

ON-SITE GRAZING LAND STUDY NRI QUALITY ASSURANCE & QUALITY CONTROL PLAN WITH IMPLEMENTATION GUIDE V. 2023

Introduction

The National Resources Inventory (NRI) program collects and produces scientifically credible information on the status, condition, and trends of land, soil, water, and related resources on the Nation's Non-Federal lands in support of efforts to protect, restore, and enhance the lands and waters of the United States. It was initially mandated by the Rural Development Act of 1972 (P.L. 92-419) to conduct a "land inventory reflecting soil, water, and related resource conditions." It requires assessments of resource quantity and quality, as well as change and trends, allowing for regular resource appraisals on the effectiveness of soil and water conservation practices, irrigation techniques, and farming technologies, techniques, and practices. The NRI is conducted by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), in cooperation with Iowa State University's Center for Survey Statistics and Methodology (CSSM).

States have responsibility for coordinating the NRI Grazing Land On-Site survey process including workload planning, data collection, and review of the quality and completeness of collected data. State Resource Inventory Coordinators (SRIC) and/or designated state grazing land specialists are involved in all parts of the process. The sections below describe Quality Assurance and Quality Control in coordination of the survey process, as well as the NRI Grazing Land applications and tools available to support these activities.

The NRI Grazing Land website (<https://grazingland.cssm.iastate.edu/>) contains survey information, instructions, links to software applications, and several other documents. The NRI Grazing Land Help Desk (nri-graze-help@iastate.edu) is available to ask questions and receive further assistance.

Quality Assurance and Quality Control

The Purpose of Quality Assurance & Quality Control is to increase the repeatability, defensibility, and usability of data. Preventing errors whenever possible. Identifying errors that do occur. Fixing the error with the correct value if possible. Describe remaining errors that cannot be fixed and consider if they are excluded from analyses. Both processes are actions that are concurrent with each step of the NRI survey process.

Quality assurance is a proactive process to prevent errors from occurring and includes the careful design of the monitoring programs; training and calibration of data collectors and sensors; structured data collection; and active data management.

Quality control is a reactive process where errors are identified and corrected if possible and includes outlier checks, logical data checks, expert review of data, missing data checks, and other metrics of a dataset that occur sometimes iteratively throughout the data life cycle.

Quality assurance is an integral part of the NRI process. Quality is the first responsibility of each state resource inventory coordinator, state grassland/range management specialist, and data gatherer. SRICs must develop and implement a plan for on-site data collection to track progress, implement quality assurance, and provide support to data gatherers.

All personnel involved with the NRI Grazing Land On-Site Data Collection are responsible for promoting scientific integrity and ensuring the quality of grazing land on-site data. All data gatherers must thoroughly and consistently follow protocols established for data collection. These protocols are established and described in the NRI Handbook of Instructions for Grazing Land On-Site Data Collection (<https://grazingland.cssm.iastate.edu/site-data-collection-handbook-instructions>).

Key components of the quality control and assurance process include:

- Workload planning

- Training and Calibration
- Using the Computer Assisted Survey Instrument (CASI) data gathering software
- Ensuring that all data gatherers have data collection instructions and know how to get assistance when needed with interpretation of instructions
- Maintaining an open communication network between leaders and data gatherers and the NRI support structure including the NRI Help Desk
- Spot checking data gatherers' work throughout data collection time periods
- Reviewing collected data

The goal is to catch and correct misunderstandings and errors early.

Workload Planning and Preparation

Survey sample segments are selected for each survey year. Sample segment files are distributed to the States to use for workload planning and preparations. These activities include screening sample sites for data collection eligibility, obtaining landowner permissions to collect data on their land, identifying data collectors to conduct data collection. States that use contractors for data collection need to work with Contracting Officers to set up contracts very early in the process. In addition, States must ensure that data collectors are trained each year.

