# Kuskokwim River Salmon Management Working Group

**1 (800) 315-6338 (MEET) Code: 58756# (KUSKO)**

**ADF&G Bethel toll free: 1 (855) 933-2433**

## Meeting Agenda

Date: **7/7/2021** **Time**: **10:00 a.m.–12:00 p.m.** Place: **ADF&G Office, Bethel, AK**

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Time Called to Order: Chair:

**ROLL CALL TO ESTABLISH QUORUM**: **QUORUM MET? Yes / No**

**Upriver Elder**:
**Downriver Elder**:
**Commercial Fisher**:
**Lower River Subsistence**:
**Middle River Subsistence**:
**Upper River Subsistence**:
**Headwaters Subsistence:**
**Member at Large 1**:
**Member at Large 2**:
**Sport Fisher**:
**Western Interior RAC**:
**Y-K Delta RAC**:
**KRITFC:**
**ADF&G**:

**INTRODUCTIONS:**
**INVOCATION**:
**APPROVAL OF MINUTES:** *Optional. ADF&G does not prepare official meeting minutes.*
**APPROVAL OF AGENDA:** *the agenda may be amended at this time.*
**USFWS/KRITFC UPDATE:**
**ADF&G MANAGEMENT ACTIONS UNDER CONSIDERATION:**
**PEOPLE TO BE HEARD:** *Non-Working Group Members*
**CONTINUING BUSINESS:**

- Subsistence Reports: Lowest River, ONC Inseason Subsistence Report, Lower River, Middle River, Upper River, Headwaters
- Inseason Harvest Report (ONC/KRITFC)
- Overview of Kuskokwim River salmon run assessment:
  a. Test Fisheries (Bethel and Aniak):
  b. Sonar/Weirs/Aerial Surveys/Other:
  c. Subsistence Division Project Update:
  d. NVN Report:
- Working Group KRITFC Representative Report:
- Commercial Catch Report: N/A
- Processor Report: N/A
- Sport Fish Report:
- Trawl Bycatch Report
- Donlin Gold
- Intercept Fishery Report: *optional*
- Weather Forecast:
- Discussion of ADF&G Management considerations and discussion of possible alternatives (recommendations from the Working Group):
- Motion for Discussion and Action:

**OLD BUSINESS:**
**NEW BUSINESS:**

**COMMENTS FROM WORKING GROUP MEMBERS:**

**NEXT MEETING DATE:**_____Time:_____Place:_____

# Informational Packet

**Information Packets *ARE*:**

- **Intended to help inform Working Group discussions.**
- **To be viewed and used in context with Working Group meetings only.**

**Packets *ARE NOT*:**

- **To be viewed as standalone documents.**
- **A final say on fisheries management decisions.**

**Please use this information responsibly:**
Packet information is an incomplete snapshot of an ongoing discussion and changing conditions. Packet information should not be reproduced for any purpose other than to describe Working Group meeting discussions.

**Misuse** of Packet information can contribute to misunderstandings that can **cause harm to salmon users** and potentially **damage salmon resources**.

**Ask Questions:** ADF&G staff will be happy to answer biology and management questions. Please call **1-855-933-2433** to reach ADF&G Kuskokwim Area staff.

**Attend Meetings:** Each Working Group meeting is announced at least 48 hours prior to time and date of meeting. In addition, each meeting is recorded. Recordings can be found here: **http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareakuskokwim.kswg**

Viewing the information packet while listening to meetings/recordings will provide a better understanding of the information presented in this packet.

**Thank you,**
**Nick Smith and Ben Gray**
**Working Group Coordinators**

ONC
ORUTSARARMIUT NATIVE COUNCIL
ONC Fisheries 545-6001

**Orutsararmiut Native Council (ONC) Inseason Harvest Monitoring Weekly Report**

**July 7, 2021**

For the June 28, 2021 opener, ONC fisheries crew visited 26 Bethel area fish camps. 24 fish camps were actively fishing and surveyed. ONC fisheries crew also gathered information from 45 fishing trips at the Bethel boat harbor with a combined total of 69 surveys conducted on June 28.

For the July 2, 2021 opener, ONC fisheries crew visited 21 Bethel area fish camps, and conducted 22 surveys. ONC crew also conducted 49 surveys at the Bethel boat harbor on July 2. A combined total of 71 surveys were conducted on July 2.

**Comments from the June 28th* and July 2nd opener are as follows:**

**June 28 boat harbor comments were given at the 6/30/21 Working Group meeting. Fish camp comments are included here.*

June 28th fish camp comments included wanting more openers, confusion over the state opener caused people to panic and management should not be doing that, some were concerned about being cited and law enforcement presence, it is illegal to keep the Kuskokwim River closed for subsistence use, need as much fish as they can get as they have a big family to feed or they will need food stamps in the winter, and salmon are returning late in the year. Two fishers wanted the river to be opened up and three fishers were nowhere near achieving their harvest goal. Three people were glad for this opener and conveyed that fishing was good. One fisher commented that a few years back when reds and chums were late, commercial fishing delayed their open date and the fish bounced back. Lastly, one fisher commented that fish were already turning red in June which is early, and when it is sunny you don't catch fish.

On July 2, five fishers were glad for the opening, and one specified that they were glad openings were earlier and more often than last year. Four fishers mentioned they saw fewer fishers out this opener. Four fishers commented that there should be another opener or the river should be opened before the 9th, two recommended opening the river 24/7, one recommended Saturday, and one recommended Tuesday because there are a lot of fish now. Three fishers stated that fishing was good this opener. Two fishers wanted longer openers, one specified for 24 hours. Two fishers stressed the need to have a drift opener on a weekend for people who work, but one wanted a 9am-5pm opener. One fisher commented that they want periodic openings and the river should open later. One fisher wants mesh net restrictions lifted. One fisher said it would be nice if the openers were done by village and it'd give everyone a chance to meet their quota. One fisher wants Fish and Game to announce fishing so there is no confusion. One fisher noticed a lot more worms in their king salmon. Lastly, one fisher wanted to have more regulations on trawlers and another stated they want all the weirs taken off this river.

**Table 1.** Average fish harvest, net length, and mesh size range surveyed at the Bethel area fish camps and Bethel boat harbor from the June 28, 2021 fishing opportunity.

| Data Source | Number of Surveys Conducted | Average Chinook Salmon Harvest | Average Chum Salmon Harvest | Average Sockeye Salmon Harvest | Average other harvest | Net Length Range (ft.) | Mesh Size Range (in.) |
|---|---|---|---|---|---|---|---|
| Bethel Boat Harbor | 45 | 8.3 | 2.9 | 16.6 | 0 | 60 - 300 | 5 - 6 |
| Bethel Fish Camps | 24 | 20.3 | 0.7 | 38.7 | 0 | 60 - 300 | $5\frac{1}{8}$ - 6 |

*3 of the surveys collected at Bethel boat harbor and 5 of the surveys collected at Bethel area fish camps were not used to produce harvest estimates because the fishing was done outside of the area used in the harvest estimates program (stratum O). Some fish camps and fishers at the harbor had multiple surveys conducted due to conducting multiple fishing trips.

**Table 2.** Average fish harvest, net length, and mesh size range reported by surveyed Bethel area fish camps and Bethel boat harbor from the July 2, 2021 fishing opportunity.

| Data Source | Number of Surveys Conducted | Average Chinook Salmon Harvest | Average Chum Salmon Harvest | Average Sockeye Salmon Harvest | Average other harvest | Net Length Range (ft.) | Mesh Size Range (in.) |
|---|---|---|---|---|---|---|---|
| Bethel Boat Harbor | 49 | 4.5 | 4.1 | 24.5 | >0.5 | 60 - 300 | 5 - 6 |
| Bethel Fish Camps | 22 | 3.9 | 2.2 | 29.9 | >0.5 | 30 - 300 | 4 - 6 |

*1 of the surveys collected at Bethel boat harbor and 3 of the surveys collected at Bethel area fish camps were not used to produce harvest estimates because the fishing was done outside of the area used in the harvest estimates program (stratum O). Some fish camps and fishers at the harbor had multiple surveys conducted due to conducting multiple fishing trips.

**Table 3.** Fishing progress data from Bethel area fish camps from 6/28 and 7/2 visits.

| Progress | Not at all | Under half | Halfway | Over Half | Goal Met |
|---|---|---|---|---|---|
| **King Salmon** | 19.44% | 13.89% | 16.67% | 19.44% | 30.56% |
| **Chum Salmon** | 66.67% | 16.67% | 8.33% | 0% | 5.56% |
| **Sockeye Salmon** | 16.67% | 22.22% | 16.67% | 16.67% | 27.78% |

**Fish Distribution**

From the afternoon of June 28, 2021 through the morning of July 6, 2021, ONC fisheries crew delivered 71 Chinook salmon, 16 chum salmon, and 38 red salmon to Bethel area Elders, widowed, and disabled. These fish were caught by the Alaska Department of Fish & Game Bethel Test Fishery. As of July 1st, ONC fisheries crew is no longer delivering chums or reds and ADF&G has started the free fish box for the community.

ONC Social Services Department went fishing and was able to catch and deliver red salmon to Bethel area Elders, widowed, and disabled on July 1, 2021. Quyana to ONC Social Services!

**Notification of End of Season Working Group Report & Surveys:** ONC will provide our last Working Group report on July 14, 2021. ONC will be hosting our Science & Culture Camp July 20-July 30 for high school students in the Lower Kuskokwim School District. All ONC fisheries staff will be involved with preparing for and running the camp. Many Working Group members, ADF&G staff, USFWS staff, Bethel Elders, and other community members will be involved in the camp and we are very excited and grateful for all of those helping!

# Kuskokwim River In-season Harvest and Effort Estimates

6/28/2021 Subsistence Harvest Opportunity (Drift & Set Nets)

Opportunity Time Period: 10:00 AM – 10:00 PM (12 Hours)

Area Covered by Estimates: Tuntutuliak ⟷ Akiak

Contact Person(s): Kevin Whitworth (kevinwhitworth@kritfc.org), Katie Russell (krussell@nativecouncil.org)

Special Action #: 3-S-WR-07-21

Special Action: http://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1276414475.pdf?fbclid=IwAR0ZqdNGRZrvkIth1vUJA0f_nCZR8j7pFw45gPPJDzhe_YgWArUpJA5HVZA

## Data Sources

**TABLE 1.** The number and percent of fisher interviews conducted by location and organization.

| Data Source | Interviews | Percent |
|---|---|---|
| Other Villages (BSFA/KRITFC) | 51 | 46% |
| Bethel Boat Harbor (ONC) | 42 | 38% |
| Bethel Area Fish Camps (ONC) | 19 | 17% |
| **Total** | **112** | **100%** |

Of these interviews, **106** were from drift nets and **6** were from set nets.

