

GROUP A. PROJECT MANAGEMENT AND INFORMATION/DATA QUALITY OBJECTIVES

A1. Title Page

Quality Assurance Project Plan

Rapid Assessment Method Development and Assessment for Subalpine Riverine Wetlands in New Mexico

Revision 0

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A2. Approval Page

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Acronyms

DQO	Data Quality Objectives
CWA	Clean Water Act
EIO	Environmental Information Operations
EPA	United States Environmental Protection Agency
GIS	Geographic Information System
GPS	Global Positioning System
HGM	Hydrogeomorphic
LLWW	Landscape position Landform Water flow path Water body type
NA	Not Applicable
NHNM	Natural Heritage New Mexico
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMRAM	New Mexico Rapid Assessment Method
NWI	National Wetland Inventory
QA	Quality Assurance
QC	Quality Control
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
RAM	Rapid Assessment Method
SA	Sample Area
SOP	Standard Operating Procedures
SQUID	Surface Water Quality Information Database
SWQB	Surface Water Quality Bureau
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load
UNM	University of New Mexico
VI	Vulnerability Index
V&V	Verification and Validation
WOI	Wetland of Interest
WPC	Wetland Program Coordinator
WPO	Wetland Program Project Officer
WPP	Wetland Program Plan

A4. Project Purpose, Problem Definition, Background

Project Purpose and Problem Definition

The purpose of this Quality Assurance Project Plan (QAPP) is to guide the development and implementation of a standardized, scientifically defensible Rapid Assessment Method (RAM) for high elevation subalpine riverine wetlands in New Mexico. This QAPP refers to the project as the *Rapid Assessment Method Development for Subalpine Riverine Wetlands in New Mexico*. The project is being managed by the New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB) Wetlands Program in collaboration with Natural Heritage New Mexico (NHNM).

Subalpine riverine wetlands located in the upper Rio Grande, Rio Chama, Canadian watersheds, and the Jemez Mountains are highly sensitive to changes in snowpack, hydrologic timing, drought, wildfire, and extreme flood events. Despite their ecological importance, there is currently limited standardized information regarding their condition, functional capacity, spatial extent, and vulnerability to environmental stressors. So, there is currently no standardized, validated rapid assessment method specifically designed for subalpine riverine wetlands in New Mexico. This limits the ability of resource managers and regulatory agencies to consistently assess wetland conditions, compare sites across regions, and make informed decisions regarding wetland protection, restoration, and management.

The purpose of defining a subclass and testing New Mexico Rapid Assessment Method (NMRAM) within a select Reference Domain is to reduce the natural variability in wetland type as well as variabilities that occur with latitude, altitude, climate, and geomorphology. The selection of Sample Areas (SA) for this project is intended for testing rapid assessment protocols based on valley characteristics, floristic characteristics as well as the spectrum of ecological condition, representing the disturbance gradient from relatively undisturbed to highly degraded sites. The “disturbance gradient” is the basic underlying assumption that wetland condition within similar wetlands will vary along a gradient from the most pristine to the most degraded in response to anthropogenic disturbance.

Project Objectives: The primary objectives of this project are to:

1. Develop and validate Level 1 and 2 RAM tailored to subalpine riverine wetlands.
2. Identify and characterize reference standard wetlands representing a gradient of ecological condition.
3. Develop, test, and refine assessment metrics and indices, including a Vulnerability Index that reflects sensitivity to climate-related and anthropogenic stressors.
4. Collect and analyze field data to calibrate and validate assessment tools.
5. Produce a Subalpine Riverine Wetlands Field Guide and update the NMRAM Manual.
6. Provide training, outreach, and technical support to facilitate implementation of the method by end users.

This project includes environmental data collection, analysis, and interpretation to support wetland assessment and management. Activities include:

- Literature review and synthesis of existing scientific information
- Use of existing data sets for site selection (e.g., National Wetland Inventory (NWI), Landscape position Landform Water flow path Water body type (LLWW), Hydrogeomorphic (HGM) classifications)

- Geospatial analysis and development of project spatial datasets
- Field data collection of Level 1 and Level 2 wetland attribute data (e.g. Landscape context, vegetation, soils, hydrology, and stressors)
- Development and testing of Level 1 & 2 assessment metrics and scoring indices using Level 3 assessment data.
- Statistical analysis for calibration and validation of assessment tools
- Integration of data into the NMRAM and University of New Mexico (UNM) Natural Heritage databases for long-term use

Decisions to be Supported: The environmental data collected under this project will support the following decisions:

- Classification of wetland conditions (e.g., reference, excellent, good, fair, poor)
- Identification of priority wetlands for conservation, protection, or restoration
- Evaluation of impacts from land use and climate-related stressors
- Support for wetland monitoring, assessment, watershed based planning and regulatory decision-making
- Development and application of standardized wetland assessment protocols across New Mexico.

The specified data quality requirements are necessary to ensure that these decisions are based on scientifically defensible and reproducible environmental information.

Type, Quantity, and Quality of Information: The project will collect environmental data from approximately 35–40 subalpine riverine wetland sites representing a range of ecological conditions within the defined reference domain. Data types will include Level 1 landscape context, Level 2 rapid assessment metrics (e.g., vegetation, soils, hydrology) and stressor information and Level 3 Assessments for detailed field measurements which may include vegetation surveys, channel cross-sections, or longitudinal profiles. A pilot study phase will be conducted to test preliminary assessment metrics, evaluate data collection procedures and identify key stressors and refine indicators. Data quality requirements include sufficient precision, accuracy, representativeness, completeness, and comparability to support development of assessment metrics, calibration of indices, and defensible decision-making and is discussed in more detail in section A6.

Conceptual Site Model: Subalpine riverine wetland conditions are driven by interactions among hydrology (e.g., snowpack and flow regime), geomorphology, vegetation communities, and external stressors such as wildfire, grazing, land use, and climate variability. These drivers influence ecological functions including water retention, nutrient processing, and habitat quality. The NMRAM framework will quantify these attributes through a set of metrics to evaluate overall wetland condition and vulnerability.

Intended Use of Information and Users: The data generated from this project will be used by NMED SWQB Wetlands Program, Federal and state regulatory agencies, Tribal natural resource programs, Watershed groups and non-governmental organizations and Environmental consultants and practitioners. This project supports implementation of the Clean Water Act (CWA), including state wetland monitoring and assessment programs administered by the NMED SWQB. The project contributes to improving wetland assessment methodologies used in water quality management, permitting, and regulatory decision-making.

Other QA Planning Documents: At this time, no additional Quality Management Plans (QMPs) or QA planning documents impose requirements beyond those described in this QAPP. This QAPP serves as the primary quality assurance document governing all project activities and environmental data collection efforts. If additional QA requirements are identified, they will be incorporated into this QAPP through formal revisions.

Background

Subalpine riverine wetlands in New Mexico occur along unconfined mountain streams and rivers at elevations greater than approximately 2,500 meters (9,000 feet). These systems occupy transitional landscape positions between headwater slope wetlands and confined valley riverine wetlands. They are typically associated with first- to third-order stream segments in low-gradient valleys (<2%) and are characterized by highly sinuous stream channels (e.g., Rosgen Type E channels; Rosgen, 2009), well-developed and vegetated floodplains, and geomorphic features such as oxbow cutoffs and backwater channels.

Subalpine riverine wetlands provide important ecological functions, including regulation of streamflow, maintenance of cold-water thermal regimes, sediment retention, nutrient cycling, and provision of habitat for Coldwater aquatic species and riparian-dependent wildlife. These systems are highly sensitive to hydrologic alteration and disturbance.

Documented stressors include hydrologic modification from dams and diversions, livestock grazing and trampling, wildfire, road construction, off-road vehicle use, agricultural and urban development, and encroachment of non-native or upland plant species. Legacy land uses such as mining, logging, and historical grazing have contributed to channel incision, widening, and vegetation loss. Climate-related stressors including reduced snowpack, drought, and extreme flooding further increase system vulnerability.

The highest priority of the SWQB Wetlands Program is to develop methods for assessment that lead to protection and provide a benchmark for restoration of the State's wetlands resources. Although the NMRAM has been developed for other five wetland subclass types, subalpine riverine wetlands are not currently represented. Without assessment information, wetlands resources will continue to decline from a variety of anthropogenic stressors.

The NMRAM provides a cost-effective and consistent evidence-based tool for assessing wetland ecological condition (McGraw, Muldavin, and Milford 2018). It uses a select set of observable and relatively easy-to-measure spatial analyses and field indicators (landscape, size, biotic and abiotic metrics) to express the relative condition of a particular wetland site. The ecological condition of a particular site is evaluated and rated as excellent, good, fair, or poor based on a preponderance of evidence from a set of landscape, biological, and abiotic metrics. Additional objectives for NMRAM development include identifying and evaluating 1) abundance, distribution and condition of wetlands in the subclass within the region, including associated habitat, and other functions, above a threshold to maintain ecological services; 2) reference wetland conditions within the subclass; 3) wetland protection needs for the subclass; 4) potential wetland restoration parameters and metrics that may be used to measure wetland restoration effectiveness and recovery; 5) locations to serve as restoration opportunities for the

subclass within the region., and 6) identifies the stressors within the watershed that are causing wetland decline. These data provide justification for preventing or eliminating stressors that will ultimately lead to increases in wetland quantity and quality.

The development and use of the NMRAM for subalpine riverine wetlands, will provide for a robust wetlands assessment program in New Mexico and is consistent with our 2012 New Mexico Assessment and Monitoring Program Strategy for Wetlands. Training agency personnel, watershed group technicians, and other interested parties will accelerate the collection of relevant data and expand the use of NMRAM to other wetlands in the same selected subclasses. The development of a New Mexico wetlands database integrated with other water quality data ensures that these data are available to the state, to communities and EPA and will help provide the basis for wetlands water quality standards. These actions ensure the attainment of quality wetlands and increase in wetlands through improved restoration and protection.

