

SURVEY PROTOCOL

FOR THE

RED TREE VOLE

Arborimus longicaudus

(= *Phenacomys longicaudus* in the Record of Decision
of the Northwest Forest Plan)

Version 2.1

Revision, October 2002

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This revision replaces the Executive Summary and page 9 through (most of) page 13 in Version 2.0 of the Survey Protocol for the Red Tree Vole. The sections of Version 2.0 that have not been revised are to be used in conjunction with Version 2.1.

EXECUTIVE SUMMARY

Species: Oregon red tree vole (*Arborimus longicaudus* = *Phenacomys longicaudus* of the Record of Decision (ROD) of the Northwest Forest Plan (NFP]).

Taxonomic Group: Mammal

Objectives: The objective of this survey protocol is to provide a consistent approach for locating active red tree vole sites in proposed project areas within the species' known or suspected range and habitat conditions within the Northwest Forest Plan area. This protocol (Version 2.1) replaces the Executive Summary and the identified sections on pages 9-13 of Version 2.0 of the "Survey Protocol for the Red Tree Vole" that was transmitted in 2000 as an attachment to the U.S. Forest Service (R6) and Bureau of Land Management (BLM) memorandum (1630/1736-PFP (BLM-OR931)P, 1920/2600 (FS), BLM Instruction Memorandum No. OR-2000-037 dated February 18, 2000). In addition, this protocol modifies the elevation in which surveys are required, dropping to 5,500 feet or below only.

Range: The Oregon red tree vole is endemic to moist coniferous forests of western Oregon and extreme northwest California and its' known and suspected range extends from the Columbia River south through western Oregon and the Siskiyou Mountains south to the Salmon and Klamath Rivers in northern California. On page 5 of the Survey Protocol for Red Tree Vole, Version 2.0 the known and suspected geographic range should now follow the 5,500-foot elevation contour.

Habitat: The literature on the red tree vole indicates that the species inhabits conifer forests containing Douglas-fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*), Sitka spruce (*Picea sitchensis*) western hemlock (*Tsuga heterophylla*) (Johnson and George 1991) and white fir (*Abies concolor*) (Manning and Maguire 1999). Carey (1991) identifies optimal habitat for red tree voles to be old-growth Douglas-fir forests. Gomez (1992) did not capture the species in hardwood stands, and generally hardwoods are not recognized as an important habitat component. Aubrey et al. (1991) found that red tree voles occur in old-growth forests significantly more than in younger forests, and also suggested that the parameters associated with age (such as large, live, old-growth trees) are important habitat components. Voles do occur in younger stands (Maser 1966; Corn and Bury 1986, 1991; Carey 1991; Johnson and George 1991; Aubrey et al. 1991; Gillesburg and Carey 1991; Gomez 1992), but these younger forests are most likely population sinks rather than sources (Carey 1991) and are unlikely to provide population persistence of red tree voles over the long term.

Based on the literature, old-growth habitat appears to provide optimum conditions for red tree vole populations. The tall, multi-layered canopies of old growth retain humidity and intercept fog, which functions as a climatic buffer and a source of free water. Large branches provide stable support for nests, protection from storms, and travel routes (Gillesburg and Carey 1991). Active nests have been found in remnant older trees in younger stands indicating the importance of legacy structural characteristics (Biswell pers. comm.). However, little is known about the

minimum number or size of conifer trees, or other stand characteristics, required to sustain a local population of red tree voles.

Red tree voles have been documented in conifer stands from sea level to 5,500 feet in elevation (Manning and Maguire 1999).

Criteria for determining the need for pre-disturbance surveys

This survey protocol encompasses habitats associated with the red tree vole as reported in the literature, survey data, habitat modeling and personal observations. Criteria for determining the need for pre-disturbance surveys include:

- 1) The proposed activity (project) is within the known or suspected geographic range of the species.
 - 2) Suitable habitat that may potentially contribute to a reasonable assurance of persistence occurs within the proposed project area (ROD S&G, p 23).
- AND
- 3) The proposed activity has the potential to “cause significant negative effect on the species habitat or the persistence of the species at the site” (ROD S&G, p 22).

