SURVEY PROTOCOL FOR SURVEY AND MANAGE TERRESTRIAL MOLLUSK SPECIES

FROM THE NORTHWEST FOREST PLAN

Version 3.0 (2003)

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EXECUTIVE SUMMARY

The following survey protocol is designed for those terrestrial mollusk species that require pre-disturbance surveys and are listed in Table 1-1, as amended, of the "Record of Decision and Standards and Guides for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines" (USDA Forest Service and USDI BLM 2001). Hereafter, these mollusks are referred to as Survey and Manage (S&M) species. The objective of this protocol is to establish whether a specific S&M mollusk is present in proposed project areas with a reasonable level of confidence, and to document known sites discovered during surveys. In order to address identification difficulties in the field for eight species of mollusks listed in Table 1-1, additional mitigation of "equivalent effort" surveys was included. The use of this protocol, and the requirement for use of the voucher collection and verification process described in this document (Appendix F) meets the need for "equivalent effort" surveys for species with this mitigation. This procedure is essential to ensure that specimens are handled in a consistent manner and the data is standardized so it can be effectively used in the Annual Species Review process and in amending management recommendations and survey protocols. Deviation from this procedure may lead to data not being considered in the Annual Species Review.

This protocol is organized as a step-by-step procedure. The basic steps of this survey protocol are as follows:

1) Determine if the proposed activity is within the range of the species.
2) Determine if the proposed activity is within or contains suitable habitat.
3) Determine if the proposed activity will cause significant negative effect on the species' habitat.
4) Survey suitable habitat for those species that could be significantly negatively effected for at least 60 minutes per 10 acres. Surveys will use a combination of short, opportunistic searches of key habitat features along a survey route and time constrained searches within established sample areas of the best habitat. Two surveys are required during appropriate environmental conditions, with at least one visit recommended during the fall or late spring.

Several Appendices are attached to this document, which contain essential information used with this protocol. Information concerning range and habitat association is located in Appendices A and B. Terms used in this protocol are defined in Appendix C. Useful information such as permits required, equipment needed, surveyor experience and training and safety considerations are presented in Appendix D. Two suggested field forms, instructions for their use and information about data management are contained in Appendix E. Species identification information and the voucher requirement description are located in Appendix F.

I. Trigger for Survey

I.A. Introduction

To determine the need for survey of a proposed project area, three criteria must be evaluated: 1) it must occur within the suspected range of a species covered by this protocol; 2) it must occur within suitable habitat for those target species; and 3) the proposed project must have the potential of being a habitat disturbing activity which would cause a significant negative effect on the species habitat or the persistence of the species at the site. Some species included in this document may not require pre-disturbance surveys, based on the management categories in which they occur following the most recent Annual Species Review. The most recent update of species placement in the management categories, documented in Table 1-1 of the 2001 S&M ROD, as amended annually, should be consulted to determine the need for surveys for each species. Appropriate grace periods are discussed in the 2001 ROD, S&G p.23, for implementation of surveys for species not previously requiring them, either due to range expansion or change in management category.

I.B. Range Determination

In order to easily determine whether an administrative unit falls within the range of a species, two references are used. As a general reference, **Appendix A. Table 1.** is a matrix which indicates those National Forests and Bureau of Land Management Districts which are within the known or suspected range of each species. **This table is not meant to imply survey requirements for any unit, but simply the current understanding of the ranges of these species.** To use this table, find your administrative unit in the column headings, then follow the column down to determine if it is within the range for each species. The table uses two numbers to indicate the range:

1 The species is not currently suspected to occur there, but because the exact ranges of these species are poorly known, surveyors in these areas should be familiar with the species in case they encounter it. The area is not considered to be within the range of the species.
2 The species is known or suspected to occur there; the area is considered to be within the range of the species. Surveys would be required for these species if they are in a management category that requires pre-disturbance surveys (based on Table 1-1 from 2001 ROD as amended annually).

Once occurrence is determined by Forest or BLM District in Table 1, a further breakdown by ranger district or resource area can be found in **Appendix A**. Other details about range, such as elevation limits or other geographical boundaries may also be included in this Appendix. Future range changes, as approved through the Annual Species Review process, will be published along with management category changes annually.

Due to our incomplete understanding of the factors determining distribution patterns, density and abundance, it is likely that relict populations may exist at the edges of the currently known range.

The probability of a species being present in suitable habitat anywhere within its suspected range is currently considered to be equal. Care should be taken

when using estimates of species abundance to determine the probability of occurrence in a given project area. Although a species may become less abundant at the edges of its range, the probability of occurrence should not be assumed to decrease.

I.C. Habitat Association Determination

The species covered by these protocols are all terrestrial mollusks. They occur in a variety of forest habitats. Some of them are widely distributed in moist, generally undisturbed coniferous forest plant associations while others are dependent on specific habitat components such as rock outcrops, hardwoods or large logs. Although riparian reserves can provide habitat and connectivity for many species and some populations may be confined to the riparian zone in dry landscapes, S&M mollusks covered by these protocols are not riparian obligates. Current information collected on these species indicates that the ranges of some are quite restricted, while others are widespread but sparsely distributed.

Within areas of range overlap, a survey for one target species might turn up other species. Therefore, the surveyor should search for all target species with similar habitats (as described in Appendix B) during the same survey. If a project area contains discrete areas in which the habitat is sufficiently different from the general forest (inclusions such as rock outcrops, wet meadows or talus areas), separate surveys, based on the acreage of those unique habitats, should be conducted for species with those specific habitat associations. It is expected that most riparian associates can be found using the general forest survey methods, concentrating searches for those species in riparian areas.

Separate surveys are required for two small species, *Pristiloma arcticum crateris* and *Vertigo* new sp., even though they may have the same habitat as larger species. Because of the minute size of these species, they are generally overlooked while searching for larger species. Special survey techniques are needed for these small species to ensure a high probability of detecting them if they are present. The time spent surveying for them cannot be counted towards time spent surveying for larger animals (see Section II.B.2.c.).

Appendix B presents a narrative account of each species' habitat associations. Once a project area is recognized as occurring within the range of a particular species, a review of the habitat description given in this Appendix and the Management Recommendations for that species should be done to determine if the elements described occur within the project area. It is recognized that some of these habitat descriptions are still very general, due to the lack of available data. The authors have tried to narrow habitat descriptions wherever possible, when based on hard data. In the future, new information about habitat associations may become known to taxa specialists, but not be published in any of the above sources. Consultation with members of the Taxa Team can add valuable information about the current understanding of habitat associations. Although some species are listed as associated with several habitat elements, the lack of one or more of them in a given area may not indicate a corresponding decrease in habitat suitability. Rather, several habitat elements may be listed because the species has been known to use different habitat features under different circumstances. Field units are encouraged to document local habitat associations found to be valid in their areas.

Although all suitable habitat should be included in a survey area, field units can use their knowledge of these local associations to concentrate survey efforts in those portions of survey areas which contain the best habitats and are most likely to be occupied by target species. Ground truthing is often necessary to determine what habitat elements are present in a project area. This should be done before making the final determination of whether habitat is considered suitable for a given species.

Areas of non-suitable habitat may occur within the range of a particular species. These areas, although they may fit the general description of suitable habitat, may not function as such for other reasons. For example, an area of geologically recent volcanic activity (ie. less than 100 yrs.) composed of pumice and ash may not be suitable habitat for any mollusk species, even though it has some down wood and conifer tree cover. Areas that are seasonally flooded also may not be suitable for such species as slugs. Such areas may be treated as non-suitable habitat if a subset of the best habitat in these areas has been searched according to protocol and no S&M mollusk occurrence is documented. The areas to be considered non-suitable habitat by this means should be delineated and the supporting evidence for non-suitable habitat designation clearly documented in program files. These local refinements of the definitions for suitable and non-suitable habitat should not be extrapolated beyond the general area that was sampled. In order to refine suitable habitat definitions in future Northwest Forest Plan documents, the regional mollusk taxa team should be notified in writing of these determinations. Designation of non-suitable habitat should not be extended to include "marginal" habitat for purposes of determining need for survey, ie. an area is either suitable habitat or it is not.

1.D. Types of Actions and Expected Impacts

Activities that trigger surveys are those that have the potential of being a habitat disturbing activity which would cause a significant negative effect on the species habitat or the persistence of the species **at the site**. These adverse effects include direct mortality resulting from mechanical crushing and injury, predation, exposure, chemical poisoning and fire; and indirect adverse effects to populations resulting from the modification of their habitats in or adjacent to a project area.

Federal lands adjacent to project areas should also be surveyed if the project may cause a significant negative effect on the species habitat or the persistence of the species on those lands. The determination of which adjacent areas may be affected depends on local site conditions and should be documented by field personnel. (Refer to the FEMAT Report of July 1993, pages v. 27-29 for a discussion of edge effects.) **[Note:** Where S&M species with flexible management recommendations, such as those with High Priority Sites or locally common criteria, are expected to occur in the adjacent and surrounding areas (i.e., the habitat is similar or better), it may be more cost effective to conduct surveys to confirm the existence of the species in adjacent stands and/or watersheds if this would allow more flexibility in management for the species. Extended surveys might also provide data for developing rationale for more flexible management.]

Because of the limited information available on the habitat needs for most species of mollusks, care should be taken when determining whether an activity will have a significant negative effect. Documenting the

(non)significance of an action could include, for instance, examples of other known sites in the local area where the current habitat condition is similar to that which will be present in a project area after an action. If these locations are similar in landscape position and other environmental parameters, it may be evidence that the species can occur in those conditions. Questions remain about changes in population density and distribution within the treated site, however. Consideration should also be given to long-term habitat condition as it relates to persistence of the species at the site.

Guidelines for activities described in Management Recommendations for fuels treatments in areas around communities at risk should **not** be used to describe activities which would result in no significant negative effects. The intention of these documents was to provide flexibility for fuels treatments while **allowing some risk to the species**. In summary, any effect which may reduce the habitat quality, cause a decrease in the number of individuals in a population or alter their distribution within the project area may have the potential to significantly negatively affect the persistence of the species at the site, depending on the effect's magnitude and scope.

In order to clarify the types of potential activities which the authors feel may or may not result in significant negative effects, the following list of examples is given. For each of the impacts described, there is a lower threshold of magnitude below which activities would not cause "significant" negative effects. As a general rule, in cases where habitat elements used by a particular species are being negatively affected by a project, significant negative impacts are not expected if less than 5% of the available amount of that element or 5% of the project area is affected (See Item 1, below). Projects may be designed to avoid significant negative affects. For example, if the habitat element being affected is canopy closure and shade from the tree canopy, a treatment could be designed to remove only 5% of the existing cover, and no significant negative affects would be expected. The determination of the need for surveys due to significant negative effects should always be done on a case by case basis, supported by local information, however, and these examples are provided simply for guidance.

Note that habitat disturbing effects for three mollusk species (*Monadenia fidelis klamathica, Monadenia fidelis ochromphalus,* and *Ancotrema voyanum*) currently are limited only to effects from grazing (see 2000 S&M ROD Standards and Guides, p. 32).

Examples of some activities that may <u>not</u> require surveys include:

1) small projects (less than 200 square meters), projects composed of a single resource extraction that is not important to mollusk habitat (such as special forest product harvest), or projects which affect suitable habitat elements (such as salvage of single logs or tree-pulling for stream restoration) but are dispersed through a project area so that less than 5% of those habitat components in the project area are negatively affected. **Exception**—Because of the small size of suitable habitat patches and the importance of maintaining all occupied sites for very rare species, surveys should be required within the range of *Pristiloma arcticum crateris, Vertigo* new sp., or *Deroceras hesperium* if suitable habitat would be negatively affected, regardless of project size;

2) road closures or decommissioning activities that <u>do not</u> result in a significant negative effect to suitable habitat (**Note--** Operations on unused

roads, jeep trails or other locations in which natural vegetation has become reestablished and suitable habitat occurs, may require surveys.);

3) use of existing quarries not requiring expansion;

4) trail construction with no significant decrease in canopy closure (an occasional tree may be removed for hazard reduction or necessary trail alignment without significantly affecting shade and moisture conditions), average tread width of less than 3 feet, and average clearing width not exceeding 6 feet. **Exception--**Surveys may be needed if: 1) the trail construction would impact a small area of limited suitable habitat, i.e., a small spring, seep, bench, or habitat unique for that area; or 2) habitat for very rare species such as *Pristiloma arcticum crateris*, *Vertigo* new sp., or *Deroceras hesperium* would be impacted;

5) biological, manual or mechanical noxious weed treatments;

6) reforestation activities on recently harvested or burned sites;

7) precommercial thinning with no removal of key habitat elements;

8) activities, including fertilization, in sapling-pole or younger stands without residual late-seral habitat elements. It is felt that these types of stands will be unlikely to support significant populations of most mollusks. **Exception**--surveys may be needed for *Vertigo* new sp., *Pristiloma arcticum crateris*, or *Deroceras hesperium* if inclusions of suitable habitat for those species would be significantly negatively affected;

9) hydromulching, erosion seeding and other erosion control measures are generally exempt from surveys because they normally occur within road prisms or on other disturbed sites. [**Note**--to reduce introduction of invasive / exotic species, straw or hay bales that may be used as filter or check dams and / or lumber that has been stored in contact with the ground should be examined and any snails or slugs found should be removed before moving to the field];

10) routine maintenance of currently used roads (including the existing road prism) and recreation facilities (developed and dispersed campgrounds, trails, ski areas, etc.), with no expansion into previously undisturbed ground. While mollusks may be found on roadsides, because of lush vegetation within ditches or large woody debris accumulated from wind throw and right-of-way clearing, they would not be there if not for the adjacent natural habitat. Populations in that adjacent habitat are expected to persist;

11) emergency situations such as fire access and / or fireline construction during suppression activities, emergency flood control, and protection of life and property from immediate threat.

Examples of some activities and impacts that may require surveys, depending on the magnitude of the effect, include:

1) increases in soil compaction, or disturbance of soil, rocks or vegetation which function as refugia or substrates for food (this may include, but is <u>not limited to</u> compaction from heavy equipment or other motor vehicle operation, road construction or yarding);

2) reduction in large woody debris quantity or quality, or in the recruitment potential for these elements (this may include, but is not limited to salvage operations or fuels treatments);

3) reduction or disturbance of litter and duff, or reduction in the recruitment potential for these components (this may include, but is not limited to fuels treatments or brush and hardwood removal);

4) changes in hydrology which may affect the water table and result in dessication, drowning or alteration of the vegetation community composition;

5) chemical treatments (eg. herbicides, pesticides, fertilizers or fire retardants);

6) introduction of exotic plant or wildlife species;

7) vegetation management, including most timber harvesting activities such as commercial thinnings, salvage and regeneration harvests, which change the forest floor microclimate (i.e., temperature, shade, humidity, soil moisture), that may alter fungal or plant diversity or abundance, or result in negative effects to environmental conditions required by mollusk species. Reductions of canopy cover by more than 5%, or beyond thresholds needed by the target mollusk species as described in Management Recommendations and Appendix B would generally be significant;

8) actions such as recreational developments, quarry expansions, certain trail construction (see item 5, previous section) or new road construction that have the potential to destabilize talus slopes, scree or rocky areas. Survey areas should include all upslope areas and adjacent vegetated habitat that may be affected;

9) livestock grazing where livestock concentrates in key range areas (i.e., riparian zones, hardwood stands, around springs or seeps, and on or in topographic benches, saddles or draws where ground vegetation is more lush than in the surrounding area). The use of salt licks should also be considered a potential impact and areas surveyed prior to placement of such material;

10) prescribed burning or fuels reduction treatments that affect suitable habitat or injure mollusks.