**TABLE 2.** The time each flight was conducted and fishers counted each flight.

| Time Information | | | Nets Counted | |
|---|---|---|---|---|
| Start Time | End Time | Hours | Drift | Set |
| 2:47 PM | 4:12 PM | 1.42 | 119 | 2 |
| 6:12 PM | 7:47 PM | 1.58 | 50 | 7 |

## Effort Estimates

- An estimated **220** total drift boat trips occurred.
  - An estimated **65%** of the trips counted on flight 2 were also counted on flight 1.
  - An estimated **83** trips were not counted during any flight.
- An estimated **8** total set net trips occurred.

## Harvest Estimates

- An estimated total of **10,810 (9,630 – 12,140)** salmon were harvested.
  - An estimated total of **2,980 (2,620 – 3,360)** Chinook salmon were harvested.
  - An estimated total of **960 (790 – 1,150)** chum salmon were harvested.
  - An estimated total of **6,880 (5,900 – 7,910)** sockeye salmon were harvested.
- Harvest by set nets accounted for an estimated **150 (20 – 360)** total salmon (20% Chinook salmon, 7% chum salmon, and 73% sockeye salmon).

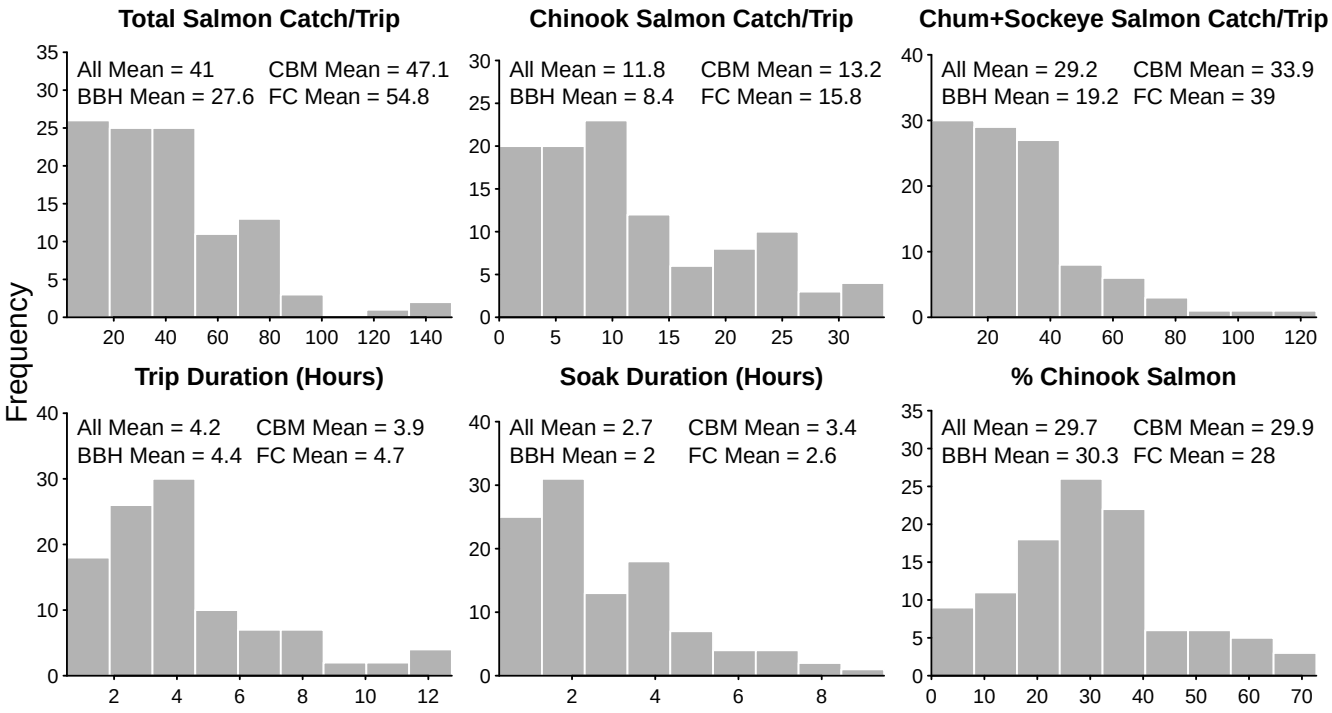
**TABLE 3.** Summary of relevant quantities by river stratum (area) for drift nets. Numbers in parentheses are 95% confidence intervals.

| Stratum | Interviews | Effort Est. | Estimated Harvest | | | |
|---|---|---|---|---|---|---|
| | | | Chinook | Chum | Sockeye | Total |
| **Tuntutuliak ⟷ Johnson R.** | 6 | 30 | 530 (430 – 630) | 230 (150 – 320) | 1,370 (1,000 – 1,800) | **2,130 (1,720 – 2,580)** |
| **Johnson R. ⟷ Napaskiak** | 38 | 39 | 670 (540 – 800) | 290 (190 – 410) | 1,530 (1,240 – 1,850) | **2,490 (2,110 – 2,840)** |
| **Napaskiak ⟷ Akiachak** | 62 | 112 | 1,300 (1,010 – 1,640) | 320 (220 – 440) | 2,860 (2,150 – 3,720) | **4,490 (3,560 – 5,590)** |
| **Akiachak ⟷ Akiak** | 0 | 39 | 450 (350 – 570) | 110 (80 – 150) | 1,000 (750 – 1,260) | **1,560 (1,230 – 1,920)** |
| **All** | **106** | **220** | **2,950 (2,600 – 3,320)** | **950 (780 – 1,140)** | **6,760 (5,780 – 7,820)** | **10,660 (9,480 – 12,000)** |

**TABLE 4.** Average (95% confidence limits) total salmon catch per trip and percent Chinook salmon, summarized for the areas above and below the confluence of the Johnson River with the Kuskokwim River. Quantities are derived from the strata- and species-specific harvest estimates, not the raw interview data.

| Quantity | Proximity to Johnson R. Mouth | |
|---|---|---|
| | Downstream | Upstream |
| Total Catch/Trip | 71 (57 – 86) | 45 (39 – 52) |
| % Chinook Salmon | 25% (20% – 30%) | 28% (25% – 31%) |

**FIGURE 1.** Distributions of relevant quantities from all completed trips using drift nets. The mean quantity by primary data source is shown in the top right; BBH = Bethel Boat Harbor (ONC), CBM = Other Villages (BSFA/KRITFC), FC = Bethel Area Fish Camps (ONC).



# Appendix: Detailed Interview Summaries

### Column Meanings

- **Area**: the area of the river the trip occurred in
- **N**: the number of interviews with usable information in each area
- **Min**: the minimum value among trips in each area
- **25%**: the value that 25% of trips fell below in each area
- **Mean**: the average value across trips in each area
- **75%**: the value that 75% of trips fell below in each area
- **Max**: the maximum value among trips in each area

*Information is for drift net trips only.*

**TABLE A1.** Summary of drift net catch rate of Chinook salmon by fishing area (salmon per 150 feet of net per hour).

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 6 | 1.9 | 2.1 | 3.6 | 3.6 | 9 |
| **Johnson R. ⟷ Napaskiak** | 38 | 0 | 3.6 | 6.4 | 7.8 | 20.2 |
| **Napaskiak ⟷ Akiachak** | 61 | 0 | 2.2 | 5.1 | 7.6 | 18 |
| **All** | **105** | **0** | **2.4** | **5.5** | **7.6** | **20.2** |

**TABLE A2.** Summary of drift net catch per trip of Chinook salmon by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 6 | 1 | 6 | 11 | 15 | 18 |
| **Johnson R. ⟷ Napaskiak** | 38 | 0 | 9 | 14 | 20 | 33 |
| **Napaskiak ⟷ Akiachak** | 62 | 0 | 3 | 11 | 17 | 34 |
| **All** | **106** | **0** | **5** | **12** | **17** | **34** |

**TABLE A3.** Summary of drift net catch rate of chum+sockeye salmon by fishing area (salmon per 150 feet of net per hour).

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 6 | 4.1 | 4.6 | 23.7 | 7.7 | 114 |
| **Johnson R. ⟷ Napaskiak** | 38 | 1.5 | 9 | 17.5 | 24 | 51.4 |
| **Napaskiak ⟷ Akiachak** | 61 | 2.4 | 5 | 12.4 | 16.6 | 57.6 |
| **All** | **105** | **1.5** | **6** | **14.9** | **18.5** | **114** |

**TABLE A4.** Summary of drift net catch per trip of chum+sockeye salmon by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 6 | 2 | 30 | 30 | 36 | 44 |
| **Johnson R. ⟷ Napaskiak** | 38 | 3 | 23 | 35 | 42 | 93 |
| **Napaskiak ⟷ Akiachak** | 62 | 2 | 9 | 26 | 31 | 125 |
| **All** | **106** | **2** | **13** | **29** | **40** | **125** |

**TABLE A5.** Summary of drift net percent composition of Chinook salmon by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 6 | 7% | 25% | 27% | 33% | 36% |
| **Johnson R. ⟷ Napaskiak** | 38 | 0% | 22% | 29% | 34% | 73% |
| **Napaskiak ⟷ Akiachak** | 62 | 0% | 20% | 31% | 41% | 71% |
| **All** | **106** | **0%** | **21%** | **30%** | **38%** | **73%** |

**TABLE A6.** Summary of drift net active fishing hours by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 6 | 0.2 | 1.9 | 4.7 | 6.9 | 7.5 |
| **Johnson R. ⟷ Napaskiak** | 38 | 0.6 | 1.5 | 2.8 | 3.7 | 6.5 |
| **Napaskiak ⟷ Akiachak** | 60 | 0.4 | 1.3 | 2.4 | 3.1 | 7.5 |
| **All** | **104** | **0.2** | **1.5** | **2.7** | **3.8** | **7.5** |

**TABLE A7.** Summary of drift net total trip duration by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 6 | 0.5 | 6.8 | 6.8 | 7.9 | 11.1 |
| **Johnson R. ⟷ Napaskiak** | 38 | 1 | 2.1 | 3.5 | 4.4 | 7 |
| **Napaskiak ⟷ Akiachak** | 62 | 0.8 | 2.4 | 4.3 | 5 | 12.8 |
| **All** | **106** | **0.5** | **2.4** | **4.2** | **5** | **12.8** |

