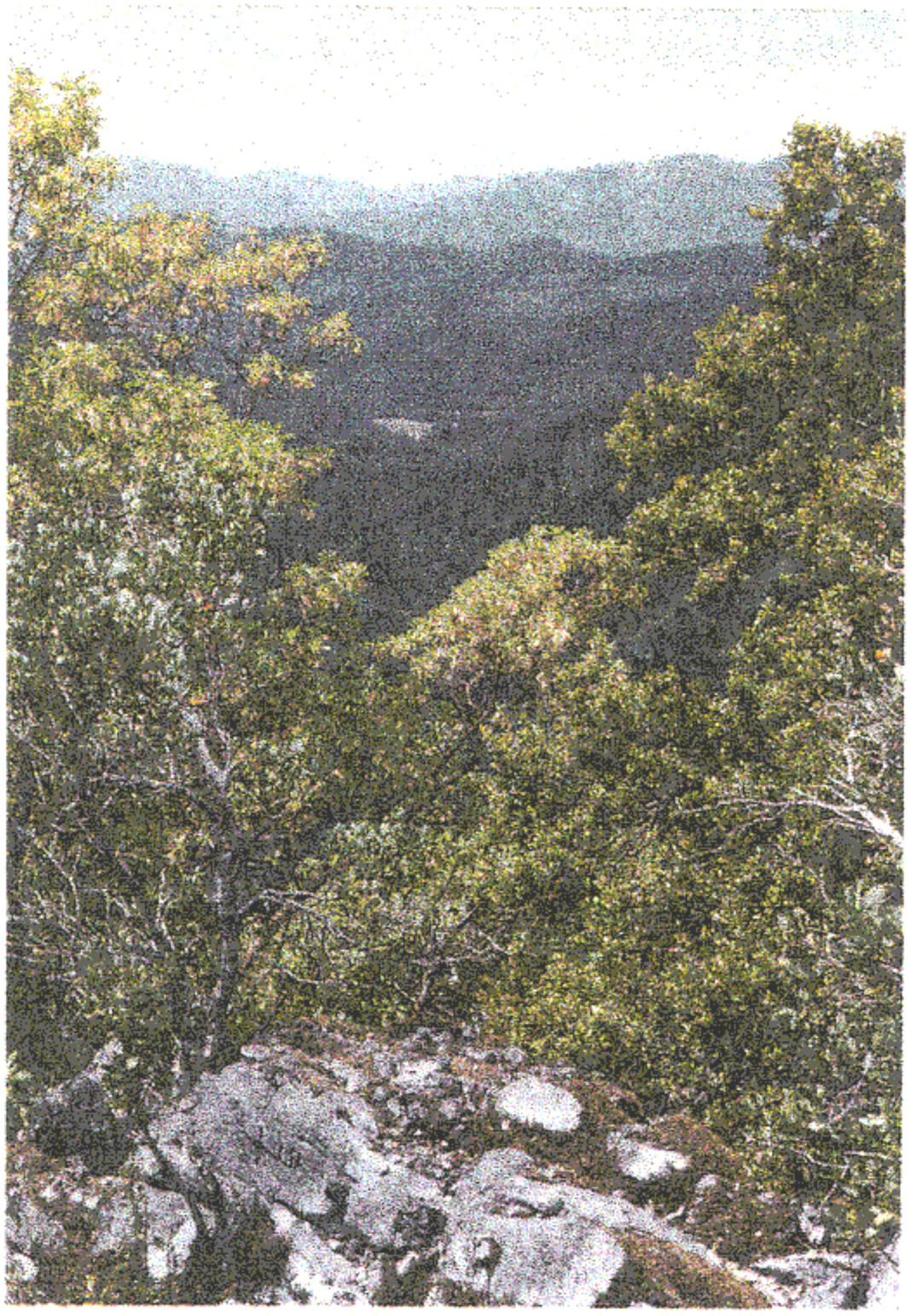
Deer Creek Watershed Analysis



U.S. Department of the Interior
Bureau of Land Management
Medford District
Grants Pass Resource Area

November 1997

October 1997

Dear Reader:

The purpose of this watershed analysis is to identify the various ecosystem components and their interactions at a landscape scale. It looks at historical ecological components, current ecological components and trends. It makes recommendations for future management actions that are needed to reach recommended ecological conditions.

As you read this document, it is important to keep in mind that the watershed analysis process is an iterative and ongoing process. As new information becomes available it will be included and updating will occur. It is also important to keep in mind that this analysis document is not a decision document. The recommendations that are included are a point of departure for project specific planning and evaluation work. Project planning then includes the preparation of environmental assessments and formal decision records as required by NEPA. Project planning and land management actions would also be designed to meet the objectives and directives of our Resource Management Plan (RMP).

This watershed analysis will thus be used as a tool in land management planning and project implementation within the Deer Creek watershed on BLM administered lands. Although ecological information, discussions and recommendations are presented at the landscape scale irrespective of administrative ownership, please understand that the BLM will only be implementing management actions on the lands it administers.

Preparation of the Deer Creek watershed analysis was initiated in the winter of 1994-95. The present document primarily follows the format outlined in the draft federal watershed analysis guidelines in effect at that time: 1994-96 Watershed Analysis Guidelines (June 1994) and that of *Ecosystem Analysis at the Watershed Scale: Federal Guide For Watershed Analysis* (version 2.1, March 1995). The format and terminology are thus slightly different from those of the more recent guidelines in the document entitled *Ecosystem Analysis at the Watershed Scale: Federal Guide For Watershed Analysis* (version 2.2, August 1995). The basic principles and approach embodied in the 1994 and 1995 documents are essentially the same.

If you have additional resource or social information that would contribute to our better understanding the ecological and social processes within the watershed, we would appreciate hearing about them.

Robert C. Korfhage
Grants Pass Resource Area Manager

TABLE OF CONTENTS

TABLES

INTRODUCTION

Federal agencies are required to conduct watershed analyses to shift their focus from species and sites to the ecosystems that support them. The watershed scale was selected because every watershed is a well-defined land area having a set of unique features, a system of recurring processes, and a collection of dependent plants and animals. It is important to keep in mind that watershed analysis is ***not*** a decision-making process but rather a stage-setting process. It provides a systematic way to understand and organize ecosystem information. The result of a watershed analysis establishes the context for subsequent decision-making processes, including planning, project development, and regulatory compliance.

The watershed analysis process is a procedure used to characterize the human, aquatic, riparian, and terrestrial features, conditions, processes, and interactions (collectively referred to as "ecosystem elements") within a watershed. It provides a systematic way to understand and organize ecosystem information. A watershed analysis enhances the ability of federal agencies to estimate direct and cumulative effects of management activities and guide the general type, location, and sequence of appropriate management activities within a watershed. The watershed analysis process is also an iterative or incremental process that will incorporate new data and management strategies to reflect changing conditions and issues. This watershed analysis process is conducted by an interdisciplinary group of resource specialists.

This watershed analysis follows the approach developed in the documents entitled: *Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis* - Versions 2.1 and 2.2 . The process for conducting an ecosystem analysis at a watershed scale involves six steps: 1) the watershed is characterized through the identification of its ecosystem elements; 2) key issues and questions are identified for the ecosystem elements and management objectives of the watershed; 3) the current condition of the watershed is described by answering the key questions and describing current distribution, range and condition of the relevant ecosystem elements; 4) describes the changes in ecological conditions over time as a result of human influence and/or natural disturbances; 5) compares the information accumulated in steps 3 and 4 to explain significant changes in ecological conditions and their probable causes and evaluates the capability of the system to achieve key management plan objectives; and 6) brings to conclusion the results of the previous steps, focusing on management recommendations that are reflective of the watershed processes identified in the analysis. Data gaps and limitations of the analysis are also documented.

The maps referenced throughout the document are all located in Appendix A at the end of the document.

Deer Creek Watershed Analysis Team Members

The following resource professionals were on the interdisciplinary team that prepared this initial version of the watershed analysis:

Dale Johnson, Fisheries Biologist	--	Fisheries and Aquatics
Kip Wright, Wildlife Biologist	--	Wildlife
Frank Betlejewski, Forester / Silviculturist	--	Vegetation
Linda Mazzu, Botanist	--	Special Status Plants
Tom Murphy, Fire and Fuels Specialist	--	Fuels and Fire
Matt Craddock, Realty Specialist	--	Cultural and Minerals
Doug Lindsey, Engineer	--	Roads and Engineering
John McGlothlin, GIS Specialist	--	Geographic Information
Ted Hass, Soil Scientist	--	Soils and Hydrology
Laura Finley, Wildlife Biologist	--	Team Lead

The team would like to specially acknowledge Marji Luther for her data collection efforts during the analysis of the Deer Creek watershed.

I. CHARACTERIZATION OF THE WATERSHED

The Deer Creek watershed is located within the Klamath Mountain Geomorphic Province of southwestern Oregon approximately 15 miles southwest of Grants Pass (see Map 1 located in Appendix A). This 72,679 acre landscape receives from 40 to 55 inches of precipitation annually. This watershed ranges in elevation from near 1,300 feet above sea level to near 5,450 feet and has over 531 miles of creeks that drain into Deer Creek which is one of the major tributaries of the Illinois river and eventually the lower Rogue River. Between this network of creeks is forest vegetation at the higher elevations and grasslands and fields at the lower elevations. This watershed provides wood, recreation, agricultural commodities and other special products for human uses while providing habitat for many species of terrestrial as well as aquatic wildlife.

The Deer Creek watershed analyzed here is a fifth field watershed that includes six (6) sub-watersheds (sixth field watersheds) that were used to facilitate analysis of aquatic, terrestrial and human dimension domains (see Map 2). These sub-watersheds, with the exception of Clear Creek, all drain into Deer Creek to the east of the town of Selma. The Clear Creek sub-watershed is to the west of Highway 199 and Selma and drains an area of the watershed with many acres influenced by serpentine soils.

TABLE I-1: Sixth Field Watersheds in the Deer Creek Watershed

Sixth Field Watershed	Acreage (approx.)
Clear Creek	17,320
Crooks Creek	9,160
Draper Creek	6,545
McMullin / Thompson Creek	16,469
South Fork Deer Creek	14,110
White Creek	9,075
TOTAL - Deer Creek Watershed	72,679

A. PHYSICAL SETTING

Geomorphology and Soils

The Deer Creek watershed is an east-west elongate trending area in the north eastern portion of the Illinois Valley basin. The Deer Creek watershed consists of mountain side slopes and stream valley bottoms ranging in elevation from 1,308 to 5,445 feet above sea level. This watershed has a wide (approx. 0.5 to 1 mile) basin that has filled with sediments hundreds of feet deep. The surrounding mountains are

moderately steep to steep (45% to 65%) along the toe and mid slopes to very steep (80+%) in the headwalls of the watershed. Faulting occurs throughout the watershed with intrusions of ultramafic (serpentine) occurring in many areas. A large area of serpentine rock occurs in the western portion of the watershed near Eight Dollar Mountain (see Map 5). The soils identified in this area are mostly formed from alluvial and colluvium from altered sedimentary and igneous rock. There is a band of soils running along the western side of the watershed (Clear Creek sub-watershed) formed from serpentinite and peridotite parent material. Soil depth, texture and rock content vary between soils that make up the associations within the watershed. The general soil map units are Takilma-Foehlin-Kerby (2), Pollard- Abegg (4), Josephine-Speaker-Pollard (8), Beekman-Vermisa-Colestine (9), Pearsoll-Dubakella-Eightlar (11), Cornutt-Dubakella (12) and Jayar-Althouse (13) (see Map 6). Headwalls of the Crooks Creek, South Fork Deer Creek and Thompson Creek portion of the McMullin/Thompson Creek sub-watersheds are primarily composed of the Beekman-Vermisa-Colestine and Jayar-Althouse soil series which have high erosion potential, rapid runoff potential and Beekman-Vermisa-Colestine soils are subject to dry ravel and mass movement.

Hydrology

This area receives from 40 to 55 inches of precipitation annually with most coming in the winter. The mountainous area above 4,000 feet holds a snow pack for 3-4 months in most years. Below this elevation the majority of the precipitation occurs in the form of rain. The Deer Creek watershed has over 531 miles of streams including the main stem of Deer Creek which is nearly 24 miles in length. Due to the geology, rocky soils and steepness of the upper mountain side slopes water drains very quickly into the lower tributaries and main stem of Deer Creek. The snowpack in the mountains provides a continuous flow of water all year long to the South and North Fork of Deer Creek as well as Paradise Creek. The flows in White Creek and Dry Creek tend to "pool up" in late August through September. The lower main stem of Deer Creek exists in a relatively wide basin that allows it to frequently change course during high water flows. Water in the main stem of Deer Creek is intermittent below White Creek during the summer months. The flow continues to be intermittent until water from Lake Selmac allows the creek to flow continuously into the Illinois River.

Unique Land Forms

There are four limestone caves located within the watershed that are listed as significant caves under the Federal Caves Resources Protection Act of 1988. These caves possess one or more of the following features: (1) geologic or mineralogic features that are fragile, or that exhibit interesting formation processes or that are otherwise for study; (2) deposits of sediments or features useful for evaluating past events; (3) educational and scientific information. The four caves (Lake, No Name, Manzanita, and Crooks Creek) are located in the Crooks Creek sub-watershed and provide unique biological and recreational values to the Deer Creek watershed.

Fire Ecology

The historical fire regime of the Deer Creek Watershed is dominated by a low-severity regime at the lower elevations and transitions into the moderate-severity regime at its higher elevations. The low-severity fire regime is characterized as less frequent (25-100 year intervals) fires that are partial stand-replacement fires, including significant areas of high and low severity (Agee, 1990). The fire return interval is 20 years or less for the majority of the watershed, with the higher elevations at 25-35 years. This is an estimate based on work by Agee (1993) and Atzet (1988), who found presettlement fire return intervals averaging 18-20 years in the eastern Siskiyou Mountains.

The current fire regime is shifting to a high-severity regime. Fire is infrequent, burns with greater intensity, and can often be a stand replacement fire. These fires can burn for longer duration, and are not easily extinguished relative to the historical regime. The probability of stand replacement type of fire is currently much higher due to the fuel ladder created by the understory vegetation and woody debris build up. Historically, this tendency for increasing fuel buildup over time was kept in relative equilibrium by the frequent low intensity fires. The stability of the current vegetation is not as great as the former because of the lack of disturbance.

The watershed has had 281 fires within the boundary from 1967 to 1994 (ODF, 1995). The majority of the fires have occurred in the more densely populated areas for the watershed. Lightning caused 126 of the fires, the remaining 155 were human caused. Fires have been kept at small sizes since 1967, with only six fires over 10 acres, and one over 100 acres. In July of 1994, two large fires occurred within and adjacent to the watershed. The Eight Dollar Mountain fire burned 143 acres, 26 acres within the watershed. The Mendenhall Complex fire burned over 7,800 acres four miles southwest of the watershed.

Air Quality

The Deer Creek watershed is all within Class II Smoke Management lands. This classification allows Oregon Department of Forestry to regulate federal and industrial prescribed burning. The objectives of the plan which influence the Deer Creek watershed are general regional air quality. Concerns from smoke in the Deer Creek watershed center on impacts to local population areas. Prescribed burning smoke was not identified as a major issue for the Deer Creek watershed. It is understood, however, that concerns by individuals living within and adjacent to the watershed do exist.

B. AQUATIC AND RIPARIAN DOMAIN

Riparian habitat along the valley floor has been dramatically altered on both private and federal land. Historically, the entire valley floor served as a floodplain, with sloughs and backwaters adding to the overall complexity of the system. The riparian habitat varies in width according to soil types and topography.

Serpentine dominated soils generally have a narrow riparian zone, while more productive soils have a wider riparian zone. Surveys conducted early in this century (1916-1917) describe a wide thickly wooded riparian zone, dominated with large conifers. This area resisted burning, allowing conifers to mature, and resulting in heavy loading of large woody debris in the streams.

Riparian habitat on private ownerships is generally in poor condition due to past conversion to agricultural use. This has led to the filling of sloughs, backwaters, and areas that once were filled by flooding or subsurface flows from the river. Water from creeks is used domestically and for agricultural purposes. An impoundment exists on federal land in the Clear Creek sub-watershed, to provide irrigation water for the Deer Creek Ranch. This dam blocks any possible upstream migration for fish. McMullin Creek was dammed for irrigation purposes to create Lake Selmac and provides habitat for non-anadromous fish. Draper Creek, Davis Creek, Crooks Creek, McMullin Creek, Thompson Creek, White Creek, Dry Creek, and a number of unnamed tributaries provide habitat for anadromous fish and native trout species. Presently the riparian zone on private lands generally consists of a narrow band of hardwoods, with some areas lacking any vegetation at all. Currently the lower portion of Deer Creek is often limited to subsurface flows during the summer months offering limited refugia for aquatic species in the remaining scattered pools. Tributaries to lower main stem Deer Creek provide good water flows during the most of the season but become very low during the summer months.

Riparian condition on federal ownership varies due to past timber management activities.

C. TERRESTRIAL DOMAIN

Vegetation within the watershed is a result of climate, slope, and soil type. Soils found west of Highway 199 in the Squaw Creek drainage are generally low in fertility and water holding capacity. Present vegetation is limited to Jeffrey pine, shrubs (major shrub species are greenleaf manzanita, Oregon white oak and coffeeberry) and bunch grasses, with California-Laurel and incense cedar in the more mesic sites.

Habitat provided by areas of serpentine and peridotite soils (pine savannah) resemble sites found along the low elevation south and west slopes of the cascades. They are generally snow free during the winter and provide limited big game winter range. Casual observation indicates that black-tailed deer do not utilize shrub species in serpentine soils as readily as other soil types, probably due to the lower nutrient value or the absence or imbalance of some trace element.

Timbered stands offer refugia for wildlife from temperature extremes due to the relative open conditions of adjacent serpentine slopes. This is particularly true for multi-canopied stands which offer a wide range of micro-niches. These stands are critical for wildlife dispersal of old-growth dependent species between the Deer Creek watershed and the Kalmiopsis wilderness.

Soils on the east side of Highway 199 produce vegetation that is more typical of southwest Oregon. Vegetation varies more with aspect and elevation than soil, except for areas with serpentine/peridotite inclusions. Lower elevation areas were historically dominated by open stands of large conifers and oak/grasslands kept free of conifers and shrubs due to fire. Currently most private lands in the valley have been converted to agriculture and livestock grazing, reducing the amount of conifers on the valley floor and restricting native oak/grasslands and ponderosa pine savannahs to remnant stands. In addition, fire has been largely excluded for nearly 80 years, which has allowed pine, fir and cedar to become firmly established in the understory of oak woodlands. This threatens the continued long term existence of the woodlands. Other threats to this habitat include urbanization, introduction of exotic plants, and changing of natural drainage patterns. Currently oak woodlands are very limited in both quantity and quality.

Ponderosa pine stands have also been encroached upon by less fire tolerant species. Their current condition is also reflective of past high grade logging that has occurred throughout the watershed. Large ponderosa pine snags are being lost in the watershed at a rate greater than they are being replaced. The loss of these habitat types will continue to contribute to the decline of associated species of wildlife.

The mixed coniferous plant communities that are dominant on the slopes of the east side of Highway 199 have been heavily impacted by logging on both private and federal lands over the last 50 years. Timber harvest on private land began to increase in the late 1980's. Currently most private lands are in early seral stage to pole stage, with little mature forest. Timber stands on federal lands range from recent clearcuts to unmanaged old-growth stands. Due to the checkerboard ownership pattern of the BLM, and previous harvest entries, remaining mature and old-growth habitats are widely scattered and do not provide adequate dispersal paths for many low mobility species. In addition, a large percent of the remnant old-growth stands are too small to serve as quality habitat for interior forest late-successional species. Nevertheless, remnant stands of older forest provide habitat for animals with small home ranges, some level of dispersal for old-growth species, thermal cover for big-game, habitat for soil organisms, refugia for bryophytes and fungi (mycorrhiza), and are anchor locations for expanding this habitat type in the watershed.

Within the Deer Creek watershed, fourteen Special Status plant species have been found (BLM Siting Reports and state of Oregon databases). Nine of these species are classified as Federal Candidates under the Endangered Species Act (one Federal Candidate is also a SEIS Special Attention species) and five are classified as Bureau Assessment species. Three other Special Status plant species have been found adjacent to the watershed in habitats similar to those within the watershed, suggesting that such species may also be present in Deer Creek. The majority of Special Status plants have been found in serpentine soils. Most occur in the vicinity of Eight Dollar Mountain, both in and outside of the Deer Creek watershed (part of Eight Dollar Mt. is in the Kerby watershed). Other serpentine belts do occur in the watershed, but have not been systematically inventoried as in the Eight Dollar Mountain area.

D. HUMAN DOMAIN

Land Status - Ownership

Table I-2 summarizes the land ownership pattern in the Deer Creek watershed. See also Map 3.

Table I-2: Land Status - Ownership

Owner	Acres	% of Watershed	
Federal -BLM	29,924	41%	
Federal - USFS	9,067	12%	In Squaw, Clear and Anderson Creeks
State of Oregon	1,308	2%	
Josephine County	2,150	3%	
Private - Forest Industry	11,475	16%	
Private - Non-industrial owners	18,755	26%	
TOTAL	72,679		

Within the private nonindustrial ownership the lands are zoned farm/forest with 4,224 acres zoned as lots less than 20 acres in size. These areas are considered by the BLM to be Rural Interface Areas (RIA) and require varied management activities to reflect this proximity to residences. Fourteen percent (14%) of BLM administered lands are within ¼ mile of private lands and subject to RIA consideration.

The Northwest Forest Plan (*Record of Decision for Amendments to Forest Service and Bureau of Land Management Planing Documents within the Range of the Northern Spotted Owl, and Standards and Guidelines for Management of Habitat for Late-successional and Old-growth Forest Related Species Within the Range of the Northern Spotted Owl, April 1994*)) and the Medford District's Resource Management Plan (June 1995) made a variety of land use allocations as a framework within which federal land management objectives vary. Together, they are designed to meet the broader objectives of the regional plans. Table I-3 summarizes these allocations as they occur within the Deer Creek watershed. (See Map 4)

Table I-3: Land Status - Land Use Allocations (NFP, RMP) on BLM administered lands (8/1/97)			
Land Use Allocation	BLM Acreage	% of BLM in Watershed	
Congressionally Reserved Areas	0		
Late Successional Reserve	16,394	53.5%	Includes Brewer Spruce RNA and Crooks Creek ACEC
Spotted Owl Core Areas	723	2.4%	
Adaptive Management Areas	0		
Administratively Withdrawn Areas			
Within LSR:	1,628	5.3%	
Brewer Spruce RNA	1,479	4.8%	Located within LSR - acreage *included* in LSR above.
Crooks Creek ACEC	149	0.5%	Located within LSR - acreage *included* in LSR above.
Within Matrix:	602	2.0%	
Eight Dollar Mtn ACEC	552	1.8%	(congruent with Murrelet Reserve)
Murrelet Reserve	552	1.8%	(congruent with Eight Dollar Mtn ACEC)
Lake Selmac R&PP Lease	50	0.2%	Recreation Site
Riparian Reserves	--		Acreage not determined - included in other allocations
Matrix	12,205	39.8%	
TOTAL - BLM	30,647		
Other Allocations (RMP)			
White Creek Deferred watershed	1,955		Includes 362 ac Brewer Spruce RNA, 1,298 ac of LSR, and 295 ac of Matrix
Botanical Emphasis area	659		Comprised of 552 ac of Eight Dollar Mtn ACEC and 107 ac of Matrix

Social Overview

Southwest Oregon has had human occupation for at least the last 10,000 years. Aboriginal inhabitants over time developed cultural adaptations to long-term occupation of the area and developed hunter/gatherer

economies with a gradual increasing dependence on anadromous fish. In the 1850's aboriginal cultures were impacted and changed forever by the exploration and settlement of the area by non-native cultures centered around the quest for gold. Gold was the cornerstone of mineral development in Josephine County. Placer gold mining dominated in the early period of Euro-Asian economic development of the area. The most important placer mines in the Deer Creek drainage were located near the mouth of Deer Creek and the Illinois River. The level of hydraulic gold mining operations was low in the watershed. Mining began to play out in the Illinois Valley in the 1870's and the low elevation lands in the Deer Creek watershed became developed for agricultural uses. A post office and town was established in Selma in 1897 to accommodate the increasing population of residents in the valley. The need for a clearing house of farming knowledge was met with the establishment of Josephine County's first Grange at Deer Creek in 1907.

Logging and lumbering begin as a support industry for the mines in the 1850's. When the mines played out the level of logging fell until the 1920's when rail connections and roads began to tie the valley to outside markets. In the early years of logging in the Deer Creek watershed there were several portable mills that were operated. From the 1950's to the 1980's the timber industry was a significant component of the economy and employer of residents within the watershed. Market fluctuations, equipment modernization and diminishing availability of federal timber have resulted in several of the mills and logging companies in the area merging or going out of business. The population demographics have gradually shifted to include greater percentages of retired and younger ex-urbanite citizens with a diminishing reliance on the timber industry for work and income.

Recreation in the watershed for both residents and visitors is tied to outdoor related activities. Lake Selmac provides developed camping and fishing opportunities and federal lands provide access to informal campgrounds, hiking, biking and horse trails.

Regulatory Constraints

Applicable laws that guide federal land management in the watershed include: Endangered Species Act (ESA), Clean Air Act, Clean Water Act, National Environmental Policy Act (NEPA), Federal Land Policy and Management Act (FLPMA), the National Historic Preservation Act (NHPA), the National Forest Management Act (NFMA), Multiple-Use Sustained-Yield Act and the O&C Act.

