National Park Service
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Monitoring Breeding Landbirds in National Parks of the Gulf Coast Network

Data Quality Standards

Natural Resource Report NPS/GULN/NRR—2018/1767

ON THE COVER
Photograph of NPS biologist sampling breeding birds. NPS Photo.

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Abstract

As part of the nationwide Inventory and Monitoring Program of the National Park Service, the Gulf Coast Network monitors breeding landbirds in six National Park Service units in the Gulf Coast region. The network's monitoring objectives are to document species richness and composition during annual visits to the parks and assess long-term trends in the relative abundance or density for the most commonly detected species. Monitoring these birds not only provides crucial information on the birds themselves, but can also be indicative of habitat changes. These data will also contribute to regional or national databases that further our understanding of continental bird population trends.

This document presents the data quality standards (DQS) used by the Gulf Coast Network for their breeding landbird monitoring project, as described in their protocol titled *Monitoring Breeding Landbirds in Gulf Coast Network Parks: Protocol Narrative* (Segura et al. 2018), and the seven associated standard operating procedures (SOPs). This DQS report and the associated quality assurance plan (QAP; forthcoming) serve as formal documentation of the standards of accuracy required by the Gulf Coast Network throughout the different stages of data collection, data processing, data storage, data analysis, and publication. By following and documenting high standards of quality, the Gulf Coast Network ensures that useful data sets are created and that future users can analyze and report on them correctly.

Introduction

The purpose of this report is to document the data quality standards used in the *Monitoring Breeding Landbirds in National Parks of the Gulf Coast Network: Protocol Narrative* (Segura et al. 2018). This report and the associated quality assurance plan (QAP; forthcoming) are meant to serve as a single source, independent of the protocol, for understanding how data are collected, processed, reviewed, subjected to quality control, stored and presented—and to what standards of accuracy—so that any associated data sets can be analyzed and reported on correctly. The plan also serves as a programmatic guide and resource for identifying publications and other literature that describe associated techniques and requirements in more detail. Additional information on the overall purpose of this document and the QAP are provided in the National Inventory & Monitoring Division Quality Management Plan (in development).

Protocol Overview

The Gulf Coast Network monitors landbirds across 179 permanent point count locations that are each sampled twice per year during the breeding season of most target species (May and June). Sampling takes place in six of the eight network parks: San Antonio Missions National Historical Park, Vicksburg Battlefield National Military Park, Palo Alto Battlefield National Historical Park, Jean Lafitte National Historical Park and Preserve, Gulf Islands National Seashore (Davis Bayou and Naval Live Oaks only), and Big Thicket National Preserve. Each park has between 21 and 33 point-count locations that represent a random selection from within the whole-park polygon (for the first three listed parks) or focal sections within the park (for the last four listed parks).

The point-count locations are surveyed using a modified version of the variable circular plot approach. An observer navigates to the point count location using GPS, and over a 10-minute period, records the number of individuals seen or heard of each bird species. The observer also records the horizontal distance of each bird from the observer's location and the minute the bird was first observed. Distances are recorded in bands of 0–25 meters (0-82 feet [ft]), 25–50 meters (82–164 ft), 50–100 meters (164–328 ft) and greater than 100 meters (328 ft). Once a bird is detected and recorded, it is removed from further consideration, avoiding any individual bird from being counted twice. The network's monitoring approach was selected to match that of other Inventory and Monitoring networks as well as the U.S. Fish and Wildlife Service, which allows for broader-scale comparisons.

Site Selection and Establishment

Bird-survey points were selected as random locations using random point generator tools in ArcGIS and the Geospatial Modelling Environment (GME) software. During point selection, a 25–50 meter (82–164 ft) buffer was required around the unit boundaries, and a 200–250 meter (656–820 ft) buffer was required between each pair of points. The smaller distances were used only as necessary, to ensure that all points would fit.

Upon the first visit to a proposed site, each point location was assessed for safety, access and suitability for long-term monitoring. If unsuitable, the point could be moved to the closest suitable location within 50 meters (164 ft). If no such location was found, that set of coordinates was rejected,

and the field personnel moved to the next set of coordinates on the list. Once a point was selected, the station location was recorded with a GPS that has sub-meter accuracy with no tree canopy (e.g., Trimble Geo 7x; USDA Forest Service 2017). Permanent markers are applied in all cases where the park allows it. The post-processed locations were validated in ArcGIS and then used by all subsequent field crew members to navigate to the sampling sites.

At the writing of this DQS, all sites have been established and fully documented, and there are no plans to add more data collection points. For these reasons, the site selection and establishment activities described here are not included in the protocol activity matrix below.

Protocol Activities

All data sets for the network's landbird monitoring protocol are collected or derived through six discrete activities (Table 1). These activities are listed in and described in greater detail in the protocol narrative (Segura et al. 2018).