Water resources assessments and management have become priority since the 1948 Federal Water Pollution Control Act and the 1972 amendments contained in the Federal Water Pollution Control Act. Rapid bioassessments (e.g., Barbour et al. 1999) have become standard approaches to evaluate the quality and biotic health of bodies of water and wetlands, and hydrogeomorphic assessments (e.g., Brinson et al. 1995; SSI) have become important tools for determining the hydrologic function of water bodies and wetlands. Wetland rapid assessment methods have evolved to combine aspects of both bioassessments and hydrogeomorphic assessments. Rapid assessment of wetlands assumes that condition can be evaluated based on a set of observable indicators or parameters and metrics, and that ecological condition varies across environmental stress gradients. Rapid assessments are based upon three basic principles: 1) assessments are relative to existing conditions only, 2) the method is rapid such that a team of three trained field technicians can complete the field assessment and data analysis for the assessment in one day, and 3) the assessment is based primarily on observed field conditions (Fennessy et al. 2004). NMRAM is being developed in accordance with these basic principles.

A5. Project Task Description

Description

This Project will employ the National Wetlands Inventory and collateral geospatial datasets to identify subalpine riverine wetland locations in Northern New Mexico within the upper Rio Grande, Rio Chama, and Canadian basins and in the Jemez Mountains (Figure 1). This subset will be assigned a preliminary ranking based on best professional judgment and familiarity with the Wetlands of Interest (WOI) by members of the NMRAM Assessment Team.

In addition, the NMRAM Assessment Team will review existing rapid assessment metrics and protocols from other rapid assessment methods. The NMRAM Assessment Team will then select a preliminary set of metrics and develop new ones specific to the subclass that will be reviewed and potentially tested for use in the NMRAM for subalpine riverine wetlands. This information (potential sites and preliminary set of metrics) will be presented to the Technical Advisory Committee (composed of local private, non-governmental organization and agency personnel familiar with subalpine wetlands, and the Reference Domain) for their input on the metric selection, new metric development and preliminary rankings made by the NMRAM Assessment Team.

A Pilot Study will be conducted prior to metric selection in which a small set of subalpine riverine wetlands (5-10) representing the disturbance gradient, unique situations or the potential limits of the Reference Domain will be visited by the NMRAM Assessment Team consisting of NMED Wetlands Program staff, and the NHHM Assessment Team Members. During the Pilot Study preliminary rankings for these sites will be reviewed, the potential utility of possible metrics, and additional metrics that should be included, created, or modified to meet the objectives of the NMRAM for subalpine riverine wetlands will be discussed. Potential drivers of ecological condition and potential stressors will be noted and discussed. Notes, photographs and conclusions from each site will be included in a Pilot Study Report.

From this Pilot Study, a draft set of GIS and field protocols and electronic data sheets will be created for data collection at 30-40 carefully selected Sample Areas that represent the disturbance gradient within the Reference Domain. Data collection protocols will include geographic information system (GIS) map evaluations using different land feature and land use map layers (Level 1); and field-based rapid assessment (Level 2) of landscape, abiotic, and biotic attributes using the selected metrics and protocols identified in Section B of this QAPP.

Potential drivers of ecological condition will be identified, and stressor checklists will be developed or modified from existing NMRAM stressor checklists to be included in the NMRAM for subalpine riverine wetlands data collection package. These checklists will be used during data collection to identify and evaluate the intensity of stressors on each Sample Area. Stressors are expected to have a negative effect on the condition of the site and may provide insight into the ecological integrity of the wetlands. A draft Risk Assessment based on the results of completion of the Stressor Checklist at each Sample Area can then be developed to identify the impacts to the resource. The intensity of stressors on the Sample Area helps define the level of risk by considering ecological condition against the severity of stressors. The stressor checklist is not included in the scoring and ranking of the Sample Area. Rather, it is a simple mechanism to increase visibility of risks and assist management decision making.

The draft set of NMRAM GIS and field metrics and field sheets will be used for data collection to:

- Verify the suitability of the selected metrics to inform conditions of the subalpine riverine wetland ecosystem
- Calibrate metric sensitivity relative to the range of variability in condition
- Determine the time and effort it takes to conduct NMRAM assessments
- Determine the Vulnerability Index
- Determine how stressor type and intensity relate to condition
- Determine the level of experience needed for a team to conduct the NMRAM
- Determine if the outcome provides the information needed to meet the SWQB project goals and NMRAM goals
- Determine site scoring and weighting factors based on condition

The data collection sheets include a Rank Summary Worksheet where the metric ratings are compiled, weighted by importance and sensitivity and summarized for each attribute. Using the attribute scores, the site is given an overall weighted Condition Rank, ranging from excellent to poor.

NHNM and the WPOs will conduct a training day in the field to ensure that all participants in data collection efforts are familiar with the requirements in the QAPP and understand the field protocols for collection of quality data from the selected sites. Safety protocols also will be reviewed on this training day. The Crew Leaders will ensure that all field sheets and data are collected and recorded at the end of each field day and will back up all data sheets either by photographing or copying to a separate hard drive.

Once data collection is concluded, a review meeting will be scheduled for the NMRAM Assessment Team and the Data Collection Team to review the data collection efforts. The data will be entered into NHNM databases for review and multi-metric analyses to ensure the efficacy of all the selected metrics. Draft final NMRAM Manual update, Field Guide and data collection worksheets will be completed by NHNM and SWQB WPOs and reviewed by project staff and prepared for end-user training. The current NMRAM Manual Version updated to include subalpine riverine wetlands details and rationale, the Final Field Guide and Final Data Collection worksheets will be in the final report of the project by NHNM. With the support and contributions of the WPC, NHNM will prepare these documents which will be reviewed and accepted by SWQB WPOs and WPC.

Data Measurement Processes and Techniques: Field and analytical methods will include:

- Vegetation sampling using plot-based surveys and species identification
- Channel and floodplain measurements using standard geomorphic survey techniques
- Hydrologic assessment through field indicators and observational metrics
- Soil characterization using field indicators of hydric soils
- Geospatial analysis using Geographic Information System (GIS) tools for mapping and landscape characterization
- Statistical analysis to calibrate and validate assessment metrics and scoring indices

These processes ensure consistent, repeatable, and scientifically defensible data collection across all sampling locations.

Use of Information: The information collected will be used to:

- Establish reference standard conditions for subalpine riverine wetlands
- Map wetland extent, distribution, and ecological gradients
- Develop and refine Level 2 rapid assessment metrics and scoring indices
- Create a Vulnerability Index (VI) to assess susceptibility to climate-related stressors
- Update the NMRAM Manual and develop a Field Guide with new protocols and tools
- Support wetland protection, restoration, and management decisions
- Inform development of narrative water quality standards under the CWA

Project Tasks: The project will be completed in the following major tasks:

1. *Literature Review and Data Compilation*- Review existing scientific literature and compile available datasets (e.g., NWI, LLWW, HGM) to inform study design, subclass descriptions, reference site selection, and metric development.
2. *Geospatial Analysis and Site Selection*- Develop project spatial layers to identify candidate wetland sites, including potential reference standard wetlands, and delineate reference domain limits.
3. *Pilot Study*- Conduct initial field sampling at selected wetland sites to test and refine assessment metrics and protocols, including preliminary data collection, site photos, and evaluation notes.
4. *Field Method Preparation and Training*- Prepare draft metrics, field datasheets, field packets, sampling supplies, and landowner permissions; train field staff on Level 2 and Level 3 assessment protocols.
5. *Field Data Collection and Database Entry*- Conduct Level 2 and Level 3 data collection at selected wetland sites; perform data entry, quality control, and management in the NMRAM and UNM Natural Heritage databases.
6. *Data Analysis and Method Development*- Perform statistical analysis, metric calibration, multi-metric analysis, and develop/validate the NMRAM method, including scoring criteria and the Vulnerability Index; update NMRAM manual and develop field guide.
7. *Reporting, Outreach, and Deliverables*- Produce final reports, technical documentation, updated NMRAM Manual, and Subalpine Riverine Wetlands Field Guide; conduct workshops, short courses, and Botany Booster trainings; provide technical support to end users; document outreach, attendance, and lessons learned.

Schedule

The project with NHNM will run from December 2025 through May 2028 and will begin with a project kick-off meeting in January 2026. Initial technical work will include a literature review, geodatabase development, preliminary site selection, draft metric development, and QAPP preparation from February through June 2026, followed by a three-day pilot study conducted between July and August 2026 to evaluate and refine assessment methods.

Field preparation and training will occur from April 2026 through August 2027. The first phase of field data collection will take place from June through September 2026, followed by a second phase of field data collection from June through September 2027. Supporting database entry and data management will occur from September 2026 through May 2028.

Results from these efforts will be used to complete multi-metric analyses, revise the NMRAM Manual, and develop a Subalpine Riverine Wetlands Field Guide with data collection tool from January 2027 through May 2028. The project will conclude with technical training workshops and outreach activities between April and May 2028 to support implementation of the assessment methods by agency staff and project partners.

Administrative tasks such as procurement, contract reimbursements, and general project management will be ongoing throughout the duration of the project.

These tasks are outlined below in Table 1.

