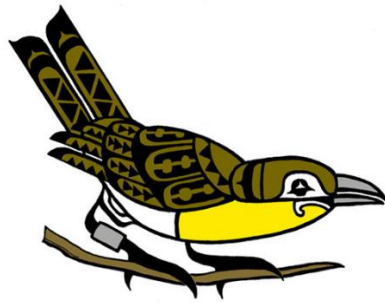


**Klamath Bird Observatory's
Landbird Monitoring
Vegetation Protocol
developed in partnership with the
National Park Service
Klamath Network**



Procedures in this document are excerpted from the NPS Klamath Network Landbird Monitoring protocol (Stephens et al. 2010), and selected SOPs have been updated with minor changes that will be incorporated into a future revision of the Stephens et al. (2010) protocol.

Lit Cited:

Stephens, J. L., S. R. Mohren, J. D. Alexander, D. A. Sarr, and K. M. Irvine. 2010. Klamath Network Landbird Monitoring Protocol. Natural Resource Report NPS/KLMN/NRR—2010/187. National Park Service, Fort Collins, Colorado.

Landbird Monitoring Protocol for Klamath Network Parks

Standard Operating Procedure (SOP) #8: Conducting Vegetation Surveys

Version 1.03

To create a new version of this SOP, 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.

Revision History Log:

Previous Version Number	Author of Change	Changes Made	Footnote #	New Version Number/ Date
1.00	J. L. Stephens	A. Changed cover estimates from categorical to numerical to the nearest 5% bins. B. Added additional fields to collect data on natural and anthropogenic disturbance.	1	1.01 5/3/12
1.01	J. L. Stephens	A. Codes for "Split" field were changed from Y/N to A/B. B. Added minimum size to snag count.	2	1.02 1/20/14
1.02	J. L. Stephens	A. Updated revision history log.	3	1.03 4/3/17

Footnote #	Detailed Reasons for and Implications of the Changes
1	A. Increase precision of cover estimates. When analyzing data with those from the previous protocol version, 5% bins can be lumped into previous categories. B. Increase understanding of vegetation structure and composition.
2	A. Increase clarity in data. Both Y/N and A/B will need to be used in analysis to indicate split plot. B. Snags under 5cm typically were not being counted by observers because they were not considered as serving the function of a snag (e.g. nesting, foraging). There are no analytical implications.
3	A. Added additional notes regarding previous changes, reasons, and implications in new format.

SOP #8: Conducting Vegetation Surveys (continued).

This SOP consists of instructions for conducting the vegetation survey. The Vegetation Survey Form is provided at the end of this SOP.

Introduction

This is a system for assessing habitat characteristics in an efficient and timely fashion at landbird monitoring stations. Using the relevé methodology, the information collected will provide enough data to describe the vegetation formation, association, and structure. The data have some logical relationship with bird requirements for feeding or nesting. The method provides enough quantitative information for correlative analyses and ordinations. It is flexible so that it can be applied to any vegetation formation, including deserts, grasslands, and forests. This method follows recommendations put forth in Ralph and Bingham (2004).

Timing of the Survey

To facilitate locating each station, typically vegetation surveys should be conducted at stations along point count routes during the afternoon preceding the point count survey for that route. If an observer has completed the route in the past and is familiar with the locations of each station, he or she may opt to complete the vegetation survey after completing the point count survey if it is logistically advantageous. At the Oregon Caves banding station, the vegetation surveys should be completed once in June or July.

Location of the Survey

A 50 m plot is established, centered at a point count station or net location.

Conducting the Survey

Begin by walking around the point and identifying the species that make up the major structural components of the habitat. Determine the number of major layers of vegetation within your relevé by their dominant growth form: tree (T), shrub (S), herb (H), and moss (M). The classification of the T, S, H, and M layers does not limit the species which will be assigned to the layers (e.g., not only trees in the T layer). This process merely attempts to describe the structure of the vegetation.

In a forest with all layers, the tree layer is the uppermost stratum, dominated by mature trees. It may be a single layer or consist of two or more sublayers recognizable by marked changes in density and canopy status (see below). The shrub layer is dominated by shrubs or small trees. The herb layer is dominated by low growing plants, typically non-woody, although seedlings and other shorter trees and shrubs may be present. The moss layer is dominated by such plants as mosses, lichens, and liverworts. Bare ground and litter are ignored for this classification scheme.

