FP21-01 Executive Summary	
General Description	Proposal FP21-01 requests that closures to subsistence fishing immediately before, during, and after commercial fishing periods be eliminated in the Kuskokwim River. *Submitted by the Yukon Delta National Wildlife Refuge.*
Proposed Regulation	**§___.27 (e)(4) Kuskokwim Area** ~~*(iii) In District 1, Kuskokuak Slough, from June 1 through July 31 only, you may not take salmon for 16 hours before and during each State open commercial salmon fishing period in the district.*~~ * * * * ~~*(v) In District 2, and anywhere in tributaries that flow into the Kuskokwim River within that district, from June 1 through September 8, you may not take salmon by net gear or fish wheel for 16 hours before or during and for 6 hours after each open commercial salmon fishing period in the district. You may subsistence fish for salmon with rod and reel 24 hours per day, 7 days per week, unless rod and reel are specifically restricted by this paragraph (e)(4).*~~
OSM Preliminary Conclusion	**Support**
Yukon-Kuskokwim Delta Subsistence Regional Advisory Council Recommendation	
Western Interior Alaska Subsistence Regional Advisory Council Recommendation	
Interagency Staff Committee Comments	
ADF&G Comments	
Written Public Comments	**None**

DRAFT STAFF ANALYSIS
FP21-01

ISSUES

Proposal FP21-01, submitted by the Yukon Delta National Wildlife Refuge, requests the Federal Subsistence Board (Board) eliminate the closures to subsistence fishing immediately before, during, and after commercial fishing periods in the Kuskokwim River.

DISCUSSION

The proponent states that current Federal subsistence fisheries regulations are not parallel with Alaska Department of Fish and Game (ADF&G) regulations. These requested regulation changes would align Federal and State regulations. Closure times before, during, and after commercial openings are now announced via State emergency order, making the Federal regulations potentially more restrictive than what the State could announce. Additionally, the proposal makes the District 2 regulation less confusing because the first and second sentences have no relation to one another.

Existing Federal Regulation

§___.27 (e)(4) Kuskokwim Area

***

(iii) In District 1, Kuskokuak Slough, from June 1 through July 31 only, you may not take salmon for 16 hours before and during each State open commercial salmon fishing period in the district.

****

(v) In District 2, and anywhere in tributaries that flow into the Kuskokwim River within that district, from June 1 through September 8, you may not take salmon by net gear or fish wheel for 16 hours before or during and for 6 hours after each open commercial salmon fishing period in the district. You may subsistence fish for salmon with rod and reel 24 hours per day, 7 days per week, unless rod and reel are specifically restricted by this paragraph (e)(4).

Proposed Federal Regulation

§___.27 (e)(4) Kuskokwim Area

****

~~*(iii) In District 1, Kuskokuak Slough, from June 1 through July 31 only, you may not take salmon for 16 hours before and during each State open commercial salmon fishing period in the district.*~~

****

(v) ~~*In District 2, and anywhere in tributaries that flow into the Kuskokwim River within that district, from June 1 through September 8, you may not take salmon by net gear or fish wheel for 16 hours before or during and for 6 hours after each open commercial salmon fishing period in the district.*~~ *You may subsistence fish for salmon with rod and reel 24 hours per day, 7 days per week, unless rod and reel are specifically restricted by this paragraph (e)(4).*

Relevant Federal Regulation

§___.27 (e)(4) Kuskokwim Area

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(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.

Existing State Regulation

Kuskokwim Area

5 AAC 01.260. Fishing seasons and periods

****

(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.

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 60_ 08.50' N. lat., 162_ 12' W. long. to the southernmost tip of Eek Island to Popokamiut at 60_ 04' N. lat., 162_ 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 60_ 08.50' N. lat., 162_ 12' W. long. to the southernmost tip of Eek Island to the Popokamiut at 60_ 04' N. lat., 162_ 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 60_ 08.50' N. lat., 162_ 12' W. long. to the southernmost tip of Eek Island to Popokamiut at 60_ 04' N. lat., 162_ 28' W. long. to a line between ADF&G regulatory markers located at approximately 60_ 28' N. lat., 162_ 18' W. long. and 60_ 28' N. lat., 162_ 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.

Extent of Federal Public Lands/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 District 1 and most of District 2 and the waters between Districts 1 and 2 in the Kuskokwim River drainage that are within and adjacent to the exterior boundaries of the Yukon Delta National Wildlife Refuge (Refuge) (**Figure 1**). Federal Public waters are generally described as the Kuskokwim River drainage from its mouth up to and including approximately 30 miles of the Aniak River.

