APPENDIX A

Fire History Methodology

Fire history studies indicate that fire regimes in parts of the Klamath Mountains over the last few centuries fall into one of two periods characterized by distinctly different fire regimes: (1) the Native American period, which usually includes both the pre-historic and early European settlement period (for this assessment defined as prior to 1910), and (2) the fire suppression period (1910 to 2010) (Skinner et al. 2006). Fire history studies specific to the watershed are limited and generally focus on Douglas-fir dominated forests rather than the other types of vegetative communities prominent in the watershed (e.g., ponderosa pine-dominated forests, hardwoods, and chaparral). Therefore, discussion of the occurrence of fire in the watershed prior to the keeping of fire records (which began about 1922), in part, draws on the regional fire history of the Klamath Mountain and Southern Cascades regions to interpolate the conditions under which pre-suppression period fires burned and their effects on vegetation composition and structure. The following discussion describes the methodology used to ascertain the regions' fire regime (i.e., return intervals, severity, fire rotation[1]).

Relatively few fire history studies have been completed for the Klamath Mountains, and more specifically, the Upper Sacramento River Watershed. Not surprisingly, fire histories of the forest types that occur in the region have not been equally studied (Frost and Sweeney 2000). Commercially valuable mid-montane Douglas-fir and mixed conifer forests are more commonly the focus of most studies, than are the foothill/lower montane, upper montane/subalpine zones and forests associated with riparian areas. In addition, fire regime characteristics such as fire size and severity often are not characterized in studies of pre-settlement fires. Therefore, for the purpose of this assessment, the fire regime within the watershed has been largely extrapolated from fire history studies conducted in similar vegetation types and climates in neighboring forested regions (e.g., the Sierra Nevada, Cascades). The few published fire regime studies available specific to the Klamath Mountains and the vegetation types found in the watershed were reviewed and relevant information has been incorporated into this assessment.

Dendrochronology, or tree-ring analysis, is the primary method by which a fire history timeline has been established for the Klamath Mountains Region. However, the extent of the historic fire regime is limited by the longevity of the species being examined. Jeffrey pine and ponderosa pine, two of the most common tree species inhabiting the watershed have a life expectancy of about 400 to 600 years, while Douglas-fir, the other dominant species of the areas mid-montane forests, can live upwards of 750 years. Accordingly, fire frequency studies based on fire scar analyses are limited to the range of time involved.

Fire histories based on tree-ring analysis are generally derived using one of the three following methods: 1) single tree samples, 2) composites of multiple trees within a specific area, and 3) composites of multiple sites throughout a landscape (Skinner 1996). Multiple tree comparisons are used to not only build a historic fire frequency timeline, but depending on the scale at which the study was conducted, such comparisons can also indicate the spatial extent and landscape pattern of past fires. Cross-dated fire scars yield reconstructions that can be geographically resolved (i.e., the extent of the fire can be determined) and temporally precise (i.e., surface burns) (Whitlock et al. 2004). Stand ages provide reconstructions that are spatially specific yet less temporally precise (i.e., decadal resolution) than dated fire scars (Whitlock et al. 2004). An examination of tree-rings also can give a sense of stand

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[1] *The length of time necessary to burn an area the size of a specific area (for example a watershed).*

establishment dates, the seasonality of burns, and general climate patterns (i.e., drought versus wet years). Fire scars appear as characteristic disruption and healing patterns of radial tree-ring growth, which can be correlated to a particular year or even to a particular season. Studies cited in this assessment that used tree-ring analysis to develop a chronology of fire frequency in the watershed used full and partial cross sections taken from stumps, downed logs, and snags having externally visible fire scars from multiple, mixed-species forested sites of <1–5 hectares (Taylor and Skinner 1998, Skinner 2001, Whitlock et al. 2004, Fry and Stephens 2006).

The primary limiting factor in the use of tree-ring analysis is often referred to as the “erasure effect” (Agee 1993, Whitlock et al. 2003). As old trees become progressively scarcer on the landscape, the fire-history data they contain is essentially “erased” (Whitlock et al. 2003). This attenuation reduces the likelihood of identifying old fire events, and consequently, most tree-ring studies show that fire events become less frequent as one goes back in time (Whitlock et al. 2003). Although tree-ring methods extend back to the age of the oldest living tree, this time span is not long enough to capture major changes in vegetation and climate, and the record is biased toward low-severity fire events that scar trees but do not kill them (Whitlock et al. 2003).

Paleoecological fire frequency studies, which can look back 1,000 years or more, utilized sediment cores taken from regional lake bottoms including Mumbo Lake (41º11′27″N, 122º30′36″W) and Cedar Lake (41º11′27″N, 122º27′49″W) (both of which are in the watershed) (Whitlock et al. 2004). Such studies make use of the fact that lakes are repositories for paleoenvironmental information. Charcoal is deposited into the lake via airborne fallout, streamflow, and surficial processes. Radiocarbon and lead-210 (^{210}Pb) dating provides a chronology for organic materials that are about 500 to 40,000 years old. Analytical error increases exponentially with age thus, fire chronologies based on charcoal records have decadal accuracy at best (Whitlock et al. 2004). However, trends shown by accumulations of charcoal in lake sediments can provide insight into the occurrence of high-severity burns, which when coupled with an analysis of pollen within the same sediment layer can be indicative of long-term changes in vegetation communities and climate (Skinner 1996; Whitlock et al. 2004). The study cited in this assessment that used lake sediment core charcoal analysis to ascertain variations in fuel loading and the occurrence of larger-scale fire events in the watershed, compared dendrochronological data to charcoal peaks to better ascertain the frequency and severity of fires on a broad spatial scale (Whitlock et al. 2004).

The influence of humans on the frequency and severity of fires in the watershed was determined through a review of scientific studies and historical accounts. Spatial and temporal determinations of historic fire in the watershed were made using Geographic Information System (GIS) layers provided by the U.S. Forest Service (USDA Forest Service 2008).

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Appendix B

Physical Processes Analysis Data Sources and Methods

Climate Analysis Data Sources and Methods

Data Sources

All climatic data were retrieved from of two sources:

- Western Regional Climate Center (WRCC): *http://www.wrcc.dri.edu/coopmap/*
- California Department of Water Resources California Data Exchange Center (CDEC): http://cdec.water.ca.gov/selectQuery.html

Climate data were compiled for multiple stations, as described below, for use in the figures and tables used as part of the assessment. The specific URL locations for all data utilized for this assessment are identified rather than showing the raw data.

Methods

Parametric statistics were used to summarize the available climatic data. Specific methods used are summarized by the type of data below.

Figure and Table Data Sources

Figure 3.2-2: Average Monthly and Annual Precipitation for City of Mt. Shasta, Dunsmuir, and Lakehead/Lakeshore

Data Sources

All historic data for this figure were retrieved from WRCC.

Lakeshore/Lakehead

- Lakeshore 2 monthly rainfall and snow fall data. POR: 7/1/1946 to7/31/1972
  http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca4709
- Lakehead monthly rainfall and snowfall data. POR: 6/1/1998-8/31/2007
  http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca4683

Dunsmuir

- Dunsmuir RS monthly rainfall and snow fall data. POR: 3/1/1906 to6/30/1978
  http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca2572
- Dunsmuir Treatment Plant monthly rainfall and snowfall data. POR: 7/1/1978-12/31/2009
  http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca4683

Mount Shasta

- Mount Shasta monthly rainfall and snow fall data. POR: 7/1/1948 to 12/31/2009 *http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca2572*

Methods

All monthly rainfall and snowfall summaries were generated by WRCC's web platform. Average monthly precipitation was determined by adding the monthly rainfall average and the average monthly snowfall average for each month of the year. Snowfall accumulation was converted to inches of precipitation by assuming that 8 inches of snowfall equals one inch of rainfall. If data from more than one weather station was used to calculate the average monthly precipitation for an area of the Subbasin, the individual monthly values from each station were multiplied by a weighted coefficient and then summed. The weighted coefficient was determined by calculating the portion of the total combined period of record that each station recorded. For example, if station #1 has 6 years of record and Station #2 has 4 years of record, Station #1 would have a weighted coefficient of 0.6 and Station #2 would have a weighted coefficient of 0.4. Then, the individual monthly values were multiplied by the corresponding coefficient and the monthly values for each weather station were summed together to determine average monthly values.

Table 3.2-1: Current and Historic Weather Monitoring Stations in the Upper Sacramento Watershed

Data Sources

- Western Regional Climate Center. *http://www.wrcc.dri.edu/coopmap/*
- California Department of Water Resources California Data Exchange Center *http://cdec.water.ca.gov/cgi-progs/mapper*

Methods

Web-based interactive station location maps were used to locate all weather stations geographically within the Subbasin boundaries. Station metadata such as period of record, location coordinates, and variables collected were identified in the site metadata link.

Figure 3.2-3: Annual Trend in Rainfall

Data Sources

All historic data for this figure were retrieved from WRCC.

Vollmers

- Vollmers monthly rainfall data. POR: 12/1/1937 to10/31/1975 *http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca9386*

Dunsmuir

- Dunsmuir RS monthly rainfall data. POR: 3/1/1906 to6/30/1978 *http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca2572*

- Dunsmuir Treatment Plant monthly rainfall data. POR: 7/1/1978-12/31/2009 *http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca4683*

Mount Shasta

- Mount Shasta monthly rainfall data. POR: 7/1/1948 to 12/31/2009 *http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca2572*

Methods

All annual rainfall summaries (by month and year) were generated by WRCC's web platform and do not account for precipitation in the form of snow. Annual rainfall totals were plotted on the x-axis as a bar chart. The mean annual rainfall was determined for area by determining a simple average using all the annual rainfall totals for the period of record.

All data were summarized using parametric statistics, and all of the calculations were performed using mathematical functions in Excel. The cumulative departure from the mean statistical analysis technique was used to show basic time series trends. For example, for the rainfall data the curves are used to show dry periods (falling curve) versus wet periods (rising curve). The cumulative departure from the mean is calculated by subtracting the average annual value of a given population from the average annual value of each time step. The difference from the mean is calculated for each time step where an average water year would have a value of zero, a wetter than average water year would have a positive value, and a dry year would be negative. The difference from the mean is then summed from year to year for the period of record. So even though consecutive years may be above or below average, longer-term wetting and drying trends are realized.

Figure 3.24: 24-Hour Rainfall Frequency Curves

Data Sources

All historic data for this figure were retrieved from CDEC.

