency special action in that portion of the Federal public waters of the Kuskokwim River main stem, excluding the previously mentioned closures around Aniak. All drift or set nets were limited to 6-inch or less mesh, and could not exceed 45 meshes in depth or 25 fathoms (150 feet) in length.

On June 27, the Federal in-season manager issued an emergency special action opening Refuge waters of the Kuskokwim River main stem from the mouth to a line downstream of Kalskag at the south edge of Uknavik Slough and then due east to the edge of the bluff line for 6 hours on June 29, allowing the harvest of Chinook Salmon by those Federally qualified subsistence users identified in the Section 804 subsistence User Prioritization analysis. Drift or set gillnets were limited to six inch or less mesh and could not exceed 45 meshes in depth. Nets from the Refuge boundary at the Kuskokwim River mouth to the Johnson River could not exceed 50 fathoms (300 feet) in length, while nets upriver from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length. Salmon bearing tributaries remained closed to the harvest of Chinook Salmon. Again, the first 100 feet of the non-salmon bearing tributaries were open to Chinook Salmon harvest during the 6 hour opportunity.

On July 3, the Federal in-season manager issued an emergency special action opening Refuge waters of the Kuskokwim River main stem to a line downstream of Kalskag at the south edge of Uknavik Slough and then due east to the edge of the bluff line for 12 hours on July 5, allowing the harvest of Chinook Salmon by those Federally qualified subsistence users identified in the Section 804 Subsistence User Prioritization analysis. Drift or set gillnets were limited to six inch or less mesh and could not exceed 45 meshes in depth. Nets from the Refuge boundary at the Kuskokwim River mouth to the Johnson River could not exceed 50 fathoms (300 feet) in length, while nets upriver from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length. Salmon bearing tributaries remained closed to the harvest of Chinook Salmon.

On July 6, the Federal in-season manager issued an emergency special action rescinding all previously issued special actions regarding the management of Chinook Salmon in the Kuskokwim River drainage, and Refuge waters opened to the harvest of Chinook Salmon by non-Federally qualified subsistence users

In 2018, a very limited commercial fishery was allowed for Coho Salmon on August 5, August 8, August 15, August 21, and August 31. Participants included those commercial fishermen who had registered with ADF&G as catcher/sellers and had secured their own markets (ADF&G 2018).

Salmon Management in 2019

See **Appendix C** for Federal special actions and State emergency orders issued in 2019.

On March 1 the Akiak Native Community submitted Temporary Special Action Request FSA19-02, with clarification provided on March 4, 2019. It requested the Board to close Federal public waters of the

Kuskokwim River Drainage to the harvest of Chinook Salmon except by Federally qualified subsistence users from June 1 to July 1, 2019, and immediately re-open to subsistence users, further reduce the pool of eligible harvesters based on the ANILCA section 804 Subsistence User Prioritization analysis that was implemented in 2017, and allow fishing under a community allocation system with harvest reported to community harvest monitors.

The Federal Subsistence Board met April 15-18, 2019 in Anchorage to consider proposed changes to the Federal subsistence fisheries regulations and two fisheries temporary special action request, including FSA19-02. The Board approved Temporary Special Action Request FSA19-02 with modification, to close Federal public waters to the harvest of Chinook Salmon from June 1, 2019 – July 1, 2019, except by Federally qualified subsistence users identified in the ANILCA Section 804 subsistence user prioritization (which includes residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek), in that portion of the Kuskokwim River drainage that are within and adjacent to the exterior boundaries of the Yukon Delta National Wildlife Refuge, unless reopened by Federal special action. Federal subsistence fishing schedules, openings, closures, and fishing methods were to be determined by the Federal inseason manager.

On May 26 the Federal in-season manager announced the closure to the harvest of Chinook Salmon in the Federal public waters of the Kuskokwim River drainage. In addition, a 12-hour set net opportunity was announced for June 1 within the Federal public waters of the Kuskokwim River mainstem. Set gillnets were limited to 6-inch or less mesh, were not allowed to exceed 60 feet in length, or 45 meshes in depth. Set gillnets were not authorized be operated more than 100 feet from the ordinary high water mark, had to be attached to the bank, and oriented perpendicular to the river. Subsistence fishing for all fish, including Chinook Salmon with dip nets, beach seines, fish wheels, and rod and reel remained open (per 3-KS-03-19).

The next announcement made by the Federal in-season manager occurred on June 4, announcing one 12-hour set net opportunity for June 8, along with three 12-hour fishing opportunities for June 12, June 15, and June 19, 2019. The set net opportunity had the same gear limitation as the June 1 opportunity. The fishing opportunities announced for June 12, 15, and 19 allowed set or drifted gill nets but were limited to 6-inch or less mesh size and could not exceed 45 meshes in depth. Nets from the Refuge boundary at the Kuskokwim River mouth to the Johnson River could not exceed 50 fathoms (300 feet) in length. Nets up river from the Johnson River to the Refuge boundary at Aniak were limited to 25 fathoms (150 feet) in length.

On June 18 the Federal in-season manager announced a 12-hour fishing opportunity for June 22. The gear restrictions were the same as the previous opportunity. In addition, it announce that starting on June 19 fishing would be open until further notice upstream of a line on beginning at the south edge of Uknavik Slough to due east of the edge of the bluff line (Kalskag Line) upriver to Aniak boundary, excluding the Aniak box as described above.

FSA19-02 expired on July 1, 2019 at 11:59pm.

Current Events

Public Hearing FSA20-01, 02, and 03

A public hearing was held on March 16, 2020, at the U.S. Fish and Wildlife Service, Regional Office in Anchorage, Alaska. Seventeen individuals identified themselves at the start of the teleconferenced meeting, with 11 people and organizations testifying.

Several testifiers supported Special Action Request SAR20-02. Specifically mentioned was support for subsistence fishing opportunities with at least four 12-hour periods, at least one per week, in June using 6-inch or less mesh-size gillnets.

One testifier supported special action request FSA20-03. The testifier was unhappy that the burden of proof justifying a closure seemed to always fall on subsistence users. The testifier indicated the Federal Subsistence Management Program needs to provide the public with evidence, based on sound science and independent analysis. The testifier said it is clear Federal managers do not want to actively manage the subsistence fishery and therefore local residents have to involve themselves in the process or else the special actions will not be implemented. The testifier cited 2013 as a year when State management failed to protect a small Chinook Salmon run by allowing too much fishing opportunity, which the State described as a tragedy of the commons. While the 2019 run met escapement objectives, the 2019 run could be an anomaly. This person could find no justification for leaving the fishery wide open this year, and any decision to do so is arbitrary. The testifier believes that fishery managers' intentions are to deny an active role for tribes in decision making. The testifier said fisheries should be managed according to ANILCA and described other Kuskokwim Chinook Salmon management considerations. Risk to stock diversity from high harvest rates are not currently accounted for, and significant decline in body size and caloric value of Chinook Salmon is not currently account for. Also, 2019 was the hottest summer on record and salmon die-offs from heat stress were observed. There is too much uncertainty to make management decisions pre-season and without the implementation of a closure, we are placing uninformed trust in State management.

Four testifiers supported all three special action requests. Common to all four was that Title VIII of ANILCA clearly states the Federal Program should prioritize consumptive uses over other uses and should close Refuge waters to the harvest of Chinook Salmon by nonsubsistence uses in order to protect the viability and sustainability of Kuskokwim Chinook Salmon into the future. Consumptive uses should be prioritized and the fishery closed to other uses because of a loss of stock diversity, decrease in fish size, and high risk to viability. They said in the end we will have a successful story, but right now is not the time to reverse strategy. If the fishery is open to all users, we are risking the ability of our children and grandchildren to harvest Chinook Salmon.

One of these testifiers added that our communities' sacrifices, in order to rebuild the Chinook Salmon run, have been very successful. The Board should listen to local people and continue to rebuild the run, because we are not out of the woods yet. The Board should continue to include the 33 communities in the drainage in management. The testifier requested to have Chinook Salmon managed by the Refuge manager and organizations that have come into agreement with the 33 signatory tribes of the Memorandum of Understanding with the U.S. Fish and Wildlife Service. Without the Board's action, fishing will be open to all uses. This is not why we have sacrificed harvest for five years. Many have

sacrificed food security by observing sever restrictions to harvest. This person said our families and the elders have suffered and will continue to suffer until run sizes are consistently larger. The overall goal is healthy populations of Chinook Salmon when restrictions on harvest will not be necessary, but we are not there yet. The testifier predicted, with Federal management, people will likely be allowed to harvest more Chinook Salmon this summer, and Federal managers have increased harvest opportunity gradually each year following 2014, from 3,000 fish up to 37,000 fish last summer, while the run is rebuilding.

Another testifier added that we have traditional and customary rights given to us by god as well as the Federal government that recognizes our tribes. Some subsistence users have voiced concerns that we have no fish on our racks, we are not supplying our families with enough fish to last throughout winter, and other concerns for their livelihood. This person said these special action requests are necessary to allow for tribal management of fisheries now and in the future.

Another testifier, supporting all three special action requests, represented the Kuskokwim River Inter-tribal Fisheries Commission and said that of 33 Federally recognized tribes represented on the Commission, 26 have submitted resolutions supporting a closure to the harvest of Kuskokwim Chinook Salmon. This person said there has been multi-year low productivity, and since 2011 well below long term harvest levels. Escapement has been met since 2014 but not as much as people wanted, and the recent escapement consisted of a majority of younger, 4-year old Chinook Salmon. The Commission's actions have been aimed at improving stocks in order to allow more harvest in the future. Additionally, the proponent of FSA20-03 identifies new information not considered by Board in the past.

Another of these testifiers said that we are building a house, and we do not have enough nails to finish. We've run out of lumber and nails and we're still pounding. This testifier said in the past women cutting and processing salmon told men when to go fishing and when enough was harvested for winter. The women were our advisors year after year and who maintained the salmon runs.

Three testifiers opposed these special action requests, specifically a closure to the harvest salmon by nonsubsistence uses. One, representing ADF&G, said ADF&G is capable of conserving Chinook Salmon and providing subsistence opportunity. If the Chinook Salmon run appears to be weak and likely at the lower end of the run-size forecast, ADF&G can still provide for subsistence. The fishery will not be wide-open because the required front end closure in the State management plan and other tools will be used with the sole purpose to conserve Chinook Salmon. Another testifier described fishing restrictions that have been implemented since 1999 and the difficulty they have imposed on subsistence users. However, this testifier said new data, such as genetic information, and technologies, such as the sonar, have resulted in much more reliable forecasts of run size allowing ADF&G to manage protectively this year. Also, people should use care in how they use this new information. The testifier said salmon stocks are affected by current subsistence uses that have been justified because they have been done for millennia, but people do not fish the way they did in the past. Subsistence users have become more efficient. One of these testifiers said the fishery should be closed only if warranted, based on in-season indicators.

One testifier said that it takes the Federal Program too long getting an analysis of special action requests to the public who are waiting for this information and that information that could be available is not made available in a timely manner for meaningful input from the public.

Several testifiers thanked the Board for approving past special actions and for listening to tribes and communities since 2014. One said we are all in this together, and we have to work together for our children, the elders, and our communities. One testifier appreciated how the Refuge has deferred to advice from the in-season management team of Commissioners from five communities along the river who are incorporating traditional forecasting methods into the management process.

Alaska Department of Fish and Game

The ADF&G described its plan to manage the Kuskokwim Salmon fishery at the Yukon-Kuskokwim Delta Council meeting on March 17, 2020; however, the exact fishing schedule occurring after June 12 is not finalized. The ADF&G will discuss these management options at the first Working Group meeting in May 5-6. The proposed ADF&G plan would allow an open fishing period for 24 hours a day every other day using drift gill nets with a maximum of 6-inch mesh and 25 fathoms in length from the mouth of the Kuskokwim River to the village of Tuluksak. Fishing would be open above the village of Tuluksak, with 6 inch gear or smaller, and upstream, with the exception of the Aniak box, where no retention of Chinook Salmon would be allowed until June 23. Retention of Chinook Salmon in the tributaries would be allowed with rod and real. Transition to Chum and Sockeye salmon management would occur once they become dominate species in each section of the river. (Smith 2020, YKDSRAC 2020).

The State sport fishery targeting Chinook Salmon will close on May 1, 2020, through June 11, 2020 (ADF&G 2020b)

After June 11, the news release continues:

> The number of king salmon returning to the Kuskokwim River is forecasted to be between 193,000 and 261,000 fish. This should be enough to provide a full subsistence harvest, sport fishing opportunity, and a spawning escapement of ~92,500 king salmon that is near the middle of the escapement goal (i.e. 65,000-120,000). The numbers of king salmon returning to the Kuskokwim River will be closely monitored using the department's sonar, test fishery, and reports from fishers. In accordance Kuskokwim River Salmon Management Plan, if the data suggests the run is large enough to provide harvest opportunity on surplus king salmon in excess of escapement and subsistence needs, the sport fishery may open after June 11.

Alaska Board of Fisheries

The Alaska Board of Fisheries met in Anchorage from March 8-10, 2020 discussing Statewide King and Tanner Crab and supplemental issues. Major outcomes of the meeting include the addition of

> "6" [inch] or less bank-oriented set gillnets as a legal gear type in addition to the current 4" or less set gillnet gear type. This would only be used after the front-end closure. Second, in the top tier of the management plan, when king salmon abundance is projected to be above the drainagewide escapement goal, the once weekly bank-oriented set gillnet periods during the frontend closure are fished with 6" or less mesh. If the projection is within the escapement goal range, the once weekly bank-oriented set net periods during the front end will still be fished with 4" or less mesh" (ADF&G 2020c).

Tribal Consultation FSA20-01, 02, and 03

Tribal consultation occurred by teleconference with members of the Federal Subsistence Board on Thursday April 16, 2020. Public Board member Rhonda Pitka, Carol Damberg representing the USFWS Board member, Wayne Owen representing the U.S. Forest Service Board member, and Glenn Chen representing the Bureau of Indian Affairs Board member all called in to the meeting.

FSA20-01

One Tribal member from Akiak (the proponent of FSA20-01) and another representing the Kuskokwim River Inter-Tribal Fish Commission (KRITFC) were in full support of the special action.

The proponent stated that subsistence protections under ANILCA should be upheld by the Board. The Federal program has co-managed the Kuskokwim River Chinook Salmon fishery from 2015 to 2019 with the express purposes of rebuilding returns and for the continuation of subsistence uses. He said that people have sacrificed for over five years. The proponent also said he would like to continue precautionary measures. Issues like heat stress and smaller fish in the run make it too early to stop conserving. There is still a need to rebuild the stocks. In addition he is concerned of the risk to stock diversity due to high harvest rates.

Both tribal representatives remarked that they did not want to see a repeat of 2013, when there was an optimistic pre-season forecast, but the total run size was ultimately low that season. In addition, both members thought it was too early to "get out of conservation mode" at this time.

The representative for the Orutsararmiut Native Council (ONC) read a letter from ONC that outlined their position. The ONC Subsistence Committee commented on all three SARs, stating: (1) they do not agree with the closure and implementing a ANILCA Section 804 subsistence user prioritization; (2) they believe it would be complicated and difficult to enforce; and (3) if the Chinook Salmon in-season numbers do not meet ADF&G predictions, then they want a special action to support Federal management until Chinook Salmon escapement goals are met.

FSA20-02

Representatives of Akiak, Kalskag, and Lower Kalskag Tribes, plus representatives of KRITFC, all reported that they support FSA20-02. The representative of Kalskag reported that they support all three special actions.

FSA20-03

The representative of Akiak stated they supported this Special Action Request. He mentioned there is a lot of new information in this Special Action Request to justify the other two, as well.

A KRITFC representative supported this Special Action Request. He referenced the moratorium on moose hunting and how well it had worked to bring the population back. He also stated that there are too many risk factors that affect salmon, such as heat stress, smaller sizes and ocean by-catch. In addition, he

stated that when Bethel is open to fishing there is a large amount of fishing pressure. If the fishery is opened to everybody, it would be detrimental to Chinook Salmon.

The representative from Kalskag supported FSA20-03 because the Chinook Salmon population is still at risk and suggested continuing management similar to what occurred in 2019 because more rebuilding of the Chinook Salmon population is needed. He also mentioned that we are learning more, but conservation is still needed.

During Tribal and ANSCA corporation consultations, one employee the Native Village of Napaimute representative, lamented the lack of a completed analysis for these special action requests. He said he needed them to be able to inform the Tribal Council. He then asked a series of questions directed towards OSM and the Federal in-season manager.

The representative first question was: what pre-season forecast is OSM using? OSM staff reminded him that OSM is not the in-season manager, but OSM is presenting all three pre-season forecasts in the analysis. One is from ADF&G; one uses the Bayes tool; and the third uses a new model developed by statistician Curry Cunningham. The preseason forecast using the ADF&G technique is 193,000-261,000. Using the Bayes tool the forecast is125,000-380,000. Curry Cunningham's model forecast is 110,000-328,000 Chinook Salmon.

The representative's second question asked: how many Chinook Salmon are needed to meet subsistence needs? OSM responded that the Federal Program under ANILCA Title VIII focuses on opportunity and the requirement to justify reducing opportunity. What is needed is a discussion between the Refuge Manager and the KRITFC. During the ANSCA Corporation consultation, the Federal in-season manager joined in the conversation and stated that using 6-inch mesh, along with the front end closure, would make it difficult to catch 100,000 Chinook Salmon. The Federal in-season manger added that it was a fluid question and hard to answer with changes in fish sizes. However, 100,000 Chinook Salmon is within the ADF&G's Amount Reasonably Necessary for Subsistence (ANS) range, and that there will be opportunity for people to harvest as many fish as possible after June 11.

The third question from the employee was: should the management objective be the ADF&G escapement goal? OSM responded: that question is best answered by the Federal in-season manager. During the ANSCA Corporation consultation, the Federal in-season manager was available to answer. His response centered on how the 2019 estimated escapement was significantly above the upper end of the escapement goal. In 2020, a harvest of 100,000 fish would result in escapement of about 120,000 fish, which is at the upper end of the escapement goal.

A fourth question from the Napaimute representative centered on management strategy for 2020. He stated that ADF&G suggested a plan and wondered what the USFWS was thinking. The question was unanswered during Tribal consultation because the Federal in-season manager was not on the call. However, during the ANSCA Corporation consultation, the Federal in-season manager reported that there had been internal discussions and the USFWS plans to do something similar to ADF&G's plan, and could liberalize harvest if a big run occurs.

The Napaimute employee also wondered if, based on preliminary estimates from ADF&G, the Federal in-season manger had a conservation concern for salmon on the Kuskokwim River. During the ANSCA Corporation consultation the Federal in-season manager stated that he did not have conservation concerns at this time. The in-season manager said that "management can balance the high end of the escapement goal at 120,000, and still have a 100,000 harvest" and the predicted run size is still bigger than that.

The Napaimute employee also asked if escapement at the upper end of the escapement goal range could jeopardize the Chinook Salmon stocks due to over-escapement. A Yukon Delta National Wildlife Refuge biologist mentioned that over-escapement is a highly controversial subject. The Napaimute representative went on to describe that, based on the spawner recruit model, if the escapement goal range is exceeded it will affect yield. He added that this point is lost when discussions like these take place and that, "The data says what it says and it is pretty strong." The reports containing age at maturity, loss of age classes, egg production, and models were just published, according to the representative. He stated that over-escapement is actually reducing yield, and cited the yields from the 2013 run as an example. There was an increase in number of recruits per spawner returning based on that run. The Napaimute representative hopes the analysis addresses these issues. Last, he continues to be concerned that if the Chinook Salmon run nears the upper end of the objectives, then "we are actually shooting ourselves in the foot."

During the Tribal Consultation, the Akiak Tribal representative stated that subsistence needs defined by ANS had not been met in recent times. Harvest has been far below the 80,000 fish necessary to meet subsistence needs on the river. The Tribal member from Akiak said that the Tribe has sacrificed their subsistence needs to help the Chinook Salmon population recover, and that he appreciated his people's sacrifices over these years. People have been running out of fish before the winter is over and are supplementing by pike fishing and setting out whitefish nets. People do not trust the forecast because of their experience in 2013; and this is making them nervous right now. If they see several years with high enough escapement numbers that indicate reduced risk to the Chinook Salmon population, then they believe fewer special action requests will be necessary.

The executive director of the KRITFC then described the makeup of the Commission stating that there are seven units representing 33 communities and 7 tribes within the region. Each tribe selects its own member to represent them on executive council. There are four in-season managers that represent different areas, whom are elected by all the commissioners, plus an elder, who also attends meetings. These members are uniquely qualified to discuss quality of salmon and long-term trends and changes that they've seen over a lifetime, sometimes having witnessed these changes firsthand. The director gave several examples. For instance, fish are returning at younger ages, are smaller, and with fewer females, though the Kuskokwim River is not unique. The director added that no one is sure why.

The director of the KRITFC mentioned that they are looking at effects on subsistence in future years. The Yup'ik way is that they harvest "in gratitude." She stated the they express thanks so Chinook Salmon will continue to come back. When they come back in good numbers, that's what they talk about, but internally they are all thinking about how the fish are smaller, it takes more to fill their freezers, there are fewer females, fewer eggs, and smaller eggs. These are long-term issues.

The director restated that they have not met their subsistence needs since 2011. Last year's estimated 40,000 fish harvested was the best in eight years. She personally does not like the words "over-escapement" and that the word 'escapement' is a loaded word—meaning "like we lost something." They know the fish "didn't escape." The term means that fish on the spawning grounds are reproducing, having escaped being harvested. The highest recorded run by ADF&G was 300,000 fish. The director said she would not argue the theory, but people on the river say the fish are not returning like they used to, and they do not smell the spawned-out fish anymore. She agreed that over-escapement can happen, but at the current run sizes it is not a problem. It is more within the realm of their control to work with the USFWS to get good harvest numbers. Subsistence needs are not a fixed number; although, it is something they are trying to quantify. If fish are smaller, higher escapement is necessary to produce enough eggs in the gravel to sustain the population, and more yet are necessary for harvest. When the run was really huge, the perception was that not enough were harvested and it caused the population to collapse. People have been harvesting one-eighth or less Chinook Salmon than they are accustomed to.

Another KRITFC representative agreed, stating that fish are becoming smaller. He said he used to get 20 big ones, but these days he needs 50. His family has tried to conserve, and he hopes fish are available for his children in the future.

During the ANSCA Corporation consultation, the executive director of KRITFC was asked what traditional ecological knowledge indicators are seen entering the season. She responded that indicators include: size of snow pack, thickness of ice on the river, and water conditions. This season looks like it will be a late breakup with cold temperatures and a lot of ice. Another sign is migratory birds. Seagulls were seen a couple of days ago with some geese passing. People are optimistic they will have the same number of Chinook Salmon returning that were seen last year.

The director reminded people that the ADF&G forecast is "give or take 100,000 fish." In 2013, the forecast was 100,000 fish off. The Kuskokwim River hosts a major subsistence fishery, but it is being managed as a commercial fishery (by the State). The cost of being wrong in a commercial fishery is less damaging than being off for a year or two in a subsistence fishery.

ANCSA Corporation Consultation FSA20-01, 02, and 03

Consultation between ANCSA corporations and members of the Board also occurred on Thursday, April 16, 2020, from 1:30 p.m. to 3:30 p.m. The meeting was conducted telephonically, with Public Board member Rhonda Pitka, Wayne Owen representing the US Forest Service Board member, Josh Ream representing the National Park Service Board member, and Carol Damberg representing the USFWS Board member. Several tribal representatives called in during the ANSCA corporation consultation. These Tribal comments are documented in the Tribal consultation section above. No ANCSA corporations called in.

Cultural Knowledge and Traditional Practices

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. Dogs ate massive amounts of fish. These circumstances have changed and fewer families now own dogs, thereby greatly reducing subsistence harvests of Chum and Sockeye Salmon from 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 contemporary village sites were staging areas for these activities (Oswalt and VanStone 1967; Fienup-Riordan 1983, 1984; Kilbuck 1988; Oswalt 1990).

The population of the Kuskokwim Fishery Management Area almost tripled in the 50 years between 1960 and 2010, from 6,776 to 17,454 people, based on the U.S. Census (**Table 1**).

Historically, in the lower and middle Kuskokwim River drainage subsistence activities centered around fish, furbearers, and migratory birds. Moose and caribou were rare sights until recently. The fact that salmon are overwhelmingly the most important food item also influences the nature of the subsistence activities in this area (Oswalt 1959, 1990).

When salmon began their ascent of the Kuskokwim River, there was no way to foretell whether the run would be strong or weak, and so from the time the run began, men fished from their boats with long gill nets much of the afternoon and night. The yearly salmon run assured people of a predictable source of food. Usually about a week before Chinook Salmon arrived, Sheefish were caught in these nets. No fish was unutilized; in fact, the entire fish was used as food for humans or dogs. Store-bought necessities included sugar, salt, flour, milk, coffee, tea, tobacco, and cooking fats. Other foods frequently purchased included various canned meats and fish, crackers, candy, carbonated beverages, canned fruits, potatoes, onions, and rice. The frequency with which these were consumed depended upon the cash or fur income of the family involved (Oswalt 1959).

In 2012, Ikuta and others (2013) observed that elders in particular expressed concern about the consequences of not taking proper care of fish. Traditionally, if people keep fishing in the correct manner, there will be more fish every year. It was widely agreed upon among the people she talked to that if fish were wasted or disrespected, there would not be as many fish returning in the future. Fish remains were

treated with great respect, so that the fish would not tell others to avoid these people. “A traditional Yup’ik belief is that fish go away if they are not used, and taken care of” (Ikuta et al. 2013:15).

Traditionally and historically, in the Kuskokwim Area, people organized much of their lives in pursuit of wild resources in order to redistribute their surpluses during winter ceremonial seasons and during more informal sharing, such as funeral and birthday gatherings or hosting family and friends. “Status and authority accrued to the one who could afford to give” (Fienup-Riordan 1984:69). People continue to organize traditional winter ceremonies. Some are organized concurrently with American holiday celebrations or have merged with gatherings to celebrate Independence Day, Thanksgiving, Christmas, and Easter. High harvesters are also high givers, and giving to other households may be a primary motivation for high production by some households (Wolfe et al. 2007).

Commercial Fishery

Kuskokwim Chinook Salmon have been exported from the area and sold on commercial markets since 1913 (Pennoyer et al. 1965). During the 1950s, commercial fishing was closed or restricted due to concerns of over-exploitation voiced by subsistence fishers (Pennoyer et al. 1965). After 1959 and statehood, commercial harvests of Chinook Salmon grew steadily. The largest commercial harvests occurred in the late 1970s and early 1980s, and took place as far up the drainage as the community of Chuathbaluk in the middle river (**Figure 1**). However, subsistence fishery harvests grew as well, and in 1987 the directed commercial fishery for Chinook Salmon was eliminated. Currently, by regulation, up to 50,000 Chinook Salmon may be incidentally harvested in the Chum Salmon-directed commercial fishery and sold; however, since 2000 these incidental harvests have been much smaller (Brazil et al. 2013). In 2014, the first commercial fishing opportunity was pushed back into July so that little incidental harvest of Chinook Salmon would occur, and the first commercial fishing opportunity in 2015 did not occur until August 10 to protect Chum Salmon due to a below average return (ADF&G 2017). Since 2016, commercial fishing has targeted only Coho Salmon beginning in late July, but no commercial salmon processors have been available in the area and the opportunity has been for catcher/sellers only (ADF&G 2016a, 2016b; ADF&G 2018). A commercial salmon processor is not expected to be in the region in 2020. Kuskokwim commercial fishing is not limited entry. Most Alaska residents can apply for and receive a commercial fishing permit; however, the majority of permits have consistently gone to residents of the region. At its peak there were over 600 Kuskokwim salmon permits (Ikuta et al. 2013).

Subsistence Fishery

In the 1950s, during the months of spring, families were often at camps harvesting fish for food and muskrats for fur and for food. The fresh food was welcome after relying on primarily dried and preserved salmon for months in late winter and early spring. People returned to settlements oriented on the Kuskokwim River to prepare for salmon season. Nylon nets were available and used, but it was still common to see people drifting nets while rowing locally-made plank boats, which might float up to two miles during one set. Fishing equipment was not very efficient (Oswalt 1959, 1990). It was the growing commercial fishery in the 1970s and early 1980s that brought more efficient gear into the subsistence fishery. People would harvest Chinook Salmon to fill drying racks and smoke houses and then turn back

to commercial fishing. Aluminum boats, 40 horse power engines, and deeper and longer nets that were more efficient at harvesting salmon became more common (Ikuta et al. 2013).

During this time, middle and upper river residents were voicing concerns that their subsistence harvests and upper river runs were being impacted by the growing commercial and subsistence fisheries in the lower river. These concerns grew in the 1980s when salmon returns decreased. To ease these concerns, in 1988 ADF&G formed the Kuskokwim River Salmon Management Working Group (Working Group) to meet weekly with the ADF&G manager to evaluate run strength and the progress of commercial and subsistence fisheries (Hamazaki 2008). In 2001, the Alaska Board of Fisheries implemented subsistence fishing closure schedule "windows" throughout the Kuskokwim River drainage. The primary objective was to reduce harvest early in the season by reducing the subsistence fishery from seven to four days a week, from Wednesday to Saturday (Hamazaki 2008).

Chinook Salmon escapement increased across the drainage, and as a result the schedule was eased. From 2007 through 2011, ADF&G did not impose the schedule. Research findings suggested the increase in escapement was not due to windows but to an increase in the Chinook Salmon run size. Additionally, subsistence fishermen increased their fishing efforts during the open period and harvested the same number of fish per week as without the scheduling. One researcher said "while the windows did not reduce the subsistence fisher's fishing opportunities, it synchronized their fishing dates, removing their ability to determine fishing dates based on their needs and availability of fish," which was a negative effect on subsistence users (Hamazaki 2008).

Upriver concerns continued to be heard. On several occasions the Working Group asked the fishery manager to delay opening the commercial fishery to allow more time for salmon to move upriver when the manager vetoed the recommendation, adhering to regulation and policy concerning sustained yield, which compelled him to allow commercial fishing opportunity soon after indications that Bethel subsistence fishermen had met their Chinook Salmon harvest goals (Carroll and Bradley 2010, Brodersen and Carroll 2011, Bailey and Shelden 2014).

In 2012 due to the shrinking run size, on March 6–8, the Association of Village Council Presidents (AVCP, the regional Native non-profit corporation comprised of lower river tribes) held a special convention (AVCP 2012). The purpose was to identify ways to help conserve Chinook Salmon. One of the major focuses was developing ideas on how to incorporate Tribes into the management of Kuskokwim salmon. During the convention, some suggested a permit or Tier II system during low returns years.

On June 5, 2012, the Working Group received a letter from AVCP and Kuskokwim Native Association (KNA, the former Native non-profit corporation comprised of mid-drainage tribes) expressing concerns about ADF&G's management strategy (AVCP and KNA 2012). Their concerns included ADF&G lowering the in-season management escapement objective to 87,000 Chinook Salmon, which was lower than historical escapements and would decrease Chinook Salmon densities and opportunities for middle and upper river subsistence users. They were also concerned that ADF&G had not consulted with others about the management strategy.

On June 10, 2012, ADF&G implemented a schedule of rolling closures. The first closure to the subsistence fishery began June 10 in the lower river and lasted seven days. The Working Group did not support a five-day extension that was requested by Federal and State fishery managers, "objecting on the basis that a 12-day closure for subsistence salmon fishing would result in an extraordinary hardship for the Kuskokwim River families that rely upon harvesting king salmon in early June" (Ikuta et al. 2013: 125); however, the closure was extended for five days.

This was the most extensive restriction on subsistence fishing ever implemented on the Kuskokwim River, and on June 20 people from Tuntutuliak to Tuluksak began fishing for salmon with 6-inch mesh gillnets despite the closure. Sixty-one people received citations and had their nets confiscated or cut (Ikuta et al. 2013). Some of these fishers were allowed to keep one Chinook Salmon, but the rest of their illegally caught Chinook Salmon were donated to charity. Some of the violators pleaded guilty and paid a fine; others went to trial at various points between the fall of 2012 and spring of 2013, and were convicted and fined. Thirteen fishermen appealed the Bethel District Court decision to the Alaska Court of Appeals (*Phillip II v. State of Alaska ap-2446*). These thirteen defendants waived any individual defenses they might have had, and instead they filed a collective brief asserting that their fishing in violation of the emergency orders was religiously based conduct that was protected under the free exercise clause of the Alaska Constitution. They were represented by John M. Starkey and Thomas Stenson of the American Civil Liberties Union of Alaska Foundation.

According to the Alaska Court of Appeals opinion, the defendants presented expert testimony on the central role that fishing for Chinook Salmon plays in Yup'ik culture and spiritual beliefs. The defense experts testified that according to traditional Yup'ik belief, *Ellam Yua* is the spirit of the universe, consisting of all things in a state of interconnectedness. Ellam Yua provides the Yup'ik with the resources they need to survive, and the Yup'ik are expected to work hard to harvest those resources. If the Yup'ik stop fishing for salmon, Ellam Yua will take offense, and the salmon will cease to make themselves available (*Phillip II v. State of Alaska ap-2446*).

The experts also testified that along the Kuskokwim River, where all of the defendants lived, Chinook Salmon is regarded as "the most important food." It is the "apex" fish, and it is irreplaceable. Other fish and other species of salmon are acceptable for eating, but they are not viewed as an adequate substitute for Chinook Salmon, in part because Chinook is the first salmon to return to the Kuskokwim River in the spring, and it arrives during the prime drying season. The testimony also established that Chinook Salmon play a central role in traditional Yup'ik fish camps, which is where Yup'ik spiritual values are taught to the next generation. Based on this expert testimony, the district court judge found that the defendants were sincere in their religious beliefs. But the judge ruled that even assuming the sincerity of each individual defendant's religious belief, the State's compelling interest in preserving the Kuskokwim River Chinook Salmon run outweighed that religious interest. In their opinion, the Appeals Court judges said, "Once the district court found the defendants' fishing in violation of the emergency orders was religiously based conduct, the burden shifted to the State to establish that its compelling interest in preserving the viability of the Kuskokwim king salmon population 'will suffer if an exemption is granted to accommodate the religious practice at issue'." In March 2015, the Appeals Court affirmed the decision of the Bethel District Court judge (*Phillip II v. State of Alaska ap-2446*).

In 2013, ADF&G management began by closing subsistence fishing in only lower river Chinook Salmon-bearing tributaries. On June 22, when the run was deemed weak and not just late, ADF&G and U.S. Fish and Wildlife Service managers implemented several drainage-wide closures. The escapement estimate, however, was the lowest on record at 36,823 Chinook Salmon.

On June 12 and 13, 2014, Yupiit Nations (a consortium of Federally recognized Tribes with the core group of Akiak, Akiachak, Tuluksak, and Kwethluk Tribes) met and considered a presentation by the Northwest Indian Fisheries Commission and convened a panel to discuss two Inter-Tribal Fisheries Commission proposals, one for the Kuskokwim River drainage and the other for the Yukon River drainage. One of the products of the meeting was Yupiit Nation Tribal Forum Strategic Plan. In the summary, they stated "there is a real possibility of civil disobedience throughout the main stem of the Kuskokwim River. It is the desire and the goal of Yupiit Nation to obviate this possibility before it happens" (Yupiit Nations 2014). One change in management strategy they requested was a village allocation of salmon implemented jointly by the Office of Subsistence Management and Tribes.

In February 2016, The U.S. Fish and Wildlife Service Director in Alaska and the Yukon Delta Wildlife Refuge Manager signed a Memorandum of Understanding with the Kuskokwim River Inter-Tribal Fisheries Commission (see **Appendix E**). The agreement was the first formalization of co-management between the Alaska tribes along the Kuskokwim River and the Federal government. The Refuge Manager consults with the Commission before making management decisions in Federal public waters.

Each year since 2013, the Board or the Federal in-season manager has closed the Kuskokwim River drainage to the harvest of Chinook Salmon by nonsubsistence users, and subsistence users have had very little fishing opportunity. Chinook Salmon fishing opportunities, including schedules, openings, closures, and methods in Refuge waters have been implemented by special actions issued by the Refuge Manager (see **Appendix C**). Harvests of fish other than Chinook Salmon have been allowed only with methods allowing live release of Chinook Salmon. In 2014, limited harvests of Chinook Salmon were allowed and fishing opportunity that was allowed occurred primarily through Federal Social and Cultural Permits that allowed harvests of up to 100 Chinook Salmon per community using most gear types. In 2015, it was necessary to close Refuge waters to the harvest of all fish by nonsubsistence users to prevent the incidental harvest of Chinook Salmon in State fisheries targeting other fish species. Subsistence users were allowed to continue using up to 4-inch mesh gillnets targeting other fish species, but nets had to be set and could be used only during three-day opportunities that were announced through special actions. This was to discourage the targeting of Chinook Salmon in small mesh nets intended for the harvest of nonsalmon fish species. Nonsalmon-bearing tributaries remained open to the use of any size gillnets by subsistence users.

In 2015, each community received a harvest allocation. 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. This opportunity was permitted from June 10–30, with no other time or gear restrictions. The Federal in-season manager realized that community 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.

In 2015, 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 (see **Appendix D**). Designated fishermen harvested salmon that were then distributed 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.

In 2016, both Chinook and Chum Salmon harvesting from Refuge waters were closed to nonsubsistence users so that the Federal in-season manager could continue implementing schedules, openings, closures, and methods through the timing of the Chum Salmon run, which overlaps the Chinook Salmon run. The Federal in-season manager, in consultation with the Kuskokwim River Inter-Tribal Fish Commission, regulated subsistence fishing by closing and opening Refuge waters to the use of gillnets. Harvests of fish other than Chinook and Chum Salmon were allowed only with methods that allowed live release of Chinook Salmon. The State closed the directed Chinook and Chum Salmon sport fisheries and the State closed the Refuge waters to the use of gillnets.

In 2017 through 2019, Chinook Salmon harvesting in Refuge waters was closed to nonsubsistence users. The Federal in-season manager, in consultation with the Kuskokwim River Inter-Tribal Fish Commission, regulated subsistence fishing by closing and opening Refuge waters to the use of gillnets. Harvests of fish other than Chinook Salmon were allowed only with methods that allowed live release of Chinook Salmon. Gillnet use in non-salmon bearing tributaries remained open to subsistence users. The State closed the directed Chinook sport fisheries in the drainage, and the State closed Refuge waters to the use of gillnets.

The Impact of Overlapping Salmon-Run Management on Subsistence Users

Management of Chinook Salmon affects management of other species of salmon because run timing overlaps considerably. People have been restricted from salmon fishing or using effective gear types such as large-mesh gillnets in recent years, even when the majority of salmon in the river were Chum and Sockeye salmon. For example in 2017, the drainage was closed to the harvest of Chinook Salmon from May 20 through June 11. From June 12 through July 3, only four opportunities to harvest salmon with gillnets with up to 6-inch mesh were provided: three 12-hour opportunities and one 6-hour opportunity. The opportunity to harvest Chum and Sockeye salmon while live releasing Chinook Salmon was allowed, but users were restricted to dip nets and not 6-inch or larger mesh gillnets that are typically used. Requiring the use dip nets and live release of Chinook Salmon prevented people from harvesting Chum and Sockeye salmon in large enough numbers to fill smokehouses, and prevented people from retaining the few Chinook Salmon they could have caught and killed in their large-mesh gillnets.

Drying and Smoking Salmon

Hiroko Ikuta and others conducted research on subsistence salmon fisheries in 2012 (see Ikuta et al. 2013). In their report, they describe how people dry and smoke salmon because it is necessary for understanding some of the impacts of early salmon fishing season closures on subsistence users that dry and smoke salmon. The closures occur early in the season, when weather is more likely to be warm and dry. The author discusses why warm and dry weather are necessary to successfully dry and smoke salmon.