For purposes of bird-habitat association, only species of trees and shrubs and woody herbs need be identified and recorded in the data below. For other herbaceous herbs, a generic name such as FERN or HERB will suffice. Moss (MOSS), lichen (LICH), and mistletoe (MIST) should be recorded in all layers in which they occur. If a plant cannot be identified in the field, bring it back to be keyed out later. Do this only if the plant makes up a significant part of the relevé(s). All snags within the plot are counted according to size class.

SOP #8: Conducting Vegetation Surveys (continued).

It is important that the total time spent taking information not exceed 15 minutes. In simple, one-layered, open vegetation sites, it can easily take less than 10 minutes per station. If you are taking longer than this, you are probably debating too much over minor details, especially layers of trees. However, new observers should expect to spend additional time at first until completely familiarized with species identification and the protocol.

Completing the Field Form

First complete the data at the top of the field form as follows:

Plot Radius (m): The radius of the plot, which will always be 50 m.

Page: The page number of current page and the total pages for the survey route or banding station.

State: The two letter abbreviation for the state where the field site is located.

Project/Region: The code for the project, which will differ by park.

Site Code: The code for the point count route or mist net site.

Site Name: The name of the survey route or mist net site.

Point: The station or point number where the relevé was conducted; use 2-digits, for example 01, 02, 03, etc.

Split: To indicate a split plot, enter 'A' for the first plot and 'B' for the second plot. Blank if plot was not split.

Observer: The first, middle, and last name initials of the observer.

Month-Day-Year: The date of the survey using two numbers for month and day and four numbers for year.

Location Notes: Describe any unusual site characteristics, problems encountered, or changes related to the location.

Complete the data in the second part of the field form. We consider that there are up to four vegetative layers (tree, shrub, herb, and moss) within each relevé. In addition, there can be one or more sublayers that comprise the tree and shrub vegetative layer. The following is a set of height classes used to separate vegetative layers. Heights are relative to the ground or fallen logs and height classes are used only as a guide and are not taken as absolute values.

- Tree Layer: Trees and shrubs usually taller than 5 m.

SOP #8: Conducting Vegetation Surveys (continued).

- Shrub Layer: Shrubs, small trees, and tall herbs approximately between 50 cm to 5 m tall.
- Herb Layer: Herbs, small shrubs, and very young trees 10 cm to 50 cm tall.
- Moss Layer: Plants less than 10 cm high, on the ground or on fallen logs.

Total Cover (Tot. Cov.): For each of the four layers, estimate cover of all plants combined to the nearest 5 percent (i.e., up to 100% cover). Record cover <5% using classes. Fill in 0's if no cover in the layer.

1 = numerous, but less than 5% cover or scattered with cover up to 5%

+ = few, with small cover

R = rare, solitary, with small cover

0 = none

Number of Sublayers (# SB): Recorded as the number of very obvious sublayers in each primary layer. Sublayers need not be recorded unless they are very obvious. Very rarely would there be more than two sublayers. The sublayers can be useful to the ecologist by providing a quick overview of the structure of a primary layer. They are primarily relevant to the tree layer, although sometimes are seen in the shrub layer. Sublayers are sometimes obvious when one species is shorter than the dominant species of the upper portion of the layer. In addition, sublayers are sometimes formed by two cohorts of one species, possibly related to some event. For example, a thick stand of young, 6 m Douglas-fir may include scattered, old, emergent individuals as well. Rarely, a third, lower layer of shade tolerant species is clear. If sublayers are present, they are obvious. Do not spend much time trying to see sublayers.

Height (Low, Upper, and Sublayer): Recorded to the nearest meter for the tree layers and the nearest decimeter (0.1 m) for the shrub layers, the average height of the lower and upper bounds of each of the layers and the upper bound of the lower sublayer if one is present.

Species (under height): Recorded as the species (use the four letter code - first two letters of the genus and the first two letters of the species) that is most common in the upper and lower limits of the layer.

DBH: For the tree layer, record the minimum and maximum diameter at breast height, to the nearest cm, of the smallest and largest tree in the plot.

Species (under DBH.): Recorded as the species of tree with maximum DBH and the species of tree with the minimum DBH.