Gibson

- Gibson Maintenance Station daily incremental rainfall data. POR: 1/1/1989 to 4/7/2002

- *http://cdec.water.ca.gov/cgi-progs/selectQuery?station_id=GBS&sensor_num=&dur_code=D&start_date=&end_date=now*

- Gibson daily accumulated rainfall data. POR: 12/2/2005 to 1/1/2010. *http://cdec.water.ca.gov/cgi-progs/selectQuery?station_id=GIB&sensor_num=&dur_code=D&start_date=&end_date=now*

Dunsmuir

- Dunsmuir Treatment Plant daily accumulated rainfall data. POR: 1/1/1989-1/1/2010
  http://cdec.water.ca.gov/cgi-progs/selectQuery?station_id=DNM&sensor_num=&dur_code=D&start_date=&end_date=now

Mount Shasta City

- Mount Shasta daily accumulated rainfall data. POR: 1/1/1989 to 1/1/2010
  http://cdec.water.ca.gov/cgi-progs/staMeta?station_id=MSC

Methods

The reoccurrence intervals of the maximum daily precipitation from three monitoring sites within the Subbasin were calculated using the Log Pearson Type III equation and graphical techniques. For each monitoring site, the 24 hour rainfall total were ranked from high to low, and the 69 highest daily rainfall amounts were used to generate the curve.

Figure 3.2-5: Annual Seasonal Snow Depth Trends

Data Sources

All historic data for this figure were retrieved from CDEC.

Slate Creek Snow Course

- Monthly, January – May, snow depth data. POR: 1945-2009
  http://cdec.water.ca.gov/cgi-progs/staMeta?station_id=SLT

Sand Flat Snow Course

- Dunsmuir RS monthly rainfall data. POR: 3/1/1906 to6/30/1978
  http://cdec.water.ca.gov/cgi-progs/staMeta?station_id=SFT

Mount Shasta

- Monthly, January – May, snow depth data. POR: 1945-2009
  http://cdec.water.ca.gov/cgi-progs/staMeta?station_id=MSH

Methods

All monthly snow depth summaries (by month an year) were generated by CDEC's web platform. Monthly snow depth measurements, taken between January and May, were used to calculate the mean annual snow depth for a specific year and were plotted on the x-axis as a bar chart.

Figure 3.2-6: Average Monthly Air Temperature Range for City of Mt. Shasta, Dunsmuir, and Lakehead/Lakeshore

Data Sources

All historic data for this figure were retrieved from WRCC.

Lakeshore/Lakehead

- Lakeshore 2 monthly air temperature data. POR: 7/1/1946 to7/31/1972
  http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca4709

  Lakehead monthly air temperature data. POR: 6/1/1998-8/31/2007
  http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca4683

Dunsmuir

- Dunsmuir RS monthly air temperature data. POR: 3/1/1906 to6/30/1978
  http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca2572

- Dunsmuir Treatment Plant monthly air temperature data. POR: 7/1/1978-12/31/2009
  http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca4683

Mount Shasta

- Mount Shasta monthly rainfall and snow fall data. POR: 7/1/1948 to 12/31/2009
  http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca2572

Figure 3.2-7: Annual Air Temperature Trends

Data Sources

All historic data for this figure were retrieved from WRCC.

Gibson

- Gibson monthly air temperature data. POR: 1948 - 1972
  http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca9386

Dunsmuir

  Dunsmuir Treatment Plant monthly average air temperature data. POR: 1979 – 2009
  http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca4683

Mount Shasta

- Mount Shasta monthly average air temperature data. POR 1948-2009
  http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5983

Methods

All annual air temperature summaries (by month and year) were generated by WRCC's web platform. Monthly air temperature averages were used to calculate the mean air temperature of a specific year. Annual air temperature was plotted on the x-axis as a bar chart.

USWA Hydrology Analysis Data Sources and Methods

Streamflow Data Sources

There is only one streamflow gauge within the Subbasin: Sacramento River at Delta (Delta gauge). Daily average and peak streamflow values were downloaded from the US Geological Survey (USGS) web site: *http://waterdata.usgs.gov/nwis/nwisman/?site_no=11342000*

Streamflow Summary and Analysis Methods

Standard hydrological analysis techniques were used to summarize and analyze the available streamflow data as part of this assessment and follow methods described by McCuen (1998). Parametric statistics were used to summarize the available hydrologic data. Specific methods used are summarized by the type of data below.

Annual Water Statistics

The Indicators of Hydrologic Alteration (IHA) program was used to summarize the streamflow record taken at the Delta gauge. This assessment used parametric (i.e., mean and standard deviation) and non-parametric (percentiles) statistics to analyze trends and differences in daily and peak high and low flows (The Nature Conservancy 2005). The program is capable of analyzing and comparing different time periods within the time series data. This program was used to analyze the potential changes in low flow regimes from Box Canyon Dam and small and large flood frequency and magnitude for the period of record (i.e., since 1945).

Flood Frequency

The annual flood frequency method was used to calculate the probability of peak high streamflow for a given return period (i.e., reoccurrence interval). This analysis used the methods described by the US Water Resources Council (United States Water Resources Council 1981), and the Log Peason Type III equation was used. This equation uses the annual maximum peak daily discharge to calculate likelihood that a peak flow event (equaling or exceeding a certain magnitude) will occur in a given year. This equation and the graphical method (United States Water Resources Council 1981) were used to estimate the recurrence interval (the average period in years between peaks of a given size or larger), or exceedance probability (the percent chance a peak will be equaled or exceeded in any year) of a given flood event.

Equivalent Roaded Area Data Sources and Methods

Equivalent Roaded Area Data Sources

Publically available GIS data were used to create a land use footprint and Equivalent Roaded Area (ERA) layer. The ERA by land use type was included in this layer to include roads; urban areas, and railroads. Timber harvest was not included due to a lack of accurate, publically available data on private lands.

Equivalent Roaded Area Methods

The ERA of each land use feature included in the analysis was calculated using ERA coefficients (Haskins 1986). The ERA from timber harvest is typically increases the ERA substantially in watersheds with a moderate to high rate of timber harvest (McGurk and Fong 1995). The USFS has established Thresholds of Concern that are used an indicator of watershed condition. For catchment size watersheds, the USFS developed empirical relationships between the percent ERA and stream channel stability (Haskins 1983, McGurk and Fong 1995)

For roads, layers from the USFS, Siskiyou County, and Shasta County were merged to create one road layer showing private roads, public roads, railroads, and trails as mapped. The roads layers were merged as line features in GIS, which is assumed to be the most accurate road layer as of this assessment. This road layer is not exact where some roads are mapped and not present and vice versa. The error associated with the road layer is likely +/- 20 percent. Once the line layers were merged, the lines were turned into polygons by buffering the lines using an approximate road width. The assigned road width varies by road type as follows: railroad = 25 feet; highways = 20 feet; urban = 15 feet; forest (gravel) = 16 feet; forest = 8 feet; and trails = 1 feet.

For urban and other bare areas, the USGS impervious area layer (Yang et al. 2002) was assumed to represent the non road urban footprint and other infrastructure around I5 and the railroad. For the ERA calculation, these areas are assumed to be paved or covered in concrete and totally impervious (i.e., all the rainfall leaves the surface as runoff).

Road Erosion Risk Data Sources and Methods

Potential Road Erosion Data Sources

Publically available GIS data were used to create a road layer for the Subbasin. The bedrock geology, geomorphology, and soils layers available from the USFS were used to assign an erosion potential to each discrete road segment.

Rainfall-Runoff and Erosion Potential Methods

The rainfall-runoff and erosion potential was developed using output from the ERA and road erosion modeling efforts. Each Subwatershed within the Subbasin was assigned a relative rating the measures the potential of a given area within the Subbasin to have above background rainfall-runoff and erosion potential. Above background for this assessment means that the modeled rainfall runoff is created by anthropogenic activities and is above what naturally runs of and erodes within a given landform type. The Subwatersheds were stratified based on landform type based on average watershed elevation, drainage density, and average stream gradient. The average watershed elevation is assumed to represent the difference between snowmelt versus rainfall-runoff driven flooding. For Subwatersheds with an average elevation greater than 4,000 feet, the runoff process is assumed to be a result of snowmelt. At lower elevations, below 4,000 feet, it is assumed to be rainfall runoff driven. Subwatersheds with a drainage density greater than 4 miles of stream per square mile of drainage area and an average stream gradient greater than 20 percent are assumed to have high drainage efficiency. The ERA and road erosion risk were then combined to assign a relative ranking intended to represent rainfall-runoff and erosion potential. Each Subwatershed was assigned a ranking from the following list:

- VL = very low potential for accelerated rainfall-runoff and erosion. Very little, if any, anthropogenic activities within the Subwatershed effecting runoff and erosion.

- L = low potential for accelerated rainfall-runoff and erosion. Very little anthropogenic activities within the Subwatershed effecting runoff and erosion.

- M = medium potential for accelerated rainfall-runoff and erosion. Moderate level of anthropogenic activities within the Subwatershed effecting runoff and erosion.

- MH = medium to high potential for accelerated rainfall-runoff and erosion. Moderate to high level of anthropogenic activities within the Subwatershed effecting runoff and erosion.

- H = high potential for accelerated rainfall-runoff and erosion. High level of anthropogenic activities within the Subwatershed effecting runoff and erosion.

- VH = very high potential for accelerated rainfall-runoff and erosion. Very high level of anthropogenic activities within the Subwatershed effecting runoff and erosion.

In the lower portion of the Subbasin around Shasta Lake, Subwatersheds with historic mining areas were ranked as high as a result of mining impacts even though they have relatively low ERA and road erosion potential.

Turbidity Data Sources

Biological Importance of Turbidity

This analysis focused on the turbidity water quality objective and salmonid beneficial uses. Turbidity is a measure of light penetration and is typically expressed in units of (Nephelometric [NTU] or Jackson [JTU] which are roughly equivalent (U.S. Environmental Protection Agency 1983). For this assessment, turbidity is also used as a surrogate for fine sediment. The effects of elevated turbidity on fish are well documented (Smith and Sykora 1976, Sigler et al. 1984, Berg 1982, Berg and Northcote 1985, and Bachman 1984). According to Central Valley Regional Water Quality Control Board (2009), the water quality objectives for turbidity in the Subbasin are as follows:

- Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.
- Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits:
  - Where natural turbidity is less than 1 Nephelometric Turbidity Unit (NTU), controllable factors shall not cause downstream turbidity to exceed 2 NTU.
  - Where natural turbidity range is 1–5 NTU's, increases shall not exceed 1 NTU.
  - Where natural turbidity range is 5–50 NTU's, increases shall not exceed 20 percent.
  - Where natural turbidity range is 50–100 NTU's, increases shall not exceed 10 NTU's.
  - Where natural turbidity range is greater than 100 NTU's, increases shall not exceed 10 percent.