Applicable plans that guide federal land management in the watershed include: The Northwest Forest Plan (*Record of Decision for Amendments to Forest Service and Bureau of Land Management Planing Documents within the Range of the Northern Spotted Owl, and Standards and Guidelines for Management of Habitat for Late-successional and Old-growth Forest Related Species Within the Range of the Northern Spotted Owl, April 1994*)), the BLM-Medford District's Resource Management Plan (June 1995) and the Forest Plan for the Siskiyou National Forest.

II. ISSUES AND KEY QUESTIONS

Issues and key questions were identified in order to focus the analysis on elements of the ecosystem. The gathering and analysis of data, current and reference conditions, as well as the anticipated future changes in the watershed will be related to these issues and key questions. The issues listed reflect the interdisciplinary team's prioritization of concerns about the watershed and which are the focus for this iteration of this watershed analysis.

The prioritization of key issues for future management of the landscape will be based on the direction provided in the Northwest Forest Plan, the Medford BLM District Resource Management Plan and the Siskiyou National Forest Plan (for federal lands) and the State of Oregon's Forest Practices Act and Oregon Department of Environmental Quality regulations (for non-federal land). The designated land use allocation (LUA) determines the management objectives of the federally managed lands. Federal lands within the watershed are designated as Riparian Reserves, Matrix, mapped and unmapped Late-Successional Reserves. Within these umbrella LUA's, the Medford District RMP designates other primary uses for resources within the watershed. These other resources include Research Natural Areas (RNA's), Areas of Critical Environmental Concern (ACEC's), recreation areas, viewsheds, and a portion of the Illinois Valley Botanical Emphasis Area (BEA) (See Map 4). All of these designations provide direction in allocating resources differently but they all contain similar provisions as well.

The Deer Creek watershed is approximately 32% private land that is zoned commercial forest land and is managed by the guidelines of the State Forest Practices Act. Other objectives stem from the recent Governor's Oregon Coastal Salmon Restoration Initiative, in both the Southwest Oregon Coho Recovery Plan and the Southwest Oregon Salmon Restoration Initiative.

Listed below are the key issues and questions as well as a brief description of indicators that assist in answering the key questions to be addressed in this iteration.

A. KEY ISSUE -- WATER QUALITY AND QUANTITY

Key Questions:

- What are the primary factors affecting water quantity and quality in the Deer Creek watershed?

- How do past, current and future forest management/timber harvest activities affect water quantity and quality?

- How do past, current and future agricultural and rural development activities affect water quantity and quality?

- What are the types of management opportunities (if any) that should be considered for the deferred White Creek sub-watershed?

Indicators:

- Water quality standard established by the Oregon Department of Environmental Quality.

- Comparison of water quantity needs and availability for in stream use (fish, wildlife, recreation) as well as for domestic, irrigation and mining use.

B. KEY ISSUE -- RIPARIAN AND AQUATIC HABITAT

Key Questions:

- What are the current riparian conditions and how do they affect fish and aquatic species distributions and population levels in the Deer Creek watershed?

- What are the levels and condition of habitat for anadramous and resident fish provided by the sub-drainages in the Deer Creek watershed?

- What are the factors affecting stream productivity and habitat quality for fish populations in each sub-drainage?

- What are the fish distribution, passage and population trends in the Deer Creek watershed?

Indicators:

- Baseline surveys have been conducted that provide information on temperature, turbidity, sedimentation, numbers and depths of pools, large woody material, riparian vegetative condition, stream morphology, channel stability, stream diversions and blockages. This data will be analyzed with respect to the environmental conditions necessary for various species of fish as well as other aquatic and riparian associated species.

Key Question:

- How do the riparian conditions in the Deer Creek watershed affect anadramous fisheries in the Illinois River?

Indicators:

- Comparisons of stream miles of habitat currently available with miles potentially available. Evaluations of current habitat quality.

C. KEY ISSUE -- FIRE MANAGEMENT

Key Questions:

- What should the role of fire be in management of the watershed?

- What is, and can be done to reduce, the wildfire hazard and risk in the rural interface and residential areas of the watershed?

- What should the role of fire be in the future management of the late-successional reserves and habitat within the watershed?

Indicators:

- Fire hazard ratings are developed through compilation of existing forest stand condition, fire behavior and effects. Fire risk is an assessment of information based on ignition source (natural and human) and expected frequency. In combination this data can be used to asses current conditions and to recommend management activities that can be used to reduce hazard.

- Comparison of current conditions to reference conditions in the watershed can help to define the role of fire in all areas and habitats in the watershed.

D. KEY ISSUE -- VEGETATION CONDITION

Key Questions:

- What is the landscape pattern of vegetation conditions that are desired in the watershed to sustain healthy ecosystems and meet the needs and values of human communities?

- What types of management activities should be used to maintain and/or improve late successional forest habitats in the designated Late-successional Reserve?

- What are the impacts of noxious weeds and introduced pathogens/species on endemic species and what is their occurrence and rate of spread in the watershed?

- What are the threats to the special status and special emphasis plant species existing in the watershed and how should we manage for them?

- What role has fire and other natural disturbance processes had in the development and maintenance of plant communities and how has fire suppression affected:
    - Structure and composition?
    - Health, vigor and stability of existing forests?
    - Amount and distribution of seral stages?

- What affect has forest management practices and rural development activities had on:
    - Structure and compostition?
    - Health, vigor and stability of existing forests?
    - Amount and distribution of seral stages?

Indicators:

- Analysis of current vegetation and plant series data and comparison to an earlier reference condition.

- For special status plant species the analysis of available data on species present and how a variety of human uses and activities may affect suitable habitat or dispersal habitat for those species.

- Trends of plant species and communities within the watershed, within the province and within these species'/communities' distribution ranges.

E. KEY ISSUE-- TERRESTRIAL WILDLIFE

Key Questions:

- What are the primary factors affecting the habitats, distribution and populations of wildlife species in the Deer Creek watershed?

- What are the threats to the special status and special emphasis wildlife species existing in the watershed and how should we manage for them?

- What affect has settlement and associated human activities (*e.g.*, timber harvest, home construction, agriculture, fire suppression) had on the development and maintenance of wildlife habitats:
    - Spatial distribution?
    - Composition wildlife communities?
    - Populations of endemic wildlife species?
    - Availability and suitability of key habitat structural components (*e.g.*, snags, down wood, canopy layering, vegetative species diversity)?

- What is the quality and condition of riparian reserves and how should these areas be managed to provide suitable dispersal and connectivity habitat for terrestrial as well as aquatic species?

- What and where are the special and unique habitats (*e.g.*, talus slopes, rock outcroppings, seeps etc.) and how should they be managed?

Indicators:

- Analysis of current vegetation and plant series data as to its amount, quality and spatial arrangement.

- Analysis of available data on species presence and how a variety of human uses and activities may affect suitable or dispersal habitat for those species.

- Trends of species and communities within the watershed, within the province and within these species/communities distribution range.

F. KEY ISSUE -- SPECIAL and UNIQUE AREAS

(Brewer Spruce RNA, Crooks Creek ACEC, Illinois Valley BEA; and Crooks Creek, Lake, No Name and Manzanita caves)

Key Question:

- How should the values associated with these areas be managed for and how will the management of lands around them affect their special and unique attributes?

Indicators:

- None identified.

G. KEY ISSUE -- HUMAN USES

Key Questions:

- What are the primary human uses and values associated with the watershed's resources?
- What are the current and potential recreation needs and opportunities?
- What are the commodities that people living both in and outside of the watershed boundary expect to be produced and at what levels?
- What are the future trends of human population in the watershed and will it be able to provide sufficient resources, such as water, for its inhabitants?
- What is the transportation access needed in the watershed to meet the needs and challenges of mixed private/public ownership patterns?
- What effect does the amount, location and management constraints of private land ownership have on all other previous key issues?

Indicators:

- The number and types of public requests for information and/or complaints filed over competing uses of public land.
- Levels of authorized activities including: firewood cutting, timber harvesting and hauling, mining and special forest product collection.
- Levels of unauthorized activities including: non-permitted firewood cutting, timber theft, improper water withdrawal, dumping and occupancy.
- Levels of casual recreation including: hiking, OHV use, horseback riding, fishing, hunting, camping and spelunking.

III. CURRENT CONDITION

A. WATER QUALITY AND QUANTITY

There are approximately 379 miles of perennial streams and 152 miles of intermittent tributaries in the Deer Creek watershed (See Map 7). The majority of the streams in the upper elevations of the watershed are relatively straight with high stream gradients and a moderate to low width to depth ratio (Rosgen type A). Streams at the mid to lower elevations are of lesser gradient, moderately sinuous and entrenched (Rosgen types B and G). Deer Creek and the lower reaches of White Creek and Draper Creek have a low gradient and are low to moderately sinuous and entrenched (Rosgen type B) there are locations where the Deer Creek channel is braided (Rosgen type F).

Stream channel substrate in the upper reaches is generally bedrock or large cobble and is very efficient in moving sediment and debris to lower portions of the watershed. As the gradient decreases material cannot be as easily moved. As a result, the channel substrate is more alluvial in nature. The substrate of most of the streams in the lower reaches is cobbles and gravel with some intermittent sand.

The stream ecosystem is very much dependant on seasonal precipitation. During the winter and spring the streams flow with an abundance of water, but in the late summer and early fall the streams, except in the case of North Fork Deer Creek and Paradise Creek are reduced to very low flows and intermittent pools. The small amount of water that does flow in the streams during the summer months is usually diverted for irrigation and/or domestic purposes. The remaining pools are a vital refuge for most of the aquatic species during that time of the year.

Water quality in the streams of the Deer Creek watershed is generally fair. The parameters that limit water quality in this watershed are sedimentation, low summer flow and water temperature. Elevated sediment loads increase channel width and decrease channel roughness as pools become filled. Suspended sediments contribute to turbidity and thus affect light transmission through the water and to the streambed. Effects of turbidity on stream biota are related to, but sometimes not clearly distinguished from, the direct effects of suspended sediment. Suspended sediments can abrade and suffocate periphyton, as well as decrease primary production (photosynthesis rate) because of light reduction and it can disrupt respiration and modify behavior of invertebrates. For fish respiratory capacity of gill surfaces may be lost and vision and feeding efficiency diminished

Water quantity is a limiting factor in most of the streams in the Deer Creek watershed. The creeks located in each of the subwatersheds are perennial but exhibit very low flows in the late summer. These streams as well as the main Deer Creek channel are often reduced to no more than intermittent pools with most of the water moving below the surface. Water diversions for human uses greatly reduces summer flows.

Table III-1 summarizes some watershed conditions/factors that influence the current hydrologic process in the Deer Creek watershed.

Table III-1: Summary of Conditions / Factors Influencing the Current Hydrologic Process

Cumulative Analysis Area	Equivalent Clearcut	Compacted Area	Transient Snow Zone Openings	Average Road Density / Section (mi)	Year Evaluated
Anderson Deer	nd	nd	nd	nd	nd
Draper Creek	10.7%	6.5%	n/a	11.4	1992
Thompson Deer	7.0%	8.9%	5.4%	5.5	1994
McMullin Deer	18.8%	7.7%	n/a	11.4	1996
Crooks Creek	13.2 %	8.7%	0.7%	9.8	1993
White Creek	20.4%	8.2%	n/a	11.8	1993
White Deer	7.7%	6.9%	n/a	4.8	1994
North Deer	2.1%	3.1%	0.7%	3.0	1994
South Fork Deer Creek	nd	nd	nd	nd	nd

Footnotes: nd = not data, n/a = not applicable

B. RIPARIAN AND AQUATIC HABITAT

Aquatic Habitat

Table III-2 summarizes the general stream habitat condition in the Deer Creek Watershed for all ownerships.

Table III-2: Stream Habitat Condition in the Deer Creek Watershed

Subwatersheds	Estimated Condition (all stream orders)			Total (mi)
	Poor (mi)	Fair (mi)	Good (mi)	
Deer Creek Mainstem and Dry Creek	12	4	3	19
South Fork Deer Creek	1	3	9	13
North Fork Deer Creek	0	0	4	4
White Creek	1	1	0	2

Table III-2: Stream Habitat Condition in the Deer Creek Watershed

Subwatersheds	Estimated Condition (all stream orders)			Total (mi)
	Poor (mi)	Fair (mi)	Good (mi)	
Thompson Creek	8	2	0	10
McMullin Creek	0	5	5	10
Crooks Creek	1	1	0	2
Draper Creek	3	1	0	4
Anderson Creek	5	0	0	5
Clear Creek	2	0	0	2
Squaw Creek	2	0	0	2
TOTAL				73

Data sources: Oregon Department of Fish and Wildlife, BLM, USFS.

The upper elevations of Deer Creek are composed of narrow canyons with steep side slopes. The middle elevations are canyons with some smaller floodplain side slopes. Lower Deer Creek is a wide alluvial valley. Most BLM streams are located in narrow floodplains or canyons and are inhabited by trout, steelhead, coho salmon and chinook salmon. Trout and steelhead inhabit to the upper stream reaches and coho and chinook inhabit the lower stream reaches with stream gradients of 3% or less.

Deer Creek and most of its tributaries have been channelized from agricultural practices and road construction. Channelizing has prevented the streams from meandering and forming side channels. Meandering side channels provide more fish habitat or refugia than a single channel. Channelizing the streams has disconnected the floodplain from the channel and has decreased fish rearing capability over the past century. Presently there is little connectivity between the stream and the floodplain in the low gradient alluvial valley. Few, if any, side channels exist for fish rearing. Channelization also causes water flows to accelerate with a consequent decrease in fish and insect production.

Major changes in the watersheds have occurred from agricultural water diversions, timber harvesting and road development. Diversions from streams for irrigation and mining purposes combined with century old water rights have significantly decreased the amount of water available to fish, especially during low flow periods. Irrigation withdrawals are the primary reason for the decline in the anadromous fishery. Juvenile anadromous fish can't migrate to the ocean because the tributaries are dry from irrigation withdrawals.

Timber harvesting in riparian zones in parts of the watershed has caused a loss of large woody material (LWM) from the riparian zones and a diminished recruitment pool of conifer trees for future LWM. Due to this, recruitment of large wood to the streams won't be of significance for another 50-150 years.

In the 1970's and 1980's timber harvesting accelerated. During this time coho salmon production dropped by 90%.

In general, road development near streams channelizes the streams, precludes stream meander and acts as heat sinks. This transfers a substantial amount of heat to the riparian area with a consequent stream temperature increase.

The cumulative effect of past management activities is a substantially altered timing and quantity of erosion and changes in stream channels, all which impact fish production. Streams and riparian conditions on federal lands are in much better condition than streams on private lands. During low flow periods, water flowing from federal lands is withdrawn for irrigation, leaving intermittent pools or a dry streambed.

Fisheries

Fish Distribution and Abundance

Deer Creek has approximately 73 miles of fish habitat for winter steelhead, coho and fall chinook salmon and resident cutthroat trout. Miles of habitat is represented as follows: coho, 46; chinook, 9; steelhead, 57; and trout, 73 (See Maps 8 and 9 and Table III-3). North and South Forks of Deer Creek, Crooks, Dry, Paradise and McMullin have the highest potential for anadromous fish production as they provide some of the best habitat for anadromous fish. Critical habitat characteristics include stream bed substrate quality and quantity available for spawning, pools for rearing, and quality and quantity of water required for fish survival. Most tributaries are dewatered and are considered "areas of lost fish production." Nongame species such as speckled dace, Pacific lamprey, sculpin, and redside shiner also inhabit streams.

Lake Selmac supports a warm water and cold water recreational fishery. Hatchery trout supplement the fishery. Bass were introduced in the 1960's.

Systematic fish habitat condition information is not presently available. Habitat condition assessments, summarized in Table III-3, are consequently subjective.

Table III-3: Fish Habitat Condition in Deer Creek

Stream	Condition [1]	Factors Limiting Potential Stream Productivity[2]
Deer Creek Mainstem and Dry Creek	F	W,A,TE,C,R,T
South Fork Deer Creek	G	W,A,C,R,T
North Fork Deer Creek	G	W,A,C,R,T
White Creek	P	W,A,TE,C,R,T
Thompson Creek	P	W,A,TE,C,R,T
McMullin Creek	F	W,A,C,R,T
Crooks Creek	F	W,A,C,R,T
Draper Creek	P	W,A,TE,C,R,T
Anderson Creek	P	W,A,TE,C,R,T
Clear Creek	P	W,A,TE,C,R,T
Squaw Creek	P	W,A,TE,C,R,T

Footnotes: 1. The fish habitat condition is a subjective judgement. The following categories are used: G = Good, F = Fair, P = Poor

2. W = Water diversion
A = Agricultural practices
TE = Temperature
C = Channelization
R = Road location
T = Timber harvest-related (i.e., timber harvest near streams, soil erosion from roads or from tractor logging)

Table III-4 summarizes the current distribution and relative abundance of salmonid species in the watershed.

Table III-4: Distribution and Relative Abundance of Salmonid Species in the Deer Creek Watershed

Stream	Species	Estimated Fish Habitat (miles)	Relative Abundance
Deer Creek Mainstem	Steelhead	15	C
	Chinook	5	C
	Coho	12	C
	Cutthroat trout	19	C
South Fork Deer Creek Subwatershed	Steelhead	9	C
	Coho	7	C
	Cutthroat trout	13	C
North Fork Deer Creek Subwatershed	Steelhead	2	C
	Coho	2	C
	Cutthroat trout	4	C

Table III-4: Distribution and Relative Abundance of Salmonid Species in the Deer Creek Watershed

Stream	Species	Estimated Fish Habitat (miles)	Relative Abundance
White Creek Subwatershed	Steelhead	2	C
	Coho	1	C
	Cutthroat trout	2	C
Thompson Creek Subwatershed	Steelhead	8	C
	Coho	7	C
	Cutthroat trout	10	C
McMullin Creek Subwatershed	Steelhead	8	R
	Coho	7	R
	Cutthroat trout	10	R
Crooks Creek Subwatershed	Steelhead	2	C
	Coho	2	C
	Cutthroat trout	2	C
Draper Creek Mainstem	Steelhead	3	C
	Coho	3	C
	Cutthroat trout	4	C
Anderson Creek Subwatershed	Steelhead	4	C
	Coho	3	C
	Cutthroat trout	5	C
Clear Creek Subwatershed	Steelhead	2	C
	Coho	1	C
	Cutthroat trout	2	C
Squaw Creek Subwatershed	Steelhead	2	C
	Coho	1	C
	Cutthroat trout	2	C

Footnotes: A = abundant C = common R = rare NP = not present P = present

Fish Barriers

Irrigation diversion dams divert waters from the lower reaches of many streams until they go dry in the summer, effectively precluding fish movement.

Currently, there are nine road culverts on BLM roads that restrict passage of juvenile salmonids. These culverts are also undersized and incapable of accommodating peak flows of a 100 year run-off event (the current BLM culvert design standard). These culverts are listed in Table III-5.

Table III-5: BLM Road Culverts which obstruct Fish Passage in the Deer Creek Watershed

Stream	Road Number	Sec.	Quarter Sec	Culvert Dimensions L x W X H (ft)	Slope (%)	Culvert Outfall Drop (ft.)	Allows Juvenile Fish Passage?
South Fork Deer Creek	39-6-4	4	NE/SE	90x6	5	3	no
South Fork Deer Creek (Tributary #2)	38-7-13	33	SE	100x6	20	4	no
South Fork Deer Creek (Tributary #1)	38-6-13	29	NE	75x10	10	1	no
White Creek #1	38-6-18	25	NW	70x8	10	3	no
White Creek #2	38-7-25.1	25	SW	70x5	20	0	no
Thompson (Tributary #1)	38-7-21.2	21	SE	45x4	5	0	no
Thompson (Tributary #2)	38-7-27	34	SW	70x6	5	3	no
Draper Creek #2	37-7-31	31	NW/SW	85x8x6	0	1.5	no
Draper Creek #3	37-7-31	31	NE	60x8x6	0	1	no

Fish Habitat Improvement

BLM has constructed log drop structures since the 1970's to enhance spawning and rearing area for salmonids. These structures are located on North Fork Deer Creek and Crooks Creek.

Macro invertebrates

A lack of cool water, habitat complexity and diversity results in a very low macro invertebrate productivity. In the upper watershed, scour of the stream bed frequently occurs which also inhibits cool water macroinvertebrate production. Lower in the watershed the lack of pools, a meandering channel and the lack of large woody material inhibits a large macroinvertebrate population. Table III-6 summarizes one assessment of benthic productivity in the Deer Creek watershed.

Table III-6: Deer Creek Watershed Benthic Macroinvertebrate Bioassessment Rating (Wisseman 1992)

Stream	Riffle Habitat	Margin Habitat	Detritus Habitat
South Fork Deer Creek	High	Medium	Low

Footnotes: 80 - 100% : High habitat/biotic integrity
60 - 79% : Moderate habitat/biotic integrity
40 - 59% : Low habitat/biotic integrity
<40% : Severe habitat/water quality limited

Flows and Temperatures

Diel water temperature fluctuation is one of the primary factors affecting salmonid survival. Fluctuations greater than 10° F for durations of one week or more can be detrimental. Temperatures over 58°F for extended time periods can produce secondary mortalities, latent mortality and thus diminished fish population viability. Seven day average temperatures are summarized in Table III-7. These figures do not depict the complete impact of high fluctuating temperatures for long and frequent durations. Salmonids prefer water temperatures at 58°F (SAT, 1995), anything in excess may cause secondary infections, decrease growth, and mortality, decreased condition factor and fitness.

Table III-7: Seven Day Average High Stream Temperatures

Stream	Temperature (°F)	Rating
North Fork Deer Creek	53.7	optimum
South Fork Deer Creek	65.3	<optimum
Crooks Creek	60	optimum
Draper Creek	63.5	<optimum
Dry Creek (above confluence of N&S Forks of Deer Creek	62.5	<optimum
Paradise Creek	59.3	optimum
White Creek	62.9	<optimum

Footnotes: These values are for Federal lands where water is relatively cool. Values for private lands would easily be in the 70's and 80's.

RATINGS: Optimum = < 60 °F (preferred water temperatures for extended periods with low variability in diel fluctuation)
< Optimum = 60 - 70 °F (tolerable with increased potential for secondary mortality, especially for extended and frequent periods with high variability in diel fluctuation
Limiting = 70 - 75 °F (lethal or intolerable/extremely high potential for mortality, especially for extended and frequent periods with high variability in diel fluctuation)

Summer stream temperatures are influenced greatly by the number of springs providing cool water, irrigation withdrawals, the amount of shade, topography, and large woody material in the stream. The lack

of water flow, trees and vegetation in the riparian zones of the Deer Creek watershed is a major limiting factor for fish production. Flows in late summer and fall are intermittent or non-existent and pools are formed containing isolated fish populations. Water temperatures are high and oxygen levels are low due to the limited shading and low water flows.

The watershed receives a sufficient amount of precipitation (rain and snow) to sustain most fish populations were it not for the currently large water withdrawals.

Tributaries on federal land are in fair to good condition for fish production. The mainstream Deer Creek severely limits or prohibits fish production. Many valley bottom streams are dewatered from irrigation withdrawals in the summer and young salmon cannot migrate to the ocean through private lands.

Special Status Species

The National Marine Fisheries Service listed the Northern California and Southern Oregon coho salmon as a threatened species on May 6, 1997. Klamath Province steelhead were proposed as threatened on March 16, 1995 (See Table III-8).

Table III-8: Special Status Fish Species Inhabiting the Deer Creek Watershed

Species	Status
Steelhead	• All coastal stocks have been petitioned for Federal T&E status • Proposed listing as a threatened species is August 9, 1997.
Coho salmon	- Federally listed - threatened species • State of Oregon sensitive (ODFW 1992)

Riparian Habitat

Systematic riparian habitat condition data/information is not yet available.

Riparian habitat varies in width according to soil types and topography. Serpentine dominated soils generally have a narrow riparian zone, while more productive soils have a wider riparian zone. The riparian zone of Squaw Creek is narrow, dominated by Douglas-fir, ponderosa pine, incense cedar, Port Orford cedar, California black oak, Oregon ash, red alder, California laurel and willow. The riparian area on federal land within the Squaw Creek drainage is in good condition reflecting little or no timber harvest activity. As early as 1916, a small irrigation ditch ran adjacent to Squaw Creek utilizing the waters for agricultural purposes. Currently this ditch is no longer in use but an impoundment exists on federal land, to provide irrigation water for the Deer Creek Ranch. This dam blocks any possible upstream migration for fish.

The Clear Creek and Anderson Creek drainages are primarily managed by the Forest Service with the lower reaches being privately owned. Riparian condition of those portions of the creek under federal ownership varies due to past timber management activity. The riparian habitat on private ownership is generally in poor condition due to conversion to agricultural lands and past filling of sloughs, backwaters and areas that were historically filled by flooding or subsurface flows from the river. Water from the creek is used domestically and for agricultural purposes.

Riparian habitat along the valley floor has been dramatically altered on both private and federal land. Historically, the entire valley floor served as a flood plain, with sloughs and backwaters adding to the overall complexity of the system. Keystone aquatic species such as beaver, modified the environment, by adding woody material to the streams and aiding in water storage. Surveys conducted early in this century (1916-1917) describe a wide thickly wooded riparian zone, dominated with large conifers. This area resisted burning, allowing conifers to mature, resulting in heavy loading of large woody debris in the streams. This material added to the overall complexity of the aquatic system that is lacking today. Harvest of conifers within the riparian zone has taken place on both private and federal land. Presently the riparian zone on private lands generally consist of a narrow band of hardwoods, with some areas lacking any vegetation at all. The condition of the riparian zone on federal lands varies from intact old-growth in parts of the upper portions of the watershed, to narrow bands of hardwoods in the lower fish productive "flats". Irrigation withdrawals are known to have occurred prior to 1916 in Crooks Creek and Deer Creek. A private irrigation ditch located in T. 38 S., R. 7 W., Section 13 was removing up to 990 gallons of water per minute in October 1916. Currently the lower portion of Deer Creek has subsurface flows during the summer months offering limited refugia for aquatic species in the remaining scattered pools.