Table 1. Protocol activities (aka Protocol activity matrix) for *Monitoring Breeding Landbirds in National Parks of the Gulf Coast Network: Protocol Narrative* (Segura et al. 2018).

Activity Category	Activity number	Activity detail	Description
Field Observations	1	General sampling event documentation	Date, time, and environmental conditions (sky cover class, windiness class and air temperature) and noise level taken at each point count event.
	2	Bird point counts	During each 10 minute point count, the following information is recorded for each individual bird detection: (1) species identity; (2) the two-dimensional distance band of first detection (0-25m, 25-50 m, 50-100 m, >100 m, or flyover from the point count station); (3) the time that the bird is first detected, in 1-min intervals. Repeat detections of the same individual bird within a point count period are not recorded. Detailed instructions are in SOP BIRD03 (Granger and Carlson 2018b).
Derived data	3	Composition of native and non-native landbird communities	Composition measures include both a species list and a total count of all species seen at least once during a point count event. Separate lists and counts are produced for native species and non-native species. The average number of species per event is calculated for each park each year.
	4	Relative abundance and density for commonly detected species, or occupancy for all species	Relative abundance is the number of individuals of a species seen in a park for a given year, divided by the number of point count events in that park. Density is the estimated number of individuals per hectare, and accounts for species-specific detection probabilities. Occupancy is the number of point count events when a given species was detected, divided by the total number of point count events in that park. Details are in the Data analysis and reporting SOP BIRD06 (Carlson and Segura 2018)
	5	Vegetation class, height, density or condition from vegetation community maps and GULN vegetation monitoring	These variables are derived using data collected for the GULN vegetation monitoring protocol (Carlson et al. 2018), which occurs once every three years in each park. These data are relevant to the 100+ bird points that are co-located with vegetation plots (10 meter offset). Vegetation data may be used as covariates in analyses or for subsetting the data prior to analyses.
QA/QC data	6	Quality control visit	Over a three year period, the Gulf Coast Network conducts a quality control visit to each park, with two or three parks visited each year. This visit consists of a qualified GULN staff person or contracted expert joining the observer for a full day of field work and simultaneously recording their own point count data at each point that is visited. These double-observer samples are used to determine precision of bird distance estimates and bird identifications. See SOP BIRD05 for more information (Granger and Carlson 2018c).

Sampling Design

Information regarding the sampling design is provided in Table 2.

Table 2. Sampling design and revisit design for each activity described in Table 1.

Activity Category	Activity number	Activity Detail	Sampling Design	Revisit Design
Field Observations	1	General sampling event documentation	Probability: At 21–33 randomly selected points per park, environmental characteristics are recorded for each point count event.	Environmental data are recorded at each of the permanent sampling point locations, which are sampled twice per season, 2–10 days apart.
	2	Bird point counts	Probability: At 21–33 randomly selected points per park, birds are counted during a 10-minute period. Only birds that are identified to species will be used in data analysis.	All points are sampled twice each year, with the second visit within 2–10 days of the first. All data collection occurs between 30 minutes before sunrise to 4 hours after sunrise, with park visits taking place during the breeding season of most park landbirds (May–June).

Data Quality Objectives

Data quality values and standards for implementation are provided in Table 3 through Table 6.

Table 3. Data Quality Values (DQVs) for *Monitoring Breeding Landbirds in National Parks of the Gulf Coast Network: Protocol Narrative* (Segura et al. 2018)

Value	Definition	Protocol Considerations
Representativeness	Measurements represent conditions at the time of sampling. Combined with accuracy, leads to repeatable data collection.	The 21–33 points per park represent a random subsample of potential bird habitats within each park or each targeted park unit. Landbird individuals that are recorded are representative of the population of breeding species on the park or unit that are detectable in those habitats using point count methodologies. It is assumed that each member of the same species has a particular probability of being found during a given event, and that the probability of detection declines as the individual's distance from the observer increases. Using the survey techniques described SOP BIRD03 (Granger and Carlson 2018b), the network can estimate a detection probability for each commonly recorded species (at least 40 observations per park for at least three years required). An alternative analytical approach is occupancy analysis, which can be performed on both the common and less-common bird species and requires at least two visits per point count location per season. The steps in performing these estimates are described in the Data Analysis and Reporting SOP (Carlson and Segura 2018).
Comparability	The degree to which data can be compared among sample locations, data sources, or periods of time.	For each park visit, the same point-locations are sampled twice in a 10-day period and the same techniques are used within seasons and across years. These techniques are described in depth in the SOP BIRD03 (Granger and Carlson 2018b), as well as Twedt (2012) and Hamel et al. (1996). Among parks, the same sampling techniques are used, but observers are typically different. It is assumed that for any one of the GULN observers, there is high consistency in an individual's ability to detect and identify birds over time and among sites, controlling for noise and other environmental covariates. Furthermore, the network only contracts highly experienced birders that already have point count experience. Thus, reasonable consistency across observers, and therefore among GULN parks, is also expected. Data are also comparable to point count data collected in other parks of the country, because protocols are broadly consistent. This includes several other I&M networks (e.g., Faccio et al. 2015; Gostomski et al. 2010), and the US Fish and Wildlife Service under the Knutson et al. (2008) plan.

