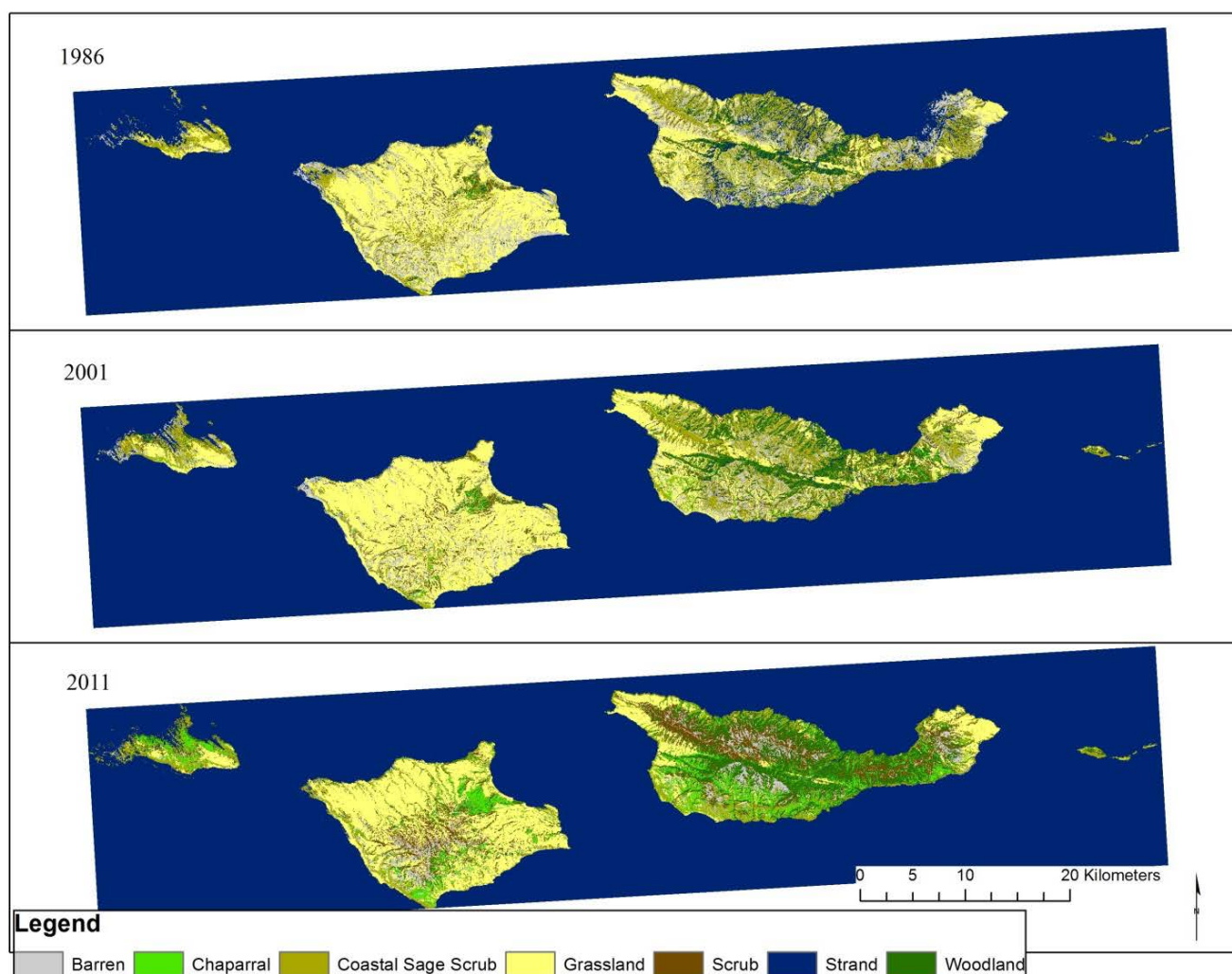




Data Quality Standards for the Protocol for Monitoring Landscape Dynamics in the Mediterranean Coast Network of Southern California

Natural Resource Report NPS/MEDN/NRR—2018/1843



ON THE COVER

Land cover change analysis at Channel Islands National Park. Note the increase in chaparral and scrub, which is presumably a result of the removal of feral nonnative animals from the islands.

Image credit: K. Willis

Data Quality Standards for the Protocol for Monitoring Landscape Dynamics in the Mediterranean Coast Network of Southern California

Natural Resource Report NPS/MEDN/NRR—2018/1843

Rebecca Key and Stacey Ostermann-Kelm

Mediterranean Coast Network
National Park Service Inventory and Monitoring Network
401 West Hillcrest Drive
Thousand Oaks, CA 90095

December 2018

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Report Series is used to disseminate comprehensive information and analysis about natural resources and related topics concerning lands managed by the National Park Service. The series supports the advancement of science, informed decision-making, and the achievement of the National Park Service mission. The series also provides a forum for presenting more lengthy results that may not be accepted by publications with page limitations.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner. This report received formal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data, and whose background and expertise put them on par technically and scientifically with the authors of the information.

