

BEAR CREEK WATERSHED ASSESSMENT

January 2006



Funded by

A grant managed by the State Water Resources Control Board through the CALFED program. With technical assistance provided by various State and Federal agencies in cooperation with concerned local organizations and private citizens.

Prepared by ENPLAN for
The Western Shasta
Resource Conservation
District



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I. INTRODUCTION

1.1. Prologue

SCOPE

The contract for the Bear Creek Watershed Assessment stated the scope as the following:

The mission of the Bear Creek Watershed Assessment is to gather and integrate existing information on the physical, cultural and demographic variables, which characterize the Bear Creek watershed at present and in the past. Existing conditions will be compared with earlier conditions in the time periods to describe change through time. Data and information lacking for particular time periods should be noted. Any prior explanations or suggestions about causes of change or effects of change, in any of these variables should be summarized and documented.

The purpose of the Bear Creek Watershed Assessment is to inform interested individuals about the human, aquatic, riparian, and terrestrial features of the entire ecosystem, and to assist in identifying areas in which additional data and information are needed.

Individuals, as well as public and private groups, need hard data and information for informed assessment of the effects of management decisions on the physical, commercial and cultural environment of the Bear Creek watershed. The Bear Creek Watershed Assessment will provide the beginning of a broad, landscape-scale description which, when combined with data and information from subsequent studies, will make possible such assessments.

This watershed assessment can be considered the initial step in developing our knowledge of the physical, commercial, and cultural conditions within the Bear Creek watershed ecosystem. It will be amended and extended as new information becomes available.

The Bear Creek Watershed Assessment will follow a five-step process of analysis, which includes:

- 1. Characterization of the watershed in terms of defined variables and identification of the dominant physical, biological, and human processes and features of the watershed.*
- 2. Descriptions of the current range, distribution and condition of ecosystem elements in the watershed, subject to the availability of data and information.*
- 3. Descriptions of how these ecosystem elements have changed through time.*
- 4. Synthesis of information, which compares existing and earlier ecosystem elements, and details studies, data and information needed to establish cause and affect relationships between change in one part of the ecosystem and another part.*

5. *Conclusions and suggestions, developed by the joint efforts of the CONTRACTOR and TAC, responsive to watershed processes identified in the assessment.*

FUNDING

This project is part of the CALFED Watershed Program, funded in full or part through an agreement with the State Water Resources Control Board (SWRCB) pursuant to the Costa-Machado Act of 2000 (Proposition 13) and any amendments thereto for the implementation of California's Non-point Source Pollution Control Program. The contents of this document do not necessarily reflect the views and policies of the SWRCB, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

1.2. Technical Advisory Committee

The Bear Creek Watershed Technical Advisory Committee consists of the Western Shasta County Resource Conservation District staff, specialists from cooperating agencies, and landowners within the watershed. Technical Advisory Committee members include:

Glen Aldridge — Landowner
Mike Berry — California Department of Fish and Game
Jack Bramhall — Western Shasta County Resource Conservation District
Leslie Bryan — Western Shasta County Resource Conservation District
Shiloe Braxton — Western Shasta County Resource Conservation District
Tricia Bratcher — California Department of Fish and Game
Dave Dubose — Landowner
Eda Eggeman — California Department of Fish and Game
Todd Golder — Natural Resources Conservation Service
Rick Hartley — California Department of Forestry and Fire Protection
Peter Johnson — W.M. Beaty & Associates
Chantz Joyce — W.M. Beaty & Associates
Aric Lester — California Department of Water Resources
Beth Doolittle-Norby — Central Valley Regional Water Quality Control Board
Tricia Parker — United States Fish and Wildlife Service
Fraser Sime — California Department of Water Resources
Roland Weidenkeller — Landowner
Carl Weidert — Landowner
Stan Weidert — Landowner

1.3. Document Organization

This document is organized into 11 chapters. At the end of each chapter is a references section, which includes complete citations for publications mentioned in the text. In each chapter, figures (if included) follow the references section, which in turn, are followed by appendices (if included).

1.4. Public Review

Public notices were posted in local newspapers and at public buildings in Shingletown announcing that the draft Bear Creek Watershed Assessment was available for public review for a period of 30 days. Copies of the watershed assessment were available to the public at various locations in Shasta County. In addition, a public meeting was held to allow the public to provide input into the Bear Creek Watershed Assessment. Public comments obtained during the 30-day review period are included in Appendix 1-A.