Table 1. Project Task, products, responsible party, timeline (use as applicable)

Task	Product	Responsible Party	Approximate State Date	Approximate Completion Date
TAC, Literature Review, Geodatabase, Subclass Description, Draft List	TAC meetings. Project geodatabase, refined subclass description and reference domain limits, Level 1 database of potential subalpine riverine wetland sites ranked to ensure range of condition is represented.	NMED SWQB, NHNM	12/16/2026	06/30/2026
QAPP	EPA approved QAPP and updates as needed.	NMED SWQB, NHNM	12/16/2025	Approved by July 2026.
Review Riverine Metrics and Conduct Pilot Study.	Questions for Pilot Study, preliminary data, notes, photos from Pilot Study, 3-day Pilot Study and Report.	NMED SWQB, NHNM	4/1/2026	7/31/2026
Draft Metrics, Materials and Supplies, Schedule Entry, Conduct Field Training.	Subalpine riverine wetlands draft metrics, protocols, stressor checklists prepared, field data collection supplies and packets ready, lodging, permissions obtained, data collection scheduled, data collection team trained for each data collection.	NMED SWQB, NHNM	6/1/2026	5/15/2028;
Collect Data From 40 Sample Areas, Database Entry.	Data Collection from 40 sites completed. Data entry into databases.	NMED SWQB, NHNM	July 2026	8/30/2027; Database entry Fall 2026 and Fall 2027
Multi-metric Analysis, Revise Manual & Field Guide	Final set of metrics, Vulnerability Index created, Field Guide completed, Manual updated and ready for SWQB Wetlands Program website.	NMED SWQB, NHNM	1/31/2027	5/15/2028
Continue SQUID Database Development	NMRAM electronic datasheets completed, SQUID data entry and access updated including polygon data and photos.	NMED SWQB, Database Contractor	Spring 2026	6/30/2028

NMRAM Botany Booster and Wetland Soils Workshops, Virtual Training Module.	Trained end-users on NMRAM for subalpine riverine wetlands, botany, and soils. Field Guide, Manual and datasheets, virtual modules on SWQB Wetlands Program website	NMED SWQB, NHNM	4/1/2028	5/15/2028
Reporting to SWQB Officer	Monthly progress reports and reimbursement requests	NHNM	12/16/2025	05/15/2028
Reporting to EPA	Semi-Annual and Final Reports and deliverables to U.S Environmental Protection Agency (EPA)	NMED SWQB	7/18/2024	06/30/2028

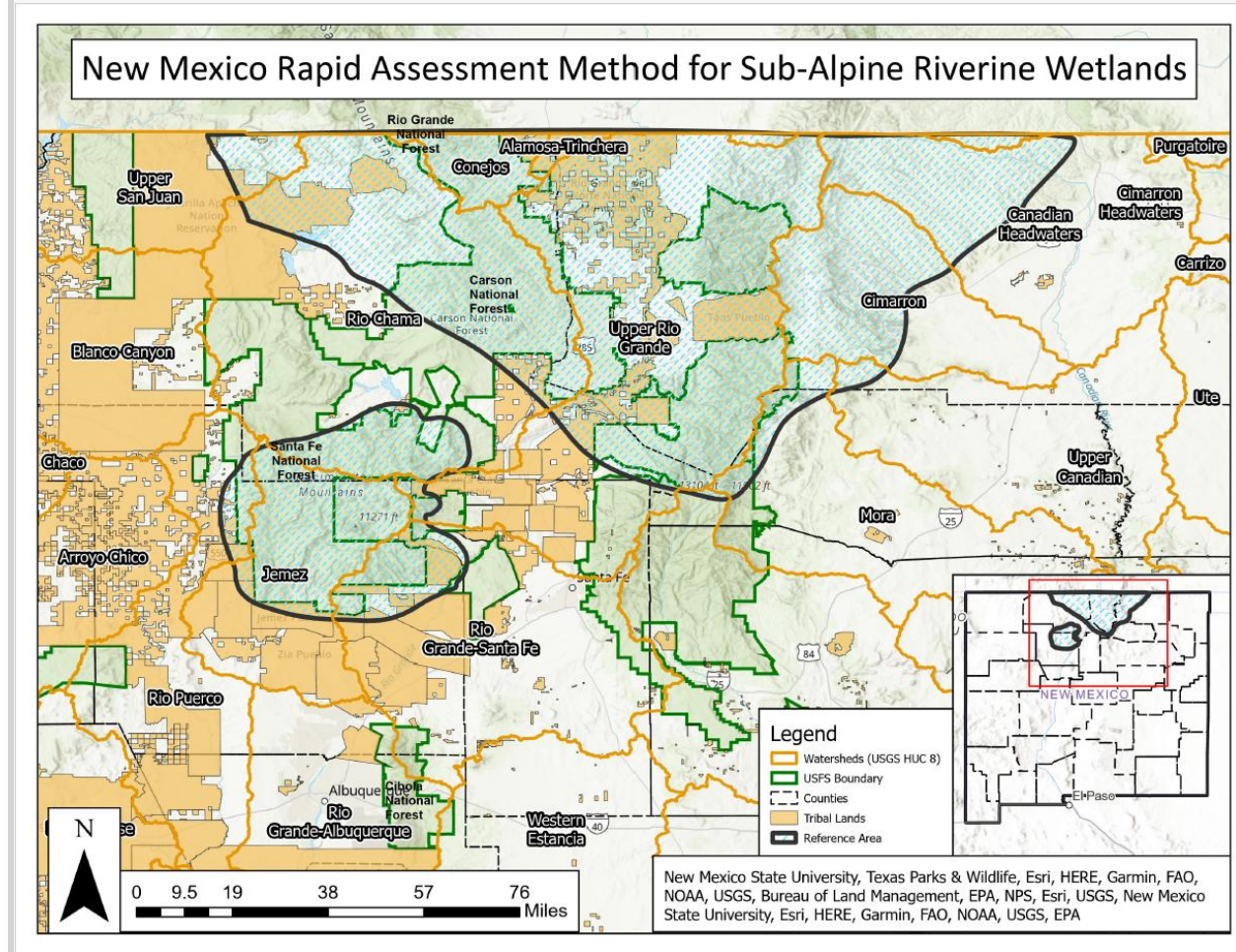
Project Area

The project area encompasses high-elevation subalpine riverine wetlands located within the upper Rio Grande, Rio Chama, and Canadian River watersheds, as well as the Jemez Mountains in northern and central New Mexico. These wetlands generally occur along unconfined, low-gradient mountain streams at elevations above 2,500 meters (approximately 9,000 feet). They are typically situated in open valley landscapes with valley slopes less than 2%, creating highly sinuous channels with well-vegetated floodplains that support diverse wetland communities. These physical and ecological characteristics distinguish subalpine riverine wetlands from steeper headwater slopes or confined valley wetlands.

Subalpine riverine wetlands in this region are highly sensitive to hydrologic changes, wildfire, drought, and other climate-related stressors. Stressors also include anthropogenic influences such as grazing, road construction, hydrologic alteration, and invasive species. The project will select sites across a range of public and private lands, including national forests, tribal lands, state-managed lands, and privately owned properties, ensuring that reference standards, metrics, and vulnerability assessments are applicable across the wetland subclass. Site selection will use geospatial tools, including GIS analysis, NWI maps, and HGM and LLWW classifications, to delineate wetland locations, map their extent, and define the reference domain. The reference domain will include wetlands that represent a gradient of ecological conditions, from minimally impacted to moderately altered sites, ensuring that the assessment captures variability within the subclass.

Field verification and a pilot study will be conducted to confirm site selection, subclass classification, and environmental conditions. This approach ensures that sites are representative, data collection is scientifically defensible, and information generated can be reliably used to develop Level 2 assessment metrics, scoring criteria, and a Vulnerability Index.

Figure 1. Project Area Map



Monitoring Location Selection Criteria

Monitoring locations for the subalpine riverine wetlands project will be selected to represent the full range of ecological conditions, hydrologic settings, and landscape characteristics across the upper Rio Grande, Rio Chama, and Canadian River watersheds, as well as the Jemez Mountains. Site selection will use a combination of geospatial analysis, literature review, existing wetland inventories, and field reconnaissance to ensure scientifically defensible, representative monitoring locations.

Identification of Potential Sites: Initial candidate sites will be identified using the following datasets and tools:

- NWI maps for wetland type and distribution.
- GIS layers for hydrology, landform, landscape position, land use, and infrastructure.
- LLWW classifications and HGM data for subclass characterization.

These data will be compiled into a project geodatabase, which will support subclass description

refinement, delineation of reference domain boundaries, and identification of wetlands representative of the subalpine riverine subclass.

Site Prioritization:

Selected monitoring sites will be prioritized based on:

- Reference condition wetlands exhibiting minimal human disturbance, used to establish baseline ecological thresholds.
- Range of ecological conditions (healthy, moderately impacted, and highly impacted) to capture functional and structural variability.
- Field accessibility and logistical feasibility, while ensuring landowner permissions and safety considerations are met.
- Diverse ownership types (public and private lands) ensure that data are representative across land management regimes.

