Kuskokwim River Salmon Management Working Group

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Meeting Summary

September 27, 2012

Called to order at 10:00am at ADF&G in Bethel and adjourned at 1:20pm. Eight of thirteen voting members were present. A quorum was established.

AGENDA ITEMS:

1.) New Business
   a. Kuskokwim River Chinook salmon Escapement Goal recommendations 2012 (*Kevin Schaberg*)
   b. ADF&G Chinook Salmon Symposium in Anchorage on October 22-23
   c. Kuskokwim Post Season Subsistence Salmon Survey
2.) Old Business
   a. Kuskokwim Area Board of Fish Proposals
   b. Action items from previous meetings:
      i. Beverly Hoffman's letter of recruitment for the Upriver Elder seat
      ii. Working Group Chairs letter to John Bryson, US Secretary of Commerce in support of adding a tribal member to the NPFMC (*Bev Hoffman*)
      iii. Review of KRSMWG Bylaws *Tabled until 2013*
      iv. Update KRSMWG Seats (roll-call list, possible alternates) *Tabled until 2013*
   c. Discussion of the Iyana Gusty Award (raised by Bob Aloysius during the August 22 meeting).
3.) Continuing Business

WORKING GROUP ACTION ITEMS:

1) Distribute Kevin Bartley's letter to the Working Group (*staff*)- *Emailed to WG participants on September 29th (Appendix A)*

2) Distribute the Recent AYK Escapement Goal memo which addresses the 2012 Chinook Escapement Goal recommendation to the Working Group participants (*staff*)- *Emailed to WG participants on September 29th (Appendix B)*

3) Distribute the following to Working Group participants:
   ADF&G. *Unpublished.* Memorandum from T. Hamazaki and S.J. Fleischman, Alaska Dept. of Fish & Game, to J. Linderman, J. Conitz, and M. Evenson, August 20, 2012, Subject: Kuskokwim Chinook salmon drainage-wide escapement goal.
   -Emailed to WG participants on October 3rd (Appendix C)

4) Distribute AVCP's September 26 letter to the Department of Fish and Game (*staff*)- *Emailed to WG participants on September 29th (Appendix D)*

5) Distribute Bev Hoffman's letter to recruit a new Upriver Elder for the Working Group (*staff*)- *Emailed to WG participants on September 29th (Appendix E)*

6) Provide references to scientific studies to help explain the process of escapement goal selection, consistent with choices currently being considered for the Kuskokwim River Chinook Salmon (*staff*) - *Emailed to WG participants on September 29th (Appendix F)*

7) Investigate the issue and rational behind the level of precision chosen for Chinook salmon tributary escapement goals; report to the Working Group – Possibly through incorporating an explanation in the agency report on this escapement goal currently under development (*staff*) – *Email Distribution (Appendix G)-currently being drafted*

8) Provide suggestions on management mechanisms that might be used to increase densities of Chinook salmon migrating passed the lower river to improve subsistence opportunity for upriver residents (*Working Group Participants*).

9) Select a Working Group member to attend the ADF&G Chinook salmon Symposium in Anchorage on October 22 – 23, 2012 (*Working Group Chairs*) – *Greg Roczicka was selected to attend with WG funding. Other Working Group members are free to attend if they are in Anchorage (see September 27 info packet).*

10) Schedule two additional Working Group meetings between now and the end of 2012 to discuss BOF items relevant to the Kuskokwim (*Working Group Chairs, members, and staff; see below*)

MEETING ACTION ANNOUNCEMENT:

The Working Group will schedule meetings in November and December to prepare for the coming Board of Fish meeting in January.

–*First meeting scheduled for **November 3rd** in Bethel at the Longhouse. This meeting will be teleconferenced. Final 2012 meeting yet to be scheduled.*

ADF&G RECOMMENDATION:

The Escapement Goal Review team is recommending that a model-based drainage wide SEG of 65,000-120,000 be established for Kuskokwim River king salmon.

The review team recommends revisions to three of the weir-based SEGs for king salmon:

- Kwethluk River: previous goal 6,000-11,000; recommended revised goal=4,100-7,500;
- George River: previous goal 3,100-7,900; recommended revised goal=1,800-3,300; and
- Kogrukluk River: previous goal 5,300-14,000; recommended revised goal=4,800-8,800.

The review team is also recommending that the weir-based SEG for king salmon in the Tuluksak River be eliminated. *This item was placed under NEW BUSINESS on the agenda. See discussion below (Appendix B).*

WORKING GROUP MOTIONS:

1.) Suspend the rules to allow voting on New Business items (concerning Working Group membership) out of order. Motion passed.
2.) Casie Stockdale will be added as a second alternate to the Lower River Subsistence seat. Motion Passed.
3.) Dave Cannon will be added as a second alternate to the Middle River Subsistence seat. Motion Passed.

PEOPLE TO BE HEARD:

1.) Kevin Barley, a graduate student working with the USF&WS read a letter to the KRSMWG (Appendix A). Kevin informed the Working Group that he intends to conduct a study on advisory groups like the Working Group, the Yukon River Drainage Fisheries Association (YRDFA), and the Yukon Kuskokwim Delta Regional Advisory Council (YK Delta RAC). Kevin asked for WG member support in his study through agreement to being interviewed. Kevin hoped to provide feedback and suggestions for improving the effectiveness of advisory councils like the ones mentioned.

Several WG members expressed support and said that they would be happy to participate. Others requested that Kevin's full letter and contact information be distributed to WG members. This letter was emailed to WG members on September 29th. Kevin went on to clarify that he would be living and working in Bethel from November through February.

RECOMMENDATION: See above for statement of the recommendation. See New Business item 1) for full discussion of the recommendation. See Appendix B for official ADF&G statement.

WORKING GROUP MOTIONS:

MOTION 1: Suspend the rules to allow voting on New Business items (concerning Working Group membership) out of order. Motion passed.

COMMENTS FOR MOTION 1:

During the initial Roll-call, it was apparent that a quorum was not available to work on BOF proposals. It was clarified that if a member signed on in time to hear full discussion on a given topic, that member could vote on motions related to that topic.

Following People to be heard, chair Greg Roczicka checked again for members that might have signed on during that portion of the meeting. At that point John Andrew announced that he was present and a quorum was established.

There was some discussion under what circumstances the Dept. representative could vote. A brief review of the by-laws did not identify the clause where this was clarified, which is on the final page of that document. The Dept. cannot vote on Dept. recommendations or the setting of commercial openings. The Dept. does have veto power on items related commercial openings voted on by the WG.

Chris Shelden, WG project leader, clarified that Working Group seat holders and alternates to their seats could not both vote in meetings where both were in attendance. Only one vote per seat would be counted. Chris also made a misstatement about voting procedure: He stated that with seven members in attendance, the WG would pass or not pass a motion on a majority vote. This is incorrect; the WG operates on a consensus voting structure, not a simple majority. **If seven members are in attendance, a motion will fail if two or more members vote "nay." If eight or more members are in attendance a motion will fail if three or more members vote "nay."**

Greg Roczicka, as chair could not make motions or vote during this meeting but he offered a suggestion that a motion be made to add an individual as a second alternate to one of the subsistence seats (see below).

Chris Shelden expressed some confusion as to where this would fall in the agenda and the chair suggested making it item *4* under new business.

Evelyn Thomas suggested that she would have to leave the meeting soon and that would collapse the quorum.

Bev Hoffman suggested that voting on new members be moved to item *1* under new business to take advantage of Evelyn's presence.

Greg requested a motion to suspend the rules and vote immediately. The motion was made and seconded and the vote was unanimous.

MOTION 2: Casie Stockdale will be added as a second alternate to the Lower River Subsistence seat. Motion passed unanimously.

COMMENTS FOR MOTION 2:

No argument or additional discussion.

MOTION 3: Dave Cannon will be added as a second alternate to the Middle River Subsistence seat. Motion passed unanimously.

COMMENTS FOR MOTION 3:

Following the vote, it was suggested that Dave could cover "that seat" when Evelyn leaves the teleconference.

There was some confusion here. The motion stated "Middle River Subsistence" however; the suggestion that Dave cover the seat when Evelyn Thomas left the meeting suggested that members may have thought they were voting Dave into the Upper River subsistence seat. ***This point must be clarified at a future meeting.***

NEW BUSINESS:

1.) Presentation: Kuskokwim River Chinook salmon Escapement Goal recommendations 2012 (Kevin Schaberg)

-For presentation materials/notes, see the September 27 info packet. For further explanation beyond discussion detailed here, please contact Kevin Schaberg of the ADF&G at kevin.schaberg@alaska.gov or (907) 267-2174.

a. **Drainage-wide goal**: SEG of 65,000-120,000

Discussion:

Casie Stockdale noted the lower end of the recommended escapement goal (65,000) had been observed on the Kuskokwim 2 or 3 times according to the Chinook salmon run reconstruction. Kevin Schaberg confirmed that similar escapements had been observed 3 times. Two of these had known returns according to the brood year tables.

Casie pointed out that the upper end of the recommended goal (120,000) seemed to be quite a bit below average (~150,000). Kevin confirmed this and pointed out that the number is chosen based on yield produced by the escapement. He said that at average escapements there wouldn't be enough yield to support the subsistence fisheries without restrictions on a fairly regular basis.

LaMont Albertson pointed out the known uncertainty in the models that produced these numbers and stated an objection to referring to them as if they truly reflected reality. He stated dissatisfaction with not having more time to think about it. Kevin Schaberg responded that there was no claim that these numbers were certain and in fact each is accompanied by a measure of uncertainty (confidence intervals). He stated that this is the best estimate of production. The escapement goal, expressed as a range instead of a point, is a reflection of that uncertainty.

Bev Hoffman said she was gaining comfort with the idea that there was uncertainty and ways to deal with it. Her concern was that the process was moving too quickly. Kevin responded that he understood the concern. He agreed that the last phase might seem fast but that the project has been under development for many years.

Doug Molyneaux pointed out that the line on the Ricker graph (packet page 5 of the Info Packet) represented average expected run given a particular escapement. He pointed out that in reality a wider variety of results had been seen. Doug asked that if escapement were

managed to the lower half of that range, what impact the managers expected on subsistence users above the lower river population centers.

Travis Elison responded by asking whether upriver subsistence users had met their needs in 2010. That had been a year in which escapements were well below the recommended goal and there had been no mainstem restrictions to fishing. Did fishers need large densities of fish to meet their needs; had they done so in 2010? Next he asked whether, with the higher escapement objective in 2012 and the river closed most of the season, had fishers met their needs?

Dave cannon came back to this point later, saying though he hadn't fished for kings in recent years, he did know fishers who had met their needs; however that success had been predicated on closures in the lower river that had allowed greater densities of fish to reach upriver fishing grounds. *This suggests that Dave might have been referring to 2011. There had been no mainstem closures in 2010.*

Casie asked for comments from upriver fishers about how much effort and expense they had to incur to capture fish in low abundance/unrestricted years. LaMont Albertson commented that cost was high and many older people had stopped subsistence fishing because of that cost. LaMont suggested that the system was created to favor commercial fishing and subsistence in the lower river and that the upper river was not considered. He also suggested that raising the escapement goals might have a beneficial effect and suggested trying it.

