Forest Level Management Indicator Assemblage Report

Shasta-Trinity National Forest

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1. Introduction

This report provides decision makers on the Shasta-Trinity National Forest (the Forest) with a report of management indicator assemblage habitat status and trends at the National Forest scale. This report fulfills the Shasta-Trinity Land and Resource Management Plan monitoring requirements for management indicator assemblages (Forest Plan, USDA 1995), and contributes to fulfilling the National Forest Management Act requirement to provide for a diversity of plant and animal communities on National Forest land (National Forest Management Act of 1976, 16 U.S.C. 1600). This report will be updated every 3 to 5 years.

Management indicator assemblages are groups of wildlife associated with vegetative communities or key habitat components, as identified in the Forest Plan (page 3-24). The Forest Plan permits the use of habitat components to represent the assemblages (Forest Plan, page 5-16), and guidance regarding management indicator assemblages directs Forest Service resource managers to monitor assemblage habitat trends at the National Forest scale (Forest level). The Forest also produces project level reports to analyze the effects of individual projects on habitat of each potentially affected management indicator assemblage, and describes how these effects to habitat may influence Forest level trends.

Direction for and Implementation of Forest Scale Monitoring for Management Indicator Assemblages

Forest level monitoring direction for the Shasta-Trinity National Forest management indicator assemblages is identified in the Monitoring Action Plan of the Forest Plan (USDA 1995, Chapter 5, Page 5-16). The Forest Plan provides direction for Forest scale monitoring of management indicator assemblages using habitat components to represent the assemblages (Forest Plan, page 5-16). Therefore, habitat status and trend is monitored at the Forest scale. Population monitoring is not required. However, the Shasta-Trinity National Forest gathers high quality population data at the Forest level for a number of species. These types of monitoring are described in more detail below.

Habitat Status and Trend Monitoring Methodology

Monitoring assemblage habitat includes Forest level reporting of habitat status and trend. Habitat status refers to the current amount of management indicator assemblage habitat on the Forest. Habitat trend is the direction of change in the amount of management indicator assemblage habitat between the time the Forest Plan was approved and the present.

The Shasta-Trinity Forest Plan provides direction for Forest scale (Forest level) monitoring of management indicator assemblages using habitat components to represent the assemblages (Forest Plan, page 5-16). Habitat components that define each assemblage are described in Table 1. The habitat components for late seral, openings and early seral, multihabitat, hardwood, riparian and chaparral assemblages are categorized using the California Wildlife Habitat Relationship (CWHR) System (CDFG 2008). The CWHR System provides the most widely used habitat relationship models for California's terrestrial vertebrate species (ibid), and is described further in Appendix A.

The Forest wide quantity and distribution of management indicator assemblage habitat are monitored using Gradient Nearest Neighbor (GNN) vegetation layers developed for use in Northwest Forest Plan effectiveness monitoring.[1] The GNN vegetation layers are used by regional interagency monitoring teams to evaluate forest conditions in the Northwest Forest Plan area, under the direction of the Regional Interagency Executive Committee.[2] The GNN layers are developed by integrating data from field plots (forest inventory data) with satellite imagery and mapped environmental data, using gradient analysis and nearest-neighbor imputation. To assess changes in proportions of assemblage habitat on the Shasta-Trinity National Forest since the time of Forest Plan approval, the GNN layer developed to reflect vegetation in 1994 is compared to the most current GNN layer (2007).[3] A similar analysis, using vegetation layers produced by regional monitoring teams, was conducted to evaluate the status and trend of late-successional habitat since 1994 in the entire Northwest Forest Plan area (Moeur et al. 2005).

The snag and down log assemblage is monitored using data collected at the Forest level by the Forest Service Forest Health Monitoring Program,[4] and by the Forest Service, Pacific Southwest Region, Fire and Aviation Management fire and fuels monitoring project.[5] The forest health monitoring program monitors forest disease and insect outbreaks through annual aerial surveys that pinpoint new areas of snag recruitment and tracks the progress of previously reported outbreaks. The fire and fuels monitoring program monitors forest fire severity. Moderate and severe fires add large pulses of snags and down logs to the landscape. The Forest management indicator assemblage analysis uses data from annual aerial forest health surveys collected from 1994 through 2009, and wildfire severity data from 1994 through 2008. In addition, the Forest Service Activity Tracking System is used to monitor management activities across the Forest. These data were used to determine areas that consist of older plantations (generally created before 1994), which are known to be deficient in snags and down logs due to past forest management practices.

The cliffs, caves, talus and rock outcrops assemblage is composed of static landscape components of habitats that are identified in GNN data vegetation layers. Forest level trends for this assemblage are generally static and the occurrence of these habitat components across the Forest is not typically influenced by management. For project analyses, presence of these habitat

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[1] The Landscape Ecology Modeling, Mapping and Analysis team develops Gradient Nearest Neighbor vegetation layers and produces GNN maps for Northwest Forest Plan effectiveness monitoring. More information is at: http://www.fsl.orst.edu/lemma/

[2] Northwest Forest Plan monitoring reports, including Moeur et al. (2005) and Haynes et al. (2006), are available at: http://www.reo.gov/monitoring/reports/10yr-report/index.shtml

[3] The GNN vegetation layers are presently undergoing an accuracy assessment by the Forest Service Pacific Northwest Research Station for the ability to detect change between years. Each separate year of data used in this analysis has already been assessed for accuracy. Accuracy reports are available on the website noted above. The Forest wide management indicator report that is currently being updated will include the data after the current accuracy update is complete.

[4] USDA Forest Service Forest Health Monitoring Program: http://www.fs.fed.us/r5/spf/fhp/fhm/index.shtml

[5] USDA Forest Service, Pacific Southwest Region, Fire and Aviation Management, fire and fuels monitoring program: http://www.fs.fed.us/r5/rsl/clearinghouse/gis-download.shtml#burnseverity

components are recorded during field surveys to determine whether they are present and may be affected by the project.

Table 1. Habitat components monitored for each management indicator assemblage.

Management Indicator Assemblage	CWHR Habitat Components*
Late Seral	Mature stands of conifers and hardwood conifer habitats, CWHR tree size 5, all canopy closures. CWHR habitat types include: • blue oak-foothill pine, • close-cone pine-cypress, • Douglas fir , • eastside pine, • Jeffrey pine, • Klamath mixed conifer, • lodgepole pine, • montane hardwood conifer, • Ponderosa pine, • red fir, • sierran mixed conifer, and • white fir
Openings and Early Seral	Young forests and woodlands with openings, CWHR tree size 1, 2, 3, and 4, all canopy cover classes. CWHR habitat types include all CWHR types listed above in Late Seral Assemblage
Multi-Habitat	Proportion of all habitats in relation to each other on the Forest including conifer forests, woodlands, chaparral and riparian.
Snag and Down Log	Conifer and hardwood habitats with substantial snags and down logs. Areas with heavy tree mortality due to fire and/or disease.
Riparian	Dense streamside shrubby or forested habitat. CWHR habitat types include: • montane riparian • valley foothill riparian • aspen[6]
Aquatic[7]	N/A

[6] Aspen is not strictly a riparian species, but in California it is usually associated with streams, seeps and wet meadows, and it is usually found with other riparian species such as willow and alder (CDFG 2008)

[7]Aquatics assemblage is analyzed in the fisheries management indicator assemblage report.

Management Indicator Assemblage	CWHR Habitat Components*
Hardwood	All size classes and canopy closures of woodlands composed of hardwood species. CWHR habitat types include: • montane hardwood, • blue oak woodland, • valley oak woodland
Chaparral	All size classes of shrub dominated habitats. CWHR types include: • chamise-redshank chaparral • mixed chaparral • montane chaparral • bitterbrush • sagebrush
Cliffs, Caves, Talus and Rock Outcrops	These habitat components are static landscape features that are identified in Forest level spatial data, and are not usually impacted by management activities.

*Based on CWHR habitat suitability information. Dbh = diameter at breast height. Canopy Cover classifications: S=Sparse Cover (10-24% canopy cover); P= Open cover (25-39% canopy cover); M= Moderate cover (40-59% canopy cover); D= Dense cover (60-100% canopy cover). Tree size classes: 1 = Seedling (<1") dbh; 2 = Sapling (1"-5.9" dbh); 3=Pole (6"-10.9" dbh); 4 = Small tree (11"-23.9" dbh); 5 = Medium/Large tree (≥24" dbh); 6 =Multi-layered Tree (CDFG 2008).

Population Status and Trend Monitoring Methodology

As discussed above, management indicator assemblages are groups of wildlife species associated with particular habitat types. Although population status and trend monitoring is not required by the Forest Plan, the Forest has selected appropriate representative species for several management assemblages and collects and/or compiles data regarding population status and trend for these species at the Forest level. Population status is the current condition of the population measure for the representative species. Population trend is the direction of change in that population measure over time. Population data are compiled and discussed in Forest level monitoring reports, which are issued every 3 to 5 years.

Population data include presence data, which are collected using methods, such as bird point counts. Forest level population data are collected from Breeding Bird Survey data. The Breeding Bird Survey (BBS)[8] is a nationwide survey that provides long-term data on population trends of many North American birds. BBS data are widely used for scientific studies on bird populations. The BBS methodology and data are described in detail in Appendix B. To be biologically meaningful for wide-ranging species, presence data are tracked at scales larger than the arbitrary administrative boundary of the Shasta-Trinity National Forest, such as Breeding Bird Survey strata, rangewide, and state. Population data at various scales are important to both assess and provide meaningful context for population status and trend at the Forest scale. Four BBS strata occur on the Forest: Sierra Nevada, South Pacific Rainforest, California Foothills, and Pitt-Klamath (Figure 1).

[8] http://www.pwrc.usgs.gov/bbs/about/

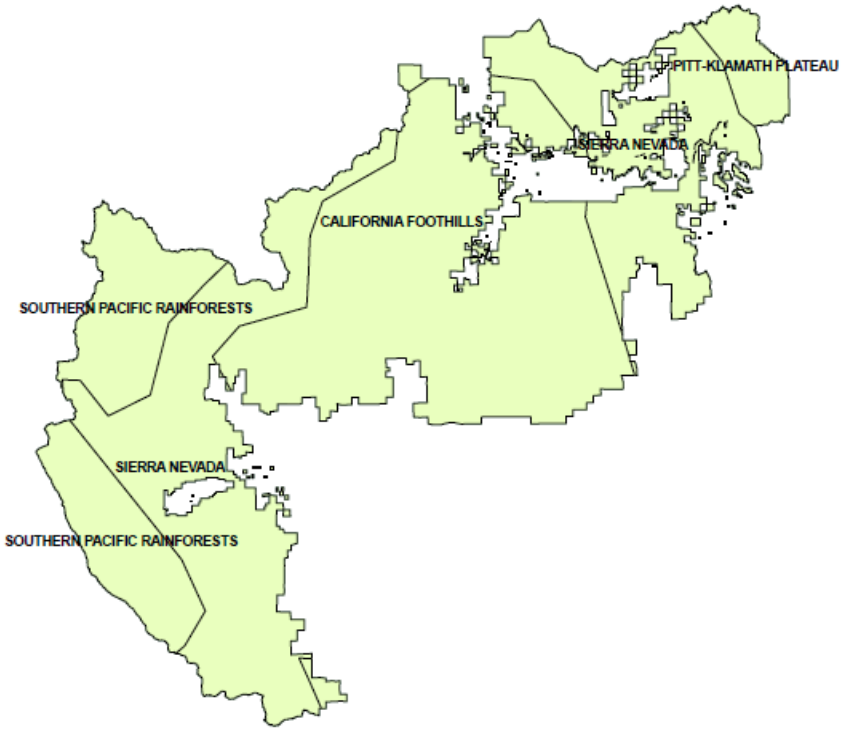

Figure 1. Breeding bird survey strata that overlap Shasta-Trinity National Forest boundaries.

2. Habitat Status and Trend

Late Seral

Based on the best available data used to track Forest wide management indicator assemblage habitat, [9] there are currently approximately 790,000 acres of late seral assemblage habitat on the Shasta-Trinity National Forest. Within the last decade, the recorded trend for amount of late seral assemblage habitat on the Forest is steady at 36% of habitat on Shasta-Trinity National Forest lands. Table 2 summarizes the trend in late seral assemblage over the last decade on the National Forest.

As described below for openings and early seral assemblage, Northwest Forest Plan effectiveness monitoring findings report a net change over the last decade in the amount of older forests [10] due to the gradual growth of trees into the lower end of the 20 inch diameter class. Analysis in the Northwest Forest Plan monitoring report found that areas of older forests are

[9] The Forest utilizes data layers developed for Northwest Forest Plan effectiveness monitoring to track Forest wide assemblage habitat. More information is in Habitat Status and Trend section near beginning of this document.

[10] Older forest encompasses both mature and old-growth stages and is defined differently than the Forest management indicator assemblages. Older forests are defined in the Northwest Forest Plan by mean diameter of over 20 inches, and the late seral assemblage is defined by mean diameter of over 24 inches. This analysis uses Northwest Forest Plan data, but categorizes the data according to Forest management indicator assemblage definitions (Table 1).

stable and expanding, and expectations are for continued increases.[11] Even though this trend reported at the Northwest Forest Plan level is not reflected definitively in current Shasta-Trinity assemblage habitat trends for early and late seral habitat, it is likely that Forest wide trends will show an increase in late seral and associated decrease in openings and early seral assemblage habitat in the near future (Haynes et al. 2006), due to current and foreseeable forest practices of retaining and encouraging development of late seral habitat.

Table 2. Forest wide late seral assemblage over time.

Assemblage	Amount of assemblage habitat in 1994 (acres)	Percent of Forest in late seral assemblage in 1994	Amount of assemblage habitat in 2007 (acres)	Percent of Forest in late seral assemblage in 2007
Late Seral	785,000	36%	790,000	36%

Openings and Early Seral Assemblage

There are currently 801,000 acres of openings and early seral assemblage habitat on National Forest System lands in the Shasta-Trinity National Forest. Within the last decade, the trend for openings and early seral assemblage on the Shasta-Trinity National Forest is steady at 36% of National Forest lands.[12]

Although not reflected in this recorded trend for assemblage habitat on the Shasta-Trinity National Forest, Northwest Forest Plan monitoring findings reported a net change over the last decade in the amount of older forests[13] due to the gradual growth of trees into the lower end of the 20 inch diameter class (Haynes et al. 2006). Across the Northwest Forest Plan area, the actual rate of net increase in older forest was 1.9 percent from 1994-2003, and attributed largely to growth and development of natural stands with quadratic mean diameter greater than 17.7 inches during the 1990's.[14] Researchers report that the increase in older forests during this period was due to a bulge in the size-class distribution of forests with diameters just below the 20-inch class, and estimate the accumulation of older forests will decline as the bulge moves into the greater than 20-inch class. Because the Forest classification of late seral assemblage habitat includes stands with mean diameters greater than 24 inches, these data predict that Forest wide trends would show an increase in late seral and decrease in openings and early seral assemblage habitat in the near future.

[11] See Haynes et al. (2006), Chapter 6 and Moeur et al. (2005).

[12] Based on GNN vegetation analysis of assemblages as defined by CWHR habitat types.

[13] Older forest encompasses both mature and old-growth stages and is defined differently than the Forest management indicator assemblages. Older forests are defined in the Northwest Forest Plan by mean diameter of over 20 inches, and the late seral assemblage is defined by mean diameter of over 24 inches.