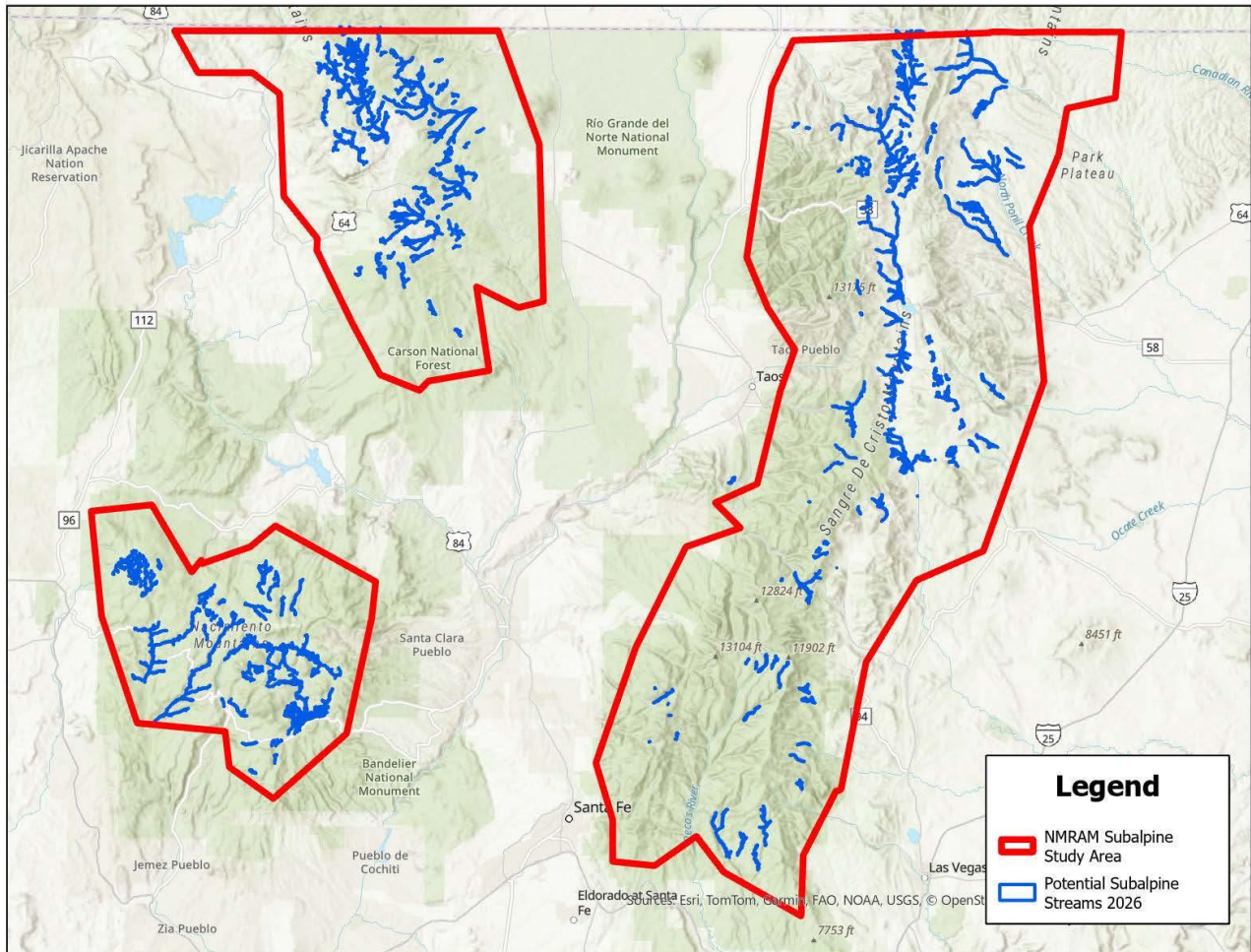
Field Verification and Pilot Studies:

Field reconnaissance and three-day pilot study sampling will be conducted to confirm site classification, evaluate accessibility, and identify current stressors. Observations from these efforts will inform final site selection by ranking and ensure that the dataset accurately reflects the diversity of subalpine riverine wetlands.

Final Monitoring Network:

The project will establish approximately 40 subalpine riverine wetland sample areas, balancing geographic coverage, gradient of ecological condition, and logistical constraints. For each site, the coordinates, ownership, access information, and relevant notes will be recorded in the project geodatabase to maintain traceability and support repeatable data collection.

Figure 2. Project Area with Monitoring Locations



A6. Information/Data Quality Objectives and Performance/Acceptance Criteria

The purpose of this project is to expand the knowledge of the condition of subalpine riverine wetlands in New Mexico. The primary Data Quality Objectives are to ensure that the resulting data are of sufficient quality to provide a high level of confidence in determining the condition, function, and vulnerability of subalpine riverine wetlands, including their response to natural and anthropogenic stressors, and their suitability as reference standards for wetland management and restoration efforts in the RAM Development for subalpine riverine wetlands in New Mexico. Data quality will be measured against the quantitative and qualitative data quality indicators described below.

Acceptance and performance criteria include:

- Adherence to standardized field protocols and QAPP requirements
- Completion of required data fields and documentation
- Implementation of quality control procedures (e.g., field verification, data validation checks)

- Consistency in data collection across field teams and sampling events

Detailed performance criteria for data quality indicators are provided in subsequent sections of this QAPP.

Data Quality Indicators (DQIs)

1. Accuracy

- Field measurements, observational data, and analytical results must reflect true wetland conditions, including hydrology, vegetation, geomorphology, and stressor presence.
- Accuracy will be evaluated through instrument calibration, comparison to reference wetlands, and cross-validation with existing datasets (NWI, LLWW/HGM).

2. Precision

- Data collection methods will be standardized across field teams to ensure repeatability.
- Multiple measurements (e.g., vegetation cover, water depth, channel cross-sections) will quantify within-site variability.

3. Representativeness

- Selected monitoring sites will capture the full range of conditions, hydrologic settings, and geomorphic positions within the subalpine riverine wetland subclass.
- Sampling includes minimally disturbed reference sites, impacted sites, and intermediate conditions across watersheds.

4. Comparability

- Methods will align with existing NMRAM protocols for other wetland subclasses to allow comparisons across wetland types and regions.
- This includes consistency in Level 2 and Level 3 metrics, scoring, and database entry (NMRAM and UNM Natural Heritage).

5. Completeness

- Data will be collected from 35-40 monitoring sites across multiple seasons to capture spatial and temporal variability.
- Field teams will document missing or unusable data points with reasons.

6. Sensitivity

- Metrics and indices, including the Vulnerability Index, will detect subtle differences in wetland condition and changes over time, including response to climate-related stressors and anthropogenic impacts.

DQI	Determination Methodologies
Precision	Precision will be ensured by consistently assigning the same staff the responsibilities of collecting, recording and analyzing data.
Accuracy	Accuracy is based on the use of methods determined to be reliable and tested through the pilot and subsequent field inventory components.

Representative	Sample Area selection is representative of the varied continuum of reference conditions needed to develop the methodology.
Comparability	Methods for data collection are standardized and reproducible from the development and adherence to this QAPP.
Completeness	All known sites within the subclass were selected to assess the range of conditions. All identified metrics will be collected for each of the Sample Areas to ensure completeness.
Sensitivity	Sensitivity of the metrics used will be analyzed during the analysis and recalibrated as applicable to develop the methodology.

Data Use and Defensibility

These DQOs, performance criteria, and quality indicators ensure that collected data are:

- Reliable and reproducible across field teams and seasons
- Defensible for management, restoration, and regulatory decision-making
- Comparable to other wetland assessments statewide

This approach ensures that subalpine riverine wetlands in New Mexico are assessed consistently and scientifically, providing a foundation for robust environmental decisions.

A7. Distribution List

The QA Officer will ensure that copies of this QAPP and any subsequent revisions are distributed to members who have signature authority to approve this QAPP. The SWQB Project Officer will ensure that copies of the approved QAPP and any subsequent revisions are distributed to the Project Manager. The Project Manager will distribute to all other project personnel listed below. All members of the distribution list who do not have signature authority to approve this QAPP will review the QAPP and sign the Acknowledgment Statement prior to initiating any work for this project. The signed Acknowledgment Statements will be collected by the SWQB Project Officer and will be given to the QA Officer for filing with the original approved QAPP.

New Mexico Environment Department Surface Water Quality Bureau

Wetlands Program Project Officer: Shabana Shoukath, (505) 372-9908

Wetlands Program Project Officer: Shinya Burck, (505) 500-9783

Wetlands Program Project Officer: Zach Shephard, (505) 618-0375

Program Manager: Kathryn Lacey-Young, (505) 946-8863

Quality Assurance Officer: Emily Miller, (505) 660-3534

Natural Heritage New Mexico, University of New Mexico

Project Operations Manager and Ecology Coordinator: Esteban Muldavin (505) 277-3827

Riparian Ecologist: Elizabeth Milford (505) 277-3829

Botanist: Yvonne Chauvin (505) 277-3829

Research Technician: Amy Urbanovsky (505) 277-3820

Botanist: Grace McCartha (505) 277-3826

U.S. Environmental Protection Agency Region 6

Project Officer: Kyla Chandler, Region 6 State and Tribal Programs, (214) 665-2166

A8. Project Organization

The table below lists all staff involved in EIO and describes their roles and responsibilities. The Project Officers will ensure that any staff responsible for conducting work in accordance with this QAPP will be provided a copy to read and acknowledge the QAPP requirements by signing the Acknowledgement Statement.