Kevin Schaberg pointed out that over the past 30 years, average subsistence harvest had been a part of the run reconstruction and so factored into the discussion. He pointed out that the lower end of the goal would actually produce more fish than the upper end because it was just above Smsy (Spawner maximum sustained yield), and the upper end was well beyond that in the area where yield started to decline.

LaMont Albertson stated that he strongly wished to see the actual data and research that had gone into producing these recommendations. Kevin responded that it would be available soon. LaMont found that answer to be inadequate was insistent about receiving the research.

Greg Roczicka stated that he wasn't questioning the science, didn't feel qualified to do so, but was more concerned about the public input into the process. He stated the process for setting the goals: the Dept. recommends a goal, the Board doesn't have to endorse or deny or even review them unless a compelling reason arises to do so. He asked whether the goals were already in place without public comment; and how stakeholders might seek some concession for the concerns about upriver opportunity to fish within the framework of this goal recommendation. Bev Hoffman echoed these concerns for getting stakeholder input.

John Lindeman clarified with respect to process and authority: the department has authority on biologically based escapement goals like BEG's and SEG's. The BOF has authority on Optimal Escapement Goals (OEG). If the Board chooses to adopt an OEG, the department would work with stakeholders and technical staff during the BOF meeting in January to work out an OEG.

John went on to say that there seemed to be a focus on the work session in October. He said that the department's recommendations would be presented at the work session as a "heads-up" so the board could begin planning for the discussion. Concurrence or direction would not be decided at the work session. Public comment may be submitted anytime between now and January 2 (and may be hand carried to the Board at the meeting), but consideration of comments will take place during the meeting itself, not at the work session. John responded to a question from Doug Molyneaux stating that the goals would not finally be in place until about March or April. He also clarified that department goals will be on the books, but an OEG would supersede them for the length of time in which it remained in regulation.

Doug Molyneaux, as a coauthor on the run reconstruction, did not have an argument against the science. He did state that, if Chinook were harvested down to near the lower end of the escapement goal, that upriver fishermen would have a significantly harder time meeting their needs.

Kevin Schaberg answered the point: First he pointed out that many individuals assumed that, if the goal were enacted, the Department would try to manage for its lower end. He stated that this was not the case. He went on to point out that the escapement goal represented a number of fish necessary for sustainable and harvestable returns to the Kuskokwim in the future. The goal was not a mechanism for providing subsistence opportunity. Management actions would be necessary to accommodate upriver fishermen. Increasing goals would serve to increase the number of fish that subsistence users would not be allowed to harvest. He said that this was an allocation issue and escapement goals only allocated fish to escapement.

Ray Collins expressed concern for the long term allocation issue with respect to escapement: he pointed out that the large salmon producing tributaries were generally in the middle and upper river and the headwaters area were less productive. By keeping the escapement goal "lower," there would be adequate numbers of fish getting to those more productive streams but not necessarily to the headwaters area. It would still be possible to say the Kuskokwim River had healthy salmon runs, while headwaters runs might be endangered or extinct. This allocation issue actually applied both to harvest and to escapement for that portion of the river.

Chris Shelden asked the managers to explain how the use of management actions like those used in 2012 (example: rolling closures) could serve to improve opportunity for upriver fishers. John Linderman reiterated much of what had been stated earlier with respect to allocation in low abundance years being of greater concern than in high abundance years. In low abundance years, normal harvest in the lower river could have a negative effect on upriver opportunity. But he reiterated that higher escapement goals would make more fish unavailable for harvest.

Greg Roczicka suggested that the OEG path would be most effective in meeting all the concerns, but wanted to continue to have conversations with the Department in preparation for the Board meeting. He didn't feel comfortable letting all the various options be hashed out in Board committees without much forethought. He suggested that it would be better to provide a package of options that were mutually developed by the Department and the WG with input from as many stakeholders as possible. He also wanted to know if the Department would support an OEG.

John Linderman Clarified that the Department will remain neutral with respect to things over which it does not have authority. He also clarified that he saw little difference between the OEG and SEG with respect to the problem of getting fish to upriver subsistence fishers. In either instance, those fish would not be available for harvest. He reiterated the management plan path as the better way to address problems of that sort. One option might be to have some sort of subsistence schedule enacted in the lower river to allow fish to pass the population centers. He didn't really address the question of how to stakeholders and the Department could work on these problems between that meeting and the BOF meeting in January.

Greg wanted to discuss how the esc goals would affect the management plan.

Bev Hoffman suggested that the goal recommendation be provided to the board as informational only and not be presented as final until stakeholders from the whole river had an opportunity to weigh-in. She said that she wants to be comfortable that the Department had heard and considered stakeholder input before proceeding. She also said that she never wants to see another season like 2012. She said that the theory about small numbers of spawners yielding large returns would either come true or not, and she didn't want to rush any set goals.

Casie Stockdale said that John Linderman's comments helpful in clarifying. She explained that the OEG proposal to the BOF had been based on a lack of information. She recapped the comments about addressing concerns through the management plan and getting adequate stakeholder input. She suggested that such a management plan should be in place before moving forward with a goal, and that a scoping process should be pursued to incorporate the suggested stakeholder input, similar to the one that occurred at the Kuskokwim interagency meeting and WG meeting in late March.

John clarified that a management plan need not be completely realized before the escapement goals could be considered. He pointed out that achieving an escapement goal was a primary focus in developing a management plan and that the goal should be a first step. He said that the recommended goal represents a shift from tributary assessment to mainstem assessment and it wasn't clear what form such a management plan should take. He said that the department currently has a lot of discretion within its powers to enact management. He said this discretion was used in the past three years to attempt to address the conservation issues that had appeared.

Doug Molyneaux recalled the low abundance years in the 1980s and early 1990s when subsistence users, noting the difficulty in catching fish, demanded an end to a directed Chinook fishery and threatened lawsuits over mismanagement. He wanted to know how this would be taken into consideration under the new recommended goal scenario.

John Linderman reiterated that the escapement goal was about escapement and not about harvest. The concerns that Doug was raising related to management of the fishery. He stated that the forecast and inseason tools would be used to assess whether there were a harvestable surplus of fish. ANS figures would be used to determine if that surplus were adequate to meet subsistence needs. The number of fish necessary to meet ANS, so long as they were available above escapement needs, would always be allocated to subsistence users. Only if biologists were confident that those priority needs were met would any incidental harvest of Chinook

salmon be allowed. He reiterated that raising of the goal would not make more fish available for harvest and the model indicated that too high an escapement would represent a decrease in fish available for harvest in some years, and that no direct benefit would be seen by users.

Chris Shelden asked managers what type of tools they would need in the management plan to address stakeholder concerns of getting adequate densities of fish into the upper system for subsistence users and making some provision for quality of escapement. Travis Elison referred to the subsistence schedule, or windows, implemented in the early to mid-2000's that had been designed to spread out harvest. Although this mechanism did not work as planned and implemented, it could be adjusted. One example of such an adjustment: if the forecast showed a return below a predetermined number of fish, the first ten days of June might be closed in District 1. Such a strategy would clearly be allocative and therefore outside the Departments jurisdiction to enact without direction from the BOF. Again, this would be a management plan issue.

Ray Collins suggested a return to more traditional methods: before the advent of modern nets and boats, setnets were most often used to harvest salmon in the lower river. A portion of migrating salmon were harvested, but the middle river and deeper water were safe zones where salmon bound for upper systems could pass through unfettered. Today, with most lower-river people preferring driftnets, all sections of the river become potential fishing areas and there are few safe passages. A return to setnet or regulations encouraging an increased use of setnets might improve densities of fish and harvest potential for upriver communities and improve upriver escapements.

Ray then asked whether adopting this goal would make it more likely that there would be years in which restrictions were necessary. Kevin Schaberg pointed out that the escapement Management Objective used in 2012, which had been based on current higher escapement goals, would cause restrictions to occur more often than the recommended goals being considered. He stated that the recommended goals were based on better information and solid biological rational with some of the expressed desires of stakeholders figured in.

Casie Stockdale asked for access to the spawner recruit analysis on which the goal was based.

This has been provided as part of an email to Working Group participants on October 3rd and is provided in this document as Appendix C.

Casie asked about the report being written that would document the development of this escapement goal, when it would be finalized, and whether stakeholders would have access to it. Kevin Schaberg stated that the report would be completed with peer review for the board meeting, but that the rational would be provided (Appendix B and C) and that the methodology was well documented in the references provided in his presentation (September 27 Info packet and an email distributed to the WG on September 29).

Casie also asked why the drainage-wide goal was being submitted as an SEG when it had originally been discussed as a BEG. Kevin stated that the goal was no longer strictly a BEG set based on Smax, msy, and the 80% error around msy. It has been altered because 1. A BEG would put the lower end of the goal below previously observed escapements; 2. Because there

was an expressed desire to see higher escapements; and 3. The realities surrounding how a fishery would be prosecuted in the Kuskokwim (it would likely not be possible to manage for maximum sustained yield with no directed commercial fishery). Because it wasn't a perfectly biologically based goal, it deserved the SEG designation.

Jan Conitz called attention to the AYK escapement goal memo (Appendix B) and pointed out that the rational for these choices was documented there: *2012 AYK EG memo.pdf distributed on 9/29/2012 in a WG email from Chris Shelden*: *Third paragraph under Kuskokwim Management Area, Appendix B.*

Greg Roczicka asked how federal management felt about the escapement goal recommendations and how their influence would affect subsistence fishers. Kevin Schaberg reported that the entire presentation had been delivered to a list of federal participants including: Pete Probasco, Tom Doolittle, Ken Harper, Gene Peltola, Dan Gilikin, Don Rivard and others at OSM. Kevin stated that other than questions, there had been little more said by federal employees. Don Rivard reported that Kevin had done a "wonderful" job of presenting the information; that USF&WS was reviewing the recommendation and preparing a report to provide to the BOF for the January meeting; but did not have a formal position at that time.

There was some discussion about why federal refuge staff was not present at the WG meeting. Some asked whether they were showing some kind of opposition to the recommendation. Bev Hoffman asked Don Rivard to share WG concerns regarding this absence with refuge staff, saying that the level of participation USF&WS had shown in recent years suggested they should be part of the conversation now. Don stated that he would do so, but pointed out it was probably due to some problem of which he was not aware.

Mike Williams noted the evolution of management over the years, including changes in staffing and the increase in federal influence, and said he thought that tribal governments should be more involved. He appreciated the information being shared by the Department. He said that he never wanted to see a similar situation (low abundance, heavy restriction) arise on the Kuskokwim again.

James Charles asked whether the recommendation would be discussed at the YK Delta RAC meeting in October. Kevin Schaberg said that the recommendation could be presented if it were requested.

