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TO: John Hilsinger, Director
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DATE: September 25, 2009

THRU: Jeff Regnart, Regional Supervisor
Division of Commercial Fisheries
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and

James Hasbrouck, Regional Supervisor
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SUBJECT: Bristol Bay
Escapement Goal
Recommendations

FROM: Lowell Fair, Regional Research Coordinator
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The purpose of this memo is to inform you of our progress in reviewing and recommending escapement goals for Bristol Bay. Many escapement goals in Bristol Bay have been set and evaluated at regular intervals since statehood. During the previous Alaska Board of Fisheries (board) cycle, 2006-2007, Bristol Bay escapement goals were reviewed and recommended changes were made by the department (Baker et al. 2006).

Recent genetic techniques have greatly improved the ability to accurately determine sockeye salmon stock compositions of the harvest. In Bristol Bay, this data is currently available for the past 3 years. However, there is a study in progress that uses previously collected scale samples from harvests dating back to 1964 to isolate DNA and determine partial historical harvest stock compositions. Over the next few years, the data gathered from these studies will be used to reconstruct brood tables for each sockeye salmon stock, and hence, greatly improve our understanding of stock productivity. Because of this imminent change to the brood tables upon which escapement goals are built, the escapement goal committee does not believe that major changes to existing goals should occur at this time. Nonetheless, it was the intention of this review to re-evaluate existing data sets using modern statistical and modeling techniques to estimate escapement levels at maximum sustained yield for comparison to current goals. Non-sockeye salmon escapement goals were evaluated, as necessary, in this review.

In February 2009, an interdivisional salmon escapement goal review committee, including staff from the Divisions of Commercial Fisheries and Sport Fish, was formed to review existing salmon escapement goals in the Bristol Bay Management Area. This review was based on the *Policy for the Management of Sustainable Salmon Fisheries* and the *Policy for Statewide Salmon Escapement Goals*. Since the 2003 review, the basis for deciding goal type [biological escapement goal (BEG) or sustainable escapement goal (SEG)] has evolved, and as a result, some changes in the goal types were recommended in the 2006 review, and in this review. In particular, the large uncertainty associated with catch allocations from mixed-stock sockeye salmon fisheries in Bristol Bay suggests that accurate estimates of escapement levels producing maximum sustained yield (MSY) may be uncertain. Nonetheless, stock-recruit models formerly used to estimate BEG ranges were appropriate for estimating SEG ranges.

The committee determined the appropriate goal type (BEG or SEG) for each salmon stock with an existing goal and other relevant stocks without an existing goal, based on the quality and quantity of available data, and then determined the most appropriate methods to evaluate the escapement goal ranges. An escapement goal for a stock was defined as a BEG if a sufficiently long time series of escapement, catch, and age estimates were available; the estimates were sufficiently accurate and precise; and the data were considered sufficient to estimate MSY (as per rules and methods in Hilborn and Walters 1992, Chinook Technical Committee 1999, Quinn and Deriso 1999). An escapement goal for a stock was defined as an SEG if a sufficiently long time series of escapement estimates were available, but there was concern about the spawner-return data (lack of age composition estimates and/or concern with stock-specific catch allocation) or there was a lack of information on stock productivity.

In a standard full review, escapement goals are evaluated for Bristol Bay stocks using the following: (1) spawner-recruit models; (2) yield analysis; (3) smolt information; and (4) risk analysis. Following these analyses, escapement goals are estimated for each stock, compared to the current goal, and recommendations to keep the current goal, change the goal, or eliminate the goal are discussed.

There were 17 escapement goals evaluated for 16 stocks in Bristol Bay (Table 1). The committee recommends that the escapement goal for Togiak River sockeye salmon be defined as an SEG instead of a BEG; however, the current escapement goal range would remain unchanged from the 2000 review (Fair 2000). The rationale for the change is a higher than expected

proportion of non-Togiak sockeye salmon stock in the Togiak harvest (Dann et al. *In prep*). The committee also recommends a change to the Kvichak River sockeye salmon escapement goal. Currently, there are 2 goals, one for pre-peak and peak years, and one for off-cycle years. In recent years, the ability to define a pre-peak or peak run was made increasingly difficult as the runs declined. A pre-peak/peak goal, largely composed of 5-year-old 2-ocean fish, was originally established because it was believed that production differed from that of off-cycle years, and therefore, it was advantageous to separate them. However, a new look at the production of pre-peak/peak versus off-cycle years shows similarity such that we cannot conclude they are different (Baker et al *In prep*). The committee, therefore, recommends that the pre-peak/peak goal of 6 to 10 million be dropped and that the off-cycle goal of 2 to 10 million be expanded to include all years.