> Salmon are cut into fillets and various parts of the fish (i.e., fillets, heads, bones, and roe) are processed into different final products. A portion of deboned king [Chinook] salmon fillets are often processed into a popular product known locally as strips. These are made by slicing deboned king salmon fillets in lengthwise strips. The strips are brined, hung to dry in covered, outdoor racks for a few days to a week, then hung in the smokehouse where wood smoke saturates the flesh with preserving compounds and they dry more completely. This method is also referred to as a cold-smoke process, so-called because drying occurs at temperatures sufficiently low to prevent cooking of the fish. Cold-smoking is a process wherein brining, drying, and smoking each contributes to the fish's preservation. Proper drying of fish for preservation in a cold-smoke process cannot occur at high relative humidity. Cold-smoking of strips is one of the preferred processing methods for king salmon in many parts of the Kuskokwim River because individuals of the species tend to be very large. Large, thick fillets will often not dry thoroughly before spoiling, unless the ambient relative humidity of the fish rack is sufficiently low and the ratio of surface area to mass of the flesh is greatly increased as it is in these strips (Ikuta et al. 2013:124).
>
> Smaller species of salmon such as chum, sockeye, and coho salmon, are often processed into a product known locally as dry fish. In this process, salmon are headed, gutted, and filleted. The fillets are cross-cut through the flesh down to the internal surface of the skin. These fillets are hung on a covered fish rack for several days until dry. The cross-cutting of the fillets increases the ratio of surface to mass of the flesh, allowing quicker and more complete air-drying. It is usually unnecessary for the processors to cut smaller fish into strips, because cross-cutting the thinner fillets sufficiently increases the surface area to mass ratio and allow for drying. Large king salmon fillets are also processed in this fashion by some fishers when weather conditions permit it. Some fishers refer to these as slabs or blankets (Ikuta et al. 2013:124).

Biological Background

Run-Size

Estimates of drainage-wide run size are produced by the Chinook Salmon run-reconstruction model. This model uses multiple sources of data such as weir and aerial escapement indices, commercial catch and effort, mark-recapture estimates, and harvest to estimate annual returns (Smith 2019).

Chinook Salmon abundance in the Kuskokwim River system has been highly variable with cyclical (~10 years) peaks around 400,000 and valleys around 80,000-100,000 fish returns. The last peak run-size occurred in 2004 with an estimated size of 365,368 Chinook Salmon. Run-sizes have dropped steadily from that peak until reaching an all-time low of 75,010 salmon in 2012. Since 2012, the population appeared to be on a slightly increasing trend, with a larger jump in 2019 (**Table 2, Figure 2**). Estimated Chinook Salmon run-sizes since 2015 have been 125,578, 130,475, 131,677, and 136,135 (Tiernan and Smith 2018). The preliminary 2019 estimated run-size for Chinook Salmon is approximately 226,987 (ADF&G 2019).

Direct estimates of total run-size for Kuskokwim River Chinook Salmon are available from 2003–2007 and 2014–2017 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 (with the exception of 2014), while the 2015 to 2017 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 to 2017 (Liller 2017). From 2003 to 2007, direct estimates ranged from 242,000 to 423,000 Chinook Salmon, while 2014–2017 estimates ranged from 78,600 to 133,200 Chinook Salmon (**Table 4**).

An updated run reconstruction model was created and published during 2018 (Liller et al. 2018). The new model uses data collected from a 2014-2017 Chinook Salmon mark recapture project initiated in the lower river, almost doubling the amount of information used for model scaling. The information used in scaling now covers periods of record high and record low run sizes (Liller et al. 2018).

In addition to the mark-recapture abundance estimates, ADF&G in 2017 began operating a sonar and drift gillnet apportionment project near Church Slough above Bethel in order to estimate daily and total abundance of adult salmon species returning to the Kuskokwim River. Given that the sonar is located above Bethel, the total abundance reported is in terms of numbers of Chinook Salmon escaping past the Bethel fishery. In order to calculate a total abundance number, Chinook Salmon harvest and escapement (i.e. Eek River) downriver from the sonar would need to be added to the sonar abundance estimate. As 2017 was the first year the sonar was in full operation, the initial results should be taken into consideration carefully until the project has accumulated more years' worth of data. The data collected for this project is not currently used in the run-reconstruction for Kuskokwim River Chinook Salmon; however, once enough data is accumulated and any challenges are identified and fixed, the sonar data will be pursued and analyzed as an additional data source to be used in the run-reconstruction. The preliminary abundance estimate for Chinook Salmon at the sonar site in 2019 was 162,672 (138,473-186,871 fish) (ADF&G 2019).

Escapement

Chinook Salmon escapement is monitored throughout the Kuskokwim River drainage with a variety of weir and aerial surveys. Currently, four weirs are utilized as data sources in the run-reconstruction model: two in the lower river (Kwethluk and Tuluksak) and four in the upper river (George, Kogrukluk, Tatlawiksuk, and Takotna). The ADF&G discontinued the Takotna weir in 2014, however, the

Kuskokwim Inter-Tribal Fish Commission, with assistance from the Takotna Tribal Council, has since restarted the weir again in 2017. Two other weirs in the drainage are 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 the upper river (Salmon-Aniak, Kipchuk, Aniak, Holokuk, Oskawalik, Holitna, Cheeneetnuk, Gagaryah, Pitka, Bear, and Salmon-Pitka).

Total escapement estimates follow the same general trend as total run estimates with cyclical peaks and valleys. Average high escapement years were around 260,000 Chinook Salmon, while average low escapements were around 85,000 Chinook Salmon. The last peak was in 2004, with an escapement of around 265,000 fish. After the last peak, the Chinook Salmon escapement dropped to a record low of around 41,000 fish in 2013 (**Table 2, Figure 2**) (Smith 2019, ADF&G 2019).

Chinook Salmon escapement in the tributaries is monitored through various aerial and ground-based weir surveys throughout the Kuskokwim River drainage. Currently, there are seven tributaries with escapement goals that are monitored by aerial surveys (Aniak, Cheeneetnuk, Gagarayah, Holitna, Kisaralik, Salmon River of the Pitka Fork, and Salmon River of the Aniak) and three tributaries with escapement goals that are monitored by weir projects (George, Kogrukluk, and Kwethluk). Each of the tributaries monitored by aerial surveys had escapements within or above their established escapement goal range in 2019. The Salmon River of the Pitka Fork, Cheeneetnuk, and Aniak Rivers were above the upper end of their established escapement goals. The George and Kogrukluk River escapements exceeded the upper bound of their goals in 2019, while the Kwethluk was near the upper end (ADF&G 2019).

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. The resulting overharvest from lack of management actions in-season resulted in the lowest escapement on record (an estimated 37,000 fish) (**Table 2, Figure 2**) (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). The new run reconstruction model as revised these estimates lower, with a run size near 84,000 and an escapement near 73,000 Chinook Salmon.

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

SEG of 65,000–120,000 Chinook Salmon (OSM 2015). However, the new run reconstruction model has revised these estimates lower, with a run size near 125,000 and an escapement near 108,000 Chinook Salmon.

In 2016, the Kuskokwim River Chinook Salmon forecast was 125,000–219,000 fish. The Federal in-season manager and the Kuskokwim River Inter-Tribal Fisheries Commission compromised to set a fundamental escapement objective of at least 100,000 Chinook Salmon. Coinciding with that decision, 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 Chinook Salmon run size in 2016 for the Kuskokwim River was around 129,000 fish, which resulted in an estimated escapement of around 98,000 fish.

The 2017 Kuskokwim River Chinook Salmon forecast was 132,000–222,000 fish. The Federal in-season manager, compromised with the Kuskokwim River Inter-Tribal Fisheries Commission, to set a fundamental escapement objective of 110,000 Chinook Salmon. The preliminary estimated total run size in 2017 for Chinook Salmon in the Kuskokwim River was around 167,000 fish, which resulted in an estimated escapement of around 150,000 fish. The level of escapement would have been above the upper bound of the SEG of 120,000 Chinook Salmon. However, the new run reconstruction model has revised these estimates lower, with a run size near 133,000 with an escapement near 117,000 Chinook Salmon.

The initial 2018 Kuskokwim River Chinook Salmon forecast was 140,000–193,000 fish (Smith and Liller 2018). However, this forecast was revised following updates to the original run-reconstruction model to 115,000–150,000 fish (Liller et al. 2018). The Federal in-season manager, working with the Kuskokwim River Inter-Tribal Fisheries Commission, set a fundamental escapement objective of 110,000 Chinook Salmon. The preliminary estimated total run size in 2018 for Chinook Salmon in the Kuskokwim River was around 141,000 fish, which resulted in an estimated escapement of around 110,000 fish.

The 2019 Kuskokwim River Chinook Salmon forecast was 115,000-150,000 fish. The Federal in-season manager, in consultation with the Kuskokwim River Inter-Tribal Fisheries Commission, set a fundamental escapement objective of 110,000 Chinook Salmon. The preliminary estimated total run size in 2019 for Chinook Salmon in the Kuskokwim River was around 227,000 fish, which resulted in an estimated escapement of around 188,000 fish, exceeding the current SEG of 65,000-120,000 Chinook Salmon.

In-Season Run Timing and Composition

In-season management relies heavily on in-river abundance estimates from test fisheries, creel surveys, and effort counts, as well as pre-season forecasts in order to inform harvest decisions that control subsistence opportunities. The main in-river abundance indicator used during the season is the Bethel Test Fishery. The 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 the test fishery is located upstream of where much of the Chinook Salmon harvest takes place, as well as the fact that in-river abundance during the season is confounded with run-timing. There is also 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 for Chinook Salmon during the early stages of in-season management. Returns of Sockeye, Chum, Pink, and Coho salmon to the Kuskokwim River are managed without a numeric pre-season forecast, and instead use basic ratings of above average, average, and below average are used to describe the expected returns for these species.

Chinook Salmon enter the Kuskokwim River beginning in late May and continue through early August, with about 85% of Chinook Salmon passing through the Bethel Test Fishery by July 1 (**Figure 3**). The Bethel Test Fishery starts operating around the end of May and continues until late August. The cumulative catch of Chinook Salmon at the test fishery can best be described by a sigmoidal shaped curve (i.e., logistic), and can be utilized to generalize run-strength, run-timing, and species composition (**Figure 3**). From 1984 to 2018, 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 5, Figure 3**). In 2019, the run-timing of Kuskokwim River Chinook Salmon was slightly early to average (Figure 3; Table 5).

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 (Smith and Liller 2017b). Based on 2018, the run-timing of Kuskokwim River Chinook Salmon was near average (FWS 2018.

Chinook Salmon are the main salmon species moving in the Kuskokwim River in the beginning of the season; however, the composition of the run transitions to Chum and Sockeye Salmon by mid-June (**Figure 4**). From 1984 to 2019, 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 4**). On average, 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 (**Figure 4**).

Early-Season (Pre-June 12) Chinook Run-Timing and Abundance

The following is an overview of the variability in the cumulative proportion of Chinook Salmon that have passed the Bethel Test Fishery from June 1 to June 12 across the time series and under various run-timing scenarios. For the following sections please refer to **Figure 5** and **Table 6**.

From 1984 to 2019, the median cumulative proportion of Chinook Salmon passing the Bethel Test Fishery by June 12 was approximately 13%, with most values falling between 6 – 19%. Over this same time period, the minimum cumulative proportion of Chinook Salmon was 0%, while the maximum was 39%. The large variation in the overall cumulative proportions can likely be attributed to run-timing; therefore, to simplify the run-timing issues the information can be stratified into three categories based on run-timing: early, average, and late.

During the five earliest run-timing years (1996, 2014, 1993, 2003, 1994; average D50: June 17), the median cumulative proportion of Chinook Salmon passing the Bethel Test Fishery by June 12 was approximately 23%, with most values falling between 17 – 35%. During these earliest run-timing scenarios, the minimum cumulative proportion of Chinook Salmon was 16%, while the maximum was 39%.

During the five latest run-timing years (2012, 2007, 2017, 1999, 1989; average D50: June 29), the median cumulative proportion of Chinook Salmon passing the Bethel Test Fishery by June 12 was approximately 3%, with most values falling between 1 – 6%. During these latest run-timing scenarios, the minimum cumulative proportion of Chinook Salmon was 0%, while the maximum was 6%.

During the average run-timing years (1987, 2004, 2009, 2016, 2010, 1986; average D50: June 22), the median cumulative proportion of Chinook Salmon passing the Bethel Test Fishery by June 12 was approximately 11%, with most values falling between 5 – 19%. During these average run-timing scenarios, the minimum cumulative proportion of Chinook Salmon was 5%, while the maximum was 24%.

In all of the scenarios above, the cumulative proportion of Chinook Salmon increases in an exponential fashion from June 1 to June 12, with the earliest run-timing scenario having the largest rate of increase, the late run-timing scenarios having the smallest rate of increase, and the average falling somewhere in-between. Additionally, the variability in the cumulative proportion of Chinook Salmon increases daily under each scenario; however, the early run-timing scenario variability is by far the largest, while the late run-timing scenario is the smallest. Across all scenarios, the cumulative proportion of Chinook Salmon by June 1 is less than or equal to 1%. In average or late run-timing years, the cumulative proportion of Chinook Salmon passing the Bethel Test Fishery by June 6 increased to around 1 – 4%, while in early run-timing scenarios the cumulative proportion is much higher, around 4 – 13%.

When viewed in this manner, it is apparent that run-timing is the most influential factor in determining the proportion of Chinook Salmon that passes the Bethel Test Fishery at any given day between June 1 and June 12. The earlier the run-timing, the more Chinook Salmon are available in the system, while the later the run-timing the less Chinook Salmon are available in the system. However, even within run-timing scenarios, the uncertainty in the cumulative proportion of Chinook Salmon is large; this is especially true under early run-timing scenarios. It is problematic to management that run-timing is so influential in determining the amount of Chinook Salmon passing by the Bethel Test Fishery. This quality poses serious problems because predicting run-timing for Chinook Salmon in the Kuskokwim River drainage is notoriously difficult, both pre-season and in-season.

Advances in forecasting run-timing pre-season for Chinook Salmon in the Kuskokwim River were recently attempted by Staton et al. (2017), using a host of environmental variables to aid in predicting run-timing. Their model predicted an early to average run-timing for the 2017 Chinook Salmon season; however, the run was about 4 days later than average. During in-season operations, run-timing becomes more informed as the season progresses with more data being collected from the Bethel Test Fishery, but is not well known or approximated until the end of June/beginning of July, by which time most of the run has progressed through the Bethel Test Fishery.

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, Smith and Liller 2017a, 2017b). Tagging studies performed by ADF&G in 2015 and 2016 performed near the confluence of the Johnson and Kuskokwim rivers, showed headwater Chinook Salmon comprised between 50 - 67% of the studies' catches during the end of May/beginning of June, while toward the middle/end of June the same sub-stock only comprised 5% or less of the catch. Additional evidence from the Salmon Pitka Fork weir located in the headwaters of the Kuskokwim River drainage also supports this pattern. The absence of a lower river Chinook Salmon subsistence fishery before June 12 for the last five years has aided in some of the largest Chinook Salmon escapements at the Salmon Pitka Fork weir (4,800 – 8,000 fish from 2015 – 2019). During the traditional timing of the Chinook Salmon subsistence fishery, these headwater stocks likely were harvested at a higher rate than the lower and middle river stocks given that the lower river subsistence fishery prefers harvesting in the early part of June when the headwater stocks are moving through the lower river towards their final destinations.

The tagging studies in 2015 and 2016 showed that all sub-stocks display similar migration rates. Between the tagging site near the confluence of the Johnson and Kuskokwim rivers to the area near Bethel (rkm 112), tagged Chinook Salmon migrated at a rate between 9 – 16 rkm/day. Chinook Salmon passing between these locations took 3 – 5 days to pass rkm 112 near Bethel. Chinook Salmon migrating pass this point proceed at a faster rate between 31 – 45 rkm/day (Smith and Liller 2017a, 2017b).

Age Composition

Chinook Salmon returning to the Kuskokwim River drainage usually complete their spawning migration between the ages of 4 and 7, with a majority returning at ages 5 and 6 (Hamazaki et al. 2012). Median brood year recruit age percentages as estimated by the Bayesian state-space spawn-recruit model are around 20% for age 4 fish, 38% for age 5, 39% for age 6, and 3% for age 7 (Hamazaki et al 2012). The sources of age structure for the Bayesian model are a combination of harvest and escapement age data collected by ADF&G through the past commercial fishery, the subsistence fishery, and weir surveys throughout the drainage.

The 2019 Chinook Salmon return saw the arrival of the initial cohort from the 2015 return (4 year olds). In 2019, four-year olds composed approximately 48% of the Chinook Salmon run, which is about a 28% increase from historical composition. Five-year olds from the 2014 cohort composed approximately 32% of the 2019 run, which is a decrease of about 6% from historical composition. Six-year olds from the 2013 cohort experienced a decrease in composition to approximately 15%, which is a 23% decrease from historical composition. Seven-year olds from the 2012 cohort composed <1% of the 2019 run, which is a decrease from the historical composition. This lower magnitude trend in seven-year olds has been consistent since 2014 (Smith 2018, pers. comm.).

Historically, Kuskokwim River Chinook Salmon show a strong sibling relationship at the younger age classes (Larson 2020). The 2019 Kuskokwim River Chinook Salmon return had the highest proportions of 3 (.04) and 4 (.48) year old fish on record. Traditionally, large 4 year old age class recruitments result in large 5 year old returns the following year. With an estimated 48% of the 2019 Chinook Salmon return

coming back as 4 year olds, than the 2020 return to the Kuskokwim River will have a high number of 5 year olds returning if the sibling relationship holds. In addition, the relationship of 3 to 4 year old fish has been increasing in recent years indicating that there should be a strong return of 4 year olds in 2020. Chinook Salmon have been returning at younger ages all across the region, and the potential reasons for this are discussed below in the declines in body sizes subheading.

Population Assessment

The output from the run-reconstruction, along with estimates of harvest and age composition from harvest and escapement is fed into a Bayesian State Space spawn-recruit analysis to produce drainage-wide estimates of productivity, carrying capacity, and age, and recruitment variation (Hamazaki et al 2012). 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).

Management Reference Points

Biological reference points are representative of a standard by which the stock abundance or exploitation rate can be compared to determine stock statuses. The reference points are calculated using estimated productivity and carrying capacity parameters from the spawn-recruit relationship and are used by ADF&G to help assist in establishing escapement goals for Chinook Salmon in the Kuskokwim River.

The reference points used by State management are: equilibrium escapement producing recruitment equal to escapement (S_{eq}), escapement providing maximum sustainable yield (S_{msy}), and escapement providing maximum recruitment (S_{max}).

Two of these reference points (S_{msy} and S_{max}) are used to calculate approximate yield, which are then used to produce two versions of escapement goals: (1) a range achieving at least 90% of maximum sustained yield (MSY) more than 90% of the time and (2) a range achieving at least 90% of maximum recruitment (R_{max}) more than 90% of the time.

The decision to use the S_{msy} or S_{max} version of the escapement goals depends on the nature of the fisheries that exist. A S_{msy} based escapement goal is more appropriate where the fishery is dominated by commercial fisheries that have excess fishing power sufficient to harvest all available yields. A S_{max} based escapement goal is deemed more appropriate where the fishery is dominated by subsistence or sport fisheries that harvest a fixed amount of fish regardless of run size and are attempting to minimize the effort needed to harvest (Hamazaki et al. 2012).

For Kuskokwim River Chinook Salmon, two escapement goal ranges were determined to be 48,400–84,400 Chinook Salmon for S_{msy} and 68,000–113,600 Chinook Salmon for S_{max}. The expected yield has less than a 2.5% chance of being less than 100,000 Chinook Salmon for both of these ranges (Hamazaki et al. 2012), and a greater the 90% probability to average yields greater than 100,000 when using the SEG of 65,000-120,000 (Liller and Savereide, 2018).

Establishing Targets and Limits

Setting the drainage-wide escapement goal for Chinook Salmon in the Kuskokwim River at 65,000–120,000 was a combination of the two escapement goals mentioned in the above section, which considered the subsistence nature of the fishery and the limited commercial fishery, with an additional consideration for not setting the lower bound of the escapement goal below the lowest historical estimated escapement that has provided recruits sufficient for meeting subsistence harvest needs. This additional consideration was needed because the lower bound suggested by the escapement goal range based on S_{msy} was 48,400 Chinook Salmon, which was lower than any escapement ever recorded for this system at the time of the analysis. (Hamazaki et al. 2012). However, the estimated escapement in 2013 has been revised below this point to 36,823 through the updated run reconstruction analysis (Liller et al. 2018).

The escapement goal was most recently reviewed by ADF&G in 2018, but was not recommended for change (Liller and Savereide 2019). The review was deemed necessary due to the recent change in statistical model used by ADF&G to estimate historical run sizes. The revisions to the statistical model resulted in smaller estimates in of drainage wide abundance and escapement, and therefore smaller estimates of total recruits from individual brood years. The same Bayesian state-space spawner recruit analysis was conducted for this review that resulted in the initial 2012 SEG (Hamazaki et al. 2012), with the only difference being updated input data. Changes to the goal were considered not justified as the results were consistent with the past analysis.

The lowest (and deemed most accurate and reliable by ADF&G) estimated escapement that provided enough recruits sufficient for meeting subsistence harvest needs, at the time of the escapement goal review, was approximately 65,000 Chinook Salmon in 2000, which was chosen as the lower bound of the SEG. The upper bound of the SEG was set at 120,000 which was approximately 6,000 more fish than recommended by the S_{max} based escapement goal. Further analysis shows that the selected SEG with buffers on the lower and upper end provides escapements that have a 95% chance of producing yields greater than 100,000 Chinook Salmon, except when escapements are consistently at 120,000 fish at which yield decreases substantially. The SEG does not have the greatest potential to produce MSY, but it achieves a balance of achieving high recruitments that would have the highest chance of meeting subsistence harvest needs, minimizing subsistence restrictions, and providing harvestable surplus for other fisheries (Hamazaki et al. 2012).

It is important to note that the current assessment of stock-recruitment dynamics for Chinook Salmon in the Kuskokwim River are done on the aggregate stock. In reality, the aggregate stock is composed of a mixture of stocks that spawn in tributaries throughout the drainage. Tributary escapement goals are in place to help monitor sub-stock populations; however, these are not based on separate stock-recruitment analyses, but are calculated by the relative size of escapement in comparison to the drainage-wide escapement (Hamazaki et al. 2012). These sub-stocks have their own productivities and carrying capacities associated with them; however, lack of stock identification techniques for harvest make separate stock-recruitment analyses difficult. The protection of weak-stocks is important for Chinook Salmon stocks in the Kuskokwim River because biodiversity in Chinook Salmon biology acts to buffer population production at aggregate scales of complexity by spreading the risk of poor production across a

diverse set of populations and life histories (Schindler et al. 2010). Additionally, Conners et al. (2019) determined that with harvest levels at or near historic maximum (~150,000 Chinook Salmon when combining commercial and subsistence harvest), aiming towards the upper end of the escapement goal is necessary and adequate to minimize risk to less productive stocks

Another important consideration is that the current escapement goal has only been in place for seven years and the escapement that resulted from the years in which the escapement goal was established are just now returning to the Kuskokwim River (6 year olds in 2019 from 2013 brood year). The first year in which a majority of the ages (4–7 year olds) of a return will be from time periods in which the current escapement goal (2013-present) was managed will be 2020, while the first year in which a majority of ages (4–7 year olds) of a return will be from time periods of conservative management (2014-present) will be 2021. Preliminary results from the 2013 brood year, which was well below the lower bound of the escapement goal, are above average and approximately 3.36 recruits per spawner for the cohort that will be returning as 7 years olds this year. The actual return of 7 year old fish will likely be a small contribution to the entire run.

Productivity from completed cohorts from the 2011-2013 brood years have shown increases over the previous 7 years. The estimated recruit per spawner for cohorts from 2004-2010 were: 0.59, 0.52, 0.41, 0.78, 0.58, 0.66, and 1.68 respectively. Productivity increased to 3.22, 2.33, and 3.36 recruits per spawner from 2011-2013 (Staton and Decoses 2019; Larson 2020).

Pre-Season Forecasts

There are 4 different pre-season forecast models that managers can use for the 2020 Kuskokwim River Chinook Salmon season. The current ADF&G model was produced in 2014, another was developed in 2018, and the last two models are new this year.

Prior to 2012, ADF&G did not produce a formal forecast for Chinook Salmon or any other salmon species. Instead, the State produced broad expectations of salmon abundance based on parent-year escapements and recent year trends. The ADF&G would then typically provide an approximation of available surplus for commercial harvest (Liller 2017, pers. comm.).

In 2012 and 2013, a formal forecast was made for Chinook Salmon using a multi-model approach that relied on sibling and spawner-recruit relationships. A variety of competing models were evaluated for each age class and the model with the best fit was used. Age-class estimates were summed (Liller 2017, pers. comm.).

The current ADF&G pre-season forecast run-size ranges for Chinook Salmon in the Kuskokwim River are produced by a method in which the range is equal to the prior year run-size plus or minus the recent seven-year average percent deviation of subsequent year runs. The average percent deviation is not a fixed value; rather it varies as a function of similarity in run-sizes observed, which recently has been around 25% (Liller 2017, pers. comm.). Since 2014, the average percent deviation has fluctuated between 24 – 27%; however, in 2018 the average percent deviation dropped to approximately 17%. The reason for this sudden decrease is that the recent seven-year average had shifted to time periods that include times in

which the Chinook Salmon run sizes have been smaller and more consistent in magnitude. This trend will continue if variability in run sizes remains low for the foreseeable future.

The ADF&G pre-season forecast is usually produced in March because of the time it takes to summarize data coming from the post-season subsistence harvest surveys that occur from September through early November. A total run estimate is produced by late February following summarization of harvest data, pre-season forecast methodology is used to predict the next year's run-size range in March, and pre-season management strategies for that year are formulated based on that prediction (FSB 2017). Additional information is used to develop pre-season management strategies such as recent year's abundance trends, stock productivity, age-class relationships, and other abundance information (Liller 2017).

As of 2018, the current methodology is surprisingly accurate as total run abundances have fallen in or near the pre-season forecast range in nearly every year since 2014 (**Table 7**). This result is a product of an era of low run size returns and extremely low variability in run sizes that the Kuskokwim River Chinook Salmon have resided in since 2010. The 2020 Kuskokwim River Chinook Salmon forecast is 193,000–261,000 fish (**Appendix F**).

In addition to the ADF&G pre-season forecast, there are three models using a Bayesian approach available for management to consider. The BayesTool (Stanton and Catalano 2019) and the AR1 Base and AR1-Empirical models (Cunningham 2020, pers. comm.) provide probabilistic estimates of forecast uncertainty. All three models utilize the entire time series of data to produce a range around the forecast, as opposed to the current ADF&G method of using the previous seven years average percent deviation of subsequent year runs. These types of models are more conducive to decision analysis and risk assessment (Cunningham 2020, pers. comm.). More specifically, they require the manager to state their risk tolerance towards a specified escapement level. Risk levels are inherently different among managers and various escapement targets are justifiable for different reasons, so management actions suggested by these forecasts will be different for different managers. Complete knowledge of the risks will allow managers to more accurately weight the outcomes of management actions. The BayesTool has been used by the USFWS in-season manager since 2018, and was cooperatively used by the USFWS in-season manager and the Kuskokwim River Inter-Tribal Fishery Commission for the 2018 season.

The Bayestool, developed by Benjamin Stanton and Matt Catalano, is available on-line for free. The forecast methodology used in this tool is probabilistically based and is readily updatable during the course of the season via Bayesian updating. The methodology considers deviations in run abundancies from the entire time series, therefore it is able to consider all of the uncertainties in run abundances (Stanton and Catalano 2019). The forecast output range from this model can be very wide, making it difficult for decision makers to grasp. However, using this methodology requires one to think probabilistically (Decossas 2020, pers. comm.). For example, using this tool with the current Coefficient of Variance (C.V.) of 0.29, there is a 25% chance the run will come in under 180,000 or over 264,000 fish. Stating it simpler, there is an equal chance it will be below 180,000 or above 264,000 (**Table 8**). Managers can also consider other points on the probability curve depending on their risk aversion tendencies. Using the Bayestool, it predicts a 95% probability that the 2020 run returns between 125,000 and 380,000 Chinook

Salmon. Additionally, the managers can change the uncertainty of the forecast to see how it may affect any management actions (**Table 8**). Notice that even with the uncertainty doubled, it is unlikely the 2020 Chinook Salmon run returns to an abundance level that occurred prior to 2019 (**Table 8).**

The AR1 Base and AR1-empirical models designed by Curry Cunningham use a lag-1 autoregressive model. This is similar to the pre-season forecast derived by ADF&G, except the AR1 model estimates the autocorrelation level in predictions, instead of assuming the current years forecast is equal to the prior year's run size (Cunningham 2020, pers. comm.). However, scaling forecast prediction uncertainty based on retrospective model performance are more likely to quantify true forecast uncertainty than basing the prediction uncertainty on variance in run reconstruction model estimates. As such, the AR1-base model has the potential to underestimate the uncertainty in the 2020 run size forecast. The AR1-Empirical model scales the forecast uncertainty based on performance across the entire time series, and is more likely to represent the true uncertainty of the 2020 run size (Cunningham 2020, pers. comm.). As such, the 95% AR1-Empirical High Density Intervals (HDI) are much wider than the estimates produced by the AR1-Base model (110,000-328,000 vs 172,000-256,000). Both models have the same point estimate of 213,000 Chinook Salmon (**Figure 6, Table 9**). Both the Bayestool and the AR-1 model have similar forecast, and both models also require the use of a risk assessment tool to be valuable to managers.

2020 Pre-Season Forecast Compared to SEG

This portion of the analysis will focus on the ADF&G pre-season forecast and its relation to historical harvest ranges as that is the forecast model that State managers would likely use for the season. It is unknown which forecast model would be used if the run was not managed by the ADF&G. The ADF&G 2020 Chinook Salmon pre-season forecast is 193,000 to 261,000 fish. It is widely known that Chinook Salmon begin their migration into the Kuskokwim River around the end of May/beginning of June. In-season data collection at the Bethel Test Fishery does not typically begin until the end of May/June 1 and even with that, the Bethel Test Fishery does not become a useful management tool until run-timing is approximated at the end of June or in early July. It is important to note that there are no current projects that can help inform management when and where Chinook Salmon are located until salmon begin migrating past the Bethel Test Fishery. This highlights the importance of the pre-season forecast in the early season management of Chinook Salmon in the Kuskokwim River. With a forecast available for the 2020 Chinook Salmon season, it is possible to look at the potential allowable harvest for Chinook Salmon. Potential allowable harvest can simply be calculated by subtracting escapement targets from the lower, middle, and upper bounds of the SEG from the lower and upper bounds of the pre-season forecast. This allows for the comparison of potential allowable harvest to the historical range of Chinook Salmon subsistence harvest during generally unrestricted times between 1990 and 2009 (67,596 – 109,778 fish, **Table 2** and **Table 3**).

The following all use the ADF&G pre-season forecast and the Kuskokwim River Chinook Salmon SEG (65,000 to 120,000 fish). Managing for escapement near the lower quartile of the SEG (65,000 – 79,000 fish), potential allowable harvest ranges from 114,000 to 196,000 Chinook Salmon for any of the run-sizes found within the pre-season forecast. This potential allowable harvest range would be above the historical range of Chinook Salmon subsistence harvest during unrestricted times (from 67,596 fish to

109,778 fish). If managing for escapement near the middle of the SEG (92,500 fish), potential allowable harvest ranges from 100,500 to 168,500 Chinook Salmon for any of the run-sizes found within the pre-season forecast. This potential allowable harvest range is mostly above the historical range of Chinook Salmon subsistence harvest during unrestricted times. And finally, if managing for escapement near the upper quartile of the SEG (106,000 – 120,000 fish), potential allowable harvest ranges from 73,000 to 141,000 Chinook Salmon for any of the run-sizes found within the pre-season forecast for the 2020 season. The majority of the potential allowable harvest range is within or above the historical range of Chinook Salmon subsistence harvest during unrestricted times.

Even targeting an escapement near the upper quartile of the SEG (106,000 – 120,000 fish) will likely allow for an unrestricted subsistence fishery in 2020 if the forecast it realized.

Declines in Body Size

Chinook Salmon returning to western Alaska are returning at smaller sizes than in the recent past (Lewis et al. 2015, Siegal et al. 2017). Decreases in length at age have been documented across Alaska, and across a range of population sizes and exploitation rates, suggesting marine conditions may be a major factor (Lewis et al. 2015). Specific to the Kuskokwim River, fish that spent 4 years in the ocean (6 year old fish) were found to have decreased in length, while Chinook Salmon that have only spent 3 years in the ocean have showed mixed results, with the samples from the commercial fishery in the lower river showing a decrease in length while samples from the Kogrukguk River weir showing a slight increase in length at age. Across western Alaska the length of 3 ocean fish has mostly remained the same showing decreases in the Kuskokwim and Nushagak Rivers, while the Yukon, Kogrugluk, and Goodnews Rivers show no change. Length of fish that have spent 2 years in the ocean remained at the average length at age on the Yukon, Kuskokwim, Kogrugluk, Kanektok, and Goodnews Rivers, while showing significant increase in growth from fish returning to the Nushagak River (Lewis et al. 2015). In addition, a recently released report by an AYK SSI independent expert review panel reports a 9% decrease in length of female Chinook Salmon spawning in the Kuskokwim River since the early 1970's (Ohlberger et al. 2020).

There are indications that average weights of Kuskokwim River Chinook Salmon have decreased along with the average lengths. The average weight of commercially caught Chinook Salmon in 1985 was 17.0 pounds, and by 2010, the last year with a significant number of commercial openings, the average weight had decreased to 13.1 pounds (Lipka and Tiernan 2018). Lower average weights were seen 2011, 2012, 2015, and 2016; however, the number of commercial openings were low and provided a low sample size. The lowest years on record were 2015 and 2016 at 9.0 pounds and 8.6 pounds respectively. However, there was only 1 opening per year during these years, thus the sample size was small and collected after peak migration had occurred, suggesting the samples may not be representative of the entire run. Commercial salmon fishing was restricted to 6-inch or less mesh beginning in 1985 (Lipka and Tiernan 2018), and is more comparable to modern data than data from before1985.

In addition, Chinook Salmon in western Alaska have been returning at a younger age. Siegal et al. (2017) found that the mean age of Chinook Salmon in the Kogrugluk River decreased from 5.32 years old to 5.12 years old during the brood years from 1974 to 2006. Researchers estimate that during the last 25-40

years, the number of 6+ year old fish in the population has declined approximately 25% in the Kuskokwim River (Ruggerone et al. 2016), while proportions of four and five year old Chinook Salmon have increased during this period (Lewis et al. 2015). This decline in older Chinook Salmon was more pronounced for even brood years than odd brood years, potentially due to interactions with Pink Salmon originating from Russia (Ruggerone et al. 2016).

Theories as to why Chinook Salmon are returning smaller and at younger ages are mixed. Using historical adult scale collections to examine growth rate on Chinook Salmon to compare with recent returns, researchers have found increased growth rates in the marine environment (Ruggerone et al. 2016, Siegal et al. 2017). There is a strong correlation between warmer Sea Surface Temperatures (SST) in the Bering Sea and increased growth during the first and second year at sea. Additionally, a correlation between this increased growth during the first two years at sea and earlier maturation also exists (Siegel et al. 2017). These results suggest that when male Chinook Salmon grow faster, they reach a size threshold for maturation at an earlier age. However, there was no correlation found between increased SST and growth during the third year at sea. Another study found that age of maturity of Kuskokwim River Chinook Salmon was inversely correlated to growth during their second and third year at sea, meaning that the slower growing fish matured at an older age (Ruggerone et al. 2016). Traditionally, western Alaskan Chinook Salmon stocks return at older ages than the majority of populations from other locations (Lewis et al. 2015). Warming ocean temperatures may be changing the age structures to be more similar to populations found further south.

Size selectivity in the commercial and subsistence fisheries harvest has the potential to alter sex and age composition of salmon populations (Lewis et al. 2015). Age at maturation is affected by genetic heritability, with 49%-57% of variation in maturation of males and 39%-41% of variation in maturation of females coming from the parents. So nearly half of the variation is from genetic factors (Hankin et al. 1993, Lewis et al. 2015). Lewis et al. (2015) found similar decrease in length at age in older fish (4 ocean) and decrease in the age at maturity across the Chinook Salmon range in Alaska. These changes were similar in both heavily and lightly exploited populations, suggesting the changes occurred due to factors other than harvest (such as climate and ocean conditions). Staton (2015) suggested that the exploitation on Kuskokwim River Chinook may not be high enough to alter sex and age composition on the spawning grounds, using the Nushagak River commercial fishery as support. Commercial harvest there usually consists of smaller sized Chinook Salmon as the fishery primarily targets Sockeye Salmon, yet these Chinook Salmon have shown similar trends in decreasing size as Kuskokwim River Chinook (Kendall and Quinn 2011, Lewis et al. 2015). There is also sportfish harvest in this system, which tends to selectively harvest larger fish and may slightly confound these results.

There are some implications of Chinook Salmon returning at younger ages and smaller sizes. Downward shifts in length at age and age at maturity can affect fitness of Chinook Salmon by reducing fecundity (Hard et al. 2008, Bell 2012, Caulduch-Verdiell et al. 2014, and Lewis et al. 2015). In Addition, larger females produce larger eggs, which typically have increased survival (Wertheimer et al. 2004, Quin et al. 2011, and Lewis et al. 2015). Changes in size may also cause a change in spawning habitat use (Lewis et al. 2015). The theoretical limit for decrease in age may occur when most females mature after 3 years in

the ocean and males after 2 years in the ocean, mainly due to the lengths at these ages represent the minimum needed to sustain migrations and to maximize fecundity (Ricker 1980, Lewis 2015).

Recent simulation-based research has indicated that a decrease in an overall length of female Chinook Salmon in the Kuskokwim River may cause an estimated reduction of about 21% (18-28%) fewer eggs and 35% (32-45%) lower egg mass compared to the early 1970s (Ohlberger et al. 2020). Estimates were completed using fecundity data collected on Chinook Salmon from the Yukon River at Eagle River sonar (near the U.S. border with Canada). The study also notes a 7.5% reduction in percent females in the Kuskokwim River population from four decades ago. However, data from assessment projects in the drainage show that while the recent five-year average (2015–2019) of percent females is down approximately 7% over the 1976–2009 average, the recent 10-year average (2010–2019) is equal to the 1976–2009 average of 34% (**Table 9,** ADF&G 2020d). Ohlberger et al. (2020) also performed a stock-recruitment model for Chinook Salmon in the Kuskokwim River, with results suggesting that the length of female Chinook Salmon has a considerable effect on expected recruitment. They noted that the uncertainty in the relationship between recruitment and total egg mass is large compared to the effect of female length on escapement at maximum sustained yield (Ohlberger et al. 2020).

Ohlberger et al. (2020) also performed a spawner-recruit analysis for Chinook Salmon in the Kuskokwim River based on quality of escapement, with results suggesting that age and length of female Chinook Salmon has an effect on expected recruitment. When simulating use of unrestricted gear, the authors state that more fish would be needed on the spawning grounds to meet Smsc (the total number of spawning salmon that would be expected to produce maximum sustainable harvest) than need for the model used by ADF&G. The effect of gear on Smsc when considering escapement quality does suggest a trade-off whereby lower escapement goals could perhaps be implemented if stakeholders were willing to accept consistently using smaller restricted-mesh gear (**Figure 7**, Ohlberger et al. 2020)

There are limited options available to managers to slow, stop, or reverse the trends of declining fish body size. Options that would affect this decline on the population are limited to such items such as restricting gill net mesh sizes, extensive fishery closure windows to allow periodic uninterrupted passage, or complete closure of the river.