Doug Molyneaux wanted to know in what portion of the BOF meeting this recommendation would be discussed. John Linderman pointed out that proposal 106 suggested an OEG for the Kuskokwim and that would foster this discussion. They agreed that mention would certainly be made in presentations and that there would probably be work sessions associated with goal setting. John also noted that there was a management plan proposal before the board as a placeholder. Had that proposal not been submitted, the issue would not normally be raised.

John stated that Working Group members, tribal entities and the public could submit comments to the board with respect to any concerns about the management plan (or any other issue). They could do this together or individually. He clarified that comments would be accepted up until the 2nd of January prior to the meeting but could also be submitted at the meeting.

Bev Hoffman referred to page 8 of the info packet: "all escapements within this range provide for greater than 100,000 fish for harvest." She said that this made her feel more open to the goals being discussed than she had been earlier in the meeting.

Kevin reiterated that in 2012, based on the management objective set to allow for achievement of existing goals, they could not forecast the return of enough fish to meet the management objective. He stated that based on the recommended goal range, the forecast indicated enough fish to satisfy that goal. Had these goals been in place during 2012, it might not have been necessary to restrict the subsistence.

Travis said that the goal had been selected foremost for sustainability, but beyond that had been set to provide returns that would support subsistence. Very little consideration had been given to commercial interests. He said that if it appeared that the department were pushing for the goals to be implemented it was because they didn't want to have to limit subsistence unnecessarily. He said if these goals are not implemented in 2013 we would have to wait for the board cycle to come around again to change the way we manage, which might mean more severe to moderate restrictions not biologically warranted.

Bev was concerned about preserving the fishery for the future and working together with managers to achieve that.

Greg wanted a clear message sent that stakeholders that residents did not support any directed commercial fishery for Chinook salmon on the Kuskokwim River *–this should not be considered an official position until or unless a resolution to this affect is passed by the Working Group.*

Regarding the phenomenon of large returns resulting in smaller numbers of offspring, Dave Cannon asked whether the biological mechanism was known. Kevin Schaberg responded that there was a lot of research currently being done to try answer that question. Kevin stated that the run reconstruction and production model identified the pattern but did not explain the reason. The pattern defined an upper threshold for spawners beyond which returns would diminish.

LaMont Albertson asked whether there were clear and vetted research that would conclusively prove that. Kevin responded that he was presenting that research at this meeting. LaMont asked for the actual reports that proved this point be "put in our hands that will educate us so that we understand this process." Kevin responded that the information was available and was very technical and he would be glad to explain further if LaMont could join him in his office.

LaMont stated that this pattern did not hold with his observations of Chinook salmon in the real world. He said that what he had seen of chum would allow him to be convinced of such relationships but not of Chinook.

Casie Stockdale spoke to Travis Ellison's point saying that people understood that the Department was attempting to spare people of hardship. She said that there seemed to be "unanimous" concern about the tardiness of information, that some information was not available, and there wasn't time to digest and consider the information prior to the board cycle. She said that people want to be confident in the decision. She wondered "why the rush?"

Travis stated that ten years of research and subsequent analysis showed that the recommended escapement goal was sustainable and very conservative.

Bev Hoffman recalled the graphs showing fluctuations in salmon returns over time and said that it made her a little more optimistic. One concern she expressed was that the Federal managers would ultimately not accept the strategy and take action of their own.

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b. **Tributary goals**:

- Kwethluk River: previous goal 6,000-11,000; recommended revised goal=4,100-7,500;
- George River: previous goal 3,100-7,900; recommended revised goal=1,800-3,300; and
- Kogrukluk River: previous goal 5,300-14,000; recommended revised goal=4,800-8,800.

Synopsis: Kevin Schaberg explained how prior escapement goals had been established (the percentile method) and said that the methodology used requires an extensive data set. In the case of goals for the Kwethluk, Tuluksak, and George Rivers, three data collection methodologies had been used together to establish those goals. He said that there had not been enough concurrent years of data to identify a relationship between these methods which made combining them undesirable. Even when considering more recent data for inclusion in the analysis, the dataset remains small and unsuited to the method. The dataset on the Kogrukluk River is the exception (30+years of comparable data). The goal established on the Kogrukluk performs fairly well.

Presentation points comparing existing and recommended tributary escapement goals:

Old Tributary Weir Escapement Goals:

- Current Escapement goals used the percentile method to identify range
    - 15th and 85th percentile of observed historical escapements at each project
- In most instances the data used was less than ideal
    - Kwethluk; 16 data points (2 years of tower; 9 years of aerial conversion; 5 years of weir)
    - Tuluksak; 16 data points (7 years of aerial conversion; 9 years of weir)
    - George; 10 data points (1 year of aerial conversion; 9 years of weir)
- Most data was not consecutive.

Recommended Tributary Escapement Goals:

- We will use the average proportion of the total escapement monitored at each weir
- Apply these proportions to the whole river SEG to get tributary SEG's
    - Same scale as the whole river SEG
    - Reduce false indicators of escapement inadequacies.

Caveats summation:

- Does not identify if escapement was sustainable, unless there is full coverage of recruitment period (8 yrs.)

- Most data was collected during high abundance years, meaning the majority of observations were above average resulting in escapement goals that are high.
- Weir goals should be based on weir data, because the assumptions of uncertainty with observations are specific to the method of data collection
    - I.e. Weir counts are better than tower counts, which are better than aerial survey counts
    - None of these are assumed to be consistent with one another, you must evaluate first.

Discussion:

Ray Collins expressed a concern for establishing a goal on the Takotna River based on this information. He suggested that the Takotna was underrepresented proportionally with respect to the full river estimate because this river had been severely impacted by human activity and it was probably producing Chinook salmon under its true capacity.

Kevin Schaberg agreed and clarified that there was currently no plan to establish a goal for the Takotna or the Tuluksak Rivers for these reasons. He went on to say that three monitored rivers, Tuluksak, Tatlawiksuk, and Takotna represented very small proportions of the total run. The Department and its partners would continue to operate the monitoring projects on these projects, while funding allows, and monitor their performance. Each of those rivers appeared to produce less than 1% of the total population. It would be inappropriate to establish escapement goals on these small tributaries because when the Kuskokwim River SEG and other tributary SEG's perform adequately, to limit opportunity in the mainstem would be irresponsible. Continuing to monitor the systems would allow for more local protections to occur when necessary. He also stated that the recommended tributary goals represent the Lower (Kwethluk), Middle (George), and Upper (Kogrukluk) regions of the Kuskokwim River, and act as subsection indices. Chronic failure to achieve any of these goals would likely result in management actions.

Greg Roczicka pointed out that this plan missed the far upper portion of the Kuskokwim River and that the George and Kogrukluk Rivers were actually fairly close together.

Doug Molyneaux asked how many years of data had gone into generating the tributary proportions by which the new goal set had been selected. Kevin Schaberg answered that weir data was used so the number of years was consistent with the number of years of successful weir monitoring.

Doug asked if there had been much variability between years as to the relative contribution that each tributary made to the overall escapement. Kevin answered that there is some variability but not much: Each of the monitored escapements seems to follow the others and to follow the full river Chinook run reconstruction with respect to proportional increases and decreases in abundance over time. The analysis included standard deviations and coefficients of variation. He said that these tight relationships are one of the reasons that gave Department biologists confidence to move forward with the escapement goal plan being presented in this recommendation.

Doug Molyneaux stated that this plan would make more sense if it were suggested for chum or coho salmon. He felt that the suggested goals were "necking it down" too close to the escapement suggested by the model and that it failed to consider that in some years, females might return in disproportionately low numbers (as in the first few years of increasing abundance).

Kevin Schaberg responded that the escapement goal is a measure of the number of fish necessary to provide the needed productivity. He said that there is no escapement goal with a sex ratio attached. He suggested using management mechanisms, like mesh size restrictions to address these concerns. This recalled the discussion about using the management plan instead of the escapement goal as a way to address concerns of escapement quality and densities of migrating fish. He also stated that if one were to attempt to deliberately boost or alter the number of females on the spawning ground, this would affect the performance of spawner recruit models because you would be creating a population that was more productive. The net effect would be a suggestion that escapement goals should be lowered to account for the higher productivity.

Bev Hoffman said that she was having an easier time following the discussions. She did want to know what Kevin Schaberg would worry about with respect to these goals/models/management decisions.

Kevin responded that his reactions were based largely on the picture that the data presented. He said that he was concerned that the "dire" situations perceived on the Kuskokwim in recent years were in part fostered by the Department as a result of setting inappropriate escapement goals in 2007. He said that the goal being recommended looks very conservative to him. He pointed out that the Department was not recommending the lowest goal that the analysis suggested would be biologically acceptable. He said the goal was chosen in part because he didn't want to encourage escapements lower than those previously observed, but he pointed out that we didn't want to see escapements much above the goal either. At a certain point, these increasing escapements show decreasing returns (decreasing recruits per spawner) and we land back in the situation observed in 2012.

Bev asked how other factors, like by-catch, figure into this model. Kevin responded that By-catch was not a part of this model because data wasn't sufficient. However, if by-catch had been figured into the model, it would indicate that Chinook stocks were somewhat more productive. This would shift the spawner/recruit relationship to a more productive prediction of return, and that would actually serve to lower the escapement goals. This is a moot point because the data aren't available. John Linderman noted that the result of not having this information also made the goals more conservative. Greg Roczicka suggested that this represented an unplanned buffer for escapement.

Casie Stockdale accepted the points being made. She said that it seemed that everyone was being held hostage by trying to meet these tributary goals and that now there was a very fast move to try and do something else. She asked about the third report that would contain the process information for the development of the goals.

Kevin stated that this had been a Bayesian spawner recruit analysis and that the report was currently under development consistent with timelines to be ready for the BOF meeting in January. John Linderman added that this report would be published in the ADF&G Special Publication Series, a rigorous process reserved for highly technical reports.

Casie had two concerns: 1. That USF&W had yet to weigh in on the recommendation; and 2. that the process seemed rushed and the report would not be available for public review before the goals would be established.

Kevin Schaberg pointed out that the process by which the goals were derived is well documented (he supplied references, see the September 27 Info Packet, Appendix F). It was only the particulars of this case that were not readily available.

Doug Molyneaux liked the proportional approach for developing tributary goals from the drainage goal. He said that the theory was good. His concern was that, because the drainage-wide goal is based on estimates, he thought that the tributary goals were going too far out on a limb with the level of precision being used. He suggested that an additional buffer should be incorporated into the goal. He did ask whether this were being taken into consideration through the range that defined the goal.

Jan Conitz mentioned having discussed this with biometrics staff and that they had said that further adjustments would not improve the recommendation. Kevin Schaberg recalled having considered different proportions, but noted that when you move further from the average, you lose the consistency of achieving the goal.

Doug Molyneaux suggested addressing the issue of a minimum number of female Chinook on the spawning grounds with a buffer, saying that when the first year of increasing abundance arrives after this low cycle, there would likely be an increased abundance of young male fish. Assessing purely on a numerical escapement goal would indicate that adequate numbers of fish were returning. But the sex ratios might not be adequate.

