Phil Sandstrom

Washington Department of Fish and Wildlife, Science Division

Natural Resources Building

1111 Washington St.

Olympia, WA 98502

Informing Puget Sound steelhead recovery goals with a life cycle model

Puget Sound steelhead were listed as threatened under the U.S. Endangered Species Act in 2007. In order to establish recovery goals and evaluate potential recovery actions, we developed a life cycle model that operates at the demographically independent population (DIP) level. The objective of this project is to predict plausible abundance trajectories under a range of biological and management scenarios based on existing empirical population data to provide realistic bounds for population abundance and productivity goals. The model uses stage specific survival rates to simulate successive, linked generations of spawning and recruitment over time. The model has two stages, freshwater production (smolts per spawner) and marine survival. Freshwater production was based on stock-recruit dynamics in which capacity is modeled as a function of habitat capacity and intrinsic productivity. The marine survival stage was informed by recent acoustic telemetry work completed in Puget Sound and smolt to adult return rates. A series of scenarios, including habitat restoration and harvest, have been developed to examine the potential impacts of management actions on DIP status. In an effort to increase accessibility of the model to a broad range of practitioners, we developed a graphic user interface tool accessible via the internet that will allow anyone to alter model parameterizations and examine results. Using the Shiny package in R, the web tool operates on user defined parameter inputs and projects population abundance and extinction risk. We developed a model user guide that defines each parameter and summarizes available empirical data relevant to the model, including adult abundance, smolt abundance, age structure, and marine survival data throughout Puget Sound. We anticipate that this graphic user interface will greatly enhance the ease and effectiveness of communication as well as collaboration between the model development team, the Puget Sound Steelhead Recovery Team, and biologists in Puget Sound. We present initial results of model runs using the online tool.