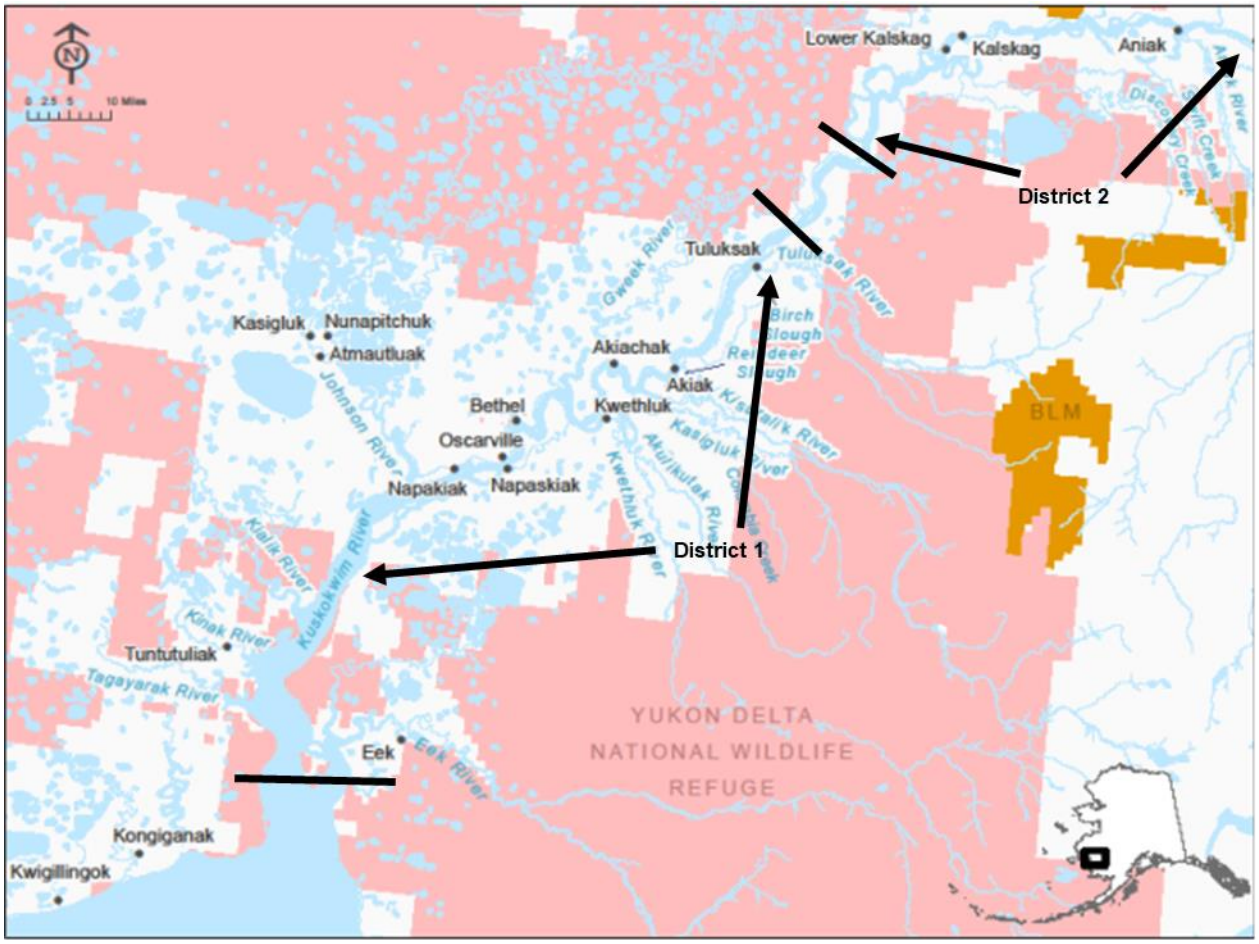

Figure 1. Map of Kuskokwim River Fishing Districts 1 and 2.

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 in the Kuskokwim River drainage.

Regulatory History

These regulations were adopted by the Board in 1999 when promulgating the initial Federal regulations for fish in navigable waters, in addition to non-navigable waters (64 Fed. Reg. 5. 1306 [January 8, 1999]). The purpose of the regulations was to prevent the sale of subsistence caught salmon into the commercial market.

In 2003, the Federal Subsistence Board adopted the following regulatory language in order to streamline regulations and reduce redundancy and confusion concerning in-season fishery management actions (FSB 2003: 39-50; OSM 2003; 68 Fed. Reg. 29. 7277, 7286 [February 12, 2003]):

§___.27 (e)(4) Kuskokwim Area

***

(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 [Emergency Orders]*), unless superseded by a Federal Special Action.*

In 2004, the Alaska Board of Fisheries changed its regulations describing subsistence fishing opportunity immediately before, during, and immediately after commercial fishing openings in the Kuskokwim River. Proposal 134, submitted by ADF&G, was a request to add a reference to the Kuskokwim River Salmon Rebuilding Management Plan (5 AAC 07.365) into the regulation 5 AAC 01.260 Fishing seasons and periods. Proposal 134 was also a request to repeal the following language in 5 AAC 01.260 in order to make subsistence fishing regulations consistent and concise:

Kuskokwim Area

5 AAC 01.260. Fishing seasons and periods

***

~~*(b) In District 1 and in those waters of the Kuskokwim River between Districts 1 and 2, excluding the Kuskokuak Slough, salmon may be taken at any time except salmon may not be taken for 16 hours before, during, and 6 hours after each commercial fishing opportunity in the district.*~~

~~*(c) In District 1, Kuskokuak Slough only, salmon may be taken at any time except (1) from June 1 through July 31, salmon may not be taken for 16 hours before and during each open commercial salmon fishing period in the district.*~~

***

(e) In District 2, and anywhere in tributaries that flow into the Kuskokwim River within that district, from June 1 through September 8, you may not take salmon by net gear or fish wheel for 16 hours before or during and for 6 hours after each open commercial salmon fishing period in the district.

The Alaska Department of Fish and Game said "during the last several commercial fishing seasons, the Department by emergency order authority has made the subsistence fishing schedule in Kuskokuak Slough the same as the remaining Kuskokwim River drainage waters downstream of Bogus Creek (District 1)," and the Department wanted to make this change to regulations (ADF&G 2004a: 84). However, Alaska Board of Fisheries members recognized there was an opportunity "to provide additional subsistence fishing opportunity on the lower Kuskokwim River" and "provided the commissioner emergency order authority to establish subsistence fishing closures around commercial

fishing periods in the District 1 subdistrict, in portions of waters adjacent to the subdistrict open to commercial fishing" (ADF&G 2004b: 13). The revised regulation read:

Kuskokwim Area

5 AAC 01.260. Fishing seasons and periods

****

(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.

~~*(b) In District 1 and in those waters of the Kuskokwim River between Districts 1 and 2, excluding the Kuskokuak Slough, salmon may be taken at any time except salmon may not be taken for 16 hours before, during, and 6 hours after each commercial fishing opportunity in the district.*~~

~~*(c) In District 1, Kuskokuak Slough only, salmon may be taken at any time except (1) from June 1 through July 31, salmon may not be taken for 16 hours before and during each open commercial salmon fishing period in the district.*~~

~~***~~

~~*(e) In District 2, and anywhere in tributaries that flow into the Kuskokwim River within that district, from June 1 through September 8, you may not take salmon by net gear or fish wheel for 16 hours before or during and for 6 hours after each open commercial salmon fishing period in the district.*~~

In 2006, the Refuge submitted Proposal FP06-05 to "Allow subsistence users more time before and after commercial fishing periods" (OSM 2005: 5). The proposed regulation read:

§___.27 (e)(4) Kuskokwim Area

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(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.

~~*(iii) In District 1 and in those waters of the Kuskokwim River between Districts 1 and 2, excluding the Kuskokuak Slough, you may not take salmon for 16 hours before, during, and for six hours after, each open commercial salmon fishing period for District 1.*~~

~~*(iv) In District 1, Kuskokuak Slough, from June 1 through July 31 only, you may not take salmon for 16 hours before and during each State open commercial salmon fishing period in the district.*~~

***

(vi) In District 2, and anywhere in tributaries that flow into the Kuskokwim River within that district, from June 1 through September 8, you may not take salmon by net gear or fish wheel for 16 hours before or during and for 6 hours after each open commercial salmon fishing period in the district. You may subsistence fish for salmon with rod and reel 24 hours per day, 7 days per week, unless rod and reel are specifically restricted by this paragraph (e)(4).

However, the modified Federal regulation maintained the fishing schedule in Kuskokuak Slough (OSM 2006).