Table 2. Project Roles and Responsibilities

<i>Name</i>	<i>Organization</i>	<i>Title/Role</i>	<i>Responsibility</i>	<i>Contact Information</i>
Kate Lacey-Young	SWQB	Program Manager	Reviewing and approving QAPP, managing project personnel and resources	(505) 946-8863 kathryn.lacey@env.nm.gov
Emily Miller	SWQB	QA Officer	Reviewing and approving QAPP	(505) 660-3534 emily.miller@env.nm.gov
Shabana Shoukath	SWQB	Project Officer	Manage progress of project, serve on Technical Advisory Committee, QAPP distribution, file management for the project, assist in Pilot Study and field data collection, data transfer and distribution activities, prepare semi-annual and final project reports to EPA	(505) 372-9908 Shabana.shoukath@env.nm.gov
Shinya Burck	SWQB	Project Officer	Assist in Pilot Study and field data collection	(505) 500-9783 Shinya.burck@env.nm.gov
Zach Shephard	SWQB	Project Officer	Assist in Pilot Study and field data collection	(505) 618-0375 Zach.shepard@env.nm.gov
Esteban Muldavin	Natural Heritage New Mexico (NHNM)	Senior Manager and Ecology Coordinator	Assessment Team Leader, serve on Technical Advisory Committee, assessment design, site selection, protocol and data management, multi-metric analysis, data transfer and distribution activities, contribute to Technical Guide	505-277-3827 muldavin@unm.edu
Elizabeth Milford	NHNM	Project Operations Manager (Riparian Ecologist)	Project Coordinator, Assessment Team, serve on Technical Advisory Committee, management of NHNM contributing staff	505-277-3829 emilford@unm.edu

			compilation of GIS layers for site selection, assist in site selection, protocol and data management, data transfer and distribution activities, Pilot Study details, contribute to Technical Guide, GIS management.	
Yvonne Chauvin	NHNM	Botanist	Assist in Pilot Study and field data collection	(505) 277-3829 chauvin@unm.edu
Amy Urbanovsky	NHNM	Research Technician	Assist in Pilot Study and field data collection	(505) 277-3820 aurbanovsky@unm.edu
Grace McCartha	NHNM	Botanist	Assist in Pilot Study and field data collection	(505) 277-3826 gmccartha@unm.edu
Kyla Chandler	EPA	Project Officer WDAS, Region 6	Reviewing and approving QAPP	(214) 665-2166 Chandler.kyla@epa.gov

A9. QAO Independence

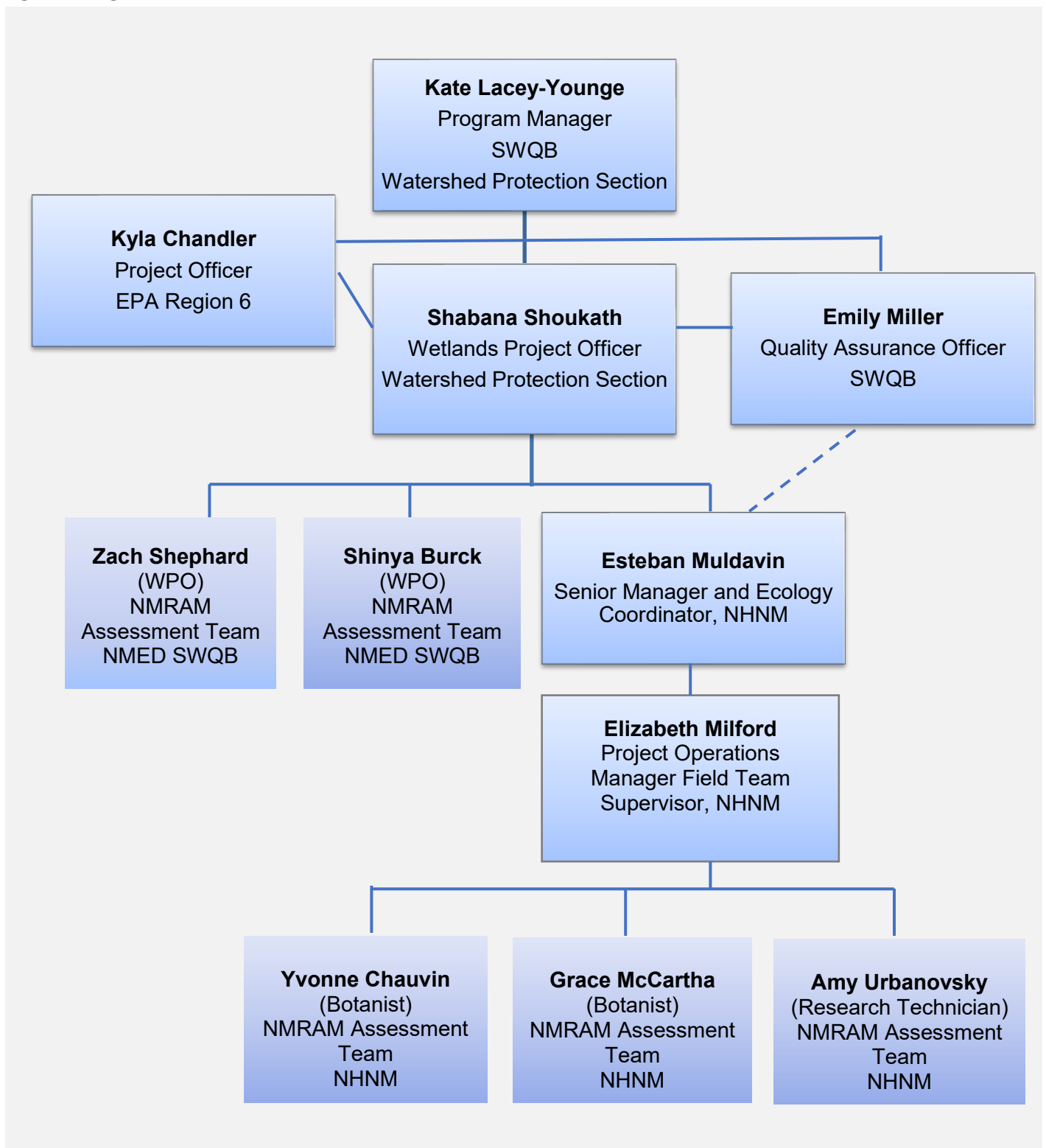
The QAO shall maintain independence in all QA matters and has the ability to directly and independently interact and initiate communication with technical staff and management. This direct access allows the QAO to independently elevate critical, quality-related issues to the attention of the Bureau Chief at their discretion without challenge or section approval. The QAO communicates with NMED senior management through the Bureau Chief and the Standards and Outreach Team Supervisor. The SWQB Quality Management Plan (NMED/SWQB 2024) further documents the independence of the QAO from this project. The QAO is responsible for maintaining the official approved QAPP.

A10. Project Organization

The Project Organization Chart describes the project management structure and lines of communication. The standard communication procedure when addressing concerns regarding data integrity, project discrepancies, or QAPP nonconformances involves the QAO and the Program Manager or Project Officer, although the QAO also has a separate and direct line of communication to the EPA Region 6 Project Officers and Quality Assurance Manager as needed. SWQB and contracting staff will provide feedback, concerns, or progress reports to the SWQB project officer. The Project Officer will then relay this information to the SWQB program manager, who will communicate with the EPA Project Officer as necessary. All communication will occur through phone and/or email.

Figure 3 presents the organizational structure for Rapid Assessment Method Development and Assessment for Subalpine Riverine Wetlands in New Mexico Project.

Figure 3. Organizational Chart



A11. Personnel Training/Certification

Specialized training is required for project personnel to ensure that field and data management activities are performed accurately and consistently. Field personnel involved in data collection for subalpine riverine wetlands will be trained by Elizabeth Milford, Riparian Ecologist NHHM in accordance with procedures outlined in SOPs referenced in this QAPP. Training will include proper identification of subalpine riverine wetlands, collection of NMRAM metrics, documentation of stressors, Global Positioning System (GPS)/GIS data collection, vegetation and geomorphology measurements, safety protocols for high-elevation, and remote fieldwork.

The Field Team will participate in a two-day NMRAM Field Training, a Botany Booster Workshop for wetland plant identification, and a Wetland Soils Workshop for hydric soils identification and sampling. Volunteers assisting with field data collection will be trained by Elizabeth Milford, Riparian Ecologist, and NHHM and will be always supervised during data collection efforts, including metrics, floristic quality, and geomorphology data.

All personnel, including field, data entry, and volunteers, will review the QAPP and sign an acknowledgment statement confirming their understanding of project protocols, QA/QC requirements, and safety procedures before initiating work. These signed acknowledgment statements, along with workshop completion certificates and training documentation, will be sent to the SWQB Project Officer.

The SWQB WPO is responsible for ensuring that all personnel meet training and certification requirements, and that only qualified individuals are assigned to conduct project tasks. Refresher training will be provided as needed for staff turnover or protocol updates. Training records will be stored in personnel files and in the project QA documentation system to allow verification by oversight authorities, including EPA.

A12. Documents and Records

The WPO will ensure that copies of this approved QAPP, associated Standard Operating Procedures (SOPs), will be distributed to all project personnel on the distribution list who do not have signature authority to approve the QAPP. When revisions affect the scope, implementation, or assessment of project outcomes, this QAPP and associated documents will be updated to maintain current technical and quality objectives. The WPO, in coordination with the QAO, will evaluate the impact of any changes on project procedures and determine if revisions are required. This QAPP will be formally reviewed at least annually by the WPO to assess the need for updates.

Project documents include this QAPP, field notebooks, calibration and equipment maintenance records, validation and verification records, recorded field data, records of analytical data in hard copy or electronic form, and quality control (QC) records. Also included are semi-annual and final reports, training and acknowledgment records, and documentation of data collection protocols. Data captured using GPS units, cameras, smartphones, tablets, or laptops will be downloaded daily to the NHHM'S and SWQB WPO'S secure computer or an external hard drive to prevent data loss. Copies of all digital data will be made and stored separately from the original files.

All project documents will be managed under a formal control system that includes preparation, review, approval, issuance, revision, and archiving. Each document will be assigned a unique identifier and revision number to ensure the most current version is in use. Electronic files will be stored on the designated project computer and a

separate external backup hard drive at the NHHM and NMED SWQB office. Hard copy documents will be maintained in a secure project folder in locked cabinets at the same office. All hard copy documents will be scanned and stored digitally on the project computer and backup drive. Access to documents will be restricted to authorized personnel, and procedures for retrieval, photocopying, or review will be documented and controlled by the SWQB Project Officers in coordination with the QAO.

At the end of each field season, typically by the end of November, Elizabeth Milford, NHHM will provide copies of all collected data, including field datasheets, GPS data, photographs, and electronic records, to the NMED SWQB WPO. All project records, including both hard copy and electronic data, will be retained for a minimum of five years after project completion, consistent with SWQB and EPA requirements. Backup procedures include daily data downloads, duplication on external drives, and secure storage at the project office to ensure preservation in case of equipment failure or data loss.

