

Project Planning Tools to Improve Data Quality

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Quality Assurance (QA) and Quality Control (QC) for Ecological Restoration Projects

QA/QC planning in ecological restoration can help to:

- Improve data quality
- Save time and money from potential rework
- Meet the data quality needs of the project



Gary Peeples, USFW

Improper QA/QC planning can lead to:

- Data quality issues
- Increased chance of incorrectly determining project success



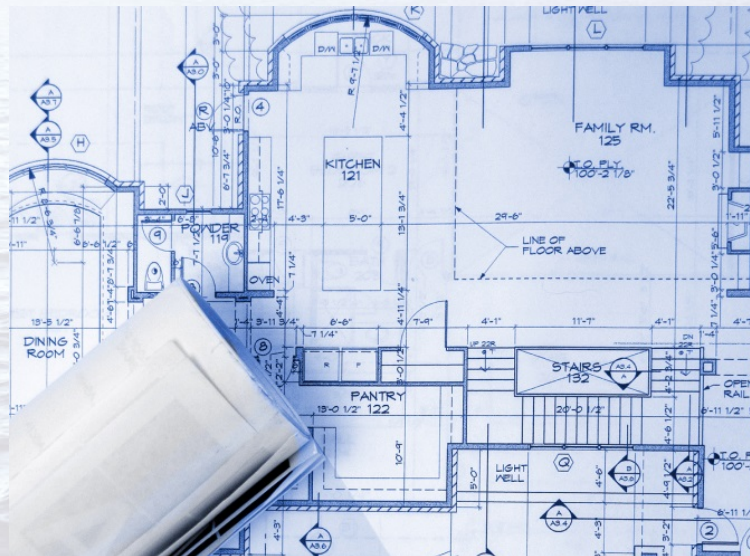
Nancy Aten

Consider these potential issues:

- Improperly trained field crews
- Faulty equipment
- Incorrect sampling methods



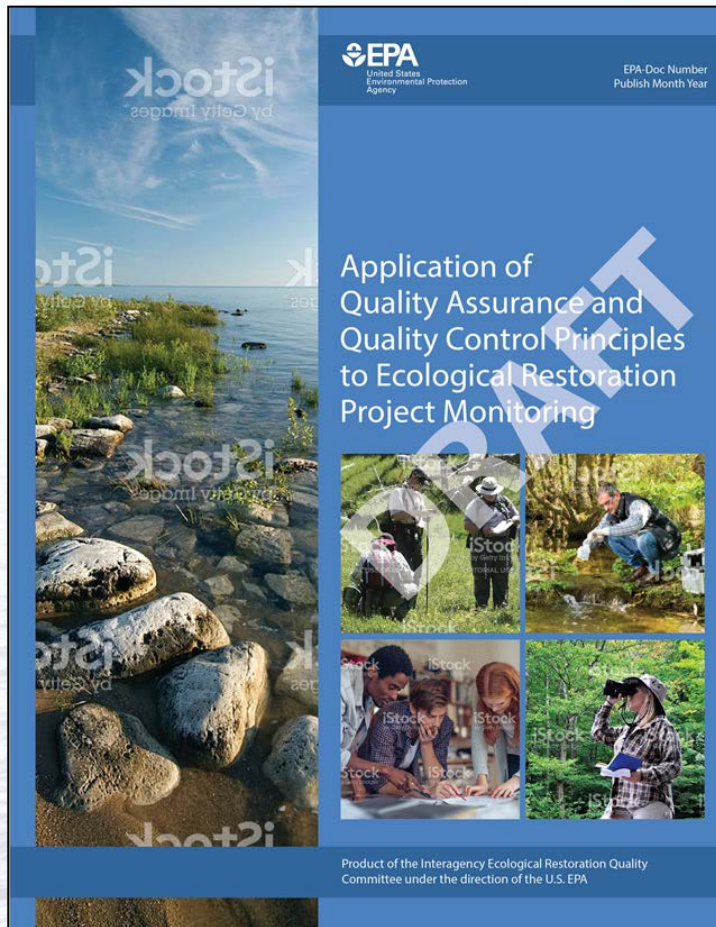
Project-level document that details QA/QC components to provide reliable, scientifically sound data that are transparent and reproducible



