Conceptual
Mitigation Plan for the
Trinity Bristlesnail (*Monadenia setosa* Talmadge)
Hyampom Road Improvement Project
Trinity County, CA

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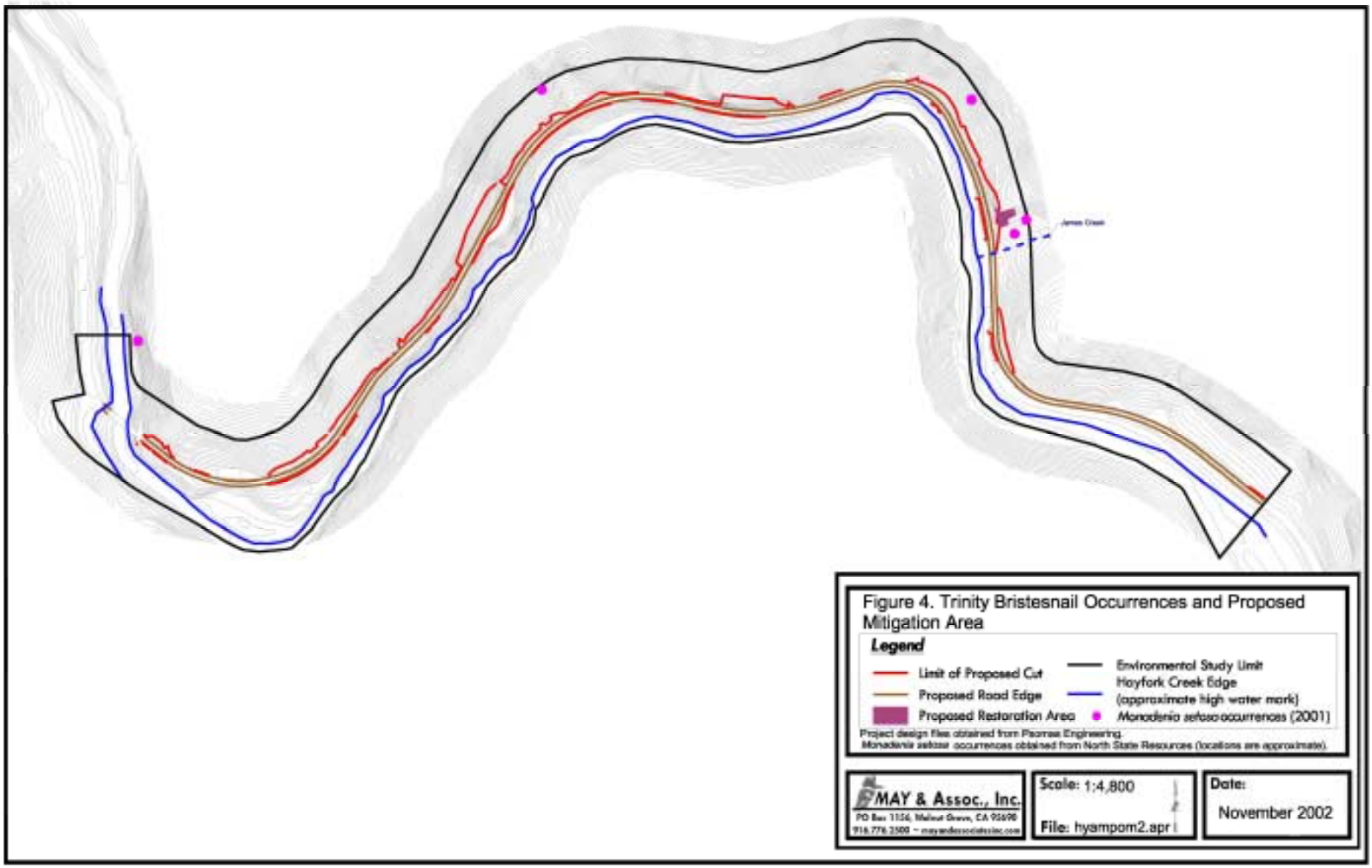
Figure 4. Trinity Bristesnail Occurrences and Proposed Mitigation Area
Legend
Limit of Proposed Cut
Proposed Road Edge
Proposed Restoration Area
Environmental Study Limit
Hayfork Creek Edge
(approximate high water mark)
Monadenia setosa occurrences (2001)
Project design files obtained from Psomas Engineering.
Monadenia setosa occurrences obtained from North State Resources (locations are approximate).
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1.0 EXECUTIVE SUMMARY

Trinity County Department of Transportation is proposing to improve approximately 2.9 km (1.8 miles) of Hyampom Road along Hayfork Creek in central Trinity County, California (see Figure 1). The proposed project is located approximately 11 km (seven miles) west of Hayfork and approximately 19 km (12 miles) east of Hyampom, along Hayfork Creek, on Hyampom Road (County Road 301; Forest Highway 114). The project is located in Trinity County in the Hayfork Ranger District of the Shasta-Trinity National Forest. The proposed project will be funded from the State Transportation Improvement Program (STIP) using state and federal funds managed by the California Department of Transportation (Caltrans) Office of Local Assistance.