Also considered in this review was the effect that transitioning from Bendix sonar to DIDSON in the Nushagak River will have on current goals (sockeye, Chinook, and chum). The final step in the transition occurred in 2009 and has not been fully processed or analyzed at this time. It is unlikely that it will be complete in time to be included in the escapement goal report (Baker et al. *In prep*), but preliminary information *may* be available at the December 2009 board meeting.

In summary, this comprehensive review of the 17 existing salmon escapement goals in Bristol Bay resulted in 2 recommended changes. For one goal, Togiak River sockeye salmon, the only change was in goal type from BEG to SEG. The other change was to combine separate goals for Kvichak River sockeye salmon into a single goal.

An oral and written report (Baker et al. *In prep*) concerning escapement goals and specific recommendations for numerous stocks in Bristol Bay will be presented to the board in December 2009. These reports will list all current and recommended escapement goals for Bristol Bay, as well as a detailed description of the methods used to reach these recommendations. Following the December board meeting, a memo will be prepared to include these recommendations to division directors for approval.

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. R. Buck, X. Zhang, S. Fleischman, and J. Erickson. *In prep*. Review of salmon escapement goals in Bristol Bay, Alaska, 2009. Alaska Department of Fish and Game, Fishery Manuscript Series No. 09-XX, Anchorage.

Chinook Technical Committee (CTC). 1999. Maximum sustained yield of biologically based escapement goals for selected Chinook salmon stocks used by the Pacific Salmon Commission's Chinook Technical Committee for escapement assessment, Volume I. Pacific Salmon Commission Joint Chinook Technical Committee Report No. TCHINOOK (99)-3, Vancouver, British Columbia, Canada.

Dann, T. H., C. Habicht, J. Jasper, H. Hoyt, W. D. Templin, T. T. Baker, F. W. West, and L. F. Fair. *In prep*. Genetic Stock Composition of the Commercial Harvest of Sockeye Salmon in Bristol Bay, Alaska, 2006-2008. Alaska Department of Fish and Game, Fishery Manuscript No. 09-XX, 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.

Hilborn, R., and C.J. Walters. 1992. Quantitative fisheries stock assessment choice, dynamics and uncertainty. Chapman and Hall. New York.
Quinn II, T.J. and R.B. Deriso. 1999. Quantitative fish dynamics. Oxford University Press. New York, NY.

Table 1. Summary of current escapement goals and recommended escapement goals for salmon stocks in Bristol Bay.

	Current Escapement Goal				Recommended Escapement Goal		
System	Goal	Type	Year Adopted	Escapement Data	Action	Goal	Type
Sockeye Salmon							
Ugashik	500,000-1,200,000	SEG	1995; Changed to SEG in 2006	Tower	No Change	500,000-1,200,000	SEG
Egegik	800,000-1,400,000	SEG	1995; Changed to SEG in 2006	Tower	No Change	800,000-1,400,000	SEG
Naknek	800,000-1,400,000	SEG	1984; Changed to SEG in 2006	Tower	No Change	800,000-1,400,000	SEG
Kvichak (off-cycle)	2,000,000-10,000,000	SEG	1997; Changed to SEG in 2006	Tower	Change to single Kvichak goal	2,000,000-10,000,000	SEG
Kvichak (pre, peak)	6,000,000-10,000,000	SEG	1997; Changed to SEG in 2006	Tower	Change to single Kvichak goal	2,000,000-10,000,000	SEG
Alagnak	320,000 minimum	SEG	2006	Tower	No Change	320,000 minimum	SEG
Wood	700,000-1,500,000	SEG	2000; Changed to SEG in 2006	Tower	No Change	700,000-1,500,000	SEG
Nushagak	340,000-760,000	SEG	1997; Changed to SEG in 2006	Sonar	No Change		SEG
Igushik	150,000-300,000	SEG	2000; Changed to SEG in 2006	Tower	No Change	150,000-300,000	SEG
Togiak	120,000-270,000	BEG	1997	Tower	Change to SEG	120,000-270,000	SEG
Kulukak Bay	8,000 minimum	SEG	2006	Aerial	No Change	8,000 minimum	SEG
Chinook Salmon							
Nushagak	40,000-80,000	SEG	2006	Sonar	No Change		SEG
Togiak	9,300 minimum	SEG	2006	Aerial	No Change	9,300 minimum	SEG
Naknek	5,000 minimum	SEG	2006	Aerial	No Change	5,000 minimum	SEG
Alagnak	2,700 minimum	SEG	2006	Aerial	No Change	2,700 minimum	SEG
Egegik	450 minimum	SEG	2006	Aerial	No Change	450 minimum	SEG
Chum Salmon							
Nushagak	190,000 minimum	SEG	2006	Sonar	No Change		SEG