1.5. Characterization of the Watershed

The Bear Creek watershed lies within Shasta County at the northern end of California's Central Valley (Figure 1-1). It is situated between the Cow Creek watershed to the north and the Battle Creek watershed to the south. The elevation ranges from 360 feet at its confluence with the Sacramento River, to approximately 6,740 feet at its headwaters in the mountains to the east. The watershed's principal stream is Bear Creek (main stem Bear Creek, North Fork Bear Creek, and South Fork Bear Creek), for which the watershed is named. Although not a tributary to Bear Creek, Ash Creek is included in the Bear Creek Watershed Assessment because it lies between Battle Creek and Bear Creek. The Ash Creek drainage encompasses 13,720 acres. The Bear Creek watershed, including the Ash Creek drainage, encompasses 100,541 acres (157 square miles). Orthophotography coverage of the watershed is presented in Figure 1-2.

The Bear Creek Watershed Assessment discusses geography, geology and soils, hydrology, water quality, botanical resources, wildlife resources, fisheries resources, land use, fire and fuels management, and cultural resources. **A brief summary of each topic is provided below.**

GEOGRAPHY

The geography of the Bear Creek watershed is characterized by its climate, topography, and culture. The climate is characterized by hot, dry summers, and cold, wet winters. The topography within the watershed is variable, ranging from the flat Millville Plains along the western boundary of the watershed, to the rugged Bear Creek Canyon, to the mountains in the eastern portion of the watershed. Current human activities such as timber harvesting, prescribed fire, and water diversions have potential effects within the watershed, in nearby watersheds, and in some cases, throughout the northern part of the Sacramento Valley.

GEOLOGY AND SOILS

The Bear Creek watershed includes two geomorphic provinces: the Cascade Range and Great Valley. The Cascade Range was produced as the Pacific Plate subducted beneath the North American Plate, beginning approximately 350 million years ago and continuing until 15 to 30 million years ago (Alt and Hyndman, 2000). This action provided the magma that fueled volcanic eruptions throughout northeastern California, including the Bear Creek watershed. The Cascade Geomorphic province occupies the eastern portion of the Bear Creek watershed. The Great Valley represents a subduction zone that became inactive and filled with sediment. The Great Valley province occupies the southwest portion of the Bear Creek watershed. Cascade flows and ash fall extend to the Millville Plains.

The Bear Creek watershed contains two volcanoes: Latour Butte and Black Butte. Latour Butte is the larger of the two and occurs in the northeastern part of the watershed. Black Butte, a plug-cinder cone, straddles the southern boundary of the watershed just west of Shingletown. Both volcanoes do not appear to be active.

The Bear Creek watershed has numerous faults. The largest fault in the watershed is the Bear Creek Fault, which trends northeast across the Millville Plains. Just south of the watershed lies the larger Battle Creek Fault, which follows Battle Creek. Although no major earthquakes are known to have occurred in the Bear Creek watershed, several earthquakes of magnitudes less than 5.0 have been reported.

Soils in the Bear Creek watershed are diverse. In general, the Cascade province is dominated by volcanic soils, while the Great Valley province is dominated by sedimentary soils. Springs occur along contacts between sedimentary and volcanic and porous impervious volcanic formations. Sedimentary rocks interfinger with cascade rocks up to 3,000 feet in elevation with cascade flows moving down erosional features (stream channels).

HYDROLOGY

The hydrology of the Bear Creek watershed is a function of the watershed's topography and climate. Hot, dry summers, followed by cold, wet winters result in extreme seasonal variation in the watershed's streams. Snow melt from heavy snow packs at middle and high elevation areas are generally adequate to fill the watershed's streams with water through late spring. Springs provide summer flow for many streams in the watershed. However, in years of below average rainfall, the lower reach in the main stem of Bear Creek is known to run dry. The natural pattern of stream flow in the main stem of Bear Creek is also affected by the diversion of water for agriculture and groundwater pumping. This effect is more pronounced in years of below average rainfall and can adversely affect biological resources, particularly anadromous fish.

Little information exists on the history of flooding in the Bear Creek watershed. Nonetheless, the U.S. Army Corps of Engineers explored several options for flood control on Sacramento River tributaries between Shasta Dam and Red Bluff in the early 1960s. Among these options were plans to divert water from the main stem of Bear Creek to proposed reservoirs in the Cow Creek watershed. During peak flows, a proposed diversion structure on the main stem of Bear Creek ten miles upstream from its confluence with the Sacramento River would divert water via a tunnel to proposed reservoirs in the Cow Creek Watershed. Although several options were considered, none were implemented.