Implementation of the proposed project will result in the temporary loss and disturbance of habitat and may affect individuals of the California State listed threatened Trinity bristlesnail (*Monadenia setosa*). The Trinity bristlesnail was listed as threatened under the California Endangered Species Act (CESA) in 1980. Because the proposed project may affect individuals and will affect habitat it may result in the "take" of the species which is prohibited under Subdivision 3, Chapter 6; Article 1 §783.1(a) of the California Fish and Game Code. Under Fish and Game Code take of species listed under CESA must be fully mitigated.

To fully mitigate the potential take of Trinity bristlesnail individuals and the loss of habitat this conceptual mitigation plan proposes measures to avoid, minimize, and compensate for impacts. Avoidance and minimization measures include a pre-construction clearance survey for the Trinity bristlesnail, clearly demarcating the limits of construction in the field, construction personnel education, and minimization of project related tree and shrub removal. Compensation measures involve restoring the portion of James Creek disturbed during construction and the restoration of one previously disturbed areas in the project vicinity that currently does not support habitat for the snail. The restoration project will focus on restoring optimal habitat conditions for the Trinity bristlesnail through an aggressive planting program.

2.0 INTRODUCTION

This plan was developed to describe mitigation measures for fully mitigating project related impacts on the California state listed threatened Trinity bristlesnail (*Monadenia setosa*) and its habitat. Though only known previously from tributaries of the Trinity River in the vicinity of Big Bar (Roth and Eng 1980) and several other nearby sites within the Trinity River drainage (NDDB 2001) the species was found at several locations within the project area during surveys in 2000-2001 (North State Resources 2001).

2.1 Project Description

Trinity County Department of Transportation is proposing to improve approximately 2.9 km (1.8 miles) of Hyampom Road along Hayfork Creek in central Trinity County, California (see Figure 1 and Figure 2). The proposed project is located approximately 11 km (seven miles) west of Hayfork and approximately 19 km (12 miles) east of Hyampom, along Hayfork Creek, on Hyampom Road (County Road 301; Forest Highway 114). The project is located in Trinity County in the Hayfork Ranger District of the Shasta-Trinity National Forest. The proposed project will be funded from the State Transportation Improvement Program (STIP) using state and federal funds managed by the California Department of Transportation (Caltrans) Office of Local Assistance.

Hyampom Road is a key part of the local transportation system in that it is the only year-round publicly maintained access to the community of Hyampom. The proposed project will reduce traffic disruption due to slope failure and localized flooding and will enhance traffic safety along Hyampom Road and the Nine Mile Bridge. The following improvements along approximately 2.9 km (1.8 miles) of Hyampom Road are proposed as part of the project:

- Realignment of tight radius curves to achieve a 40 kilometers per hour (km/h; 25 miles per hour, mi/h) design speed.

- Widening of Hyampom Road to two 3.35-meter (11-foot) lanes with 0.6-meter (two-foot) paved shoulders, including roadway excavation and embankment and installation of new asphalt concrete pavement.

- Realignment of portions of the roadway to accommodate horizontal curves, which will meet a minimum 40 km/h (25 mi/h) design speed.

- Raising the profile of the existing road for approximately 1 km (0.6 mile) at the eastern end of the project above the 100-year floodplain to correct flooding problems.

- Widening the Hayfork Nine Mile Bridge to 8.39 meters (27.5 feet from face of post rail to face of post rail; or 7.9 meters, 26 feet, from shoulder

edge to shoulder edge), consisting of two 3.35-meter(11-foot) lanes and two 0.61-meter (two-foot) shoulders. This widening includes the addition of a new steel girder and augmenting the pier walls and foundations. This work may require dewatering and excavation of a small portion of the creek bed adjacent to the bridge piers, at the edge of the low flow channel.

- Rehabilitating the existing bridge, including the replacement of the barrier rail, refinishing the bridge deck and repainting the existing steelwork.

- Stabilizing the new and existing embankment slopes through the placement of rock slope protection and retaining wall systems.

- The construction of a single-span bridge to replace the culvert at James Creek. This bridge will likely be prefabricated with cast-in-place concrete abutments. Piers will not be necessary for the new bridge and the abutments will be located outside of the Ordinary High Water Mark. The bridge crossing will accommodate the 50-year flow with a minimum two feet of clearance for debris or the 100-year flow, whichever is greater. It is expected that the existing culvert can be left in place during construction of the bridge across James Creek, and during construction, controlled traffic can pass on the existing lane adjacent to Hayfork Creek.

- Replacement of two other culverts currently in place along Hyampom Road, which accommodate non-jurisdictional ephemeral drainages. A diverted drainage at Mile Post 7.3 (KP 11.7) will be returned to its drainage of origin. New culverts would be designed to accommodate 100-year flows, and fitted with downspouts and/or outlet protection to prevent erosion of fill slopes.

- Construct a walkway access to the Eight Mile Trail (located just east of the Nine Mile Bridge) for hikers. This access will improve hiker safety. Sufficient fill will be placed to realign the road towards the creek and improve the alignment of the approach to the bridge. The trailhead will be relocated slightly to accommodate the road realignment. The area that is now currently unofficially used for parking for access to the trailhead will remain in its current location, as will access to the parking area.