EPA QAPP Requirements: [EPA QA/R-5](#)

- Group A: Project Management
- Group B: Data Generation and Acquisition
- Group C: Assessment and Oversight
- Group D: Data Validation and Usability

“Application of Quality Assurance and Quality Control Principles to Ecological Restoration Projects”



This guidance document addresses how to minimize the uncertainty associated with data collection for ecological restoration projects

EPA QA/R-5 was not specifically written for ecological restoration projects

- Focused on projects collecting field samples and laboratory analyses

The Guidance

- Focus on observational data collection
- Not specifically based on EPA QA requirements

How do we bridge this gap?

Appendices in the Guidance Document

A

Data Management Best Practices

B

Assessment of Data Quality
Indicators

C

Quality Assurance Project Plan
Template for Ecological Restoration
Projects

D

Quality Assurance Project Plan
Review Checklist for Ecological
Restoration Projects



Template



- Bridge the gap between the Guidance and EPA QA requirements
- Features to assist QA Plan authors
- Focus on hard-to-address QA topics



A.3 DISTRIBUTION LIST

List the individuals and their associated organizations and titles that need copies of the approved QAPP and any subsequent revisions, including all persons responsible for implementation (e.g., project managers), QA managers, and representatives of all groups involved. This includes EPA roles.

IERQC GUIDANCE REFERENCES

Topic	IERQC Guidance
Distribution list	<i>This topic is not addressed in the IERQC Guidance</i>

A.4 PROJECT/TASK ORGANIZATION

Identify the individuals or organizations participating in the project and discuss their specific roles and responsibilities. Include the principal data users, the decision makers, the project QA manager, and all persons responsible for implementation. The Project QA manager position must indicate independence from the unit collecting and/or using the data. If this independence is not feasible, an explanation must be provided. Please refer to **Chapter 1, Exhibit 1-3** of the IERQC Guidance for a list of potential QA roles and responsibilities. (See [Table C1](#) of this template for an example table to present this information.)

Provide a concise organizational chart showing the relationships and the lines of communication among all project participants, including EPA. The organization chart must also identify any subcontractor relationships relevant to environmental data operations, including laboratories providing analytical services. (See [Figure 3 of EPA QA/G-5](#) and **Chapter 1, Exhibit 1-2** of the IERQC Guidance for an example organizational chart.)

IERQC GUIDANCE REFERENCES

Topic	IERQC Guidance
Identifying key individuals	Section 1.6
Organizational chart	Exhibit 1-2
Independent Project QA Manager	Exhibits 1-2 and 1-3

A.5 PROBLEM DEFINITION/BACKGROUND

Describe: (1) the specific problem to be resolved, including sufficient background information that provides the historical, scientific and regulatory perspective for this particular project; and (2) the overall restoration project goal(s). More specific information, including suggested content, is provided below.

- Provide historical and background information, including the:
 - project location, boundaries, and ownership;
 - targets of restoration (e.g., ecosystems, natural communities, rare or protected species);
 - threats, need for restoration, and desired state and anticipated benefits from a successful project;
 - current condition of the site;
 - social, political, and physical context of the project; and
 - expectations from funding sources, stakeholders, and project staff.
- Include the overall restoration project goal(s), including the:

TABLE C8. ANALYTICAL QC
(ONLY APPLICABLE TO PROJECTS INVOLVED IN THE ANALYSIS OF FIELD SAMPLES)

Matrix:						
Analytical Parameter:						
Laboratory QC	Frequency/ Number	Method/ SOP QC Acceptance Limit	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator	Measurement Quality Objectives
Method Blank						
Reagent Blank						
Storage Blank						
Instrument Blank						
Lab Duplicate						
Lab Matrix Spike						
Matrix Spike Duplicate						
Lab Control Sample						
Surrogates						
Internal Standards						

