POPULATION LEVEL RESULTS AND RECOVERY ACTIONS

As described in detail in Volume I, Chapter 4 (Methods) of the Plan, NOAA's National Marine Fisheries Service (NMFS) completed the following steps to develop this recovery plan: (1) selected populations for recovery scenarios using the framework provided by Bjorkstedt et al. (2005) and Spence et al. (2008 and 2012); (2) assessed current watershed habitat conditions; (3) identified ongoing and future stresses and threats to these populations and their habitats; and (4) developed site-specific and range-wide recovery actions. For each population identified as essential or supporting, we summarized the best available information from a variety of sources into a narrative that describes the species abundance and distribution, the history of land use, land management and current resources, and descriptions of the results of our analyses of current conditions and future threats.

Populations were selected using a variety of criteria defined primarily by the Technical Recovery Team (Spence et al. 2008 and 2012), including extinction risk, population size, unique life history traits, connectivity between populations, habitat suitability, etc. Essential populations are those expected to achieve a high probability of persisting over long periods of time (low risk of extinction), while additional supporting populations are expected to either achieve a moderate probability of persisting (moderate risk of extinction) or to provide ESU/DPS stability by providing connectivity and redundancy.

For each population, we estimated the amount of accessible habitat area (in kilometers). Estimates are based on a model that uses stream gradient, channel width, and discharge to define the area with the intrinsic potential (IP-km) to support salmonids (Bjorkstaedt et al. 2005). Where natural barriers, steep gradient changes, or stream flow dynamics were undetected by the model or where regional experts deemed areas unlikely to support spawning

(e.g., ephemeral reaches, reaches inundated by reservoirs or estuaries, or highly modified and irretrievable reaches), we made appropriate changes to modeled IP. Using the Spence et al. (2008 and 2012) criteria and any revisions to IP habitat, spawner targets for each population were calculated using formulas for viable populations.

Current watershed conditions and threats for essential and supporting populations were assessed using a method called Conservation Action Planning (CAP) (TNC 2007). Conditions and threats were analyzed using a detailed set of spatial and ecological parameters described in Appendix D.

The essential populations were analyzed using the full CAP protocol and individual CAP workbooks. These detailed analyses identified an array of watershed habitat conditions, and ranked them using specific indicators developed from literature review. Similarly, future threats were ranked based on available data and knowledge of the watersheds (Appendix D). The supporting populations were analyzed using an abbreviated rapid assessment protocol based on the CAP protocol. These populations were analyzed in groups of ecologically similar Diversity Strata as defined by Spence et al. (2008 and 2012). The rapid assessments utilized a subset of the factors analyzed in the full CAP protocol.

Where we identified poor watershed conditions or high or very high threats, we identified recovery actions to improve conditions and abate/reduce a threats. We organized actions into three levels: Objective, Recovery Action and Action Step. Objectives link the Recovery Actions and Action Steps to the five listing factors. Organizing actions and actions steps to a specific listing factor allows improved and more direct tracking of the listing factors overtime. Recovery Actions were designed in general terms to improve conditions or abate specific threats. If actions were broad in scope (e.g., work with State Water Resources Control Board), they were incorporated into the Stratum or ESU/DPS level actions. Action steps are the most site-specific restoration or threat abatement action needed and are written to address a specific recovery action. Action steps include additional required information such as cost, priority, etc.

For each action step, additional information was included such as the estimated time to implement the action, estimated costs, and likely recovery partners who could contribute to implementing the action.

We present recovery actions in detailed implementation tables for each population and assign each action step as priority 1, 2, or 3. Priority 1 actions must be taken to prevent extinction, or to identify actions needed to prevent extinction (55 FR 24296, June 15, 1990). Priority 2 actions must be taken to prevent significant decline in population numbers, habitat quality, or other significant negative impacts short of extinction. Priority 3 actions include all other actions necessary to provide for full recovery of the species.

Populations are organized by Diversity Strata and then alphabetical within the Diversity Stratum (See Table of Contents).