The Office of Subsistence Management (OSM) analysis further described the Refuge request:

> Subsistence fishing closures before, during, and after commercial fishing periods provide an enforcement tool to assure fish will not be harvested by unlicensed fishers and enter commercial markets. Until 2004, Federal and State subsistence fishing regulations prevented the subsistence harvest of salmon by net or fish wheel 16 hours before, during, and 6 hours after each State commercial salmon fishing period in District 1, excluding Kuskokuak Slough, and in District 2. In January 2004, the Alaska Board of Fisheries changed State regulations to allow the Alaska Department of Fish and Game (ADF&G) to establish subsistence fishing closures around commercial fishing periods by emergency order. This regulation change was permanent and requires emergency order action to establish periods closed to subsistence fishing. In 2004, the ADF&G changed, by emergency order, the time period for the subsistence closure to six hours before and during, and three hours after the commercial periods to allow for more subsistence opportunity (ADF&G 2004[c] *in original*) (OSM 2006: 155).

The OSM analysis based this description on an ADF&G emergency order in 2004 (ADF&G 2004c), instead of the changes to State regulations promulgated by the Alaska Board of Fisheries in 2004, described above. Additionally, OSM misinterpreted the ADF&G emergency order in 2004, and removed the District 1 closure instead of the Kuskokuak Slough closure. The Federal Subsistence proposal was on the consent agenda. The Federal Subsistence Board adopted the following revisions to the regulations (71 Federal Register 60. 15571 [March 29, 2006]):

> **§___.27 (e)(4) Kuskokwim Area**
>
> *(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.*
>
> ~~*(iii) In District 1 and in those waters of the Kuskokwim River between Districts 1 and 2, excluding the Kuskokuak Slough, you may not take salmon for 16 hours before, during, and for six hours after, each open commercial salmon fishing period for District 1.*~~
>
> *(iv) In District 1, Kuskokuak Slough, from June 1 through July 31 only, you may not take salmon for 16 hours before and during each State open commercial salmon fishing period in the district.*
>
> ***
>
> *(vi) In District 2, and anywhere in tributaries that flow into the Kuskokwim River within that district, from June 1 through September 8, you may not take salmon by net gear or fish wheel for 16 hours before or during and for 6 hours after each open commercial salmon fishing period in the district. You may subsistence fish for salmon with rod and reel 24 hours per day, 7 days per week, unless rod and reel are specifically restricted by this paragraph (e)(4).*

Since 2015, the only commercial fishermen participating in the commercial fishery were those who registered with ADF&G as catcher/sellers and secured their own markets. The Alaska Department of Fish and Game did not implement 5 AAC 01.260 and close subsistence fishing periods by emergency order before or after these commercial fishing periods for catcher/sellers (Lipka and Tiernan 2018, ADF&G 2018a and 2019). Other opportunities for commercial fishing have not occurred because there have been no salmon processors in the area, leaving the area without a large-scale salmon processor for the first time since statehood (Lipka and Tiernan 2018: 2–3).

Biological Background

Chinook Salmon

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 (Larson 2020).

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 365,368 Chinook Salmon. Run-sizes have dropped steadily from this peak until reaching an all-time low of 75,010 salmon in 2012. Since 2012, the population appears to be on a slightly increasing trend, with a larger jump in 2019 (**Table 1, Figure 2**). Estimated Chinook Salmon run-sizes from 2015–2018 have been 125,578, 130,475, 131,677, and 136,135, respectively (Tiernan et al. 2018). The 2019 estimated run-size for Chinook Salmon was approximately 226,987 (Larson 2020).

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.

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 several 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 analyzed as an additional data source in 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, six 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). ADF&G discontinued the Takotna weir in 2014, however, the Kuskokwim Inter-Tribal Fish Commission, with assistance from the Takotna Tribal Council restarted the weir 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 and Salmon River of the Pitka Fork drainage). In addition to the weir projects, data from 14 aerial index surveys are used in 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 1, Figure 2) (Larson 2020, ADF&G 2019).

In the 2013 Chinook Salmon fishing season, a new sustainable escapement goal (SEG) was established (65,000–120,000 fish). In-season fisheries managers, with concurrence from the Kuskokwim River Salmon Management Working Group, agreed on managing the fishery with an escapement goal of 65,000-120,000 Chinook Salmon (ADF&G 2020a) . Due to run timing and the return being compressed, few restrictions were placed on Chinook Salmon subsistence harvest throughout the 2013 fishing season. However, the resulting overharvest from a lack of management actions in-season resulted in the lowest escapement on record (an estimated 37,000 fish) (Table 1, Figure a) (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, the estimated drainage-wide run size was predicted to be 135,000 Chinook Salmon, and resulted 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 revised these estimates lower, with a total 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 revised these estimates lower also, 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, the Working Group set an escapement objective of 85% of the upper bound of the SEG (65,000–120,000 fish), which was approximately 102,000 Chinook Salmon. The estimated total Chinook Salmon run size in 2016 for the Kuskokwim River was around 129,000 fish, and resulted in an estimated escapement of around 98,000 fish.

The 2017, the 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. This level of escapement would have been above the upper bound of the SEG of 120,000 Chinook Salmon. However, the new run reconstruction model revised these estimates lower, with a run size near 133,000 and 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.

Table 1. 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 (Larson 2020).

Kuskokwim River Drainage							
Year	Total Run	Escapement	Harvest				
			Subsistence	Commercial	Sport	Test Fish	Total
1976	206,672	116,125	58,606	30,735		1,206	90,547
1977	324,860	231,153	56,580	35,830	33	1,264	93,707
1978	237,518	154,046	36,270	45,641	116	1,445	83,472
1979	236,554	140,252	56,283	38,966	74	979	96,302
1980	362,290	265,322	59,892	35,881	162	1,033	96,968
1981	311,309	200,910	61,329	47,663	189	1,218	110,399
1982	143,957	36,956	58,018	48,234	207	542	107,001
1983	148,051	65,906	47,412	33,174	420	1,139	82,145
1984	175,501	86,325	56,930	31,742	273	231	89,176
1985	145,163	63,236	43,874	37,889	85	79	81,927
1986	123,817	53,205	51,019	19,414	49	130	70,612
1987	182,967	78,724	67,325	36,179	355	384	104,243
1988	206,619	78,856	70,943	55,716	528	576	127,763
1989	214,473	88,320	81,175	43,217	1,218	543	126,153
1990	267,793	103,607	109,778	53,502	394	512	164,186
1991	215,518	102,370	74,820	37,778	401	149	113,148
1992	260,878	129,778	82,654	46,872	367	1,380	131,273
1993	272,385	172,718	87,674	8,735	587	2,515	99,511
1994	398,188	276,084	103,343	16,211	1,139	1,937	122,630
1995	371,220	236,491	102,110	30,846	541	1,421	134,918
1996	323,884	218,309	96,413	7,419	1,432	247	105,511
1997	262,498	171,164	79,381	10,441	1,227	332	91,381
1998	254,674	154,702	81,213	17,359	1,434	210	100,216
1999	160,332	81,739	72,775	4,705	252	98	77,830
2000	122,228	54,019	67,620	444	105	64	68,233
2001	192,625	113,985	78,009	90	290	86	78,475
2002	238,337	156,489	80,982	72	319	288	81,661
2003	231,825	163,120	67,134	158	401	409	68,102
2004	365,368	264,727	96,788	2,305	857	691	100,641
2005	326,910	235,134	85,090	4,784	572	557	91,003
2006	324,338	229,953	90,085	2,777	444	352	93,658
2007	248,762	151,902	96,155	179	1,478	305	98,117
2008	214,991	116,086	98,103	8,865	708	420	108,096
2009	195,102	107,168	78,231	6,664	904	470	86,269
2010	116,048	45,384	66,056	2,732	354	292	69,434
2011	114,599	50,570	62,368	747	579	337	64,031
2012	75,010	51,518	22,544	627	0	321	23,492
2013	88,515	41,027	47,113	174	0	201	47,488
2014	82,096	70,330	11,234	35	0	497	11,766
2015	125,578	108,974	16,124	8	0	472	16,604
2016	130,475	99,257	30,676	0	0	522	31,198
2017	131,677	115,007	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

