

Appendix 1

Ecoregional Approach and the NASSP Prioritization Process

Ecoregional Approach and the NASSP Prioritization Process

Ecoregions are incorporated into the NASSP prioritization process to account for ecological diversity throughout the planning area. Ecoregions cover large areas of relatively homogenous climatic patterns, geomorphological characteristics, and biotic communities. Ecoregions are commonly used by conservation organizations (TNC, WWF) for planning purposes.

The utility of using ecoregions for salmon planning is to provide an accounting of the genetic and habitat diversity throughout the region. Evolutionary Significant Units (ESUs) provide a more detailed approach. However, ESU boundaries vary among species, creating excessive complexity for delineating “core” and “contributing” strongholds. We will include ESUs in the analytical approach, which will rely on Marxan. Marxan can efficiently deal with the complexity of multiple ESU boundaries. For the spatial template for delineating core and contributing strongholds, we advocate the use of ecoregions.

Several different ecoregion maps have been developed. These include:

- Omernik’s ecoregions, EPA.
- Bailey’s ecoregions, Forest Service.
- TNC Freshwater ecoregions
- WWF Freshwater ecoregions
- WSC/SoS Salmon Ecoregions

We chose the WSC/SoS Salmon Ecoregions as our base spatial template for prioritization (Map 1). Salmon Ecoregions were developed through an international workshop in Corvallis, OR (1999)ⁱ. Maps showing the Salmon Ecoregions with Bailey’s and Omernik’s ecoregions are in Maps 2 and 3.

Salmon Ecoregions represent spatial units that are meaningful for salmon. These were developed in the following way:

- First, by major oceanic divisions, Pacific vs. Arctic Oceans.
- Further delineations were based upon semi-enclosed seas and primary circulation systems with distinct bathymetric characteristics and associated freshwater drainages.
- Final delineations were based upon finer-scale coastal discontinuities within each semi-enclosed sea or major circulation system, including fjords, straits, and areas with distinct production processes (e.g., upwelling and downwelling areas).

Since this is a North Pacific scale ecoregional delineation, it is occasionally necessary to merge, alter, or divide the Salmon Ecoregion boundaries. For example, the Columbia River is treated as one polygon in the Salmon Ecoregions. For planning at the scale of NASSP, it was necessary to split it into finer units based upon sub-watersheds (lower, middle, upper Columbia).

In California, there are 5 ecoregions (Map below): Strong Upwelling Year-round, Klamath River, Sacramento-San Joaquin River, Weak Upwelling Cline, and California Undercurrent. Ecoregion names

are from Augerot (2005). We propose merging the Weak Upwelling Cline and California Undercurrent into one ecoregion.

WSC/SoS Salmon Ecoregions

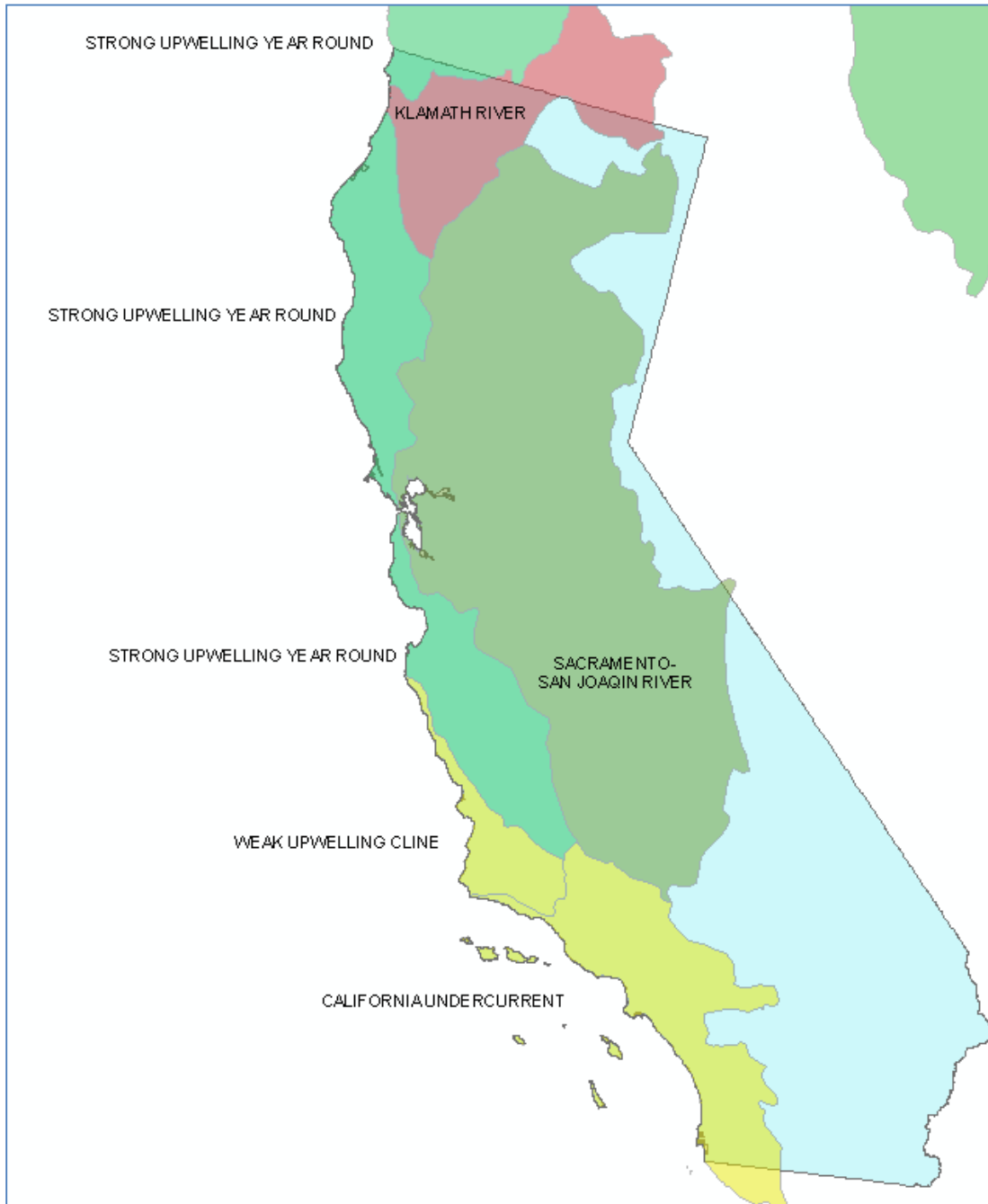
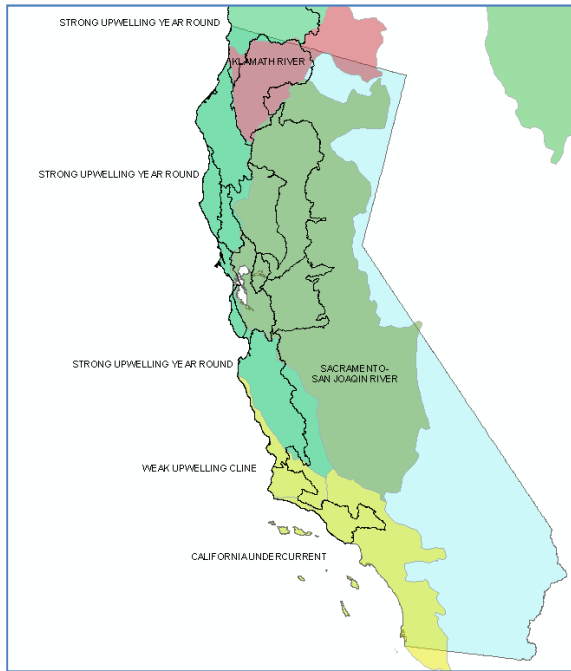