C. FUELS AND FIRE MANAGEMENT

The existing fire situation has been created by 70-80 years of successful fire suppression and by 100 years or more of forest management. The most common ignition source of naturally-occurring fires is lighting. However, with the arrival of people in the forest the relative importance of man caused ignitions has increased.

The following definitions will be used to describe the current fire situation in the subsequent tables:

Hazard: Current condition of the fuel profile. Stated as low, moderate, or high. Based on vegetation condition, fuel continuity, aspect, position on slope, slope percents, access, etc.

Risk: Ignition sources, human and lightning. Stated as low, moderate, or high. Based on historical lightning activity, human use such as residential and rural interface areas, recreation activity, and transportation routes. Includes land ownership, and values at risk within the assessment area.

Ratings can be given for individual components of the assessment area (*e.g.*, stands by serial stage, geographic areas within assessment area, etc.) or for the assessment area as a whole. This information would be used in analysis in conjunction with data on areas of high value to identify an overall risk potential to resource loss from wildfire and to identify priority areas requiring efforts to minimize that potential for loss.

1. Hazard

Assumptions used in assigning HIGH, MODERATE, LOW status were as follows: The premise used in assigning the status is fire behavior and effects. Fire behavior refers to resistance to control and potential for fire to escape initial attack and become a ten acre or larger fire. Fire effects refers to potential for the fire to become a stand replacement fire which largely kills the conifer overstory or destroy the long term value of an area. Analysis phase will refine this through field data collection.

HIGH Hazard: Includes vegetation classes 4, 5, 6, some 7 and 8 with McKelvey Classes 1, 2. This was a judgement call based on the known vegetation and fire behavior characteristics in stands of these types. Eight Dollar Mountain is included because as yet no data is available on the role of fire in the life cycle of the Special Status Plants present so the long term impacts of a fire are unknown.

MODERATE Hazard: Vegetation classes 5, 6, 7, 8, based on size, intactness, continuity, and location. Generally smaller and less fuel continuity then HIGH.

LOW Hazard: Vegetation classes 1, 2, 3, and cleared or cultivated lands. Also includes low commercial timber sites such as the serpentine areas with grasses and widely scattered trees.

Table III-9 summarizes the assessment classifications as of February 1995.

Table III-9: Hazard Classification Deer Creek Watershed

OWNERSHIP	HIGH HAZARD	MODERATE HAZARD	LOW HAZARD
BLM ACRES 29,922	12,770 42%	13,039 44%	4,113 14%
FOREST SERVICE ACRES 9,067	2,012 22%	3,252 36%	3,803 42%
OREGON STATE ACRES 1,310	850 65%	260 20%	200 15%

JOSEPHINE COUNTY ACRES 2,149	1,005 47%	1,144 53%	0 0%
PRIVATE FOREST INDUSTRY ACRES 11,482	4,110 36%	6,701 59%	570 5%
PRIVATE NON-INDUSTRY ACRES 18,807	3,840 21%	8,896 47%	6,071 32%
TOTAL ACRES PERCENT	24,587 34%	33,292 46%	14,757 20%

Footnote: Acreages may vary slightly from earlier tables due to methodologies use.

Issues Identified: Some of the key conclusions from the table III-9 are: HIGH hazard areas constitute 34% of the watershed. Forty-two percent (42%) of BLM lands are classed as HIGH hazard. Lands with HIGH hazard are distributed throughout the watershed and many of these areas are adjacent to BLM in the rural interface area and within residential zones. Only 20% of the area is in LOW hazard. Field work is needed to refine this classification in order to pin point the potential problem areas.

2. Risk

The basis used in assigning a HIGH, MODERATE, LOW risk status were as follows. The premise used in assigning the risk class is ignition source and frequency. This includes human and lightning sources. Acreage calculations were made on 40-acre blocks.

Human risk is high in the populated areas. Lightning risk is moderate for the entire watershed.

Table III-10 summarizes the risk categories in the watershed.

Table III-10: Risk Classification Deer Creek Watershed

OWNERSHIP	HIGH RISK	MODERATE RISK	LOW RISK
BLM ACRES 29,922	3,491 12%	18,631 62%	7,800 26%

FOREST SERVICE ACRES 9,067	120 1%	5,734 63%	3,212 36%
OREGON STATE ACRES 1,310	0 0%	511 39%	799 61%
JOSEPHINE COUNTY ACRES 2,149	40 2%	1,488 69%	621 29%
PRIVATE FOREST INDUSTRY ACRES 11,482	2,577 23%	7,284 64%	51,520 13%
PRIVATE NON-INDUSTRY ACRES 18,807	16,186 86%	2,048 11%	573 3%
TOTAL ACRES PERCENT	22,414 31%	35,696 49%	14,525 20%

Footnote: Acreages may vary slightly from earlier tables due to methodologies use.

Issues Identified: Human risk will continue to increase with rural interface growth. This will increase the percentage of area in high risk category.

3. Values at Risk

Assumptions used in assigning HIGH status were as follows. High Values at Risk were identified in four categories. These categories are:

a) Special Areas And Recreational Areas

Brewer Spruce RNA, Eight Dollar Mountain ACEC, recreation sites along the Illinois River have been identified. Botanical Emphasis Area is shown on map but was not included in acreage calculations.

b) Areas Receiving Silvicultural Treatment - Young Timber

Stands with Vegetation Condition Classes 4 and 5 (Age 0-5 and seedlings/saplings 0-5" dbh) were considered HIGH by the Fuels Specialist. This was due to high susceptibility to stand replacement fire and monetary investments previously made in these stands. Data was based on BLM classification.

c) Wildlife Areas - Mature Trees

Vegetation stands with vegetation Condition Classes 7 and 8 (Trees 11-21"dbh and Mature trees 21" dbh+) and with McKelvey Ratings of 1 and 2 were considered HIGH by wildlife biologists. This was due to its habitat value. Data was based on BLM classification.

The Late Successional Reserve area was all included as a HIGH value.

d) Residential Areas

Areas of homes and other structures were identified from aerial photos and were considered HIGH value at risk due to potential loss from wildfire by Fire Management Specialist. This is for all privately owned lands. Acres were calculated on 40-acre blocks.

A total of 40,824 acres were identified as HIGH Values at Risk. This represents 57% of the total watershed. Table III-11 shows this by ownership category.

TABLE III-11: HIGH VALUES AT RISK

OWNERSHIP	SPECIAL AREAS	RESID AREAS	YOUNG TIMBER	LSR	MATURE TIMBER	TOTAL ACRES
BLM ACRES PERCENT	603	N/A	2,662	16,248	2,354	21,867
FOREST SERVICE ACRES PERCENT	1,046	N/A	107	119	555	1,827
OREGON STATE ACRES	639	N/A	0	N/A	0	639
JOSEPHINE COUNTY ACRES	0	N/A	125	N/A	40	165
PRIVATE FOREST INDUSTRY ACRES	0	N/A	659	N/A	712	1,371
PRIVATE NON-INDUSTRY ACRES	O	14,955	0	N/A	0	14,955
PERCENT OF TOTAL WATERSHED	2,288 3%	14,955 21%	3,553 5%	16,367 23%	3,661 5%	40,824 57%

Issues Identified: The residential area category and the Late Successional Reserve are the largest number of acres and represents 77% of the high value areas. The closer a forest system is managed in harmony with the natural processes by which it evolved, the more successful that management will be. This would mean returning the role of fire into the watershed while meeting RIA issues.

4. Fire Regime

The historical fire regime of the Deer Creek watershed is dominated by a low-severity regime at the lower elevations and transitions into the moderate-severity regime at its higher elevations. The low-severity fire regime is characterized as frequent (1-25 years return interval) fires of low intensity. The moderate-severity fire regime is characterized as less frequent (25-100 years return interval) fires that are partial stand-replacement fires, including significant areas of high and low severity (Agee, 1990).

Low-Severity Regime: Fires in a low-severity regime are associated with ecosystem stability, as the system is more stable in the presence of fire than in its absence (Agee, 1990). Frequent, low severity fires keep sites open so they are less likely to burn intensely even under severe fire weather. With the advent of fire exclusion, the pattern of frequent low intensity fire is ended. Dead and down fuel and understory vegetation are no longer periodically removed. In Douglas-fir/hardwood forest, shade tolerant and less fire resistant conifer and hardwood trees become established in both the overstory and understory. Douglas-fir increases producing a multilayered stand. The probability of stand replacement type of fire is much higher due to the fuel ladder created by the understory vegetation and woody debris build up. This tendency for increasing fuel buildup over time is kept in relative equilibrium by the natural fire scenario. The stability of this vegetation pattern is not as great as the former because of lack of disturbance. In the oak woodlands once common on the dry sites and lowlands, fire exclusion has lead to massive conifer tree invasion. Conifer invasion produces a dense understory replacing the formerly open oak understory. This creates a fuel ladder and high fire hazard. Over time, Douglas-fir will overtop Oregon white oak and the shade-intolerant mature oaks will die (Agee, 1993). The transition between the oak woodlands and the Douglas-fir/hardwood forest was historically a Douglas-fir/ponderosa pine mixture. These were lower elevational bans and not of great extent. The exclusion of fire tends to eliminate the pine due to overcrowding causing increased competition for resource and shading.

Moderate-Severity Regime: Fires in a moderate-severity regime show a wide range of effects, from high to low severity. The overall effect is a patchiness over the landscape as a whole, and individual stands will often consist of two or more age classes (Agee, 1990). Two and three-storied stands are a result of repeated low to moderate severity surface fire which produces even-aged stories. This layered understory vegetation then often contributes to the intensity of the fire. Waxy-leaved shrubs and trees can carry flames into the overstory, creating a high-intensity fire. The exclusion of fire tends to increase the extent of high-intensity burned area. Areas at highest elevations are in this regime.

D. VEGETATION CONDITION

Current vegetation conditions across the landscape of the Deer Creek watershed are highly variable. This is the result of both human and natural influences. The natural influences include major geologic features such as the bands of serpentine soils on the west side of the watershed and the stream terrace and floodplain of Deer Creek. These geologic features strongly influence the vegetation existing on those sites

today. Primary human influences affecting the current vegetation conditions have included settlement, fire suppression, logging, mining, and agriculture.

With the exception of the Deer Creek valley, the dominant vegetation in the Deer Creek watershed is forest. The valley bottom is the portion of the watershed where agricultural activities have been concentrated due to the flat, tillable lands. Currently, this area is either cultivated fields, vineyards, orchards or open, flat grasslands.

Current vegetation conditions are described and mapped for features such as major plant series, existing condition class with respect to size and structure (See Maps 10 and 11).

1. Major Plant Series

A major plant series is an aggregation of plant associations with the same climax species dominants. It defines the potential natural vegetation that would exist on the site at the climax stage of plant succession or the end point of succession. The major plant series also tells us something about site productivity and site potential.

The plant series listed below were identified and mapped within the Deer Creek watershed (See Map 10 and Table III-12). Site productivity in terms of basal area per acre is described for each series. Basal area is defined as the area of the cross section of a tree stem near its base, generally at breast height (4.5 feet above the ground) and inclusive of the bark (USDI, 1994).

The following basal area production rates are on a per acre basis. Basal area in a plant series is not limited to the tree species that series is named for. For example, basal area in the Douglas-fir series can be from Douglas-fir, madrone, sugar pine, or any other tree species present on the site.

Douglas-fir is the most common tree species in southwestern Oregon. Sites within the Douglas-fir series are similar to tanoak in productivity and have basal areas averaging 254 square feet (Atzet and Wheeler, 1984). Douglas-fir tends to produce conditions that favor fire wherever it occurs. This species is self-pruning, often sheds its needles and tends to increase the rate of fuel buildup and fuel drying (Atzet and Wheeler, 1982). Due to the success of fire suppression efforts over the last 70 years, overall cover of this species has increased.

Sites in the white fir series are also considered productive with basal area averaging over 341 square feet (Atzet and Wheeler, 1984). The white fir series is widespread, diverse, and productive (Atzet and McCrimmon, 1990). White fir's thin bark provides little insulation during low intensity under burns until tree diameters reach at least 8 inches. Moreover, the tolerant nature of white fir which allows branches to survive close to the ground, makes the lower crown a ladder to the upper crown (Atzet and Wheeler,

1982). Due to the success of fire suppression efforts over the last 70 years, white fir occupancy has increased.

In general, tanoak sites are considered productive. Average total basal area for this series is 262 square feet (Atzet and Wheeler, 1984). The tanoak series occurs where both soil and atmospheric moisture are plentiful. The series occurs most frequently on cooler aspects with fine textured soils (Atzet and Wheeler, 1984). Fire is the principal inhibitor of dominance of individual tanoak trees (Tappeiner and others, 1990). Due to the success of fire suppression efforts over the last 70 years, overall cover of this species has increased.

Forests in the ponderosa pine series average approximately 170 square feet of basal area. This series is relatively rare as ponderosa pine does not often play the role of a climax dominant (Atzet and Wheeler, 1984). This series tends to occupy hot, dry aspects that burn frequently. Ponderosa pine regeneration is restricted by reducing the number of fire events. Due to the success of fire suppression over the last 70 years, overall cover of this series has decreased (Atzet and Wheeler, 1982).

The tanoak/Douglas-fir grouping is a mix of tanoak and Douglas-fir. There is not enough data to distinguish which species is climax.

The pine/Douglas-fir grouping is a mix of either knobcone pine or ponderosa pine and Douglas-fir. There is not enough data to distinguish which species is climax.

The white oak series occurs at low elevations and is characterized by shallow soils. Although Oregon white oak is usually considered a xeric species, it also commonly occurs in very moist locations - on floodplains, heavy clay soils, and on river terraces. On better sites, white oak is out competed by species that grow faster and taller (Stein, 1990). Average basal area is 46 square feet. Water deficits significantly limit survival and growth (Atzet and McCrimmon, 1990). White oak has the ability to survive as a climax species as it is able to survive in environments with low annual or seasonal precipitation, droughty soils, and where fire is a repeated natural occurrence (Stein, 1990). Fire events in this series are high frequency and low intensity (Atzet and McCrimmon, 1990). Due to the success of fire suppression over the last 70 years, the prominence of this series has declined.

The nonforest classification refers to areas that do not fit into one of the recognized natural plant series classifications, such as farmland, pasture lands, orchards, gravel streambeds, etc.

The nonvegetative classification refers to areas such as rock quarries or gravel storage sites.

Port-Orford cedar is quite common in the riparian areas of this watershed. These areas of Port-Orford cedar were not separated out as a series because the actual amount of acreage at an individual site along

any one stream is extremely small. There is a rich mixture of ground and shrub species, including many special status plants that are endemic to these sites. Huckleberry species, Pacific rhododendron, salal, dwarf Oregon grape and baldhip rose are the most common shrub species.

Productivity in the Port-Orford cedar series is very similar to that seen in the white fir series. Average basal area is 341 feet. In some areas, Port-Orford cedar and white fir can occur as co-climax species (Atzet and Wheeler, 1984). Port-Orford cedar is rare where fire is common, nevertheless, its resistance to fire is high due to thick bark. This characteristic makes Port-Orford cedar a good candidate as a source for fire dating (Atzet and Wheeler, 1982).

Table III-12: Major Plant Series

	BLM Lands		Non-BLM Lands		All Lands	
Series Name	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Douglas-fir	15,480	52%	a		a	
White fir	2,421	8%	a		a	
Tanoak	9,304	31%	a		a	
Ponderosa Pine	290	1%	a		a	
Jeffrey Pine	1,857	6%	a		a	
White oak	66	1%	a		a	
Nonforest	100	<1%	a		a	
Not Classified	293	<1%	a		a	

Footnotes: * The total percentage amounts may equal more than 100 percent due to rounding of the percentage number.
a. Data not available at this time

2. Existing Vegetation Condition Classes

Existing vegetation conditions (See Map 11 and Table III-13) are grouped into eight classes. The size ranges for classes five through eight were limited by how the existing data is stored in the BLM's Micro*STORMS database.

Table III-13 - Existing Vegetation Condition Classes

Vegetation Condition Class	Condition Class Description	BLM Lands		Non-BLM Lands		All Lands	
		Acres	%	Acres	%	Acres	%
1	Grass, forbs, herbaceous vegetation	165	<1%	a		a	
2	Shrubs, nonforest land, usually natural shrub fields	1071	4%	a		a	
3	Hardwood/woodland, includes nonforest and low site lands, could include commercial lands dominated with hardwoods	161	<1%	a		a	
4	Early, 0 - 5 years stand age	1418	<1%	a		a	
5	Seedlings/saplings, 0 - 4.9" dbh	3,243	11%	a		a	
6	Poles, 5 - 11" dbh	2,136	7%	a		a	
7	Mid, 11 - 21" dbh	7,446	25%	a		a	
8	Mature/old-growth, 21" + dbh	13,472	46%	a		a	
	Nonvegetative	95	<1%	a		a	

Footnotes: a Data not available at this time
* Because of rounding, percentages may add up to more than 100%

The above condition classes in themselves do not describe the structural characteristics of the vegetation and its degree of intactness (open vs. closed canopy, partial cut previously, never entered, etc.). Lumping the stands into one diameter range will often not permit us to assess the functional characteristics of the class for vegetative and habitat assessments. Natural stands in the Klamath Province are rarely single size class, single-storied stands. They are generally multi-aged, multi-storied stands that contain trees in a variety of different sizes. As an example, a class 7 in a Douglas-fir stand on the west side of the watershed could be much different than a class 7 in a ponderosa pine stand on the east side of the watershed. This is because the ponderosa pine stand will naturally have a much more open canopy.

The McKelvey spotted owl habitat rating system can be used to describe additional qualitative aspects of the condition classes. Table III-14 summarizes the acreages of federal lands in each McKelvey rating class.

Table III-14 - McKelvey Spotted Owl Habitat Rating Classes

	Federal Lands		Non-BLM Lands		All Lands	
Class	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
# 1	1,463	4%	a		a	
# 2	5,333	14%	a		a	
# 3	18,413	49%	a		a	
# 4	6,994	19%	a		a	
# 5	4,943	13%	a		a	
#6	430	<1%	a		a	

Footnotes: a = Data not available at this time

McKelvey Classes:
1 - Spotted owl nesting, roosting, and foraging habitat
2 - Spotted owl roosting and foraging habitat
3 - Currently does not meet 1 or 2 criteria
4 - Will never meet 1 or 2 criteria
5 - Currently does not meet 1 or 2 criteria, but meets dispersal
6 - Will never meet 1 or 2 criteria but meets dispersal

Special Status Plants/Habitats

Table III-15 lists the special status plants found to date in the Deer Creek watershed on BLM lands. These findings are based on survey of approximately 25% of the watershed. The most likely plant series and condition classes for special status plants in Deer Creek watershed fall into three categories.

Late Successional Associated Species: These are special status plants dependent upon late successional conditions, such as, *Cypripedium fasiculatum*, Clustered Ladyslipper (CYFA) and *Cypripedium montanum*, Mountain Ladyslipper (CYMO). According to Appendix J of the FEIS Northwest Forest Plan, CYFA and CYMO are most likely found in areas with 60-100% shade provided by older stands of various plant communities within Douglas-fir forests. Although these species are not attached to a specific vegetation community, they are dependent on specific microsite characteristics, including high percent shading, high moisture and undisturbed mychorrhizal connections in older stand age classes. The plant series most likely to harbor these orchids within the Deer Creek watershed are Douglas-fir and tanoak/Douglas-fir series. Currently 83% of the BLM lands in the watershed falls into these plant series. The actual viable habitat for these species is much smaller being limited to microsites with moister, north aspects and 60-90% canopy closure.

The majority of CYFA populations known on BLM land have been found while surveying timber sale acreage. These sales were cut in the early 1990's prior to the Northwest Forest Plan. Although protection was recommended for each population location, no follow up monitoring was established to determine if populations are currently in stable condition. It is uncertain how known populations are faring in the watershed.

Current conditions regarding habitat for these orchids can only be postulated using vegetation condition class and plant series information. Larger sized vegetation condition classes in Douglas-fir plant series offer a high percentage of acreage in the watershed and the most promise of orchid habitat. But without intensive field surveys it is difficult to determine the actual amount of habitat that exists within these areas. This is because microsite characteristics cannot be determined from vegetation maps.

Another species dependent upon these late successional conditions is *Allotropa virgata*, Candystick. The current status of this species is unknown because it not been surveyed until its recent designation as a "survey and manage species". This species requires coarse, woody debris to survive as well as the characteristics mentioned for the orchids. The species can exist in drier microsites than the orchids.

Serpentine Associated Species: This category of special status plants are those dependent upon serpentine habitat (see Table III-15). Serpentine species have adapted to cope with the unusual parent material of their substrate which is high in iron, magnesium and heavy metals. Most plants cannot tolerate such soil conditions. Many species that can, are endemic to serpentine soils resulting in a rich and unique botanical diversity. The Jeffrey pine plant series which contains serpentine soils constitutes 6% of the watershed. The bands of serpentine in the western portion of the watershed and the small outcrops throughout the rest of the watershed contain several plant species endemic to southwestern Oregon. They only exist on serpentine soils, most only in the vicinity of the Illinois Valley. Serpentine soils occur on USFS and BLM land in the western portion with the smaller eastern acreage on BLM. These serpentine areas represent some of the last intact native grasslands in the watershed.

Wetland Associated Species: Wetlands and seeps are a habitat that harbors at least one known special status species: *Limnanthes gracilis var. gracilis*. Current conditions of wetland areas or seeps have not been thoroughly documented, though some may remain intact.

Another current condition that could eventually affect special status plants is the invasion of noxious weeds. A thorough inventory of noxious weeds has not been completed in the watershed but their occurrence has been documented. They are most common in the nonforested areas where pastures or grasslands have been invaded by such species as star thistle. Scotch broom has also been documented in several forested locations in the central portion of the watershed.

A major data gap is the lack of information regarding nonvascular plants in the watershed. A rough estimate from Table C-2 (Appendix C of the RMP), survey and manage species, shows that 50 nonvascular species could possibly be found in the vicinity of the Deer Creek watershed. No surveys have ever been done for nonvascular plants in Medford District BLM.

Table III-15: Special Status Plants Known to be in the Deer Creek Watershed

Species Name	Species Status	Habitat
Allotropa virgata	SM	dry mixed evergreen
Calochortus howellii	BS	dry, rocky serpentine
Cypripedium fasciculatum	BS/SM	moist to dry, mixed evergreen with filtered sun
Dicentra pauciflora	AS	moist mixed evergreen
Epilobium oreganum	BS	bogs, often serpentine
Fritillaria glauca	AS	barren, dry rocky often serpentine
Gentiana setigera	BS	meadows, bogs on serpentine
Hastingsia bracteosa	BS	springs, meadows, serpentine bogs
Hieracium bolanderi	AS	dry hill, wooded
Limnanthes gracilis var. garcilis	BS	seeps, wetlands
Microseris howelii (possible)	BS	dry serpentine soils
Monardella purpurea	AS	dry serpentine
Perideridia erythrorhiza	BS	valleys, pastures, meadows
Senecio hesperius	BS	dry, rocky serpentine
Viola primulafolia ssp. occidentalis	BS	serpentine and Sphagnum Bogs

Footnotes:
FC = Federal candidate
AS = Bureau assessment
BS = Bureau sensitive
SM = Survey and manage species
BT = Bureau tracking

E. TERRESTRIAL WILDLIFE

1. Current Habitat Conditions

Vegetation within the watershed is a result of climate, slope, and soil type. Lands found west of Highway 199 in the Squaw Creek drainage are generally of the Eight Dollar-Dubakella complex, derived from serpentine and peridotite sources, which are typically low in fertility and water holding capacity. Present vegetation is limited to Jeffrey pine, shrubs (major species of shrubs are greenleaf manzanita, Oregon white

oak and coffeeberry) and bunch grasses with California-Laurel and incense cedar in the more mesic sites. Shrubs species such as green and white manzanita, Himalaya berry and evergreen blackberry are also present. Soil types and plant diversity in the Clear Creek and Anderson Creek drainages differ from those found on Squaw Creek. Soils include Speaker-Josephine, Pollard, Dubakella Pearsoll and Cornutt-Dubakella. These soils are moderately deep, well drained, and more productive then the Eightlar-Dubakella. Typical flora is Douglas-fir, ponderosa pine, Jeffrey pine, sugar pine, Pacific madrone, California black oak, shrubs (buck brush, deer brush, green and white manzanita) forbs and grasses.

Habitat provided by areas of serpentine and peridotite soils (pine savannah) resemble sites found along the low elevation south and west slopes of the Cascades. They are generally snow free during the winter and provide limited big game winter range. Casual observation indicate that black-tailed deer do not utilize shrubs species in serpentine soils as readily as other soil types, probably due to the lower nutrient value or the absence or imbalance of some trace element (Oakley, pers comm.). Timbered stands offer refugia for wildlife from temperature extremes due to the relative open conditions of adjacent serpentine slopes. This is particularly true for multi-canopied stands which offer a wide range of micro-niches. These stands are critical for wildlife dispersal of old-growth dependent species between the Deer Creek drainage and the Kalmiopsis wilderness. The federal administered lands in T. 38 S., R. 8 W., Section 3 and T. 37 S., R. 8 W., Section 35 (NW¼) function as critical thermal cover and a dispersal stepping stone. Summer condition on these open serpentine slopes are hot and dry which benefit some wildlife groups such as reptiles.