[14] See Haynes et al. (2006), Chapter 6 and Moeur et al. (2005).

Table 3. Forest wide openings and early seral assemblage over time.

Assemblage	Amount of assemblage habitat in 1994 (acres)	Percent of Forest in openings and early seral assemblage in 1994	Amount of assemblage habitat in 2007 (acres)	Percent of Forest in openings and early seral assemblage in 2007
Openings & Early Seral	796,000	36%	801,000	36%

Snag and Down Log Assemblage

The snag and down log assemblage is defined as conifer and hardwood habitats with substantial snags and down logs. The habitat components defining the assemblage (snags and down logs) also occur within the other assemblages and are evaluated at the project level using site-specific data (forest stand data). At the Forest level, the amount of assemblage habitat is tracked using annual aerial survey data, which provide information about forest mortality due to insect and disease, and wildfire data. Because snags and down logs are habitat components found within the other assemblages, the amount of snag and down log assemblage tracked at the Forest level is known to represent only a portion of the habitat that provides snags and down logs throughout the Forest.

Since 1994, snags have been recruited in large pulses by disease mortality and fire on 591,100 acres of National Forest System lands in the Shasta-Trinity National Forest. Snags are not permanent features on the landscape (Cluck and Smith 2007, Landram et al. 2002), and when they fall, they contribute to the log component and continue to provide snag and down log assemblage habitat. Snags and logs are known to be deficient in plantations due to past management practices; therefore, there is a deficiency of snags on 67,700 acres of National Forest System Lands. Also, snags and logs are not usually retained on private timber land, so snag and down log assemblage is likely restricted to National Forest System lands.

Table 4. Forest wide trends in snag and down log assemblage habitat.

Assemblage	Total amount of assemblage contributed since 1994 (acres)	Gain due to wildfire since 1994 (acres)	Gain due to disease since 1994 (acres)	Acres of Snag Deficiency
Snag and Down Log	591,100	177,300	413,800	67,700

As shown in Table 4, snag and down log assemblage habitat continues to increase over time due to wildfire events and insect and disease outbreaks. Contributing forces to the recruitment of snags involves the overall health and flammability of forests. The Forest Service monitors forest health through field reconnaissance and annual aerial surveys. Aerial surveys report areas containing current-year conifer and hardwood mortality, defoliation, and other damage; more information is found at: http://www.fs.fed.us/r5/spf/fhp/fhm/aerial/index.shtml.

Any decreases in the snag habitat component would be localized and due to vegetation and fuels management actions such as linear fuel management zones or private forestry where Forest Plan snag retention guidelines do not apply. The amount of snag and down log habitat may also be

reduced due to intense wildfires that consume snags and logs, and slowly due to natural decomposition.

Riparian Assemblage

According to Forest level estimates, there are currently 1,500 acres of riparian assemblage habitat mapped on National Forest System lands in the Shasta-Trinity National Forest. [15] Within the last decade, the trend for riparian assemblage on the Forest is steady at 0.07% of habitat on National Forest lands. The steady trend in amount of Forest wide riparian assemblage habitat would be expected due to implementation of the Aquatic Conservation Strategy since 1994, which focuses on maintaining and restoring aquatic and riparian ecosystems on National Forest lands.

Table 5. Forest wide riparian assemblage over time.

Assemblage	Amount of assemblage habitat in 1994 (acres)	Percent of Forest in riparian assemblage in 1994	Amount of assemblage habitat in 2007 (acres)	Percent of Forest in riparian assemblage in 2007
Riparian	1,500	0.07%	1,500	0.07%

Hardwood Assemblage

There are currently 323,000 acres of hardwood assemblage habitat on National Forest System lands in the Shasta-Trinity National Forest. Within the last decade, the trend for hardwood assemblage on the Forest is steady at 15% of habitat on National Forest system lands. Forest Plan standards and guidelines encourage retention of hardwoods (Forest Plan 4-14); therefore, the steady trend in hardwood habitat is likely to persist or a gradual increase may be seen over time.

Table 6. Forest wide hardwood assemblage over time.

Assemblage	Amount of assemblage habitat in 1994 (acres)	Percent of Forest in hardwood assemblage in 1994	Amount of assemblage habitat in 2007 (acres)	Percent of Forest in hardwood assemblage in 2007
Hardwood	334,000	15%	323,000	15%

Chaparral Assemblage

There are currently 58,000 acres of chaparral assemblage habitat mapped on National Forest System lands in the Shasta-Trinity National Forest. Within the last decade, the trend for chaparral assemblage on the Forest is steady at 3% of habitat on National Forest lands.

[15] Since this assemblage is narrowly defined and difficult to track at the Forest level due to the fine resolution required to detect the occurrence of streamside vegetation, the Forest wide acreage figure is likely an underestimate of actual riparian assemblage habitat on the Forest.

Table 7. Forest wide chaparral assemblage over time.

Assemblage	Amount of assemblage habitat in 1994 (acres)	Percent of Forest in chaparral assemblage in 1994	Amount of assemblage habitat in 2007 (acres)	Percent of Forest in chaparral assemblage in 2007
Chaparral	58,000	3%	58,000	3%

Multihabitat Assemblage

The Forest currently consists of approximately 36% late seral assemblage, 36% openings and early seral assemblage, 3% chaparral assemblage, and 15% hardwood assemblage on National Forest System lands in the Shasta-Trinity National Forest. Within the last decade, the general trend for these assemblages on the Forest is steady.

3. Population Status and Trend

Representative Species

Table 2 displays representative species for each management indicator assemblage. BBS data have varying degrees of reliability based upon sample size. The eight species below have high reliability BBS data in at least one of the four strata that occur across the Forest.

Table 8. Representative species.

Management Indicator Assemblage	Representative Species	Justification for species selection
Late Seral	Brown creeper *Certhia americana*	Prefers dense stands of mature forests. Nests under loose bark in large trees. Average nest tree dbh is 26" (CDFG 2008)
Openings and Early Seral	Nashville warbler *Vermivora ruficapilla*	Nests in brushy openings of young forests and woodlands (CDFG 2008). Shows preference for second growth stands, with habitat becoming less suitable as stands mature (Williams 1996).
Multi-habitat	Mourning dove *Zenaida macroura*	Commonly uses a variety of habitats from open grasslands and crops to chaparral and woodlands and forests. Breeds mostly in forests and woodlands (CDFG 2008).
Snag and Down Log	Red-breasted nuthatch *Sitta canadensis*	Excavates cavities in snags for nesting. Primarily found in mature stands with dense canopy cover and snags. Nest snag average dbh is 28" (CDFG 2008).
Riparian	Yellow warbler *Dendroica petechia*	Primarily nest in shrubby riparian areas (CDFG 2008).
Hardwood	White-breasted nuthatch *Sitta carolinensis*	Primarily found in woodlands and mixed conifer-hardwood stands. Nests in naturally occurring cavities especially in deciduous trees (Grubb et al. 2008).
Chaparral	Wrentit *Chamaea fasciata*	Prefers dense stands of shrubs. Not found in bitterbrush or sagebrush chaparral. Nest concealed in dense shrubs (CDFG 2008).
Chaparral	Green-tailed towhee *Papilo chlorurus*	Prefers moderately open, dry chaparral, including bitterbrush and sagebrush. Nests at base of low growing shrubs (CDFG 2008).

Habitat/Species Relationship

The CWHR program includes habitat suitability information for each species. Table 9 displays the moderate and high quality reproductive habitat that falls within each assemblage for each

representative species. The assemblage CWHR types that are not listed in table below are used as low, moderate or high suitability feeding and cover habitat, and/or low suitability reproductive habitat by the representative species.

Table 9. Representative species habitat suitability.

Management Indicator Assemblage and Representative Species	Reproductive CWHR Habitat Suitability	CWHR Habitat Types
Late Seral Brown creeper *Certhia americana*	Moderate	Closed Cone – Pine Cypress, Tree size 4, 5, Canopy Cover M, D Douglas Fir, Tree size 4, Canopy Cover M, D Eastside Pine, Tree size 4, Canopy Cover M, D Jeffrey Pine, Tree size 4, Canopy Cover M, D Lodgepole Pine, Tree size 4, 5, Canopy Cover M, D Montane Hardwood-Conifer, Tree size 4, Canopy Cover M, D Ponderosa Pine, Tree size 3, Canopy Cover M, D Red Fir, Tree size 4, Canopy Cover M, D Red Fir, Tree size 5, Canopy Cover P
	High	Douglas Fir, Tree size 5, Canopy Cover M, D Eastside Pine, Tree size 5, Canopy Cover M, D Jeffrey Pine, Tree size 5, Canopy Cover M, D Klamath Mixed Conifer, Tree size 4, 5, Canopy Cover M, D Montane Hardwood-Conifer, Tree size 5, Canopy Cover M, D Ponderosa Pine, Tree size 4, 5, Canopy Cover M, D Red Fir, Tree size 5, Canopy Cover M, D Sierran Mixed Conifer, Tree size 4, 5, Canopy Cover M, D White Fir, Tree size 4, 5, Canopy Cover M, D
Openings and Early Seral Nashville warbler *Oreothlypis ruficapilla*	Moderate	Klamath Mixed Conifer, Tree size 2, 3, 4, Canopy Cover M Montane Hardwood – Conifer, Tree size 2, 3, 4, Canopy Cover M Ponderosa Pine, Tree size 2, 3, 4, Canopy Cover M Sierran Mixed Conifer, Tree size 2, 3, 4, Canopy Cover M Sierran Mixed Conifer, Tree size 5, Canopy Cover S, P, M White Fir, Tree size 2, 3, 4, Canopy Cover M
	High	Klamath Mixed Conifer, Tree size 2, 3, 4, Canopy Cover S, P Montane Hardwood – Conifer, Tree size 2, 3, 4, Canopy Cover S, P Ponderosa Pine, Tree size 2, 3, 4, Canopy Cover S, P Sierran Mixed Conifer, Tree size 2, 3, 4, Canopy Cover S, P White Fir, Tree size 2, 3, 4, Canopy Cover S, P

Management Indicator Assemblage and Representative Species	Reproductive CWHR Habitat Suitability	CWHR Habitat Types
Multi-habitat Mourning Dove *Zenaida macroura*	Moderate	Blue Oak Woodland, Tree size 3, Canopy Cover S, P Blue Oak Foothill Pine, Tree size 3, Canopy Cover S, P Blue Oak–Foothill Pine, Tree size 4, 5, Canopy Cover D Closed Cone Pine-Cypress, Tree size 4, 5, Canopy Cover M Closed Cone Pine-Cypress, Tree size 5, Canopy Cover, S, P Douglas Fir, Tree Size 4, 5, Canopy Cover, S, P, M Klamath Mixed Conifer, Tree size 3, 4, 5, Canopy Cover M Klamath Mixed Conifer, Tree size 4, 5, Canopy Cover S, P Montane Hardwood, Tree size 3, Canopy Cover S, P Montane Hardwood, Tree size 3, 4, 5, Canopy Cover D Montane Hardwood-Conifer, Tree size 3, Canopy Cover S, Montane Riparian, Tree size 3, Canopy Cover S, P Ponderosa Pine, Tree size 3, Canopy Cover S, P Sierran Mixed Conifer, Tree size 3, 4, 5, Canopy Cover M Sierran Mixed Conifer, Tree size 4, 5, Canopy Cover S, P Valley Foothill Riparian, Tree size 3, Canopy Cover S, P Valley Oak Woodland, Tree size 3, Canopy Cover S, P White Fir, Tree size 3, 4, 5, Canopy Cover M White Fir, Tree size 4, 5, Canopy Cover S, P
	High	Blue Oak Woodland, Tree size 4, 5, Canopy Cover, S, P, M Blue Oak-Foothill Pine, Tree size 3, 4, 5, Canopy Cover M Blue Oak-Foothill Pine, Tree size 4, 5, Canopy Cover, S, P Montane Hardwood, Tree size 3, 4, 5, Canopy Cover, M Montane Hardwood, Tree size 4, 5, Canopy Cover S, P Montane Hardwood-Conifer, Tree size 3, 4, 5, Canopy Cover, M Montane Hardwood-Conifer, Tree size 4, 5, Canopy Cover S, P Montane Riparian, Tree size 3, 4, 5, Canopy Cover M Montane Riparian, Tree size 4, 5, Canopy Cover S, P Ponderosa Pine, Tree size 3, 4, 5, Canopy Cover M Ponderosa Pine, Tree size 4, 5, Canopy Cover S, P Urban, no stages defined Valley Foothill Riparian, Tree size 3, 4, 5, Canopy Cover M Valley Foothill Riparian, Tree size 4, 5, Canopy Cover S, P Valley Oak Woodland, Tree size 3, 4, 5, Canopy Cover M Valley Oak Woodland, Tree size 4, 5, Canopy Cover S, P

Management Indicator Assemblage and Representative Species	Reproductive CWHR Habitat Suitability	CWHR Habitat Types
Snag and Down Log Red-breasted Nuthatch *Sitta canadensis*	Moderate	Douglas Fir, Tree size 4, Canopy Cover S, P, M, D Eastside Pine, Tree size 5, Canopy Cover S, P, M, D Jeffrey Pine, Tree size 4, Canopy Cover S, P, M, D Klamath Mixed Conifer, Tree size 4, Canopy Cover S, P, M, D Lodgepole Pine, Tree size 5, Canopy Cover S, P, M, D Ponderosa Pine, Tree size 4, Canopy Cover S, P, M, D Red Fir, Tree size 4, Canopy Cover S, P, M, D Sierran Mixed Conifer, Tree size 3, Canopy Cover P, M, D Sierran Mixed Conifer, Tree size 4, Canopy Cover S, P, M, D White Fir, Tree size 4, Canopy Cover S, P, M, D
	High	Douglas Fir, Tree size 5, Canopy Cover S, P, M, D Jeffrey Pine, Tree size 5, Canopy Cover S, P, M, D Klamath Mixed Conifer, Tree size 5, Canopy Cover S, P, M, D Ponderosa Pine, Tree size 5, Canopy Cover S, P, M, D Red Fir, Tree size 5, Canopy Cover S, P, M, D Sierran Mixed Conifer, Tree size 5, Canopy Cover S, P, M, D White Fir, Tree size 5, Canopy Cover S, P, M, D
Riparian Yellow warbler *Dendroica petechia*	Moderate	Montane Riparian, Tree size 2, 3, Canopy Cover D Montane Riparian, Tree size 3, 4, Canopy Cover S Valley Foothill Riparian, Tree size 2, 3, Canopy Cover D Valley Foothill Riparian, Tree size 3, 4, Canopy Cover S
	High	Montane Riparian, Tree size 2, 3, 4, Canopy Cover P, M Valley Foothill Riparian, Tree size 2, 3, 4, Canopy Cover P, M
Chaparral Wrentit *Chamaea fasciata*	Moderate	Chamise Redshank Chaparral, Shrub size 2, 3, 4, Cover P Chamise Redshank Chaparral, Shrub size 4, Cover S Mixed Chaparral, Shrub size 2, 3, 4, Cover S, P Montane Chaparral, Shrub size 2, 3, Cover M, D
	High	Chamise Redshank Chaparral, Shrub size 2, 3, 4, Cover M, D Mixed Chaparral, Shrub size 2, 3, 4, Cover M, D
Chaparral Green-tailed towhee *Pipilo chlorurus*	Moderate	Bitterbrush, Shrub size 2, 3, 4, Cover D Bitterbrush, Shrub size 3, 4, Cover S Montane Chaparral, Shrub size 1 Montane Chaparral, Shrub size 2, 3, 4, Cover D Montane Chaparral, Shrub size 4, Cover M Sagebrush, Shrub size 2, 3, 4, Cover D Sagebrush, Shrub size 3, 4, Cover S
	High	Bitterbrush, Shrub size 2, 3, 4, Cover P, M Montane Chaparral, Shrub size 2, 3, Cover S, M Sagebrush, 2, 3, 4, Cover P, M