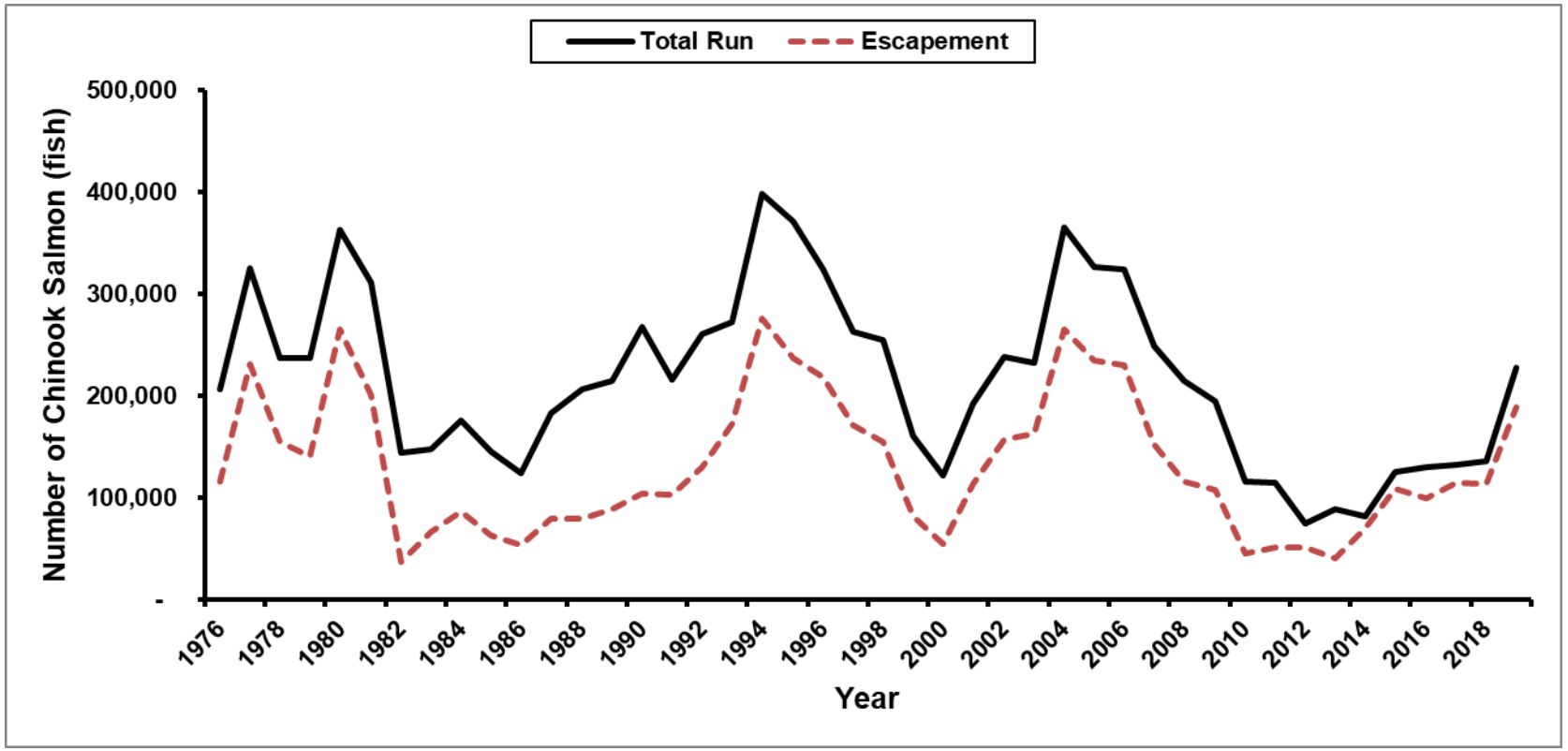

Figure 1. Estimates of Kuskokwim River Chinook Salmon total run-sizes and escapements from 1976 to 2019. Estimates are produced from the Kuskokwim River Chinook Salmon Run-Reconstruction Model (Larson 2020).

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 via test fisheries, creel surveys, effort counts, and pre-season forecasts in order to inform harvest decisions that control subsistence opportunities. The main in-river abundance indicator used in season is the Bethel Test Fishery. The Bethel Test Fishery has operated upstream of Bethel since 1984 and provides a long term data set on species composition, relative abundance, and run-timing. There are complications using data from the test fishery to help in-season management because abundance estimates are confounded by run-timing, as well as the test fishery being located upstream of where much of the Chinook Salmon harvest takes place. Specifically, there is a large amount of variation in historical run-timing, which complicates in-season predictions of run abundance. These factors highlight the importance of the pre-season forecast during the early stages of in-season management.

Chinook Salmon enter the Kuskokwim River beginning in late May and continue through early August. The Bethel Test Fishery starts operating around the end of May and continues till late August. The cumulative catch of Chinook Salmon at the test fishery can best be described by a sigmoidal shaped curve (i.e., logistic), which is used to generalize run-strength, run-timing, and species composition. From 1984 to 2019, 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 the average being June 22 ± 4 days. Past research has shown that Chinook Salmon migrating to the upriver portions of the drainage tend to migrate earlier 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 (Clark and Smith 2019).