Risk to Stock Diversity

Salmon biodiversity is important for ensuring the health of populations into the future, with population diversity being the driver of several agencies' policies such as the State of Alaska's Sustainable Salmon Policy (Conners et al. 2019). Populations can vary in productivity over time, and systems that are currently struggling could be more productive in the future. This change in production over time shows the importance of keeping biodiversity in its natural state. Higher productivity in one location can offset lower productivity in another while still keeping the overall drainage wide production relatively stable (Brennan and Schindler 2019).

Over fishing and high exploitation rates can threaten stocks with lower productivity, while stocks with higher productivity can sustain higher rates of exploitation (Ricker 1954; Conners et al. 2019). Conners et al. (2019) simulated the chances of a population being extirpated at differing exploitation rates for the

Chinook Salmon in the Kuskokwim River, and found that with an exploitation rate of 50% leads to 20% of stocks at risk of extirpation. At 40% exploitation leads to10% of stocks at risk of extirpation and 30% exploitation leads to 5% of stocks at risk of extirpation. In addition, this same study also suggested that a target harvest near historic maximum (around 150,000 Chinook Salmon) would require managing for the upper end of the escapement goal to minimize extirpation risk.

Estimated exploitation rates of Kuskokwim River Chinook Salmon from the subsistence catch have varied tremendously between 1976 and 2013, with a low of around 15% in 1978 to a high of 59% in 2010. The average exploitation rate of Chinook Salmon specific to subsistence harvest on the Kuskokwim River during that time frame is near 33%, occurring at a time before the front end closure was enacted in 2017. Historically, the subsistence harvest hasn't exceeded the 50% exploitation rate except during times of smaller returns (<130,000 run abundance) (**Figure 8;** Decossas 2020, pers. comm.).

A run that returns at the upper end of the 2020 preseason forecast range (193,000 to 261,000 fish) would have 50%, 40%, and 30% exploitation rates of 130,500, 104,400, and 78,300 Chinook Salmon, respectively. If the run were to come in at the mid-point (227,000) of the pre-season forecast, the 50%, 40%, and 30% exploitation rates would be 113,500, 90,800, and 68,100 fish respectively. If the return were to come in at the lower end (193,000) of the preseason forecast, the 50%, 40%, and 30% exploitation rates would be: 96,500, 77,200, and 57,900 fish respectively. The three harvest levels (50%, 40%, and 30% exploitation) for all three forecast scenarios (upper end, mid-point, and lower end) would be within the historical unrestricted harvest range of 67,596 to 109,778 Chinook Salmon, except for the lower end forecast at the 30% (57,900 Chinook Salmon) exploitation rate. At a 50% exploitation rate, and with the run returning anywhere within the preseason forecast range, escapement would still remain within or above the upper end of the drainage wide escapement goal range of 96,500 to 130,500 Chinook Salmon. The level of risk to stocks is determined by the manager, and this risk tolerance will differ between managers.

Impacts of Climate Driven Heat Stress on Migrating Salmon

Extended exposure to temperatures above 20°C can have negative physiological effects on Chinook Salmon. Studies conducted in laboratory settings found that adult Chinook Salmon exposed to a water temperature of 19°C for more than a few hours can have a negative effect on egg viability (Berman 1990). Chinook Salmon subjected to thermal stress may exhibit increased levels of a heat shock protein (HSP70), with a study currently testing this on the Yukon River (Shink 2020, von Biela et al., *In prep).* The results from this study show different gene activity of fish held in water below or above 18°C.

Heat stress can also have an effect on migration timing, behavior, egg development and disease resistance (Geist et al. 2006, Goniea et al. 2006, Benda et al. 2015, Shink 2020). The U.S. Environmental Protection Agency (EPA) identified that water between 17°C and 18°C can have negative effects on salmon's ability to migrate, temperatures above 20°C reduce swimming performance, and temperatures greater than 21 or 22°C blocked migration (EPA 2003, Shink 2020). These elevated temperatures have been linked to barriers to migration (Keefer et al. 2018) and increased pre-spawn mortality (Keefer et al. 2010). Elevated mortality can occur above 18°C (Crossin et al. 2008; Shink 2020) with near death occurring quickly at

25°C or above (Brett 1952, cited in Shink 2020). However, Salmon will routinely seek out cool water refugia, such as cold tributaries or cool water seeps, during times of high water temperatures when possible (Torgenson et al. 1999), thereby reducing the effect of water above their preferred range.

Freshwater temperatures have significantly exceeded species thresholds for salmon during recent years' heat events in Alaska. Water temperatures ≥ 21 or 22°C have been recorded in the Andreafsky and Gisasa Rivers (tributaries to the Yukon River) in the recent past (Carlson and Edwards 2017, Mears and Morella 2017). Temperatures >20°C encountered on the Yukon during 2019 are suspected of causing mortality in pre-spawn Chum Salmon (Shink 2020).

Specific to the Kuskokwim River, loggers placed at different tributary locations in the drainage (Kwethluk, Tuluksak, Aniak, Kogrukluk, George, Tatlawiksuk, Takotna, and Salmon Pitka Fork rivers) have registered temperatures above 15°C each year between 2009 and 2017 (Davis and Davis 2019). Only three locations in this data set registered temperatures above 20°C, the Tatlawiksuk, Takotna, and Salmon Pitka Fork Rivers. On average the Takotna, and Salmon Pitka Fork see 3 days and 1 day at ≥20°C per year, respectively (the Tatlawiksuk registered only one day ≥20°C during that period, in 2009). Temperature data from 2019 is limited at this time, but the Salmon Pitka Fork River registered two days at 20°C, while the George River had a maximum temperature of 19°C (ADF&G 2020, pers. comm.). Temperatures ≥20°C were recorded in the Kwethluk River on six days during 2019. Afternoon water temperatures were ≥20°C from July 5-July 9 and again on July 11. The morning water temperatures were mostly under 18°C but varied from 17°C to 19°C (Weber 2020, pers. comm.). Long term water (1984-2018) temperatures at the Bethel Test Fishery typically average near 15°C during the heat of the summer; however, the latest 5 year (2015-2019) average is closer to 17°C during this time frame (ADF&G 2020, pers. comm.). In 2019, the Bethel test fishery record 12 days in a row (7/6-7/17) of water temperatures at ≥20°C with a maximum of 22°C (ADF&G 2020, pers. comm.), which is 5-7°C above the long term average. Although temperatures ≥20°C have been documented in the past, they haven't been recorded at ≥20°C for this length of time. For reference, 83%-92% of the Chinook salmon run is typically past the Bethel Test fishery by July 5 based on the central 50% of all run timing scenarios, as demonstrated above in the section In-season Run Timing and Composition. Although extended periods of water temperature ≥18°C are not occurring in the spawning tributaries based on the available data, fish traveling through the lower river have clearly experienced conditions within heat stress levels for salmon during this past summer, particularly Chum and Sockeye salmon who generally migrate upriver in shallower waters than Chinook Salmon.

Uncertainty in Management of the Fishery

Management of fisheries is inherently uncertain (Holland 2010). Each step of the assessment process has uncertainty associated with it, starting with preseason forecasts, inseason assessment, management implementation, harvest estimates, and climatological stressors. The issues of preseason forecast and its associated uncertainty in the forecast range, difficulties of using the Bethel test fishery for management, and heat stress have been discussed above, so this section will focus on management implementation and harvest estimates.

Management of the Kuskokwim River Chinook Salmon stocks is challenging due to a lack of in-season data. Currently, the Bethel Test Fishery is the primary source for run timing and run strength; however, the sonar is entering its fifth year and is becoming more useful. The test fishery and its weaknesses have been discussed above. In addition to the difficulties in using the Bethel Test Fishery for in-season management, there is an inability to separate out stock run timing. In general, the stocks from the headwaters return the earliest, but the remainder of the stocks are difficult to separate (Clark and Smith 2019). The inability to focus harvest on the more productive stocks during a given year provides uncertainty in implementing a fishery. Too much pressure at the wrong location can jeopardize weak stocks, potentially leading to extirpation. Conners et al. (2019) suggest that aiming for the upper end of the escapement goal can help mitigate those risks, but this was only necessary at higher harvests of around 150,000 Chinook Salmon.

In-season harvest estimates have been conducted by the Yukon Delta National Wildlife Refuge, in cooperation with the Kuskokwim River Intertribal Fisheries Commission and the Orutsararmiut Native Council during recent years (Decossas 2019). The collection of this data had helped the in-season manager make informed decisions, particularly during years with lower returns (Decossas 2019). Sampling occurred during every opportunity announced by the Federal in-season manager during June. Harvest was estimated from camps, boats returning to the Bethel boat harbor, and from villages along the lower Kuskokwim River. These efforts have provided the most up to date in-season harvest estimates in recent times. In addition, aerial surveys were flown to estimate effort during these opportunities. For the 2020 season, it is anticipated that the Yukon Delta NWR will start the season with similar harvest monitoring efforts and will adjust after the first week if indicators of run strength match the pre-season forecasts (Decossas pers. comm.).

One way to identify acceptable levels of risk is through a structured framework that identifies risk, itemizes potential consequences, identifies tolerances for those consequences, and then identifies the potential for those consequences occurring (Feeny et al. 2019). This process is sometimes referred to as management strategy evaluation, and is commonly developed with a mix of fisheries scientists, fishery managers, and stakeholders. Once the objectives are defined, the management strategy evaluation model can allow management options to be tested to see if strategies can achieve predefined objectives (Pew Charitable trust 2016). The Bayestool mentioned in preceding sections, contains the Pstar model, which is used in management strategy evaluation plans for many marine fisheries. The Yukon Delta National Wildlife Refuge has used these tools in management of the Kuskokwim River Chinook Salmon fishery during 2018 and 2019 to test the results of potential management strategies prior to announcing fishing opportunities. A properly conducted management strategy evaluation provides a solid first step in building a management plan through regulatory processes. The Yukon Delta NWR is in the initial phases of conducting a management strategy evaluation with stakeholders (Ray Born pers. Comm. 2020).

Harvest History

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 in 1959. 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 are 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 2018. The average harvest during this period was around 9,800 Chinook Salmon (**Table 2, Figure 1**; Liller and Smith 2018).

Subsistence

The Kuskokwim River Chinook Salmon subsistence fishery is the largest in Alaska. Before 1990, annual harvest surveys employed various non-standard methods that were not always comparable between years. In 1990, a formal statistical survey protocol was established (Walker and Coffing 1993, Simon et al. 2007). Since 2009, the harvest of Chinook Salmon has been restricted during most years.

From 1990 to 2009, annual subsistence harvest averaged 86,418 fish, with a range of 67,620 fish in 2000 to 109,778 fish in 1990. 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 (2014–2018), ten-year (2009–2018), and 20-year (1999–2018) average annual subsistence harvest estimates for Chinook Salmon are: 44,013 fish, 37,299 fish, and 60,287 fish, respectively (**Table 2**, Liller and Smith 2018). The Chinook Salmon subsistence harvest for 2019 was 37,941 fish (Liller and Smith 2018). Annual harvest estimates by village for the time period 2008–2018 are reported in **Table 11**. The 2019 estimates of harvest by village are not yet available. The majority of harvest has occurred in the lower river, where the majority of the human population of the drainage resides (**Table 1**).

Ohlberger et al. (2020) estimated changes in mean length and reproductive potential of Chinook Salmon, discussed above in Biological Background. They also estimated that the associated decline in fish energy content, caloric value, from the early 1970s to recent years to be 22–33% in the Kuskokwim River; roughly 100 fish caught in the early 1970s provided the same amount of energy as roughly 138 fish caught in recent years in the Kuskokwim River. Findings of this research agree with local observations on the Kuskokwim River; however, more research is needed to further substantiate these estimates.

Section 804 Subsistence User Prioritization Analysis

The following sections address the closure under ANILCA Section 804, which the proponent requested the Board to implement. For Chinook Salmon in the Kuskokwim River drainage, the Board has delegated the Federal in-season manager the authority to close Refuge waters to nonsubsistence uses and to close Refuge waters to all uses, but not to implement a closure under Section 804 establishing a priority among subsistence users.

Section 804 of ANILCA, 36 CFR 242.17, 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 at 36 CFR 242.17 and 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. The following sections address these criteria as they relate to each of the communities included in the customary and traditional use determination for Chinook Salmon in the Kuskokwim River drainage.

Most residents of the Kuskokwim Fishery Management Area (except those persons residing on the United States military installations located on Cape Newenham, Sparrevohn U.S. Air Force Base, and Tatalina U.S. Air Force Base) have a customary and traditional use determination for Chinook Salmon in the Kuskokwim River drainage. The area includes 40 villages (**Table 1**).

Sources of Information

Published ethnographic studies of the communities that have a customary and traditional use determination for Chinook Salmon in the Kuskokwim River drainage include: Fienup-Riordan (1983, 1984), Ikuta et al. (2013), Oswalt (1959, 1990), Wolfe and Ellanna (1983), Wolfe and Spaeder (2009), and Wolfe et al. (1983). Historical and contemporary subsistence patterns are described in the technical paper series of the Division of Subsistence, ADF&G. Harvest statistics are housed in three places. The results of comprehensive (includes the use of all wild resources) household harvest surveys are reported in the Community Subsistence Information System, an online database, Division of Subsistence, ADF&G (2014b). The FWS/ADF&G permit reporting system is another source, but it is not widely used by residents of the Kuskokwim River drainage. Finally, drainage residents report their harvests of salmon during annual household harvest surveys that are described in Lipka and Tiernan (2018) and McDivitt et al. (2019) (**Table 11**). The primary purpose of comprehensive household harvest surveys is to document subsistence uses of wild resources. These quantitative studies focus on one-year time periods; however, they may not be the “typical” year. In fact, annual variation in subsistence patterns can be significant as subsistence harvesters respond, for example, to the availability of resources or employment opportunities that may vary considerably from year to year. Thus, harvest estimates for some communities may be imprecise and large data sets are required to detect trends. Household harvest survey data are collected, processed, and reported by major resource categories (for example, salmon and nonsalmon fishes).

Harvest levels are converted to pounds (lbs.) edible weight and presented as per capita harvest levels. Per capita harvest levels allow comparisons between resources and communities and take into account human population differences by community and through time (**Table 12**).

The sections below describe the customary and traditional harvest and use of Kuskokwim River drainage populations of Chinook Salmon, the degree of local residency of subsistence users, and the availability of subsistence resources as an alternative to Kuskokwim River drainage Chinook Salmon.

Criterion 1: Customary and Direct Dependence upon the Population as the Mainstay of Livelihood

1. Residents of South Kuskokwim Bay

Goodnews Bay, Quinhagak, and Platinum—Chinook Salmon are a mainstay of the subsistence economy for the villages; however, Chinook Salmon are generally harvested from drainages nearby the villages including the Kanektok, Goodnews, and Arolik rivers and not from the Kuskokwim River drainage (La Vine et al. 2007). Salmon spawn locally in the Kanektok, Goodnews, and Arolik river drainages, first arriving in May. Historically, people harvested salmon while living at summer fish camps located in the drainages. Currently, people harvest salmon closer to the villages and return to processing sites located nearby their homes. People moved from the historical village of Apokak when the bank eroded into Apokak Slough (around 1935). Apokak Slough is located at the mouth of the Kuskokwim River. Some people chose to move to Eek while others moved to Quinhagak (La Vine et al. 2007).

2. Residents of Nelson Island, and Newtok and Chefornak

Newtok, Nightmute, Tununak, and Toksook Bay—Chinook Salmon are not a mainstay of the subsistence economy. These villages rely more on herring, nonsalmon fishes, and marine mammals than they do on salmon. Salmon are harvested, but from marine waters closer to the villages and not from the Kuskokwim River drainage (Fienup-Riordan 1983, Wolfe et al. 2012). Instead, herring, other nonsalmon fishes, and marine mammals are harvested at high levels by Nelson Island people. Tununak and Toksook Bay are located near herring harvesting areas. Herring are generally abundant near the villages. Some residents of Newtok and Nightmute set up camps near to Tununak or Toksook Bay to harvest, process, and preserve their herring (Fienup-Riordan 1983, Pete 1984, Wolfe et al. 2012).

Chefornak—Chinook Salmon are a mainstay of the subsistence economy. People at Chefornak, while culturally and linguistically related to the people of Nelson Island, do not have opportunities to harvest herring at the high levels seen on Nelson Island. Other nonsalmon fishes and marine mammals are likely harvested at high levels also (Fienup-Riordan 1983, Pete 1984). The people of Chefornak inhabit the flat coastal region between the mouth of the Kuskokwim River and Nelson Island at the juncture of the Keguk and Kinia rivers, 12 river miles from the Bering Sea. Early in the 1950s people moved from the village of Old Svarnak to the location of Chefornak near the new Bureau of Indian Affairs school. People at Chefornak began harvesting herring from areas near their village fairly recently (before 1984) (Fienup-Riordan 1983, Pete 1984).

Historically, some families traveled to the Kuskokwim River to fish for salmon from June to August based at seasonal fish camps where they harvested, processed and preserved salmon. The trip took up to

four days by boat. Outboard motors shortened travel time. Currently, a few Chefornak families still travel to their Kuskokwim River fish camps to harvest, process, and preserve Chinook Salmon. A few people retain salmon from their commercial harvests in Bristol Bay. They harvest a mixed variety of Chinook, Chum, Sockeye, and Coho salmon from near-shore waters of Etolin Strait and Cape Vancouver. People catch Coho Salmon during August in the Kinia River that is adjacent to the village (Wolfe et al. 2012). In 2011, people harvested an estimated 840 salmon, 141 harvested from the Kuskokwim River, the majority Chum or Sockeye Salmon. More than half the Chinook Salmon was harvested in the Kuskokwim River (95 fish). Wolfe et al. (2012:7) reported that "salmon was commonly cut as flanks and strips and salted, dried, and smoked, or half-dried (fermented) and cooked, or frozen for later use. Some families salted heads. Some salmon used to be buried and aged underground (taken out before winter), but this was not common anymore."

3. Residents of Nunivak Island

Mekoryuk—People at Mekoryuk do not rely on Chinook Salmon as a mainstay of the subsistence economy (Pete 1984, Drozda 2010, Wolfe et al. 2012). They harvest large numbers of nonsalmon fishes and marine mammals also. At least one stream on Nunivak supports a Sockeye Salmon run. People occasionally harvest Chinook Salmon when they travel across Etolin Strait to Cape Vancouver and fish with gillnets (Pete 1984, Drozda 2010, Wolfe et al. 2012). Most Nunivavaarmiut live at Mekoryuk on Nunivak Island. People at Mekoryuk do not rely on herring as much as the people of Nelson Island, probably because herring are less predictable and harder to locate in harvestable numbers. Historically, the arrival of herring coincided with walrus hunting season. In 2011, during a house to house harvest survey, people reported harvesting only Chum, Coho, and Pink Salmon (Drozda 2010, Pete 1984, Wolfe et al. 2012).

4. Residents of the Coast

Kwigillingok and Kongiganek—Chinook Salmon are a mainstay of the subsistence economy for the villages and are harvested from the Kuskokwim River drainage (**Table 11**, **Figure 9**, Stickney 1983). People of Kwigillingok and Kongiganek inhabit the flat coastal region between the mouth of the Kuskokwim River and Nelson Island. Salmon fishing has long been one of the primary activities of the people living along this area of the coast (Stickney 1983). In the 1960s, some residents of Kwigillingok, in order to escape flooding, moved their houses and established the village of Kongiganek about nine miles away. Historically people moved to seasonal fish camps on both sides of the Kuskokwim River mouth in order to harvest, process, and preserve salmon. Probably starting in the 1930s, people moved their fish camps to locations near to Napakiak and Napaskiak. Since the 1980s, people generally have not moved to fish camps in the lower Kuskokwim River. Men generally go by boat to harvest salmon at the mouth of the Kuskokwim River and return to Kwigillingok or Kongiganek the same day. Salmon are processed in the village. Some residents have had commercial fishing permits for the Kuskokwim Area and likely return home with some salmon retained from their commercial catches. People do not have access to other runs of Chinook Salmon. Salmon are dried and smoked in June and July. August is generally rainy, and not favorable for drying. In 1983, the combined harvest of Chinook and Chum Salmon usually numbered in the several hundred per household (Stickney 1983).

Kipnuk—Chinook Salmon are a mainstay of the subsistence economy (**Figure 9**, Wolfe et al. 2012). Kipnuk is situated on the Kuguklik River near the coast, about 60 miles from the mouth of the Kuskokwim River. Kipnuk's wild food harvest also includes herring, Blackfish, Halibut, needlefish, Tomcod, whitefish, cisco, Pacific Cod, and smelt. Additionally, in 2011, Kipnuk people harvested an estimated 3,147 salmon, and 25% was Chinook Salmon, in lbs. edible weight. Sockeye Salmon were harvested at the highest level, 32% in lbs. edible weight. It is estimated that two thirds of Kipnuk's salmon harvest was from the Kuskokwim River, and 95% of Kipnuk's Chinook Salmon harvest of 479 fish was from the Kuskokwim River (Wolfe et al. 2012).

Historically, some families traveled to the Kuskokwim River to fish for salmon from June to August based at seasonal fish camps where they harvested, processed and preserved salmon. Kipnuk people's fish camps were generally located along the east side of the Kuskokwim River mouth at the north end of Kuskokwim Bay, across and south from Eek Island. Before outboard motors, the trip took up to three days. In recent years, a few Kipnuk families still travel to their Kuskokwim River fish camps to harvest, process, and preserve salmon. Other people harvest salmon from the local area and from the Kuskokwim River usually returning in a single day or after camping overnight, especially during Chinook Salmon season; however, a few travel to Bethel by airplane to harvest from fish camps near Bethel. Wolfe et al. (2012:8) described that in Kipnuk "drying salmon was rare. Because of the high oil content of ocean salmon and the wet weather, key respondents reported that it was difficult to dry salmon taken locally. Some families traded for dried salmon from the Kuskokwim area, offering seal, Halibut, and other products." Salmon were half-dried and frozen, or frozen whole, and cooked. Some salmon were salted (Wolfe et al. 2012).

5. Residents of the Lower and Middle Kuskokwim River Drainage

Tuntutuliak and Eek—Chinook Salmon harvested from the Kuskokwim River drainage are a mainstay of the subsistence economy in these villages (**Tables 9 and 10**, **Figure 9**, Ray et al. 2010, Ikuta et al. 2013). Eek is located on the Eek River about 12 miles from the Kuskokwim River. In the 1930s, many people moved to the present site seeking refuge from inland locations that were flooding seasonally and to attend the school. Currently, people maintain summer fish camps on Eek Island, near the entrance of *Eenayarak* River. Tuntutuliak is located on the north bank of Kinak River (also called the Tunt River). In about 1957, people moved from the Kinak settlement, situated at the mouth of the Kinak River where it enters the Kuskokwim River, and *Qukaqllircaraq* settlement, situated inland, when a school was built at the present site of Tuntutuliak. The site is not located in an area that was heavily used historically, and people must travel away from the village for many hunting and fishing activities. Many families continue to move seasonally to spring, summer, and fall camps (Ray et al. 2010, Ikuta et al. 2013).

When their historically-used fish camps situated at the mouth of the Kinak River eroded out, most families began harvesting, processing and preserving salmon from seasonally occupied fish camps situated directly across the Kuskokwim River from the Kinak River until the 1950s. Eventually, people observed fewer near shore fish. Between 1950 and 1965, most families abandoned these fish camps and moved seasonally to Fish Camp Island (*Kuiguyuk*) in the Johnson River area, during a period that coincided with school vacation. People began to fish from Tuntutuliak when improvements in motors

made it possible to reach the Kuskokwim River quickly. Currently, few people stay at summer fish camps, instead operating salmon processing and preservation stations nearby their homes in Tuntutuliak. People dry salmon roe, eat the organs, backbones and skin, and clean, braid, and dry the stomachs, esophaguses, and intestines. People make stinkheads or salt the heads. Chinook Salmon are the most popular eating fish. People dry Chinook Salmon when the weather is ideal in order to produce the best possible fish for winter. A resident of Tuntutuliak said in 2012, "Drying fish in wet weather is more demanding, takes longer, and produces an inferior product, if it works at all." Additionally, rainy weather can be rough and dangerous. "Better to let the weather make the windows" (Ikuta et al. 2013:39).

Napakiak, Napaskiak, and Oscarville—Chinook Salmon harvested from the Kuskokwim River drainage are a mainstay of the subsistence economy in these villages (**Tables 9 and 10**, **Figure 9**, Oswalt 1959). The site of Napaskiak was a seasonally occupied camp. The semi-permanent winter village, called "Oovingiyuk," was a mile upriver. It was partially washed away before people moved the village to its present site (Oswalt 1959). People hunted, fished, and trapped in nearby waters of the Kuskokwim River and the lakes and tundra inland. People from "Eelchuk" located about a mile downriver also relocated to the present site of Napaskiak. More recently, people from nearby, now-abandoned settlements at Loamavik (near the present location of Bethel), *Painguq* (along the lower Johnson River) and "Akuleruk," moved to Napaskiak. Close ties exist with people at Kwethluk, Napakiak, and Eek. Oscarville was the site of the Oscarville Trading Post and a few families moved nearby (Oswalt 1959).

In 1956, early in June almost every family in Napaskiak had a large-meshed net in an eddy along the Kuskokwim River in order to harvest Chinook Salmon, according to an observer (Oswalt 1959). When Chinook Salmon were harvested at a rate of three or four per night, people began drifting, usually in front of the village. People processed and preserved Chinook Salmon nearby their homes at Napaskiak. Chinook Salmon were dried and smoked for a week or two. Sometime before 1956, more than half the village went to summer fish camps at sites up to 30 miles away. In 1956, only two families were away all summer at fish camp (Oswalt 1959).

Kasigluk, Nunapitchuk, and Atmautluak, Bethel, Kwethluk, Akiachak, Akiak, Tuluksak, Lower Kalskag, and Kalskag—People rely most on Chinook Salmon as the mainstay of the subsistence economy in these villages. They harvest salmon from the lower Kuskokwim River drainage almost exclusively (**Tables 9 and 10**, **Figure 9**, Andrews and Peterson 1983, Andrews 1989, Coffing 1991, Coffing et al. 2001, Brown et al. 2012, Brown et al. 2013, Ikuta et al. 2013). These communities rely on the harvest of fish, economically, spiritually, and as a matter of survival. They rely the most on salmon. The salmon runs have generally been consistent, predictable, and large, and people organize their economic, spiritual, and social lives around harvesting, processing, and preserving salmon. People process much of the salmon they harvest by carefully tending to it while it is drying and smoking, a process that takes several weeks in dry weather. Chinook Salmon are available for harvest in June during normally dry weather. Historically, people harvested enormous quantities of Chum and Sockeye Salmon to feed their dogs, during the period when all winter travel was by dog sleds. Occasional harvests of Chinook Salmon were preserved for human consumption and not as feed for dogs. People preserved Chum, Sockeye, and Coho Salmon for later use by drying and smoking it. Chum, Sockeye and Coho Salmon were available for harvest in July and August when periods of wet weather were typical, and when drying and smoking salmon took more

time. Today, people rely more heavily on Chinook Salmon to feed themselves because it can be processed and preserved during dry weather, and very large quantities can be stored that will remain suitable for human consumption throughout the winter (Oswalt 1959, Andrews and Peterson 1983, Brelsford et al. 1987, Andrews 1989, Coffing 1991, Coffing et al. 2001, Ray et al. 2010, Brown et al. 2012, Brown et al. 2013, Ikuta et al. 2013).

Aniak—People rely on Chinook Salmon as the mainstay of the subsistence economy (**Tables 9 and 10**, **Figure 9**, Brelsford 1987, Brown et al. 2012). People at Aniak harvest Chinook Salmon from the middle and upper Kuskokwim River drainage from a point midway between Kalskag and Aniak to a point halfway between Chuathbaluk and Kolmakoff. Chinook Salmon are processed and preserved at fish camps that are located nearby their homes at Aniak. Chinook Salmon are dried and smoked. Chinook Salmon are processed into "blanket" fish or cured into "salt fish." Preservation methods can include drying, freezing, jarring, or vacuum packing of whole, stripped, or sectioned fish. People's harvest of other salmon species depends on how successful they are harvesting Chinook Salmon, which are preferred and generally harvested early enough to avoid the rainy season and the flies that accompany it (Brelsford 1987, Brown et al. 2012). "Unless cut salmon had dried slightly and formed a 'crust,' flies were likely to lay eggs on cut fish. And, they added, it is a laborious process, indeed, to remove fly eggs from cut fish. Even if flies were not the problem, fish tend to sour or mold rather than dry in wet weather" (Brown et al. 2012:25).

Chuathbaluk—People rely on Chinook Salmon from the Kuskokwim River drainage as the mainstay of the subsistence economy (**Tables 9 and 10**, **Figure 9**, Oswalt 1980, Brown et al. 2012). Chuathbaluk (also known as Little Russian Mission) is situated at the confluence of Mission Creek and the Kuskokwim River. The Russian trading fort Kolmakovsky Redoubt was about 12 miles from present-day Chuathbaluk when people built the Orthodox Church at the site of Chuathbaluk. For a while, small migrations of Deg Hit'an (or Ingalik) Athabascans and Yup'ik people moved to the church site. In the 1950s, the Orthodox Church was rebuilt and families again moved to the site at Chuathbaluk. From there, people relocated seasonally to summer fish camps that were located between Aniak and Chuathbaluk. Chinook Salmon arrive in front of the village around the middle of June and continue to run through late July. People sometimes travel as far as Bethel to harvest salmon (Oswalt 1980, Brown et al. 2012).

6. Residents of the Upper Kuskokwim Drainage

Crooked Creek—People rely on Chinook Salmon from the Kuskokwim River drainage as a mainstay of the subsistence economy (**Table 12, Figure 9**, Oswalt 1980, Brelsford et al. 1987, Brown et al. 2012). Crooked Creek is situated at the confluence of Crooked Creek and the upper Kuskokwim River. Historically, Crooked Creek was at the intersection of Central Yup'ik, Deg Hit'an, and Dena'ina cultures and languages. Historically, people moved to seasonal fish camps near the site of the present-day village. People formed a semi-permanent settlement around a trading post at the site. People from nearby Georgetown, Oskawalik, and Canoe Town moved to nearby the trading post. People from Crooked Creek harvest salmon at the mouths of the George and Oskawalik rivers. They process and preserve salmon at fish camps that are located nearby their homes at Crooked Creek (Oswalt 1980, Brelsford et al. 1987, Brown et al. 2012).

Red Devil and Sleetmute—People rely on Chinook Salmon from the Kuskokwim River drainage as a mainstay of the subsistence economy (**Table 12**, **Figure 9**, Brelsford et al. 1987, Brown et al. 2012). Red Devil along the upper Kuskokwim River drainage is not located at the mouth of a tributary. People chose the site to mine mercury from the 1930s to the 1970s. People living in seasonal settlements along the Holitna River moved to Red Devil when the school was built. Currently, the people living at Red Devil are a mix of Yup'ik, Athabascan, and non-Natives who obtained Federal homesteads. The village has close ties with nearby Sleetmute. People from Red Devil harvest, process, and preserve salmon at sites nearby their homes. People harvest salmon also from the George and Holitna rivers (Brelsford et al. 1987, Brown et al. 2012).

Sleetmute (Sikmiut or *Cellitmiut* in Yup'ik and *Tovishq'vl ghunh* in Deg Hit'an) was likely the site of a seasonal fish camp during historical times. People occupying seasonal camps along the Holitna and Hoholitna river drainages moved to the more permanent settlement of Sleetmute, attracted to a new school and trading post. Non-Natives came to Sleetmute after obtaining Federal homesteads. Families harvest, process, and preserve Chinook and Sockeye Salmon at summer fish camps that are situated up to three miles from the village. People take few Coho Salmon because Coho Salmon are available during a normally rainy season when people have a hard time smoking them. People do not prefer to eat frozen Coho Salmon (Brown et al. 2012).

Stony River and Lime Village—People rely on Chinook Salmon from the Kuskokwim River drainage as a mainstay of the subsistence economy (**Table 12**, **Figure 9**, Oswalt 1980; Kari 1983, 1985; Brown et al. 2012). Stony River village is located on the upper Kuskokwim River two miles from its confluence with Stony River. The settlement has been called Moose Village and Moose Creek. Non-Native people first moved to the site of Stony River village, attracted to the trading post. In the 1960s, Dena'ina families from Lime Village and Dena'ina and Deg Hit'an families living in the area began staying at Stony River. People harvest salmon and whitefishes, especially Chinook Salmon and humpback whitefish, as the bulk of their subsistence diet. Salmon are harvested from the upper Kuskokwim River mainstem and Stony River. Lime Village is located well off the mainstem middle Kuskokwim River along Stony River. For Lime Village, moose and caribou are a mainstay of the subsistence economy also (Oswalt 1980; Kari 1983, 1985; Brown et al. 2012).

7. Residents of the Kuskokwim River Headwaters

Nikolai, Takotna and Telida—Chinook Salmon from the Kuskokwim River drainage are a mainstay of the subsistence economy. People are also highly dependent on their harvests of moose (**Tables 9 and 10**, **Figure 9**).

Nikolai, Takotna, and Telida are primarily Upper Kuskokwim Athabascan villages. Many people moved to Nikolai after 1948 when the first school was built. In the 1990s, the school at Telida closed and most residents moved to Nikolai.

Prior to the adoption of snowmachines, many residents of Nikolai and Telida spent a large part of each summer using fish wheels to harvest chum salmon to be used as dog food (Stokes 1985:61). At Alaska Statehood, subsistence salmon fishing regulations changed and fish fences that had been used before this

to harvest king salmon became illegal (Holen et al. 2006:93). This regulatory change led to the replacement of fish fences with a rod and reel subsistence king salmon fishery that, along with the harvest of king salmon with set gillnets, currently yields a large portion of Nikolai's total wild food harvest.

The seasonal pattern of salmon fishing in Nikolai has changed from harvesting multiple salmon species over the entire summer to emphasizing mainly king salmon from late June until mid-July. Fishing other salmon species continues for some residents into August or September (Ikuta et al. 2013:106).

Some people continue to harvest, process, and preserve salmon at fish camps. Others stay in the villages. People travel to Chinook Salmon harvesting locations along the Little Tonzona River, Big River, Blackwater Creek, and Salmon River. Some also harvest Chum and Coho Salmon (Collins 2004, Williams et al. 2004, Ikuta et al. 2013).

McGrath—Chinook Salmon are a mainstay of the subsistence economy in the community. People are also highly dependent on their harvest of moose (**Tables 9 and 10**, **Figure 9**, Ikuta et al. 2014**)**. McGrath is situated in the headwaters area of the Kuskokwim drainage at the mouth of Takotna River, and the site was used seasonally by Upper Kuskokwim Athabascans. Non-Native people moved to the area primarily to mine. A large airstrip was built in 1940 during World War II. McGrath has developed into the region's hub of government, trade, and transportation. The Federal Aviation Communication offices closed sometime after 1990, and personnel moved from the community, lowering the community population somewhat (**Table 1**). Salmon harvesting locations include downriver areas where salmon are fresher and higher in oil content, such as the Swift and Takluitsik rivers. More Chinook and Coho Salmon are harvested than Chum and Sockeye Salmon (Ikuta et al. 2014).

Criterion 2. Local Residency

People living within the Kuskokwim River drainage have the highest level of local residency. Within the Kuskokwim River drainage, people presently occupy 28 village sites. They are listed in **Table 1**. Two other villages, Kwigillingok and Kongiganek, while not within the drainage are situated within a few miles west of the mouth of the Kuskokwim River. Kipnuk is about 60 miles west of the mouth, further west is Chefornak, and farthest west are the villages of Nelson Island and Nunivak Island. For south Kuskokwim Bay, the village nearest to the mouth of the Kuskokwim River is Quinhagak, about 40 miles from the mouth. Goodnews Bay and Platinum are located further south.

Criterion 3. Availability of Alternative Resources

Only residents of the Kuskokwim River drainage and the coastal communities of Kwigillingok, Kongiganek, Kipnuk, and Chefornak are discussed regarding Criterion 3 because it has not been shown that other rural communities rely on Chinook Salmon that they harvest from the Kuskokwim River drainage as a mainstay of livelihood. The following description of the availability of wild resources other than Chinook Salmon relies on ethnographic sources, harvest surveys, and wildlife population assessments in ADF&G management reports.

In research conducted between 2009 and 2011, residents of lower Kuskokwim River drainage communities harvested high levels of nonsalmon fishes, 23–46% of their annual harvest of all wild resources in lbs. edible weight (**Table 12**). Harvest levels in other resource categories, such as large land mammals and birds and eggs, were considerably lower. Nonsalmon fishes harvested by residents of communities in the lower river included pike and whitefishes and smaller amounts of Blackfish, Burbot, and smelt. One community harvested Herring and Halibut as well as freshwater fishes (Napakiak), but this was rare. Few Char, trout, or Grayling were reported in the harvests (ADF&G 2014b, Ray et al. 2010). Typically, communities in the middle and upper Kuskokwim River drainage, from Lower Kalskag to Nikolai, reported harvesting nonsalmon fishes at a lower rate than lower river communities, 5–17% of annual wild food harvests. The exception was Red Devil where nonsalmon fishes made up 39% of annual wild food harvests. The most common nonsalmon fishes harvested in middle and upper river communities were whitefishes. Other fish included smelt, Blackfish, and Grayling. Harvests of moose and caribou in only some upper river communities was a large portion of the annual wild resource harvests, 49% in McGrath and 26% in Lime Village (ADF&G 2014b, Krauthoefer et al. 2007, Williams et al. 2004).

The Kuskokwim population of moose in Unit 18 (up to Lower Kalskag) "is small and is still in the process of colonizing the available riparian habitat." Most of the area "is lowland treeless tundra, which is not suitable as winter habitat for moose . . . . Moose densities are low and growing in the lower Kuskokwim drainage . . . . Heavy hunting pressure from communities along the Kuskokwim River has effectively limited moose population growth along that riparian corridor" (Perry 2010:271).

In Unit 19 (above Lower Kalskag), Federal and State moose hunts are closed upstream of Georgetown in Unit 19A. Unit 19A remainder is closed except to residents of local villages with a Federal draw permit, or a Tier II permit on State-managed lands. Moose numbers are high in Unit 19D east including the McGrath area (Seavoy 2010).

From 1994 to 2010, "approximately 10,000 to 40,000 Mulchatna caribou entered Unit 18 from the east" and wintered "throughout the eastern lower Kuskokwim River and Kuskokwim Bay drainages. . . . Occasionally, caribou are reported west of the Kuskokwim River. These reports are sporadic, and no long-term presence of caribou west of the Kuskokwim River has been established" (Perry 2011:111). The hunting season in Units 18, 19A, and 19B is seven and a half months with a 2 caribou harvest limit. Several small herds exist in the McGrath area in Unit 19D. Caribou are rare in Unit 21E (Seavoy 2011).

For the coastal communities of Chefornak, Kipnuk, Kwigillingok and Kongiganek, people at the villages harvest locally available populations of nonsalmon fishes (such as sculpin and sole) and marine mammals. Some Chum, Sockeye, and Coho Salmon are available locally, primarily in marine waters. A small and growing population of moose is available for harvest (Fienup-Riordan 1983, Stickney 1983, Wolfe et al. 2012).

Summary

Residents of 32 communities in the Kuskokwim River drainage and Kwigillingok, Kongiganek, Kipnuk, and Chefornak are known to rely on Chinook 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 Chinook Salmon runs there. As alternatives to Kuskokwim Chinook Salmon, wild resources available for harvest include other salmon, 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 of Section 804 Analysis

Residents of the Kuskokwim River drainage, including 28 communities, and additionally Kwigillingok, Kongiganek, Kipnuk, and Chefornak have the highest customary dependence on Chinook 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 Chinook Salmon at higher levels than other resources (such as other salmon, nonsalmon fishes, land mammals, marine mammals, birds and eggs, and plants); they generally harvest Chinook Salmon in large quantities to dry and smoke during June; they are not situated near alternative Chinook 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.