Management Indicator Assemblage and Representative Species	Reproductive CWHR Habitat Suitability	CWHR Habitat Types
Hardwood White-breasted nuthatch *Sitta carolinensis*	Moderate	Blue Oak Woodland, Tree size 4, Canopy Cover S, P Blue Oak-Foothill Pine, Tree size 4, Canopy Cover S, P Klamath Mixed Conifer, Tree size 4, Canopy Cover S, P Montane Hardwood, Tree size 4, Canopy Cover S, P Montane Hardwood-Conifer, Tree size 4, Canopy Cover S, P Montane Riparian, Tree size 4, Canopy Cover S, P Sierran Mixed Conifer, Tree size 4, 5, Canopy Cover M, D Sierran Mixed Conifer, Tree size 5, Canopy Cover S, P Valley Foothill Riparian, Tree size 4, Canopy Cover S, P Valley Oak Woodland, Tree size 4, Canopy Cover S, P
	High	Blue Oak Woodland, Tree size 4, 5, Canopy Cover M, D Blue Oak Woodland, Tree size 5, Canopy Cover S, P Blue Oak-Foothill Pine, Tree size 4, 5, Canopy Cover M, D Blue Oak-Foothill Pine, Tree size 5, Canopy Cover S, P Klamath Mixed Conifer, Tree size 4, 5, Canopy Cover M, D Klamath Mixed Conifer, Tree size 5, Canopy Cover S, P Montane Hardwood, Tree size 4, 5, Canopy Cover M, D Montane Hardwood, Tree size 5, Canopy Cover S, P Montane Hardwood-Conifer, Tree size 4, 5, Canopy Cover M, D Montane Hardwood-Conifer, Tree size 5, Canopy Cover S, P Montane Riparian, Tree size 4, 5, Canopy Cover M, D Montane Riparian, Tree size 5, Canopy Cover S, P Valley Foothill Riparian, Tree size 4, 5, Canopy Cover M, D Valley Foothill Riparian, Tree size 5, Canopy Cover S, P Valley Oak Woodland, Tree size 4, 5, Canopy Cover M, D Valley Oak Woodland, Tree size 5, Canopy Cover S, P

Canopy Cover classifications: S=Sparse Cover (10-24% canopy cover); P= Open cover (25-39% canopy cover); M= Moderate cover (40-59% canopy cover); D= Dense cover (60-100% canopy cover). Tree size classes: 1 = Seedling (<1") dbh; 2 = Sapling (1"-5.9" dbh); 3=Pole (6"-10.9" dbh); 4 = Small tree (11"-23.9" dbh); 5 = Medium/Large tree (≥24" dbh); 6 =Multi-layered Tree (CDFG 2008).

Late Seral Representative Species: Brown Creeper

Distribution - The brown creeper occurs throughout much of North America, including parts of Mexico and Central America (Hejl et al. 2002, Figure 2). In California, it is found in northern and central parts of the state (CDFG 2008, Figure 3). It is absent from northeastern California and from much of southern California (Ibid.). It is only found in the central valley during winter (Ibid.). The brown creeper is generally considered to be a non-migratory species, but some migration occurs by evidence of records occurring outside of the breeding range (Hejl et al. 2002).

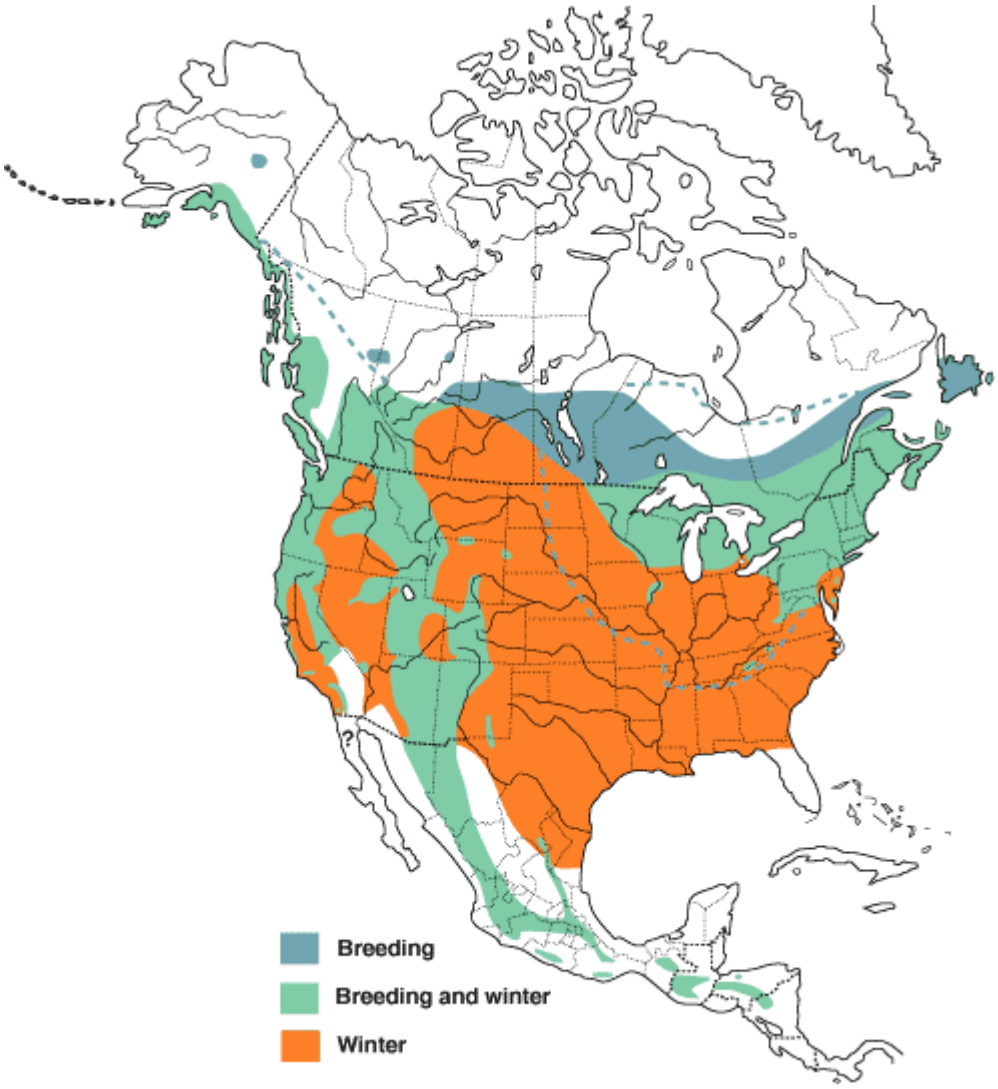

Figure 2. Rangewide distribution of brown creeper (Hejl et al. 2002 in North American Birds).

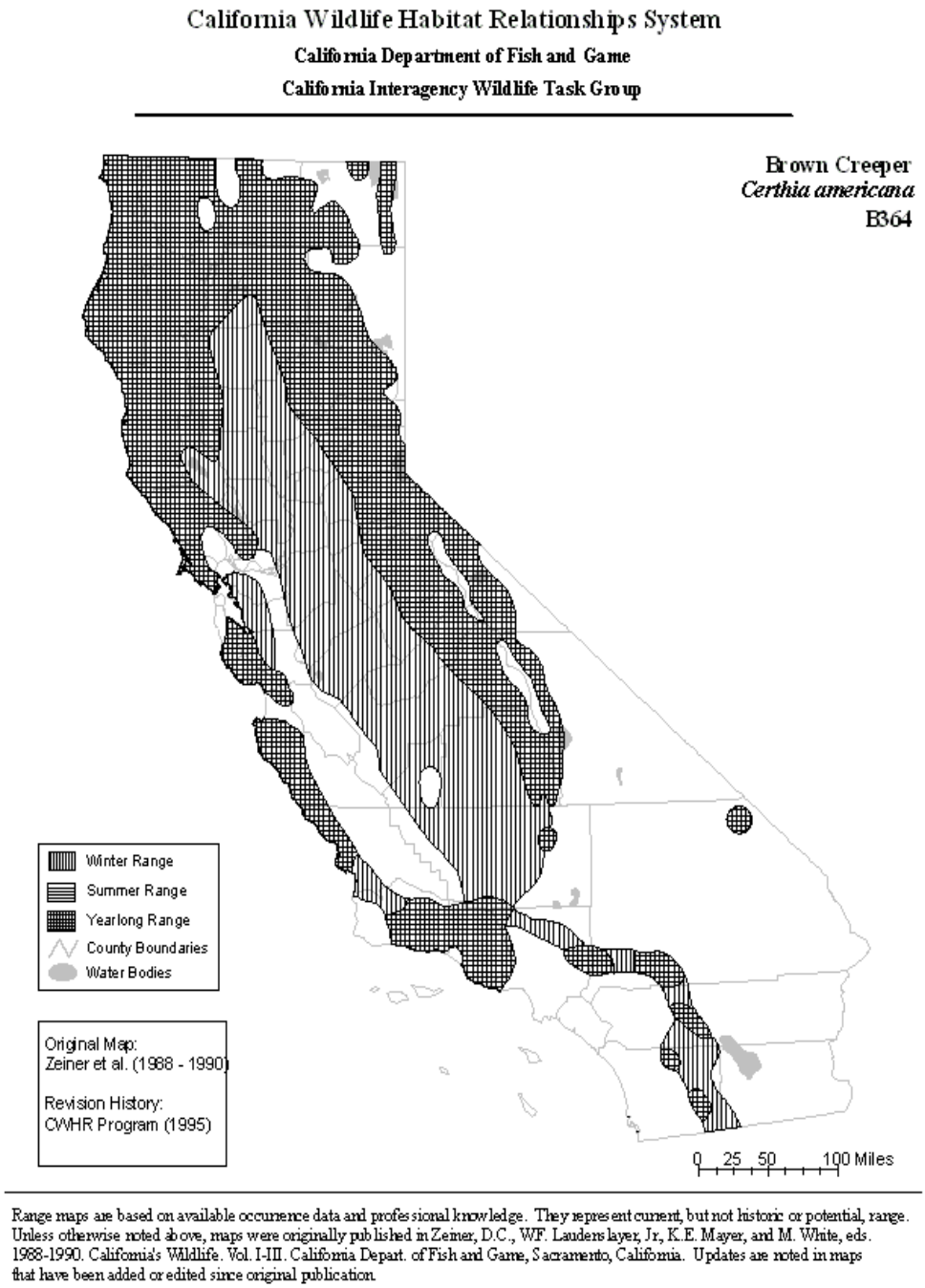

Figure 3. Distribution of brown creeper in California (CDFG 2008).

Habitat - The brown creeper is primarily associated with mature conifer forests in the Pacific Northwest, but is found in hardwood and other habitats in other parts of its range. The consistent elements found in brown creeper habitat include large trees and large snags. Dense canopy cover also seems to be an important element in most parts of its range (Hejl et al. 2002). Nests are usually built behind loose bark, or more rarely in cavities, in old-growth trees or large snags (CDFG 2008). Average nest tree dbh is 26 inches (ranges from 14-64 inches; Ibid.).

The brown creeper is a small songbird (approximately 12 cm long), known for its decurved bill and gleaning behavior, spiraling upward around tree trunks as they forage for insects. Their relatively long tails are used as a prop when foraging along tree trunks.

Population Status and Trend

The brown creeper has been monitored in northern California at various sample locations with breeding bird survey protocols, including BBS routes throughout the Forest (Sauer et al. 2008). These data indicate that brown creepers continue to be present across the Shasta-Trinity, but they are declining at the California scale (P=0.06). No significant downward or upward trends occur in any strata on the Forest. The regional credibility measure is good in 2 strata, but is lower quality for the Sierra Nevada, California foothills and at the survey-wide scale. They seem to be most common in the Sierra Nevada stratum, with an average of 4.33 brown creepers observed on each route.

Table 10. Breeding bird survey population trends for brown creeper for strata that occur on the Forest, for California and survey-wide (species range)

Brown creeper	1966 – 2007					
BBS Strata	**RCM**	**Trend**	**P**	**N**	**(95% CI)**	**RA**
Sierra Nevada	2	-2.4	0.26	30	-6.4 – 1.7	4.33
California foothills	2	-1.3	0.47	26	-4.8 – 2.2	0.77
S. Pacific rainforests	1	-1.0	0.36	60	-3.0 – 1.1	1.31
Pitt-Klamath	1	0.3	0.83	2.5	-2.1 – 2.7	1.53
California	1	-1.9	0.06	102	-3.9 – 0	2.22
Survey-wide	2	0.6	0.42	657	-0.9 – 2.1	0.36

RCM: Regional Credibility Measure. "1" ("blue" in original data) is highest given by BBS, "2" and "3" have deficiencies – see http://www.mbr-pwrc.usgs.gov/bbs/cred.html.
Trend: Estimated trend, summarized as a percent change/year.
P: Statistical level of significance. Because trends are estimates, we conduct a statistical test to determine whether trend is significantly different from 0.
- A "0.01" indicates a 1 percent probability that a number would have occurred by chance alone.
- The lower the number, the less likely that a particular value would have occurred by chance alone.
- A very low number indicates that we cannot reject the null hypothesis that the trend is different from 0.

N: Number of survey routes in the analysis. Caution should be used in interpreting any result that was based on less than 14 routes.
95% CI: 95 % confidence interval for trend estimate. Estimated as a multiplicative (constant rate) change in counts over time, with covariables to adjust for differences in observer quality. Regional trends are estimated as a weighted average of the route trends.
RA: Relative abundance for the species; an approximate measure of how many birds are seen on a route in the region.

Openings and Early Seral Representative Species: Nashville Warbler

Distribution- The Nashville warbler breeds in northern parts of North America, and winters on the west coast of California and in Mexico and Central America (Williams 1996, Figure 4). In California, it is found in mountainous areas of northern parts of the state and south through the Sierra Nevadas (CDFG 2008, Figure 5). It is absent from parts of northeastern California and from much of central and southern California (Ibid.). The Nashville warbler is a migratory

species that breeds in North America, and winters in North and Central America (Williams 1996).

Figure 4. Rangewide distribution of Nashville warbler (Williams 1996 in North American Birds).