The project data package will include field collection records, operational logs, GPS data, photographs, chain-of-custody forms, sample receipt records, calibration records, analytical data, validation/verification documentation, and any interim or final reports. All data will be formatted in standardized electronic spreadsheets, databases, and digital files compatible with the NMRAM database and the UNM Natural Heritage database. Hard copy documentation will be digitized for redundancy and ease of sharing with project stakeholders. Final disposition of records and documents is discussed in section B7.

Table 3. Data Records for the Project

Document	Type of Form	Storage Location	Field Sheet Used
QAPP	Electronic (.doc)	Electronic: NHHM project file on Elizabeth Milford's computer & external backup drive. Also, in Google drive and SWQB Webpage https://www.enr.com/gov/surface-water-quality/qapps/ ;	Quality Assurance Project Plan Standard. C10 2105-S-02.1 . Located at: https://www.epa.gov/system/files/documents/2024-04/quality_assurance_project_plan_standard.pdf
Calibration Records	Electronic (.doc)	Electronic: NHHM & NMED SWQB shared project file & backup drive.	NA

NMRAM Field sheets (cross-section, longitudinal profile, slope, and percent canopy cover)	Electronic (.xls) & Hard Copy	Electronic: NHNM, NMED SWQB project file & backup drive. Hard copy: Lockable filing cabinet at NHNM & NMED SWQB office	Sub Alpine Field data sheet. Located at https://www.env.nm.gov/surface-water-quality/wetlands/ once developed.
Data Verification and Validation Procedures	Electronic (.doc)	Electronic: NHNM, NMED SWQB project file & backup drive.	Appendix I – Verification and Validation Worksheet
Field Photos	Electronic (.jpg)	NHNM & NMED SWQB project file & external backup drive	Permanent Phot Point Record. Appendix I “ <i>Let the Water do the Work</i> ”
Interim and Final Reports	Electronic (.doc)	Electronic: NHNM & NMED SWQB project file & backup drive.	Final Report of the project will be published at https://www.env.nm.gov/surface-water-quality/wetlands-projects/

GROUP B. IMPLEMENTING ENVIRONMENTAL INFORMATION OPERATIONS

This QAPP was developed following the Quality Assurance Project Plan Standard and QAPP Standard Checklist (EPA, 2023).

B1. Identification of Project Environmental Information Operations

The primary Environmental Information Operations (EIO) for this project involve field data collection and monitoring of subalpine riverine wetlands across the Upper Rio Grande, Rio Chama, Canadian watersheds, and Jemez Mountains in New Mexico. The results of these samples will determine wetland condition, function, stressor presence, and vulnerability to climate-related impacts. Specifically, data will be used to develop and validate NMRAM metrics, populate rating curves for wetland condition, and develop a Vulnerability Index, which informs resource managers about wetland health, restoration priorities, and protection strategies.

Field data will be collected by NMRAM assessment team including NHNM personnel, SWQB Wetlands Program staff, and trained cooperator personnel, with volunteers assisting under direct supervision. Sampling will include rapid assessment of wetland metrics, Level 3 floristic quality assessments, geomorphology measurements, and observation of stressors. Sample locations will be selected to represent the range of physical and ecological conditions within the subalpine riverine wetland subclass, including variations in elevation, hydrology, and

anthropogenic impacts. Locations will be identified using GIS and geodatabase tools, NWI maps, and landscape analysis, with reference to known subalpine riverine wetland areas to ensure representative sampling of the reference domain.

Sampling frequency at each location will typically occur during two field seasons, allowing for refinement and validation of metrics. Sites will be visited once per season, with data collected on physical, biological, and hydrologic characteristics. If a monitoring location becomes inaccessible due to weather, wildfire, flooding, or private land restrictions, alternate sites pre-selected during the site-ranking and geodatabase development process will be used to ensure continuity of data collection and representativeness.

This EIO satisfies the project purpose, data quality objectives, and performance criteria described in sections A4 and A6 by ensuring that representative wetland conditions are accurately captured, metrics are validated against reference sites, and all field procedures follow SOPs described in this QAPP. Data collection will generate the information required to assess wetland function, condition, and climate vulnerability, supporting informed decision-making for protection, restoration, and management of subalpine riverine wetlands in New Mexico.

Table 4. Project Monitoring Specifics

Responsible Party	Monitoring	Location	Frequency
NHNM, Field Staff, NMED SWQB Team	Rapid assessment of wetland metrics (Level 1 & 2)	35-40 subalpine riverine wetlands in Upper Rio Grande, Rio Chama, Canadian watersheds, and Jemez Mountains	15-20 sites per field year (2026 and 2027)
NHNM, Field Staff, NMED SWQB Team	Level 3- Floristic quality assessments (species composition, plant cover, floristic indices); Geomorphology and hydrology monitoring (channel morphology, water levels, soil moisture)	Same 35-40 subalpine riverine wetland sites	15-20 sites per field year (2026 and 2027)
NHNM, Field Staff, NMED SWQB Team	Stressor documentation (grazing, fire, invasive species, land use impacts)	Same 35-40 subalpine riverine wetland sites	15-20 sites per field year (2026 and 2027)

The monitoring activities described above are designed to ensure that the project purpose of developing and validating the NMRAM for subalpine riverine wetlands is fully achieved. By collecting comprehensive data on vegetation, hydrology, geomorphology, and stressors at 35-40 representative subalpine riverine wetland sites across the Upper Rio Grande, Rio Chama, Canadian watersheds, and Jemez Mountains, the project will capture the full range of wetland conditions necessary for metric development, validation, and calibration.

These operations satisfy the project's information and data quality objectives by ensuring that all data collected are accurate, representative, and comparable across sites. Standardized sampling protocols and SOPs will be followed by trained contractors, SWQB staff, and supervised volunteers, and all personnel will review and acknowledge the QAPP prior to field work. Data collection timing will be aligned with the seasonal optimal time for floristic inventory and site access.

The performance and acceptance criteria outlined in Sections A4 and A6 are met through several mechanisms: metrics are collected consistently across the reference domain, validation of Level 3 floristic data and geomorphologic measurements ensure reliability, and stressor documentation provides context for interpreting wetland condition. Pre-selected alternate sites allow for contingency in case of inaccessibility, maintaining the integrity of the dataset. Data entry into the NMRAM database and UNM Natural Heritage database ensures proper storage, QA/QC review, and accessibility for analysis. Together, these monitoring operations provide the high-quality environmental information necessary to assess wetland condition, identify stressors, and develop the Vulnerability Index, ultimately supporting the project's goal of producing reliable, actionable information for wetland protection, restoration, and management. Therefore, the environmental information operations described herein directly support the project purpose and meet all data quality objectives and performance and acceptance criteria established in Sections A4 and A6

B2. Methods for Environmental Information Acquisition

The developed NMRAM sampling protocols for the subalpine riverine wetlands subclass will be utilized in the collection of data, processing, analysis, reporting and tracking of environmental data associated with each subclass to accurately represent the condition of the wetland of interest. The protocols will follow established NMRAM procedures and standardized methodologies to ensure consistency, repeatability, and comparability with other New Mexico wetland subclasses.

The metrics will be designed to measure aspects of condition that are relative to the reference conditions based on validation and on best professional judgement. Metric development will be supported by the existing NMRAM Manual and NMRAM Field Guides developed for other New Mexico wetland subclasses, (<https://www.env.nm.gov/surface-water-quality/wetlands-rapid-assessment-methods/>) with modifications and additions specific to subalpine riverine wetlands. The NMRAM data collection worksheets, new Survey123 app, and other field forms will also be utilized. In addition, a new field guide specific to the subalpine riverine wetlands subclass will be developed to support field implementation of the protocols and metrics. Updates to the NMRAM Manual will also be completed to incorporate the new subclass, associated methodologies, metric descriptions, scoring procedures, and data collection requirements. These updates will ensure integration of the subalpine subclass into the broader NMRAM framework for wetland assessment in New Mexico.

The assessment is a multi-step process involving a two- or three-person team. It begins with delineating a target Wetland of Interest (WOI) and one or more Sampling Areas (SAs) within the WOI to be assessed. For each SA, 10-15 metrics (varies by subclass) will be grouped into three attribute categories are evaluated: Landscape Context, Biotic, and Abiotic. A sample list of metrics has been included below. Metrics are measured using maps and aerial imagery or evaluated in the field. Landscape Context metrics are assessed using maps and/or a geographic information system (GIS) and these are termed “Level 1” metrics. Landscape Context metrics are preferably completed before going into the field to help familiarize the team with the site. Level 1 metrics are also confirmed or modified as necessary during the field survey and pilot study. In contrast, Biotic and Abiotic metrics are evaluated in the field (“Level 2” metrics) and include annotated field maps and documentary photographs. In addition, a stressor checklist for evaluating potential drivers of ecological condition at local to watershed scales is completed in the office prior to going in the field and reviewed and updated, if necessary, as part of the field survey. The checklist is not used directly in scoring or ranking the condition of the wetland and accordingly explicitly excludes elements that are already incorporated in NMRAM metrics themselves (e.g., Surrounding Land Use). To arrive at an overall rating for an SA, individual metric ratings are weighted and rolled up by attribute group into a final overall numeric score. Based on the scores, categorical condition ranks are assigned as follows: A = Excellent (>3.25-4.0); B = Good (>2.5-3.25); C = Fair (>1.75-2.5), and D = Poor (1.0-1.75). When there are multiple SAs in a WOI, the SA scores can be averaged to arrive at a final rank for the entire wetland.