**TABLE A8.** Summary of drift net trip start time by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 6 | 10:00 AM | 10:15 AM | 11:30 AM | 11:52 AM | 2:30 PM |
| **Johnson R. ⟷ Napaskiak** | 38 | 10:00 AM | 10:30 AM | 12:14 PM | 1:11 PM | 6:15 PM |
| **Napaskiak ⟷ Akiachak** | 62 | 9:30 AM | 10:00 AM | 12:37 PM | 3:00 PM | 9:24 PM |
| **All** | **106** | **9:30 AM** | **10:00 AM** | **12:25 PM** | **2:30 PM** | **9:24 PM** |

**TABLE A9.** Summary of drift net trip end time by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 6 | 3:00 PM | 5:45 PM | 6:21 PM | 7:00 PM | 9:06 PM |
| **Johnson R. ⟷ Napaskiak** | 38 | 12:00 PM | 2:00 PM | 3:42 PM | 5:00 PM | 10:18 PM |
| **Napaskiak ⟷ Akiachak** | 62 | 11:30 AM | 1:45 PM | 4:57 PM | 7:29 PM | 10:15 PM |
| **All** | **106** | **11:30 AM** | **2:00 PM** | **4:35 PM** | **7:00 PM** | **10:18 PM** |

# Kuskokwim River In-season Harvest and Effort Estimates

7/2/2021 Subsistence Harvest Opportunity (Drift & Set Nets)

Opportunity Time Period: 6:00 AM – 3:00 PM (9 Hours)

Area Covered by Estimates: Tuntutuliak ⟷ Akiak

Contact Person(s): Kevin Whitworth (kevinwhitworth@kritfc.org), Katie Russell (krussell@nativecouncil.org)

Special Action #: 3-KS-03-21

Special Action: https://www.fws.gov/uploadedFiles/3-KS-03-21_Final_7.1.2021.pdf?fbclid=IwAR2tAlnoL7tVqfm3s40yFia6NXPVI9yalYMCrY6-fm4BGfZDt98c4e7a8Lg

## Data Sources

**TABLE 1.** The number and percent of fisher interviews conducted by location and organization.

| Data Source | Interviews | Percent |
|---|---|---|
| Other Villages (BSFA/KRITFC) | 55 | 45% |
| Bethel Boat Harbor (ONC) | 48 | 39% |
| Bethel Area Fish Camps (ONC) | 19 | 16% |
| **Total** | **122** | **100%** |

Of these interviews, **119** were from drift nets and **3** were from set nets, but set net interview information was deemed insufficient to produce a reliable estimate.

**TABLE 2.** The time each flight was conducted and fishers counted each flight.

| Time Information | | | Nets Counted | |
|---|---|---|---|---|
| **Start Time** | **End Time** | **Hours** | **Drift** | **Set** |
| 10:05 AM | 11:40 AM | 1.58 | 148 | 4 |

## Effort Estimates

- An estimated **211** total drift boat trips occurred.
  - Since only one flight was conducted, the counts did not need to be corrected for double counts.
  - An estimated **62** trips were not counted during any flight.
- An estimated **4** total set net trips occurred, but no harvest estimate was made.

## Harvest Estimates

- An estimated total of **11,460 (10,120 – 12,880)** salmon were harvested.
  - An estimated total of **1,330 (1,100 – 1,570)** Chinook salmon were harvested.
  - An estimated total of **1,150 (820 – 1,510)** chum salmon were harvested.
  - An estimated total of **8,990 (7,790 – 10,170)** sockeye salmon were harvested.

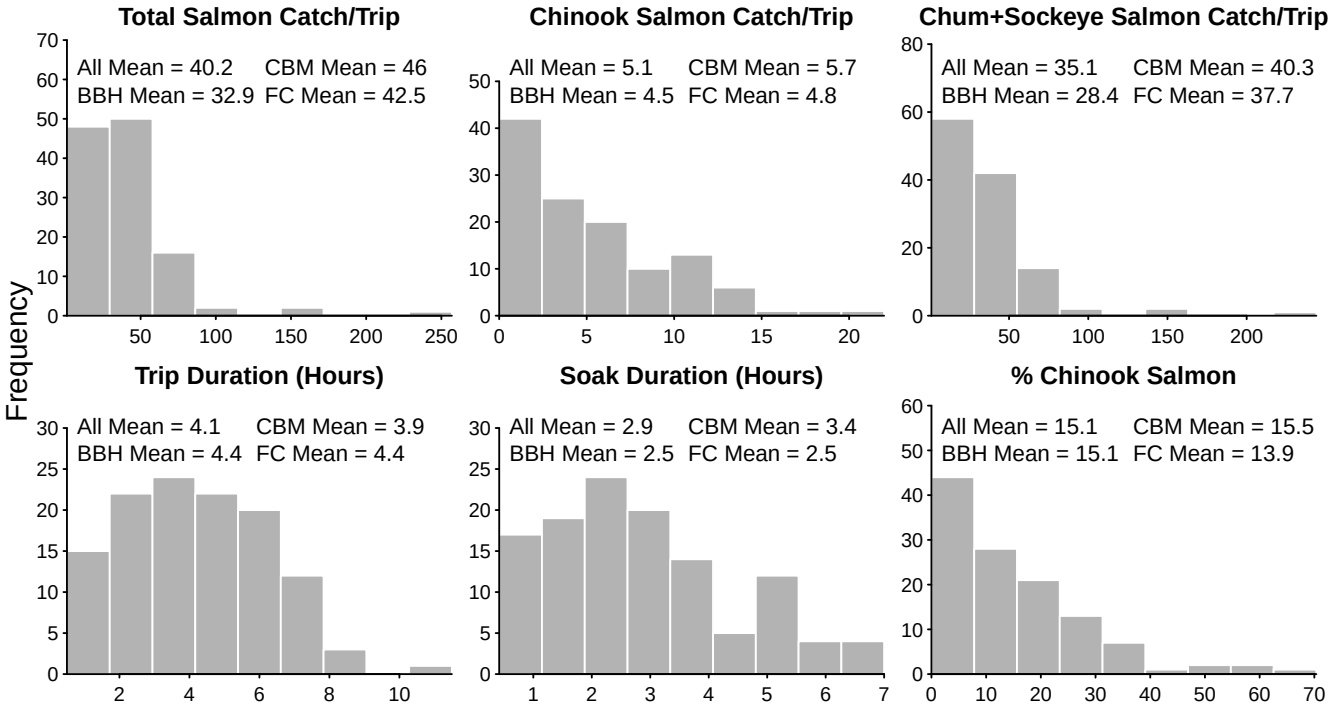
**TABLE 3.** Summary of relevant quantities by river stratum (area) for drift nets. Numbers in parentheses are 95% confidence intervals.

| Stratum | Interviews | Effort Est. | Estimated Harvest | | | |
|---|---|---|---|---|---|---|
| | | | Chinook | Chum | Sockeye | Total |
| **Tuntutuliak ⟷ Johnson R.** | 7 | 54 | 360 (260 – 490) | 430 (220 – 680) | 2,960 (2,280 – 3,850) | **3,750 (3,000 – 4,730)** |
| **Johnson R. ⟷ Napaskiak** | 38 | 57 | 310 (220 – 400) | 440 (230 – 700) | 2,580 (2,110 – 3,150) | **3,320 (2,760 – 3,940)** |
| **Napaskiak ⟷ Akiachak** | 74 | 91 | 600 (430 – 800) | 260 (160 – 360) | 3,130 (2,410 – 3,900) | **3,990 (3,140 – 4,880)** |
| **Akiachak ⟷ Akiak** | 0 | 9 | 60 (40 – 80) | 30 (20 – 40) | 310 (240 – 390) | **400 (310 – 490)** |
| **All** | **119** | **211** | **1,330 (1,100 – 1,570)** | **1,150 (820 – 1,510)** | **8,990 (7,790 – 10,170)** | **11,460 (10,120 – 12,880)** |

**TABLE 4.** Average (95% confidence limits) total salmon catch per trip and percent Chinook salmon, summarized for the areas above and below the confluence of the Johnson River with the Kuskokwim River. Quantities are derived from the strata- and species-specific harvest estimates, not the raw interview data.

| Quantity | Proximity to Johnson R. Mouth | |
|---|---|---|
| | Downstream | Upstream |
| Total Catch/Trip | 69 (56 – 88) | 49 (43 – 56) |
| % Chinook Salmon | 10% (7% – 13%) | 12% (10% – 15%) |

**FIGURE 1.** Distributions of relevant quantities from all completed trips using drift nets. The mean quantity by primary data source is shown in the top right; BBH = Bethel Boat Harbor (ONC), CBM = Other Villages (BSFA/KRITFC), FC = Bethel Area Fish Camps (ONC).



# Appendix: Detailed Interview Summaries

### Column Meanings

- **Area**: the area of the river the trip occurred in
- **N**: the number of interviews with usable information in each area
- **Min**: the minimum value among trips in each area
- **25%**: the value that 25% of trips fell below in each area
- **Mean**: the average value across trips in each area
- **75%**: the value that 75% of trips fell below in each area
- **Max**: the maximum value among trips in each area

*Information is for drift net trips only.*

**TABLE A1.** Summary of drift net catch rate of Chinook salmon by fishing area (salmon per 150 feet of net per hour).

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 7 | 0 | 2.6 | 3.5 | 4.4 | 7.5 |
| **Johnson R. ⟷ Napaskiak** | 38 | 0 | 0.7 | 1.6 | 1.9 | 8 |
| **Napaskiak ⟷ Akiachak** | 74 | 0 | 0.6 | 2.6 | 2.8 | 22 |
| **All** | **119** | **0** | **0.6** | **2.3** | **2.8** | **22** |

**TABLE A2.** Summary of drift net catch per trip of Chinook salmon by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 7 | 0 | 10 | 11 | 14 | 22 |
| **Johnson R. ⟷ Napaskiak** | 38 | 0 | 2 | 5 | 6 | 14 |
| **Napaskiak ⟷ Akiachak** | 74 | 0 | 1 | 5 | 8 | 19 |
| **All** | **119** | **0** | **2** | **5** | **8** | **22** |

**TABLE A3.** Summary of drift net catch rate of chum+sockeye salmon by fishing area (salmon per 150 feet of net per hour).