The Squaw Creek drainage was used to graze sheep as early as 1914, and today cattle are grazed on a government allotment in T. 38 S., R. 8 W., Sections 3, 4, and 9. Records indicating condition of these lands prior to grazing are not available. Range utilization plots assessing current conditions have not been conducted.

Soils on the east side of Highway 199 produce vegetation that is more typical of southwest Oregon. Vegetation varies more with aspect and elevation than soil, except for areas with serpentine/peridotite inclusions. Lower elevation areas were historically dominated by a open stands of large conifers and oak/grasslands kept free of brush due to fire. Currently most private lands in the valley have been converted to agriculture and livestock grazing, reducing the amount of conifers on the valley floor and restricting native oak/grasslands and ponderosa pine savannahs to remnant stands. In addition, fire has been excluded for nearly 80 years, which has allowed pine, fir and cedar to become firmly established in the understory of oak woodlands, threatening the continued existence of the oak woodland type. Other threats to these habitat include urbanization, introduction of exotic plants, and changing of natural drainage patterns. Historically, rich valley oak/pine savannahs provided nesting habitat for various species, mast crops of acorns for wildlife forage, and big game winter range. Currently oak woodlands on federal land are very limited in both quantity and quality and have been identified as one of the five critical habitats by the Oregon/Washington neotropical bird working group. Ponderosa pine stands have been out-competed

by less fire intolerant species, and high graded during past timber harvesting throughout the watershed. Large ponderosa pine snags are being lost in the watershed at a rate greater than they are being replaced. The loss of these habitat types will contribute to the decline of associated species of wildlife.

The mixed conifer vegetation that is dominant on the slopes of the east side of Highway 199, has been heavily impacted by logging on both private and federal lands over the last 50 years. Timber harvest on private land began to increase in the late 1980's. Currently most private lands are in early seral stage to pole stage, with little mature forest. Timber stands on federal lands range from recent clearcuts to unentered old-growth stands. Table III-13 presents seral stage by acres on BLM lands in the watershed. Due to the checkerboard ownership pattern the remaining mature and old-growth habitats are widely scattered and do not provide good dispersal paths for many species (see Map 12 of McKelvey habitat).

2. Current Condition of Wildlife by Species: Birds

NORTHERN SPOTTED OWL - Federal Threatened
(Strix occidentalis caurina)

Habitat

Northern spotted owl habitat has been analyzed using the McKelvey rating system. This system is based on a model that predicts spotted owl population based on habitat availability. Stands are examined for such characteristics as canopy layering, canopy closure, snags, woody material and other features. Biological potential of a stand to acquire desired conditions is also taken in consideration. Table III-16 and 17 summarize the best current estimate of the amount of available habitat for spotted owls in the watershed on federal administered lands (BLM & Forest Service). (See Map 12).

There are 1,463 acres of *spotted owl nesting, roosting and foraging habitat* (McKelvey class #1) found in the watershed on BLM land (2% of the total watershed). The largest contiguous blocks are locate in the subwatershed of North Fork Deer Creek (Map 12). Remaining optimal habitat in the watershed is heavily fragmented with little occurring outside the LSR. The subwatershed of Clear Creek, McMullin Creek and Draper Creek are virtually devoid of spotted owl optimal habitat.

The watershed has 5,333 acres (7 % of total watershed) of *spotted owl roosting and foraging habitat* (McKelvey class #2). The largest patches are found in the LSR in the North Fork Deer Creek drainage. Outside the LSR the largest blocks of habitat are found in the White Creek, Crooks Creek and McMullin Creek subdrainges (See Table III-18). The average distance between patches greater then 100 acres in size is also summarized in Table III-18.

Dispersal habitat for spotted owls is defined as stands that have a canopy closure of 40% or greater, open enough for flight and avoidance of predators. This habitat type is heavily fragmented in the watershed with

the majority being found in the LSR. Two large blocks of dispersal habitat found outside the LSR are located in the Clear Creek subwatershed, and one in the Draper Creek subwatershed. These parcels are important "islands" of habitat that function as stepping stones allowing for dispersal into the adjacent Kalmiopsis wilderness.

The above analysis indicates that the majority of BLM administered land in the Deer Creek watershed is composed of stands that currently do not meet the needs of the spotted owl and its late-successional associated species. But it does have the potential in the long term to become optimal habitat. Approximately 18,413 acres (25 %) of the watershed meets this criteria.

Table III-16: Acres of McKelvey Spotted Owl Habitat Classes (Federal Land only)

Class 1: Optimal/ Nesting	Class 2: Foraging/ Dispersal/ Roosting	Class 3: Not Suitable/ Potential Future Habitat	Class 4: Not Suitable/ No Potential To Become Suitable	Class 5: Current Dispersal/ Potential Optimal	Class 6: Current Dispersal/ No Potential For Optimal
1,463 Acres	5,333 Acres	18,413 Acres	6,994 Acres	4,943 Acres	430 Acres

Footnotes: Data as of 7/28/97. Data not available for private ownerships

Table III-17: Acres of Old-growth and Mature Habitat as indexed by McKelvey ratings - by subwatershed (Federal land only)

SUBWATERSHED	OLD-GROWTH HABITAT	MATURE HABITAT	TOTAL
South Fork Deer	707	1682	2389
White Creek	313	1076	1389
Crooks Creek	424	778	1202
McMullin / Thompson	37	1000	1037
Draper Creek	0	175	175
Clear Creek	0	794	794

Footnotes: Data as of 7/28/97. Data not available for private ownerships

Table III-18: Patch Size and Average Distance Between Patches Greater Than 100 Acres - by subwatershed (Federal land only)

SUBWATERSHED	AVERAGE DISTANCE	COMMENTS
South Fork Deer	1.6 miles	15 blocks of habitat, 4 greater than 100 acres. Largest block size 1,102 acres.

White Creek	1.3 miles	10 blocks of habitat, 3 larger than 100 acres. Largest block size 490 acres.
Crooks Creek	1.5 miles	15 blocks of habitat, 3 larger that 100 acres. Largest block size 333 acres.
McMullin / Thompson	2.85 miles	14 blocks of habitat, 3 larger than 100 acres. Largest block size 451 acres.
Draper Creek	See comments	3 blocks of habitat, 0 larger than 100 acres. Largest block size 95 acres.
Clear Creek	Unavailable	11 blocks of habitat, 3 larger than 100 acres. Largest block size 239 acres.

Footnote: Data as of 7/28/97. Data not available for private ownerships

Site History

There are 16 known spotted owl sites within the watershed, 15 which are active sites and 1 which is historic. An active site is one in which a territorial single or pair has occupied the site at least once since 1985. There are an additional 7 sites whose provincial home range (1.3 mi radius) are partly located within the Deer Creek watershed and may be affected by activities occurring in the watershed. The sites of Irish Mac and Draper Creek are located on private land; private habitat acreage data is unavailable at this time. Table III-19 summarizes information on habitat (McKelvey 1 & 2) availability within 0.7 and 1.3 mile radii, for sites within the watershed. Table III-20 summarizes the same information for those sites outside the watershed, but whose home ranges might be affected by activities within the watershed. Table III-21 presents the results of occupational status and nesting information collected since 1985 for sites within the watershed.

Table III-19: Spotted Owl Habitat (McKelvey ratings 1&2) Available on Federal Land Within 0.7 and 1.3 Mile Radius of Sites

SITE NAME (Sites as of January 1, 1994)	**HABITAT WITHIN 0.7 MILES** * (Acres - Federal land only)	**HABITAT WITHIN 1.3 MILES** * (Acres - Federal land only)
Bare Nelson **	368	1,074
Big Cedar **	317	1,113
Bonnies' Delight **	375	1,199
Clear Creek (USFS site)	UNAVAILABLE	UNAVAILABLE
Crooks Deer *	573	1,460
Davis Creek **	263	449
Draper Creek **	339	755
Dry Creek *	283	658

Table III-19: Spotted Owl Habitat (McKelvey ratings 1&2) Available on Federal Land Within 0.7 and 1.3 Mile Radius of Sites

SITE NAME (Sites as of January 1, 1994)	**HABITAT WITHIN 0.7 MILES** * (Acres - Federal land only)	**HABITAT WITHIN 1.3 MILES** * (Acres - Federal land only)
Dryden **	270	238
Irish Mac	32	402
North Fork Deer Creek *	721	1,473
Thom White	373	598
Thompson-Illinois **	343	1,243
Tommy Mac	159	241
Tri Delta	102	377
West Lookout *	205	1,168
West Lookout Alternate *	337	1,043

Footnotes: * Sites in LSR

** Sites with 100 acre core area

Table III-20: Spotted Owl Activity Centers Within 1.3 Miles of the Deer Creek Watershed

SITE NAME	FEDERAL HABITAT WITHIN 0.7 MILES	FEDERAL HABITAT WITHIN 1.3 MILES
Case Creek	92	358
Chapman Corner	361	800
Cheney Creek	381	999
Holton Creek	183	529
Knight Creek	211	463
Mooney Mountain	474	1,513
Mooney Mountain Alt.	500	1,286

Table III-21: Results of Spotted Owl Nesting Surveys in the Deer Creek Watershed

SITE NAME	1985	1986	19 87	1988	1989	1990	1991	1992	1993	1994	1995
Bare Nelson	SU	SU	SU	SU	SU	SU	S	U	0	1	S
Big Cedar	SU	SU	SU	SU	SU	SU	S	S	S	X	P
Bonnie's Delight	SU	SU	SU	SU	SU	SU	2	0	0	2	X
Clear Creek (Forest Service Site)	SU	SU	SU	SU	SU	S	X	X	X	X	U
Crooks Deer	SU	SU	SU	SU	SU	SU	SU	SU	S	X	P
Davis Creek	SU	SU	SU	SU	SU	1	0	0	U	X	X
Draper Creek	SU	SU	SU	SU	SU	2	0	1	U	S	X
Dry Creek	SU	SU	SU	SU	SU	0	2	0	0	2	X
Dryden	H	H	H	H	H	H	H	H	H	H	U
Irish Mac	SU	SU	SU	SU	SU	SU	SU	SU	SU	U	P
N.F. Deer Creek	S	X	X	X	X	X	2	0	0	0	S
Thom White	SU	SU	SU	SU	SU	SU	SU	0	X	U	U
Thompson-Illinois	X	X	NS	X	SU	0	0	S	0	0	U
Tri Delta	X	X	X	X	X	X	X	S	S	S	U
West Dryden	SU	SU	SU	SU	SU	SU	SU	SU	U	X	U

FOOTNOTES: NS = Not Surveyed
SU = Site Unknown At This Time
0 = No Young Produced
1 = 1 Young Produced
S = Single Bird
2 = 2 Young Produced

U = Unknown
H = Historic Birds No Longer Present
X = No Birds Present
P = Pair, no young produced

Inventories

Surveys for Northern Spotted Owls have been conducted in the watershed since 1975. Early surveys were opportunistic until 1985 when areas with proposed management activity began to be surveyed. From 1990 to 1993 a portion of the watershed (20,587 acres) was intensively surveyed for owls as a part of the Williams density study project. The purpose of this study was to determine the total number of owls in a 119 square mile tract of land. In 1994 an effort was made to survey the remaining habitat outside of the density study and the Squaw Creek drainage. Approximately 34,820 acres were surveyed during this effort. Surveys began on June 15 and continued until August 26. Five routes were established that encompassed the area outside the study area, except for land found west of Highway 199. Each route was called 3 times, separated by at least a 7 day period. No new activity centers were located. Table III-22 summarizes the 1994 route information.

Table III-22: Results of 1994 Survey for Spotted Owls in the Deer Creek Watershed

ROUTE NAME	DATE	DATE	DATE	RESPONSES & COMMENTS
Dryden Overlook	6/20/94	6/30/94	8/16/94	Response from a male stoc on 6/30 and 8/16. Follow finds blue right male banded USFWS. #1387-65293. Possible female response 6/20
Kerby Peak Shadow	6/15/94	6/30/94	7/26/94	Single four note response from male 6/30 2201, follow-up produced nothing
Lepus Lake	6/21/94	6/30/94	8/26/94	No responses
Selmac Picnic	6/20/94	6/29/94	8/18/94	Western screech owl, great horned owl
Upper Thompson Creek	6/14/94 6/20/94	6/29/94	8/16/94	Response from Thompson-Illinois Site, Bare Nelson And Tri-delta site, western screech owl

MARBLED MURRELET - Federally listed as Threatened
(Brachyramphus marmoratus)

Habitat

Nesting habitat for marbled murrelet is characterized by older forest stands with trees that have large moss-covered limbs and high (70%) canopy closure. This habitat is further defined by its distance from the coast.

Approximately 70,458 acres (97%) of the watershed lies within the 35-50 mile band (zone 2) and 2,278 acres (3%) lies within 35 miles from the coast (zone 1).

Using OI records for McKelvey spotted owl habitat ratings as an index for potential murrelet habitat, there are an estimated 10,809 acres of suitable marbled murrelet nesting habitat in the watershed (See Map 13). There are, however, no known nest locations within the Deer Creek watershed. It is unknown at this time if the stands that contain structural components usually associated with marbled murrelet use would actually be used by the birds. The Deer Creek sites are generally warmer and drier that those located closer to the coast that are occupied by nesting murrelets.

A 552 acre marbled murrelet reserve has been designated by the USFWS in the Clear Creek drainage. Field review of this site indicates that it is actually not murrelet habitat.

Inventories

Surveys for marbled murrelets have been conducted in the watershed on a limited number of acres of suitable habitat. As of July 28, 1997, marbled murrelets have not been detected.

BALD EAGLES - Federally and State listed as Threatened
(*Haliaeetus leucocephalus)*

A pair of nesting bald eagles were located near Lake Selmac during the summer of 1995. Preferred nesting habitat consists of older forest, generally near water, with minimal human disturbance.

PEREGRINE FALCONS - Federally and State listed as Threatened
(*Falco peregrinus)*

Peregrine falcons nest on ledges located on cliff faces. There are no known historic or current peregrine falcon nests in the watershed, but there are several potential cliff faces including Kerby Peak, Rabbit Lakes, and Crooks Creek cliffs. During the fall of 1994, a falcon was heard calling from one of the cliff faces of Kerby Peak. It is not known if the falcon was migrating through, or was a resident.

NORTHERN GOSHAWK - Bureau sensitive, State critical
(*Accipiter gentilis)*

Goshawks occur in the watershed, but population levels, and location of nest sites are not known. Goshawks have similar habitat requirements as spotted owls: older forests. There are approximately 6,083 acres of goshawk habitat found in the watershed. Limited goshawk surveys were conducted in the Deer

Creek watershed in 1994. A single historic goshawk site is known to exist in the upper reaches of White Creek.

TRICOLORED BLACKBIRD - Bureau sensitive, State peripheral
(Agelaius tricolor)

It is unknown if this species is found in the watershed. It occurs in the interior valleys of southern Oregon near freshwater habitat, generally containing cattails or Himalayan blackberry.

MOUNTAIN QUAIL - Bureau sensitive
(Oreortyx pictus)

This species is commonly found throughout the watershed. Preferred habitat is shrub fields, meadows, and forested stands.

ACORN WOODPECKER - State undetermined
(Melanerpes formicivorus)

This species is present in the watershed, generally occupying the valley oak savannah, and mixed oak/conifer forest. This species prefers park-like stands in oak groves in which there is room to fly below the branches.

BLACK-BACKED WOODPECKER - Federal Survey and Manage, State critical
(Picoides arcticus)

It is unknown if this species is present in the watershed. See survey and mange on page XX for habitat information.

FLAMMULATED OWL - Federal protection buffer species, State Critical
(Otus flammeolus)

It is not known if this species is present in the watershed. Generally, this bird is found east of the Cascades were it inhabits old growth ponderosa pine. Aural surveys conducted in adjacent watersheds indicate that this species is using stands composed primarily of Douglas-fir.

WHITEHEADED WOODPECKER - Federal protection buffer species, State Sensitive
(Picoides albolarvatus)

It is unknown if this species is present in the watershed. See federal protection buffer species section for habitat information.

PURPLE MARTIN - State critical
(Progne subis)

It is unknown if this species is present in the watershed. The habitat for this species is variable, preferring open areas typically near water. This bird utilizes woodpecker cavities, nest boxes, and buildings for nesting.

GREAT GRAY OWL - Federal protection buffer species, State Sensitive
(Strix nebulosa)

It is unknown if this species is present in the watershed. Preferred habitat includes open areas such as meadows and clearcuts for foraging, and mature/oldgrowth stands for nesting. This species has been detected in an adjacent watershed during aural surveys for spotted owls.

WESTERN BLUEBIRD - State Vulnerable
(Sialia mexicana)

It is unknown if this species is present in the watershed. Preferred habitat is trees in open areas with cavities. This species will utilize clearcuts if snags with cavities are present. Agricultural lands with trees with cavities or nest boxes will be utilized.

GRASSHOPPER SPARROW - State peripheral
(Ammodramus savannarum)

It is unknown if this species is present in the watershed. It is a very rare breeder in Oregon, with local populations in Eagle Point and the Medford area. Preferred habitat is grassland with shrubs.

NORTHERN PYGMY OWL - State undetermined
(Glacidium gnoma)

The northern pygmy owl is present throughout the watershed, inhabiting areas as diverse as Jeffrey pine savannah to old growth Douglas-fir stands. These owls nest in tree cavities, either produced by woodpeckers or naturally formed.

BANK SWALLOW - State Undetermined
(Riparia riparia)

There is no known breeding population of this bird west of the Cascade mountains. It could possibly be a transient in the watershed. Preferred habitat includes sandy, loam, or gravel banks were it burrows. This species primarily feeds over open ground and water.

3. Current Condition of Wildlife by Species: Amphibians/reptiles

DEL NORTE SALAMANDER - Bureau sensitive, Federal survey and manage, State vulnerable
(Plethodon elongatus)

The Del Norte salamander is known to occur in the watershed. Habitat consist of talus slopes, with a canopy closure that protects the cool moist micro-climatic features. The life history of this animal is not well

understood. It is active in the spring (when it lays eggs) and fall when the ground is moist. During the height of the summer it is thought to aestivate or move deeply subterranean. In the winter it is presumed that it enters a state of torpor. Inventories in the watershed to date have been opportunistic when suitable habitat is encountered.

FOOTHILL YELLOW-LEGGED FROG - Bureau sensitive, State undetermined
(Rana boylei)

The yellow-legged frog is found in almost all low gradient, permanently flowing streams in the watershed (*e.g.*, Deer Creek, Dry Creek, Crooks Creek) . Habitat requirements are permanent streams with rocky, gravely or sandy bottoms. These frogs are known to occur in a diverse array of streams ranging from streams with no overhead canopy (*e.g.*, serpentine areas) to areas with complete canopy closure.

NORTHERN RED-LEGGED FROG - Bureau sensitive, State undetermined
(Rana aurora)

This forest frog utilizes slack water ponds, and low gradient streams with emergent vegetation during breeding. During nonbreeding periods the frog ranges through the forest utilizing microclimatic features such as mountain beaver burrows to avoid desiccation during the heat of the day. The closest documented occurrence of this frog was recorded in 1973, 12 miles west of Selma in Store Gulch. Occurrence within the Deer Creek watershed is unknown.

CLOUDED SALAMANDER - Bureau Assessment, State undetermined
(Aneides ferreus)

Clouded salamanders are present in the watershed, but there has been no formal surveys. These salamanders are found from sea level to 1,500 meters in elevation and are generally found in the forest or forest edge. This salamander is generally found under bark of down logs or snags. Locally this salamander has been collected under bark on old logging landings, in talus slopes, and on down logs with little sign of decay. A lack of down woody material may limit maintaining populations and allowing for dispersal.

BLACK SALAMANDER - Bureau Assessment, State peripheral
(Aneides flavipunctatus)

Black salamanders are present in the watershed, primarily having been found in the Dry Creek drainage. This salamander is restricted to southwestern Oregon, where it may be found under talus, forest litter, and in rock crevices. Locally, they have been found from Jeffrey pine savannahs, oak/grasslands, to mixed conifer forest. A lack of down woody material may limit maintaining populations and allowing for dispersal.

SOUTHERN TORRENT SALAMANDER - Bureau sensitive, State vulnerable
(Rhyacotriton variegatus)

This salamander is known to occur in the Cheney-Slate watershed to the east, and it is assumed they occur in the watershed, due to presence of habitat. Local populations appear to be disjunct from the more abundant coastal population. Locally this salamander is found in very restrictive habitat, occupying the splash zones of some cold, permanent, first order streams. The presence of talus, and gravel seem to be an important feature.

TAILED FROG - Bureau senstive, State vulnerable
(Ascaphus truei)

This frog is known to occur in the watershed in most steep, permanent, fast flowing, cold streams. Studies have shown that this species is susceptible to high water temperatures and sediment levels. (Leonard et al., 1993). Adults forage at night, and remain hidden under rocks during the day. Larvae are adapted to feed in the fast flowing part of the stream.

NORTHWESTERN POND TURTLE - Bureau sensitive, State critical
(Clemmys mamorata)

Northwestern pond turtles are present in the watershed. Habitat preference consist of almost all freshwater habitats, with available basking sites. During the winter this species generally disperses in the upland for hibernation. They will move up to ¼ mile distance from the aquatic source (Holland, 1993) Uplands also serve as nesting sites. Populations within the Rogue Basin are diminishing due to low recruitment of young turtles. Exotic species such as large mouth and bullfrogs prey on the small turtles.

NORTHERN SAGEBRUSH LIZARD - Bureau sensitive
(Sceloporus graciosus)

The Northern sagebrush lizard is present in the watershed. Local populations are generally found on open serpentine slopes. Squaw Creek and the upper portion of the Dry Creek drainage are particularly good sites. This species seldom uses vertical structure, preferring to escape by running and hiding.

SHARPTAIL SNAKE - State critical
(Contia tenuis)

Currently, there are no records of this snake occurring in the Illinois Valley, but it does occur in the Rogue Valley in similiar habitat. This species probably occurs in the Illinois Valley (Dr. Steve Cross, pers. comm.). Locally, the snake is generally encountered on the valley floor, and immediate adjacent uplands. The snake has been found as high as 4,000 ft elevation in the Siskiyous. Microhabitat includes forest litter, down logs, and talus.

CALIFORNIA MOUNTAIN KINGSNAKE - State vulnerable
(Lampropeltis zonata)

This snake is present in the watershed. Distribution of this species is very restricted in the state of Oregon, found only in the southwest part of the state and near the Columbia River. Preferred habitat is talus or down logs in oak and pine forest types. The snake is common in Squaw Creek and Clear Creek drainages.

COMMON KINGSNAKE - State vulnerable
(Lampropeltis getulus)

This species is present in the watershed. Preferred habitat includes oak and pine forest, generally near water. Distribution in the state is limited to Douglas, Josephine, and Jackson counties (Nussbaum et al., 1983).

4. Current Condition of Wildlife by Species: Mammals

WHITE-FOOTED VOLE - Bureau sensitive, state peripheral
(Aborimus albipes)

It is unknown if this species occurs in the watershed, as it is more associated with the coast. Habitat includes riparian areas and alder thickets. Areas containing heavy brush or down logs seem to be an important component of the micro-habitat.

CALIFORNIA RED TREE VOLE - Bureau senstive
(Aborimus pomo)

It is unknown if the California red tree vole occurs in the watershed. Range maps indicate this species is known to occur in northern California in the Klamath mountains. This arboreal mammal is highly associated with mature seral stages of conifer forest, where they construct nest in the green foliage of the tree. Forage consist of conifer needles and twigs. Adults can breed anytime during the year, with young born from February to September (Ingles, 1965). Habitat available for this species within the watershed corresponds to spotted owl habitat (McKelvey 1&2).

RED TREE VOLE - Federal survey and manage, Bureau sensitive
(Aborimus longicaudas)

This species is known to occur in the watershed. Habitat and life history information is similar to the California red tree vole.

FISHER - Bureau sensitive, State critical
(Martes pennanti pacifica)

It is unknown if this species occurs in the watershed. Fishers prefer mature/oldgrowth forest with hardwoods. They seem to be highly associated with riparian areas. Studies have shown that this species is reluctant to travel through open areas, making it very susceptible to forest fragmentation (Maser et al., 1981). Denning sites include brush piles, tree roots, snags, down logs, and large living trees.

AMERICAN MARTEN - State vulnerable
(Martes americana)

It is unknown if martens are present in the watershed. Preferred habitat includes mature/oldgrowth forest with an abundance of down woody material. Den sites are often brush piles, snags, and down logs. Dispersal corridors generally are located along riparian zone, low divides, and ridgetops.

RINGTAIL - State undetermined
(Bassacriscus astutus)

It is unknown if ringtail are present in the watershed. Habitat includes rocky cliff, bluffs, and caves. Locally they range from oak woodlands to mixed conifer forest. Dens are located in buildings, brush piles, down logs, and caves.

CALIFORNIA WOLVERINE - Bureau sensitive, State threatened
(Gulo gulo luteus)

It is not known if this animal is present in the watershed. The species traverses large area, with home ranges of 200 to 300 square miles (Copeland, 1992). The preferred habitat is remote, high elevation areas covered with park stands of trees. During the winter the species may drop in elevation.

5. Current Condition of Wildlife by species: Bats

TOWNSEND'S BIG-EARED BAT - Federal survey and manage, Bureau sensitive
(Plecotus townsendi)

There are several natural caves in the watershed that historically or currently have populations of this species. Habitat requirements include caves, buildings or mines that meet specific temperature and humidity regimes for both maternity roosts and hibernacula. This species is very susceptible to human disturbance, and it is believed they have abandoned their use of certain caves due to disturbance from recreational use. There is very little potential for creating additional habitat for these bats, making management of the existing sites the only way to secure populations in the watershed.