All of the 32 villages included in the Section 804 Subsistence User Prioritization analysis are small enough to organize for the harvest of an allocation of Chinook Salmon at the community level, with the exception of Bethel. Bethel, with a population of over 6,000, based on the 2010 U.S. Census (**Table 1**, ADCCED 2014), comprises almost half (40%) of the eligible subsistence users. In such circumstances, Federal subsistence regulations specify that “If allocation on an area or community basis is not achievable, then the Board shall allocate subsistence opportunity on an individual basis” through application of three criteria: (1) customary and direct dependence upon the resource as the mainstay of livelihood, (2) local residency, and (3) the availability of alternative resources (50 CFR 100.17 Determining priorities for subsistence uses among rural Alaska residents). In order to address the unique characteristics of Bethel, staff further analyzed the dependence of Bethel residents on Chinook Salmon and their eligibility to harvest Chinook Salmon in **Appendix D**.

Allocation

In 2015, 2016, 2018, 2019 and this year 2020, proponents of special action requests to the Board, to close Refuge waters to the harvest of Chinook Salmon for nonsubsistence uses, have also requested the implementation of an allocation system. In these cases before the Board, the allocation system has been

viewed as an alternative to the race to harvest fish, also called derby fishing that results when short opportunities for harvest are provided, and a tool for management in which local communities play vital role. Community harvest limit and reporting systems, whereby allocations are made in the form of community harvest limits, are described in Federal regulations (36 CFR 242.6 and 50 CFR 100.6: Licenses, permits, harvest tickets, tags, and reports). Best practices advise careful consideration be given to operational planning describing, for example, if a permit will be used and if so how will it be distributed, who will be key personnel, how will data be stored, and how will it be reported to the public (Fall and Shanks 2000).

If the Board approved the implementation of an allocation strategy, the Office of Subsistence Management, in cooperation with the Yukon Delta National Wildlife Refuge, would be responsible for coordinating the allocation of Chinook Salmon to the residents of 32 communities eligible to harvest Chinook Salmon within the Federal public waters of the Kuskokwim River Drainage. It is recommended that such an allocation be based on each community's 20-year (1990–2009) average harvest of Chinook Salmon (totaling 87,056 drainage-wide). The period 1990–2009 is considered the best representation of historical salmon harvests and was used to determine community allocations of Chinook Salmon in 2015. Before 1990, annual harvest surveys employed various non-standard, ad hoc methods that were not always comparable between years. In 1990, a formal statistical survey protocol was established (Walker and Coffing 1993, Simon et al. 2007). Since 2009, the harvest of Chinook Salmon has been restricted during most years. Since 2010, the Chinook Salmon subsistence fishery has had some of its lowest runs on record and harvest restrictions have been implemented most years. Therefore, these years were excluded from the calculation of community Chinook Salmon allocations in 2015, and it is recommended that calculations of average harvest continue to be based on the 20-year period between 1990 and 2009.

In 2015, a combination of Community Harvest Permits and the use of designated fishers were employed to allocate up to 7,000 Chinook Salmon to Federally qualified subsistence users in the 32 communities. In Bethel, harvested Chinook Salmon were distributed to registered fish camps and Bethel residents without access to fish camps who requested an allocation. This process resulted in an updated list of 238 registered fish camps by May 18, 2016 (Joseph 2016, pers. comm.). Approximately 1,677 Chinook Salmon were harvested out of 2,086 Chinook Salmon (80%) allocated to Bethel residents in 2015. Within the other 31 communities, a Community Harvest Permit was issued to a community representative identified by the local tribe and was responsible for assigning designated fishers to harvest Chinook Salmon and distribute them in the community. For the 31 communities, a total of 2,948 out of 4,012 Chinook Salmon allocated (73%) were harvested (FWS 2015d).

For the 2020 season, if the Board approved the implementation of an allocation strategy, it is recommended that the use of designated fishers to target Chinook Salmon not be required during harvest opportunities.

Effects of the Requests

FSA20-01

If this special action request is approved, then the Board will close Refuge waters to the harvest of Chinook Salmon from June 1, 2020, through June 30, 2020, except by Federally qualified subsistence users identified in the Section 804 subsistence user prioritization analysis approved by the Board in 2014 and fishing under the terms and authority of a community harvest permit, unless superseded by subsequent special actions. This will mean Chinook Salmon fishing opportunities including schedules, openings, closures, and methods will be determined by the Federal in-season manager in consultation with the Kuskokwim River Inter-Tribal Fisheries Commission and other fishery managers including State and Tribal interests. Decisions will be coordinated with the Office of Subsistence Management to ensure proposed actions align with Federal subsistence regulations and policy. Additionally, the Federal in-season manager will consult with 32 communities to establish an appropriate Chinook Salmon harvest allocation amongst these communities.

FSA20-02

If this special action request is approved, then the Board will close Refuge waters to the harvest of Chinook Salmon from June 1, 2020, through June 30, 2020, except by subsistence users identified in a Section 804 subsistence user prioritization analysis. This will mean Chinook Salmon fishing opportunities including schedules, openings, closures, and methods will be determined by the Federal in-season manager in consultation with the Kuskokwim River Inter-Tribal Fisheries Commission and other fishery managers including State and Tribal interests. Decisions will be coordinated with the Office of Subsistence Management to ensure proposed actions align with Federal subsistence regulations and policy.

FSA20-03

If this special action request is approved, then the Board will close Refuge waters to the harvest of Chinook Salmon throughout the run, except by Federally qualified subsistence users identified in a Section 804 subsistence user prioritization analysis. This will mean Chinook Salmon fishing opportunities including schedules, openings, closures, and methods will be determined by the Federal in-season manager in consultation with the Kuskokwim River Inter-Tribal Fisheries Commission and other fishery managers including State and Tribal interests. Decisions will be coordinated with the Office of Subsistence Management to ensure proposed actions align with Federal subsistence regulations and policy.

FSA20-01, 02, and 03

If these special action requests are not approved, then State subsistence and sport fisheries targeting Chinook Salmon will be closed prior to June 11. State regulations now mandate that Chinook Salmon fisheries be closed through June 11 every year. The Kuskokwim Salmon Management Working Group, who for the past several years has recommended the start date of this front end closure, will have its first

meeting in May 5-6. Before June 12, ADF&G will issue an emergency order for at least one fishing period per week with 6-inch or less mesh-size set gillnets for the purpose of allowing harvest of nonsalmon fish species during which Chinook Salmon can be retained.

The exact fishing schedule that would occur after June 11 has not been finalized. The ADF&G has announced that it will be discussing management options at the first Working Group meeting in May 5-6. However, they will be presenting a plan to the Working Group that would allow an open fishing period for 24 hours a day every other day using drift gill nets with a maximum of 6-inch mesh and 25 fathoms in length, from the mouth of the river to the village of Tuluksak. Fishing would be open upstream of the village of Tuluksak, with 6 inch or less gear, with the exception of the Aniak box, where no retention of Chinook Salmon would be allowed until June 23. Retention of Chinook Salmon in the tributaries would be allowed with rod and reel.

The State has issued an advisory announcement that the Chinook Salmon sport fishery in the Kuskokwim drainage will close from May 1, 2020, through June 11, 2020, as mandated in State regulations, and might re-open after June 11 based on in-season indicators (ADF&G 2020b)

If these special action requests were not approved, the Federal in-season manager, in consultation with the Kuskokwim River Inter-Tribal Fisheries Commission and other fishery managers including State and Tribal interests, could allow additional subsistence fishing opportunity than that being allowed under State Management. Alternatively, the Federal in-season manager could close Refuge waters to the harvest of Chinook Salmon except by Federally qualified subsistence users until superseded by subsequent special actions. This would mean Chinook Salmon fishing opportunities including schedules, openings, closures, and methods would be determined by the Federal in-season manager in consultation with the Kuskokwim River Inter-Tribal Fisheries Commission and other fishery managers including State and Tribal interests. Decisions would be coordinated with the Office of Subsistence Management to ensure proposed actions were aligned with Federal subsistence regulations and policy.

OSM CONCLUSION

Neutral on FSA20-01/02/03.

The Board's earlier decisions to support closing Refuge waters to the harvest of Chinook Salmon except by rural residents identified in a Section 804 subsistence user prioritization were justified based on poor returns from previous years and anticipation of reduced subsistence opportunities. Escapements from 2014 to 2019 were within or above the escapement goal range due to severe harvest restrictions. Low pre-season forecasts that wouldn't allow for a full subsistence harvest and escapement toward the upper end of the escapement goal range led the Board to support conservation measures and the subsistence user prioritization process mandated in ANILCA Title VIII. This support was needed to provide the most opportunity to as many subsistence users as possible and to ensure continued healthy populations of Kuskokwim Chinook Salmon.

Any allocation system implemented in 2020 would be hampered by the stated opposition these Special Action Requests by the Bethel Tribe represented by ONC. Historically, Bethel residents have accounted

for approximately 40% of the drainage-wide harvest (**Table 11**). In 2015 ONC was instrumental in the success of the allocation process in Bethel; however, the allocation was only several thousand fish. There is no indication that ONC would not contribute to this effort this year, but the work could put a large strain on ONC resources that might need to be compensated. Instead, allocation might occur on a first come first serve basis through a permit system. However, this type of system is not preferred because it encourages some rural residents, who would otherwise not harvest as many salmon, to put additional harvest pressure on the resource.

One previous concern raised with State management of the fishery was related to the lack of opportunity to harvest nonsalmon fish species during the front -end closure. Subsistence users said they were unable to harvest nonsalmon fish species, such as Sheefish, using efficient gear. These regulations were modified following the 2019 season, and the State now allows the use of up to 6-inch mesh-size gear at least once a week during the front-end closure. In addition, the closure has been moved from late May to early June.

State regulations direct the State to open subsistence fishing seven-days a 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” (5 AAC 07.365(d)(1)). The State has indicated that it will restrict the subsistence fishery beginning on June 12, after the mandated front-end closure, however, these management strategies are preliminary at this time. Until the Working Group meeting in May 5-6, neither the Federal in-season manager, the Board, nor subsistence users can be sure of the State’s strategy.

Much new information is available describing Chinook Salmon returns throughout its range and for the 2020 pre-season forecast. All four pre-season forecast models have a midpoint above 200,000 Chinook Salmon for 2020. If the 2020 Kuskokwim River Chinook Salmon run comes in as forecasted there may be enough to meet subsistence needs and still have escapement near the upper end of the 65,000-120,000 escapement goal. The 2019 Chinook Salmon run had strong returns of 3 and 4 year olds, which may lead to strong returns of the 4 and 5 year olds in 2020 based on historical sibling relationships. Recruits per spawner from the 2011-2012 brood years indicate productivity of completed cohorts have shown increases over the previous 7 years. The estimated recruit per spawner for cohorts from 2004-2010 were: 0.59, 0.52, 0.41, 0.78, 0.58, 0.66, and 1.68 respectively. Productivity increased to 3.22, 2.33, and 3.36 recruits per spawner from 2011-2013 (Staton and Decoses 2019; Larson 2020).

Stakeholders have mentioned concerns over decreases in length and ages of Kuskokwim River Chinook Salmon. These issues are observed throughout the range of Chinook Salmon and are likely affected by climatic conditions, as well as past size-selective fishing practices. Bering Sea water temperatures have increased, which has caused increased growth rate in Chinook Salmon during their first and second years in the saltwater. The faster growth rates may allow Chinook Salmon to reach a size threshold for maturation at an earlier date and return younger than they did historically. These younger maturing Chnook salmon have similar ages as Chinook Salmon spawning in the more southern portions of their range. Size is a heritable trait and, therefore, size-selective fisheries can influence trends in fish sizes. However, Chinook Salmon have been decreasing in size throughout their range, independent of exploitation rate, suggesting the decrease may not be exclusively associated with harvest.

There are some implications of Chinook Salmon returning at younger ages and smaller sizes. For instance, downward shifts in length at age and age at maturity can affect fitness of Chinook Salmon by reducing fecundity (Hard et al. 2008, Bell 2012, Caulduch-Verdiell et al. 2014, and Lewis et al. 2015). In addition, larger females produce larger eggs, which typically have increased survival (Wertheimer et al. 2004, Quin et al. 2011, and Lewis et al. 2015). Changes in size may also cause a change in spawning habitat use (Lewis et al. 2015). The theoretical limit for a decrease in age may occur when most females mature after 3 years in the ocean and males after 2 years in the ocean, mainly due to the minimum lengths needed to sustain migrations and to maximize fecundity (Ricker 1980, Lewis 2015).

Recent modeling indicates that a decrease in the overall length of female Chinook Salmon in the Kuskokwim River has caused a reduction of about 21% (18-28%) fewer eggs and 35% (32-45%) lower egg mass compared to the early 1970s (Ohlberger et al. 2020). In addition, the study also notes a 7.5% reduction in females in the population from four decades ago. However, data from assessment projects in the drainage show that while the recent five-year average (2015-2019) of percent females is down approximately 7% over the 1976-2009 average, the recent 10-year average (2010-2019) is equal to the 1976-2009 average of 34%.

Ohlberger et al. (2020) also performed a spawner-recruit analysis for Chinook Salmon in the Kuskokwim River based on quality of escapement, with results suggesting that age and length of female Chinook Salmon has an effect on expected recruitment. When simulating use of unrestricted gear, the authors state that more fish would be needed on the spawning grounds to meet Smsc (the total number of spawning salmon that would be expected to produce maximum sustainable harvest) compared to the model used by ADF&G. Although the effect of gear on Smsc, when considering escapement quality, suggests a trade-off whereby lower escapement goals could perhaps be implemented if stakeholders were willing to accept using smaller restricted-mesh gear (Ohlberger et al. 2020). Simply stated, if stakeholders are willing to use nets with smaller mesh, then lower escapement goals could perhaps be implemented.

Salmon biodiversity is important for ensuring the health of populations into the future, with population diversity being the driver of several agencies' policies, such as the State of Alaska's Sustainable Salmon Policy (Conners et al. 2019). Populations can vary in productivity over time, and systems that are currently struggling could be more productive in the future. Over fishing and high exploitation rates can threaten stocks with lower productivity, while stocks with higher productivity can sustain higher rates of exploitation (Ricker 1954; Conners et al. 2019). Conners et al. (2019) modeled the chances of a Chinook Salmon population in the Kuskokwim River being extirpated at differing exploitation rates and found that an exploitation rate of 50% leads to 20% of stocks at risk of extirpation. A 40% exploitation rate leads to 10% of stocks at risk of extirpation; and 30% exploitation leads to 5% of stocks at risk of extirpation. In addition, this same study suggested that a target harvest near the historic maximum (around 150,000 Chinook Salmon) would require managing for the upper end of the escapement goal to minimize extirpation risk.

Estimated exploitation rates of Kuskokwim River Chinook Salmon from subsistence harvest varied tremendously between 1976 and 2013, with a low of around 15% in 1978 to a high of 59% in 2010. The average exploitation rate for Chinook Salmon was about 33% during that time frame, and occurred before

the front end closure was enacted in 2016. Historically, the subsistence harvest hasn't exceeded a 50% exploitation rate except during times of smaller returns (<130,000 total run size).

High water temperature events can affect migration timing, behavior, egg development and disease resistance of Chinook Salmon. During recent years, particularly in 2019, high temperature events were documented in the Kuskokwim River and its tributaries. These events are not a regular, predictable occurrence, but may become more common in the future.

Proponents of these Special Action Requests and subsistence users have emphasized their concerns regarding risks to stock diversity from high harvest rates, significant decline in body size, impacts of climate driven heat stress on migrating salmon, and sources of uncertainty that increase risk. These risks are additive in nature and are cumulative. Comments have focused on the danger of near extirpation of Chinook Salmon in some tributaries and the harm to run resiliency that follows, along with the danger to the continuation of subsistence uses if runs do not rebound to historical levels. Comments have also focused on the effect of reduced body sizes and declining caloric value of Chinook Salmon harvests, and the need to harvest higher numbers of Chinook Salmon to make up for these changes.

While available forecasting methods and sibling relationships indicate that the 2020 return of Chinook Salmon to the Kuskokwim should be strong enough to support both an escapement near the top end of the goal, as well as a harvest within the historical range, there is still concern over the uncertainty inherent in the methods used to model the pre-season forecast and poor returns in recent years. Additionally, affected Regional Advisory Councils have provided support for these Special Action Requests. Therefore, the OSM conclusion is neutral.

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REGIONAL ADVISORY COUNCIL RECOMMENDATIONS

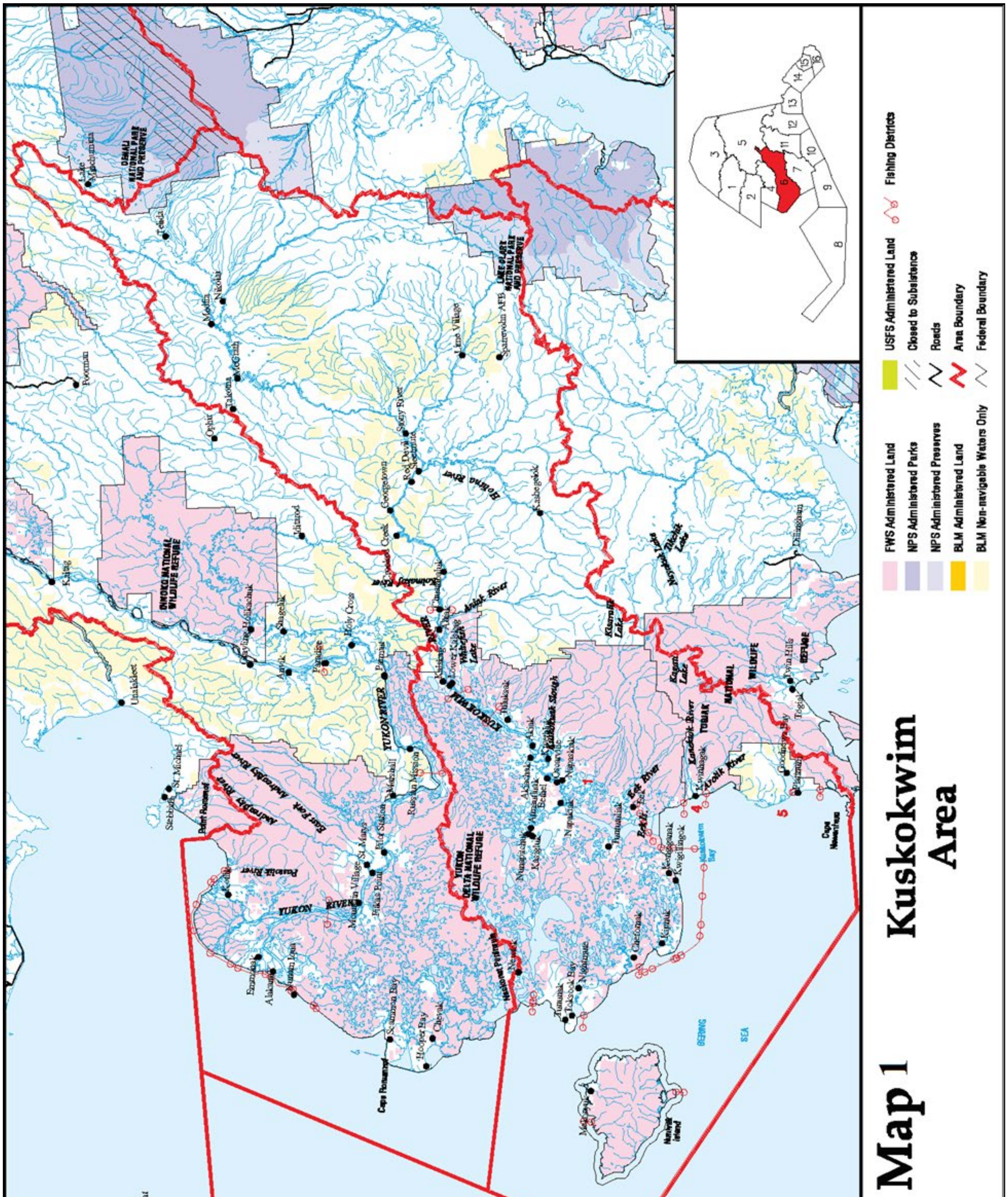
Yukon Kuskokwim Delta Subsistence Regional Advisory Council

Support FSA20-01/02/03. The Council voted to support Special Action Requests FSA20-01, 02, and 03, citing concurrence with the majority of public testimony they heard during the Public Hearing for these Special Action Requests and also during the public and tribal comment during the Council's meeting. Overall the Council expressed that protecting a subsistence priority during these uncertain times is critical for communities situated along the Kuskokwim River. The Council stated that closing to all but Federally qualified subsistence users will help ensure these rural communities meet their subsistence needs, and it will also provide better tools for long-term conservation of Chinook Salmon. The Council agrees with the justification presented in Special Action Request FSA20-03 that quality of escapement is a concern that should be considered for Kuskokwim River salmon management as subsistence fishers are seeing smaller and smaller fish. They also concur that climate change impacts are creating more and more uncertainty for the health of salmon and whether they will successfully return to spawn. The die-off of salmon observed last year due to extreme warm water temperatures is of particular concern. The Council feels it is imperative to manage the salmon fishery for conservation and the subsistence priority in these uncertain times to ensure the long-term viability of Kuskokwim Chinook Salmon and to ensure that communities meet their subsistence needs. The Council stressed that subsistence communities have been doing their part for conservation, restricting the harvest of Chinook Salmon in order to help the population rebound and that the subsistence priority should be maintained at this time so that these communities can benefit from those conservation efforts.

The Council further concurred with the justification provided in Kuskokwim River Inter-Tribal Fisheries Commission resolution in support of Special Action Request FSA20-01, 02, and 03 presented during the meeting. The Council made a motion to support this resolution as read into the record.

Western Interior Alaska Subsistence Regional Advisory Council

Support FSA20-01/02/03. The Western Interior Council supports the premise of these requests. The Council stressed that Special Action Request FSA20-03 looks at the issue in more detail and brings up several good points that were observed in last year's fisheries, such as risks to stock diversity from high harvest rates, significant decline in body size, impacts of climate driven heat stress on migrating salmon, and sources of uncertainty that increase risk. These details were not considered in previous special action request analyses. The Council said management actions in these requests are a high priority for residents and the Federal Subsistence Board.



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

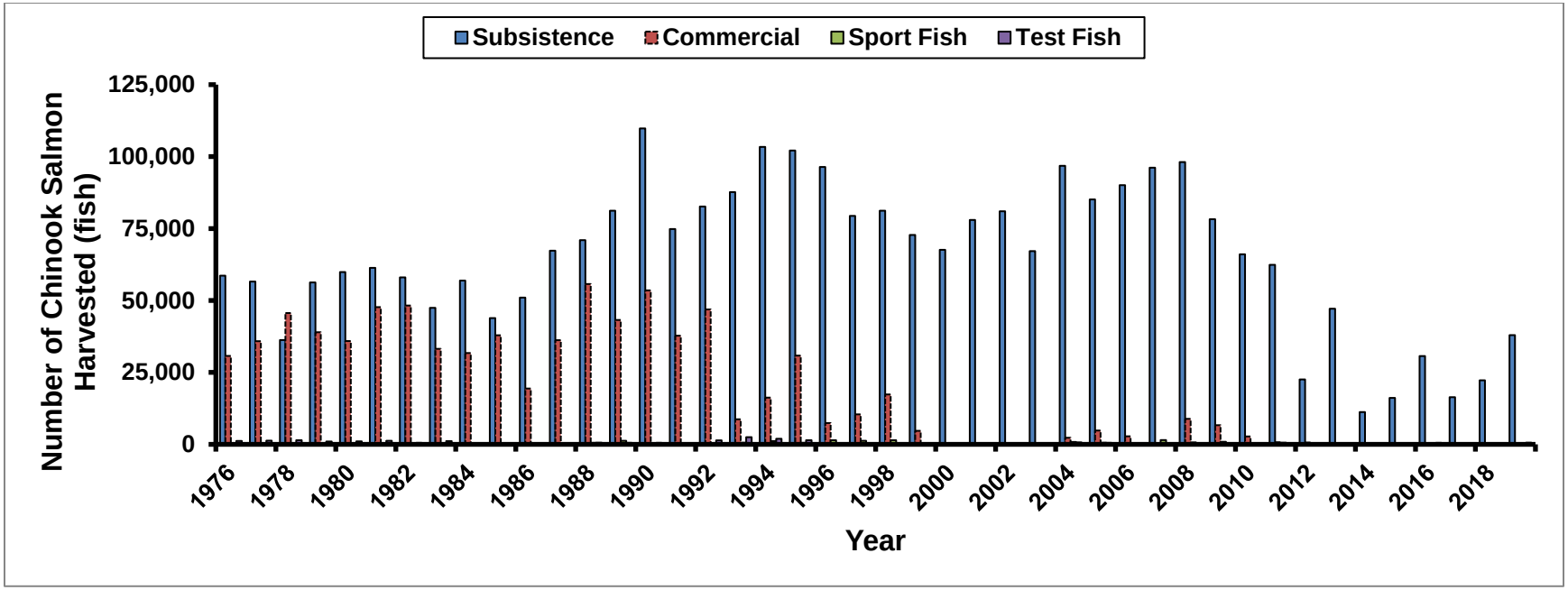


Figure 1. Number of Chinook Salmon harvested in the Kuskokwim River from 1976 to 2019 for Subsistence, Commercial, Sport Fish, and the Bethel Test Fishery (Smith 2019, McDevitt et al. 2019).

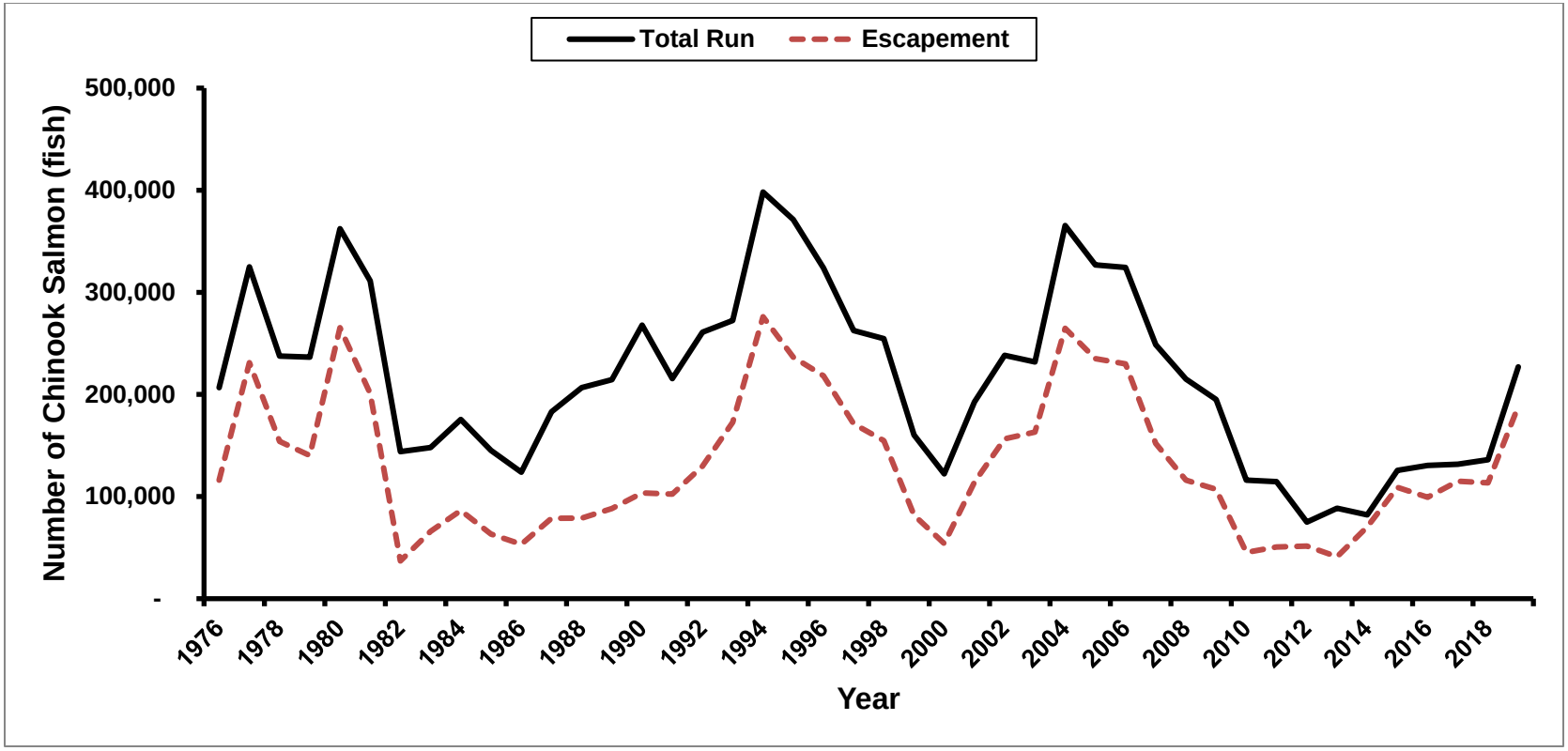


Figure 2. Estimates of Kuskokwim River Chinook Salmon total run-sizes and escapements from 1976 to 2019. Estimates are produced from the Kuskokwim River Chinook Salmon Run-Reconstruction Model (Smith 2019).

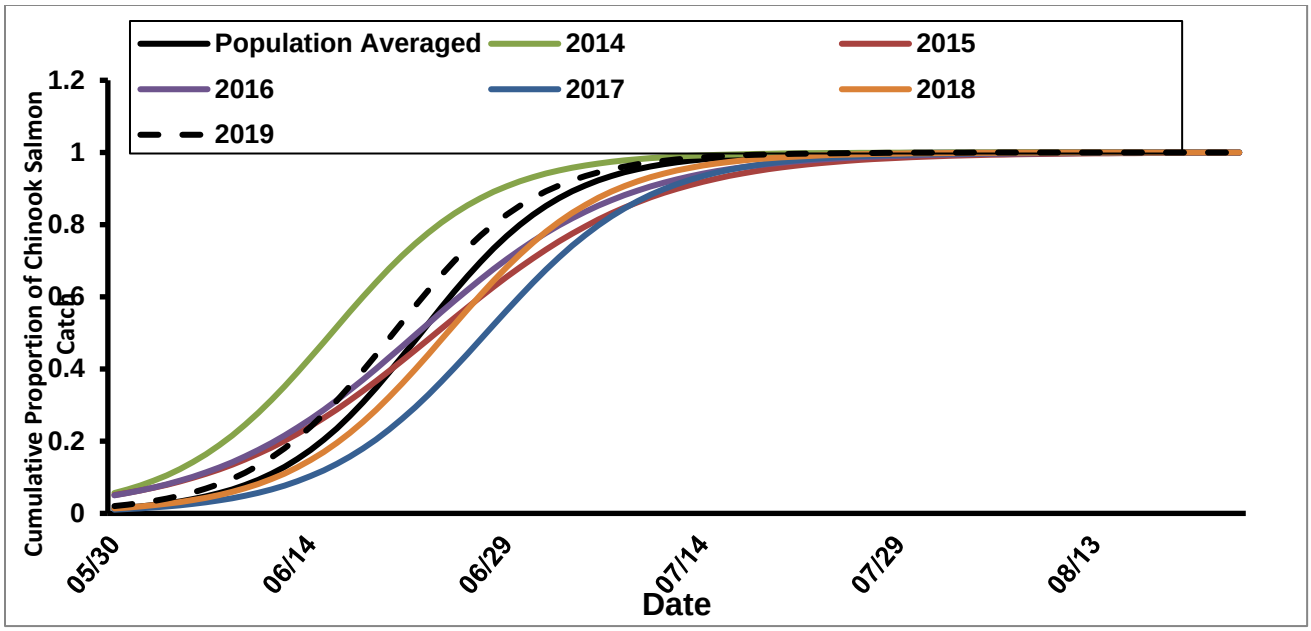


Figure 3. Estimated average of the cumulative proportion of Chinook Salmon catch collected by date at the Bethel test fishery from 1984 to 2018. The most recent five years of the cumulative proportion of catch at the Bethel test fishery is also plotted for comparison purposes. Dates were estimated using non-linear version of the logistic equation.

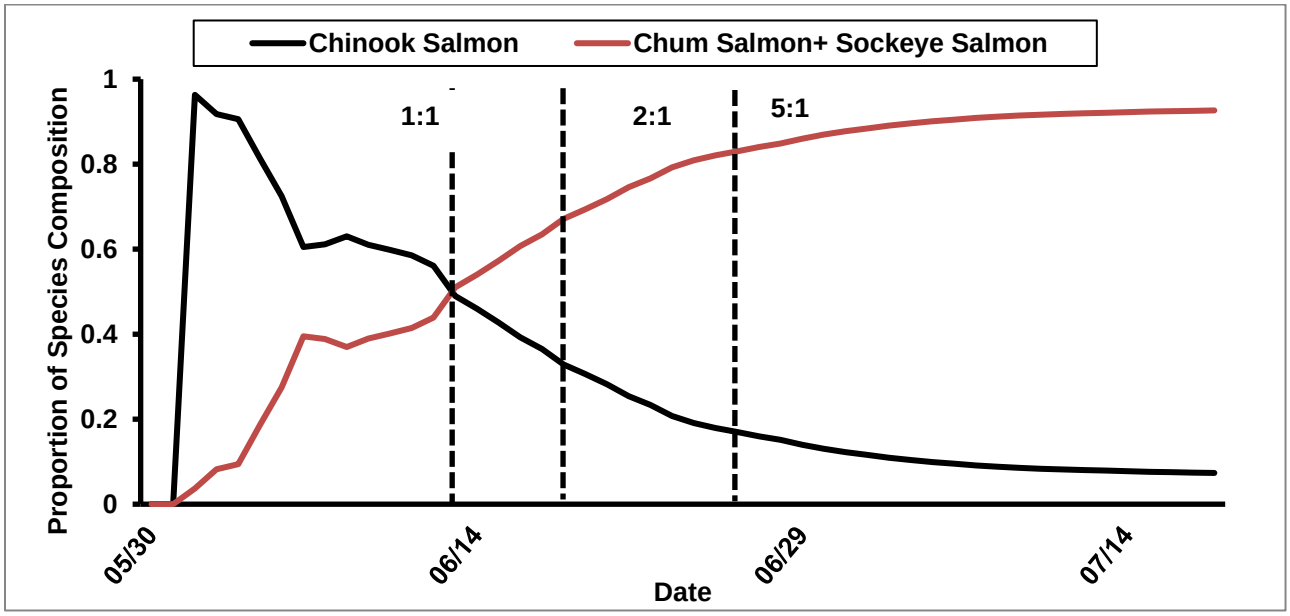


Figure 4. Average proportion of species composition by date caught at the Bethel test fishery from 1984 to 2018. Three vertical dashed lines represent three increasing ratios of Chum and Sockeye to Chinook Salmon, which occur approximately on June 13 (1:1), June 18 (2:1), and June 26 (3:1).

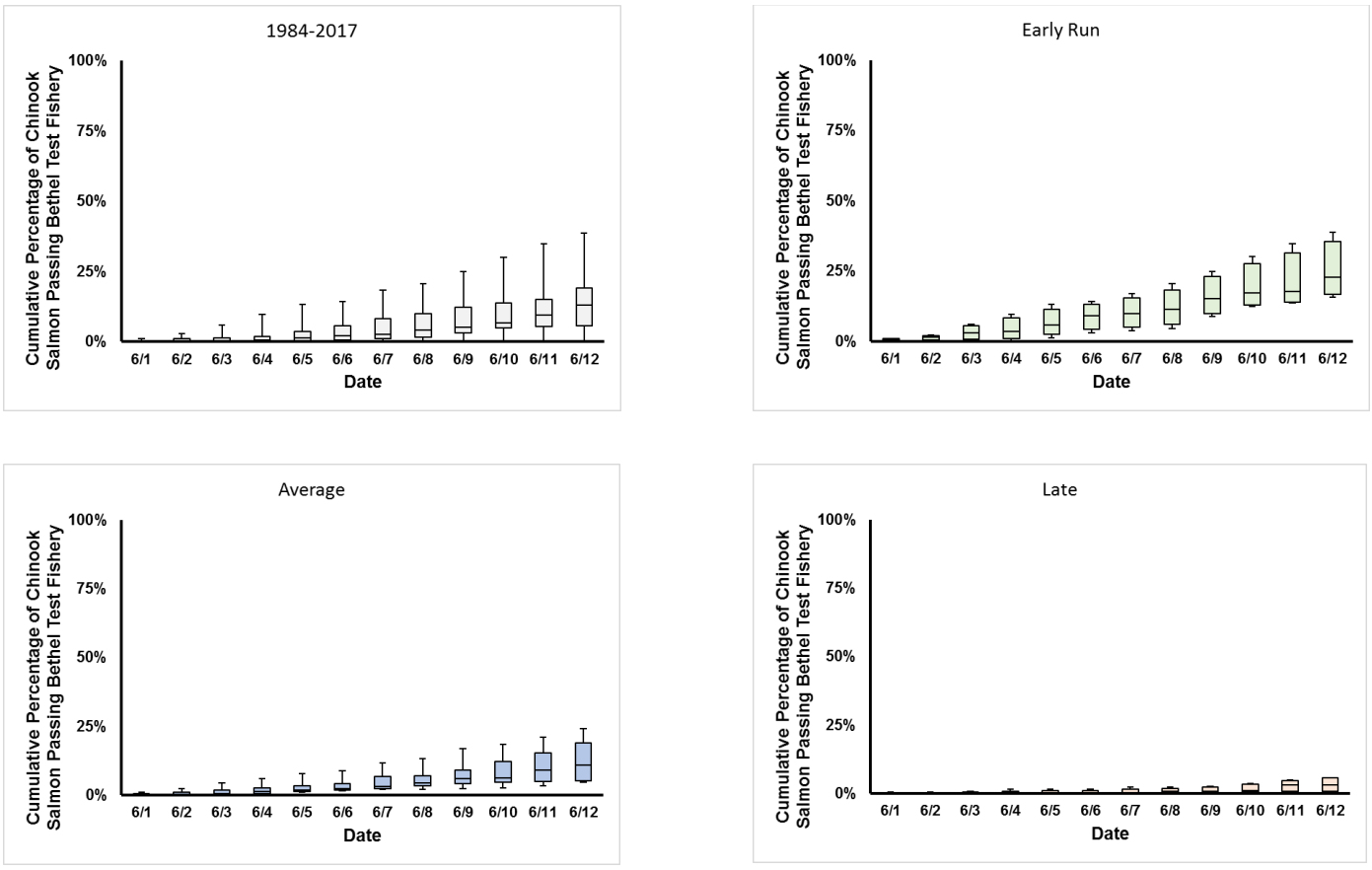


Figure 5. Box and Whisker plot for the cumulative percentage of Chinook Salmon passing through the Bethel Test Fishery from June 1 to June 12 under various run-timing scenarios.

