Planning and Conducting "All Hands" Rapid Assessment Method Data Collection Campaign for the Assessment of New Mexico Wetlands, Phase 2
CWA Section 104(b)(3) Wetlands Development Grant
CD# 01F788-01-0 (FY2020)

Quality Assurance Project Plan

Submitted by:
New Mexico Environment Department
Surface Water Quality Bureau

A Project Management

A1 Title and Approval Sheet

Maryann McGraw Digitally signed by Maryann McGraw Date: 2024.08.09 15:22:24 -06'00'
_____ Date: _____
Maryann McGraw
Wetlands Program Coordinator, SWQB

Emily Miller Digitally signed by Emily Miller Date: 2024.08.09 16:23:20 -06'00'
_____ Date: _____
Emily Miller
Quality Assurance Officer, SWQB

Kate Lacey-Younge Digitally signed by Kate Lacey-Younge Date: 2024.08.09 16:06:32 -06'00'
_____ Date: _____
Kate Lacey-Younge
Program Manager, SWQB Watershed Protection Section

KYLA CHANDLER Digitally signed by KYLA CHANDLER Date: 2024.08.26 13:42:34 -05'00'
_____ Date: _____
Kyla Chandler
Project Officer, WQPD, EPA Region 6

NELLY SMITH Digitally signed by NELLY SMITH Date: 2024.08.29 15:20:49 -05'00'
_____ Date: _____
Nelly Smith
Chief, State and Tribal Programs Section, WQPD, EPA Region 6

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A2.1 Acronyms

ABS	Above Sea Level
BAMI	Before and After Mitigation Impacts
CD	Compact Disc
CRAM	California Rapid Assessment Method
CWA	Clean Water Act
CWA 404	Section 404 of the Clean Water Act
DOQQ	Digital Orthophoto Quarter Quadrangles
DOT	Department of Transportation
DQI	Data Quality Indicators
DQO	Data quality Objectives
EPA	United States Environmental Protection Agency
FY	Fiscal Year
GIS	Geographic Information Systems
GPS	Geographic Positioning System
HGM	Hydrogeomorphic Method
HUC	Hydrologic Unit Codes
IT	Information Technology
MQO	Measurement Quality Objectives
NA	Not Applicable
NEPA	National Environmental Policy Act
NHNM	Natural Heritage New Mexico, University of New Mexico
NMED	New Mexico Environment Department
NMRAM	New Mexico Rapid Assessment Method
NWI	National Wetlands Inventory
OERR	Office of Emergency and Remedial Response
PDF	Portable Document Format
PO	Project Officer
PPE	Personal Protective Equipment
QA	Quality Assurance
QAO	Quality Assurance Officer
QC	Quality Control
QAPP	Quality Assurance Project Plan
RA	Rapid Assessment
RID	Request Identification Number
SA	Sample Area
SOP	Standard Operating Procedures
SQUID	Surface Water Quality Information Database
SWCA	SWCA, Inc.
SWQB	New Mexico Environment Department Surface Water Quality Bureau
U	University
USACE	United States Department of the Army Corps of Engineers
US EPA	United States Environmental Protection Agency
WOI	Wetland of Interest
WPS	Watershed Protection Section
WPC	Wetlands Program Coordinaton

A3 Distribution List

This EPA-approved Quality Assurance Project Plan (QAPP) signed original will be kept on file at SWQB and a copy will be kept on file at the lead contractor's office (Natural Heritage New Mexico, University of New Mexico (NHNM)).

The Wetlands Program Coordinator (WPC) will ensure 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 Acknowledgement Statements (electronic or hard copy) will be collected by the SWQB WPC/File Manager and will be filed with the original approved QAPP in the project files. The NHNM Director will ensure that any NHNM staff involved in data collection or analysis for this project have access to a copy of this QAPP, review its contents, and follow its quality assurance procedures. The NHNM Director and WPC will also ensure that volunteer data collection teams' Team Leader reads the QAPP, signs the Acknowledgement Statement, and follows its quality assurance procedures. The Team Leader's Acknowledgement Statement will be provided to the WPC prior to receiving training certification.

Table 1 lists the names and organization of those on the distribution list and the roles and responsibilities of persons that will collect and/or use the information gathered for the classification verification, wetlands assessment, and multi-metric analyses.

Table 1: Distribution List with Roles and Responsibilities

Name	Organization	Role	Responsibilities	Contact Information
Kate Lacey-Younge	SWQB	Watershed Protection Section Program Manager	Review of QAPP	(505) 490-3135 kathryn.lacey@env.nm.gov
Maryann McGraw	SWQB	Wetlands Program Coordinator, Project Oversite; File Manager, Assessment Team	Principal Investigator, participate in developing NMRAM Field Campaign Planning, assist and oversee volunteer teams and scheduling data collection. Review of web-hosted and in-person training materials. Develop training certification requirements. Maintain Wetlands Program project files. Review of final project report and key deliverables. Liaison to EPA.	(505) 490-3135 maryann.mcgraw@env.nm.gov
Emily Miller	SWQB	Quality Assurance Officer (QAO)	Review and approval of QAPP, QA audits, as needed, to assure adherence to the approved QAPP. Review training certification requirements.	(505) 660-3534 Emily.Miller@env.nm.gov
Shinya Burck	SWQB	Data Collection Team, Wetlands Team, Assessment Team	Assist with refresher training and with volunteer teams field data collection.	(505) 500-9783 shinya.burck@env.nm.gov

Name	Organization	Role	Responsibilities	Contact Information
Esteban Muldavin	NHNM	Rapid Assessment Contractor, NHNM Project Manager, Assessment Team	Project Manager, conduct organizational meeting, participate in developing NMRAM Field Campaign Planning, develop web-hosted and in-person training materials, assist and oversee volunteer teams and scheduling data collection.	(505) 277-3822 ex 228 muldavin@unm.edu
Elizabeth Milford	NHNM	Rapid Assessment Contractor, NHNM Project Coordinator, Assessment Team	Project Coordinator, Team Coordinator, compilation of GIS layers for site selection and identifying Subclass, assist volunteers in site selection, protocol and data management, data transfer and distribution activities, conduct organizational meeting, participate in developing NMRAM Field Campaign Planning and develop web-hosted and in-person training materials.	(505) 277-3822 ex 227 Emilford2@gmail.com
Yvonne Chauvin	NHNM	Rapid Assessment Contractor, Assessment Team	Assist in refresher trainings and volunteer NMRAM Data Collection.	(505) 277-3822 ex 227 ydchauvin@gmail.com
Amy Urbanovsky	NHNM	Rapid Assessment Contractor, Assessment Team	Assist in refresher trainings and volunteer NMRAM Data Collection.	(505) 277-3822 ex 229 amy.urbanovsky@gmail.com
Jaqueline Smith	NHNM	Rapid Assessment Contractor, Team Coordinator,	Coordination of organizational meeting, data collection scheduling.	(505) 277-3822 x 231 jwoodsmith@gmail.com
Kyla Chandler	U.S. EPA	State and Tribal Grants Project Officer, Water Division	QAPP review and approval	(214) 665-2166 Chandler.Kyla@epa.gov
Nelly Smith	U.S. EPA	Chief, Region 6	QAPP review and approval	(214) 665-7109 Smith.nelly@epa.gov

A4 Project Task Organization

A project organizational chart (Figure 1) displays hierarchy of the project.

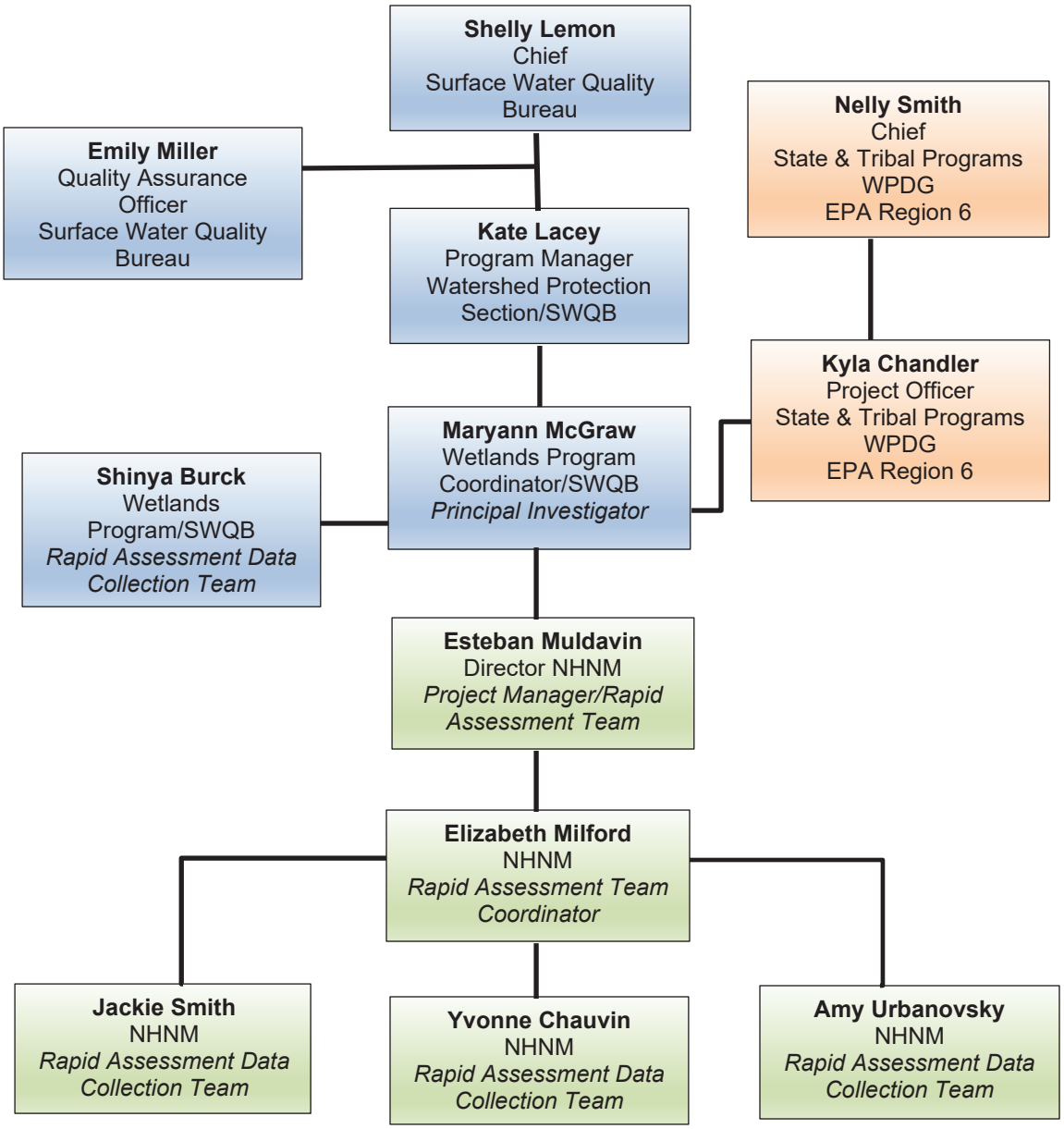

Figure 1: Organizational Chart of Key Personnel

A5 Problem Definition/Background

SWQB Wetlands Program is in the process of developing rapid assessment methods for New Mexico wetlands by subclass. The goal of this project is to train teams throughout New Mexico to use the New Mexico Rapid Assessment Method (NMRAM) to assess wetland resources and to collect quality data. This rapid assessment project is designed to increase the use of NMRAM by our partners by 1) conducting a Partners Planning Meeting to engage participants in the "All Hands Phase 2" NMRAM data collection campaign; 2) distributing an "All Hands Phase 2" meeting survey to assess the needs of potential participants; 3) developing two sets of NMRAM training videos - one for the Montane Riverine Wetlands and one for Lowland Riverine Wetlands subclasses; 4) conducting two NMRAM training sessions consisting of webinar reviews of the training videos, a virtual question and answer session, and one day in the field, and conducting one Botany Booster training consisting of classroom and field training; 5) providing "Certificate of Completion" certifying that the participant is trained and capable of collecting quality NMRAM data; 6) preparing up to eight volunteer teams for NMRAM data collection including selection and approval of Sample Areas (SAs), guidance obtaining permission to enter property correlated with the chosen wetland SAs, and the preparation of data collection materials and maps; 7) overseeing initial data collection by trained participant teams by SWQB Wetlands Program and Natural Heritage New Mexico (NHNM) staff; 8) conducting follow-up meetings with participant teams to review data collection results and to discuss data uses, future data collection and feedback. The data collection area for this project includes all areas within New Mexico that either the Lowland Riverine Wetlands or Montane Riverine Wetlands NMRAM applies. NHNM will determine if the participating teams SA fits into one of these subclasses.

SWQB Wetlands Program and Natural Heritage New Mexico (NHNM) will provide staff, coordination, training, and supplies to support up to eight teams to conduct "All Hands Phase 2" NMRAM volunteer data collection campaigns. Working collaboratively with the SWQB Wetlands Program, Natural Heritage New Mexico will develop two sets of web-hosted training videos covering NMRAM introduction; landscape, biotic, and abiotic metric concepts; stressor checklist and score roll-up methods for the Montane Riverine Wetlands and Lowland Riverine Wetlands NMRAMs. At least two team members from each volunteer team is expected to view and understand the training videos in the NMRAM appropriate to the target subclass and have basic New Mexico botany or hydrology/soils training. For team members, NHNM and SWQB will provide the training using newly developed web-based training videos supplemented with a virtual question and answer session and half-day field training sessions at the beginning of the campaigns with emphasis on data collection and field observation techniques. NHNM will also provide a Botany Booster training focused on common wetland and riparian plants and common weeds expected to be encountered in their SAs. Teams will be composed of qualified citizens, federal, state, county and municipal agencies, non-profit and for-profit entities who will contribute to the data collection efforts. After team members view and understand the concepts and application of the training videos and half-day training sessions, a questionnaire (quiz) will be provided to the trained participants. Successful completion of the questionnaire will result in a "Certificate of Completion" certifying the participant for using NMRAM for data collection. The Certificate of Completion Questionnaire will be developed by NHNM and SWQB Wetlands Program as part of this project and reviewed and approved by the SWQB Quality Assurance Officer.

An All Hands Partner Planning Meeting will be conducted to recruit and organize volunteer teams that meet the minimum qualifications. Teams will collect biotic and abiotic field data and complete electronic (or paper) field sheets for each location. Locations (SAs) will be selected by the teams or assigned by NHNM staff. High quality sites will be targeted for the locations assigned by NHNM to increase the New Mexico set of "Reference Standard" or best sites assessed with NMRAM. Each site will be approved by the NHNM and SWQB Wetlands Program staff as fitting the subclass.

NHNM will provide maps and materials needed by the data collection teams to record data at the data collection sites. SWQB will provide two copies of the current relevant Field Guide, interactive data collection worksheets or paper worksheets, and a copy of this QAPP to each of the volunteer teams participating in data collection.

The basic assumption underlying this rapid assessment method is that wetland condition will vary along a disturbance gradient and that the resultant state can be evaluated based on a set of landscape-level measurements in combination with visible field metrics and the characterization of stressors that affect wetland ecological integrity. The purpose of defining a subclass is to reduce the natural variability in wetland type as well as variability that occur with latitude, altitude, climate, and geomorphology. The selection of SAs within the subclass for this project is focused on collection of rapid assessment data from sites that are important to the teams or, if assigned by NHNM, from the best available sites to increase our understanding of the subclass as a whole and to contribute to a set of Reference Standards sites for New Mexico. The trained teams can collect data from more than one site if they wish to do so, however, help and oversight by SWQB Wetlands Program and Natural Heritage New Mexico (NHNM) staff will be only for initial data collection (Day 1) by trained participant teams. Virtual follow-up meetings with participant teams will be conducted to review data collection results, answer questions, and to discuss data uses, future data collection and feedback.

A6 Project and Task Description

The primary goal of this project is to increase the use of NMRAM by our partners. Participant teams will be encouraged to use NMRAM to assess wetlands for their own projects, and to help identify and assess wetland condition of Reference Standard sites within the Lowland Riverine Wetlands and Montane Riverine Wetlands subclasses of wetlands in New Mexico. The NMRAM is meant to provide a cost-effective tool to obtain information about the condition of wetlands that may be employed by a variety of users from different agencies and institutions. Additional objectives for NMRAM use during the "All Hands Phase 2" campaign include identifying and evaluating 1) abundance, distribution and condition of wetlands in the subclass within the region, including associated habitat, water quality, and flood control 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) the effects of environmental stressors within the wetlands; and 6) locations to serve as restoration opportunities for the subclass within the region.

