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Data Quality Standards for Stream Condition Monitoring in the Mediterranean Coast Inventory and Monitoring Network of Southern California

Natural Resource Report NPS/MEDN/NRR—2019/1872



ON THE COVER
Photograph of Water Canyon, Santa Rosa Island in Channel Islands National Park
Photograph by S. Ostermann-Kelm, National Park Service Mediterranean Coast Network

Data Quality Standards for Stream Condition Monitoring in the Mediterranean Coast Inventory and Monitoring Network of Southern California

Natural Resource Report NPS/MEDN/NRR—2019/1872

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Abstract

This report documents the data quality standards used by the Mediterranean Coast Network (MEDN) of the NPS Inventory and Monitoring Program. Data quality standards apply to activities related to the collection, processing, storage, analysis, and publication of monitoring data as described in the Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a). This document also serves as a guide for all MEDN 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

The mission of the National Park Service (NPS) is “to conserve unimpaired the natural and cultural resources and values of the national park system for the enjoyment of this and future generations”. To uphold this goal, the Director of the NPS approved the Natural Resource Challenge to encourage national park units to focus on the preservation of the nation’s natural heritage through science, natural resource inventories, and expanded resource monitoring (NPS 1999). Through the Challenge, the 270 parks having significant natural resources in the national park system were organized into 32 inventory and monitoring networks. The Mediterranean Coast Network (MEDN) includes three park units: Cabrillo National Monument, Channel Islands National Park (CHIS) and Santa Monica Mountains National Recreation Area (SAMO).

The MEDN Inventory and Monitoring Program (I&M) identified 22 priority park vital signs, or indicators of ecosystem health, which represent a broad suite of ecological phenomena operating across multiple temporal and spatial scales (Cameron et al. 2005). This Data Quality Standards report focuses on the vital sign “Integrated Freshwater Quality.” Federico et al. (2019a and 2019b) developed a Protocol Implementation Plan (PIP) for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California that describe monitoring program for this vital sign.

The PIP for Monitoring Stream Condition includes the use of peer-reviewed, published, and well-established methodologies to monitor the condition of streams using a rapid assessment method. The California Rapid Assessment Method (CRAM) is a cost-effective and scientifically defensible rapid assessment method for monitoring the condition of wetlands throughout California that does not require the presence of water (Collins et al. 2008; Stein et al. 2009). It is designed for assessing ambient conditions within watersheds, regions, and throughout the state. Where conditions are suitable (i.e., the presence of a wadeable stream), we will also sample physical habitat and benthic invertebrates, which are effective ways to measure stream health (Harrison et al. 2004). Benthic invertebrates have diverse life histories that make them sensitive to a variety of stressors, and therefore have the ability to integrate responses over space and time in a way that traditional measures of stream health (e.g., water chemistry) cannot. Limited water chemistry sampling will also be conducted when feasible to help identify stressors to streams on NPS-managed lands.

The overarching goal of the MEDN I&M Stream Condition Monitoring Program is to obtain information that will aid in the assessment, conservation, and restoration of surface water resources. This monitoring program addresses the following management questions:

1. What is the regulatory status of SAMO streams under section 303(d) of the Clean Water Act?
2. What is the status of and what are the trends in the overall health of the streams in SAMO and CHIS?
3. What is the relationship between aquatic amphibian presence/abundance and stream health at SAMO and CHIS?

Riverine wetland conditions will be monitored using the CRAM riverine module (California Wetlands Monitoring Workgroup 2013). Macroinvertebrate assemblages, physical habitat conditions and stream water chemistry will be monitored using the bioassessment protocols designed by the California Surface Water Ambient Monitoring Program (Ode 2007, Ode et al 2018).

Protocol Activities and Modules

Data are collected or derived as a part of the PIP for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. in 2019a and 2019b) in 17 different activities or modules (Table 1).

Table 1. Protocol activity matrix for Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a and 2019b).

