In-Season Management Policies for Kuskokwim Chinook

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Abstract:

Management of salmon fisheries to simultaneously achieve both conservation (e.g., ensuring adequate escapement) and fishery performance (e.g., meeting subsistence harvest needs) objectives is challenging because of uncertainty and annual variability in run size and timing. Managers faced with balancing these objectives in western Alaska Chinook salmon fisheries are particularly challenged because of historically small runs in recent years. As Chinook stocks have declined on the Kuskokwim River, the need to improve the efficacy, transparency, and predictability of in-season management techniques has increased. We propose to address these needs by 1) articulating and evaluating in-season harvest control rules that seek to meet subsistence salmon harvest needs from the suite of available species while limiting exploitation of Chinook stocks during weak run years, 2) holding a series of technical workshops with agency staff and key stakeholder representatives to elicit feedback on potential management control rules and objectives, and 3) developing in-season run assessment tools that utilize preseason forecasts coupled with in-season assessments informed by the Bethel Test Fishery. The technical workshops will also provide an opportunity for information transfer among workshop participants and allow further refinement of models and precise consideration of stakeholder objectives used to evaluate the performance of alternative management policies. We anticipate deliverables from this project to include: 1) a suite of in-season assessment models and decision rules potentially useful to inform management decisions, 2) increased capacity of managers and stakeholders to appreciate and utilize objective-based decision making techniques, and 3) publications in the scientific literature highlighting project results.

Project Objectives:

Objective 1: Reconstruct historical in-season run and fishery dynamics of Kuskokwim River Chinook, chum, and sockeye salmon stocks to inform the closed-loop simulation models. We will estimate run timings, spatial and temporal distribution of fishing effort and harvest, and escapement. Obtaining estimates of catchability, fishing effort expectations, and the responses of fishing effort to management actions and in-river salmon abundance will be particularly important in the analysis. In cases where the data are insufficient to estimate these parameters, we will use expert opinion solicited from managers and fishers.

Objective 2: Evaluate trade-offs associated with choosing among a candidate set of in-season harvest control rules for the mixed-species salmon fishery of the Kuskokwim River. We will use a computer simulation model of the in-season salmon run, multi-species subsistence fishery, and candidate harvest control rules. The candidate control rules will determine the spatial and temporal distribution of harvest openings. In particular we wish to assess the performance of decision rules that seek to avoid Chinook salmon harvest during times of low Chinook abundance.

Objective 3: Elicit agency and stakeholder input on objectives and options, and facilitate technology transfer of in-season modeling tools. We will hold two workshops with agency staff and key stakeholder representatives to (1) elicit input on operating model structure, objectives and management options, and (2) provide technology transfer in the form of training on in-season modeling approaches. We envision one workshop in the early stages of the project that will focus on eliciting input from biologists, managers, and stakeholder representatives on objectives and management options. A special emphasis of the meeting will be to adequately characterize the suite of conservation and fishery objectives valued by fishers and managers. A second technical training workshop will take place during the middle stages of the project to train technical staff on in-season modeling techniques.

Objective 4: Develop a probabilistic Bayesian in-season run forecasting tool to assist with management decision-making. This model will use associations between cumulative in-season gill net index counts (Bethel Test Fishery) and total run abundance to estimate the updated daily run abundance projection for the current year. We will adopt a Bayesian approach to incorporate uncertainty and appropriately weight the pre-season forecast (i.e., the prior) and the in-season data