Task Description

1 NHNM/SWQB Planning Meeting: NHNM will meet with SWQB Wetlands Program Staff to review responsibilities and tasks, confirm timeline and prepare for All Hands Partner Planning Meeting. All Hands Planning Meeting Survey will be sent to potential participants to select date and assess needs.

2. All Hands Partner Planning Meeting: SWQB Wetlands Program Staff and NHNM will organize and conduct an NMRAM All-Hands planning meeting of participating government agencies, NGOs, and universities. Specific goals are to a) engage partners in the All Hands NMRAM field campaign; b) identify initial sites and target dates for assessment; c) evaluate training needs, identify and schedule NMRAM training opportunities to support the campaign, d) sign up Teams to participate, and e) develop an NMRAM All-Hands Field Data Collection Campaign Plan that is in keeping with goals and mission of the NMRAM and its partners. The Meeting may be conducted in virtual format. This QAPP and its requirements for quality data collection will be introduced at this meeting.

3. QAPP: The SWQB Wetlands Program Coordinator will write the Project QAPP and will obtain EPA approval.

4. Develop Web-Hosted and In-Person Training Materials and Conduct NMRAM Trainings: 4a) NHNM, in collaboration with SWQB Wetlands Program Staff, will develop electronic training materials, including four to five training videos (two sets) covering the introduction, landscape, biotic, and abiotic metric concepts, and stressor checklist and score roll-up methods for the Montane Riverine Wetlands and Lowland Riverine Wetlands NMRAMs. NHNM will host the training videos on a publicly available website and provide to SWQB to host on SWQB Wetlands Program Website. Post-video Training Certification materials will also be developed by NHNM, SWQB Wetlands Program and SWQB Quality Assurance Officer.

4b) NHNM will conduct two one and half-day NMRAM field training sessions (two in 2024-2025) which will include scheduled webinar reviews in association with videos, and one-day field training for each training session. A Botany Booster training which will include a classroom and field portion for NMRAM modules will be conducted in 2024 based on the needs of the participating teams. A Certificate will be issued to Team participants who attend training sessions and understand the training materials in preparation for data collection by successfully passing the questionnaire (quiz).

5. All-Hands NMRAM Campaign Preparation and Field Team Logistics: 5a) In accordance with the needs identified in the NMRAM All-Hands Field Data Collection Campaign Plan, NHNM and SWQB will coordinate volunteer field team scheduling and training needs, per the QAPP to ensure that all protocols are clearly understood and are consistent with the QAPP. NHNM will assist participants with GIS and site map development. NHNM will be responsible for sending information to participants including field supplies lists as the "All Hands" data collection days approach. NHNM will provide protocols for contacting public and private landowners for site access and a field safety plan for review by participants prior to performing field work. NHNM will inform participants regarding follow-up meetings and data collection results review.

5b) NHNM will assist teams with preparation of field packets for each of the sites including maps and directions to properties. The packets will include two copies of the appropriate Field Guide and data collection worksheets supplied by the SWQB Wetlands Program. Volunteer Teams will be instructed to provide their own tools and other supplies. NHNM will ensure that each volunteer is instructed about the contents of the QAPP and receives required certification before field data collection. The Team Leader will sign the QAPP Acknowledgement Form for the volunteer team.

6. All-hands Field Campaign Coordination and Oversight: NHNM will provide a total of 8 ten-hour field days (including travel time) for qualified staff members to oversee data collection at one site for each participant team. SWQB Wetlands Program will also provide trained staff for participation in data collection team oversight in excess of this time. Oversite staff will ensure that all data is collected according to the approved project QAPP and will be available for volunteer questions and data review during this time. NHNM will ensure that field data collection teams include a designated Team Leader in charge of Quality Assurance/Quality Control (QA/QC) that will ensure that all data is collected at each field site using the latest versions of the NMRAM Field Guides and data collection worksheets. The Team Leader will sign the QAPP Acknowledgement Form for the volunteer team and will participate in the follow-up meeting for data review.

NHNM will guide teams in obtaining landowner permission for the field sites, arrange access, and schedule site entry in advance of the data collection days unless NHNM assigns their data collection sites for them. A template for Thank You notes will be provided by NHNM to each Team Leader to be sent to landowners

after data collection is completed. Landowner information will be kept on file as provided by collection teams for future data collection and participation time will be tracked as project match contribution by NHNM.

6. Follow-up Meeting: NHNM and SWQB Wetlands Program staff will conduct a follow-up meeting/webinar with participating Team Leaders and other team members to review team results, address issues, discuss data output uses and results, plan for future "All Hands" efforts, and provide feedback.

7. Final Report: NHNM will prepare a final report with the following sections: 1) summary of project goals and objectives, 2) map of all sampling sites, 3) table of teams participating, team members, and subclass and sites visited by each team, 4) meeting notes, 5) notes and feedback from follow-up meeting, 6) suggestions for future "All Hands" efforts, and 7) NHNM will compile and deliver all data provided by each participant team as hardcopy or electronic data collection worksheets to SWQB Wetlands Program.

Table 2: Tasks, Timeline, and Products

Task	Timeline	Products
SWQB/NMHM Planning Meeting	Summer 2021	Review tasks, responsibilities, confirm timeline, All Hands Partner Planning Prep.
All Hands Partner Planning Meeting	Summer 2021	Invite participants, organize and conduct meeting, identify potential sites, evaluate training needs, develop plan with participants.
Prepare QAPP	March 2021 and May 2024	QAPP prepared and forwarded to EPA for review and approval.
Develop Web-Hosted and In-Person Training Materials and Conduct NMRAM Trainings	April-July 2021 to September 2024	NMRAM Training videos uploaded to SWQB and NHNM websites, chat and attendee list from webinar reviews, certification materials, botany booster and field training materials (electronic maps), sign-in sheets for two field training sessions (one in 2024 and one in 2025) and botany booster, copies of all Certificates issued to participants.
All Hands NMRAM Campaign Prep and Field Team Logistics	August-Sept 2024 and April-Sept 2025	Schedule Teams, assist in GIS and map development, assist in landowner contacts, provide field safety plan, provide materials. Signed QAPP Acknowledgement forms.
All-Hands Field Campaign Coordination and Oversite	July-Sept 2024 and July-Sept 2025.	Assist Teams with data collection on the first day, data review at end of first day. All field data collected and completed on electronic datasheets or paper datasheets for each site visited.
Follow-up Meeting	Sept 2021 - November 2025	Review results, address issues, discuss data output and results, plan for future All Hands.
Final Report	Dec 15, 2025	Summary of Project Goals, maps, teams, meeting notes, feedback from follow-up meeting, Suggestions for future All Hands and datasheets provided by teams.

A7 Quality Objectives and Criteria for Measurement Data

This section describes the data quality objectives of the project, identifies the targeted action limits and levels, and defines the measurement performance of acceptance criteria deemed necessary to meet those objectives.

The purpose of this project is to expend the knowledge of the condition of wetlands associated with montane riverine and lowland river systems in New Mexico. Data quality will be measured against the quantitative and qualitative data quality indicators described below.

Table 3: Data Quality Indicators

Data Quality Indicator	Data Acquisition
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 previous NMRAM development for each subclass and review of field inventory components.
Bias	Bias will be reduced by using professional and experienced staff to oversee the data collection and analysis.
Representativeness	Sample selection is representative of the varied continuum of reference conditions of each subclass of wetland 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 during the development of NMRAM for each subclass. All metrics data will be collected for each of the SAs to ensure completeness.
Sensitivity	Analyses will be conducted to ensure sensitivity of metrics to environmental conditions and recalibrated as applicable as part of the methodology development.

A8 Special Training Requirements/Certification

SWQB has qualified and experienced scientific staff, with expertise in GIS, wetland identification, Rosgen classification and methods, the development of rapid assessment methods, and southwestern riparian ecosystems to help carry out and administer this project. In addition, the SWQB Wetlands Program is using qualified contractor (Natural Heritage New Mexico) with extensive experience in New Mexico's wetlands and in the development of rapid assessments, biotic integrity, riparian vegetation and hydrology, and field work to carry out this EPA-funded Rapid Assessment of Wetlands. The oversite staff of NHNM and SWQB Wetlands Program and the participating volunteer data collection teams will be given a copy of this QAPP (electronic or hard copy) and will be instructed in appropriate data collection, validation and ground truth techniques through refresher training prior to data collection.

Maryann McGraw (WPC), received her bachelor's and master's degrees in geology from the University of Texas at Austin, and is a Water Resources Manager for SWQB. Maryann has been the principal investigator and contributing author for all NMRAMs to date. She has attended advanced training sessions in fluvial geomorphology assessment of stream conditions and departures conducted by Dave Rosgen, California Rapid Assessment Method (CRAM), HGM training, NWCA training and Stream Pyramid Training. The WPC has also participated in training and data collection for NWCA (2011, 2016, 2021), conducted

greenline monitoring of riparian areas and SWQB photo monitoring protocols for other wetlands projects. She participated in the development of the Rio Puerco Monitoring Manual. She worked for the Los Luna Plant Materials Center propagating wetland plants. She is qualified for developing the assessment criteria, conducting and participating in the training, and for overseeing and managing any of the monitoring procedures specified for this project.

Shinya Burck serves as data collection oversite technician for this project. She is a Water Resources Specialist and Wetlands Program team member for the Surface Water Quality Bureau, based in the Santa Fe Office. She attended Fort Lewis College in Durango, Colorado where she earned her bachelor's degree in Organismal Biology and Geographic Information Systems Certificate. Ms. Burck previously worked for the Bureau of Land Management as a New Mexico Lotic Assessment, Inventory, and Monitoring (AIM) Data Analyst, and for the USFS, Dillon Ranger District as a fire suppression technician.

Contractor qualifications are documented through resumes and professional references. The qualifications have been reviewed by the SWQB WPC for this project. The documentation of this information will be kept in the SWQB project files managed by the File Manager. NHNM staff resumes were submitted with the project proposal to EPA and are available from the project File Manager.

A9 Documentation and Records

Copies of this QAPP and any subsequent revisions will be provided to all individuals included on the distribution list by the SWQB WPC. Signed Acknowledgement Statements will be kept in the project file by the File Manager.

The WPC will also distribute all applicable protocol documents and subsequent revisions used throughout the project to the appropriate contractors. NHNM will prepare and submit quarterly project reports. These will be submitted to NMED, in accordance with the approved QAPP. The QAPP, protocol documents and reports will be maintained on the SWQB WPC's hard drive, SWQB server (File Depot) and in the project file at SWQB Santa Fe, and at NHNM.

This QAPP includes references to protocols for the development and testing of written procedures for all methods, metrics and procedures or protocols related to the collection, processing, analyses, reporting and tracking of environmental data. All data generated from this project and covered by this QAPP will be of sufficient quality to withstand challenges to their validity, accuracy and legibility. To meet this objective, data are recorded in standardized formats and in accordance with prescribed procedures.

The documentation of all environmental data collection activities will meet the following minimum requirements:

1. Each individual participating in volunteer data collection and receiving certification must be documented by the WPC and certification kept in the project electronic files.
2. Data, data collection and analytical methods, and associated information must be documented directly, promptly, and legibly.
3. All reported data must be uniquely traceable to the raw data. All data reduction/transformation formulae must be documented.
4. All original data records include, as appropriate, a description of the data collected, units of measurement, unique sample identification (Request Identification [RID] number), station or location identification (if applicable), name and signature or initials of the person collecting the data, and date of collection.

Any changes to the original (raw data) entry must be clear and not obscure the original entry. Taxonomic refinements and translational typographic errors will be corrected on the field datasheets and in the database, with clear documentation of what and by whom those changes were made.

A9.1 Reporting Format and Storage

All field data will be recorded each day and for each metric on project-specific field data sheets. The designated Team Leader for each volunteer field crew will scan a representative set of field data sheets and email them to the SWQB WPC if they are willing to share their data (note: tribal teams may not). After the field work, the NHNM Project Coordinator will assign NHNM personnel to enter the data into the NHNM database. Typically, this task is assigned to several personnel to reduce fatigue. Assigned staff may include the NHNM Team Coordinator, Data Technicians, interns, or contractors (e.g. botanist). The personnel entering data from a datasheet will sign and date each sheet when it is complete. The NHNM database requires a username, password, and specific permissions to access and edit data, and tracks the username and date when records are added or edited. Once the data have been entered and corrected, the Project Coordinator will assign NHNM staff to scan the field data sheets if not already electronically generated; these will be delivered to the SWQB WPC. The Surface Water Quality Information Database (SQUID) is the central repository for NMRAM data at SWQB. NHNM will deliver the data into a geodatabase that includes all related tables and metadata to NMED for inclusion in SWQB project files until SQUID is prepared for Lowland Riverine and Montane Riverine NMRAM data entry. The SWQB WPC will ensure these data are entered into the Wetlands SQUID by December 2025. Copies of the paper datasheets will be kept in the project file at SWQB and at NHNM office. A list of SAs visited and site scores will be provided by the WPC to EPA Region 6 Wetlands Program as a deliverable attachment to the semi-annual reports. The data collection final report produced by the NHNM and SWQB will include scans of the data collection worksheets in an appendix.

B Data Generation and Acquisition

B1 Sampling Design

The SA location for Lowland Riverine Wetlands and Montane Riverine Wetlands Subclasses will be selected for logistical purposes, access, importance to volunteer teams, and to increase the New Mexico set of "Reference Standard" for each wetland subclass. These wetland subclasses were selected based on the SWQB prioritization of wetland types and:

1. data acquisition for potential best available reference sites
2. access
3. potential for impairment by future stressors (anthropogenic activities)

The selection of Sample Areas (SA) for this project will focus on collection of rapid assessment data from sites important to the data collection teams and if assigned by NHNM, the best available sites to increase our understanding of each wetland subclass as a whole and to contribute to a set of Reference Standards sites for New Mexico.

SA Locations will be selected by the volunteer teams (with prior approval from NHNM) or assigned by NHNM staff. High quality sites will be targeted to increase the New Mexico set of "Reference Standard" or best sites assessed with NMRAM. Each site will be approved by the NHNM and SWQB Wetlands Program staff as fitting the subclass.

Metrics were selected by the SWQB Wetlands Team and NHNM staff during the development of the NMRAM by wetland subclass, these metrics have been incorporated into electronic data collection worksheets (Appendix F2 and F3). Metrics represent relevant attribute categories such as Landscape Context, Size, Biotic, and Abiotic (Table 4) for each subclass of wetland (Lowland Riverine Wetlands and Montane Riverine Wetlands). The metrics are measured using maps and aerial imagery or evaluated in the field. Landscape Context and Size metrics are assessed using maps and/or a GIS and these are termed "Level 1" metrics (Fennesey et al 2004). Landscape Context metrics usually are evaluating conditions surrounding the SA (the Buffer, Riparian Corridor, or Land Use Zone) and are preferably completed before going into the field to help familiarize the team with the site. Size metrics are also measured using maps. Level 1 metrics are also confirmed or modified as necessary during the field survey.

Table 4: List of NMRAM metrics by Subclass for "All Hands" Phase II
*Level refers to measurement either in a GIS (1) or in the field (2)

Metric	Level	Module	
		Montane	Lowland
Landscape Context Metrics			
L1. Buffer Integrity Index	1	x	x
L2. Riparian Corridor Connectivity	1	x	x
L3. Relative Wetland Size	1	x	x
L4. Surrounding Land Use	1	x	x
Biotic Metrics			
B1. Relative Native Plant Community Composition	2	x	x
B2. Vegetation Horizontal Patch Structure	2	x	x
B3. Vegetation Vertical Structure	2	x	x
B4. Native Riparian Tree Regeneration	2	x	x
B5. Invasive Exotic Plant Species Cover	2	x	x
Abiotic Metrics			
A1. Floodplain Hydrologic Connectivity	2	x	x
A2. Physical Patch Diversity	2	x	x
A3. Channel Equilibrium	2	x	
A4. Stream Bank Stability and Cover	2	x	
A5. Soil Surface Condition	2	x	x
A6. Channel Mobility	2		x
A11. Groundwater Index	2		x

In contrast, Biotic and Abiotic metrics are determined and evaluated in the field. Rapid field-based metrics are termed "Level 2" metrics. Biotic metrics may be based on floristic or wildlife data that represent habitat condition. Abiotic metrics may be based on hydrology, geomorphology, physical features, or soil condition. The Groundwater Index metric is based on plant composition and health. Level 2 metrics are sensitive to disturbance and can be collected by using data collection methods or observations with direct results in the field or by matching features within the SA with narrative descriptions identified in NMRAM's. Rapid assessments do not use methods that require lab analyses or other intensive methods

which would be considered Level 3. In addition, a draft set of field-based stressor checklists representing anthropogenic processes (Montane Riverine Wetland and Lowland Riverine Wetland) are completed during the field survey along with annotated field maps and documentary photographs. During the 2021-2022 data collection, the volunteer field teams will take additional notes and photographs to provide feedback to NHNM and SWQB during the follow-up meeting as to how the metrics were applied, details for describing the application of the metrics, stressors that are evident, and other comments that will help in the further development of the NMRAM suite of metrics that evaluate wetland condition.