Table 3 (continued). Data Quality Values (DQVs) for Monitoring Breeding Landbirds in National Parks of the Gulf Coast Network: Protocol Narrative (Segura et al. 2018).

Value	Definition	Protocol Considerations
Timeliness / Currency	How recent the data need to be to be considered valid for their intended use. Data represents conditions and/or is available and in a format for use at the appropriate time in the decision-making process.	By the end of each calendar year, all data for the previous summertime field season in each park are entered into the database and have passed the database verification step (check for transcription errors). Within three more months, database validation steps are completed, such that data are approved and can be shared with the park and posted on IRMA (see also Data Management SOP, Granger and Carlson 2018c). Full reports on the status and trend of landbirds in GULN parks are completed once every three years (Carlson and Segura 2018).
Completeness	All data and measures required to evaluate accuracy and representativeness are present; incomplete data sets (either at a location, across sampling locations, or over time) lose utility or relevance. Data records contain values as planned across the period of record.	The park is always visited during the breeding season of landbird species (May–June). All points are visited twice each year, 2–10 days apart, and all sampling events are completed in as few consecutive days as possible. Before leaving a point location, the datasheet are reviewed for completeness by the observer.
Consistent Representation	Use of standard definitions when describing data quality or resource quality based on data	Data quality is defined as “fit for analysis” or “not fit for analysis.” Data is ‘fit for analysis’ after passing all QA/QC measures and becoming an accepted data set. The reporting products are always based on accepted data sets, and they always use the same derived variables associated with the monitoring objectives, as described in the protocol narrative (Segura et al. 2018) and the data analysis and reporting SOP (Carlson and Segura 2018)
Data Accessibility: Secure	Access to data, products, and systems limited to appropriate audiences.	Protected species data will be flagged upon entry and prevented from dissemination. The network also prevents the dissemination of any Personally Protected Information in accordance to NPS data management standards.

Table 4. Measurement Quality Objectives for *Monitoring Breeding Landbirds in National Parks of the Gulf Coast Network: Protocol Narrative* (Segura et al. 2018).

Activity detail and number	Indicator	Quality objective
General sampling event documentation (1)	Measurement accuracy for temperature	Hand-held meter meets accuracy standards of ±0.5 C for temperature
Bird point counts (2)	Taxonomic resolution	Taxonomic identifications are made to the species level (see Table 5: Taxonomic standards)
	Individual-level identification accuracy	95% accuracy Contracted observer identification accuracy is assessed once every three years, during a special field visit by GULN staff or another contracted expert on a Quality Control (QC), double-observer visit. Both the outside expert and the regular observer independently complete the same point counts for an entire day of sampling. The target is met if, on average, the observer and the outside expert are in agreement 95% of the time on species-level identifications. This applies to auditory bird detections where the "true" species identification is unknown. This standard is therefore primarily a measure of precision.
	Individual-level identification completeness	99% of identifications are made to species level Observers are trained and encouraged to use an "unknown bird" identifier when they are unsure of the species identification. This reduces the likelihood of misidentified birds in the database. Only highly experienced birders are contracted to perform surveys.
	Distance category	75% accuracy The observer assigns each bird detected to one of four "distance from observer" categories. The standard is assessed during the QC, double observer visit where, on average, the regular observer and the outside expert are in agreement 75% of the time on which distance category to assign. This applies to auditory bird detections where the "true" distance from the observer is unknown. This standard is therefore primarily a measure of precision.

Table 5. Taxonomic standards to be used in *Monitoring Breeding Landbirds in National Parks of the Gulf Coast Network: Protocol Narrative* (Segura et al. 2018).

Activity detail and number	Standard to be used	Reference/Authority
Bird point counts (2), **collection** of observational data	Field Subject Matter Expert	Field crew lead w/ documented identification proficiency
Bird point counts data (2), **reporting** of observational data	Scientific Publication	Pyle and DeSante 2017 and Chesser et al. 2018

Table 6. Data Protection standards for *Monitoring Breeding Landbirds in National Parks of the Gulf Coast Network: Protocol Narrative* (Segura et al. 2018). With the exceptions noted, all data collected are to be made publicly available in a timely fashion.

Category	Type of Data	Level of Protection	Rules for Dissemination
Resource Data and Information	State/federal threatened or endangered species locations	Legally protected	Locations of species observations are unreported or reported at the park centroid only
	Threatened and endangered migratory shorebird locations	Legally protected	Locations of observations reported at park centroid for three years; fuzzed to within 50m thereafter.
Personally Identifiable Information	Non-NPS Staff Information	Legally protected	All but first name and last initial redacted from public release.

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