Other activities determined not to have a significant negative effect on a species' habitat or the persistence of a species at the site do not require surveys. All such activities should be evaluated and a justification for exemption from survey documented.

II. Survey Procedures

II.A. Plan the Surveys

The following methods pertain to forest habitats which contain key habitat features. Certain types of habitats commonly found as small inclusions in forests such as rock outcrops, caves and talus, require search methods differing somewhat from the following discussion. Three mollusk species also require different search methods. Please refer to Section II.B.2. for a discussion of these methods.

Two visits to a project area are required to implement this protocol, one of which is recommended to occur during the fall rainy season or late in the spring to provide adequate opportunity to discover annual species which may be too small to be reliably located in early spring. Once the extent of suitable habitat in a project area is identified, an opportunistic search of key habitat features along a survey route distributes a general search effort over the entire area. More intensive searching of small, well defined "sample areas" provides an additional survey method that increases the probability of finding target species in concentrations of the best habitat for those species. The combination of both methods was thought to provide the best overall method for determination of species presence.

For each visit, **a total of one hour of survey time for every ten acres of affected habitat** should be completed using a combination of two sampling methods. 1) Opportunistic "point searches" should constitute **one-third** of the total search time in the project area. This method briefly samples many representative key habitat features along a survey route throughout the survey area. 2) **Two thirds** of the search time should be spent in a more intensive, time constrained search of a few small, well defined sample areas. In certain habitat types, a single sampling method may be employed as discussed in Section II.B.1.b.

General Survey Field Forms should be completed for each visit to a survey area. When S&M species (or suspected S&M species) are detected, the locations should be flagged in the field and the appropriate Species Location Field Forms completed in order to document the known site. Voucher collections should be made to verify the species identification. Permits are required in Washington State for collection of specimens (see Appendix D).

II.A.1. Identify the Survey Area

A **survey area** is defined as that portion of a project area and adjacent land that contains suitable habitat which may be significantly negatively impacted directly or indirectly by the proposed activity. This is the area to be effectively covered by the survey. It may be all or a portion of a project area, sale unit or other impacted area as well as the adjacent suitable habitat considered to be affected by the proposed action. In situations where rock outcrops, talus habitats or caves greater than 1/4 acre in size which require different survey methods are identified within a project area, the boundaries of each should be delineated and each surveyed separately. For example, the project may include one patch of an acre of talus deposit within a matrix of general forest habitat. Range descriptions may also indicate that species using talus habitats are suspected in the area in addition to species using the

general forest habitat. In this case, independent surveys, using protocol methods for rock habitats, are required in the talus areas. These individual survey areas should be delineated on a map, in GIS and / or on aerial photographs. These maps will document and describe the areas surveyed. Each survey area should have a unique identifier (i.e., a pertinent landmark, geographic feature, or project name) and / or a number to distinguish between units and this must be recorded on field forms and notes. This designation will be entered into the interagency database as the **general survey location ID**, and should not change through the period during which the project is being surveyed.

II.A.2. Lay out the Survey Route

Tentative **survey routes** should be planned to safely traverse through the defined survey areas using the maps and photos. However, since aerial photos may not reveal the best habitat under forest canopy, field reconnaissance of the survey area may be necessary in order to identify the best survey route. Actual survey routes should be located to pass through a representative sample of habitat types within the survey area, focusing on any areas within it that have concentrations of the key habitat features identified for the target species. Survey routes should meander through most of the survey area, and proceed from one "sample area" to the next. Distance from existing roads or edges does not need to be considered. In project areas where biologists have previewed and identified the best habitat, and for which surveys will be assigned to other personnel (or contractors), it may be useful to define a survey route by flagging in the field and include a map of this route in the project file. Flagging and mapping of the survey route also aids in relocating known sites for future management.

II.A.3. Locate and Identify Sample Areas

Identify **sample areas** in the field along or near the survey route, approximately 5 m. (16.5 ft) radius or 78.5 sq.m. (854.9 sq.ft.) in size, which encompass areas with a number of key habitat features for the target species. In some cases, the best sample areas may be around only one feature, such as a large tree or down log. These areas do not need to be circular, but should be defined areas of the required size encompassing concentrations of the key habitat features. These are areas in which an intensive time-constrained search will be conducted. Sample areas do not need to be evenly spaced within the survey area, but they should be distributed throughout a variety of the best suitable habitat within it. Small inclusions of rock habitat, less than 1 / 4 acre each, may be included in sample areas within a general survey area composed mostly of forest habitat. These may be searched as "sample areas" using the rock habitat methods described in Section II.B.2.b. and not recorded as separate survey areas. It is helpful to number these sample areas sequentially, flag their locations in the field and map them in the project files so that they may be relocated if the need arises. These sample area numbers may then be recorded on field forms and used as the Location ID for any known sites which are found there.

A minimum of two sample areas should be identified for every ten acres of suitable habitat in a survey area. In determining the number of sample areas required, only acres of suitable habitat should be calculated. However, it should be recognized that a striking change in habitat would be needed to separate suitable and non-suitable habitat for most species, (ie. non-forest, clear-cut or grassy meadow vs. general forest). For survey areas less than ten

acres in size, a variation of the standard two sample area search method is acceptable, as described in Section II.C.4.

II.B. Survey Methods

II.B.1. General Methods

This protocol is designed to employ **single surveyors** searching for 20 minutes in each sample area and utilizing an opportunistic point search method outside of sample areas. These surveyors must be familiar with the known habitat requirements for the target S&M species in order to identify key habitat features during the survey. An additional person may assist with data collection, records-keeping, specimen identification or plot location (GPS or offset), reducing the total time spent in a sample area due to data being simultaneously recorded during the survey, but each plot must be actively searched by only **one person** for a minimum of 20 minutes. This requirement ensures a consistent effort between management units, eliminates the possibility of double-counting specimens, reduces confusion and limits disturbance of the habitat. Two surveyors may choose to be in the same sample area, but the second person's presence does not reduce the 20 minute search time required for the plot.

In order to economize on total survey time needed in a project area, multiple surveyors may work concurrently on separate routes, and their total search time can be added to meet the search time requirements for the entire survey area. This approach will meet the requirements for the number of surveyor-hours in the project area while reducing the number of days necessary to complete a visit. For survey areas of less than ten acres, refer to section II.C.4. Duration of Visits, for required surveying time.

II.B.1.a Point Searches

At least 20 minutes for every 10 acres in the survey area should be spent checking key habitat features in point searches along the survey route between sample areas. This type of searching has been found to increase opportunities to discover species of mollusks in less than ideal situations and to locate species that were not expected in the search area. It also serves to distribute the search effort over the survey area and to help delineate the extent of known sites.

While walking the survey route between sample areas, look for key features and briefly search in likely places for snails and slugs. Opportunistically search around key habitat features within approximately 10 meters (33ft.) of the route. These short point searches may include rolling over small logs, looking under bits of bark, rocks, vegetation and debris, picking through hardwood leaf litter and searching the needle and leaf litter at the bases of logs and shrubs. In other words, a surveyor checks a representative sample of points where snails and slugs might be expected to be found. These point searches may consist of quick, continuous sampling, with less than a minute for each feature, or may be more scattered, localized sampling of several key habitat features along the route. Each of these key features should be searched for approximately one minute or less; many short searches are more efficient than a few longer ones. No single point should be searched for longer than 5 minutes, however, the surveyor may choose to extend a point search beyond 5 minutes and treat the point as a full 20-minute sample area if

numerous specimens are found. If a survey point is converted to a sample area, the remaining time needed to satisfy the requirement of 20 minutes of point search time per ten acres must be fulfilled elsewhere.

II.B.1.b. Sample Area Searches

Each sample area should be searched for a total of 20 minutes, or until all target species have been located. During the search, 1) examine all or most large debris within the sample area, especially the moss and accumulated litter along the sides of logs; 2) search through and under several shrubs and other plants; 3) sort through concentrations of leaf and needle litter and into bare soil in several patches of one-half square meter (5.38 sq.ft.) or less; 4) examine smooth lower trunks, leaves and branches of hardwood trees and shrubs within easy reach; and 5) roll-back moss mats and examine the undersides of the mats and the mineral soil below. Efforts should be made to recognize and avoid disturbance to other S&M species such as bryophytes and fungi that might be encountered during this process. If such species are located, the site should be marked and vouchers forwarded to the taxa expert for positive identification. Although this is not intended to be a destructive sample, the plot will be disturbed significantly. Therefore, surveyors should endeavor to minimize trampling, replace habitat components to their original positions immediately and to replace litter back over areas from which it was removed. Live animals not taken as vouchers should be replaced in the locations they were found. Search time should not include time spent recording data or other activities. Sample areas do not need to be evenly spaced within the survey area, but they should be distributed throughout the best representative types of suitable habitat within it.

For some survey areas which are linear or in which key habitat features are uniformly distributed and not concentrated, protocol may be met using point search methods only. Specific instances for which this approach would be appropriate include trail construction or maintenance, disturbance in a narrow but continuous belt along existing roadsides and in high-elevation snow melt zones where moisture is available briefly as the snow line recedes. This method may also be suitable for high-elevation sites which are dominated by sparse groundcover and very thin duff layers, especially when the major habitat feature (e.g. coarse woody debris or other cover) is scattered throughout. Whatever method or combination of methods is employed, the total search time for the project area must be 1 hour for each 10 acres of affected habitat or, in cases where habitat is very limited and extended searching would result in destruction of that habitat, until all available habitat has been searched. Complete or partial abandonment of sample area search methods or any other departure from standard survey protocol methods should be justified in writing, and this documentation should be included in the project file.

II.B.1.c Known Site Locations

All sample areas and point search locations in which target species have been detected should be marked in the field and mapped on aerial photos, GIS or other media for future reference. Though not required, sample areas may be marked regardless of target species detections so that these plots may be re-located and re-sampled on subsequent visits if desired. Sites with live specimens or shells of undetermined species which are recorded or collected during point search should be marked as well, in case a later identification confirms a S&M site.

II.B.1.d. Specimen Identification and Documentation

All target survey and manage mollusks should be identified to species at the field unit level, to the extent possible. Other species of mollusks encountered during surveys should be identified to at least the genus level. However, because some of the species are not easily recognized in the field or local office and new species are still being discovered, final and accurate identification at the field unit level is not always possible. **In order to provide a method which addresses the need for positive verification of species identifications that will make these surveys practical, collection of voucher specimens of each S&M species is required.** These voucher specimens will be sent to the regional taxa expert for final verification and curation. At a minimum, **at least one voucher of each S&M taxon (or unusual variant) should be collected from each project area or drainage** for verification of identification and for future reference. Vouchers of common or unknown species may also be forwarded to the taxa expert for identification or verification if desired. Adult vouchers in good condition are the best vouchers to collect. In situations where there are very few specimens at a site and collection of live animals may threaten the persistence of the species, only shell vouchers should be collected. Photographic vouchers of live specimens which capture the identifying features of the species are also acceptable in these situations. For record keeping purposes, juvenile specimens may be assumed to be the same species as adults found in the same survey area, unless similar species are known to be found in the vicinity. Positively identified specimens may be returned to field units if requested or maintained in a central voucher collection. Because of the difficulty in discriminating between closely similar species or variants of the same species, these vouchers will serve to document the location data and provide comparative material for later reference. **Refer to Appendix F for direction on voucher processing and verification**.

Several species of mollusks are currently considered not practical to survey for due to questions about field identification. The addition of required vouchers and verification is the only change to the Terrestrial Mollusk Survey Protocol necessary in order to meet the requirement for **"Equivalent Effort Surveys"** for these species as described in the 2001 S&M ROD. Field survey methods for these species are the same as those described in this document.

Survey efforts using this protocol should be recorded on the **Terrestrial Mollusk General Survey Field Form**, even if no S&M species were found, in order to document the survey effort. It may be useful to record all non-S&M mollusk species found during a survey on the General Survey Form in order to document mollusk activity for the purposes of verifying protocol conditions. Each form is formatted to describe the survey effort that is conducted on one visit to an individual survey area.

In addition, locations of confirmed or suspected target species should also be recorded on individual **Terrestrial Mollusk Species Location Field Forms**. This form is formatted to describe the habitat characteristics and S&M mollusk species present at a single sample area or point search location. All discovery sites for all S&M species within 30 feet of each other are to be recorded on the same form as a single location record. It is important to document the number of live specimens vs. shells for each species on the field form in order to evaluate species persistence. No Species Location Field Form is required for locations where only non-S&M species were detected.

See **Appendix E** for instructions on required data and use of the field forms. It is critical that required data be gathered in a standardized format for entry into the interagency database.

II.B.2. Special Survey Methods

When surveying unique habitats occurring in discrete areas which are clearly different from the surrounding habitat, some modifications of the standard survey techniques may be required. If areas are less than ten acres in size, for instance, it may be appropriate to utilize more point searches and fewer sample areas (see Section II.C.4.). When surveying talus or other rock habitats, search methods may be different from the standard duff and litter examination. For three snail species (*Oreohelix* new sp., *Pristiloma arcticum crateris* and *Vertigo* new sp.), the general survey methods cannot be used; a different search image is needed and a separate search period is required. Habitats for these species can usually be delineated within the general forest matrix and the acres of survey area calculated for each. These special circumstances are described in the following sections.

II.B.2.a. Talus, Rock and Cave Habitats

Areas with exposed rock have been found to be important mollusk habitats regardless of climatic regime or associated plant community. However, certain species, especially in the more arid southern parts of the Northwest Forest Plan area, are restricted to these habitat types. Frequently, these special features can offer refugia from predators, temperature and moisture extremes and have dependable food resources in areas where the general conditions are relatively hostile to mollusks. Several species of S&M mollusks are known to be closely associated with rocky substrates. Rocky areas may be especially significant in areas with limited cover. In open or arid to semi-arid localities, the bottom 1/3 of a talus slope, where moisture and temperature conditions tend to be more stable, is a good area to search, as are talus lateral borders.