Available Turbidity Data

This assessment gathered and summarized all readily available turbidity data taken within the Subbasin. Turbidity data were available for two monitoring sites within the Subbasin. Publically available data are available for the Sacramento River at Delta (DLT) gauge on CDEC. SPI provided about eight years of turbidity data taken on Hazel Creek, a main tributary of the Subbasin in the middle Watershed. The turbidity and sediment data collected as part of the Cantara Spill monitoring could not be located as part of this assessment.

The longest record of usable turbidity data is a series of manual turbidity probe measurements taken at DLT about once a month from 1998 to 2010. There are also 20 years of continuous turbidity data available for DLT: however, the continuous data are not presently usable due to technical problems encountered with the probe (Greg Gotham, personal communication 2010). Most of the manual turbidity measurements were taken at base or average flow conditions. There were two measurements taken at flows greater than 4,000 cfs. For this assessment, these data were used to characterize low flow turbidity levels and were not used to characterize turbidity levels at higher flow regimes.

The manual measurements taken at the DLT gauge during average flow regimes (i.e., generally less than 4,000 cfs) for the last 13 years indicate that the average measured turbidity is 1.3 NTU with a minimum of 0 NTU and a maximum of 18 NTU. The corresponding average stream flow was 823 cfs, with a minimum of 192 cfs, and a maximum of 3,990 cfs. These data show that during average flow regimes the turbidity levels are low and likely meeting water quality objectives.

Within the Hazel Creek Subwatershed, SPI has continuously measured turbidity at one site every 15 minutes since 2003. Hazel Creek, a main tributary of the Subbasin, drains about 14,011 acres, or 4 percent of the Subbasin. The predicted average annual flow is 80 cfs or about 8.5 percent of the average annual flow. From 2003 to 2010 the average measured maximum daily turbidity is 4 NTU, with a minimum of 0, and a maximum of 247 NTU. These data show that during average flow regimes the turbidity levels are low and likely meeting water quality objectives.

The instantaneous manual turbidity measurements from DLT were paired with the daily maximum measurements from Hazel Creek from 2003 to 2010. The average turbidity for this time period is 2.1 NTU at DLT and 1.5 NTU at Hazel Creek. Hazel Creek has a maximum of 44 NTU, and DLT has a maximum of 35 NTU. No correlation was found between the DLT and Hazel Creek sites (correlation coefficient of 0.54), and the turbidity measurements between the sites are not statistically related.

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Personal Communications

Greg Gotham, BOR Hydrographer. 2010 – conversation with J. Fitzgerald, North State Resources re quality of turbidity data.

Steve Bachmann, USFS Hydrologist. 2010 – conversation with J. Fitzgerald, North State Resources re observed rainfall-runoff and erosion patterns during storms.

APPENDIX C

Wildlife Species Potentially Occurring in the Watershed

Wildlife Species Potentially Occurring in the Watershed

Common Name	Scientific Name
acorn woodpecker	*Melanerpes formicivorus*
Allen's chipmunk	*Neotamias senex*
American badger	*Taxidea taxus*
American beaver	*Castor canadensis*
American coot	*Fulica americana*
American crow	*Corvus brachyrhynchos*
American dipper	*Cinclus mexicanus*
American goldfinch	*Carduelis tristis*
American kestrel	*Falco sparverius*
American marten	*Martes americana*
American mink	*Mustela vison*
American peregrine falcon	*Falco peregrinus anatum*
American pika	*Ochotona princeps*
American pipit	*Anthus rubrescens*
American robin	*Turdus migratorius*
Anna's hummingbird	*Calypte anna*
aquatic garter snake	*Thamnophis atratus*
ash-throated flycatcher	*Myiarchus cinerascens*
bald eagle	*Haliaeetus leucocephalus*
band-tailed pigeon	*Patagioenas fasciata*
barn owl	*Tyto alba*
barn swallow	*Hirundo rustica*
barred owl	*Strix baria*
belted kingfisher	*Megaceryle alcyon*
Bewick's wren	*Thryomanes bewickii*
big brown bat	*Eptesicus fuscus*
black bear	*Ursus americanus*
black phoebe	*Sayornis nigricans*
black salamander	*Aneides flavipunctatus*
black swift	*Cypseloides niger*
black-backed woodpecker	*Picoides arcticus*
black-headed grosbeak	*Pheucticus melanocephalus*
black-tailed deer	*Odocoileus hemionus*
black-tailed jackrabbit	*Lepus californicus*
black-throated gray warbler	*Dendroica nigrescens*
blue-gray gnatcatcher	*Polioptila caerulea*
bobcat	*Lynx rufus*
Botta's pocket gopher	*Thomomys bottae*
Brazilian free-tailed bat	*Tadarida brasiliensis*

Wildlife Species Potentially Occurring in the Watershed

Common Name	Scientific Name
Brewer's blackbird	*Euphagus cyanocephalus*
broad-footed mole	*Scapanus latimanus*
brown creeper	*Certhia americana*
brown-headed cowbird	*Molothrus ater*
brush mouse	*Peromyscus boylii*
brush rabbit	*Sylvilagus bachmani*
bufflehead	*Bucephala albeola*
bullfrog	*Rana catesbeiana*
Bullock's oriole	*Icterus bullockii*
burrowing owl	*Athene cunicularia*
bushtit	*Psaltriparus minimus*
bushy-tailed woodrat	*Neotoma cinerea*
California ground squirrel	*Spermophilus beecheyi*
California gull	*Larus californicus*
California kangaroo rat	*Dipodomys californicus*
California mountain kingsnake	*Lampropeltis zonata*
California myotis	*Myotis californicus*
California quail	*Callipepla californica*
California thrasher	*Toxostoma redivivum*
California towhee	*Pipilo crissalis*
California vole	*Microtus californicus*
California whipsnake	*Masticophis lateralis*
Calliope hummingbird	*Stellula calliope*
Canada goose	*Branta canadensis*
canyon wren	*Catherpes mexicanus*
Cascades frog	*Rana cascadae*
Cassin's finch	*Carpodacus cassinii*
Cassin's vireo	*Vireo cassinii*
cedar waxwing	*Bombycilla cedrorum*
chestnut-backed chickadee	*Poecile rufescens*
chipping sparrow	*Spizella passerina*
Clark's grebe	*Aechmophorus clarkii*
Clark's nutcracker	*Nucifraga columbiana*
cliff swallow	*Petrochelidon pyrrhonota*
common garter snake	*Thamnophis sirtalis*
common kingsnake	*Lampropeltis getula*
common merganser	*Mergus merganser*
common nighthawk	*Chordeiles minor*
common poorwill	*Phalaenoptilus nuttallii*

Wildlife Species Potentially Occurring in the Watershed

Common Name	Scientific Name
common porcupine	*Erethizon dorsatum*
common raven	*Corvus corax*
common yellowthroat	*Geothlypis trichas*
cooper’s hawk	*Accipiter cooperii*
coyote	*Canis latrans*
creeping vole	*Microtus oregoni*
dark-eyed junco	*Junco hyemalis*
deer mouse	*Peromyscus maniculatus*
double-crested cormorant	*Phalacrocorax auritus*
Douglas’ squirrel	*Tamiasciurus douglasii*
downy woodpecker	*Picoides pubescens*
dusky flycatcher	*Empidonax oberholseri*
dusky-footed woodrat	*Neotoma fuscipes*
eared grebe	*Podiceps nigricollis*
elk	*Cervus elaphus*
ensatina	*Ensatina eschscholtzii*
ermine	*Mustela erminea*
Eurasian wigeon	*Anas penelope*
European starling	*Sturnus vulgaris*
evening grosbeak	*Coccothraustes vespertinus*
ferruginous hawk	*Buteo regalis*
flammulated owl	*Otus flammeolus*
foothill yellow-legged frog	*Rana boylii*
fox sparrow	*Passerella iliaca*
fringed myotis	*Myotis thrysanodes*
gadwall	*Anas strepera*
golden eagle	*Aquila chrysaetos*
golden-crowned kinglet	*Regulus satrapa*
golden-crowned sparrow	*Zonotrichia atricapilla*
golden-mantled ground squirrel	*Spermophilus lateralis*
gopher snake	*Pituophis melanoleucus*
grasshopper sparrow	*Ammodramus savannarum*
gray fox	*Urocyon cinereoargenteus*
gray jay	*Perisoreus canadensis*
great blue heron	*Ardea herodias*
great horned owl	*Bubo virginianus*
greater white-fronted goose	*Anser albifrons*
green heron	*Butorides virescens*
green-tailed towhee	*Pipilo chlorurus*

Wildlife Species Potentially Occurring in the Watershed

Common Name	Scientific Name
green-winged teal	*Anas crecca*
hairy woodpecker	*Picoides villosus*
Hammond's flycatcher	*Empidonax hammondii*
Harris's sparrow	*Zonotrichia querula*
heather vole	*Phenacomys intermedius*
hermit thrush	*Catharus guttatus*
hermit warbler	*Dendroica occidentalis*
hoary bat	*Lasiurus cinereus*
hood merganser	*Lophodytes cucullatus*
house finch	*Carpodacus mexicanus*
house mouse	*Mus musculus*
house sparrow	*Passer domesticus*
house wren	*Troglodytes aedon*
Hutton's vireo	*Vireo huttoni*
killdeer	*Charadrius vociferus*
lazuli bunting	*Passerina amoena*
lesser goldfinch	*Carduelis psaltria*
lesser scaup	*Aythya affinis*
Lewis's woodpecker	*Melanerpes lewis*
Lincoln's sparrow	*Melospiza lincolnii*
little brown bat	*Myotis lucifugus*
loggerhead shrike	*Lanius ludovicianus*
long-eared myotis	*Myotis evotis*
long-eared owl	*Asio otus*
long-legged myotis	*Myotis volans*
long-tailed vole	*Microtus longicaudus*
long-tailed weasel	*Mustela trenata*
long-toed salamander	*Ambystoma macrodactylum*
MacGillivray's warbler	*Oporornis tolmiei*
mallard	*Anas platyrhynchos*
marsh wren	*Cistothorus palustris*
merlin	*Falco columbarius*
montane vole	*Microtus montanus*
mountain beaver	*Aplodontia rufa*
mountain bluebird	*Sialia currucoides*
mountain chickadee	*Poecile gambeli*
mountain cottontail	*Sylvilagus nuttallii*
mountain lion	*Puma concolor*
mountain pocket gopher	*Thomomys monticola*