Chinook Salmon are the main salmon species migrating in the Kuskokwim River in the beginning of the season; however, the composition of the run transitions to Chum and Sockeye Salmon over a period of a few weeks. From 1984 to 2016, the average date when the proportion of Chinook Salmon was equal to that of Chum Salmon plus Sockeye Salmon at the Bethel test fishery (1:1 ratio) was June 13. 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.

Population Assessment

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

carrying capacity, age, and recruitment variation. These estimates and the uncertainty around them are used to derive biological reference points that are then used to develop drainage-wide escapement goals for the Kuskokwim River (the current SEG is 65,000–120,000), as well as goals for selected tributaries (Kwethluk, George and Kogrukluk).

Chum Salmon

Run Size

In-season run abundance and run timing of Kuskokwim River Chum Salmon is monitored utilizing the Bethel Test Fishery. The relative strength of a run is assessed by comparing the cumulative end of the season catch per unit effort (CPUE) of any one year to the CPUE of one or more other years.

The most recent 10-year average (2008–2018) cumulative CPUE for Chum Salmon is 6,314, with a range of 2,942 in 2015 to 10,028 in 2011 (Lipka and Tiernan 2018 and ADF&G 2020b). The 2019 CPUE was 4,990, while Bethel Sonar chum salmon passage was an estimated 385,409 fish (95% CI = 320,026–450,792).

Escapement

Escapement of Kuskokwim River Chum Salmon was monitored at three weirs located on the Kwethluk, George, and Kogrukluk during 2019. In 2019, escapements were above average at all three weirs, but remained within the historical range.

The Kogrukluk River has the longest data set, starting in 1976 and is the only tributary with an established escapement goal for Chum Salmon; a range of 15,000–49,000 fish. Annual escapement has been greater than the lower bound of the goal range every year since 2001, with the exception of 2012, when counts were very close to the minimum escapement goal even while missing 19 days of counting due to high water. The upper bound of the goal range has been exceeded in six of the past 10 years (Lipka and Tiernan 2018 and ADF&G 2020b).

The average escapement for the Kogrukluk River for the years 2009–2018, minus three years when estimates were not made, is 61,344 fish, with a range of 30,763 fish in 2014, to 94,387 fish in 2017 (Lipka and Tiernan 2018). The Kogrukluk River escapement goal was achieved in both 2018 (54,211) and 2019 (70,577) (ADF&G 2020b).

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The Kwethluk River does not have an established escapement goal. Only partial escapements counts are available for 2012 and 2013, so are not included in this analysis. The average escapement for the years 2009–2018 is 26,773 fish (range of 17,941 to 53,741). The escapement for 2018 was incomplete;

escapement for 2019 was 42,013 fish. The 2014 escapement was the second lowest and the 2015 escapement was the sixth lowest for the years recorded since 2000 (counts incomplete in 2001) (ADF&G 2020b).

The George River does not have an established escapement goal. The average escapement for the years 2009–2018 is 29,590 fish (range of 7,944 to 48,277). The escapement for 2018 was 48,277 fish and for 2019 was 40,072 fish. The 2014 and 2015 escapements were the ninth and tenth lowest amounts, respectively, for the years recorded since 1996 (ADF&G 2016 and ADFG 2020b).

In-season Run-Timing and Composition

Chum Salmon start moving past the Bethel Test Fishery near the middle of June, with the earliest capture date at the test fishery being June 1. On average, early July (July 3 – July 6) is when 50% of the run has passed the Bethel Test Fishery. From the beginning of June until early July, Chum Salmon transition to become the dominant salmon species captured at the Bethel Test Fishery. From 1984 to 2016, Chum Salmon, on average, accounted for 68% of the yearly catch composition at the Bethel Test Fishery in comparison to Chinook and Sockeye Salmon, which accounted for 7% and 25%, respectively.

Population Assessment

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

Sockeye Salmon

Run-Size

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

In 2009, an ADF&G project was funded by the Alaska Sustainable Salmon Fund (Project No. 45920) to develop estimates of the number of Sockeye Salmon that returned to the Kuskokwim River annually from 1985–2012 using a statistical model that combines data collected from mark-recapture investigations with historical escapement data. The project was not successful at estimating total numbers of Sockeye Salmon. A statistical model was completed, however, but an accurate reconstruction of annual run-size required independent estimates of abundance for scaling purposes. The mark-recapture portion of this project was conducted 2010–2012 to provide independent estimates of abundance for scaling the statistical model. The mark-recapture portion of the project was not successful in 2010 and 2012 due to high water conditions, which prevented the sufficient recapture of tagged fish. The tagging study was successful in 2011, but had significant biases that could not be

corrected (Alaska Sustainable Salmon Fund 2015). Since 2012, there has not been any attempt to provide independent estimates of abundance through mark-recapture projects; however, ADF&G initiated a sonar project in the Kuskokwim River in 2017 that will be used to monitor all salmon species.

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

The end of season cumulative CPUE at the Bethel Test Fishery for Sockeye Salmon (2008–2018) ranged from 1,376 to 2,690 fish, with an average of 1,762 (Lipka and Tiernan 2018 and ADF&G 2020b). The 2019 CPUE was 1,753, while Bethel Sonar Sockeye passage was an estimated at 924,579 fish (95% CI = 839,112–1,010,046).

Escapement

The escapement of Kuskokwim River Sockeye Salmon is currently monitored at four weirs located on the Kwethluk, George, and Kogrukluk rivers; the fourth weir is on the outlet of Telaquana Lake.

The Kogrukluk River has the longest data set and is the only tributary with an established escapement goal for Sockeye Salmon that has a range of 4,400–17,000 fish. From 2009 to 2018, Sockeye Salmon escapement in the Kogrukluk River ranged from 6,411 to 27,315 fish, with an average escapement of 15,305 fish. In 2019, the upper bound of the escapement goal range was exceeded by almost 15,000 Sockeye Salmon with a total of 31,816 fish. The annual escapement has been greater than the lower bound of the goal range every year since 2001. The upper bound of the goal range has been exceeded in five of the past 10 years (ADF&G 2017).

The Kwethluk River does not have an established escapement goal. From 2009 to 2018, Sockeye Salmon escapement in the Kwethluk River ranged from 2,031 to 29,939 fish, with an average of 10,523 fish. The weir did not operate or provided incomplete counts in 2012, 2013 and 2018. The 2019 Sockeye Salmon escapement was 30,306, which is the highest observed escapement level in the weir's recorded history. The number of Sockeye Salmon passing the Kwethluk River weir in 2019 was almost triple the 2009–2018 average escapement (ADF&G 2020b).

The George River does not have an established escapement goal. From 2009 to 2018, Sockeye Salmon escapement in the George River ranged from 43–2,807 fish, with an average of 609 fish. (ADF&G 2020b). The 2019 Sockeye Salmon escapement was 3,973 fish, which is the highest on record dating back to 2003 (Lipka and Tiernan 2018).