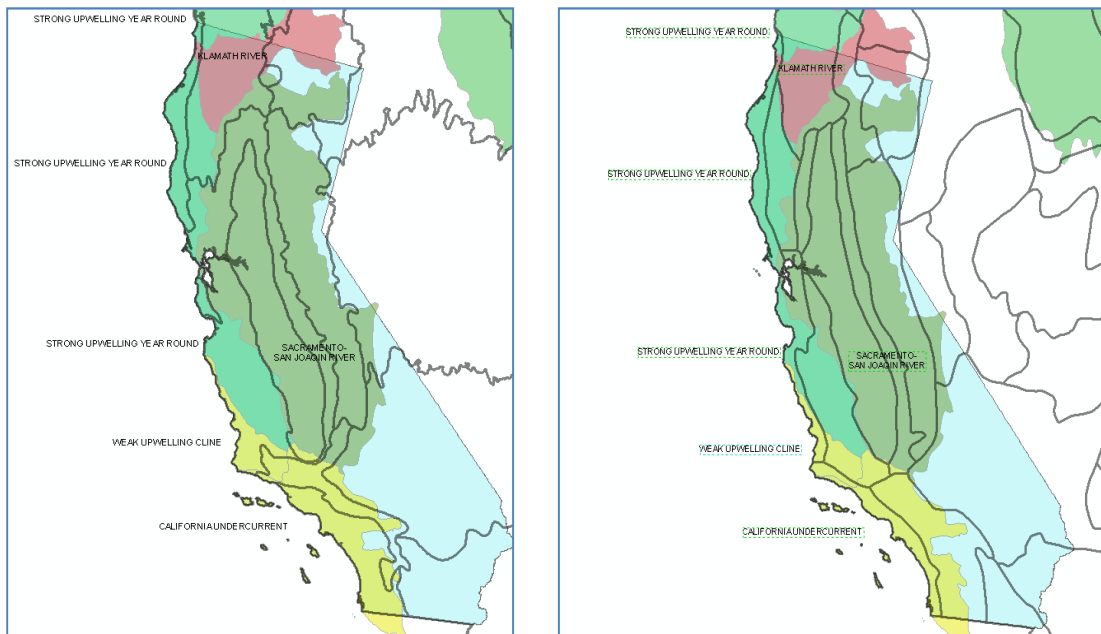
Figure 1. Salmon Ecoregions from Augerot (2005).



Map 2. Salmon Ecoregions (in color) with ESU boundaries (black lines) for chinook, steelhead, and coho.

Ecoregion Alternatives

The following approaches were also considered to determine eco-regions:



Map 3. Salmon Ecoregions, in color. Left: Omernik's Level III ecoregions in grey. Right: Bailey's ecoregions with grey borders.

ⁱ Augerot, X., 2005. "Atlas of Pacific Salmon", Berkeley: University of California Press, 150 pp.