



Data Quality Standards for the South Florida/Caribbean Network Early Detection Protocol for Exotic Plants

Natural Resource Report NPS/SFCN/NRR—2022/2423





ON THIS PAGE

Shoebuttan ardisia (*Ardisia elliptica*), found along Military Canal Biscayne National Park.
Photograph courtesy of South Florida/Caribbean Network, National Park Service.

ON THE COVER

Upper left: SFCN Botanist Robert B. Shamblin surveying the Rowdy Bend trail in Everglades National Park. Upper right: Using the “Mule” to survey Spite Highway on Elliott Key in Biscayne National Park. Lower left: Road survey near Chekika in Everglades National Park. Lower right: Airboat survey in Shark Slough within Everglades National Park.
NPS photo / SFCN

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Abstract

The purpose of this document is to outline the standards used by the South Florida/Caribbean Network (SFCN) for activities related to the collection, processing, storage, analysis, and publication of monitoring data as described in the *South Florida/Caribbean Network Early Detection Protocol for Exotic Plants* (Shamblin et al. 2022). The policies and procedures documented in this quality-assurance plan for activities complement the quality-assurance plans for other monitoring activities conducted by the South Florida/Caribbean Network. The plan also serves as a guide for all South Florida/Caribbean Network personnel who are involved in protocol or program activities and as a resource for identifying memoranda, publications, and other literature that describe associated techniques and requirements in more detail.

Introduction

The purpose of this document is to outline the standards used by the South Florida/Caribbean Network (SFCN) for activities related to the collection, processing, storage, analysis, and publication of monitoring data as described in the *South Florida/Caribbean Network Early Detection Protocol for Exotic Plants* (Shamblin et al. 2022). The policies and procedures documented in this quality-assurance plan for activities complement the quality-assurance plans for other monitoring activities conducted by the South Florida/Caribbean Network. The plan also serves as a guide for all South Florida/Caribbean Network personnel who are involved in protocol or program activities and as a resource for identifying memoranda, publications, and other literature that describe associated techniques and requirements in more detail.

Protocol Overview

Exotic plants were identified as an important item for monitoring in the SFCN vital sign monitoring plan (Patterson et. al. 2008) because of the effects these plants can have on natural resources. Early detection and rapid response (EDRR) of exotic plants while they comprise small populations is critical to the longer-term management of natural resources. The most successful and cost-effective strategy for preventing the establishment of exotic plant species is to implement an early detection plan for these species (Hobbs and Humphries 1995; Randall 1996; Rejmanek and Pitcairn 2002).

Early detection through observation of pathways by which invasive exotics become introduced into an ecosystem is suggested in General Guidelines for the Establishment and Evaluation of Invasive Species Early Detection and Rapid Response Systems (National Invasive Species Council 2003). The South Florida/Caribbean Network's protocol proposes the use of active detection networks along high-risk locations (corridors) to catch invasions early, before they develop into a larger problem, and respond adequately. To accomplish this goal, we have established monitoring of exotic plants along Corridors of Invasiveness.

“Corridors of Invasiveness” are defined in the protocol as areas that allow or facilitate the introduction of exotic species due to intentional or non-intentional human activities. The corridors of invasiveness function as in-roads or access into natural areas allowing for a seed source for colonization, and ultimately an introduction site for founder populations. The general assumption is that plant species with human-assisted dispersal mechanisms can potentially be introduced via a corridor into natural habitats. Seeds or propagules can be moved by attaching themselves to clothing or equipment and by humans actively transporting them from site to site (e.g., via hiking trails or ORV roads). The seeds or propagules can readily invade areas where there is disturbance or in areas that are more open and receive a large amount of sunlight (e.g., trails or trail heads, road stops, or campgrounds).

The South Florida/Caribbean Network is implementing monitoring of exotic plants along corridors of invasiveness to assist in the long-term management of invasive exotic plants in these park units. For our purpose, the goal of surveying the “Corridors of Invasiveness” is to detect newly emerging exotic plant species and infestations in the national parks of South Florida and provide the park management with effective decision-making information.