The NMRAM Field Guides for Lowland Riverine Wetlands and Montane Riverine Wetlands will provide procedures for conducting a rapid ecological assessment of wetlands in each subclass system. Field Guides provide specific protocols and datasheets for evaluating wetland ecological condition using a combination of GIS-based measurements and field surveys. In addition to details on metric measurements, appendices are provided that include at minimum, the data collection worksheets, a plant species list with wetland indicator status, an invasive plant species list and a glossary of terms.

Anthropogenic stress affecting the SA at a watershed scale is evaluated before going to the field. Anthropogenic stress on the SA is also evaluated and documented on the stressor checklist during the field survey. Maps will be annotated with data collection site details, changes to landscape metrics and other features of note in the SA and the surrounding buffer. Documentary photographs allow the volunteer field team to relate findings back to NHNM and SWQB as well as supporting choices and data collected in the field. Documentary photographs are also taken of plant species that need further identification and as supporting documentation for plant communities identified in the SA. Photographs are used as supporting data collection and are generally not considered a metric or used as data by themselves. Photologs are included in the datasheet packet for tracking and recording photo information.

Metric scores based on Level I analysis and field data (Level 2) are weighted by importance and rolled up into an attribute score (i.e., Landscape Context, Biotic and Abiotic Scores) where 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). The rationale behind scoring procedures and the efficacy of any given metric will be provided in the NMRAM Manual Version 2.0.

A set of worksheets organized by attribute classes (Appendix A in each NMRAM subclass Field Guide) will be used for efficient data collection at each SA**.** These data collection worksheets will be provided as printable forms in Appendices of the Field Guides and as a downloadable fillable PDF file that computes and rates most metrics automatically and rolls up the scores for the user. The worksheet packets contain 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 for each wetland subclass SA that becomes the supporting record at a project level and the tool for data entry into SQUID. The Team Leader will check field sheets for accuracy and completeness prior to leaving the SA. A representative set of field sheets will be scanned and sent by designated Team Leader to the WPC and/or NHNM Program Manager for further inspection and review. A Validation and Verification form for NMRAM data will be filled out by the volunteer Team Leader to accompany the field sheet submittal to the SWQB Wetlands program. This is a required component of the SWQB QAPP if data will be entered into SQUID and used in the future for environmental decision-making, such as assessment against wetlands Water Quality Standards.

B2 Sampling Methods

The NMRAM sampling protocols identified in NMRAM Field Guides will be utilized in the collection of data for the Lowland Riverine Wetland and Montane Riverine Wetland Subclasses. Field Guides for each Subclass includes written procedures for all methods and procedures or protocols related to the

collection, processing, analysis, reporting and tracking of environmental data associated with each wetland subclass to accurately represent the condition of the wetland of interest. The metrics were designed to measure aspects of condition that are relative to the reference conditions based on the literature cited in the reference section of this QAPP, on previous testing and validation and on best professional judgment. The NMRAM data collection worksheets (Appendix A for the Lowland Riverine Wetlands and Montane Riverine Wetlands Subclasses) in F2, and F3 will also be utilized for data entry into SQUID.

B2.1 Surface Water Sampling at Confined Riverine Wetland sites

No water samples will be taken for the NMRAM for Montane Riverine Wetlands and Lowland Riverine Wetlands subclasses.

B2.2 Field Health and Safety Procedures

The NHNM and SWQB Wetlands Program staff will supervise and assist volunteer data collection teams during NMRAM data collection field days. These will be scheduled during late summer 2021 through late summer 2022. Field data collection will be scheduled to avoid thunderstorm activity and flooding, and in warmer weather while plants are more likely to be in bloom for purposes of identification.

Safety is of primary importance to field studies. Only sites that are safely accessible will be sampled. Unsafe sites include, but are not limited to, private lands not granting permission access, areas with evidence of illegal activities, exceptionally steep-sided and unstable slopes adjacent to rivers and acequias, and swift water and flooding.

In remote areas, the data collection team will always carry sufficient supplies of water, food, flashlights, shovels, extra spare tires, and first aid and emergency supplies to deal with accidents and unexpected circumstances, such as rapid changes in weather. Hard hats and closed-toe boots are required in burned or construction areas. Teams should have adequate communication devices for their location (cell phones, GPS, etc.). A field team will consist of at minimum a botanist, a hydrogeologist, and technical assistants. A designated Team Leader will be determined by NHNM Project Coordinator and WPC during the field team training before data collection field trips, and will be responsible for field trip decisions, crew performance, and data compilation.

Any invasive species will be identified during data collection at the wetland SAs. Measures will be taken to prevent the carrying of seeds and propagules from site to site including the visual inspection and sterilization of shoes, clothes and equipment. Measures and procedures for invasive species control are included in the NMRAM for Montane Riverine Wetlands and Lowland Riverine Wetlands Field Guides for users.

B2.3 Field Variances

As field conditions vary there may be the need for safety, common sense, or local site variables that prohibit or require minor adjustments to the sampling procedures and protocols. Such changes will be reported to NHNM at the follow-up meeting. If there is a deviation from the QAPP, the project manager/project coordinator must notify the QAO and provide written notification of the proposed changes and explanation on the reasoning behind the change. Upon the QAO's approval, modification to the QAPP will be sent to the US EPA for review and approval. Sampling problems, minor adjustments of field sampling, and QAPP modifications will be documented in any semi-annual reports to US EPA.

B2.4 Decontamination Procedures

Field equipment and shoes will be decontaminated between sites using a dilute bleach solution. This decontamination procedure is needed to prevent the spread of aquatic and terrestrial invasive species. Field clothing, including boots, will be decontaminated using a dilute bleach solution either in the field or by frequent laundry machine application. Disposal of decontamination fluids and rinse fluids is described below under "Disposal of Residual Materials". Any gloves used during the sampling regime will be considered disposable and will be packaged for disposal appropriately between sites.

B2.5 Disposal of Residual Materials

In the process of sampling there may be a small amount of waste, including used personal protective equipment (PPE). The US EPA's National Contingency Plan requires that management of the wastes generated during sampling comply with all applicable or relevant and appropriate requirements to the extent practicable. Residuals generated for this project will be handled in a manner consistent with the Office of Emergency and Remedial Response (OERR) Directive 9345.3-02 (May 1991), which provides the guidance for the management of wastes. In addition, other legal and practical considerations that may affect the handling of the wastes will be considered, as follows:

Used PPE and disposable containers or equipment will be bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any used PPE and disposable containers or equipment (even if it appears to be reusable) will be rendered inoperable before disposal in the refuse dumpster.

Decontamination fluids generated in the sampling event could consist of water and bleach. Decontamination fluids will be disposed into a municipal sewerage or onto an impervious surface for evaporation, at least 50 m from the nearest surface water.

B3 Sample Handling and Custody

No samples are expected to be collected for analysis at a laboratory for this project.

B4 Field Measurement Methods

Relevant metrics using Rosgen Level 2 geomorphology surveys techniques, such as cross-sections may be conducted at selected SA locations that utilize the Montane Riverine Wetland NMRAM Field Guide only. Methodology will follow the guidelines described in the Field Guide. Surveys will be located by GPS points for future data collection efforts to ensure repeat surveys are recreated accurately.

Plant communities will be documented using photographs and recorded on the data collection worksheets throughout each individual SA for the project. Photograph site locations will be recorded using a GPS to ensure accurate creation of the plant community map. Photo documentation will occur throughout the course of the project. Other documentary photographs include transect locations upstream, downstream from bank to bank. Photograph documentation details will be recorded on the data collection worksheets on designated photo-documentation pages.

B5 Quality Control

Quality control (QC) activities are technical activities performed on a routine basis to quantify the variability that is inherent to any environmental data measurement activity. The purpose for conducting QC is to understand and incorporate the effects the variability may have in the decision-making process. Additionally, the results obtained from the QC analysis, or data quality assessment, may identify areas where variability can be reduced or eliminated in future data collection efforts, thereby improving the overall quality of the project being implemented. Many of the proposed metrics consist of observation data including plant species lists and site geomorphology. To ensure quality control for these observational data, the data collection team will have subject matter experts. For example, the team will include a trained or degreed botanist and hydrogeologist to eliminate errors.

B5.1 Field Sampling Quality Control

All volunteer data collection team members who collect environmental data must be trained in the use of the metric protocols and will collect data in accordance with the procedures as they are defined in the NMRAM Field Guides, Field Sheets and at the training session. Training sessions will be led by one of the following project staff: SWQB WPC, SWQB Wetland's Team, NHNM Project Manager or NHNM Project Coordinator. Upon completion of the training sessions, each member of the volunteer data collection team will receive a quiz related to the virtual training materials and field training. Upon successful completion of the quiz, the member will be certified to collect NMRAM data as part of the volunteer data collection team.

Several potential metrics lend themselves to observer bias, particularly estimation and measurement of vegetation cover and land use cover. Density estimation sheets are useful for training and calibration of field team members and will be part of the NMRAM Field Guide if other sources are not available.

B5.2 Data Entry Quality Control

Field sheets will be organized, reviewed for completeness and placed in a labeled file folder by the designated Team Leader. Data entry from paper datasheets will be transferred to the fillable PDF data collection worksheets if the fillable PDF data collection worksheets were not initially used to collect data. The fillable data collection worksheets flag entries or values that are not consistent with that expected for the metric. The Team Leader will complete a Validation and Verification form for NMRAM data to accompany the field sheet submittal to NHNM and the SWQB Wetlands Program. Should any questions arise, the Team Leader will add a note to the field sheet and record on the Validation and Verification form and contact the field team member to answer that question. A note on the Validation and Verification form will be added when the inconsistent data entry is resolved. NHNM trained support staff will enter the data into NHNM database other than the individual who filled out the field sheet. Should any questions arise, the data entry personnel will add a note to the field sheet, to the Validation and Verification form and contact volunteer Team Leader to answer that question. When each data point from a page has been addressed, the data entry staff person will sign and date the field sheet that will serve as a verification process. The NHNM Project Coordinator or the WPC will review all data, using standardized exported reports that identify missing values and outliers and ensure that any inconsistencies are recorded on the Validation and Verification worksheet.

B6 Instrument/Equipment Testing, Inspection, and Maintenance

The NHNM Team Coordinator or designated volunteer Team Leader are responsible for inspecting equipment and supplies before the data collection team leave for field data collection and upon return to office.

B7 Instrument/Equipment Calibration and Frequency

Rosgen Level 2 measurements collected by the teams utilizing the NMRAM Montane Riverine Wetland Field Guide will be limited to those that can be collected using a tape measure and level. There are no instruments/equipment that require calibration.

B8 Inspection and Acceptance of Supplies and Consumables

B8.1 Field Sampling Supplies and Consumables

The NHNM Team Coordinator is responsible for preparing supplies checklists and informing the volunteer data collection Team Leader of needed supplies and equipment for each field sampling trip. Volunteer field sampling supplies and consumables are checked at the end of every field trip by the designated Team Leader. Replacement supplies and consumables 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.

B9 Non-Direct Measurements

Printed field maps for each SA are an integral part of the NMRAM Assessment Package. Printed field maps will be prepared for each SA by the volunteer team or by NHNM Project Coordinator. Two different map formats are required to support field mapping and the field survey; 1) A map at approximately 1:6000-10000 scale that shows the SAs in a landscape context. This map should delineate the maximum extent of a potential buffer and land use index area. 2) a map that encompasses a single SA at between 1:1500-3000 scale for mapping vegetation communities, abiotic features and transect locations. Two copies of the field maps are required, one for measuring biotic metrics and one for measuring abiotic metrics. Modifications to the SA boundary will be recorded on the SA abiotic map.

B10 Data Management

Data obtained for this project are maintained in a relational database and GIS electronic files at NHNM and SWQB. All electronic data will be filed and labeled in a consistent manner. All data will be delivered to the WPC as soon as practical following data collection event. All data are secured through password protection and are unavailable to unauthorized users, to protect from accidental manipulation. Exported geodatabases that are delivered to the SWQB contain metadata that includes the date of export. Data transmitted to the SWQB are available at NHNM, on the SWQB hard drive, SWQB server (File Depot) and in hard copy form as Wetlands Program files that are maintained by the SWQB File Manager.

NHNM will provide summary reports to the SWQB WPC. All data and summary reports will be compiled into the quarterly reports and final project report and provided to US EPA Region 6 Wetlands Program.

B10.1 Data Acquisition, Direct Measurements

Expeditious data entry helps ensure field team memory of site-specific details, and ability to respond to questions by SWQB and NHNM project managers about questionable data**.**

NMRAM protocol follows three data acquisition principles:

1. It should be highly efficient, requiring no more time to enter the data than it did to collect them.
2. The data entered should be restricted to assure accuracy and consistency, with terminology, scientific names, and responses limited to values in lookup tables, yet have the flexibility to allow for anomalous occurrences.
3. Users must be able to easily export meaningful data.

C Assessment and Oversight

C1 Assessment/Oversight and Response Actions

The SWQB WPC provides project oversight by reviewing data collection efforts. The NHNM Project Manager and Project Coordinator provide day-to-day oversight including adherence to this QAPP. Any problems encountered during the course of this project will be immediately reported to the SWQB WPC, who will consult with appropriate individuals to determine appropriate action. Should the corrective action impact the project or data quality, the SWQB WPC will alert the QAO. If it is discovered that NMRAM methodologies must deviate from the approved QAPP, a revised QAPP must be approved before work can be continued. All problems will be documented for inclusion in the project file, with quarterly reports and the final report. The SWQB will assess project progress to ensure the QAPP is being implemented, including periodic audits by the QAO, as needed. Those assessments and any problems will be reported by the SWQB WPC to the QAO.

C2 Reports to Management

Quarterly reports will be prepared and reviewed internally by the NHNM Project Coordinator and presented to the SWQB WPC for review. Any deviations from the specifications in the NHNM Memorandum of Agreement for this project will be documented and reported to WPC. Following inclusion of SWQB review comments, NHNM Project Coordinator will submit finalized reports to the SWQB WPC, who will summarize those reports in Project Semi-Annual Reports to the US EPA Grants Project Officer, to show project accomplishments, data acquisition and entry, and to provide a venue to bring up any issues with the project. The reports will allow the US EPA to assess the productivity of this Wetlands Project and be kept informed on the progress of the project. A report detailing the findings will be provided in the final project report to US EPA by SWQB WPC. The NMRAM Manual will serve as major documentation of the NMRAM for Lowland Riverine Wetlands and Montane Riverine Wetlands, and will relate the findings to several different NMRAMs, covering different wetlands types in New Mexico.

D Data Review and Usability

D1 Data Review, Verification, and Validation Requirements

Prior to using the data for wetlands protection, policy, or public uses, the quality of the data will be reviewed and evaluated, as described in Sections B10.1 and C1, above. Data are compiled from field sheets, reviewed and verified by NHNM staff that did not enter those data, and re-verified and validated by NHNM Project Coordinator. Errors will be corrected where possible and rejected and reported upon by the NHNM if questions about those data cannot be satisfactorily answered. Should any questions arise,

the data entry personnel will add a note to the field sheet, to the Validation and Verification form and contact volunteer Team Leader to answer that question. When each data point from a page has been addressed, the data entry staff person will sign and date the field sheet that will serve as a verification process. The NHNM Project Coordinator or the WPC will review all data, using standardized exported reports that identify missing values and outliers and ensure that any inconsistencies are recorded on the Validation and Verification worksheet.

