

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

Division of Commercial Fisheries

SEAN PARNELL, GOVERNOR

1255 W. 8TH Street
P.O. BOX 115526
JUNEAU, AK 99811-5526

PHONE: (907) 465-4210
FAX: (907) 465-2604

MEMORANDUM

TO: John Hilsinger, Director
Division of Commercial Fisheries

DATE: September 21, 2009

and

Charles Swanton, Director
Division of Sport Fish

THRU: John Linderman, Regional Supervisor
Division of Commercial Fisheries
Region III - Anchorage

SUBJECT: AYK Escapement
Goal Report

and

Don Roach, Regional Supervisor
Division of Sport Fish
Region III - Fairbanks

FROM: Dani Evenson, Regional Research Supervisor
Division of Commercial Fisheries
Region III - Anchorage

and

Matt Evenson, Regional Research Supervisor
Division of Sport Fish
Region III - Fairbanks

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 non-governmental organizations. A timeline was agreed upon (Appendix A) for goal development, documentation, public review, presentation to the board, and final submission to the division directors. The review team helped direct the work of other staff and reviewed that work in the process of making escapement goal recommendations.

An oral and written report (Volk 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 2010. These reports 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 2010 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 Chinook salmon, 4 chum salmon, 3 coho salmon, and 4 sockeye salmon stocks (Table 1). A comprehensive review of escapement data for most Kuskokwim Management Area stocks was conducted for the 2007 board cycle (Molyneaux and Brannian 2006), and this team only reviewed stocks for which there was sufficient evidence to justify further reviews for escapement goals.

The review team is recommending one new coho salmon goal based on weir and tower counts at the Kwethluk River. Nine years of escapement estimates are available from recent years and all were realized under a light to moderate harvest regime. The recommended goal is a sustainable escapement goal (SEG) threshold of >19,000 coho salmon, which corresponds to the minimum observed escapement. It was the consensus of the review team that escapements exceeding this threshold would be sustainable and would provide for moderate yields.

The review team is also recommending one new sockeye salmon escapement goal based on weir counts at the Kogruklu River (a tributary of the Holitna River). There are active subsistence and commercial sockeye salmon fisheries in the Kuskokwim River with an amount necessary for subsistence finding of 27,500-39,500 fish and a guideline harvest level of 50,000 fish, yet there are no escapement goals for sockeye salmon anywhere in the Kuskokwim River drainage. Recent radiotelemetry studies have shown that up to 70% of Kuskokwim River drainage sockeye salmon spawn in the Holitna drainage and 12-13% of these fish spawn in the Kogruklu River. The recommended SEG is 4,400-17,000 sockeye salmon and was derived using the percentile approach (Bue and Hasbrouck 2001).

All other existing goals are recommended to continue without revision. Twenty-eight additional stocks in the Kuskokwim Management Area were reviewed, but no goals were recommended.

Reasons for not recommending a goal were generally because there was a lack of sufficient data or because a particular enumeration method was changed.

Yukon Management Area

In the Yukon River Management Area, which includes the entire Yukon River drainage, there are currently 17 established escapement goals for 7 Chinook salmon, 2 summer chum salmon, 7 fall chum salmon, and 1 coho salmon stocks (Table 2). Eleven of these goals are biological escapement goals (BEG) developed from spawner-recruit analyses. Six are SEGs developed using the percentile approach. In addition, there are three goals for Canadian stocks, not listed here, that were established as part of the *Yukon River Salmon Agreement*. Annual escapement targets for these Canadian stocks (mainstem Yukon River Chinook salmon, mainstem Yukon River fall chum salmon, and Fishing Branch River fall chum salmon) are set annually by the Yukon River Panel through agreement based on rebuilding plans.

The review team is recommending revision of the Chinook salmon SEG for the East Fork Andreafsky River from an aerial survey-based goal to a weir-based goal. The previous aerial goal was 960-1,700 Chinook salmon. The recommended new SEG is 2,100-4,900 Chinook salmon past the weir and was derived using the percentile approach. The team is also recommending elimination of the Gisasa River aerial survey goal for Chinook salmon because aerial surveys do not appear to track true abundance based on recent weir counts.

For East Fork Andreafsky summer chum salmon, the team is recommending that the weir-based BEG of 65,000-130,000 chum salmon be changed to an SEG threshold of >40,000. This recommendation is based on a stock-recruit analysis using a Bayesian approach that accommodates data uncertainty associated with measurement error and missing data. Even though this stock has experienced light exploitation in recent years, the existing escapement goal has rarely been met. The stock-recruit analysis indicates that meeting or exceeding this threshold should provide a >90% probability of providing at least 70% of maximum sustained yield (MSY).