The history of hydroelectric power generation in the Bear Creek watershed dates back to 1900, when a small power plant was constructed along Snow Creek. However, the power plant was expensive to maintain and was dismantled several years later. Presently, only one hydroelectric power plant exists in the watershed, and is located on South Fork Bear Creek near Inwood.

WATER QUALITY

The Central Valley Regional Water Quality Control Board (RWQCB) prepared the Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Water Quality Control Plan), which established water quality standards for the Bear Creek watershed. None of the tributaries in the Bear Creek watershed have specific beneficial uses designated in the Water Quality Control Plan. However, Bear Creek and Ash Creek

are both tributary to the Sacramento River, and therefore, the “tributary rule” applies (e.g., all designated beneficial uses of the Sacramento River apply to Bear Creek and Ash Creek). The designated beneficial uses of the Sacramento River (from Shasta Dam to the Colusa Basin Drain) are the following: municipal and domestic supply, agricultural supply, industrial service supply, navigation, hydropower generation, water contact recreation, non-contact water recreation, warm freshwater habitat, cold freshwater habitat, wildlife habitat, migration of aquatic organisms, and spawning, reproduction, and/or early development.

No comprehensive study of the watershed’s streams has been conducted. Water quality monitoring in the Bear Creek watershed by the RWQCB and the California Department of Fish and Game (DFG) has been limited to the following surface waters: main stem Bear Creek, North Fork Bear Creek, South Fork Bear Creek, Dickerson Creek, Lack Creek, Sheridan Creek, and Snow Creek.

BOTANICAL RESOURCES

Vegetation in the Bear Creek watershed is diverse due to the varied topography of the landscape, variable weather, and diverse soil types. Grasslands and oak woodlands are found throughout low elevation areas of the watershed. High elevation areas consist predominantly of coniferous forest. Middle elevation areas include a mixture of vegetation types present in low and high elevation areas, depending on slope, aspect, soil type, and soil depth.

The composition and structure of vegetation types in the Bear Creek watershed has changed somewhat following the arrival of European settlers in the early 1800s. These changes are primarily the result of fire suppression, prescribed fires, timber harvest practices, and the introduction of non-native weeds.

The Bear Creek watershed has 17 vegetation types, based on the Wildlife Habitat Relationships system of classification. The California Natural Diversity Database (CNDDB) identifies three unique natural communities within the Bear Creek watershed: Great Valley mixed riparian forest, Great Valley valley oak riparian forest, and northern interior cypress forest. Residents in the watershed have identified three additional unique natural communities not listed in the CNDDB: Pacific yew forest, Oregon white oak woodland, and northern hardpan vernal pools. In addition, six special-status plant species are known to occur in the watershed and include Ahart’s paronychia (*Paronychia ahartii*), Butte County fritillary (*Fritillaria eastwoodiae*), Red Bluff dwarf rush (*Juncus leiospermus* var. *leiospermus*), Shasta clarkia (*Clarkia borealis* ssp. *arida*), silky cryptantha (*Cryptantha crinita*), and slender Orcutt grass (*Orcuttia tenuis*). Numerous non-native plants are known to occur within the watershed. The majority of these non-native plants are weeds. Most non-native weeds are classified as invasive weeds, and several are also classified as noxious weeds.

WILDLIFE RESOURCES

The Bear Creek watershed’s mosaic of vegetation types and rural character provide a variety of habitats for many species of wildlife. Special-status wildlife species reported in the Bear Creek watershed include foothill yellow-legged frog (*Rana boylei*), northwestern pond turtle (*Clemmys marmorata*), American dipper (*Cinclus mexicanus*), American white pelican (*Pelecanus erythrorhynchos*), bald eagle (*Haliaeetus leucocephalus*), bank swallow (*Riparia riparia*), black-capped chickadee (*Poecile atricapillus*), California horned lark (*Eremophila alpestris*), Cooper’s hawk (*Accipiter cooperii*), Lawrence’s goldfinch (*Carduelis*