Composition, age, particle size and areal extent of talus deposits may have a strong influence on mollusk distribution. For example, granite talus deposits are generally much less suitable habitat than limestone or basalt talus. The size of the rocks in the deposit may be an important habitat factor. Mollusks will not generally inhabit areas where they have to travel more than a few meters down to the soil surface, so areas composed of deep beds of large rocks may not be particularly suitable. Talus deposits, caves and areas around the drip line of large stable rocks are logical sites to search. Talus consisting of small cobble to gravel-sized materials (i.e.,<7 cm. (2 in.) diameter) is considered suitable habitat for many species of mollusks, although larger rock sizes are appropriate habitat for larger species if they are not in deep deposits. Smaller species such as *Trilobopsis spp*. or *Vertigo spp*. may be found in gravel deposits with particles ranging from 0.5 to 8 cm in diameter.

Where taluses, cliff faces, isolated rock outcrops, or other rocky areas are near a floodplain, in a forest, or are shaded for most of the year, the whole feature should be considered suitable habitat. Based on field observations, it appears that most mollusk species will move out of refugia to forage but rarely travel more than 10 m. (33ft) from secure habitat. Mollusk foraging areas can include a vegetated area within a talus or rocky area or along its edge. An unvegetated center of a large unshaded talus deposit would

probably not be considered good habitat; deposits separated by more than 20 m. (66 ft) of nonsuitable habitat should be considered individual survey areas. Very small rocky areas can be as important as larger areas for some S&M species. In designating survey areas for rock features, include at least 10 m. of adjacent habitat in order to locate the majority of individuals using that habitat.

Vegetation types that are commonly associated with talus where mollusks occur include nettle (*Urtica spp.*), horse tail (*Equisetum spp.*), and small shrubs and brush such as poison oak (*Rhus diversiloba = Toxicodendron diversilobum*), hackberry (*Celtis reticulata*), ninebark (*Physocarpus* spp.), and California laurel (*Umbellularia californica*). In areas with permanent seeps or springs, watercress (*Rorippa spp.*), water hemlock (*Cicuta spp.*), Oregon myrtle (*Umbellularia californica*), speedwell (*Veronica spp.*), and monkey flower (*Mimulus spp.*) often have associated snail or slug colonies.

II.B.2.b. Survey Methods for Caves, Talus and Rock Habitat (including sinkholes and fissures):

A well-distributed search of most rocky areas can be done by walking through the area and searching suitable sites as they are encountered, concentrating the search in the areas or conditions as described in II.B.2.a.. **No designated sample areas are required unless the survey area is larger than one acre.** Carefully search between, on the sides of and under rocks, and in litter beneath vegetation. Remove the rocks if possible, down to the soil or bedrock substrate. The rocks should be replaced immediately to limit potentially adverse impacts to the habitat. Concentrate on moving those rocks that are easily and safely handled. Do not move rocks which could destabilize areas higher up. Use a hand rake or similar tool to loosen gravel substrates and to search between small cobbles.

Surveying in caves, sinkholes or fissures consists of looking for empty shells near the entrance, on the surface, and under rocks or debris. Searching within the feature will be similarly limited to looking on the walls and floor and under any loose rocks or debris. All materials moved should be returned to their original position. No living specimens should be collected from caves without the appropriate permits that define the specific research goals. If it is absolutely necessary to collect or verify the presence of living specimens, then the survey should be performed at night with headlamps during wet weather.

Caves on federal lands are protected by the Federal Cave Resources Protection Act of 1988. Rare and endemic plant and animal species are commonly associated with these fragile habitats. Appropriate authorization should be obtained before performing a survey within or near a cave. Do not survey in a cave during cold weather when hibernating bat species may be disturbed. The Occupational Safety and Health Administration confined space rules, as well as safety regulations of the surface management agency, may also apply.

Protocol surveys for salamanders that use these habitat types may be required in areas that also require mollusk surveys. These surveys may be conducted simultaneously, but differences exist between the standards set in the two protocols and care should be taken to ensure that all requirements for both protocols are met if attempts are made to consolidate surveys. At the

least, surveyors should be familiar with all S&M species, mollusk and amphibian, potentially found in talus habitats in their local areas so that incidental observations can be documented.

II.B.2.c. Species Requiring Special Survey Techniques

Three snail species are unique enough to require special techniques for an adequate survey. These species are discussed below.

Oreohelix new sp. Chelan mountainsnail

Although shells of this species may be found anytime of the year, impacts of large wildfires within its range have caused a need to confirm survival of populations via locating live specimens. Surveys for this species have rarely resulted in the collection of live specimens. As a group, living *Oreohelices* are most easily found during or shortly after rains, or in aestivation among talus. The following procedure is currently recommended, although changes may be made as additional specimens are found and more is learned about the species' habitat and behavior.

Key habitat and sample areas should focus on features such as the center of a patch of pinegrass or elk sedge, the head of a draw, the confluence of small draws, the inside break of a bench, a ridgetop saddle, or the lower edge of a talus slope. Survey time required for this species can be calculated based on the extent of this type of habitat. During ground surveys, a hand rake is recommended for raising fallen grasses and low branches of shrubs during the search, and digging into loose soil. In talus, first search along lower talus / vegetation edges, then into deeper talus. Search under shrubs and grasses, then carefully lift rocks, examining all sides of them for aestivating snails. Work down into the talus interspaces to areas where rocks are cool and moist, and snails are most likely to be found.

Voucher collection requirements given in section II.B.1.d. should be observed, but may not be sufficient to document the variation within a population at any given site for this species. Be careful to collect enough specimens to document color or structural variation, giving preference to shell vouchers to avoid causing undue impacts to the living population. **Juvenile and subadult specimens** aid in identification of this species.

Pristiloma arcticum crateris, Crater Lake tightcoil

Until more is learned about the habitat and distribution of this species, surveys for it should be conducted only within 10 meters of perennially wet areas within forests and riparian areas. Because of the minute size of this species, it is generally overlooked while searching for other, larger species. For this reason, time spent searching in this habitat type during general surveys cannot be counted towards the time required for this species. Due to the typical small size of suitable wet habitat patches, separate search time requirements should be determined (see section II.C.4.a.) and separate surveys completed for this species.

Pristiloma are very small (2-3 mm), and surveyors will need to examine the substrate closely in order to detect them. During surveys of suitable wet habitat, search the undersides of woody debris, among wet mosses, rushes and other low vegetation at the edges of wetlands, springs, seeps and streams and in perennially damp forest floor litter, especially where it has accumulated at the bases of shrubs and against logs. Pick up a small handful

of litter, vegetation or moss and examine both sides of each leaf or frond. Use a 10-15x hand lens to examine any object that might be a snail. Examination of material in bright light helps to make animals active and easier to detect. Care should be taken to avoid wind, even gentle air currents, that could cause shells to blow away while examining them.

An alternate method is to collect litter by hand from several points within a likely sample area until about 1 gallon of material per 32 sq. m. (10.8 sq. ft.) area has been gathered, and examine it in the laboratory as described by Frest and Johannes (1995:p. 66). This method is time consuming, and it is not required for this protocol. However, it is the method of choice if more intensive or quantifiable sampling is desired, and remains the only certain method of discovering small species.

Although there are various species of *Pristiloma*, the distinct shell characteristics of the genus can be determined in the field. The species and subspecies characteristics may need to be identified in the laboratory. It is required, as described in section II.B.1.d., that the subspecies identification be verified by an authority. Until proven otherwise, sites identified to the species level should be considered S&M sites and managed as such.

If possible, collect adult, live specimens of *Pristiloma* and shells in separate containers. Small vials or clean film canisters are adequate, but include a piece of moist unbleached paper towel with the live specimens to provide moisture. Do not allow the specimens to overheat or dry out. Identify living specimens as soon as possible. Where there is risk to species persistence at the site due to low numbers of individuals, only shell specimens should be collected. Adult specimens are preferred.

Vertigo n.sp. Hoko Vertigo

Vertigo are found in moist forest conditions within 200m. of water where deciduous shrubs and small hardwood trees are present. Limited search times may be used for this species based on the extent of this suitable habitat (see section II.C.4.a.). Because of the minute size of this species and its arboreal habitat, it is generally overlooked while searching for other, larger species. For this reason, time spent searching during general surveys cannot be counted towards the search time required for this species.

Vertigo are very small (2.5 mm long), so surveyors will need to examine the substrate closely. Adults in this genus are easily recognized by their minute, pupa-shaped shell and apertural teeth. *Columella*, another pupillid snail genus likely to be found in the same area, lacks apertural teeth.
The live animals will generally be found suspended from the undersides of smooth-barked limbs and twigs of deciduous shrubs and small trees. Examine the trunks and lower branches of young trees with smooth bark, primarily hardwoods, and the branches of shrubs. *Vertigo* have elongate shells and will resemble a small bud. Care should be taken, when examining a specimen in this situation, to hold a hand under the specimen so that it does not become dislodged and fall to the ground. Also search leaf litter and bits of bark on the ground under such vegetation for shells and fallen animals. Pick up a small handful of dead leaves, being sure to include mostly damp ones from underneath the surface duff. Turn the leaves over one at a time and examine both sides for snails. Use a 10-15x hand lens to examine any small object that might be a snail.

An alternate method is to collect litter by hand from several points within a likely sample area until about 1 gallon of material per 32 sq. m. area has been gathered, and examine it in the laboratory as described by Frest and Johannes (1995:p. 66). This method is time consuming, and it is not required for this protocol. However, it is the method of choice if more intensive or quantifiable sampling is desired, and remains the only certain method of discovering small species.

Collect shells and / or living specimens (of adults only) to be examined in the laboratory. Living specimens may be allowed to die and dry up, since **adult shells which have developed apertural teeth** are sufficient for identifying the Hoko *Vertigo*. Voucher collection requirements given in section II.B.1.d. may not be sufficient for this species. In order to ensure that a good specimen is available with all the key characteristics, at least 5 to 10 adults should be provided to verify the species, which may require collection of living snails to find a sufficient quantity. This species generally occurs in large colonies of many individuals. However, if specimens do not occur in sufficient numbers to allow multiple specimen collections without threatening persistence of the species at that site, only shells with obvious apertural teeth should be collected. Identification of this species, though not difficult, may require microscope examination of apertural structures and expert verification.

II.C. Timing of Surveys (Season and Frequency for Sampling)

Survey timing is discussed in 4 ways: 1) time of year and environmental conditions in which to survey (the most important consideration); 2) time of day (which is generally not critical, but understanding daily activity patterns of mollusks is helpful in finding them); 3) the number of visits to a survey area (which is correlated with appropriate environmental conditions); and 4) duration of survey (time spent surveying each survey area).

II.C.1. Time of Year

Because environmental conditions suitable for mollusk activity may vary within species and between species, and many environmental factors which determine mollusk activity periods are still unknown, it is difficult to propose rigid temperature and moisture limits in which to frame survey periods. Mollusk activity at the project area is the best determining factor for assessing the suitability of environmental conditions at the site. Suitable conditions can be said to exist when several species of the more common snails and slugs are easily found and some are out on the ground, litter, logs, or vegetation. Conversely, detection of aestivating or hibernating individuals is an indication of unsuitable survey conditions. Disturbance of animals at these times may result in adverse affects to mollusk populations. The survey period may vary dramatically from year to year, on a spatial and elevational scale within the Northwest Forest Planning area, or even within an individual Ranger District or Resource Area. In assessing appropriate survey conditions for a large survey area which may have different elevations or aspects resulting in different temperature and moisture conditions, divide the survey area into logical portions having different conditions, or use the most restrictive conditions as a guide for the entire survey area. For purposes of documenting conditions during a general survey, soil temperatures may be estimated by taking measurements at the beginning and the end of a survey

period at several places in the survey area which represent the range of environmental conditions and averaging the results.

As a general set of guidelines, fall surveys can usually begin in late September or October after **1)** autumn rains have soaked the ground (i.e., generally after at least three days of moderate to heavy rains), and **2)** the soil is wet to a 1" depth or morning dew or frost is present (in areas or years in which autumn rains may not occur before the ground freezes).

Surveys may continue into the late fall or early winter until **1)** soil temperatures fall below 0°C (32°F) and remain below 2°C (36°F) (under the canopy) for three consecutive days (i.e. when there is a constant period of three or more days of cold temperatures), or **2)** the ground is frozen, or **3)** snow prevents a reasonable search. Survey conditions are still within protocol if soil temperatures drop below 2°C (36°F) during the night and rise again during the day. Although mollusk activity is usually the best indicator of proper survey conditions and some mollusk species become active during brief periods of warmer weather after the cold weather cut-off, the use of mollusk activity as an indicator during these periods may not be appropriate, as some species may not be as sensitive to small temperature changes or may be annual species which die during the first cold period. Surveys should not be conducted after the cold weather cut-off has been reached.

Surveys may resume in the spring after **1)** the snow has melted and the ground is thoroughly thawed and **2)** the soil temperature remains above 5°C (40°F) for at least three consecutive days. A slightly higher temperature threshold is considered necessary in the spring in order to compensate for the need for animals to become active after a long dormant period and also to allow time for new hatchlings to emerge.

Surveys may continue into early summer until **1)** the top half-inch of soil is dry or **2)** daytime air temperatures remain above 27°C (80°F) for three consecutive days. Surveys windows may re-open in late spring after dry periods if rainfall is sufficient to moisten the top half-inch of the duff layers, as mollusks may become active again during this time with less soil moisture than was available to trigger the beginning of the season. The presence of aestivating mollusks is an indication that the environmental conditions are not appropriate for surveys. In warm, wet climates such as coastal areas of SW Oregon and Northern California, there may be only one, long rainy season survey period with continuous adequate environmental conditions. In this case, surveys may be conducted through the winter.

In warm, dry climates, such as interior Northern California and the eastern Cascades, or at high elevations, there may be a very narrow window of suitable survey conditions, especially during the fall season. February and March may be the best survey season in this region, even though soil temperatures may still be less than 36°F, because moisture quickly becomes very limited after this time. Snails in these habitats are also easier to find in the spring when they are dispersing and foraging, rather than during the fall when they may remain in secluded recesses. Documentation of these special circumstances may recommend conducting two spring surveys or doing consecutive visits less than three weeks apart (see section II.C.3). Some species of slugs (*P. coeruleum*, and *Hemphillia spp.*) which hatch in early spring may be easier to find and identify at a larger and more visible adult stage in late spring or fall. Avoid early spring surveys when annual species are targeted.

II.C.2. Time of Day

During the proper seasons to survey, time of day to search is generally not critical, providing that the surveyor has enough light for adequate visibility. However, understanding mollusk daily movement patterns helps to improve survey efforts. Many mollusk species are most easily seen early in the morning when conditions are cool and moist, before they move to their daytime retreats. Mollusks will be actively foraging, breeding and using more of the area during these moist periods. In areas where frost or dew provides the only moisture, surveys should be limited to morning hours, when it is warm enough for mollusks to be active but before the moisture has evaporated. Some species are photophobic and will retreat when light levels are high, but stay out on cloudy or rainy days. Good visibility is important to the surveyor and suitable search time may be cut short as light levels drop in the late afternoon, on cloudy days during the fall and winter months, especially in closed forest stands. Headlamps or other artificial light can greatly improve the visibility of mollusks.