The review team is also recommending that the drainage-wide BEG for fall chum salmon be changed to an SEG because the current goal range does not provide for a high probability of achieving MSY. No change is recommended for the specific numerical goal range. Additionally, the review team is recommending that the Toklat River fall chum salmon BEG be eliminated. Environmental changes have altered the relationship between surveys and peak spawning dates and channel breaches have altered the flow of the mainstem river through some of the more productive habitat, obscuring fish and making counts impossible. These changes have rendered the Toklat River survey unreliable and foot surveys have been discontinued. With no assessment to evaluate performance of the goal, it should be eliminated.

All other existing goals are recommended to continue without revision. Eighteen additional stocks in the Yukon Management Area were reviewed, but no goals were recommended. Reasons for not recommending a goal were generally because there was a lack of sufficient data or because a particular enumeration method was changed.

Norton Sound-Port Clarence and Kotzebue Management Areas

A total of 32 escapement goals exist in the Norton Sound-Port Clarence and Kotzebue Management Areas for 5 Chinook salmon, 17 chum salmon, 3 coho salmon, 5 pink salmon, and 2 sockeye salmon stocks (Table 3). Biological escapement goals exist for 4 stocks, including Norton Sound Subdistrict 1 (Nome) chum salmon, Kwiniuk and Tubutulik Rivers chum salmon, and Kotzebue (all areas) chum salmon, and the remaining 28 goals are SEGs.

The review team is recommending elimination of aerial survey SEGs for chum salmon on the Flambeau, Sinuk, Solomon, and Bonanza Rivers. Due to weather, uncertainty of the relationship of the survey to peak spawning time, and availability of aircraft, these counts are unreliable for evaluating goals on these specific systems. However, the aerial surveys will continue when possible and be used as part of the overall evaluation of the Subdistrict 1 chum salmon goal. The team recommends changing the Niukluk River chum salmon goal to an SEG threshold of >23,000 based on a risk analysis (Bernard et al. 2009) which indicated escapements exceeding this threshold would result in only a 6.6% estimated risk of a management concern (4 consecutive years of escapements below the threshold), and only a 6.4% estimated risk of experiencing a 75% drop in mean escapement

The review team is also recommending a modification to the range of the SEG for Niukluk coho salmon. The previous goal (2,400-5,800 coho salmon) did not account for subsistence and sport harvest occurring upstream from the counting tower. Subsistence permits and the sport fishing statewide harvest survey now specifically enumerate harvest above the tower. The revised SEG of 2,400-7,200 coho salmon was derived using the percentile approach and reflects true escapement above the tower.

All other existing goals are recommended to continue without revision. Twenty-three additional stocks in the Norton Sound-Port Clarence and Kotzebue Management Areas were evaluated during the current review, but no goals were recommended. Reasons for not recommending a goal were typically because there was a lack of sufficient data or because a particular enumeration method was changed.

LITERATURE CITED

- Bernard, D. R., J. J. Hasbrouck, B. G. Bue and R. A. Clark. 2009. Estimating risk of management error from precautionary reference points (PRPs) for non-targeted salmon stocks. Alaska Department of Fish and Game, Special Publication No. 09-09, Anchorage.
- Bue, B. G. and J. J. Hasbrouck. 2001. Escapement goal review of salmon stocks of Upper Cook Inlet. Alaska Department of Fish and Game, Report to the Board of Fisheries, 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.
- Volk, E., M. J. Evenson, and R. A. Clark. *In prep.* Escapement goal recommendations for select Arctic-Yukon-Kuskokwim Region salmon stocks, 2010. Alaska Department of Fish and Game, Fishery Manuscript, Anchorage.