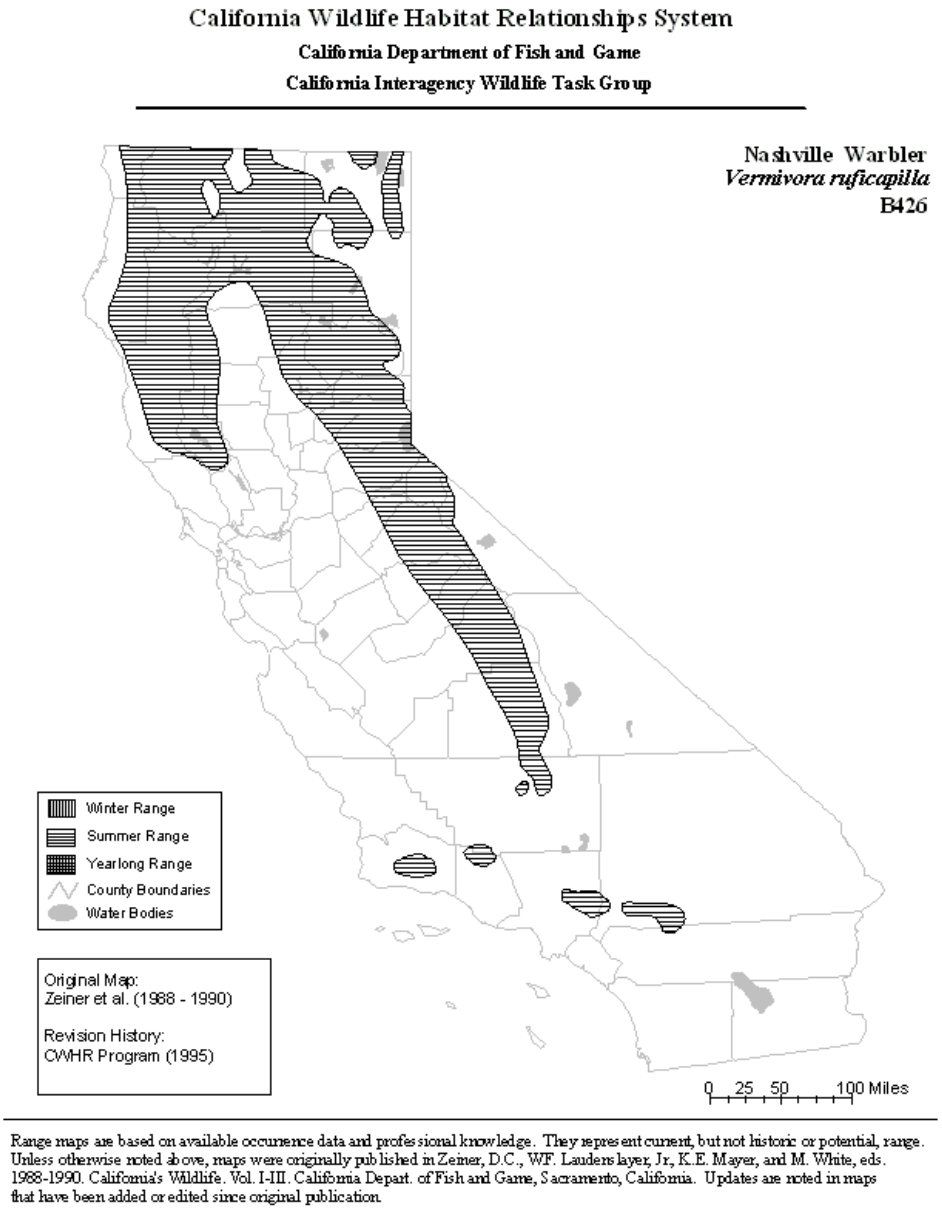

Figure 5. Distribution of Nashville warbler in California (CDFG 2008).

Habitat- In their breeding range, the Nashville warbler prefers shrubby understories of young (second growth) forests and woodlands, with open canopy structure (CDFG 2008, Williams 1996). They nest on the ground under dense shrubs in the understory of young forests and woodlands (CDFG 2008). Nashville warblers can benefit from intensive timber management practices, including clearcuts (Williams 1996).

Population Status and Trend - The Nashville warbler has been monitored in northern California at various sample locations by Breeding Bird Survey (BBS) protocols (1968 to 2007 – BBS routes throughout northern California; Sauer et al. 2008). These data indicate a potential

decline in species occurrence within the BBS strata that overlap the Shasta-Trinity National Forest, but the decline is weakly supported by statistical analysis (Sauer et al. 2008; Table 11). The regional credibility measure is good in all strata that occur on the Forest. The Nashville warbler seems to be most abundant in the Sierra Nevada stratum on the Forest, with an average of 10.3 birds being seen on each route.

Table 11. Breeding bird survey population trends for Nashville warbler for strata that occur on the Forest, for California and for survey-wide (species range)

Nashville warbler	1966 – 2007					
BBS Strata	**RCM**	**Trend**	**P**	**N**	**(95% CI)**	**RA**
Sierra Nevada	1	**-3**	0.00	253	-4.7 - -1.3	10.3
California foothills	1	**-0.1**	0.96	19	-3.1 – 3.0	2.31
S. Pacific rainforests	1	**-0.5**	0.40	40	-1.7 – 0.7	3.32
Pitt-Klamath	1	**-0.1**	0.96	22	-3.1 – 2.9	2.15
California	1	**-1.7**	0.02	77	-3.1 - -0.3	5.08
Survey-wide	1	**1.0**	0.32	839	-0.9 – 2.8	7.86

RCM: Regional Credibility Measure. "1" ("blue" in original data) is highest given by BBS, "2" and "3" have deficiencies – see http://www.mbr-pwrc.usgs.gov/bbs/cred.html.
Trend: Estimated trend, summarized as a percent change/year.
P : Statistical level of significance. Because trends are estimates, we conduct a statistical test to determine whether trend is significantly different from 0.
- A "0.01" indicates a 1 percent probability that a number would have occurred by chance alone.
- The lower the number, the less likely that a particular value would have occurred by chance alone.
- A very low number indicates that we cannot reject the null hypothesis that the trend is different from 0.

N: Number of survey routes in the analysis. Caution should be used in interpreting any result that was based on less than 14 routes.
95% CI: 95 % confidence interval for trend estimate. Estimated as a multiplicative (constant rate) change in counts over time, with covariables to adjust for differences in observer quality. Regional trends are estimated as a weighted average of the route trends.
RA: Relative abundance for the species; an approximate measure of how many birds are seen on a route in the region.

Multi-habitat Representative Species: Mourning Dove

Distribution- Mourning dove range includes most of North America and parts of Central America (Otis et al. 2008). There are migratory and non-migratory individuals in the species (Ibid). The year round residents occupy most of the range except the most northerly parts of their range in Canada, and the most southerly parts of their range in Mexico and Central America (Ibid). Migratory range overlaps significantly with non-migratory range, and only slightly expands to the north and south of the residential range (Ibid). In California, mourning doves are found in most areas of the state, but higher elevations are only occupied during the breeding season (CDFG 2008, Figure 7).

Figure 6. Rangewide distribution of mourning dove (Otis et al. 2008 in North American Birds).

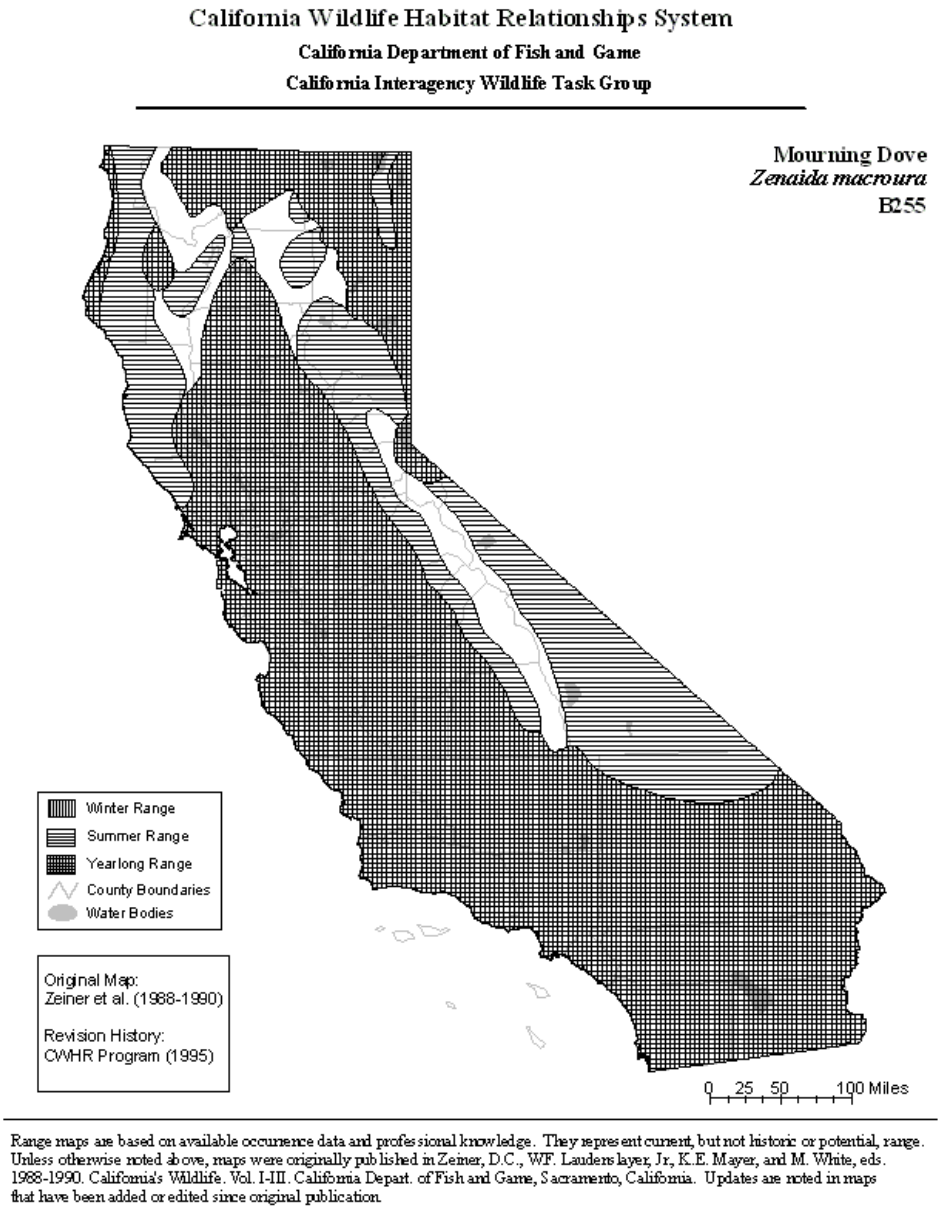

Figure 7. Distribution of mourning dove in California (CDFG 2008).

Habitat- The mourning dove is a habitat generalist and is found in a wide variety of habitats, from agricultural crops to chaparral, to conifer-hardwood stands. They are not commonly found in extensive forest areas, but are more likely to use edges between forested and open habitats (Otis et al. 2008). Mixed conifer-hardwood habitats are more likely to be chosen for nesting habitat. Nest substrate widely varies as well, ranging from ground nests to shrub, hardwood or conifer nest sites (Otis et al. 2008).

Population Status and Trend- The mourning dove is a game bird with over 20 million individuals being harvested annually range wide. Mourning dove populations have been monitored in northern California at various sample locations by Breeding Bird Survey (BBS) protocols (1968 to 2007 – BBS routes throughout northern California; Sauer et al. 2008). These data indicate a slight decline in population within the BBS strata that overlap the Shasta-Trinity National Forest. This decline is statistically supported in the California foothills and South Pacific rainforest BBS strata that occur on the Forest, and at the California level (Sauer et al. 2008, Table 12). The regional credibility measure is high in all strata except for the Sierra Nevada stratum and at the survey-wide scale. They seem to be most abundant in the California foothills and Pitt Klamath strata on the Forest, with 35.06 and 12.04 respectively being seen on average on each route in these areas.

Table 12. Breeding bird survey population trends for mourning dove for strata that occur on the Forest, as well as California and survey-wide (species range)

Mourning dove	1966 – 2007					
BBS Strata	**RCM**	**Trend**	**P**	**N**	**(95% CI)**	**RA**
Sierra Nevada	2	0.4	0.83	24	-3.5 – 4.4	2.96
California foothills	1	-1.2	0.05	60	-2.5 – 0.0	35.06
S. Pacific rainforests	1	-1.1	0.07	58	-2.3 – 0.1	3.40
Pitt-Klamath	1	0.9	0.25	38	-0.6 – 2.4	12.04
California	1	-0.9	0.05	225	-1.9 – 0.0	26.25
Survey-wide	2	0.0	0.91	3822	-0.2 – 0.2	27.32

RCM: Regional Credibility Measure. "1" ("blue" in original data) is highest given by BBS, "2" and "3" have deficiencies – see http://www.mbr-pwrc.usgs.gov/bbs/cred.html.
Trend: Estimated trend, summarized as a percent change/year.
P : Statistical level of significance. Because trends are estimates, we conduct a statistical test to determine whether trend is significantly different from 0.
- A "0.01" indicates a 1 percent probability that a number would have occurred by chance alone.
- The lower the number, the less likely that a particular value would have occurred by chance alone.
- A very low number indicates that we cannot reject the null hypothesis that the trend is different from 0.

N: Number of survey routes in the analysis. Caution should be used in interpreting any result that was based on less than 14 routes.
95% CI: 95 % confidence interval for trend estimate. Estimated as a multiplicative (constant rate) change in counts over time, with covariables to adjust for differences in observer quality. Regional trends are estimated as a weighted average of the route trends.
RA: Relative abundance for the species; an approximate measure of how many birds are seen on a route in the region.

Snag and Down Log Representative Species: Red-breasted Nuthatch

Distribution- The red-breasted nuthatch is a year round resident in most temperate coniferous forests, especially in the western U.S. and northern North America (Ghalambor and Martin 1999, Figure 8). The species is not a regular migrant, but irregular irruptive movements have been observed when food availability is lacking during the winter (Ibid). Populations in the most northern part of their range exhibit some southward movement during the winter, as do populations that live in higher elevations throughout the rest of their range (Ibid). The red-breasted nuthatch is found throughout the coniferous forest areas of California (CDFG 2008, Figure 9). The higher elevation areas are sporadically occupied during the non-breeding season, with some down slope seasonal movements in the winter (Ibid).