lawrencei), northern goshawk (*Accipiter gentilis*), northern harrier (*Circus cyaneus*), osprey (*Pandion haliaetus*), peregrine falcon (*Falco peregrinus*), rufous hummingbird (*Selasphorus rufus*), sandhill crane (*Grus canadensis*), large-billed savannah sparrow (*Passerculus sandwichensis rostratus*), Vaux's swift (*Chaetura vauxi*), white-headed woodpecker (*Picoides albolarvatus*), white-tailed kite (*Elanus leucurus*), and ringtail (*Bassariscus astutus*). Special-status wildlife species that have been reported in the vicinity of the Bear Creek watershed include California linderiella fairy shrimp (*Linderiella occidentalis*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardii*), California wolverine (*Gulo gulo*), Pacific fisher (*Martes pennanti pacifica*) pine marten (*Martes americana*), Sierra Nevada red fox (*Vulpes vulpes necator*), and California red-legged frog (*Rana aurora draytonii*). In addition, several species of wildlife have been introduced into the watershed. Some introductions are the result of programs sanctioned by the DFG, while others are the result of private individuals.

The DFG manages three populations of big game in the Bear Creek watershed: black-tailed deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), and wild pig (*Sus scrofa*). However, the number of animals taken from each population is unknown.

The native fauna of the Bear Creek watershed has changed following the arrival of European American settlers in the early 1800s. For example, the grizzly bear (*Ursus horribilis*) was extirpated from the watershed by the mid-1890s.

FISHERIES RESOURCES

Three special-status fish species are known to occur in the Bear Creek watershed: Pacific lamprey (*Lampetra tridentata*), Central Valley steelhead (*Oncorhynchus mykiss irideus*), and four runs (fall-run, late fall-run, winter-run, and spring-run) of Chinook salmon (*O. tshawytscha*). An additional special-status fish species, the green sturgeon (*Acipenser medirostris*), is known to occur in the vicinity of the Bear Creek watershed. Of the different runs of Chinook salmon that spawn in the upper Sacramento River and its tributaries, only fall-run Chinook salmon return consistently in sizable numbers to spawn in Bear Creek. However, the number of fall-run Chinook salmon that spawn in Bear Creek is less than the number that spawn in nearby Cow Creek, Cottonwood Creek, and Battle Creek. Approximately 300 fall-run Chinook salmon and 200 Central Valley steelhead were estimated to spawn in Bear Creek in 1965 (Potter, 1965). However, the actual number of fish that return annually to spawn is variable and is dependent on stream flow conditions and water temperature. No systematic surveys have been conducted for the different runs of salmon in the Bear Creek Watershed.

Seven species of resident native fish known to occur in the Bear Creek watershed: rainbow trout (*O. mykiss*), Sacramento pikeminnow (*Ptychocheilus grandis*), hardhead (*Mylopharodon conocephalus*), California roach (*Lavinia symmetricus*), speckled dace (*Rhinichthys osculus*), Sacramento sucker (*Catostomus occidentalis*), and riffle sculpin (*Cottus gulosus*). In addition, several species of fish have been introduced into the Bear Creek watershed. The effect of these introductions on native fish, amphibians, and invertebrates is unknown.

LAND USE

Land in the Bear Creek watershed is primarily privately owned. Several small parcels of public land managed by the Bureau of Land Management are scattered throughout the watershed. In addition, a small section of the Latour State Demonstration Forest, which is managed by the California Department of Forestry and Fire Protection (CDF), occupies the eastern portion of the watershed.

The principal regulatory agency and policy making body for private land use in Shasta County is the Shasta County Board of Supervisors, although timber lands are regulated by the California Department of Fire and Forestry. The Board makes all decisions relevant to land use, resource management, development approvals, environmental impact assessment, and related matters within the context of the Shasta County General Plan. The Shasta County General Plan is a document that describes the long-term land use in Shasta County and provides a policy framework that must be reflected in zoning, in ordinances, specific plans, and other development guidelines. The Shasta County General Plan identifies 11 land use designations in the Bear Creek watershed: Public Land, Agricultural Croplands, Agricultural Grazing, Timberland, Rural Residential A, Rural Residential B, Habitat Resource, Open Space, Mixed Use, Mineral Resource, and General Industrial. Not all land use in the Bear Creek watershed reflects the land use as specified in the Shasta County General Plan. Some privately owned land is enrolled under the Williamson Act, while other land is preserved through conservation easements or timber zoning.