Table 1. Summary of escapement goal recommendations for Kuskokwim Management Area salmon stocks for 2010.

| Stock Unit | Enumeration | Current Escapement Goal | | | Escapement Goal Recommendation | | |
|-------------------------------|---------------|-------------------------|------|------------------|--------------------------------|---------------------|------|
| | Method | Goal | Type | Year Established | Action | New or Revised Goal | Type |
| Chinook Salmon | | | | | | | |
| Aniak River | Aerial Survey | 1,200-2,300 | SEG | 2005 | No Revision | | |
| Cheneetnuk River | Aerial Survey | 340-1,300 | SEG | 2005 | No Revision | | |
| Gagaraya River | Aerial Survey | 300-830 | SEG | 2005 | No Revision | | |
| George River | Weir | 3,100–7,900 | SEG | 2007 | No Revision | | |
| Goodnews River (Main Fork) | Aerial Survey | 640-3,300 | SEG | 2005 | No Revision | | |
| Holitna River | Aerial Survey | 970-2,100 | SEG | 2005 | No Revision | | |
| Kanektok River | Aerial Survey | 3,500-8,000 | SEG | 2005 | No Revision | | |
| Kisaralik River | Aerial Survey | 400-1,200 | SEG | 2005 | No Revision | | |
| Kogrukluk River | Weir | 5,300-14,000 | SEG | 2005 | No Revision | | |
| Kwethluk River | Weir | 6,000–11,000 | SEG | 2007 | No Revision | | |
| Middle Fork Goodnews River | Weir | 1,500–2,900 | BEG | 2005 | No Revision | | |
| Pitka Fork Salmon River | Aerial Survey | 470-1,600 | SEG | 2005 | No Revision | | |
| Salmon River (Aniak Drainage) | Aerial Survey | 330-1,200 | SEG | 2005 | No Revision | | |
| Tuluksak River | Weir | 1,100–2,100 | SEG | 2007 | No Revision | | |

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Table 1. Page 2 of 2.

| Stock Unit | Enumeration | Current Escapement Goal | | | Escapement Goal Recommendation | | |
|----------------------------|---------------|-------------------------|------|------------------|--------------------------------|---------------------|------|
| | Method | Goal | Type | Year Established | Action | New or Revised Goal | Type |
| Chum Salmon | | | | | | | |
| Aniak River | Sonar | 220,000-480,000 | SEG | 2007 | No Revision | | |
| Kanektok River | Aerial Survey | >5,200 | SEG | 2005 | No Revision | | |
| Kogruklu River | Weir | 15,000-49,000 | SEG | 2005 | No Revision | | |
| Middle Fork Goodnews River | Weir | >12,000 | SEG | 2005 | No Revision | | |
| Coho Salmon | | | | | | | |
| Kanektok River | Aerial Survey | 7,700-36,000 | SEG | 2005 | No Revision | | |
| Kogruklu River | Weir | 13,000-28,000 | SEG | 2005 | No Revision | | |
| Middle Fork Goodnews River | Weir | >12,000 | SEG | 2005 | No Revision | | |
| Kwethluk | Weir | None | | | Establish | >19,000 | SEG |
| Sockeye Salmon | | | | | | | |
| Goodnews River (Main Fork) | Aerial Survey | 5,500-19,500 | SEG | 2005 | No Revision | | |
| Kanektok River | Aerial Survey | 14,000-34,000 | SEG | 2005 | No Revision | | |
| Middle Fk. Goodnews River | Weir | 18,000-40,000 | BEG | 2007 | No Revision | | |
| Kogruklu River | Weir | None | | | Establish | 4,400-17,000 | SEG |

Table 2.—Summary of escapement goal recommendations for Yukon River Management Area for 2010.

| Stock Unit | Enumeration | Current Escapement Goal | | | Escapement Goal Recommendation | | |
|-----------------------------------|----------------------|-------------------------|------|------------------|--------------------------------|---------------------|------|
| | Method | Goal | Type | Year Established | Action | New or Revised Goal | Type |
| Chinook Salmon^a | | | | | | | |
| Andreafsky River (East Fork) | Aerial Survey | 960-1,700 | SEG | 2005 | Revise | 2,100-4,900 (weir) | SEG |
| Andreafsky River (West Fork) | Aerial Survey | 640-1,600 | SEG | 2005 | No Revision | | |
| Anvik River | Aerial Survey | 1,100-1,700 | SEG | 2005 | No Revision | | |
| Chena River | Tower/Mark-Recapture | 2,800-5,700 | BEG | 2001 | No Revision | | |
| Gisasa River | Aerial Survey | 420-1,100 | SEG | 2005 | Eliminate | | |
| Nulato River (forks combined) | Aerial Survey | 940-1,900 | SEG | 2005 | No Revision | | |
| Salcha River | Tower/Mark-Recapture | 3,300-6,500 | BEG | 2001 | No Revision | | |
| Chum Salmon (Summer) | | | | | | | |
| East Fork Andreafsky River | Weir | 65,000-130,000 | BEG | 2001 | Revise | >40,000 | SEG |
| Anvik River | Sonar | 350,000-700,000 | BEG | 2005 | No Revision | | |