Sample Sites, Files, and Confidentiality

Each survey year, BLM and NRI Grazing Land On-Site sample segments and points are made available to States and those given the current year's GrazingDataManagement role on the Grazing Land website: <https://www.nrisurvey.org/securefiles/statefiles.jsp>. Those in that role may download State sample files (<https://grazingland.cssm.iastate.edu/sample-and-ancillary-data-files>). The site provides three sets of files for each of the two types of on-site samples (NRI and BLM) that are applicable to your State:

- The counties files contain numbers of sample segments by county.
- The segments file contains lists of sample segments.
- The ancillary data file contains point-level information for the sample segments.

The NRI Grazing Land website also provides sample site spatial data (<https://grazingland.cssm.iastate.edu/sample-and-ancillary-data-files>), and segment and point site maps with soils information (<https://grazingland.cssm.iastate.edu/segment-and-point-site-maps-soils>) to those with a current year's GrazingDataManagement role. Navigation maps (<https://www.nrisurvey.org/grazinglandMaps/>) are also available.

Sample locations for the surveys and data collected at those sites must be kept confidential to maintain statistical validity, integrity, and credibility of the data and estimates. The Director, Resource Inventory & Assessment Division (RIAD), NRCS, has established a Confidentiality Agreement framework to meet NRCS policy. This agreement is to be signed and adhere to by all individuals requiring access to or use of the NRI program sensitive information. The SRIC will maintain the signed/witnessed agreements. The Confidentiality Agreement form is available at: <https://grazingland.cssm.iastate.edu/confidentiality-agreement>.

Screening Sample sites- Land Cover/Use; Ownership; Landowner Permissions

The NRI Grazing Land On-Site sample is selected by segment (PSU) from the primary list of NRI segments that historically have had at least one eligible point. To be eligible, a point must be non-Federal and have a land

cover/use of rangeland or pastureland, or in some cases, hayland. Segments generally have three points, but not all points may be eligible for data collection. Points falling on rangeland will have data collected using the rangeland protocols and points falling on pastureland will have data collected using the pasture/grassland protocols. On-site data are collected for at most two eligible points per segment.

SRICs and/or their designate will use the files described in the previous section to determine points that are likely to be eligible for data collection based on land cover/use and non-Federal ownership. Note that imagery for maps may not show changes in land cover/use that occurred after the imagery was obtained and field determinations will be needed for verification.

For those points that will possibly be eligible for data collection, spatial data, field office records, and/or State or County records must be used to determine the landowner to obtain permission to access their land to collect data. Some States have provided helpful hints for obtaining landowner permissions; these are available at: <https://grazingland.cssm.iastate.edu/ideas-landowner-permission>. In addition, a landowner brochure (<https://grazingland.cssm.iastate.edu/landowner-brochure>) has been developed to provide landowners with information about the NRI Grazing Land On-Site survey.

The BLM sample is statistically selected from segments created to be similar to the NRI. Each segment generally has three points, but not all may be eligible for data collection. To be eligible for on-site data collection as part of the BLM sample, a point must be located on BLM-managed land and have a land cover/use of rangeland. No pastureland data are collected on BLM-managed land. On-site data are collected for at most two eligible points per segment.

The BLM is responsible for determining, to the extent possible, eligibility of points from their sample based on land cover/use and ownership. SRICs will work with their BLM counterparts to obtain permissions to cross private lands to collect data on BLM-managed lands. The BLM is also responsible for obtaining clearances for archeologically or biologically sensitive sites.

Data Collectors, Contracting

Every grazing lands onsite data collection must be conducted by an authorized technical leader, accompanied by one or more crew members. Each of the collectors must be authorized annually before collecting data. Authorization is based on the combination of training and experience.

Crew Members —A crew member for a grazing lands onsite collection must attend one of the following the same year as the collection:

- Grazing lands onsite training conducted by the Employee Development Service (EDS)
- Grazing lands onsite training conducted locally by a national grazing lands trainer
- Grazing lands onsite training conducted by an authorized technical leader

Technical Leader —The technical leader for any grazing lands onsite collection must have been previously qualified as a crew member and acted as a crew member for data collections at five or more points led by an authorized technical leader. The current year training may be waived if the technical leader has demonstrated proficiency as a technical leader the previous year and acted as technical leader for data collections at five or more macroplot point locations.