TABLE C9. REPORTS

Type of Report	Frequency (e.g., daily, weekly, monthly, quarterly, annually)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation	Report Recipients

IERQC GUIDANCE REFERENCES

Topic	IERQC Guidance
Restoration project objectives	Section 3.2
Required regulatory permits	Section 4.3
Map(s) of project area	Section 4.3; Exhibit 4-2
Work schedule	Sections 3.2 and 4.3; Exhibit 4-6

Linking Terminology

Term in EPA QA/R-5	Equivalent Term in the IERQC Guidance
Overarching goal(s)	Restoration project goal(s)
Project objectives	Restoration project objectives
Data quality objectives	Sampling objectives
Data quality indicators	Data quality indicators
Measurement quality objectives	Data quality acceptance criteria (e.g., tolerance plus compliance rate) objective

Content Organization

Variable	Variable Type*	Unit of Measure	Expected Range of Values

*Primary or Ancillary

Content Organization

Variable	Variable Type*	Unit of Measure	Expected Range of Values
Cover Class	Primary	%	0-100 in %5 increments
GPS Coordinates	Primary	Decimal Degrees	Lat: 36.97030 to 49.38450 Lon: -71.85620 to -97.23920
Plant Species	Primary	Genus, Species	N/A
Cloud Cover	Ancillary	Class	1=0%, 2=1-25%, 3=26-50%, 4=51-75%, 5=76-100%
Air Temperature	Ancillary	Degrees Celsius	0-35

*Primary or Ancillary

Considerations for developing overall restoration project goals:

- Subject or resource of concern
- Attribute of interest for that subject or resource
- Conceptual target or condition for that attribute
- Action(s) or effort(s) to be made relative to target

Example: Restore native plant species cover to improve floristic quality on a 15-acre wet prairie degraded by invasive reed canarygrass.

Extended Discussion/Examples

Based on your overall restoration project goal, define restoration project objectives that are:

- **Specific**
- **Measurable**
- **Achievable**
- **Results-oriented**
- **Time-sensitive**

Example: Reduce total cover of reed canarygrass to less than 10% across the 15-acre wet prairie after four years.

Consider the Following

Helpful Tip

A debriefing at the end of a field season or data collection effort is recommended to obtain valuable feedback from the field personnel's point of view. See Chapter 5, [Section 5.3.2](#) of the IERQC Guidance for more details.

Helpful Tip

In addition to establishing compliance with data quality acceptance criteria, QC checks are a means to assess (1) adherence with SOPs, (2) measurement error arising from variability in the sample collection efforts, and (3) calibration of observers and equipment.

Helpful Tip

In addition to a table with coordinates for proposed and alternate sampling locations, consider including a map displaying this information.

Helpful Tip

Observer-determined data can be subjective and variable by their nature. Training is particularly important for these data since they do not rely on a calibrated piece of equipment.



Checklist



Checklist Design

- Six-page outline of QA elements
- Facilitate review of a QA Plan
- Final check for project managers

Using the Checklist

QAPP Review Checklist for Ecological Restoration Projects	
QAPP Title	_____
Grant/Contract/Project #	_____
Date of Review	_____
Key: IA=Included and acceptable; IU=Included and unacceptable; NI=Not included; NA=Not applicable	

Key: IA=Included and acceptable; IU=Included and unacceptable; NI=Not included; NA=Not applicable

Topic	IA	IU	NI	NA	Comments
A8. Special Training Requirements/Certifications					
Identifies special licenses, training, crew competency requirements, and/or certification (e.g., herbicide application, prescribed burn, taxonomic classification, GPS use) prior to data/sample collection		X			<i>Please include description of training for GPS use.</i>
Discusses how training records will be documented and where records will be kept	X				

B2. Field Data Collection and Sampling Method Requirements					
Lists the data collection methods for each field measurement and/or sample (e.g., field crew observations and/or measurements, data from field instruments, GPS, photographs, sound recordings)					
Lists field sample collection equipment and on-site supply lists; including, labeling, sample preservation, maximum holding times, etc.					

Next Steps

- Conduct final EPA review
- Publish and distribute to the restoration community

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