No major roadway or bridge realignment will occur as part of the project.

The proposed Hyampom Road Project is entirely within the Shasta-Trinity National Forest. The existing roadway is located within an existing Federal Department of Transportation (DOT) easement, which extends 20 meters (66 feet) each side of the existing roadway centerline. Some new right-of-way may be required in order to construct the project

2.2 Site Location

The project site is located in the southern Klamath Mountains at roughly 640 m (2,100 ft) elevation between the rural communities of Hayfork and Hyampom on Hyampom Road (Figure 1 and Figure 2). The entire project site lies within lands administered by the Shasta-Trinity National Forest.

2.3 Summary of Environmental Review Process

The proposed project has undergone review under both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) and as a result impacts to the Trinity Bristlesnail and its habitat were identified as significant, and/or adverse impacts requiring mitigation. Informal communications with representatives of the California Department of Fish and Game (DFG) regarding impacts to the species' habitat indicated that take of the species (as defined under the California Endangered Species Act [CESA]) was likely to occur and an Section 2081 Incidental Take Permit (ITP) would be required for the project (Miller, J. and Williams, B. pers. comm.). The mitigation and monitoring plan put forth in this document has been prepared to compensate and fully mitigate for impacts to the Trinity bristlesnail.

2.4 Overview of Proposed Mitigation

The proposed mitigation involves actions to avoid impacts to the species above those anticipated, minimize impacts to the species during construction, and compensating for impacts to the species habitat that could not be avoided. The avoidance and minimization measures will ensure that project related effects on the species or its habitat do not exceed those anticipated for the project. Compensation will involve the restoration and rehabilitation of habitat temporarily impacted by the project as well as restoration of a site that was formerly suitable habitat but now consists of unsuitable disturbed area within the project vicinity. The mitigation area identified is in the vicinity of a semi-permanent waterway (James Creek) so that habitat conditions typically associated with the species can be successfully restored.

The mitigation plan also involves periodic monitoring of construction activities by a biologist experienced with endangered species issues and construction projects. Post-construction monitoring is also recommended following implementation of the restoration plan.

2.5 Trinity Bristlesnail Species Account

Species Description and Taxonomy.

The Trinity bristlesnail (*Monadenia setosa*) is a land snail in the order Gastropoda. Roth et al. (1980) measured adult shells ranging from 25.2 to 31.3 mm in diameter. They found body color to be dark gray with an overall pattern of closely spaced russet or salmon-colored tubercles. Very young animals were gray with a purplish cast. It is crepuscular or nocturnal. May and October are the months of greatest activity (Roth pers. comm., Roth et al. 1986).

Status and Distribution.

The Trinity bristlesnail has no federal legal status and was listed as threatened under the California Endangered Species Act (CESA) in 1980.

The Trinity bristlesnail is found primarily in riparian corridors and canyon slopes with dense deciduous understory in Trinity County, California. Previously only known from a few localities in the vicinity of Big Bar on the Trinity River (Roth and Eng 1980) the Trinity bristlesnail has recently also been discovered at several other localities in Trinity County, including the project site (North State Resources 2001).

Habitat Requirements.

Roth et al. (1990) found the Trinity bristlesnail in two general microhabitats: a) moist but generally well drained, somewhat stable, leaf-mold-covered talus slopes in mixed deciduous-coniferous forest; and b) on stabilized, forested, riparian benches generally consisting of talus accumulations behind riffles or bed rock and having at least a 25 cm (10 inch) accumulation of leaf-mold resting on the talus. Densely shaded riparian habitats spared from routine flooding and dominated by deciduous riparian vegetation with a thick layer of organic detritus (i.e., leaf-mold) covering the ground in combination with down and standing broadleaf deadwood appear to represent optimal habitat for the species (Roth pers. comm., Roth and Eng 1980, and Roth and Pressley 1986). The species has also been found on moist densely shaded north-, east-, and west-facing canyon slopes in mixed evergreen/deciduous forest unassociated with riparian vegetation (Roth and Eng 1980); however, occurrences in this type of habitat is very limited (Roth and Pressley 1986). Dead standing broadleaf trees may play a role in providing shelter for juvenile snails when found within mixed evergreen/deciduous forest and may also provide refugia from predators (Roth pers. comm, Roth and Eng 1980). In all instances the presence of adequate moisture during the period of greatest activity (i.e., May and October) appears to be an important factor in the persistence of the species at any given location possessing suitable substrate (Roth pers. comm.).

In summary, preferred, or optimal, habitat characteristics for the Trinity Bristlesnail include (Roth pers. comm., Roth and Pressley 1986, Roth and Eng 1980):

- A moist, but not saturated, well developed and well-drained leaf-mold substrate for food, cover, and possibly oviposition; thick enough that lower leaf-mold layers consist of broken and decaying materials; composed chiefly of soft non-sclerophyllous deciduous leaves (i.e., alder and maple); of great enough lateral extent that the snails can move about and locate suitable mating partners.
- Undecayed downed woody debris >25 cm (>10 inches) in diameter to stabilize the substrate and leaf-mold; provide substrate for lichens;
- Surface moisture during at least late spring and fall months to allow for activity of the snail;
- A hardwood (e.g., maple, alder, canyon live oak) component to provide leaf biomass, down woody vegetation, and possibly provide refugia for juvenile snails; and
- A rocky, or other stable, surface with the presence of a crustose and/or foliose lichen component (Roth pers. comm.).