Views, statements, findings, conclusions, recommendations, and data in this report do not necessarily reflect views and policies of the National Park Service, U.S. Department of the Interior. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

This report is available in digital format from the [Mediterranean Coast Inventory and Monitoring Network website](#) and the [Natural Resource Publications Management website](#). If you have difficulty accessing information in this publication, particularly if using assistive technology, please email irma@nps.gov.

Please cite this publication as:

Key, R., and S. Ostermann-Kelm. 2018. Data quality standards for the protocol for monitoring landscape dynamics in the Mediterranean Coast Network of Southern California. Natural Resource Report NPS/MEDN/NRR—2018/1843. National Park Service, Fort Collins, Colorado.

Contents

	Page
Tables	iii
Introduction and Summary	1
Protocol Overview	1
Protocol Activities and Modules	1
Sampling Design	3
Data Quality Objectives	4
Taxonomic Data Standards	6
Protected Data Standards	6
Literature Cited	7

Tables

	Page
Table 1. Protocol activity matrix for the Protocol for monitoring landscape dynamics in the Mediterranean Coast Network of southern California.	1
Table 2. Activity-level sample design matrix for the Protocol for monitoring landscape dynamics in the Mediterranean Coast Network of southern California.....	3
Table 3. Data Quality Values (DQVs) for the Protocol for monitoring landscape dynamics in the Mediterranean Coast Network of southern California.....	4
Table 4. Measurement Quality Objectives for the Protocol for monitoring landscape dynamics in the Mediterranean Coast Network of southern California.....	5

Introduction and Summary

The purpose of this report is to document the standards, used by the Mediterranean Coast Network of the NPS Inventory and Monitoring Program for activities related to the collection, processing, storage, analysis, and publication of monitoring data as described in the Protocol for Monitoring Landscape Dynamics in the Mediterranean Coast Network of Southern California (Willis et al. 2018a, 2018b). The policies and procedures documented in this quality-assurance plan for activities complement the quality-assurance plans for other monitoring activities conducted by the Mediterranean Coast Network and supplement National Inventory & Monitoring Division Quality Management Plan (DeVivo *in review*). The plan also serves as a guide for all Mediterranean Coast Network personnel who are involved in protocol/program activities and as a resource for identifying memoranda, publications, and other literature that describe associated techniques and requirements in more detail.

Protocol Overview

The Protocol for Monitoring Landscape Dynamics in the Mediterranean Coast Network of Southern California (Willis et al. 2018a, 2018b) describes the application of remote sensing data to monitor changes in the landscape. Protocol objectives focus on detecting changes in Land Use/Land Cover (including vegetation communities), phenology, and light pollution through the use of various satellite imagery. Data will be analyzed to document landscape changes at approximately 5-year intervals.

Protocol Activities and Modules

Data are acquired or derived from nationally-standardized external source data (Willis et al. 2018a) in 16 different activities or modules (Table 1).

Table 1. Protocol activity matrix for the Protocol for monitoring landscape dynamics in the Mediterranean Coast Network of southern California (Willis et al. 2018a).

Category	Activity Number	Activity	Description
Site Identification	1	Area of Analysis	Identification and generation of area of analysis (AOA) polygons, including park boundaries, areas within parks, and other areas of interest, for use in landscape dynamics metrics.
External Data	2	GAP Analysis Data	Gap Analysis Program datasets to be used
	3	Landsat Imagery	Imagery from summer months (July - September) to be used
	4	Digital Elevation Models	Digital Elevation Model (DEM) datasets to be used

Table 1 (continued). Protocol activity matrix for the Protocol for monitoring landscape dynamics in the Mediterranean Coast Network of southern California (Willis et al. 2018a).

Category	Activity Number	Activity	Description
External Data (continued)	5	Google Earth	Variety of Imagery viewed within the Google Earth software
	6	MODIS Data	Imagery from MODIS Satellite Imagery to be used. Includes NDVI values.
	7	Precipitation Data	Precipitation data from the National Climatic Data Center of NOAA to be used
	8	DMSP Data	Composite nighttime light imagery to be used
Derived Data	9	Landsat Preprocessed Data	Landsat imagery (activity 3) ran through preprocessing (ENVI) for properly using imagery in further activities. (In some cases, imagery is already preprocessed when acquired.)
	10	Classification Images	Derived image from classification of Landsat Imagery (activity 3 and/or 9) with Gap Analysis (activity 2) and DEMs (activity 4)
	11	Calculate Land Use / Land Cover and Vegetation Type Change Metrics	Calculate detection change statistics for each AOA using the Classification Images (Activity 10) [SOP 1]
	12	Compute Phenological Variability Metrics	Extract NVDI values for each AOA using MODIS Images (Activity 6) and compute changes in NVDI over time [SOP 2]
	13	Compute Nighttime Lighting Metrics	Extract Brightness Values from DMSP Images (Activity 8) and compute change detection over time [SOP 3]
Data Validation	14	Validation Sample Locations	Create a set of sample locations through the GRTS process for validation purposes.
	15	Field Validation - Land Use / Land Cover	Field visitation to 30 points per Land Use / Land Cover (LULC) type determined from the Classification Imagery (Activity 10) and GRTS sampling locations (Activity 14) to validate classification.
	16	Spatial Validation - Land Use / Land Cover	Visual check of 100 points per LULC type determined from the Classification Imagery (Activity 10) and GRTS sampling locations (Activity 14) through use of Google Earth Imagery (Activity 5) to validate classification.