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 7 | 2.8 | 5.2 | 28.7 | 49.2 | 75 |
| **Johnson R. ⟷ Napaskiak** | 38 | 3.2 | 8.9 | 16 | 16.7 | 62.4 |
| **Napaskiak ⟷ Akiachak** | 74 | 0.4 | 5.7 | 14.5 | 16.3 | 80 |
| **All** | **119** | **0.4** | **6.4** | **15.9** | **17.7** | **80** |

**TABLE A4.** Summary of drift net catch per trip of chum+sockeye salmon by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 7 | 14 | 22 | 68 | 62 | 244 |
| **Johnson R. ⟷ Napaskiak** | 38 | 4 | 26 | 42 | 59 | 160 |
| **Napaskiak ⟷ Akiachak** | 74 | 1 | 12 | 28 | 36 | 161 |
| **All** | **119** | **1** | **16** | **35** | **44** | **244** |

**TABLE A5.** Summary of drift net percent composition of Chinook salmon by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 7 | 0% | 11% | 25% | 38% | 61% |
| **Johnson R. ⟷ Napaskiak** | 38 | 0% | 6% | 10% | 14% | 26% |
| **Napaskiak ⟷ Akiachak** | 74 | 0% | 5% | 17% | 25% | 70% |
| **All** | **119** | **0%** | **5%** | **15%** | **22%** | **70%** |

**TABLE A6.** Summary of drift net active fishing hours by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 7 | 0.5 | 1.3 | 2.4 | 3.2 | 4.5 |
| **Johnson R. ⟷ Napaskiak** | 38 | 0.5 | 2.1 | 3.5 | 4.9 | 7 |
| **Napaskiak ⟷ Akiachak** | 74 | 0.4 | 1.5 | 2.7 | 3.3 | 6.8 |
| **All** | **119** | **0.4** | **1.6** | **2.9** | **4** | **7** |

**TABLE A7.** Summary of drift net total trip duration by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 7 | 0.5 | 3.8 | 5.1 | 5.9 | 11.5 |
| **Johnson R. ⟷ Napaskiak** | 38 | 0.5 | 2.6 | 4.1 | 5.9 | 8 |
| **Napaskiak ⟷ Akiachak** | 74 | 0.8 | 2.5 | 4.1 | 5.6 | 9 |
| **All** | **119** | **0.5** | **2.5** | **4.1** | **5.7** | **11.5** |

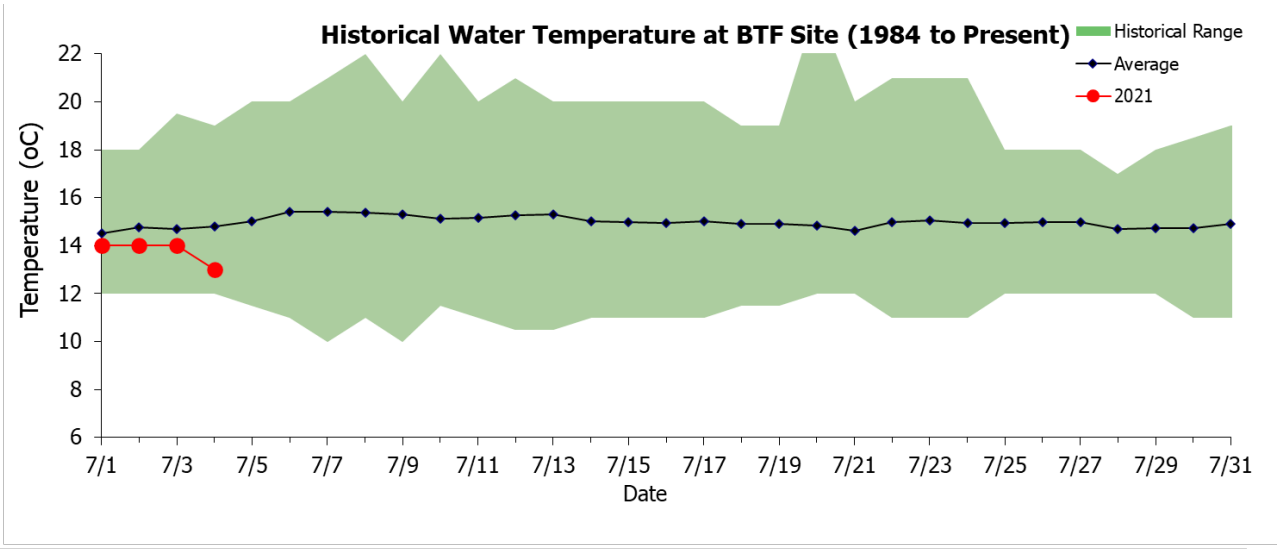
**TABLE A8.** Summary of drift net trip start time by fishing area.

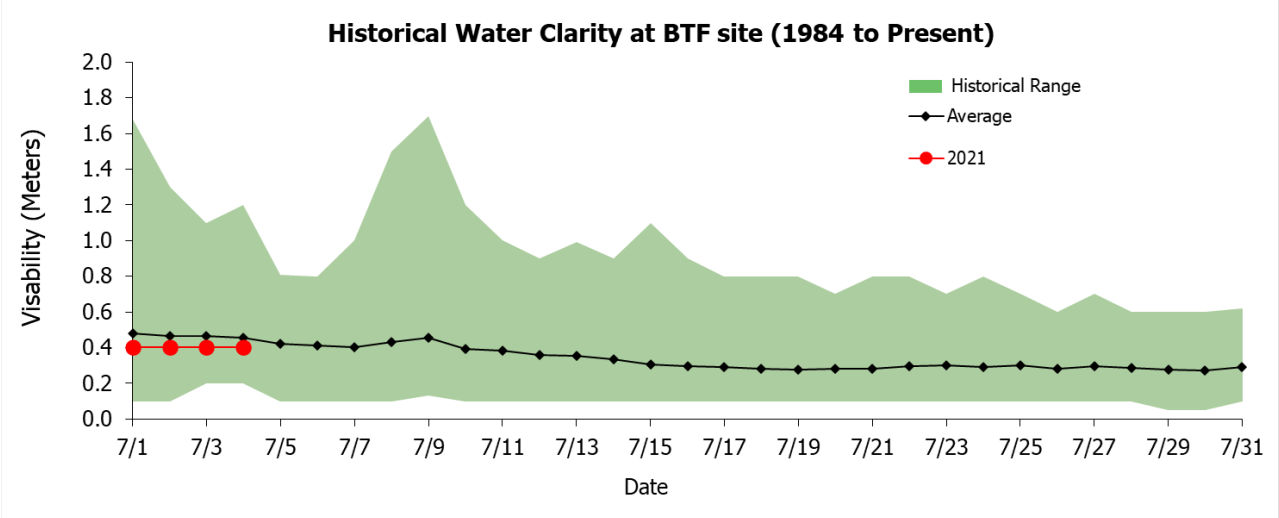
| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 7 | 7:00 AM | 8:00 AM | 9:45 AM | 10:55 AM | 2:30 PM |
| **Johnson R. ⟷ Napaskiak** | 38 | 6:00 AM | 7:30 AM | 9:16 AM | 10:45 AM | 2:30 PM |
| **Napaskiak ⟷ Akiachak** | 74 | 5:30 AM | 6:00 AM | 8:44 AM | 10:30 AM | 2:00 PM |
| **All** | **119** | **5:30 AM** | **6:30 AM** | **8:58 AM** | **10:30 AM** | **2:30 PM** |

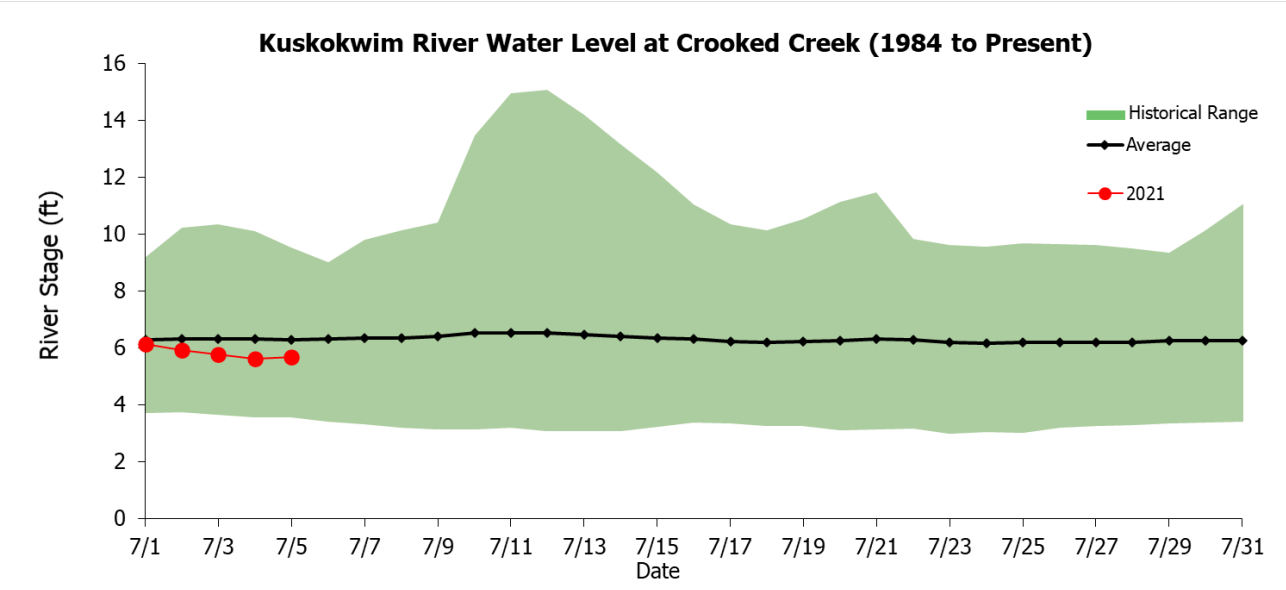
**TABLE A9.** Summary of drift net trip end time by fishing area.

| Area | N | Min | 25% | Mean | 75% | Max |
|---|---|---|---|---|---|---|
| **Tuntutuliak ⟷ Johnson R.** | 7 | 1:30 PM | 1:56 PM | 2:54 PM | 3:00 PM | 6:30 PM |
| **Johnson R. ⟷ Napaskiak** | 38 | 10:00 AM | 12:30 PM | 1:23 PM | 2:29 PM | 3:20 PM |
| **Napaskiak ⟷ Akiachak** | 74 | 7:30 AM | 11:15 AM | 12:47 PM | 2:41 PM | 3:25 PM |
| **All** | **119** | **7:30 AM** | **12:00 PM** | **1:06 PM** | **2:41 PM** | **6:30 PM** |

## Weather summary at BTF as of 7/5



# Kuskokwim River Salmon Assessment Update
# 7/5/2021

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This document presents the key assessment information considered by managers in-season. The production of this document is a collaborative effort between USFWS and ADF&G. **All data and analyses contained are preliminary and are subject to change, so please make interpretations carefully**.