The specific monitoring objectives are:

1. Detect new species of exotic plants along selected corridors of invasiveness (i.e., roads, trails, canals, campgrounds, boat launches, and airboat trails).
2. Detect new invasions of existing exotic plants along selected corridors of invasiveness.
3. Determine status and trends in percent infested area and distribution of infestations along selected corridors of invasiveness.
4. Survey all selected corridors of the three target parks within a five-year period.

Due to logistical and time restraints, only three national parks of South Florida will be monitored for this project: Big Cypress National Preserve (BICY), Biscayne National Park (BISC), and Everglades National Park (EVER).

Field sampling involves navigating safely to the site, then walking, boating, or slow driving of the corridors to survey the area for exotic plant species. Sites are monitored on a 5-year rotation. During the survey we check on previously observed infestations and note any new exotic plants.

Data are typically recorded using an iPad, which allows data collection with real time geolocation on background imagery. This type of data collection allows in field assessment of imagery features and allows previously observed infestation information to be displayed, facilitating follow-up observations on fate of infestation.

Data reporting includes location of new exotic plant infestations, if new infestations were treated at time of observation, and fate of previously observed infestations. This information is conveyed to park management via geospatial data (shapefile), database, annual report, and a resource brief.

Protocol Activities and Modules

Data are collected or derived as a part of the *South Florida/Caribbean Network Early Detection Protocol for Exotic Plants* (Shamblin et al. 2022) in six different activities or modules (Table 1).

Table 1. Protocol activity matrix for the South Florida/Caribbean Network Early Detection Protocol for Exotic Plants (Shamblin et al. 2022).

Type	Activity and Number	Description
Site Establishment	1. Site Establishment	Site coordinates, extent of site, and logistics of access to site are documented. No physical markers are placed in the field.
Field Observations	2. Habitat characterization	Each individual corridor of invasiveness site is visually surveyed for exotic plant infestation. At the same time there is a check to determine if previously observed infestations are still present. The survey follows previously surveyed tracks by following a GPS trackline. This occurs on an iPad.
Sensor Data	3. Photos	Depending on need, photos are taken of exotic plants and exotic plant infestations. Typically, photos are taken with an iPad.
	4. GPS point and trackline	GPS in iPad and external gps device collect spatial location data and path surveyed.
Derived Data	5. Geospatial Data processing	Creation of infestation polygon shapefiles, buffering field of view estimates, and digitizing long linear infestation to more accurately represent infestation size.
Quality Control Data	6. Duplicate survey	A subset of sites and parts of some of the road survey areas have a duplicate survey.

Sampling Design

Information regarding the sampling design is described in Table 2.

Table 2. Activity-level sample design matrix for the South Florida/Caribbean Network Early Detection Protocol for Exotic Plants (Shamblin et al. 2022).

Type	Activity and number	Sampling Design	Revisit Design
Field Observations	2. Habitat characterization	Survey: all official, publicly accessible roads, trails, canals, campgrounds, boat ramps, and airboat trails, within the boundaries of Everglades National Park, Biscayne National Park, and Big Cypress National Preserve were identified as survey sites. Some survey areas were discarded or restricted for safety or for feasibility reasons. Sites are permanent. Surveys occur following tracklines from previous survey. Sites are broken up into 5 regions, one region is sampled each year. This way each site is sampled on a 5-year rotation.	Annual sampling but revisit of each site is on a 5-year rotation
Sensor Data	3. Photos	Survey: Same as activity 2. Photos if needed are taken of exotic plant or exotic plant infestation.	5-year rotation
	4. GPS point and trackline	Survey: Same as activity 2. GPS in iPad and external gps device collects spatial location for exotic plant infestation data and path surveyed.	5-year rotation

Data Quality Objectives

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

Table 3. Data quality values (DQVs) for the South Florida/Caribbean Network Early Detection Protocol for Exotic Plants (Shamblin et al. 2022).