Wildlife Species Potentially Occurring in the Watershed

Common Name	Scientific Name
mountain quail	*Oreotyx pictus*
mourning dove	*Zenaida macroura*
Nashville warbler	*Vermivora ruficapilla*
night snake	*Hypsiglena torquata*
northern alligator lizard	*Elgaria coerulea*
northern flicker	*Colaptes auratus*
northern flying squirrel	*Glaucomys sabrinus*
northern goshawk	*Accipiter gentilis*
northern mockingbird	*Mimus polyglottos*
northern pintail	*Anas acuta*
northern pygmy owl	*Glaucidium gnoma*
northern river otter	*Lontra canadensis*
northern rough-winged swallow	*Stelgidopteryx serripennis*
northern saw-whet owl	*Aegolius acadicus*
Nuttall’s woodpecker	*Picoides nuttallii*
oak titmouse	*Baeolophus inornatus*
olive-sided flycatcher	*Contopus cooperi*
orange-crowned warbler	*Vermivora celata*
osprey	*Pandion haliaetus*
Pacific chorus frog	*Pseudacris regilla*
Pacific fisher	*Martes pennanti pacifica*
Pacific giant salamander	*Dicamptodon tenebrosus*
Pacific-slope flycatcher	*Empidonax difficilis*
pallid bat	*Antrozous pallidus*
pied-billed grebe	*Podilymbus podiceps*
pigmy short-horned lizard	*Phrynosoma douglassi*
pileated woodpecker	*Dryocopus pileatus*
pine siskin	*Carduelis pinus*
pinyon mouse	*Peromyscus truei*
prairie falcon	*Falco mexicanus*
purple finch	*Carpodacus purpureus*
purple martin	*Progne subis*
pygmy nuthatch	*Sitta pygmaea*
raccoon	*Procyon lotor*
racer	*Coluber constrictor*
red crossbill	*Loxia curvirostra*
red fox	*Vulpes vulpes*
red phalarope	*Phalaropus fulicarius*
red-breasted nuthatch	*Sitta canadensis*

Common Name	Scientific Name
red-breasted sapsucker	*Sphyrapicus ruber*
red-necked phalarope	*Phalaropus lobatus*
red-tailed hawk	*Buteo jamaicensis*
red-winged blackbird	*Agelaius phoeniceus*
ring-billed gull	*Larus delawarensis*
ringneck snake	*Diadophis punctatus*
ringtail	*Brassariscus astutus*
rock dove	*Columba livia*
rock wren	*Salpinctes obsoletus*
roughskin newt	*Taricha granulosa*
rubber boa	*Charina bottae*
ruby-crowned kinglet	*Regulus calendula*
ruddy duck	*Oxyura jamaicensis*
ruffed grouse	*Bonasa umbellus*
sagebrush lizard	*Sceloporus graciosus*
savannah sparrow	*Passerculus sandwichensis*
sharp-shinned hawk	*Accipiter striatus*
sharp-tail snake	*Contia tenuis*
Shasta salamander	*Hydromantes shastae*
shrew-mole	*Neurotrichus gibbsii*
silver-haired bat	*Lasionycteris noctivagans*
snowshoe hare	*Lepus americanus*
snowy egret	*Egretta thula*
song sparrow	*Melospiza melodia*
Sonoma chipmunk	*Tamias sonomae*
sooty grouse	*Dendragapus fuliginosus*
spotted bat	*Euderma maculatum*
spotted owl	*Strix occidentalis*
spotted sandpiper	*Actitis macularius*
spotted towhee	*Pipilo maculatus*
Steller's jay	*Cyanocitta stelleri*
striped skunk	*Mephitis mephitis*
striped racer	*Masticophis lateralis*
Swainson's thrush	*Catharus ustulatus*
Townsend's big-eared bat	*Corynorhinus townsendii*
Townsend's solitaire	*Myadestes townsendi*
tree swallow	*Tachycineta bicolor*
Trowbridge's shrew	*Sorex trowbridgii*
turkey vulture	*Cathartes aura*

Wildlife Species Potentially Occurring in the Watershed

Common Name	Scientific Name
vagrant shrew	*Sorex vagrans*
varied thrush	*Ixoreus naevius*
Vaux’s swift	*Chaetura vauxi*
violet-green swallow	*Tachycineta thalassina*
Virginia opossum	*Didelphis virginiana*
warbling vireo	*Vireo gilvus*
water shrew	*Sorex palustris*
western bluebird	*Salia mexicana*
western fence lizard	*Sceloporus occidentalis*
western gray squirrel	*Sciurus griseus*
western grebe	*Aechmophorus occidentalis*
western harvest mouse	*Reithrodontomys megalotis*
western jumping mouse	*Zapus princeps*
western kingbird	*Tyrannus verticalis*
western mastiff bat	*Eumops perotis*
western meadowlark	*Sturnella neglecta*
western pipistrelle	*Pipistrellus hesperus*
western pocket gopher	*Thomomys mazama*
western pond turtle	*Actinemys marmorata*
western rattlesnake	*Crotalus viridis*
western red bat	*Lasiurus blossevillii*
western red-backed vole	*Clethrionomys californicu*
western screech owl	*Otus kennicottii*
western scrub-jay	*Aphelocoma californica*
western skink	*Eumeces skiltonianus*
western small-footed myotis	*Myotis ciliolabrum*
western spotted skunk	*Spilogale gracilis*
western tailed frog	*Ascaphus truei*
western tanager	*Piranga ludoviciana*
western terrestrial garter snake	*Thamnophis elegans*
western toad	*Buto boreas*
western whiptail	*Aspidoscelis tigris*
western wood-pewee	*Contopus sordidulus*
white-breasted nuthatch	*Sitta carolinensis*
white-crowned sparrow	*Zonotrichia leucophrys*
white-headed woodpecker	*Picoides albolarvatus*
white-throated sparrow	*Zonotrichia albicollis*
wild turkey	*Meleagris gallopavo*
Wilson’s snipe	*Gallinago delicata*

Wildlife Species Potentially Occurring in the Watershed

Common Name	Scientific Name
Wilson's warbler	*Wilsonia pusilla*
winter wren	*Troglodytes troglodytes*
wood duck	*Aix sponsa*
wrentit	*Chamaea fasciata*
yellow warbler	*Dendroica petechia*
yellow-breasted chat	*Icteria virens*
yellow-headed blackbird	*Xanthocephalus xanthocephalus*
yellow-pine chipmunk	*Neotamias amoenus*
yellow-rumped warbler	*Dendroica coronata*
yuma myotis	*Myotis yumanensis*

APPENDIX D

Upper Sacramento River Watershed Fish Assemblage

Upper Sacramento River Watershed Fish Assemblage

		Salmonid Species				Native Species								Non-Native Species									
Sub-Region	**Stream/ Lake**	**BKT**	**BRT**	**CT**	**RBT**	**SD**	**SS**	**SPM**	**RS**	**HDH**	**ROS**	**SCB**	**STU**	**GNS**	**BG**	**CRA**	**LMB**	**SMB**	**SB**	**BNB**	**CCF**	**CRP**	**GLS**
Headwaters	Castle Lk.	X			X																		X
	Castle Lake Cr.				X									X									(X)
	Chipmunk Lk.	X			X																		
	Cliff Lks.	X			X																		
	Deer Cr.				X																		
	Fawn Cr.				X																		
	Grayrock Lks	X																					
	Gumboot Lk.				X																		
	Heart Lk.	X			X																		
	Lk. Siskiyou	X	X		X	(X)	(X)	(X)	(X)					X	X	X	X		X	X		X	X
	Lt. Castle Lk.	X			X																		
	Porcupine Lk.				X																		
	Sac R.M. Fk.				X	?	?	?	?														
	Sac R.S. Fk.	X			X	?	?	?	X														
	Sac R.N. Fk.				X	?	?	?	?														
	Sac R. Upper		X		X	?	?	?	?														
	Scott Camp Cr.	X			X									X									
	Scott Lk.				X																		
	Soapstone Cr.				X																		
	Timber Lk.	X																					
	Toad Lk.	X			X																		
Upper Sac																							
	Sac R		X		X		X	X	X	X		X							X		X		
	Ney Spg. Cr.				X				X														
	Stink Cr.				X				X														
	Big Canyon Cr.																						
	Hedge Cr.																						
	Bear Cr.				X																		
	Little Castle Cr.				X				X														

		Salmonid Species				Native Species								Non-Native Species									
Sub-Region	**Stream/ Lake**	**BKT**	**BRT**	**CT**	**RBT**	**SD**	**SS**	**SPM**	**RS**	**HDH**	**ROS**	**SCB**	**STU**	**GNS**	**BG**	**CRA**	**LMB**	**SMB**	**SB**	**BNB**	**CCF**	**CRP**	**GLS**
	Soda Cr.				X				X														
	Root Cr.				X				X														
	Fall Cr.				X																		
	Unnamed Cr. (FC-2)																						
	SF Castle Cr.				X				X														
	MF Castle Cr.				X				X														
	NF Castle Cr.				X				X														
	Castle Creek								X														
	Unnamed Cr. (S8-1)																						
	Sweetbriar Cr.																						
	Unnamed Cr. (CNT-1)																						
	Flume Cr.				X																		
	Mears Cr.				X																		
	SF Hazel Cr.				X				X														
	Hazel Cr.				X				X														
	SF Shotgun Cr.				X																		
	Shotgun Cr.				X				X														
	Unnamed Cr. (D-6)																						
	Boulder Cr.				X				X														
	North Salt Cr.				X	X			X														
	MF Salt Cr.																						
	Little Slate Cr.																						
	NF Slate Cr.																						
	SF Slate Cr.				X																		
	Slate Cr.				X				X														
	Whitlow Cr.				X				X														
	Clark's Gulch																						
	Mosquito Cr.																						