Regardless of vegetation association, optimal habitat conditions for the Trinity bristlesnail are tied to the availability of mesic conditions and the highly shaded, moist, temperature regulating characteristics of dense riparian habitats most readily provide these conditions (Roth and Pressley 1986).

Reasons for Decline.

The current trend for the Trinity bristlesnail is unknown (NDDB 2001). The losses of Trinity bristlesnail populations are attributed to habitat loss and/or degradation and random local extinction (Roth pers. comm.). The species is sensitive to changes in moisture, leaf-mold, cover, shade, and temperature modulation within its habitat. (Roth et al. 1986). Therefore, logging, roadbuilding, and fire can affect the species when it results in changes in surface hydrology, understory composition, or shading that affect desirable habitat parameters.

3.0 EXISTING CONDITIONS

3.1 Baseline Habitat Conditions

Four terrestrial community types were identified in the study area: Douglas fir forest, Oregon oak woodland, foothill pine – chaparral woodland (non-serpentine), and white alder riparian forest (see Figure 3). Each of these community types is briefly described below.

3.1.1 Douglas Fir Forest

At the study site Douglas fir forest is the predominant community type occurring on both sides of Hayfork Creek. Depending on past land use (i.e., homestead, logging, etc.) and length of time since last timber harvest the canopy cover in this community varies from roughly 60% to greater than 90% cover. Douglas fir forest on the canyon slopes opposite side of Hayfork Creek from Hyampom Road (i.e., outside of the project area) are north facing and are consequently moister and support a denser cover of trees and shrubs.

The dominant tree in this community is Douglas fir (*Pseudotsuga menziesii*) with ponderosa pine (*Pinus ponderosa*) and incense cedar (*Calocedrus decurrens*) also present in limited numbers. Oregon white oak (*Quercus garryana*) is also present in limited numbers, especially where this community intergrades with Oregon Oak woodland. At the study site the dense canopy cover of Douglas fir largely precludes a significant shrub component; however, when present the scattered shrubs in the understory consist of interior live-oak (*Quercus wislizenii* var. *frutescens*), wood rose (*Rosa gymnocarpa*), and gooseberry (*Ribes* sp.). The herb layer in this community is very sparse (less than 5% cover) and at the time of the survey was comprised chiefly of Ross' sedge (*Carex rossii*) and pine violet (*Viola lobata* ssp. *lobata*). Large woody debris is sparse within this community type within the project area, however numerous small standing Douglas fir snags (i.e., DBH <10 inches) are present.

3.1.2 Oregon Oak Woodland

Oregon oak woodland is a moderately dense canopied woodland dominated by Oregon oak with a largely herbaceous understory with scattered weak shrubs. Found on south facing slopes within the Hayfork Creek Canyon this community type is slightly drier than the adjacent Douglas fir forest. Other tree species infrequently encountered in this community include saplings of Douglas fir or foothill pine (*Pinus sabiniana*). Dominant understory species in this community include dogtail grass (*Cynosurus echinatus*), blue wildrye (*Elymus glaucus*), and melic grasses (*Melica* spp.).

3.1.3 Foothill Pine – Chaparral Woodland (non-serpentine)

The foothill pine – chaparral woodland is an open canopied (less than 30% tree cover) south facing woodland with a sparse tree layer dominated by foothill pine with infrequent Oregon oak and canyon live oak (*Quercus chrysolepis*). The shrub layer in this community is well developed and is dominated by mountain mahogany (*Cercocarpus betuloides* var. *betuloides*) with green leaf manzanita (*Arctostaphylos manzanita*), buckbrush (*Ceanothus cuneatus*), and shrubby interior live oak, as codominants in some areas. The herb layer in this community is sparse owing to the rocky nature of the substrate and is composed primarily of Ross' sedge, bedstraw (*Galium* sp.), and coyote mint (*Monardella villosa*).

3.1.4 White Alder Riparian Forest

White alder riparian forest at the project site consists of a discontinuous band of willows and white alders (*Alnus rhombifolia*) near the creek edge intergrading with canyon live oak on the steep canyon slopes below Hyampom Road and with Douglas fir on the slopes on the opposite side of Hayfork Creek. Because of the high energy nature of Hayfork Creek during flood events the midstory and understory are very sparse owing to the scouring nature of these flows. When present, midstory plants may include blackberry (*Rubus lacinatus, R. discolor*), dogwood (*Cornus* sp.), and snowberry (*Symphoricarpos* sp.). The sparse herbaceous understory consists of mugwort (*Artemisia douglasiana*) and horsetail (*Equisetum telemateia* ssp. *braunii*).