Data collected by individuals or organizations other than the SWQB to be used for enforcement of water quality standards under the NM Water Quality Act (74-6-10 NMSA), water quality assessments, development of the Integrated List, TMDL development, or WQS amendments being proposed by the SWQB must, at a minimum, meet the QA/QC requirements described in the SWQB QAPP. Standardized and randomized checks of data entry, field calibration of instrumentation, and technician training will be conducted and reported upon by the NHNM, and data error levels above 1% will not be accepted. These data review, verification, and validation efforts will ensure the volunteer teams under the guidance of NHNM and SWQB Wetlands Program Staff provide high quality assessment data to SWQB.

D2 Verification and Validation Methods

Defining the data verification and validation methods helps ensure that project data are evaluated in an objective and consistent manner. For the current project, such methods have been described in Section D1 (above) for information gathered and documented as part of the field measurement activities. A copy of the Validation and Verification worksheet for NMRAM can be obtained by contacting the SWQB WPC.

D3 Reconciliation with User Requirements

NHNM, in collaboration with SWQB Wetlands Program, will use the assembled All Hands Phase 2 data and analyses to clarify issues related to protocol adequacy, completeness, and efficiency. The data assembled through the larger inventory and assessment will be used to further those analyses, and to address the question of the applicability of the methods to demonstrate the utility of the NMRAM for Lowland Riverine Wetlands and Montane 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 site 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 F1 Acknowledgement Statement

New Mexico Environment Department Surface Water Quality

Planning and Conducting "All Hands" Rapid Assessment Method Data Collection Campaign for the Assessment of New Mexico Wetlands, Phase 2

Quality Assurance Project Plan Acknowledgement Statement

This is to acknowledge that I have received a copy of the QAPP for **Planning and Conducting "All Hands" Rapid Assessment Method Data Collection Campaign for the Assessment of New Mexico Wetlands, Phase 2.**

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

_____
Name (Please Print)

_____
Date

Return to SWQB Wetlands Program Coordinator (Maryann McGraw)

NEW MEXICO RAPID ASSESSMENT METHOD

Montane Riverine Wetlands

Data Collection Worksheets

Appendix A

New Mexico Rapid Assessment Method

Montane Riverine Wetlands

Field Guide Worksheet Packet

(Version 2.5)

For conducting the New Mexico Rapid Assessment Method (NMRAM), a packet of worksheets is provided for evaluation of both Level 1 GIS mapping metrics (Landscape Context) and the Level 2 field metrics (Biotic and Abiotic). These worksheets are to be used in conjunction with the Landscape and Biotic and Abiotic SA field maps. The worksheets are designed for either paper use or as digital application using an interactive PDF available from New Mexico Environment Department Surface Water Quality Bureau (http://www.env.nm.gov/surface-water-quality/WETLANDS/). The PDF version computes some of the metric scores automatically, and auto-fills the SA Rank Summary Worksheet and headers. If field team members use paper versions in the field, they can choose to fill in a PDF later to compute the score and make reports, but regardless, all raw data must be collected first.

Version Date: 05/11/2022

NMRAM Montane Riverine Wetlands Version 2.5

SA Cover Worksheet				
SA Code	SA Name		Project	
AU Code	AU Name		WOI	
County	HUC 12	Elevation (ft)	(m)	Ecoregion
SA General Location and Boundary (Rationale, comments)				
Driving Directions				
Ownership		Data Sharing Restrictions		Fish Observed in Wetland?

Surveyor Role	Surveyor Name	Surveyor Initials
Landscape		
Biotic		
Abiotic		
Stressors		

Easting (m)	Northing (m)	Zone	Datum	Latitude (DD ft)	Longitude (DD ft)
Survey Date		**Start Time**		**End Time**	

SA Description

SA Landscape Context (summarize the wetland and surrounding landscape; include condition and impacts)

SA Biotic Condition (vegetation patterns, composition and structure, exotics and invasives, disturbance evidence, fire and herbivory)

SA Abiotic Condition (hydrological alterations {e.g., dams, walls etc.]; flooding characteristics and evidence of overbank flooding; soil disturbance and other site impacts; explain the hydrologic breaks or other factors that define the SA limits)

Assessment Summary (Overall site condition summary and comments after the field data is collected.)

Provisional Field Score	Rank	Surveyor(s)	Final Score	Rank	Initials	Date

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

NMRAM - SA Rank Summary Worksheet: Montane Riverine Wetlands 2.5			
Metric Description	Rating	Wt	Final Score
Landscape Context		Σ	
L1. Buffer Integrity Index		0.25	
L2. Riparian Corridor Connectivity		0.25	
L3. Relative Wetland Size		0.25	
L4. Surrounding Land Use		0.25	
Biotic		Σ	
B1. Relative Native Plant Community Composition		0.2	
B2. Vegetation Horizontal Patch Structure		0.2	
B3. Vegetation Vertical Structure		0.2	
B4. Native Riparian Tree Regeneration		0.2	
B5. Invasive Exotic Plant Species Cover		0.2	
Abiotic		Σ	
A1. Floodplain Hydrologic Connectivity		0.3	
A2. Physical Patch Complexity		0.2	
A3. Channel Equilibrium		0.2	
A4. Stream Bank Stability and Cover		0.2	
A5. Soil Surface Condition		0.1	

SA Condition Scoring Summary			
Major Attribute	Score	Wt.	Wt. Score
Landscape Context		0.3	
Biotic		0.35	
Abiotic		0.35	
SA WETLAND CONDITION SCORE Σ			
SA WETLAND RANK =			

SA Wetland Rank		
Rank	Score	Description
A	≥3.25 - 4.0	Excellent Condition
B	≥2.5 - <3.25	Good Condition
C	≥1.75 - <2.5	Fair Condition
D	1.0 - <1.75	Poor Condition

Stressor Summary	Major	Minor	Top Three	
	0	0	1	
			2	
			3	

Stressor Comments (Evaluation of risk)

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

Landscape Context

L1 - Buffer Integrity Index

Worksheet 1a. Buffer and RCC Checklist. Check off land cover elements within the buffer area or RCC corridors that are either allowed, or are excluded and considered non-buffer elements that disrupt ecosystem connectivity. Indicate the imagery type and date (season and year of imagery).

Imagery		Image Date	

Allowed buffer/RCC land cover elements			Excluded non-buffer/RCC land cover elements		
Buffer	RCC		Buffer	RCC	
☐	☐	Natural or semi-natural vegetation patches	☐	☐	Commercial/residential developments, parking lots, dams, bridges, revetments, and other structures
☐	☐	Small irrigation ditches without levees	☐	☐	Lawns, parks, golf courses, sports fields
☐	☐	Old fields, unmaintained	☐	☐	Railroads
☐	☐	Open range land	☐	☐	Maintained levees, sediment piles, construction materials, staging areas
☐	☐	Foot trails, horse trails, unpaved bike trails (low intensity)	☐	☐	Intensive livestock areas, horse paddocks, feedlots
☐	☐	Non-channel open water	☐	☐	Intensive agriculture: maintained pastures, hay fields, row crops, orchards, and vineyards
☐	☐	Non-functioning abandoned vegetated levees, or naturally occurring levees	☐	☐	Paved roads or developed second-order unpaved but graded roads
☐	☐	unpaved two tracks roads	☐	☐	Open water bounded by a levee or other manmade structure
☐	☐	Other	☐	☐	Other

Worksheet 1b. Buffer Percent Sub-metric. Measure or estimate the percentage of the SA perimeter composed of allowed buffer elements and enter into the Buffer Percent Box below. Rate the sub-metric using Table L1a and enter the rating on the Buffer Integrity Summary Worksheet 1d.

Buffer Percent (%)=	

Table L1a. Buffer Percent

Rating	Buffer Percent
○ 4	100%
○ 3	≥80% - <100%
○ 2	≥50% - <80%
○ 1	<50%

Worksheet 1c. Buffer Width Sub-metric. Measure the length of each buffer line in meters in the GIS or on the map. Average the line lengths and rate using Table L1b. Enter the rating on the Buffer Integrity Summary Worksheet 1d.

Line	Buffer Width (m)	Buffer Width (ft)	Line	Buffer Width (m)	Buffer Width (ft)
A			E		
B			F		
C			G		
D			H		
Average		(m)		(ft)	

Table L1b. Buffer Width

Rating	Average buffer width
○ 4	≥190m
○ 3	≥130 - <190m
○ 2	≥65 - <130m
○ 1	<65m

Worksheet 1d. Buffer Integrity Summary. Enter the sub-metric Ratings from Tables L1a and L1b above to calculate the Buffer Integrity Index Score using the formula in the box below. Using the Buffer Integrity Index Score, enter rating for Buffer Integrity in Table L1c and on the SA Summary Worksheet.

Buffer % Rating	+	Buffer Width Rating	/2 =	Buffer Integrity Index Score
	+		/2 =	

Table L1c. Summary Rating for Buffer Integrity

Rating	Score
○ 4	>3.5
○ 3	>2.5 - ≤3.5
○ 2	>1.5 - ≤2.5
○ 1	≤1.5

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

L2 - Riparian Corridor Connectivity (RCC)

Worksheet 2. RCC excluded non-buffer elements calculation. Refer to worksheet 1a for excluded non-buffer RCC land cover elements. Following the steps in the Field Guide, enter the summed values in meters for excluded element lengths for each bank within each segment upstream and downstream of the SA. Sum the values for each segment and calculate % Segment Disruption for the upstream side and the downstream side. Add the total disruption for upstream and downstream segments and then calculate the % Total Disruptions for the riparian corridor. Rate Riparian Corridor Connectivity using Table L2 and the data from this worksheet. Enter rating on the SA Summary Worksheet.

Segments	Upstream Segment		Downstream Segment	
Banks	**Left Bank**	**Right Bank**	**Left Bank**	**Right Bank**
A) Total Bank Disruption (m)				
B) Total Disruption by Segment (m)				
C) % Segment Disruption = (B/1000)*100				
D) Total Disruption both segments				
E) % Total Disruptions = (D/2000)*100				

Table L2. RCC Rating

Rating	Description
◯ 4	**0%** total disruption on both segments combined.
◯ 3	**<15%** total disruption on both segments combined.
◯ 2	**≥15%** - **<40%** total disruption on both segments combined.
◯ 1	**≥40%** total disruption on both segments combined.

L3 - Relative Wetland Size

Worksheet 3a. Calculate the Relative Size Ratio (RSR) between the current WOI size and the historic WOI size. b. Calculate the Relative Wetland Size Score (RWSI (%)) as (1-RSR)*100. Rate Relative Wetland Size Index using Table L3 and enter rating on the SA Summary Worksheet.

RSR					RWSI						
Current Size	/	Historic Size	=	RSR	1	-	RSR	X	100	=	RWSI (%)
	/		=		1	-		X	100	=	

Table L3. Relative Wetland Size Rating

Rating	RWSI Score	Description
◯ 4	≤10%	Wetland is at or only minimally reduced from its full natural extent
◯ 3	>10% - ≤40%	Wetland remains equal to or more than 60% of its natual size
◯ 2	>40% - ≤70%	Wetland has been reduced by more than 40% its natural size
◯ 1	>70%	Wetland has been reduced by more than 70% its natural size

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

L4 - Surrounding Land Use

Worksheet 4. Surrounding Land Use. Enter the percent area occupied by a given Land Use Element in the Land Use Zone (LUZ) surrounding the SA. Calculate the Land Use Index (LUI) Score by element as the product of the element coefficient times the percent of the LUZ Area occupied. (The %LUZ Area must total 100%.) Sum the LUI scores for each element to create the final LUI Score. Rate using Table L4 and enter the rating in the SA Rank Summary Worksheet.

Land Use Element	Coef	% LUZ Area	LUI Score
Paved roads, parking lots, domestic or commercially developed buildings, mining (gravel pit, quarry, open pit, strip mining), railroads	0		0
Unpaved roads (e.g., driveway, tractor trail, unpaved parking lots), paddock, dirt lot	0.1		
Dredging, borrow pits, abandoned mines, water-filled artificial impoundments (ponds and reservoirs)	0.1		
Filling or dumping of sediment or soils	0.1		
Intense recreation (all-terrain vehicle use, camping, popular fishing spot, etc.)	0.3		
Rip-rapped channel (highly modified channel with severely limited vegetation zone that is altered by human activities but not a completely concrete channel [that goes under paved roads]), junkyards, trash dumps, disturbed ground (not including roads)	0.3		
Ski area	0.4		
Dam sites and flood-disturbed shorelines around water storage reservoirs	0.5		
Abandoned artificial impoundments (ponds and reservoirs) and associated disturbed flood zones	0.5		
Artificial/Constructed wetlands, irrigation ditches	0.7		
Developed/Managed trail system (high use trail)	0.8		
Agriculture - active tilled crop production	0.2		
Agriculture - permanent crop (vineyards, orchards, nurseries, berry production)	0.3		
Manicured lawns, sport fields, and golf courses; urban manicured parks	0.3		
Old fields and other disturbed fallow lands dominated by ruderal and/or exotic species (e.g., kochia, Russian thistle, mustards, annual vegetation)	0.5		
Mature old fields and other fallow lands with natural composition, introduced hay field and pastures (e.g., perennial vegetation cover)	0.7		
Restoration areas in process to natural conditions (re-conversion in process)	0.8		
Haying of native grassland (e.g., no tillage, haying and baling only)	0.9		
Heavy logging or tree removal with >50% of large trees (e.g., >30 cm diameter at breast height) removed, woodland/shrub vegetation conversion (chaining, cabling, rotochopping)	0.3		
Commercial tree plantation, Christmas tree farms	0.6		
Selective logging or tree removal with <50% of large trees (e.g., >30 cm diameter at breast height) removed	0.8		
Mature restoration areas returned to natural conditions (re-converted)	0.9		
Natural area, land managed for native vegetation - No agriculture, logging, development	1		
LUI Score= Coefficient * % LUZ Area			

Table L4. Surrounding Land Use Rating

Rating	LUI Score
○ 4	≥95 - 100
○ 3	≥80 - <95
○ 2	≥40 - <80
○ 1	<40

SA CODE : **SA Name :** **Date :** **Surveyor Initials :**

Biotic Metrics

Worksheet 5. Vegetation Community Patch Polygon Data for Biotic Metrics B3, B4, and B5 for Polygons from SA Biotic Map. Enter data for each polygon under a unique number assigned from the SA Biotic Map. Each polygon is evaluated with respect to Vegetation Vertical Structure (B3), Native Tree Regeneration (B4), and Invasive Exotic Plant Species Cover (B5) metrics. Enter the Vertical Structure Type (VST) for B3, tree regeneration % cover within the polygon for B4 and the % cover of invasive exotic species for B5. Use the Tables in Appendix B and the Field Guide for metric instructions. Enter the species codes for the invasive exotic species found in the polygon (from NM Noxious Weed List - Appendix D). Use the comments box for documenting and describing vegetation community patch features.

Polygon No	B3 Vertical Structure Type	B4 Tree Regeneration % Cover	B5 Invasive Exotic Species % Cover	Invasive Exotic Species (List Code(s))	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

SA CODE : **SA Name :** **Date :** **Surveyor Initials :**

B1 - Relative Native Plant Community Composition

Worksheet 6. CT Plant Species and Polygon Assignments. Starting with CT A, enter the number of the first polygon from Worksheet 5. Enter the species codes for the two top dominant species in each stratum that appears in the polygon. See footnotes for special instructions. If a species appears in more than one strata, assign the species to the stratum in which it is more abundant. Each polygon is either assigned to the same CT if it has the same composition or a new CT is created for the polygon.

		Tall Woody Stratum [1]				Short Woody Stratum [2]				Herbaceous/Sparse Stratum [3]				CT Score [4]		
CT	Polygon Nos.	Species 1	E N	Species 2	E N	Species 3	E N	Species 4	E N	Species 5	E N	Species 6	E N	Raw[4]	% SA[5]	Wt Score[6]
A																
B																
C																
D																
E																
F																
G																
H																
I																
J																
K																
L																
M																
N																
O																
													Final Weighted Score[7]			

1. Trees and shrubs > 6 m (20 feet) and > 25% total stratum cover; 2. Trees and shrubs ≤6m (20 feet) and >25% total stratum cover; 3. Herbaceous (graminoids and forbs)>10% total stratum cover. [4]Raw Score is from Table B1a (Appendix B); [5]%SA is the percentage of the SA area covered by the CT and expressed as a decimal number; the total area %SA must equal 1; [6]Wt. Score is the product of the Raw Score * % SA; [7]The Final Weighted Score is the sum of the Wt. Scores. Rate the CT Final Weighted Score on Table B1 and enter the Rating for Relative Native Plant Community Composition on the SA Rank Summary Worksheet.