Upper Sacramento River Watershed Fish Assemblage

		Salmonid Species				Native Species								Non-Native Species									
Sub-Region	Stream/ Lake	BKT	BRT	CT	RBT	SD	SS	SPM	RS	HDH	ROS	SCB	STU	GNS	BG	CRA	LMB	SMB	SB	BNB	CCF	CRP	GLS
	Dog Cr.				X				X														
	Campbell Cr.																						
Lake Shasta																							
	Shasta Lake	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	(X)	X	X	X
	Big Backbone Cr.	(X)			X	(X)	(X)	(X)	(X)	(X)	(X)	(X)		(X)	(X)	(X)	(X)	(X)	(X)		(X)	(X)	(X)
	*Little Backbone Cr.																						
	Dry Fork Cr.				~																		
	Little Sugarloaf				~																		
	Elmore Cr.				~																		
	Alder Cr.				~																		
	Adler Cr.				~																		
	Sugarloaf Cr.	(X)			X	(X)	(X)	(X)	(X)	(X)	(X)	(X)		(X)	(X)	(X)	(X)	(X)	(X)		(X)	(X)	(X)
	Charlie Cr.				~																		
	Doney Cr.				~																		
	*Squaw Cr.																						
	Shoemaker Cr.				~																		
	Bull Cr.				~																		

*Biologically poor or dead as a result of impact from mine drainage.

<u>Sources:</u>

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Vander Zanden, M. J., S. Chandra, S. K. Park, Y. Vadeboncoeur, and C. R. Goldman. 2006. Efficiencies of benthic and pelagic trophic pathways in a subalpine lake. *Canadian Journal of Fisheries and Aquatic Sciences* 63:2608-2620.

<u>Status Key</u> Present: x Seasonal or Intermittent: ~ Likely but unconfirmed (x) Historically present but currently unconfirmed: ?

Fish Species Abbreviation Key

Category	Abbreviation	Common Name	Scientific Name
Salmonid			
	BKT	Brook Trout	*Salvelinus fontinalis*
	BRT	Brown Trout	*Salmo trutta*
	CHS	Chinook Salmon	*Oncorhynchus tshawytscha*
	KS	Kokanee Salmon	*Oncorhynchus nerka*
	RBT	Rainbow Trout	*Oncorhynchus mykiss*
Native			
	SD	Speckled Dace	*Rhinichthys osculus*
	SS	Sacramento Sucker	*Catostomus occidentalis*
	SPM	Sacramento Pikeminnow	*Ptychocheilus grandis*
	RS	Riffle Sculpin	*Cottus gulosus*
	HDH	Hardhead	*Mylopharodon conocephalus*
	ROS	Rough Sculpin	*Cottus asperrimus*
	SCB	Sacramento Blackfish	*Orthodon microlepidotus*
	STU	White Sturgeon	*Acipenser transmontanus*
Non-native			
	GNS	Green Sunfish	*Lepomis cyanellus*
	BG	Bluegill	*Lepomis macrochirus*
	CRA	Black Crappie	*Pomoxis nigromaculatus*
	LMB	Largemouth Bass	*Micropterus salmoides*
	SMB	Smallmouth Bass	*Micropterus dolomieui*
	SB	Spotted Bass	*Micropterus punctulatus*
	BNB	Brown Bullhead	*Ameiurus nebulosus*
	CCF	Channel Catfish	*Ictalurus punctatus*
	CRP	Carp	*Cyprinus carpio*
	GLS	Golden Shiner	*Notemigonus crysoleucas*

APPENDIX E

Region 5 Sensitive Plants, Lichens, and Fungi Known or Suspected to Occur on the Shasta-Trinity National Forest

Region 5 Sensitive Plants, Lichens, and Fungi Known or Suspected to Occur on the Shasta-Trinity National Forest

Sensitive Vascular Plants

*Ageratina shastensis**

Anisocarpa scabrida

*Arnica venosa**

Botrychium pinnatum

Botrychium virginianum

Calochortus longebarbatus var. *longebarbatus*

Calystegia atriplicifolia ssp. *buttensis*

Campanula shetleri

Campanula wilkinsiana

Chaenactis suffrutescens

Clarkia borealis ssp. *borealis*

Collomia larsenii

Cordylanthus tenuis ssp. *pallescens*

Cypripedium fasciculatum

Cypripedium montanum

Epilobium oreganum

Eriastrum brandegeae

Eriastrum tracyi

*Ericameria ophitidis**

Erigeron maniopotamicus

Eriogonum alpinum

*Eriogonum libertini**

Eriogonum ursinum var. *erubescens*

Erythronium citrinum var. *roderickii*

Frasera umpquaensis

Fritillaria eastwoodiae

Harmonia doris-nilesiae

Harmonia stebbinsii

Iliamna bakeri

Iliamna latibracteata

Ivesia longibracteata

Ivesia pickeringii

Leptosiphon nuttallii ssp. *howellii*

Lewisia cantelovii

Lupinus elmeri

Minuartia rosei

Minuartia stolonifera

Montia howellii

Neviusia cliftonii

Ophioglossum pusillum

Parnassia cirrata

Penstemon filiformis

Phacelia cookei

Phacelia greenei

Polemonium chartaceum

Raillardella pringlei

Rorippa columbiae

Sedum paradisum

Silene campanulata ssp. *campanulata*

Smilax jamesii

Sensitive Fungi

Collybia racemosa

Phaeocollybia gregaria

Sowerbyella rhenana (*Aleuria rhenana*)

Sensitive Bryophytes

Buxbaumia viridis

Meesia uliginosa

Mielichhoferia elongata

Ptilidium californicum

Sensitive Lichens

Peltigera hydrothyria

*Forest endemic, not Region 5 sensitive but treated as sensitive by Shasta-Trinity National Forest LRMP

Appendix F

Invasive Plants and Noxious Weeds
Known to Occur in the Upper Sacramento River Watershed

Invasive Plants and Noxious Weeds
Known to Occur in the Upper Sacramento River Watershed

Scientific Name **Common Name**	**Cal-IPC List Category[1]**	**CDFA List Category[2]**
Ailanthus altissima tree of heaven	Moderate	None
Avena barbata slender wild oats	Moderate	None
Avena fatua common wild oats	Moderate	None
Briza maxima rattlesnake grass	Limited	None
Bromus diandrus ripgut brome	Moderate	None
Bromus hordeaceus soft brome	Limited	None
Bromus tectorum cheatgrass	High	None
Cardaria chalapensis hairy whitetop	Moderate	B
Centaurea diffusa white knapweed	Moderate	A
Centaurea maculosa spotted knapweed	High	A
Centaurea solstitialis yellow star-thistle	High	C
Centaurea virgata var. squarrosa squarrose knapweed	Moderate	A
Chondrilla juncea rush skeleton weed	Moderate	A
Cirsium arvense Canada thistle	Moderate	B
Cirsium vulgare bull thistle	Moderate	None
Convolvulus arvensis field bindweed	Evaluated, not listed	C
Cynodon dactylon Bermuda grass	Moderate	C
Cystis scoparius Scotch broom	High	C
Erodium botrys longbeak stork's bill	Evaluated, not listed	None
Erodium cicutarium redstem stork's bill	Limited	None
Euphorbia esula leafy spurge	High- ALERT	A
Ficus carica fig	Moderate	None
Foeniculum vulgare fennel	High	None
Genista mospessulana French broom	High	C

Invasive Plants and Noxious Weeds
Known to Occur in the Upper Sacramento River Watershed

Scientific Name **Common Name**	**Cal-IPC List Category**[1]	**CDFA List Category**[2]
Hordeum marinum, H. murinum Mediterranean barley, hare barley, wall barley	Moderate	None
Hypericum perforatum common St. John's wort	Moderate	C
Isatis tinctoria Dyer's woad	Moderate	B
Linaria dalmatica dalmation toadflax	Moderate	A
Lolium multiflorum Italian ryegrass	Moderate	None
Nerium oleander oleander	Evaluated, not listed	None
Phytolacca americana pokeweed	None	None
Robinia pseudoacacia black locust	Limited	None
Rubus discolor Himalayan blackberry	High	None
Rubus laciniatus cutleaf blackberry	None	None
Rumex crispus curly dock	Limited	None
Senecio jacobaea tansy ragwort	Limited	B
Sorghum halepense Johnsongrass	None	C
Spartium junceum Spanish broom	High	None
Taeniatherum caput-medusae medusa-head	High	C
Torilis arvensis spreading hedgeparsley	Moderate	None
Verbascum thapsus common mullein	Limited	None
Vinca major periwinkle	Moderate	None
Vulpia myuros rat-tail fescue	Moderate	None

[1]Cal-IPC List Categories

High — These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate — These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited — These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

[2]CDFA List Categories

A — An organism of known economic importance subject to state (or commissioner when acting as a state agent) enforced action involving: eradication, quarantine, containment, rejection, or other holding action.

B — An organism of known economic importance subject to: eradication, containment, control or other holding action at the discretion of the individual county agricultural commissioner; or An organism of known economic importance subject to state endorsed holding action and eradication only when found in a nursery.

C — An organism subject to no state enforced action outside of nurseries except to retard spread. At the discretion of the commissioner; or an organism subject to no state enforced action except to provide for pest cleanliness in nurseries.

Q — An organism or disorder requiring temporary "A" action pending determination of a permanent rating. The organism is suspected to be of economic importance but its status is uncertain because of incomplete identification or inadequate information. In the case of an established infestation, at the discretion of the Assistant Director for Plant Industry, the Department will conduct surveys and will convene the Division Pest Study Team to determine a permanent rating.

D — No action.

APPENDIX G

Special-Status Wildlife Species Accounts

Hardhead (*Mylopharodon conocephalus*). California Species of Special Concern and Forest Service Sensitive. The hardhead is a freshwater fish native to California. Its distribution is limited to the Sacramento-San Joaquin river system. Hardhead are typically found in small to large streams in a low to mid-elevation environment. They may also inhabit lakes or reservoirs. Hardhead tend to prefer warmer temperatures than salmonids, thus it is usually found in clear deep streams with a slow but present flow (U.C. Cooperative Extension 2003). Spawning habitat is typically characterized by gravel and rocky substrate.

California floater (*Anodonta californiensis*). Forest Service Sensitive. The California floater is a freshwater mussel that is known to require a host fish for larval development and dispersal. Although western *Anodonta* are thought to be somewhat a generalist with respect to host fish requirements, these relationships have not been determined (Mock et al. 2004).

Shasta Hesperian (*Vespericola shasta*). Forest Service Sensitive. The Shasta hesperian is a terrestrial snail that is endemic to the Klamath Province, primarily in the vicinity of Shasta Lake, up to 3,000 feet in elevation (Bureau of Land Management 1999). It is generally found in moist bottom lands, such as riparian zones, springs, seeps, marshes, and in the mouths of caves. The Shasta hesperian has been recorded along the Sacramento Arm of the watershed.