At the project site optimal habitat for the Trinity bristlesnail is limited to the James Creek riparian corridor, which consists of an overstory of Douglas fir forest and an understory of big-leaf maple (*Acer macrophyllum*), hazlenut (*Corylus cornuta*), and dogwood (*Cornus* sp.) with a thick layer of leaf-mold consisting primarily of big-leaf maple leaves. Densely shaded but drier suitable habitat (i.e, sub-optimal habitat) is present within areas of west or east facing densely shaded evergreen/deciduous forest (i.e., Douglas fir forest and Oregon oak woodland) occurs in several areas within the project site beyond the limits of construction. (Figure 3). Outside of the project site extensive optimal habitat is present within the Douglas fir forest/riparian ecotone on the bank of Hayfork Creek opposite Hyampom Road. The riparian areas within the Hayfork Creek channel probably do not represent suitable habitat for the species owing to the annual scouring flows encountered within this zone.

3.2 Habitat Mitigation Area

Within the project area there are two sites that have been disturbed as a result of road or homestead construction. Prior to disturbance, these sites likely supported Douglas fir with some hardwood component consisting of either big leaf maple and/or tan oak based on habitat types adjacent to the sites. Both of these sites are within lands managed by the Trinity National Forest. The disturbance of these areas resulted in tree and shrub removal and soil disturbance that altered habitat conditions (e.g., greatly reduced

shading, removed surface organic material, etc.) creating areas unsuitable for the Trinity bristlesnail. These sites are also adjacent to riparian areas and perennial or nearly-perennial water. One site is located adjacent to Jud Creek at the western terminus of the project near Nine-mile Bridge. Successful restoration of the site would be constrained by the presence of a potentially invasive plant species (i.e., periwinkle [*Vinca major*]) and frequent recreational trespass.

The preferred site is in the vicinity of a Trinity Bristlesnail occurrence on James Creek and similar to the site near Jud Creek, consists of abandoned roads and a housing pad. The site near James Creek is preferred as a mitigation area (see Figure 4) because of its proximity to an existing Trinity bristlesnail occurrence and existing optimal habitat. The mitigation area is presently largely unvegetated with many areas of bare mineral soil. Mature Douglas fir trees surround the site. (see Appendix A for photographs)

3.3 Impacts

Construction of the project will result in the direct loss or disturbance of 83 m^2 (0.022 ac) of optimal habitat within the James Creek riparian corridor and the permanent direct loss of 0.34 ha (0.83-ac) of sub-optimal habitat consisting of roadside Douglas fir forest and Oregon oak woodland. Optimal habitat disturbed in the James Creek Riparian corridor consists of moist leaf-mold covered soil and fractured rock with an overstory of small (i.e., less than 6 inches dbh) big-leaf maple trees. Sub-optimal habitat impacted consists of moderately shaded Douglas fir forest and Oregon oak woodland on southeast and west facing slopes. The majority of sub-optimal habitat that is impacted is on southeast facing slopes and is relatively dry due to its southerly aspect. Because project related impacts to Trinity bristlesnail habitat are occurring on the edge of contiguous habitat blocks no habitat fragmentation will occur.

4.0 PROPOSED MITIGATION

Proposed mitigation involves a variety of measures that will help avoid, minimize, and fully mitigate for direct and indirect effects on Trinity bristlesnail individuals and their habitat. Avoidance and minimization measures involve limiting construction activities to the minimal area necessary to achieve the project goals and avoiding sensitive habitat areas to the fullest extent practicable. Compensation measures involve restoration of a heavily disturbed area adjacent to James Creek with a combination of riparian associated trees and Douglas fir to create optimal habitat conditions for the Trinity bristlesnail. The dense revegetation of the restoration area has two objectives: 1) rapidly provide dense shading to moderate surface moisture; and 2) rapidly build up organic detritus (leaf-mold) on the ground surface. After the restoration plantings have become established (after approximately 5 to 7 years) a percentage of the living deciduous hardwoods will be girdled in place to provide standing deadwood trees or felled. The girdling and/or felling of the young planted trees will release other trees for growth, and will further contribute to the sites' organic detritus and down and dead wood. These restoration procedures were developed with the goal of encouraging rapid development of optimal habitat for the snail.

Avoidance, minimization, and compensations measures are described in further detail below.

4.1 Avoidance and Minimization Measures

The project proponent will undertake the following actions to avoid and minimize impacts on Trinity bristlesnail habitat:

- Clearly depict James Creek and its associated riparian vegetation and Hayfork Creek and its associated riparian vegetation as Environmentally Sensitive Areas (ESAs) on all project drawings and plans.

- Prior to the initiation of construction activities clearly demarcate (with uniquely colored construction stakes and flagging) the limits of construction within natural habitat areas (i.e., Douglas fir forest, Oregon oak woodland, and riparian habitats); staked boundaries may be inspected by a representative of DFG prior to the onset of earthwork.

- Prior to the onset of site grading, construction personnel will be informed about the importance of avoiding ground-disturbing activities outside the designated construction work area. The contract compliance inspectors and environmental compliance coordinator, with support from qualified biologists, will ensure that construction equipment and associated activities avoid any disturbance of sensitive resources outside the designated project areas.