Threats: The major threats to this species are the continued loss of occupied sites where these sites may be important to the persistence of vole populations and the increased geographic isolation of remaining populations. This species has many life history characteristics that cumulatively raise concerns for its long-term persistence such as very small home ranges, low dispersal capability, extremely low reproduction potential, short life span and a sensitivity to stand level disturbances.

Information Needs: Current survey protocols and management guidelines could be improved with information on the species' reproductive potential, demographics, population status or trend, and the spatial extent of known sites. Generally, the scientific information needed for management cannot come solely from pre-disturbance surveys. To date pre-disturbance surveys have been limited to locating new sites and collecting counts of the number of nest trees within projects. More studies are vital to improving our understanding of red tree vole ecology, range and distribution, habitat relationships, population trends, effects of prescribed fire on individuals and sites and management options. Further genetic research is needed to resolve the geographic distribution of *Arborimus longicaudus* and *A. pomo* and to determine if there are any ecological differences between the two species.

SURVEY PROTOCOL

Protocol Objectives

The objective of this survey protocol is to provide a standardized approach for locating active red tree vole sites in proposed project areas within the species' known or suspected range and habitat conditions within the Northwest Forest Plan area. This protocol follows direction in the "Record of Decision and Standards and Guidelines for Amendment to the Survey and Manage, Protection Buffer, and other Mitigation Measures" (S&M ROD, 2001). This protocol (Version 2.1) replaces the Executive Summary and identified sections on pages 9-13 of Version 2.0 of the "Survey Protocol for the Red Tree Vole" that was transmitted in 2000 as an attachment to the U.S. Forest Service (R6) and Bureau of Land Management (BLM) memorandum (1630/1736-PFP (BLM-OR931)P, 1920/2600 (FS), BLM Instruction Memorandum No. OR-2000-037 dated February 18, 2000).

Criteria for determining the need for pre-disturbance surveys

There are 3 Criteria for determining the need for pre-disturbance surveys:

- 1) The proposed activity (project) is within the known or suspected geographic range of the species;
 - 2) Suitable habitat that may potentially contribute to a reasonable assurance of persistence occurs within the proposed project area (ROD S&G, p 23);
- AND
- 3) The proposed activity has the potential to a "cause significant negative effect on the species habitat or the persistence of the species at the site" (ROD S&G, p 22).

If all 3 of these criteria are met, then pre-disturbance surveys should be conducted following the guidelines established in this survey protocol.

Criteria 1: The proposed activity (project) is within the known or suspected geographic range.

The Bureau of Land Management Districts and National Forests listed in Table 1 have known Oregon red tree vole sites within their boundaries. All or part of the land area within their jurisdictions fall within the known and suspected range of the species.

Table 1. Bureau of Land Management Districts and National Forests in Oregon and northern California within the known or suspected range of the Oregon red tree vole *.

List of Administrative Units Within the Red Tree Vole Distribution Zones (Amended from FSEIS pg. 379)

| Mesic Forest Distribution Zone | |
|---|---|
| Coos Bay District BLM | Siuslaw NF; Mapleton RD and Waldport RD |
| Medford District BLM; Glendale RA (within Douglas County) | Six Rivers NF; Smith River NRA and Orleans RD (that portion within the known and suspected range) |
| Roseburg District BLM | Umpqua NF |
| Siskiyou NF; Chetco, Powers and Gold Beach RD | Willamette NF; Middle Fork RD |
| Northern Mesic Forest Distribution Zone | |
| Eugene District BLM | Siuslaw NF; Hebo RD |
| Mt. Hood NF; Clackamas River, Zigzag RD | Willamette NF; Blue River, Sweet Home, Detroit and McKenzie RD |
| Salem District BLM; Cascades, Marys Peak, Tillamook RA | |
| Xeric Forest Distribution Zone | |
| Klamath NF; Happy Camp, Scott River, Ukonom RD | Rogue River NF |
| Medford District BLM; Ashland, Butte Falls, Grants Pass RA's and that portion of the Glendale RA not in Douglas county | Siskiyou NF; Illinois Valley and Galice RD |
| *Habitat types or vegetation communities associated with the red tree vole are located at $\leq 5,500$ feet in elevation. | |
| NF = National Forest, RD = Ranger District, RA = Resource Area | |

Criteria 2: Suitable habitat that may potentially contribute to a reasonable assurance of persistence occurs within the proposed project area (ROD S&G, p 23).