II.C.3. Number of Visits

Two surveys are required in order to increase the chances that a range of environmental conditions will be present and all mollusk species will be detected. Mollusk species are very sensitive to changes in moisture, temperature and light, and survey results can vary considerably from visit to visit. As described above, some slug and snail species have seasons and / or weather conditions when they are most detectable. Visits should be spaced **at least three weeks apart** in order to increase the chances that the full range of mollusk species present can be detected. Spacing visits apart by periods longer than three weeks may increase the chances of finding more specimens. Variations in mollusk behavior through the seasons and in different years will result in differing success at locating specimens. It is recommended, though not required, that at least one survey be done well within the autumn rainy season, as the majority of mollusk activity occurs within this season in most areas. This is especially important when annual species which hatch in the early spring and may be very small at that time of year are the target of the search.

For some areas and habitat types, protocol conditions may be short-lived, and it will not be possible to complete two surveys in one season with a three week interval between visits (for example at high elevations). In these situations, if environmental conditions change substantially in less than three weeks, the period between successive visits may be reduced. Both visits must, however, still be within the temperature and moisture conditions described above. Justification for surveys done with a shortened time period between visits should be documented in the project file.

For survey areas which contain relatively uniform habitat with well-distributed habitat features, survey routes and sample areas selected for the second visit should be in areas <u>not</u> covered by the first visit. For very small project areas, linear project areas or larger project areas which contain few concentrations of habitat features upon which to focus Sample Area methodology, it is acceptable to resurvey virtually the same route and sample areas on both visits in order to search the most suitable habitat. Since Management Recommendations for each S&M species may not necessarily

overlap and are certain to change over time, it is not redundant to attempt to locate additional S&M species where not all target species were located on the first survey.

II.C.4. Duration of Visits

The identified survey area should be well covered during a survey. Well covered means that sample areas and / or point searches were distributed within the survey area such that a good representation of the habitat types within the delineated survey area has been searched. An adequate survey can be assumed when one the following criteria are met:

1) Averaged for the survey area, **at least 60 minutes for every ten acres of survey area** has been spent actively searching. This time should be divided into **20 minutes each for two sample areas** (or less if all target species have been located at a given sample area) and **20 minutes total for point searches outside of sample areas**. Additional time should be added in proportion to added survey area, rounded to the nearest five acres, i.e 16 acres would require 90 minutes of survey time: three 20 minute sample areas and 30 minutes of point search. NOTE: The time necessary to walk the area during a survey and to identify specimens and complete the field forms is not included in this requirement and will add considerably to the actual time needed to complete a survey.

2) If the suitable habitat to be surveyed exists in small patches, such as occurs with rocky outcrops, talus deposits or small project areas, a variation from the standard time requirements described above, may be used. **A minimum of 20 minutes** should be spent in searching any suitable habitat area **between 1/ 4 acre and one acre in size**. This search time can be spent entirely in point searches with more extensive searching of individual habitat features. At least **45 minutes** should be spent searching areas **one to ten acres in size, including at least one sample area**. Small talus patches or rock outcrops **less than 1/4 acre in size may be treated as sample areas** within a larger general survey area. Only a few of such patches occurring within a survey area need to be included as sample areas.

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Appendices

Appendix A. Table 1 . Terrestrial mollusk species known or suspected ranges - by Forest or BLM District*

* this table is not meant to imply survey requirements for any unit, but simply the current understanding of the range of these species.

Administrative Units listed in shaded type below represent proposed range extensions since the previous version of this protocol. Also, Administrative Units marked by an "@" below were listed in Version 2.0 of the mollusk protocol, but they also now include new portions (individual Ranger Districts or Resource Areas, for example) that are proposed as range extensions. None of the proposed extensions here have been approved thorough the Annual Species Review (ASR) process as of DEC 2002, and hence surveys within these areas are not yet required. The transmittal of the results of the FY02 ASR will indicate approved range extensions, and phase in requirements for survey need. Use Table 1.1 from the Survey and Manage ROD, amended annually, to determine where surveys are currently required.

Terrestrial Snail Species			**BLM Land Units**								
Scientific Name	Common Name	Sp Code	ARC	CLK	RED	KFA	SAL	EUG	ROS	MED	COOS
Ancotrema voyanum	Hooded lancetooth	ANVO	2		2						
Cryptomastix devia	Puget oregonian	CRDE2					2				
Cryptomastix hendersoni	Columbia oregonian	CRHE					1				
Helminthoglypta hertleini	Oregon shoulderband	HEHE			2				2@	2	
Helminthoglypta talmadgei	Trinity shoulderband	HETA			2						
Megomphix hemphilli	Oregon megomphix	MEHE					2	2	2	2	2
Monadenia chaceana	Siskiyou sideband	MOCH			2	2			2	2	
Monadenia fidelis klamathica	Klamath sideband	MOFIK	2		2						
Monadenia fidelis minor	Dalles sideband	MOFIM					1				
Monadenia fidelis ochromphalus	Yellow-based sideband	MOFIO	2		2						
Monadenia troglodytes troglodytes	Shasta sideband	MOTRT			2						
Monadenia troglodytes wintu	Shasta (Wintu) sideband	MOTRW			2						
Oreohelix n.sp.	Chelan mountainsnail	ORXX1									
Pristiloma arcticum crateris	Crater Lake tightcoil	PRARC				2	2	2	2	2@	
Trilobopsis roperi	Shasta chaparral	TRRO2			2						
Trilobopsis tehamana	Tehama chaparral	TRTE	2	2	2	1					
Vertigo n.sp.	Hoko vertigo	VEXX1					1				
Vespericola pressleyi	Big Bar hesperian	VEPR		1	2						
Vespericola shasta	Shasta hesperian	VESH			2						

Table 1 (Continued):

Terrestrial Slug Species			BLM Land Units								
Scientific Name	Common Name	Species Code	ARC	CLK	RED	KFA	SAL	EUG	ROS	MED	COOS
			C056	C058	C059	O010	O080	O090	O100	O110	O120
Deroceras hesperium	evening fieldslug	DEHE				2	2	1	1	2	1
Hemphillia burringtoni	Burrington jumping-slug	HEBU									
Hemphillia glandulosa	warty jumping-slug	HEGL					2				
Hemphillia malonei	Malone jumping-slug	HEMA					2				
Hemphillia pantherina	Panther jumping-slug	HEPA									
Prophysaon coeruleum	blue-grey tail-dropper	PRCO	2		2	2	2	2	2	2	2

OCCURRENCE CODES	BLM LAND MANAGEMENT UNITS	
Blank = Outside of known range. . 1 = Not suspected in unit. Know these species if they are encountered. . 2 = Known or Suspected to occur.	NORCAL Districts: ARC C056 = Arcata RA CLK C058 = Clear Lake RA RED C059 = Redding RA	Oregon Districts: KFA O014 = Klamath Falls RA of Lakeview District SAL O080 = Salem District EUG O090 = Eugene District ROS O100 = Roseburg District MED O110 = Medford District COOS O120 = Coos Bay District

Table 1 (Continued)

Terrestrial Snail Species			National Forest Land Units									
Scientific Name	Common Name	Sp Code	GIP	MBS	OKA-WEN		OLY	CRG	DES	MTH	SIU	WIL
Ancotrema voyanum	Hooded lancetooth	ANVO										
Cryptomastix devia	Puget oregonian	CRDE2	2	2	1	2	2	2		2	2	1
Cryptomastix hendersoni	Columbia oregonian	CRHE	2			2		2	1	2		1
Helminthoglypta hertleini	Oregon shoulderband	HEHE										
Helminthoglypta talmadgei	Trinity shoulderband	HETA										
Megomphix hemphilli	Oregon megomphix	MEHE	2	1			2	2		2	2	2
Monadenia chaceana	Siskiyou sideband	MOCH										
Monadenia fidelis klamathica	Klamath sideband	MOFIK										
Monadenia fidelis minor	Dalles sideband	MOF1M	2					2	1	2		
Monadenia fidelis ochromphalus	Yellow-based sideband	MOFIO										
Monadenia troglodytes troglodytes	Shasta sideband	MOTRT										
Monadenia troglodytes wintu	Shasta (Wintu) sideband	MOTRW										
Oreohelix n.sp.	Chelan mountainsnail	ORXX1			1	2@						
Pristiloma arcticum crateris	Crater Lake tightcoil	PRARC						1	2	2	1	2
Trilobopsis roperi	Shasta chaparral	TRRO2										
Trilobopsis tehamana	Tehama chaparral	TRTE										
Vertigo n.sp.	Hoko vertigo	VEXX1	1	1			2					
Vespericola pressleyi	Big Bar hesperian	VEPR										
Vespericola shasta	Shasta hesperian	VESH										

Table 1 (Continued)

Terrestrial slug species			National Forest Land Units								
Scientific Name	Common Name	Species Code	GIP	MBS	OKA-WEN		OLY	CRG	DES	MTH	SIU	WIL
			W603	W605	W608	W617	W609	622	O601	O606	O612	O618
Deroceras hesperium	evening fieldslug	DEHE	1	1		1	2	2	1	2	2	1
Hemphillia burringtoni	Burrington jumping-slug	HEBU	2	1		1	2	1				
Hemphillia glandulosa	warty jumping-slug	HEGL	2	2		1	2	2		1	2	
Hemphillia malonei	Malone jumping-slug	HEMA	2	1			2	2		2		2
Hemphillia pantherina	Panther jumping-slug	HEPA	2	1			1	1		1		
Prophysaon coeruleum	blue-grey tail-dropper	PRCO	2	1	1	2	2	2	2	2	2	2

* this table is not meant to imply survey requirements for any unit, but simply the current understanding of the range of these species.

OCCURRENCE CODES	FOREST SERVICE LAND MANAGEMENT UNITS	
Blank = Outside of known range 1 = Not expected in unit. Know these species in case they are encountered. 2 = Known or Suspected to occur.	Washington National Forests: GIP W603 = Gifford Pinchot N. F. MBS W605 = Mt. Baker-Snoqualmie N. F. OKA W608 = Okanogan N.F. OLY W609 = Olympic N. F. WEN W617 = Wenatchee N. F. Other: CRG 622 = Columbia Gorge National Scenic Area	Oregon National Forests: DES O601 = Deschutes National Forest MTH O606 = Mount Hood National Forest SIU O612 = Siuslaw National Forest WIL O618 = Willamette National Forest

Table 1 (Continued)

Terrestrial Snail Species			National Forests								
Scientific Name	Common Name	Sp Code	ROR	SIS	UMP	WIN	KLM	MEN	MOD	SIX	SHA
Ancotrema voyanum	Hooded lancetooth	ANVO					2			2	2
Cryptomastix devia	Puget oregonian	CRDE2									
Cryptomastix hendersoni	Columbia oregonian	CRHE									
Helminthoglypta hertleini	Oregon shoulderband	HEHE	2	2	2		2		1	1	2
Helminthoglypta talmadgei	Trinity shoulderband	HETA					2			2@	2
Megomphix hemphilli	Oregon megomphix	MEHE	2	2	2						
Monadenia chaceana	Siskiyou sideband	MOCH	2@	2	2@		2		1		2
Monadenia fidelis klamathica	Klamath sideband	MOFIK	2	2			2			2	1
Monadenia fidelis minor	Dalles sideband	MOFIM				1					
Monadenia fidelis ochromphalus	Yellow-based sideband	MOFIO	2	2			2			2	1
Monadenia troglodytes troglodytes	Shasta sideband	MOTRT									2
Monadenia troglodytes wintu	Shasta (Wintu) sideband	MOTRW									2
Oreohelix n.sp.	Chelan mountainsnail	ORXX1									
Pristiloma arcticum crateris	Crater Lake tightcoil	PRARC	2	1	2	2					
Trilobopsis roperi	Shasta chaparral	TRRO2					1		1		2
Trilobopsis tehamana	Tehama chaparral	TRTE	1				2	1		1	2
Vertigo n.sp.	Hoko vertigo	VEXX1									
Vespericola pressleyi	Big Bar hesperian	VEPR								2	2
Vespericola shasta	Shasta hesperian	VESH									2

Table 1 (Continued)

Terrestrial Slugs			<----------National Forest Land Units (continued)---------->								
			<----------OREGON---------->				<----------CALIFORNIA---------->				
Scientific Name	Common Name	Species Code	ROR	SIS	UMP	WIN	KLM	MEN	MOD	SIX	SHA
Deroceras hesperium	evening fieldslug	DEHE	2		1	2	1				
Hemphillia burringtoni	Burrington jumping-slug	HEBU									
Hemphillia glandulosa	warty jumping-slug	HEGL									
Hemphillia malonei	Malone jumping-slug	HEMA									
Hemphillia pantherina	Panther jumping-slug	HEPA									
Prophysaon coeruleum	blue-grey tail-dropper	PRCO	2	2	2	2	2			2	

* this table is not meant to imply survey requirements for any unit, but simply the current understanding of the range of these species.

OCCURRENCE CODES	FOREST SERVICE LAND MANAGEMENT UNITS	
Blank = Outside of known range. 1 = Not expected in unit. Know these species in case they are encountered. 2 = Known or suspected to occur.	Oregon National Forests: ROR O610 = Rogue River National Forest SIS O611 = Siskiyou National Forest UMP O615 = Umpqua National Forest WIN O620 = Winema National Forest	California National Forests: KLM C505 = Klamath National Forest MEN C508 = Mendocino National Forest MOD C509 = Modoc National Forest SIX C510 = Six Rivers National Forest SHA C514 = Shasta-Trinity National Forest

APPENDIX A - MOLLUSK RANGES by FEDERAL AGENCY UNIT

Terrestrial mollusks species covered by this protocol, arranged alphabetically, with the known and suspected range of each species as of January 2002, defined in terms of federal administrative units. If no sub-administrative units are in parentheses, then the entire national forest or BLM district is included. This list is intended to expand upon information in Table 1. For example, if all known locations for a species are confined to a particular area (i.e., a county, ranger district, or resource area), the range is considered to include only that area, rather than the whole National Forest or BLM District. Elevation information is approximated, and low to mid-elevation means to 0-460 m (0-1500 ft).

Administrative Units (or portions thereof) listed in shaded type below represent proposed range extensions since the previous version of this protocol. These proposed extensions have not yet been approved thorough the Annual Species Review (ASR) process as of DEC 2002, and hence surveys within these areas are not yet required. The transmittal of the results of the FY02 ASR will indicate approved range extensions, and phase in requirements for survey need. Consult the results of the current Annual Species Review process to determine pre-disturbance survey requirements for each species and changes to their known and suspected range.

Ancotrema voyanum - NorCal BLM (Redding RA in Siskiyou and Trinity Counties, Arcata RA), Klamath NF (Happy Camp RD, Ukonom RD, Oak Knoll RD, Salmon River RD), Shasta-Trinity NF (Big Bar RD, Hayfork RD, Weaverville RD), Six Rivers NF (all).