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

Table B1. Relative Native Plant Community Composition Rating		
Rating	**CT Final Weighted Score**	
◯ 4	≥ 3.75	<10% non-native
◯ 3	≥ 3.25 and <3.75	10% ≤20% non-native
◯ 2	> 2.0 and <3.25	20% ≤50% non-native
◯ 1	≤2.0	>50% non-native

B2 - Vegetation Horizontal Patch Structure

Worksheet 7. Using Tables B2a and B2c (Appendix B), choose the schematic pattern that best matches the mapped vegetation patch pattern for the SA. Rate using Table B2 and enter rating on the SA Rank Summary Worksheet.

Horizontal Patch Structure pattern A,B,C, or D:

Table B2. Rating for Vegetation Horizontal Patch Structure	
Rating	**Description**
◯ 4	Most closely matches Pattern A. SA has a diverse patch structure (≥4 patch types) and complexity. A dominant patch type would be difficult to determine.
◯ 3	Pattern B. SA has a moderate degree of patch diversity (3 patch types present) and complexity. A single, dominant patch type may be present, although the other patch types would be well represented and have more than one occurrence in the SA.
◯ 2	Pattern C. SA has a low degree of patch diversity and complexity. Two or three patch types may be present; however, a single, dominant patch type exists with the others occupying a small portion of the SA.
◯ 1	Pattern D. SA has essentially little to no patch diversity or complexity. The SA is dominated by a single patch type. Other patch types, if present, occur infrequently and occupy a small portion of the SA.

B3 - Vegetation Vertical Structure

Worksheet 8. Percentage of SA by vertical structure type (VST). Using the Structure Type from Worksheet 5 and the %SA from Worksheet 6 calculate the total area of the SA occupied by each VST using the formula VST(type) = Sum (%SA for CTs with same VST) x 100. Enter the total %SA for each VST below.

	VST 1 High Structure Forest	VST 2 Low Structure Forest	VST 5 Tall Shrubland	VST 6S Short Shrubland	VST 6W Herbaceous Wetland	VST 6H Herbaceous Vegetation	VST 7 Sparse Vegetation
Total % of SA							

Table B3. Rating for Vegetation Vertical Structure. Using the data from Worksheet 8 rate the SA based on the criteria in Table B3. Pick the row that best fits the distribution of VSTs in the SA. Each row specifies the required dominant structure type plus co- and sub-dominants. Percentage cover required per co- or sub-dominant is a minimum. The types listed in the columns must be the most common VSTs in the SA for the rating to be applicable (Worksheet 8). VSTs 1 and 2 can be inverted in dominance and the rating is still applicable. Work from the top of the table down. As long as the requirements for one row are met, any other types may or may not co-occur without changing the rating. Enter the rating on the SA Rank Summary Worksheet.

Rating	Dominant VST	Co- or Sub-dominant VST ≥15%	Sub-dominant VST ≥5%
◯ 4	1	5	6W and/or 6H
	1	6W	
	2 or 1 and 2	5	6W and/or 6H
◯ 3	1		
	2 or 1 and 2	5	
	2 or 1 and 2	6W	
	5	6W	
◯ 2	2 or 1 and 2		
	5		
	6W		
◯ 1	6S		
	6H		
	7		

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

B4 - Native Riparian Tree Regeneration

Table B4. Native Riparian Tree Regeneration rating. Using the polygon percent cover of native tree seedlings, saplings and poles from Worksheet 5, rate the SA based on polygon percent cover and patch density. Enter the rating on the SA Rank Summary Worksheet.

Rating	Description
○ 4	Native poles, sapling, and seedlings trees well represented, obvious regeneration, many patches or polygons with >5% cover, typically multiple size (age) classes.
○ 3	Native poles, saplings and/or seedlings common, scattered patches or polygons with 1% -5% cover, size classes few.
○ 2	Native poles, saplings and/or seedlings present but uncommon, restricted to one or two patches or polygons with typically <1% cover, little size class differentiation.
○ 1	Native poles, saplings, and/or seedlings absent (0% cover).

B5 - Invasive Exotic Plant Species Cover

Worksheet 9. Based on Worksheets 5 and 6, calculate or estimate the percentage cover of invasive exotic species for the SA and enter below. Rate using Table B5 and enter the rating on the SA Rank Summary Worksheet.

Rating Method

Invasive cover (%)

calculate

Table B5. Ratings for Invasive Exotic Plant Species Cover

Rating	Invasive Species Cover %
○ 4	0%
○ 3	>0% - <1%
○ 2	≥1% - <10%
○ 1	≥10

Additional CTs and Biotic Metric Comments:

SA CODE : **Date :**

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Abiotic Metrics

A1 - Floodplain Hydrologic Connectivity

Method 1

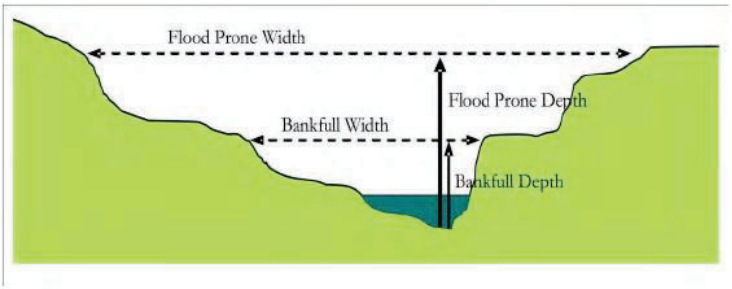
Worksheet 10a. Floodplain Hydrologic Connectivity Measurements. The following six steps are conducted at each of three cross-sections at the approximate mid-points along straight riffles and away from deep pools or meander bends. Use a measuring tape and temporary stakes for horizontal measurements, and a stadia rod or similar measuring stick for vertical measurements. If unavailable, use visual estimates. Where straight channel segments do not occur, or if there is excessive ponding or bankfull indicators are obscured, use the narrative rating approach (Method 2). Enter the rating method in the box below, either meander pool, riffle pool or narrative (Method 2) and choose the corresponding Table (A1a, A1b, or A1c) to rate Floodplain Hydrologic Connectivity. Enter the rating on the SA Rank Summary Worksheet. Photographs of each cross-section are required and recorded in Table A1d.

Steps	Description	Cross-section:	1	2	3
1: Bankfull width	This is a critical step requiring familiarity with field indicators of the bankfull contour. Measure the distance between the right and left bankfull contours with a tape.				
2: Maximum bankfull depth	Keeping the tape level between the right and left bankfull contours, measure the height of the line above the thalweg (the deepest part of the channel). A pocket line level can help here.				
3: Flood-prone depth	Double the estimate of maximum bankfull depth from Step 2.				
4: Flood-prone width	Using a tape, measure the length of a level line at a height equal to the flood prone depth from Step 3 to where it intercepts the right and left banks.				
5: Calculate Entrenchment Ratio	Divide the flood-prone width (Step 4) by the bankfull width (Step 1).				
6: Calculate average ratio	Calculate the average for Step 5 for all three replicate cross-sections. Enter the average here and rate using Table A1a. Enter the rating in the A1 box on the SA Rank Summary Worksheet.				

Rating Method

Table A1a. Rating for Floodplain Hydrologic Connectivity in meandering single-channel riffle-pool systems

Rating	Description
◯ 4	Average entrenchment ratio is ≥ 2.2;
◯ 3	Average entrenchment ratio is ≥1.9 - <2.2
◯ 2	Average entrenchment ratio is ≥1.5 - <1.9
◯ 1	Average entrenchment ratio is < 1.5



Worksheet 10b. Floodplain Hydrologic Connectivity Indicators. Use this Worksheet in conjunction with Table A1c. Check the boxes for all that apply to each segment.

U	M	L	Indicator
☐	☐	☐	Bankful is slightly below bank height
☐	☐	☐	Bankful is well below bank height and channel is incised
☐	☐	☐	Channel widening due to bank failure
☐	☐	☐	Constructed levees preclude floodplain inundation
☐	☐	☐	Stream is straightened/channelized
☐	☐	☐	Inset floodplain formation
☐	☐	☐	Decreased peak flows due to hydrologic modification
☐	☐	☐	Bankfull indicators at point of incipient flooding of the floodplain
☐	☐	☐	Indicators of overbank flow on floodplain
☐	☐	☐	Floodplain inundation due to beaver activity

Table A1b. Rating for Floodplain Hydrologic Connectivity in single-channel step-pool systems

Rating	Description
◯ 4	Average entrenchment ratio is ≥ 1.9
◯ 3	Average entrenchment ratio is ≥1.4 - <1.9
◯ 2	Average entrenchment ratio is ≥1.2 - <1.4
◯ 1	Average entrenchment ratio is < 1.2

SA CODE : **Date :**

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Method 2

Table A1c. Narratve Floodplain Hydrologic Connectivity Rating. Select the narrative description that best describes the floodplain hydrologic connectivity. At each cross-section, use Worksheet 10b to record channel incision, bank modification, inset floodplain or other hydrologic evidence that would preclude natural floodplain inundation. Conversely, assess indicators and evidence for overbank flow and floodplain inundation. Record whether beaver activity is obscuring bankful indicators due to inundation of the floodplain. Select a rating from the table below. Use data from Worksheets 10b to help select rating. Enter Rating on SA Summary Worksheet. Photographs are required at each cross-section and recorded in Table A1d.

Rating	Description
○ 4	Fully connected to the natural floodplain. Indicators of bankfull discharge are at the bank/floodplain transition, with over-bankfull flows likely to inundate a broad area of floodplain. Floodplain supports riparian vegetation and shows signs of overbank sediment deposition. Or beaver ponds inundate the entire, normally active floodplain and preclude the identification of bankfull indicators and the active floodplain width.
○ 3	Flow access to the floodplain moderately limited by incision, channelization. Less frequent inundation than fully connected streams described above (as noted by bankfull indicators below floodplain transition). Floodplain supports a riparian overstory, but some understory plants may be upland. An inset floodplain supporting riparian vegetation may also be present.
○ 2	Incised, channelized or modified with an inset floodplain formed, which is regularly inundated and supports riparian vegetation and sediment regimes. Or the stream has minimal access to the natural floodplain due to incision, channelization, or flow modification, and the natural floodplain does not support riparian vegetation except for relatively long-lived phreatophytes (e.g., cottonwood, salt cedar, etc.).
○ 1	Fully disconnected from floodplain, either through incision, bank modification/channelization, or hydrologic modification (i.e., abandonment of floodplain due to decreased peak flows). Indicators may include upland vegetation and lack of overbank sediment deposits on the floodplain, etc.

Table A1d. Photo Point Log for Cross-Section Photographs. For each cross-section record the digital names/numbers of photographs taken looking Upstream and Downstream from the thalweg and looking Bank Right* and Bank Left* across the stream from each side of the cross-section. Leave the cross-section tape and flags indicating bankful in the ground when taking the Bank Right and Bank Left photos. A photo board with SA name and cross-section information is helpful. (*The bank of a stream or river on the right (left) of the observer when facing in the direction of flow or downstream.) See Appendix E for additional details.

Cross Section	Easting (Latitude)	Northing (Longitude)	Upstream	Downstream	Bank Right	Bank Left
1						
2						
3						

Floodplain Hydrologic Connectivity Comments:

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

A2 - Physical Patch Complexity

Worksheet 11. Physical Patch Complexity checklist. Check off existing physical patch types for the upper, middle and lower segments of the SA; count the number of unique patch types and rate using Table A2 in combination with the narrative description. Enter the rating on the SA Rank Summary Worksheet.

Upper Segment	Middle Segment	Lower Segment	Field Indicators (check all existing conditions)
☐	☐	☐	Active side channels
☐	☐	☐	Abandoned channels
☐	☐	☐	Backwater/eddy
☐	☐	☐	Riffles or rapids
☐	☐	☐	Shoals, sparely-vegetated bars
☐	☐	☐	Channel boulders
☐	☐	☐	Oxbow lakes/ponds on floodplains
☐	☐	☐	Vegetated island and side bars
☐	☐	☐	Terraces
☐	☐	☐	Channel pools
☐	☐	☐	Beaver ponds
☐	☐	☐	Swales, depressional features on floodplains
☐	☐	☐	Debris jams in channel
☐	☐	☐	Woody wrack piles on the floodplain
☐	☐	☐	Floodplain micro-topography (mounds, pits)
☐	☐	☐	Downed logs
☐	☐	☐	Natural levees
☐	☐	☐	Standing snags
☐	☐	☐	Variegated, convoluted, or crenulated foreshore
☐	☐	☐	Undercut banks in channels
			No. of unique Patch Types

Table A2. Rating for Physical Patch Complexity

Rating	Description
◯ **4**	**High** degree of physical patch complexity across the floodplain. There are many floodplain micro-habitats present (mounds and pits, woody wrack piles, etc.), many fluvial geomorphic surfaces (swales, side channels, terraces, side bars, etc.), and there is high in-channel complexity (pools and riffles, large woody debris, undercut banks, etc.). As a guide, 12 or more unique indicators are present and well distributed throughout the SA (most indicators are found on multiple segments).
◯ **3**	**Moderate** physical patch complexity scattered across the floodplain. There are several floodplain micro-habitats present, several fluvial geomorphic surfaces, and there is moderate in-channel complexity. As a guide, 9 - 11 indicators are scattered throughout the SA (some on multiple segments).
◯ **2**	**Limited** physical patch complexity scattered across the floodplain. There are some floodplain micro-habitats present, some fluvial geomorphic surfaces, and there is limited in-channel complexity. As a guide, on average there are 6 - 8 unique indicators present in the SA (only a few on multiple segments).
◯ **1**	**Little** or no physical patch complexity on the floodplain. There are few or no floodplain micro-habitats present, few different fluvial geomorphic surfaces, and there is little or no in-channel complexity. As a guide, ≤ 5 unique indicators are present in the SA.

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A3- Channel Equilibrium

Worksheet 12. Channel Equilibrium Checklist. Check all field indicators that apply to the upper, middle and lower segment of the SA observed at the channel edge of the traverse. Rate using the Table A3 descriptions and based on a preponderance of evidence from this checklist. Enter the rating on the SA Rank Summary Worksheet.

Condition	Upper Segment	Middle Segment	Lower Segment	Field Indicators(check all existing conditions)
Indicators of Channel Equilibrium	☐	☐	☐	The channel has a well-defined bankfull contour that clearly demarcates the point of incipient flooding where moderate frequent flow events spread flow across the floodplain.
	☐	☐	☐	Perennial riparian vegetation is abundant and well established along the bankfull contour, but not below it.
	☐	☐	☐	There is leaf litter, thatch, or wrack in most pools.
	☐	☐	☐	The channel contains embedded woody debris of the size and amount consistent with what is naturally available in the riparian area.
	☐	☐	☐	There is little or no active undercutting or burial of riparian vegetation.
	☐	☐	☐	There are no bars that are densely vegetated with perennial vegetation (neither mid-channel bars or point bars).
	☐	☐	☐	Channel and point-bars consist of well-sorted bed material.
	☐	☐	☐	The channel bed is not planar and without an abundance of fine materials filling the interstitial spaces between larger stream substrate.
	☐	☐	☐	There are channel pools at meander bends and some deep pools within the reach.
Indicators of Active Degradation	☐	☐	☐	The channel is characterized by deeply undercut banks with exposed living roots of trees or shrubs.
	☐	☐	☐	There are abundant bank slides or slumps, or the lower banks are uniformly scoured and not vegetated.
	☐	☐	☐	Bank vegetation is declining in stature or vigor, or many riparian trees and shrubs along the banks are leaning or falling into the channel.
	☐	☐	☐	Channel bed is scoured to large cobbles or boulders and entrained bank material is filling the cobble interstices and pools.
	☐	☐	☐	There are active headcuts within the channel.
	☐	☐	☐	An obvious historical floodplain has recently been abandoned, as indicated by the age structure of its riparian vegetation.
Indicators of Active Aggradation	☐	☐	☐	There is abundant fresh splays of coarse sediment covering the floodplain above the natural point bar elevation.
	☐	☐	☐	There are partially buried living tree trunks or shrubs along the banks.
	☐	☐	☐	The channel bed is planar overall. The stream lacks well-defined channel pools at meander bends, or pools are filled with sediment.
	☐	☐	☐	There are partially buried or sediment-choked culverts.
	☐	☐	☐	There are avulsion channels on the floodplain or adjacent valley floor.

