RIPPLE is a powerful, analytical tool to help inform habitat restoration and salmon recovery planning. RIPPLE uses an ecological process-based approach to model the distribution of fish habitat conditions in the watershed and simulate lifestage-specific population dynamics.

**How does it work?**

The premise of the conceptual model for stream and salmon restoration is to engage essential geomorphic and ecological processes that create and maintain salmon habitat. RIPPLE quantitatively applies this conceptual model across multiple spatial scales and throughout the salmon life cycle. It then employs a multi-stage, stock-production model to predict long-term average abundance for each life stage, as well as summary statistics such as long-term average escapement. Operationally, these elements are evaluated through three sub-models that are run sequentially: (1) a physical model (GEO), executed through ESRI’s ArcGIS Desktop; (2) a habitat carrying capacity model (HAB); and (3) a population dynamics model (POP).

**Why use RIPPLE?**

RIPPLE is a flexible, scientifically rigorous tool, designed to prioritize and improve salmon conservation and management. It can be used with limited data and still produce credible preliminary results to guide further hypothesis testing; it can be customized with watershed-specific data to generate progressively more refined results; and it can be used to assess the value of collecting additional field data.

RIPPLE was developed by Stillwater Sciences together with scientists at the University of California, Berkeley. While the focus species for its development were anadromous salmonids, RIPPLE is applicable to other aquatic species; we have explored the feasibility of modeling such species as Pacific lamprey and California freshwater shrimp. The model is freely available and can be downloaded from the website of the National Center for Earth-surface Dynamics at http://www.nced.umn.edu/Ripple2.html.
Evaluating alternative enhancement opportunities, North Umpqua River, Oregon

In the North Umpqua River we applied RIPPLE to develop salmonid production estimates and assess the potential benefits of providing fish passage at Soda Springs Dam. Access to historically available habitat was contrasted against the potential benefits of alternative enhancement opportunities downstream of the dam. Benefits were reported in terms of increase in life-stage-specific production over current conditions, allowing relevant comparison of management alternatives and informed decision making.

Chinook salmon spawning and rearing habitat distribution, Tonsina River, Alaska

We predicted the distribution of Chinook salmon spawning and rearing habitat using RIPPLE for the Tonsina River basin, a tributary to Alaska’s Copper River. Using limited field data we were able to characterize habitat for the mainstem Tonsina River and three sub-basins as input for the model. Using that data to parameterize RIPPLE, we simulated salmon productivity over a relatively large area and specific to each sub-basin. These data will be used to assess current and future conditions, and to prioritize future monitoring and restoration efforts.

For more information, please contact Jody Lando at jblando@stillwatersci.com or Frank Ligon at frank@stillwatersci.com.