Cryptomastix devia — **low to mid-elevations** in: Columbia River Gorge NSA, Gifford Pinchot NF (all), Mount Hood NF (Clackamas RD, Hood River RD, Zigzag RD), Olympic NF (East Side: Hood Canal RD and Quilcene RD), Salem BLM (Tillamook RD and Cascades RD north of Marion Co.), Siuslaw NF (Hebo RD), Wenatchee NF (Cle Elum RD, Natches RD, Leavenworth RD and Lake Wenatchee RD), Mt. Baker-Snoqualmie NF.

Cryptomastix hendersoni — **low to mid-elevations** in: Columbia River Gorge NSA, Mt. Hood NF (all), Wenatchee NF (Natches RD), Gifford-Pinchot NF (Mt. Adams RD).

Deroceras hesperium —: Columbia River Gorge NSA, Mount Hood NF (all), Olympic NF (all), Salem BLM (all), Siuslaw NF (Hebo RD), Medford BLM (Ashland RA), Rogue River NF (Butte Falls RD), Lakeview BLM (Klamath RA), Winema NF (Klamath RD).

Helminthoglypta hertleini — Klamath NF (all), Medford BLM (all), NorCal BLM (Redding RA), Rogue River NF (all), Roseburg BLM (South River RA, Swiftwater RA), Shasta-Trinity NF (Mt. Shasta RD, Shasta Lake RD, McCloud RD), Siskiyou NF (Galice RD, Illinois Valley RD), Umpqua NF (Tiller RD).

Helminthoglypta talmadgei — **elevations below 1525 m, (5000 ft.)** in: Klamath NF (Happy Camp RD, Ukonom RD, Salmon River RD), NorCal BLM (Redding RA in Trinity County), Shasta-Trinity NF (Big Bar RD, Hayfork RD, Weaverville RD, Yolla Bolla RD), Six Rivers NF (Lower Trinity RD, Orleans RD, Mad River RD)

Hemphillia burringtoni — **elevations below 915 m. (3000 ft.)** in: Olympic NF (all), Gifford Pinchot NF (all).

Hemphillia glandulosa — **elevations below 915 m.(3000 ft.)** in: Columbia River Gorge NSA, Gifford Pinchot NF (all), Olympic NF (all), Salem BLM (Tillamook RA, Mary's Peak RA), Siuslaw NF (Hebo RD), Mt. Baker-Snoqualmie NF (all).

Hemphillia malonei – **elevations up to 1220 m.(4000 ft.)** in: Columbia River Gorge NSA, Gifford Pinchot NF (all), Mount Hood NF (all except Barlow RD), Salem BLM (Cascades RA), Olympic NF (Hood Canal RD), Willamette NF (Detroit RD).

Hemphillia pantherina — **elevations below 915 m.(3000 ft.)** in Gifford Pinchot NF (Mt St Helens RD)

Megomphix hemphilli — **below 3000 ft. elevation** in: Columbia River Gorge NSA, Coos Bay BLM (all), Eugene BLM (all), Medford BLM (Glendale RA), Mount Hood NF (Hood River RD, Clackamas RD, Zigzag RD), Rogue River NF (Prospect RD), Roseburg BLM (all), Salem BLM (all), Siskiyou NF (Powers RD), Siuslaw NF (all), Umpqua NF (all), Willamette NF (all), Gifford Pinchot NF (Mt. St. Helens RD, Cowlitz Valley RD), and Olympic NF (Hood Canal RD).

Monadenia chaceana — Klamath NF (Goosenest RD, Oak Knoll RD east of the mouth of the Scott River, Scott River RD), Lakeview BLM (Klamath RA), Medford BLM (Ashland RA, Butte Falls RA), Roseburg BLM (South River RA), NorCal BLM (Redding RA in Siskiyou and Shasta Co), Rogue River NF (Applegate RD, Ashland RD, Butte Falls RD, Prospect RD), Shasta-Trinity NF (Mount Shasta RD, McCloud RD), Siskiyou NF (Galice RD, Illinois Valley RD), Umpqua NF (Tiller RD, Diamond Lake RD)

Monadenia fidelis klamathica — NorCal BLM (Redding RA in Siskiyou and Trinity Counties, Arcata RA), Klamath NF (Happy Camp RD, Ukonom RD, Oak Knoll RD, Scott River RD, Salmon River RD), Six Rivers NF (Orleans RD, Lower Trinity RD, Mad River RD), Siskiyou NF (Illinois Valley RD), Rogue River NF (Applegate RD).

Monadenia fidelis minor — Columbia River Gorge NSA, Mt. Hood NF (Hood River RD, Barlow RD), Gifford-Pinchot (Mt. Adams RD).

Monadenia fidelis ochromphalus – NorCal BLM (Redding RA in Siskiyou and Trinity Counties, Arcata RA), Klamath NF (Happy Camp RD, Ukonom RD, Oak Knoll RD, Scott River RD, Salmon River RD), Six Rivers NF (Orleans RD, Lower Trinity RD, Mad River RD) Siskiyou NF (Illinois Valley RD), Rogue River NF (Applegate RD).

Monadenia troglodytes troglodytes — NorCal BLM (Redding RA in Shasta Co.), Shasta-Trinity NF (Shasta Lake RD)

Monadenia troglodytes wintu — NorCal BLM (Redding RA in Shasta Co.), Shasta-Trinity NF (Shasta Lake RD)

Oreohelix **n. sp.** — northeastern Chelan County, Washington. The eastern boundary of the known range is the Columbia River, the northern boundary is the shore of Lake Chelan, the western boundary the line between the Douglas fir and grand fir forest series, and the southern boundary is the

Wenatchee River. In: Okanogan and Wenatchee NF (Methow Valley RD south of route 20, Chelan RD, Entiat RD, Leavenworth RD).

Pristiloma arcticum crateris — **above 610 m.(2000 feet) elevation**: Eugene BLM (McKenzie and South Valley RA east of Interstate 5), Deschutes NF (Bend portion of Bend / Fort Rock RD, Crescent RD, Sisters RD), Lakeview BLM (Klamath RA), Medford BLM (Ashland RA east of I-5, Butte Falls RA), Mount Hood NF (Barlow, Clackamas RD), Rogue River NF (Ashland RD east, Butte Falls RD, Prospect RD), Roseburg BLM (east of Interstate 5), Salem BLM (Cascades RA), Umpqua NF (all), Willamette NF (all), Winema NF (all).

Prophysaon coeruleum – Salem BLM (all), Eugene BLM (all), Roseburg BLM (all), Coos Bay BLM (all), Medford BLM (all), Lakeview BLM (Klamath RA), Willamette NF, Mt. Hood NF (all except Balrow RD), Siuslaw NF, Siskiyou NF, Columbia River Gorge NSA, Gifford Pinchot NF (all), Rogue River NF (all), Wenatchee NF (all), Olympic NF (all), Deschutes NF (Bend portion of Bend / Fort Rock RD, Crescent RD, Sisters RD), Klamath NF (Happy Camp RD, Oak Knoll RD, Goosenest RD), NorCal BLM (Redding RA in Siskiyou Co., Arcata RA), Umpqua NF, Winema NF, Six Rivers NF (Orleans RD, Lower Trinity RD).

Trilobopsis roperi — NorCal BLM (Redding RA in Shasta County), Shasta-Trinity NF (Shasta Lake RD).

Trilobopsis tehamana — Klamath NF (Scott River RD, Salmon River RD, Oak Knoll RD), NorCal BLM (Arcata RA in Mendocino County, Clear Lake RA in Glenn County, Redding RA), Shasta-Trinity NF (all).

***Vertigo* n. sp.** — Olympic NF (Soleduck RD in Clallum County).

Vespericola pressleyi — **up to 915 m. (3000 ft.) elevation** in: NorCal BLM (Redding RA in Trinity County), Shasta-Trinity NF (Big Bar RD, Hayfork RD, Weaverville RD), Six Rivers NF (Lower Trinity RD).

Vespericola shasta — **up to 915 m. (3000 ft) elevation** in: NorCal BLM (Redding RA in Shasta County), Shasta-Trinity NF (McCloud RD, Mount Shasta RD, Shasta Lake RD).

Abbreviations: BLM (Bureau of Land Management), NF (National Forest), NSA (National Scenic Area)

APPENDIX B -DESCRIPTION OF HABITAT

The following list summarizes the current understanding of known habitat associations and key habitat features for each species. In addition to the information provided in this Appendix, **Management Recommendations and other sources of information should be used to determine suitable habitat for these species.**

Ancotrema voyanum (Newcomb, 1865).
The **Hooded lancetooth** seems to be typically found associated with moist forest sites in either upland or riparian habitat with perennial subsurface dampness. Late seral, closed forest canopy, hardwood leaf litter and woody debris are important habitat elements which provide protection from dessication.

Cryptomastix devia (Gould, 1846).
The **Puget Oregonian** may be found in mature or old growth forest habitat, typically on or under hardwood logs and leaf litter. Rocks and talus, which are cool and moist beneath, may also be used. These snails are also found on or in the litter under sword ferns growing under hardwood trees and shrubs, especially big leaf maples. Young *C. devia* may also be found under mosses growing on the trunks of big leaf maples, but in these locations young of *Monadenia fidelis fidelis* are more common and may be mistaken for juvenile *C. devia* when very small.

Cryptomastix hendersoni (Pilsbry, 1928).
The **Columbia Oregonian** is generally found within 100 m. of streams, seeps and springs east of the Cascade Divide and in the Columbia Gorge. It is typically a riparian associate in these steppe communities. In the Western Cascades, it can also be found in mature forested habitats outside of riparian areas, among small, moist talus, hardwood leaf litter or shrubs, or under logs or other debris.

Deroceras hesperium (Pilsbry, 1944).
The **Evening Fieldslug** has been reported to be associated with wet meadows in forested habitats in a variety of low vegetation, litter and debris; rocks may also be used. Little is known about this species or its habitat. Surveys may be limited to moist surface vegetation and cover objects within 30 m. (98 ft.) of perennial wetlands, springs, seeps and riparian areas.

Helminthoglypta hertlieni (Hanna and Smith, 1937).
The **Oregon Shoulderband** is known from rocky areas, including talus deposits and outcrops, which contain stable interstitial spaces large enough for snails to enter. Within rocky habitat, the species is associated with herbaceous vegetation and deciduous leaf litter, generally within 30 m. (98 ft.) of stable talus deposits or other rocky areas in shrublands or rocky inclusions in forest habitat, often adjacent to areas with substantial grass or seasonal herbaceous vegetation. Woody debris is often used as refugia in moist situations.

Helminthoglypta talmadgei (Roth, 1988).
The **Klamath Shoulderband** has been found to be associated with deciduous tree species (especially oaks) in mixed hardwood / conifer stands. On moister

sites it is associated with woody debris or root structures, moss and leaf litter, while rock refugia may be used in dry situations. Partial shading (or a combination of dense shande and open areas) is preferred and the presence of seasonal, herbaceous plants or grass may be a limiting factor.

Hemphillia burringtoni (Pilsbry, 1948).
The **Burrington Jumping-slug** is associated with conifer logs and / or heavy ground cover of low vegetation, moss, litter and woody debris in moist, shaded, mature forest habitats.

Hemphillia glandulosa (Binney and Binney, 1872).
The **Warty Jumping-slug** has been found in at moist sites where conifer logs and / or heavy ground cover, moss, litter and woody debris is prevalent, usually in forest stands with greater than 40% canopy cover.

Hemphillia malonei, (Pilsbry, 1917).
The **Malone Jumping-slug** has been found in moist forested habitats, generally over 50 years of age with greater than 50% canopy cover, especially where dense sword fern, conifer logs, coarse woody debris, exfoliated bark piles and large decaying stumps are prevalent. While shrub cover is typically present, vegetative ground cover may be sparse, especially at higher sites. The species has also been found in marshy open sites where dense skunk cabbage, fallen logs and other low vegetative cover is present.

Hemphillia pantherina (Branson, 1975).
The **Panther Jumping-slug** has been found at one location in deep forest floor litter near a stream. Its habitat is assumed to be similar to that of other *Hemphillia*. It is not known whether this species is more strongly associated with riparian habitat than other Hemphillia, or if this is merely coincidental at the type locality. Down woody debris and sword ferns are assumed to be key habitat elements. Mature or late seral forest habitats with at least 40% canopy cover are expected to provide suitable habitat for this species.

Megomphix hemphilli (Binney, 1879).
The **Oregon Megomphix** has been found in mature or late-seral, moist conifer / hardwood forests, usually in hardwood leaf litter and decaying non-coniferous plant matter under bigleaf maple trees. The species may also be present in the absence of bigleaf maple, especially at moist sites where deciduous shrubs, coarse woody debris, rotten logs or stumps and large sword ferns provide abundant cover.

Monadenia (Shastelix) chaceana (Berry, 1940).
The **Chace Sideband** may be found within 30 m. (98ft.) of rocky areas, talus deposits and in associated riparian areas in the Klamath physiographic province and adjacent portions of the south-western Oregon Cascades. Areas of herbaceous vegetation in these rocky landscapes adjacent to forested habitats are preferred. Areas that contain moist, shaded rock surfaces are preferred for daily refuges. In more mesic, forested habitats, especially in the Oregon Cascades, the species is associated with large woody debris and the typical rocky habitat is not required. Forest habitats without either rock features or large woody debris are not currently considered to be suitable habitat for this species.

Monadenia fidelis klamathica (Berry, 1937).
The **Klamath Sideband** is found in late-successional conifer forests with high canopy closure and is associated with woody debris or rock talus within this habitat. Upland as well as riparian sites have been documented where moisture is available in refugia.

Monadenia fidelis minor (Binney, 1885).
The **Dalles Sideband** has been located in steep situations on both sides of the Columbia Gorge near and below where springs are located and in upland locations where moisture conditions allow. This species is usually found associated with basalt talus, within 200 m. of streams, seeps or springs, in steppe or dry forest plant communities. It may be found among rocks, shrubs, or other vegetation and under down wood.

Monadenia fidelis ochromphalus (Berry, 1937).
The **Yellow-based Sideband** is found in late-successional conifer forests with high canopy closure and is associated with woody debris or rock talus within this habitat. Upland as well as riparian sites have been documented where moisture is available in refugia.

Monadenia (Shastelix) troglodytes (Hanna and Smith, 1933).
The **Shasta Sideband** is usually found in brush-covered talus in mature or late-seral pine-oak woodlands within 1 km. of surface limestone outcrops; associated with calcareous soil, rock deposits, and found in or near the mouths of caves. Refuge sites do not need to have vegetative cover, but typically have adjacent late seral conifer or oak tree canopy cover.

Monadenia (Shastelix) troglodytes wintu (Roth, 1981).
The **Wintu Sideband** occurs within 1 km. of surface limestone areas in mature pine-oak woodland, often in brush-covered talus within or adjacent to forested habitat. Woody debris and deciduous leaf litter are important habitat elements within rocky habitats.

Oreohelix new sp.1.
The **Chelan Mountainsnail** is difficult to find and its preferred habitat is not yet known for certain. It was originally found in a “schist talus” above the southwest shore of Lake Chelan, but since then, shells have been found at several sites with no apparent talus. These sites are near ridgetops, often in small draws, benches or depressions, in open, mature Ponderosa pine or Douglas-fir forest stands, with ground cover of pinegrass (*Calamagrostis rubescens*) or elk sedge (*Carex geyeri*).