SA CODE : **Date :**

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Table A3. Rating for Channel Equilibrium	
Rating	**Description**
○ 4	Most of the channel throughout the SA is in equilibrium condition with little evidence of excessive aggradation or degradation based on the field indicators listed in Worksheet 12.
○ 3	There is some evidence of excessive aggradation or degradation; the channel throughout the SA seems to approach an equilibrium condition. Circle primary process: aggradation or degradation.
○ 2	There is evidence of severe aggradation or degradation throughout most of the channel through the SA. Circle primary process: aggradation or degradation.
○ 1	The channel is artificially hardened, channelized, or is concrete throughout most of the SA.

A4- Stream Bank Stability and Cover

Worksheet 13. Bank Soil Stability and Streambank Erosion Potential Checklist. Check the indicator that best describes the condition looking a minimum of 25 m upstream and downstream at the channel edge of the upper, middle and lower segment of the SA. Average the six scores for both Bank Soil Stability and Streambank Erosion Potential. Rate using the Table A4 and enter the rating on the SA Summary Worksheet.

Condition	Upper Segment	Middle Segment	Lower Segment	Field Indicators
Indicators of Bank Soil Stability	☐4	☐4	☐4	Infrequent raw banks, less than 10% of steam bank under stress from trampling, slumping, vegetation removal or active erosion, etc.
	☐3	☐3	☐3	Raw banks and loose soil intermittently and 10%-25% of stream bank under stress from trampling, trail crossing, hoof punching, vegetation removal, erosion etc.
	☐2	☐2	☐2	Significant raw banks and loose soil, 25%-50% of stream bank under stress, trampled, slumping or eroding etc.
	☐1	☐1	☐1	Raw banks almost continuous with greater than 50% of stream bank under stress, loose soil, slumping, trampled or eroding; or channel appear to lack banks due to trampling; or channel that is artificially hardened or concrete along most of its length.
Indicators of Stream Bank Erosion Potential	☐4	☐4	☐4	≥ 80% of the stream bank surfaces are covered by vegetation in vigorous condition with dense root mass or by boulders, large cobbles and/or large woody debris that prevent bank erosion.
	☐3	☐3	☐3	≥50% - <80% of the stream bank surfaces are covered by vegetation in vigorous condition with dense root mass or by cobble or larger material. Those areas not covered by vegetation are protected to allow only minor erosion.
	☐2	☐2	☐2	≥25% - <50% of the stream bank surfaces are covered by vegetation in vigorous condition with dense root mass or by cobble or larger material. Those area not covered by vegetation or stabilized by roots, are covered by materials or vegetation that give limited protection.
	☐1	☐1	☐1	Less than 25% of the stream bank surfaces are covered by vegetation in vigorous condition with dense root mass or by cobble or larger material. Those areas not covered by vegetation provide little or no control over erosion and excess shear stress, and the banks are susceptible to erosion by high water flows.

Average Indicator Score ☐

Table A4. Stream Bank Stability and Cover Rating	
Rating	**Description**
○ 4	>3.5 - 4.0
○ 3	>2.5 - ≤3.5
○ 2	>1.5 - ≤2.5
○ 1	1.0 - ≤1.5

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

A5 - Soil Surface Condition

Worksheet 14. Soil Surface Condition. Check all that apply in the upper , middle and lower SA segments during the field reconnaissance. The absence of these indicators would signify that disturbances are naturally occurring (e.g., flood deposition or low-density wildlife trails). Estimate the percent soil disturbance by segment area and referring to the SA abiotic map. Rate using Table A5 and enter on the SA Rank Summary Worksheet.

Upper Segment	Middle Segment	Lower Segment	Field Indicators (Check all existing conditions)
☐	☐	☐	Active erosion features due to anthropogenic disturbance (eg. rills, gullies, plant pedestals).
☐	☐	☐	Multiple livestock and other (fishing,hiking) trails,
☐	☐	☐	Vehicle tracks including off-road and construction, etc.
☐	☐	☐	Impervious compacted surfaces or pavement
☐	☐	☐	Grading or plowing
☐	☐	☐	Fill
☐	☐	☐	Gravel pits
☐	☐	☐	Anthropogenic levees and berms
☐	☐	☐	Irrigation-driven salinity and mineral crusts
☐	☐	☐	Fire pits
☐	☐	☐	Other:
			Estimate % soil disturbance by segment area

Average % Soil Disturbance:

Table A5. Soil Surface Condition Rating	
Rating	**Description**
○ 4	Bare soil areas due to anthropogenic disturbance absent or very limited. No human-caused impervious surfaces or gravel pits are found within the SA. Total disturbance, including erosion, impervious surfaces, fill, or other anthropogenic degradation to the soil surface is less than 1% of the SA.
○ 3	Some amount of bare soil from human causes is present but the extent is limited. Area of impervious surfaces are minimal in extent. Total disturbance, including erosion, impervious surfaces, fill, gravel pits, vehicle tracks or other anthropogenic degradation to the soil surface is between 1% and 5% of the sampling area.
○ 2	Bare soils from human causes are common. These may include dense livestock trails, vehicle tracks, trails, construction staging areas, mechanical rutting, or irrigation-driven salinity. Soil disturbance, while apparent, is limited to specific areas and not found across the majority of the SA. Total disturbance, including erosion, impervious surfaces, fill, gravel mining, or other anthropogenic degradation to the soil surface is greater than 5% or less than 10% of the SA.
○ 1	Bare soil areas degrade portions of the site because of altered hydrology or other long-lasting impacts. Deep ruts from off-road vehicles or machinery are present. Livestock disturbance or trails are widespread and several inches deep. Water is channeled into rills or ponded. Additional human-caused impervious surfaces or soil compaction are present. Total disturbance, including erosion, impervious surfaces, fill,gravel mining or other anthropogenic degradation to the soil surface is equal to or greater than 10% of the SA.

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

Worksheet 15. Stressor Checklist. Check off stressors by intensity category that may be affecting wetland ecological condition of the SA and WOI. Assign categories using direct evidence where available or your best professional judgement otherwise. If the presence of the stressor is uncertain, mark as "Unknown". Rank Major Stressors in Dominant Stressor column(Pick up to 3)

Rank	Affect				Stressor Group/Stressor	Comments
	Major	Minor	Absent	Unknown		
					Adverse water management	
	☐	☐	☐	☐	Extended low flow dam releases	
	☐	☐	☐	☐	Timing of flow releases not concordant	
	☐	☐	☐	☐	Extended high flow dam releases	
	☐	☐	☐	☐	Agriculture/Urban flow diversion upstream	
					Adverse sediment management	
	☐	☐	☐	☐	Adverse sediment retention by dams	
	☐	☐	☐	☐	Sediment loss by dredging	
	☐	☐	☐	☐	Adverse sediment input (roads/development)	
					Artificial water additions	
	☐	☐	☐	☐	Sewer treatment effluent	
	☐	☐	☐	☐	Point source urban runoff	
	☐	☐	☐	☐	Factory, feedlot outfall	
	☐	☐	☐	☐	Agricultural irrigation ditch returns	
	☐	☐	☐	☐	Mining waste	
					Ground water pumping	
	☐	☐	☐	☐	Urban depletions	
	☐	☐	☐	☐	Fracking	
	☐	☐	☐	☐	Agriculture irrigation wells	
					Watershed alteration	
	☐	☐	☐	☐	Extensive recent fires in watershed	
	☐	☐	☐	☐	Extensive recent timber harvest	
	☐	☐	☐	☐	Extensive open pit mining in watershed	
	☐	☐	☐	☐	Livestock/wildlife overgrazing	
					Local biodiversity impacts	
	☐	☐	☐	☐	Evidence of excessive grazing (local)	
	☐	☐	☐	☐	Excessive noise affecting wildlife	
	0	0		0	Counts by Intensity	

Additional Comments

Version Date: 05/11/2022 Schema: Montane 2.5

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

Photo Point Log

Worksheet 16. Photo point Log. Photo points are highly recommended to document 1) general condition of the SA, 2) dominant plant communities, and 3) stream condition. (See metric descriptions for when photo documentation is required.) The photograph number, direction (AZM=azimuth compass direction of photo), photo point coordinates (GPS UTM northing and easting location), and latitude and longitude should be recorded, along with a general description and segment on which the photo was taken and the initials of the photographer.

Photo PT File	AZM	Easting	Northing	Latitude	Longitude	Description	Initial

NEW MEXICO RAPID ASSESSMENT METHOD

Lowland Riverine Wetlands

Data Collection Worksheets

Appendix A

New Mexico Rapid Assessment Method

Lowland Riverine Wetlands

Field Guide Worksheet Packet

(Version 2.2)

For conducting the New Mexico Rapid Assessment Method (NMRAM), a packet of worksheets is provided for evaluation of both Level 1 GIS mapping metrics (Landscape Context) and the Level 2 field metrics (Biotic and Abiotic). These worksheets are to be used in conjunction with the Landscape and SA field maps. The worksheets are designed for either paper use or as digital application using an interactive PDF available from New Mexico Environment Department Surface Water Quality Bureau (http://www.env.nm.gov/surface-water-quality/WETLANDS/) The PDF version computes some of the metric scores automatically, and auto-fills the SA Rank Summary Worksheet and headers. If field team members use paper versions in the field, they can choose to fill in a PDF later to compute the score and make reports, but regardless, all raw data must be collected first.

Version Date: 05/13/2024

NMRAM Lowland Riverine Wetlands Version 2.2

SA Cover Worksheet				
SA Code	SA Name		Project	
AU Code	AU Name		WOI	
County	HUC 12	Elevation (ft)	(m)	Ecoregion
SA General Location and Boundary (Rationale, comments)				
Driving Directions				
Ownership		Data Sharing Restrictions		Fish Observed in Wetland?

Surveyor Role	Surveyor Name	Surveyor Initials
Landscape Context		
Biotic		
Abiotic		
Stressors		

Easting	Northing	Zone	Datum	Latitude	Longitude
Survey Date		**Start Time**		**End Time**	

SA Description

SA Landscape Context (summarize the wetland and surrounding landscape; include condition and impacts)

SA Biotic Condition (vegetation patterns, composition and structure, exotics and invasives, disturbance evidence, fire and herbivory)

SA Abiotic Condition (hydrological alterations {e.g., dams, walls etc.]; flooding characteristics and evidence of overbank flooding; soil disturbance and other site impacts; explain the hydrologic breaks or other factors that define the SA limits)

Assessment Summary (Overall site condition summary and comments after the field data is collected.)

Provisional Field Score	Rank	Surveyor(s)	Final Score	Rank	Initials	Date

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

NMRAM - SA Rank Summary Worksheet: Lowland Riverine Wetlands 2.2			
Metric Description	Rating	Wt	Final Score
Landscape Context		Σ	
L1. Buffer Integrity Index		0.25	
L2. Riparian Corridor Connectivity		0.25	
L3. Relative Wetland Size		0.25	
L4. Surrounding Land Use		0.25	
Biotic		Σ	
B1. Relative Native Plant Community Composition		0.2	
B2. Vegetation Horizontal Patch Structure		0.2	
B3. Vegetation Vertical Structure		0.2	
B4. Native Riparian Tree Regeneration		0.2	
B5. Invasive Exotic Plant Species Cover		0.2	
Abiotic		Σ	
A1. Floodplain Hydrologic Connectivity		0.3	
A2. Physical Patch Complexity		0.2	
A5. Soil Surface Condition		0.1	
A6. Channel Mobility		0.2	
A11. Groundwater Index	1	0.2	0.2

SA Condition Scoring Summary			
Major Attribute	Score	Wt.	Wt. Score
Landscape Context		0.3	
Biotic		0.35	
Abiotic		0.35	
SA WETLAND CONDITION SCORE Σ			
SA WETLAND RANK =			

SA Wetland Rank		
Rank	Score	Description
A	≥3.25 - 4.0	Excellent Condition
B	≥2.5 - <3.25	Good Condition
C	≥1.75 - <2.5	Fair Condition
D	1.0 - <1.75	Poor Condition

Stressor Summary	Major	Minor	Top Three	
	0	0	1	
			2	
			3	

Stressor Comments (Evaluation of risk)

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

Landscape Context

L1 - Buffer Integrity Index

Worksheet 1a. Buffer and RCC Checklist. Check off land cover elements within the buffer area or RCC corridors that are either allowed, or are excluded and considered non-buffer elements that disrupt ecosystem connectivity. Indicate the imagery type and date (season and year of imagery).

Imagery		Image Date	

Allowed buffer/RCC land cover elements			Excluded non-buffer/RCC land cover elements		
Buffer	RCC		Buffer	RCC	
☐	☐	Natural or semi-natural vegetation patches	☐	☐	Commercial/residential developments, parking lots, dams, bridges, revetments, and other structures
☐	☐	Small irrigation ditches without levees	☐	☐	Lawns, parks, golf courses, sports fields
☐	☐	Old fields, unmaintained	☐	☐	Railroads
☐	☐	Open range land	☐	☐	Maintained levees, sediment piles, construction materials, staging areas
☐	☐	Foot trails, horse trails, unpaved bike trails (low intensity)	☐	☐	Intensive livestock areas, horse paddocks, feedlots
☐	☐	Non-channel open water	☐	☐	Intensive agriculture: maintained pastures, hay fields, row crops, orchards, and vineyards
☐	☐	Non-functioning abandoned vegetated levees, or naturally occurring levees	☐	☐	Paved roads or developed second-order unpaved but graded roads
☐	☐	unpaved two tracks roads	☐	☐	Open water bounded by a levee or other manmade structure
☐	☐	Other	☐	☐	Other

Worksheet 1b. Buffer Percent Sub-metric. Measure or estimate the percentage of the SA perimeter composed of allowed buffer elements and enter into the Buffer Percent Box below. Rate the sub-metric using Table L1a and enter the rating on the Buffer Integrity Summary Worksheet 1d.

Buffer Percent (%)=	

Table L1a. Buffer Percent

Rating	Buffer Percent
○ 4	100%
○ 3	≥80% - <100%
○ 2	≥50% - <80%
○ 1	<50%

Worksheet 1c. Buffer Width Sub-metric. Measure the length of each buffer line in meters in the GIS or on the map. Average the line lengths and rate using Table L1b. Enter the rating on the Buffer Integrity Summary Worksheet 1d.

Line	Buffer Width (m)	Buffer Width (ft)	Line	Buffer Width (m)	Buffer Width (ft)
A			E		
B			F		
C			G		
D			H		
Average		(m)		(ft)	

Table L1b. Buffer Width

Rating	Average buffer width
○ 4	≥190m
○ 3	≥130 - <190m
○ 2	≥65 - <130m
○ 1	<65m

Worksheet 1d. Buffer Integrity Summary. Enter the sub-metric Ratings from Tables L1a and L1b above to calculate the Buffer Integrity Index Score using the formula in the box below. Using the Buffer Integrity Index Score, enter rating for Buffer Integrity in Table L1c and on the SA Summary Worksheet.

Buffer % Rating	+	Buffer Width Rating	/2 =	Buffer Integrity Index Score
	+		/2 =	

Table L1c. Summary Rating for Buffer Integrity

Rating	Score
○ 4	>3.5
○ 3	>2.5 - ≤3.5
○ 2	>1.5 - ≤2.5
○ 1	≤1.5

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

L2 - Riparian Corridor Connectivity (RCC)

Worksheet 2. RCC excluded non-buffer elements calculation. Refer to worksheet 1a for excluded non-buffer RCC land cover elements. Following the steps in the Field Guide, enter the summed values in meters for excluded element lengths for each bank within each segment upstream and downstream of the SA. Sum the values for each segment and calculate % Segment Disruption for the upstream side and the downstream side. Add the total disruption for upstream and downstream segments and then calculate the % Total Disruptions for the riparian corridor. Rate Riparian Corridor Connectivity using Table L2 and the data from this worksheet. Enter rating on the SA Summary Worksheet.

Segments	Upstream Segment		Downstream Segment	
Banks	**Left Bank**	**Right Bank**	**Left Bank**	**Right Bank**
A) Total Bank Disruption (m)				
B) Total Disruption by Segment (m)				
C) % Segment Disruption = (B/2000)*100				
D) Total Disruption both segments				
E) % Total Disruptions = (D/4000)*100				

Table L2. RCC Rating

Rating	Description
◯ 4	**0%** total disruption on both segments combined.
◯ 3	**<15%** total disruption on both segments combined.
◯ 2	**≥15%** - **<40%** total disruption on both segments combined.
◯ 1	**≥40%** total disruption on both segments combined.

