

Invasive Species Early Detection Monitoring Protocol for Klamath Network Parks

Standard Operating Procedure (SOP) #5: Field Survey Methods

Version 2025Jun09

Citation for this SOP:

Klamath Network. 2025. Standard Operating Procedure 5: Field Survey Methods: 2025Jun09. Klamath Network Early Detection Monitoring Protocol for Klamath Network Parks. Unpublished National Park Service Report, Klamath Inventory and Monitoring Network, Ashland, Oregon.

Citation for the original protocol:

Odion DC, Sarr DA, Mohren SR, Klinger RC. 2010. Invasive Species Early Detection Monitoring Protocol for Klamath Network Parks. Natural Resource Report. NPS/KLMN/NRR—2010/227. National Park Service. Fort Collins, Colorado <https://irma.nps.gov/DataStore/Reference/Profile/2124867>

(Note that updated versions of the protocol are linked from the original IRMA record.)

To create a new version of this SOP, carefully follow the instructions for the KLMN (caves) SOP: Revising the Protocol (<https://irma.nps.gov/DataStore/Reference/Profile/2238840>). Use the Revision History Log below to describe the revisions:

- Populate the top table of the revision history log, providing the previous version date, author of the change, a specific but concise description of the changes made, the footnote number associated with change details, and a new version date.
- In the bottom table, add a footnote and as much text as needed to describe in detail the reasons for and implications of the change.
- Replace en dashes with text.

Previous Version Date	Author of Change	Changes Made	Footnote #	New Version Date
2010	SBS	Added description of placing new random plots if predetermined plots are unreachable.	1	5/18/2011
5/18/2011	SBS	Dropping of randomized segment sampling.	2	12/16/2022
12/16/2022	SMB	Continued ISED protocol update	3	4/20/2023
4/20/2023	LNy, AS	Continued ISED protocol update	4	4/18/2025
4/18/2025	TB	Update to format to comply with section 508.	–	6/09/2025

Footnote #	Detailed Reasons for and Implications of the Changes
1	Some random plots are too steep to sample
2	Protocol update to reflect ISED alteration discussions among parks
3	Corrections made to remove segment language, clarify the procedures for segment selection and sampling, additional clarity in language throughout.
4	Corrections made to further clarify segment selection.

This SOP details field data collection methods to be used in this protocol. Field data collection is primarily completed electronically and only done manually as a last resort. The core staffing for the field data collection will be two seasonal employees who will be trained by and work closely with the Crew Lead (who may be one of the two crew members) and/or Protocol Lead. To prepare for field data collection, each member of the crew, or supplemental staff, will attend training on how to use the electronic equipment to collect data (SOP #3: Observer Training). It is the responsibility of the Protocol and Crew Lead to ensure that the seasonal crew members are proficient in all the field data collection, entry, and management methods before going into the field.

Selecting Sampling Sites

Monitoring of prioritized species will primarily occur along roads and trails as determined by park staff. Roads may include those in campgrounds or other developed areas. Prior to visiting a park, the Protocol Lead will work with park staff to develop a list of areas and segments that will be sampled in the sampling season. This process (along with the prioritized species list) should be initiated by KLMN by mid-January. We encourage parks to develop sample frames that include specific management areas of interest, with segments grouped (in close proximity) to reduce travel time between segments and improve efficiency. Busy roads will not be sampled due to safety concerns.

Previous iterations of the protocol divided the entire sampling frame per park into 3km segments, of which sampling was then done in 500m subsegments, with randomized plots located along each subsegment. The subsequent elimination of all randomized elements of the protocol, including the elimination of randomized segment sampling and all plot work necessitated an alteration to the protocol to drop both the 3km segment requirement as well as all subsegments. The protocol sampling frame is now one of sampling linear segments (as determined by the park and KLMN staff) which include roads and trails, developed areas in the park including campgrounds, and powerlines. There is no expectation of a standard segment size (i.e., 3 km lengths are not required), and segment sizes should be representative of natural breaks in sampling to facilitate coherent beginning and end points to sampling segments (e.g. trailhead to trail junctions, road segments between specific locations, individual roads within campgrounds).

In addition to the roads and trails sampling frame, the protocol allows for KLMN and park staff to identify extra area searches. These areas can account for up to 25% of total sampling days and will be sampled only after completing the road and trail sample frame (estimates are 8 days for roads and trails and 2 days for extra area, equaling 10 days total). These extra areas are a park directed sampling frame which may include a range of other linear features, including but not limited to fire suppression features such as dozer or handlines, boundary fences, lake shores, and even stream segments, and can include off-trail areas. Park staff can select polygons for the 25% extra search areas, however in that case, park staff must clearly identify linear features within the polygon to be sampled. We encourage park staff to prioritize safety and accessibility, minimizing travel time to maximize sampling efficiency and enhance the chances of early detection. All areas selected for

surveying must comply with KLMN safety standards, ensuring they are not on dangerously steep slopes and are within 1000 m of a road or trail.

