THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Fish and Game
DIVISIONS OF SPORT FISH & COMMERCIAL FISHERIES
333 Raspberry Road
Anchorage, AK 99518

MEMORANDUM

TO: Forrest R. Bowers, Acting Director
Division of Commercial Fisheries

Thomas Brookover, Director
Division of Sport Fish

THRU: Bert Lewis, Regional Supervisor BL
Division of Commercial Fisheries, Region II

Thomas Vania, Regional Supervisor TV
Division of Sport Fish, Region II

FROM: Jack Erickson, Regional Research Coordinator JWE
Division of Commercial Fisheries, Region II

Timothy McKinley, Regional Research Coordinator TRM
Division of Sport Fish, Region II

DATE: October 3, 2018

SUBJECT: Bristol Bay Escapement Goal Memo

The purpose of this memo is to report our progress reviewing and recommending escapement goals for the Bristol Bay Management Area (BBMA). The *Policy for Statewide Salmon Escapement Goals* (5 AAC 39.223) recognizes the establishment of salmon escapement goals as a joint responsibility of the Alaska Department of Fish and Game (department) and the Alaska Board of Fisheries (board) and describes the concepts, criteria, and procedures for establishing and modifying salmon escapement goals. Under the policy, the board recognizes and describes the department's responsibility for establishing and modifying biological escapement goals (BEG) and sustainable escapement goals (SEG).

Beginning in February 2018, an interdivisional salmon escapement goal committee, including staff from the divisions of Commercial Fisheries and Sport Fish, initially met to discuss salmon escapement goals in the BBMA. Escapement goals for this area have been set and evaluated at regular intervals since statehood and many of these stocks have long-term historical datasets. The review was based on the *Policy for the Management of Sustainable Salmon Fisheries* (5 AAC 39.222) and the *Policy for Statewide Salmon Escapement Goals* (5 AAC 39.223). Two important terms 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."

The committee determined the appropriate goal type (BEG or SEG) for each salmon stock with an existing goal and reviewed other monitored stocks without an existing goal. Using available data, we determined the most appropriate methods to develop each escapement goal.

Currently 15 escapement goals are evaluated in BBMA (Table 1). Due to the comprehensive previous analyses in Cross et al. (1997), Fair (2000), Fair et al. (2004), Baker et al. (2006 and 2009), Fair et al. (2012), and Erickson et al. (2015) this review committee only considered reanalyzing goals with recent (2015–2017) escapements that might result in a substantially different escapement goal from the last review, or those that should be eliminated or newly established.

Sockeye salmon

For this review, we updated the sockeye salmon genetic harvest allocations to better account for mixed-stock harvest in each district, and to more accurately represent the true production of the primary stocks (Alagnak, Egegik, Igushik, Kvichak, Naknek, Nushagak, Ugashik, and Wood rivers) in Bristol Bay. The committee reviewed the updated stock-recruit analyses for each of these stocks and recommends no changes for Egegik, Igushik, Kvichak, Naknek, Nushagak, Ugashik, and Wood River sockeye salmon escapement goals.

For this review, the expansion factor (aerial counts to tower counts) for Alagnak River sockeye salmon was updated to include recent aerial surveys and tower counts, and corrections made to the aerial survey data. The committee recommends that the lower-bound SEG of 320,000 Alagnak River sockeye salmon assessed using tower counts be changed to a lower-bound SEG of 210,000. The committee also recommends that the companion lower-bound SEG of 125,000 assessed using a single aerial survey be eliminated in deference to the tower-based lower-bound SEG. Allocative implications associated with a change in this escapement goal are found within the *Alagnak River Sockeye Salmon Special Harvest Area Management Plan* (5 AAC 06.373).

King salmon

For this review, the time series for Nushagak River king salmon was updated to include recent harvest and escapement, and corrections made to the harvest data. The updated stock-recruit analysis resulted in a greater estimate of spawner abundance that maximizes sustained yield (S_{msy}) but the new S_{msy} estimate is well within the current goal. In addition, results from sonic-tagging (2011–2014) and capture-recapture (2014–2016) studies show that substantial numbers of king salmon are not enumerated by the existing sonar assessment. The escapement goal committee recommended no change be made to the existing goal and that a stock-recruit model be developed prior to the next Bristol Bay regulatory-cycle which incorporates the corrected harvest data and uncertainty in king salmon abundance estimated by the sonar.

The committee recommends the king salmon goal for the Alagnak River stock be discontinued because there are indications that aerial surveys conducted since 2015 may not index escapement the same as, or similar to, previous surveys used to develop the escapement goal. This goal was

recommended to be discontinued during the last board cycle, because funding was unavailable and uncertainty over the current survey observer efficiency in relation to historic aerial survey numbers.