Field assessment steps vary between subclass types but generally follow the following steps:

1. Preliminaries. Together, team members fill in basic survey information (date, time, location, etc.) on the SA Cover Worksheet. The team then conducts a joint rapid reconnaissance of the site to help set up the survey and make SA boundary changes based on local conditions. All changes to the SA boundary are recorded on field maps and noted on the SA Cover Worksheet with rationale for changes.
2. Biotic Survey. The biotic team maps the patches of major vegetation communities on the Biotic SA Map and fills out the required data for each community type (CT) encountered. Based on this information, the entire SA is mapped based on aerial image interpretation. If time permits, mapped patches off the transect can be visited and validated. This map becomes the basis for filling out worksheets.
3. Abiotic survey. The abiotic team member(s) evaluates the Abiotic metrics along the transects / lines based on visual indicators of abiotic conditions and annotates the Abiotic SA Map with supporting information. During each traverse, indicators are checked off on metric specific lists on the worksheets that are then used to rate each Abiotic metric.
4. Landscape Context review. The Landscape Context metrics have been measured prior to the field survey and now must be reviewed based on field evidence during the survey. Each team member is likely to survey different areas in the SA and each should note landscape context condition issues that may affect the ratings on their copy of the Landscape Map, particularly in areas adjacent to the SA boundary. These are reported on the SA Cover Worksheet and can be used to modify metric ranks (with a narrative justification).

5. Stressor Checklist. Team members collaboratively review the Stressor Checklist that was completed prior to the field survey to identify potential drivers of ecological condition in the WOI and greater watershed.
6. SA Summary. After completion of the surveys, team members collaboratively complete the narrative summaries on the SA Cover Worksheet; review and complete the in-field ranking of all metrics, add comments on conditions and stressors, and provide a provisional SA Rank and Score and Assessment Summary (signed off with team member initials).
7. Team should verify valley bottom boundaries for Relative Wetland Size Index (RWSI) metric during travel to and from the SA.

Major categories of indicators, sample indicators and assessment level of effort used in wetland rapid assessment methods are.

ATTRIBUTE	INDICATOR	Assessment Level
Hydrology (Abiotic)	Hydrologic Alterations	2
	Hydroperiod	1
	Surface Water Connectivity	2
	Flood Storage Potential	2
	Water Sources	2
	Maximum water depth	2
Soils/Substrate (Abiotic)	Substrate Disturbance	2
	Microtopography	2
	Sediment Composition	2
Vegetation (Biotic)	Degree of Interspersion	1
	Extent of Invasive Species	2
	Endangered/threatened species	1 & 2
	Presence and cover of wetland plant species	2
	Vegetation Vertical Structure	2
	Course Woody Debris	2
	Dominant Vegetation	2
	Native Riparian Tree and Shrub Regeneration	2
	Relative Native Plant Community Composition	2
Landscape Context and Size	Size	1
	Relative Wetland Size	1
	Surrounding Land Use	1
	Riparian Corridor Connectivity	1
	Extent and Condition of Buffer Zone	1
	Wetland Configuration	1

A set of worksheets organized by attribute classes will be developed to support efficient data capture and automated tallying of scores. The worksheet packet contains a cover worksheet for recording basic information, surveyor identification, and narrative descriptions of the SA by attribute. The worksheets together with maps and photographs make up the NMRAM Assessment Package that becomes the supporting record, which will ultimately be converted into an Excel table format.

Rosgen Level II measurements will be collected using a laser level or total station to survey channel cross-sections and longitudinal profiles within each subalpine riverine wetland Sample Area. These geomorphic surveys provide quantitative data on channel morphology, gradient, bank full dimensions, floodplain connectivity, and substrate characteristics, which are subsequently used to develop and evaluate abiotic and biotic condition metrics. Cross-section surveys will be established perpendicular to streamflow at representative channel locations, while longitudinal profiles will document changes in bed elevation, water surface slope, habitat units, and channel features along the study reach. Survey methods will follow standard Rosgen Level II stream classification and monitoring procedures (Rosgen 1994, 1996).

Photographic documentation will be conducted using the protocols identified in *Let the Water Do the Work* (Zeedyk, et al, 2009) Appendix I, Outline for Photographic Monitoring Plan. Photo points will be recorded using Permanent Photo Point-Record-Initial Take (Form 1).

Field data will be collected using standardized datasheets, GPS units, tablets, cameras, and field notebooks. Instrument calibration (e.g., GPS units, flow meters) will be conducted according to manufacturer specifications and applicable SOPs prior to data collection.

Sample Handling and Custody

No water, soil, or sediment samples requiring laboratory analysis will be collected as part of this project. Therefore, sample containers, preservation methods, sample volumes, and holding times are not applicable. All data collected will be observational or instrument based. Field data (including GPS coordinates, photographs, and datasheets) will be recorded in both hard copy and electronic formats. Digital data will be downloaded daily or at the end of each field day and stored on secure project computers and external backup drives. Hard copy records will be maintained in project files and digitized for backup and long-term storage. Access to project data will be restricted to authorized personnel to ensure data integrity and proper custody.

Data Management and Quality Control

All field-collected data will be entered into the NMRAM database and the UNM Natural Heritage database following established QA/QC procedures. Data will be reviewed for completeness, accuracy, and consistency by the field team and the SWQB Project Officer prior to final acceptance.

Any deviations from approved SOPs, equipment malfunctions, or data quality concerns will be documented in field logs and reported to the SWQB Project Officer and Quality Assurance Officer (QAO). Corrective actions may include re-measurement, data flagging, or exclusion from analysis following QA/QC review procedures.

Laboratory Analyses

Laboratory analyses are not required for this project as no chemical or nutrient sampling is planned. All data will be derived from field measurements, observations, and existing reference databases.

Existing Information

Existing datasets, including National Wetlands Inventory (NWI) maps, GIS layers, hydrology datasets, and landscape classification data (e.g., LLWW and HGM), will be used to support site selection, stratification, and analysis. These datasets are central to defining the reference domain and identifying representative wetland sites. All existing data sources will be evaluated for quality assurance and quality control based on the originating agency's standards. Only verified and reliable datasets will be used for project analysis.

SOP Maintenance and Updates

Any necessary modifications to field methods or assessment metrics will be documented, reviewed, and incorporated into revised SOPs to ensure consistency with project data quality objectives.

B3. Integrity of Environmental Information

This project does not involve the collection of water, soil, sediment, or other physical samples requiring laboratory analysis. Therefore, requirements related to sample preservation, handling, transport, holding times, and chemical integrity are not applicable.

All environmental information collected consists of observational data, physical measurements, and instrument-based records, including vegetation surveys, geomorphic measurements, hydrologic observations, GPS coordinates, and photographic documentation. The integrity of these data will be maintained through standardized data collection procedures, immediate review of field records for completeness and accuracy, and adherence to approved SOPs.

Digital data (e.g., GPS coordinates, photographs, and electronic field forms) will be downloaded daily to secure project computers and backed up on external storage devices to prevent data loss or corruption. Hard copy records (e.g., field notebooks and datasheets) will be protected from environmental damage during field activities and stored in secure project files upon return from the field. All hard copy records will be digitized for redundancy.

Data will be subject to QA/QC review by field personnel and the SWQB Project Officer to ensure accuracy, completeness, and consistency. Access to project data will be limited to authorized personnel, and all data will be maintained in a manner that preserves traceability, including documentation of collection date, location, and responsible personnel.

Because no physical samples are collected, traditional chain-of-custody procedures are not required. Data custody and integrity will instead be ensured through controlled data management, secure storage, and documented QA/QC procedures.

B4. Quality Control

Quality control (QC) activities for this project are designed to assess and document the variability associated with field-based measurements and to ensure that collected data meet the data quality objectives described in Section A6 (accuracy, precision, representativeness, comparability, completeness, and sensitivity).

Because this project does not involve laboratory sampling, QC activities focus on field measurements, observational data, and data management procedures.

QC Activities and Frequency

The following QC activities will be implemented:

1. **Field Data Verification (Daily)**
Field personnel will review all field data (notebooks, datasheets, and electronic entries) at the end of each field day to ensure completeness, accuracy, and legibility.
2. **Instrument Calibration Checks (Before Each Field Deployment)**
Field instruments (e.g., GPS units) will be calibrated according to manufacturer specifications. Calibration logs will be maintained.
3. **Photo Documentation Review (Daily)**
Photographs will be reviewed for proper labeling, orientation, and completeness at the end of each field day.
4. **Data Entry Verification (100% Review)**
All data entered into the NMRAM data collection tool and UNM Natural Heritage database will be independently cross-checked against original field records by a second reviewer.
5. **Metric and Method Review (Periodic)**
Preliminary metrics and scoring approaches will be reviewed with the TAC and SWQB Project Officer throughout the project to ensure scientific validity and consistency.

Control Limits and Corrective Actions

- **Numeric Measurements:** Differences greater than $\pm 5\%$ between duplicate measurements will trigger re-measurement or verification by the field team lead.
- **Data Completeness:** $\geq 95\%$ completeness is required. Missing data will be documented with reason codes; critical gaps may require site revisits if feasible.
- **Data Entry Errors:** Any discrepancies identified during data entry review will be corrected and documented. Error rates exceeding 5% will trigger additional review and retraining if necessary.
- **Instrument Performance:** Instruments found to be out of calibration or malfunctioning will be recalibrated or replaced prior to further use. Data collected with faulty instruments will be flagged and evaluated for usability. All corrective actions will be documented in QC logs and reviewed by the SWQB Project Officer.