FIRE AND FUELS MANAGEMENT

The frequency of natural wildfire in the Bear Creek watershed prior to the settlement by humans is thought to have been less than every 20 years (McKelvey et al., 1996). Wildfire records kept since 1911 and maintained by the CDF indicate that natural and human-caused wildfires have occurred throughout the watershed. Wildfires are of concern because they pose a threat to important assets, such as soil, water, air quality, wildlife, rangeland, recreation, timberlands, and human resources.

The earliest prescribed fire known in the Bear Creek watershed was conducted on the Aldridge Ranch in 1950. Since then, prescribed fires have been a regular occurrence in the watershed. Presently, the California Vegetation Management Plan enables private landowners to enter into a contract with the CDF to use prescribed fire to achieve fire protection and resource management goals.

Fire behavior is a function of weather, topography, and fuels. In the Bear Creek watershed, the summer weather is typically hot, dry, and subject to occasional gusts of wind. The watershed's topography is variable, consisting of steep canyons covered with dense vegetation. In response to the increasing threat of catastrophic wild fire facing residents in the Bear Creek Watershed, particularly in the vicinity of Shingletown, the Western Shasta RCD has begun working with local landowners and resources agencies and prepared the *Fire Safe Plan for the Shingletown Community*. This plan identifies values at risk, evacuation routes, potential sources of funding, and fuel reduction guidelines for homeowners.

CULTURAL RESOURCES

The Bear Creek watershed has a diversity of natural resources, which have been utilized by Native Americans for at least 5,000 to 7,000 years. Native Americans in the watershed were complex hunter-gatherers who practiced a transhumance subsistence strategy consisting of the utilization of various native resources for use within the local economy and in limited trade. The Native American population in the watershed did not grow beyond that which the environment could sustain. European Americans settled in the watershed in the 1830s and practiced a sedentary agricultural/ranching subsistence strategy which consisted of the utilization of land in order to produce and maintain native and non-native resources for use in the local, state, and national economies. Settlement increased dramatically following the completion of Noble's Emigrant Trail in 1851. The population of European Americans was able to exceed that which the environment could sustain due to their advanced storage techniques and transportation of resources by means of horse, wagon, boat, train, and automobile. The most significant and lasting impacts to the landscape by European Americans are the exclusion of fire, introduction of exotic plants and animals, logging, mining, water diversion and management, and stock grazing.

1.6. References

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APPENDIX 1-A

Public Review



DEPARTMENT OF FISH AND GAME

<http://www.dfg.ca.gov>

NORTHERN CALIFORNIA-NORTH COAST REGION
601 Locust Street
Redding, CA 96001
(530) 225-2300



January 11, 2006

Bear Creek Watershed Group
Mr. Shiloe Braxton, Project Manager
Western Shasta Resource Conservation District
6270 Parallel Road
Anderson, CA 96007-4833

Dear Bear Creek Watershed Group:

Bear Creek Watershed Assessment Final Draft

The Department of Fish and Game (DFG) has reviewed the public draft of the Bear Creek Watershed Assessment. The watershed assessment can be a valuable land management tool that comprehensively identifies issues, examines the history of the watershed, describes its features, and evaluates resources within the watershed. DFG biologists participated on the Technical Advisory Committee, reviewed earlier drafts and provided comments throughout the assessment process. Upon review of the Bear Creek Watershed Assessment final draft, DFG believes that our comments and input for earlier drafts have been adequately addressed.

Watershed assessments are the initial step toward gathering and integrating existing information on the physical, cultural, and demographic characteristics of a watershed. The foldout maps and figures included in this assessment help users visualize the natural and cultural resources found in the Bear Creek watershed. This valuable reference will help the Bear Creek Watershed Group identify features and processes important to fish and wildlife habitat, water quality, and the social environment in order to prioritize their restoration goals.

DFG appreciates the combined efforts of agencies, landowners, and the Western Shasta Resource Conservation District along with the assessment contractor, ENPLAN, to produce this document. We will continue to work with the Bear Creek stakeholders to identify additional data needs and participate in future planning and restoration efforts. If you have any questions regarding this information, please contact Environmental Scientist Eda Eggeman at the letterhead address or telephone (530) 225-2753.