L3 - Relative Wetland Size

Worksheet 3. Relative Wetland Size Calculation. a. Calculate the Relative Size Ratio (RSR) between the current WOI size and the historic WOI size. **b.** Calculate the Relative Wetland Size Score (RWSI (%)) as (1-RSR)*100. Rate Relative Wetland Size using Table L3 and enter rating on the SA Rank Summary Worksheet.

RSR					RWSI						
Current Size	/	Historic Size	=	RSR	1	-	RSR	X	100	=	RWSI (%)
	/		=		1	-		X	100	=	

Table L3. Relative Wetland Size Rating

Rating	RWSI Score	Description
◯ 4	≤10%	Wetland is at or only minimally reduced from its full natural extent
◯ 3	>10% - ≤40%	Wetland remains equal to or more than 60% of its natual size
◯ 2	>40% - ≤70%	Wetland has been reduced by more than 40% its natural size
◯ 1	>70%	Wetland has been reduced by more than 70% its natural size

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

L4 - Surrounding Land Use

Worksheet 4. Surrounding Land Use. Enter the percent area occupied by a given Land Use Element in the Land Use Zone (LUZ) sourrounding the SA. Calculate the Land Use Index (LUI) Score by element as the product of the element coefficient times the percent of the LUZ Area occupied. (The %LUZ Area must total 100%.) Sum the LUI scores for each element to create the final LUI Score. Rate using Table L4 and enter the rating in the SA Rank Summary Worksheet.

Land Use Element	Coef	% LUZ Area	LUI Score
Paved roads, parking lots, domestic or commercially developed buildings, mining (gravel pit, quarry, open pit, strip mining), railroads	0		0
Unpaved roads (e.g., driveway, tractor trail, unpaved parking lots), Paddock, dirt lot	0.1		
Dredging, borrow pits, abandoned mines, water-filled artificial impoundments (ponds and reservoirs)	0.1		
Filling or dumping of sediment or soils	0.1		
Intense recreation (all-terrain vehicle use, camping, popular fishing spot, etc.)	0.3		
Rip-rapped channel (highly modified channel with severely limited vegetation zone that is altered by human activities but not a completely concrete channel [that goes under paved roads]), junkyards, trash dumps, disturbed ground (not including roads)	0.3		
Ski area	0.4		
Dam sites and flood-disturbed shorelines around water storage reservoirs	0.5		
Abandoned artificial impoundments (ponds and reservoirs) and associated disturbed flood zones	0.5		
Artificial/Constructed wetlands, irrigation ditches	0.7		
Developed/Managed trail system (high use trail)	0.8		
Agriculture - active tilled crop production	0.2		
Agriculture - permanent crop (vineyards, orchards, nurseries, berry production)	0.3		
Manicured lawns, sport fields, and golf courses; urban manicured parks	0.3		
Floodplain leveled with current or historic mowing	0.4		
Old fields and other disturbed fallow lands dominated by ruderal and/or exotic species (e.g., kochia, Russian thistle, mustards, annual vegetation)	0.5		
Mature old fields and other fallow lands with natural composition, introduced hay field and pastures (e.g., perennial vegetation cover)	0.7		
Restoration areas in process to natural conditions (re-conversion in process)	0.8		
Haying of native grassland (e.g., no tillage, haying and baling only)	0.9		
Heavy logging or tree removal with >50% of large trees (e.g., >30 cm diameter at breast height) removed, Woodland/Shrub vegetation conversion (chaining, cabling, rotochopping)	0.3		
Commercial tree plantation, Christmas tree farms	0.6		
Selective logging or tree removal with <50% of large trees (e.g., >30 cm diameter at breast height) removed	0.8		
Mature restoration areas returned to natural conditions (re-converted)	0.9		
Natural area, land managed for native vegetation - No agriculture, logging, development	1		
Element Score= Coefficient * % Area			

Table L4. Surrounding Land Use Rating

Rating	LUI Score
◯ 4	≥95 - 100
◯ 3	≥80 - <95
◯ 2	≥40 - <80
◯ 1	<40

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

Biotic Metrics

Worksheet 5. Vegetation Community Patch Data for Polygons from the SA Biotic Map for Biotic Metrics B3, B4, and B5 and for Abiotic Metric A11. Enter data for each polygon under a unique number assigned from the SA Biotic Map. Estimate the percentage of the SA (%SA) each polygon covers (expressed as decimal). Each polygon is then evaluated with respect to Vegetation Vertical Structure (B3), Native Tree Regeneration (B4), and Invasive Exotic Plant Species Cover (B5) metrics. Enter the Vertical Structure Type (VST) for B3, tree regeneration % cover within the polygon for B4 and the % cover of invasive exotic species for B5. Use the Tables in Appendix B and the Field Guide for metric instructions. For the Groundwater Index metric (A11) select a composition rating for tall woody, short woody or herbaceous using Table A11a in Appendix B if that stratum occurs in the polygon. A health modifier value is also selected from Table A11b for each woody stratum (tall or short) when riparian woody phreatophytes occur in the polygon. The comments box is used for documenting and describing vegetation community patch features.

Polygon No	% SA	B3 Structure Type	B4 Tree Regeneration % Cover	B5 Invasive Exotic Species % Cover	Invasive Exotic Species (List Code(s))	A11 Tall Woody (TW)	A11 Short Woody (SW)	A11 Herbaceous	A11 TW Health Modifier	A11 SW Health Modifier	Comments
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

Worksheet 5, continued. Vegetation Community Patch Data for Polygons from the SA Biotic Map for Biotic Metrics B3, B4, and B5 and for Abiotic Metric A11.

Polygon No	% SA	B3 Structure Type	B4 Tree Regeneration % Cover	B5 Invasive Exotic Species % Cover	Invasive Exotic Species (List Code(s))	A11 Tall Woody (TW)	A11 Short Woody (SW)	A11 Herbaceous	A11 TW Health Modifier	A11 SW Health Modifier	Comments
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

B1 - Relative Native Plant Community Composition

Worksheet 6. CT Plant Species and Polygon Assignments. Starting with CT A, enter the number of the first polygon from Worksheet 5, and the species codes for the two top dominant species in each stratum that appear in the polygon. See footnotes for special instructions. If a species appears in more than one strata, assign the species to the stratum in which it is more abundant. Each polygon from Worksheet 5 is then either assigned to the same CT if it has the same composition, or a new CT is created for the polygon. For polygons with sparse or no vegetation (VST 7) and no dominant plant species, select NO DOM in the Herbaceous/Sparse Stratum under Species 6. Then select E if the polygon is human-disturbed ground (0), U if mixed natural/human disturbance (2), or N if naturally unvegetated (4).

		Tall Woody Stratum [1]				Short Woody Stratum [2]				Herbaceous/Sparse Stratum [3]				CT Score [4]		
CT	Polygon Nos.	Species 1	E N	Species 2	E N	Species 3	E N	Species 4	E N	Species 5	E N	Species 6	E N	Raw[4]	% SA[5]	Wt Score[6]
A																
B																
C																
D																
E																
F																
G																
H																
I																
J																
K																
L																
M																
N																
O																
													Final Weighted Score[7]			

1. Trees and shrubs > 5 m (15 feet) and > 25% total stratum cover; 2. Trees and shrubs ≤5m (15 feet) and >25% total stratum cover; 3. Herbaceous (graminoids and forbs)>10% total stratum cover. [4]Raw Score is from Table B1a (Appendix B); [5]%SA is the percentage of the SA area covered by the CT and expressed as a decimal number; the total area %SA must equal 1; [6]Wt. Score is the product of the Raw Score * % SA; [7]The Final Weighted Score is the sum of the Wt. Scores. Rate the CT Final Weighted Score on Table B1 and enter the Rating for Relative Native Plant Community Composition on the SA Rank Summary Worksheet.

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

Table B1. Relative Native Plant Community Composition Rating		
Rating	**CT Final Weighted Score**	
◯ 4	≥ 3.75	<10% non-native
◯ 3	≥ 3.25 and <3.75	10% ≤20% non-native
◯ 2	> 2.0 and <3.25	20% ≤50% non-native
◯ 1	≤2.0	>50% non-native

B2 - Vegetation Horizontal Patch Structure

Worksheet 7. Using Tables B2a and B2c (Appendix B), choose the schematic pattern that best matches the mapped vegetation patch pattern for the SA. Rate using Table B2 and enter rating on the SA Rank Summary Worksheet.

Horizontal Patch Structure pattern A,B,C, or D:

Table B2. Ratings for Vegetation Horizontal Patch Structure	
Rating	**Description**
◯ 4	Most closely matches Pattern A. SA has a diverse patch structure (>4 patch types) and complexity. A dominant patch type would be difficult to determine.
◯ 3	Pattern B. SA has a moderate degree of patch diversity (3 patch types present) and complexity. A single, dominate patch type may be present, although the other patch types would be well represented and have more than one occurrence in the SA.
◯ 2	Pattern C. SA has a low degree of patch diversity and complexity. Two or three patch types may be present; however, a single, dominant patch type exists with the others occupying a small portion of the SA.
◯ 1	Pattern D. SA has essentially little to no patch diversity or complexity. The SA is dominated by a single patch type. Other patch types, if present, occur infrequently and occupy a small portion of the floodplain.

B3 - Vegetation Vertical Structure

Worksheet 8. Percentage of SA by vertical structure type (VST). Using the Structure Type from Worksheet 5 and the %SA from Worksheet 6 calculate the total area of the SA occupied by each VST using the formula VST(type) = Sum (%SA for CTs with same VST) x 100. Enter the total %SA for each VST below.

	VST 1 High Structure Forest	VST 2 Low Structure Forest	VST 5 Tall Shrubland	VST 6S Short Shrubland	VST 6W Herbaceous Wetland	VST 6H Herbaceous Vegetation	VST 7 Sparse Vegetation
Total % of SA							

Table B3. Rating for Vegetation Vertical Structure. Using the data from Worksheet 8 rate the SA based on the criteria in Table B3. Pick the row that best fits the distribution of VSTs in the SA. Each row specifies the required dominant VST plus co- and sub-dominants. Dominance is based on percentage cover, with the highest percentage cover VST being the dominant. The listed percentage cover of the co- or sub-dominant VSTs is a minimum. The VSTs listed in the columns must be the most common VSTs in the SA for the rating to be applicable Woksheet 8). Column 1 and 2 can be inverted in dominance, and the rating will still apply (i.e. the VST in the "dominant" column can be the the co- or sub-dominant VST, when the VST from the "co- or sub-dominant" column is dominant VST). Work from the top of the table down. As long as the requirements for a row are met, any other VSTs may or may not co-occur without changing the rating.

Rating	Dominant VST	Co- or Sub-dominant VST ≥15%	Sub-dominant VST ≥5%
◯ 4	1	5	6W and/or 6H
	2	5	6W
	1	6W	
◯ 3	1		
	2 or (2 & 1 combined)	5 or 6W	
	5	6W	
◯ 2	2		
	5		
	6W		
◯ 1	6S		
	6H		
	7		

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

B4 - Native Riparian Tree Regeneration

Table B4. Native Riparian Tree Regeneration rating. Using the polygon percent cover of native tree seedlings, saplings and poles from worksheet 5, rate the SA based on polygon percent cover and patch density. Enter the rating on SA Rank Summary Worksheet .

Rating	Description
○ 4	Native poles, sapling, and seedlings trees well represented; obvious regeneration, many patches or polygons with >5% cover; typically multiple size (age) classes.
○ 3	Native poles, saplings and/or seedlings common; scattered patches or polygons with 1% -5% cover; size classes few.
○ 2	Native poles, saplings and/or seedlings present but uncommon; restricted to one or two patches or polygons with, typically <1% cover); little size class differentiation.
○ 1	Native poles, saplings, and/or seedlings absent (0% cover).

B5 - Invasive Exotic Plant Species Cover

Worksheet 9. Based on Worksheets 5 and 6, calculate or estimate the percentage cover of invasive exotic species for the SA and enter below. Rate using Table B5 and enter the rating on the SA Rank Summary Worksheet.

Rating Method

Invasive cover (%)

calculate

Table B5. Ratings for Invasive Exotic Plant Species Cover

Rating	Invasive Species Cover %
○ 4	0%
○ 3	>0% - <1%
○ 2	≥1% - <10%
○ 1	≥10

Biotic metrics comments:

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

Abiotic Metrics

A11 - Groundwater Index

Worksheet 10. Groundwater Index. Enter the SA % for each vegetated polygon from Worksheet 5 (polygons with Vertical Structure Type VST 7 are excluded). If a tall woody stratum was present in the polygon (a value entered into A11 Tall Woody (TW) column on Worksheet 5), enter a 3 into the Tall Woody Presence (TP) column. If a short woody stratum was present (a value entered into A11 Short Woody (SW) column on Worksheet 5) enter a 1 in the Short Woody Presence(SP) column. If a herbaceous stratum was present (a value entered into A11 Herbaceous column on Worksheet 5) enter a 1 into the Herbaceous Presence (HP) column. If any stratum was absent, enter a 0 in the corresponding presence column. Fill in Composition (TC, SC and HC) and Health Modifier ratings (Th and SH) from Worksheet 5. Calculate the Health Wtd Groundwater Average using the formula below for each vegetated polygon (excluding the polygons with VST 7). For each polygon multiply the Health Wtd Groundwater Average by its %SA for Area Wtd Groundwater Average. Sum all Area Wtd Groundwater Averages and divide by Total % SA for the GroundWater Index Score. Rate using Table A11d and enter rating on the SA Rank Summary Worksheet.

		TP	SP	HP	TC	TH	SC	SH	HC		
Polygon	**%SA**	**TW Presence**	**SW Presence**	**Herbaceous Presence**	**TW Composition**	**TW Health Modifier**	**SW Composition**	**SW Health Modifier**	**Herbaceous Composition**	**Health Wtd Groundwater Average**	**Area Wtd Groundwater Average**
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
Total % SA								**SUM Area Wtd Groundwater Average**			
Groundwater Index Score (Area Wtd Groundwater Avg/Total %SA)											

Health Wtd Groundwater Avg = $\frac{((TC*TH)*3)+(SC*SH)+(HC)}{TP+SP+HP}$

Table A11d. Groundwater Index Rating

Rating	Groundwater Index Score
○ 4	≥3.25
○ 3	>2.5 and <3.5
○ 2	>1.75 and ≤2.5
◉ 1	≤1.75

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

A1 - Floodplain Hydrologic Connectivity

Worksheet 11a. 1. Based on evidence observed during the traverse of each segment (Upper (U), Middle (M), and Lower (L)), estimate the percentage of overall level of SA flood inundation **(11a1.)**. For each segment include all SA surfaces inundated due to flooding from the channel, side channels, or groundwater, but ignoring inundation from culverts (or other man-made inputs) and from non-channel sources originating outside the SA. **2.** Estimate extent (percent) of surface inundation **(11a2.)** in each segment in three locations, channel edge, SA center and outer edge. Enter M, F or A for indicators of inundation features present in each segment from Abiotic SA Map.

11a1. SA Surface Inundation - cumulative					**11a2. SA Surface Inundation - extent**				
U	**M**	**L**	**% of SA**	**Description**	**% U**	**% M**	**%L**	**General Location**	**Description**
☐	☐	☐	≥ 75%	The degree that recent large flood events have inundated the SA surface depositing fresh sediments, scouring surfaces, depositing fine wrack lines, and leaving mud cracks in fine sediment. Watch for indicators during each traverse, then select the percentage range that best fits the observed evidence.	☐	☐	☐	Channel edge	The extent (location) of SA wetting and pathways for inundation. Lowland systems evidence of flooding should be many across the floodplain. Use the Abiotic SA Map to estimate unvisited locations. Note that abandoned side channels can be inundated through hyporheic (local water table) connections (oxbows) or abandoned through channel avulsion showing no indicators of recent flow.
☐	☐	☐	≥ 50% to < 75%		☐	☐	☐	SA Center	
☐	☐	☐	≥ 35% to < 50%		☐	☐	☐	Outer edge	
☐	☐	☐	≥ 20% to < 35%		**SA Inundation Features: enter a M if many indicators occur, F if few occur, or A if indicators are absent in the SA for each transect from the Abiotic SA Map.**				
☐	☐	☐	≥ 10% to < 20%						
☐	☐	☐	≥ 5% to < 10%		☐	☐	☐	Overbank flow	
☐	☐	☐	≥ 1% to < 5%		☐	☐	☐	Active side channels	
☐	☐	☐	> 0% to <1%		☐	☐	☐	High flow channels	
☐	☐	☐	0%		☐	☐	☐	Abandoned channels	

Worksheet 11b - Floodplain Hydrologic Connectivity Supplemental Inundation Indicators - For each supplemental indicator estimate the rating for each segment using the rating description. If no indicators are present, check the X box for the segment.

