The US Fish and Wildlife Service Arcata Fisheries Program (USFWS) and USGS California Cooperative Fish and Wildlife Research Unit (CACFWRU) at Humboldt State University, are co-sponsoring a post-doctoral position in Arcata, CA. This position seeks a new research scientist with quantitative fishery biology and modeling skills. The recipient of this post-doctoral position will pursue management-based research interests in the construction of fish population dynamics models. In particular, the selected individual will investigate best practices for assigning or estimating the relationship between river discharge and available fish habitat within river basins, and also the interplay of mainstem and tributary habitat use for juvenile coho salmon. A more detailed scope of work and other associated information are outlined below.

We seek candidates that can effectively interact with cooperating and resident scientific staff of USGS, USFWS, and HSU, and have the expertise to complement and enhance our scientific programs. This appointment is scheduled to begin January 2015, but the start time is flexible (sooner or later) to meet the needs of the selected individual. This position has been funded for two years, and with an extension to the second year subject to research progress.

Particulars: Ph.D. or other earned research doctoral degree recognized in U.S. academic circles as equivalent to the Ph.D. Salary: $47,917—$52,780 with health insurance and other benefits included. To be given full consideration, applicants should provide a copy of graduate school transcripts, a curriculum vitae, a 1 - 2 page cover letter explaining their interest and qualifications for the position, the names and contact information for three references, and when they might be available to start the position. Questions about the position should be directed to the contact below. The position will remain open until filled, so interested individuals are encouraged to promptly submit application packets, as an e-mail attachment, to:

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The following describes the two major research components, educational opportunities, and general travel expectations associated with the post-doctoral position being sponsored by the US Fish and Wildlife Service Arcata Fisheries Program (USFWS AFO) and the US Geological Survey California Cooperative Fish and Wildlife Research Unit (CACFWRU) at Humboldt State University in Arcata, California.

GENERAL BACKGROUND

USFWS AFO has been working with Dr. Russell Perry at the US Geological Survey Columbia River Research Laboratory, and Dr. Thomas Hardy from Watershed Systems Group, Inc. and Texas State University, to develop the Stream Salmonid Simulator (S^3) model. The S^3 model, currently constructed for the Klamath River, represents an integrated set of sub models that reflect the array of physical and biological processes that interact to affect the growth, movement, and survival of sub-adult Chinook Salmon. In essence, the S^3 model aims to: (1) link population dynamics to physical and biological conditions, (2) operate on spatial scales fine enough to capture habitat quality gradients within the river, and (3) run on temporal scales that capture variability resulting from flow management actions.

The model is being extended into the Trinity Basin, and will also include ocean survival and upstream adult migration components. These improvements will transform the S^3 model into a basin-wide, full life-cycle model. Additionally, development of the S^3 model will include its expansion to incorporate Coho Salmon, as requested by NOAA Fisheries and the Bureau of Reclamation.

Task 1: Evaluate best practices for assigning flow-to-habitat relationships for fish population dynamics models with applications to the Klamath Basin S^3 model.

An important element of many fish population dynamics models is the relationship between physical river characteristics and the amount of available fish habitat, and is often expressed as the amount of available habitat at given river discharges (hereafter: flow-to-habitat). There are numerous methods for assigning flow-to-habitat values to locations within a river basin. These include fine-scale field-measured values that are extrapolated to other locations within the basin having similar physical characteristics, or equation-driven values created by functions of model-predicted values of physical characteristics. In recent years, the array of data types and amounts available for creating these models has increased

drastically with increased computational power, more affordable remotely-sensed data, and the synergy of data collected via multiple agencies.

This task includes evaluating best practices for assigning flow-to-habitat relationships for large river basins with the goal of revealing methodological recommendations according to user's data types and simulation needs. Potential components necessary for successful task completion include extensive literature review and research development, followed by collaborative S^3 implementation and journal manuscript submission. It is anticipated that this task will take approximately one year.

Task 2: Main Channel and Tributary Use of Juvenile Coho Salmon

The current version of the S^3 model tracks the population dynamics of juvenile Chinook Salmon along the main channel. A sub-model inputs tributary-origin fish to the main channel at tributary confluence nodes, and the population dynamics of these fish are modeled after they enter the main channel. This is reflective of the most common life history type of Chinook Salmon in the Klamath Basin being ocean-type, which rear predominantly in the main channel and migrate to the ocean within several months of emergence from spawning gravel.

An extension of the S^3 model to incorporate Coho Salmon is forthcoming. However, the current architecture of the model will need to be altered for applications to Coho Salmon. Coho Salmon exhibit diverse life history strategies that include extended freshwater rearing in tributaries (natal and non-natal), the mainstem, or both. As such, the current S^3 movement sub-model needs to be augmented to accommodate the main channel vs. tributary habitat interplay exhibited by Coho Salmon, as well as to track their prolonged freshwater rearing experience.

This task includes development of a Coho Salmon movement sub-model suitable for the life history characteristics of the species. Project PI's will provide extensive support to the candidate that includes statistical modeling methods, and data that includes habitat, fish use, and GIS. Potential components necessary for successful task completion include literature review, data assimilation, and coordination with Klamath Basin monitoring and research organizations (e.g., Tribes, state and federal agencies, Universities, NGOs) to acquire Coho Salmon-specific size and movement data. Collaborating with Project PI's and others, the candidate will use these data to construct a Coho Salmon movement sub-model for

use within the S^3 model. The task will conclude with a journal manuscript and/or technical report. It is anticipated that this project will take approximately one year.

Educational Component

The assigned individual will be primarily mentored by USFWS AFO (Nicholas Som, Statistician and HSU Adjunct Professor, Fisheries Biology) and CACFWRU (Peggy Wilzbach, Unit Leader, and HSU Adjunct Professor, Fisheries Biology). In addition to supervision by these personnel, the individual will work collaboratively with, and receive mentoring by, Russell Perry (Research Fisheries Biologist from the USGS Columbia River Research Laboratory) and Thom Hardy (Chief Science Officer from the Texas State University Meadows Center for Water and the Environment). Other educational and career development activities will include the facilitation of attendance at scientific presentations, development of journal manuscript preparation skills, and preparation and delivery of research presentations at professional meetings. The assigned individual will receive a strong educational exposure to quantitative and statistical methods for modeling biological and physical processes in riverine environments.

Travel

The candidate will be expected to accompany Project PIs to attend approximately 4 Klamath Basin stakeholder technical meetings per year, three of which are anticipated to require overnight travel each year. In addition, the candidate will be expected to present the findings of this research during year two of the study at a Professional Conference (anticipated to be Klamath Modelling Session at either the CA, OR, Western, or National AFS Conference).