If you have any questions about the content, please contact Spencer Rearden (USFWS; spencer_rearden@fws.gov) or Sean Larson (ADF&G; sean.larson@alaska.gov). Major credit for the development of this data packet belongs to Benjamin Staton.

## Table of Contents:



**Abbreviations:**

- BTF: Bethel Test Fishery
- ATF: Aniak Test Fishery
- CPUE: Catch-per-unit-effort
- EOS: End-of-Season
- ADF&G: Alaska Department of Fish and Game
- KRITFC: Kuskokwim River Inter-tribal Fisheries Commission
- ONC: Orutsaramiut Native Council
- USFWS: United States Fish and Wildlife Service
- YDNWR: Yukon Delta National Wildlife Refuge

**To view escapement information, please visit the ADF&G Kuskokwim River Fish Counts page:**

- http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareakuskokwim.salmon#fishcounts

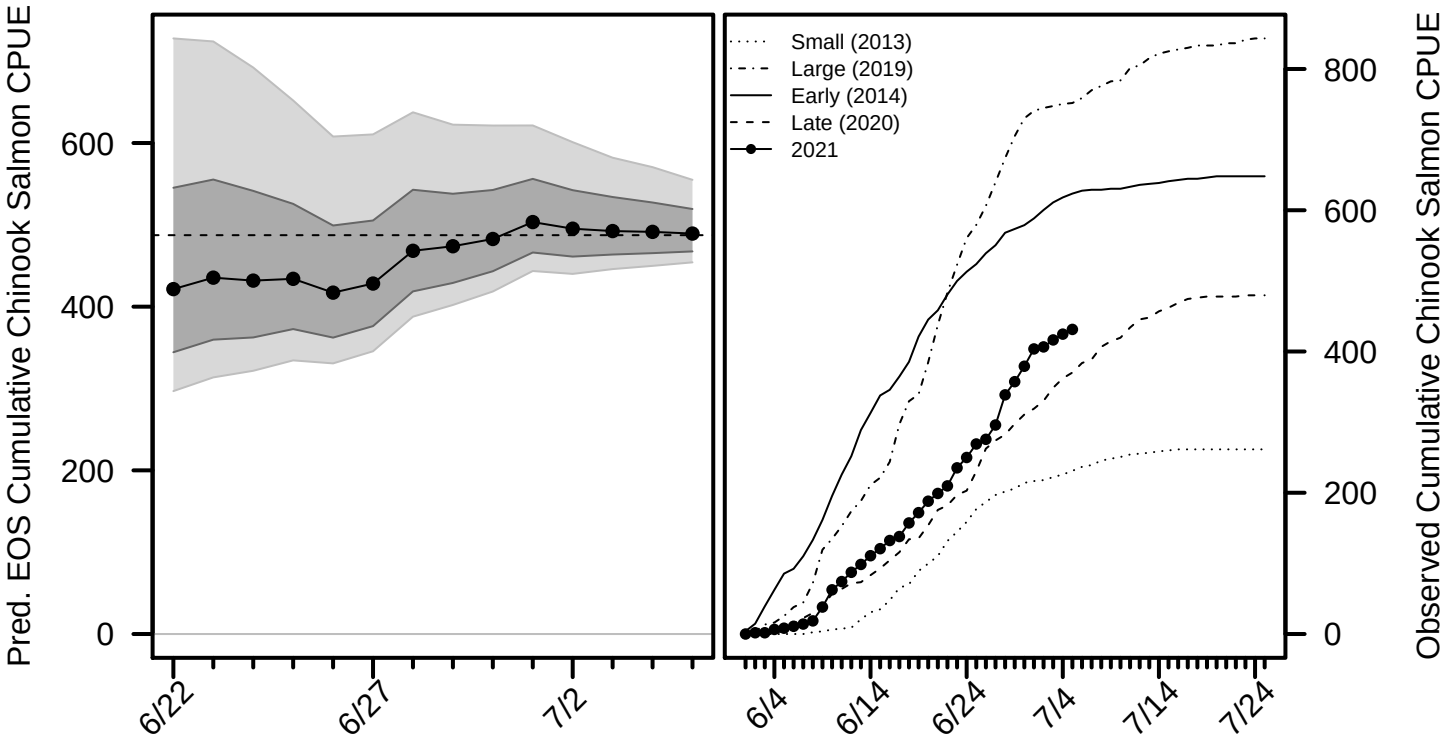
**For the most up-to-date information regarding fishing opportunities please visit:**

- **USFWS:** https://www.fws.gov/refuge/yukon_delta/wildlife_and_habitat/dailyupdate.html
- **ADF&G:** http://www.adfg.alaska.gov/index.cfm?adfg=cfnews.main

## Chinook Salmon BTF Summary (7/5)

- The BTF daily CPUE was **7**.
- The BTF cumulative CPUE is now **431**.
- **38%** years since 2008 fell below this cumulative CPUE on this date.
- **88%** of the run is complete based on historical average run timing.
- **83% - 92%** of the run is complete based the central 50% of all historical run timing scenarios.
- **4% - 7%** of the run is expected to pass Bethel in the next 5 days.
- Over the last 3 days, Chinook salmon made up **12%** of the BTF catches, compared to **4%** on average.

**Chinook Salmon Figure 1.** *Left*: predicted cumulative EOS BTF CPUE according to various run timing scenarios: central 80% (light grey band), central 50% (dark grey band), and the historical median (circles). The dashed horizontal line shows the EOS value from 2020. *Right*: The cumulative BTF CPUE from 2021 plotted along with four previous years intended to represent a range of early/late and small/large index values.



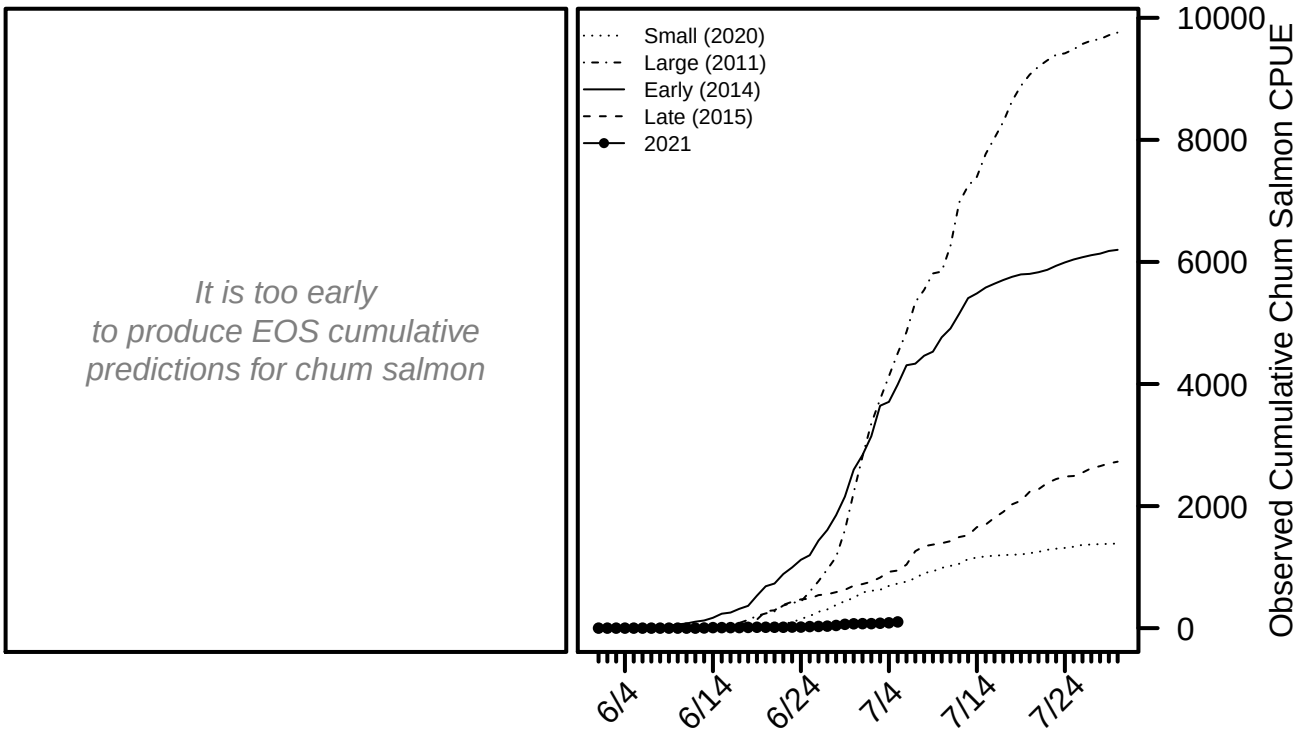

*For more detailed information, see the* ***Chinook salmon appendix*** *at the end of this document.*

**Return to Table of Contents**

## Chum Salmon BTF Summary (7/5)

- The BTF daily CPUE was **15**.
- The BTF cumulative CPUE is now **102**.
- **0%** years since 2008 fell below this cumulative CPUE on this date.
- **52%** of the run is complete based on historical average run timing.
- **40% - 63%** of the run is complete based the central 50% of all historical run timing scenarios.
- **16% - 18%** of the run is expected to pass Bethel in the next 5 days.
- Over the last 3 days, chum salmon made up **14%** of the BTF catches, compared to **67%** on average.

**Chum Salmon Figure 1.** *Left*: will show predicted cumulative EOS BTF CPUE according to various run timing scenarios when enough data have been collected. *Right*: The cumulative BTF CPUE from 2021 plotted along with four previous years intended to represent a range of early/late and small/large index values.