Habitat descriptions listed below do not include all stand conditions where red tree vole sites have been discovered. The differences in survey recommendations for stand conditions between distribution zones are based on the following factors: number of known extant sites, detection

rate of red tree vole nests per survey effort, site quality, plant association, amount of late-successional forest, and land ownership patterns. The variation in these factors across the range of the species takes into consideration the need to identify sufficient number of sites that may provide for species persistence.

QMD/AMD Size Description by Distribution Zone

For purposes of deciding whether a stand, or portion of a stand is suitable habitat that may contribute to a reasonable assurance of persistence, determine the estimated Quadratic Mean Diameter (QMD) or Arithmetic Mean Diameter (AMD). *Administrative units may use whichever method is more commonly used in their local forest management applications.* Trees considered for the QMD or AMD estimate should include merchantable trees only. If the estimated QMD or AMD is greater than or equal to the diameters for the distribution zones listed below, the stand or portion of the stand equal to or exceeding those standards may be suitable habitat.

Northern Mesic Forest Distribution Zone

The stand, or portion of the stand, where the habitat-disturbing activity will occur has approximately an estimated stand QMD ≥ 16 inches dbh or an AMD ≥ 15 inches dbh.

Mesic Forest Distribution Zone

The stand, or portion of the stand, where the habitat-disturbing activity will occur has approximately an estimated stand QMD ≥ 18 inches dbh or an AMD ≥ 16 inches dbh.

Xeric Forest Distribution Zone

The stand, or portion of the stand, where the habitat-disturbing activity will occur has approximately an estimated stand QMD ≥ 16 inch dbh or AMD ≥ 14 inch dbh.

Red Tree Vole General Habitat Descriptions

Once the QMD or AMD for the stand or portion of the stand has been estimated, determine if one of the red tree vole general habitat descriptions below applies. If the stand or portion of the stand is determined to meet the QMD/AMD dbh estimates and at least one of the red tree vole general habitat descriptions below applies, then Criteria 2 for determining the need for pre-disturbance surveys has been met.

1) Mature and Old-growth conifer forests and those older mixed age conifer forests containing Douglas-fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*), Sitka spruce (*Picea sitchensis*), western hemlock (*Tsuga heterophylla*) (Johnson and George 1991), or white fir (*Abies concolor*) (Manning and Maguire 1999) with multi-layered canopies and large branches capable of supporting nests and providing travel routes for red tree voles. (See the glossary in the 2001 Survey and Manage Record of Decision for definitions of “mature” and “old-growth”).

OR

2) Conifer forest stands with a canopy closure of 60% or greater of the intermediate, co-dominant and dominant trees and with two or more predominant conifer trees per acre.

Predominant trees should have one or more of the following characteristics: large limbs, well developed crowns, cavities, broken tops, or mistletoe, that may provide structure for suitable platforms for red tree vole nests. Predominant trees are overstory trees remaining from an earlier cohort, which should have a portion of their crowns above the dominant canopy. Synonyms for predominant trees include remnant, relict, and residual.

In some higher site class (1,2) stands, particularly within the Mesic zone in the coast range, a stand may exceed the minimum stand QMD/AMD but not meet the minimum stand age associated with a mature stand. In these instances the determination for the need to implement a protocol survey should include an assessment of the dominant trees within the stand. If the dominant trees within the stand have similar characteristics as stated above for predominant trees, a protocol survey should be considered. The determination to conduct the survey is to be made by the line officer, based on recommendations from the biologist.

If none of the general habitat descriptions above are met, or if the stand does not meet the minimum diameters described above, then surveys are not needed.

Criteria 3: The proposed project is a habitat disturbing activity that has the potential to “cause significant negative effect on the species habitat or the persistence of the species at the site” (ROD S&G, p 22).

Habitat-disturbing activities are defined as those disturbances likely to have a significant negative impact on the species’ habitat, its life cycle, microclimate, or life support requirements (ROD S&G’s, p 22). The line officer should seek the biologist’s recommendations to help determine the need for a survey based on site-specific information. In making such determination, the line officer should consider the probability of the species being present on the project site, as well as the probability that the project would cause a significant negative effect on the species habitat or the persistence of the species at the site. If the proposed activity is determined to not pose a potential significant negative effect, then surveys are not needed.