Kevin reiterated that this was a management plan issue, not a number of fish issue. He noted that some of the options for achieving desirable age and sex compositions on the spawning grounds had an allocative affect as well, which meant they would need to be taken up by the BOF. He said that a lot of the information the department had for management plan concepts had come from the list of priorities fleshed out during the March 2012 Interagency and Working Group meetings.

Doug Molyneaux suggested a collaborative process of this type would probably not be completed by the time of the BOF meeting. He wanted to know who and what would be involved.

Casie Stockdale wanted clarification about developing one goal from another. Did that represent more uncertainty? Doug answered that it did. He suggested that one would expect a wider variance in a goal of that type. Casie reiterated her request to see the analysis.

Jan Conitz suggested having the authors of the coming escapement goal technical report address these points directly in that work.

Bev Hoffman noted that "this year there was a lot thrown at us pretty darn fast…" She indicated that the explanations she was receiving during the meeting were helping: "I'm more open now than earlier today…"

John Linderman informed the group that the question of coping with appropriate ratios of males to females in the escapement was a topic at the forefront of Department concerns. He noted mesh size restrictions on the Yukon as one manifestation of that concern. He said that it wasn't yet clear what would be the best approach in this type of situation. Was it most desirable to mimic the sex ratios of the run prior to harvest? Was it more desirable to increase the proportion of females over the sex ratios in the run prior to harvest? Analysis of this type must occur before sex based concerns can adequately be addressed in a management plan.

Greg Roczicka expressed the worry that the BOF might make an OEG selection without enough information and that users would be stuck with that decision through the next board cycle. Alternatively, there might be no firm decision on an escapement goal. He didn't want to see the opportunity lost and people saying they should have acted when they had the chance.

John Linderman didn't want to look at the 2012 BOF meeting as the only opportunity to work on these issues.

Doug Molyneaux wanted to know, in the event that these goals are adopted and low abundance is experienced in 2013, what options the Department had to ensure that fish get to upstream users. Closing the lower river early would be an allocation issue and therefore outside of the Department's purview. So what would the department have in the way of options?

John Linderman listed management options available: mesh size restrictions for conservation; discretion over time and area (rolling closures); adjusting the existing subsistence schedule that appears in the Kuskokwim River salmon rebuilding plan; etc.

Doug Molyneaux clarified that these points did not answer the question of how opportunity would be protected upriver. He asked again how that call might be made.

John Linderman said that initiating management actions would be predicated on providing reasonable opportunity to meet subsistence needs. Conservation needs would also be a trigger to management actions. If there were adequate abundance for providing for need, no further restrictions would be justifiable. He saw the argument applying in low abundance years.

Kevin Schaberg said the first indication of conservation concern comes from a forecast of inadequate abundance to meet both escapement objectives and ANS. In 2012 it had been apparent from the start, and made more acute by the selection of the management objective of 127,000. The Bethel Test Fish tool came into use to assess progress toward that objective.

Doug Molyneaux pointed out that this discussion of conservation still would not address the problem of upriver allocation of fish.

This concluded the discussion about escapement goal recommendations. The remaining members resolved to address the question at a future meeting. Discussion of meeting feasibility

concluded with all parties resolved to try to have 2 or more meetings prior to the January BOF meeting.

2.) ADF&G Chinook Salmon Symposium in Anchorage October 22-23

Noting the flyer in the September 27 Info Packet, Kevin Schaberg explained the ADF&G Chinook Salmon Symposium: Given the state-wide concerns about Chinook salmon, the State of Alaska has dedicated fisheries scientists to hosting a symposium on existing information gathering and data analysis and an examination of the gaps in our knowledge about Chinook salmon. This will include panel discussions and public discussions about the direction that research should take in the future.

Greg Roczicka asked if this were a state-wide level version of the After Action Review executed in Bethel in August. Kevin responded that it wasn't really the same thing. John Linderman explained that a major part of the symposium was aimed at getting stakeholder and public comment to improve the gap analysis and provide a funding request to the Governor's office. The particulars of funding were yet to be determined: source, duration, etc.

Chris Shelden stated that the Working Group support team would be able to provide funding for one member of the Working Group to attend the symposium as a representative and to report back to the WG with his or her impressions of the meeting.

Greg Roczicka asked whether that would preclude a WG member attending the BOF and Chris responded that it likely would not.

Mike Williams suggested Greg Roczicka should attend both meetings.

Chris Shelden requested that the chairs canvas members and make a decision quickly so arrangements could be made.

3.) Kuskokwim Post Season Subsistence salmon survey

Chris Shelden introduced himself as the new project-leader for the Post Season Subsistence Salmon Survey and said that he and crew-leader Maureen Horne-Brine were now in Bethel overseeing the survey. ADF&G surveyors were on the ground and had visited three villages on their way to their goal of 26. Chris stated that partner agencies ONC and KNA were in the process of hiring surveyors and that they would begin training in early October. Surveyors had been fairly well received but had understandably seen a higher refusal rate than in recent years. Chris pointed out that harvest surveys added a very important component to run reconstructions and management of the fishery and that without them the Department would likely be forced to manage more conservatively. He asked the help of Working Group members in encouraging people to participate.

OLD BUSINESS:

1.) Kusko Area BOF proposals

After the Escapement goal discussion, the WG repeated the roll-call and determined that there was no longer a quorum. The remaining members resolved that discussion of proposals to the BOF would be taken up at a future meeting.

2.) Action items from previous meetings

a. Beverly Hoffman's letter of recruitment for the Upriver Elder seat.
Bev Hoffman requested that the Working Group review the letter she drafted to recruit for the seat of Upriver Elder (Appendix E).

b. Working Group Chairs' letter to John Bryson, US secretary of commerce.
Distributed in the September 27 Info Packet.

1.) Discussion of Iyana Gusty award
Deferred until March.

CONTINUING BUSINESS:

Continuing business items were not discussed due to time restrictions. A synopsis of the 2012 salmon season was provided in the September 27 packet, including graphs, tables and narrative summaries.

WORKING GROUP ATTENDANCE:

MEMBER SEAT:	NAME:
UPRIVER ELDER	*Vacant*
DOWNRIVER ELDER	James Charles
COMMERCIAL FISHER	*absent*
LOWER RIVER SUBSISTENCE	Mike Williams
MIDDLE RIVER SUBSTENCE	*absent*
UPPER RIVER SUBSISTENCE	Evelyn Thomas
HEADWATERS SUBSISTENCE	*absent*
PROCESSOR	Stuart Currie
MEMBER AT LARGE	*absent*
SPORT FISHER	LaMont Albertson
WESTERN INTERIOR RAC	Ray Collins
Y-K DELTA RAC	John Andrew
ADF&G	Travis Elison
CHAIR	Greg Roczicka

Other Participants:	
ADF&G Comm. Fish : John Linderman, Jan Conitz, Kevin Schaberg, Doug Bue, Brittany Blain, Chris Shelden, Maureen Horne-Brine, Janet Bavilla, Odin Miller Sport Fish : Tom Taube, John Chythlook Subsistence Division: Hiroko Ikuta	
USFWS: Kevin Bartley; OSM: Don Rivard, George Papis, Helen Armstrong,	
Dave Cannon (Napaimute) Casey Stockdale (AVCP) LaDonn Robins (KNA) Bev Hoffman (alternate member) John Andrew (alternate member) Roberta Chavez (ONC)	Doug Molyneaux Barb Carlson (Stony River Holitna Advisory Committee) Art Nelson (BSFA) Karen Gillis (BSFA) Sky Starkey (AVCP) Maridon Boario (Senator Hoffman's office)

GLOSSARY OF ACRONYMS:

Alaska Department of Fish and Game (**ADF&G**), Orutsararmiut Native Council (**ONC**), Kuskokwim Native Association (**KNA**), Association of Village Council Presidents (**AVCP**), U.S. Fish and Wildlife Service (**USFWS**), Bethel Test Fishery project (**BTF**), Catch Per Unit Effort (**CPUE**), Coastal Village Seafoods (**CVS**), ADF&G Commercial Fisheries Division (**CF**), ADF&G Sport Fisheries Division (**SF**), Regional Advisory Council (**RAC**), Kuskokwim River Salmon Management Working Group (**KRSMWG or Working Group, WG**), Sustainable Escapement Goal (**SEG**), Biological Escapement Goal (**BEG**), Optimal Escapement Goal (OEG), Management Objective (**MO**), Amounts Reasonably Necessary for Subsistence (**ANS**), Emergency Order (**EO**), Maximum Sustained Yield (**msy**),

Appendix A: Kevin Bartley's letter to the Kuskokwim River Salmon Management Working Group.

Mr. Chair—Kevin Bartley

Hello everyone. First, I would like to thank the working group for allowing me to visit and speak with you in Bethel today. My name is Kevin Bartley. I currently live in Anchorage. I was born in Kentucky and have lived in Alaska for 5 years. I am a student at the University of Alaska Anchorage working on my Master's Degree in Cultural Anthropology.

In June of this year, I began observing both the Kuskokwim River Salmon Management Working Group and the Yukon River Drainage Fisheries Association for the U.S. Fish and Wildlife office in Anchorage.

While listening to these meetings, I have been greatly influenced by the concerns of rural subsistence users from the Yukon/Kuskokwim Region. Based upon what I have heard during these meetings, I developed a research project and presented it to the U.S. Fish and Wildlife for funding. I would like to talk with and gather information from members of the YK RAC, Kuskokwim Working Group, and YRDFA. I would also like to talk with people who call in by phone to the Kuskokwim Working Group and YRDFA meetings. The primary goal of this study is to allow rural subsistence users the chance to share their experiences and opinions on what works and what could be improved in the workings of these advisory groups.

With your support, I would begin interviewing people in November. These interviews would be with one person at a time and they would be informal. Most of the interviews would likely be conducted in Bethel, but I would also like to travel to some villages to talk with people. At this time I am unsure which villages I would be able to visit, but I hope to know more by November or December.

I am hopeful that this study will make some positive changes in the way advisory groups work together with managers, and in how subsistence users work with both. . Once I have completed a draft report, I would like to offer it to the Working Group for review. My hope is to have a draft for your review by the fall of 2013.

I want to thank the Kuskokwim Working Group for allowing me to speak to you today and I hope to gain your support for my research. I will work hard to represent the concerns of rural subsistence users of the Yukon/Kuskokwim Region.

Thank you.

If there are any questions I will be happy to answer them.

Appendix B: AYK Region Escapement Goal memorandum, 2012.