- All material stockpiling and staging areas will be located at designated areas in disturbed/developed areas adjacent to construction zones;
- Vehicle and equipment refueling and lubrication will only be permitted in designated staging areas where accidental spills can be immediately contained; and
- Minimize tree and shrub removal to the extent necessary to accommodate construction and provide adequate line-of-sight and hazard reduction.

The project proponent will undertake the following actions to avoid and minimize impacts on Trinity bristlesnail individuals:

- The project proponent will retain an experienced biologist to conduct a focused survey in all optimal and optimal microhabitat areas within sub-optimal habitat areas (i.e., in the James Creek Riparian corridor and in mesic moderately shaded Douglas fir forest and Oregon oak woodland on southeast and west facing slopes) within the project area (defined as the area to be disturbed) for Trinity bristlesnail individuals. The survey should be conducted in the month of May prior to construction to maximize the potential for species detection (Roth pers. comm.). If individuals of Trinity bristlesnail are found within areas proposed for disturbance within the project area they should be captured and moved to suitable sites outside the project area that contain optimal habitat within the local watershed. Capture and relocation of the Trinity bristlesnail may only proceed after applicable memorandums and permissions are obtained from DFG.

4.2 Habitat Restoration Plan

The habitat restoration portion of the mitigation program involves restoring the areas of James Creek disturbed during construction of the single-span bridge and the restoration of a heavily disturbed area adjacent to high quality, or optimal Trinity bristlesnail habitat. The goal of the former is to restore the optimal habitat conditions within the James Creek corridor that may have been disturbed during project construction while to goal of the latter is to restore optimal habitat conditions for the Trinity bristlesnail in a heavily disturbed area adjacent to existing optimal habitat.

4.2.1 Site Preparation

Site preparation for the portion of James Creek that may be disturbed during construction of the new bridge will consist of the following activities:

- Prior to ground disturbing activities, stockpile all duff and soft vegetative material, leaf-mold and moderate size woody debris (i.e., logs between 6 and 10 inches diameter) in one of the project staging areas; and
- Following construction, remove all construction related debris and recontour the creek channel to pre-project conditions if necessary.

Site preparation for mitigation area (see Figure 4) will consist of the following activities:

- Prior to ground disturbing activities, stockpile all surficial deciduous tree duff and soft vegetative material, leaf-mold and moderate size woody debris (i.e., logs between 6 and 10 inches diameter) in one of the project staging areas;
- Remove trash, rubble, and other debris from restoration site;
- Lightly scarify compacted areas and contour to facilitate drainage and if necessary to match surrounding topography;
- Place moderate size woody debris (i.e, between 6 and 10 inches diameter) parallel to site contour to form stabilizing barriers for leaves and vegetative detritus (i.e., to prevent leaves and other debris from washing downslope); and
- Re-apply stockpiled deciduous tree duff, soft vegetable material, and leaf-mold.

4.2.2 Planting

The restoration area adjacent to James Creek (Figure 4) will be planted with both deciduous and a limited number of coniferous species. Trinity bristlesnail habitat restoration will rely heavily on the planting and successful growth of a number of deciduous hardwood tree species to rapidly provide dense shading and ample organic detritus. A small number of Douglas fir seedlings will also be planted to create habitat shading over the long-term (30-50 years). Revegetation of the disturbed area of James Creek and the mitigation area will restore these areas' vegetation and conditions to those favorable to the Trinity bristlesnail.

To create optimal habitat qualities for the species, the planting plan proposes to initially overplant the sites to allow for natural mortality and also to provide the opportunity for the recruitment of standing dead hardwood trees in the future. As previously mentioned, the standing deadwood trees may play a role in providing habitat for the juvenile snails and also provide downed wood when they fall. The planting plan relies heavily on a dense planting of deciduous trees to rapidly develop a layer of leaf-mold on the ground surface and to provide dense shading. Investigations of the James Creek corridor indicate that big-leaf maple is a prodigious leaf producer that contributes a considerable amount of the biomass to the leaf-mold in that area. Table 1 lists plant species recommended for planting and recommended planting densities.

Table 1. Planting Palette for Trinity Bristlesnail Habitat Restoration Areas.

Common Name	Scientific Name	Spacing (feet, on center)	Density (trees per acre)
Big-leaf maple	*Acer macrophyllum*	6	1396
Canyon live oak	*Quercus chrysolepis*	30	46
Black oak	*Quercus kelloggii*	15	224
Douglas fir	*Pseudotsuga menziesii*	50	21

Final quantity of material to be planted at the site will need to be determined during the project design phase. Planting materials (i.e., tree seedlings) should be rooted cuttings and/or container stock derived from local genetic stock (i.e., Hayfork Creek watershed or Trinity River watershed) to ensure viability and planting methods should follow those commonly used in the landscaping trade (i.e., over-excavation and backfill to provide ideal conditions for root penetration) such as:

- Clearing the soil surface of any remaining vegetation to reduce competition.
- Constructing a watering basin ±2-3 feet in diameter.
- Dig or auger a hole a minimum of 2 times the diameter of the planting material's pot (Harris and Dines 1998) to a depth of roughly 24-inches (3+ feet in heavily compacted areas) to break through any restrictive or compacted layers.
- Backfill to within 2 feet of grade and place a slow-release fertilizer tablet in each hole.
- Further backfill to an appropriate depth for rooted material (i.e., adequate depth to encompass the rootball). Mychorrhizal inoculants can be added here if desired.