Activities that would remove or modify the intermediate, co-dominant, dominant or pre-dominant canopy strata within the stand may be considered habitat-disturbing activities. This includes activities that may cause a significant negative effect on the species or habitat in the project area by isolating or damaging nests or nest trees. Prescribed fire is considered an activity that has the potential to negatively affect the canopy and/or affect individual animals due to heat, needle scorch or smoke.

Some examples of projects that might be exempt from pre-project surveys include:

Brush and understory clearing, hand and machine piling of smaller diameter material, stream restoration, culvert replacement, snag creation, tailholds, guylines, lift trees, road repairs, and rights-of-way and routine maintenance.

For all projects where this S&G direction is applied, a field unit biologist should be involved in determining and documenting impacts and appropriate rationale used to exempt pre-disturbance surveys.

Survey Methodology

Because red tree voles tend to occur in low numbers and a somewhat clumped distribution at landscape and stand level scales, survey techniques need to cover a large percentage of the survey area to ensure detection of red tree vole nests. Vole nest trees are an indicator of a possible vole population and are used to identify the red tree vole site. The actual survey methodology used will depend upon the type of project. Either a **modified line transect** or **individual tree examination method** can be used depending on the scale and type of project under consideration.

The survey techniques included in this protocol emphasize approaches for determining red tree vole nest use and activity status from the ground. If all ground-based methods are used and it has not been possible to confirm a nest as red tree vole or determine activity status, tree climbing may be used as an option. If tree climbing is conducted, all applicable Occupational Safety and Health Administration (OSHA) and agency standards should be followed.

If confirmation of red tree vole use cannot be determined from the ground and tree climbing is not considered a viable option, the alternative is to assume, for management purposes, that the nest is active and belongs to a red tree vole. However, correct assessment of species use and activity status will be essential for evaluating future annual species reviews, survey protocols, and management options. Information concerning site activity status and quality of the site as determined by the number of active nests will be needed for analyzing red tree vole abundance, distribution, and persistence.

Survey results using this protocol should be considered valid for 5 years after completion of the survey.

Modified Line Transect Survey Method. This method is appropriate for surveys that encompass stand level projects. Examples of projects best suited to this type of survey include timber harvest and prescribed fire. Unlike strip surveys, the modified line transect methods do not assume 100 percent detection but are based on a modified detection function approach. Studies have shown that the average effective strip width and detection distance of vole nests, under average stand conditions, was approximately 15 meters on either side of the transect line.

The modified line transect survey method should follow these general guidelines:

- Establish the starting point of the first transect segment along the edge of the survey area and space any additional transect segments parallel to the first segment.
- Run transects across any environmental gradients where possible.
- Using the pre-located starting point, slowly walk along a pre-determined compass bearing or elevation contour using an altimeter, through the stand (walking along the transect center line) and visually search the tree canopy for likely structures on both sides of the

transect. Inspect possible structures detected from the transect at a closer range to determine if they are nests.

- A minimum of 90 meters (approximately 300 feet) of transect line per acre of survey area should be searched. Assuming a transect detection width of approximately 15 meters (49 feet) on each side of the transect line, this length of survey will visually cover approximately 68 percent of each acre in the survey area
- To determine an adequate total transect length for a stand refer to Appendix I, “*A Sample Method for Calculating Transect Spacing for Red Tree Vole Surveys*”, for guidance in performing these calculations. This length of transect should provide a good assessment of the presence or absence of voles within the stand.
- The total length of transect needed to survey a stand can be divided into varying length segments and distributed throughout the stand to accommodate stands of various shapes and sizes.

Individual Tree Examination Survey Method. This method can be used in situations where searching individual trees in a project area would be more appropriate than surveying with the line transect method (the project also needs to be evaluated in relation to the general requirements in the “Trigger for Protocol Surveys” section). Examples of projects best suited to this type of survey include snag creation, stream restoration, and individual tree removal.

Individual conifer trees meeting the minimum diameter standards listed by distribution zone, that may be modified or affected by the proposed project, should be surveyed. All trees of this diameter, within at least one tree height radius that may be affected by felling, blasting, or other activities, should also be surveyed. A visual search in and near the entire live crown of all trees should be conducted from several viewpoints using binoculars or a spotting scope.

