Developing a Model to Predict How Streamflow Affects Smallmouth Bass Habitat in the Willamette River, Oregon, and Potential Overlap with Juvenile Chinook Salmon

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Effective management of endangered fish species requires careful consideration of many factors including population-level effects of mortality from predation at various life stages. In the Willamette River, juvenile Chinook salmon rear and outmigrate through the mainstem, including reaches where non-native smallmouth bass populations are substantial. Thus, a predictive tool would be useful for managers to: (1) describe how flow management influences potential habitat overlap between juvenile Chinook salmon and adult smallmouth bass; and (2) describe how future conditions, given current climate change projections, may influence smallmouth bass distribution in the Willamette River. Recently, the USGS Oregon Water Science Center has developed a hydrodynamic model that is proving useful for resource managers tasked with flow management decision-making. The initial intent of the model was to predict how habitat availability for juvenile and adult salmon and steelhead changes in response to streamflow. However, new developments are increasing the usefulness of the model. One of these developments is a "layer" that predicts adult smallmouth bass habitat based on attributes such as streamflow, water temperature, and revetment presence. This model is being refined based on past data collected by Oregon State University. Figure 1 illustrates model output comparing predicted habitat for smallmouth bass, Chinook salmon fry, and Chinook salmon parr in a short reach on the mainstem Willamette River. This presentation will provide an overview of the current model and discuss how its use will benefit managers in the Willamette River basin.

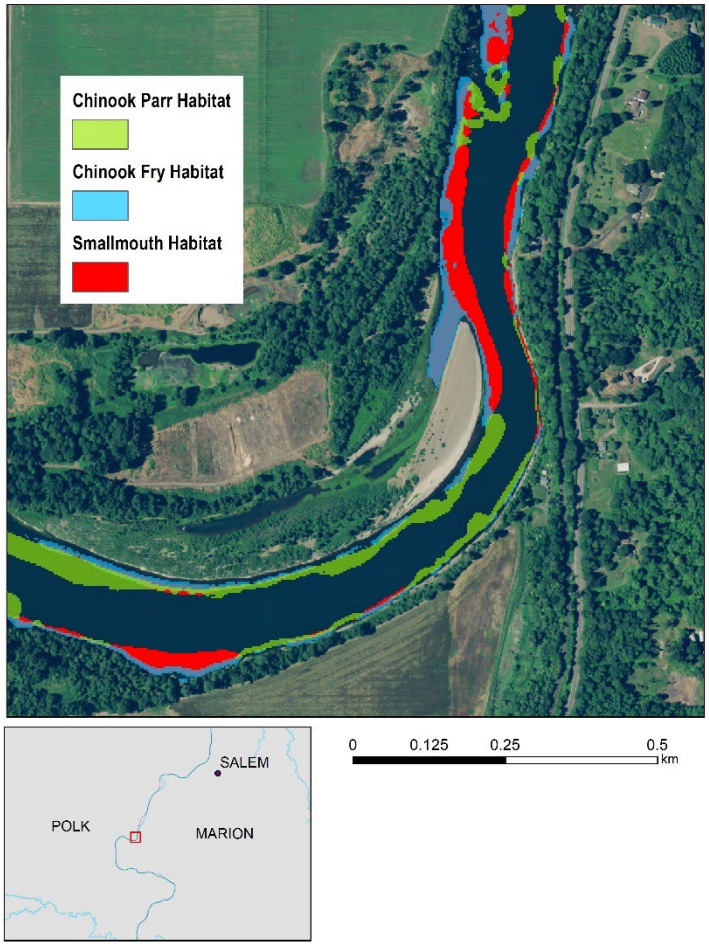

Figure 1.—Image showing predicted habitat for smallmouth bass, Chinook salmon fry, and Chinook salmon parr in a short reach on the mainstem Willamette River. The habitat predictions were generated from a hydrodynamic model in development for use in predicting habitat overlap between juvenile Chinook salmon and smallmouth bass, and for predicting how smallmouth bass distributions will change in the Willamette River basin in the future.