Planting should occur during the onset of the dormant season for deciduous trees in the area (i.e., late October to November).

Planting locations should be selected and arranged to approximate a natural pattern of placement rather than a geometric configuration. Proper configuration from an ecological standpoint (i.e., slope, soil texture, proximity to water, etc.) is also essential for the long-term survival and viability of the plantings. Following planting apply leaf-mold and/or mulch stockpiled during project construction over the restoration site to promote surface microbiological activity.

4.2.3 Thinning

At the end of the establishment period (i.e., approximately year 5 following planting when plants are self-sustaining) deciduous hardwood tree species planted in the restoration area (Figure 4) will be thinned to provide standing deadwood

and to allow for more rapid growth of the remaining trees. Thinning will be accomplished through girdling (i.e., cutting through the tree cambium around the entire circumference of the trunk) of individual trees scattered throughout the restoration areas. Approximately 15% of the big-leaf maple and 5% of the remaining deciduous trees surviving at the end of the establishment period will be girdled and/or felled. As time progresses natural mortality will continue to recruit new standing deadwood in the restoration areas.

4.2.4 Maintenance

The restoration area should not require extensive maintenance during the establishment period (years 1 through 5); however, the following maintenance activities may need to be conducted on an annual basis:

- Remove invasive or weedy plant species;
- Remove garbage if present;
- Maintain vehicle exclusionary devices (i.e., berms, gates, etc.); and
- Inspect for erosion and control if necessary.

5.0 MONITORING

Success of the mitigation effort will rely on the successful establishment of a vigorous and dense assemblage of riparian tree species with an overstory of Douglas fir in the restored area adjacent to James Creek. The primary purpose for monitoring the mitigation efforts is to document the degree of success attained in achieving the performance standards (described below). Secondary purposes include identifying necessary changes in maintenance methods, evaluating effectiveness and suitability of the mitigation procedures used at the site, and documenting baseline conditions for long-term monitoring at the site. Monitoring will focus on an annual inventory of the planted tree species and a qualitative assessment of habitat conditions onsite. Monitoring is proposed annually during the establishment period (years 1 through 5) and in years 7, 10, and 15.

5.1 Annual Monitoring

Tree growth will be monitored seasonally and be reported on annually for vigor, and height over the five-year establishment period. Tree vigor will be rated "good", "fair", "poor", or "dead" based on qualitative observations of symptoms of disease, browsing/herbivory, density of foliage, internode length, leaf color, leaf size, and insect infestation. A vigor rating of "good" will be applied to a planting that has 25% or less of the foliage affected by one or more of the aforementioned symptoms. A vigor rating of "fair" will be applied to a planting that has between 25% and 75% of the foliage affected by one or more of the aforementioned symptoms. A vigor rating of "poor" will be applied to a planting that has greater than 75% of the foliage affected by one or more of the aforementioned symptoms. Photographic documentation of the site from permanent points will also be conducted on an annual basis. Annual monitoring will be conducted in mid-summer of each monitoring year to observe the plants prior to the period of greatest water stress.

5.2 Long-Term Monitoring

Long-term monitoring (i.e., years 7, 10, and 15) will consist of photographic documentation, compiling a list of wildlife or their sign observed during monitoring, and a thorough qualitative description of the habitat conditions at the site. Long-term monitoring will occur in May to coincide with the period of greatest snail activity. The qualitative description will include discussions of the following:

- Tree height and canopy cover;
- Leaf-mold development (i.e., measurements of depth);
- Observations of mollusk species in the restoration areas;
- Natural recruitment of tree and shrub species; and
- Understory moisture (as compared to similar adjacent natural habitat).

5.3 Performance Standards

Mitigation will result in the establishment of a minimum of 0.13-acre of optimal Trinity bristlesnail habitat. Planted trees will have a combined survival rate of 80% by the fall of fifth year of monitoring prior to thinning. By the end of year 15 the restoration area will exhibit a dense continuous canopy cover and will exhibit significant development of a leaf-mold layer consisting of soft deciduous tree vegetative material (defined as a continuous layer at least 5-cm thick). If the restoration area meets its performance standard in year 10, no further monitoring will be necessary.

5.4 Remedial Actions

Failure to achieve performances standards will require TCDOT to implement remedial measures. TCDOT will identify the magnitude and causes of mitigation failure, and the remedial measures implemented by TCDOT, in monitoring reports.

Remedial measures may include removing or otherwise correcting environmental factors causing a mitigation shortcoming or failure and replanting failed sites with appropriate species at densities that will achieve performance standards. Remedial measures may also be implemented by TCDOT if performance standards are met but monitoring trends indicate that standards may not be met in future years. If environmental factors that inhibit successful mitigation cannot be removed or corrected, remedial actions may also include development of alternate mitigation areas.