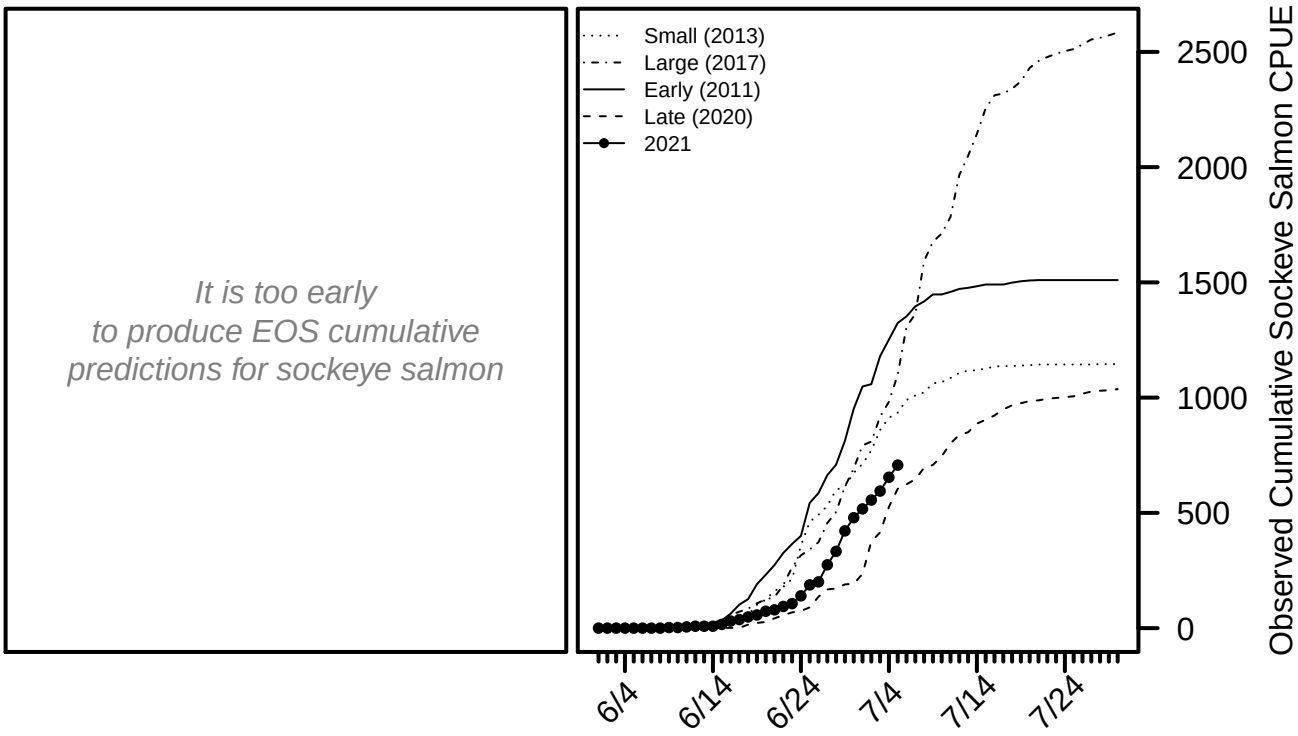

*For more detailed information, see the* ***chum salmon appendix*** *at the end of this document.*

**Return to Table of Contents**

## Sockeye Salmon BTF Summary (7/5)

- The BTF daily CPUE was **53**.
- The BTF cumulative CPUE is now **707**.
- **15%** years since 2008 fell below this cumulative CPUE on this date.
- **80%** of the run is complete based on historical average run timing.
- **66% - 90%** of the run is complete based the central 50% of all historical run timing scenarios.
- **8% - 18%** of the run is expected to pass Bethel in the next 5 days.
- Over the last 3 days, sockeye salmon made up **74%** of the BTF catches, compared to **29%** on average.

**Sockeye Salmon Figure 1.** *Left*: will show predicted cumulative EOS BTF CPUE according to various run timing scenarios when enough data have been collected. *Right*: The cumulative BTF CPUE from 2021 plotted along with four previous years intended to represent a range of early/late and small/large index values.



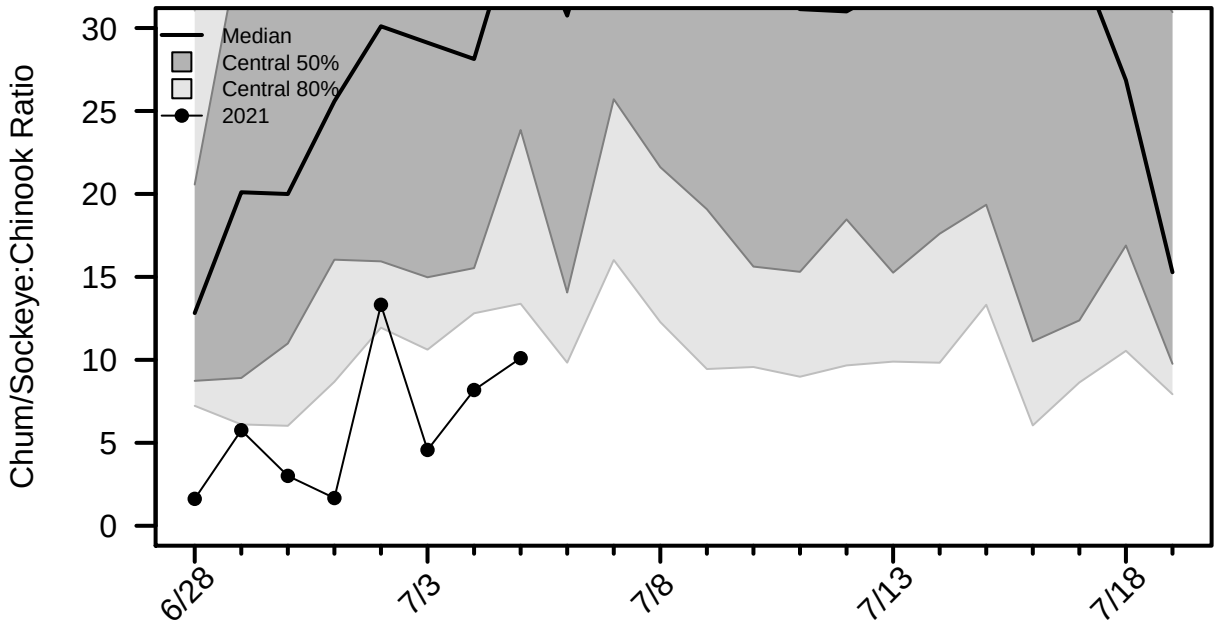

*For more detailed information, see the* ***sockeye salmon appendix*** *at the end of this document.*

**Return to Table of Contents**

## Chum/Sockeye:Chinook Salmon Ratio

*This ratio is calculated by dividing the total number of chum and sockeye salmon counted by the number of Chinook salmon counted by a project each day. A value of zero indicates Chinook salmon were counted that day, but not chum or sockeye salmon. A missing value on a day the project operated indicates no Chinook salmon were counted that day.*

**Species Ratio Figure 1.** Time series of the species ratio with historical quantiles shown as grey regions and the ratio time series for 2021 shown with points connected by lines.




**Ratio Table 1.** A subset of the species ratios, including the ratios from the ATF.

| Date | 2021 BTF | BTF Median | BTF Lower 10% | BTF Upper 10% | 2021 ATF |
|---|---|---|---|---|---|
| **7/2** | 13.32 | 30.1 | 11.94 | 77.31 | 0.31 |
| **7/3** | 4.57 | 29.11 | 10.62 | 72.91 | 0.2 |
| **7/4** | 8.18 | 28.13 | 12.81 | 87.58 | – |
| **7/5** | **10.1** | **37.43** | **13.38** | **77.11** | – |
| **7/6** | | 30.75 | 9.83 | 114 | |
| **7/7** | | 40.34 | 16.02 | 100.6 | |
| **7/8** | | 37.71 | 12.28 | 100.4 | |

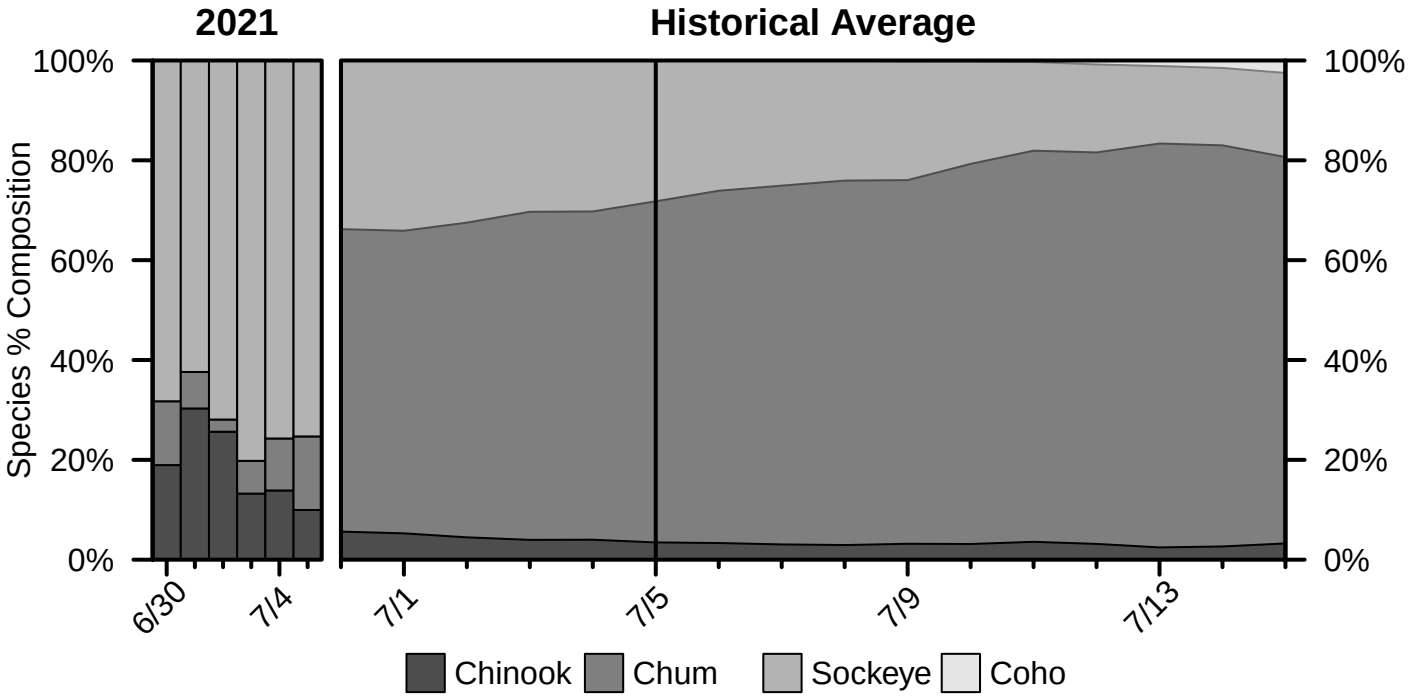
**Ratio Table 2.** The percent of previous years in which a given species ratio was exceeded at least once before a certain day in the BTF.