The Telaquana River weir has been operated cooperatively by ADF&G and the National Park Service since 2010. The system is by far the biggest contributor of Sockeye Salmon in the Kuskokwim River drainage. From 2010 to 2018, Sockeye Salmon escapement in the Telaquana River ranged from 23,005–197,352 fish, with an average of 78,138 fish. The last two years of the project have seen the largest numbers of Sockeye Salmon escapement with 197,352 fish and 190,265 fish, respectively (ADF&G 2020b).

In-season Run-Timing and Composition

Sockeye Salmon start moving past the Bethel Test Fishery in early June, with the earliest capture date on June 1. On average, late June (June 27 –30) is the time when 50% of the run has passed the Bethel Test Fishery. During the latter half of June, on average, Sockeye Salmon overtake Chinook Salmon as the second most abundant species of salmon at the Bethel Test Fishery.

Population Assessment

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

Coho Salmon

Run-Size

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

Estimates of Coho Salmon abundance in the Kuskokwim River system are available from 2000 – 2015 (Schaberg and Liller 2015). Coho Salmon runs ranged from 499,951–2,699,102 fish with an average run size around 1,000,000 ± 550,000 Coho Salmon during this time period.

Estimates of total inriver abundance for Kuskokwim River Coho Salmon are available from 2001 – 2004 and 2008 – 2009 via mark-recapture projects conducted near Kalskag. From 2001 to 2004, direct estimates ranged from 603,414 to 2,024,571 Coho Salmon, while in 2008 – 2009, 963,058 and 714,481 Coho Salmon were estimated.

Coho Salmon are still passing through the Bethel Test Fishery and Sonar sites when the project is removed for the season, therefore, the counts are incomplete. However, the end of season cumulative CPUE at the Bethel Test Fishery for Coho Salmon (2008 – 2018) ranged from 2,024 to 6,785 fish, with an average of 3,236 (Lipka and Tiernan 2018 and ADF&G 2020b). The 2019 CPUE was 1,799, when the Bethel Sonar ceased operations on July 26, prior to the majority of Coho Salomon passing through the area.

Escapement

The escapement of Kuskokwim River Coho Salmon is monitored at three weirs located on the Kwethluk, George, and Kogrukluk rivers. Estimates of drainage-wide escapement are produced by the Kuskokwim River Coho Salmon run-reconstruction model (Schaberg and Liller 2015). From 2000 to 2015, drainage-wide escapement for Coho Salmon ranged from 407,065 to 2,375,943 fish with the average over the time series being 810,398 ± 497,276 fish. The last peak in drainage-wide escapement occurred in 2014 with an estimated 1,435,689 Coho Salmon, while the 2015 estimate was 919,421.

In-season Run-Timing and Composition

Coho Salmon are the last of the major salmon species to migrate into the Kuskokwim River with the earliest capture date at the Bethel Test Fishery being July 6. On average, early August (August 7 – 9) is when 50% of the run has passed the Bethel Test Fishery. Because of the late date when the majority of Coho Salmon pass through the Bethel Test Fishery, the composition of the run is almost all Coho Salmon. Caution should be taken in interpreting Bethel Test Fishery data for Coho Salmon because the test fishery operations generally cease by August 24, which means late-run Coho Salmon might not represent the entire run of Coho Salmon during years with late-run timing.

Population Assessment

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

<u>Whitefish Species</u>

Six common whitefish species are present in the Kuskokwim River: Inconnu (Sheefish), Broad Whitefish, Humpback Whitefish, Least Cisco, Bering Cisco, and Round Whitefish. Biological data on distribution, migration, and life history for these whitefish species come from directed sampling and radio telemetry studies in the drainage. Age and length data are available for some of the species in the Kuskokwim River drainage, but it is not adequate to provide a complete assessment of the populations.

Sheefish, Broad Whitefish, Humpback Whitefish, and Least Cisco are generally distributed from the Kuskokwim River mouth to the Swift Fork of the Kuskokwim River. Bering Cisco appear to have a limited distribution, which ranges from the mouth to the South Fork of the Kuskokwim River (Brown et al. 2012, Alt 1973). Based on weirs operated in several of the Kuskokwim River's salmon tributaries, it does not appear as though large whitefish migrations occur in most salmon spawning streams; however, data is limited to (~ 3 month) windows when the weirs do operate.

Sheefish are known to be seasonally migratory, moving to the marine environment during the winter and then returning to the river during the summer and fall to feed and spawn (Alt 1977, Stuby 2010). Most appear to overwinter from the lower Holitna River to Kuskokwim Bay (Alt 1977, Stuby 2010). Summer feeding habitats include slow flowing reaches of numerous tributaries in the lower river into the North Fork of the Kuskokwim River. Fall spawning habitats are known to exist in four primary areas in upper river tributaries: Swift Fork, Big River, Middle Fork, and Slow Fork near Tonzona (Alt 1972, 1981, Stuby 2010). Spawning typically occurs between late September and mid-October. Sheefish, as well as the other riverine whitefish species, are broadcast spawners, spreading their eggs over gravel substrate in the fall and larvae emerge after a winter of developing, where they are distributed downstream by river currents to feeding areas (McPhail and Lindsey 1970, Gates et al. 2017).

Riverine populations of Broad Whitefish, Humpback Whitefish, and Least Cisco rear, feed, and overwinter in the lower drainage and in Kuskokwim Bay (Maciolek 1986; Harper et al. 2007, 2008, 2009). Beginning mid to late summer, pre-spawning individuals migrate from feeding habitats to upstream spawning habitats in gravel substrate reaches of the drainage (for example: Big River, Swift Fork, lower Holitna River). Broad Whitefish typically spawn later than most species of whitefish, usually beginning in early November (Harper et al. 2009). Humpback Whitefish usually begin to spawn in late September or early October (Stein et al. 1973, Alt 1979, Brown 2006). Migration data are not available for Least Cisco, Bering Cisco, or Round Whitefish populations in the Kuskokwim River drainage. These species generally start migrating toward overwintering grounds by the end of the fall (late October–early November).

Harvest History

Historically, salmon have been harvested in subsistence, commercial, sport, and in the Bethel test fishery. Annual harvest is reported in the Area Management Reports that are provided by the Alaska Department of Fish and Game, Division of Commercial Fisheries. The most recent report covers through the 2017 season (Lipka and Tiernan 2018). Commercial fishing has been extremely restricted in recent years, as there hasn't been a commercial processor in the Kuskokwim area since 2015 (Lipka and Tiernan 2018). Commercial, Subsistence, Sport, and Test Fishery harvest estimates of Chinook, Chum, Sockeye, and Coho Salmon from 1990 through 2017 can be found **Table 2**, **Table 3**, **Table**, and **Table 5** respectively.