Category	Activity Number	Activity	Description
Site Recon and Relocation	1	Site Recon	Investigate suitability of sites to be used as sampling locations (SOPs 2 and 7) and record the reason for rejecting any sampling sites.
	2	Relocation of sampling sites	Once site is accepted as a monitoring location, develop detailed documentation to aid in relocation. Site descriptions and directions to the sites are retained for reference (SOP 13).
Field Observations	3	California Rapid Assessment (CRAM)	Method for assessing the landscape context, hydrology, physical structure and biotic structure of a stream (SOP 5)
	4	Physical Habitat (PHAB)	Detailed data collected to characterize the physical structure of a stream, including assessments of substrate composition and algal cover (SOP 4)
	5	Aquatic Amphibian presence/absence survey	Presence or absence of Baja California Tree frogs (*Pseudacris hypochondriaca*) or Channel Islands Slender Salamander (*Batrachoseps pacificus)*. Data collected only at CHIS. (SOP 4)
Sensor Data	6	In-Field water chemistry measurements	Temperature, pH, specific conductance, dissolved oxygen, and turbidity; If SWAMP site, also includes alkalinity and salinity. (SOPs 3 and 4)
	7	Photographs	Upstream and downstream photos to document stream reach conditions
Field Sample & Specimen Collection and Processing	8	Water sample	Bottle samples collected using the hand-dipping method described in the USGS National Field Manual (USGS 2006) and sent to the laboratory for analysis of total nitrogen, total phosphorus, sulfate, chloride, and total selenium (SOP 4)
	9	Benthic macroinvertebrates	Sediment macroinvertebrate samples collected using a grab sample and returned to CDFW ABL for identification and analysis (SOP 4)

Table 1 (continued). Protocol activity matrix for Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a and 2019b).

Category	Activity Number	Activity	Description
Laboratory Data	10	Water chemistry	Laboratory analysis of total nitrogen and total phosphorus, sulfate, chloride and total selenium from samples collected in activity 8.
External Data	11	Impaired Waterbody Listing	Most recent 303(d) listing of the Los Angeles Region (Region 4). (SOP 6)
	12	Total Maximum Daily Load (TMDL) promulgation	Most recent TMDL listing of the Los Angeles Region (Region 4). (SOP 6)
Derived Data	13	CRAM Scores	Index based on combination of 4 scores (landscape context, hydrology, physical structure and biotic structure) based on assessments conducted in activity 3.
	14	California Stream Condition Index	Statewide biological scoring tool that translates complex data about benthic macroinvertebrates found living in a stream into an overall measure of stream health (Mazor et al. 2016, Ode et al. 2016), based on data collected with activity 4.
Quality Control Data	15	Replicate water sample	Replicate samples taken for duplicate lab sampling
	16	Replicate benthic macroinvertebrates	Replicate samples taken for duplicate sampling identification
	17	Pre and post calibration data	Calibration of sensors before and after deployment to test for measurement drift

Sampling Design

Information regarding the sampling design is provided in Federico et al. (2019a) and Table 2. In summary, monitoring will alternate between CHIS and SAMO every three years. At CHIS, 30 randomly selected sites on Santa Rosa Island will be monitored over a 3-year period (2016-2018; approximately 10 sites/year). In the subsequent 3 years (2019-2021), sampling will be performed at SAMO at 24 of the already established amphibian monitoring sites (approximately 8/year; Delaney et al. 2011). Afterward, monitoring will continue to alternate between the two parks.

Table 2. Activity-level sample design matrix for Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a).