PACIFIC PALLID BAT - Federal protection buffer species, State critical
(Antrozous pallidus)

Two subspecies of pallid bat occur in the state. *Antrozous pallidus pacificus* are found west of the Cascades and *Antrozous pallidus cantwelli* are found east of the Cascades. Distribution west of the Cascades appears to be limited primarily occurring in Jackson, Josephine and Lane county (Maser and Cross, 1981). Habitat preference west of the Cascades is not well understood. Quaccia (1992), found pallid bats utilizing large snags and rock piles as day roosts location in southern Oregon. Night roosts are in open shelters such as bridges, mines, and buildings (Barbour and Davis, 1969). There is not much known about hibernation location though apparently they do not migrate. In the spring females assemble into maternity colonies were two young are generally born (Barbour and Davis, 1969). A historic location of Pallid bats is known to occur in the watershed. This site has not been surveyed since 1983 and the current status of this population is unknown. Large snags in various stages of decay, which provide sloughing bark, radial cracks and crevices appear to be essential for this species.

FRINGED MYOTIS -Federal protection buffer species
(Myotis thysanodes)

Fringed myotis bats have limited distribution in Oregon, primarily inhabiting Jackson and Josephine counties, with scattered records from Lake, Klamath, Grant, Lincoln, and Clackamas counties (Maser and Cross, 1981). Mist netting information in adjacent watersheds have found this species in a wide variety of habitat ranging from oak woodlands to mixed evergreen. Specific habitat requirements remain largely unknown. Using radio-telemetry in Southwestern Oregon, Cross (1993)found that snags are utilized as day roosts. Maintenance of large snags with sloughing bark, radial cracks, and crevices appear to be essential for this species Locally the bat has been encountered utilizing mine shafts as day and night roosts. Gaylord (pers comm.) has found this species hibernating in tunnels. Little is known about their reproduction, except they form maternity colonies and give birth to a single young. No maternity colonies or hibernacula have been located in the watershed.

LONG-LEGGED MYOTIS -Federal protection buffer species, State undetermined
(Myotis volans)

Long-legged myotis have been recorded throughout the Medford District and occur statewide. Habitat preference is not well understood, but they do utilize snags, rock crevices and buildings as day roosts (Barbour and Davis, 1969). Some individuals have been found hibernating in caves but apparently this is not the norm, though caves are used for night roosts. Large snags with sloughing bark, radial cracks, and crevices are essential for this species. Large maternity colonies are formed in the spring with each individual producing a single young (Barbour and Davis, 1969). Currently, no maternity colonies or hibernacula have been located in the watershed.

LONG-EARED MYOTIS -Federal protection buffer species, State undetermined
(Myotis evotis)

Long-eared myotis bats are found throughout the state with two subspecies being recognized, *Myotis evotis pacificus* found west of the Cascades, and *Myotis evotis evotis* found east of the Cascades. These bats are inhabitants of coniferous forest primarily using buildings, snags and exfoliated bark as day roosts, and caves as night roosts. Little is known about their reproduction expect that it forms small maternity colonies, and produces a single young (Barbour and Davis, 1969). Mist netting efforts in adjacent watersheds have found these bats ranging from oak savannahs to mixed conifers. Post breeding adults have been captured in adjacent watersheds.

YUMA MYOTIS - Bureau sensitive, State undetermined
(Myotis yumanensis)

Yuma myotis are highly associated with habitats with an open water source (Barbour & Davis, 1969). Maser (1981) found these bats utilizing a variety of human made structures. Bridges, buildings, and snags all are utilized by this species. Maintaining a snag component across the landscape will help insure the viability of this species in the Deer Creek watershed. Local mist netting surveys in adjacent watersheds have found these bats ranging from oak savannah to mixed conifers. Lactating females and post reproductive males have been captured in adjacent watersheds, but no survey work has been done in the Deer Creek watershed.

6. Current Condition of Wildlife Species: Invertebrates

BURNELL'S FALSE WATER PENNY BEETLE - Bureau sensitive
(Acneus burnelli)

It is not known if this species is present in the watershed. Adults are found along small, rapid, low elevation streams, frequently near waterfalls. Larvae are found in rapid sections of streams, in pools of quiet water, protected from current by boulders. This species has been found in Coos County in upper Middle Creek.

DENNING'S AGAPETUS CADDISFLY -Bureau sensitive
(Agapetus denningi)

It is not known if this species is present in the watershed. Currently no habitat information is available. A similar species *A. taho*, is found in cool, mid to large size streams of moderate gradient in forested areas over a large elevation range. A single specimen was collected in the Rogue River National Forest.

GREEN SPRINGS MT. FARULAN CADDISFLY -Bureau sensitive
(Farula davisi)

It is not known if this species is present in the watershed. This species has been collected near a small stream with a marshy area nearby. Two other adults were collected from Green Springs Mt., 10 miles east of Ashland near a large stream.

SCHUH'S HOMOPLECTRAN CADDISFLY - Bureau sensitive
(Homoplectra schuhi)

It is not known if this species is present in the watershed. Larvae are found in spring-seepage habitats in forested montane areas. *Homoplectra spp*. are found in streams with moderate to closed canopy. The distribution of this species appears to be limited to the Cascade and Coast range mountains of southwestern Oregon and northern California, where suitable habitat is found.

O'BRIEN RHYACOPHILIAN CADDISFLY - Bureau sensitive
(Rhyacophila colonus)

It is not known if this species is present in the watershed. The habitat and ecology on this genus is poorly understood. They appear to inhabit clear, cool, creeks. A single specimen was collected from the vicinity of O'Brien in Josephine County.

SISKIYOU CADDISFLY -Bureau sensitive
(Tinodes siskiyou)

It is not known if this species is present in the watershed. The larvae of this species are associated with mid-size streams, with moderate to dense shading, from mixed hardwood/conifer forest. Adults have been collected from streams with a varied temperature range. Members of this genus have been found from the coastal mountains of northern California, and from two disjunct populations in Oregon. The nearest known population is in the Squaw Lakes region of the Rogue River National Forest.

SISKIYOU CHLOEALTIS GRASSHOPPER - Bureau sensitive
(Chloealtis aspasma)

It is not known if this species is present in the watershed. This species appears to be associated with elderberry plants in which it lays it eggs. Local specimens have been collected from near Mt. Ashland and Willow Lake.

FRANKLIN'S BUMBLEBEE - Bureau sensitive
(Bombus franklini)

It is not known if this species is present in the watershed. This species has been found in herbaceous grasslands between 1,400-4,000 ft elevation. Their activity spans the entire blooming season, so they do not appear restricted to a particular flower or host. Their range is restricted to southwestern Jackson County, and perhaps southeastern corner of Josephine County.

7. Survey and Manage Species

Table III-23 presents the species that are to be protected through Survey and Management Guidelines as outlined in the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (ROD)*. This table also describes the level of protection and the amount of surveys conducted to date. Surveys for new sites in proposed projects that will be implemented in 1997 or later must be conducted for red tree vole, great gray owl and Del Norte salamander.

Amphibians

The **Del Norte salamander** is known to occur in the watershed. Habitat consist of talus slopes, with a canopy closure that protects the cool moist microclimatic features. The life history of this animal is not well understood. It is active in the spring (when it lays eggs) and fall when the ground is moist. During the height of the summer it is thought to aestivate or become deep subterranean. In the winter it is presumed that it enters a state of torpor.

Mammals

The **red tree vole** occurs in the watershed. This arboreal mammal is highly associated with mature conifer forest, where they construct nest in the green foliage of the tree (Maser et al., 1981). Forage consist of conifer needles and twigs. Adults can breed anytime during the year, with young born from February to September (Ingles, 1965). Habitat available for this species within the watershed corresponds to spotted owl habitat (McKelvey 1&2).

8. Federal Protection Buffer Species: Bats

Surveys for bats have been limited in number and scope. In general only absence/presence information has been collected while searching caves within the watershed. No mist netting has occurred, but mist netting has occurred in the adjacent Williams watershed. The Williams Creek watershed is located due east to the Deer Creek watershed and has been surveyed for bats using mist nets. **Long-eared myotis, long-legged myotis, fringed myotis,** and **silver-haired** bats have all been recorded there.

Silver-haired bats are primarily a northern species associated with coniferous forest and are migratory in nature (Maser et al., 1981). In Oregon they range throughout the state in summer and winter (Barbour and Davis, 1969). They have been found in the Williams Creek watershed throughout the summer but reach their greatest number late in the fall when migratory waves of bats pass through. Protected crevices in trees, exfoliated bark, and woodpecker holes serve as day roosts and winter roost sites (Barbour and Davis, 1969).

Fringed myotis bats have limited distribution in Oregon, primarily inhabiting Jackson and Josephine counties, with scattered records from Lake, Klamath, Grant, Lincoln, and Clackamas counties (Maser and Cross, 1981). Habitat requirements remain unknown, but from mist netting information in adjacent watersheds they have been found in locations ranging from oak woodlands to mixed evergreen. Locally the species has been encountered using mine shafts as day and night roosts. Cross (1993) using radio-telemetry found that snags are also utilized as day roosts. Little is known about their reproduction except that they form maternity colonies and give birth to a single young.

Long-eared myotis bats are found throughout the state with two subspecies being recognized, *Myotis evotis pacificus* found west of the Cascades, and *Myotis evotis evotis* found east of the Cascades. These bats are inhabitants of coniferous forest primarily using buildings, snags and exfoliated bark as day roosts, and caves as night roosts. Little is known about their reproduction expect that it forms small maternity colonies, and produces a single young (Barbour and Davis, 1969).

Long-legged myotis have been recorded throughout the Medford district and occur statewide. Habitat preference is not well understood, but they do utilize snags, rock crevices and buildings as day roosts (Barbour and Davis, 1969). Some individuals have been found hibernating in caves but apparently this is not the norm, though caves are used for night roosts. Large maternity colonies are formed in the spring with each individual producing a single young (Barbour and Davis, 1969)

Two subspecies of **pallid** bat occur in the state. *Antrozous pallidus pacificus* are found west of the Cascades and *Antrozous pallidus cantwelli* are found east of the Cascades. Distribution west of the Cascades appears to be limited primarily occurring in Jackson, Josephine and Lane county (Maser and Cross, 1981). Habitat preference west of the Cascades is not well understood. Quaccia (1992), found pallid bats utilizing large snags as day roosts locations in southern Oregon. Night roosts are in open shelters such as bridges, mines, and buildings (Barbour and Davis, 1969). There is not much known about hibernation location though apparently they do not migrate. In the spring females assemble into maternity colonies were two young are generally born (Barbour and Davis, 1969). An historic location of pallid bats is known in the watershed. This site has not been surveyed since 1983 and the current status of the population is unknown.

9. Federal Protection Buffer Species: Birds

Systematic surveys for birds other than spotted owls have been very limited within the watershed. In 1993 a breeding bird survey was established in the watershed. This aural survey is based on 50 established points, in which an observers listen for three minutes. The following information on species absence/presence has been gathered from various databases, range maps and field experience of Resource Area biologists and incidental detections made while surveying for other species.

Black-backed woodpeckers are found in the Siskiyou, Cascade, Strawberry, and Wallow mountains in Oregon (Marshall, 1992). Generally the birds are found above 3,000 feet in elevation (Ehrlich et al, 1988) Snags, mature and over mature trees are the primary feeding and nesting locations.

White-headed woodpecker are a high elevation species generally found above 4,000 feet in elevation (Ehrlich et al, 1988). The bird is currently listed as a critical sensitive species by the state of Oregon and an assessment species by the BLM. Like all woodpeckers, snags are an important part of their primary habitat and reduction of snags in managed timber stands have contributed to the state listing (Marshall, 1992). Ponderosa pine stands with mature trees for foraging, and snags for nesting are the chief habitat requirements.

The **great gray owl** is a species that prefers open stands and meadows for hunting and mature/old-growth forest for roosting. This species has been detected in the Crooks Creek sub-watershed while conducting spotted owl surveys. This bird has been placed on the State of Oregon sensitive species category as "vulnerable", and is recognized as a assessment species by the BLM. Amount of feeding habitat has increased as a result of past forest management activities.

The **flammulated owl** is primarily found east of the Cascade mountain range in Oregon but is also known to occur in the Siskiyou mountains. The bird is currently listed on the state of Oregon critical sensitive species list, and is recognized as a BLM assessment species. Primary habitat is Oregon appears to be open forest containing mature ponderosa pine, but is also known to occur mature/old-growth forest dominated by Douglas-fir in British Columbia (Marshall, 1992). Marshall (1992) also reports that this species does not nest in clear-cuts or young forests. This species is an obligatory cavity nester generally using abandoned pileated woodpecker and northern flicker excavations for a nest.

Table III-23: Survey and Manage Species in the Deer Creek Watershed and Recommended Levels of Protection

SPECIES	PRESENCE	PROTECTION LEVEL
Del Norte Salamander *(Plethodon elongatus)*	Present	Manage known sites and survey prior to activities, within matrix land buffer length of 1 potential site tree or 100 feet.
White-headed Woodpecker (*Picoides albolarvatus)*	Suspected	On Matrix land no cutting snags 20" DBH or over. Maintain green trees to provide for 100% population potential
Black-backed Woodpecker (*Picoides pubescens)*	Unknown	On Matrix land no cutting snags 20" DBH or over. Maintain green trees to provide for 100% population potential

Table III-23: Survey and Manage Species in the Deer Creek Watershed and Recommended Levels of Protection

SPECIES	PRESENCE	PROTECTION LEVEL
Flammulated Owl *(Otus flammeolus)*	Unknown	On Matrix land no cutting snags 20" DBH or over. Maintain green trees to provide for 100% population potential
Great Gray Owl *(Strix nebulosa)*	Present	1/4 mile protection zone around nest sites, survey prior to activities, 300 foot buffers of meadow and natural openings.
Red Tree Vole (*Aborimus longicaudas)*	Presnet	Manage known sites and survey prior to activities

Source: NFP-ROD (Appendix J2)

10. Neotropical Migratory Birds

Neotropical migrants are species of birds that winter south of the Tropic of Cancer, and breed in North America. More then twenty years of Breeding Bird Surveys (BBS), Breeding Bird Census (BBC), Winter Bird Population Study, and Christmas Bird Counts indicate that many species of birds are experiencing a precipitous decline. This is particularly true for birds that utilize mature and old-growth forest either in the tropics, in North America or both (DeSante & Burton, 1994). Rates of decline are well documented for birds on the east coast of North America, and less so on the west coast.

A BBS route has been located in this watershed since 1994. Also, in 1992 the BLM signed a multi-agency agreement called "Partners in Flight." The purpose of this program is to establish a long-term monitoring effort to gather demographic information, and try to establish to what extent deforestation and forest fragmentation on the temperate breeding grounds, versus that on the tropical wintering grounds, are causes for declining populations.

The Deer Creek watershed contains a number of neotropical migrants that utilize various habitats. Studies conducted on the Medford District have found that neotropical migrants comprise 42 - 47% of the breeding species at lower elevation forest dominated by Douglas-fir (Janes, 1993). In higher elevation forest dominated by white fir, neotropical migrants are less abundant contributing to a smaller portion of the bird species present.

Table III-24 lists the known and suspected neotropicals found in the Deer Creek watershed and nationwide trends for these species. Habitats of particular importance to these species are valley brushfields, old-growth, riparian, and oak woodlands communities. Most neotropical migrants utilize more then one type of habitat during the breeding season. Overall, 46% of these birds are habitat generalists using four or more habitat types, while 34% are habitat specialist utilizing one or two habitats.

Two of 32 neotropical species that use old-growth conifer habitat west of the Cascades are known specialists to that type.

11. Game Species

Species of game animals located within the Deer Creek watershed are: elk, black-tailed deer, black bear, mountain lion, wild turkeys, ruffed grouse, blue grouse, grey squirrels, mountain and valley quail. The Deer Creek watershed includes parts of two Oregon Department of Fish and Wildlife game management units: the Applegate and Chetco units. The entire watershed is open to hunting during the appropriate season for game species.

Information from the Oregon Department of Fish and Wildlife (ODFW) regarding trends of game animals present in the Deer Creek watershed indicate that black-tailed deer populations are overall stable and meet department goals. Elk are present in small remnant populations, with no department plans to increase number due to lack of winter range. Elk have been seen recently (1993) in the Rabbit Lake and Deer Creek ranch area. Overall trend for elk is a slow increase.

Black bear populations are extremely hard to monitor due to their secretive nature. Populations in the watershed appear to be stable. Cougar sightings in the watershed have increased with the overall population on the rise.

Grouse and quail had an excellent nesting year in 1994. The population of these birds is very cyclic depending on weather conditions and other factors. Long-term trends appear to be stable.

A turkey release was conducted in the McMullin Creek area in 1990. The transplant seems to have been successful with turkeys being sighted throughout the drainage.

In general, all of these game species are habitat generalists that benefit from edge habitats. Past land management practices both on private and federal lands have increased the overall amount of forest edge within the watershed. In addition, there has been an increase in the amount of roads which has decreased the value of all habitat types for all wildlife species. High road densities have shown to have a negative effect on deer and elk populations and lead to increase poaching opportunities. Local citizens group have expressed concern over the increase level of poaching they are witnessing, especially for black bears.

Table III-24: Neotropical Birds of the Deer Creek Watershed

COMMON NAME	PRESENCE	TREND*
American Robin		
Ash-throated Flycatcher	Present	Insufficient Data

Table III-24: Neotropical Birds of the Deer Creek Watershed

COMMON NAME	PRESENCE	TREND*
Barn Swallow	Present	Decline
Black-headed Grosbeak	Present	Stable/increase
Black-throated Gray Warbler	Present	Insufficient Data
Blackheaded Grosbeak		
Blue-gray Gnatcatcher	Suspected	Insufficient Data
Brownheaded Cowbird	Present	Decline
Calliope Hummingbird	Suspected	Insufficient Data
Chipping Sparrow	Present	Decline
Cliff Swallow	Suspected	Insufficient Data
Common Yellowthroat	Present	Stable / Increase
Common Nighthawk	Present	Insufficient Data
Dusky Flycatcher	Present	Insufficient Data
Flammulated Owl	Unknown	Insufficient Data
Green-tailed Towhee	Suspected	Stable/increase
Green-winged Teal	Suspected	Insufficient Data
Hammond's Flycatcher	Present	Insufficient Data
Hermit Warbler	Present	Insufficient Data
House Wren	Present	Insufficient Data
Lazuli Bunting	Present	Insufficient Data
Macgillivray's Warbler	Present	Insufficient Data
N. Rough-winged Swallow	Present	Insufficient Data
Nashville Warbler	Present	Insufficient Data
Northern Oriole	Present	Decline
Olive-sided Flycatcher	Present	Decline
Orange-crowned Warbler	Present	Decline
Osprey	Present	Stable Or Increasing
Pacific-slope Flycatcher	Present	Insufficient Data
Rufous Hummingbird	Present	Decline
Solitary Vireo	Present	Insufficient Data

Table III-24: Neotropical Birds of the Deer Creek Watershed

COMMON NAME	PRESENCE	TREND*
Sora	Unknown	Insufficient Data
Spoptted Sandpiper		
Swainson's Thrush	Present	Decline
Townsend's Warbler	Unknown	Insufficient Data
Tree Swallow	Present	Insufficient Data
Turkey Vulture	Present	Decline
Vaux's Swift	Present	Decline
Violet-green Swallow	Present	Decline
Warbling Vireo	Present	Insufficient Data
Western Kingbird	Present	Insufficient Data
Western Tanager	Present	Decline
Western Wood-peewee	Present	Decline
Wilson's Warbler	Present	Decline
Yellow Warbler	Present	Insufficient Data
Yellow-breasted Chat	Present	Insufficient Data

Footnote: * based on information from Partners in Flight in Oregon and might not necessary represent nationwide figures.

12. Other Species

There are some species known to occur in the watershed and that currently show a potential for decline in abundance. These include:

Band-tail pigeons (*Columba fasciata*) have shown a precipitous decline throughout its range since monitoring began in the 1950's (Jarvis, *et al*, 1993). These birds are highly prized as a game species and restrictive hunting regulations has not led to an increase in bird populations. Habitat alteration due to intensive forest managment practices may partially explain their decrease in population and on going research is now trying to answer these question (Jarvis, *et al*, 1993). Band-tail pigeons are highly mobile and utilize many forest habitat types, but the preferred habitat consist of large conifers and deciduous trees interspersed with berry and mast producing trees and shrubs. These birds are known to occur in the watershed. In the spring and the fall large flocks are seen migrating through the watershed. It is suspected that some of these birds are nesting in a stand on the ridge between Williams and Deer Creek watershed.

The birds utilize this higher elevation feeding on blue elderberries and also frequent the serpentine slopes west of Hwy 199 where they feed on coffeeberry, manzanita, and Pacific madrone berries. Fire exclusion, road building, and other management activities have reduced/ eliminated many stands of mast crop producing plants.

Cavity dependent species and species utilizing down logs are of special concern in the watershed because of past silvicultural practices. Silvicultural practices in the past have focused on even-aged stands which has resulted in few, if any, snags and down logs in areas previously harvested. Other activities that have diminished snags and down logs are site preparation for tree planting (particularly broadcast burning), fuelwood cutting, post fire salvage, and previous entries for mortality salvage. Managed stands that currently contain 10-12 (5 MBF) overstory trees per acre or less, are also of concern from a wildlife tree/down log perspective. Stands with remaining overstory trees have the potential to provide for current and future snag/down log requirements throughout the nest rotation if existing trees are removed.

Snags and down logs provide essential nesting/denning, roosting, foraging, and hiding cover for at least 100 species of wildlife in western Oregon (Brown et al., 1985). For some species, the presence or absence of suitable snags will determine the extent to which a species will survive in the local site. In forested stands, cavity nesting birds may account for 30-40% of the total bird population (Raphael and White, 1984). The absence of suitable snags (snags decay stage, number and distribution) can be a major limiting factor for these snags dependent species.

The hardness (decay stage) of a snag is an important factor in determining its use by individual species and its ability to provide suitable nesting and/or foraging for those species. Woodpeckers, like the pileated woodpecker (*Dryocous pileatus*), often choose hard snags (stage 1) for nesting where as wrens and chickadees use the softer stage 2 and 3 snags. The use of snags as a foraging substrate also changes with time and the decay stage of the snag. As a snag decomposes the insect communities found within it changes. Evans and Conner (1979) identified three foraging substrates provided by snags: the external surface of the bark, the cambium layer and the heartwood of the tree.

Snags are also used as food storage sites and as roosting/resting sites for many species. A variety of mammals, birds and some owls use snags to cache prey and other food items. Vacated nesting cavities are often used by wildlife for protection from inclement weather or on hot summer days. The marten *(Martes americana*) often use snags as resting and hunting sites and a pileated woodpecker may use up to 40 different snags for roosting.

Snags continue their function as a key element of wildlife habitat when they fall to the ground as down logs. Once again down log use by individual species is dependent on the decay stage of the log. The larger the diameter of the log and the longer its length the more functional it is for wildlife. Depending on the decay stage of the log it will be used for lookout and feeding sites, nesting and thermal cover, for food storage or

for foraging. For example species like the clouded salamander (*Aneides ferreus*) require the microhabitat provided by bark sloughing of the log where as small mammals such as red-backed voles *(Clethrionomys occidentalis*) burrow inside the softer logs.

F. SPECIAL AND UNIQUE AREAS

Map 4 shows the location of the Areas of Critical Environmental Concern (ACEC) and Research Natural Area (RNA) located within the Deer Creek watershed. RNAs are designated primarily with scientific and educational activities intended as the principal form of resource use, for the short and long term. ACEC's are designated specifically to protect unique and important natural resource values and special status species.

The Brewer Spruce RNA was designated for the study of this unique vegetation community. The 1995 RMP expanded the Brewer Spruce RNA from 390 to 1,774 acres. The RNA is closed to timber harvest, off-road vehicle use and mineral entry.

The Crooks Creek ACEC protects 149 acres of unlogged Douglas-fir/sugar pine/tanoak vegetation including pristine springs and ponds. It is closed to timber harvest and off-road vehicle use.

The Illinois Valley Botanical Emphasis Area (BEA) has been established in the 1995 RMP. Of the 10,613 BEA acres, 4,755 are located in the Deer Creek watershed.

G. HUMAN USES

The 1990 population for the Deer Creek area (Selma zip code 97538) was 2,133. The average annual population growth rate in the Deer Creek watershed may be similar to that of Josephine County as a whole: 2.6%/year between 1990-1995. Certainly population is expected to continue to increase in the Deer Creek watershed. As more people build homes in the valley, resources such as water and valley floor habitats will continue to be adversely impacted.

The majority of BLM-managed lands in the watershed were in the commercial forest base under the previous forest plan. As a result, timber harvest on those lands reached an all time high in the 1980s. Under the current Medford District RMP, 54 percent of the BLM lands in the watershed are in the late successional reserve (LSR) and available for only very limited timber harvest (ROD pages C-11 and 12). Lands in the matrix land use allocation make up 40 percent of the BLM-managed lands in the watershed. Matrx lands is where scheduled timber harvesting/production is to occur. Of that 40 percent, 10 percent is withdrawn from the timber base due to its incapability to produce commercial forest.

In the 1990s, harvest levels from private lands in the watershed have been higher than in the past. These current levels are expected to continue. The remaining trees on the majority of private land are just now reaching a merchantable size after the first harvest entry in the 1940s and 1950s. It is highly probable that this timber will be harvested soon after it reaches merchantable size.