Pristiloma arcticum crateris (Pilsbry, 1946).
The **Crater Lake Tightcoil** may be found in perennially wet situations in mature conifer forests, among rushes, mosses and other surface vegetation or under rocks and woody debris within 10 m. of open water in wetlands, springs, seeps and riparian areas, generally in areas which remain under snow for long periods in the winter. Riparian habitats in the Eastern Oregon Cascades may be limited to the extent of permanent surface moisture, which is often much less than 10 m. from open water.

Prophysaon coeruleum (Cockerell, 1890).
The **Blue-grey Tail-dropper** is found in moist conifer and mixed conifer / hardwood forests usually located in sites with relatively higher shade and moisture levels than those of the general forest habitat. It is usually associated

with partially decayed logs, leaf and needle litter (especially hardwood leaf litter), mosses and moist plant communities such as big leaf maple and sword fern associations.

Trilobopsis roperi (Pilsbry, 1889).
The **Shasta Chaparral** is associated with deciduous hardwood and shrub leaf litter, in mixed conifer / hardwood forest habitats within 100 m. of shaded limestone rockslides, draws or caves, usually with a cover of shrubs or oak.

Trilobopsis tehamana (Pilsbry, 1928).
The **Tehama Chaparral** is generally associated with deciduous leaf litter near limestone caves, talus or outcrops within mature forest habitats, but has also been found under leaf litter and woody debris in situations not associated with limestone outcrops.

Vertigo n. sp.
The **Hoko Vertigo** may be found on the smooth trunks and lower limbs of deciduous trees and shrubs or in leaf litter under such vegetation in old-growth forests and riparian areas, within 200 m. of streams, seeps or springs.

Vespericola pressleyi (Roth, 1985).
The **Pressley Hesperian** inhabits conifer and / or hardwood forest habitat in permanently damp areas within 200 m. of seeps, springs and stable streams. Woody debris and rock refugia near water are used by the species during dry and cold periods. Herbaceous vegetation and leaf litter are common habitat elements associated with this species.

Vespericola shasta (Berry, 1921).
The **Shasta Hesperian** has been found associated with deciduous vegetation and woody debris in perennially moist areas within 200 m. of riparian zones, springs and seeps, marshes, and in the mouths of caves.

APPENDIX C

TERMS USED IN THIS PROTOCOL

Key Feature (= key habitat feature)--A habitat component that is likely associated with mollusks, since it provides such needs as moisture retention, food sources, and physical protection. Key features should guide the surveyors in choosing points and areas to be sampled. Refer to Appendix B for descriptions of features associated with each species.

Point Search--Any search of a key habitat feature for mollusks outside of a sample area. This search should be 5 minutes or less at any single point, normally less than one minute.

Sample Area--An area of 5 meters (16.5 ft) radius or 80 m^2 (855 ft^2), around a marked point in a concentration of the best suitable habitat in the survey area that is intensively searched for mollusks. This area should contain many or all of the key habitat features associated with the target species and should be centered on the habitat features described in Appendix B..

Survey Area--The area that will be impacted, directly or indirectly, by the proposed activity. The area for which a Survey and Manage mollusk survey is required, or that area of suitable habitat to be effectively covered by a survey route and associated sample areas. It may be a project analysis area, a sale unit, a watershed, or other area for which a need to survey has been identified. The survey area will encompass all areas of suitable habitat for the target species, within and adjacent to a proposed project area. See Section II.A, Plan the Survey for details.

APPENDIX D.

Required Permits

It is the responsibility of the surveyors to acquire any needed permits and to secure permission for access across non-federal lands.

Washington Department of Fish and Wildlife requires a Scientific Collection Permit for all animals collected for study or display. Several people can collect under the same Collection Permit, but all of their names and birth dates must be listed as sub-permittees. As of 1997, a permit fee of $12.00 was charged. Up to 60 days or longer may be required for a collection permit to be issued in Washington, so an application should be submitted as soon as possible in January (or December of the previous year).

To apply for a Washington State Scientific Collection Permit, write to Enforcement Program, Washington Department of Fish and Wildlife, 600 Capitol Way N, Olympia, WA 98501-1091.

Neither Oregon nor California currently requires a collecting permit for mollusks.

Caves are protected by the Federal Cave Resources Protection Act of 1988. Be sure to obtain the appropriate authorization before surveying in or near a cave. Release of information regarding locations of protected caves outside of immediate field unit is not authorized.

Equipment

Equipment and supplies suggested for the surveys include:

- Contour maps and aerial photos of the area as needed to locate the unit and record location of any target species found, the legal description, latitude and longitude or UTM, elevation and other physical site information;
- Field forms and notebook or clipboard;
- A watch to record time spent on each sample area;
- Hand Lens (10x or more), for field identification of species (mollusks and plants);
- Rigid containers with labels on which to record specimen or collection numbers to be coordinated with information on field forms and notes (i.e., collection vials or film canisters (note: do not use new film canisters for live specimens, the residual oils may be toxic.) and some containers such as small tupperware or other plastic boxes for live specimens;
- Bottles with screw tops in which to preserve voucher specimens;
- Ice chest and ice or cold pack if living specimens are to be collected during hot weather;
- Plant keys, field guides or a knowledge of plants of the area to describe the plant communities and specific habitats;
- Air and soil thermometers for recording habitat information.
- A hand garden fork for lifting and examining duff and needle litter.

Other useful items include:

- A pocket knife for reaching into cracks or small spaces for specimens.
- A strong staff (4-5 feet long) or a potato rake (with blunted tines) for holding back brambles and other vegetation, and for prying up small logs, etc.;
- Compass, Clinometer or abnee;
- Flagging, permanent markers, hand towel (for cleaning hands and specimens);
- Crown densiometer (optional);
- Sand bags or equivalent if litter samples are to be collected (see section B,2,b, Species Requiring Special Survey Techniques--*Pristiloma*).

These items may be purchased through most biological supply catalogs or at local stores.

Surveyor background, qualifications and skills

Personnel who will be doing these surveys will need to display an ability to recognize target mollusk species. Training for individuals not already familiar with mollusk systematics should be provided by an instructor with first-hand knowledge of the species and their habitats. Familiarity with most gastropod taxa, at least to genera and target taxa to species, should be a prerequisite for surveyors, so they will be able to: (1) recognize the many species they will encounter that are not of one of the target species; and (2) so they can recognize target species well enough to determine when a sufficient survey has been achieved (see "Duration of Visits"). Some National Forests and BLM Districts require "Mollusk Certification" for mollusk surveyors, including contractors and consultants, to ensure data quality. Check with your administrative unit to determine whether these requirements apply. Each surveyor should have sufficient knowledge and experience to demonstrate skills in executing these survey methods and in finding and recognizing the target species. They should be trained for these abilities by person(s) knowledgeable of current mollusk taxonomy, species characteristics and survey methods.

Training

At a minimum, training sessions should include one day in a classroom for instruction in recognition of mollusk taxonomic groups, survey and manage species, survey methods, and handling and preserving specimens. This should be followed by a day of field training in survey methods and practical experience in recognizing the species. It is recommended that instructors follow-up this training by additional work with persons who will be implementing surveys, either during a third day in session, or within 30 days, in smaller groups at their home units.

Objectives of the training should be to prepare the surveyors to be able to: (1) recognize examples of adults of most genera of snails and slugs that occur in their areas of concern; (2) recognize the survey and manage species that might occur within their area of concern; and (3) understand and be able to implement the survey protocol.

Safety Considerations

These safety considerations are not meant to be an inclusive list of hazards expected to be encountered while doing this protocol survey method. They are simply some important ideas to keep in mind. If a potato rake or garden fork is used during surveys, the tines should be ground off to dull the points to prevent impaling snails and other small animals, and to avoid injury to the surveyors.

Appropriate sanitation should be observed while surveying for mollusks. Snails and slugs are intermediate hosts to many parasites of mammals and other animals, though these parasites that are native to the Pacific Northwest are not known to infect humans directly. Hands should be washed or disinfected after handling them.

Rodent middens are often disturbed during searches for gastropods. Use care to avoid breathing dust from middens which could contain *Hanta* virus.

Habitats of the Chelan mountainsnail and other species found in semiarid and rocky landscapes are also prime habitats for rattlesnakes, black widow spiders, scorpions and other venomous species. Using the handle of a potato rake or other staff to probe vegetation is recommended. Heavy, high-topped boots should always be worn it areas where rattlesnakes can be expected.

Surveyors should remain alert for nests of wasps and hornets which may be broken into when searching through woody debris.

Since surveys are conducted during the fall season, field personnel may be working in heavy cover during hunting season. When bent over, searching the ground for mollusks, the risk of accidental shooting is greatly increased. Take precautions such as wearing brightly colored clothing, making noise, working in pairs and having radio contact with other field workers during this season.

APPENDIX E

Field Forms and Instructions for Data Entry

This Appendix contains mollusk **General Survey** and **Species Location** field forms whose fields and values correspond to the Interagency Species Management System (ISMS) data entry screens. These field forms provide a permanent record that a survey was done to protocol, as well as documenting information for locations, habitat and collection information of species sites in the ISMS database. In order to make ISMS data entry easier, the data on the field form is arranged in sections with headings which correspond to the different ISMS tables used. Also included in Appendix E are definitions of values and directions for completing the forms and for transferring the data to ISMS. Use of these forms will help to increase data consistency and help to facilitate data transfer into the ISMS database. If you choose to modify these field forms for use by your local unit, remember that all of the required information on them and the field names and exact values used for each field must be contained in any local version of the form.

General Survey Field Form

Regardless of whether you use the form provided in this document or a modified version, one **General Survey Field Form** must be completed for each visit to survey a project area or strategic survey location, even if no target species are found. All required fields on this form must have data entered in them for the survey to be considered valid. Information on this field form represents the entire area surveyed during a visit, not specific locations within it. This form is separated into three portions with headings which correspond to three different tables in the ISMS General Survey data entry screen. The first portion contains information describing the survey area and includes a unique Survey Location ID, Admin Unit, number of acres in the survey area, average elevation and project name or description. The second and third portions of the field form contain information about the visit to that area such as survey type, method and date, number of acres searched, search time, surveyor name, soil and air temperature (at beginning and end of survey) and target mollusk species searched for and/or located. It is recommended that the Species Location ID for all sites of target species located during a survey visit (see Species Location Field Form, below) also be recorded on the General Survey Field Form for cross referencing.

- ISMS data entry

  The information from this field form is entered into the ISMS database using the **ISMS Fauna General Survey Form**. All of the data on the field form from the first visit to a survey area (all three portions of the field form) is entered as a new record on this ISMS form. This General Survey Location record is linked to a polygon in GIS which includes the suitable habitat within the survey area. Small inclusions such as roads or other intervening areas adjacent to or between portions of a survey area may be included in the GIS polygon of this area, but large areas of non-habitat should not be included. Data from subsequent visits to the same survey area are entered by opening this original record (query for Survey Loc ID) and **inserting** the new visit information (the second and third portions of the field form) into the ISMS survey tables section of

this General Survey Location record. In other words, a survey area (typically suitable habitat within a project unit or other similar-sized area) is identified with a unique General Survey Loc ID and the location, size and physical description of that area is entered as a record in the ISMS General Survey Locations Table which appears in the upper half of the ISMS Fauna General Survey data entry screen. This is the information contained in the first portion of the **General Survey Field Form**. Data for each visit to a survey area (from the second and third portions of the field forms) is entered as separate survey records in the Surveys and Fauna Species Tables which appear in the lower half of the data entry screen. These survey visit records are subsets of the ISMS General Survey Location record.

One General Survey Location record in ISMS can therefore have multiple survey visit records attached to it, one for each visit to that area. These separate visit records are identified using a unique survey ID (typically the General Survey Loc ID plus the visit number). Because of this parent-child relationship between one General Survey Location record and multiple survey visit records, all General Survey Field Forms which record data from visits to the same survey area will contain the same information in the first portion of the field form describing the survey location. The information in the second and third portions of the field form will be different for different visits as the date, observer and results of the visit change.

Species Location Field Form

For each site within the survey area where target species are found, a **Species Location Field Form** is completed. All information on this form pertains to a specific site location (defined as an area which includes any locations within 30 feet of each other) rather than to the larger survey area in general. This form is divided into six portions, corresponding to different tables in the ISMS entry screens. Information describing the site, such as a unique Species Location ID, coordinates defining the geographic location, plant community, habitat information and environmental conditions at the site are contained in the first four portions of the field form. Information about each species located, such as observation type, microsite feature and collection information is contained in the fifth portion of the field form. The last portion of the field form contains information about the plant species found at the site location. Because mollusk habitat preferences seem to be defined at a much smaller scale than those of other larger taxa, the species of plants they are associated with may be important in describing the local microhabitat type.

The same Survey ID recorded in the surveys table (second portion) of the **General Survey Field Form**, corresponding to the visit to the survey area in which the species site occurs, is also entered in the Species Location Survey Table (second portion) of the **Species Location Field Form**. Some of the information in this portion of the field form is identical to information in the General Survey Field Form, however it is useful to have that data on each form because it is required for ISMS data entry of both types of data.

Recording the time at which each specimen was found helps to document times between encountering species for a check for adequate surveys. If a specimen is found and a voucher specimen is collected, record the species code used on the field form along with the Location ID and the date on the

container in which specimens of these are collected, so that they can be referred back to the field notes or form.

Habitat information at known sites of Survey and Manage species is required. Good records of habitat characteristics are especially important since so little is known about these S&M species and their ecology. Plant community data and microsite feature associations are the key to future management on the landscape scale.

- ISMS Data Entry

  This information is entered into the ISMS database using the **Fauna Species Locations Full Form.** Because of the structure of the ISMS database, several different ISMS screens and tables must be used to capture all of the information from a single **Species Location Field Form**. Some of these tables are not available using the ISMS Fauna Brief Form. **1)** In general, the ISMS Fauna Species Location Table contains information from the first portion of the field form about the spatial and physical description of the site. **2)** The ISMS Surveys Table is opened from this first screen using a button bar, and information from the second portion of the field form is entered into the Species Location Surveys Table on the second screen. **3)** Temperature conditions at the site location are entered into the Environmental Observations Table by using the Affiliate button on the Menu bar at the top of the screen. **4)** Information from the fourth portion of the field form about habitat is entered in the Community Observations Table. **5)** Data in the fifth portion of the field form contains information about each species found at the site and is entered in the Fauna Observations Table. The Feature Observations Table, the Observation Data Table and the affiliated Collections Table are subsets of the Fauna Observations Table. These tables contain additional information about each species observation and are on other screens within ISMS accessed via buttons in this table or on the main menu bar. **6)** Information about plant species at the site are entered in the Flora Observations Table, accessed using a toggle button on the Community Observations Table. Refer to the instructions in ISMS data entry manuals for complete directions on entering data using these tables. Refer to Figure 1. for a schematic diagram of the relationship of these tables to each other.