THE STATE of ALASKA
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MEMORANDUM

TO: Jeff Regnart, Director
Division of Commercial Fisheries

Charles O. Swanton, Director
Division of Sport Fish

THRU: John Linderman, Regional Supervisor
Division of Commercial Fisheries, Region IIII

Don Roach, Regional Supervisor
Division of Sport Fish, Region IIII

FROM: Jan Conitz, Regional Research Coordinator
Division of Commercial Fisheries, Region III

Katie Howard, Regional Research Coordinator
Division of Commercial Fisheries, Region III

Matt Evenson, Regional Research Coordinator
Division of Sport Fish, Region III

DATE: September 19, 2012

SUBJECT: Artic-Yukon-Kuskokwim Escapement Goal Recommendations

The purpose of this memorandum is to inform you of our progress in reviewing and recommending escapement goals for the Arctic-Yukon-Kuskokwim (AYK) Region. The *Policy for the Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222) directs the department to provide the Alaska Board of Fisheries (board) with a review of salmon escapement goals every three years in concert with the regulatory cycle for each management area. Escapement goals were evaluated and recommended based on the SSFP and the *Policy for Statewide Salmon Escapement Goals* (5 AAC 39.223).

An interdivisional escapement goal review team (review team) was convened to review available escapement and other data and make escapement goal recommendations where appropriate. Escapement goals recommended in this memorandum are the products of several collaborative meetings of the review team, other department staff, and stakeholders from federal agencies and various nongovernmental organizations. The review team helped direct the work of other staff and reviewed that work in the process of making escapement goal recommendations to the directors of the divisions of Sport Fish and Commercial Fisheries.

Two important definitions are:

> 5 AAC 39.222(f)(3) "*Biological Escapement Goal* (BEG): the escapement that provides the greatest potential for maximum sustained yield (MSY);" and
>
> 5 AAC 39.222(f)(36) "*Sustainable Escapement Goal* (SEG): a level of escapement, indicated by an index or an escapement estimate, that is known to provide for sustained yield over a 5 to 10 year period, used in situations where a BEG cannot be estimated or managed for."

Since inception of the *Policy for the Management of Sustainable Salmon Fisheries* and the *Policy for Statewide Salmon Escapement Goals* in 2000 and 2001, comprehensive escapement goal reviews have been conducted every three years for the AYK Region (ADFG 2004; Brannian et al. 2006; Molyneaux and Brannian 2006; Volk et al. 2009). Therefore, analyses for this review focused on stocks for which recent data (2009–2011) might result in a substantially different escapement goal from the last review, or those goals that should be eliminated or established.

The review team compiled existing data for each salmon stock with an existing goal and other monitored, exploited stocks without an existing goal and made a determination to either: 1) retain an existing goal; 2) revise an existing goal; 3) establish a new goal; or 4) eliminate a goal. For escapement goals that were being revised or newly created, we determined the most appropriate methods to evaluate the escapement goal.

Oral and written reports (Conitz et al. *In prep*) concerning escapement goals and specific recommendations for numerous stocks in all areas of the AYK Region will be presented to the board in January 2013. This memo will list all current and recommended escapement goals for all management areas of the AYK Region. These recommendations are briefly described for each management area below. Following the January 2013 Board of Fisheries meeting, a memorandum will be prepared by the review team to include any additional recommendations generated through the board review process, and these recommendations will be sent to the division directors for final adoption.

Kuskokwim Management Area

In the Kuskokwim Management Area, which includes the Kuskokwim River and Kuskokwim Bay drainages, there are currently 25 established escapement goals for 14 king salmon, four chum salmon, three coho salmon, and four sockeye salmon stocks (Table 1).

The review team is recommending that a model-based drainagewide SEG of 65,000–120,000 be established for Kuskokwim River king salmon. To develop this goal, historical (1976–2011) Kuskokwim River king salmon run size was estimated using models combining available escapement, harvest, run timing, and abundance data (Schaberg et al. 2012; Bue et al. *In prep*). From these estimates of total run size, a spawner-recruit relationship was modeled and yield profiles were constructed and used to select an escapement goal range (ADF&G *Unpublished*). This run reconstruction and spawner-recruit modeling represented new information to evaluate exploitation and escapement goals for Kuskokwim River king salmon.

The range for the drainagewide SEG was chosen to include the following attributes: 1) it corresponds to escapements that have a high probability (~80%) of achieving 80% or more of

maximum returns; 2) escapements in this range are expected to provide yields adequate to meet subsistence needs; 3) the lower bound does not extend below the smallest observed estimate of escapement; and, 4) the lower bound is approximately equal to the level of escapement having the highest probability of achieving MSY (64,500). Currently, there is no whole-river escapement monitoring project, so total escapement will be estimated each year postseason using the run reconstruction model.

Currently there are 10 SEGs for king salmon stocks in tributaries of the Kuskokwim River. Using the total run size estimates and spawner-recruit model for all stocks combined, the existing tributary goals were re-evaluated in the context of the drainagewide goal. All of these current SEGs were developed using the percentile method (Bue and Hasbrouck *Unpublished*). Weir-based goals for the George, Tuluksak, and Kwethluk rivers were developed with a relatively short time series (10–12 years) of escapement estimates. The Tuluksak and Kwethluk river data sets were also inconsistent over a time series that coincidentally happened to capture predominately high escapement years. With the new information provided by the total run size estimation, it is apparent that the goals for the George, Kwethluk, and Tuluksak rivers are higher than necessary. The weir-based goal on the Kogrukluk River was developed using a much longer time series dating back to 1976, and encompasses a much more representative range of king salmon production in the Kuskokwim River. Although the SEG for the Kogrukluk River stock was based upon an adequate time series, it was likewise revised on the basis of the new run reconstruction model and spawner-recruit analysis (ADF&G *Unpublished*). **Therefore, the review team recommends revisions to three of the weir-based SEGs for king salmon:**

- **Kwethluk River: previous goal 6,000–11,000; recommended revised goal=4,100–7,500;**
- **George River: previous goal 3,100–7,900; recommended revised goal=1,800–3,300; and**
- **Kogrukluk River: previous goal 5,300–14,000; recommended revised goal=4,800–8,800.**

These revisions were developed by multiplying the average proportional escapement in each of these systems (escapement in tributary divided by total drainage escapement) by the upper and lower bounds of the recommended drainagewide goal.

The review team is also recommending that the weir-based SEG for king salmon in the Tuluksak River be eliminated. This system has been extensively altered by mining activity and supports a very small and variable escapement of king salmon. The existing SEG is 1,000–2,100 and was based on a relatively short and inconsistent data set. Measured escapements between 1991 and 2011 have ranged from 239 to 2,917 fish. The nearby Kwethluk and Kisaralik rivers support much larger escapements and likely provide an adequate index of escapement for lower Kuskokwim River king salmon stocks.

The review team is also recommending that the aerial survey-based SEG for chum salmon in the Kanektok River (Kuskokwim Bay) be eliminated. Due to poor weather conditions, uncertainty of the relationship of the survey to peak spawning time, and availability of aircraft, these counts are unreliable for evaluating a goal on this system.

All other existing escapement goals for salmon stocks in the Kuskokwim Management Area are recommended to continue without revision.

Yukon Management Area

In the Yukon River Management Area, which includes the entire Yukon River drainage within Alaska, there are currently 16 established escapement goals for seven king salmon, two summer

chum salmon, six fall chum salmon, and one coho salmon stocks (Table 2). Eight of these goals are BEGs and eight are SEGs. In addition, there are three goals for Canadian stocks, not listed here, that were established as part of the *Yukon River Salmon Agreement*. Escapement targets for these Canadian stocks (mainstem Yukon River king salmon, mainstem Yukon River fall chum salmon, and Fishing Branch River fall chum salmon) are set annually by the Yukon River Panel.

All existing escapement goals for salmon stocks in the Yukon Management Area are recommended to continue without revision.

Norton Sound-Port Clarence and Kotzebue Management Areas

A total of 30 escapement goals exist in the Norton Sound-Port Clarence and Kotzebue management areas for six king salmon, 14 chum salmon, three coho salmon, five pink salmon, and two sockeye salmon stocks (Table 3). Biological escapement goals exist for three stocks, including Norton Sound Subdistrict 1 (Nome) chum salmon, Tubutulik River chum salmon, and Kotzebue (all areas) chum salmon. An optimal escapement goal (OEG) for Kwiniuk River chum salmon was established by the board in 2001. The remaining 26 goals are SEGs.

The review team is recommending elimination of the aerial survey SEG for king salmon on the Shaktoolik River. Due to poor weather conditions, uncertainty of the relationship of the survey to peak spawning time, and availability of aircraft, these counts are unreliable for evaluating a goal on this system.

All other existing escapement goals for salmon stocks in the Norton Sound-Port Clarence and Kotzebue Management Areas are recommended to continue without revision.

LITERATURE CITED

ADF&G. *Unpublished.* Memorandum from T. Hamazaki and S.J. Fleischman, Alaska Department of Fish and Game, to J. Linderman, J. Conitz, and M. Evenson, August 20, 2012, Subject: Kuskokwim Chinook salmon drainage-wide escapement goal.

Brannian, L. K., M. J. Evenson, and J. R. Hilsinger. 2006. Escapement goal recommendations for select Arctic-Yukon-Kuskokwim region salmon stocks, 2007. Alaska Department of Fish and Game, Fishery Manuscript No. 06-07, Anchorage.

Bue, B. G. and J. J. Hasbrouck. *Unpublished.* Escapement goal review of salmon stocks of Upper Cook Inlet. Alaska Department of Fish and Game, Report to the Board of Fisheries, Anchorage.

Bue, B.G., K.L. Schaberg, Z.W. Liller, and D.B. Molyneaux. *In prep.* Estimates of the historic run and escapement for the Chinook Salmon stock returning to the Kuskokwim River, 1976-2011. Alaska Department of Fish and Game, Fishery Data Series No.12-XX, Anchorage.

Conitz, J. M, M. J. Evenson, and K.G. Howard. *In prep.* Escapement goal recommendations for select Arctic-Yukon-Kuskokwim Region salmon stocks, 2013. Alaska Department of Fish and Game, Anchorage.

Molyneaux, D. B. and L. K. Brannian. 2006. Review of escapement and abundance information for Kuskokwim area salmon stocks. Alaska Department of Fish and Game, Fishery Manuscript No. 06-08, Anchorage.

Schaberg, K. L., Z. W. Liller, D. B. Molyneaux, B. G. Bue and L. Stuby. 2012. Estimates of total annual return of Chinook salmon to the Kuskokwim River, 2002–2007. Alaska Department of Fish and Game, Fishery Data Series No. 12-36, Anchorage.

Volk, E., M. J. Evenson, and R. A. Clark. 2009. Escapement goal recommendations for select Arctic-Yukon-Kuskokwim Region salmon stocks, 2010. Alaska Department of Fish and Game, Fishery Manuscript No. 09-08, Anchorage.

Table 1.–Summary of escapement goal recommendations for Kuskokwim Management Area salmon stocks for 2013.