Category	Activity Number	Activity	Sampling Design	Revisit Design
Site Recon	1	Site recon	Probabilistically selected*	none
Site Relocation	2	Site relocation	Probabilistically selected*	Using the notation from MacDonald (2003): [1-5] rotating panel revisit design. Sampling rotates between CHIS and SAMO every 3 years.
Field Observations	3	California Rapid Assessment (CRAM)	Probabilistically selected*	Using the notation from MacDonald (2003): [1-5] rotating panel revisit design. Sampling rotates between CHIS and SAMO every 3 years.
	4	Physical Habitat (PHAB)	Probabilistically selected*	Using the notation from MacDonald (2003): [1-5] rotating panel revisit design. Sampling rotates between CHIS and SAMO every 3 years.
	5	Aquatic Amphibian presence/absence survey	Probabilistically selected*	Using the notation from MacDonald (2003): [1-5] rotating panel revisit design. Sampling rotates between CHIS and SAMO every 3 years.
Sensor Data	6	In-field water chemistry	Probabilistically selected*	Using the notation from MacDonald (2003): [1-5] rotating panel revisit design. Sampling rotates between CHIS and SAMO every 3 years.
	7	Photographs	Probabilistically selected*	Using the notation from MacDonald (2003): [1-5] rotating panel revisit design. Sampling rotates between CHIS and SAMO every 3 years.
Field Sample & Specimen Collection	8	Water sample	Probabilistically selected*	Using the notation from MacDonald (2003): [1-5] rotating panel revisit design. Sampling rotates between CHIS and SAMO every 3 years.
	9	Macroinvertebrates	Probabilistically selected*	Using the notation from MacDonald (2003): [1-5] rotating panel revisit design. Sampling rotates between CHIS and SAMO every 3 years.

* CHIS sites were probabilistically-selected using Generalized Randomized Tessellation Sampling, and SAMO sites were co-located with amphibian monitoring sites. Amphibian sites were probabilistically selected using methods described in Delaney et al. 2011.

Table 2 (continued). Activity-level sample design matrix for Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a).

Category	Activity Number	Activity	Sampling Design	Revisit Design
External Data	11	Impaired Waterbody Listing	Targeted; acquire for the SAMO Ecological Management Zone.	Revisit annually
	12	Total Maximum Daily Load (TMDL)	Targeted; acquire for the SAMO Ecological Management Zone.	Revisit annually

* CHIS sites were probabilistically-selected using Generalized Randomized Tessellation Sampling, and SAMO sites were co-located with amphibian monitoring sites. Amphibian sites were probabilistically selected using methods described in Delaney et al. 2011.

Data Quality Objectives

Data quality values and standards for implementation are provided in Tables 3-8.

Table 3. Data Quality Values (DQVs) for the Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a and 2019b).

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.	Accuracy of data is achieved by training field crew personnel in all standard operating procedures and basic plant identification at the beginning of each field season as well as by using expert resources, such as botanists, when available. MEDN is collaborating with CDFG ABL and SCCWRP to collect data. Only trained and highly experienced CDFG ABL staff collect data to ensure accuracy in all measurements and identifications (SOP 11).
	Representativeness	Measurements represent conditions at the time of sampling. Combined with accuracy, leads to repeatable data collection.	Sampling locations were selected using a probabilistic sampling design (Generalized Random Tessellation Stratified; GRTS) to allow statistical inference to the sampling domain (SOPs 2 and 7). Data collection and analysis methods meet California State Water Board standards.
Contextual Data Quality	Comparability	The degree to which data can be compared among sample locations, data sources, or periods of time.	Data comparability is ensured over time, even when sensors, instruments, and staff changes occur, by following guidance in SOP 11, which requires that all professional staff be trained through the College of Bioassessment and participate in annual intercalibration and training exercises. Only trained and highly experienced CDFG ABL staff collect data to ensure accuracy in all measurements and identifications, and comparability with regional data.

Table 3 (continued). Data Quality Values (DQVs) for the Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a and 2019b).

Category	Data Quality Value	Definition	Protocol Considerations
Contextual Data Quality (continued)	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.	Every effort will be made to achieve 100% completion of data collection at all visited sites, per Federico et al. (2019a). Road washouts or security concerns may occasionally prevent access to a site in a given year. Any site that is frequently unsuitable for monitoring will be permanently replaced by the next site in the GRTS draw.
Representational Data Quality	Consistent Representation	Use of standard definitions when describing data quality or resource quality based on data	Definitions and scores follow published and well-established methodology (Ode et al. 2016)
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 Director's Order #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 Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a and 2019b).

Activity	Measure / Quality Indicator	Quality Objective
Site Relocation	Location Accuracy	Sample location within +/ 300m of established waypoint.
	Location Description Detail	Description provided with enough detail to relocate without use of GPS equipment. Description includes permanent landmarks and does not rely on features that may be moved or destroyed by flood, fire, etc.