General Guidelines for Both Survey Methods

- The presence of other confirmed red tree vole nests in the vicinity of an unconfirmed nest *may* be an indication that the nest is a red tree vole nest.
- Take advantage of steep slope positions (even if outside the project area) to look into tree crowns.
- Red tree vole surveys can be conducted during all seasons of the year but should be planned to achieve the best visibility conditions within the project area. Conditions such as snow, rain, fog, or hardwood leaves may reduce visibility in some situations.
- All detected nest structures must be classified into one of the following categories:
 - 1) **Confirmed Active Red Tree Vole:** An arboreal nest that is *confirmed to be currently in use* by a red tree vole.
 - 2) **Confirmed Inactive Red Tree Vole:** An arboreal nest that is *confirmed to be currently not in use* by a red tree vole - but evidence of past use is present.

3) **Confirmed Red Tree Vole:** An arboreal nest that is *confirmed* to be used by a red tree vole and the *activity status is undetermined*.

4) **Confirmed to a Species Other than a Red Tree Vole:** Any arboreal nest structure confirmed to not have been used by a red tree vole.

5) **Unconfirmed Species Nest:** Any arboreal nest that is not confirmed as belonging to a red tree vole or any other species. Some of these undetermined structures may not be rodent nests but rather a bird nest or accumulation of litter fall.

When potential nest structures are observed:

- Search the nest from the ground and under the tree for possible red tree vole nest signs, particularly resin ducts (see “Identification of Nest Structures” section below). Use binoculars or spotting scopes if necessary.
- Utilize any collection or examination devices that will enable a closer view of the nest. Such devices may include visual techniques such as cameras or mirrors mounted on extension poles or techniques such as extension poles with grapples or golf ball retrievers that sample a small portion of the nest. These devices should not cause undue disturbance to the nest.
- Utilize tree climbing to determine nest and activity status if other options are not successful or feasible.
- Determine the species associated with the potential nest structure and the activity status of the structures (see “Identification of Nest Structures” section).
- Mark all trees that contain a confirmed red tree vole nest, confirmed active red tree vole nest, or a confirmed inactive red tree vole nest.
- Indicate the location as accurately as possible on a map or using GPS.
- If the nest is unconfirmed to species, mark the tree(s) that are questionable for further evaluation to determine the appropriate classification of the nest structure. For management purposes, the nest is assumed to be an active RTV nest until additional surveys are conducted.
- If any type of red tree vole nest is detected (confirmed, confirmed active, or confirmed inactive) surveys should be conducted within 330 feet (100 meters) to determine the extent of the site. This distance is based on the maximum distance (75.8 meters) voles moved between consecutive nests from a sample of seven adults that were radio-tracked for approximately 110 days (Biswell in prep.). Due to the small sample size and potential variation in movement among different stand types, 100 meters was used.

Additional Survey Guidelines for Old-Growth Conifer Stands

The primary objective of the protocol is to determine the presence of active red tree vole nests. Some old-growth conifer stands have conditions that make it exceptionally difficult to detect red tree vole nests from the ground. This is due to such things as the height from the ground to the live crown, high crown density, and the lack of good vantage points from which to view into the canopy. These conditions may be encountered in stands or portions of stands. Stands or portions of stands (old Growth inclusions) over *2 acres in size* with any of the following characteristics: uniform tree density, dominant and co-dominant trees averaging 36 inches dbh or greater, heights to the first live branch greater than or equal to 75 feet, or few mid-canopy conifers should be surveyed following these guidelines. In these stand types two survey guidelines can be considered:

- 1) If the modified line transect or individual tree examination surveys are conducted and detect very few/no red tree vole nests in these conditions and it is suspected that, based on the habitat quality and/or visibility concerns, red tree vole nests could have been missed, tree climbing should be considered to more fully evaluate whether voles are present. Only the portion of the stand that has these conditions would need to be sampled.

OR

- 2) Based on the professional judgment of a biologist experienced with red tree vole surveys, the requirement of completion of ground surveys prior to sampling by tree climbing may be dropped in stands with the old-growth habitat conditions as described above, provided that tree climbing is conducted to more fully evaluate whether voles are present OR the stands can be assumed to be active based on a line officer's discretion. Only the portion of the stand that has these conditions would need to be sampled or assumed active.