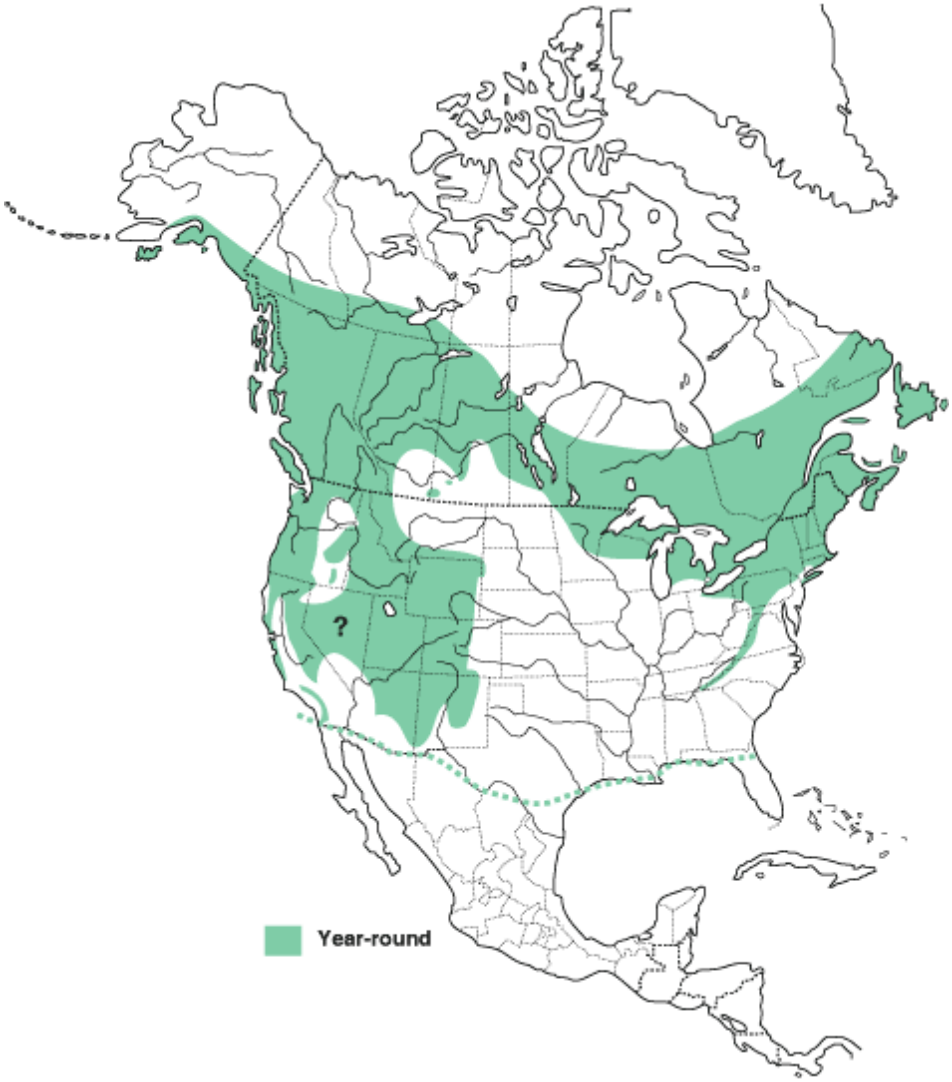

Figure 8. Rangewide distribution of red-breasted nuthatch (Ghalambor and Martin 1999 in North American Birds).

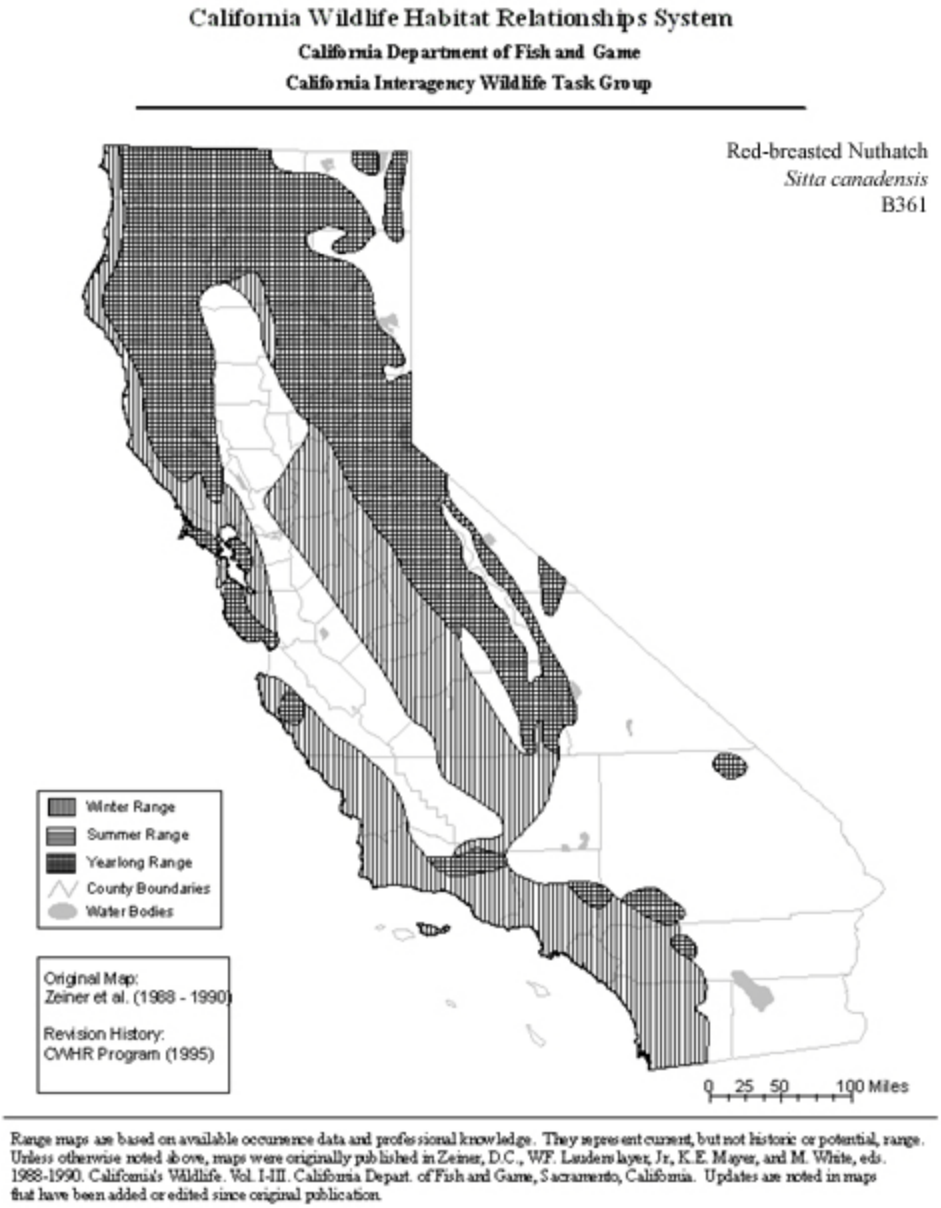

Figure 9. Distribution of red-breasted nuthatch in California (CDFG 2008).

Habitat- The red-breasted nuthatch occupies coniferous and mixed conifer-hardwood habitats throughout its range (CDFG 2008). They prefer mature forests with large trees and numerous snags for excavation of nest cavities (CDFG 2008). Average nest tree/snag dbh is 28 inches (range of 7.5-64 inches dbh) (CDFG 2008). During irruptive movement occurrences, red-breasted nuthatches can be seen in widely varying habitat such as agricultural, urban and sagebrush areas in addition to coniferous forest habitats (Ghalambor and Martin 1999).

Population Status and Trend- The red-breasted nuthatch has been monitored in northern California at various breeding bird survey protocol sample locations (BBS; Sauer et al. 2008).

These data indicate that red-breasted nuthatches continue to be present across the Shasta-Trinity. The general trend seems to be a steady population, but there is a significant increasing trend in the S. Pacific Rainforest stratum and the survey-wide scale. No significant increasing or decreasing trends occur in any other strata, but the regional credibility measure is good in all strata except for the California foothills. The red-breasted nuthatch seems to be most common in the Sierra Nevada stratum, with an average of 16.80 individuals observed on each route.

Table 13. Breeding bird survey population trends for red-breasted nuthatch for strata that occur on the Forest, as well as California and survey-wide (species range)

Red-breasted nuthatch	1966 – 2007					
BBS Strata	**RCM**	**Trend**	**P**	**N**	**(95% CI)**	**RA**
Sierra Nevada	1	-0.1	0.90	29	-1.8 – 1.6	16.80
California foothills	2	1.4	0.38	24	-1.6 – 4.3	1.49
S. Pacific rainforests	1	2.4	0.01	73	0.5 – 4.3	3.45
Pitt-Klamath	1	1.7	0.09	38	-0.2 – 3.5	8.57
California	1	0.4	0.57	104	-0.9 – 1.7	6.83
Survey-wide	1	1.3	0.00	1192	0.8 – 1.8	2.54

RCM: Regional Credibility Measure. "1" ("blue" in original data) is highest given by BBS, "2" and "3" have deficiencies – see http://www.mbr-pwrc.usgs.gov/bbs/cred.html.
Trend: Estimated trend, summarized as a percent change/year.
P : Statistical level of significance. Because trends are estimates, we conduct a statistical test to determine whether trend is significantly different from 0.
- A "0.01" indicates a 1 percent probability that a number would have occurred by chance alone.
- The lower the number, the less likely that a particular value would have occurred by chance alone.
- A very low number indicates that we cannot reject the null hypothesis that the trend is different from 0.

N: Number of survey routes in the analysis. Caution should be used in interpreting any result that was based on less than 14 routes.
95% CI: 95 % confidence interval for trend estimate. Estimated as a multiplicative (constant rate) change in counts over time, with covariables to adjust for differences in observer quality. Regional trends are estimated as a weighted average of the route trends.
RA: Relative abundance for the species; an approximate measure of how many birds are seen on a route in the region.

Riparian Representative Species: Yellow Warbler

Distribution- The yellow warbler is a migratory species, breeding in North America and wintering in Central and Southern America. The yellow warbler breeds in most of the northern half of North America, with patches of breeding range in the southwest, Baja California and central Mexico (Lowther et al. 1999, Figure 10). Winter range includes Coastal Mexico and Central America (Ibid.), and the northern part of South America (Ridgely et al. 2003). In California, yellow warblers are found during the breeding season in most areas of the state except for the Central Valley and southern and eastern deserts (Lowther et al. 1999, CDFG 2008, Figure 11).

Figure 10. Rangewide distribution of yellow warbler (Lowther et al. 1999 in North American Birds).

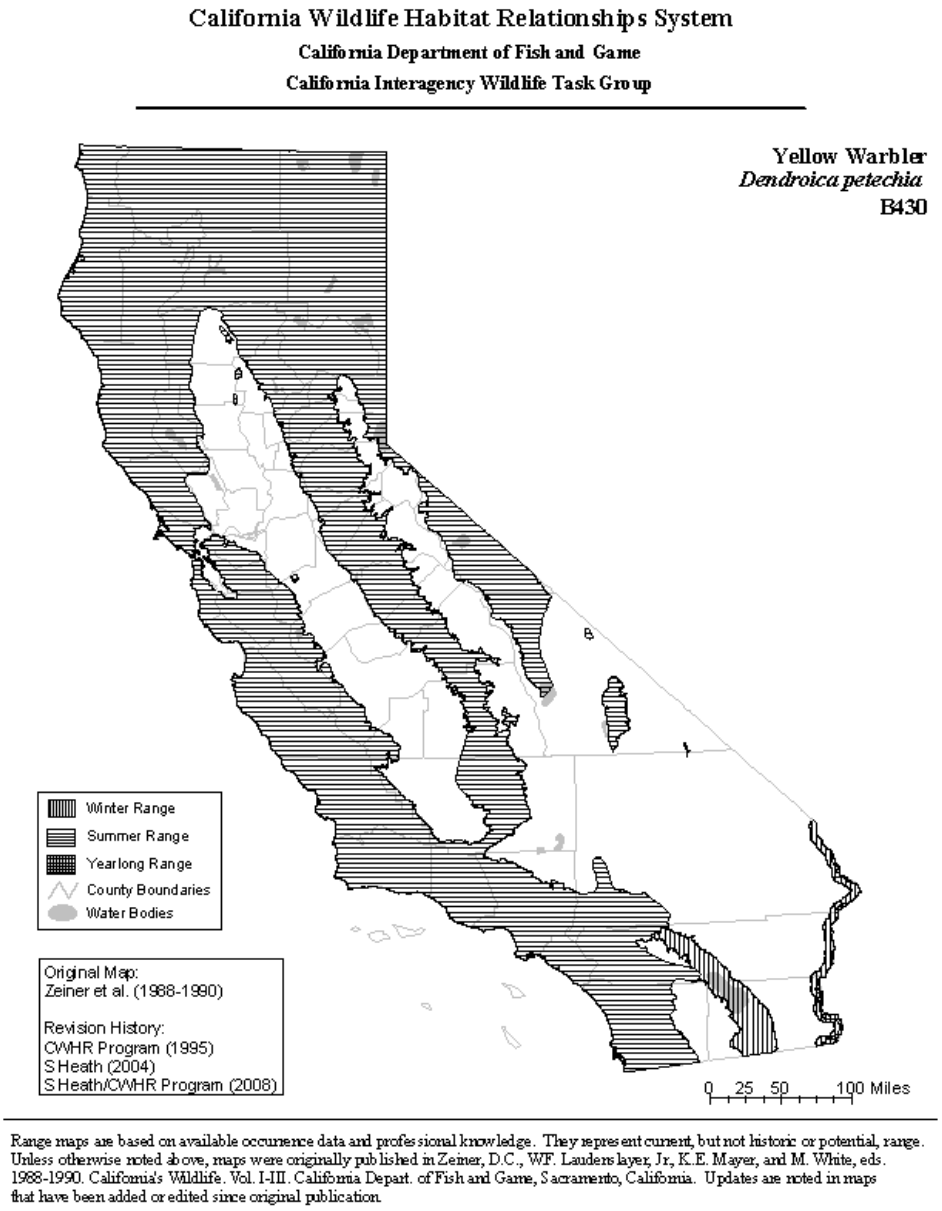

Figure 11. Distribution of yellow warbler in California (CDFG 2008).

Habitat- In the breeding range, the yellow warbler is highly associated with riparian habitats (CDFG 2008, Lowther et al. 1999). They also have been found breeding in shrubby areas within montane forested habitats to a lesser degree (CDFG 2008). The occupancy of these areas outside of riparian vegetation may be a relatively new phenomenom (CDFG 2008). Preferred riparian habitats seem to consist of open canopied (CWHR ratings open and moderate), densely shrubby areas (CDFG 2008). They seem to be especially associated with riparian habitats that include willows (Lowther et al. 1999).

Population Status and Trend- Numbers of breeding pairs of yellow warblers have been declining over the last several decades in California, especially in lowland areas such as the Central Valley where they were previously abundant (CDFG 2008). These declines may be due to high rates of cowbird parasitism (CDFG 2008). The yellow warbler has been monitored in northern California at various breeding bird survey protocol sample locations (BBS; Sauer et al. 2008). These data indicate that yellow warblers continue to be present within the BBS strata that overlap the Shasta-Trinity National Forest. The general trend seems to be a slightly declining population, but this trend is only statistically supported in the California foothills stratum. No significant increasing or decreasing trends occur in any other strata, but the regional credibility measure is high in all strata except for the California foothills. The yellow warbler seems to be most common in the Sierra Nevada and Pitt-Klamath strata, with an average of 4.29 and 3.29 individuals observed on each route respectively.

Table 14. Breeding bird survey population trends for yellow warbler for strata that occur on the Forest, as well as California and survey-wide (species range)

Yellow warbler	1966 – 2007					
BBS Strata	**RCM**	**Trend**	**P**	**N**	**(95% CI)**	**RA**
Sierra Nevada	1	-1.9	0.23	25	-4.8 – 1.1	4.29
California foothills	1	-2.5	0.07	48	-5.1 – 0.2	1.60
S. Pacific rainforests	2	-1.9	0.39	58	-6.3 – 2.4	2.17
Pitt-Klamath	2	0.7	0.51	31	-1.4 – 2.9	3.29
California	1	-1.1	0.17	132	-2.7 – 0.5	1.69
Survey-wide	1	0.0	0.71	2682	-0.2 – 0.3	4.35

RCM: Regional Credibility Measure. "1" ("blue" in original data) is highest given by BBS, "2" and "3" have deficiencies – see http://www.mbr-pwrc.usgs.gov/bbs/cred.html.
Trend: Estimated trend, summarized as a percent change/year.
P : Statistical level of significance. Because trends are estimates, we conduct a statistical test to determine whether trend is significantly different from 0.
- A "0.01" indicates a 1 percent probability that a number would have occurred by chance alone.
- The lower the number, the less likely that a particular value would have occurred by chance alone.
- A very low number indicates that we cannot reject the null hypothesis that the trend is different from 0.