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Table 2. Page 2 of 2.

| Stock Unit | Enumeration | Current Escapement Goal | | | Escapement Goal Recommendation | | |
|---|-----------------------|-------------------------|------|------------------|--------------------------------|---------------------|------|
| | Method | Goal | Type | Year Established | Action | New or Revised Goal | Type |
| Chum Salmon (Fall)^b | | | | | | | |
| Yukon R Drainage ^c | Multiple ^d | 300,000-600,000 | BEG | 2001 | Revise | 300,000-600,000 | SEG |
| Tanana River | Mark-Recapture | 61,000-136,000 | BEG | 2001 | No Revision | | |
| Delta River | Foot Survey | 6,000-13,000 | BEG | 2001 | No Revision | | |
| Toklat River | Foot Survey | 15,000-33,000 | BEG | 2001 | Eliminate | | |
| Upper Yukon R. Tributaries ^e | Multiple ^f | 152,000-312,000 | BEG | 2001 | No Revision | | |
| Chandalar River | Sonar | 74,000-152,000 | BEG | 2001 | No Revision | | |
| Sheenjek River | Sonar | 50,000-104,000 | BEG | 2001 | No Revision | | |
| Coho Salmon | | | | | | | |
| Delta Clearwater River | Boat Survey | 5,200-17,000 | SEG | 2005 | No Revision | | |

^a The Canadian Chinook salmon border escapement goal, which is under the Yukon River Salmon Agreement and reviewed annually by the Yukon River Panel is not included as part of this summary.

^b The Canadian fall chum salmon border escapement goal or Fishing Branch River goal, which are under the Yukon River Salmon Agreement and reviewed annually by the Yukon River Panel are not included in this summary.

^c This goal includes all Alaskan and Canadian stocks.

^d Includes foot survey, weir, sonar, aerial survey counts, and mark-recapture.

^e Includes Chandalar, Sheenjek, and Fishing Branch Rivers. Per footnote above, Fishing Branch River is not listed as an individual goal.

^f Includes sonar, weir, and aerial survey counts.

Table 3. Summary of escapement goal recommendations for Norton Sound/Port Clarence and Kotzebue Management Areas for 2010.

| Stock Unit | Enumeration | Current Escapement Goal | | | Escapement Goal Recommendation | | |
|---|------------------------|-------------------------|------|------------------|--------------------------------|---------------------|------|
| | Method | Goal | Type | Year Established | Action | New or Revised Goal | Type |
| <i>Norton Sound/Port Clarence Management Area</i> | | | | | | | |
| Chinook Salmon | | | | | | | |
| Fish R./Boston Cr. | Aerial Survey | >100 | SEG | 2005 | No Revision | | |
| Kwiniuk River | Tower | 300-550 | SEG | 2005 | No Revision | | |
| North River (Unalakleet R.) | Tower | 1,200-2,600 | SEG | 2005 | No Revision | | |
| Old Woman R. (Unalakleet R.) | Aerial Survey | 550-1,100 | SEG | 2005 | No Revision | | |
| Shaktoolik River | Aerial Survey | 400 - 800 | SEG | 2005 | No Revision | | |
| Chum Salmon | | | | | | | |
| Bonanza River | Expanded Aerial Survey | 2,300-3,400 | SEG | 2001 | Eliminate | | |
| Eldorado River | Expanded Aerial Survey | 6,000-9,200 | SEG | 2001 | No Revision | | |
| Flambeau River | Expanded Aerial Survey | 4,100-6,300 | SEG | 2001 | Eliminate | | |
| Kwiniuk River | Tower | 10,000-20,000 | BEG | 2001 | No Revision | | |
| Niukluk River (Fish R.) | Tower | >30,000 | SEG | 2005 | Revise | >23,000 | SEG |
| Nome River | Weir | 2,900-4,300 | SEG | 2001 | No Revision | | |
| Old Woman R. (Unalakleet R.) | Aerial Survey | 2,400-4,800 | SEG | 2005 | No Revision | | |
| Sinuk River | Expanded Aerial Survey | 4,000-6,200 | SEG | 2001 | Eliminate | | |
| Snake River | Tower/weir | 1,600-2,500 | SEG | 2001 | No Revision | | |
| Solomon River | Expanded Aerial Survey | 1,100-1,600 | SEG | 2001 | Eliminate | | |

Table 3. Page 2 of 3.

