

3. QUALITY ASSURANCE PROGRAM

3.1 Quality Assurance Plan

A Quality Assurance Plan was developed for this study. All sampling plans and analytical procedures were prepared under the direction of a Project Director who also served as the Principal Investigator. The Project Director was responsible for establishing and monitoring the overall technical direction of the study.

A Project Manager was assigned to work under the direction of the Project Director and was responsible for providing technical supervision of field staff to assure consistency of sampling procedure. A Data Management Specialist was assigned to this study to oversee data validation and storage in compliance with established procedures and standards. A Project Coordinator was assigned to facilitate transfer of data from field staff to the Data Management Specialist, provide quality review of field data, and coordinate staff training of sampling procedures under the supervision of the Project Manager. All field staff were trained in the use of GPS.

Field staff from the NJDEP Land Use Regulation Program conducted independent field evaluations and provided quality assurance oversight of sampling methods and data collection techniques. All field data were subject to NJDEP review prior to entering information into the wetland mitigation database.

The Project Director coordinated with the internal NJDEP project team during study development and implementation. The NJDEP project team consisted of two Project Managers representing the NJDEP Division of Science, Research and Technology, and the Land Use Regulation Program. In addition, the Bureau of Geographic Information and Analysis and the NJDEP NEPPS Land and Natural Resources Workgroup members collaborated on study design. A Peer Review Committee was established to review and comment on development of the sampling procedures and analysis of results. The Peer Review Committee included representatives from academic institutions, resource agencies, government and non-government

organizations and the private sector. Regular communications with members of the project team and peer review committee were maintained throughout the duration of the study to facilitate exchange of information and ideas and allow for collaborative problem solving and planning.

All data collection followed established sampling protocols utilizing standardized data collection procedures. The data collection procedures specified sampling parameters and frequency (see Appendix D). All field evaluations were restricted to the growing period from April 1 through September 15 to minimize the effect of seasonal variability.

3.2 Field Trials

Initial field trials of the Concurrence Evaluation and WMQA procedures were conducted on sixteen (16) separate mitigation sites in July of 1999. Results of the field trials were used to refine sampling procedures and data management techniques. Trial wetland delineations were conducted on two (2) sites in November 1999 using the GPS data collection techniques to assist in the development of the data management system and assure that all data generated by the study would be compatible with NJDEP GIS/GPS mapping standards.

3.3 Inter-rater Variability Analysis

An analysis of inter-rater variability was conducted on six (6) study sites in July of 1999 to determine the repeatability of the WMQA and concurrence scores. Two to three study teams, consisting of two individuals per team, independently evaluated each of the six sites. A permutation test (Efron and Tibshirani, 1993) was performed to calculate inter-rater variability for each WMQA variable, the total WMQA Index score, and the total Concurrence Evaluation score. Confidence intervals were calculated for each parameter. The permutation tests did not reveal a statistically significant difference in mean scores between study teams for any of the parameters ($P \geq 0.44$). Although the permutation test provides no evidence of differences between study teams, the sample size is too small for the tests to have adequate power to detect differences. NJDEP recognizes this, however, and the reliability of the WMQA assessment

procedure is being tested in an independent, NJDEP-funded Rutgers University study, currently underway.

Confidence intervals for most parameters were very wide, probably due to the large variability inherent in wetland systems evident in the sites evaluated. As a result of the inter-rater variability analysis, sampling procedures were adjusted to provide additional clarification in scoring those variables exhibiting wide confidence intervals. For example, a matrix was included in the WMQA procedure for ease of reference and to provide additional guidance to the field staff in assigning a raw score (see Appendix C).