Contractors may be authorized as Technical Leader and Crew Members. Either authorization requires a contractor to attend annual training as part of the contract.

DATA COLLECTOR TRAINING AND CALIBRATION

Two levels of data collector are established. Technical Leader and Crew Member.

Technical Leader has highest level of authorization. Must be proficient in all grazing land protocols. Each field crew must have at least one member authorized as a technical leader.

Crew Member has lower authorization. May not be proficient in all grazing land protocols. Some crew members may be hired to only do certain protocols. In this case, that crew member would calibrate and show proficiency on those certain protocols. SRIC needs to maintain and make available an annual list for each data collector's level of authorization and training. On-site data collector's names need to be entered in CASI as part of the point data for that site.

Webinars

Primary, supplemental, and Employee Development Services (EDS)

On-Site Training

CASI, Equipment, Protocols,

Data collector training assures being proficient in protocols BEFORE data is collected. Data collectors are to be the best they can be at the beginning and consistent throughout the collection time periods. Formal training of all protocols and assessments requires 3 full days in the field. Includes time for the standardized written test. Technical Trainers will observe collectors with performance-based testing throughout the three days.

Plant Identification is essential QAQC. Establish realistic expectation of the ability of personnel to positively identify all plants regardless of phenological season or intensity of use on the point location. Data collectors make an honest call on not identified versus unidentifiable. To prevent errors, it may be best to label an unidentified plant species with an unknown plant functional group code rather than a selection of an approximate Genus Code. The use of Genus Code is problematic since a Genus may contain species in multiple Duration or Growth Habits and Functional Groups. When every effort to identify the unknown plant fails, use unknown plant functional group codes and note the field characteristics plus Genus code or a common name in the notes.

Photos sent to plant identification specialists are encouraged. BLM botanists in the area are a good source of knowledge. Details needed for identification purposes are difficult with field snapshots. The unknown plants and parts should be collected and photographed in vehicles or rooms. Include a ruler for scale in photos. Record the point, transect, and mark(s) the unknown species occurred. Also record the Plant Census tally category. NRI has regional and state plant field guide recommendations under references on the web site <https://grazingland.cssm.iastate.edu/reference-materials>.

Calibration

Calibration ensures that data gatherers are performing the grazing land on-site data collection protocols in a way that results in consistent and precise data. In the calibration exercises for the grazing land on-site protocols, two or more people will collect data on the same transect or transects. Summaries from the CASI are used to compare the data collected by everyone. If the summaries are not within specified units of one another, the calibration exercise should be repeated until the summaries of data collected by the data gatherers fall within the specified tolerance. Calibration spreadsheet is available.

The calibration tape(s) shall be firmly secured with multiple anchors to avoid movement which may alter the course.

Calibration should be conducted:

- Following training to ensure that data gatherers can consistently and accurately apply the protocols.
- When the data gatherers begin collecting data on a significantly different ecological site.

- Periodically during the field season (e.g., every two weeks).

Protocols the NRI calibrates on are Soil Site Stability – within one stability category; Line Point Intercept - within 5% (absolute, not relative) cover of one another; Canopy Gaps and Perennial Canopy Gaps (a continuous line transect) - within 5% (absolute, not relative) of one another for percent of transect in gaps of the four sizes; Plant Height – within 2.5 inches for category 1: (0 – 2' interval), 5 inches for category 2: (2' 1" to 5.0' interval), 5 feet for category 3: (5' 1" to 15.0' interval), 15 feet for category 4: (> 15' 1" interval).

Species Composition by Weight – within 10% per species. Reconstruction factors should match. Required if double-sampling protocol is used on non-Federal locations. Select the proper herbaceous quadrat frame size in parameters. The Standing Biomass protocol on pastureland cover is not calibrated but technical trainers should ensure that an observer-based performance test is completed for QAQC.

Soil Site Stability – within 1 average soil stability class of each other for overall average for 9 samples, average for samples with vegetative canopy, average for samples without vegetative canopy. Requires a consistent size of ped. Most important quality concern is judging the ped's reaction during water dipping. The technical trainer will do the dipping while the data collectors observe and rate the ped category from 1-6. Because of limited space, only 4 data collectors can gather above the cases to observe the dipping process.