[1] Macroinvertebrate Taxonomic and Identification information from SWAMP 2009.

[2] Accuracy information for water quality field measurements were from the following citations: pH - Hanna 2016; Temperature, DO, Salinity, and Specific Conductivity - YSI 2013; Turbidity - Eutech 2006; Alkalinity - LaMotte.

[3] Water quality objectives and benchmarks are found in SOP 9.

Table 4 (continued). Measurement Quality Objectives for the Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a and 2019b).

Activity	Measure / Quality Indicator	Quality Objective
California Rapid Assessment (CRAM)	Riverine Wetlands Scoring Sheets	100% of metrics calculated
	Plant Community Metrics - Taxonomic Resolution	Identifications made to species level (see taxonomic standards)
	Plant Community Metrics - Identification Accuracy	95% Accuracy
Physical Habitat (PHAB)	Length, Width, Depth Measurements Accuracy	if measurement is in cm: ± 1 cm if measurement is in m: ± 0.1 m
	Depth of Substrate Particle Accuracy	± 1 mm
	Particle Size Accuracy	If size class not used, measurement to nearest ± 1 mm, unless less than 1 cm, then nearest ± 0.01 mm
	Cobble Embeddedness Accuracy	± 5%
	Flow Habitats Accuracy	± 5%
	Discharge - Velocity Area Method - Velocity Accuracy	+/- 0.1 cfs
	Discharge - Buoyant Object Method - Float Time Accuracy	± 1 second
	Stadia Rod Measurement Accuracy	± 0.5 cm to ± 1 cm, depending on equipment
	Slope Percent Accuracy	± 0.5%
	Bearing Range	0 - 359°
	Bearing Measurement Accuracy	±1°
	Densiometer Accuracy	90% Accuracy for densiometer point readings
Water Chemistry [3]	MDL, Precision, Bias	See lab method performance requirements for specifications by analyte
	WQ Objectives/Benchmarks	Total Nitrogen: 0.42 mg/L Total Phosphorus: 1.71 mg/L Total Selenium: 0.05 mg/L Chloride – Malibu Creek: 500 mg/L Chloride – Calleguas Creek: 150 mg/L Sulfate – Malibu Creek: 500 mg/L Sulfate – Calleguas Creek: 250 mg/L

[1] Macroinvertebrate Taxonomic and Identification information from SWAMP 2009.

[2] Accuracy information for water quality field measurements were from the following citations: pH - Hanna 2016; Temperature, DO, Salinity, and Specific Conductivity - YSI 2013; Turbidity - Eutech 2006; Alkalinity - LaMotte.

[3] Water quality objectives and benchmarks are found in SOP 9.

Table 4 (continued). Measurement Quality Objectives for the Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a and 2019b).

Activity	Measure / Quality Indicator	Quality Objective
Water Chemistry [3] (continued)	Lab MQO	See the weblinks in the Literature Cited section under SWAMP - Quality Control and Sample Handling Guidelines.
Benthic Macroinvertebrates [1]	Taxonomic resolution	Identifications made to the species level, but *Chironomidae* to genus (see taxonomic standards)
	Identification Accuracy	90% accuracy
	Identification Completeness	99%
Aquatic Amphibians	Taxonomic resolution	Identifications made to species level (see taxonomic standards)
	Identification Accuracy	100% accuracy for broad category ID
Photographs	Image resolution	8 megapixel or greater
	Image format	JPEG w/ embedded EXIF metadata
	GPS accuracy	±10 m
In-Field Water Chemistry Measures[2,3]: pH	Units	standard pH Units
	Accuracy	± 0.05 pH
	Resolution	0.01 pH
	Range	-2 to 16 pH
	WQ Objective/Benchmark	6.5 – 7.5 pH
	Reporting	Report up to two decimals
	Calibration/Data Correction Criteria	± 0.1 pH
In-Field Water Chemistry Measures[2]: Temperature	Units	degrees Celsius (°C)
	Accuracy	± 0.3 °C
	Resolution	0.1 °C
	Range	0 to 45 °C
	Reporting	report to one decimal
	Calibration/Data Correction Criteria	± 0.2 °C
In-Field Water Chemistry Measures[2]: Dissolved Oxygen Saturation	Units	% saturation
	Accuracy	0 to 200%: ± 2% of the reading or ± 2% air saturation, whichever is greater 200 to 500%: ± 6% of the reading
	Resolution	0.1% or 1% air saturation (user selectable)
	Range	0 to 500% air saturation

[1] Macroinvertebrate Taxonomic and Identification information from SWAMP 2009.