N: Number of survey routes in the analysis. Caution should be used in interpreting any result that was based on less than 14 routes.
95% CI: 95 % confidence interval for trend estimate. Estimated as a multiplicative (constant rate) change in counts over time, with covariables to adjust for differences in observer quality. Regional trends are estimated as a weighted average of the route trends.
RA: Relative abundance for the species; an approximate measure of how many birds are seen on a route in the region.

Chaparral Representative Species: Wrentit

Distribution- Wrentit range is limited to coastal North America. Its range is bounded to the north by the Columbia River, to the south by the Baja desert and to the east by the Cascades and Sierra Nevada's (Geupel and Ballard 2002, Figure 12). Within California, they are found throughout most of the state west of the Cascade and Sierra Nevada's, with a slight extension to the northeast in Modoc County (CDFG 2008, Figure 13). They are found in the Central Valley during the non-breeding season, and display some upslope movement after breeding, otherwise they are relatively sedentary (Ibid).

Figure 12. Rangewide distribution of wrentit (Geupel and Ballard 2002 in North American Birds).

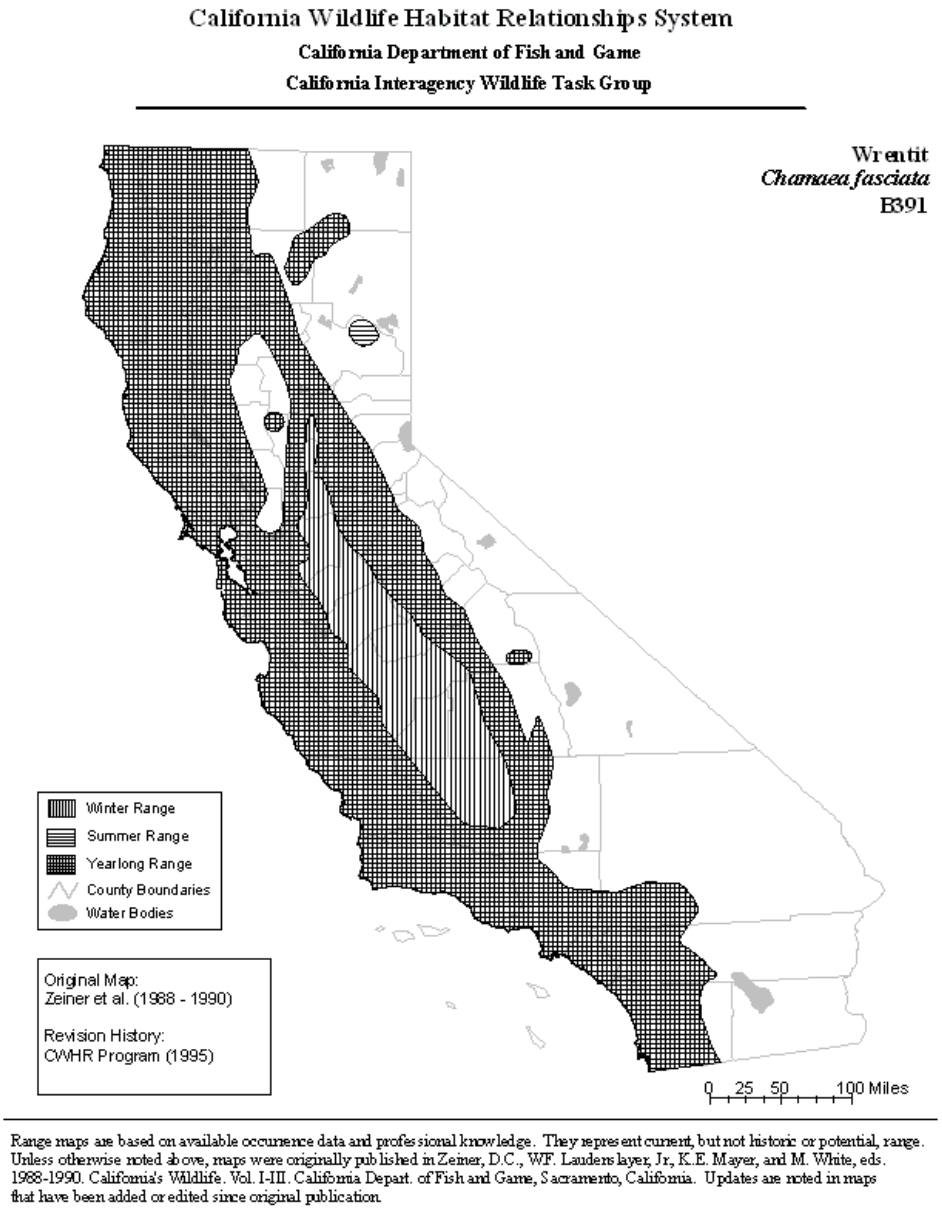

Figure 13. Distribution of wrentit in California (CDFG 2008).

Habitat- The wrentit is highly associated with dense chaparral habitat, but occasionally also breed in dense, shrubby understories of open forested habitat (Geupel and Ballard 2002). They nest in dense shrub stands, usually placing nest within 4 feet of the ground (CDFG 2008).

Population Status and Trend - The wrentit has been monitored in northern California at various BBS protocol sample locations (Sauer et al. 2008). These data indicate a fairly stable population within the BBS strata that overlap the Shasta-Trinity National Forest (Table 15). Most of the BBS strata that occur on the Forest show a slight decline, but these declines are not statistically supported. The population appears to be increasing in the Pitt-Klamath BBS stratum,

and this increase is statistically supported; however, the sample size is relatively small in that stratum causing the regional credibility measure to be low (Sauer et al. 2008). No significant increasing or decreasing trends occur in any other strata, but the regional credibility measure is high in all other strata. The wrentit seems to be most common in the California foothills stratum, with an average of 13.47 individuals observed on each route.

Table 15. Breeding bird survey population trends for wrentit for strata that occur on the Forest, as well as California and survey-wide (species range)

Wrentit	1966 – 2007					
BBS Strata	**RCM**	**Trend**	**P**	**N**	**(95% CI)**	**RA**
Sierra Nevada	1	-1.4	0.54	15	-5.9 – 3.0	1.83
California foothills	1	-1.1	0.29	56	-3.2 – 0.9	13.47
S. Pacific rainforests	1	-0.8	0.18	46	-1.9 – 0.3	6.15
Pitt-Klamath	2	9.7	0.02	6	4.6 – 14.8	0.39
California	1	-1.1	0.17	122	-2.6 – 0.5	7.25
Survey-wide	1	-1.0	0.22	146	-2.5 – 0.6	5.87

RCM: Regional Credibility Measure. "1" ("blue" in original data) is highest given by BBS, "2" and "3" have deficiencies – see http://www.mbr-pwrc.usgs.gov/bbs/cred.html.
Trend: Estimated trend, summarized as a percent change/year.
P : Statistical level of significance. Because trends are estimates, we conduct a statistical test to determine whether trend is significantly different from 0.
- A "0.01" indicates a 1 percent probability that a number would have occurred by chance alone.
- The lower the number, the less likely that a particular value would have occurred by chance alone.
- A very low number indicates that we cannot reject the null hypothesis that the trend is different from 0.

N: Number of survey routes in the analysis. Caution should be used in interpreting any result that was based on less than 14 routes.
95% CI: 95 % confidence interval for trend estimate. Estimated as a multiplicative (constant rate) change in counts over time, with covariables to adjust for differences in observer quality. Regional trends are estimated as a weighted average of the route trends.
RA: Relative abundance for the species; an approximate measure of how many birds are seen on a route in the region.

Chaparral Representative Species: Green-tailed Towhee

Distribution - Green-tailed towhee range consists of the western part of North America south through Mexico, east through Texas and north to the northern parts of the United States (Dobbs et al. 1998, Figure 14). In California, green-tailed towhee breeding range includes the northern and eastern parts of the state, and winter range includes parts of the southern deserts (CDFG 2008, Figure 15). They are absent from coastal regions, except for in southern California where they occasionally can be found in the winter (CDFG 2008).

Figure 14. Rangewide distribution of green-tailed towhee (Dobbs et al. 1998 in North American Birds).

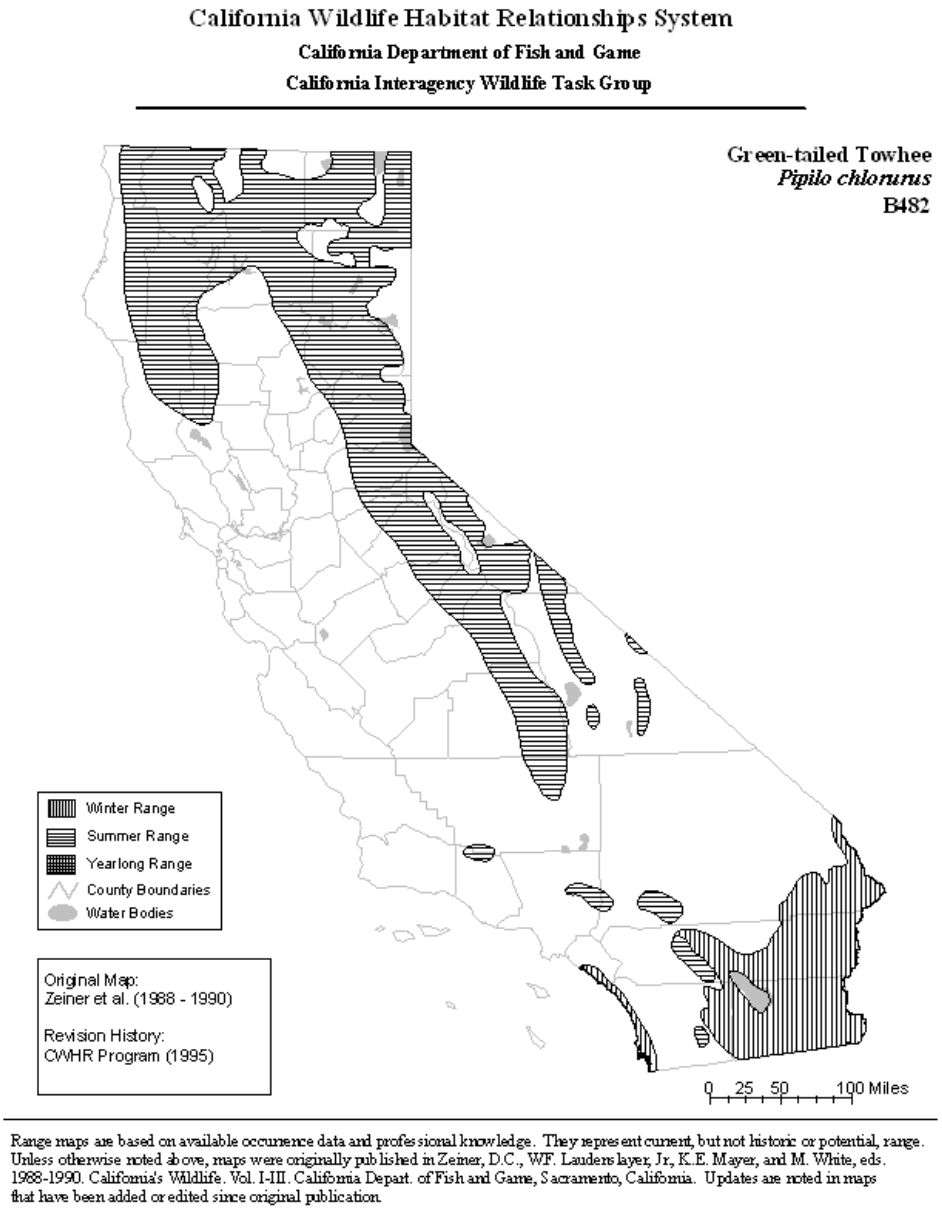

Figure 15. Distribution of green-tailed towhee in California (CDFG 2008).

Habitat – Green-tailed towhees are primarily found in shrubby habitats, and are sometimes found in young, second growth with small trees and abundant shrubs (Dobbs et al. 1998). In California they are primarily found in chaparral, sagebrush and bitterbrush habitats (CDFG 2008). They may also be found where this shrub structure is found in the understory of a sparse forest (Ibid.). Optimal breeding habitat is arid, openly shrubby chaparral (Ibid.).

Population Status and Trend - The green-tailed towhee has been monitored in northern California at various BBS protocol sample locations (Sauer et al. 2008). The green-tailed towhee does not occur in the south pacific rainforest stratum, so there is no data available for this stratum. The BBS data indicate a fairly stable population within the BBS strata that overlap the Shasta-Trinity National Forest (Table 16). Most of the BBS strata that occur on the Forest show a slight increase, but these increases are not statistically supported. The population appears to be decreasing in the Pitt-Klamath BBS stratum and at the survey-wide scale. This decrease is borderline statistically supported in the Pitt-Klamath stratum, but it is not statistically supported at the survey-wide scale (Sauer et al. 2008). No significant increasing or decreasing trends occur in any other strata, and the regional credibility measure is good in all strata except the California foothills. The green-tailed towhee seems to be most common in the Pitt-Klamath stratum, with an average of 5.49 individuals observed on each route.

Table 16. Breeding bird survey population trends for green-tailed towhee for strata that occur on the Forest, as well as California and survey-wide (species range)

Green-tailed towhee	1966 – 2007					
BBS Strata	**RCM**	**Trend**	**P**	**N**	**(95% CI)**	**RA**
Sierra Nevada	1	0.3	0.81	21	-2.3 – 2.9	4.56
California foothills	3	10.1	0.13	4	0.6 – 19.6	0.06
S. Pacific rainforests	N/A	N/A	N/A	N/A	N/A	N/A
Pitt-Klamath	1	-1.6	0.06	26	-3.3 – 0.0	5.49
California	1	0.9	0.32	57	-0.9 – 2.8	2.48
Survey-wide	1	-0.4	0.40	341	-1.3 – 0.5	3.28

RCM: Regional Credibility Measure. "1" ("blue" in original data) is highest given by BBS, "2" and "3" have deficiencies – see http://www.mbr-pwrc.usgs.gov/bbs/cred.html.
Trend: Estimated trend, summarized as a percent change/year.
P : Statistical level of significance. Because trends are estimates, we conduct a statistical test to determine whether trend is significantly different from 0.
- A "0.01" indicates a 1 percent probability that a number would have occurred by chance alone.
- The lower the number, the less likely that a particular value would have occurred by chance alone.
- A very low number indicates that we cannot reject the null hypothesis that the trend is different from 0.

N: Number of survey routes in the analysis. Caution should be used in interpreting any result that was based on less than 14 routes.
95% CI: 95 % confidence interval for trend estimate. Estimated as a multiplicative (constant rate) change in counts over time, with covariables to adjust for differences in observer quality. Regional trends are estimated as a weighted average of the route trends.
RA: Relative abundance for the species; an approximate measure of how many birds are seen on a route in the region.