U	**M**	**L**	**Rating**	**Rating Description**	**Supplemental Indicator**
☐	☐	☐	**4**	Fresh FDLWD found scattered throughout the SA	**A. Recent Flood Deposited Large Woody Debris(FDLWD):** Presence of FDLWD that looks recently transported by flow (i.e., minimal disturbance from animals, no recent termite infestation, etc). Does not include non-fluvial woody debris piles (slash, deadfall, etc); does include reworked or old woody debris with new deposits on top. Woody debris must be >4" diameter to count as large.
☐	☐	☐	**3**	Fresh FDLWD has limited distribution across SA; only near large active side channels or main channel	
☐	☐	☐	**2**	Fresh FDLWD rare and close to the main channel	
☐	☐	☐	**1**	FDLWD present, but no fresh deposits	
☐	☐	☐	**X**	No FDLWD of any kind present in SA	
☐	☐	☐	**4**	Side channels have indicators of recent flow throughout SA	**B. Side Channel Wetting:** Side channels, when present, should be actively connected to the main channel, i.e. one or more side channels disperse peak flows across the floodplain. Indicators of active flow within the channels are recently deposited or scoured sediments, ripple-marks, pushed over or recently buried vegetation, fine wrack, lack of litter, or litter buried by sediment.
☐	☐	☐	**3**	Some side channels show indications of flow, but limited in extent or volume	
☐	☐	☐	**2**	Side channels show indications of very limited flow extent and volume	
☐	☐	☐	**1**	Side channels show no indications of flow	
☐	☐	☐	**X**	No side channels present	
☐	☐	☐	**4**	Minimal litter present, or litter very recent or covered by sediment	**C. SA Surface Litter:** Recent flooding will reduce natural tree and shrub litter, most litter is either decomposed rapidly under moist conditions or is covered by sediment, or removed downstream. Rate litter depth only on portions of SA were litter producing woody species are present.
☐	☐	☐	**3**	Litter layers scattered in small patches; not deep (< 2 cm thick)	
☐	☐	☐	**2**	Litter layers moderately thick (2-5 cm) and generally large patches	
☐	☐	☐	**1**	Litter layers very thick (>5 cm) and distributed over large areas.	
☐	☐	☐	**X**	Minimal or no litter producing woody species present, or litter removed by human activity	

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

Table A1. Floodplain Hydrologic Connectivity Ratings. Select a ratings table based on estimated return interval for the peak stream discharge that occurred on the SA within last five years. Use data from worksheets 11a1., 11a2., and 11b to help select ratings.

>25 year recent peak discharge return interval ☐

Rating	Description
◯ 4	Highly connected wetlands that have evidence of inundation across the majority of the SA surface (≥50%) and signs of flow in all but the oldest side channels. Active side channels are not limited to the SA bank edge.
◯ 3	Moderately connected wetlands have moderate evidence of inundation of the SA surface (25 to <50%) but still show signs of flow in the majority of side and back channels. Active side channels are not limited to the SA bank.
◯ 2	Minimally connected wetlands have limited evidence of inundation of the SA surface (10 to <25%), if active side channels exist they are only found near the channel banks. Most of the SA is dry, side channels away from the bank edge appear abandoned, rarely active, or do not exist.
◯ 1	Disconnected wetlands have minimal or no evidence of inundation across the SA surface (<10%) and no signs of flow in any side channels or side channels do not exist. ***Or*** evidence of inundation across SA but SA has been artificially reduced in size by levees or development such that it is confined to a narrow fringe along the active channel.

10-25 year recent peak flow return interval ☐

Rating	Description
◯ 4	Highly connected wetlands have moderate evidence of inundation of the SA surface (≥25%) and signs of flow in all but the oldest side channels. Active side channels are not limited to SA bank edge.
◯ 3	Moderately connected wetlands have limited evidence of inundation of the SA surface (10% to <25%) and signs of flow in the majority of side and back channels. Active side channels are not limited to the SA bank edge.
◯ 2	Minimally connected wetlands have minimal evidence of inundation of the SA surface (5% to <10%) , if active side channels exist they are only found near the channels banks,. Most if the SA is dry, side channels away from the bank edge appear abandoned, rarely active, or do not exist.
◯ 1	Disconnected wetlands have almost no evidence of inundation across the SA surface (<5%) and no signs of flow in any side channels or side channels do not exist. ***Or*** evidence of inundation across SA but SA has been artificially reduced in size by levees or development such that it is confined to a narrow fringe along the active channel.

2-10 year recent peak discharge return interval ☐

Rating	Description
◯ 4	Highly connected wetlands have limited evidence of inundation of the SA surface (≥10%) and signs of flow in many side channels. Active side channels are not limited to the SA bank edge.
◯ 3	Moderately connected wetlands have minimal evidence of inundation of the SA surface (5% to <10%) and signs of flow in some side channels. Active side channels are not limited to the SA bank edge.
◯ 2	Minimally connected wetlands have almost no evidence of inundation of the SA surface (1% to <5%) and where active side channels exist they are only be near the channel banks. Most of the SA is dry, side channels away from the bank edge appear abandoned, rarely active, or do not exist.
◯ 1	Disconnected wetlands have no evidence of inundation across the SA surface (<1%) and no signs of flow in any side channels or side channels do not exist. ***Or*** evidence of inundation across Sa but SA has been artificially reduced in size by levees or development such that it is confined to a narrow fringe along the active channel.

1-2 year recent peak discharge return interval ☐

Rating	Description
◯ 4	Highly connected wetlands have minimal evidence of inundation of the SA surface (≥5%) and signs of flow in most side channels. Active side channels are not limited to the SA bank edge.
◯ 3	Moderately connected wetlands have no evidence of inundation of the SA surface (1% to <5%), Side channels do not appear abandoned even though signs of flow maybe lacking, they are not limited to the SA bank edge.
◯ 2	Minimally connected wetlands have no evidence of inundation of the SA surface (<1%) and where active side channels exist they are only found near the channel banks. Most of the SA is dry, side channels away from the bank edge appear abandoned, or do not exist.
◯ 1	Disconnected wetlands have no evidence of inundation across the a SA surface and no signs of flow in any side channels, ***Or*** evidence of inundation across SA but SA has been artificially reduced in size by levees or development such that it is confined to a narrow fringe along the active channel.

Rating Adjustment Comments (Use this box when additional flooding evidence recorded supports ratings adjustment.)

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

A2 - Physical Patch Complexity

Worksheet 12. Physical Patch Complexity checklist. Check off existing physical patch types for each segment; count the number of unique patch types and rate using **Table A2** in combination with the narrative description. Enter the rating on the SA Rank Summary Worksheet.

Upper Segment	Middle Segment	Lower Segment	Field Indicators (check all existing conditions)
☐	☐	☐	Active side channels
☐	☐	☐	Abandoned channels
☐	☐	☐	Backwater/eddy
☐	☐	☐	Riffles or rapids
☐	☐	☐	Shoals, sparely-vegetated bars
☐	☐	☐	Channel boulders
☐	☐	☐	Oxbow lakes/ponds on floodplains
☐	☐	☐	Vegetated island and side bars
☐	☐	☐	Terraces
☐	☐	☐	Channel pools
☐	☐	☐	Beaver ponds
☐	☐	☐	Swales, depressional features on floodplains
☐	☐	☐	Debris jams in channel
☐	☐	☐	Woody wrack piles on the floodplain
☐	☐	☐	Floodplain micro-topography (mounds, pits)
☐	☐	☐	Downed logs
☐	☐	☐	Natural levees
☐	☐	☐	Standing snags
☐	☐	☐	Variegated, convoluted, or crenulated foreshore
☐	☐	☐	Undercut banks in channels
			No. of unique Patch Types

calculate

Table A2. Ratings for Physical Patch Complexity

Rating	Description
◯ **4**	**High** degree of physical patch complexity across the floodplain. There are many floodplain micro-habitats present (mounds and pits, woody wrack piles, etc.); many fluvial geomorphic surfaces (swales, side channels; terraces, side bars, etc.), and there is high in-channel complexity (pools and riffles, large woody debris, undercut banks, etc.). As a guide, 12 or more unique indicators present and well distributed throughout the SA (most indicators are found on multiple segments).
◯ **3**	**Moderate** physical patch complexity scattered across the floodplain. There are several floodplain micro-habitats present; several fluvial geomorphic surfaces, and there is moderate in-channel complexity. As a guide, 9 - 11 indicators that are scattered throughout the SA (some on multiple segments).
◯ **2**	**Limited** physical patch complexity scattered across the floodplain. There are some floodplain micro-habitats present; some fluvial geomorphic surfaces, and there is limited in-channel complexity. As a guide, on average there are 6 - 8 unique indicators that are present in the SA (only a few on multiple segments).
◯ **1**	**Little** or no physical patch complexity on the floodplain. There are few or no floodplain micro-habitats present; few different fluvial geomorphic surfaces, and there is little or no in-channel complexity. As a guide, ≤ 5 unique indicators in the SA.

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

A5 - Soil Surface Condition

Worksheet 13. Soil Surface Condition. Check all that apply in the upper , middle and lower SA segments during the field reconnaissance. The absence of these indicators would signify that disturbances are naturally occurring (e.g., flood deposition or low-density wildlife trails). Estimate the percent soil disturbance by segment area and referring to the SA abiotic map. Rate using Table A5 and enter into the A5 box on the SA Rank Summary Worksheet.

Upper Segment	Middle Segment	Lower Segment	Field Indicators (Check all existing conditions)
☐	☐	☐	Active erosion features due to anthropogenic disturbance (eg. rills, gullies, plant pedestals).
☐	☐	☐	Multiple livestock and other (fishing,hiking) trails,
☐	☐	☐	Vehicle tracks including off-road and construction, etc.
☐	☐	☐	Impervious compacted surfaces or pavement
☐	☐	☐	Grading, plowing, historic leveling, mowing
☐	☐	☐	Fill
☐	☐	☐	Gravel pits
☐	☐	☐	Anthropogenic levees and berms
☐	☐	☐	Irrigation-driven salinity and mineral crusts
☐	☐	☐	Fire pits
☐	☐	☐	Other:
			Estimate % soil disturbance by segment area

Average of Estimates: _____

Table A5. Soil Surface Condition Rating Table

Rating	Description
○ 4	Bare soil areas due to anthropogenic disturbance absent or very limited. No human-caused impervious surfaces or gravel pits are found within the SA. Total disturbance, including erosion, impervious surfaces, fill, or other anthropogenic degradation to the solid surface is less than 1% of the sampling area.
○ 3	Some amount of bare soil from human causes is present but the extent is limited. Area of impervious surfaces are minimal in extent. Total disturbance, including erosion, impervious surfaces, fill, gravel, mining, or other anthropogenic degradation to the soil surface is between 1% and 5% of the sampling area.
○ 2	Bare soils from human causes are common. These may include dense livestock trails, off-road vehicle tracks,tracks, other mechanical rutting, or irrigation-driven salinity. Soil disturbance, while apparent, is limited to specific areas and not found across the majority of the SA. Total disturbance, including erosion, impervious surfaces, fill, gravel mining, or other anthropogenic degradation to the soil surface is between 5% and 10% of the sampling area.
○ 1	Bare soil areas degrade portions of the site because of altered hydrology or other long-lasting impacts. Deep ruts from off-road vehicles or machinery are present. Livestock disturbance or trails are widespread and several inches deep. Water is channeled into rills or ponded. Additional human-caused impervious surfaces or soil compaction are present. Total disturbance, including erosion, impervious surfaces, fill,gravel mining or other anthropogenic degradation to the soil surface, is greater than or equal to 10% of the sampling area.

Soil disturbance comments:

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

A6 - Channel Mobility

Worksheet 14. Channel Mobility. Enter % cover of stabilizing elements on SA Bank and opposite bank (Opp) looking 25m upstream and downstream from channel edge of each segment. If "Other" is chosen for stabilizing element, please specify. Total % cover per bank should not exceed 100% for each of the Stabilizing Elements - Exotic Woody Cover (%) and Artificial Stabilization Features (%) at Bank Edge. Average % bank cover for each segment, and then for the SA. Rate using Table A6 and enter rating on SA Summary Worksheet.

Stabilizing Element	Upper Segment		Middle Segment		Lower Segment	
Exotic Woody Cover (%)	SA Bank	Opp Bank	SA Bank	Opp Bank	SA Bank	Opp Bank
Russian olive						
Saltcedar						
Other						
Artificial Stabilization Features (%) at Bank Edge	SA Bank	Opp Bank	SA Bank	Opp Bank	SA Bank	Opp Bank
Jetty Jacks						
Constructed Levees						
Rip Rap/Concrete						
Other						
Total % Cover per Bank						
Average % Bank Cover per Segment						
Average % Bank Cover all Segments						

Table A6. Channel Mobility

Rating	Description
◯ **4**	<10% channel stabilized: most of the channel has the capacity to migrate under high flows
◯ **3**	≥10%-<25% channel stabillized.
◯ **2**	≥25%-<50% channel stabilized.
◯ **1**	≥50% channel stabilized. Little or no opportunty for channel migration. The channel is artificially hardened, covered by dense exotic woody cover, or covered in concrete on the SA side and opposite banks.

Abiotic Metrics Comments:

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

Worksheet 15. Stressor Checklist. Check off stressors by intensity category that may be affecting wetland ecological condition of the SA and WOI. Assign categories using direct evidence where available or your best professional judgement otherwise. If the presence of the stressor is uncertain, mark as "Unknown". Rank Major Stressors in Dominant Stressor column(Pick up to 3)

Rank	Affect				Stressor Group/Stressor	Comments
	Major	Minor	Absent	Unknown		
					Adverse water management	
	☐	☐	☐	☐	Extended low flow dam releases	
	☐	☐	☐	☐	Timing of flow releases not concordant	
	☐	☐	☐	☐	Extended high flow dam releases	
	☐	☐	☐	☐	Agriculture/Urban flow diversion upstream	
					Adverse sediment management	
	☐	☐	☐	☐	Adverse sediment retention by dams	
	☐	☐	☐	☐	Sediment loss by dredging	
	☐	☐	☐	☐	Adverse sediment input (roads/development)	
					Artificial water additions	
	☐	☐	☐	☐	Sewer treatment effluent	
	☐	☐	☐	☐	Point source urban runoff	
	☐	☐	☐	☐	Factory, feedlot outfall	
	☐	☐	☐	☐	Agricultural irrigation ditch returns	
	☐	☐	☐	☐	Mining waste	
					Ground water pumping	
	☐	☐	☐	☐	Urban depletions	
	☐	☐	☐	☐	Fracking	
	☐	☐	☐	☐	Agriculture irrigation wells	
					Watershed alteration	
	☐	☐	☐	☐	Extensive recent fires in watershed	
	☐	☐	☐	☐	Extensive recent timber harvest	
	☐	☐	☐	☐	Extensive open pit mining in watershed	
	☐	☐	☐	☐	Livestock/wildlife overgrazing	
					Local biodiversity impacts	
	☐	☐	☐	☐	Evidence of excessive grazing (local)	
	☐	☐	☐	☐	Excessive noise affecting wildlife	
	0	0		0	Counts by Intensity	

Additional Comments

SA CODE : **Date :**

SA Name : **Surveyor Initials :**

Photo Point Log

Worksheet 16. Photo point Log. Photo points are highly recommended to document 1) general condition of the SA, 2) dominant plant communities, and 3) stream condition. (See metric descriptions for when photo documentation is required.) The photograph number, direction (AZM=azimuth compass direction of photo), photo point coordinates (GPS UTM northing and easting location), and latitude and longitude should be recorded, along with a general description and segment on which the photo was taken and the initials of the photographer.

Photo PT File	AZM	Easting	Northing	Latitude	Longitude	Description	Initial