| Date | Ratio > 1 | Ratio > 3 | Ratio > 5 | Ratio > 10 | Ratio > 20 |
|---|---|---|---|---|---|
| **7/2** | 100% | 100% | 100% | 100% | 84% |
| **7/3** | 100% | 100% | 100% | 100% | 86% |
| **7/4** | 100% | 100% | 100% | 100% | 92% |
| **7/5** | **100%** | **100%** | **100%** | **100%** | **95%** |
| **7/6** | 100% | 100% | 100% | 100% | 95% |
| **7/7** | 100% | 100% | 100% | 100% | 95% |
| **7/8** | 100% | 100% | 100% | 100% | 97% |

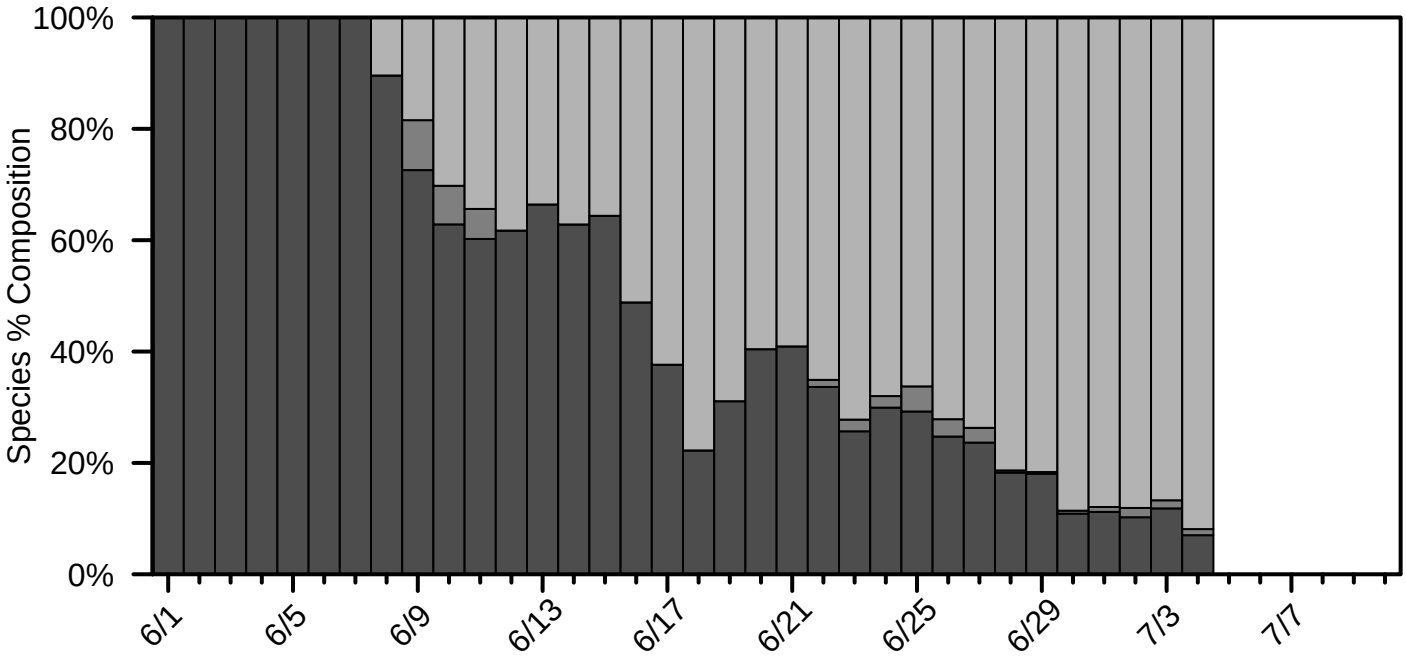
**Return to Table of Contents**

## Percent Composition by Salmon Species

**Percent Composition Figure 1.** Species percent composition in the BTF from 2021 and based on the historical average. The composition presented on each day represents the average composition over the past 2 days.



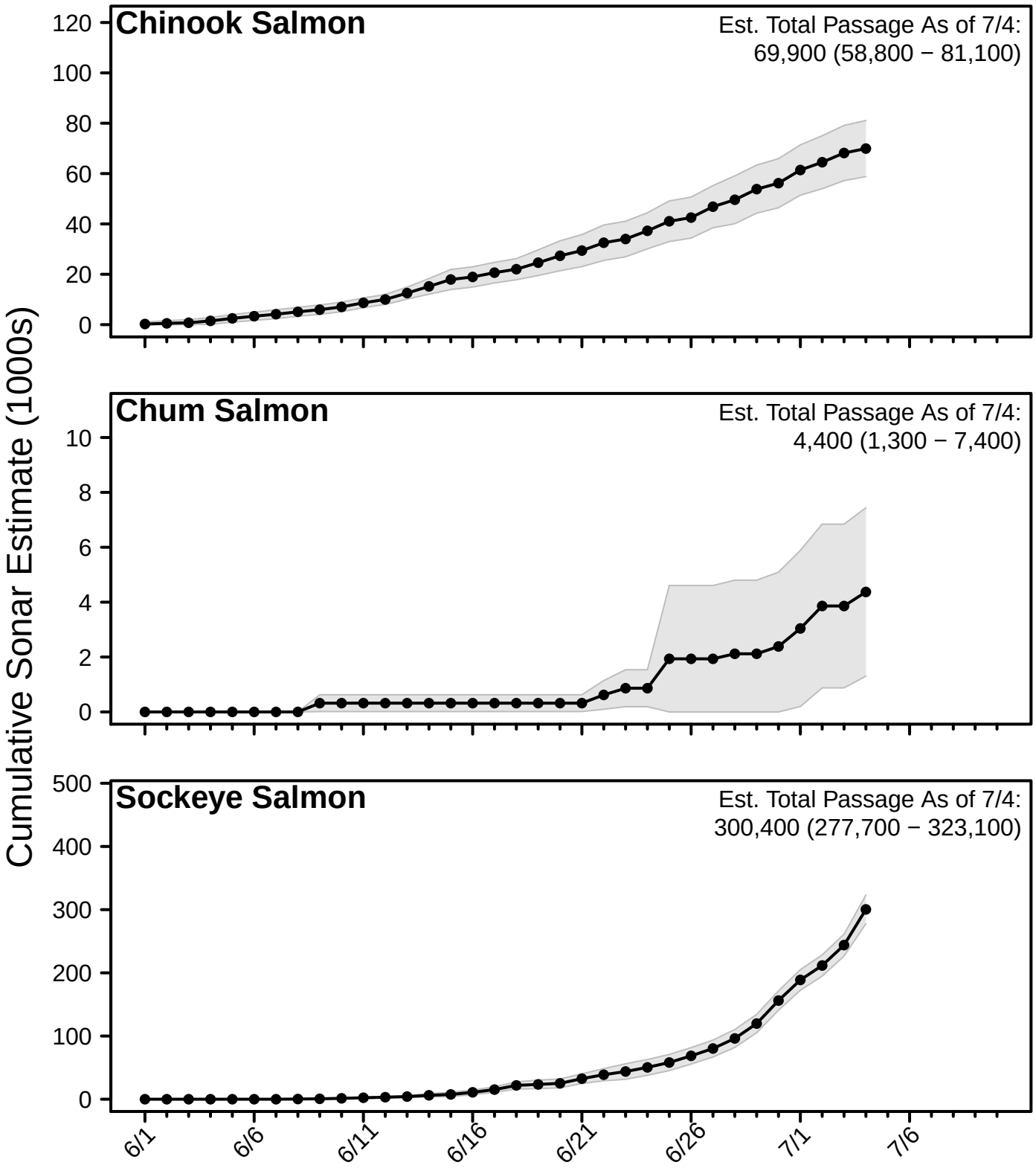

**Species Composition Figure 2.** Species percent composition from the sonar estimates from 2021 (salmon species only, excluding pink salmon). The composition presented on each day represents the average composition over the past 3 days.




Return to Table of Contents

## Sonar Passage Estimates

**Sonar Figure 1.** Cumulative estimates of salmon passage from the 2021 sonar operation through the last complete reporting day. Grey bands show the 95% confidence intervals on each complete reporting day.




Return to Table of Contents

# In-Season Harvest Estimates

In-season harvest estimates are produced by combining counts of total fishing effort (usually obtained via aerial surveys performed by USFWS) and on-the-ground fisher interview information using statistically-rigorous methodology. The data collection efforts to produce these estimates is a highly collaborative effort, involving staff from KRITFC and ONC, with harvest data collected by community based harvest monitors and ONC. Fishing periods from 6/2-6/9 were set net only opportunities. More detailed information can be found on the KRITFC website (https://www.kuskosalmon.org/2021-fishing-info).

In the tables below, CV stands for coefficient of variation, which is a commonly-used measure of uncertainty in the estimate (larger CV values are more uncertain).