Shasta Sideband (*Monadenia troglodytes troglodytes*). Forest Service Sensitive. The Shasta sideband is a terrestrial snail known only from Shasta County, California along the McCloud River Arm and near the Pit River Arm of Shasta Lake. It occurs in limestone areas, including caves, talus slopes, and other rocky areas that are open, brush-covered, or associated with pine-oak woodlands. Refuge sites do not need to have vegetative cover (Bureau of Land Management 1999). The Shasta sideband has not been recorded within the watershed.

Wintu Sideband (*Monadenia troglodytes wintu*). Forest Service Sensitive. The Wintu sideband is a terrestrial snail only known from Shasta County, California along the Pit River Arm of Shasta Lake over to Squaw Creek and at Mountain Gate. It occurs in limestone areas, including caves, talus slopes, and other rocky areas that are open, brush-covered, or associated with pine-oak woodlands. Refuge sites do not need to have vegetative cover (Bureau of Land Management 1999). This species is known to occur near Shasta Lake.

Shasta Chaparral (*Trilobopsis roperi*). Forest Service Sensitive. The Shasta chaparral is a terrestrial snail endemic to Shasta County, California. It may be found within approximately 330 feet of lightly to deeply shaded limestone rockslides, draws, or caves with a cover of shrubs or oak (Bureau of Land Management 1999). The species is known to occur near Shasta Lake.

Cascades Frog (*Rana cascadae*). California Species of Special Concern. Cascades frogs are known to have occurred at many of the sub-alpine lakes and along several of the major tributaries in the Headwaters portion of the watershed. Suitable habitat for the Cascades frog includes slow, permanent bodies of water surrounded by moist forested habitat with herbaceous cover for thermoregulation and predator avoidance. Cascades frogs are strongly tied to water and lake and tributary headwater habitat may be especially suitable for them (USDA Forest Service 2001).

A 1994 study on Cascades frogs documented an existing population between Gumboot Lake and 1/2 mile downstream (USDA Forest Service 2001). The current condition of this population as well as the presence and distribution of other populations in the Headwater potion of the watershed is, unknown. Locations where Cascades frogs have been reported include Gumboot Creek, Toad Lake, Cedar Lake and Cliff Lake, the North fork of Deer Creek and Fawn Creek (USDA Forest Service 2001) and several sites in the central portion of the watershed.

There is reason to believe that the intensive introduction and stocking of non-native salmonid species in the Headwaters portion of the watershed, as well as the widespread distribution of these fish within the watershed may have affected Cascades frog populations and may be continuing to affect these populations. In a study that spanned several adjacent portions of the Cascades frogs range within the Klamath-Siskiyou Bioregion (specifically, the Trinity Alps Wilderness, the Marble Mountains Wilderness, and the Russian River Wilderness), Welsh and others found that presence of Cascades frogs in subalpine aquatic habitats was strongly negatively correlated with the presence of introduced salmonids (Welsh et al 2006). Additionally, Cascades frogs were 3.7 times more likely to be found in fishless waters (Welsh et al. 2006). Welsh and others (2006) hypothesize that in addition to being palatable to fish, in part as the result of their lacking a chemical defense, the highly aquatic life histories of Cascades frogs make them especially susceptible to fish predation. With this in mind, the continued persistence or status of all Cascades frog populations in the Upper Sacramento River Watershed should be considered unknown.

Foothill Yellow-Legged Frog (*Rana boylii*). California Species of Special Concern and Forest Service Sensitive. The foothill yellow-legged frog is found in or near rocky streams in a variety of habitats, including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadow types. Adults often bask on exposed rock surfaces near streams. When disturbed, they dive into the water and take refuge under submerged rocks or sediments. During periods of inactivity, especially during cold weather, individuals seek cover under rocks in the streams or on shore within a few meters of water. Unlike most other ranid frogs in California, this species is rarely encountered (even on rainy nights) far from permanent water. Tadpoles require water for at least three or four months while completing their aquatic development.

The species occurs in the Coast Ranges from the Oregon border south to the Transverse Mountains, in most of northern California west of the Cascade crest, and along the western flank of the Sierra south to Kern County. The species has been recorded in numerous locations throughout the watershed (California Department of Fish and Game 2008a).

Tailed Frog (*Ascaphus truei*). California Species of Special Concern. Much of all three subregions of the watershed fall within the tailed frog's natural elevational (0–6,000 feet) distribution as well as in both the southern and eastern portion of its known geographical range in California. Suitable habitat for tailed frogs is considered permanent, clear, cold (<15 °C) water in a steep drainage, bordered by a dense, moist forest habitat. Riffles with small, clean cobble are important for larval stage stages.

Though early life phases are based in the water, adult tailed frogs are primarily terrestrial and inefficient at underwater feeding (Metter 1964, Bury 1970, California Department of Fish and Game 1996). As such, status of the riparian buffer is an important constituent of tailed frog habitat. Riparian buffer is also important because of its role in temperature control through shading. Water temperature is a critical determinant of tailed frog habitat as this species may have one of the lowest and narrowest ranges of tolerance for water temperature of all the world's frogs (Welsh 1990). The upper lethal limit for tailed frog eggs is reported at 18.5 °C and this is the lowest upper limit of any North American frog (Brown 1975).

Tailed frogs have been recorded in numerous locations in the central portion of the watershed (California Department of Fish and Game 2008a).

Western Pond Turtle (*Actinemys marmorata*). California Species of Special Concern. The western pond turtle is the only primarily aquatic reptile species in the watershed. Typical habitat for the turtle includes slow water aquatic habitat with available basking sites. Hatchlings require shallow water with dense submergent or short emergent vegetation. Females require an upland oviposition site near their aquatic site.

Though there is some anecdotal evidence of greater abundance historically, western pond turtles are present throughout the watershed, but more common in the central and lower portions. In the Headwaters, single sightings of individuals have been reported at Castle Lake and Cliff Lake. In the central portion of the watershed, western pond turtles are known to inhabit the mainstem of the Sacramento River. Surveys conducted in 1994 on 28 tributaries in the central portion of the watershed, however, recorded only a single occurrence of this species across all surveyed sites. The species has also been recorded around Shasta Lake (California Department of Fish and Game 2008a).

Long-eared Owl (*Asio otus*). California Species of Special Concern. The long-eared owl occurs as a permanent resident or winter visitor throughout much of the northern portion of the state. It requires wooded areas for roosting and breeding and often frequents riparian habitats. At higher elevations, this species can be found in dense conifer stands. The long-eared owl typically forages in open habitats, primarily for small rodents. The cause of this species' decline is unclear, although loss of riparian habitat may play a role. Conifer woodlands in the watershed provide suitable roosting habitat for this species.

Flammulated Owl (*Otus flammeolus*). USFWS Bird of Conservation Concern. Flammulated owls are tiny owls (~6 inches long) with a deep voice. They are typically found in montane forests, especially ponderosa pine, with intermediate canopy closures. Flammulated owls favor areas with small openings and edges and clearings with snags for nesting and roosting. They nest in cavities or woodpecker holes and feed almost exclusively on insects and arthropods. In the watershed, flammulated owls are summer residents in a variety of coniferous habitats.

Golden Eagle (*Aquila chrysaetos*). California Species of Special Concern, California Fully Protected, and USFWS Bird of Conservation Concern. Golden eagles are most common in rugged, open country bisected by canyons where there are ample nesting sites and food. They are a rare permanent resident or migrant throughout California but are more common in the foothills surrounding the Sierra Nevada and Coast Ranges and in the southern California deserts. Golden eagles nest on cliffs of all sizes and in the tops of large trees. They construct very large stick nests, sometimes exceeding 10 feet across (Zeiner et al. 1990). The species forages on rabbits and larger rodents, but may also take birds and reptiles; some also feed on carrion.

American Peregrine Falcon (*Falco peregrinus*). California Fully Protected Species and USFWS Bird of Conservation Concern. The American peregrine falcon is known as one of the fastest flying birds of prey, feeding almost entirely on birds that it kills while in flight. These falcons nest primarily on high cliffs; however, they will also use human-made structures and occasionally tree cavities or the old nests of other raptors. In California, peregrine falcons are known to nest along the coast north of Santa Barbara, the northern Coast and Cascade ranges, and the Sierra Nevada. During winter and periods of migration, they can be found throughout most of the state. However, they are most likely to be encountered near wetland or aquatic habitats. Suitable habitat for the American peregrine falcon occurs in the watershed, and the species has been recorded nesting along the Sacramento River Arm of Shasta Lake (California Department of Fish and Game 2008a).

The American peregrine falcon was listed as endangered by the USFWS in 1970 and by the State of California in 1971. Intensive efforts to protect peregrine falcons were initiated by biologists from the Santa Cruz Predatory Bird Research Group in 1975. These efforts led to over 120 pairs of peregrine falcons by 1992 (Thelander and Crabtree 1994). The USFWS removed the American peregrine falcon from the endangered species list in 1999 and the State of California delisted it in 2009.

Northern Goshawk (*Accipiter gentilis*). California Species of Special Concern, Forest Service Sensitive, and USFWS Bird of Conservation Concern. The northern goshawk is found in dense, mature conifer and deciduous forests, interspersed with openings and riparian habitat. Nests are typically constructed on north-facing slopes near water. They prey mainly on birds and small mammals. In California, northern goshawks breed in the northern Coast Ranges and in the Sierra Nevada, Klamath, Cascade, and Warner Mountains. Northern goshawks have been recorded in the watershed (California Department of Fish and Game 2008a).

Ferruginous Hawk (*Buteo regalis*). USFWS Bird of Conservation Concern. The ferruginous hawk is a large, broad-winged hawk of open habitats. In the watershed, ferruginous hawks occur only as uncommon winter residents or migrants. Winter habitat includes areas with large, open tracts of grasslands, sparse shrub, or desert habitats where prey (e.g., small mammals such as rabbits and ground squirrels) is abundant.

Prairie Falcon (*Falco mexicanus*). USFWS Bird of Conservation Concern. The prairie falcon inhabits dry environments where cliffs or bluffs punctuate open plains and shrub-steppe deserts. Nests are typically built on a sheltered ledge of a cliff overlooking a large open area. It is a specialized predator of medium-sized mammals and birds. The prairie falcon is a year-round resident of suitable habitats in the watershed.

Lewis's Woodpecker (*Melanerpes lewis*). USFWS Bird of Conservation Concern. Lewis's woodpeckers inhabit open, deciduous and conifer habitats with a brushy understory and scattered snags and live trees for nesting and perching. They excavate cavities in snags or the dead part of live trees for nesting. Lewis's woodpeckers are opportunistic in their feeding habits, eating mostly insects in summer but switching to nuts in the winter, which they often store in bark crevices for later consumption. This species may occur in the watershed as a summer resident and breeder.