Table 2. Chinook Salmon utilization on the Kuskokwim River, 1990-2017 (Lipka and Tiernan 2018).

	Harvest				
Year	Commercial [a]	Subsistence	Test fish [b]	Sport	Total
1990	53,504 [c]	109,778	257	394	163,933
1991	37,778 [c]	74,820	149	401	113,148
1992	46,872 [c]	82,654	518	367	130,411
1993	8,735 [c]	87,674	2,515	587	99,511
1994	16,211 [c]	103,343	1,850	1,139	122,543
1995	30,846 [c]	102,110	1,001	541	134,498
1996	7,419 [c]	96,413	247	1,432	105,511
1997	10,441 [c]	79,381	332	1,227	91,381
1998	17,359 [c]	81,213	210	1,434	100,216
1999	4,705	72,775	98	252	77,830
2000	444	67,620	60	105	68,229
2001	90	78,009	0	290	78,389
2002	72	80,982	0	319	81,373
2003	158	67,134	0	401	67,693
2004	2,305 [c]	96,788	19	857	99,969
2005	4,784 [c]	85,863	2	572	91,221
2006	2,777 [c]	90,812	0	444	94,033
2007	179 [c]	94,898	0	1,478	96,555
2008	8,865 [c]	88,912	0	708	98,485
2009	6,664 [c]	79,896	0	904	87,464
2010	2,732 [c]	67,286	0	354	70,372
2011	747 [c]	62,366	0	579	63,692
2012	627 [c]	22,544	0	0	23,171
2013	174 [c]	47,113	0	0	47,287
2014	0	11,234	0	0	11,234
2015	8	16,124	0	0	16,132
2016	0	30,676	0	0	30,676
2017	–	16,380 [d]	–	–	–
Average 2007–2016	2,000	52,105	0	402	54,507

[a] Does not include personal use.

[b] Test fishery sales do not include donations.

[c] Districts 1 and 2.

[d] Preliminary estimate.

Table 3. Chum Salmon utilization on the Kuskokwim River, 1990-2017 (Lipka and Tiernan 2018).

	Harvest				
Year	Commercial [a]	Subsistence	Test Fish [b]	Sport Fish	Total
1990	459,974 [c]	153,825	1,650	533	615,982
1991	431,802 [c]	87,237	1,014	378	520,431
1992	344,603 [c]	116,391	12,409	608	474,011
1993	43,337 [c]	59,797	8,365	359	111,858
1994	271,115 [c]	76,937	11,637	1,280	360,969
1995	605,918 [c]	70,977	16,241	226	693,362
1996	207,877 [c]	100,913	2,864	280	311,934
1997	17,026 [c]	37,366	790	86	55,268
1998	207,809 [c]	61,732	1,140	291	270,972
1999	23,006	44,242	363	180	67,791
2000	11,570	56,499	1,033	26	69,128
2001	1,272	56,005	19	112	57,408
2002	1,900	86,381	7	53	88,341
2003	2,764	41,167	0	53	43,984
2004	20,150 [c]	64,140	113	84	84,487
2005	69,139 [c]	58,555	96	500	128,290
2006	44,152 [c]	89,674	0	13	133,839
2007	10,783 [c]	73,560	53	391	84,787
2008	30,798 [c]	63,789	0	121	94,708
2009	76,956 [c]	44,324	0	285	121,565
2010	93,917 [c]	45,089	0	85	139,091
2011	118,316 [c]	54,316	0	83	172,715
2012	65,195 [c]	79,631	93	80	144,999
2013	52,236 [c]	53,627	0	31	105,894
2014	19,080 [c]	68,398	0	36	87,514
2015	507 [c]	42,612	0	102	43,221
2016	–	44,857	0	72	44,929
2017	–	52,589 [d]	–	–	–
Average 2007–2016	51,976	57,020	15	129	103,942

[a] Does not include personal use.

[b] Test fishery sales do not include donations.

[c] Districts 1 and 2.

[d] Preliminary estimate.

Table 4. Sockeye Salmon utilization on the Kuskokwim River, 1990-2017 (Lipka and Tiernan 2018).

	Harvest				
Year	Commercial [a]	Subsistence	Test fish [b]	Sport fish	Total
1990	84,414 [c]	45,897	456	61	130,828
1991	108,946 [c]	47,370	383	38	156,737
1992	92,218 [c]	43,514	1,264	131	137,127
1993	27,008 [c]	51,616	4,706	348	83,678
1994	49,365 [c]	42,362	2,561	359	94,647
1995	92,500 [c]	30,905	1,992	95	125,492
1996	33,878 [c]	40,591	623	315	75,407
1997	21,989 [c]	38,744	584	423	61,740
1998	60,906	36,103	625	178	97,812
1999	16,976	47,360	562	54	64,952
2000	4,130	45,942	410	46	50,528
2001	84	53,245	510	231	54,070
2002	84	32,296	0	42	32,422
2003	282	32,241	0	140	32,663
2004	8,532 [c]	39,127	44	400	48,103
2005	27,645 [c]	41,885	7	636	70,173
2006	12,618 [c]	43,577	0	231	56,426
2007	703 [c]	46,817	4	322	47,846
2008	15,601 [c]	52,213	0	273	68,087
2009	25,673 [c]	35,747	0	162	61,582
2010	22,428 [c]	38,735	0	419	61,582
2011	13,482 [c]	43,245	0	98	56,825
2012	2,857 [c]	47,396	1	132	50,386
2013	768 [c]	39,382	0	85	40,235
2014	2,720	48,372	0	270	51,362
2015	130	37,419	0	14	37,563
2016	0	51,552	0	175	51,727
2017	–	48,462 [d]	–	–	–
Average 2007–2016	8,436	44,088	1	195	52,720

[a] Does not include personal use.

[b] Test fishery sales do not include donations.

[c] Districts 1 and 2.

[d] Preliminary estimate.

Table 5. Coho Salmon utilization on the Kuskokwim River, 1990-2017 (Lipka and Tiernan 2018).