Multiple transect lines should be set up for LPI calibrations. Limit the number to 3 pairs of data collector canopy disturbing events per transect line. Technical trainers observe crew members dropping the wire flag, alignment, and other details of technique during performance test.

Training Records

SRIC will maintain and make available accurate and annual records of employees and contractors trained, days and protocols.

Workload Monitoring In-Field Review

Tools and reports will be available as segments are completed and status categories of other segments. The SRIC will be in contact with data collectors to ensure data collection is progressing according to plans. The SRIC or designate will also conduct calibration of the field crews and spot checks (in-field reviews) as part of quality assurance. At least 5% of segments completed by each field crew will be reviewed in the field. If fewer than 15 segments are completed by a field crew, the field supervisor will perform an in-field review of at least one of those segments. The SRIC will communicate any issues with data collection progress to Erik Suffridge (esuff@iastate.edu), National NRI Grazing Land Leader.

Ideally the field crew should be present for the observer-based performance part of the in-field review. If the crew is not present, then be sure to visit the site within a few days of data collection. Collected data is compared within the PSU (similar weather, etc.) In-field Review Check List is available on the web site.

Post-collection data review

The SRIC, the data collector technical leader, and the crew member data collector are involved at all the levels of QA and QC. It is essential to review all data with multiple trained eyes during the data collection and review process.

The data collector assures the quality and accuracy of the data input. CASI is programed to present error warnings for completeness of data collections. The technical leader reviews crew data. The post collection reviewer, usually the SRIC, observes with a new set of eyes, any inconsistencies. This results in 3 sets of eyes looking at the data before submitting as complete.

Identify anomalies/data entry errors. Field experience is helpful to spot anomalies. SRIC open each point and hit the import button on Plant Census. With this complete set of plant symbols, compare it to the PLANTS

database list for your State’s plant list. Assure that woody plant symbols are in the right columns in plant height and woody button marked on production protocols.

To better compare ecological consistency, use Ecological Site Development tables with multi-year data for each Ecological Site identified in the point data collection. Compare the multi-year ranges to the present year’s data under review.

SRIC should seek data management training which will give confidence in their data management during the review.

The CSSM does one final but separate data check before entering the database.

Grazing Land Review Tables

Review tables are constructed from collected data and organized by themes of related data. The tables are updated when segments are uploaded to the server. The tables display data from multiple points and allow the reviewer to identify anomalies. Any edits must be done using the web CASI or CASI on the handheld unit. A guidance document provides directions for using these tables. Table 1 below lists protocols by sample type. (https://www.nrisurvey.org/nrcs/range/data_review/Table%20review%20guidance_17.pdf).

Photos

Grazingland Images -Data collectors take a minimum of nine photos at each field site. Review photos for completeness as soon as possible.

Table 1. Review tables and associated NRI grazing land protocol by sample type			
Rangeland	BLM	Pastureland	Protocol
1	NA	NA	Production
2	NA	NA	Production
3	NA	NA	Production
4	NA	NA	Production
5	NA	NA	Production
NA	NA	23	Standing Biomass
NA	NA	24	Standing Biomass
NA	NA	25	Standing Biomass
6	6	26	Plant Height
7	7	NA	Sagebrush Shape
8	8	28	Landscape/Soil/ESD/FSD
9	9	29	ESD/FSD
10	10	30	Location/Land Cover/Ownership
11	11	31	Location/Land Cover/Ownership
12	12	32	All Protocols
14	14	34	Point Intercept
15	15	35	Point Intercept
16a	16a	36a	Plant Census
16b	16b	36b	Plant Census
17a	17a	NA	Range Health
17b	17b	NA	Describing Indicators of Range Health

Grazing Land Review Complete

The final step in the data collection process is to mark each sample segment and points as reviewed and complete. Use the following Segment Status Code Definition:

NS - Not Started

IP - In Progress

UC - Incomplete

CO - Complete

RC - Reviewed and Complete