Hardwood Represenative Species: White-breasted Nuthatch

Distribution – The white-breasted nuthatch range includes most of North America, except for the far north and coastal Mexico (Grubb and Pravosudov 2008, Figure 16). The species is non-migratory, so they occupy their entire range year round (Ibid.). The white-breasted nuthatch breeds and winters throughout much of California, including all mountain ranges, except for the desert southeast (Figure 17, CDFG 2008).

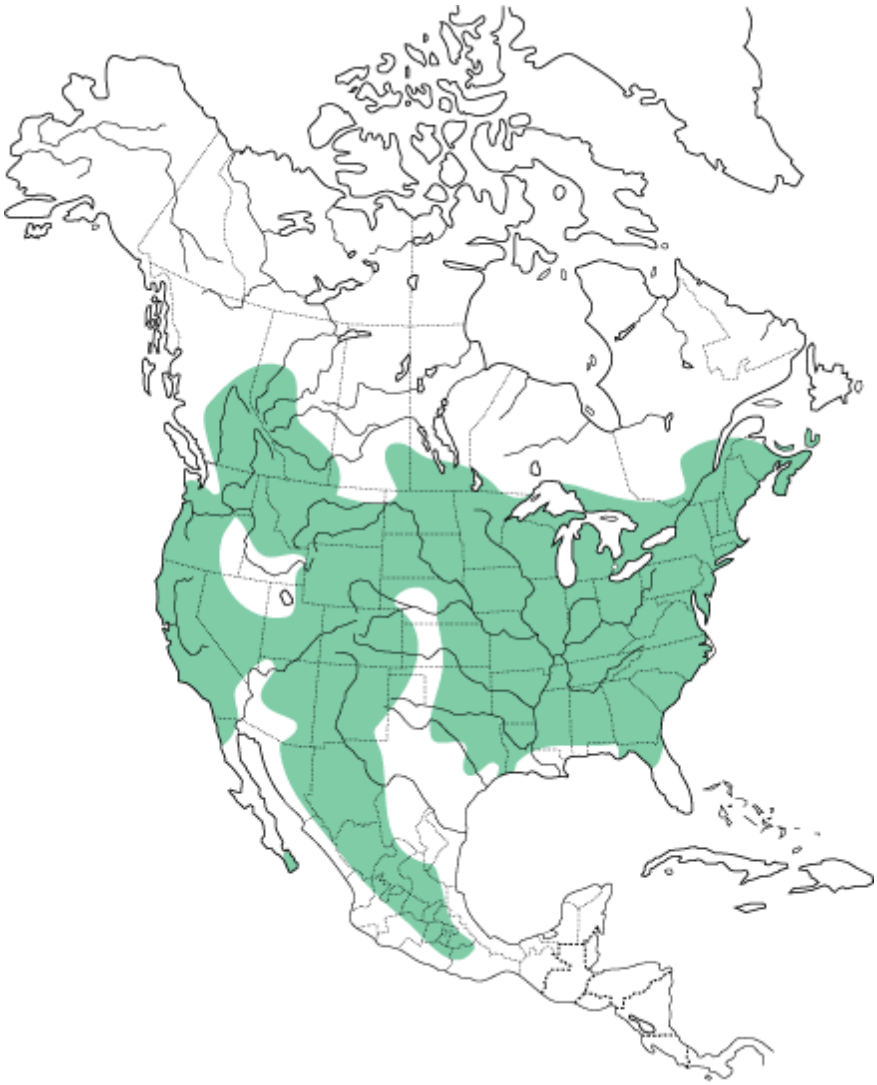

Figure 16. Rangewide distribution of white-breasted nuthatch (Grubb and Pravosudov 2008 in North American Birds).

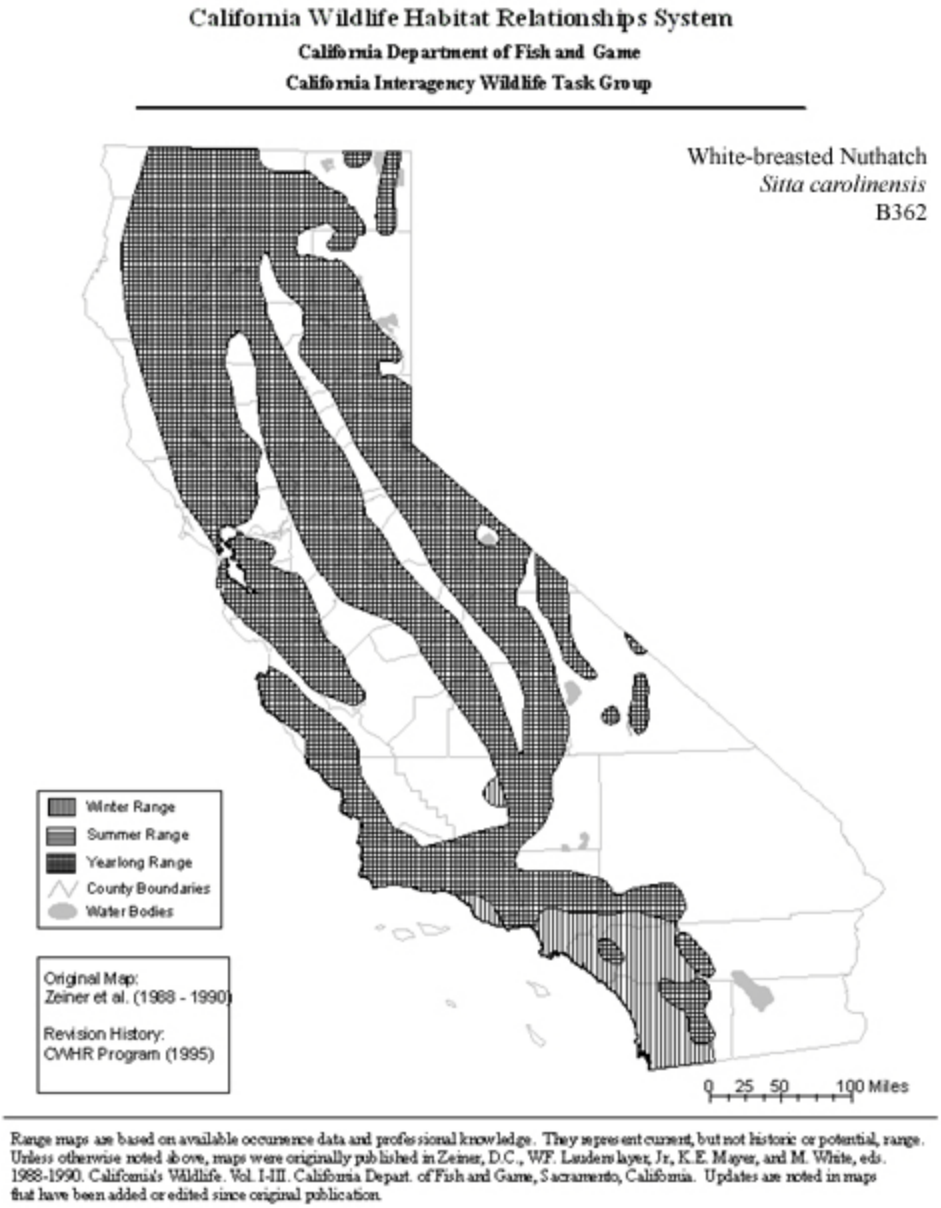

Figure 17. Distribution of white-breasted nuthatch in California (CDFG 2008).

Habitat – The white-breasted nuthatch primarily occupies mature oak woodlands, but it is also found in mixed conifer-hardwood habitats (Grubb and Pravosudov 2008). They excavate cavities in large trees or snags for roosting and nesting (CDFG 2008). In one area of their range, the mean diameter at breast height of nesting snags was 25 inches. The species requires large trees for nesting habitat, but will use young woodlands and forests for foraging habitat (Ibid.).

Population Status and Trend - The white-breasted nuthatch has been monitored in northern California at various BBS protocol sample locations (Sauer et al. 2008). The BBS data indicate a fairly stable to increasing population within the BBS strata that overlap the Shasta-Trinity National Forest (Table 17). Most of the BBS strata that occur on the Forest show a slight increase, and these increases are statistically supported in the Pitt-Klamath stratum and at the survey-wide scale. Only the Sierra Nevada stratum shows a potential decline in the population, but this decrease is not statistically supported (Sauer et al. 2008). The regional credibility measure is high in two strata the overlap the Forest (California foothills and the Pitt-Klamath), as well as at the state scale. The white-breasted nuthatch seems to be most common in the California foothills stratum, with an average of 7.27 individuals observed on each route.

Table 17. Breeding bird survey population trends for white-breasted nuthatch for strata that occur on the Forest, as well as California and survey-wide (species range)

White-breasted nuthatch	1966 – 2007					
BBS Strata	**RCM**	**Trend**	**P**	**N**	**(95% CI)**	**RA**
Sierra Nevada	2	-0.6	0.88	19	-8.1 – 6.9	1.95
California foothills	1	1.3	0.21	54	-0.7 – 3.4	7.27
S. Pacific rainforests	2	2.1	0.23	27	-1.2 – 5.4	0.69
Pitt-Klamath	1	5.5	0.00	27	2.5 – 8.5	1.54
California	1	1.4	0.17	124	-0.6 – 3.3	2.78
Survey-wide	2	2.0	0.00	1999	1.4 – 2.5	0.99

RCM: Regional Credibility Measure. "1" ("blue" in original data) is highest given by BBS, "2" and "3" have deficiencies – see http://www.mbr-pwrc.usgs.gov/bbs/cred.html.
Trend: Estimated trend, summarized as a percent change/year.
P : Statistical level of significance. Because trends are estimates, we conduct a statistical test to determine whether trend is significantly different from 0.
- A "0.01" indicates a 1 percent probability that a number would have occurred by chance alone.
- The lower the number, the less likely that a particular value would have occurred by chance alone.
- A very low number indicates that we cannot reject the null hypothesis that the trend is different from 0.

N: Number of survey routes in the analysis. Caution should be used in interpreting any result that was based on less than 14 routes.
95% CI: 95 % confidence interval for trend estimate. Estimated as a multiplicative (constant rate) change in counts over time, with covariables to adjust for differences in observer quality. Regional trends are estimated as a weighted average of the route trends.
RA: Relative abundance for the species; an approximate measure of how many birds are seen on a route in the region.

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APPENDIX A

CALIFORNIA WILDLIFE HABITAT RELATIONSHIPS (CWHR) SYSTEM

Reference: CDFG 2008. California Department of Fish and Game and California Interagency Wildlife Task Group. 2008. California Wildlife Habitat Relationships version 8.2 personal computer program. Sacramento, California.
http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.asp.

CWHR Overview. The California Wildlife Habitat Relationship (CWHR) is a wildlife information system and predictive model for California's regularly-occurring birds, mammals, reptiles and amphibians and is considered "a state-of-the-art information system for California's wildlife." It contains life history, geographic range, habitat relationships, and management information on 692 species of amphibians, reptiles, birds, and mammals known to occur in the state. It provides the most widely used habitat relationships models for California's terrestrial vertebrate species. CWHR is operated and maintained by the California Department of Fish and Game in cooperation with the California Interagency Wildlife Task Group (CIWTG). CWHR Version 8.2 is used in the management indicator assemblage representative species accounts.

CWHR contains the following components:

- a complete species list of California's 1000+ terrestrial vertebrates;
- life history information and geographic range data by season on 692 regularly-occurring species;
- a standardized habitat classification scheme for California, containing 59 habitats, structural stages for most habitats, and 124 special habitat elements (*A Guide to Wildlife Habitats of California (1988); Edited by Kenneth E. Mayer and William F. Laudenslayer, Jr., State of California, Resources Agency, Department of Fish and Game. Sacramento, CA. 166 pp.*)
- a community-level matrix model associating 692 wildlife species to these standard habitats and stages and rating suitability for reproduction, cover, and feeding;
- A software application containing all system components.

CWHR Utility. CWHR has been used for several large wildlife resource conservation efforts including California's GAP effort, the Legislatively-authorized Timberland Task Force effort, and the Sierra Nevada Framework and Forest Plan Amendment efforts. It is one of the primary biological data sets used in an assessment of California's biodiversity for the "Atlas of the Biodiversity of California." CWHR is used in sustained yield planning efforts by several large private timber companies and is part of regulations adopted by the California Board of Forestry.

CWHR Validation. The information in CWHR is based on current published and unpublished biological information and professional judgment by recognized experts on California's wildlife. Research to improve the CWHR System is ongoing and is focused in the areas of model and validation standards, field validation studies, and interpretation of model output. Some examples of these studies are presented below.

Model and Validation Standards

Barrett, R.H. and M. White (authors) and M. Parisi (editor). 1999. Guide for Designing Field Validation Studies of the California Wildlife Habitat Relationships System. Technical Report No. 30. California Wildlife Habitat Relationships System, California Department of Fish and Game. Sacramento, CA.

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Welsh, H.H., Jr., and A.J. Lind. 1991. The structure of the herpetofaunal assemblage in the Douglas-fir/hardwood forests of northwestern California and southwestern Oregon. Pages 394-413 *in* Ruggiero, L.F., K.B. Aubry, A.B. Carey, and M.H. Huff (technical coordinators). USDA Forest Service Pacific Northwest Forest and Range Experiment Station General Technical Report PNW-GTR-285. Portland, OR. 533 pp.

Interpretation of Model Output

Garrison, B.A. 1994. Determining the biological significance of changes in predicted habitat values from the California Wildlife Habitat Relationships System. California Fish and Game 80:150-160.

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Garrison, B.A. and T. Lupo. 2002. Accuracy of bird range maps based on wildlife habitat relationships models. Pages 367-375 *in* Scott, J.M., P.J. Heglund, M.L. Morrison, J.B. Haufler, M.G. Raphael, W.A. Wall, and F.B. Samson (editors). Predicting Species Occurrences: Issues of Accuracy and Scale. Island Press. Washington, D.C.

CWHR Vegetation Classification System. There are 59 wildlife habitats in the CWHR System to be used with the predictive models for terrestrial vertebrate wildlife species (27 tree, 12 shrub, 6 herbaceous, 4 aquatic, 8 agricultural, 1 developed, and 1 non-vegetated) (Table A-1). In addition, stages and special habitat elements are defined.

Stages are defined for virtually all habitats. A stage is a combination of size and cover class for tree-dominated habitats (Tables A-2 and A-3), age and cover class for shrub habitats, height and cover class for herb habitats, and depth and substrate for aquatic habitats. A field sampling protocol is well-established for determining stages in all vegetated habitats.

CWHR Predictive Models. The predictive model for each species has expert-applied suitability ratings for three life-requisites: breeding, cover, and feeding. For each species, each habitat stage is rated as high, medium, low, or unsuitable for each of these life requirements, as well as a composite rating:

> **High**: Habitat suitability rating where habitat is optimal for species occurrence; habitat can support relatively high population densities at high frequencies. Suitability index value = 1.00.

Medium: Habitat suitability rating where habitat is suitable for species occurrence; habitat can support relatively moderate population densities at moderate frequencies. Suitability index value = 0.66.

Low: Habitat suitability rating where habitat is marginal for species occurrence; habitat can support relatively low population densities at low frequencies. Suitability index value = 0.33

Unsuitable: Habitat stage is unsuitable for species occurrence, and the species where habitat is rated unsuitable is not expected to reliably occur in the habitat. Suitability index value = 0.00.

Table A-1. CWHR Habitat Types (Mayer and Laudenslayer 1988).

