
EVALUATING WATERSHED CONDITION: BOTTOM UP VS. TOP DOWN APPROACHES?

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Habitat degradation has been identified as one of the major factors affecting the declines of fishes in the Columbia River Basin. The condition of physical habitat and the biotic integrity of stream systems are often directly correlated with substantial alterations to key landscape attributes. As such, numerous approaches to measure watershed condition have been developed. Here, we compare two separate measures of watershed condition: 1) a GIS-based measure of condition, i.e., top down; and 2) a ground based assessment of condition, i.e., bottom up), using field data collected across 1200 sites in the Interior Columbia River Basin under the PIBO Effectiveness Monitoring Project. With our GIS approach, we integrate land management and natural disturbance from watershed upstream of sample reaches into an overall watershed condition score. With our bottom-up approach, we integrate stream temperature data, indices of macroinvertebrate health, and an index of physical habitat condition from reach-level field data into an overall condition score. Our results indicate significant differences in assessments of condition across the two methods, as the GIS approach ranked considerably more watersheds with management activities into a low condition category than found in the bottom-up approach. Conversely, the GIS approach also categorized most watersheds with no or minimal management activities, i.e., reference, as low risk, while the field-based, bottom up approach illustrated a wide range of condition of reference sites due to natural disturbances. Our results suggest GIS-based approaches tended to quantify the ‘risk’ rather than condition within watersheds. The bottom-up approach tended to quantify actual conditions within streams, without consideration of potential risks associated with land management activities. Here, we advocate the most beneficial approach that would be some combination of the two to help guide and prioritize restoration activities to enhance habitat conditions and minimize risk of catastrophic disturbances.