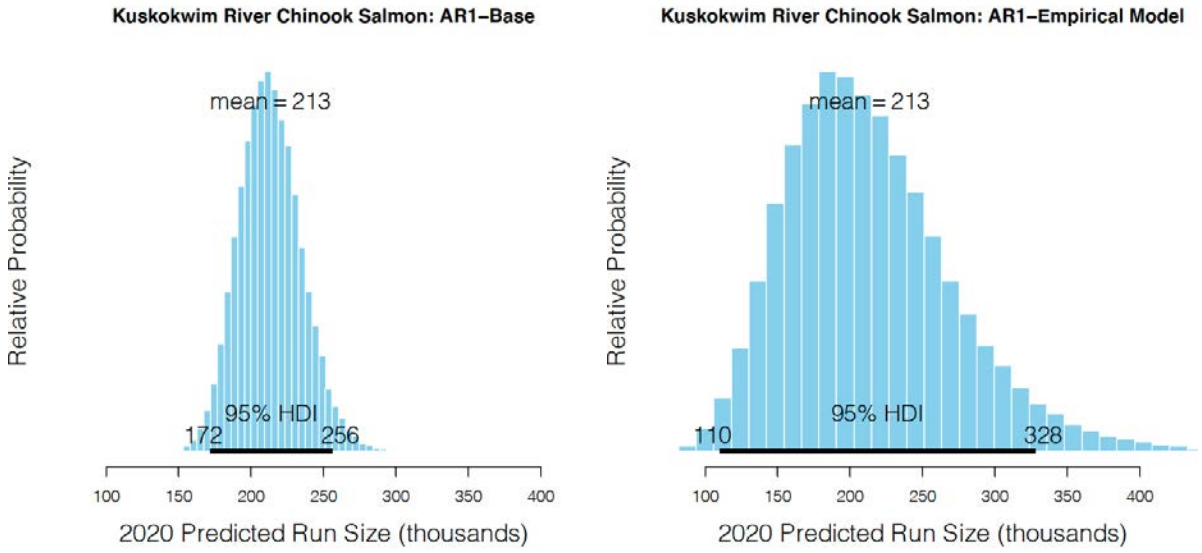


Figure 6. Posterior predictive distributions for 2020 Kuskokwim River Chinook salmon run size. The left panel is the prediction from the AR1-Base model and the right panel is that from the AR1-Empirical model. Curry Cunningham personal communications.

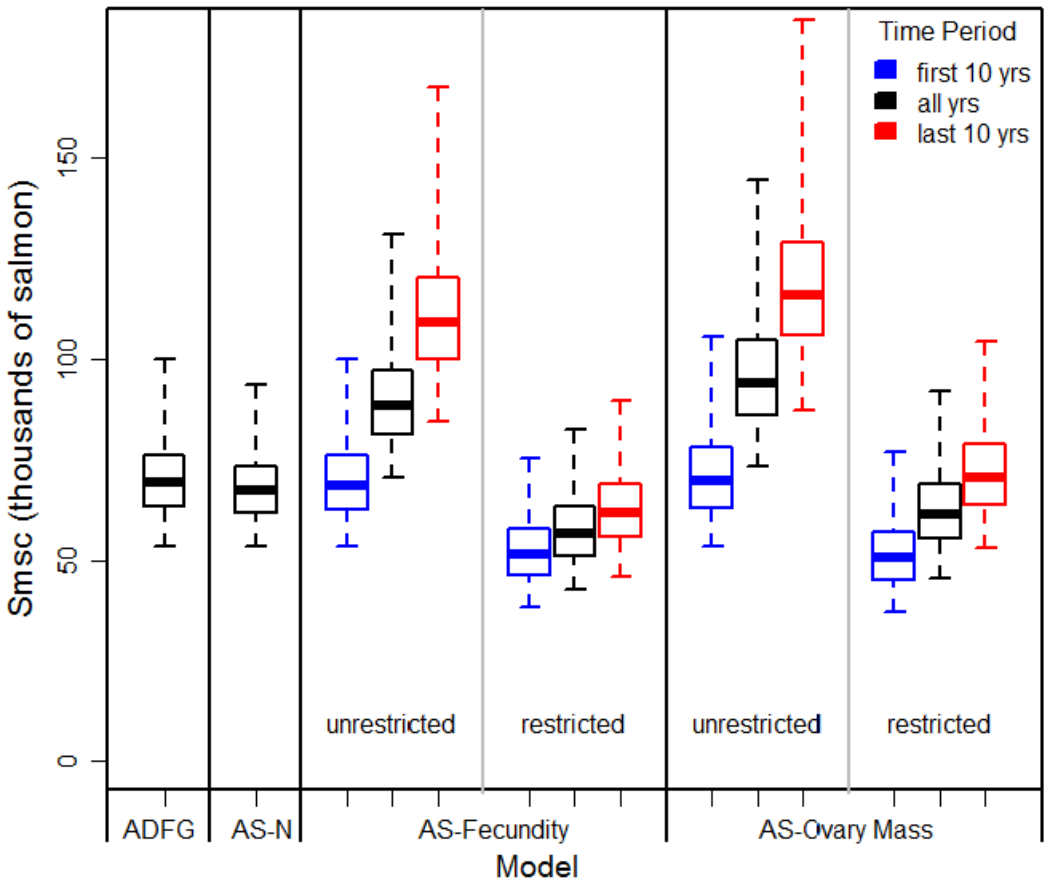


Figure 7. Escapement (thousands of salmon) associated with maximum sustainable harvest (Smsc) estimated from four different spawner-recruit models: ADFG, AS-N, AS-Fecundity, and AS-Ovary Mass. Smsc depends on per capita reproductive output, which varies over time, and as a function of the differential exploitation across age/sex classes (i.e., vulnerability). Therefore, separate Smsc estimates were obtained for restricted (<=6" stretch mesh) and unrestricted (>6" stretch mesh) mesh size cases to depict the effects of gear-specific vulnerability. For each vulnerability scenario, three separate Smsc estimates were otained to represent the effects of time varying maturity, sex ratios, and size-at-age on per capita fecundity. The first case estimated Smsc using the maturity, sex ratios, and length-at-age from the first 10 brood years of the tmie series (1976-1985; blue boxes), the second used those quantities from all brood years (1976-2013; black boxes), and the third used only the 10 most recent brood years of maturity, sex ratios, and length-at-age (2004:2013; red boxes). The midpoint of each box depicts the median, the box indicates the central 50th percentile, and the whiskers show the 95% credible intercal of the posterior distribution of Smsc. Figure from Ohlberger et al. (2020).

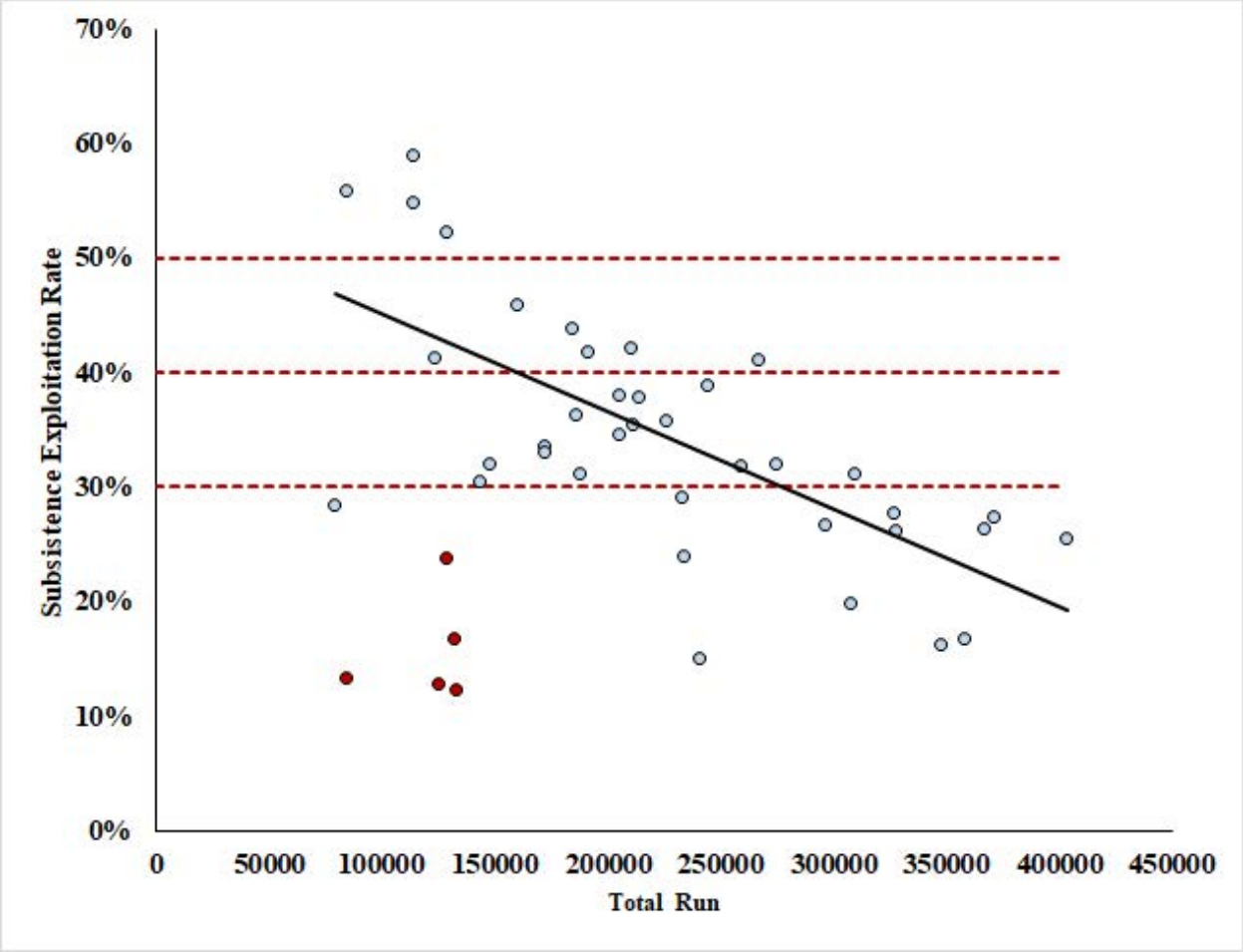


Figure 8. Historical exploitation rate of Chinook Salmon in the subsistence fishery on the Kuskokwim River. As run size increases, the exploitation decreases, likely a function of the processing and needs of the subsistence fishery in the area. Red dots indicated years with restricted subsistence fishery. Data from Gary Decosses, YDNWR. Red dashed lines represent exploitation rates that lead to 20%, 10%, and 5% of stocks at risk of extirpation.

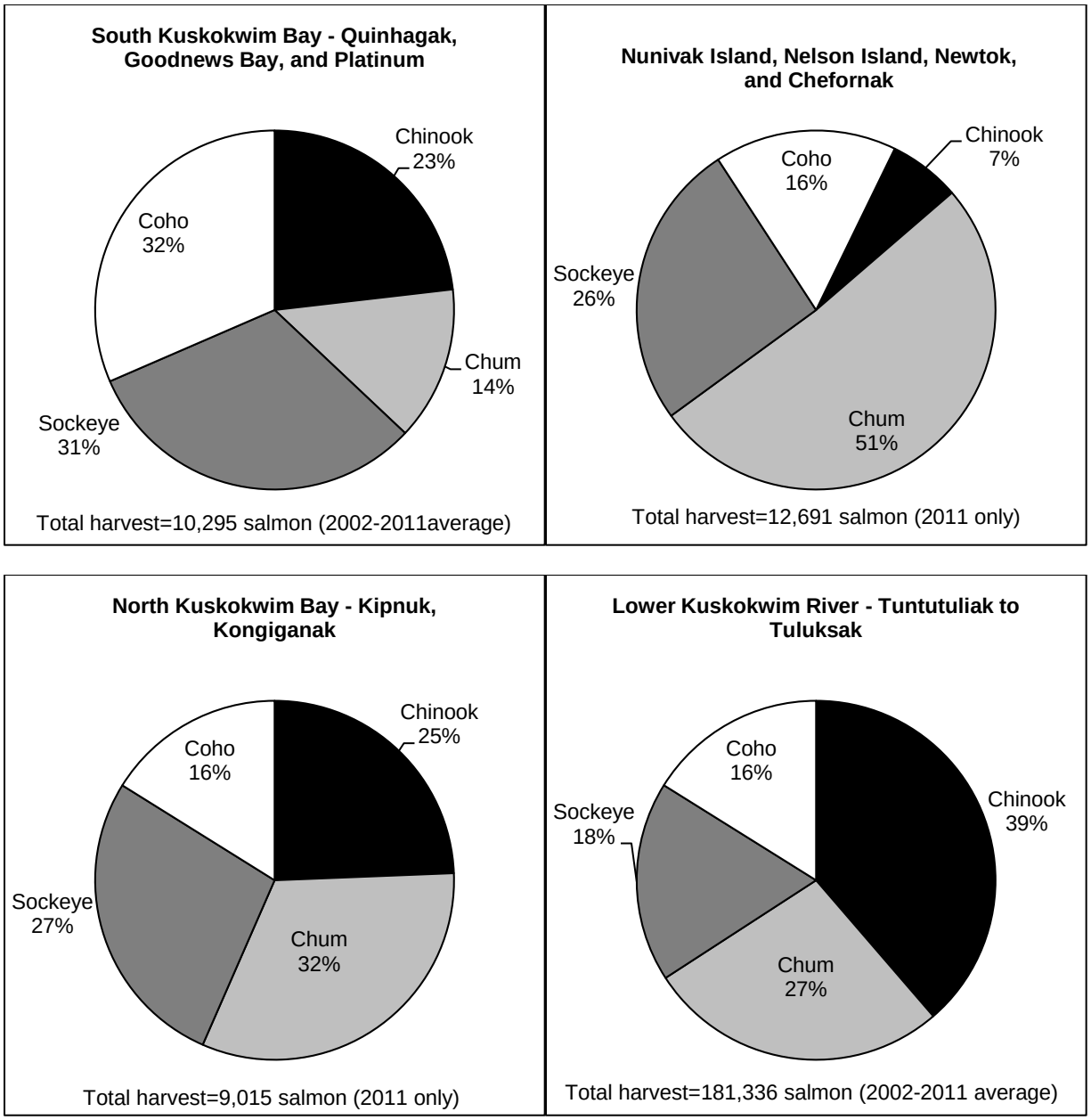


Figure 9. The relative size of the Chinook, Chum, Sockeye, and Coho Salmon harvests, in fish, by communities that participated in yearly postseason household harvest surveys. No estimate for Kwigillingok is available (Sources: Shelden et al. 2014, Wolfe et al. 2012).

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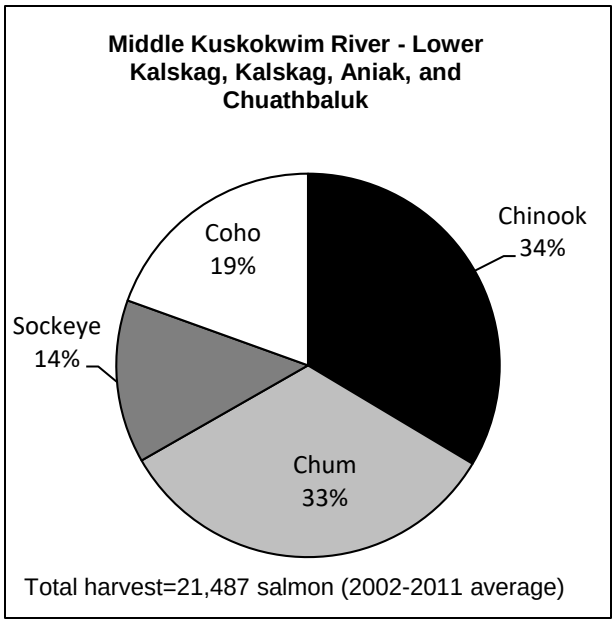

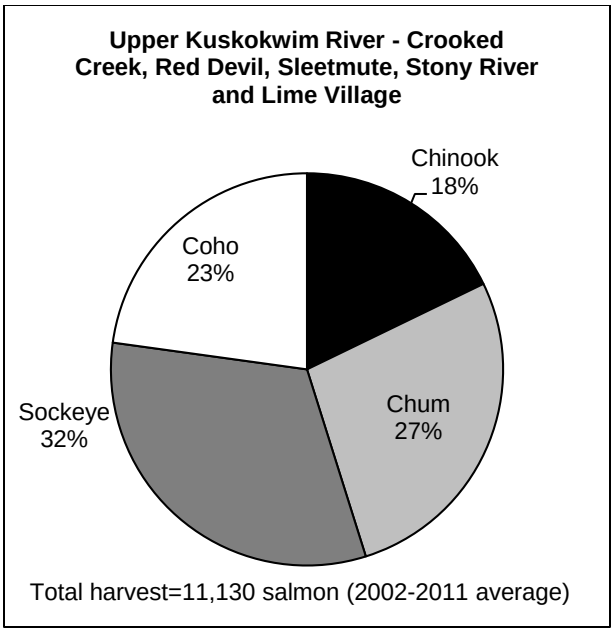

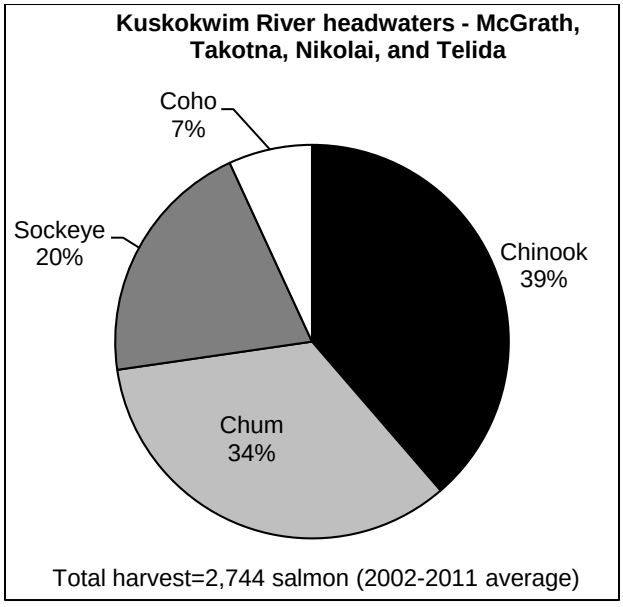

Figure 9. The relative size of the Chinook, Chum, Sockeye, and Coho Salmon harvests, in fish, by communities that participated in yearly postseason household harvest surveys.

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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 (ADCCED 2014).

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
Atmauthluak			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.

Table 2. Published estimates of Kuskokwim River Chinook Salmon run-size, escapement, and harvest from 1976 to 2019. Total Run and Escapement are estimated from the Kuskokwim River Chinook Salmon Run-Reconstruction Model (Smith 2019).

		Revised		Revised	Harvest				
Year	Total Run	Total Run	Escapement	Escapement	Subsistence	Commercial	Sport	Test Fish	Total
1976	233,967	187,584	143,420	97,037	58,606	30,735		1,206	90,547
1977	295,559	348,824	201,852	255,117	56,580	35,830	33	1,264	93,707
1978	264,325	241,781	180,853	158,309	36,270	45,641	116	1,445	83,472
1979	253,970	233,787	157,668	137,485	56,283	38,966	74	979	96,302
1980	300,573	357,950	203,605	260,982	59,892	35,881	162	1,033	96,968
1981	389,791	308,660	279,392	198,261	61,329	47,663	189	1,218	110,399
1982	187,354	173,072	80,353	66,071	58,018	48,234	207	542	107,001
1983	166,333	148,278	84,188	66,133	47,412	33,174	420	1,139	82,145
1984	188,238	171,853	99,062	82,677	56,930	31,742	273	231	89,176
1985	176,292	143,568	94,365	61,641	43,874	37,889	85	79	81,927
1986	129,168	123,452	58,556	52,840	51,019	19,414	49	130	70,612
1987	193,465	186,184	89,222	81,941	67,325	36,179	355	384	104,243
1988	207,818	204,824	80,055	77,061	70,943	55,716	528	576	127,763
1989	241,857	214,081	115,704	87,928	81,175	43,217	1,218	543	126,153
1990	264,802	266,353	100,614	102,167	109,778	53,502	394	512	164,186
1991	218,705	210,525	105,589	97,377	74,820	37,778	401	149	113,148
1992	284,846	259,154	153,573	127,881	82,654	46,872	367	1,380	131,273
1993	269,305	274,830	169,816	175,319	87,674	8,735	587	2,515	99,511
1994	365,246	411,724	242,616	289,094	103,343	16,211	1,139	1,937	122,630
1995	360,513	371,079	225,595	236,161	102,110	30,846	541	1,421	134,918
1996	302,603	307,072	197,092	201,561	96,413	7,419	1,432	247	105,511
1997	303,189	295,259	211,247	203,878	79,381	10,441	1,227	332	91,381
1998	213,873	184,356	113,627	84,140	81,213	17,359	1,434	210	100,216
1999	189,939	158,770	112,082	80,940	72,775	4,705	252	98	77,830
2000	136,618	129,138	65,180	60,905	67,620	444	105	64	68,233
2001	223,707	205,152	145,232	126,677	78,009	90	290	86	78,475
2002	246,296	226,106	164,635	144,445	80,982	72	319	288	81,661
2003	248,789	232,282	180,687	164,180	67,134	158	401	409	68,102
2004	388,136	366,725	287,178	266,084	96,788	2,305	857	691	100,641
2005	366,601	326,904	275,598	235,901	85,090	4,784	572	557	91,003
2006	307,662	326,067	214,004	232,409	90,085	2,777	444	352	93,658
2007	273,060	244,754	174,943	146,637	96,155	179	1,478	305	98,117
2008	237,074	219,709	128,978	111,613	98,103	8,865	708	420	108,096
2009	204,747	189,370	118,478	103,101	78,231	6,664	904	470	86,269
2010	118,507	112,975	49,073	43,541	66,056	2,732	354	292	69,434

(Continued on next page)

Table 2. *Continued from previous page.*

Kuskokwim River Drainage									
Year	Total Run	Revised Total Run	Escapement	Revised Escapement	Harvest				
					Subsistence	Commercial	Sport	Test Fish	Total
2011	133,059	113,749	72,097	49,718	62,368	747	579	337	64,031
2012	99,807	79,238	76,074	55,746	22,544	627	0	321	23,492
2013	94,166	84,311	47,315	36,823	47,113	174	0	201	47,488
2014	135,749	84,326	123,987	72,560	11,234	35	0	497	11,766
2015	172,055	125,058	155,464	108,454	16,124	8	0	472	16,604
2016	176,916	128,855	145,718	97,640	30,676	0	0	522	31,198
2017	165,863	133,267	150,193	116,597	16,380	0	0	290	16,670
2018		136,135		113,404	22,266	0	0	465	22,731
2019		226,987		188,483	37,941	0	0	563	38,504

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 Kuskokwim River Subsistence Fishery							
Time Period	**Average**	**SD**	**Minimum**	**1st Quartile (25%)**	**Median (50%)**	**3rd Quartile (75%)**	**Maximum**
Overall (1976-2017)	68,052	23,319	11,234	56,432	67,620	83,872	109,778
Five Year (2013-2017)	24,305	14,675	11,234	13,679	16,380	38,895	47,113
10 Year (2008-2017)	44,883	30,141	11,234	16,316	38,895	69,100	98,103
20 Year Average (1998-2017)	63,234	28,959	11,234	34,785	70,198	84,121	98,103
ANS (set in 2013)	88,500	-	67,228	-	-	-	109,778

Table 4. Comparison of mark-recapture estimates and run-reconstruction output for Kuskokwim River Chinook Salmon for years 2003-2007 and 2014-2017. Numbers inside parentheses represent lower and upper 95% confidence intervals. Run-reconstruction estimate does not include 2014-2017 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	78,600 (67,300 – 98,100)	131,674 (99,377 - 174,466)
2015	122,400 (112,000 - 132,600)	164,906 (123,895 - 219,491)
2016	127,500 (110,100 - 155,300)	176,916 (134,407 - 232,871)
2017	133,200 (101,500 – 160,274)	166,863 (130,668 – 213,085)

Table 5. 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	Date of 50% Catch in the Bethel Test Fishery
1984	06/23
1985	07/02
1986	06/22
1987	06/22
1988	06/20
1989	06/23
1990	06/25
1991	06/25
1992	06/21
1993	06/17
1994	06/19
1995	06/21
1996	06/14
1997	06/20
1998	06/24
1999	06/30
2000	06/20
2001	06/23
2002	06/19
2003	06/18
2004	06/22
2005	06/23
2006	06/24
2007	06/27
2008	06/24
2009	06/22
2010	06/22
2011	06/23
2012	06/27
2013	06/23
2014	06/16
2015	06/24
2016	06/22
2017	06/27
2018	6/24
2019	6/20
Average (1984-2017)	06/22

Table 6. Summary statistics for the cumulative percentage of Chinook Salmon passing through the Bethel Test Fishery from June 1 to June 12 under various run-timing scenarios.

Run-Timing	Summary Statistic	6/1	6/2	6/3	6/4	6/5	6/6	6/7	6/8	6/9	6/10	6/11	6/12
Overall	**Min**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Overall	**25%**	0%	0%	0%	0%	0%	1%	1%	2%	3%	5%	5%	6%
Overall	**Median**	0%	0%	0%	1%	1%	2%	3%	4%	5%	7%	10%	13%
Overall	**75%**	0%	1%	1%	2%	4%	6%	8%	10%	12%	14%	15%	19%
Overall	**Max**	1%	3%	6%	10%	13%	14%	18%	20%	25%	30%	35%	39%
Early	**Min**	0%	0%	0%	0%	1%	3%	4%	4%	9%	12%	14%	16%
Early	**25%**	0%	1%	1%	1%	2%	4%	5%	6%	10%	13%	14%	17%
Early	**Median**	1%	1%	3%	3%	6%	9%	10%	11%	15%	17%	18%	23%
Early	**75%**	1%	2%	5%	8%	11%	13%	15%	18%	23%	28%	31%	35%
Early	**Max**	1%	2%	6%	10%	13%	14%	17%	20%	25%	30%	35%	39%
Average	**Min**	0%	0%	0%	0%	1%	1%	2%	2%	2%	2%	3%	5%
Average	**25%**	0%	0%	0%	0%	1%	2%	2%	3%	4%	5%	5%	5%
Average	**Median**	0%	0%	0%	1%	2%	2%	3%	4%	6%	6%	9%	11%
Average	**75%**	0%	1%	2%	3%	3%	4%	7%	7%	9%	12%	15%	19%
Average	**Max**	1%	2%	4%	6%	8%	9%	12%	13%	17%	18%	21%	24%
Late	**Min**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Late	**25%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
Late	**Median**	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	3%	3%
Late	**75%**	0%	0%	0%	1%	1%	1%	1%	2%	2%	3%	5%	6%
Late	**Max**	0%	0%	1%	1%	1%	1%	2%	2%	3%	4%	5%	6%

Table 7. Pre-season forecast for Chinook Salmon in the Kuskokwim River as provided by ADF&G from 2012 to 2019.

Forecast Year	Lower Range	Upper Range	Actual Run Size
2012	158,000	236,000	75,010
2013	160,000	240,000	88,515
2014	71,000	116,000	82,096
2015	96,000	163,000	125,578
2016	125,000	219,000	130,475
2017	132,000	222,000	131,677
2018	140,000	193,000	136,135
2019	115,000	150,000	226,987
2020	193,000	261,000	

Table 8. Forecasts generated by the BayesTool methodology. The first column is the forecast distribution given the current calculated level of uncertainty (Coefficient of Variation, CV, 0.29). The second column is the forecast distribution given when the currently calculated level of uncertainty is increased by 25% (CV=0.44). The second column is the forecast distribution given when the currently calculated level of uncertainty is doubled (CV=0.58). Forecasts are summarized by the mean, standard deviation, and certain selected percentiles (2.5%, 10%, 25%, 50%, 75%, 90%, 97.50%). Decosses 2020, pers. comm.)

Mean = 227,000, **CV** = 0.29		**Mean** = 227,000, **CV** = 0.44		**Mean** = 227,000, **CV** = 0.58	
Statistic	**Forecast**	**Statistic**	**Forecast**	**Statistic**	**Forecast**
Mean	227,000	Mean	227,000	Mean	227,000
SD	66,000	SD	100,000	SD	132,000
2.50%	125,000	2.50%	91,000	2.50%	68,000
10%	151,000	10%	121,000	10%	98,000
25%	180,000	25%	157,000	25%	136,000
50%	218,000	50%	208,000	50%	196,000
75%	264,000	75%	276,000	75%	282,000
90%	314,000	90%	356,000	90%	392,000
97.50%	380,000	97.50%	474,000	97.50%	564,000

Table 9. Results of forecast created by the AR-1 Empirical and AR-1 base methodology. Forecasts are summarized by the mean, standard deviation, and certain selected percentiles (2.5%, 10%, 25%, 50%, 75%, 90%, 97.50%). Data from Curry Cunningham personal communications

	AR1-Empirical	AR1-Base
Mean	213,317	213,361
SD	58,060	21,546
CV	0.27	0.10
2.50%	121,447	174,124
25%	171,732	198,275
50%	205,944	212,369
75%	246,675	227,248
97.50%	347,562	258,643

Table 10- Percent females estimated by time period in the total run of Chinook Salmon in the Kuskokwim River from 1976-2019 (Gary Decosses pers com)

Time Period	% Females	SD
1976-2019	34%	6%
1976-2009	34%	6%
2010-2019	34%	8%
1976 - 1979	38%	12%
1980 - 1989	35%	5%
1990 - 1999	35%	6%
2000 - 2009	32%	4%
2010 - 2019	34%	8%

Table 11. Estimated number of Chinook Salmon harvested for subsistence by community, Kuskokwim River drainage, based on the annual postseason survey, 2008 – 2018.

Community	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2013-2017 5-year average	2008-2017 10-year average
Kongiganak[a]	2,233	1,243	1,456	1,208	*287*	*641*	*964*	-	-	-	-	-	-
North Kuskokwim Bay	2,233	1,243	1,456	1,208	287	641	964	-	-	-	-	-	-
Tuntutuliak	*4,266*	3,067	3,261	3,032	1,123	2,448	*574*	1,668	1,963	1,459	2,178	1,622	2,286
Eek	*2,966*	1,982	1,761	1,378	1,004	1,188	665	850	1,460	825	706	998	1,408
Kasigluk	2,471	2,464	3,014	2,823	552	2,919	205	438	951	791	843	1,061	1,663
Nunapitchuk	*4,234*	3,468	2,548	3,559	845	2,563	287	1,051	1,695	761	1,389	1,271	2,101
Atmautluak	*1,298*	1,567	1,088	1,236	234	1,592	108	514	763	195	661	634	860
Napakiak	1,903	2,387	1,674	1,963	457	1,588	311	917	1,151	505	842	894	1,286
Napaskiak	4,555	5,372	4,333	3,360	1,108	2,939	422	816	1,535	858	1,079	1,314	2,530
Oscarville	1,351	754	618	694	51	585	68	120	208	122	123	221	457
Bethel	27,800	26,170	26,157	25,093	7,321	17,246	3,089	4,918	9,462	5,336	5,469	8,010	15,259
Kwethluk	8,451	7,130	4,440	2,467	1,709	3,192	959	900	1,731	1,019	1,518	1,560	3,200
Akiachak	9,719	7,361	4,470	3,852	2,862	3,585	1,033	1,103	3,438	1,415	2,520	2,115	3,884
Akiak[b]	4,090	3,247	3,625	2,455	*1,218*	1,449	530	610	1,274	694	1,248	911	1,919
Tuluksak	2,937	3,212	2,057	1,230	651	732	404	231	709	511	705	517	1,267
Lower Kuskokwim	76,041	68,181	59,046	53,142	19,135	42,026	8,655	14,136	26,340	14,491	19,281	21,130	38,119
Lower Kalskag	1,748	2,525	1,030	1,260	459	744	283	351	578	260	474	443	924
Upper Kalskag	2,435	1,696	1,496	1,772	562	1,317	258	334	838	190	638	587	1,090
Aniak[b]	3,100	2,130	2,262	2,214	993	1,440	344	542	1,293	718	803	867	1,504
Chuathbaluk	772	877	551	409	103	155	90	90	203	100	216	128	335
Middle Kuskokwim	8,055	7,228	5,339	5,655	2,117	3,656	975	1,317	2,912	1,268	2,131	2,026	3,852
Crooked Creek	488	608	240	402	124	*145*	35	78	384	110	144	150	261
Red Devil	148	258	33	186	225	77	83	52	69	38	10	64	117
Sleetmute	933	693	272	242	132	96	58	137	169	36	76	99	277
Stony River	514	704	189	134	151	51	24	25	33	109	53	48	193
Lime Village	*29*	75	47	*118*	29	*43*	32	-	35	33	10	36	49
McGrath	288	600	262	829	68	95	173	75	384	118	239	169	289
Takotna	*0*	*8*	*0*	*0*	*0*	*0*	*0*	3	0	0	2	1	1
Nikolai	184	298	402	450	276	283	235	301	367	177	317	273	297
Telida[a]	-	-	-	-	-	-	-	-	-	-	-		
Upper Kuskokwim	2,584	3,244	1,445	2,361	1,005	790	640	671	1,441	621	851	833	1,480
Kuskokwim River[b]	88,913	79,896	67,286	62,366	22,544	47,113	11,234	16,124	30,693	16,380	22,263	24,309	44,255
Quinhagak	3,125	3,312	2,793	2,588	2,396	3,143	3,723	3,082	4,822	5,217	3,592	3,997	3,420
Goodnews Bay	898	569	480	834	389	413	431	220	654	*457*	*555*	435	535
Platinum	42	61	17	62	24	39	46	11	99	*96*	*67*	58	50
South Kuskokwim Bay	4,065	3,942	3,290	3,484	2,809	3,595	4,200	3,313	5,575	5,770	4,214	4,491	4,004
Total Estimated Harvest	92,978	83,838	70,576	65,850	25,353	50,708	15,434	19,437	36,268	22,150	26,477	28,799	48,259

Source: Lipka and Tiernan 2018, McDivitt et al. 2019.

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

[a] Villages not surveyed in 2017. 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 12. The estimated harvest of wild resources in pounds edible weight per person by communities that have participated in household harvest surveys, from south to north (Source: ADFG 2014b).

Community (from south to north)	Per person harvest	95% Confidence interval (+/-)	Percentage of total harvest
	Pounds		
Quinhagak 1982			
Salmon	342	78%	45%
Nonsalmon fish	150	51%	20%
Large land mammals	103	117%	13%
Small land mammals	14	107%	2%
Marine mammals	124	68%	16%
Birds and eggs	29	65%	4%
Marine invertebrates	0		0%
Berries and plants	4	115%	1%
Total	766	47%	100%
Tununak 1986			
Salmon	114	23%	10%
Nonsalmon fish	663	19%	61%
Large land mammals	19	47%	2%
Small land mammals	2	42%	0%
Marine mammals	220	25%	20%
Birds and eggs	32	19%	3%
Marine invertebrates	5	21%	0%
Berries and plants	38	20%	3%
Total	1,093	15%	100%
Napakiak 2011			
Salmon	232	30%	47%
Nonsalmon fish	151	22%	31%
Large land mammals	50	27%	10%
Small land mammals	4	44%	1%
Marine mammals	9	62%	2%
Birds and eggs	25	21%	5%
Marine invertebrates	<1	122%	0%
Berries and plants	19	17%	<1%
Total	490	21%	100%

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Table 12. (*Continued from previous page).*

Community (from south to north)	Per person harvest	95% Confidence interval (+/-)	Percentage of total harvest
	Pounds		
Napaskiak 2011			
Salmon	175	17%	43%
Nonsalmon fish	105	52%	26%
Large land mammals	61	23%	15%
Small land mammals	1	75%	<1%
Marine mammals	29	47%	7%
Birds and eggs	24	20%	6%
Marine invertebrates	0		0%
Berries and plants	16	19%	4%
Total	411	21%	100%
Oscarville 2010			
Salmon	256	22%	49%
Nonsalmon fish	169	36%	33%
Large land mammals	42	28%	8%
Small land mammals	0	0%	0%
Marine mammals	14	45%	3%
Birds and eggs	18	24%	3%
Marine invertebrates	0		0%
Berries and plants	21	18%	4%
Total	520	21%	100%
Nunapitchuk 1983			
Salmon	288	58%	36%
Nonsalmon fish	365	37%	46%
Large land mammals	21	61%	3%
Small land mammals	30	14%	4%
Marine mammals	20	78%	2%
Birds and eggs	34	26%	4%
Marine invertebrates	0		0%
Berries and plants	44	15%	5%
Total	802	31%	100%
Kwethluk 2010			
Salmon	170	24%	47%
Nonsalmon fish	84	38%	23%
Large land mammals	48	18%	13%
Small land mammals	8	26%	2%
Marine mammals	25	53%	7%
Birds and eggs	13	21%	4%
Marine invertebrates	<1	109%	<1%
Berries and plants	16	29%	4%
Total	364	17%	100%

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Table 12. (*Continued from previous page).*

Community (from south to north)	Per person harvest Pounds	95% Confidence interval (+/-)	Percentage of total harvest
Kwethluk 1986			
Salmon	446		53%
Nonsalmon fish	269		32%
Large land mammals	51		6%
Small land mammals	17		2%
Marine mammals	8		1%
Birds and eggs	21		3%
Marine invertebrates	0		0%
Berries and plants	26		3%
Total	838		100%
Akiachak 1998			
Salmon	649	12%	49%
Nonsalmon fish	248	12%	19%
Large land mammals	245	10%	18%
Small land mammals	26	16%	2%
Marine mammals	31	47%	2%
Birds and eggs	69	11%	5%
Marine invertebrates	0		0%
Berries and plants	61	12%	5%
Total	1,329	8%	100%
Akiak 2010			
Salmon	292	28%	48%
Nonsalmon fish	209	55%	34%
Large land mammals	57	17%	9%
Small land mammals	10	20%	2%
Marine mammals	6	56%	1%
Birds and eggs	21	18%	3%
Marine invertebrates	<1	80%	<1%
Berries and plants	21	55%	3%
Total	616	30%	100%
Tuluksak 2010			
Salmon	173	13%	48%
Nonsalmon fish	87	26%	24%
Large land mammals	34	21%	9%
Small land mammals	7	17%	2%
Marine mammals	6	66%	2%
Birds and eggs	21	20%	6%
Marine invertebrates	0		0%
Berries and plants	31	15%	9%
Total	359	14%	100%

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Table 12. (*Continued from previous page).*

Community (from south to north)	Per person harvest Pounds	95% Confidence interval (+/-)	Percentage of total harvest
Lower Kalskag 2009			
Salmon	99	16%	53%
Nonsalmon fish	32	17%	17%
Large land mammals	35	17%	19%
Small land mammals	3	33%	2%
Marine mammals	0		0%
Birds and eggs	5	14%	3%
Marine invertebrates	0		0%
Berries and plants	13	26%	7%
Total	187	12%	100%
Kalskag 2009			
Salmon	199	17%	58%
Nonsalmon fish	48	26%	14%
Large land mammals	46	28%	13%
Small land mammals	8	63%	2%
Marine mammals	0		0%
Birds and eggs	8	19%	2%
Marine invertebrates	0		0%
Berries and plants	36	47%	10%
Total	345	25%	100%
Aniak 2009			
Salmon	190	18%	65%
Nonsalmon fish	50	57%	17%
Large land mammals	41	14%	14%
Small land mammals	3	46%	1%
Marine mammals	2	959%	1%
Birds and eggs	2	14%	1%
Marine invertebrates	0		0%
Berries and plants	6	14%	2%
Total	294	27%	100%
Chuathbaluk 2009			
Salmon	159	26%	65%
Nonsalmon fish	20	36%	8%
Large land mammals	41	38%	17%
Small land mammals	8	65%	3%
Marine mammals	0		0%
Birds and eggs	3	36%	1%
Marine invertebrates	0		0%
Berries and plants	14	32%	6%
Total	245	27%	100%

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Table 12. (*Continued from previous page).*

Community (from south to north)	Per person harvest Pounds	95% Confidence interval (+/-)	Percentage of total harvest
Crooked Creek 2009			
Salmon	171	17%	70%
Nonsalmon fish	29	19%	12%
Large land mammals	25	37%	10%
Small land mammals	7	36%	3%
Marine mammals	0		0%
Birds and eggs	2	25%	1%
Marine invertebrates	<1	85%	<1%
Berries and plants	11	11%	4%
Total	245	15%	100%
Red Devil 2009			
Salmon	142	28%	46%
Nonsalmon fish	120	74%	39%
Large land mammals	21	54%	7%
Small land mammals	9	68%	3%
Marine mammals	0		0%
Birds and eggs	6	28%	2%
Marine invertebrates	0		0%
Berries and plants	8	26%	3%
Total	306	52%	100%
Sleetmute 2009			
Salmon	277	17%	68%
Nonsalmon fish	53	14%	13%
Large land mammals	44	20%	11%
Small land mammals	15	31%	4%
Marine mammals	0		0%
Birds and eggs	6	21%	1%
Marine invertebrates	0		0%
Berries and plants	11	12%	3%
Total	406	14%	100%
Stony River 2009			
Salmon	366	56%	69%
Nonsalmon fish	92	87%	17%
Large land mammals	20	70%	4%
Small land mammals	39	78%	7%
Marine mammals	0		0%
Birds and eggs	5	65%	1%
Marine invertebrates	0		0%
Berries and plants	10	41%	2%
Total	532	55%	100%

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Table 12. (*Continued from previous page).*

Community (from south to north)	Per person harvest Pounds	95% Confidence interval (+/-)	Percentage of total harvest
Lime Village 2007			
Salmon	556	57%	59%
Nonsalmon fish	50	68%	5%
Large land mammals	243	71%	26%
Small land mammals	17	51%	2%
Marine mammals	0		0%
Birds and eggs	22	60%	2%
Marine invertebrates	0		0%
Berries and plants	48	33%	5%
Total	935	54%	100%
Takotna 2011			
Salmon	1	127%	1%
Nonsalmon fish	8	52%	5%
Large land mammals	131	35%	82%
Small land mammals	5	103%	3%
Marine mammals	0		0%
Birds and eggs	11	67%	7%
Marine invertebrates	0		0%
Berries and plants	4	70%	3%
Total	160	33%	100%
Nikolai 2011			
Salmon	131	39%	26%
Nonsalmon fish	76	50%	15%
Large land mammals	247	27%	49%
Small land mammals	11	47%	2%
Marine mammals	0		0%
Birds and eggs	24	34%	5%
Marine invertebrates	<1	119%	<1%
Berries and plants	10	26%	2%
Total	499	27%	100%
Nikolai 2002			
Salmon	115	21%	29%
Nonsalmon fish	29	17%	7%
Large land mammals	231	20%	58%
Small land mammals	10	19%	2%
Marine mammals	0		0%
Birds and eggs	10	16%	2%
Marine invertebrates	<1	22%	<1%
Berries and plants	6	15%	1%
Total	401	Not available	100%

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Table 12. (*Continued from previous page).*

Community (from south to north)	Per person harvest Pounds	95% Confidence interval (+/-)	Percentage of total harvest
Nikolai 1984			
Salmon	379		48%
Nonsalmon fish	7		1%
Large land mammals	340		43%
Small land mammals	18		2%
Marine mammals	0		0%
Birds and eggs	18		2%
Marine invertebrates	0		0%
Berries and plants	24		3%
Total	787		100%
McGrath 2011			
Salmon	66	20	28%
Nonsalmon fish	26	15	11%
Large land mammals	115	11	49%
Small land mammals	6	34	3%
Marine mammals	0		0%
Birds and eggs	9	22	4%
Marine invertebrates	<1	97	<1
Berries and plants	14	13	6%
Total	236	10	100%
McGrath 1984			
Salmon	75		41%
Nonsalmon fish	19		11%
Large land mammals	76		42%
Small land mammals	1		1%
Marine mammals	0		0%
Birds and eggs	8		4%
Marine invertebrates	0		0%
Berries and plants	2		1%
Total	182		100%

APPENDIX A

RELEVANT FEDERAL REGULATIONS

Kuskokwim Area—Fish

(i) Unless otherwise restricted in this section, you may take fish in the Kuskokwim Area at any time without a subsistence fishing permit.