Quality	Data Quality Value	Definition	Protocol Considerations
Intrinsic Data Quality	Accuracy	Measurements reflect the true value of the parameter being observed. This applies to measures (length, width, position) or classes (species, types, or categories). Includes components of precision and bias.	Observations are made by staff familiar with vegetation of south Florida. All sites are monitored following the schedule and methods outlined within Shamblin et al. (2022).
	Representativeness	Measurements represent conditions at the time of sampling. Combined with accuracy, leads to repeatable data collection.	Surveys occur at selected sites that: 1) meet the definition of corridors of invasiveness (Shamblin et al. 2022), 2) are safe to sample, 3) are feasible to sample. These sites represent the majority of the corridors of invasiveness in the park units being surveyed.
Contextual Data Quality	Comparability	The degree to which data can be compared among sample locations, data sources, or periods of time.	All sample locations are monitored following the schedule and methods outlined within Shamblin et al. (2022).
	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.	Data reports will be generated within six months of completed sampling.
	Completeness	All data/ measures required to evaluate accuracy 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.	Data are collected according to methods outlined within Shamblin et al. (2022). Analysis is not contingent on having all sites collected. Sites can be skipped due to unforeseen circumstance and the remaining data set is still useful.

Table 3 (continued). Data quality values (DQVs) for the South Florida/Caribbean Network Early Detection Protocol for Exotic Plants (Shamblin et al. 2022).

Quality	Data Quality Value	Definition	Protocol Considerations
Representational Data Quality	Consistent Representation	Use of standard definitions when describing data quality or resource quality based on data	Definitions are provided in Shamblin et al. (2022).
Data Accessibility	Secure	Access to data, products, and systems limited to appropriate audiences.	Data will be posted to the NPS Data Store .

Table 4. Measurement quality objectives for the South Florida/Caribbean Network Early Detection Protocol for Exotic Plants: Protocol Narrative (Shamblin et al. 2022).

Quality Type	Measure/Quality Indicator	Quality Objectives
Site	Location accuracy	± 4 meters (GPS accuracy)
Infestation and survey path	Location accuracy	± 4 meters (GPS accuracy). The survey follows previously surveyed tracks by following a gps trackline.
Habitat characterization	Field of view estimate:	Linear distance ± 2 m; The field of view estimate is the distance where the observer has high confidence of identifying exotic (or unknown) plants in all three vegetation structure layers, i.e., herb layer, shrub layer, and tree layer
	Area of infestation	Observer estimates of the linear length or the width agree within 30%
	Survey type	Correct 100% of time
	Taxonomic Resolution	Identifications made to the species level
	Taxonomic Identification Accuracy	95% accuracy
	Taxonomic Identification Completeness	95% of observations made to species level
	Infestation Cover class	Two independent observers agree on cover class 90% of the time, and are always within one cover class
	Abundance class	Two independent observers agree on cover class 90% of the time, and are always within one cover class
	Treatment	100% accuracy
	Habitat Type	Consensus in identification between two staff
	Detection	95% detection of infestation at least 1m ² (for walking mode) and 10 m ² for driving mode of survey
Photos	Image resolution	5 megapixel
	Image format	JPG

Table 5. Taxonomic standards to be used in the South Florida/Caribbean Network Early Detection Protocol for Exotic Plants (Shamblin et al. 2022).

Data	Activity	Standard to be Used	Reference/Authority
Collection of Observational Data	Identification of species	Scientific Publication	Wunderlin and Hansen (2003)
Reporting of Observational Data	Identification of species	Scientific Publication	Wunderlin and Hansen (2003)

Table 6. Data Protection standards for South Florida/Caribbean Network Early Detection Protocol of Exotic Plants: Protocol Narrative (Shamblin et al. 2022)

Type of Information	Type of Data	Level of Protection	Rules for Dissemination
Personally Identifiable Information	Non-NPS Staff Information	Legally Protected	All but initials redacted from public release

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