A Novel Technique Using Side Scanning Sonar to Map Benthic Habitat of Medium to Large River Systems

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Abstract: A need exists within the natural resource community for an inexpensive and rapid technique for mapping and quantifying benthic habitat features of navigable river systems. Habitat mapping and assessment are critical components of research and management of aquatic fauna and the systems they inhabit. Unlike more expensive side scanning sonar units, the Humminbird® side imaging system employs a transducer that can be mounted directly to the transom of a small boat thus enabling the survey of streams that include shallow, rocky areas. Our field experience with the Humminbird 981c has demonstrated this device can be used to easily obtain high-resolution, geo-spatially referenced images of riverbed habitat. Such images might then be organized and analyzed within a geographic information system (GIS). We have developed a technique utilizing ArcGIS, Microsoft PowerPoint, and ERDAS Imagine software that effectively merges the images obtained during the field sonar survey and warps the images to match the actual configuration of the stream channel. The end product is a GIS layer revealing continuous river bottom habitat that can be interpreted and analyzed to map features such as rocky shoals, large woody debris, areas of fine sediment substrate (sand/mud), and relative depth. Although some technical proficiency is required to construct the GIS layer from the images captured during a sonar survey, we are currently working to streamline the process and to prepare documentation that will enable a user with basic knowledge of GIS and access to ERDAS Imagine to construct such habitat maps. In addition, we are conducting a study of the accuracy of habitat delineation via sonar image analysis by obtaining in-field habitat measurements within reaches containing woody debris and rocky areas, and reaches apparently devoid of such habitat. By comparing in-field measurements to estimates made from side scan imagery we will report the accuracy of this technique for delineating and quantifying habitat types.

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