(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.

. . .

(ix) You may only take salmon by gillnet, beach seine, fish wheel, dipnet, or rod and reel subject to the restrictions set out in this section, except that you may also take salmon by spear in the Kanektok, and Arolik River drainages, and in the drainage of Goodnews Bay.

(x) You may not use an aggregate length of set gillnets or drift gillnets in excess of 50 fathoms for taking salmon.

(xi) You may take fish other than salmon by set gillnet, drift gillnet, beach seine, fish wheel, pot, long line, fyke net, dip net, jigging gear, spear, lead, handline, or rod and reel.

(xii) You must attach to the bank each subsistence gillnet operated in tributaries of the Kuskokwim River and fish it substantially perpendicular to the bank and in a substantially straight line.

(xiii) Within a tributary to the Kuskokwim River in that portion of the Kuskokwim River drainage from the north end of Eek Island upstream to the mouth of the Kolmakoff River, you may not set or operate any part of a set gillnet within 150 feet of any part of another set gillnet.

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

> *(A) Gillnets with 6-inch or smaller stretched-mesh may not be more than 45 meshes in depth;*
>
> *(B) Gillnets with greater than 6-inch stretched-mesh may not be more than 35 meshes in depth.*

(xv) You may not use subsistence set and drift gillnets exceeding 15 fathoms in length in Whitefish Lake in the Ophir Creek drainage. You may not operate more than one subsistence set or drift gillnet at a time in Whitefish Lake in the Ophir Creek drainage. You must check the net at least once every 24 hours.

APPENDIX B

RELEVANT STATE REGULATIONS

AS 16.05.060. Emergency orders.

(a) This chapter does not limit the power of the commissioner or an authorized designee, when circumstances require, to summarily open or close seasons or areas or to change weekly closed periods on fish or game by means of emergency orders.

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.

(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.

. . .

(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 01.271. Identification of gear

In addition to the requirements of 5 AAC 01.010(h), (1) each fish wheel must have the first initial, last name and address of the operator plainly and legibly inscribed on the side of the fish wheel facing midstream of the river; (2) for all gillnets and unattended gear that are fished under the ice, the first initial, last name and address of the operator must be plainly and legibly inscribed on a stake inserted in the ice and attached to the gear.

5 AAC 01.280. Subsistence fishing permits

Fish may be taken for subsistence purposes without a subsistence fishing permit, except as otherwise provided in this section.

(1) Starting in the 2018 fishing season, during times when the commissioner determines it is necessary for the conservation of king salmon, the commissioner may, by emergency order, require that in the Kuskokwim River drainage, upstream of a line between ADF&G regulatory markers at the Yukon Delta National Wildlife Refuge Boundary near Aniak, king salmon may be taken only under the authority of a subsistence fishing permit with the following conditions:

(A) annual limit of 10 king salmon;

(B) fishing under the permit may not commence until the subsistence king salmon fishery opens after June 11 as described in 5 AAC 07.365;

(C) the commissioner may, by emergency order, implement one or more of the gear limitations specified in 5 AAC 01.270(n) (1) for fishing under the permit;

(D) permit holders must complete and return permits, including daily records of king salmon harvested, each year by October 31;

(E) once the annual limit is reached, additional king salmon may not be taken except in compliance with all applicable regulations and emergency orders;

(F) only one permit may be issued to a household each year;

(2) the provisions of (1) of this section do not apply after December 31, 2021.

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 C

FEDERAL SPECIAL ACTIONS AND STATE EMERGENCY ORDERS 2014–2019

Appendix Table C-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 27–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 C-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.

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Appendix Table C-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.

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Appedix Table C-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 6:00p.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 C-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 C-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 C-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 C-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 C-2**).

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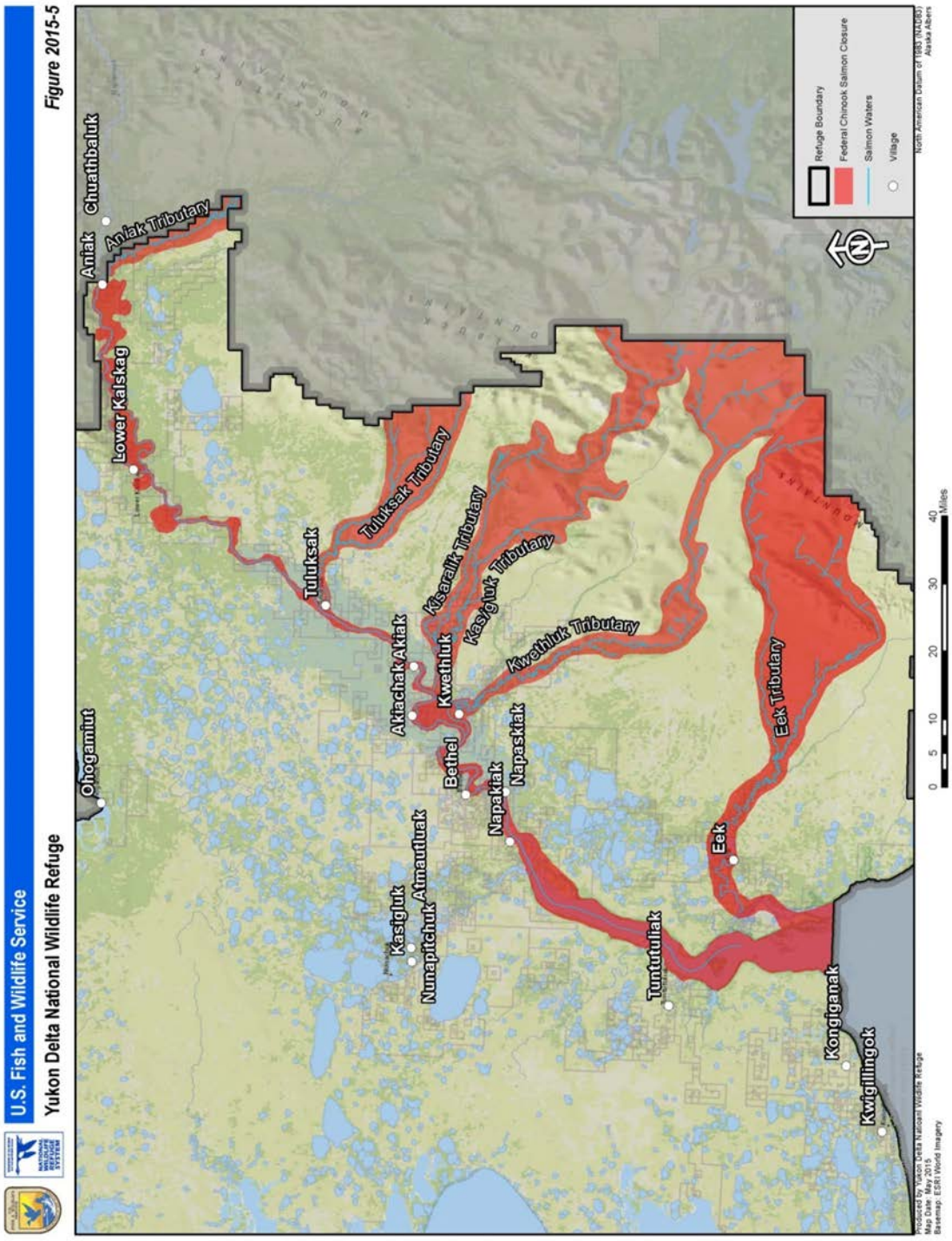
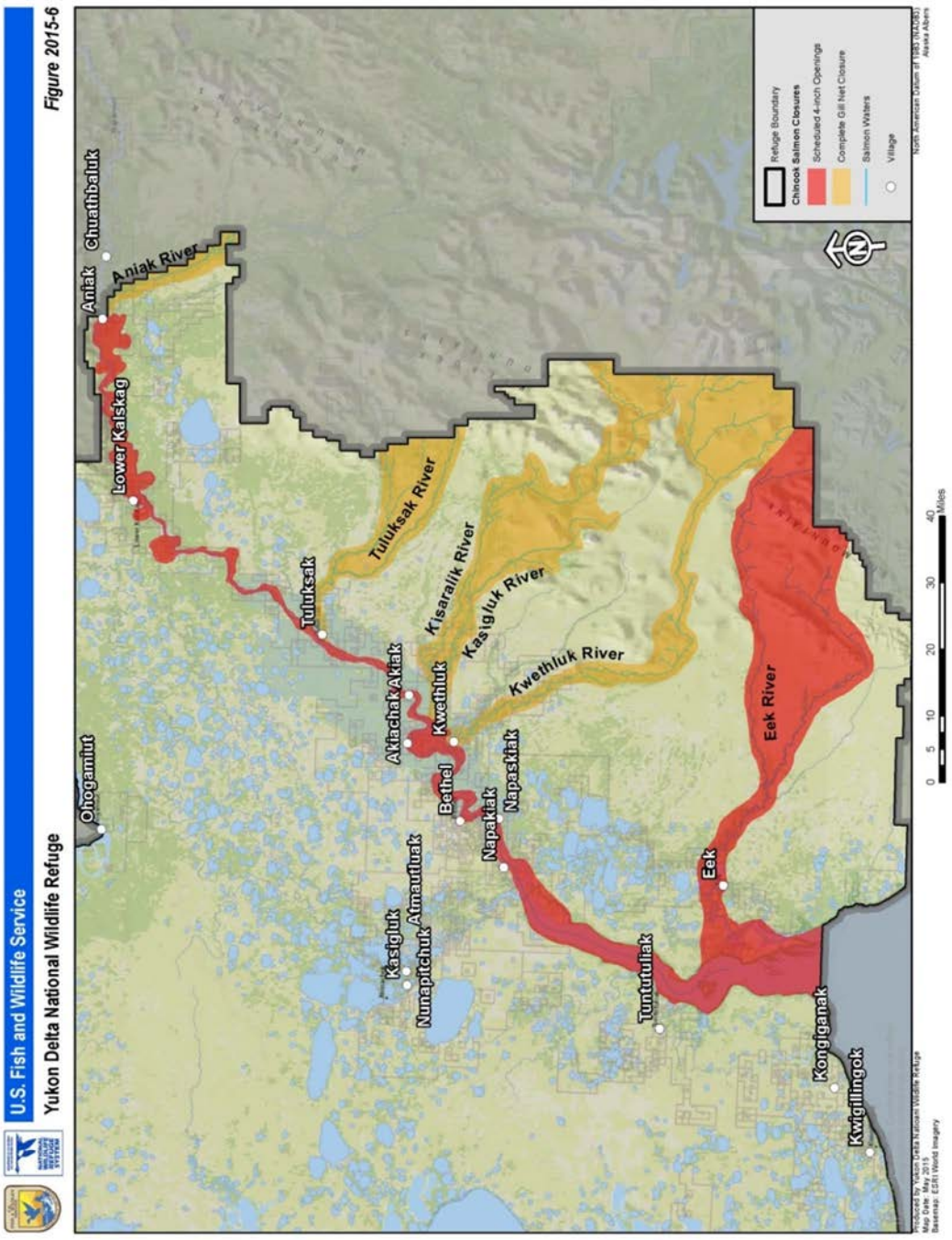


Appendix Figure C-1. Federal Special Action SA 3-KS-03-15 closure to the harvest of Chinook Salmon by all users.



Appendix Figure C-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 C-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 C-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 C-3**).

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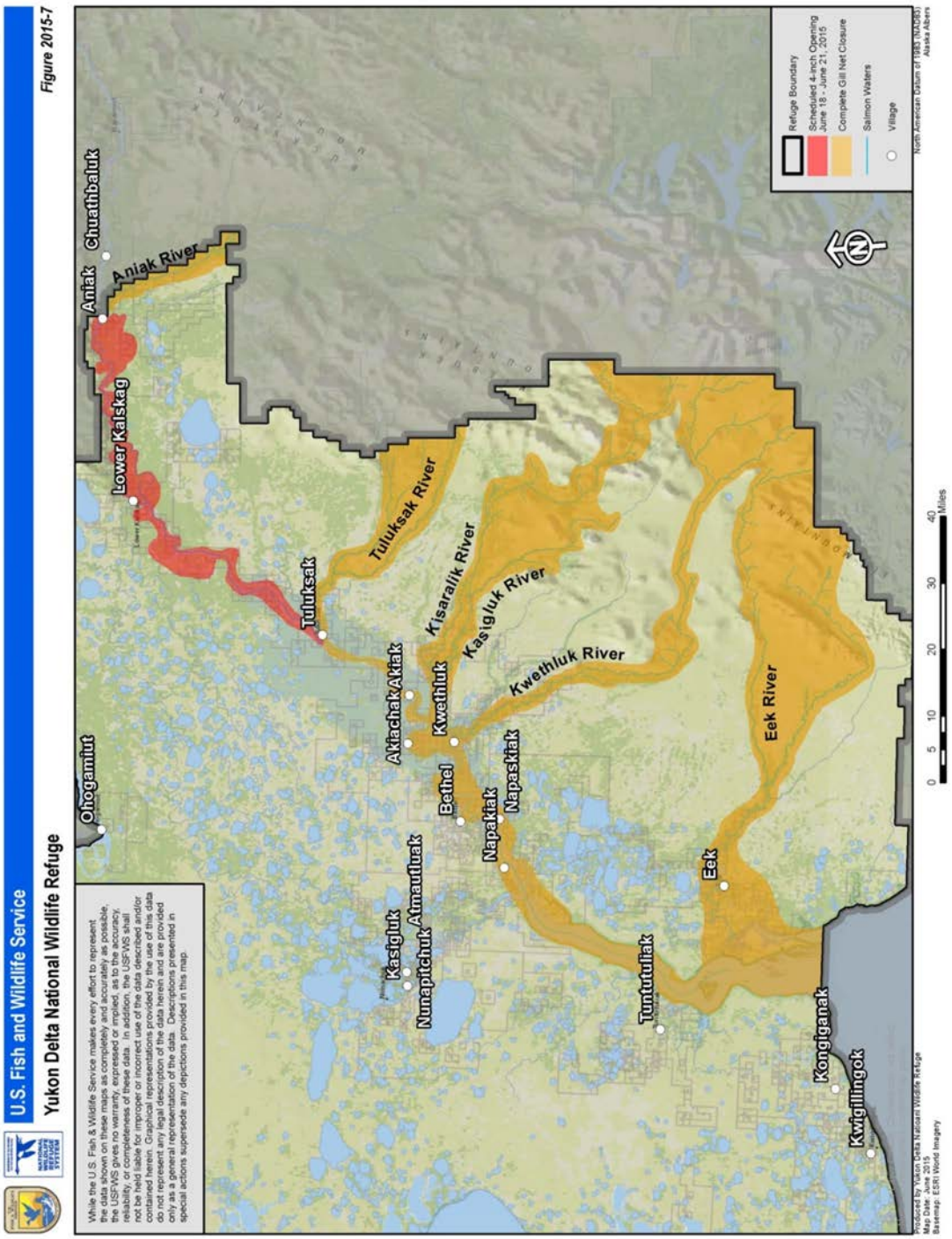

Appendix Figure C-3. Federal Special Actions SA 3-KS-07-15 (closure to gillnets) and SA 3-KS-08-15 (scheduled opening to 4-inch mesh nets).

Appendix Table C-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 C-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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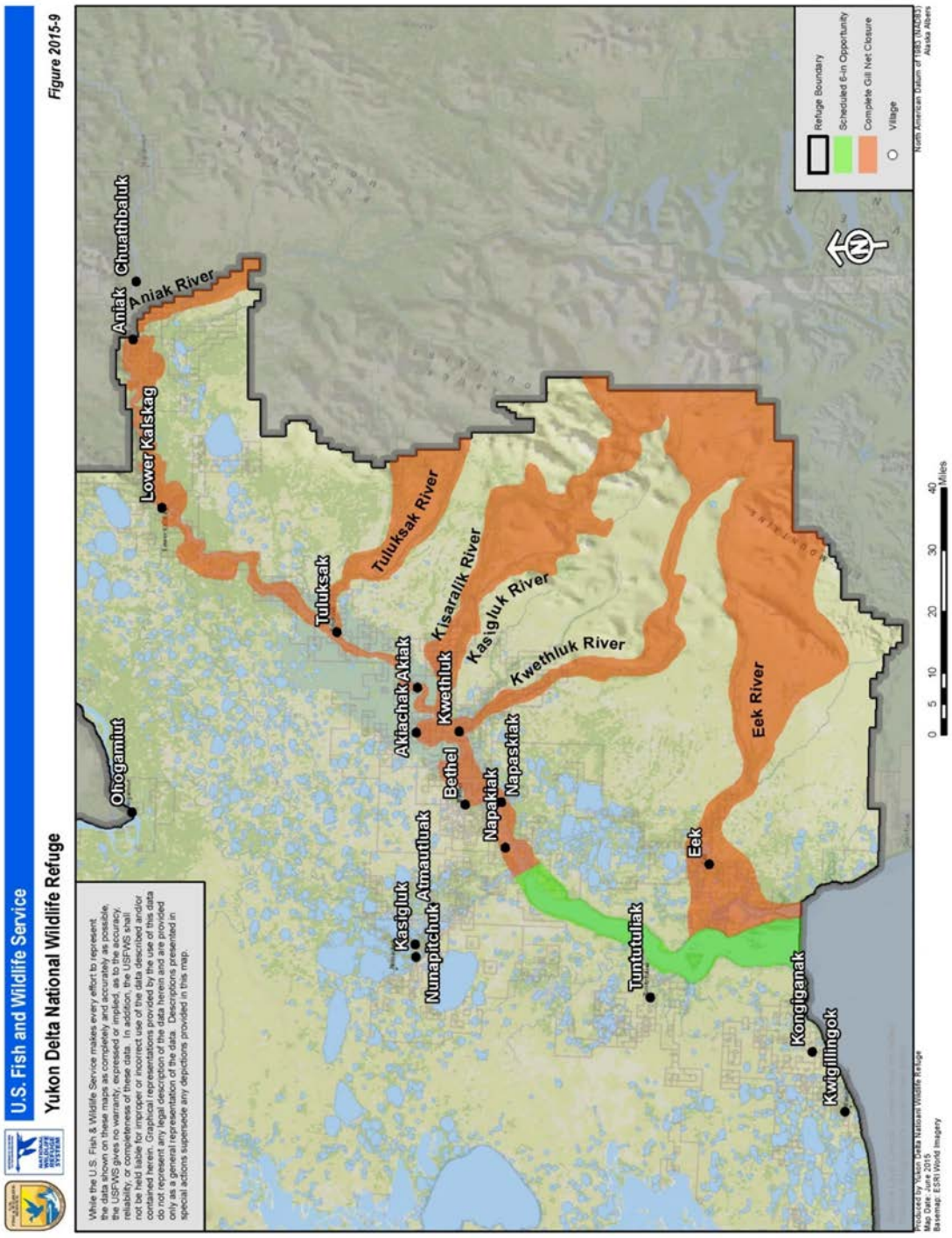

Appendix Figure C-4. Federal Special Actions SA 3-KS-09-15 (scheduled opening to 6-inch mesh nets).

Appendix Table C-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 C-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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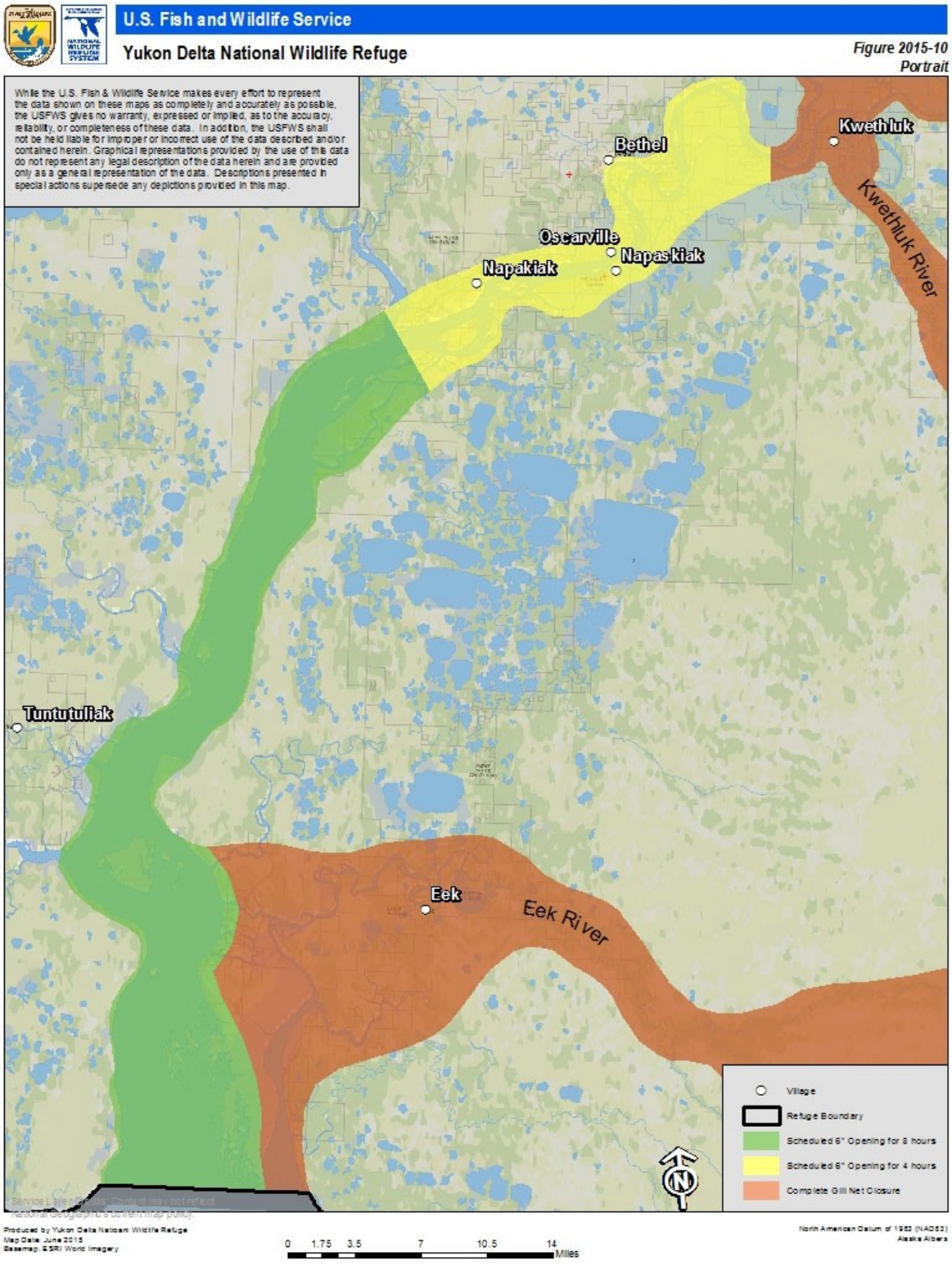

Appendix Figure C-5. Federal Special Actions SA 3-KS-10-15 (scheduled opening to 6-inch mesh nets).

Appendix Table C-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 C-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 C-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, June14; 6:00 a.m. Thursday, June 18 until 6:00 a.m. Sunday, June21; 6:00 a.m. Thursday, June 25 until 6:00 a.m. Sunday, June28; 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 C-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 C-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 C-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 C-6. State of Alaska Emergency Order EO 3-S-WR-14-15 (closed area in front of Aniak).

Appendix Table C-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 C-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 C-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 C-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 C-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 C-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 C-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 C-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).

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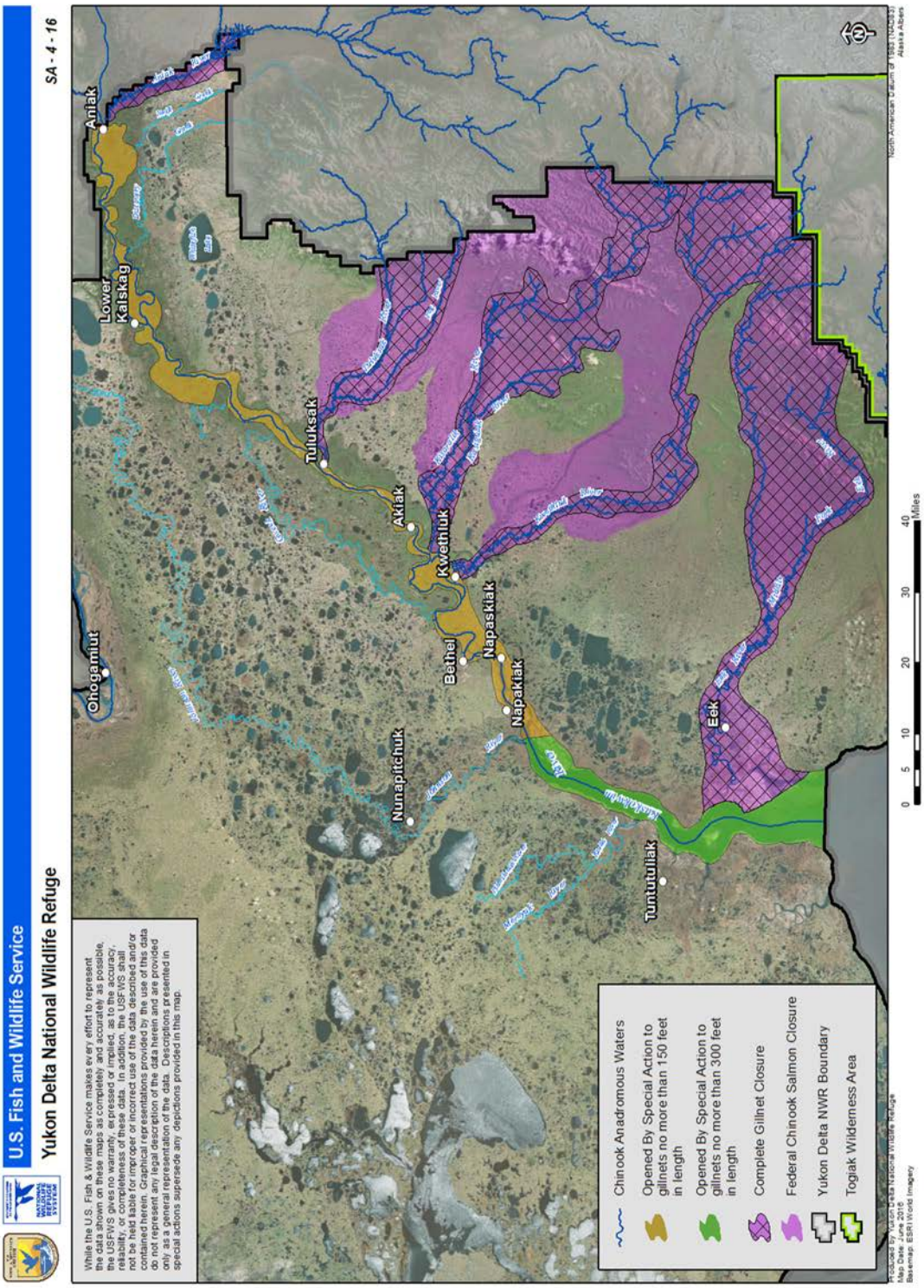
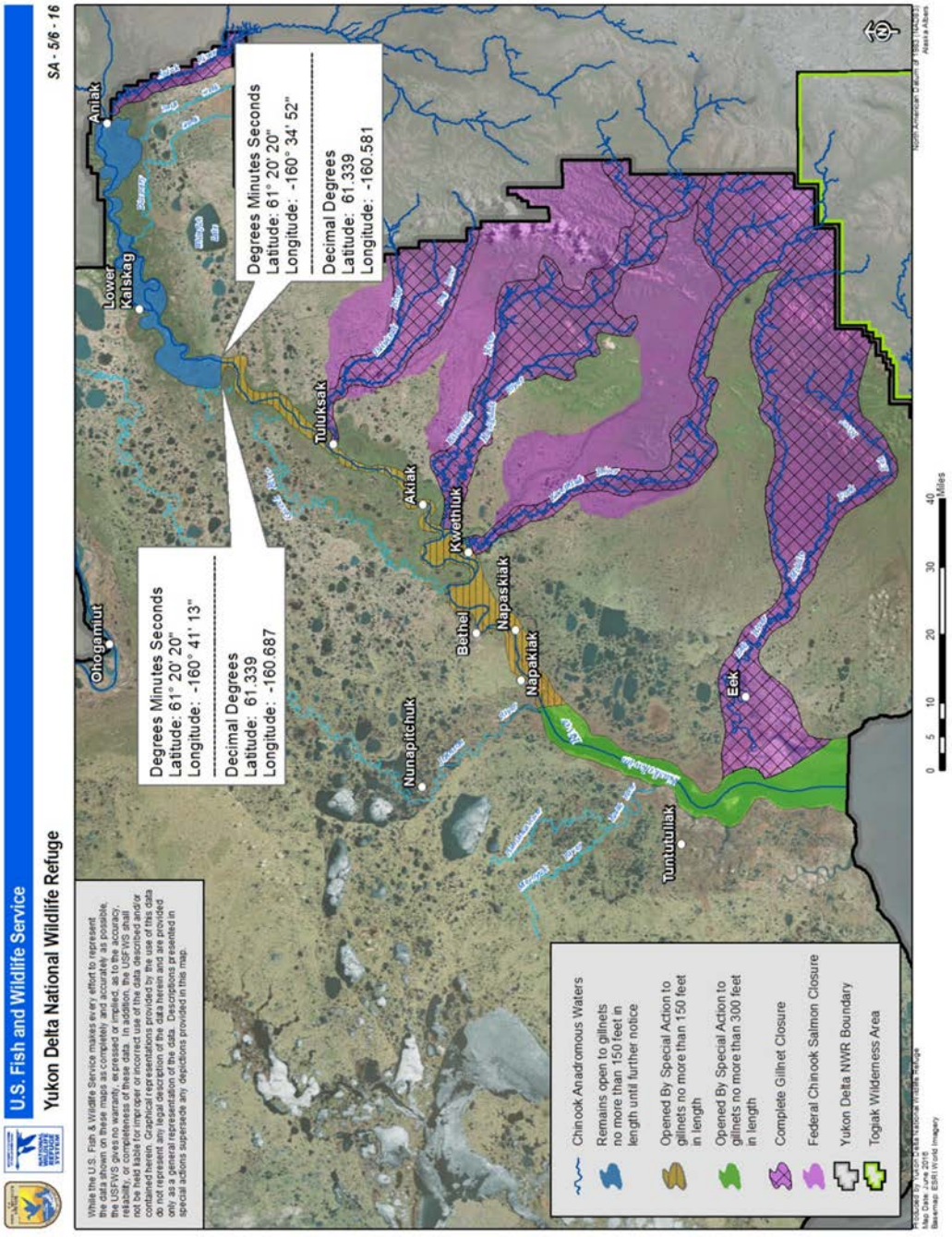
Appendix Table C-5. Federal special actions, Kuskokwim River drainage, 2016 (*continued from previous page*.)

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 C-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 C-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 C-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 C-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 C-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 C-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 C-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 C-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 Table C-7. Federal special actions, Kuskokwim River drainage, 2017

2017 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
Federal Special Actions	**Effective Date**	**Actions**
SA 3-KS-01-17	June 12 – August 10, 2017	Waters under Federal subsistence fisheries jurisdiction of the Kuskokwim River main stem and salmon tributaries including the Eek, Kwethluk, Kasigluk, Kisaralik, Tuluksak, and Aniak rivers will be closed to the use of all gillnets by all users. All Chinook salmon caught with other legal methods must be immediately released.
FSA 17-03 (FSB ACTION)	June 12, 2017	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
FSA 17-04 (FSB ACTION)	June 12, 2017	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 the Section 804 subsistence users prioritization analysis. Those eligible to harvest Chinook Salmon under Federal regulations were restricted to Federally qualified subsistence users residing in the Kuskokwim River drainage and the coastal communities of Chefornak, Kongiganek, Kipnuk, and Kwigillingok.
SA 3-KS-02-17	June 12 – August 10, 2017	Waters under Federal subsistence fisheries jurisdiction of the Kuskokwim River main stem and salmon tributaries including the Eek, Kwethluk, Kasigluk, Kisaralik, Tuluksak, and Aniak rivers will be closed to the harvest of Chinook salmon by all Federally qualified subsistence users.
SA 3-KS-03-17	June 12, 2017	Opened a 12-hour opportunity for Federally qualified subsistence users identified in the Section 804 analysis, which included residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek, to harvest Chinook Salmon on Federal public waters of the Kuskokwim River on June 12, 2017, from 12:01 p.m. until 11:59 p.m. Drift or set gillnets were limited to 6-inch or less mesh and could not exceed 45 meshes in depth. Nets from the Yukon Delta National Wildlife Refuge (Refuge) boundary at the Kuskokwim River mouth to the Johnson River could not exceed 50 fathoms (300 feet) in length. Nets up river from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length. The area around the Old Kuskokuak and the Kuskokuak were closed to the harvest of Chinook Salmon.

Appendix Table C-7. Federal special actions, Kuskokwim River drainage, 2017 (*continued from previous page*)

2017 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
Federal Special Actions	**Effective Date**	**Actions**
SA 3-KS-04-17	June 24, 2017	Opened a 12-hour gillnet opportunity for Federally qualified subsistence users to harvest fish other than Chinook Salmon on Federal public waters of the mainstem of the Kuskokwim River on June 24, 2017, from 12:01 p.m. until 11:59 p.m. Drift or set gillnets were limited to 6-inch or less mesh and could not exceed 45 meshes in depth. Nets could not exceed 25 fathoms (150 feet) in length. Federally qualified subsistence users identified in the ANILCA Section 804 subsistence user prioritization could retain Chinook Salmon incidentally harvested in gillnets. The waters of the Kuskokwim River around the boundary of the Yukon Delta NWR near Aniak was closed to subsistence gillnet fishing. Subsistence fishing with dip nets, beach seines, fish wheels, and rod and reel were allowed to be used during this opportunity. However, there were some restrictions to fish wheel regulations. Any Chinook Salmon caught in these other gear types had to be returned to the water alive.
SA 3-KS-05-17	July 1, 2017	Opened a 6-hour gillnet opportunity for Federally qualified subsistence users to harvest fish other than Chinook Salmon on Federal public waters of the main-stem of the Kuskokwim River from the mouth of the river to approximately 10 miles upriver from Upper Kalskag on July 1, 2017, from 3:00 p.m. until 9:00 p.m. Gear restrictions and authorizations, as well as Chinook Salmon release requirements for non-gillnet gear types were the same as SA 3-KS-04-17. Federally qualified subsistence users identified in the ANILCA Section 804 subsistence user prioritization could retain Chinook Salmon incidentally harvested in gillnets.
SA 3-KS-06-17	July 3, 2017	Opened a 12-hour gillnet opportunity for Federally qualified subsistence users to harvest fish other than Chinook Salmon on Federal public waters of the main-stem of the Kuskokwim River on July 3, 2017, from 12:01 p.m. until 11:59 p.m. Gear restrictions and authorizations, as well as Chinook Salmon release requirements for non-gillnet gear types were the same as SA 3-KS-04-17. Federally qualified subsistence users identified in the ANILCA Section 804 subsistence user prioritization could retain Chinook Salmon incidentally harvested in gillnets. The waters of the Kuskokwim River around the boundary of the Yukon Delta NWR near Aniak was closed to subsistence gillnet fishing
SA 3-KS-07-17	July 7, 2017	Rescinded all previously issued special actions regarding the management of Chinook Salmon in the Kuskokwim River drainage. Federal public waters within the Yukon Delta NWR opened to the harvest of Chinook Salmon by non-Federally qualified subsistence users.

Appendix Table C-8. State emergency orders, Kuskokwim River drainage, 2017.

2017 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Actions**
EO 3-S-WR-01-17	Multiple effective dates depending on area of Kuskokwim River (May 20, 2017 – June 4, 2017)	Subsistence fishing with gillnets in the Kuskokwim River will be closed during the following times and areas: • Beginning 12:01 a.m. Saturday, May 20, 2017, the Kuskokwim River Drainage from the Yukon Delta NWR boundary at the mouth of the Kuskokwim River to ADF&G markers approximately one-half mile upstream of the Tuluksak River mouth; • Beginning 12:01 a.m. Thursday, May 25, 2017, from the ADF&G markers approximately one-half mile upstream of the Tuluksak River mouth to the Yukon Delta Refuge boundary near Aniak; • Beginning 12:01 a.m. Thursday, June 1, 2017, from the Yukon Delta Refuge boundary near Aniak to the ADF&G regulatory markers near the Holitna River mouth; and • Beginning 12:01 a.m. Sunday, June 4, 2017, upstream of the ADF&G regulatory markers located near the Holitna River mouth to the headwaters of the Kuskokwim River. The following subsistence fishing restrictions and tributary gillnet fishing closures will also go into effect beginning 12:01 a.m. Saturday, May 20, 2017, until further notice: • 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. Additionally, subsistence fishing with hook and line for Chinook Salmon will close until further notice. Subsistence fishing with fish wheels will be allowed until further notice. Subsistence fishing with dip nets and beach seines is currently allowed until further notice. Any Chinook salmon caught in a dip net or beach seine must be returned immediately to the water alive.