	Harvest				
Year	Commercial [a]	Subsistence	Test fish [b]	Sport fish	Total
1990	409,053 [c]	57,560	1,279	581	468,473
1991	500,935 [c]	39,252	1,188	1,003	542,378
1992	666,170 [c]	52,299	10,109	1,692	730,270
1993	610,739 [c]	28,485	8,084	980	648,288
1994	724,689 [c]	36,609	7,854	1,925	771,077
1995	471,461 [c]	36,823	6,620	1,497	516,401
1996	937,299 [c]	43,173	3,013	3,423	986,908
1997	130,803 [c]	29,816	1,103	2,408	164,130
1998	210,481 [c]	24,667	607	2,419	238,174
1999	23,593	27,409	343	1,998	53,343
2000	261,379 [c]	42,341	2,818	1,689	308,227
2001	192,998	31,089	1,530	1,204	226,821
2002	83,463	42,602	680	2,030	128,775
2003	284,064	33,259	570	3,244	321,137
2004	435,407 [c]	45,450	464	4,996	486,317
2005	142,319 [c]	32,755	454	3,539	179,067
2006	185,598 [c]	41,175	169	1,474	228,416
2007	141,049 [c]	33,766	446	2,355	177,616
2008	142,862 [c]	44,724	0	3,755	191,341
2009	104,546 [c]	29,767	0	3,257	137,570
2010	58,031 [c]	33,580	0	1,482	93,093
2011	74,108 [c]	32,172	0	896	107,176
2012	86,389 [c]	28,200	151	974	115,714
2013	114,069 [c]	26,409	0	1,147	141,625
2014	117,588	49,736	0	1,059	168,383
2015	65,034	33,939	0	1,412	100,385
2016	–	36,787	0	1,686	38,473
2017	–	37,788 [d]	–	–	–
Average 2007–2016	100,408	34,908	60	1,802	127,138

[a] Does not include personal use.

[b] Test fishery sales do not include donations.

[c] Districts 1 and 2.

[d] Preliminary estimate.

Estimated harvest levels of Humpback Whitefish, Broad Whitefish, and Sheefish are displayed in **Table 6, Table 7, and Table 8**. These are the primary fishes that may be harvested in this fishery.

Table 6. The estimated harvest, in numbers of fish, of Humpback Whitefish by communities in the lower and middle Kuskokwim River drainage, based on household harvest surveys (CI 95%, lower harvest estimate is the lower bound of the estimate or the reported harvest, whichever is larger) (Source ADF&G 2018b).

Community	Study year	Humpback Whitefish estimated harvest	Lower harvest estimate	Upper harvest estimate
Akiachak	1998	7,233	5,588	8,878
Akiak	2010	7,089	5,018	13,197
Aniak	2009	919	762	1,413
Bethel	2012	10,427	10,423	10,430
Chuathbaluk	2009	78	65	113
Eek	2005	1,726	1,683	1,789
Eek	2013	674	672	675
Kalskag	2009	1,091	873	1,446
Kwethluk	2010	8,375	4,849	14,751
Lower Kalskag	2009	1,109	932	1,324
Napakiak	2011	2,591	2,581	2,601
Nunapitchuk	2005	3,373	2,587	4,157
Oscarville	2010	1,430	1,226	2,392
Tuluksak	2010	2,687	2,124	3,641
Tuntutuliak	2005	4,334	3,425	4,661
Tuntutuliak	2013	2,496	2,491	2,501

Table 7. The estimated harvest, in numbers of fish, of Broad Whitefish by communities in the lower and middle Kuskokwim River drainage, based on household harvest surveys (CI 95%, lower harvest estimate is the lower bound of the estimate or the reported harvest, whichever is larger) (Source ADF&G 2018b).

Community	Study year	Broad Whitefish estimated harvest	Lower harvest estimate	Upper harvest estimate
Akiachak	1998	4,168	3,145	5,191
Akiak	2010	1,232	872	1,742
Aniak	2009	599	497	755
Bethel	2012	5,633	5,631	5,635
Chuathbaluk	2009	125	104	187
Eek	2005	532	519	572
Eek	2013	333	332	334
Kalskag	2009	703	563	878
Kwethluk	2010	865	533	1,197
Lower Kalskag	2009	728	612	920
Napakiak	2011	1,799	1,791	1,806
Napaskiak	2011	1,505	1,493	1,517
Nunapitchuk	2005	2,321	1,616	3,026
Oscarville	2010	53	45	78
Tuluksak	2010	738	525	951
Tuntutuliak	2005	1,975	1,561	2,104
Tuntutuliak	2013	1,934	1,930	1,939

Table 8. The estimated harvest, in numbers of fish, of Sheefish by communities in the lower and middle Kuskokwim River drainage, based on household harvest surveys (CI 95%, lower harvest estimate is the lower bound of the estimate or the reported harvest, whichever is larger) (Source ADF&G 2018b).

Community	Study year	Sheefish estimated harvest	Lower harvest estimate	Upper harvest estimate
Akiachak	1998	205	149	262
Akiak	2010	2,036	1,441	3,337
Aniak	2001	701	544	859
Aniak	2009	667	553	892
Bethel	2012	1,854	1,853	1,854
Chuathbaluk	2001	187	152	245
Chuathbaluk	2009	119	99	142
Eek	2005	235	230	270
Eek	2013	37	36	37
Kalskag	2009	453	363	626
Kwethluk	1986	2,119	2,119	2,119
Kwethluk	2010	253	152	384
Lower Kalskag	2009	242	203	304
Napakiak	2011	168	167	170
Napaskiak	2011	271	269	273
Nunapitchuk	1983	12	3	27
Nunapitchuk	2005	53	31	75
Oscarville	2010	36	31	65
Tuluksak	2010	271	208	334
Tuntutuliak	2005	372	294	432
Tuntutuliak	2013	356	353	357

Effects of the Proposal

If Proposal FP21-01 is adopted, then closures to subsistence fishing opportunity immediately before, during, and immediately after commercial fishing openings will be managed by emergency order regulations issued by ADF&G (§___.27 (e)(4) Kuskokwim Area).

§___.27 (e)(4) Kuskokwim Area

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(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 [Emergency Orders]*), unless superseded by a Federal special action.*

If Proposal FP21-01 is not adopted, then when Federal regulations are more restrictive than ADF&G emergency orders covering subsistence fishing opportunities immediately before, during, and

immediately after commercial openings, subsistence users could opt to fish under ADF&G's less restrictive emergency order regulations. When these same Federal regulations were more lenient than ADF&G emergency order regulations, Federal subsistence users could continue to fish under Federal subsistence regulations. This might create confusion and defeat the purpose of the Board adopting regulations in 2003 specifically to streamline subsistence fishing schedules.

OSM PRELIMINARY CONCLUSION

Support Proposal FP21-01.

Justification

In 2003, the Board adopted regulations to coordinate management of fishing actions by State and Federal managers to minimize confusion, with the realization that the Federal in-season manager can issue special actions if an emergency order is detrimental to Federally qualified subsistence users.

Current Federal regulations that close subsistence fishing immediately before, during, and immediately after commercial fishing openings in the Kuskokwim River are redundant and confusing, and should be rescinded.

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