Stock Unit	Assessment method	Most recent escapement goal			Recommendation for 2013		
		Goal	Type	Year established or last revised	Action	New or revised goal	Type
King Salmon							
Kuskokwim River and tributaries							
Kuskokwim River (entire drainage)	Run reconstruction[1]				Establish goal	65,00–120,000	SEG
Aniak River	Aerial Survey	1,200–2,300	SEG	2005	No change		
Cheeneetnuk River	Aerial Survey	340–1,300	SEG	2005	No change		
Gagarayah River	Aerial Survey	300–830	SEG	2005	No change		
George River	Weir	3,100–7,900	SEG	2007	Revise goal	1,800–3,300	SEG
Holitna River	Aerial Survey	970–2,100	SEG	2005	No change		
Kisaralik River	Aerial Survey	400–1,200	SEG	2005	No change		
Kogrukluk River	Weir	5,300–14,000	SEG	2005	Revise goal	4,800–8,800	SEG
Kwethluk River	Weir	6,000–11,000	SEG	2007	Revise goal	4,100–7,500	SEG
Pitka Fork Salmon River	Aerial Survey	470–1,600	SEG	2005	No change		
Salmon River (Aniak Drainage)	Aerial Survey	330–1,200	SEG	2005	No change		
Tuluksak River	Weir	1,000–2,100	SEG	2007	Eliminate goal		
Kuskokwim Bay							
Kanektok River	Aerial Survey	3,500–8,000	SEG	2005	No change		
Middle Fork Goodnews River	Weir	1,500–2,900	BEG	2005	No change		
North (Main) Fork Goodnews River	Aerial Survey	640–3,300	SEG	2005	No change		

-continued-

Appendix C: Kuskokwim Chinook Salmon Drainage-wide Escapement Goal- *unpublished memorandum*

THE STATE of ALASKA
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MEMORANDUM

TO: John Linderman, Regional Supervisor
Division of Commercial Fisheries, Region III

Jan Conitz, Regional Research Coordinator
Division of Commercial Fisheries, Region III

Mathew Evenson, Regional Research Coordinator,
Division of Sport Fish, Region III

DATE: August 20, 2012

SUBJECT: Kuskokwim Chinook salmon drainage-wide escapement goal

FROM: Hamachan Hamazaki, Biometrician III
Division of Commercial Fisheries, Region III

Steve Fleischman, Fishery Scientist I
Division of Sport Fish,

In preparation for the 2013 Board of Fisheries meeting, the AYK escapement goal review team proposed establishment of a Biological Escapement Goal (BEG) and subsequent revision of existing tributary escapement goals for Kuskokwim River Chinook Salmon. This memo briefly describes methodology and several drainage-wide escapement goal ranges based on standard criteria. **However, these ranges are merely examples of possible goal ranges, and the Escapement Goal Team is highly encouraged to consider alternative goals based on other factors.**

Data

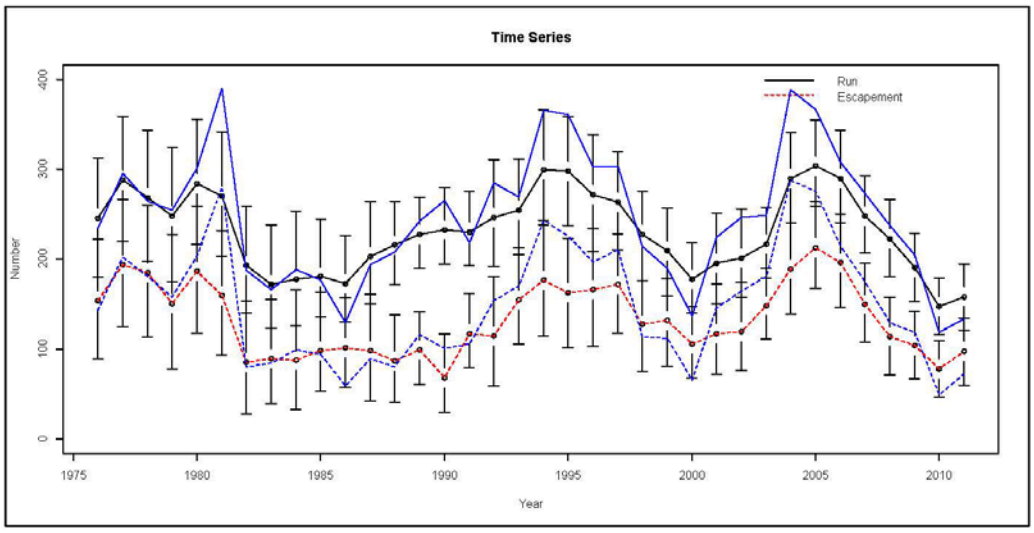
Historical (1976-2011) Kuskokwim Chinook salmon run size was modeled by combining available historical escapement, harvest, run timing, and abundance data (Schaberg et al. 2012, Bue et al. 2012). Bue et al. (2012) also reconstructed historical return by age. In this reconstruction, Bue et al. (2012) pointed out large uncertainties in the estimates of run size and age composition in some early years because of the lack of data. In the Kuskokwim River, many weir and ASL sampling projects began around 2000. Before 2000, weir escapement numeration was limited to the Kogrukluk river.

Construction of Spawner-Recruit model: Difference between Traditional and Bayesian State-Space models

In construction of Ricker spawner-recruit model, two versions are considered: traditional and Bayesian state-space models. The main difference between the two models is handling of uncertainties. The traditional model treats all data used to construct the brood table (e.g., reconstructed abundance and age composition estimates) as being observed without error, whereas the Bayesian model explicitly incorporates missing and uncertain observations in a way that preserves the age-structured relationships between these quantities. Because historical run size and age-composition of the Kuskokwim Chinook salmon were estimated from incomplete data sources, the Bayesian state-space model is more appropriate for this application.

Results of Bayesian State-Space model

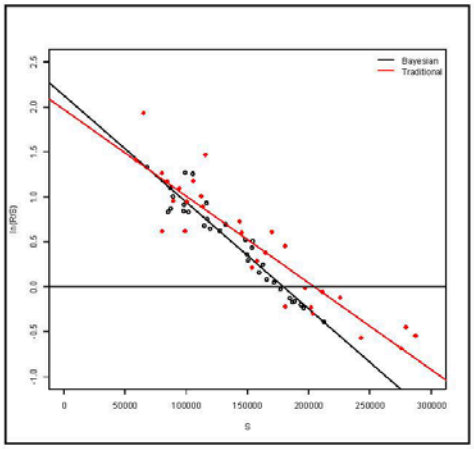
In the Bayesian statistical framework, current information (from the "posterior" distribution) about uncertain quantities depends on the context ("prior information"). Compared to raw estimates from the run reconstruction, Bayesian posterior estimates of total run in the context of the Ricker SR model "shrank" toward the global mean (i.e., annual fluctuation was reduced; Figure 1). This amounts to implicit acknowledgement that some of the observed variation in run size estimates is due to observation error. Mean run size of reconstructed data was 246,833 (CV 30%), whereas those from Bayesian model were 230,927 with CV 19%. A further consequence of considering the reconstructed estimates in the context of a spawner recruit model is that escapement estimates were reduced in magnitude. Mean escapement of reconstructed data was 149,340 with CV 44% and range 49,073-287,178, whereas those from Bayesian model were 133,103 with CV 30% and range 68,089-212,576. Median escapement was 144,326 for reconstructed and 123,236 for Bayesian.



Page 2

Figure 1. Comparison of total run and escapement, between original raw data (blue line) and Bayesian (black and red).

This resulted in higher estimates of ln(alpha) and beta than from the traditional model (Figure 2, Table 1), shifting the estimated Ricker spawner-recruit model toward the left (Figure 3).



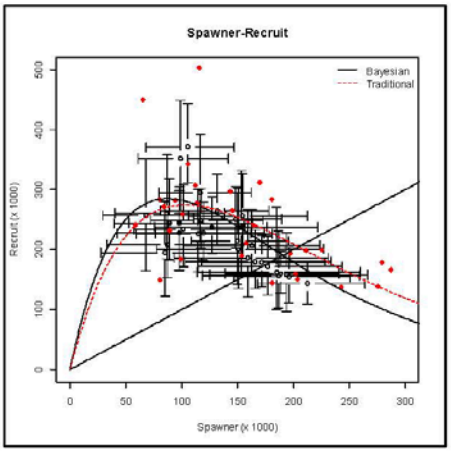


Figure 2 (left) . Comparison of traditional (red) and Bayesian (black) spawner –recruit relationship.
Figure 3 (right) . Comparison of traditional (red) and Bayesian (black) spawner –recruit relationship.

Median S_{msy} of the Bayesian model was 64,515 (95%: CI 53,290-81,371), about 10,000 fish lower than that of traditional 74,801 (95%: CI 69,116-82,700; Table 1). On the other hand, uncertainty about the estimates was greater for the Bayesian analysis than that estimated from the traditional model.

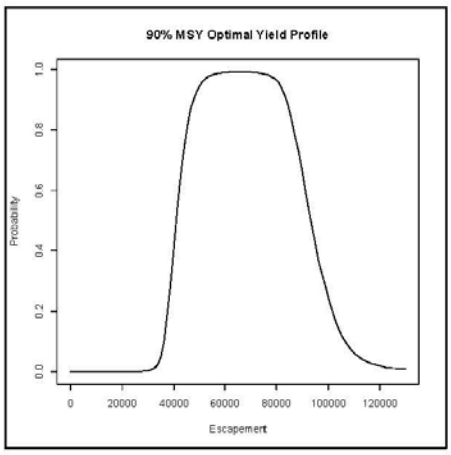
Table 1. Kuskokwim BEG: Comparison of Traditional and Bayesian State-Space Spawner-Recruit model results. Numbers in parenthesis indicate upper and lower 95% Confidence (Traditional) / Credible (Bayesian) bounds.

Scenario	Alpha	Beta (10^{-5})	Phi (sd)	S_{msy}	S_{max}	S_{eq}
Bayesian State-Space	8.16 (4.75, 12.97)	1.15 (0.79, 1.49)	0.253 (-0.717, 0.934)	64515 (53290, 81371)	86615 (67289, 126400)	184300 (162300, 225500)
Traditional	7.21 (5.60, 9.28)	0.97 (0.82, 1.11)		74801 (69116, 82700)	103479 (89831, 121233)	204912 (199687, 217762)

Several alternative assumptions were considered, such as greater uncertainty in harvests, and age composition; and incorporating age-specific harvest rates. However, estimates from the alternative configurations were similar to current model, and thus are not presented here.

Drainage-wide Biological Escapement Goal Ranges

For setting a Kuskokwim drainage-wide escapement goal, two standard goal criteria were considered, based on maximizing sustained yield (MSY) and production (R_{max}). From those, two scenarios were considered: 1) achieving 90% of MSY/R_{max} more than 90% of time, 2) achieving 90% of MSY/R_{max} more than 80% of time. (Table 2, Figures 4,5)



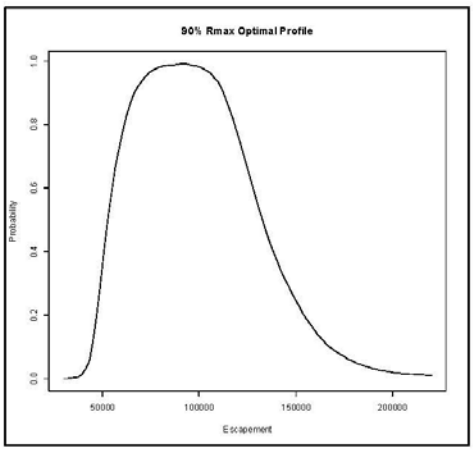


Figure 5 (left) Optimal 90% MSY yield profile.
Figure 6 (right) Optimal 90% Rmax profile

Table 2. Proposed drainage wide escapement goals between Bayesian and Traditional spawner-recruit models.

