

## Information Source and Methods

### A. Information Source and Methods:

1. Flow and natural production graphs for the Tuolumne, Stanislaus, Calaveras, Cosumnes, and San Joaquin River.
  - a. Actual flow – data taken from the USGS (United States Geological Service) or CDEC (California Data Exchange Center) website as either mean daily or mean monthly flow in cubic feet per second (cfs). Flow at Vernalis was converted from hourly cfs to mean daily cfs.
  - b. Unimpaired flow – data taken from CDEC as acre feet (af) per month was converted into mean monthly cfs, where 1 cfs/24 hrs = 1.9835 af.
  - c. AFRP recommended flow – information was taken from either the Final Restoration Plan for the AFRP: January 9, 2001 or the Working Paper on Restoration Needs, Volume 3.
  - d. Geomorphic flows – taken from the Habitat Restoration Plan for the Lower Tuolumne River Corridor, March 2000, page 105.
  - e. Natural production – the numbers are generated from the spreadsheet CHINOOKPROD (see 3. below).
2. Doubling goal graphs – generated from the spreadsheet CHINOOKPROD natural production numbers, and data sources Grand Tab and the Central Valley Anadromous Sport Fish Annual Run-size, Harvest, and Population Estimates, 1967 through 1991.
3. CHINOOKPROD - a spreadsheet that was developed through formulas in the Working Paper on Restoration Needs, Volume 2, pages 2-IX-14 through 2-IX-18, and the Final Restoration Plan for the AFRP: January 9, 2001, Appendix A-11 through A-18.
4. Data sources for CHINOOKPROD.
  - a. Central Valley Anadromous Sport Fish Annual Run-size, Harvest, and Population Estimates, 1967 through 1991, Mills and Fisher, August 1994. Data from this publication was used to generate natural production estimates for the doubling goal baseline period, 1967 through 1991.
  - b. Grand Tab, California Department of Fish and Game. Data from this publication was used to generate natural production estimates for the doubling goal, 1952 through 1966, and the doubling period, 1992 through 2001.
5. Caveats – explains anomalies associated with the source data used for both flow and natural production estimates. While it is recognized that these sources may not be fully comparable between or within tributaries, they are the best and in most cases the only data available.
6. Newman, K.B. and Hankin, D.G. (2004) Statistical procedures for defining and detecting the CVPIA natural Chinook salmon production doubling goal. Part of an ongoing effort to analyze the doubling and sustainability of anadromous fish in the Central Valley.
7. Stakeholder table - list of AFRP completed and ongoing projects

### B. Coordinated with and obtained recommendations from:

1. Dr. Ken Newman, Statistical Consultant, Treetops, Leven, Scotland, and Dr. David Hankin, Professor and chair, Department of Fisheries, Humboldt State University, Arcata, CA, 95521. Authors of Statistical procedures for detecting the CVPIA natural Chinook salmon production doubling goal and determining sustainability of production increases, May 11, 2004. They reviewed and provided input on doubling and sustainability and reviewed the doubling goal graphs, CHINOOKPROD, and Grand Tab.

2. NOAA Fisheries, Santa Cruz, CA workshop on flows and escapement in the Stanislaus River. Methodology would be applied to all Central Valley tributaries, and received comments from Dr. Steve Lindley.
3. Dr. Noah Hume - Stillwater Sciences, 2855 Telegraph Ave., Suite 400, Berkeley, CA 94705-1151. Reviewed flow and escapement on the Stanislaus River, and is developing flow and escapement graphs for all AFRP tributaries where data is available.
4. Stanislaus River Fish Group -a technical forum to improve anadromous fish habitat. Reviewed flows and escapement on the Stanislaus River.
5. Central Valley Salmon Project Work Team - part of the IEP. The team members work to develop and coordinate Chinook salmon monitoring and special studies in Sacramento and San Joaquin valley streams. The team commented on the approach on methodologies and caveats for all Central Valley tributaries.

**C. Other contacts:**

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3. California Department of Fish and Game  
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601 Locust St.  
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4. California Department of Fish and Game  
Sacramento Valley and Central Sierra Region  
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Sacramento, CA, 95814
5. California Department of Fish and Game  
San Joaquin Valley and Southern Sierra Region  
1234 E. Shaw Ave.  
Fresno, CA, 93710
6. National Oceanic and Atmospheric Administration  
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