Sincerely,

DONALD B. KOCH
Regional Manager

JAN 2006

cc: See page two *Conserving California's Wildlife Since 1870*

Mr. Shiloe Braxton, Project Manager
January 11, 2006
Page Two

cc: Mr. Donald Burk
ENPLAN
3179 Bechelli Lane #100
Redding, CA 96002

Mr. James Moller, Watershed Coordinator
Western Shasta Resource Conservation District
6270 Parallel Road
Anderson, CA 96007-4833

Ms. Eda C. Eggeman
Department of Fish and Game
601 Locust Street
Redding, CA 96001

ec: Mr. Steve Turek
Ms. Patricia Bratcher
Ms. Eda C. Eggeman
Department of Fish and Game
601 Locust Street
Redding, CA 96001

Public Review

- Identify the historic routes of cattle drives to assess the effects of historical range management in the Bear Creek Watershed.
- Map the historic route of the Nobles Trail to assess the settlement of the Bear Creek Watershed.
- Include an open range lands map in the Bear Creek Watershed.

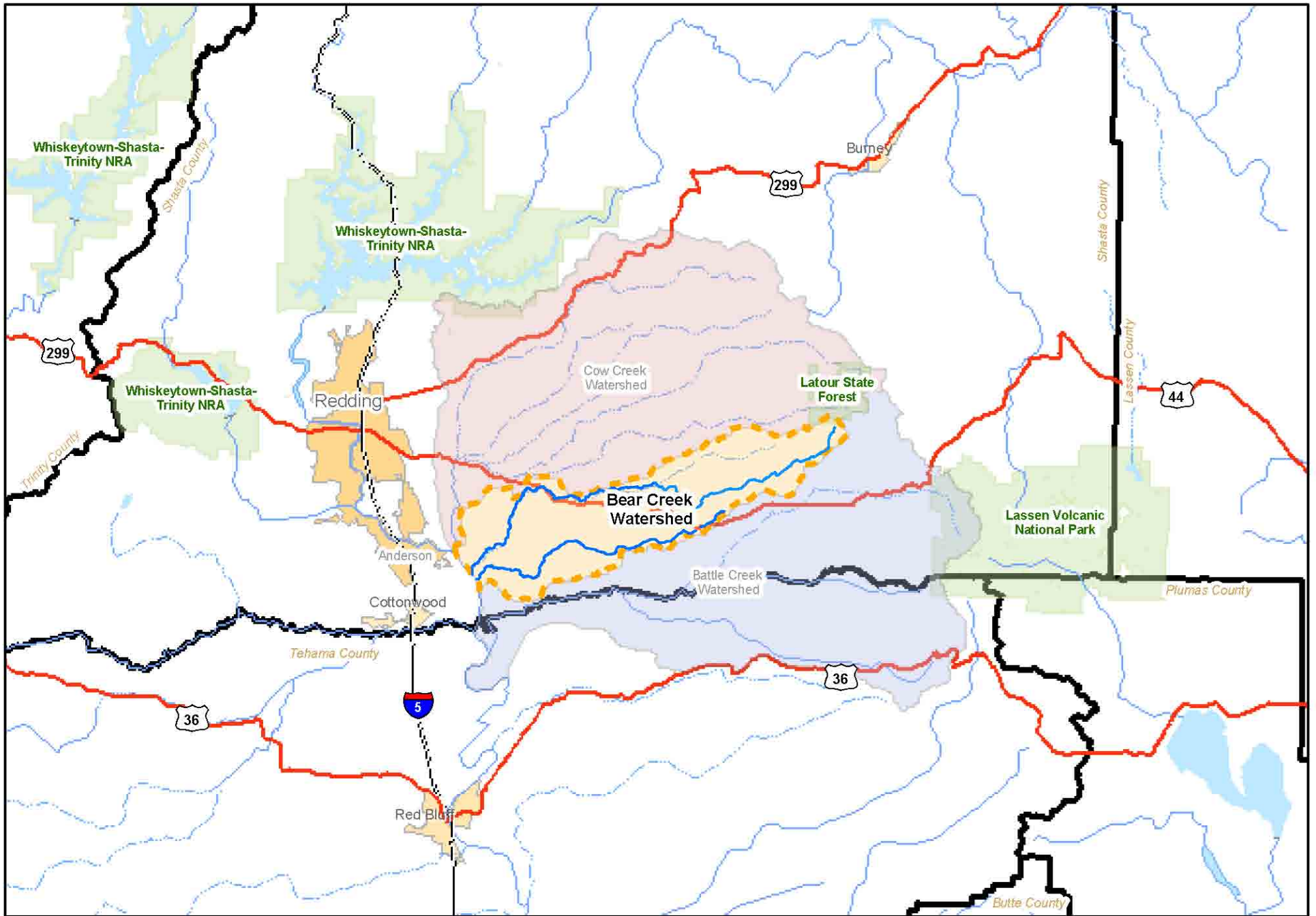


Figure 1-1
Vicinity Map
Bear Creek Watershed Assessment 2005



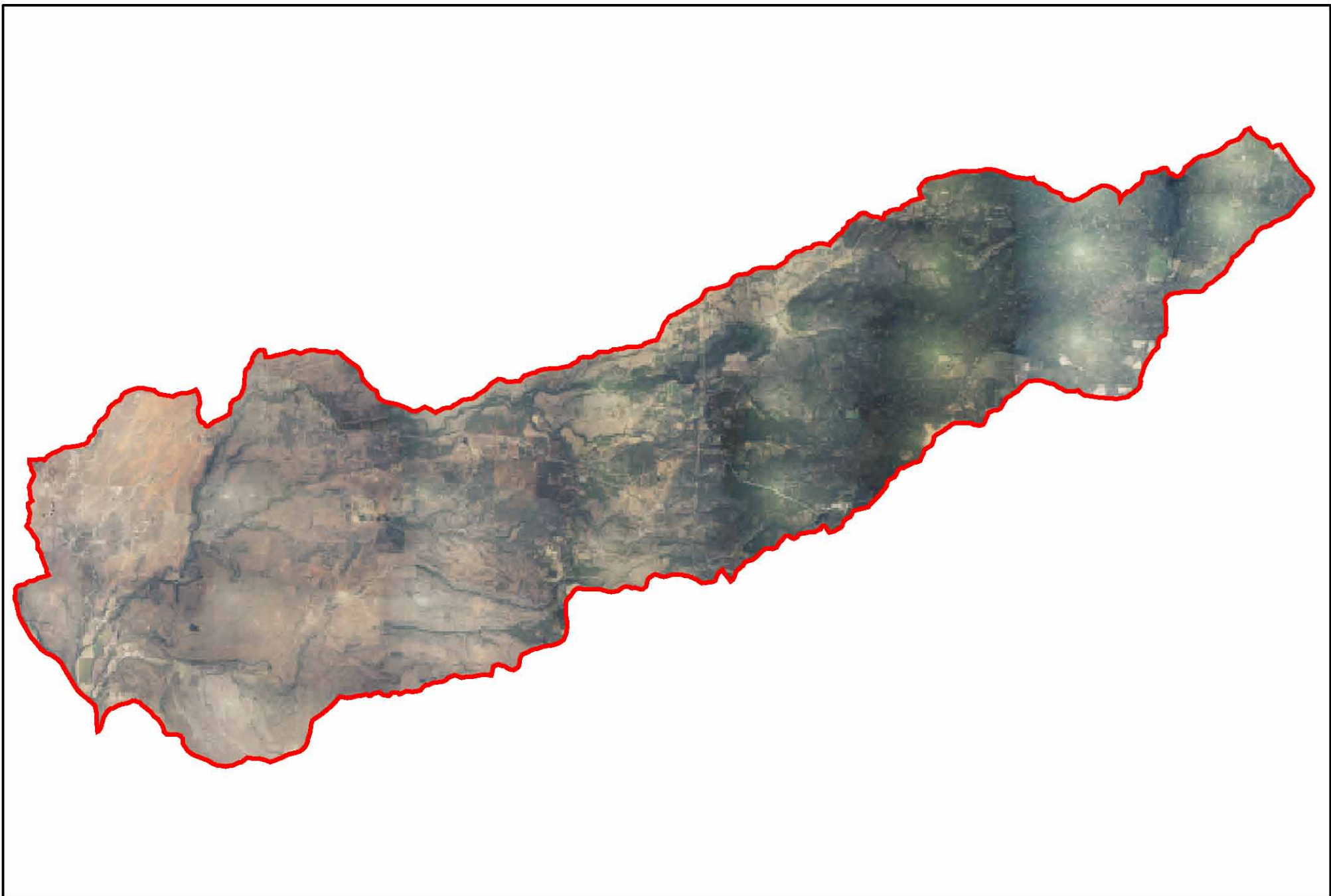


Figure 1-2
Orthophotography Coverage in 2003
Bear Creek Watershed Assessment 2005