	90% MSY >90%	90% MSY >80%	90% R_{max} >90%	90% R_{max} >80%
Bayesian	46800-84500	45500-85800	66100-111700	62300-117400
Traditional	51000-102000	49500-104000	69500-145000	67500-148000

Based on optimum yield curve, escapement goal range of MSY based is 46,800 – 84,500, and that of R_{max} based is 66,100 – 111,700 (Table 2). Escapement goals based on Traditional model was similar but slightly higher and wider range. With all the above goals, there is greater than

95% probability that the expected yield is at least 100,000 (Figure 7). It should again be noted that the BEG ranges presented above are merely examples. The Escapement Goal Team is strongly encouraged to consider alternative goals based on other factors.

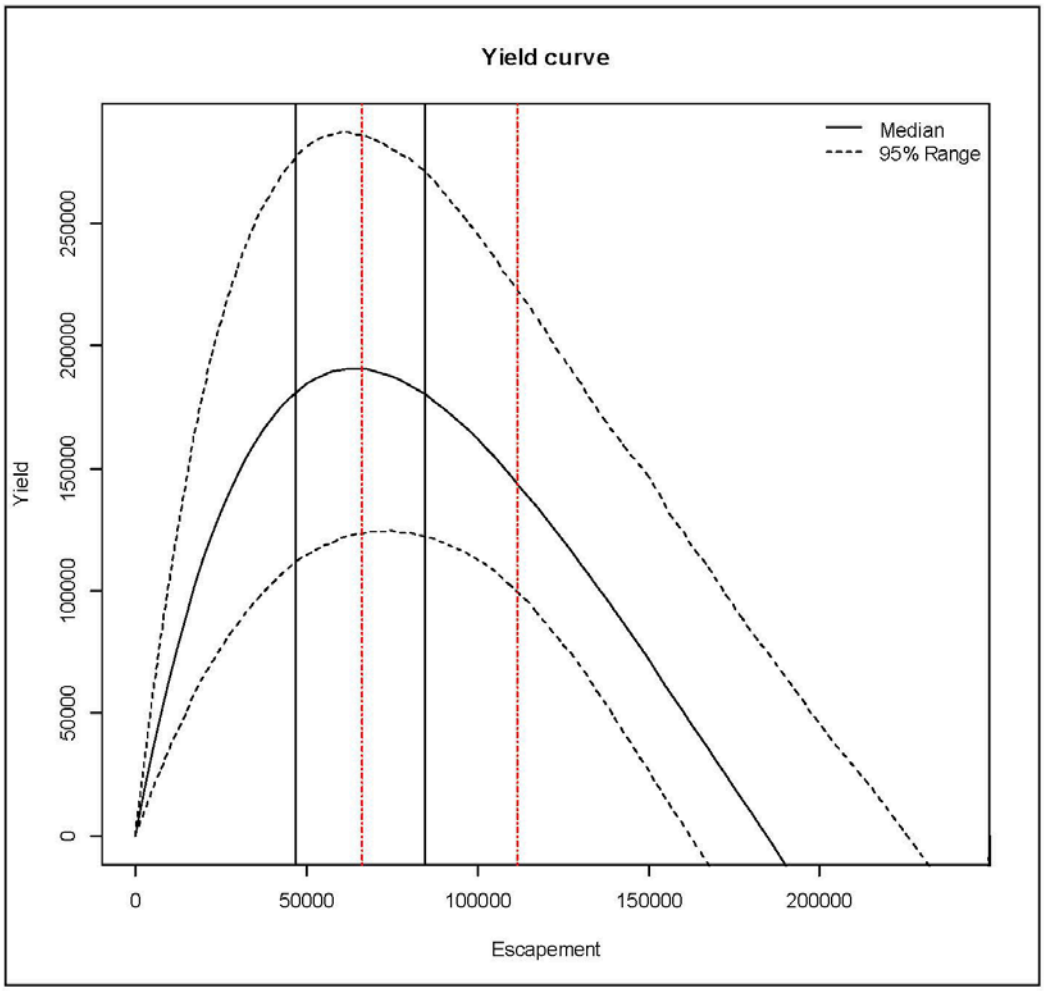


Figure 7. Yield curve with 90%MSY (black) and 90% R_{max} (Red) based escapement goal ranges.

Appendix D: Septembe 26, 2012 letter from AVCP to the Department of Fish and Game.

AVCP

Association of Village Council Presidents
Administration
Pouch 219, Bethel, AK 99559

Raymond Watson, Chairperson
Myron P. Naneng Sr., President
Phone: (907) 543-7300
Fax: (907) 543-3369

Akiachak
Akiak
Alakanuk
Andreafsky
Aniak
Atmautluak
Bethel
Bill Moore's Sl.
Chefornak
Chevak
Chuathbaluk
Chuloonawick
Crooked Creek
Eek
Emmonak
Georgetown
Goodnews Bay
Hamilton
Hooper Bay
Lower Kalskag
Upper Kalskag
Kasigluk
Kipnuk
Kongiganak
Kotlik
Kwethluk
Kwigillingok
Lime Village
Marshall
Mekoryuk
Mtn. Village
Napaimiut
Napakiak
Napaskiak
Newtok
Nightmute
Nunakauyak
Nunam Iqua
Nunapitchuk
Ohogamiut
Oscarville
Paimiut
Pilot Station
Pitka's Point
Platinum
Quinhagak
Red Devil
Russian Mission
Scammon Bay
Sleetmute
St. Mary's
Stony River
Tuluksak
Tuntutuliak
Tununak
Umkumiut

September 26, 2012

John Linderman, AYK Regional Supervisor
Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, AK 99518-1565

Dear Mr. Linderman,

I am writing on behalf of the Association Village Council Presidents, who represents the 56 Tribes of the Yukon-Kuskokwim Delta, to express our concerns regarding pending Kuskokwim escapement goal recommendations from the Department. This letter is intended to be a courtesy letter about our concerns about the timeline and the process.

Specifically, we are writing to request that all materials are provided in a timely way so that key stakeholders can have input into decisions that will be made that effects the lives of our Tribal members. It is the "common memory" of many stakeholders at the August 21 and 22 Working Group Meeting/AAR meeting that we were told the escapement goal recommendations would be available the first week in September. It's also our understanding that these goals have been final since that time. After not seeing a public release of recommendations both Bering Sea Fisherman's Association and AVCP contacted you asking for an update. You stated to BSFA that the memo would be available September 24th and stated to AVCP that escapement goals have been finalized and the memo would be available September 24th or 25th.

Still, key concerned stakeholders including AVCP, Tanana Chiefs Conference, other Tribal entities, and the Working Group have yet to receive any information about the forthcoming recommendations to the Board of Fisheries. Furthermore, the deadline for comments to the Board of Fisheries to be posted on the Board of Fisheries website for the public to see was September 25 and has now past. While we do realize that we can still provide comment to the Board of Fisheries, those comments will not be published online. We feel that it is poor process to not have the recommendations available to comment on before the comment deadline.

We expect the Alaska Department of Fish and Game to provide a meaningful period for review of any escapement goal recommendations and the analysis and data used to develop those recommendations. To permit meaningful review we assume that the Departments staff recommendations will be accompanied by the full analysis, all data, and model code that supports those

escapement goal recommendations would of course be made available at the same time as the release of the recommendations to create transparent and allow for full independent review by concerned stakeholders. We currently have one business day until the end of season Working Group meeting. We have four business days prior the Annual AVCP Convention, a meeting where we discuss crucial issues with our Tribal members. We have eight business days prior to the Board of Fisheries Work Session and less than four months before the Board of Fisheries AYK meeting. We already feel that the Department has not provided adequate information or time for review of that information in advance of the upcoming BOF Work Session.

Sincerely,

Raymond Watson, Chairman
Association of Village Council Presidents

Myron P. Naneng, Sr., President

Cc Beverly Hoffman, Lamont Albertson, and Greg Roczicka, Kuskokwim River Salmon Management Working Group Chairs
Cc Mike Thalhauser, Fisheries Director, Kuskokwim Native Association
Cc Karen Gillis, Bering Sea Fisherman's Association
Cc John Sky Starkey, Hobbs Straus Dean & Walker
Cc Orville Huntington, Wildlife & Parks Director, Tanana Chiefs Conference
Cc Gene Peltola Jr., Refuge Manager, USFWS
Cc Pete Probasco, Assistant Regional Director, Office of Subsistence Management
Cc Senator Lyman Hoffman
Cc Representative Bob Herron, House District 38
Cc Karl Johnstone, Board of Fisheries Chairman
Cc Monica Wellard, Board Support Staff Director

Appendix E: Beverly Hoffmans letter of recruitment for the Upriver Elder seat.

Kuskokwim River Salmon Management Working Group

P.O. BOX 1467 • BETHEL, AK 99559 • 907-543-2433 • 907-543-2021 FAX

Dear

The Kuskokwim Salmon Management Working Group needs to fill the Upriver Elder seat left vacant when we lost the late Iyana Gusty. We would like your community to appoint an elder who will work with other stakeholders on issues and management of our Kuskokwim Salmon.

This individual will need to attend Working Group inseason meetings via teleconference and at least once a year in person. It would be good if the tribal organization can be responsible for receiving the agenda packets prior to each meeting and making sure the upper river elder has a place to use a telephone to call in. All calls are toll-free.

We are anxious to have someone in this seat. Please contact any of the chairs regarding this matter. I have listed all the Working Group members who volunteer their time to work on the issues and management of all Kuskokwim Salmon Species. Quyana for your help in filling this seat.