Mining

Mineral potential on BLM lands within the watershed ranges from low to medium. The low potential areas are primarily the lower elevation areas along Deer Creek in the center of the watershed. Other areas with low mineral potential extend to the north central and south central portions of the watershed.

The medium potential areas are in the eastern third of the watershed and in the western serpentine areas. One pocket of medium potental for minerals exists at the headwaters of Crooks Creek, an area that was originaly a patented mining claim until acquired by BLM in 1994.

The valuable mineral commodities in the eastern areas of the watershed are rated as medium for gold and nickel. The valuable mineral commodity located in the western serpentine area is nickel. The valuable mineral commodity in the headwaters of Crooks Creek appears to be molybdenum.

There are 25 placer claims within the watershed (as of February 28, 1994). In general, placer claims are located in places where gold is obtained by washing an alluvial or glacial deposit, such as sand and gravel.

There are 27 lode, or hardrock, mining claims located with the watershed (as of February 28, 1994). A lode claim is generally a deposit of valubale minerals in a solid rock deposit. A lode deposit is normally mined by tunneling underground.

Road Density and Condition

Before settlement of the west, ground disturbances were mainly caused by animal trails and forces of nature. As the west developed, trails became narrow roads used to transport people and supplies. These roads were generally natural surface with the amount of sediment flow depending upon use, location, weather conditions, and soil type. As the use of these roads increased over the years, the roads themselves changed in design. Many of today's highways began as trails and are now widened, realigned, and surfaced to meet the change and increase in vehicular traffic. Even with the increase in traffic flow, crushed rock surfacing, asphalt, modern techniques in road stabilization, and improved road drainage have actually decreased sedimentation and erosion compared to the original natural surfaced roads.

Many of the roads in the Deer Creek watershed have been constructed based on the public's need for access. Road construction and improvement across BLM managed lands was based mainly on timber

management objectives. Many natural surfaced roads remained open for administrative access after timber sales were completed. some of these roads are known to be major contributors to sediment flow into streams.

Road density and type of roads varies greatly across the watershed. Total miles of road is 644. The average road density on BLM land in the watershed is approximately 4.48 miles per square mile. The average road density on non-BLM land in the watershed is approximately 8.24 miles per square mile.

Many natural surfaced road systems built on private lands and are a major source of erosion and sedimentation into streams. The BLM has no authority over private land use. Increased timber harvest on these lands in the past five years has re-established many roads that had previously overgrown and stabilized. This trend is expected to continue as the remaining trees on private land grow to commercial size.

The majority of the roads that are newly constructed or rebuilt on private lands are expected to be natural surfaced and their ground-disturbing activities will continue to cause problems with erosion and siltation in the local streams. Timber harvest on private land, for the most part, will be conducted using the most economical system (tractor yarding) thus increasing the erosion and siltation problem at least in the short term.

Table III-25 summarizes miles of roads by surface type.

Table III-25: Road Information Generated from BLM Road Records

ROAD OWNERSHIP	SURFACE TYPE	MILES
BLM	PRR	18.15
BLM	GRR	20.43
BLM	NAT	92.27
BLM	ABC	14.40
BLM	ASC	47.59
BLM	BST	16.86
Total BLM Road Miles		209.70
PRIVATE	UNK	434.26
Total Road Miles		643.96

Source: BLM road records

Footnotes: PRR = Pit Run Rock
GRR = Grid Rolled Rock
NAT = Natural Surface
ABC = Aggregate Base Coarse
ASC = Aggregate Surface Coarse
BST = Bituminous Surface Treatment
UNK = Unknown/Various Types

Special Forest Products

A wide variety of different special forest products are sold by the BLM and harvested. (See Table III-26). Future use and demand for these materials is expected to increase as new uses are developed for current materials and as new markets are developed for additional materials (See Table III-27).

Table III-26: Special Forest Products Known to be Harvested in the Deer Creek Watershed (based on BLM permit sales)

PRODUCTS	**VALUE**	DEMAND	**CURRENT SUPPLY**	**CURRENT SOURCE OF PRODUCT**	**POTENTIAL SUPPLY**	**POTENTIAL SOURCE OF PRODUCT**	**CURRENT MARKET**
FIREWOOD Commercial Personal	 MED MED	 HIGH HIGH	 LOW LOW	Slash from timber sales.	 MEDIUM MEDIUM	Hardwood thinning; larger-sized PCT material; slash from timber sales; standing hardwoods along roads; preharvesting timber sale units.	Williams and Grants Pass residents; Murphy and Grants Pass wholesalers. Williams residents.
POLES Commercial Personal	 MED LOW	 LOW LOW	 HIGH HIGH	Overstocked stands/understory thinning.	 HIGH HIGH	Larger-sized DF PCT units; pre-harvesting commercial thinning units.	Grants Pass fence companies; White City, Central Point mills.
MUSHROOMS Matsutake	 HIGH	 HIGH	 VARIES	Mixed hardwood/conifer stands, ridges	 VARIES	Habitat Enhancement Innoculation	Primarily processed in Portland and exported overseas.
MANZANITA	LOW	MEDIUM	HIGH	Along roads; Serpentine areas; historically burned over areas.	HIGH	Same.	Floral, craft, and bird perch markets. Glendale wreath-making company.
BURLS Madrone Big Leaf Maple	 HIGH HIGH	 MED/HI HIGH	 MED/LOW LOW	Matrix Lands. Very scattered.	 MED LOW	LSR Lands.	Selma and Grants Pass buyers; primarily exported.
BOUGHS Port-Orford cedar Incense cedar White fir	 HIGH MED/HIL OW	 HIGH MED/HI LOW	 LOW LOW/MED LOW	Younger trees along roads; Higher elevations	 LOW LOW MED	Plant decommissioned roads with bough species; manage for increased bough production; establish more stewardship programs.	Numerous buyers on the south coast; Glendale; Myrtle Creek. Mainly shipped to Washington State for processing, then to eastern U.S./overseas.
CHRISTMAS TREES Silver fir White fir Douglas-fir Pine Noble fir	HIGH MED LOW LOW HIGH	HIGH MED LOW LOW HIGH	LOW MED HIGH MED LOW	Trees within the road prism; trees outside of plantations; PCT projects.	LOW/MED MED HIGH HIGH LOW/MED	Plant decommissioned roads; culture overstocked units in stewardship programs.	Local residents for personal use; Local commercial sales; California markets.

Table III-26: Special Forest Products Known to be Harvested in the Deer Creek Watershed (based on BLM permit sales)

PRODUCTS	**VALUE**	DEMAND	**CURRENT SUPPLY**	**CURRENT SOURCE OF PRODUCT**	**POTENTIAL SUPPLY**	**POTENTIAL SOURCE OF PRODUCT**	**CURRENT MARKET**
TRANSPLANTS / WILDLINGS Personal	LOW	LOW	HIGH	Small trees/plants within road prism or in clumps.	HIGH	Along roads; thin overstocked areas.	Local residents.
FLORAL GREENERY Huckleberry Salal	LOW LOW	LOW LOW	MED LOW	Understory vegetation.	MED MED	Locate and/or culture patches; Plant decommissioned roads; stewardship programs.	Local residents sell to coastal floral wholesalers.

Table III-27: Potential Special Forest Products Known to Occur in the Deer Creek Watershed

PRODUCTS	USES	ACTIVE MARKETS EXIST (Y/N)	ESTIMATED SUPPLY
Lichen	dye/floral/pharm	Y	high
Mosses	craft/floral/pharm	Y	med
Fungi			
Boletus	food	Y	varies
Coral	food	Y	varies
Chanterelle	food	Y	varies
Picture conk	craft	Y	med
Morel	food	Y	varies
Herbs			
Beargrass	craft/floral/transplant	Y	low
Ferns	floral/transplant	Y	med
Horsetail	floral/pharm	Y	med
Lomatium	pharm	N	low
Pearly everlasting	floral/transplant	Y	med
Spikenard	pharm	Y	med
St. John's wort	dye/pharm	Y	med
Vanilla leaf	floral/potpourri/transplant	Y	low
Yarrow	floral/pharm/transplant	Y	low
Yerba santa	pharm	Y	low
Trees/shrubs			
California hazel	floral	Y	med
Chinquapin	floral/food/transplant	N	med
Dogwood	floral/transplant	Y	low
Elderberry	food/pharm	Y	med/low
Huckleberry	floral	Y	med
Jeffery pine	cones	Y	low
Live oak	floral	Y	med
Oceanspray	floral	Y	high
Oregon boxwood	floral/transplant	Y	med
Oregongrape	floral/food	Y	med
Prince's pine	food	Y	low/med
Red alder	floral/woodcraft	Y	low/med
Red currant	floral	Y	low
Vine maple	transplant/woodcraft	Y	med
White oak	floral/mushroom logs	Y	med
Yew	fence post/pharm	Y	low
Port-Orford Cedar	fence post/export	Y	low
Ponderosa pine	boughs/cones	Y	low/varies
Sugar pine	boughs/cones	Y	low/varies

IV. REFERENCE CONDITION

A. WATER QUALITY AND QUANTITY

The upper reaches of the stream network in the Deer Creek watershed are relatively straight. The function of these streams and their tributaries has always been to produce high quality water to the lower gradient streams in the valley bottoms. The forest vegetation intercepted the precipitation and either stored it (snow pack) or yielded it (runoff). The organic matter along the forest floor protected the soil from detaching forces and also aided in filtering out sediments before the water entered the streams. Sedimentation rates were generally low and habitat quality for aquatic dependant species was high.

A mature forest provided shade and an abundance of coarse woody material (as a result of tree mortality) in the forest and creeks. This was used as a food source and shelter for many insects, fungi and benthos. Debris jams and flood events would change the stream course causing it to meander across the flood plain. Most of the creeks at mid and lower elevations were more sinuous and, therefore, were longer and more complex with more aquatic habitat available.

Since European settlement the number of irrigation diversion has increased and water rights for agricultural use have reached a point of over appropriation. Irrigation of farmlands de-waters streams reducing water quantity and increasing stream temperatures to the detriment of native fish and wildlife species. Timber harvest was minimal until the late 1800's and accelerated sharply in the 1980's. Both agricultural use and timber harvesting has lead to a decline of quality through increases in sedimentation.

B. AQUATIC AND RIPARIAN HABITAT

*Pre-European Settlement***:**

A pre-European depiction of the Deer Creek watershed would include robust beaver and salmon populations, a mixture of mature conifer and hardwood riparian areas, large woody material or logs distributed through the stream and riparian area and plenty of cool, clear water. There probably was an abundance of fish in most streams. Native Americans relied heavily on salmon, steelhead, lamprey and suckers for subsistence and ceremonial purposes.

Prior to European settlement low elevation streams meandered with unconstrained channels. Multiple stream channels dissipated flows and created fish habitat. Stream channels contained larger amounts of large woody material for insect and fish production, low water temperatures ideal for salmonids, and low sedimentation in the gravels or stream substrate.

Prior to the settlement of the valley, pristine streams flowed from their source to Deer Creek. Water quality was extremely high. Seeps, springs, and snow all contributed to keeping the water cool. Due to the mature nature of the majority of the forest in the higher elevations of the watershed, winter snowpack would remain for longer periods of time than it currently does. During the winter and spring occasional floods would flush the system clear of sediment that was deposited from natural slides and erosion. Stream courses in the uplands were primarily lined by conifers with a narrow band of deciduous trees. These streams were generally well defined by entrenched channels. As the stream dropped to the valley floor, wide floodplains developed and the streams began to meander, taking on a variety of courses from year to year. This highly sinuous stream system consisted of undercut banks and oxbows, with an accumulation of large woody material from both the uplands and lowlands which created an extremely diverse aquatic system and associated habitats. Here the riparian zone would also widen, with deciduous trees playing a more important role than they did in the uplands. Due to higher humidity, conifers near the streams resisted burning, allowing them to mature, resulting in heavy loading of large woody debris in the water. Adding to the diversity was a myriad of wildlife species.

Beavers (*Castor canadensis*) acted as a keystone species, creating backwater sloughs behind their dams, and adding finer woody material to the stream. This fine material particularly benefitted fish in the stream providing them with cover. Species such as ducks and geese also benefitted from the creation of ponds which provide nesting habitat. The diversity of wildlife species was not restricted to the surface as a profusion of aquatic insects took advantage of the variety of available niches. These insects in turn supported an assortment of vertebrate species including anadromous fish. As the adult fish returned to their native streams, their carcasses would produce a rich source of food which in turn supported minks *(Mustela vision)*, American black bears *(Ursus americanus)*, grizzly bears *(Ursus arctos)*, bald eagles *(Haliaeetus leucocephalus)* and a number of other scavenger species that would benefit from this annual event.

Post-European Settlement: European settlers trapped beaver extensively and over the decades began the reduction in numbers of coho salmon. As beaver numbers decreased so did the amount of summer juvenile coho salmon habitat (pools and small ponds). The settlers cleared the floodplains and adjoining lands. The lands were drained and streams channelized. Stream meander was eliminated along with the connectivity of the stream with its floodplain. Due to the channelization of Deer Creek and over appropriations of water available during low flow periods Deer Creek flows intermittently in the late summer. Irrigation of farmlands dewaters the stream preventing juvenile yearling fish migration, upstream and downstream to seek cooler waters.

Coho salmon numbers have decreased by 90% since 1970. Coho production potential and habitat complexity has subsequently decreased as a result of agricultural practices, timber harvest and road activities. Fish numbers were very high during the 1800's and early 1900's. Over harvest of anadromous fish also reduced numbers in the late 1800's and in the early 1900's.

Selmac Lake was completed in 1961. The design of the dam did not include fish passage and so has blocked anadromous fish spawning and rearing habitat above it. It was created as a safe place for children to fish and

an alternative to river fishing. Cole Rivers the first Rogue River fishery biologist helped design the dam on McMullin Creek and coordinated with Grants Pass merchants to purchase private lands with BLM lands. The county traded timber on county land from relocated roads and powerlines valued at $101,000. There were no feasibility studies and the design of the lake and dam were free. The lake filled within two months of the completion of construction. Originally the lake was planted with black bass from Montana, then planted with bass from Siltcoos Lake, Oregon. Bluegill and crappie populations were killed in 1970 and then people wanted a trout fishery. Currently trout are annually planted in Selmac Lake (Jack Sim, pers. comm, 1995).

C. FIRE

1. Historical Fire Regime

The historical fire regime of the Deer Creek watershed was dominated by a low-severity regime. The low-severity fire regime is characterized as frequent (1-25 years) fires of low intensity (Agee, 1990). A small amount of area of the watershed approaches a moderate-severity regime at the higher elevations on the western portion of the watershed. These areas had a longer fire frequency of 25-35 years and experienced a range of effects from high to low severity. These areas are a minor component in the total watershed and will not be discussed further.

2. Low-Severity Regime

Fires in a low-severity regime are associated with ecosystem stability, as the system is more stable in the presence of fire than in its absence (Agee, 1990). Frequent, low severity fires kept sites open so that they were less likely to burn intensely even under severe fire weather. Limited overstory mortality occurred. The majority of the dominant overstory trees were adapted to resist low intensity fires because of thick bark developed at an early age. Structural effects of these fires were on the smaller understory trees and shrubs. These were periodically removed or thinned by the low intensity fire along with down woody fuels.

With the advent of fire exclusion, the pattern of frequent low intensity fire ended. Dead and down fuel and understory vegetation were no longer periodically removed. Species composition changed and less fire resistant species increased in numbers and site occupancy. This created a trend toward an ever increasing build-up in the amounts of live and dead fuel. The longer interval between fire occurrence creates higher intensity, stand replacement fires rather than the historical fire effect of stand maintenance.

D. VEGETATION

1. Vegetation Types

The vegetative conditions found in the watershed today differ in some significant ways from the historic conditions. For the purposes of this discussion, the reference condition will be considered to be approximately 1920 and is characterized based on the Oregon and California (O&C) Revestment Notes.

To try and assess vegetative conditions in the watershed at the turn of the century, the 1916 O&C Revestment Notes were examined. Unfortunately, specific data or stand descriptions are not available for the watershed prior to this time. The 1916 O&C Revestment Surveys were done to determine the economic value of the land at that time, to estimate the volume and quality of timber present, and to recommend best use of the land. Every forty-acre parcel of O&C land was surveyed. The information is general and brief but some conclusions can be drawn as to what the general landscape looked like in the early part of this century.

Enough information is present in the notes to develop a plant series map for those lands that were surveyed. The information in the survey notes described the conifers present in both the overstory and understory, major hardwood species present on the parcel (madrone, canyon live oak, myrtle, etc.), the primary shrub species present such as ceanothus or manzanita, and whether or not there were any recent signs of a fire event. The following table summarizes the reference condition plant series and compares it to current conditions.

Table IV-1: Major Plant Series (circa 1920 and present)

Plant Series	circa 1920		1996	
	Acres [1] (est)	%	Acres [1] (est)	%
Douglas-fir	23,560	85%	15,480	52%
White fir	120	<1%	2,421	8%
Tanoak	40	<1%	9,304	31%
Ponderosa Pine	2,080	7%	290	<1%
Jeffrey Pine	640	2%	1,857	6%
White oak	40	<1%	66	<1%
Nonforest	1,400	5%	393	<1%
	27,880		29,811	

Footnotes: 1) 1920 data derived from General Land Office notes for federal land in the watershed at that time. 1996 data derived from BLM OI records for BLM land only. Difference in total acres due to land exchanges.

As is consistent with generally all forests in the Klamath Province, the forests in the Deer Creek watershed were historically diverse, contained a mix of seral stages and size classes, and were generally more open than they are today. The forests were complex and contained a variety of species and structures. The largest trees were generally pine (ponderosa and sugar) which developed in more open conditions than the dense pole stands present across much of the watershed today. The pine series (ponderosa and Jeffrey) covered approximately

27% more acres in 1920 than it does today. These two are combined as some of the acres listed as ponderosa pine in the revestment notes are probably the Jeffrey pine series. The significant issue is that open pine dominated sites were more prevalent in 1920 than they are today.

The Douglas-fir series declined from 85% of the watershed acres to 52% today. Mid-seral hardwood species such as Pacific madrone and California black oak were common, especially where fire frequency and intensity had been greater. This is further indicated by the decline in non-forest which dropped from 1,400 acres in 1920 to 100 acres today. This reduction implies that areas that burned more frequently in the past have become vegetated in large part due to loss of fire disturbance. Twenty-seven percent of the land surveyed showed evidence of past fire according to the revestment notes. About 8 percent of the acres had evidence of two (2) burns (the 8% is included in the 27 percent).

Tanoak occurred less frequently than is found in the watershed today. In fact, tanoak is only listed on one 40-acre parcel compared to over 9,000 acres of the series today. Such a significant change in the plant community raises questions regarding how such a extreme difference in plant species composition could occur over only an 75 to 80 year period or why a species that is readily detected even in small or shrub form does not show up more frequently in the revestment notes.

Another species that appears to have benefited over the last 75 years is white fir. This series has increased from less than 1% of the watershed to 8% today.

Port-Orford cedar is mentioned in 66 parcels in riparian areas and in the uplands on two forty-acre parcels. Sugar pine was the sole conifer mentioned on six forty-acre parcels and this 240 acres could not be classified.

The board foot per acre totals were broken out showing percent of the BLM ownership in each township with more than 15 thousand board feet per acre. This is done for two reasons: 1) to show the amount of "high volume" acres in the watershed in 1920 and to give an indication of suitable habitat for old growth dependent species. Fifteen thousand board feet per acre is considered the low end for this type of habitat (Oakley, 1995). Approximately 17% of the BLM ownership in the watershed had at least 15,000 board feet per acre.

The largest and highest quality trees for timber described in the notes are pine, both sugar and ponderosa. Douglas-fir is generally described as being small and of poor quality. Some larger Douglas-fir are described in places but nowhere in the notes are thick stands of Douglas-fir old growth described. Hardwoods are described as a significant component of the stands in places. Examples of the types of information found in the notes includes: "clay soil, thick stand of black oak from 10 to 26 inches on the stump, make good cordwood, short coarse bodied and heavy tops. No timber." The (no timber description is referring to conifer timber only) or "open clean woods, many black oak, make grazing land" and "no brush, surface is clean and smooth. Will make good grazing land."

Since this inventory took place during the homestead entry period, high emphasis was placed on potential agricultural endeavors. Because the landscape was more open, many of the parcels surveyed were classified as agricultural. The agricultural land classification implied nontimber use and didn't necessarily imply crop farming. If the parcel was too steep for crop farming but could still be used for cattle grazing, it was usually classed as agricultural land. Many of the BLM lands in these same parcels today are mapped with a current condition of large poles or mature forest.

While the revestment notes provide some information on past vegetation, they should not be considered as representing a "pristine" or "natural" condition (*i.e.*, without human influence). Euro-American influence was occurring within the watershed prior to 1920. Additionally, Native Americans were known to have used fire frequently to provide better habitat for some plants and animals. These disturbance patterns resulted in dynamic forest ecosystems that changed constantly over time. They also played a vital process role in providing for a diversity of vegetative types, structures, seral stages, and for maintaining sustainable densities.

The oldest aerial photographs of the watershed that could be located are from 1953. These photos indicate that extensive harvesting had occurred on the nonfederal lands by that time. Most of these harvests probably occurred in the late 1940's and 1950's, just after World War II. Some of the harvests appear to have extended over onto federal lands also. Whether these were done by the federal agencies or inadvertently done because ownership lines weren't established at that time is not known. The harvests appear to have been high grade type harvests where most of the larger trees were removed and the lower value understory trees were left. Most of these areas are classified as large poles in the current condition mapping with the remainder classified as hardwood/conifer or poles.

2. Special Status Plants

Intensive surveys of special status plants have only occurred during the past fifteen years. It is difficult to assess the adequacy of older surveys because the listing of special status plants has changed over the years. A plant considered special status today may not have been in the past, which means that no information on the presence of the species would have been documented.

It can be postulated that the habitat for those late successional special status species (e.g., the *Cypripedium sps*. and *Allotropa virgata*) was more extensive in the watershed before timber harvest was common. Even though larger sized vegetation condition classes do exist in the watershed today, it is impossible to know what presettlement habitats harbored the most orchid populations. The microhabitat required was most likely more abundant and contiguous with frequent, low intensity fires helping to maintain a competitive edge for these species in the herbaceous layer. Due to the complex life history of these plants, they were probably never a dominant species in the herbaceous layer, but they could have occurred more frequently in the watershed and with higher numbers of plants per population area if moister, shaded microsite conditions occurred more frequently.

Serpentine reference conditions most likely exhibited higher species diversity in the herbaceous layer than in the past. Since serpentine areas occur because of unusual soils their area was probably similar to and contained the same type of plants as today. Also, one can only assume that wetlands and seeps probably existed more frequently before settlement of the area.

E. TERRESTRIAL WILDLIFE

A pre-European/Asian depiction of the Deer Creek watershed would dramatically different then one would see today. Native Americans were managing the landscape for habitats and products they found useful. Fire was used extensively to burn off undesirable vegetation, and to promote growth of desired products. Wildlife was extensively used by these people to meet their everyday needs. Human exploitation of the wildlife resources was not beyond the point were species couldn't recover. Each species maintained its role in an intricate food chain, where their presence benefits the community as a whole. Large predator species such as grizzly bear, and wolf *(Canis lupus*) were present in the watershed (Bailey, 1936). These along with cougar *(Felis concolor)* and black bears help maintain the balance of species such as Roosevelt elk *(Cervus elaphus)* and black-tailed deer *(Odocoileus hemionus)*. Predator species kept herbaceous species in balance with vegetation. Predator species also benefit other community members like ground nesting birds. They harvested small mammals such as raccoons *(Procyon lotor)* that fed on the young birds. Predators also made available carcass in the winter that benefit species as diverse as the stripped skunk *(Mephitis mephitis)* and the black-capped chickadee *(Parus atricapillus)*.

The landscape was open and the movement of animals was unrestricted. Many animals would migrate with the seasons to take advantage of food, shelter and water. Black bears in the early spring sought green grass to activate their digestive system. Winter kills that remained around were utilized by the bears at this time. During early summer California ground-cone *(Orobanche spp.*) became an important part of their diet, until berries were available. As fall approached, the salmon would return to the river, spawn and die. This abundant food source was available to a host of consumers. Deer and elk also followed the seasons. Winter was primarily spent in the oak/savannahs. As the seasoned progress they would enter the uplands, until fall arrived. Other species such as the wolverine (*Gulo gulo luteus*) remained at high elevation throughout the year. This species was a opportunistic predator, feeding on animals such as porcupines *(Erithizon dorsatum*) as well as occasional winter kills.

1. Valley Floor Habitats

Historically the valley floor was dominated by an open stand of large conifers and oak/grasslands kept free of brush due to fire. This habitat type provided nesting habitat for various species, mast crops of acorns for wildlife forage, and big game winter range. A variety of bird species such as the acorn woodpecker *(Melanerpes formicivorus*), Western blue birds *(Sialia mexicana)* and the Lewis' Woodpecker *(Melanerpes lewis*) were intricately tied into these stands of trees. The open condition, and the grass was highly beneficial to a number

of game animals, and ground nesting birds. Deer and elk, utilized this area, as did valley quail *(Callipepla californica)*. In turn game animals provided sustenance for a host of predators species. Grey foxes *(Urocyon cinereoargenteus*) primarily used the valley and nearby brushy slopes as their habitat.

