Factors Affecting the Low Abundance of Klamath Naturally-Spawning Fall Chinook salmon in 2004 and 2005

1. Introduction
   a. Biological situation
      i. Historical numbers
      ii. 2004-2005 status
   b. Salmon FMP charge
   c. Process of this document

2. Fishing
   a. Possible effects of Fishing
      i. Overfishing in parent year
      ii. Overscaped in parent year
      iii. Overfishing in return year
   b. Number of fish caught
      i. In parent years
      ii. In years leading to 2004 and 2005
      iii. In 2004 and 2005
   c. Technical infrastructure
      i. F1 generation – hatchery fish counted as natural spawners
      ii. Other issues

3. Habitat
   a. Historical perspective
      i. Early impacts
      ii. Decline of fish and fisheries
   b. Inriver habitat
      i. Dams and their effects
         1. General dam operations
         2. Mainstem Dams
         3. Dwinell Dam
         4. Trinity River Diversion Project
         5. Lack of fish passage
            a. Unreachable habitat
         6. BO for Klamath operations; long-term nature of impacts
         7. Low flows and drought conditions
            a. Recent droughts
            b. Crisis water management
            c. Reduced flows in bypassed reaches
            d. Relationship between flows and temperatures
            e. Low flows as barriers to upstream migration
            f. Water temperatures and dissolved oxygen
      8. Effects of hydroelectric peaking operations
a. Effects of large flow fluctuations in peaking reaches  
b. Reduced abundance of macroinvertebrates  
c. Restricted fish movement  
d. Decreased water quality  
e. Fish stranding  

9. Impacts of impoundment/alteration of the natural hydrologic regime  
   a. Changes to water temperature  
   b. Changes to dissolved oxygen  
   c. Changes to nutrient loads  
   d. Gravel depletion  
   e. Altered flood flows  
   f. Loss of thermal refugia  
   g. Loss of ecosystem function  

ii. 2002 adult fish kill (and other fish kills)  
   1. Multiple fish kills have occurred  
   2. Major 2002 fish kill affected stocks of concern  
      a. Causes of fish kills  
         i. Enhanced conditions for toxic algae blooms and parasitic disease vectors  
            1. Reduced flows  
            2. High temperatures  

3. Water management in the Klamath Basin  
   a. Private Agricultural Diversions in the Upper Klamath Basin  
   b. Federal Klamath Irrigation Project – the only water withdrawals on the Klamath Side with a Federal nexus.  

4. Scott River  
   a. Private water diversions primarily for agriculture. X number of acres, Y number of acre-feet on an annual basis.  

5. Shasta River  
   a. Private water diversions primarily for agriculture. X number of acres, Y number of acre-feet on an annual basis.  
   b. Historically a primary producer of Klamath River fall Chinook.  
   c. More than 80,000 fall Chinook in 193? (Shasta Racks data)  

6. Trinity River  
   iii. EFH considerations  
   c. Other inriver habitat impacts  
      i. Water withdrawals (see dams, etc.)  
      ii. Timber harvest practices  
      iii. Road building  
   d. Ocean conditions
4. Hatcheries
   a. Mitigation purpose
   b. Juvenile interactions
      i. Magnitude, size and timing of hatchery releases with regard to
         competition with naturally produced juveniles
   c. Adult interactions
      i. Contributions to natural spawners in 2004 and 2005 (less than
         anticipated, as a “cause” of shortfall?)
      ii. Long term genetic effects of interbreeding over many generations
5. Cumulative effects
6. Conclusion
7. Recommendations
   a. Habitat recommendations
      i. Remove dams
      ii. Allocate water fairly
      iii. Develop interim measures to be implemented prior to dam removal
      iv. Protect Trinity River flows
      v. Reinitiate consultation with National Marine Fisheries Service
         (NMFS) as soon as possible regarding the effects of water project
         operations on chinook and coho salmon essential fish habitat (EFH)
      vi. Implement Hardy Phase II recommendations as an interim measure
          while consultations are ongoing.
      vii. Meet mitigation obligations
      viii. Establish a flow management advisory committee as soon as possible
           (DOI).
      ix. Revise water bank accounting.
      x. Support studies of juvenile survival and health and provide adequate
         funding for the Klamath monitoring programs.
      xi. Change hatchery operations (coded wire tags)
      xii. Develop credible long-term solutions to water management problems
           within the Klamath Basin.
      xiii. Directions for Council involvement [OPTIONAL]
      xiv. Timeline for FERC relicensing
      xv. Recommended studies
8. Appendices/bibliography