Next, complete the data under the composition heading of the field form as follows:

SOP #8: Conducting Vegetation Surveys (continued).

Species: Use the four letter code to record the plant species. It is important to use the standardized four letter code. If you are unsure of the species or proper code, please use the notes field to write an explanation and use a reference (e.g., <http://plants.usda.gov/>) to look up the correct code or species.

Sublayer: If no sublayers are present, only the primary layers (T, S, H, M) are used in the first row of the sublayer field. If sublayers are present, the primary layer letter on the top is followed by a sublayer number (e.g., T1 [tallest trees], T2, S1, S2...) below it on the bottom in the same column.

Cover (under Sublayer): Record the percent cover to the nearest 5 percent that each species covers out of the entire circle. Record cover less than 5 percent using classes (1, +, R). Since all the trees (or shrubs) in a primary layer can overlap, the total of all the species can add up to more than the total cover recorded above. Fill in 0's if no cover for a species is present in the sublayer.

Vegetation Notes: Describe unknown or unique plant codes used. If you are unsure of a code or used a common name, please make a note of it here.

Snags: The number of snags according to size class (>5 and <14.9, 15-27.9, 28-63.9, 64-101.9, >102 cm DBH) should be recorded. They can be tallied while you are collecting data on the plot and then summed in the Count column. You should not spend more than 5 minutes on the snag count. If the snags cannot be tallied individually, total counts should be estimated. Fill in 0's if no snags present. A snag is defined as a standing dead tree that has not been chainsawed and is >1.5 m in height.

Information about the point count location should be recorded in the field to supplement spatial information obtained from other sources. Ground-truthing and careful visual inspection provide important information about the point count location. Field crews should be informed of the types of treatments which they should expect to encounter on a project, and report any unusual treatments to the Project Lead.

Water: Recorded as '+' if water is present within the plot radius or '-' if there is no water in the plot. Permanent or semi-permanent sources of water are recorded (e.g., flowing creeks, seeps, or ponds).

R/U: R = Riparian plant species comprise a minimum of 5% of the plot radius. U = Plot radius is not composed of at least 5% riparian plant species.

TYPE: The type of water present within 100 m of the plot center; F = Flowing water (e.g., river, stream, or creek), P = Pond, W = Wetland, L = Lake.

AREA: The size of the entire riparian area (includes contiguous riparian outside of the plot); 1 = less than 0.5 hectares, 2 = between 0.5 and 4 ha, 3 = >4 ha.

SOP #8: Conducting Vegetation Surveys (continued).

Natural or Prescribed Fire (Burned): B = Recently burned vegetation (e.g., scorched shrubs, trees with brown leaves still on branches, etc.) with greater than 10% cover within the plot. U = Plot is unburned or with less than 10% burned vegetation.

While the burned and unburned categories are limited to recent occurrence, the type, % plot, and time include both recent and past events.

Type: record the type of treatment using the appropriate code as detailed below.

%Plot: Record the proportion of the 50 m radius plot, which has been affected by the natural or anthropogenic disturbance. For example if half of the trees were harvested on thirty percent of the plot, record 30%. If there is no clear boundary, and a disturbance such as grazing is evident, record 100%.

Time: Time since treatment should be recorded using codes W = week, S = season, Y = year, R = recent, 1–5 years, O = older, 5–10 years, H = historic, >10 years, and U = unable to determine. Use the guide below to assist in identifying time since treatment.

Types of natural and prescribed fire:

- Piles Burned (PB): look for patches of burned ground with remnant slash
 - Record if slash piles have been burned as part of a hand-pile burn fuel treatment.
- Lightning or unknown burn scars (BS): looks for burn scars on a single tree
 - This category should be used to record burn scars on individual tree within the plot, such as caused by a lightning strike. Include unknown limited burn scars in this category.
- Underburn (UN): look for burn scars at the base of several trees
 - During low intensity fire the majority of canopy trees are retained, and trees show burn scars around the base. This category may include prescribed fire, burn scars from low intensity wildfire, or burn scars from extensive pile burning. Woody shrubs will initially be reduced, but may regenerate overtime.
- Wildfire (WF): look for burned snags
 - Moderate to high intensity wildfire or other fire, which top kills trees and creates snags. In some cases snags may have been removed during salvage logging. Older burns may show regeneration of tree species which benefit from fire such as Pacific Madrone or Lodgepole Pine.