**Harvest Table 1.** Estimated total Chinook salmon harvest within the YDNWR, excluding the section between Akiak and Aniak.

| Date | Daily Harvest | Cumulative Harvest | Daily CV | Cumulative CV |
|---|---|---|---|---|
| **6/2** | 30 | 30 | 0.23 | 0.23 |
| **6/5** | 310 | 340 | 0.47 | 0.43 |
| **6/9** | 480 | 820 | 0.19 | 0.21 |
| **6/12** | 3,220 | 4,040 | 0.06 | 0.06 |
| **6/15** | 6,780 | 10,820 | 0.06 | 0.04 |
| **6/19** | 6,190 | 17,010 | 0.08 | 0.04 |
| **6/28** | 2,980 | 19,990 | 0.06 | 0.04 |
| **7/2** | 1,330 | 21,320 | 0.09 | 0.03 |

**Harvest Table 2.** Estimated total chum salmon harvest within the YDNWR, excluding the section between Akiak and Aniak.

| Date | Daily Harvest | Cumulative Harvest | Daily CV | Cumulative CV |
|---|---|---|---|---|
| **6/2** | 0 | 0 | 0 | 0 |
| **6/5** | 20 | 20 | 0.65 | 0.65 |
| **6/9** | 0 | 20 | 0 | 0.65 |
| **6/12** | 70 | 90 | 0.18 | 0.2 |
| **6/15** | 350 | 440 | 0.15 | 0.13 |
| **6/19** | 990 | 1,430 | 0.19 | 0.14 |
| **6/28** | 960 | 2,390 | 0.1 | 0.09 |
| **7/2** | 1,150 | 3,540 | 0.15 | 0.08 |

**Harvest Table 3.** Estimated total sockeye salmon harvest within the YDNWR, excluding the section between Akiak and Aniak.

| Date | Daily Harvest | Cumulative Harvest | Daily CV | Cumulative CV |
|---|---|---|---|---|
| **6/2** | 0 | 0 | 0 | 0 |
| **6/5** | 50 | 50 | 0.44 | 0.44 |
| **6/9** | 20 | 70 | 0.43 | 0.34 |
| **6/12** | 340 | 410 | 0.16 | 0.14 |
| **6/15** | 1,400 | 1,810 | 0.11 | 0.09 |
| **6/19** | 2,400 | 4,210 | 0.07 | 0.06 |
| **6/28** | 6,880 | 11,090 | 0.07 | 0.05 |
| **7/2** | 8,990 | 20,080 | 0.07 | 0.04 |

**Return to Table of Contents**

# Chinook Salmon Appendix

**Chinook Salmon Table A1.** Cumulative CPUE from the BTF.

| Date | 2021 | 2020 | 2019 | 2018 | 2017 | 5-Yr Avg. | 2008 - 2020 Avg. |
|---|---|---|---|---|---|---|---|
| **7/2** | 406 | 330 | 745 | 522 | 257 | 475 | 455 |
| **7/3** | 416 | 349 | 748 | 546 | 266 | 488 | 468 |
| **7/4** | 425 | 362 | 751 | 558 | 278 | 498 | 479 |
| **7/5** | **431** | **370** | **752** | **582** | **284** | **510** | **490** |
| **7/6** | | 384 | 759 | 590 | 289 | 520 | 498 |
| **7/7** | | 389 | 770 | 597 | 296 | 530 | 506 |
| **7/8** | | 407 | 776 | 602 | 304 | 538 | 513 |
| **EOS** | | 487 | 848 | 667 | 374 | 613 | 568 |

**Chinook Salmon Table A2.** Cumulative CPUE from the ATF.

| Date | 2021 | 2020 | 2019 | 2018 | 2017 |
|---|---|---|---|---|---|
| **7/2** | 1,084 | 1,000 | 1,553 | 491 | 4,258 |
| **7/3** | 1,121 | 1,142 | 1,586 | 522 | 4,522 |
| **7/4** | NA | 1,223 | 1,628 | 530 | 4,943 |
| **7/5** | **NA** | **1,299** | **1,691** | **570** | **5,293** |
| **7/6** | | 1,353 | 1,691 | 629 | 5,604 |
| **7/7** | | 1,463 | 1,691 | 661 | 5,766 |
| **7/8** | | 1,576 | 1,691 | 725 | 5,908 |
| **EOS** | | 1,874 | 1,691 | 820 | 6,508 |

**Chinook Salmon Table A3.** Percent of run complete according to various historical run timing scenarios from the BTF.

| Timing | Midpoint | 7/5 Cumulative % |
|---|---|---|
| **Earliest** | 6/14 | 97% |
| **Early 10%** | 6/18 | 95% |
| **Early 25%** | 6/21 | 92% |
| **Median** | 6/22 | 88% |
| **Late 25%** | 6/25 | 83% |
| **Late 10%** | 6/26 | 77% |
| **Latest** | 7/3 | 71% |

**Return to Table of Contents**

# Chum Salmon Appendix

**Chum Salmon Table A1.** Cumulative CPUE from the BTF.

| Date | 2021 | 2020 | 2019 | 2018 | 2017 | 5-Yr Avg. | 2008 - 2020 Avg. |
|---|---|---|---|---|---|---|---|
| **7/2** | 73 | 612 | 1,369 | 1,990 | 2,574 | 1,486 | 1,981 |
| **7/3** | 80 | 628 | 1,458 | 2,144 | 2,744 | 1,583 | 2,197 |
| **7/4** | 87 | 692 | 1,536 | 2,380 | 2,849 | 1,697 | 2,396 |
| **7/5** | **102** | **730** | **1,636** | **2,578** | **3,030** | **1,828** | **2,607** |
| **7/6** | | 762 | 1,780 | 2,627 | 3,346 | 1,961 | 2,812 |
| **7/7** | | 818 | 1,940 | 2,746 | 3,691 | 2,121 | 3,044 |
| **7/8** | | 903 | 2,018 | 3,270 | 4,088 | 2,380 | 3,261 |
| **EOS** | | 1,442 | 6,427 | 8,212 | 6,785 | 5,352 | 6,256 |

**Chum Salmon Table A2.** Cumulative CPUE from the ATF.

| Date | 2021 | 2020 | 2019 | 2018 | 2017 |
|---|---|---|---|---|---|
| **7/2** | 26 | 574 | 593 | 2,656 | 3,112 |
| **7/3** | 34 | 628 | 634 | 3,129 | 3,724 |
| **7/4** | NA | 808 | 778 | 3,445 | 4,670 |
| **7/5** | **NA** | **961** | **1,051** | **3,958** | **5,664** |
| **7/6** | | 1,140 | 1,051 | 4,603 | 6,499 |
| **7/7** | | 1,304 | 1,051 | 5,066 | 7,323 |
| **7/8** | | 1,501 | 1,051 | 5,493 | 7,832 |
| **EOS** | | 2,611 | 1,051 | 10,277 | 11,588 |

**Chum Salmon Table A3.** Percent of run complete according to various historical run timing scenarios from the BTF.

| Timing | Midpoint | 7/5 Cumulative % |
|---|---|---|
| **Earliest** | 6/23 | 82% |
| **Early 10%** | 7/1 | 73% |
| **Early 25%** | 7/3 | 63% |
| **Median** | 7/6 | 52% |
| **Late 25%** | 7/8 | 40% |
| **Late 10%** | 7/11 | 30% |
| **Latest** | 7/15 | 21% |

**Return to Table of Contents**

# Sockeye Salmon Appendix

**Sockeye Salmon Table A1.** Cumulative CPUE from the BTF.

| Date | 2021 | 2020 | 2019 | 2018 | 2017 | 5-Yr Avg. | 2008 - 2020 Avg. |
|---|---|---|---|---|---|---|---|
| **7/2** | 556 | 376 | 816 | 623 | 810 | 648 | 769 |
| **7/3** | 595 | 415 | 874 | 696 | 917 | 720 | 855 |
| **7/4** | 655 | 526 | 1,020 | 905 | 982 | 843 | 945 |
| **7/5** | **707** | **604** | **1,157** | **1,006** | **1,100** | **949** | **1,023** |
| **7/6** | | 624 | 1,396 | 1,055 | 1,308 | 1,063 | 1,102 |
| **7/7** | | 646 | 1,530 | 1,193 | 1,363 | 1,175 | 1,181 |
| **7/8** | | 696 | 1,582 | 1,270 | 1,593 | 1,269 | 1,238 |
| **EOS** | | 1,060 | 2,685 | 2,275 | 2,690 | 2,234 | 1,779 |

**Sockeye Salmon Table A2.** Cumulative CPUE from the ATF.

| Date | 2021 | 2020 | 2019 | 2018 | 2017 |
|---|---|---|---|---|---|
| **7/2** | 84 | 72 | 22 | 52 | 135 |
| **7/3** | 84 | 78 | 22 | 60 | 145 |
| **7/4** | NA | 83 | 22 | 60 | 196 |
| **7/5** | **NA** | **83** | **33** | **60** | **233** |
| **7/6** | | 88 | 33 | 60 | 268 |
| **7/7** | | 94 | 33 | 60 | 268 |
| **7/8** | | 100 | 33 | 68 | 286 |
| **EOS** | | 209 | 33 | 75 | 393 |

**Sockeye Salmon Table A3.** Percent of run complete according to various historical run timing scenarios from the BTF.

| Timing | Midpoint | 7/5 Cumulative % |
|---|---|---|
| **Earliest** | 6/22 | 99% |
| **Early 10%** | 6/24 | 96% |
| **Early 25%** | 6/27 | 90% |
| **Median** | 6/29 | 80% |
| **Late 25%** | 7/2 | 66% |
| **Late 10%** | 7/6 | 51% |
| **Latest** | 7/10 | 35% |

**Return to Table of Contents**

# Bering Sea Bycatch Update

## Bycatch updated through July 1, 2021

- King salmon bycatch to date: **11,379** (all stocks)
- Non-king salmon bycatch to date: **15,007** (all stocks)

**Important: Kuskokwim River fish are a small component of the total bycatch.**

## Background Information

- Bycatch occurs in the Bering Sea and Aleutian Island (BSAI) groundfish fishery, which is managed by the National Marine Fisheries Service and is one of the most extensively monitored fisheries in the U.S.
- The 2011–2020[1] average king bycatch of all stocks is ~23,000
- The impact of bycatch on adult Kuskokwim River King salmon runs is small compared to other sources of mortality and does not explain the magnitude of declines we have observed on the Kuskokwim River.

  We think this is true because:

  - The Kuskokwim River is only one of many stocks that make up the total bycatch (other stocks range from California, Alaska, to Russia)
  - The Kuskokwim River is one part of the Western Alaska stock group[2], which makes up about 45%–70% of the total annual bycatch.
  - Most of the bycatch is made up of juvenile fish, many of which would not have survived to adulthood due to natural mortality[3].
  - Of the fish that would have survived in they had not been caught, only subset of them would have returned this year because salmon spend a varying amount of time in ocean.

### Helpful Links

Bycatch numbers are reported by the National Marine Fisheries Service, available at: https://alaskafisheries.noaa.gov/fisheries-catch-landings?tid=286

Bycatch updates are reported by the North Pacific Fisheries Management Council, available at: https://www.npfmc.org/bsai-salmon-bycatch/

[1] 2011–2020 is the recent 10-year average. In 2011, amendments to Fishery Management Plans were enacted to reduce King salmon bycatch in the BSAI Pollok fishery.
[2] The Western Alaska group includes Bristol Bay, Kuskokwim, Yukon, and Norton Sound stocks.
[3] It is estimated that about 90% of all salmon that enter the marine environment die of natural causes.