The line officer has the discretion to decide that climbing is not an option, and to assume that red tree voles are present. The area where climbing is not conducted should be managed as a known site. Future management activities within the Habitat Area should not preclude red tree vole occupancy, until red tree vole presence is verified. All sites/Habitat Areas assumed to be occupied by red tree voles without validation of activity or species status should be entered into the Interagency Species Management System (ISMS) database as a managed site, following the appropriate guidelines.

Sampling Trees by Climbing

A sufficient number of trees should be sampled to conclude that red tree vole nests are not likely to occur in the area examined. When a red tree vole nest is confirmed active during sampling, no additional climbing is needed and the stand is considered to be a known site. Further sampling may be necessary to determine the extent of the site within the project area or stand. Trees selected for climbing are at the discretion of the field biologist and the climber, but should be well distributed throughout the area being sampled, provide vantage points for viewing into nearby conifer crowns and viewing a range of canopy layers within the stand. Vantage points should attempt to achieve a level of survey that roughly equates to the amount of area assumed surveyed with implementation of the modified line transect survey methodology (68% of the

stand). Additional selection criteria for trees to be climbed or examined should include trees with large limbs, defects, cavities, broken tops, mistletoe brooms, or other features that may provide for stable nest structures. If climbing is conducted all applicable Occupational Safety and Health Administration (OSHA) and agency standards should be followed.

Determination of Site Type

Surveys completed to protocol may result in identification of a red tree vole site. A site can be a single point representing one nest tree or a polygon connecting the outer nest trees in a multiple nest tree site. The identification of which trees to include in a site are incremental and cumulative and can result in a “linked chain” of trees that is ultimately used to define the total number of trees in the site and the site perimeter. This ‘linked chain’ effect can result in various combinations of nest trees defining various types of red tree vole sites for management purposes.

| Definitions of Red Tree Vole Site Types | |
|--|---|
| Red Tree Vole Site | <p>A red tree vole site is an individual nest tree or a collection of nest trees within a local area (all nest trees in a stand and adjacent stands that are not isolated from other clumps of nest trees generally by more than 100 m (330 ft))</p> <p>“RTV Site” is the term for the 3 specific site types described below. Red tree vole sites are defined by ANY/ALL nest tree/resin duct locations that are generally within 100 m. of ANY OTHER nest tree/resin duct location.</p> |
| Biological Site | |
| Active Site | <p>A location with one or more confirmed Active red tree vole nests. These sites are known sites as defined on page 76 of the 2001 Survey and Manage Record of Decision and Standards and Guidelines. Active sites may include ANY other type of inactive or unconfirmed red tree vole nest or resin duct location, as long as at least one tree in the site is active, thereby defining the site as an Active Site.</p> <p><u>All red tree vole nest types and resin duct locations should be considered as part of the site as long as they are generally within 100m of at least one other nest/resin duct location that is considered to be part of the site.</u></p> |
| Inactive Site | <p>A location where ALL nests, that are generally located within 100m of any other nest, are determined to be confirmed inactive red tree vole nests. Sites composed of all Inactive nests indicate historic red tree vole use at the site, not current use.</p> |
| Undetermined Site | <p>The activity status of confirmed tree vole nests has not been determined for the nests in the site. The site is assumed to be currently occupied by the species for management purposes. Additional survey effort would identify these sites as either active or inactive sites. <u>All red tree vole nest types and resin duct locations should be considered as part of the site as long as they are generally within 100m of at least one other nest/resin duct location that is considered to be part of the site.</u></p> |
| Managed Site | |
| | <p>Species use of nests has not been determined, and the site is assumed to be active for management purposes. These sites may include:</p> <p>1. Nests Unconfirmed to species. OR 2. “ Nests, or portions of old-growth stands, where species use has not been determined, and the site is assumed to be active for management purposes ”</p> |

Protocol Modifications

The protocol was designed to ensure a high probability of finding red tree vole nests across the species' range and provide a measure of consistency for annual species reviews and future survey protocol or management recommendation revisions. The protocol should be followed, and a minimum of 68% of each acre in the survey area should be surveyed. There may be site specific conditions that warrant some modification of the protocol. Biologists should make the decision concerning any modifications of the protocol based on their professional judgment. Where there is any deviation from the protocol, biologists must document the specific changes and the rationale for those changes and alert their line officers when changes or deviations are made. In addition, the data sets collected using the modifications should be clearly identified.