[2] Accuracy information for water quality field measurements were from the following citations: pH - Hanna 2016; Temperature, DO, Salinity, and Specific Conductivity - YSI 2013; Turbidity - Eutech 2006; Alkalinity - LaMotte.

[3] Water quality objectives and benchmarks are found in SOP 9.

Table 4 (continued). Measurement Quality Objectives for the Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a and 2019b).

Activity	Measure / Quality Indicator	Quality Objective
In-Field Water Chemistry Measures[2]: Dissolved Oxygen Saturation (continued)	Reporting	TBD
	Calibration/Data Correction Criteria	± 2%
In-Field Water Chemistry Measures[2,3]: Dissolved Oxygen	Units	milligrams per liter (mg/L)
	Accuracy	0 to 20 mg/L: ± 2% of the reading or ± 0.2 mg/L, whichever is greater 20 to 50 mg/L: ± 6 % of the reading
	Resolution	0.01 or 0.1 mg/L (user selectable)
	Range	0 to 50 mg/L
	WQ Objective/Benchmark	7 mg/L
	Reporting	Report up to two decimals
	Calibration/Data Correction Criteria	± 0.3 mg/L
In-Field Water Chemistry Measures[2,3]: Specific Conductivity	Units	microsiemens per centimeter [µS/cm] (unit used for recording and available on sonde probe) millisiemens per centimeter [mS/cm] (unit available on sonde probe)
	Accuracy	1-m or 4-m cable, ± 1.0% of reading or 1.0 µS/cm, whichever greater
	Resolution	0.0001 to 0.1 mS/cm (range dependent)
	Range	0 to 200 mS/cm (auto range)
	WQ Objective/Benchmark	878 µS/cm
	Reporting	report to nearest whole number (µS/cm)
	Calibration/Data Correction Criteria	When ≤ 100 µS/cm: ± 5% When > 100 µS/cm: ± 5%
In-Field Water Chemistry Measures[2.3]: Turbidity	Units	NTU
	Accuracy	0 to 500 NTU: ± 2% of reading ± 1 LSD 501 to 1000 NTU: ± 3% of reading ± 1 LSD
	Resolution	0 – 19.99 NTU: 0.01 NTU 20 – 99.9 NTU: 0.1 NTU 100 – 1000 NU: 1 NTU
	Range	0 to 1000 NTU
	WQ Objective/Benchmark	3.8 NTU

[1] Macroinvertebrate Taxonomic and Identification information from SWAMP 2009.

[2] Accuracy information for water quality field measurements were from the following citations: pH - Hanna 2016; Temperature, DO, Salinity, and Specific Conductivity - YSI 2013; Turbidity - Eutech 2006; Alkalinity - LaMotte.

[3] Water quality objectives and benchmarks are found in SOP 9.

Table 4 (continued). Measurement Quality Objectives for the Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a and 2019b).

Activity	Measure / Quality Indicator	Quality Objective
In-Field Water Chemistry Measures[2.3]: Turbidity (continued)	Reporting	report to two decimals
	Calibration/Data Correction Criteria	± 10%
In-Field Water Chemistry Measures[2]: Alkalinity	Units	ppm
	Accuracy	± 4 ppm
	Resolution	4 ppm
	Range	0 to 200 ppm
	Reporting	report to nearest whole number
In-Field Water Chemistry Measures[2]: Salinity	Units	parts per trillion (ppt)
	Accuracy	±1.0% of the reading or 0.1 ppt, whichever is greater
	Resolution	0.1 ppt
	Range	0 to 70 ppt
	Reporting	report to one decimal
	Calibration/Data Correction Criteria	None. salinity is calculated in sonde from conductivity and temperature

[1] Macroinvertebrate Taxonomic and Identification information from SWAMP 2009.

