

**SALMON TECHNICAL TEAM PROPOSED REBUILDING PLAN
 FOR SACRAMENTO RIVER FALL CHINOOK**

Sacramento River fall Chinook (SRFC) became overfished in 2010 when the stock failed to meet its conservation objective for three consecutive years (2007-2009). In June of 2011 the Council adopted Amendment 16 to the Salmon Fishery Management Plan (FMP) which established new status determination criteria. Under the new criteria, SRFC are determined to be overfished when the 3-year geometric mean spawning escapement falls below the minimum stock size threshold (MSST) of 91,500 adult natural and hatchery spawners, and the stock is determined to be subject to overfishing if the fishing mortality rate exceeds the maximum fishing mortality threshold (MFMT) of 78 percent. In the amended FMP, the default criterion for rebuilt status is when the 3-year geometric mean spawning escapement exceeds maximum sustainable yield spawning escapement (S_{MSY}). For SRFC, S_{MSY} is defined as 122,000 adult natural and hatchery spawners. Relevant escapement estimates and the 3-year geometric means are displayed below (Table 1).

Table 1. Sacramento River fall Chinook adult spawning escapement. Escapement is hatchery and natural combined, and the 3-year geometric mean is for run year and the two prior years. Because escapement occurs after the fishing season, when the MSST was not met for the third consecutive year in 2009, the stock triggered an overfishing concern in 2010. That same year, it met the current FMP criterion for being classified as overfished.

year	escapement	3-yr geometric mean
2007	91,374	215,097
2008	65,364	117,991
2009	40,873	62,498
2010	124,270	69,244
2011	114,741	83,530

The STT proposed rebuilding plan is required to include the following components:

- (1) an evaluation of the roles of fishing, marine and freshwater survival in the overfished determination,
- (2) consideration of any modifications to the rebuilt criterion,
- (3) recommendations for actions the Council could take to rebuild the stock to S_{MSY} including modifications to the control rule if any, and
- (4) specification of a rebuilding period.

Each of these components is addressed below.

Roles of Fishing, Marine, and Freshwater Survival

The status of SRFC was reviewed when SRFC failed to meet the conservation objective of 122,000 to 180,000 adult natural and hatchery spawners in 2007 and 2008 (Lindley et al. 2009). That report identified ocean conditions as the proximate cause of the collapse of SRFC, and that while freshwater habitat conditions and harvest both reduced the survival of SRFC, they were not directly responsible for the collapse. The review was updated by the Salmon Technical Team (STT) when SRFC triggered an overfishing concern by failing to meet the conservation

objective again in 2009 (STT 2011). That report confirmed the conclusions of Lindley et al. (2009). While sufficient reductions in fishery impacts could have resulted in meeting the conservation objective in 2007, they could not have prevented the stock from falling below the MSST in 2008 and 2009 (Table 1).

Rebuilt Criterion

Because the default rebuilt criterion is based on S_{MSY} , which is the escapement level intended to maximize yield on a continuing basis, the STT does not believe that any modifications to the default rebuilt criterion are warranted. The STT recommends the Council adopt the default criteria of a 3-year geometric mean spawning escapement exceeding the S_{MSY} estimate of 122,000 adult natural and hatchery spawners.

Recommended Rebuilding Alternatives

The control rule in the FMP for managing fishery impacts constitutes a default rebuilding plan (status quo). Under this control rule, the stock is to be managed for an exploitation rate not to exceed 70 percent, while providing at least 122,000 natural and hatchery adult spawners. The control rule further defines allowable levels of *de minimis* fishing mortality when spawning escapement is projected to be below 122,000.

The STT considered two alternatives to the status quo: Alternative 1 is to set a minimum escapement target of the upper end of the conservation objective goal range (180,000) adult natural and hatchery spawners, while retaining the maximum allowable exploitation rate (F_{ACL}) at 70 percent. Alternative 2 is to retain the current minimum escapement of S_{MSY} , but limit the allowable total exploitation rate to 65 percent.

Given the high abundance forecast for SRFC in 2012, the alternative minimum escapement targets of Alternatives 1 and status quo would not constrain fisheries. The Sacramento Index forecast of 819,400 reduced by the F_{ACL} of 70 percent would be expected to result in 245,820 adult natural and hatchery spawners. Given the spawning escapements in 2010 and 2011, this would produce a 3-year geometric mean of 151,903. The reduced maximum harvest rate of Alternative 2 would result in an expected spawning escapement of 286,790, which would produce a 3-year geometric mean spawning escapement of 159,913.

Because differences between the alternatives are relatively minor given this year's circumstances, the STT recommends the status quo as the preferred alternative.

Rebuilding Period

Because the 2012 Sacramento Index forecast, fished at the highest allowable target exploitation rate (F_{ACL}), would result in a 3-year geometric mean spawning escapement well above the rebuilding criterion, each of the alternatives would be expected to have a greater than 50 percent probability of achieving the rebuilding criterion within one year. Status determinations are made annually when escapement estimates for the prior year first become available. One year is therefore the minimum time possible to achieve rebuilding. The STT specifies the rebuilding period to be one year, and concludes that this is the minimum.

PFMC
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