2. Upland Habitats

The area found above the valley floor was generally dominated by conifers. The west side of the watershed differed from the east, north and south. The west side of the watershed was dominated by species that are tolerant of dry conditions such as Oregon white oak *(Quercus garryana*), ponderosa pine *(Pinus ponderosa)*, and various shrub species. This area burned frequently allowing for grass to dominated the herbaceous layer. Stands of conifers found on north facing slopes were usually composed of Douglas-fir (*Pseudotsuga menziessii*), sugar pine (*Pinus lambertiana*) and incense cedar *(Calocedrus decurrens*). These stands experienced stand replacing fires and were often devoid of large amounts of down woody material. The east, north, and southern part of the watershed retained more moisture then the west and had more diverse vegetation. This area was characterized by forest in various stages of stand development due to disturbance events, such as fire. The amount of old-growth forest found in the watershed is unknown. Species that benefitted from these forest like pileated woodpeckers (*Dryocopus pileatus*), northern flying squirrels (*Glaucomys sabrinus*) and red tree voles (*Phenacomys longicaudus*) would have been abundant. Dispersal of animals, recolonization of former habitats, and pioneering into unoccupied territories, was accomplished easier then it is today due the connectivity of the older forest. Species that benefitted from edge environments like stripped skunks (*Mephitis mephitis*) were less common in the uplands then they are today.

F. SPECIAL AND UNIQUE AREAS *(to be completed)*

G. HUMAN USES

1. Mining/Cultural

Archeological evidence indicates that human occupation of southwest Oregon dates back about 10,000 years. The native inhabitants of the area are generalized as hunters and gatherers.

Evidence in the Applegate River watershed indicates that natives burned their landscape for a variety of reasons. These reasons included pest control, stimulation of new plant growth for various utilizations, the reduction in undergrowth and hazard control near residences.

The first known Europeans to enter the Applegate watershed passed through the area in early 1827. They belonged to a party of Hudson's Bay Company trappers from Fort Vancouver under the leadership of Peter Skene Ogden. The Hudson Bay Company trappers continued to visit the area for several years. Others trappers and explorers made periodic visits to the area up to the time of the discovery of gold in Jackson County.

Gold was discovered on Jackson Creek (near present day Jacksonville) in the Rogue Valley in late 1851, or early 1852. Although gold was discovered elsewhere along the Applegate and Illinois Rivers previously, this gold discovery brought an influx of thousands of miners to the region in search of gold.
Gold mining occurred on a small scale within the Deer Creek watershed in the early years. The majority of the mining in the mid 1800's within this watershed was small scale, primarily prospecting and the level of hydraulic gold mining was low in the watershed. No records of large scale gold mining operations were found for the Deer Creek watershed.

The low elevation lands in the Deer Creek drainage became developed for agricultural uses. The need for a clearing house of farming knowledge was met with the establishment of Josephine County's first grange at Deer Creek in 1907.

The development of the timber resources for commercial purposes in southwestern Oregon began in the 1850's. In August of 1851 the first exports of forest products, cedar shingles, occurred. In the Illinois Valley whipsawing occupied many virtually full time with the rapid expansion of mining activity in the 1850's. In 1884 the mining boom in the rest of the Illinois Valley had passed. Lacking rail connections and adequate roads potential for a timber industry was minimal until the 1920's.

During the 1920's several portable mills moved into drainages in the watershed as routes into the drainages improved. The timber was either used in the drainage or taken to mills in the Illinois Valley at the rail terminus at Waters Creek for delivery elsewhere.

2. Recreation

Until the 1930's, much of the land in southern Oregon was inaccessible for recreation. The 1930's brought about the Civilian Conservation Corps, which, among other duties, was responsible for building many roads. These new roads provided recreation opportunities that were not previously accessible to many people. People began using roads to access sites for hiking, camping and driving for pleasure. According to an Oregon forester at the time, "Motorists and campers moved into areas previously unreachable or discovered alternative shortcuts to favored recreation spots... Where there are roads, you'll find the public." (McKinley and Frank, 1995) One of the first known recreation reports was developed in 1935 in the Applegate District of the USFS (Preister, 1994). Other recreation opportunities in the area included hunting and fishing.

3. Roads

As the watershed was settled by Europeans, trails became narrow roads used to transport people and supplies. The quality and condition of the road varied greatly depending on use, location, weather conditions and soil type. As the use of these roads increased over the years, the roads themselves changed in design. Many of today's highways began as trails and are now widened, realigned, and surfaced to meet the increase and change in

vehicle traffic. Even with the increase in traffic flow, crushed rock surfacing, asphalt, modern techniques in road stabilization, and improved road drainage have actually decreased sedimentation and erosion along the original natural surfaced roads.

V. SYNTHESIS AND INTERPRETATION

A. WATER QUALITY AND QUANTITY

1. Erosion Processes

Erosion levels have undergone a dramatic increase from pre-European settlement levels to current conditions. This increase is directly related to changing patterns of land use. Development of low elevation lands and water diversions in the Deer Creek drainage for agriculture has been more instrumental in changing erosion processes than mining.

Timber harvest began near the same time as settlement of the valleys and slowly increased until 1990. Harvesting timber required the construction of roads to harvest and remove the product. Timber harvest practices have changed through the years but impacts continue from road construction and clearcut harvest systems. These impacts include an elevation of erosion rates and in some headwall locations, slumping and mass failure has occurred. The potential to recover this watershed to the reference conditions will be limited by existing roads, new roads, timber harvest, agricultural uses and rural development.

Private and federal lands are interspersed and there is a mutual reliance on the existing roads. Many roads located on federal land must, by legally binding agreements, continue to be available for use by private companies and individuals. As a result the BLM cannot decommission these roads and they will continue to erode and have the potential for slumping and mass failure. In addition roads used and constructed on private land will probably continue to be managed as they currently are, which will also limit the watershed's restoration potential.

2. Soils

The soils in the Deer Creek watershed are relatively young in a geological time frame and are still in a young stage of development. As soil develops, it incorporates organic matter from existing and past vegetation. Depending on the amount of organic matter in the soil, populations of bacteria and fungi increase or decline. These soil microbes break down the organic matter into available plant nutrients and aid plants in assimilating these nutrients. The more nutrients available and assimilated by plants produce more vegetative material which eventually becomes organic matter. Humus is also necessary to provide protein for nitrogen fixation. The main source of humus in the forest environment comes from animal waste. This cyclic process continues over time with physical factors such as temperature and moisture influencing its speed and efficiency. Soil productivity increases when soil depth and nutrient capital increases.

Timber harvesting has reduced the amount of vegetative material that would otherwise have been available to be converted to organic matter and, eventually, soil nutrients. Harvesting timber also disturbs the soil which

increases erosion and decreases soil depth. Roads built to provide access in the watershed removes productive soil and reduces the amount of area contributing vegetation to the nutrient cycle.

Fire suppression efforts, that have allowed fuel to build up over the landscape, have increased the risk of a high intensity wildfire occurring that would substantially reduce vegetative amounts and soil microbe populations.

3. Hydrology

The geomorphology of most of the streams, particularly those in the valley bottoms, has changed over time as a result of human and natural physical influences. Changes in the vegetation, physical landscape and flooding (either natural or human actions) have greatly affected the fluvial processes. Water diversions either for domestic or agricultural purposes during the summer months decreases flow thus reducing the amount of aquatic habitat available while increasing water temperature. In the mainstem of Deer Creek the flow is intermittent below White Creek due to these diversions and stream temperatures in the summer often exceed 65°F.

Roads constructed in floodplains and along some creeks (Thompson, Draper, Anderson, Clear, McMullin and South Fork Deer) have straightened the stream's channel. Agricultural activities in the valley bottoms have pushed the creeks against the hillside reducing meander and sinuosity. This has reduced stream length which decreased the amount of available aquatic and riparian habitat and ground water recharge area.

Logging in riparian areas has reduced shade, lowered the amount of large wood in and along the stream and destabilized banks. Logging and road building in the hills above the streams has increased sedimentation rates which have embedded fish spawning and rearing habitat. The effects of past logging in the White Creek sub-watershed led to the deferral of additional timber harvesting and surface disturbing activities in the approximately 1,600 BLM acres in this subwatershed for period of the current Resource Management Plan.

Four factors were identified that are currently having a major affect on the beneficial uses of water and the associated stream and riparian habitat within the watershed. These factors are low stream flow in the summer months, high sedimentation rates, high water temperature during the summer months and the lack of large wood in the stream and riparian areas. Precipitation cycles will continue to fluctuate through time. Precipitation intensity, duration and amount will vary over the coming years causing floods and/or drought. The manner in which the factors affecting the streams are managed will determine the future hydrologic conditions.

B. RIPARIAN AND AQUATIC HABITAT

Since the 1930's there has been a substantial decrease in fish populations due to the cumulative effects of irrigation diversions, agricultural development, timber harvesting, road construction, dams, and over fishing. These factors have changed the landscape and have had an adverse impact on fish populations over the past 100 years.

Diversions from streams for irrigation and domestic use purposes combined with century old water rights have significantly decreased the amount of water available to fish, especially during low flow periods. Changes in the landscape are caused by agriculture and roads (stream channelization), and timber harvest. Continuing irrigation withdrawals exacerbate the adverse effects of past timber harvesting and road construction and contribute to declines in the anadromous fishery.

The construction of Selmac Dam blocked any possibility of anadromous fish migration throughout the extent of McMullin Creek. McMullin Creek supports anadromous fish below the dam and cutthroat trout are above. Coho salmon habitat is abundant above the dam and would be used for coho salmon spawning, as well as by cutthroat trout, if fish passage past the dam was possible.

On the valley floor, current livestock grazing and farming essentially precludes conifer regeneration in the riparian zone resulting in a substantial decline of conifer vegetation in this area. The result is lack of shade and an increase in stream temperature. Large tree recruitment into streams in these areas is extremely slow or nonexistent.

Timber harvest has caused a loss of large wood, and no recruitment of conifer trees in the riparian zones of previously clearcut areas. Large wood contributes to the riparian and stream, habitat, shade and nutrients for terrestrial and aquatic insects.

In some cases, past road construction has lead to a channelization of streams which has precluded stream meander. Past timber harvesting, agricultural land uses, the presence of roads and rural residential development has accelerated surface water runoff and erosion of sediment into the streams. This increase in sediment has contributed to declines in fish production.

The cumulative effects of land use have substantially altered the timing and quantity of erosion and changes in stream channels, all which have impacted fish production at one time or another. Streams and riparian areas with federal ownership are in much better condition than streams on nonfederal lands. During low flow periods, water flows off federal lands and in some streams, such as White and Dry Creek, are totally withdrawn for irrigation, leaving the stream bed dry.

1. Stream and Riparian Trends

The future trend in aquatic habitat conditions in the Deer Creek watershed will be primarily influenced by four factors:

(1) successional stage of vegetation in riparian zones;
(2) the amount of stream flow between early summer and fall;
(3) the rate and magnitude of sediment delivery;
(4) water temperature of the streams in the summer and fall.

The expected fish habitat trend in the watershed will vary with land ownership.

2. Riparian Reserves and Coarse Woody Material

Federal Lands: Streamside shade and coarse woody debris will increase. It is estimated that, left alone, it may take on the order of 150-300 years for some streamside areas on federal land to regain old growth characteristics in previously harvested areas. Large mature trees will contribute to fish habitat complexity after falling into the stream. Age and structural diversity of vegetation in riparian areas will increase in response to efforts to promote the Aquatic Conservation Strategy objectives. There is no intent to change riparian widths but to protect and manage riparian areas to meet the objectives of the ACS and improve conditions limiting aquatic/riparian habitat.

Nonfederal Lands: Aquatic and riparian habitat quality on nonfederal land will continue to decline as timber harvest proceeds. The amount of coarse woody material in the riparian area on private land will diminish due to natural processes, agricultural or range development and timber harvest. It will not be replaced to any appreciable degree because largest conifers in riparian transition zones will be logged when they reach commercial size.

Roads on private woodlands and on private commercial forest land will be primarily natural surface with inadequate drainage. Tractor yarding will continue to be the most frequently used yarding method, even on steep slopes (>35%). Water bars are often ineffective due to poor placement or design. This will cause excessive siltation in the streams which will smother salmon eggs and reduce fish survival.

3. In-Stream Large Woody Debris

Federal Lands: The greatest potential for improvement in complexity of fish habitat on a watershed scale over the long term will be on federal lands. If stream improvement projects are initiated, and ACS guideline followed, streams on federal land would become more effective at dissipating stream flow energy; scouring pools, providing complex habitat for fish, amphibians and invertebrates; and would be more retentive of organic detritus.

Boulders and rubble rather than large wood, could play a major role in creating fish habitat in larger streams (i.e., >3rd order). However large woody debris continues to be important in the steeper class 3 and 4 streams by dissipating stream energy (i.e., forming a stepped channel profile), controlling the movement of sediment and small organic matter and providing habitat for fish and amphibians.

Riparian condition, as well as contribution of large woody debris to streams, will improve on federal land as the BLM implements projects under Aquatic Conservation Strategy (ACS) objectives.

Nonfederal Lands: Class 3 and 4 streams on forested nonfederal land may become less capable of controlling movement of sediment and fine organic material and providing habitat for amphibians because of low levels of large woody debris. It will probably never recover to pre-management conditions without substantial changes to current practices. Riparian transition zones will probably remain in early and mid-successional stages.

4. Stream Sedimentation

Federal Lands: Stream sedimentation is expected to decrease in class 3 and 4 streams on federal lands with full implementation of the aquatic conservation strategy (ACS) and best management practices (BMPs) in all watershed restoration and land management activities.

Nonfederal Lands: Many roads and tractor skid roads on private lands do not receive regular maintenance, nor were most of them designed with adequate drainage or erosion control features. These problems are expected to continue. Sediment from these areas can be expected to continue to adversely impact streams on public and other private lands downstream.

5. Stream Flow

Federal Lands: Water flows should increase in the future during dry seasons based on the application of the latest revised Best Management Practices (BMPs). Intensity and frequency of peak flows, if they have been altered as a result of management activities, will return to previous levels as vegetation regrows in previously harvested areas and if road mileage is reduced. Potential indirect adverse effects of altered peak flows on salmonid reproduction would diminish.

Nonfederal Lands: Water diversions from streams for irrigation purposes combined with century old water rights have significantly decreased the amount of water needed by aquatic and riparian species, especially during low flow periods. Changes in the landscape are caused by agriculture and domestic water diversions, roads and timber harvesting.

6. Stream Temperature

Federal Lands: Stream temperatures in the upper portion of the watershed should decrease with implementation of the ACS and BMPs. Water temperatures, on federal land in the lower portion of watershed where intermingled with nonfederal lands, are expected to remain above optimum levels for salmonids, some amphibians and aquatic macro invertebrates.

Nonfederal Lands: Water temperatures will remain at current levels or increase in class 1-3 streams on private lands. Water temperatures in the lower portions of Deer Creek as well as Dry, White, Thompson, Draper, Anderson, Clear and Squaw Creeks are expected to remain above optimum for salmonids, some amphibians

and aquatic macro-invertebrates, regardless of the water year because stream flows are over-appropriated with excessive water rights.

7. Aquatic Species

Factors outside the Deer Creek watershed that will continue to influence anadromous fish in the watershed include ocean productivity, recreational and commercial harvest, predation in the Illinois and Rogue Rivers and the ocean, habitat changes due to human development of floodplains, and migration and rearing conditions in the Illinois and Rogue Rivers. Correcting human-related factors that limit fish survival in freshwater and marine environments will be important. Habitat for Pacific lamprey is expected to remain at stable to moderate condition.

Federal Lands: There are nine culverts located on BLM lands that restrict or prohibit the passage of juvenile salmonids. Modification of these culverts located on South Fork Deer, White, Thompson and Draper Creeks to allow fish passage would provide potential habitat for species currently restricted. However, overall potential for recovery of anadromous fish habitat is poor because of the land use practices on private ownerships in the watershed.

Nonfederal Lands: Current resource management practices on nonfederal lands and water diversions, will continue to limit potential for recovery of salmon and steelhead habitat and populations. Nonfederal lands, which contain most of the fish habitat in the watershed, will continue to be desired sites for home construction and to be managed intensively for wood production, agriculture and livestock pasture which may conflict with important aquatic conservation strategies. The cumulative effects of management activities have substantially altered the timing and quantity of erosion and changes in stream channels, all which have impacted fish production at one time or another.

C. FIRE

The exclusion of fire occurrence (both natural and prescribed) has led to a shift in the fire regime. Current condition is now that of a unnatural high-severity fire regime where fires are infrequent, usually high-intensity, and are stand replacement fires. Where natural high-severity fire regime normally occur (e.g., northern Cascades or Olympic Mtns.) fire return intervals are long and usually associated with infrequent weather events such as prolonged drought or east wind, low humidity events and lightning ignition sources.

Southern Oregon and the Deer Creek watershed has the same weather conditions and topography that creates the low-severity fire regime. The only change in the fire environment has been the fuel conditions created since the removal of frequent fire. Vegetation has shifted to become very densely stocked stands of less fire resistant species, dead and down fuels have been allowed to build-up, and a dramatic increase in human ignition sources has occurred. This has created a current condition that will result in increasingly destructive, large, difficult to suppress wildfires having the capability to destroy many of the resource and human values present in the watershed.

See also the "Issues Identified" in the Current Condition - Fire chapter.

D. VEGETATION CONDITION

Trends of vegetation in the Deer Creek watershed are increasing densities of trees and shrubs within stands and a shift from historically dominant species to species that were historically a lesser component of the landscape or found primarily in the understory. Ponderosa pine and sugar pine were far more prevalent and often dominated forest stands. Non-tanoak hardwoods were much more common than today. Currently, while the Douglas-fir series is prevalent on many of the more xeric sites, this plant community transitions into the tanoak series on warm, mesic sites and into white fir on cooler mesic sites.

The vegetation conditions in the watershed today are a result of suppressing fire this century and replacing the natural disturbance pattern with human disturbances such as logging (particularly of the high value pine species), farming and rural development.

Existing vegetation composition and pattern generates two areas of concern:

1. Fire suppression has resulted in many of the forests in the watershed reaching densities of trees and shrubs that are not sustainable over time. In addition, fire suppression has shifted Douglas-fir onto what were formerly ponderosa pine sites, and tanoak and white fir onto what were formerly Douglas-fir sites.

2. Past harvest patterns in the watershed, have resulted in a predominance of forests in one to two age and size classes as well as removing economically and ecologically valuable tree species such as sugar and ponderosa pine.

The vegetative and structural conditions of the forests are not constant and have changed frequently with historic disturbance patterns. Disturbance has played a vital role in creating a diverse vegetation types, structures and densities. Fire, insects, disease, periods of drought and the resultant tree mortality have always been components of ecosystem processes and occurred within a range of natural conditions.

Maintaining vegetative diversity and densities that are sustainable over time are important terrestrial and riparian ecosystem processes. These important processes have been impacted by the shift from frequent, low intensity fire to settlement related disturbances and fire suppression. When forest density, species composition, structure (variety of tree sizes, presence of snags and large down logs, etc.), populations of insects, presence of disease, incidence of stand replacement fire events, and tree mortality occur outside the range of natural conditions, components of the ecosystem process are impacted. This is the current trend for many plant communities in the Deer Creek watershed.

The previous timber harvest patterns in the watershed have tended to simplify forest structures and alter the natural mix of seral and age class distributions. A high percentage of the watershed (33%) currently exists in small (5-11" DBH) and large (11-21" DBH) pole size classes. This predominance of one size and structure class does not represent the structural diversity found in the reference condition nor the desired vegetation condition of a diverse landscape pattern of vegetation needed to meet the many values being managed for in the watershed.

Similarly, fire suppression this century has contributed to dense pole stands developing over much of the watershed, crowding out important less shade tolerant mid-seral species such as ponderosa and sugar pine, Pacific madrone and California black oak. Stands consisting of dense poles or of small diameter are more vulnerable to stand replacement wildfire. Fire suppression has also permitted tanoak to become a much more significant stand component than in the reference condition in many areas of the watershed.

When forests remain at unsustainable densities for too long, a number of trends begin to occur that effect stand health. Species composition and diversity, relative density, percent live crown ratio, and radial growth are all indicators of how forests can be expected to respond to environmental stresses.

Forests of the Klamath Mountain Province are known for their rich species diversity. For example, within the watershed, there are tree species (Alaska yellow cedar, brewer spruce and knobcone pine) found in small remnant populations. This diversity is not only an important habitat quality for plants and animals, diverse forests are much better able to withstand environmental stresses such as drought and insect and disease attacks.

Species such as ponderosa and sugar pine, California black oak, and Pacific madrone have historically been important components of the forests of the Deer Creek watershed. These are considered mid-seral species and to flourish they require the less dense, more open canopy conditions that existed in the forests of the watershed prior to fire suppression. As stand densities increase beyond the range of natural conditions, these species drop out and the forests become dominated by late seral climax dominants such as Douglas-fir at lower elevations, tanoak at mid-elevation sites and true fir at higher elevations. Forests composed of climax dominant species, as is the trend in the watershed, are more unstable and become increasingly vulnerable to environmental stresses.

In the mixed evergreen forests of the Siskiyou Mountains, old growth is a condition where the forest exists in a complex mixture of both species and structures. Some of the distinctive features of old-growth Douglas-fir/hardwood forests include (Bingham & Sawyer, 1991):

1. A two-tiered canopy with canopy closure between 65 and 80%.

2. Trees 40 to 130 feet tall, conifers 6 to 23/acre and hardwoods 43 to 113/acre; between 14 and 20 conifers/acre greater than 130 feet tall. Dominant stems, conifers greater than 35 inches in diameter,

8 to 16/acre; hardwoods less than 18 inches in diameter 172 to 282/acre. Stand basal area 15 to 40% hardwoods.

3. Saplings 3 to 26 feet tall, conifers 12 to 120/acre and hardwoods 263 to 607/acre.

4. Seedlings less than 3 feet tall, conifers 61 to 445/acre and hardwood seedings/sprouts 1,417 to 4,008 per acre

5. Snags greater than 4 inches in diameter, 8 to 16/acre. Hardwood snags 15 to 25% of snag density. Large snags greater than 16 inches in diameter and greater than 13 feet tall 0.2 to 4/acre.

6. Logs greater than 4 inches in diameter, 87 to 156/acre. Hardwood logs 20 to 55% of log density. Large logs greater than 17 inches in diameter and greater than 13 feet long, 6 to 15/acre.

The amount of the federal forest land in the watershed that currently exist in a mature/old-growth condition is approximately 6,986 acres. The percentage that existed in a mature/old-growth condition in the reference condition is not known but it was probably greater than 4,639 acres. The amount of old-growth is a combination of the natural disturbance history, native American burning practices, timber harvesting this century, and site limitations. Natural disturbance history as well as human impacts from burning and timber harvest history play an important role in the amount of old-growth existing in the watershed today.

Percent live crown ratio and radial growth are physiological indicators of trees' abilities to produce food and defensive compounds. Healthy live crowns are essential for healthy trees. When the average live crown ratios of forests drop much below 33% the canopy's ability to support vital processes in the tree becomes diminished. Live crown ratios begin to recede as forests remain in an over-dense condition for too long. When live crown ratios are reduced too far, trees are unable to quickly respond to the release provided by density management thinning and partial cutting management prescriptions may no longer be a forest management option.

Similarly, radial growth rate is an indicator of whether trees have sufficient resources to support vital physiological processes. Low production of stem wood per unit of foliage has been associated with a trees inability to accumulate reserves or to produce defensive compounds. Stem growth only occurs once the resource demands of foliage and root growth have been met. When trees are not able to produce sufficient photosynthate and defensive compounds, they become increasingly vulnerable to insect and disease attacks.

Periods of extended drought are not particularly harmful to trees if densities are maintained within the range of historic natural conditions and if trees have well developed root systems and canopies that capture sufficient sunlight for photosynthesis. The mortality occurring in the forests of southwestern Oregon during the recent drought period is a result of over-dense conditions in many forest stands. Insect population levels in the forests of southwestern Oregon, including the Grants Pass Resource Area, have shown an increase since 1989. Tree

and understory vegetation densities, combined with drought conditions, are probably the most predisposing factor to an individual tree's vulnerability to insects.

The capability of the ecosystem to restore the Deer Creek watershed vegetation to natural conditions, as we understand them, using natural processes would be through fire, insect and disease. These processes would lower densities and clear out competing understory vegetation.

Fire is the primary process that the ecosystem would use to lower densities and clear out competing understory vegetation. In the absence of fire, insects and disease often become the process that reduce stand density. Because of densities in the forest stands (live fuels) in the Deer Creek watershed, the build up of dead and down fuels, the checkerboard ownership of private and government lands and the rural residential interface, it is impossible to allow the natural fire regime to control forest densities at this time. At the present time, a naturally occurring fires, such as caused by lightening, would have a high potential to be intense stand replacement fires.

Allowing for insect and disease to return dense stands to within the natural range of conditions is not a desirable alternative at this time. In addition, the amount and volatility of fuel that is created by large areas of dead, dry fuels increase the likelihood of stand replacing fires thus impacting land in private ownership as well as that managed by the federal government.

Port-Orford cedar is an important shade tolerant conifer species along many streams in northwestern California and southwestern Oregon. It can regenerate under its own canopy, providing stream shading and habitat for a number of wildlife species. In a study conducted by Jimerson and Creasy (1991), Port-Orford cedar appeared to have the highest species richness of the five primary vegetation series found in northwest California. In areas that have not been logged, stand age frequency shows a dominance by older stands.

Phytophthora lateralis, a pathogen which kills Port-Orford cedar, is not currently found in the Deer Creek watershed. *Phytophthera* is an exotic species whose spores are carried by water and infested soil. It is transported by animals, vehicles, people and along streams and in ditch lines during wet weather. Although the pathogen is not threatening the viability of POC as a species, it has the potential to accelerate the death rate POC. A goal for this watershed is that it remain free of the pathogen.