Tree-Dominated Habitats

Subalpine Conifer (SCN)
Red Fir (RFR)
Lodgepole Pine (LPN)
Sierran Mixed Conifer (SMC)
White Fir (WFR)
Klamath Mixed Conifer (KMC)
Douglas Fir (DFR)
Jeffrey Pine (JPN)
Ponderosa Pine (PPN)
Eastside Pine (EPN)
Redwood (RDW)
Pinyon-Juniper (PJN)
Juniper (JUN)
Aspen (ASP)
Closed-Cone Pine-Cypress (CPC)
Montane Hardwood-Conifer (MHC)
Montane Hardwood (MHW)
Blue Oak Woodland (BOW)
Valley Oak Woodland (VOW)
Coastal Oak Woodland (COW)
Blue Oak-Foothill Pine (BOP)
Eucalyptus (EUC)
Montane Riparian (MRI)
Valley Foothill Riparian (VRI)
Desert Riparian (DRI)
Palm Oasis (POS)
Joshua Tree (JST)

Shrub-dominated Habitats

Alpine Dwarf-Shrub (ADS)
Low Sage (LSG)
Bitterbrush (BBR)
Sagebrush (SGB)
Montane Chaparral (MCP)
Mixed Chaparral (MCH)
Chamise-Redshank Chaparral (CRC)
Coastal Scrub (CSC)
Desert Succulent Shrub (DSS)
Desert Wash (DSW)
Desert Scrub (DSC)
Alkali Desert Scrub (ASC)

Herbaceous Dominated Habitats

Annual Grassland (AGS)
Perennial Grassland (PGS)
Wet Meadow (WTM)
Fresh Emergent Wetland (FEW)
Saline Emergent Wetland (SEW)
Pasture (PAS)

Aquatic Habitats

Lacustrine (LAC)
Estuarine (EST)
Marine (MAR)

Developed Habitats

Cropland (CRP)
Dryland Grain Crops (DGR)
Irrigated Grain Crops (IGR)
Irrigated Hayfield (IRH)
Irrigated Row and Field Crops (IRF)
Rice (RIC)
Orchard - Vineyard (OVN)
Deciduous Orchard (DOR)
Evergreen Orchard (EOR)
Vineyard (VIN)
Urban (URB)

Non-vegetated Habitats

Barren (BAR)

Table A-2. Size Class Breakdown for Tree Habitat Types (excluding Desert Riparian, Joshua Tree, Palm Oasis, and Orchard types) (Mayer and Laudenslayer 1988).

CHWR Size Class	CWHR Code	Conifer Crown Diameter (ft.)	Hardwood Crown Diameter (ft.)	Quadratic Mean dbh (inches)
Seedling Tree	1	n/a	n/a	<1.0”
Sapling Tree	2	n/a	<15.0’	1.0”-5.9”
Pole Tree	3	<12.0’	15.0’-29.9’	6.0”-10.9”
Small Tree	4	12.0’-23.9’	30.0’-44.9’	11.0”-23.9”
Medium/large Tree	5	≥ 24.0’	≥ 45.0’	≥ 24.0”
Multi-layered Tree	6	A distinct layer of size class 5 trees over a distinct layer of size class 4 and/or 3 trees, and total tree canopy closure of the layers ≥60.0% (layers must have ≥10.0% canopy cover and distinct height separation)		

Table A-3. Canopy Closure Classes for Tree and Shrub Terrestrial Habitats (excluding desert-tree and desert-shrub habitat types) (Mayer and Laudenslayer 1988).

CWHR Canopy Closure Class	CWHR Code	Vegetation Canopy Closure
Sparse Cover	S	10.0% - 24.9%
Open Cover	P	25.0% - 39.9%
Moderate Cover	M	40.0% - 59.9%
Dense cover	D	≥ 60.0%

Appendix A References Cited

CDFG (California Department of Fish and Game). 2005. California Department of Fish and Game and California Interagency Wildlife Task Group. California Wildlife Habitat Relationships (CWHR) version 8.1. personal computer program. Sacramento, California. On-Line version. http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.asp. (Accessed: January 3, 2008).

Mayer, K.E., and W.F. Laudenslayer, eds. 1988. A Guide to Wildlife Habitats of California. California Department of Forestry and Fire Protection, Sacramento, CA. 166pp.

APPENDIX B

NORTH AMERICAN BREEDING BIRD SURVEYS

Reference: Sauer, J. R., J. E. Hines, and J. Fallon. 2007. The North American Breeding Bird Survey, Results and Analysis 1966 - 2006. Version 10.13.2007. USGS Patuxent Wildlife Research Center, Laurel, MD. http://www.pwrc.usgs.gov/bbs/

The North American Breeding Bird Survey (BBS) is a cooperative effort between the U.S. Geological Survey's Patuxent Wildlife Research Center and the Canadian Wildlife Service's National Wildlife Research Centre to monitor the status and trends of North American bird populations. Following a rigorous protocol, BBS data are collected by thousands of dedicated participants along thousands of randomly established roadside routes throughout the continent. Professional BBS coordinators and data managers work closely with researchers and statisticians to compile and deliver these population data and population trend analyses on more than 400 bird species, for use by conservation managers, scientists, and the general public. Data from Droege (1990) and Peterjohn & Sauer (1993) provide detailed descriptions of BBS methodology and rationale.

The BBS, which has been conducted annually since 1966, consists of a continent-wide array of roadside point-count routes. Each route is 39.4 km (24.5 miles) long, and includes 50 3-minute point counts at 0.8 km (.5 mile) intervals. Expert observers conduct point-counts once each year during the peak of the breeding season, recording numbers of every bird species detected within a 0.4 km (.25 mile) radius. BBS routes occur on each of the National Forests including the Shasta-Trinity National Forest.

BBS data provide the most extensive, long-term data set available on landbird population trends (Siegel and DeSante 1999), and have been used in a wide variety of management and scientific applications (Table B-1). More than 270 scientific publications have relied heavily, if not entirely, on BBS data. However, BBS data have some important limitations. Reliable information is produced only for the more common species. Additionally, BBS data are problematic because point counts are conducted exclusively at roadsides, which often include a large proportion of fragmented and edge habitats, and may not be representative of the larger habitat matrix. Nevertheless, BBS data are a tremendously valuable resource for conservation planning (Siegel and DeSante 1999).

Table B-1. Applications in which BBS data have been used.

Organization / Agency	Application
U.S. Fish and Wildlife Service and Partners in Flight	Use BBS trends along with other indicators to assess national and regional bird conservation priorities.
Land Management Agencies	BBS data were instrumental in focusing research and management action on neotropical migrant species in the late 1980s, and on grassland species in the mid-1990s.
State Natural Heritage programs and Breeding Bird Atlas projects	BBS data is used to enrich local databases.
Educators	BBS data is often used as a tool to teach biological, statistical, and GIS concepts.

USDI Geologic Survey (USGS) has utilized BBS data to generate indices of population trend, estimates of relative abundance, and contour maps of bird abundance. Although trend is calculated for all scales with data, caution should be used in interpreting any result that was based on fewer than 50 routes. At the regional scale, BBS personnel suggest that a species must be detected on at least 14 different routes to provide enough data to reliably assess the regional population trend of that species (Siegel and DeSante 1999). The BBS data are edited to remove data that are of questionable quality or represent birds that are thought to be migrating rather than breeding (see the metadata for the BBS dataset for more information on editing and quality control of the BBS data).

Indices of Population Trend. *Breeding bird surveys, which have been conducted since 1966, provide an index of population trends for many species. Trend analysis is conducted on these data at a variety of scales, including Survey-Wide, California-wide, and at the BBS strata level. BBS data are collect from routes within and near each National Forest (Table B-4).*

Based on the BBS data collected over time, trend and relative abundance is calculated for each species. Most calculations are done at each special scale (survey-wide within the species range, Statewide (e.g., California), and at the BBS strata level. The trend data is calculated for three time periods: 1966-2005, 1966-1979, and 1980-2005.

Trends are calculated as estimates, and a statistical test is conducted to determine whether the trend is significantly different from 0. The lower the "P value," the less likely that a particular estimated trend would have occurred by chance alone (e.g., a "0.01" indicates a 1% probability that a trend estimate would have occurred by chance). A very low number indicates that the null hypothesis cannot be rejected that the trend is different from 0.

In addition, each estimated trend is calculated with a 95% Confidence Interval (CI) for the trend estimate. The CI is estimated as a multiplicative (constant rate) change in counts over time, with co-variables to adjust for differences in observer quality.

The BBS data set for each species is ranked as to its "regional credibility" (Table B-2).

Table B-2. BBS data Regional Credibility ranking system (BBS 2005).

Red (3 in tables above)	This category reflects data with an important deficiency. In particular:	1. The regional abundance is less than 0.1 birds/route (very low abundance),
		2. The sample is based on less than 5 routes for the long term, or is based on less than 3 routes for either subinterval (very small samples), or
		3. The results are so imprecise that a 5%/year change would not be detected over the long-term (very imprecise).
Yellow (2 in tables above)	This category reflects data with a deficiency. In particular:	1. The regional abundance is less than 1.0 birds/route (low abundance),
		2. The sample is based on less than 14 routes for the long term (small sample size),
		3. The results are so imprecise that a 3%/year change would not be detected over the long-term (quite imprecise), or
		4. The sub-interval trends are significantly different from each other (P less than 0.05, based on a z-test). This suggests inconsistency in trend over time).
Blue (1 in tables above)	This category reflects data with at least 14 samples in the long term, of moderate precision, and of moderate abundance on routes	

Bird Relative Abundance. Relative abundance for the species, in birds/route is also calculated for each species at each spatial scale, for 3 timeframes. This number is an approximate measure of how many birds are seen on a route in the region.

Contour Maps of Bird Abundance. USGS has also used the BBS bird survey data to develop contour maps of bird abundance based on mean counts on survey routes. These maps are simple summaries of the raw BBS data, with only a minimal interpolation of information from nearby survey routes. Birds encountered on routes are not necessarily breeding in the area in which they are observed, and many factors can influence the distribution of birds in early summer. Users of these maps should be aware of the limitations of simple counts of birds. These maps are based on exactly the same data that are used in the BBS trend analyses, and route summaries are simple averages of counts on routes over time. However, these are simple averages that do not account for observer differences in counting ability or for other factors that could be controlled in more sophisticated analyses.

Siegel and DeSante (1999) used a population trend classification system (Table B-3) that helps to clarify significance of trend data.

Table B-3. Breeding Bird Survey (BBS) population trend classification system (from Siegel and DeSante 1999).

Classification	No. of Routes (n)	Trend (Tr)	Significance of Trend (P)
Definitely increasing	$n \geq 14$	$Tr \geq 1\%$	$P \leq 0.05$
	$9 \leq n \leq 13$	$Tr \geq 1\%$	$P \leq 0.01$
Likely increasing	$n \geq 14$	$Tr \geq 1\%$	$0.05 < P \leq 0.1$
	$9 \leq n \leq 13$	$Tr \geq 1\%$	$0.01 < P \leq 0.05$
	$5 \leq n \leq 8$	$Tr \geq 1\%$	$P \leq 0.01$
Possibly increasing	$n \geq 14$	$Tr \geq 1\%$	$P > 0.1$
	$9 \leq n \leq 13$	$Tr \geq 1\%$	$0.05 < P \leq 0.1$
	$5 \leq n \leq 8$	$Tr \geq 1\%$	$0.01 < P \leq 0.05$
	$1 \leq n \leq 4$	$Tr \geq 1\%$	$P \leq 0.01$
Increasing tendency	$9 \leq n \leq 13$	$Tr \geq 1\%$	$P > 0.1$
	$5 \leq n \leq 8$	$Tr \geq 1\%$	$0.05 < P \leq 0.1$
	$5 \leq n \leq 8$	$Tr \geq 5\%$	$P > 0.1$
	$1 \leq n \leq 4$	$Tr \geq 1\%$	$0.01 < P \leq 0.05$
Definitely decreasing	$n \geq 14$	$Tr \leq -1\%$	$P \leq 0.05$
	$9 \leq n \leq 13$	$Tr \leq -1\%$	$P \leq 0.01$
Likely decreasing	$n \geq 14$	$Tr \leq -1\%$	$0.05 < P \leq 0.1$
	$9 \leq n \leq 13$	$Tr \leq -1\%$	$0.01 < P \leq 0.05$
	$5 \leq n \leq 8$	$Tr \leq -1\%$	$P \leq 0.01$
Possibly decreasing	$n \geq 14$	$Tr \leq -1\%$	$P > 0.1$
	$9 \leq n \leq 13$	$Tr \leq -1\%$	$0.05 < P \leq 0.1$
	$5 \leq n \leq 8$	$Tr \leq -1\%$	$0.01 < P \leq 0.05$
	$1 \leq n \leq 4$	$Tr \leq -1\%$	$P \leq 0.01$

Classification	No. of Routes (n)	Trend (Tr)	Significance of Trend (P)
Decreasing tendency	$9 \leq n \leq 13$	$Tr \leq -1\%$	$P > 0.1$
	$5 \leq n \leq 8$	$Tr \leq -1\%$	$0.05 < P \leq 0.1$
	$5 \leq n \leq 8$	$Tr \leq -5\%$	$P > 0.1$
	$1 \leq n \leq 4$	$Tr \leq -1\%$	$0.01 < P \leq 0.05$
Definitely stable	$n \geq 14$	$-0.5\% < Tr < 0.5\%$	--
Likely stable	$n \geq 14$	$-1.0\% < Tr \leq 0.5\%$	--
	$n \geq 14$	$0.5\% \leq Tr < 1.0\%$	--
Possibly stable	$9 \leq n \leq 13$	$-1.0\% < Tr < 1.0\%$	--
Stable tendency	$5 \leq n \leq 8$	$-1.0\% < Tr < 1.0\%$	--

Table B-4. Breeding Bird Survey Routes within and near (10 Mile Radius) of the Shasta-Trinity National Forest

RTENO	SEQNO	SRTENAME
14199	2184	BARTLE
14409	2240	BURNT RANCH
14409	2241	BURNT RANCH
14002	185	CARRVILLE
14429	213	CECILVILLE
14404	2229	DIRIGIO
14404	2230	DIRIGIO
14412	2238	FALL RIVER MILLS
14410	2234	FRENCH GULCH
14410	2235	FRENCH GULCH
14905	173	FRIDAY RIDGE
14435	2236	FRIDAY RIDGE
14435	2237	FRIDAY RIDGE
14901	2213	GAZELLE
14201	2187	HAT CREEK
14431	2239	HAY FORK
14431	2243	HAY FORK
14164	2139	JUNCTION CTY
14164	2140	JUNCTION CTY
14169	2145	MCCLOUD
14169	2146	MCCLOUD
14430	2218	MEDICINE MTN.
14430	2219	MEDICINE MTN.
14430	2220	MEDICINE MTN.
14175	2155	MT SHASTA
14003	1967	NUBIEBER
14097	2065	ONO
14167	2143	ORLEANS
14903	2242	PILOT CREEK
14163	2138	REDDING
14077	2043	SHASTA LAKE
14077	2044	SHASTA LAKE
14953	2245	SOUTH FORK MTN
14406	2221	TIONESTA
14411	2247	TOMHEAD
14411	2248	TOMHEAD
14403	2232	WHISKEYTOWN
14403	2233	WHISKEYTOWN
14179	2160	YOLLA BOLLY

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