

Environmental flows from a habitat suitability perspective

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Keywords: environmental flow, hydrological method, hydraulic rating method, habitat simulation method, physical habitat simulation, habitat suitability-discharge relationship

Abstract

Environmental flow presents the quantity, timing, and quality of water flows required to sustain freshwater and estuarine ecosystems and the human livelihoods and well-being that depend on these ecosystems [1]. So far, more than 200 methods for estimating environmental flow have been suggested globally [2]. These estimation methods can be classified into three groups, namely hydrological methods, hydraulic rating methods, and habitat simulation methods. This study attempts to compare environmental flows from a habitat suitability perspective. The hydrological methods, hydraulic rating methods, and habitat simulation methods were used to estimate environmental flows. The study site is a 20 km long reach of the Naeseong-cheon Stream downstream from the Youngju Dam in Korea. The Naeseong-cheon Stream is a moderately sized stream (order 8) with a normal flow of 4.1 m³/s. It was found that environmental flows vary greatly depending on the selection of methodologies. Specifically, the minimum flows by the hydrological methods were significantly smaller than those by the hydraulic rating methods or the habitat simulation methods, and the optimal flow by the hydraulic rating method is much larger than those by the other two methods. Physical habitat simulations for various environmental flows were carried out. It was revealed that the minimum flow by the hydrological methods might fail to provide the minimum requirement for an aquatic habitat and the optimal flow by the hydraulic rating method can degrade the habitat suitability of the target fish species.

Acknowledgment

The authors would like to express the appreciation for the financial support of the sponsors [Grant Number: NRF2017R1A2A2A05069836].

References

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