Other recent indicators of relative king salmon abundance in the Alagnak River (e.g., Statewide Harvest Survey estimates of catch, guide logbook data, personal communication with anglers and guide businesses) are on par with years when historical survey index counts were greater than 3,000 fish. The exact reason(s) for these differences are unknown, in part because surveys have been conducted in a different manner (i.e., two observers per survey and multiple surveys per year since 2015 but one observer flying single aerial surveys historically). The department currently lacks the information needed to understand the relationship between current aerial survey data and the existing escapement goal, as well as reported sport fishing data. By discontinuing this goal, the *Alagnak River Sockeye Salmon Special Harvest Area Management Plan* (5 AAC 06.373 (c)) will need to be updated.

Pink, coho, and chum salmon

The committee concluded that updating the analyses for these stocks would not likely result in a substantially different escapement goals; therefore, the committee recommends no changes at this time.

In summary, this comprehensive review of the 15 existing salmon escapement goals in the BBMA resulted in recommendations to update 1 existing sockeye salmon escapement goal and discontinuing 2 escapement goals (one for sockeye salmon, one for king salmon). It is also recommended that a concerted effort be made by the department to develop a run reconstruction and stock-recruit analysis for Nushagak River king salmon that accounts for errors in harvest data used to develop the current escapement goal, and the uncertainty in proportion of king salmon counted by sonar that was identified by recent tagging and capture-recapture studies. Oral and written reports (Erickson et al. *In prep.*) concerning BBMA escapement goals and stock status will be presented to the board in December 2018. These reports will list current escapement goals for BBMA, detailed descriptions of the methods used to develop the goals, and annual escapements through 2018.

Table 1. – Summary of escapement goals and recommendations for salmon stocks in Bristol Bay Management Area.

System	Escapement Goal	Enumeration Method	Goal Type	Initial Year	Recommendation
KING SALMON					
Nushagak River	55,000 – 120,000	sonar	SEG	2013	No change
Alagnak River	2,700	single aerial survey	lower-bound SEG	2007	discontinue
CHUM SALMON					
Nushagak River	200,000	sonar	lower-bound SEG	2013	No change
COHO SALMON					
Nushagak River	60,000 – 120,000	sonar	SEG	2013	No change
PINK SALMON					
Nushagak River (even years only)	165,000	sonar	lower-bound SEG	2013	No change
SOCKEYE SALMON					
Kvichak River	2,000,000 – 10,000,000	tower count	SEG	2010	No change
Alagnak River	320,000	tower count	lower-bound SEG	2007	correct & update to 210,000
Alagnak River	125,000	single aerial survey	lower-bound SEG	2015	discontinue
Naknek River	800,000 – 2,000,000	tower count	SEG	2015	No change
Egegik River	800,000 – 2,000,000	tower count	SEG	2015	No change
Ugashik River	500,000 – 1,400,000	tower count	SEG	2015	No change
Wood River	700,000 – 1,800,000	tower count	SEG	2015	No change
Igushik River	150,000 – 400,000	tower count	SEG	2015	No change
Nushagak River	370,000 – 900,000	sonar	SEG	2015	No change
	260,000 – 760,000	sonar	OEG	2012	NA
Togiak River	120,000 – 270,000	tower count	SEG	2007	No change

Literature Cited

Baker, T.T., L.F. Fair, R.A. Clark, and J.J. Hasbrouck. 2006. Review of salmon escapement goals in Bristol Bay, Alaska, 2006. Alaska Department of Fish and Game, Fishery Manuscript No. 06-05, Anchorage.

Baker, T.T., L.F. Fair, F.W. West, G.B. Buck, X. Zhang, S. Fleischman, and J. Erickson. 2009. Review of salmon escapement goals in Bristol Bay, Alaska, 2009. Alaska Department of Fish and Game, Fishery Manuscript No. 09-05, Anchorage.

Cross, B.A., D.C. Gray, and D.L. Crawford. 1997. Report to the Alaska Board of Fisheries on spawning escapement goal evaluations for Bristol Bay salmon. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A97-30, Anchorage.

Erickson, J.W., C.E. Brazil, X. Zhang, T.R. McKinley, and R.A. Clark. 2015. Review of salmon escapement goals in Bristol Bay, Alaska, 2015. Alaska Department of Fish and Game, Fishery Manuscript No. 15-06, Anchorage.

Fair, L.F. 2000. Report to the Alaska Board of Fisheries on spawning escapement goal evaluations for Bristol Bay salmon. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A00-38, Anchorage.

Fair, L.F., C.E. Brazil, X. Zhang, R.A. Clark, and J.W. Erickson. 2012. Review of salmon escapement goals in Bristol Bay, Alaska, 2012. Alaska Department of Fish and Game, Fishery Manuscript No. 12-04, Anchorage.

Fair, L.F., B.G. Bue, R.A. Clark, and J.J. Hasbrouck. 2004. Spawning escapement goal review of Bristol Bay salmon stocks. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A04-17, Anchorage.