White-headed Woodpecker (*Picoides albolarvatus*). USFWS Bird of Conservation Concern. The white-headed woodpecker is a yearlong resident in the watershed, occurring in mixed coniferous forests dominated by pine. Pine seeds are an important part of its diet through much of the year. Pairs excavate nests in snags, stumps, or the dead portions of living trees. Nests are often located within 10 feet of the ground (Garrett et al. 1996).

Black Swift (*Cypseloides niger*). California Species of Special Concern and USFWS Bird of Conservation Concern. Black swifts nest on ledges or shallow caves in steep rock faces and canyons, usually near or behind waterfalls, and in sea caves. If suitable habitat for breeding is present, they will forage for insects over a variety of habitats. Black swifts breed very locally in the Sierra Nevada and Cascade Range, including a portion of the watershed. The species was recorded nesting on the cliffs near Mossbrae Falls in 1976 and 1977 (California Department of Fish and Game 2008a).

Vaux's Swift (*Chaetura vauxi*). California Species of Special Concern. The Vaux's swift is a summer resident of northern California that forages over most terrains and habitats, commonly at lower levels in forest openings, above burns, and above rivers. The species roosts in large hollow trees and snags, most often in redwood and Douglas-fir but it may also use other conifers and, occasionally, chimneys and buildings.

Olive-sided Flycatcher (*Contopus cooperi*). California Species of Special Concern and USFWS Bird of Conservation Concern. Olive-sided flycatchers may occur as summer residents in a variety of forest and woodland habitats in the watershed. Preferred nesting habitat includes mixed conifer, montane hardwood-conifer, Douglas-fir, and red fir. They are most numerous where these forest habitats overlook canyons, meadows, lakes, or other open terrain. Olive-sided flycatchers prey almost exclusively on flying insects, especially bees.

Purple Martin (*Progne subis*). California Species of Special Concern. The purple martin is an uncommon summer resident of old-growth, multi-layered open forests in California. It primarily uses old woodpecker cavities for nesting, but will occasionally nest in boxes or under bridges. Purple martins forage for insects over a variety of habitats, including riparian areas and forests. The species has declined in numbers in recent decades due to competition with non-native species for nest cavities, the loss of riparian habitat, and the removal of snags. One of the few known nesting colonies of this species in interior California occurs along the Pit River Arm of Shasta Lake in snags that are submerged at full pool. The only other known purple martin breeding sites in interior northern California include scattered historical sites in Siskiyou and eastern Shasta Counties (Williams 1998) and recent known sites are from Lava Beds National Monument, and Lake Britton. Recent historical records also occur from locations in the McCloud Arm (Williams 1998). The Shasta Lake population represents between 14 and 51 percent of the interior northern California population (Lindstrand 2008) and included 21 pairs in 2008. However, this species has not been recorded breeding within the watershed.

California Yellow Warbler (*Dendroica petechia brewsteri*). California Species of Special Concern. The yellow warbler is a long-distance migrant, usually arriving in California in April and leaving by October. It is typically found in dense riparian deciduous habitats with cottonwoods, willows, alders, and other small trees and shrubs typical of open-canopy riparian woodlands. The species breeds from mid-April to early August, building an open cup nest in a tree or shrub. Foraging patterns typically involve gleaning and hovering for insects and spiders. Suitable habitat for this species occurs in the watershed.

Yellow-breasted Chat (*Icteria virens*); California Species of Special Concern. The yellow-breasted chat is a neotropical migrant that occurs in riparian or marsh habitats throughout California. It is found in dense, brushy thickets near water and in the thick understory of riparian woodlands. Forage patterns usually involve gleaning insects, spiders, and berries from the foliage of shrubs and low trees. Nests are often low to the ground in dense shrubs along streams. Yellow-breasted chats occur as summer breeding residents in the Sacramento River Valley and its tributaries. Suitable habitat for this species occurs in the watershed.

Loggerhead Shrike (*Lanius ludovicianus*). California Species of Special Concern and USFWS Bird of Conservation Concern. The loggerhead shrike prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches located in open-canopied valley foothill hardwood, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats. Loggerhead shrikes skewer their prey to thorns or barbs on barbed-wire fences. The purpose of this trait may be to help kill the prey or to cache the food for later consumption. Suitable habitat for the loggerhead shrike occurs in the northern portion of the watershed.

American Marten (*Martes americana*). Forest Service Sensitive. Chiefly nocturnal, the American marten is mostly carnivorous, taking primarily small mammals, however it also consumes birds, insects, fruits, and fish. Breeding occurs in the summer with most litters born in March and April. The American marten is an uncommon to common, permanent resident of the North Coast regions and Sierra Nevada, Klamath, and Cascades Mountains (California Department of Fish and Game 2008b). It requires a variety of different-aged stands, particularly old-growth conifers and snags, which provide abundant cavities for denning and nesting. Martens tend to travel along ridgetops, and rarely move across large areas devoid of canopy cover. Small clearings, meadows, and riparian areas provide foraging habitats, particularly during snow-free periods. The availability of habitat with limited human use is also an important requirement for martens. The American marten has been recorded in the northern portion of the watershed (California Department of Fish and Game 2008a).

Oregon Snowshoe Hare (*Lepus americanus klamathensis*). California Species of Special Concern. The Oregon snowshoe hare is known only from the vicinity of Mt. Shasta, the Trinity Mountains, and one locality in the Warner Mountains (Williams 1986). In, California the snowshoe hare is primarily found in montane riparian habitats with thickets of alders and willow, and in stands of young conifers interspersed with chaparral. Dense cover is preferred either in under-story thickets of montane riparian habitats or in shrubby under stories of young conifer habitats.

The species is solitary except during the breeding season, from mid-February to July. Snowshoe hares are primarily crepuscular and nocturnal and active year round. They eat a variety of plant materials with forage type varying by season. Succulent green vegetation is consumed when available; after the first frost, buds, twigs, evergreen needles, and bark form the bulk of the diet.

Townsend's big-eared bat (*Corynorhinus townsendii*). California Species of Special Concern and Forest Service Sensitive. The Townsend's big-eared bat has been reported in a wide variety of habitat types including coniferous forests, mixed mesophytic forests, deserts, native prairies, riparian communities, active agricultural areas, and coastal habitat types. Distribution is strongly correlated with the availability of caves and cave-like roosting habitat, including abandoned mines. It has also been reported to utilize buildings, bridges, rock crevices, and hollow trees as roost sites. Summer maternity colonies range in size from a few individuals to several hundred individuals. Winter hibernating colonies are composed of mixed-sexed groups, which can range in size from a single individual to colonies of several hundred animals (Piaggio and Sherwin 2005). The Townsend's big-eared bat primarily consumes moths that it captures while foraging in edge habitats along streams, adjacent to and within a variety of wooded habitats. These bats often travel large distances while foraging. NSR biologists observed the species during a survey of a limestone cave on the Big Backbone Creek Arm in June 2008.

Pallid Bat (*Antrozous pallidus*). California Species of Special Concern and Forest Service Sensitive. This medium-sized bat occurs throughout much of California. It prefers foraging on terrestrial arthropods in dry, open grasslands near water and rocky outcroppings or old structures. It may also occur in oak woodlands and at the edge of redwood forests along the coast. Roosting typically occurs in groups. Day and night roosts often occur in caves and mine tunnels. However, buildings and trees may also be used for day roosts. More open sites (e.g., buildings, porches, garages, and highway bridges) may be used for night roosts. Pallid bats are sensitive to human disturbances at roost sites.

Western Red Bat (*Lasiurus blossevillii*). Forest Service Sensitive. The western red bat is a migratory species occurring in California from Shasta County to the Mexican border, west of the Sierra Nevada/Cascade crest and deserts (California Department of Fish and Game 2008b). The species prefers sites with a mosaic of habitats that includes trees for roosting and open areas for foraging. Western red bats typically roost solitarily in dense tree foliage, particularly in willows, cottonwoods, and sycamores. Western red bats appear to be strongly associated with riparian habitats, particularly mature stands of cottonwood/sycamore (Pierson et al. 2006). Data also suggests that western red bat populations require fairly extensive stands (>164 feet wide) of riparian forest (Pierson et al. 2006). However, direct observations of roosting behavior in California are limited primarily to collections or sightings that have occurred in fruit orchards (Pierson et al. 2006). They forage over a wide assortment of habitat types for a variety of insects, but primarily feed on moths.

Spotted Bat (*Euderma maculatum*). California Species of Special Concern. In California, the spotted bat has a patchy distribution throughout the western portion of the state due to its dependence on rock-faced cliffs for roosting habitat. Roosts are found in small cracks in cliffs and rocky outcrops. The spotted bat forages over a variety of habitats, primarily for large moths. California spotted bats have been recorded in the northern half of the watershed (California Department of Fish and Game 2008a).

Western Mastiff Bat (*Eumops perotis*). California Species of Special Concern. The western mastiff bat, California's largest bat species, is an uncommon resident throughout its range in California. It ranges from Central Mexico across the southwestern United States. In addition, recent surveys have extended the previously known range to the north in both Arizona and California (to within a few miles of the Oregon border) (Pierson and Siders 2005). Primarily a cliff dwelling species, roosts are found under exfoliating rock slabs and in similar crevices in large boulders and buildings (Pierson and Siders 2005). Roosts are generally high above the ground, usually allowing a clear vertical drop of at least 10 feet below the entrance for flight. This species has been recorded in the northern portion of the watershed (California Department of Fish and Game 2008a).

American Badger (*Taxidea taxus*). California Species of Special Concern. Badgers are highly specialized fossorial (adapted for burrowing or digging) mammals found throughout almost all of California. They are found in a range of habitats that contain friable soils and relatively open ground where they dig burrows in pursuit of prey and to create dens for cover and raising of young. Badgers are carnivorous, preying primarily on rodents.

Ring-tailed Cat (*Bassariscus astutus*). California Fully Protected Species. The ring-tailed cat occurs in various riparian habitats in and brush stands of most forest and shrub habitats. Nocturnal and primarily carnivorous, ring-tailed cats mainly eat small mammals but also feed on birds, reptiles, insects, and fruit. They forage on the ground, among rocks, and in trees, usually near water. Hollow trees and logs, cavities in rocky areas, and other recesses are used for cover. The ring-tailed cat is widely distributed in California.

