Feasibility of using video technology to estimate salmon escapement in the Ongivinuk River, a clear-water tributary of the Togiak River

Abstract: Current monitoring of salmon runs on the Togiak River is primarily focused on sockeye salmon *Oncorhynchus nerka*. A method for monitoring escapement of other species of salmon in the drainage is needed to improve management. The applicability of sonar and a floating weir have been assessed in previous studies, but were considered unviable. As an alternative, we assessed the use of video technology for monitoring salmon runs in clear-water tributaries of the Togiak River, which could be used to index escapement for the entire drainage. In this two-year feasibility study, digital video recording equipment, above- and underwater cameras, and a remote power system were operated on the Ongivinuk River, a tributary of the Togiak River. Tests were conducted to determine optimal camera placement, field-of-view width, and lighting based on image quality and performance of motion detection processing. We also tested the hypothesis that upstream migrant salmon would avoid swimming over white substrate panels, as a possible method for concentrating fish passage into narrow sections of the channel. Image quality of above-water cameras and performance of the motion detection algorithm increased as the field-of-view width decreased. Motion detection processing was more effective when fish were viewed from the side than from the front. We were able to successfully count salmon at night with the aid of artificial light, but species could only be identified from underwater camera images. A V-shaped panel formation was successful at redirecting a portion of upstream migrant coho salmon *O. kisutch* through a gap located at its apex, within the view of an underwater camera. Accuracy of estimates could be increased by refining the technology used to count fish at night. Improvements in the motion detection algorithm we used or a substitute method of electronically discriminating fish passage is needed to minimize the amount of video collected when monitoring continuously. In addition, field-of-view width of above-water cameras should be limited to less than 10 m to improve image quality, as needed to correctly identify species of adult salmon. We concluded that with these refinements, estimating salmon escapement in clear-water tributaries of the Togiak River using video technology is feasible.

Citation: Hetrick, N. J., K. M. Simms, M. P. Plumb, and J. P. Larson. 2004. Feasibility of using video technology to estimate salmon escapement in the Ongivinuk River, a clear-water tributary of the Togiak River. U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Program, Final Report (Study 00-010 Phase II). U.S. Fish and Wildlife Service, King Salmon Fish and Wildlife Field Office, Alaska Fisheries Technical Report Number 72, King Salmon, Alaska.