[2] Accuracy information for water quality field measurements were from the following citations: pH - Hanna 2016; Temperature, DO, Salinity, and Specific Conductivity - YSI 2013; Turbidity - Eutech 2006; Alkalinity - LaMotte.

[3] Water quality objectives and benchmarks are found in SOP 9.

Table 5. Laboratory method performance requirements and analysis methods to be used for water chemistry analysis in the Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a).

Analyte	Units	MDL Objective	Transition Value	Precision Objective	Accuracy Objective	Potential Methods conforming to NELAC guidance
Total Nitrogen (TN)	mg/L	0.0208	0.05	± 20%	± 20%	Standard Methods #4500-N CM v21
Total Phosphorus (TP)	mg/L	0.0041	0.01	± 20%	± 20%	Standard Methods #4500-P H
Sulfate, Dissolved	mg/L	40	200	± 20%	± 20%	EPA 300.0
Chloride, Dissolved	mg/L	20	100	± 20%	± 20%	EPA 300.0
Selenium, Total	µg/L	0.6	1.0	± 20%	± 20%	EPA 1638M

Table 6. Taxonomic standards to be used in the Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a and 2019b).

Category	Activity Number	Activity	Standard to be Used	Reference / Authority
Collection of Observational Data	3	California Rapid Assessment (CRAM) - Plant Species	Scientific Publication	The Jepson Manual: vascular plants of California, second edition (2002)
	5	Aquatic Amphibians	Field Subject Matter Expert	NPS Wildlife Biologists and Field Crew
	5	Aquatic Amphibians	Scientific Publication	Western Reptiles and Amphibians, 3rd edition. 2003, by Robert C. Stebbins, Robert C. Western Reptiles and Amphibians, 3rd edition. Peterson Field Guide.
	9, 16	Benthic Macroinvertebrates	Taxonomic Subject Matter Expert	D. Pickard, CDFW Aquatic Bioassessment Laboratory Taxonomist
	9, 16	Benthic Macroinvertebrates	Scientific Publication	Richards, A.B. and D.C. Rogers 2011. Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) List of Freshwater Macroinvertebrate Taxa from California and Adjacent States including Standard Taxonomic Effort Levels - SAFIT Level 2. (https://www.safit.org/Docs/STE_1_March_2011_7MB.pdf)
Reporting of Observational Data	3	California Rapid Assessment (CRAM) - Plant Species	Scientific Publication	Integrated Taxonomic Information System (ITIS) (https://www.itis.gov/)
	5	Aquatic Amphibians	Scientific Publication	Integrated Taxonomic Information System (ITIS) (https://www.itis.gov/)
	9, 16	Benthic Macroinvertebrates	Scientific Publication	Integrated Taxonomic Information System (ITIS) (https://www.itis.gov/)

Table 7. Professional and laboratory accreditation requirements for the Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a).

Accreditations	Parameter	Accreditation Requirement	Location of Certification Documentation
Professional	Species Identifications	Professional Wetland Ecologist	At this time a formal certificate does not exist on file at MEDN.
Lab	Total Nitrogen (TN), Total Phosphorous (TP), Sulfate, Chloride, Selenium	CA State Water Resources Control Board - Environmental Laboratory Accreditation Program (ELAP)	At this time a formal certificate does not exist on file at MEDN.

Table 8. Data Protection standards for the Protocol Implementation Plan for Monitoring Stream Condition in the Mediterranean Coast Inventory and Monitoring Network of Southern California (Federico et al. 2019a).

Category	Type of Data	Level of Protection	Rules for Dissemination
Location Data and Information	Amphibian Monitoring Locations	Operationally protected	Provided to NPS personnel upon request. Shared outside NPS upon request and only with permission of park(s).
Resource Data and Information	Federally listed T&E species locations	Legally Protected	Locations of observations reported at park centroid only.
Personally Identifiable Information	Non-NPS Staff Information	Legally Protected	All but first initial and last name redacted from public release

With the exceptions noted, all data collected are to be made publicly available in a timely fashion.

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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.

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