Statistical Evaluation

Metric scoring and condition indices will be statistically evaluated across sampled wetland sites to assess the consistency, reproducibility, and applicability of the NMRAM assessment method for subalpine riverine wetlands in New Mexico. Statistical analyses will be conducted to examine relationships among physical, hydrological, and

biological indicators and to evaluate the ability of the assessment methods to distinguish reference-quality wetlands from impaired or anthropogenically impacted sites. Analyses may include ranked non-parametric statistical procedures, correlation analyses, and multivariate analyses applied to physical and biological datasets. These evaluations will support assessment of metric variability, sensitivity of condition indices to disturbance gradients and identification of exemplary reference sites. Results of these analyses will be used by NHNM, SWQB, and the Technical Advisory Committee to evaluate method performance and determine whether the assessment framework adequately supports wetland management and policy objectives for the State of New Mexico.

Role of Personnel

All personnel involved in data collection will be trained in project SOPs and QA/QC procedures. The experience and training of field staff support the implementation of QC activities, while oversight by the SWQB Project Officer ensures adherence to established quality standards.

B5. Instrument/Equipment Calibration, Testing, Inspection, and Maintenance

Calibration and Frequency:

All instruments and equipment used for field data collection will be calibrated or verified, as appropriate, to ensure accuracy and reliability of environmental data.

As previously mentioned, Rosgen Level II measurements will be collected using a laser level or total station to survey channel cross-sections and longitudinal profiles within each subalpine riverine wetland Sample Area. The resulting rapid assessment metrics will be limited to those that can be collected using a tape measure and level.

GPS units will be verified against known reference locations prior to deployment to ensure positional accuracy within acceptable limits. Cameras will be checked to ensure proper functionality, date/time accuracy, and image clarity.

If any instrument fails to meet calibration or verification criteria, it will be removed from service, recalibrated, or replaced prior to use. Any data collected outside acceptable calibration limits will be flagged, evaluated, and either corrected or excluded, as appropriate.

All calibration activities will be documented including date, time, calibration standards used, results, and the initials of the person performing the calibration. These records will be maintained by the SWQB Project Officer, with field implementation support from the Field Team Leader, and retained as part of the project QA documentation.

Testing, Inspection, and Maintenance

All field instruments to collect physical measurements include a survey device (e.g. laser level, auto level, theodolite, or total station depending on the contractor), global positioning system unit (GPS), camera and equipment will be routinely inspected, tested, and maintained to ensure proper operation and data quality throughout the project. Photo points, GPS, and NMRAM data collection will be taken on tablet or cell phone and will be visually inspected for damage before and after each use and if any maintenance is necessary, it will be

completed prior to the next monitoring trip. No calibration is required for tablets or cell phones. Phone apps such as Survey123 and Fulcrum will be downloaded and regularly checked for any necessary software updates before use in the field.

Maintenance logs are maintained for all SWQB instruments and equipment. Results of equipment inspections will be noted in the maintenance log and/or project file. Any deficiencies in equipment will be noted and reported immediately. If condition of equipment is in doubt, it will not be used. In the event of instrument failure, the NHHM Team Leader or the SWQB Technical Team Member will correct the problem, rejecting the resultant data or accepting the data with notations.

B6. Inspection/Acceptance of Supplies and Services

NHHM Team Coordinator is responsible for preparing any necessary equipment checklists and informing any trainees of needed supplies and equipment for each field sampling trip. Volunteer field sampling supplies are checked at the end of every field trip by the designated Team Leader. Replacement supplies are purchased as needed and checked before the next field trip. All team members are expected to be familiar with the equipment and supplies needed for an individual trip. A copy of the checklist is reviewed and completed during trip planning.

B7. Environmental Information Management

SWQB WPO and Elizabeth Milford, NHHM will be responsible for managing all project data. All field and monitoring data will be converted to electronic format, organized, and stored by NHHM & NMED SWQB. Computer hard drives will be backed up weekly, with additional copies stored on external hard drives to ensure redundancy.

Hard copies of field sheets, sample logs, and other project records will be maintained in a project binder organized by assessment type and date. These binders will be stored in a key-protected filing cabinet in the office of NHHM & NMED SWQB.

At the end of each field season, typically by the end of December, all electronic and hard copy data will be transmitted to the SWQB Project Officer by Elizabeth Milford, NHHM. Upon receipt, the SWQB Project Officer will store the data on the SWQB network drive for long-term retention.

All project documents, including this QA Project Plan, field data, calibration records, and project reports, will be retained in accordance with New Mexico's Disposition of Public Records and Non-Records regulation (1.13.30 New Mexico Administrative Code (NMAC)) and Retention and Disposition of Public Records regulations (1.21.2 NMAC). Access to both electronic and hard copy data will be limited to authorized project personnel. Copies may be provided to stakeholders upon request, with appropriate safeguards to maintain data integrity.

GROUP C. ASSESSMENT, RESPONSE ACTIONS, AND OVERSIGHT

C1. Assessment and Response Actions

Project activities will be assessed throughout the project to ensure that the QA Project Plan (QAPP) is implemented as approved. Both internal (self-assessments by project personnel) and external assessments (independent

review) will be conducted as necessary to evaluate data quality, procedural compliance, and overall project progress. The frequency of assessments will depend on the type of data collected, the complexity of monitoring activities, and the level of confidence required in the results.

The SWQB Project Officer will provide project oversight, including periodic assistance with and/or review of data collection efforts. At the end of each monitoring season, the SWQB Project Officer will review baseline data collection and monitoring activities to evaluate project progress and ensure adherence to the QAPP. The QAO may conduct periodic audits as needed to assess compliance and data quality.

Any problems encountered during project implementation, including deviations from the approved QAPP or issues affecting data quality, will be immediately reported to the SWQB Project Officer. The Project Officer will consult with relevant personnel to determine the appropriate corrective action. If the corrective action could impact project outcomes or data quality, the SWQB Project Officer will notify the QAO. Should monitoring methodologies deviate from the approved QAPP, a revised QAPP must be approved prior to continuation of work. All identified issues, corrective actions, and any adjustments to project plans will be fully documented in the project file and included in the final project report to ensure transparency and traceability of all assessment and response activities.

C2. Oversight and Reports to Management

Management will be kept informed of project oversight and assessment activities through regular reporting by the SWQB Project Officer. Quarterly progress and annual reports will be prepared and submitted by Elizabeth Milford, NHNM to the SWQB Project Officer. These reports will summarize project progress, describe any issues encountered, and include all available data collected during the reporting period.

Additional reports, such as assessment reports, calibration records, proficiency test results, or model evaluation reports, will be prepared as needed or upon request by SWQB or EPA. The responsible individual or team for each type of report will be identified in project documentation, and the schedule for submission will be clearly defined in accordance with project timelines.

The final project report, summarizing all monitoring results, assessment findings, and corrective actions, will be submitted to the SWQB Project Officer by May 15, 2028. The SWQB Project Officer will then be responsible for submitting the final deliverables to EPA, ensuring that all project documentation and data are officially archived and accessible for review.

GROUP D. ENVIRONMENTAL INFORMATION REVIEW AND USABILITY DETERMINATION

D1. Environmental Information Review

Data collected during the project will undergo a systematic review to ensure it meets the quality objectives and performance/acceptance criteria defined in Section A6 of this QAPP. The Field Team Supervisor will perform an initial review of the data in the field prior to demobilization, checking for errors such as incomplete entries, transcription mistakes, or calculation and data reduction issues.

Data will be considered usable if all procedures outlined in this QAPP were followed and the results fall within the acceptable range limits specified. Any data that appears incomplete, inconsistent, or otherwise questionable will be flagged for further review. The flagged data will be discussed with the SWQB Project Officer to determine its cause and to assess whether it can be used. If a reasonable justification for its use cannot be established, the data will be excluded from analysis and project decision-making unless the parameter can be recollected and reassessed for usability. This review process ensures that only accurate, reliable, and quality-checked environmental information is used for project evaluation and implementation.

Validation and Verification Methods

NHNM and the SWQB will ensure that valid and representative data are acquired. Verification of field sampling and analytical results will be performed by the SWQB project officer. Verification and validation (V&V) of data will occur after every field season using the attached V&V worksheets (Appendix I). In the event questionable data are found, the SWQB Project Officer will consult appropriate personnel to determine the validity of the data. Results of the verification and validation process will be included in the final reports.

D2. Usability Determination

NHNM, in collaboration with the SWQB and the Technical Advisory Committee, will use the data assembled through the inventory and assessment to analysis and address the question of the applicability of the methods to demonstrate the utility of the NMRAM for subalpine riverine wetlands in New Mexico. Critical analyses here will include the adequacy of the methods for identifying individual sites that are exemplary and of use as reference sites, sites at which management attention is warranted, and sites at high levels of risk due to anthropogenic impacts. Such analyses will be conducted using ranked, non-parametric statistical analyses, and multivariate analyses of the diverse physical, and biological ranking. These analyses will help clarify the utility of the project to meet the management and policy needs of the State of New Mexico.

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Appendix I – Verification and Validation Worksheet

Data and Equipment Verification and Validation Worksheet

Type of Data: _____

Name and Date of Personnel Collecting Data: _____

Verification of Complete Record [Y/N]: _____

Instrument in working order [Y/N]: _____

Checked for anomalous data [Y/N]: _____

Validated by [name of reviewer]: _____

Validated on [Date]: _____

Acknowledgement Statement



New Mexico Environment Department Surface Water Quality Bureau

Rapid Assessment Method Development and Assessment for Subalpine Riverine Wetlands in New Mexico
Quality Assurance Project Plan Acknowledgement Statement

This is to acknowledge that I have received a copy (in hard copy or electronic format) of the “Rapid Assessment Method Development and Assessment for Subalpine Riverine Wetlands in New Mexico” Quality Assurance Project Plan.

As indicated by my signature below, I understand and acknowledge that it is my responsibility to read, understand, become familiar with and comply with the information provided in the document to the best of my ability.

Signature or Electronic Signature (e-certified accepted)

Name (Please Print)

Date

Return to SWQB QAO Emily Miller