To: Scott Cantrell
Date: May 17, 1999
Subject: Spring-run Chinook Salmon "Recovery Goals" for CALFED Multi-species Conservation Strategy
From: Deborah Mckee

The following are my proposed interim "recovery goals" for Sacramento spring run chinook salmon as Perry Herrgesell requested we generate last Thursday. These are interim "goals" to place in the document for the time being until we can finish development of recovery goals following the same scientific methodology used to develop recovery goals for the Sacramento winter-run chinook salmon (as described in the National Marine Fisheries Service's draft Recovery Pan for Sacramento River winter-run chinook salmon).

The basis for the following interim criteria is derived from the winter-run chinook salmon extinction model (Viability of a Pacific Salmon Population: the Sacramento River Winter-run Chinook by Louis Botsford and John Brittnacher, May 1996) and draft material provided by the National Marine Fisheries Service to regarding Properly Functioning Populations of Pacific Salmonids.

The parameters and thresholds for properly functioning populations are: abundance, productivity, population structure, and genetic diversity. It is assumed that a population of 5,000 to 10,000 or more naturally-produced spawners per generation should be sufficient to buffer a population against both genetic and demographic stochasticity. Depending on the mean spawning age of the population under consideration, this would translate to between 1100 to 3300 or more spawners per year depending on the predominance of 3 and 4-year-olds in the population. These targets should be adjusted upwards if historic data indicates a greater habitat carrying capacity, and historic population abundances for a given stream. Given the lack of information regarding age-class structure for Sacramento spring-run populations, it is assumed that they are identical to the age-class structure observed for winter-run chinook and used for the winter-run extinction model: 25% are 2-year-olds; 67% are 3-year-olds, 8% are 4-year-olds.

The critical abundance threshold below which a population is at substantial risk of extinction is 100 to 500 spawners per year.

Based on the most recent analyses of allozyme data (by NMFS) and microsattelite DNA (Bodega Marine Lab), Mill and Deer creeks appear to be fairly closely related, Butte Creek is a genetically distinct population, and the status of the Feather River is still under evaluation. No genetic analyses have yet been performed for the Mainstem Sacramento River, Yuba River, Battle Creek, Beegum Creek (Cottonwood), or Big Chico Creek to assess their degree of inter-relatedness. Given the results of recent genetic analyses we can infer that there is a fair amount of gene flow between Mill and

Deer creeks. However, until a more precise estimate of gene flow between these two creeks has been developed and for all other spring-run populations, until evidence is provided to that would indicate any two or more populations function as a single interbreeding unit, all populations shall be managed for their individual integrity.

Tributary	Recovery / Restoration Goal	Critical Threshold	Co
Feather River	4,700 adult annual escapement		This is the prese of Feather River spring-run. This to recovery goals naturally-reprodu other Sacrament streams. Attain need to be transf stream which ca of spring-run with introgression wit
Mill Creek	2,500 adult annual escapement	250 adult annual escapement	The historic maxi escapement was
Deer Creek	2,500 adult annual escapement	250 adult annual escapement	The historic maxi escapement was
Battle Creek	1,250 adult annual escapement	250 adult annual escapement	1952-1956 annu estimates range f
Butte Creek	5,000 adult annual escapement	500 adult annual escapement	Historic maximu of 20,000.

Additional population abundance to reduce likelihood of extinction due to genetic and demographic stochasticity	The following populations need to be maintained and enhanced to the carrying capacity of each stream: Antelope, Big Chico, and Cottonwood creeks; and the Yuba River below Englebright Dam. New populations where there is a capacity to sustain minimum population sizes of 1,250 annual adult returns. This goal can be met by increasing the existing total abundance. The net additional abundance shall be 5,000 spring-run shall be restored to the Sacramento-San Joaquin River system. If this is to be accomplished by re-introduction, any donor wild population must be recovered before it may be used as a source for founding a new population.		

Attainment of specified annual abundance recovery criteria shall cover a minimum 15 years which constitutes five times a generation time. The population's annual escapement can not drop below the critical threshold during any of the 15 consecutive years. The geometric mean of a Cohort Replacement Rate for each population of spring-run over the 15-year period will be greater than 1.0. Estimates of these criteria will be based on natural production alone and will not include hatchery-produced fish. If the precision for estimating spawning run abundance has a standard error greater than 25%, then the sampling period over which the geometric mean of the Cohort Replacement Rate is estimated will be increased by one additional year for each 10% of additional error over 25%.