Sampling Design

Information regarding the sampling design is provided in Table 2.

Table 2. Activity-level sample design matrix for the Protocol for monitoring landscape dynamics in the Mediterranean Coast Network of southern California (Willis et al. 2018a).

Category	Activity Number	Activity	Sampling Design	Revisit Design
External Data	2	GAP Analysis Data	Targeted; acquire for each area of interest	Revisit every 3-5 years; acquire data between revisit year and last year done
	3	Landsat Imagery	Targeted; acquire for each area of interest	Revisit every 3-5 years; acquire data between revisit year and last year done
	4	Digital Elevation Models	Targeted; acquire for each area of interest	Revisit every 3-5 years; acquire data between revisit year and last year done
	5	Google Earth	Targeted; acquire for each area of interest	Revisit every 3-5 years; acquire data between revisit year and last year done
	6	MODIS Data	Targeted; acquire for each area of interest	Revisit every 3-5 years; acquire data between revisit year and last year done
	7	Precipitation Data	Targeted; acquire for each area of interest	Revisit every 3-5 years; acquire data between revisit year and last year done
	8	DMSP Data	Targeted; acquire for each area of interest	Revisit every 3-5 years; acquire data between revisit year and last year done

Data Quality Objectives

Data quality values and standards for implementation are provided in Table 3 through Table 4. We consulted Nelson et al. (in review) for example data quality values for landscape scale protocols.

Table 3. Data Quality Values (DQVs) for the Protocol for monitoring landscape dynamics in the Mediterranean Coast Network of southern California (Willis et al. 2018a).

Category	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.	External source data used for derivation of landscape dynamics metrics will be accompanied by suitable documentation—including a quality assurance plan—to allow for evaluation of data quality prior to use.
Contextual Data Quality	Comparability	The degree to which data can be compared among sample locations, data sources, or periods of time.	For landscape dynamics metrics, data values are comparable over time because data sources are selected, in part, based on planned repeat intervals of data collection and dissemination.
	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.	All data used for metric calculation will cover the entire Area of Analysis being evaluated and/or the entire period of record being analyzed.
Representational Data Quality	Consistent Representation	Use of standard definitions when describing data quality or resource quality based on data	Standard definitions will be used in all reports and products to describe the data quality. Derived metrics will remain consistent over time.
Data Accessibility	Secure	Access to data, products, and systems limited to appropriate audiences.	MEDN will identify and ensure that potentially protected data, including sensitive species location data, sensitive cultural resource information, and other data as protected by DO#66 are not released to the public. Protected data may be released in limited cases only with park Superintendent approval following park procedures. For protected data, MEDN will collaborate with parks to determine the appropriate method of redaction.

Table 4. Measurement Quality Objectives for the Protocol for monitoring landscape dynamics in the Mediterranean Coast Network of southern California (Willis et al. 2018a).

Activity	Measure / Quality Indicator	Quality Objective
Site Identification	Location Accuracy	Areas of Analysis (AOAs) contain or are adjacent to park of interest or other areas of interest that relate to park missions
Landscape Change Metrics for Activities 10-13	Completeness	Metrics calculated for 100% of AOAs

Taxonomic Data Standards

No biological data are collected or managed as a part of this protocol.

Protected Data Standards

At the time of implementation, no protected data are used as a part of this protocol (all data sources are available in the public domain). If/when new data sources are evaluated for use in the implementation of this protocol, each will be screened to determine whether they contain data that should be protected, and rules for dissemination will be established in consultation with appropriate parks.

Literature Cited

- DeVivo, J. C. In review. DRAFT quality management plan for the National Park Service Inventory & Monitoring Program: Guidance for vital signs monitoring protocols. Inventory and Monitoring Division, National Park Service. Fort Collins, Colorado.
- Nelson, L., M. Kinseth, and J. C. DeVivo. In review. Data quality standards for monitoring environmental setting of National Park Service units. Natural Resource Report NPS/IMD/NRR—2018/XXX. National Park Service, Fort Collins, Colorado.
- Willis, K. S., S. Ostermann-Kelm, F. Federico, L. Lee, G. M. MacDonald, and T. W. Gillespie. 2018a. Protocol for monitoring landscape dynamics in the Mediterranean Coast Network of southern California. Natural Resource Report NPS/MEDN/NRR—2018/1830. National Park Service, Fort Collins, Colorado.
- Willis, K. S., S. Ostermann-Kelm, F. Federico, L. Lee, G. M. MacDonald, and T. Gillespie. 2018b. Protocol for monitoring landscape dynamics in the Mediterranean Coast Network of southern California: Standard Operating Procedures, Version 1.0. Mediterranean Coast Network, Thousand Oaks, California..

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 925/150066, December 2018

National Park Service
U.S. Department of the Interior



[Natural Resource Stewardship and Science](#)

1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525