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APPENDIX H

Neotropical Migrants Occurring on the Shasta-Trinity National Forest[♦]

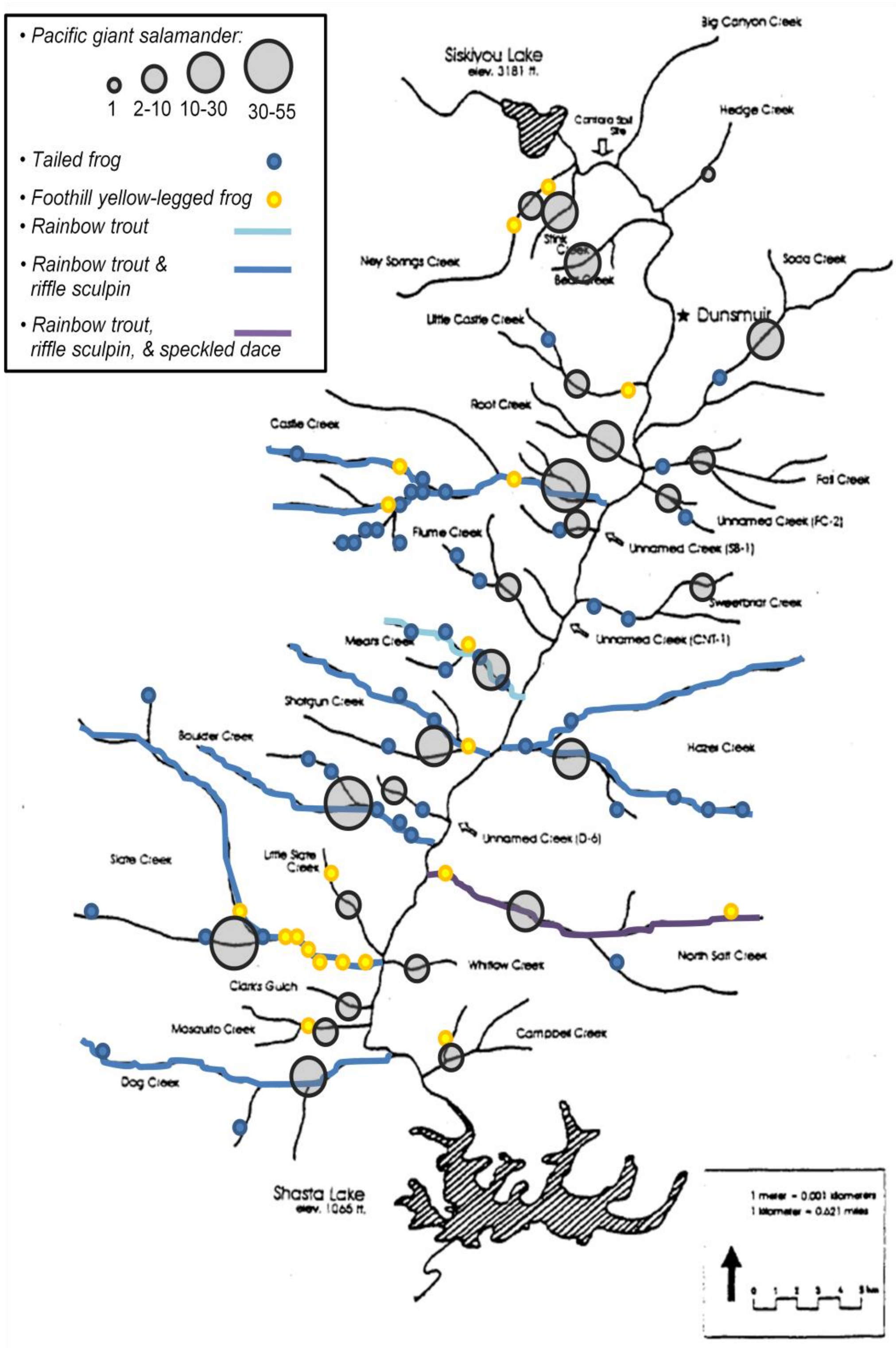
[♦] Source: USDA Forest Service. 2008. Bird checklist Shasta-Trinity National Forest

Neotropical Migrants Occurring on the Shasta-Trinity National Forest

Allen's hummingbird
American goldfinch
American kestrel
American pipit
American robin
Anna's hummingbird
Ash-throated flycatcher
Band-tailed pigeon
Barn swallow
Belted kingfisher
Black swift
Black-chinned hummingbird
Black-headed grosbeak
Black-throated gray warbler
Blue-gray gnatcatcher
Brewer's blackbird
Brown-headed cowbird
Calliope hummingbird
Cassin's finch
Chipping sparrow
Cliff swallow
Common nighthawk
Common yellowthroat
Cooper's hawk
Dark-eyed junco
Dusky flycatcher
Ferruginous hawk
Flammulated owl
Golden eagle
Golden-crowned kinglet
Grasshopper sparrow
Gray flycatcher
Green-tailed towhee
Hammond's flycatcher
Hermit thrush
Hermit warbler
Hooded oriole
House wren
Lark sparrow
Lazuli bunting
Lesser goldfinch
Lewis's woodpecker
Lincoln's sparrow
MacGillivray's warbler
Marsh wren
Merlin
Northern rough-winged swallow
Nashville warbler
Northern goshawk
Northern harrier
Northern oriole
Olive-sided flycatcher
Orange-crowned warbler
Osprey
Pacific-slope flycatcher
Peregrine falcon
Pine siskin
Pinyon jay
Prairie falcon
Purple martin
Red-breasted sapsucker
Red-shouldered hawk
Red-tailed hawk
Red-winged blackbird
Rough-legged hawk
Ruby-crowned kinglet
Rufous hummingbird
Sage sparrow
Savannah sparrow
Sharp-shinned hawk
Solitary vireo
Spotted towhee

APPENDIX I

Sensitive Amphibian Species Locations in the Upper Sacramento River Watershed



Map of Upper Sacramento River tributaries below Box Canyon Dam, with sureveyed locations where sensitive amphibian species (tailed frog, foothill yellow-legged frog, and pacific giant salamander) and fish species (rainbow trout, riffle scuplin, and speckled dace) were found. Compiled from CDFG (1995, 1996, 2001).

APPENDIX J

Additional Comments from Arne Hultgren, Roseburg Resources Company

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- Chap 1: The development of a management strategy as a requisite goal is fairly unconventional practice. WA's typically detail structure & function of the water shed, simply stating the conditions.

- Ch.3 : Uses an outdated Fuel Model (Albini 1976) …is that really the latest and/or best available science?

- Use of "publically available" GIS without field verification casts doubt on accurate data; Examples of mis-mapped roads were noted at an interim meeting of the steering committee; the contractor was alerted to these data blows, yet the data was still used in subsequent modeling which drove ERA, EHR, and other modeled analysis.

- Ch. 3-133 Hydrology: Equivalent Roaded Area is an outdated metric of watershed health; it fails to account for types of road surfaces, types/efficacy of drainage facilities and structures. Further, it was altered in its use herein. The Appendix B-10 reference to McGurk & Fong (1995) is a 15-year old paper; methods used in the paper were not apparently the same as in the USWA; see B-7 insofar as road types were not defined, nor was proximity to watercourses, nor was the recovery period. The State Board of Forestry's Monitoring Study Group has a large body of more relevant research that was completely missed.

- Fig 3.2-49 uses a single "mean annual runoff"; good statistical practices also include a measure of central tendency; e.g. the variation over the past 20, 30, 50 or 100 years. Also the "cumulative departure" metric is meaningless unless there is a discrete event to accumulate from, that this graph supposedly correlated to.

- Ch. 3-54 Figures 3.2-2 & 3 – It makes no sense to display rainfall from 3 different sources as a stacked-bar graph, because this implies there is some type of implicit additive value, which there is not. These are independent measurements. As noted elsewhere, the mean without the standard deviation or the range is uninformative.

- 3-61 (including tables 3.2-2, 3, &4) Tables purport to represent air in the WA area, but these air basins include lands include Susanville, Sacramento, Alturas, Happy Camp and Yreka. They dwarf the WA area. The relevance to this WA is marginal.

- 3-65 Climate Change. Fails to note a rather important fact: that Mt. Shasta's glaciers are growing "It's a bit of an anomaly that they are growing, but it's not to be unexpected," said Ed Josberger, a glaciologist at the U.S. Geological Survey in Tacoma, Wash., who is currently studying retreating glaciers in Alaska and the northern Cascades of Washington." http://www.usatoday.com/tech/science/environment/2008-07-08-mt-shasta-growingglaciers_N.htm

- Fig 3.2-48 is based on modeled ERA and is not accurate. It should not be included. (see remarks above about weakness of this obsolete method and manner of application to this WA.)

- Ch. 3-133 Netmap modeling fails to account for, or calibrate to varied road surfaces (last sentence, extends to top of 134). Just plain incorrect. Asphalt, concrete, native surface or railroad grades have some demonstrable amount of infiltration. They are not impermeable in the scientific sense.

- 3-142 Table 3.2-10 displays monitoring components from the unavailable Cantara Spill data source, as noted in the Appendices "The turbidity and sediment data collected as part of the Cantara Spill monitoring could not be located as part of this assessment[B-9]."

- 3-142-143. Referenced SWCMP's sole monitoring point on the Sacramento River above Shasta Lake is the discredited turbidity sensor at DLT. As a result, reference to this program suggests greater oversight of the watershed by the SWCMP than may actually exist.

- Table 3.2-13 fails to use accepted stream temperature metrics, substituting instead single instantaneous measurement of mean, max and min. The Maximum Weekly Average Temperature (MWAT) is the customary measure as applied to biotics.

- 3-204-224. The reader would be better served if this, and the other 20 pages of citations were placed in the Appendices.

- 4-1. The belief that biological integrity is a constant baseline and is measureable is not a universally accepted premise among ecologists. The WA is not a place for unqualified speculation.

- 4-4. (Fig 4.1-1) Displays in a uniform fashion, varied intervals; 5-yrs, then 10-yrs, then 180-year; all have the same width; exaggerating the early seral stage and confusing to the reader.

- 4-5. Latter 2 paragraphs under heading 'Shasta Dam' is extremely speculative and should not be the purpose of a watershed assessment.

- Castle Lake, while unique, fails to sufficiently resemble the assemblages of a riverine system like the Upper Sacramento to constitute a reference body. These are 'apples and oranges'.

- B-9 Turbidity-the Turbidity data from DLT was so completely compromised, that it cannot be compared to the SPI Hazel Creek data, which originated from a calibrated, research grade station that received regular oversight. Contrast this to the DLT site where months elapsed between visits, and even then did not detect nor purge obviously errant readings or fix bad sensors.

- Points at top of B-9 are re-pasted facts from p. 3-141.