Sincerely,

Beverly A. Hoffman, Co-Chair

KUSKOKWIM RIVER SALMON MANAGEMENT WORKING GROUP

Teleconference number: 1-800-315-6338 (MEET); Code: 58756# (KUSKO#)

MEMBER SEAT	*NAME*	*COMMUNITY*
DOWNRIVER ELDER	**JAMES CHARLES** CHUCK CHALIAK	Tuntutuliak Nunapitchuk
HEADWATERS SUBSISTENCE	**DANIEL ESAI** NICK PETRUSKA	Nikolai Nikolai
UPRIVER ELDER	*vacant*	
LOWER RIVER SUBSISTENCE	**MIKE WILLIAMS** GREG ROCZICKA	Akiak Bethel
MIDDLE RIVER SUBSISTENCE	**GERALD SIMEON** ANGELA MORGAN WAYNE MORGAN	Aniak Aniak Aniak
UPRIVER SUBSISTENCE	**EVELYN THOMAS** MARK LEARY	Crooked Creek Napaimute
PROCESSOR	**STUART CURRIE** **NICK SOUZA** TONY JOAQUIN	Kuskokwim Seafoods CVS CVS
MEMBER AT LARGE	**HENRY LUPIE** FRITZ CHARLES GEORGE ALEXIE	Tuntutuliak Bethel Eek
YK DELTA RAC	**BOB ALOYSIUS** JOHN W. ANDREW	Kalskag Kwethluk
COMMERCIAL FISHER	**CHARLIE BROWN** GEORGE ALEXIE	Eek Eek
WESTERN INTERIOR RAC	**RAY COLLINS** CARL MORGAN	McGrath Aniak
ADF&G	TRAVIS ELISON	Bethel
SPORT FISHING	**LAMONT ALBERTSON** BEV HOFFMAN	Aniak Bethel

CO CHAIRS: Greg Roczicka, Lamont Albertson, Beverly Hoffman

Primary members are in **bold** type

Grey shading means may not be a member anymore

Appendix F: Scientific references used in drafting the Kuskokwim River Chinook Salmon Run Reconstruction.

Kuskokwim Run Reconstruction papers can be found on the web:

Schaberg, K.L., Z. W. Liller, D.B. Molyneaux, B.G. Bue, and L. Stuby. 2012. Estimates of total annual return of Chinook salmon to the Kuskokwim River, 2002-2007. Alaska Department of Fish and Game, Fishery Data Series No. 12-36, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/FDS12-36.pdf

Bue, B.G., K.L. Schaberg, Z.W. Liller, and D.B. Molyneaux. 2012. Estimates of the historic run and escapement for the Chinook salmon stock returning to the Kuskokwim River, 1976-2011. Alaska Department of Fish and game, Fishery Data Series No. 12-49, Anchorage. http://www.sf.adfg.state.ak.us/FedAidpdfs/FDS12-49.pdf

REFERENCES CITED

Bavilla, J., D. Bue, H. Carroll, T. Elison, D. Taylor, J. Estensen and C. Brazil. 2010. 2009 Kuskokwim area management report. Alaska Department of Fish and Game, Fishery Management Report No. 10-56, Anchorage.

Bromaghin, J. F., and T. J. Underwood. 2004. Evidence of residual effects from the capture and handling of Yukon River fall chum salmon in 2002. U. S. Fish and Wildlife Service, Alaska Fisheries Technical Report Number 70, Anchorage Alaska.

Bromaghin, J. F., R. M. Nielson, and J. J. Hard. 2011. A model of Chinook salmon population dynamics incorporating size-selective exploitation and inheritance of polygenic correlated traits. Natural Resource Modeling 24:1–47.

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

Chapman, D. G. 1951. Some properties of the hypergeometric distribution with applications to zoological censuses. University of California Publications in Statistics 1:131-160.

Chythlook, J. 2009. Fishery management report for sport fisheries in the Kuskokwim management area, 2006. Alaska Department of Fish and Game, Fishery Management Report No. 09-07, Anchorage.

Costello, D. J., D. B. Molyneaux, and C. Goods. 2008. Takotna River salmon studies, 2007. Alaska Department of Fish and Game, Fishery Data Series No. 08-38, Anchorage.

Efron, B. 1982. The jackknife, the bootstrap, and other resampling plans. Society for Industrial and Applied Mathematics. Philadelphia.

Hamazaki, T. 2011. Reconstruction of subsistence salmon harvests in the Kuskokwim Area, 1990–2009. Alaska Department of Fish and Game, Fishery Manuscript Series No. 11-09, Anchorage.

Harris, F., and K. C. Harper. 2010. Characterization of Tuluksak Chinook salmon subsistence harvests, 2008 and 2009. U.S. Fish and Wildlife Service, Kenai Fishery Resource Office, Alaska Fisheries Data Series Number 2010-07, Soldotna, Alaska.

Hilborn, R., T. P. Quinn, D. E. Schindler and D. E. Rogers. 2003. Biocomplexity and fisheries sustainability. Proceedings of the National Academy of Sciences of the United States of America 100(11):6564-6568.

REFERENCES CITED (Continued)

Johnson, J., and M. Daigneault. 2008. Catalog of waters important for spawning, rearing, or migration of anadromous fishes – Western Region, Effective June 2, 2008. Alaska Department of Fish and Game, Special Publication No. 08-08, Anchorage.

Miller, S. J., K. C. Harper, C. Whaley. 2008. Abundance and run timing of adult Pacific salmon in the Kwethluk River, Yukon Delta National Wildlife Refuge, Alaska 2007. U.S. Fish and Wildlife Service, Alaska Fisheries Data Series No. 2008-18, Soldotna

Molyneaux, D. B., and L. K. Brannian. 2006. Review of escapement and abundance information for Kuskokwim area salmon stocks. Alaska Department of Fish and Game, Fishery Manuscript No. 06-08, Anchorage.

Molyneaux, D. B., A. R. Brodersen, and C. A. Shelden. 2010. Salmon age, sex, and length catalog for the Kuskokwim area, 2009. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A10-05, Anchorage.

Parken, C. K., R. E. McNicol, and J. R. Irvine. 2006. Habitat-based methods to estimate escapement goals for data limited Chinook salmon stocks in British Columbia, 2004. Fisheries and Oceans Canada, Research Document 2006/083, Nanaimo, British Columbia.

Plumb, M. P., and K. C. Harper. 2008. Abundance and run timing of adult Pacific salmon in the Tuluksak River, Yukon Delta National Wildlife Refuge, Alaska 2007. U.S. Fish and Wildlife Service, Alaska Fisheries Data Series No. 2008-4, Kenai

Schaberg, K. L., Z. W. Liller, and D. B. Molyneaux. 2010. A mark–recapture study of Kuskokwim River coho, chum, sockeye, and Chinook salmon, 2001–2006. Alaska Department of Fish and Game, Fishery Data Series No. 10-32, Anchorage.

Schindler, D. E., R. Hilborn, B. Chasco, C. P. Boatright, T. P. Quinn, L. A. Rodgers, and M. S. Webster. 2010. Population diversity and the portfolio effect in an exploited species. Nature 465:609-612.

Seber, G. A. F. 1982. The estimation of animal abundance and related parameters, second edition. Edward Arnold, London.

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

Stewart R., D. J. Costello, D. B. Molyneaux, and J. M. Thalhauser. 2008. Tatlawiksuk River salmon studies, 2007. Alaska Department of Fish and Game, Fishery Data Series No. 08-59, Anchorage.

Stuby, L. 2003. Inriver abundance of Chinook salmon in the Kuskokwim River, 2002. Alaska Department of Fish and Game, Fishery Data Series No. 03-22, Anchorage.

Stuby, L. 2004. Inriver abundance of Chinook salmon in the Kuskokwim River, 2003. Alaska Department of Fish and Game, Fishery Data Series No. 04-30, Anchorage.

Stuby, L. 2005. Inriver abundance of Chinook salmon in the Kuskokwim River, 2002-2004. Alaska Department of Fish and Game, Fishery Data Series No. 05-46, Anchorage.

Stuby, L. 2006. Inriver abundance of Chinook salmon in the Kuskokwim River, 2005. Alaska Department of Fish and Game, Fishery Data Series No. 06-45, Anchorage.

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

Thalhauser, J. M., D. J. Costello, R. Stewart, and D. B. Molyneaux. 2008. George River salmon studies, 2007. Alaska Department of Fish and Game, Fishery Data Series No. 08-63, Anchorage.

Williams, D. L., and C. A. Shelden. 2010. Kogrukluk River weir salmon studies, 2008. Alaska Department of Fish and Game, Fishery Data Series No. 10-24, Anchorage.

Winter, J. D. 1983. Underwater biotelemetry. Pages 371-395 [In]: L. A. Nielsen and D. L. Johnson, editors. Fisheries Techniques. American Fisheries Society, Bethesda, Maryland.

Appendix G: Email explanation of Biometric rational for the level of precision placed on Tributary Escapement Goal revisions.

From: Shelden, Christopher A (DFG)
Sent: Monday, October 15, 2012 9:46 AM
To: Kuskokwim River Salmon Management Working Group Distribution List
Subject: Action item: request for Data from September 27 meeting.

Below is a response to questions asked during a recent meeting of the KRSMWG. The department is making an effort to be as open and forthcoming and answer as many questions as possible. These issues will also be dealt with in the upcoming escapement goal report that will be published concerning the selection of Kuskokwim River Chinook salmon escapement goals:

At the time of the August 27 Working Group meeting, Doug Molyneaux and Casie Stockdale asked some questions about the recommended Tributary escapement goals, and how they might be adjusted for uncertainty. At the time, staff alluded to conversations with biometric staff involved in the goal development, saying that the option had been considered and rejected. Staff resolved to confer and get back to the Working Group with an answer to these questions:

Question: Doug pointed out that there was some acceptable uncertainty in the model based drainage-wide goal. He said that the practice of tributary goals being derived from that first goal was a valid approach, but is more uncertain because they were an estimate derived from another estimate. For that reason he suggested a buffer, or an upward adjustment in the escapement goal, to address that uncertainty and safeguard against problems including sex ratios that cannot be accounted for in the goal directly (there is extensive discussion of this concern documented in the September 27 meeting summary).

Answer from staff: "The buffer consideration for tributaries was actually addressed within the Kuskokwim River Escapement goal. We did not recommend setting the SEG at Maximum Sustained Yield (msy). We moved it up to MAX (constituting a "buffer" of sorts) and then used the *lower 90%* CI range (instead of the normal 80% constituting a further "buffer") and the *upper 80% CI* range (not 90% like the lower, further constituting a "buffer"). Therefore when applying the tributary proportions, we already have a well built-in 'tributary buffer."

It should be noted that this is not an opinion-based (subjective) "buffer" placed on a goal to help ensure against a suspected problem. This is an observation-based (objective) goal range that has been derived and adjusted with the intent of accounting for unknowns. It's a more solid and defensible form of safeguard against unknown variation.

The tributary goals, being derived from the drainage-wide goal, already have the safeguard built in so no further buffer was warranted.

Question: Casie Stockdale was concerned about the level of uncertainty in tributary goals being discussed in the prior question. Kevin Schaberg addresses this point by discussing the alternative method
that was considered for developing the tributary escapement goals:

Answer from staff: "An alternative approach was considered for developing the tributary proportions. This entailed using model generated escapements at weir projects to develop the proportions. This was deemed unacceptable because you would be estimating the annual escapement within the model for each tributary using a proportion (parameter estimate). Therefore when you back calculate the proportions you won't get variability in your annual proportions because you used a stable proportion in estimating tributary escapement." This stability would be artificial and would have a negative effect on the performance of the model. Developing the drainage-wide goal first and back calculating the tributary goals is much better than the other way around.