Additional Natural and Anthropogenic Disturbances (Other): Recorded as '+' if other natural or anthropogenic disturbances are present within the plot radius or '-' if there are no additional disturbances.

SOP #8: Conducting Vegetation Surveys (continued).

- Lop and scatter (LS): look for slash on the ground
 - In a pre-commercial thin small trees and shrubs are removed to reduce fuel loading and increase the growth of remaining trees. Slash is spread out instead of piled.
- Hand-piled (HP): look for slash piles
 - In a pre-commercial thin small trees and shrubs are removed to reduce fuel loading and increase the growth of remaining trees. Slash is piled prior to burning and sometimes may be covered with black plastic. In older treatments cut-off bases of woody shrubs may be an indication of treatment. Look for smaller regenerating shrubs in contrast to retained older woody shrubs.
- Masticated (MS): look for chips and woody debris on the ground
 - As part of a pre-commercial thin, woody debris are broken up and spread out on the ground where it may remain for a number of years. In older treatments cut-off bases of woody shrubs may be an indication of treatment. Ground cover may be reduced due to the woody debris. Look for smaller regenerating shrubs in contrast to a few retained older woody shrubs.
- Commercial Thin (TH): look for cut-off tree stumps as an indication of thinning
 - This category includes commercial harvests in which some of the full-sized trees have been removed for sale, and stumps can be located in the field. Also include any partially harvested treatments in which stumps of full-sized trees are clearly evident. After older or historic thinning stumps may be apparent with a dense layer of small trees regenerating in the gaps created from harvesting. Look for stumps in areas with two distinct tree layers. Height of stump sprouts or small trees may be used to assist with ageing the treatment.
- Clearcut (CC): look for large open areas in which the majority of trees have been cut
 - This category includes commercial harvests in which almost all full sized trees have been removed for sale. Occasionally residual trees may be retained. Overtime these large openings will regenerate with dense early seral vegetation. Height of stump sprouts or small trees may be used to assist with ageing the treatment.
- Girdled (GD): look for snags marked with rings
 - Girdled trees will have a strip of bark completely removed around the trunk of the tree, which causes the tree to die and create a snag. In some forests this type of management may be used to increase the number of snags to benefit certain wildlife species.

SOP #8: Conducting Vegetation Surveys (continued).

- Planted (PL): look for even-aged, evenly spaced trees planted in rows
 - Planted areas will usually show a uniform distribution of a single species. Look for rows of trees of the same age and species.
- Bark Beetle (BB): look for dead trees or snags without evidence of fire
 - Outbreaks of Mountain Pine Bark Beetle often occur in coniferous forest, especially forests of ponderosa and lodgepole pine. The beetles reproduce in the inner bark, and healthy trees often produce resin to help fight the attack. This can result in popcorn-shaped masses of resin, called pitch tubes, on the exterior of the tree where the beetles have entered. The tree remains green when first attacked, but usually within a year will be dead or dying and the needles will turn red. In three to four years very little foliage is left and trees appear grey. In the absence of fire, large stands of dead trees or snags may be an indication of a pine bark beetle outbreak.
- Flooded (FD): look for trees and shrubs surrounded by water
 - Record the extent of the plot that is underwater, which is not part of a stream or lake. Flooded areas will typically show vegetation above the water level.
- Grazed by cattle (GZ): look for fences, piles of cow dung, hoof prints, and limited shrub cover
 - Seasonally grazed areas will typically be fenced and may show piles of dried cow dung. Shrub cover may be limited in grazed areas, and show a clear contrast with adjacent ungrazed areas. Current or heavily grazed areas may have reduced herbaceous cover, show evidence of hoof prints, soil compaction or erosion. Wild ungulates such as deer or elk should not be recorded under grazing.
- Bulldozed (DZ): look for dug up or scraped ground
 - Record any extensive ground disturbance in this category.
- Additional (AD): record other treatments that do not fit in the above categories
 - Any other treatments should be carefully described in the notes. Additional unknown treatments should be discussed with the Project Lead.

References

Ralph, C. J., and B. Bingham. 2004. Instructions for completing the location and vegetation form: The releve technique. Redwood Sciences Laboratory, Arcata, CA.

