

Executive Summary

Each year millions of dollars are spent to monitor the status and trend of natural resources and determine the effectiveness of restoration programs in the Pacific Northwest. Although there is increasing consensus among regional, Federal, private, State, Tribal, and stakeholder organizations with respect to the need for integrated and standardized monitoring information, funding for these activities is stagnant or decreasing. As a result, there is an increasing need to improve the efficiency and cost effectiveness of monitoring programs.

Natural resource managers currently largely rely on traditional assessment methods to determine watershed health, habitat condition and the behavior and status of individual animals or groups of animals. The information collected is then used in many diverse biological and ecological science and policy forums, often with significant management implications. Although current programs use various techniques to assess population status and trends and habitat condition, the statistical design and methods associated with these programs often address a limited number, or, individual hypotheses. In some cases, the information provided using these methods is not sufficient to understand sources of data variability or causative mechanisms, or to aid in the selection of corrective actions if needed. Similarly, these programs are unable to provide regionally comparable or spatially relevant information. We believe it is essential to improve our ability to gather comparable data, examine the suitability of current designs and methods to address regional monitoring needs, and to consider new tools and resources to complement traditional approaches.

Thus, the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) has recognized a need to improve the availability of information about remote sensing applications that are used in the monitoring arena. This is one of several monitoring tools, but it is a powerful addition to existing methods. To this end, and as an outlet for information about some current uses of remote sensing in the Pacific Northwest, PNAMP hosted a special session at the 2008 American Society for Photogrammetry and Remote Sensing (ASPRS) Annual Meeting. The special session, titled "Remote Sensing Applications for Aquatic Resource Monitoring," was intended to share some current applications of remote sensing techniques in aquatic resource monitoring and to raise awareness in the remote sensing community of the need for improved remote sensing applications.

The session included 11 presentations of current applications of remote sensing in aquatic resource monitoring, which provide the basis for the papers included in this volume. The session concluded with an expert panel discussion that focused on current technologies and needs these technologies address. In addition, participants were asked to discuss other

potential uses of current technologies and the development of new tools and their application in the monitoring arena. Much of the expert panel discussion, session presentations, and papers in this volume addressed three varieties of airborne LiDAR (LIght Detection And Ranging) instrument; thus, we offer a brief description of these technologies as part of the introduction to the expert panel discussion (chapter 12, this volume). We note these three central topics are part of several remote sensing data acquisition methods; other methods include satellite imagery, and some ground-based methods.

As a result of the special session, PNAMP has started a greater dialog among its members about remote sensing applications in aquatic resource monitoring and affiliations with experts in the field of remote sensing. This dialog suggests that as advances in remote-sensing technology are improving the quality and quantity of topographic data available, there is strong likelihood that more precise and cost-effective data can be collected in coordination with traditional ground survey-based habitat assessment techniques. PNAMP would like to continue to facilitate these discussions, to include a comparison of the cost, benefits, and tradeoffs of remote sensing technique integration with ground surveys. It is our hope that this dialog will increase awareness, expand the use of remote sensing techniques in aquatic resource monitoring, and create impetus for development of new remote sensing applications. In 2009, PNAMP will work with the American Fisheries Society's Washington and British Columbia Chapter to host a larger regional symposium that builds upon the impetus and depth-of-knowledge approach that began with ASPRS and PNAMP remote sensing specialists.

In closing, there is a fundamental need to improve information available to natural resources managers and decision processes. Categorical investigations to inform ecosystem-driven scientific effort and especially management decisions by State, Federal, and Tribal governments are complex and numerous. Although some monitoring questions are unique to particular agencies and organizations, the need for comprehensive and efficient collection of information on metrics and indicators on all or certain aspects of the status and trend of fish, habitat, and watershed health is common to entities involved in monitoring in the Pacific Northwest. By applying well-coordinated monitoring approaches, technical and fiscal resources can be more effectively shared among interested parties, data can be shared, resulting information can provide increased scientific credibility, and allow greater accountability to stakeholders. In particular, economies of scale, shared interests, and multiple-use data suggest that it would be good to pool monitoring funds from multiple agencies for acquisition of remotely-sensed data. PNAMP will strive to provide leadership through the development and advancement of recommendations and agency level agreements that are considered for adoption by the participating agencies to this end.

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