Data Management

Complete General Survey and Species Location field forms in the field, as the surveys are done. Attach copies of maps and / or aerial photographs, on which the survey areas, routes, sample areas and species locations are delineated, to the completed Mollusk Survey Field Forms. When target species are found, be sure that site locations of target species are clearly indicated on copies of the maps and / or aerial photographs. General Survey Field Forms should be kept together with the Species Location Field Forms that result from that survey visit. File these forms and maps in a secure location as appropriate for official documents. Enter the collected information into the ISMS database in a timely manner and maintain all documentation for future reference.

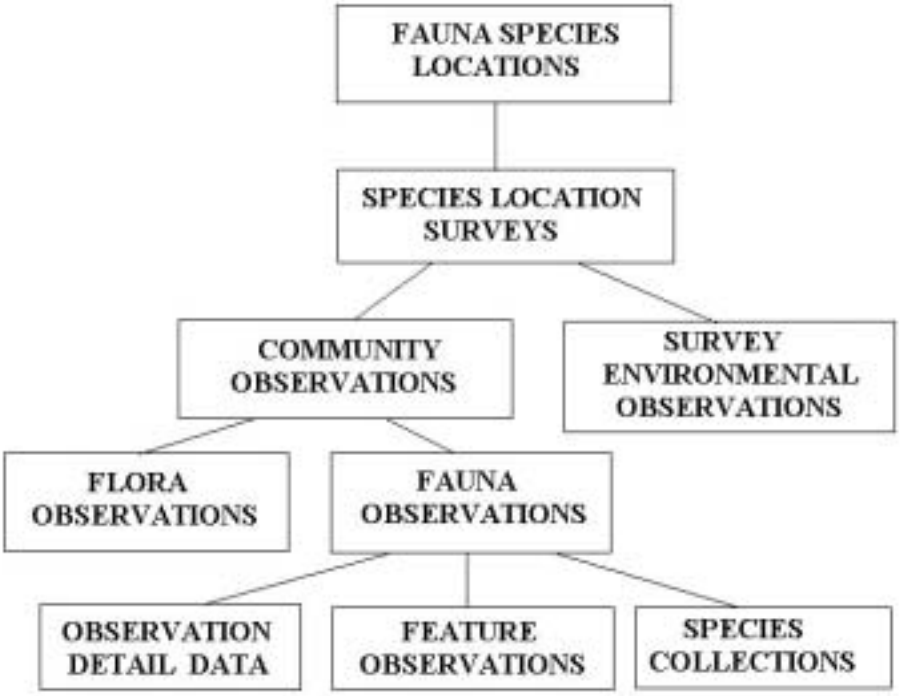

FIGURE 1. DIAGRAM OF ISMS TABLE RELATIONSHIPS

Terrestrial Mollusk
Species Locations Field Form

Please see Species Locations Field Form instructions for explanation on filling out forms.

Bolded denotes information that is required, an asterisk indicates a limited list of ISMS values required

****

Fauna Species Locations Table:

Species Location ID#:_____ **UTM_E:**__|__|__|__|__|__
(Project-Unit-Visit-Sample Area or Point Search #) **UTM_N:**__|__|__|__|__|__|__

***Admin Unit Code:**_____ ***Sub Admin Code:** _____

Slope ave. %:_____ *Slope Position:_____Aspect(°):_____ **Elevation ave. (ft):** _____

*Soil:_____ ***MoistureType:** Dry, Moist, Wet, Standing water, Snow

*Map Source:_____ ***Map Accuracy:** <1.5mi,<1/2mi,<1/4mi,<1/8mi,<150ft

****

Species Location Surveys Table:

Survey ID: _____ ***Survey Type**_____
Project Unit Visit

***Method**: Key Feature/Sample Area, Incidental, Time Constrained, Area Constrained (Circle One)

Protocol: Y / N (circle one) **(Start) Date**_____ **(Start) Time** _____

Observer(s): _____**Project** _____

****

Affiliated Table: Environmental Observations (condition at site location)

Air Temp (°F): __|__|__ **Soil Temp (°F):** __|__|__

****

Community Observations Table (for species location)

***Cmty Classification:** Series or Association (Circle One) ***Cmty Code Name**:_____

*Canopy Structure: Multiple, Single, Two (Circle one) **Community Age**_____(years)

Seral Stage: Grass/Forb, Shrub, Pole, Early-mature, Mid-mature, Late- mature, Old Growth (Circle one)

Total Overscore Cover % ____ Total Underscore Cover % ____ **Total Canopy %** ____

****

(List only mollusk species found at this location)

Fauna Observations Table:				**Obs. Data Table**	**Affiliated Collections Table**:	**Feature Observations Table:**			
***Species Code**	**Total**	***Obs. Reliability**	***Obs. Type**	**Condition** (Live/Dead)	**Collection #**	***Feature Type**	*Feature Species	Decay Class	D.B.H.

****

Flora Observations Table: (enter the three most common plant species from tree, shrub and ground cover layers observed at the site location, if known). Entries of plant species and cover amounts are not required, but will help document community type.

	TREE SPECIES			SHRUB/UNDERSCORE			GROUND COVER		
	Species 1	Species 2	Species 3	Species 4	Species 5	Species 6	Species 7	Species 8	Species 9
*Species Code									
Total Cover %									

****

Location notes:

Terrestrial Mollusk
General Survey Field Form

Please refer to General Survey Field Form Instructions for an explanation on filling out this form
Bolded denotes information that is required, an asterisk indicates a limited list of ISMS values.

****

General Survey Locations Table:

Survey Loc. ID: _____ ***Admin. Unit**:_____
Project | Unit | Additional *Sub Admin Unit:_____

Survey **Area** (Acres): _____

Elevation: Min: _____ Max: _____ **Average Elevation (ft)**: _____

T_____ R_____ S_____ 1/4_____ 1/16_____ 1/64_____

****

Surveys Table:

(Survey) ***Type:** Incidental, Pre_Disturbance, Monitoring, Other (Circle one)

Survey ID: _____ (Project-Unit-Visit) **Date:** _____(Day | Month |Year)

Project Name (and Unit #):_____***Protocol**: Yes or No

***Method**: Key Feature/Sample Area, Incidental, Time Constrained, Area Constrained (Circle One)

Observer(s): _____

Acres Surveyed Today: _____

Start Time**:**_____ End Time:_____ **Total Survey Time Hrs:** _____ **Mins:** _____

Air Temp (°F), Beginning: _____ End: _____ **Average Air Temp**: _____

Soil Temp (°F), Beginning: _____ End: _____ **Average Soil Temp**: _____

****

Fauna Species Table: (List mollusk species searched for or located within this Survey Area during this visit)

***Species Code**	**Presence**	Total	Species Loc ID	***Species Code**	**Presence**	Total	Species Loc ID

Terrestrial Mollusk
General Survey Field Form Instructions
2001

The Terrestrial Mollusk **General Survey Field Form** should be completed for documentation purposes for each visit to a survey area (generally defined as a project unit or other similar-sized area which is surveyed at one time). A separate form should be used for separate portions of a project area, such as different units or portions of a unit, that are not physically adjacent (eg. cannot be illustrated with a single polygon). A complete summary of the survey effort completed for one timber sale may, for instance, consist of several General Survey Field Forms, one for each visit to each unit, and possibly more if any unit requires multiple surveys to complete a single visit. The use of a regular format for the Survey Loc. ID (see below) will help to identify all records that pertain to a single project. This field form will need to be completed even if no target species are found in order to document that the survey effort was conducted to the correct protocol standards. Fields that require information are in bold. Some fields require the use of a limited set of values used by the ISMS database. These fields are indicated with an asterisk. Additional fields are included for organization and tracking. For each individual site where a target species is found, an additional form **(Species Locations Field Form)** is completed with information pertinent to that location. Complete the General Survey Field Form in the field as surveys are done.

Neat and clean handwriting cannot be stressed enough. Please take a couple of extra seconds to ensure that your handwriting is clear and that unique letters and numbers are discernable.

****

Information in the Fauna General Survey Locations Table captures the spatial and physical information which is used to identify and locate the survey area. This information is linked to the polygon in GIS which represents the survey area. Each visit to the same survey area should contain identical information in this section.

Survey Loc. ID- This is a unique ID# for the survey area being documented. This may be character and/or numeric. The suggested format is: two-letter abbreviations identifying the Forest/BLM District, ranger district/ resource area, and project name; plus a 2-character value representing the unit (use zeros to fill in where needed, e.g. unit 5 would be 05) For example, Six Rivers National Forest, Mad River district, project Upper Mad, unit 5A is identified as SRMRUM05A.

***Admin.Unit-** Enter the Administrative Unit containing this survey area location. See ISMS codes sheet supplied with this field form.
Example: FS0510 = Forest Service, Region 5, Forest 10 (Six Rivers N.F.)

***Sub Admin-** Enter the name of the sub-unit where the survey area is located.
Example: Southriver = BLM, Roseburg District, Southriver Resource Area

Survey**Area** - This field is used to record the total number of acres in the individual unit of a sale or other identified Survey Area being recorded (defined in the protocol as **the area of suitable habitat surveyed** in accordance to the terms of this protocol). Several days may be necessary to adequately survey one survey area. The number of acres entered in this field is usually equal to the area of the polygon in GIS to which this survey location description is linked. In some cases the GIS polygon may be slightly larger. Small areas outside of the actual survey area, such as roads or riparian areas, may be included in the GIS polygon if the resulting polygon more accurately represents the area documented during one complete survey. However, the number of acres entered in this field in ISMS should only include the suitable habitat within the survey area. The area entered in this field and the GIS polygon linked to the general survey location should **not** include large areas that were "cleared" (i.e., not actually surveyed) because they contained no suitable habitat. The number of acres in a survey area may be equal to or larger than the actual number of acres surveyed during any individual day, if several days are required to complete one visit to the survey area. (see Surveys Table portion of this field form).

Elevation Min., Max., **Average**- The lowest and highest elevation (in feet) within the survey area being documented is optional data. The average elevation within the actual area for which this survey record is used is required data. Elevation can be obtained from topographical maps, or with calibrated altimeters

T, R, S, 1/4, 1/16- Using a topographical map determine the Township, Range, and Section, Quarter Section, and Sixteenth Section of the survey area being documented. If the area is in more then one Section, quarter section, etc., record the one which represents the largest portion. If detail to the sixteenth section is not appropriate, limit data entry to the best quarter township. This data may be used to check polygon locations in GIS.

****

Information in the Surveys Table captures data for each visit to the Survey Area Location described above.

(Survey) ***Type-** Circle the type of survey conducted, (ie. Pre-Disturbance, Purposive, etc.)

Survey ID- Enter a unique ID # for this survey visit. For tracking purposes, this should be the Survey Loc ID# of the area being surveyed (above) plus a "1" or "2" which indicates the first or second visit to that area. There is additional space for indexing if needed. For example, Six Rivers National Forest, Mad River district, project

Upper Mad, unit 5A, visit number one is identified as SRMRUM05A-1. Enter the same Survey ID as is used on the Species Locations Field Forms for this survey. In this way, information contained in either table can be used to describe a record and may be queried together for reports. It is imperative that similar numbers and letters be entered clearly.

Date- Enter the day, month (in 3 letter code, e.g. Jan), and year, (e.g.05 / Oct / 1999).

Project Name- Enter the name of the project and unit # within which this survey is being conducted. This name is designated by the local field unit, and may be character or numeric. This name can be used to cross-check with the Survey ID number and location information.

***Protocol-** Circle Yes or No depending on whether the survey was done to protocol standards.

***Method-** Circle one of the values that best corresponds to the method used for this survey. (eg. for most project clearance surveys, this would be Key Feature / Sample Area)

Observer(s)- Record each surveyors last name.

The remaining information in this portion of the field form is required documentation for protocol survey visits, but is not currently entered into ISMS in the Fauna General Survey Form. Future versions of ISMS may add these fields to the General Survey Table.

Acres Surveyed- Indicate the actual number of acres that were surveyed during this visit. This number should be equal to or less than ten times the number of hours spent surveying (recorded in Total Survey Time, below) if this was a protocol survey visit.

Start Time- Enter the time of day (24-hour clock) that the surveys for the day were started.

End Time Enter the time of day (24-hour clock) that the surveys for the day were completed.

Total Survey Time- Enter the total number of person-hours and -minutes spent surveying the acres documented by this survey form. In order to meet protocol standards, this number should be equal to or greater than one hour for every ten acres surveyed (recorded in the Acres Surveyed field, above).

Air Temp: Begin, End, **Average-** The air temperature (in degrees Fahrenheit) at the start and end of the recorded survey period is optional data, and the <u>average temperature during the survey is required</u>. This information is required to document that

a survey was done during appropriate weather conditions.

Soil Temp: Begin, End, **Average-** The soil temperature (in degrees Fahrenheit) at the start and end of the recorded survey period is optional data, and the average temperature during the survey is required. This information is required to document that a survey was done during appropriate weather conditions.

****

The Fauna Species Table records all mollusk species that were searched for and other species that were encountered during the course of a survey visit. This list includes all Survey and Manage target species and may also be used to document any other common species found during the survey. These additional species observations help to document that a survey was done during appropriate weather.

***Species Code:** Enter the four to six digit alphanumeric code (as listed in the attached ISMS species code list) for any species of mollusk searched for or observed during the survey visit. This species list includes both Survey and Manage species for which surveys are required and other species. Standard format for specimens known only to the genus level is the first five letters of the species name, in capitols. For new species that have been recognized, the first two letters of the genus are used, followed by two Xs and the assigned new species number. For example, and unknown species of Vespericola may be recorded as VESPE, and a specimen of the Fluminicola, new species 2 would be FLXX2. Additional species may also be documented in the Survey Notes.

Presence- For each species recorded, indicate if it was present or not (ie. a target S&M species may have been searched for, but not found).

Total- Record the total number of specimens found during the entire survey visit, including both live animals and shells.

Species Loc ID- The Species Location ID (from the corresponding Species Location Field Form) can be recorded for Survey and Manage species as a cross reference to those location records.

Survey_Notes - This is a memo field in which any additional information regarding this documented survey visit may be added, such as other species observations, directions or other comments. Information in this field is not available for query purposes.

Terrestrial Mollusk

Species Location Field Form Instructions

2001

Listed below are instructions for completing the Terrestrial Mollusk Species Location Field Form. The form must be completed for each location (farther than 30 feet from the next closest) where ROD mollusk species are detected. A geographic UTM co-ordinate is required to describe the location. This may be acquired directly with GPS units in the field or entered after the field visit by consulting aerial photographs, orth-quad maps or other maps. The map source field is used to document the method used to determine this coordinate pair. The center of a sample area may be used as the location coordinate when several species are located within a single sample area, so that all species can be recorded in a single location record. Required fields are in bold, and fields for which a limited set of ISMS values should be used are indicated with an asterisk. Note: Some specific types of **habitat information are now required** in this form for this version of the survey protocol. This information is vital for analysis of habitat associations and for the development of management strategies. This information is collected for the immediate area around the site, in an attempt to characterize the small-scale features of the habitat in which these species are found. For purposes of habitat description, it is considered the area within 100 ft. of the site.