Remedial plantings, if necessary, will be monitored for an additional 10 years or until performance standards are met.

6.0 REPORTING

6.1 Annual Monitoring Report

Monitoring results will be submitted to DFG in December following each monitoring period. Monitoring reports will include:

- An introduction and background of the project history and monitoring performed to date;
- A summary of plant survival and comparison to performance standards;
- A qualitative description of growth and vigor of all species of plants in the restoration area;
- A description of environmental factors that may be affecting plant vigor (i.e., rainfall, fire, toxins, etc.);
- Photography of the site from permanent photographic documentation points;
- A discussion of leaf-mold and standing deadwood development;
- A qualitative description of wildlife (including mollusks) use of the site;
- A description of necessary remedial measures; and
- A description and justification for any proposed amendments to the mitigation program that result from observations made during monitoring.

6.2 Project Closure Report

Following monitoring in year 15 (if monitoring is not extended because of the need for remedial actions) the TCDOT will prepare and submit a project closure report to DFG to signify successful completion of the mitigation project. The project closure report will include:

- An introduction and chronological summary of activities performed at the mitigation area over the past 15 years;
- A thorough qualitative description of the habitat conditions at the site (i.e., tree height, canopy cover, leaf-mold development);
- Observations of mollusk species in the restoration area;
- Natural recruitment of tree and shrub species; and
- Understory moisture (as compared to similar adjacent natural habitat).
- An appendix with a chronological photographic documentation of the restoration area's progress; and
- Recommendations for future Trinity bristlesnail habitat restoration projects or restoration area management activities.

7.0 ROLES AND RESPONSIBILITIES

7.1 Current Ownership

The mitigation area is currently within lands administered by the U.S. Forest Service-Trinity National Forest, Hayfork Ranger District. A Federal Department of Transportation (DOT) easement extends for 30 m (66 ft) on either side of Hyampom Road. Portions of the restoration area fall within the existing DOT easement. Construction of the proposed project may require adjustment of the easement boundaries. Temporary use of the USFS property outside of the existing easement will require a Special Use Permit. Permanent use of property (i.e. the road right-of-way) will require an easement from the United States Department of Agriculture (USDA), USFS, or a revised DOT easement.

7.2 Responsibilities for Plan Implementation

TCDOT is responsible for the implementation, monitoring, and management of this mitigation effort. The avoidance, minimization, and compensation measures detailed in this plan will be funded in whole/part by Trinity County Road Funds. Road maintenance funds are allocated to TCDOT annually from State and Federal fuel tax revenues. These funds are designated for road maintenance activities, and can be used for ROAD-RELATED mitigation projects, such as this one.

7.3 Future Protection and Management of Mitigation Lands

The restoration area should not require significant management after the completion of the monitoring phase. As mentioned above, the restoration area is within lands administered by the Trinity National Forest. After the requirements of this mitigation plan are satisfied and the Closure Report has been accepted by DFG, responsibility for management of the restoration site outside of the TCDOT's easement will revert to the Shasta Trinity National Forest. TCDOT will be responsible for only those lands included in its permanent USDA or USDOT easement. The restoration area will require berms or other devices to restrict vehicular trespass.

8.0 REFERENCES

8.1 Printed References

Harris, C.W. and N.T. Dines. 1998. Time-saver standards for landscape architecture: design and construction data. Second edition. McGraw-Hill. New York, NY.

Natural Diversity Database. 2001. Rarefind Computerized Database. Records search for Trinity Bristlensail. Sacramento, CA.

North State Resources. 2001. Letter Report regarding Survey and Manage Species surveys for the TCDOT Hyampom Road project PM 6.4-8.4. Prepared for Trinity County Public Works. Redding, CA.

Roth, B. and Eng, L. 1980. Distribution, ecology, and reproductive anatomy of a rare land snail, *Monadenia Setosa* Talmadge. California Fish and Game 66(1): 4-16.

Roth, B. and Pressley, P. 1986. Observations on the range and natural history of *Monadenia setosa* (Gastropota: Pulmonata) in the Klamath Mountains, California, and the taxonomy of some related species. The Veliger 29(2): 169-182.

8.2 Personal Communications

Roth, Barry. Research Associate California Academy of Sciences. Telephone conversation March 29, 2002

APPENDIX A. SITE PHOTOGRAPHS

Photograph A-1. Optimal Trinity bristlesnail habitat on James Creek, upstream of impact area. Note dense shading even before deciduous trees are leafed out and abundant leaf litter.

Photograph A-2. Sub-optimal Trinity bristlesnail habitat (southeastern aspect within a draw). Note: relative lack of leaf-mold, leaf litter is primarily Douglas fir needles, canyon oak leaves, and madrone leaves. Area very hot and dry during summer months. Lichen covered rock can provide habitat for the snail.

Photograph A-3. Characteristic impacted area consisting of sub-optimal, south-facing, young Douglas fir forest upslope of an existing roadcut (roadcut is not habitat for the Trinity bristlesnail).

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Photograph A-4. Portion of Restoration Area. Note flat ground and lack of shrub or tree cover and debris. Area was formerly a homestead or other building site.