Appendix Table C-8. State emergency orders, Kuskokwim River drainage, 2017 (*continued from previous page*).

2017 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Actions**
EO 3-S-WR-02-17	May 27, 2017	Subsistence fishing will be allowed on the Kuskokwim River mainstem within the Yukon Delta Refuge boundaries with 4-inch or less mesh size set gillnets from 9:00 a.m. until 9:00 p.m. Saturday, May 27, 2017. Gillnets may not to exceed 60 feet in length or 45 meshes in depth and may not be operated more than 100 feet from the ordinary high water mark.
EO 3-S-WR-03-17	June 3, 2017	Subsistence fishing will be allowed within the mainstem Kuskokwim River from the Yukon Delta Refuge boundaries at the mouth of the Kuskokwim River to the ADF&G regulatory markers downstream of the mouth of the Holitna River with 4-inch or less mesh size set gillnets from 9:00 a.m. until 9:00 p.m. Saturday, June 3, 2017. Gillnets may not to exceed 60 feet in length or 45 meshes in depth and may not be operated more than 100 feet from the ordinary high water mark.
EO 3-S-WR-04-17	June 10, 2017	Subsistence fishing will be allowed within the mainstem Kuskokwim River from the Yukon Delta Refuge boundary at the mouth of the Kuskokwim River to the headwaters with 4-inch or less mesh size set gillnets from 10:00 a.m. until 10:00 p.m. Saturday, June 10, 2017. Gillnets may not exceed 60 feet in length or 45 meshes in depth and may not be operated more than 100 feet from the ordinary high water mark. Chinook salmon incidentally harvested in gillnets during this opportunity may be retained.
EO 3-S-WR-05-17	June 12, 2017	From the Yukon Delta NWR boundary at Aniak up to the Holitna River mouth: Section 4. Subsistence fishing with 6-inch or less mesh gillnets, not to exceed 25 fathoms in length, will be allowed for 24 hours from 12:00 p.m. noon, Monday, June 12 until 12:00 p.m. noon, Tuesday, June 13, 2017.
EO 3-S-WR-06-17	June 12, 2017	From the Holitna River mouth to the headwaters of the Kuskokwim River: Section 5 Subsistence fishing with 6-inch or less mesh gillnets will be allowed from 12:00 p.m. noon, Monday, June 12 until further notice.
EO 3-S-WR-07-17	June 13, 2017	From the Yukon Delta NWR boundary at Aniak up to the Holitna River mouth: Section 4. Subsistence fishing with hook and line, fish wheels equipped with live boxes or chutes, beach seines, and dip nets is currently allowed until further notice, however retention of Chinook salmon caught with these gear types will close at 12:00 p.m. noon, Tuesday, June 13, 2017. Any Chinook salmon caught with these gear types must be returned immediately to the water alive
EO 3-S-WR-08-17	June 24, 2017	From the Yukon Delta NWR boundary at Aniak up to the Holitna River mouth: Section 4. Subsistence fishing with 6-inch or less mesh gillnets, not to exceed 25 fathoms in length and 45 meshes in depth, will be allowed for approximately 12 hours from 12:01 p.m. until 11:59 p.m., Saturday, June 24, 2017.

Appendix Table C-8. State emergency orders, Kuskokwim River drainage, 2017 (*continued from previous page*).

2017 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Actions**
EO 3-S-WR-09-17	July 3, 2017	From the Yukon Delta NWR boundary at Aniak up to the Holitna River mouth: Section 4. Subsistence fishing with 6-inch or less mesh gillnets, not to exceed 25 fathoms in length and 45 meshes in depth, will be allowed for approximately 12 hours from 12:01 p.m. until 11:59 p.m., Monday, July 3, 2017. The waters of the Kuskokwim River from the Yukon Delta NWR boundary at Aniak 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 12:01 p.m. until 11:59 p.m., Monday, July 3, 2017.
EO 3-S-WR-10-17	July 7, 2017	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 will be closed to subsistence fishing with gillnets from 12:01p.m.Saturday, July 8, 2017 until further notice.
EO 3-S-WR-11-17	July 13, 2017	Subsistence fishing in the Kuskokwim River Drainage, from the Yukon Delta NWR boundary at the mouth of the Kuskokwim River up to the confluence of the Johnson River (Section 1), will be allowed from 12:01 p.m. Thursday, July 13, 2017 with gillnets restricted to 6-inch or less mesh, 45 meshes deep, and 50 fathoms in length until further notice.
EO 3-S-WR-12-17	July 27, 2017	Kuskokwim River Drainage: Effective 12:01 p.m. Thursday, July 27, 2017, the following restrictions to the mainstem Kuskokwim River subsistence salmon fishery are rescinded: • 6-inch or less mesh requirements for subsistence gillnets; • 25 fathom gillnet length restrictions from the mouth of the Johnson River up to the mouth of the Holitna River (Sections 2–4); • The live release requirement of Chinook salmon caught in beach seines, fish wheels, and by hook and line; • The use of dip nets for the taking of salmon; and • The closed waters within Kuskokuak and Old Kuskokuak sloughs and around the mouth of the Aniak River. Subsistence fishing with gillnets will remain closed in the following tributaries: • The Kwethluk River drainage to its confluence with Kuskokuak Slough. • The Kasigluk and Kisaralik river drainages to their confluence with Old Kuskokuak Slough.

Appendix Table C-8. State emergency orders, Kuskokwim River drainage, 2017 (*continued from previous page*).

2017 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Actions**
EO 3-S-WR-13-17	August 23, 2017	All subsistence fishing restrictions in Kuskokwim River tributaries have been lifted.

Appendix Table C-9. Federal special actions, Kuskokwim River drainage, 2018

2018 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
Federal Special Actions	**Effective Date**	**Actions**
FSA 18-01 (FSB ACTION)	June 12 – July 15, 2018	Beginning on June 12, 2018, Federal public waters of the Kuskokwim River drainage were closed to the harvest of Chinook Salmon except by Federally qualified subsistence users identified in the Section 804 subsistence users prioritization analysis. Those eligible to harvest Chinook Salmon under Federal regulations were restricted to Federally qualified subsistence users residing in the Kuskokwim River drainage and the coastal communities of Chefornak, Kongiganek, Kipnuk, and Kwigillingok.
3-KS-03-18	June 12, 2018	Beginning on June 12, 2018, Federal public waters of the Kuskokwim River main stem, the non-salmon tributaries within 100 yards of their confluence with the main stem of the Kuskokwim River, and salmon bearing tributaries were closed to the harvest of Chinook Salmon by all Federally qualified subsistence users
3-KS-04-18	June 12, 2018	Opened a 12-hour opportunity for Federally qualified subsistence users identified in the Section 804 analysis, which included residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek, to harvest Chinook Salmon on Federal public waters of the Kuskokwim River on June 12, 2018, from 10:00 a.m. until 10:00 p.m.. Drift or set gillnets were limited to 6-inch or less mesh and could not exceed 45 meshes in depth. Nets from the Yukon Delta National Wildlife Refuge (Refuge) boundary at the Kuskokwim River mouth to the Johnson River could not exceed 50 fathoms (300 feet) in length. Nets up river from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length. Eek River, Kwethluk River deainage including its confluence with Kuskokuak Slough and downstream to ADF&G regulatory markers located at the downstream mouth of the slough; Kasigluk and Kisaralik river drainages including Old kuskokuak Slough to ADF&G regulatory markers at the confluence of Old Kuskokuak Slough with Kuskikuak Slough; Tuluksak River Drainage including its confluence with the Kuskokwim River and downstream approximately 1-mile to ADF&G regulatory markers; and the Aniak River drainage to ADF&G regulatory markers at its confluence with the Kuskokwim River to the harvest of Chinook Salmon by All Federally qualified subsistence users.

Appendix Table C-9. Federal special actions, Kuskokwim River drainage, 2018 (*continued from previous page*).

SA 3-KS-05-18	June 16, 2018	Opened a 12-hour opportunity for Federally qualified subsistence users identified in the Section 804 analysis, which included residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek, to harvest Chinook Salmonon Federal public waters of the Kuskokwim River on June 16, 2018, from 10:00 a.m. until 10:00 p.m.. Drift or set gillnets were limited to 6-inch or less mesh and could not exceed 45 meshes in depth. Nets from the Yukon Delta National Wildlife Refuge (Refuge) boundary at the Kuskokwim River mouth to the Johnson River could not exceed 50 fathoms (300 feet) in length. Nets up river from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length. Eek River, Kwethluk River deainage including its confluence with Kuskokuak Slough and downstream to ADF&G regulatory markers located at the downstream mouth of the slough; Kasigluk and Kisaralik river drainages including Old kuskokuak Slough to ADF&G regulatory markers at the confluence of Old Kuskokuak Slough with Kuskikuak Slough; Tuluksak River Drainage including its confluence with the Kuskokwim River and downstream approximately 1-mile to ADF&G regulatory markers; and the Aniak River drainage to ADF&G regulatory markers at its confluence with the Kuskokwim River to the harvest of Chinook Salmon by All Federally qualified subsistence users.
SA 3-KS-06-18	June 24, 2018	Opened a 12-hour opportunity for Federally qualified subsistence users identified in the Section 804 analysis, which included residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek, to harvest Chinook Salmonon Federal public waters of the Kuskokwim River on June 24, 2018, from 10:00 a.m. until 10:00 p.m.. Drift or set gillnets were limited to 6-inch or less mesh and could not exceed 45 meshes in depth. Nets from the Yukon Delta National Wildlife Refuge (Refuge) boundary at the Kuskokwim River mouth to the Johnson River could not exceed 50 fathoms (300 feet) in length. Nets up river from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length. Eek River, Kwethluk River deainage including its confluence with Kuskokuak Slough and downstream to ADF&G regulatory markers located at the downstream mouth of the slough; Kasigluk and Kisaralik river drainages including Old kuskokuak Slough to ADF&G regulatory markers at the confluence of Old Kuskokuak Slough with Kuskikuak Slough; Tuluksak River Drainage including its confluence with the Kuskokwim River and downstream approximately 1-mile to ADF&G regulatory markers; and the Aniak River drainage to ADF&G regulatory markers at its confluence with the Kuskokwim River to the harvest of Chinook Salmon by All Federally qualified subsistence users.

Appendix Table C-9. Federal special actions, Kuskokwim River drainage, 2018 (*continued from previous page*).

SA 3-KS-07-18	June 24, 2018	Reopened opportunity for Federally qualified subsistence users identified in the section 804 subsistence user prioritization analysis to harvest Chinook Salmon on Federal public waters of the Kuskokwim River Main Stem from a line downstream of Kalskag at the south edge of Uknavik Slough, due east to the edge of the bluff line to the Yukon Delta NWR boundary at Aniak beginning on June 24, 2018, until superseded by subsequent emergency special action in that portion of the Federal public waters of the Kuskokwim River main stem, excluding the previously mentioned closures around Aniak. All drift or set nets were limited to 6-inch or less mesh, and could not exceed 45 meshes in depth or 25 fathoms (150 feet) in length.
3-KS-08-18	June 29, 2018	Opened a 12-hour opportunity for Federally qualified subsistence users identified in the Section 804 analysis, which included residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek, to harvest Chinook Salmon on Federal public waters of the Kuskokwim River on June 29, 2018, from 12:00 p.m. (noon). until 6:00 p.m.. Refuge waters of the Kuskokwim River main stem from the mouth to a line downstream of Kalskag at the south edge of Uknavik Slough and then due east to the edge of the bluff line for 6 hours allowing the harvest of Chinook Salmon by those Federally qualified subsistence users identified in the Section 804 subsistence User Prioritization analysis for June 29, 2018. Drift or set gillnets were limited to six inch or less mesh and could not exceed 45 meshes in depth. Nets from the Refuge boundary at the Kuskokwim River mouth to the Johnson River could not exceed 50 fathoms (300 feet), while nets upriver from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length. Salmon bearing tributaries remained closed to the harvest of Chinook salmon.

Appendix Table C-9. Federal special actions, Kuskokwim River drainage, 2018 (*continued from previous page*).

3-KS-09-18	July 5, 2018	Opened a 12-hour opportunity for Federally qualified subsistence users identified in the Section 804 analysis, which included residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganek, to harvest Chinook Salmon on Federal public waters of the Kuskokwim River on July 5, 2018, from 9:00 A.M. until 9:00 p.m.. Refuge waters of the Kuskokwim River main stem from the mouth to a line downstream of Kalskag at the south edge of Uknavik Slough and then due east to the edge of the bluff line for 6 hours allowing the harvest of Chinook Salmon by those Federally qualified subsistence users identified in the Section 804 subsistence User Prioritization analysis for June 29, 2018. Drift or set gillnets were limited to six inch or less mesh and could not exceed 45 meshes in depth. Nets from the Refuge boundary at the Kuskokwim River mouth to the Johnson River could not exceed 50 fathoms (300 feet), while nets upriver from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length. Salmon bearing tributaries remained closed to the harvest of Chinook salmon.
3-KS-10-18	July 6, 2018	Emergency special action rescinding all previously issued special actions regarding the management of Chinook Salmon in the Kuskokwim River drainage, and the Yukon Delta NWR waters will open to the harvest of Chinook salmon by non-Federally qualified subsistence users

Appendix Table C-10. State emergency orders, Kuskokwim River drainage, 2018.

2018 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Actions**
EO 3-S-WR-01-18	May 25, 2018	**Subsistence fishing with gillnets in the Kuskokwim River will be closed during the following times and areas, <u>until further notice</u>:** • <u>Sections 1 & 2</u>: Beginning 12:01 a.m. Friday, May 25, 2018, the Kuskokwim River Drainage from the Yukon Delta NWR boundary at the mouth of the Kuskokwim River to ADF&G markers approximately one-half mile upstream of the Tuluksak River mouth; • <u>Section 3</u>: Beginning 12:01 a.m. Wednesday, May 30, 2018, from the ADF&G markers approximately one-half mile upstream of the Tuluksak River mouth to the Yukon Delta Refuge boundary near Aniak; • <u>Section 4</u>: Beginning 12:01 a.m. Monday, June 4, 2018, from the Yukon Delta Refuge boundary near Aniak to the ADF&G regulatory markers near the Holitna River mouth; and • <u>Section 5</u>: Beginning 12:01 a.m. Saturday, June 9, 2018, upstream of the ADF&G regulatory markers located near the Holitna River mouth to the headwaters of the Kuskokwim River. **The following subsistence fishing restrictions and tributary gillnet fishing closures go into effect beginning 12:01 a.m. Friday, May 25, 2017 until further notice**: • 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.

Appendix Table C-10. State emergency orders, Kuskokwim River drainage, 2018 (*continued from previous page*).

EO 3-S-WR-01-18 (*Continued*)	May 25, 2018	**Subsistence fishing with hook and line for Chinook salmon will close until further notice**. Any Chinook salmon caught must be returned alive to the water. **Subsistence fishing with fish wheels will be allowed until further notice**. 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 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 currently allowed until further notice**. Any Chinook salmon caught in a dip net or beach seine must be returned immediately to the water alive.
EO 3-S-WR-02-18	May 30, 2018	Subsistence fishing will be allowed on the Kuskokwim River mainstem within the Yukon Delta Refuge boundaries with 4-inch or less mesh size set gillnets from 11:00 a.m. until 11:00 p.m. Wednesday, May 30, 2018. Set gillnets may not exceed 60 feet in length and 45 meshes in depth and may not be operated more than 100 feet from the ordinary high water mark. As previously announced subsistence fishing with hook and line, fish wheels equipped with live boxes or chutes, beach seines, and dip nets is currently allowed until further notice though any Chinook salmon caught with these gear types must be returned immediately to the water alive.
EO 3-S-WR-03-18	June 6, 2016	Subsistence fishing will be allowed on the Kuskokwim River mainstem from the Yukon Delta Refuge boundary at the mouth of the Kuskokwim River to the Holitna River mouth (Sections 1–4) with 4-inch or less mesh size set gillnets from 11:00 a.m. until 11:00 p.m. Wednesday, June 6, 2018. Set gillnets may not exceed 60 feet in length and 45 meshes in depth and may not be operated more than 100 feet from the ordinary high water mark. . As previously announced subsistence fishing with hook and line, fish wheels equipped with live boxes or chutes, beach seines, and dip nets is currently allowed until further notice though any Chinook salmon caught with these gear types must be returned immediately to the water alive.
EO 3-S-WR-04-18	June 12, 2018	From the Yukon Delta NWR boundary at Aniak upstream to the Holitna River mouth: Section 4 Subsistence fishing with 6-inch or less mesh gillnets, not to exceed 25 fathoms in length and 45 meshes in depth, will open for 12 hours from 10:00 a.m. until 10:00 p.m., Tuesday, June 12, 2018. Chinook salmon may be retained if caught with fish wheels, beach seines, and hook and line, and gillnets during this gillnet opener. The waters of the Kuskokwim River from the Yukon Delta NWR boundary at Aniak 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)

Appendix Table C-10. State emergency orders, Kuskokwim River drainage, 2018 (*continued from previous page*).

EO 3-S-WR-04-18 (*Continued*)	June 12, 2018	will remained closed to subsistence fishing with gillnets until further notice. These closed waters are in place to help provide protection for Chinook salmon bound for the Aniak River. As previously announced, subsistence fishing with gillnets remains closed in the Aniak River From the Holitna River mouth to the headwaters of the Kuskokwim River: Section 5 Subsistence fishing with 6-inch or less mesh gillnets, not to exceed 25 fathoms in length and 45 meshes in depth , will be allowed from 10:00 a.m., Tuesday, June 12 until further notice. Chinook salmon may be retained if caught with fish wheels, beach seines, and hook and line gear until further notice in Section 5.
EO 3-S-WR-05-18	June 12, 2018	From the Yukon Delta NWR boundary at Aniak upstream to the Holitna River mouth: Section 4: Beginning 10:01 p.m., June 12, 2018, subsistence fishing with the King Salmon permit will be allowed until further notice during times that the subsistence gillnet fishery is closed. Regulations for fishing with this permit are stated below: • Only one permit may be issued per household. Annual permit harvest limit is 10 king salmon. • Permit must be on your person while fishing. • Gillnets must be 6-inch or less mesh, not to exceed 25 fathoms in length and 45 meshes depth. • King salmon may also be harvested with hook and line, fish wheels, and beach seines. • All king salmon harvested by any gear type count toward the household's annual permit limit. • The waters of the Kuskokwim River from the Yukon Delta NWR boundary at Aniak 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 remained closed to subsistence fishing with gillnets. Subsistence fishing with a permit may only occur from the Yukon Delta NWR boundary at Aniak upstream to the mouth of the Holitna River. Once permit holders harvest the annual limit of 10 King Salmon, the permit is no longer valid and fishers must wait until a regularly scheduled opening to continue subsistence fishing. All other fish caught while fishing with the permit may be retained. *As Previously Announced:*

Appendix Table C-10. State emergency orders, Kuskokwim River drainage, 2018 (*continued from previous page*).

EO 3-S-WR-05-18 (*Continued*)	June 12, 2018	From the Yukon Delta NWR boundary at Aniak upstream to the Holitna River mouth: Section 4 Subsistence fishing with 6-inch or less mesh gillnets, not to exceed 25 fathoms in length and 45 meshes in depth, will open for 12 hours from 10:00 a.m. until 10:00 p.m., Tuesday, June 12, 2018. King salmon may be retained if caught with fish wheels, beach seines, and hook and line, and gillnets during this gillnet opener. From the Holitna River mouth to the headwaters of the Kuskokwim River: Section 5 Subsistence fishing with 6-inch or less mesh gillnets, not to exceed 25 fathoms in length and 45 meshes in depth , will be allowed from 10:00 a.m., Tuesday, June 12 until further notice. King salmon may be retained if caught with fish wheels, beach seines, and hook and line gear until further notice in Section 5.
EO 3-S-WR-06-18	June 19, 2018	From the Yukon Delta NWR boundary at Aniak upstream to the Holitna River mouth: Section 4 Subsistence fishing with 6-inch or less mesh gillnets, not to exceed 25 fathoms in length and 45 meshes in depth, will open for 24 hours from 10:00 a.m. Tuesday, June 19 until 10:00 a.m., Wednesday, June 20, 2018. Chinook salmon may be retained if caught with fish wheels, beach seines, and hook and line, and gillnets during this gillnet opener. The waters of the Kuskokwim River from the Yukon Delta NWR boundary at Aniak 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 remained closed to subsistence fishing with gillnets until further notice. These closed waters are in place to help provide protection for Chinook salmon bound for the Aniak River. Beginning 10:01a.m., Wednesday, June 20, 2018, subsistence fishing with the King Salmon permit will be allowed until further notice.
EO 3-S-WR-07-18	June 25, 2018	From the Yukon Delta NWR boundary at Aniak upstream to the Holitna River mouth: Section 4 Subsistence fishing with 6-inch or less mesh gillnets, not to exceed 25 fathoms in length and 45 meshes in depth, will open at 12:01 a.m. Monday, June 25, 2018 until further notice. Chinook salmon may be retained if caught with fish wheels, beach seines, and hook and line, and gillnets during this gillnet opener. The waters of the Kuskokwim River from the Yukon Delta NWR boundary at Aniak 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)

Appendix Table C-10. State emergency orders, Kuskokwim River drainage, 2018 (*continued from previous page*).

EO 3-S-WR-07-18 (*Continued*)		will remain closed to subsistence fishing with gillnets until further notice. Subsistence fishing with hook and line, fish wheels equipped with a live box or chute, beech seines and dip nets is allowed in these waters, but all Chinook salmon caught must be returned to the water alive. These closed waters are in place to help provide protection for Chinook salmon bound for the Aniak River. As previously announced, subsistence fishing with gillnets remains closed in the Aniak River.
EO 3-S-WR-08-18	July 6, 2018	Yukon Delta NWR boundary at the mouth of the Kuskokwim River upstream to the Yukon Delta NWR boundary at Aniak (Sections 1–3): Subsistence fishing will be allowed beginning 3:00 p.m. Friday, July 6 until further notice. Below the Johnson River, gillnets are restricted to 6-inch or less mesh, 45 meshes in depth, and 50 fathoms in length. Above the Johnson River, gillnets are restricted to 6-inch or less mesh, 45 meshes in depth, and 25 fathoms in length. In addition, the waters of the Kuskokwim River near Aniak, 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 beginning 3:00 p.m. Friday, July 6, 2018 until further notice. Subsistence fishing with hook and line, fish wheels equipped with a live box or chute, beech seines and dip nets is allowed, but all Chinook salmon caught must be returned to the water alive. These closed waters are in place to help provide protection for Chinook salmon bound for the Aniak River.
EO 3-S-WR-09-18	July 26, 2018	Kuskokwim River Drainage: Effective 12:01 a.m. Thursday, July 26, 2018, the following restrictions to the mainstem Kuskokwim River subsistence salmon fishery are rescinded: • 6-inch or less mesh requirements for subsistence gillnets; • 25 fathom gillnet length restrictions from the mouth of the Johnson River upstream to the headwaters of the Kuskokwim River (Sections 2–5); • The live release requirement of Chinook salmon caught in beach seines, fish wheels, and by hook and line; • The use of dip nets for the taking of salmon; and • The closed waters within Kuskokuak and Old Kuskokuak sloughs and around the mouth of the Aniak River. Subsistence fishing with gillnets will remain closed in the following tributaries:

Appendix Table C-10. State emergency orders, Kuskokwim River drainage, 2018 (*continued from previous page*).

EO 3-S-WR-09-18 (*Continued*)		The Kwethluk River drainage to its confluence with Kuskokuak Slough. • The Kasigluk and Kisaralik river drainages to their confluences with Old 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. In addition, subsistence fishing with hook and line for Chinook salmon will remain closed within the Kwethluk, Kisaralik, Kasigluk, Tuluksak, and Aniak river drainages. Any Chinook salmon caught must be returned to the water alive.
EO 3-S-WR-010-18	August 5, 2018	Subdistrict 1-A will open to commercial salmon fishing for 6 hours from 10:00 a.m. until 4:00 p.m. Sunday, August 5, 2018. 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 in the Kuskokwim Management Area at this time, this opportunity is being provided for those individuals registered with the department as catcher/sellers.
EO 3-S-WR-011-18	August 8, 2018	Subdistrict 1-A will open to commercial salmon fishing for 6 hours from 2:00 p.m. until 8:00 p.m. Wednesday, August 8, 2018. 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. Subsistence fishing will be allowed during this timeframe. As there are no commercial salmon processors in the Kuskokwim Management Area at this time, this opportunity is being provided for those individuals registered with the department as catcher/sellers.
EO 3-S-WR-012-18	August 15, 2018	Subdistrict 1-A will open to commercial salmon fishing for 6 hours from 6:00 p.m. until 11:59 p.m. Wednesday, August 15, 2018. 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. Subsistence fishing will be allowed during this timeframe. As there are no commercial salmon processors in the Kuskokwim Management Area at this time, this opportunity is being provided for those individuals registered with the department as catcher/sellers.
EO 3-S-WR-013-18	August 16, 2018	Effective 9:00 a.m. Thursday, August 16, 2018, all subsistence fishing restrictions in Kuskokwim River mainstem and tributaries have been lifted.

Appendix Table C-10. State emergency orders, Kuskokwim River drainage, 2018 (*continued from previous page*).

EO 3-S-WR-014-18	August 21, 2018	Subdistrict 1-A will open to commercial salmon fishing for 6 hours from 10:00 a.m. until 4:00 p.m. Tuesday, August 21, 2018. 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. Subsistence fishing will be allowed during this timeframe. As there are no commercial salmon processors in the Kuskokwim Management Area at this time, this opportunity is being provided for those individuals registered with the department as catcher/sellers.
EO 3-S-WR-015-18	August 31, 2018	Subdistrict 1-A will open to commercial salmon fishing for 6 hours from 10:00 a.m. until 4:00 p.m. Tuesday, August 31, 2018. 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. Subsistence fishing will be allowed during this timeframe. As there are no commercial salmon processors in the Kuskokwim Management Area at this time, this opportunity is being provided for those individuals registered with the department as catcher/sellers.

Appendix Table C-11. Federal special actions, Kuskokwim River drainage, 2019

2019 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
Federal Special Actions	**Effective Date**	**Actions**
FSA 19-02 (FSB ACTION)	June 1 – July 1, 2019	Beginning on June 1, 2019, Federal public waters of the Kuskokwim River drainage were closed to the harvest of Chinook Salmon except by Federally qualified subsistence users identified in the Section 804 subsistence user prioritization analysis. Those eligible to harvest Chinook Salmon under Federal regulations were restricted to Federally qualified subsistence users residing in the Kuskokwim River drainage and the coastal communities of Chefornak, Kongiganek, Kipnuk, and Kwigillingok.
3-KS-03-19	June 1, 2019	Beginning June 1, the following waters under Federal subsistence fisheries jurisdiction will be closed to the harvest of Chinook Salmon by all Federally qualified subsistence users: • Eek River; • Kwethluk River drainage starting at its confluence with Kuskokuak Slough; • Kasigluk and Kisaralik river drainages including Old Kuskokuak Slough to ADF&G regulatory markers at confluence of Old Kuskokuak Slough with Kuskokuak Slough. • Tuluksak River drainages including its confluence with the Kuskokwim River and downs stream to approximately 1-mile to ADF&G regulatory markers. • The Aniak River drainage to ADF&G regulatory markers at its confluence with Kuskokwim River; • Aniak Box as defined as: waters of the Kuskokwim River main stem from Yukon Delta NWR boundary at Aniak downstream to a line formed from the northwest corner of runway (latitude 60°35’ 16N”, longitude 159°33’ 28”W), due north to pint on the southeast corner of sandbar (latitude 61°35’ 37”N, longitude 159°33’ 16W). Additionally, on June 1, 2019, for the conservation of Chinook Salmon, the following waters of the mainstem Kuskokwim River will remain open to the harvest of Chinook Salmon by Federally qualified users with the use of dip nets, beach seines, rod and reel, and fish wheels (fishwheels are required to have live box with no less than 45 cubic feet of water and must be checked every 6 hours). Fish wheels must be equipped with a chute and must be closely attended while in operation.

Appendix Table C-11. Federal special actions, Kuskokwim River drainage, 2019 (*continued from previous page*).

3-KS-04-19	June 1, 2019	Opened one 12-hour set gillnet opportunity for Federally qualified subsistence users identified in the Section 804 subsistence user prioritization analysis, which includes residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganak, to harvest Chinook Salmon on Federal public waters of the Kuskokwim River main stem. Waters closed to the harvest of Chinook Salmon by Federally qualified users include • Eek River; • Kwethluk River drainage starting at its confluence with Kuskokuak Slough; • Kasigluk and Kisaralik river drainages including Old Kuskokuak Slough to ADF&G regulatory markers at confluence of Old Kuskokuak Slough with Kuskokuak Slough. • Tuluksak River drainages including its confluence with the Kuskokwim River and downs stream to approximately 1-mile to ADF&G regulatory markers. • The Aniak River drainage to ADF&G regulatory markers at its confluence with Kuskokwim River; • Aniak Box as defined as: waters of the Kuskokwim River main stem from Yukon Delta NWR boundary at Aniak downstream to a line formed from the northwest corner of runway (latitude 60°35' 16N", longitude 159°33' 28"W), due north to pint on the southeast corner of sandbar (latitude 61°35' 37"N, longitude 159°33' 16W). The start time and end time for this opportunity was from 11:00 AM to 11:00 PM. Set gillnets were limited to 6-inch or less mesh, could not exceed 60 feet in length, and could not exceed 45 meshes in depth. Set gillnets could not be operated more than 100 feet from the ordinary high water mark, must be attached to the bank, and oriented perpendicular to the river.

Appendix Table C-11. Federal special actions, Kuskokwim River drainage, 2019 (*continued from previous page*).

3-KS-05-19	June 8, 2019	Opened one 12-hour set gillnet opportunity for Federally qualified subsistence users identified in the Section 804 subsistence user prioritization analysis, which includes residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganak, to harvest Chinook Salmon on Federal public waters of the Kuskokwim River main stem. Waters closed to the harvest of Chinook Salmon by Federally qualified users include • Eek River; • Kwethluk River drainage starting at its confluence with Kuskokuak Slough; • Kasigluk and Kisaralik river drainages including Old Kuskokuak Slough to ADF&G regulatory markers at confluence of Old Kuskokuak Slough with Kuskokuak Slough. • Tuluksak River drainages including its confluence with the Kuskokwim River and downs stream to approximately 1-mile to ADF&G regulatory markers. • The Aniak River drainage to ADF&G regulatory markers at its confluence with Kuskokwim River; • Aniak Box as defined as: waters of the Kuskokwim River main stem from Yukon Delta NWR boundary at Aniak downstream to a line formed from the northwest corner of runway (latitude 60°35' 16N", longitude 159°33' 28"W), due north to pint on the southeast corner of sandbar (latitude 61°35' 37"N, longitude 159°33' 16W). The start time and end time for this opportunity was from 10:00 AM to 10:00 PM on June 8, 2019. Set gillnets were limited to 6-inch or less mesh, could not exceed 60 feet in length, and could not exceed 45 meshes in depth. Set gillnets could not be operated more than 100 feet from the ordinary high water mark, must be attached to the bank, and oriented perpendicular to the river.

Appendix Table C-11. Federal special actions, Kuskokwim River drainage, 2019 (*continued from previous page*).

3-KS-06-19	June 12, 2019 June 15, 2019 June 19, 2019	This emergency special action announced three 12-hour harvest opportunities for Federally qualified subsistence users identified in the Section 804 subsistence user prioritization analysis, which included residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganak, to the use of gillnets for the harvest of Chinook Salmon on Federal public waters of the Kuskokwim River main stem. Waters closed to the harvest of Chinook Salmon by Federally qualified users include • Eek River; • Kwethluk River drainage starting at its confluence with Kuskokuak Slough; • Kasigluk and Kisaralik river drainages including Old Kuskokuak Slough to ADF&G regulatory markers at confluence of Old Kuskokuak Slough with Kuskokuak Slough. • Tuluksak River drainages including its confluence with the Kuskokwim River and downs stream to approximately 1-mile to ADF&G regulatory markers. • The Aniak River drainage to ADF&G regulatory markers at its confluence with Kuskokwim River; • Aniak Box as defined as: waters of the Kuskokwim River main stem from Yukon Delta NWR boundary at Aniak downstream to a line formed from the northwest corner of runway (latitude 60°35' 16N", longitude 159°33' 28"W), due north to pint on the southeast corner of sandbar (latitude 61°35' 37"N, longitude 159°33' 16W). Fisheries will take place on June 12, June 15, and June 19, 2019. The start time and end time for each of these three opportunities were from 06:00 AM to 06:00 PM. All drift or set gillnets were limited to 6-inch or less mesh size and could not exceed 45 meshes in depth. Nets from the Refuge boundary at the Kuskokwim River mouth to the Johnson River cannot exceed 50 fathoms (300 feet) in length. Nets up river from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length. Subsistence fishing for Chinook Salmon with dip nets, beach seines, fish wheels, and rod and reel could also be used. Fish wheels were required to have a live box with no less than 45 cubic feet of water and had to be checked at least every 6 hours. Fish wheels had to be equipped with a chute and be closely attended while in operation.

Appendix Table C-11. Federal special actions, Kuskokwim River drainage, 2019 (*continued from previous page*).

3-KS-07-19	June 19, 2019	Reopened opportunity for Federally qualified subsistence users identified in the section 804 subsistence user prioritization analysis to harvest Chinook Salmon on Federal public waters of the Kuskokwim River Main Stem from a line downstream of Kalskag at the south edge of Uknavik Slough, due east to the edge of the bluff line to the Yukon Delta NWR boundary at Aniak beginning on June 19, 2019, until superseded by subsequent emergency special action in that portion of the Federal public waters of the Kuskokwim River main stem, excluding the previously mentioned closures around Aniak. All drift or set nets were limited to 6-inch or less mesh, and could not exceed 45 meshes in depth or 25 fathoms (150 feet) in length.
3-KS-08-19	June 22, 2019	This emergency special action announced one 12-hour harvest opportunity for Federally qualified subsistence users identified in the Section 804 subsistence user prioritization analysis, which included residents of the Kuskokwim River drainage and the villages of Chefornak, Kipnuk, Kwigillingok, and Kongiganak, to the use of gillnets for the harvest of Chinook Salmon on Federal public waters of the Kuskokwim River main stem on June 22, 2019. The start time and end time for this opportunity was from 06:00 AM to 06:00 PM. Waters closed to the harvest of Chinook Salmon by Federally qualified users include • Eek River; • Kwethluk River drainage starting at its confluence with Kuskokuak Slough; • Kasigluk and Kisaralik river drainages including Old Kuskokuak Slough to ADF&G regulatory markers at confluence of Old Kuskokuak Slough with Kuskokuak Slough. • Tuluksak River drainages including its confluence with the Kuskokwim River and downs stream to approximately 1-mile to ADF&G regulatory markers. • The Aniak River drainage to ADF&G regulatory markers at its confluence with Kuskokwim River; • Aniak Box as defined as: waters of the Kuskokwim River main stem from Yukon Delta NWR boundary at Aniak downstream to a line formed from the northwest corner of runway (latitude 60°35’ 16N”, longitude 159°33’ 28”W), due north to pint on the southeast corner of sandbar (latitude 61°35’ 37”N, longitude 159°33’ 16W). All drift or set gillnets were limited to 6-inch or less mesh size and could not exceed 45 meshes in depth. Nets from the Refuge boundary at the Kuskokwim River mouth to the Johnson River cannot exceed 50 fathoms (300 feet) in length. Nets up river from the Johnson River to the Refuge boundary at Aniak could not exceed 25 fathoms (150 feet) in length.

Appendix Table C-11. Federal special actions, Kuskokwim River drainage, 2019 (*continued from previous page*).

3-KS-08-19 (Continued)	June 22, 2019	Subsistence fishing for Chinook Salmon with dip nets, beach seines, fish wheels, and rod and reel could also be used. Fish wheels were required to have a live box with no less than 45 cubic feet of water and had to be checked at least every 6 hours. Fish wheels had to be equipped with a chute and be closely attended while in operation.

Appendix Table C-12. State emergency orders, Kuskokwim River drainage, 2019.

2018 KUSKOKWIM RIVER DRAINAGE SUBSISTENCE FISHING		
State Emergency Order	**Effective Date**	**Actions**
EO 3-S-WR-01-19	May 28, 2019	**Subsistence fishing with gillnets in the Kuskokwim River were closed during the following times and areas, <u>until further notice</u>:** • <u>Sections 1 & 2</u>: Beginning 12:01 a.m. Tuesday, May 28, 2019, the Kuskokwim River Drainage from the Yukon Delta NWR boundary at the mouth of the Kuskokwim River to ADF&G markers approximately one-half mile upstream of the Tuluksak River mouth; • <u>Section 3</u>: Beginning 12:01 a.m. Saturday, June 1, 2019, from the ADF&G markers approximately one-half mile upstream of the Tuluksak River mouth to the Yukon Delta Refuge boundary near Aniak; • <u>Section 4</u>: Beginning 12:01 a.m. Thursday, June 6, 2019, from the Yukon Delta Refuge boundary near Aniak to the ADF&G regulatory markers near the Holitna River mouth; and • <u>Section 5</u>: Beginning 12:01 a.m. Thursday, June 11, 2019, upstream of the ADF&G regulatory markers located near the Holitna River mouth to the headwaters of the Kuskokwim River. **The following subsistence fishing restrictions and tributary gillnet fishing closures go into effect beginning 12:01 a.m. Tuesday, May 28, 2019 until further notice**: • The Kwethluk River drainage to regulatory markers at its confluence with Kuskokuak 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.

Appendix Table C-12. State emergency orders, Kuskokwim River drainage, 2019 (*continued from previous page*).

EO 3-S-WR-01-19 (*Continued*)	May 28, 2019	• All Kuskokwim River tributaries not expressly mentioned above within the Yukon Delta NWR closed to subsistence fishing with gillnets from their confluence with the Kuskokwim River upstream 100 yards. Subsistence fishing with gillnets remained open upstream of that 100 yard closure area**.** **Subsistence fishing with hook and line for Chinook salmon was closed until further notice**. Any Chinook salmon caught must be returned alive to the water. **Subsistence fishing with fish wheels was allowed until further notice**. Fish wheels were 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 could be equipped with a chute and had to be closely attended while in operation. All Chinook salmon were required to be returned alive to the water. **Subsistence fishing with dip nets and beach seines is currently allowed until further notice**. Any Chinook salmon caught in a dip net or beach seine was required to be returned immediately to the water alive.
EO 3-S-WR-02-19	June 1, 2019	Subsistence fishing was allowed on the Kuskokwim River mainstem within the Yukon Delta Refuge boundaries (sections 1-3) with 4-inch or less mesh size set gillnets from 11:00 a.m. until 11:00 p.m. Saturday, June 1, 2019. Set gillnets could not exceed 60 feet in length and 45 meshes in depth and could not be operated more than 100 feet from the ordinary high water mark. As previously announced subsistence fishing with hook and line, fish wheels equipped with live boxes or chutes, beach seines, and dip nets were allowed until further notice though any Chinook salmon caught with these gear types were required to be returned immediately to the water alive.
EO 3-S-WR-03-19	June 8, 2016	Subsistence fishing was allowed on the Kuskokwim River mainstem from the Yukon Delta Refuge boundary at the mouth of the Kuskokwim River to the Holitna River mouth (Sections 1–4) with 4-inch or less mesh size set gillnets from 10:00 a.m. until 10:00 p.m. Saturday, June 8, 2019. Set gillnets could not exceed 60 feet in length and 45 meshes in depth and could not be operated more than 100 feet from the ordinary high water mark. . As previously announced subsistence fishing with hook and line, fish wheels equipped with live boxes or chutes, beach seines, and dip nets was allowed until further notice though any Chinook salmon caught with these gear types were required to be returned immediately to the water alive.