****

Fauna Species Location information captures spatial and physical information which is used to identify and locate the site.

SpeciesLocation ID- Assign a ***unique ID#*** to each S&M site. A suggested format is a 2-character value for project name; a 3-character value representing the unit (use zeros to fill in where needed, e.g. unit 5 would be 005), followed by "S" (spring) or "F" (fall) to represent the season of the visit, a "1" or "2" which indicates the first or second visit, and ending with the SA, PS, or I, followed by the number or letter of the sample area / point search.

Coordinates- Record UTME and UTMN coordinates (to the nearest whole number). **This pair of coordinates must be entered for the record to be complete.**

***Admin Unit**- Enter the ISMS code for the administrative unit responsible for managing this species location, (ie. Forest or BLM District). Refer to ISMS codes sheets or pick lists for values.
Example: FS0510 = Forest Service, Region 5, Forest 10 (Six Rivers N.F.)

***Sub Admin**- Enter the administrative sub-unit responsible for managing this species location (ie. Ranger district or BLM resource area). Refer to ISMS codes sheets or pick lists for values.
Southriver = BLM, Roseburg District, Southriver Resource Area

Slope ave- Slope is determined using a clinometer, compass or visual estimate. Record % slope based on the general topography at the site.

Slope Position- Circle the value that best describes the site position where the species observation was made.

Aspect °- Aspect is recorded using a compass. It is determined by the direction the general slope is facing and is recorded in degrees.

Elevation (ave) - Record the elevation of the species location site in feet.

*Soil- Record the soil type at the species location. Refer to ISMS pick list of values.

***Moisture Type-** Circle the value that best describes the available moisture at the site location where the recorded species were observed.

*Map Source- Enter the source of the UTM coordinates or site mapping. Refer to ISMS pick lists for selection of sources.

***Map Accuracy-** Estimate how close you think the coordinate pair location is to the actual site on the ground. Circle the estimated accuracy.

****

Survey information: Due to the structure of the ISMS database, each location record must be able to stand alone, and provide its own documentation of some required survey information. Some of the following fields duplicate fields found in the General Survey Data Form.

Survey ID- See notes for this field in the General Survey Field Form Instructions. This is not a required field, due to the possibility that some locations may be documented which are not the result of a survey. **For records that <u>are</u> the result of a survey, enter the same Survey ID # as used on the General Survey Field Form for this survey.** In this way, information contained in either table can be used to describe a record and may be queried together for reports. It is imperative that similar numbers and letters be entered clearly.

***Survey Type-** Enter one of the values that best corresponds to the type of survey being documented. (ie. Incidental, Pre_Disturbance)

***Method-** Enter the method used for this survey, (eg. For pre-disturbance surveys, the method would be key feature / sample area)

Protocol- Circle Y or N to indicate whether the survey which resulted in this location record was done to protocol standards.

(Start) Date- Enter the **day**, **month** (in 3 letter coder), and **year**, (e.g. 05 Oct 1999) when the location was found.

(Start) Time- Enter the time of day (24-hour clock) when the

recorded species observations were made at this location. Separate hours and minutes by a colon, e.g. 10:40.

Observers - Enter the last names of surveyors conducting the survey, separated by a forward slash, up to 50 character total.

Project- Enter the name of the project within which this survey was conducted. This name is designated by the local field unit, may be character and / or numeric.

****

Environmental Observations record the average temperature conditions at the site location, and are not individually recorded for each species. Accurate documentation in these fields is very important because protocol is temperature based.

Air Temp- Record the temperature in Fahrenheit degrees at the location site. Air temperature is taken 4 ft off the ground out of direct sun light.

Soil Temp- Record the soil temperature in Fahrenheit degrees at the location site. Use a thermometer designed to measure soil. Soil temperature is taken 4 inches or deeper into the ground or litter. Wait until the temperature reading stabilizes before entering the reading.

****

Community Observations are used to document the plant community found within 100 feet of the species location. If the plant community is significantly different closer to the actual site, conditions in this smaller area are described.

***City Classification-**Enter the selected classification level at which the plant community code (below) will be described (ie. Series, Association, etc.) Information at the plant association level is much more useful for habitat analysis.

***City Code Name**- Enter the name for the plant / vegetation series or association which best matches the local site. Use the standard ISMS pick list provided for plant series / subseries / association. The ISMS code for this community name will be automatically entered by the ISMS program, however you may record either name or code and the corresponding value will be entered.

*Canopy structure- Circle the number of tree canopy layers present at the site location from the list given. (Multiple, Single, Two)

(Cmty) Age- Enter the age of the plant community within 100 feet of the site location. This is generally determined to be the age of the oldest trees present at the site.

Seral Stage- Circle the seral stage that best describes the average successional stage of the vegetation in the species location area. (Grass / Forb, Shrub, Pole, Early-mature, Mid-mature,Late- mature, Old Growth).

Total Overscore and Underscore Cover %- Estimate the % cover for the Overscore and Underscore at the site, as separate percentages. Use the definition of underscore as saplings, suppressed trees and intermediate-sized trees. Other trees are to be considered as being in the overscore. Do not include shrub species when estimating this number. Ocular estimates or other instrumental estimates may be used. These figures represent canopies that may have considerable overlap when considering the total cover at the site.

Total Cover %- Estimate, to the nearest 5 %, the total amount of canopy cover (both tree and shrub) that occurs within 100 feet of the specific site location. Any method including visual estimates or instrument measurements may be used to estimate this value. % recorded above.

****

Fauna Species Observations are recorded on individual rows of the field form table for each species located at a site. Additional information pertaining to each species is entered on the form in the same row. Explanations of these fields are given below.

***Species Code**- Enter the four to six digit alphanumeric code for mollusks only as listed in the ISMS species codes list. Any mollusk species, including those which are not currently on the Survey and Manage list, but for which it may be important to keep records of known sites for future listing, may be recorded. Indicate subspecies by recording the five letter code which includes the species code plus the first letter of the subspecies (Eg. *Monadenia fidelis ochromphalus* is represented as MOFIO). If it is unknown what subspecies a specimen may be, an X may be added to the four letter species code. For example, a white variant of the species PRCO, which has no common name, would be recorded by entering the code PRCOX. Standard format for specimens known only to the genus level is the first five letters of the genus name, in capitols. For new species that have been recognized, the first two letters of the genus are used, followed by two Xs and the assigned new species number. For example, an unknown species of Vespericola may be recorded as VESPE, and a specimen of Fluminicola, new species 2 would be FLXX2. Common species may be recorded in the location notes memo field described above, or preferably in the fauna observations list on the General Survey Form for this site.

Total- Enter the number of specimens described in this record. A separate record (new row) should be made for live specimens versus shells of the same species. The observations detail table (below) is used to capture the **condition** (live / shell) for each record.

***Obs.Reliability** - Select the value which best describes the level of confidence in the specimen identification for this record at the time of observation. This entry in ISMS may be edited after final verification has been made. For purposes of this database, use the following definitions for the selected values:

Excellent – Identified by taxa specialist (Hohenlohe, Roth or Frest)
Good - Identified by taxa team member or someone who has received advanced mollusk identification training
Fair - Identified by someone who has received basic mollusk identification training
Poor – Identified by untrained observer
Unknown – Unknown identification ability

Observation Type- Record the type of observation which corresponds to this record. For example, if one live specimen and one shell of a certain species was found at a site, and the shell was collected as a voucher while the live specimen was left at the site, Obs. Type = voucher would be listed for the shell record, while Obs. Type = visual observation would be recorded for the live specimen.

Observation Data information is useful when determining quality of the known site. Separate rows should be used for a single species if both live animals and shells were found.

Condition- Record whether the species located was a shell or live specimen.

Collection information is necessary for specimens collected at known sites for identification verification and to document the site. If the Observation Type entered for a species record was "Voucher", complete the following field for that record to describe the collection information. Updates to the collections table in ISMS may be made at a later date after verification is done.

Collection # - Enter the identification number assigned to a voucher taken of this species. Usually this is the Species Location ID plus a sequential record indicator.

Feature Observations record information about microsite habitat for each species or record.

***Feature Type**- Determine the appropriate structure that best represents where the specimen was detected. For multiple detections of the same species, you may list the feature which describes the most common associated feature, or separate feature types for individual specimens. Select the feature type from the ISMS picklist or use one of the following:
Bark, Moss, Brush_pile, Needles, Cobble,

Deciduous_leaves, Rootwad, Duff, Shrub, Forb, Snag, Fungi, Soil, Gravel, Talus, Litter, Tree, Log, Woody_debris, other.

*Feature species - Enter the species code for the microsite feature species. For example, enter PSME when specimen is found associated with a Douglas-fir log. Use standard species code format for plants known only to the Genus level. For example, deciduous leaf litter composed of willow leaves would be identified with the species code SALIX.

Decay Class- If a mollusk is found in association with logs or woody_debris, list the appropriate decay class (Brown 1985).
0 = Not applicable. 1 = Log, recently fallen, bark intact or snag with fine limbs present. 2 = Log, bark intact, small twigs absent or snag with 50% loose bark. 3 = Log, trace of bark or snag with bole form intact. 4 = Log, bark absent or snag, losing bole shape. 5 = Log, decomposed or snag, form mostly gone.

D.B.H.- If a mollusk is found in association with a tree, snag, log or woody_debris feature, list the diameter at breast height (standing tree)or the largest diameter for down wood. This is an important indicator of late seral legacy association.

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Flora Observations may include any plant species found at the site location. We recommend recording three species of trees, shrubs and ground cover to help document the plant association at the site. If plant community is not specified, these species lists become critical.

*Species Code- Enter the species code for plants found within 100 feet of the site location which help to define the plant association. Refer to the ISMS codes for species as described in Fauna Species observations, below.

Total Cover %- Enter the individual percent cover of each plant species as the actual % cover that is created by that species within a 100 feet of the site location. Example: PSME 60%, ABCO 40%, LIDE2 5%. The combined percents for all species do not necessarily equal 100% and may be greater than 100%.

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Notes- Record pertinent comments and additional information on the bottom or reverse side of the form.

APPENDIX F

Species Identification and Voucher Collection Requirements

All target survey and manage mollusks should be identified to species at the field unit level, to the extent possible. Other species of mollusks encountered during surveys should be identified to at least the genus level. However, because some of the species are not easily recognized in the field, and new species are still being discovered, final and accurate identification in the field is not always possible. In order to provide greater reliability of identification data, collection of voucher specimens of each target species is required. These voucher specimens will then be sent to the regional taxa specialist for final verification and curation. As a minimum, **one voucher of each taxon (or unusual variant) should be collected from each project area or drainage** for verification of identification and for future reference. Project area, as used in this context, is meant to refer to a timber sale unit or equivalent-sized area. If several small units are located within a single drainage, one representative voucher will suffice for all. In situations where there are very few specimens at a site and collection of live animals may threaten the persistence of the species, only shell vouchers should be collected. Photographic vouchers of live specimens which capture the identifying features of the species are also acceptable in these situations. Vouchers of common species may also be forwarded for identification or verification. Positively identified specimens may be returned to field units if requested or maintained in a central voucher collection. Because of the difficulty in discriminating between closely similar species or variants of the same species, these vouchers will serve to document the location data and provide comparative material for later reference.

When collecting snails for identification, adult shells in good condition are usually sufficient, so living specimens may not need to be sacrificed. However, live animals can provide valuable information for identification, such as internal anatomy and DNA. With this in mind, the first specimen of each species encountered during a survey should be collected, and then if a better specimen of that species is subsequently found, it can be collected in place of first specimen. Never release living gastropods at locations other than those where they were collected. If a live juvenile snail is discovered in addition to an adult shell, both should be retained. The best voucher would be a live, adult snail or slug in good condition. Washed film canisters make excellent temporary containers for voucher specimens. Shells should be protected from breakage with paper towel or tissue paper. Proper handling of live animals, especially slugs, is important to prevent deterioration during transport. **Always keep live specimens cool and moist, and include moist, unbleached paper toweling with the specimen.** An insulated cooler with ice is recommended for carrying containers of live animals during hot weather. Most live specimens can be stored in containers in a refrigerator for short periods, however the sooner a specimen is processed, the better condition it will be in. Live specimens may be sent by overnight mail to the regional taxa specialist in airtight containers using insulated mailing boxes if the weather is cool, or delivered in person. Always contact the taxa specialist ahead of time to receive live specimens.

If these conditions cannot be met, specimens should be properly preserved. Slug specimens should be first drowned in cool water for several hours, then

transferred to a 50% isopropyl alcohol / water solution for 1-2 hours before being placed in a final 70% isopropyl alcohol solution. Snail specimens may need to be "relaxed" prior to preservation, by adding a few menthol crystals to the drowning medium, in order to ensure that the internal organs are available for examination. Proper labeling should include species, location (physical description or coordinates), collection date and observer name. Labels should include an ISMS Location ID number, if possible, with which to cross reference voucher specimens with database location records.

Many keys are available and should be consulted to understand key characteristics that can be used to separate genera or species. The key by J.B. Burch and T.A. Pearce in the 1990 *Soil Biology Guide* edited by Daniel L. Dindal is a useful key. Tom Burke has also developed a key to terrestrial mollusk taxa that is very good for the Pacific Northwest. The 1997 key developed by Terrence J. Frest and Edward J. Johannes for the Roseburg District of the Bureau of Land Management is recommended for use in Douglas County, Oregon and nearby areas. No keys are perfect and some key characteristics are not easily recognized. Training and familiarity with specimens to be found in the area to be surveyed is essential. The primary literature for the individual species should be consulted to understand all of the species characteristics. Pilsbry, Land Mollusca of North America (North of Mexico) 1948 remains the single most complete reference for information of these species. It is recommended that local units build up a voucher collection of positively identified specimens for direct comparison purposes.

A Field Guide to Survey and Manage Terrestrial Mollusks Species from the Northwest Forest Plan and a Field Guide to Survey and Manage Freshwater Mollusk Species are available on line at [http: / / www.or.blm.gov] under survey and manage documents. These guides provide photographs and text descriptions of ROD species and other similar species found in the region. Management recommendations are also available for all species at the same site and provide a detailed description of morphology and habitat for each species. A website for mollusk information is also posted on the Intranet at [http:web.or.blm.gov / mollusks] which includes additional photographs and descriptions of both survey and manage and other local species, as well as an on-line test for surveyor knowledge. Other resources available to aid in identifying these snails and slugs include:

- General Taxa: Burch (1962); Burch and Pearce (1990).
- Specific to Rod Species: Deixis Consultants (1996); Roth (1996).
- *Cryptomastix*: Pilsbry (1940:852-875).
- *Megomphix*: Pilsbry (1946:506-512)
- Slugs: Pilsbry (1948).