| Stock Unit | Enumeration | Current Escapement Goal | | | Escapement Goal Recommendation | | |
|--|------------------------|-------------------------|------|------------------|--------------------------------|---------------------|------|
| | Method | Goal | Type | Year Established | Action | New or Revised Goal | Type |
| Chum Salmon, continued | | | | | | | |
| Subdistrict One (Nome, all systems) | Multiple | 23,000-35,000 | BEG | 2001 | No Revision | | |
| Tubutulik River | Expanded Aerial Survey | 8,000-16,000 | BEG | 2001 | No Revision | | |
| Coho Salmon | | | | | | | |
| Kwiniuk River | Aerial Survey | 650-1,300 | SEG | 2005 | No Revision | | |
| Niukluk River | Tower | 2,400-6,100 | SEG | 2007 | Revise | 2,400-7,200 | SEG |
| North River (Unalakleet R.) | Aerial Survey | 550-1,100 | SEG | 2005 | No Revision | | |
| Pink Salmon | | | | | | | |
| Kwiniuk River (all years) | Tower | >8,400 | SEG | 2005 | No Revision | | |
| Niukluk River (all years) | Tower | >10,500 | SEG | 2005 | No Revision | | |
| Nome River (even year) | Weir | >13,000 | SEG | 2005 | No Revision | | |
| Nome River (odd year) | Weir | >3,200 | SEG | 2005 | No Revision | | |
| North River (Unalakleet. R. all years) | Tower | >25,000 | SEG | 2005 | No Revision | | |

Table 3. Page 3 of 3.

| Stock Unit | Enumeration | Current Escapement Goal | | | Escapement Goal Recommendation | | |
|--|---------------------------|-------------------------|------|------------------|--------------------------------|---------------------|------|
| | Method | Goal | Type | Year Established | Action | New or Revised Goal | Type |
| Sockeye Salmon | | | | | | | |
| Salmon Lake | Aerial Survey | 4,000-8,000 | SEG | 2005 | No Revision | | |
| Glacial Lake | Aerial Survey | 800-1,600 | SEG | 2005 | No Revision | | |
| <u>Kotzebue Management Area</u> | | | | | | | |
| Chum Salmon | | | | | | | |
| Kotzebue (all areas) | Expanded Aerial Survey | 196,000–421,000 | BEG | 2007 | No Revision | | |
| Noatak/Eli Rivers | Aerial Survey | 42,000–91,000 | SEG | 2007 | No Revision | | |
| Salmon River (Kobuk R. drainage) | Aerial Survey | 3,300-7,200 | SEG | 2007 | No Revision | | |
| Squirrel River (Kobuk R. drainage) | Aerial Survey | 4,900–10,500 | SEG | 2007 | No Revision | | |
| Tutuksuk River (Kobuk R. drainage) | Aerial Survey | 1,400-3,000 | SEG | 2007 | No Revision | | |
| Upper Kobuk and Selby Rivers | Aerial Survey | 9,700–21,000 | SEG | 2007 | No Revision | | |

Appendix A. Timeline for review and reporting escapement goal recommendations for 2010.

FINAL
2010 Board of Fisheries Meeting
Escapement Goal Review Team
Timeline for Review and Reporting

| | |
|---------------------|---|
| February 26, 2008 | Initial Escapement Goal Review Team meeting to determine stocks to be reviewed. |
| April 17, 2008 | Meeting with regional and area staff to review timelines and procedures and make assignments for escapement goal analyses. |
| April 30, 2008 | Notification sent to NGO's and stakeholders about the escapement goal review process and the need for analysis presentations at October meeting. |
| October 14-15, 2008 | Presentation and review of preliminary work on assignments. |
| December 10, 2008 | Presentation and review of additional work assignments made at the October meeting. |
| March 16, 2009 | Draft summary of escapement goal recommendations sent to agency staff and public. |
| April 10, 2009 | Board of Fisheries proposal deadline. |
| March – Dec. 2009 | Agency staff and public continue review of escapement goal reports and recommendations. Meet as necessary to refine or revise reports and recommendations prior to Board meeting. |
| October 13-14, 2009 | Summary of escapement goal recommendations presented at Board of Fisheries Work session. |
| October 15, 2009 | Draft Escapement Goal report sent for peer review. |
| December, 2009 | Final recommendations sent to board as a staff report. |
| January 26-31, 2010 | AYK Board of Fisheries meeting. |
| February 2010 | Memo from Regional Research Supervisors through Regional Supervisors to division directors describing escapement goal recommendations for approval signatures. |