Appendix Table C-12. State emergency orders, Kuskokwim River drainage, 2019 (*continued from previous page*).

EO 3-S-WR-04-19	June 12, 2019	From the Yukon Delta NWR boundary at Aniak upstream to the headwaters of the Kuskokwim River: Sections 4 & 5 Subsistence fishing with 6-inch or less mesh gillnets, not to exceed 25 fathoms in length and 45 meshes in depth, was opened at 10 am Wednesday June 12 until further notice. Chinook salmon could be retained if caught with fish wheels, beach seines, and hook and line, and gillnets could be retained until further notice. The waters of the Kuskokwim River from the Yukon Delta NWR boundary at Aniak 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 remained closed to subsistence fishing with gillnets until further notice
EO 3-S-WR-05-19	June 26, 2019	From the Yukon Delta NWR boundary at the mouth of the Kuskokwim River upstream to the Yukon Delta NWR boundary at Aniak (Sections 1–3): Subsistence fishing opened beginning 4:00 p.m. Wednesday, June 26 until further notice. Below the Johnson River, gillnets were restricted to 6-inch or less mesh, 45 meshes in depth, and 50 fathoms in length. Above the Johnson River, gillnets were restricted to 6-inch or less mesh, 45 meshes in depth, and 25 fathoms in length. Live release requirements of Chinook salmon while fishing with hook and line, dip nets, fish wheels, and beach seines were rescinded within the mainstem of the Kuskokwim River. Live release requirements remained in effect within the closed waters of the Kwethluk, Kasigluk, Kisaralik, Tuluksak River drainages as previously announced; any Chinook salmon caught with these gear types in these waters were required to be returned immediately to the water alive Subsistence fishing with hook and line, fish wheels equipped with a live box or chute, beech seines and dip nets was allowed, but all Chinook salmon caught were required to be returned to the water alive.
EO 3-S-WR-6-19	July 22, 2019	Effective 12:01 a.m. July 22, rescind the following restrictions: • 6-inch or less mesh requirement • 25 fathom gillnet length restrictions from the mouth of the Johnson River upstream to the headwaters of the Kuskokwim River (Sections 2–5); and • The closed waters around the mouth of the Aniak River

Appendix Table C-12. State emergency orders, Kuskokwim River drainage, 2019 (*continued from previous page*).

EO 3-S-WR-07-19	July 22, 2016	Subdistrict 1-A opened for five 8 hour commercial fishing periods with 6-inch or less mesh gillnets that could not exceed 50 fathoms in length and not more than 45 meshes deep: • 11:00 a.m. to 7:00 p.m. Monday, July 22 • 11:00 a.m. to 7:00 p.m. Wednesday, July 24 • 11:00 a.m. to 7:00 p.m. Friday, July 26 • 11:00 a.m. to 7:00 p.m. Monday, July 29 • 11:00 a.m. to 7:00 p.m. Wednesday, July 31 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 were no commercial salmon processors in the Kuskokwim Management Area at this time, this opportunity was provided for those individuals registered with the department as catcher/sellers.
EO 3-S-WR-8-19	August 1, 2019	Subdistrict 1-A opened for five 8 hour commercial fishing periods with 6-inch or less mesh gillnets that could not exceed 50 fathoms in length and not more than 45 meshes deep: • 11:00 a.m. to 7:00 p.m. Thursday, August 1 • 11:00 a.m. to 7:00 p.m. Friday, August 2 • 11:00 a.m. to 7:00 p.m. Monday, August 5 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 were no commercial salmon processors in the Kuskokwim Management Area at this time, this opportunity was provided for those individuals registered with the department as catcher/sellers.
EO 3-S-WR-09-19	August 16, 2016	Subdistrict 1-A opened for five 8 hour commercial fishing periods with 6-inch or less mesh gillnets that could not exceed 50 fathoms in length and not more than 45 meshes deep: • 11:00 a.m. to 7:00 p.m. Friday, August 16 • 11:00 a.m. to 7:00 p.m. Saturday, August 17 • 11:00 a.m. to 7:00 p.m. Wednesday, August 21 • 11:00 a.m. to 7:00 p.m. Friday, August 23 • 11:00 a.m. to 7:00 p.m. Saturday, August 24 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 were no commercial salmon processors in the Kuskokwim Management Area at this time, this opportunity was provided for those individuals registered with the department as catcher/sellers.

APPENDIX D

ELIGIBILITY OF BETHEL RESIDENTS

ANILCA SECTION 804 ANALYSIS

DEMOGRAPHY

The community of Bethel is located approximately 60 miles from where the Kuskokwim River meets the Bering Sea, and 390 miles from Anchorage, Alaska. The community can be accessed only by boats and planes and is not connected overland by road to any other community. All cash commodities are delivered either via river barge in summer or by year-round air service.

Bethel is located in the heartland of the traditional territory of Central Yup'ik. Moravian missionaries established Bethel at an unoccupied site in 1885 across the river from the village of *Mumtreglak*. The missionaries ran an orphanage, school, church, store, post office, and sawmill. Periodically gold seekers, trappers, and merchants spent time in Bethel awaiting supplies (Hankelman and Vitt 1985). People residing in the region moved to Bethel for the school and church and to trade. By 1960, the population had increased to 1,258 people; it doubled in 1970 to 2,416 people, and continued to increases each census year, numbering 3,576 people in 1980, 4,675 people in 1990, 5,471 people in 2000, and 6,080 in 2010 according to the U.S. Census (ADCCED 2014). In 2010, over two-thirds of Bethel residents were from the region.

HARVEST

Based on the Postseason Salmon Harvest Survey, the estimated number of Bethel households that harvested salmon 2008–2013 is displayed below (**Table F-1**). In 2013, there were about 2,100 households in Bethel of which about 970 households (46%) fished for salmon. The year 2012 was a year when closed fishing periods were used in order to prevent the harvest of Chinook Salmon, and only 38% of Bethel households fished for salmon. During other years of Chinook Salmon conservation but with fewer closed fishing periods, 2010 and 2011, the number of people that reported fishing for salmon actually increased to 66% and 56% of households, respectively. For this study, "fishing household" was defined as a household that participated in subsistence fishing activities, such as harvesting or processing salmon. The five-year average 2003–2007 harvest of Chinook Salmon by residents of Bethel was 28,109 fish. The 2008–2012 five-year average harvest was 22,508 fish, a decrease of 20%. In contrast, in 2014 in-season closures resulted in an estimated harvest of only 11,000 Chinook Salmon from the entire Kuskokwim River drainage (Hamazaki and Liller 2015).

Table F-1. The harvest of Chinook Salmon by residents of Bethel, based on household harvest surveys, 2008–2013.

BETHEL						
POST-SEASON SALMON HARVEST ASSESSMENT SURVEY						
Year	Total number of households	Average number of people per household	Estimated number of fishing households	Percentage of households that fished	Estimated total population of Bethel based on survey	Estimated harvest of Chinook Salmon[a]
2013	2,126	3.39	968 (+/-78)	46%	7,216 (+/- 298)	17,246 (+/- 3,450)
2012	2,128	3.44	825 (+/- 86)	38%	7,311 (+/- 324)	7,321 (+/- 1,474)
2011	2,097	3.29	1,175 (+/- 52)	56%	6,893 (+/- 165)	25,093 (+/- 4,052)
2010	2,043	3.41	1,353 (+/- 36)	66%	6,974 (+/- 120)	26,157 (+/-)[b]
2009	2,005	3.34	941 (+/- 50)	47%	6,688 (+/- 206)	26,170 (+/-)[b]
2008	1,981	3.42	886 (+/- 68)	45%	6,770 (+/- 315)	27,800 (+/-)[b]

Source: Carroll and Hamazaki 2012; Sheldon, Hamazaki, Horne-Brine, Roczicka, Thalhauser, and Carroll 2014; Shelden, Hamazaki, Horne-Brine, Chavez, and Fry 2015.

[a] In 2014, in-season closures resulted in an estimated harvest of only 11,000 Chinook Salmon from the entire Kuskokwim River drainage (Hamazaki and Liller 2015).

[b] Harvest estimates were revised in 2013; confidence intervals were not reported.

SECTION 804 ANALYSIS

Section 804 of ANILCA requires the Secretary of the Department of the Interior and the Secretary of the Department of Agriculture to respond when the population of a fish or wildlife species in a particular area becomes depressed to the point that the Secretaries are forced by circumstances to choose between otherwise qualified rural residents who wish to fish, hunt, or trap from that depressed population. Section 804 of ANILCA requires the Secretaries to make a determination based on three criteria: (1) customary and direct dependence upon the populations as the mainstay of livelihood, (2) local residency, and (3) the availability of alternative subsistence resources.

Criterion 1. Customary and direct dependence upon Chinook Salmon as the mainstay of livelihood

Contemporary Fish Camps at Bethel

There are estimated to be 55 to 60 active fish camps within the Bethel city limits (Roczicka 2014, pers. comm.). They are at home sites that are situated in areas that are away from the dust that pervades the city during dry weather. In addition, there are another 70 to 80 fish camps occupied each summer that are situated along the Kuskokwim River adjacent to Bethel (Chavez 2014, pers. comm.). The total number of fish camps is in a range from 125 to 140.

An In-season Salmon Harvest Monitoring Program is conducted each year in the Bethel area by staff at the *Orutsararmiut* Native Council, which is the tribal organization in Bethel. Participants in the In-season Salmon Harvest Monitoring Program are people occupying the 70 to 80 fish camps situated in the Bethel area between the mouth of the Gweek River and the village of Napaskiak (Patton and Carroll 2011). The use of fish camps along the Kuskokwim River to process and preserve salmon is well documented (cf.

Coffing 1991, Kilbuck 1988). From June through August, the daily activities of many households revolve around harvesting, processing, and preserving salmon for home use, or subsistence. Families process and hang their catches to dry at fish camps making traditional style "dryfish" and smoked strips. Smaller amounts of the salmon catch are preserved for the year by freezing, canning, salting, and fermenting. Households not directly involved in catching salmon assist family and friends with processing and share in the harvest. Fish camps are used by extended families, and often the youngest to the oldest all take part in fish camp activities. This family time together, gathering local food and being out on the land, is considered integral to good health, a sense of well-being, and transmission of local knowledge. The use of family fish camps has been, and remains, an important part of subsistence activities in the area (Patton and Carroll 2011).

Many families either own or have access to sites and have inherited the right to occupy them seasonally. Additionally, families use various strategies to participate at fish camp, for example, by sharing camps with others, or using camps after the owners are done for the season. Fish camps are inherited, for example, in the form of Native allotments or other privately-held land. Some river lots are leased for an annual fee from the Bethel Native Corporation. Fish camps are usually made up of a simple fish rack and smoke house made of tree branches, plywood and other lumber, and plastic tarps. Numerous other structures may include a plywood cabin, outhouse, steam bath, and storage shed. Some long-term fish camps have a larger house that is lived in throughout the summer with a few having solar panels or generators for electricity. Many families spend the majority of the salmon fishing season and other parts of the summer at fish camp. Other families rotate through in shifts with different members helping out at different times. Many Bethel families with full time jobs routinely go back and forth to their fish camps to process and tend their fish while it is drying and smoking. If fishermen are not able to take time off from their day jobs they often harvest, dry, and smoke fish at camp in the evening after work, returning to Bethel late at night to go to work the next day (Patton and Carroll 2011).

People at fish camps near Oscarville and at Napaskiak Slough are of mixed residency, about half from the nearby communities of Oscarville or Napaskiak and half from Bethel. Bethel residents have fish camps wherever they can secure the land and be near a water source. Some fishermen prefer to be "away from civilization, dust, and chemicals," while others have fish camps "in town" in their own backyards if sufficiently protected from the pervasive windblown road dust in Bethel. Bethel area fish camps are located along the river for ease of transferring the fish catch from the boat, and because of better drying conditions due to the river breeze reducing flies, and close proximity to water needed to clean the fish. Some people from Napaskiak and Oscarville who live in Bethel go to their families' fish camps near those communities. Bethel residents generally harvest salmon between the villages of Akiachak and Napaskiak as they usually can make good fish catches within this zone without having to travel farther (Patton and Carroll 2011).

Bethel residents use drift gillnets to harvest the majority of their salmon. A variety of mesh sizes are commonly used depending on what each fisherman owns or can borrow. Mesh sizes typically used for salmon range from 8 inches (locally called "king gear") to 6 inches or less. Some people who possess multiple nets of different sizes rotate between them depending on what species and size of fish they desire to catch and which mesh size is most effective. Setnets are more commonly used to target Chinook

Salmon early in the run. This is a more efficient means of fishing when fish are just beginning the upriver migration and are less abundant. Some families fish using only drift or only set nets depending on their financial resources and what works best for them. Many families employ both methods, tailoring their mesh size, method, and catch to the size and run timing so that they get a specific quantity of each desired species and can process and dry them in a timely manner (Patton and Carroll 2011).

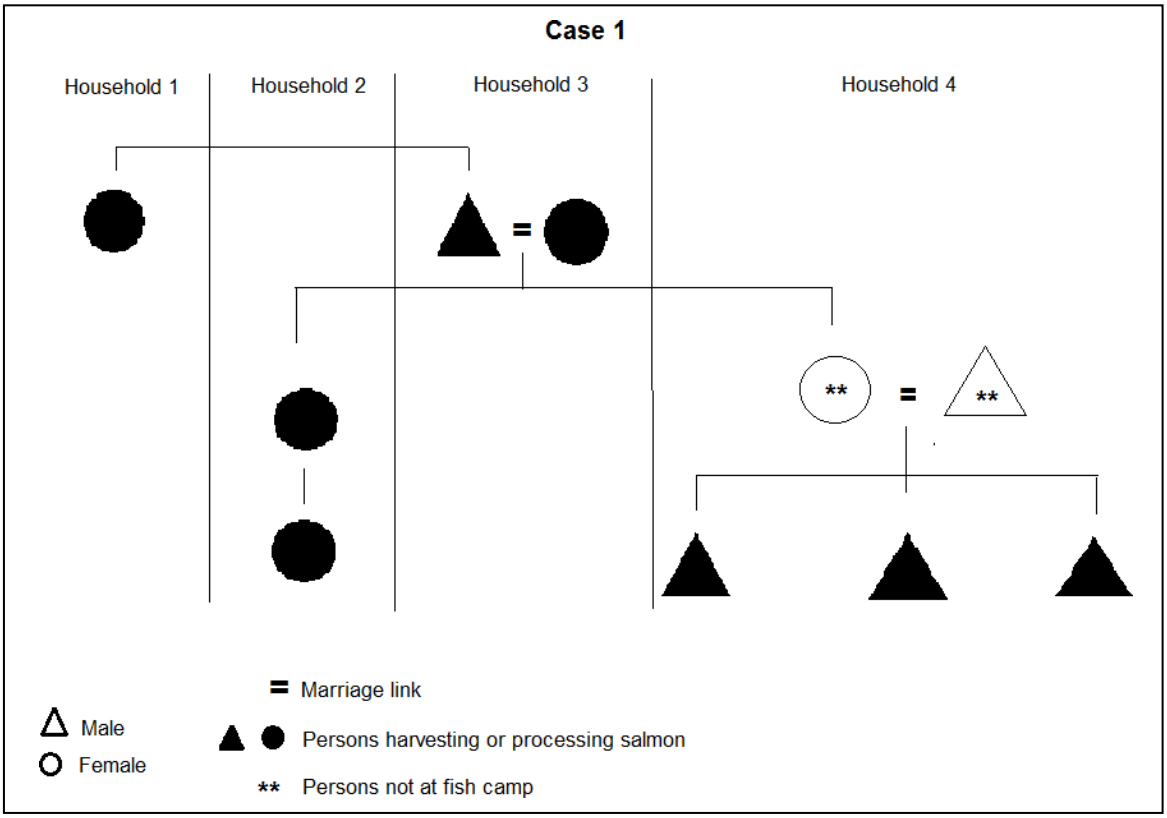
Both drift and setnet fishing requires costly equipment such as a skiff, boat motor, gas, and gillnet; thus, sharing of resources is important for many families, and for some, rod and reel fishing along the river's edge is the only economic option available. Some of the rod and reel fishing occurs at the Bethel sea wall, which is "a popular activity during the summer months and affords people an opportunity to harvest fish for subsistence use without requiring the investment of a boat and motor or a gillnet" (Coffing 2001:5). There is also rod and reel fishing at the mouth of the Kisaralik and Kasiguluk rivers, and parts of Kuskokwak Slough, especially for Coho Salmon. Rod and reel fishing often coincides with summer berry picking and late summer-early fall hunting activities.

How long people fish often depends on the size of their families, their fish harvest goals, and success in meeting those goals. For example, fish camps harvesting for extended families fish throughout the run to meet their needs; or at times when the fish returns are low all fishermen usually take longer to meet their catch goals for the year. Fishing for salmon begins in spring when weather conditions are likely to be at their best for drying and smoking salmon. Sometimes, salmon spoils due to poor weather for drying and due to fly infestations. In these cases families extend their fishing to the very end of the Chinook or Sockeye Salmon run or make up more of their catch with a larger quantity of Coho Salmon arriving later in the summer. How much families harvest and preserve is based on their obligations throughout the winter. Salmon are preserved as a main food source to feed the family all year, shared at festivals, holiday gatherings, memorial feasts, and sometimes traded for other subsistence goods, such as seal oil from the coast, or moose and caribou meat (Mather 1985, Patton and Carroll 2011).

The information below describing the social organization of salmon production work groups are based on interviews with participants (Kenner 2014). A work group is a group of people that together participated in subsistence fishing activities, such as harvesting or processing salmon.

Case 1

The first case is the extended family of a married, middle-aged couple. Both are employed fulltime year round. They are both originally from other villages situated in the region, but they have used their fish camp alongside the Kuskokwim River adjacent to Bethel for many years. They lease the site from the Bethel Native Corporation and were grandfathered in when the Bethel Native Corporation began leasing to only shareholders. The work group is comprised of family members from four separate households.



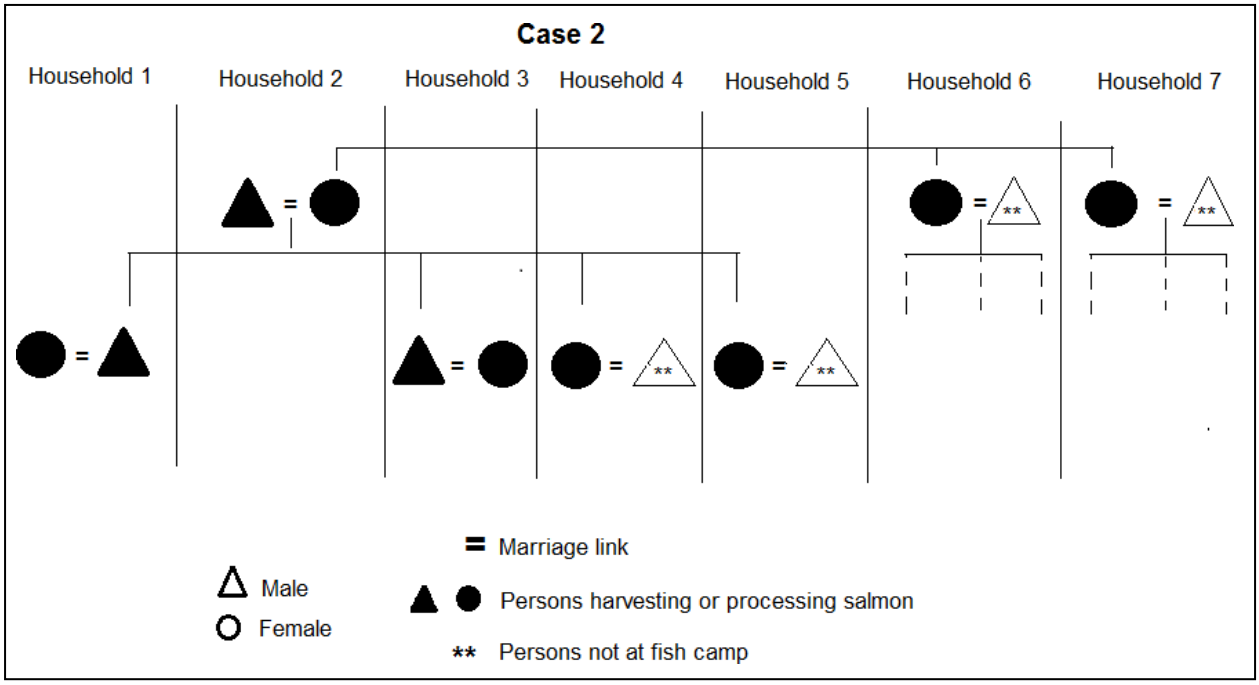
The husband's sister lives in a nearby village. The wife, her sister-in-law, and one daughter do most of the processing. The husband and his three grandsons do most of the harvesting.

The work group puts up 30 to 40 salmon in total. They have built a small cabin at the site. They return to their homes in Bethel most nights. They harvest salmon in a setnet in front of the processing station. The net is picked from a small skiff by the husband with help from his three grandsons, or the husband pulls the net and they pick the salmon from shore. They harvest whatever hits their net, a combination of Chinook, Chum, and Sockeye Salmon. They also put a setnet in the adjacent slough to harvest whitefish, checking it often to retrieve broad and humpback whitefish and the occasional jack Chinook Salmon or Dolly Varden.

Whitefish are processed along with salmon. Some salmon and whitefish are fermented in a hole in the ground several feet deep by layering the fish with guts and grass. Plants are picked at the fish camp such as wild celery. Occasionally, other family members are present. The river bank at the fish camp is constantly eroding and they have moved their cabin, racks, and smokehouse further from the bank. One of the daughters and her husband are employed fulltime and cannot go to fish camp; however, their three sons go and help their grandparents. They put salmon that has been preserved blanket style into cardboard boxes and strips into plastic baggies when bringing them to their home in Bethel. They do not have facilities for canning at their fish camp.

Case 2

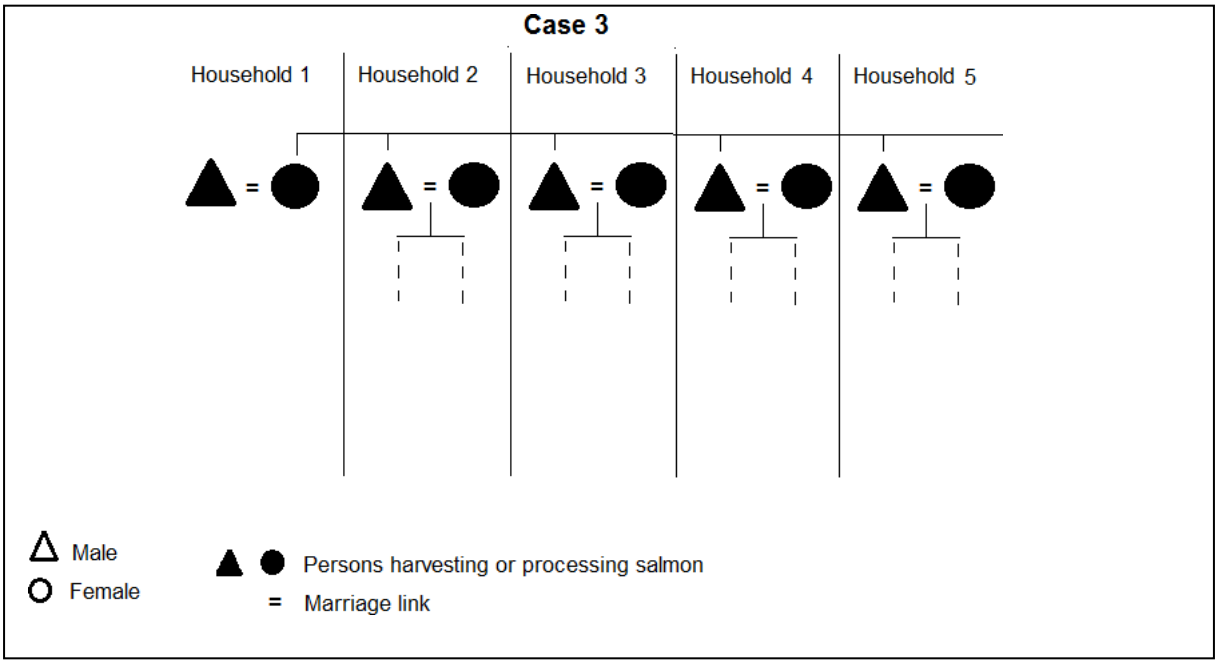
The second case is the extended family of a married, middle-aged couple. Both are members of Orutsararmiut, the Bethel tribe. Their fish camp is situated at a site that they own alongside the Kuskokwim River adjacent to Bethel. They have built a house at the site and family members stay at the house for most of the summer. A generator furnishes the home with electricity and there are cooking facilities in the home. The family has the typical racks and smokehouse. The workgroup is comprised of seven separate households. The wife's two sisters and their children use the fish camp. The couple's two sons and their sons' wives and the couple's two daughters use the fish camp. Their two sons harvest the salmon. They harvest about 400 salmon; about 200 Chinook Salmon and a combination of Chum and Sockeye Salmon. The Chinook and Sockeye Salmon are dried and smoked. Chum Salmon are dried and smoked and sometimes canned; Chum Salmon are canned because dried they cannot be preserved for long periods of time to consume later in the year. Coho Salmon might be harvested later in the season for freezing. Work group members take turns tending to a garden patch of potatoes and other vegetables.



Case 3

The third case concerns a middle-aged married couple living in Bethel who operate their fish camp within the Bethel city limits. One of them has a fulltime year round job. One is a member of Orutsararmiut, the Bethel tribe, and the other is originally from outside Alaska. They have grown children. They are situated in a location that is protected from the pervasive dust created by cars traveling on the dirt roads in Bethel. They have racks and a smokehouse. Her brothers and their wives are part of the work group; although, some have begun putting up fish at their own homes. Children of all ages arrive with their parents and help with the harvesting, cutting, hanging, and smoking. Both men and women perform all duties. The stove is fueled for two to three weeks by locally-collected cottonwood. In the past, the family put up more

Chinook Salmon but in recent years almost all of the salmon that they dry and smoke is Chum and Sockeye Salmon. Sheefish caught in their net are frozen, as is Chum Salmon that is beginning to turn that is used to feed their dogsled team. They preserve about 60 salmon and divide them between the households. The strips are generally frozen to consume later.



Criterion 2. Local residency

For salmon, all residents of Bethel exhibit similar attributes concerning local residency. The community is located alongside the Kuskokwim River with all residents living within one and a half miles of the river edge. Multiple public access areas exist where people can fish from the riverbank or park their boats. The majority of people do not live along the river bank because modern home sites were purposively established away from the river bank to protect them from flood waters and from being undercut by bank erosion.

Criterion 3. The availability of alternative resources

All residents of Bethel are similarly situated concerning the availability of alternative wild resources to Chinook Salmon. Bethel residents are similarly situated regarding harvest limits, seasons, and allowable gear types for most wild resources available to them. One difference is in the Marine Mammal Protection Act that allows only Alaska Natives to harvest seals and some other marine mammals. Bethel residents participated in a harvest survey of all wild resource use for the year 2012, and marine mammal harvests represented only 2% of the total harvest by weight (ADF&G 2014b). This is because Bethel is situated approximately 65 river miles from Kuskokwim Bay, the closest marine mammal habitat. The availability of marine mammals to Alaska Native residents of Bethel as an alternative to Chinook Salmon is low.

Summary

It appears that the vast majority of usable fish camp sites that are situated alongside the Kuskokwim River adjacent to Bethel are already taken by longtime residents of Bethel. Some have fish camps at their home sites in Bethel that are situated at favorable locations away from the pervasive dust. Others who enter the community generally participate in salmon fishing when invited by friends or co-workers at established fish camps, or by harvesting smaller amounts of salmon from shore or skiff with net or rod and reel. If dependence on Chinook Salmon is measured by harvest levels, it is clear that the large harvesters are people who own or lease fish camp sites alongside the Kuskokwim River adjacent to Bethel or within the Bethel city limits. A fish camp is often used by extended families comprising as many as seven separate households whose members are mostly processing and preserving salmon and not harvesting them. Several harvesters may supply salmon directly to multiple households. It is for this reason that both the in-season Salmon Harvest Monitoring Program and the Post-season Salmon Harvest Assessment Program, described above, recognize that work groups are the basis of the salmon subsistence economy in Bethel, and both programs structure their surveys to identify work groups in order to collect accurate information about salmon use patterns and harvest levels.

JUSTIFICATION

Work groups at Bethel area fish camps have the greater customary and direct dependence on Chinook Salmon from the Kuskokwim River drainage than do most other residents of Bethel after consideration of the three criteria in Section 804. It was not possible to identify *individuals* who have the greater customary and traditional dependence on Chinook Salmon based on the available information. Instead, harvesting is often one task in a multi-task, multi-household production effort. The entire work group is considered to consist of “fishing” households that contribute the most to the Chinook Salmon harvest estimates for Bethel (Shelden et al. 2014). Therefore, recognizing work groups at fish camps optimizes the pattern of use exemplified by the domestic mode of production that characterizes much of the salmon subsistence economy in Bethel. Further, the domestic mode of production observed in Bethel area fish camps should be the basis for any allocation system. It is recommended that salmon harvesters should primarily be identified not as individuals or through their household affiliations but by identification of their work groups. However, while identification of individuals who have the greater dependence on Chinook Salmon was not possible, it can be assumed that some Bethel residents without access to work groups or fish camps are highly dependent on Chinook Salmon and consider Chinook Salmon to be irreplaceable. Therefore, the Federal Subsistence Management Program should provide another form of opportunity for residents of Bethel to harvest Chinook Salmon, such as a drawing permit.

APPENDIX E

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

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 - AUTHORJTY

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 Ill - 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 AJ}REE:

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.

APPENDIX F

ALASKA DEPARTMENT OF FISH AND GAME COMMENTS ON FSA20-01/02/03

THE STATE of ALASKA
GOVERNOR MICHAEL J. DUNLEAVY

Department of Fish and Game

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MEMORANDUM

TO:	Anthony Christianson, Chair Federal Subsistence Board	DATE:	March 16, 2020
		PHONE:	267-2190
FROM:	Ben Mulligan BJM Deputy Commissioner	SUBJECT:	Fisheries Special Actions 20-01,02 & 03

The Alaska Department of Fish and Game (ADF&G) has reviewed Fisheries Special Actions (FSA) 20-01, 02, and 03 and opposes these proposals. FSA20-01, 02, and 03 submitted by the Akiak Native Community, Organized Village of Kwethluk, and LaMont Albertson all request in slightly different ways the federal government close those portions of the Kuskokwim River drainage flowing through or adjacent to federal land to the harvest of Chinook salmon except by federally qualified subsistence users and further reduce the pool of eligible harvesters based on an ANILCA 804 subsistence user prioritization analysis.

Given the Chinook salmon outlook for 2020, ADF&G is capable of managing and conserving Kuskokwim River salmon with the management tools available. ANILCA Section 804 and Section 815 state 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 such uses, such priority shall be implemented…" and "Nothing in this title shall be construed as-…authorizing a restriction on the taking of fish and wildlife for nonsubsistence uses on the public lands (other than national parks and park monuments) unless necessary for the conservation of healthy population of fish and wildlife for reasons set forth in section 816 (public safety, administration or to assure the continued viability of such population), to continue subsistence uses of such population, or pursuant to other applicable law." With the current outlook well within the escapement goal range and having enough potential surplus for a full subsistence harvest, we cannot find where any of these reasons will apply to the 2020 Kuskokwim River Chinook salmon run.

Background:

Between 2010 and 2018, the Kuskokwim River experienced below average Chinook salmon runs. Total run estimates for Kuskokwim River Chinook salmon in 2012, 2013, and 2014 were the three lowest on record. From 2010 through 2013, many tributary escapement goals were not achieved and the established Kuskokwim River drainagewide escapement goal was not achieved in 2013. Beginning in

2014, the most restricted subsistence fishing seasons have occurred on the Kuskokwim River, but have led to the majority of tributary escapement goals being achieved. In addition, the drainage wide escapement levels have been near the upper end of the established escapement goal of 65,000–120,000 Chinook salmon since 2015. The drainage wide escapement goal was exceeded in 2019 with an estimated escapement of 188,483 (95% CI: 144,307–243,335) fish.

The total Chinook salmon run in 2015 was 125,578 fish, with a spawning escapement of 108,974 and a subsistence harvest of 16,124 Chinook salmon. An additional yield of approximately 16,000 fish was available, which would have resulted in a spawning escapement near the midpoint of the drainagewide goal.

The 2016 total Chinook salmon run was 130,475 fish, with a spawning escapement of 99,257 and subsistence harvest of 30,693 Chinook salmon. An additional yield of approximately 7,000 fish was available, which would have resulted in a spawning escapement near the midpoint of the drainagewide goal.

The 2017 total Chinook salmon run was 131,677 fish, with a spawning escapement of 115,007 and a subsistence harvest of 16,380 Chinook salmon. An additional yield of approximately 22,000 fish was available, which would have resulted in a spawning escapement near the midpoint of the drainagewide goal.

The 2018 total Chinook salmon run was 136,135 fish, with a spawning escapement of 113,404 and a preliminary subsistence harvest of 22,266 Chinook salmon. An additional yield of approximately 21,000 fish was available, which would have resulted in a spawning escapement near the midpoint of the drainagewide goal.

The 2019 total Chinook salmon run was 226,987 fish, with a spawning escapement of 188,483 and a preliminary subsistence harvest of 37,941 Chinook salmon. An additional yield of approximately 96,000 fish was available, which would have resulted in a spawning escapement near the midpoint of the drainagewide goal.

Over the past few years (2016–2019), total run sizes have been below the long-term historical average of 216,000 Chinook salmon and above the recent 10-yr average of 126,000 Chinook salmon, with 2019 being the exception (2019 total run size slightly above the historical average). During 2016–2019, run sizes have been large enough to provide for escapement needs and there has been additional yield available for subsistence uses. Subsistence harvests have been severely restricted by regulation and by the sacrifices of subsistence fishermen along the river even though there have been additional yields available.

Discussion:

The Board of Fisheries has determined that 67,200–109,800 Chinook salmon are reasonably necessary for subsistence uses. This is known as an “amount reasonably necessary for subsistence” (ANS) and is one way to determine if the regulations are providing a normally diligent fisherman a reasonable opportunity to harvest salmon for subsistence uses.

If implemented, any of the proposed special actions will prevent non-federally qualified users from fishing for Chinook salmon in those specified reaches of the Kuskokwim River. This includes preventing subsistence users from outside the area as well as relatives of Kuskokwim Area residents who do not currently live in the Kuskokwim Area from “taking” fish; they cannot pursue, trap, net,

capture, collect, or kill fish. Only users prioritized under the ANILCA Section 804 analysis will be allowed to take fish in the subsistence fishery.

The preliminary 2020 season outlook of 200,000–260,000 Chinook salmon is expected to be larger in run size compared to recent years and near the long-term average (1976–2018) of 216,000 fish. If the run materializes as expected, even at the lower end of the outlook, there is enough potential surplus that harvest could exceed ANS and achieve near the mid-point of the drainagewide escapement goal (i.e., 92,500 fish). However, if the 2020 run size is near the midpoint of the forecast range (230,000 fish), there will be adequate surplus to provide for a full subsistence fishery (i.e., 110,000 fish) and be within the upper end of the drainage wide escapement goal range (i.e., 120,000 fish).

Regulatory changes and assessment tools have been developed since 2013 that increase the ability to conservatively manage the Kuskokwim River Chinook salmon fishery. After the 2013 season, a review of forecasting methods was conducted. From this review, the best method selected uses the prior year run size to forecast the upcoming year and this method has proved to be accurate since 2014. Second, a front-end drift gillnet closure that was proposed and supported by local stakeholders was passed by the Alaska Board of Fisheries in 2016. The intent of this closure is to move fish through the lower Kuskowim River to provide for equitable harvest throughout the drainage. Consequently, this early season closure also has the conservative effect of putting more fish on spawning grounds; specifically, headwater streams because these stocks tend to migrate upriver earlier. Third, since 2014 gillnet mesh size has been restricted to 6-inch or less. Six-inch mesh harvests Chinook salmon in proportion to the size structure and sex ratio of the total run (N. Smith ADF&G, unpublished data). To state it another way, the size composition and sex ratio of fish harvested in the fishery with 6-inch mesh mirrors the size structure and sex ratio observed at escapement projects. Fourth, ADF&G has operated a lower Kuskokwim River mainstem sonar project since 2017 that provides abundance estimates of all upriver migrating fish. Finally, a Chinook salmon in-season Bayesian risk assessment tool was developed for use on the Kuskokwim River (Staton and Catalano 2019). One important aspect of this tool is the production of the full range of uncertainty around the pre-season forecast and the updated inseason projections of total run.

ADF&G is capable of conserving Chinook salmon and providing for subsistence opportunities to traditional harvesters of salmon in the Kuskokwim River drainage. The Kuskokwim River Salmon Management Plan (5 AAC 07.365) has an annual regulatory front-end closure to Chinook salmon fishing: the end date is 11:59 p.m. June 11, and the beginning date is determined with input from stakeholders of the Kuskokwim River drainage. Starting June 12, the plan calls for at least one open subsistence fishing period per week, if ADF&G projects the run will meet the escapement goal for Chinook salmon. Prior to any Chinook salmon openings, ADF&G has authority to provide subsistence fishing opportunity with a maximum of 4-inch mesh. ADF&G also has authority to provide a limited Chinook salmon opportunity in waters upstream of the potentially closed waters during times of setnet closure under a permit allowing harvest of 10 Chinook salmon per household.

The Kuskokwim River Salmon Management Working Group (Working Group) was established by the Alaska Board of Fisheries to allow all stakeholders to participate and provide advice and input in an open public forum to the department on how to ensure equitable harvest and distribution of salmon resources throughout the Kuskokwim River drainage. Through this process, Working Group members and members of the public provide extensive local and traditional knowledge, expertise, management recommendations, and other data during weekly public meetings that occur throughout the entire salmon season. A preseason meeting is also provided for all stakeholders and members of the general public to attend and give input to managers prior to the fishing season. That meeting will take place in Bethel this spring. These meetings enable ADF&G to collaboratively manage for conservation purposes to protect

Chinook salmon while allowing for subsistence opportunity of other healthy species. ADF&G also welcomes the continued attendance of refuge staff at all Working Group meetings.

After the regulatory front-end closure, ADF&G recommends fishing periods every other day, based on the preseason forecast, because it will be too early for inseason indicators to provide accurate run projections. Forecasts since 2014 have been more accurate based on the prior year forecast method and the Bethel Test Fishery is more reliable as a run projection later in the season. Starting June 12, four periods would be announced for 24 hours and with gear type as discussed with the Yukon Delta National Wildlife Refuge manager, state and federal researchers, and stakeholders, which includes the Working Group and other members of the public. This management strategy errs on the side of caution by not initially opening the fishery to unlimited time and area, since the 2019 run was the first average total run observed in the last decade.

If the run comes in lower than expected, then ADF&G can, through Emergency Order, delay weekly Chinook salmon subsistence fishing periods until the chum and sockeye salmon ratios are high enough to warrant subsistence fishing openings focused on these healthy salmon stocks. ADF&G will continue to implement management measures along the entire length of the drainage.

Thank you for consideration of our comments.

Cc: Sam Rabung, Director, Commercial Fisheries
Dave Rutz, Director, Sport Fish
Lisa Olson, Operations Manager, Subsistence
Aaron Peterson, Assistant Attorney General, Department of Law
Cheryl Brooking, Assistant Attorney General, Department of Law

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