Collecting Occurrence Data

Data will be collected using a digital device provided by the KLMN data manager (SOP #6: Data Collection and Entry). Data will only be collected for species included in each park's priority invasive species list, which can be updated and adjusted by park staff as needed prior to sampling seasons.

As the crew hikes the linear sampling segment, they will collect: 1) the beginning point for every sampling segment, 2) a trackline of the linear segment, 3) an end point for each linear segment sampled, and 4) individual point data for the location of all prioritized species observed along the sampling segment. Tracklines will be collected in Avenza. Point data will be recorded in ESRI Field Maps and care should be taken to fill out all fields. Individual populations of target species are to be considered distinct if they are separated by a distance of 20 m. Crews will record their Effective Detection Distance (EDD) for each linear segment (the maximum distance from which an observer can consistently detect a prioritized species). Effective Detection Distance will not be consistent among segments as it will vary with vegetation type, physiognomy, and density. EDD will be high where ground vegetation is minimal and low where ground vegetation is dense (e.g., in dense chaparral). EDD will be recorded at the beginning and end of each linear segment to account for variation across the length of a sampled segment. The distance from the road or trail, to the infestation can be determined more accurately using a tape measure, but may also be paced. All infestations will have the same suite of data collected at each distinct infestation (see Data Collection below).

In some instances, there may be a high density of prioritized species along a linear segment. It is highly inefficient to record every instance and population of a more ubiquitous species that is found distributed throughout an entire linear segment. If this occurs, the whole segment can be considered infested, suggesting to managers that the entire segment be searched and treated for the species found. If the crew should encounter this situation, the crew shall consider evenly spacing point data that can reflect not only the distribution of the species across the entire linear segment, but also to capture the relative abundance of the species throughout the sample area. Consider starting with a population, then make an educated guess about evenly distributing repeat sampling points for this species in as even a way as possible; be sure to include additional notes indicating this population is continuous/ubiquitous in the area.

Should the species occur in a continuous pattern throughout the area, record a single point somewhere between the segment start and end points, with care taken to note the continuous nature of the population in the notes field, recording all other data.

Data Collection

ESRI Field Maps

For this project, we will use a tablet computer and ESRI Field Maps to collect point data while in the field. The data collection forms incorporate auto-populated fields and domain values to ensure that data are being collected in an efficient and accurate manner (SOP #6: Data Collection and Entry).

Two different forms are used for data collection: the *Invasive_Start_Stop* form and the *Invasive_Point* form. Data collected include:

Invasive_Start_Stop form:

- **Route-** if there is no name or it is unknown, select “Other” and enter and information in the Comments field.
- **Comments-** optional field for any comments
- **Date/Time-** select form calendar
- **Effective Detection Distance (m)**

Invasive_Point form:

- **Species from Priority List**
- **Non-Priority Species**
- **Survey Date/Time**
- **Is this an Extra Area Search** (yes or no)
- **GPS Unit** (Trimble or Garmin)
- **Phenology**
 - Bolting
 - Bud
 - Dead
 - Flowering
 - Mature
 - Rosette
 - Seed Set
 - Seedling
- **Distance from road/trail (m)**

- **Infestation size**
 - < 1 m²
 - 1-25 m²
 - > 25 m²
- **Percent of Area Infested**
 - < 1 %
 - 1-5 %
 - 5-25 %
 - 25-50 %
 - 50-75 %
 - 75-95 %
 - 95-100 %
- **Whether the infestation was treated** (yes or no)

Avenza

Where possible, the crew should create tracklines in Avenza to document their survey route.

Treatment of Invasive Species

One of the primary goals of this project is to survey trails, roads, and extra areas to record occurrence data and report it in a timely manner to park staff. It is neither a specific goal of this project nor the responsibility of the Inventory and Monitoring Program to eradicate observed invasive species.

Therefore, a major responsibility of the Crew Lead is to report any detected locations of a priority species to the Park Contact in a timely manner (coordinate with parks as to what they view as timely) and to maintain close communication with park managers throughout the year. With the revision of this protocol we have downweighed analysis and trend detection and pivoted to recognize the ultimate goal of park managers is early detection and rapid response to control and eradicate novel infestations.