Late-successional Reserves

The east side of the Deer Creek watershed includes a portion of the East Illinois Valley/Williams-Deer Late-Successional Reserve (LSR). The LSR will be managed to protect and enhance conditions of mature and old-growth (late-successional) forest ecosystems. The management objective is to maintain functional, interacting, late-successional ecosystems. Natural ecosystem processes such as low level disturbances are intended to be maintained.

Late-successional forests provide certain attributes that are different from early-successional and managed forests. These can include: large, live old-growth trees, snags, down logs on the forest floor, logs in streams, complex structure provided by multiple canopy layers, canopy gaps, and species diversity. A primary objective of this LSR is to protect these attributes where they presently exist and to try and manage to promote them where they currently do not exist.

Another important objective of LSRs is the connectivity they provide for a network of old-growth forest ecosystems. The East Illinois Valley/Williams-Deer LSR provides and important east-west tie from the Siskiyou Mountains to the Cascade Range.

A spotted owl density study area was established in the Williams-Deer portion of this LSR over five years ago. Intensive inventory and monitoring over that time has established that a viable population of spotted owls exists in the LSR. Maintaining this viable population is an important goal for the LSR.

Many acres of forest inside of the established LSRs are young, managed stands created through past management practices. Silvicultural manipulation of these early-successional forests can accelerate the development of some of the structural and composition features of late-successional forests.

Special Status/Survey and Manage Plants

The most apparent difference between current and reference conditions as related to special status plants is in habitat extent and quality. Fragmentation of older forests due to timber extraction is the limiting factor that has brought on a decline in microsite habitat size and quality for the *Cypripedium* species and *Allotropa virgata.* Although large pole and mature condition classes do exist in the majority of the watershed today, timber harvesting since the 1940's on federal land and since the 1800's on nonfederal lands has greatly influenced their extent. Aerial photos from 1953 confirm that most low elevation nonfederal timbered land has been clearcut and tractor logged.

Appendix J of the Northwest Forest Plan notes that loss of *Cypripedium fasciculatum* populations due to timber harvest has occurred. Therefore any harvested area in the watershed could have once harbored more populations of this species, especially in the sub-basins of McMullin, Crooks and Draper Creeks which were harvested in the 1940's. Though it is true that these species are currently found in areas logged in the past, the historical extent and abundance prior to the beginning of intensive logging is unknown. Current population occurrences could represent marginal habitat or could represent the best of habitat available. These populations could be older aged and able to exist due to excellent microsite conditions or they could be new populations moving in.

In the same respect, development of buildings and roads is another factor that has contributed to the fragmentation of *Cypripedium* species and *Allotropa virgata* habitat. As with timber harvest practices,

disruption of high quality microsites has undoubtedly occurred. Besides limiting the amount of habitat available there has also been a disruption in the movement of these species into new areas by development.

Suppression of fire in the watershed is another limiting factor that has perhaps contributed to a decline of habitat for *Cypripedium* species. These plants are adapted to low intensity fires that reduce competition in the herbaceous vegetation layer. The rhizomatous roots of the species are deep enough in the ground to survive low intensity fires, but not high intensity fires.

For serpentine habitats, the differences between current and reference conditions are not as great. The limiting factors affecting serpentine habitat are active mining claims and off-road vehicle use. In the western portion of the watershed, the serpentine areas have been used for recreation and is surrounded by rural development. Serpentine habitats do provide the highest concentrations of native grassland left in the watershed. All of the above activities would threaten native grasses as well as serpentine special status species. The lack of natural fire is also a limiting factor as it has resulted in a build up of an herbaceous and shrub layer on serpentine soils. Frequent, low intensity fire maintains the herbaceous layer in a more diverse condition (i.e., larger variety of species) as well.

Though not yet common in serpentine, noxious weeds have been reported to be slowly encroaching. The impact of their invasion will be most noticeable in native grasslands, where noxious weeds could easily replace native species without aggressive eradication efforts.

Since little documentation exists it is impossible to determine the differences between current and reference conditions for wetlands and seeps. It is most likely that some have been reduced in size or completely eradicated due to development, domestic water use and timber harvest activities.

For all three habitats discussed a thorough inventory of special status plants in the watershed would be necessary to accurately assess the extent of population. For late successional dependent species, protection of remaining late successional stands is necessary along with increasing their size and connectivity through stand enhancement projects. Focus should be on ensuring that well distributed microsite conditions are maintained throughout the watershed for the late successional species.

For both late successional and serpentine species it is necessary to use prescribed fire to reduce hazardous fuel to natural levels and to enhance species diversity and provide a competitive edge for special status species in the herbaceous layer. For wetlands and seeps it will be necessary to accurately locate these unique habitats in order to assess their condition throughout the watershed. For both wetlands and serpentine it is important to eliminate / preclude ground disturbing activities, such as mining or off-road vehicle use, that destroy these habitats.

A limiting factor in reaching/maintaining late successional species habitat is the high level of fire hazard in the watershed. This will make attempts at use of prescribed fire difficult. Compounding this is the increasing level of rural residential development that will make the initiation of prescribed fire projects even more challenging. One last limiting factor is the spread of noxious weeds from agricultural areas into the more natural parts of the watershed. Without cooperation from private landowners, the spread of noxious weeds could counter any efforts to improve watershed conditions.

E. TERRESTRIAL WILDLIFE

1. Species

Native wildlife recovery efforts by the federal government are limited by availability of species to repopulate habitat, land ownership, spatial relationship of the federal land, and current habitat quantity and quality.

The extirpation of native species of wildlife from an area influences how the remainder of the community functions. Native species play roles that benefit the community as a whole. Removal of one species may lead to a population imbalance in another. Historically, wolves and grizzly bears served as predators in the watershed. The act of predation played a critical role in defining the remaining character of the community. Prey remains not consumed by the wolf were available to a host of other animals. Deer and elk populations were kept in balance with the vegetation. The community as a whole benefitted from the predation.

When exotic species enter a community the food chain is set out of balance. Historically, the watershed did not contain largemouth bass (*Micropterus salmoides*). The introduction of this species into the community has had deleterious effects on turtles, frogs, and ducks. The ability to recover species of concern will be limited by the fact that some species are extirpated and exotics have been introduced.

Species known to be extirpated from the watershed include grizzly bear and wolf. Wolves have remained on the sensitive species list due to sightings of large canids within southwestern Oregon. Currently, Oregon is not included in the recovery plans for these two species. Species such as the wolverine that have remnant populations in the province may have the ability to recover by themselves in this watershed. Due to the checkerboard ownership, however, the federal government has limited options to promote the remote habitat these species require.

The expected trend for the remaining sensitive species can be found in the following table.

Table V-1: Expected Habitat Trends on Federal Lands for Species of Concern

COMMON NAME	HABITAT	EXPECTED HABITAT TREND
GRAY WOLF	GENERALIST, PREFERS REMOTE TRACTS OF LAND	NO CHANGE FROM CURRENT LEVELS
WHITE-FOOTED VOLE	RIPARIAN ALDER/ SMALL STREAMS	INCREASE IN HABITAT ON PUBLIC LAND AS RIPARIAN AREAS RECOVER FROM PAST DISTURBANCE/DECREASE ON PRIVATE LAND.
RED TREE VOLE	MATURE CONIFER FOREST	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE MATRIX & PRIVATE LAND .

Table V-1: Expected Habitat Trends on Federal Lands for Species of Concern

COMMON NAME	HABITAT	EXPECTED HABITAT TREND
CALIFORNIA RED TREE VOLE	MATURE CONIFER FOREST	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE MATRIX & PRIVATE LAND
FISHER	MATURE CONIFER FOREST	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE MATRIX & PRIVATE LAND
CALIFORNIA WOLVERINE	REMOTE/HIGH ELEVATION FOREST	NO CHANGE FROM CURRENT LEVELS
AMERICAN MARTEN	MATURE CONIFER FOREST	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LAND.
RINGTAIL	ROCKY BLUFFS, CAVES AND MINES	DECREASE IN HABITAT IF HARD ROCK MINES/QUARRIES REOPEN.
PEREGRINE FALCON	REMOTE ROCK BLUFFS	NESTING HABITAT CURRENTLY AVAILABLE
BALD EAGLE	RIPARIAN/MATURE CONIFER FOREST	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LAND.
NORTHERN SPOTTED OWL	MATURE CONIFER FOREST	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LAND.
MARBLED MURRELET	MATURE CONIFER FOREST	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LAND.
NORTHERN GOSHAWK	MATURE CONIFER FOREST	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LAND.
MOUNTAIN QUAIL	GENERALIST	STABLE.
PILEATED WOODPECKER	MATURE CONIFER FOREST/SNAGS	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LAND.
LEWIS' WOODPECKER	OAK WOODLANDS	DECREASE ON PRIVATE LAND DUE TO RURAL DEVELOPMENT, DECREASE ON PUBLIC LAND UNTIL MANAGEMENT STRATEGY DEVELOPED
WHITE-HEADED WOODPECKER	HIGH ELEVATION MATURE CONIFER FOREST	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LAND
FLAMMULATED OWL	MATURE PONDEROSA PINE/MATURE DOUGLAS-FIR FOREST	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LANDS.

Table V-1: Expected Habitat Trends on Federal Lands for Species of Concern

COMMON NAME	HABITAT	EXPECTED HABITAT TREND
PURPLE MARTIN	FORAGE IN OPEN AREAS NEAR WATER/CAVITY NESTERS	INCREASE AS RIPARIAN AREAS RECOVER AND FOREST MATURE ON PUBLIC LANDS/DECREASE ON PRIVATE LANDS
GREAT GRAY OWL	MATURE FOREST FOR NESTING/MEADOW& OPEN GROUND FOR FORAGING	POSSIBLE DECREASE IN FORAGING HABITAT AS PUBLIC LAND CLEAR-CUTS MATURE / INCREASE IN NESTING HABITAT AS FOREST MATURE IN LSR/DECREASE IN NESTING HABITAT ON MATRIX & PRIVATE LANDS.
WESTERN BLUEBIRD	MEADOWS/OPEN AREAS	DECREASE ON PUBLIC LAND AS CLEARCUTS REFOREST, MEADOWS BECOME ENCROACHED WITH TREES AND NEST CAVITY SITES IN OPENINGS NOT PROVIDED
ACORN WOODPECKER	OAK WOODLANDS	DECREASE ON PRIVATE LAND DUE TO RURAL DEVELOPMENT, DECREASE ON PUBLIC LAND UNTIL MANAGEMENT STRATEGY DEVELOPED
TRICOLORED BLACKBIRD	RIPARIAN HABITAT/ CATTAILS	STABLE LOW LEVELS
BLACK-BACKED WOODPECKER	HIGH ELEVATION MATURE CONIFER FOREST	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LANDS
NORTHERN PYGMY OWL	CONIFER FOREST/SNAGS	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE ON MATRIX & PRIVATE LANDS
GRASSHOPPER SPARROW	OPEN SAVANNAH	DECREASE ON PUBLIC LAND UNTIL MANAGEMENT STRATEGY DEVELOPED FOR SAVANNAH HABITAT/DECREASE ON PRIVATE LAND DUE TO RURAL DEVELOPMENT
BANK SWALLOW	RIPARIAN	STABLE LOW LEVELS
TOWNSEND'S BIG-EARED BAT	MINE ADIT/CAVES	STABLE/SUITABILITY DIMINSHED DUE TO DISTURBANCE FROM INCREASES IN RECREATION AND RURAL RESIDENCES
FRINGED MYOTIS	ROCK CREVICES/SNAGS	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LANDS
SILVER-HAIRED BAT	CONIFER FOREST	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LANDS
YUMA MYOTIS	LARGE TREES/SNAGS	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LANDS

Table V-1: Expected Habitat Trends on Federal Lands for Species of Concern

COMMON NAME	HABITAT	EXPECTED HABITAT TREND
LONG-EARED MYOTIS	LARGE TREES/SNAGS	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LANDS
HAIRY-WINGED MYOTIS	LARGE TREES/SNAGS	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LANDS
PACIFIC PALLID BAT	LARGE TREES/SNAGS/ ROCK CREVICES	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LANDS
WESTERN POND TURTLE	RIPARIAN/ UPLANDS	INCREASE AS RIPARIAN HABITAT RECOVERS ON PUBLIC LAND/REMAIN STABLE OR DECREASE ON PRIVATE LAND
DEL NORTE SALAMANDER	MATURE FOREST/TALUS SLOPES	STABLE IN LSR/POSSIBLE DECREASE ON MATRIX/DECREASE ON PRIVATE LAND
FOOTHILLS YELLOW-LEGGED FROG	RIPARIAN/PERMANENT FLOWING STREAMS	INCREASE AS RIPARIAN HABITAT RECOVERS ON PUBLIC LAND/DECREASE ON PRIVATE LAND
RED-LEGGED FROG	RIPARIAN/SLOW BACKWATERS	INCREASE AS RIPARIAN HABITAT RECOVERS ON PUBLIC LAND/DECREASE ON PRIVATE LAND
CLOUDED SALAMANDER	MATURE FOREST/SNAGS/ DOWN LOGS	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE IN MATRIX & PRIVATE LANDS
SOUTHERN TORRENT SALAMANDER (VARIEGATED SALAMANDER)	RIPARIAN/COLD PERMANENT SEEPS/STREAMS	INCREASE AS RIPARIAN HABITAT RECOVERS ON PUBLIC LAND/DECREASE ON PRIVATE LAND
BLACK SALAMANDER	TALUS/DOWN LOGS	INCREASE AS FOREST WITHIN LATE-SUCCESSIONAL RESERVE MATURES/DECREASE ON MATRIX AND PRIVATE LANDS.
SHARPTAIL SNAKE	VALLEY BOTTOM	DECREASE WITH INCREASING RURAL DEVELOPMENT
CALIF. MTN. KINGSNAKE	GENERALIST	STABLE
COMMON KING SNAKE	GENERALIST	STABLE
NORTHERN SAGEBRUSH LIZARD	OPEN BRUSH STANDS	STABLE
TAILED FROG	RIPARIAN/ MATURE FOREST	INCREASE AS RIPARIAN HABITAT RECOVERS ON PUBLIC LAND/DECREASE ON PRIVATE LAND

2. Cavity Dependent Species

Snags and down logs provide essential nesting/denning, roosting, foraging, and hiding cover for at least 100 species of wildlife in western Oregon (Brown et al., 1985). For some species, the presence or absence of

suitable snags will determine the existence or localized extinction of that species. In forested stands, cavity nesting birds may account for 30-40 percent of the total bird population (Raphael and White, 1984). The absence of suitable snags (snags decay stage, number and distribution) can be a major limiting factor for these snag dependent species.

Cavity dependent species and species utilizing down logs are of special concern in the watershed due to the decrease of this type of habitat. Historically, snags were produced by various processes including drought, wind-throw, fires, and insects. The amount of snags fluctuated through time in response to these events.

This natural process has been greatly interrupted by timber harvest activity. The potential recovery of snag dependent sensitive species such as the pileated woodpecker will depend upon future snag availability. Past silvicultural practices have historically focused on even-aged stands and have resulted in low levels of snags and downed logs in harvested areas. Other activities that have depleted snags and down logs are site preparation for tree planting (particularly broadcast burning), fuel wood cutting, post fire and mortality salvage logging.

Managed stands that currently contain 10-12 or less overstory trees per acres, are also of concern from a wildlife tree/downed log perspective. Stands with remaining overstory trees have the potential to provide for current and future snag/downed log needs throughout the next rotation if existing trees are retained.

3. Dominant Processes

The settlement of the watershed, and the subsequent division of land between the public and private ownership limits the ability of federal agencies to restore historic conditions in the watershed, were that the goal. Currently, the checkerboard ownership pattern of federal land, and the low representation of some plant communities on federal lands minimizes the recovery potential of species of concern without the participation of private land owners. This is particularly true for native grasslands, oak savannahs, and anadromous fish bearing streams (riparian habitat).

Suppression of fire within the watershed has changed vegetation patterns and historic habitat distribution. Timber harvest has affected older forest habitat and associated species. Road building has decreased the effectiveness to a number of habitats due to disturbance. Timber harvest and road building has led to increased sedimentation, increased stream temperatures, and decreased stream stability and structural diversity.

4. Expected Habitat Trends

The habitat trends for species of concern varies with ownership and plant community. In general, habitats found on private lands have undergone the most significant change from historic conditions. Public lands management by the federal government have undergone less dramatic change but are notably different from conditions found in pre-settlement times.

Expected trends on private lands are nearly impossible to gauge, but there is a tendency for short-term harvest rotations on forest lands (60-80 years), and heavy use of most native grasslands, riparian, and oak woodlands for agriculture and homesites. Native grasslands, pine stands, oak savannahs, and old-growth forest, and their associated fauna could be considered at risk on private lands.

Trend for habitats found on federally administered public lands are determined by the Northwest Forest Plan. Broadly speaking the Deer Creek watershed is composed of LSR, riparian reserves and matrix land.

Late-successional reserve (LSR) comprises 7% of the watershed. Expected trend for the LSR is a gradual increase in forest with late successional (mature and old-growth) habitat conditions. Ideally, as this area increases in older forest, stable populations of species requiring this forest type will also increase. The success of the reestablishment of old-growth species will be depend on the species dispersal capabilities, habitat condition of the matrix land, and ownership pattern.

Matrix land comprises approximately 41% of the BLM land in the watershed. Matrix land will be primarily managed for timber production, with a trend towards younger forest with some old-growth components. Expected habitat trend for each plant community can be found in the following narrative. Table V-1 presents expected trends for species and habitat in the watershed.

Potential limiting factors for recovery of sensitive species' habitats in the Deer Creek watershed include fire suppression and habitat fragmentation. Historically many habitats within the watershed were created and maintained by disturbance events, in particular, fire. Fire for the most part has been excluded from the watershed for the last 80 years. Fire created / maintained habitats and associated wildlife species have been negatively impacted from fire suppression. This is particular true for oak/savannah and pine stands.

Habitat fragmentation occurs both on the valley floor as well as the uplands. Habitats found along the valley floor have experienced severe fragmentation due to conversion to agricultural lands, and homesites. Due to habitat fragmentation, patch size, and access for wildlife, many sites no longer function to their biological potential. Of particular concern is the remaining oak woodlands and ponderosa pine sites. The loss of these habitat types will continue to contribute to the decline of associated species of wildlife. Tracts of public land are critical in insuring that this habitat type and the biodiversity it supports remain represented in the valley.

Fragmentation of old-growth habitat in the watershed is of particular concern. Due to the checkerboard ownership pattern and past timber harvesting, the remaining mature and old-growth habitats are fragmented. Species dependent on older forest such as the American marten (*Martes americana*), the fisher (*Martes pennanti*) and the northern spotted owl (*Strix occidentalis*) have limited habitat in the watershed.

Many of the remaining older stands no longer serve as effective habitat for late-successional dependent species due to the amount of edge the stands contain, an attribute that is increased by irregular shapes and small sizes.

The edge to interior ratio affects how useful the stand is for late-successional species. Stands with a great deal of edge function poorly as interior forest. The micro-climatic changes of the "edge effect" can be measured up to 3 tree lengths in the interior of the stand (Chen, 1991). Isolated patches of old-growth habitat may be too small to support the diversity of old growth associated species.

In heavily fragmented environments, larger predators that naturally occur at low densities are lost first (Harris and Gallagher, 1989). The California wolverine *(Gulo gulo luteus*) utilizes high elevation, undisturbed habitat and their population is now in jeopardy due to fragmentation. Fragmented habitats lead to isolated populations of animals which lose genetic vigor and could be a threat to biological diversity (Wilcox and Murphy, 1985).

Intact dispersal corridors are critical for insuring gene-pool flow, natural reintroduction and successful pioneering of species into unoccupied habitat. Animals disperse across the landscape for a number of reasons including food, cover, mating, refuge, and to locate unoccupied territories. The vast majority of animals must move during some stage of the life cycle (Harris and Gallagher, 1989). Dispersal habitat is functioning when it can provide hiding and resting cover. Many species that depend on late-successional forest are poor dispersers and more vulnerable to extinction from fragmented landscapes than species associated with early successional stages (Noss, 1992). This is particularly true for flightless species such as the fisher (*Martes pennanti*) which is reluctant to travel through areas lacking overhead cover (Maser et al., 1981).

The high density of roads in the watershed are of concern due to their effects on habitats. The construction of roads contributes to sediment loads in the aquatic system. Road building along streams has also led to increased channelization of the stream thus reducing the amount of riparian associated habitats. Roads also lead to increased disturbance, such as poaching, and decrease habitat effectiveness. Increased disturbance to deer and elk increase their metabolic rate and decrease their reproductive success (Brown, 1985).

Pine Habitat: Maps produced in 1857 by the General Land Office characterize much of the valley floor as having a pine component. Many of these stands have been lost on private land through timber harvest and conversion to homesites and agriculture. The majority of pine stands on public land have been harvested while other stands have degraded due to fire suppression and encroachment of fire intolerant species.

The expected trend for pine habitat on federal land in the LSR is to remain at the same level. The expected trend on private land is for continued harvesting of this habitat on a short-term rotation basis. Pine habitat found outside the LSR will continue to be available for timber harvest. Pine habitat found on withdrawn land will continue to degrade in quality until such time that an active management strategy has been developed.

Oak woodlands: Oak woodlands within the watershed are disappearing faster than they are regenerating. The precise amount of this habitat type historically found in the watershed is unknown, but current quantity of this habitat are thought to be a fraction of what historically occurred. (See Table IV-1)

The expected trends on nonfederal lands for oak woodlands is to remain static or decline. The majority of federal controlled oak woodland are found on land withdrawn from the timber base, and largely remain unmanaged. Natural disturbance such as fire has been reduced, and many of these stands are in poor condition. Expected trend is for further habitat degradation until reversed by a specific management strategy.

Old-Growth Forest: Private old-growth forest is nonexistent in this watershed. Due to short rotation between timber harvests on private forest land there is not expected to be an increase in old-growth forest. Old-growth forest on federal lands is expected to recover in the Late-Successional Reserve as are species associated with this habitat type. Quantity and quality of old-growth forest in matrix land is expected to decrease.

F. SPECIAL AND UNIQUE AREAS

The Brewer Spruce RNA was designated for the study of this unique vegetation community. In the 1995 RMP the Brewer Spruce RNA was expanded from 390 acres to 1,774 acres. The RNA is closed to timber harvest, off-road vehicle use and mineral entry.

The Crooks Creek ACEC protects 149 acres of unlogged Douglas-fir/sugar pine/tanoak vegetation including pristine springs and ponds. It is closed to timber harvest and off-road vehicle use.

RNAs are designated primarily with scientific and educational activities intended as the principal form of resource use, for the short and long term. ACEC's are designated specifically to protect unique and important natural resource values and special status species.

The Illinois Valley Botanical Emphasis Area (BEA) has been established in the RMP which recognizes 4,755 acres of BLM managed land within the Deer Creek watershed as only a portion of its 10,613 acres.

G. HUMAN USES

As noted when comparing the reference conditions with the current conditions of the watershed several broad changes have occurred. In general, the changes include an increase in population in the watershed, including rural residences; an increase in the miles of roads within the watershed; increased use of the public lands with recreation use changing from nonmotorized to motorized use; and an increase in illegal uses within the watershed.

The road densities have increased primarily due to the past timber harvest and to access private lands. The increase in road densities, coupled with the increase in the population of the area, has made a larger amount of public lands available for human activities. These include recreation, timber harvest activities, agricultural uses, and various illegal activities such as unauthorized timber cutting and increased dumping.

The increase in road densities and local area populations are directly tied to increased recreation use. Road densities and population increases also affect the amount of illegal activities occurring on the public lands, however, increased dumping is also related to the increase in dumping fees at local landfills, and increased timber/firewood theft is related to the lack of available fuelwood sources.

Anticipated social or demographic changes/trends that have ecosystem management implications include an increase in population which increases the use (or abuse) of public lands, a continuation of the illegal activities, and the continued increases in dump fees.

VI. RECOMMENDATIONS

Synthesis of data/information and interpreting current trends in the Deer Creek watershed points out two primary ecological large scale issues/functions of concern: (1) the condition of a critical terrestrial linkage between the Deer Creek watershed and other provincial watersheds; and (2) the condition of the aquatic habitat particularly as it relates to salmonid species. The desired future condition of the watershed and the recommendations in this section emanate from these two important ecological functions.

1. Terrestrial Links

The northern mountainous ridge line that separates the Deer Creek watershed from the Cheney/Slate Creek watershed is an important dispersal route for terrestrial species, especially old-growth dependent species. This dispersal route includes all of the designated Late-Successional Reserve (LSR) lands and connects watersheds of the Illinois River basin with those of the Rogue River basin and thus provides a vital linkage with the coastal mountain range. Maintaining and increasing the effectiveness of this dispersal route would require the forest vegetation to be managed to provide the habitat conducive to old-growth dependent species. Along this dispersal corridor, the forest canopy closure and structure required by old-growth dependent species should be maintained on lands currently in that condition and created on lands that do not currently exhibit those conditions. A reduction in the amount of tanoak in the understory of much of the forest in this corridor would be necessary to achieve this objective. This corridor would also need to be protected from catastrophic fire events and further degradation / fragmentation from both old and new roads.

The recommended desired vegetation condition along the dispersal corridor would be an old-growth forest. Vegetation manipulation objectives would maintain canopy closure at 40% or more. Large hardwood trees would be mingled amongst old coniferous trees. The understory would be a scattered young conifer stand with numerous large downed logs on the forest floor in various stages of decay. Aside from the scattered downed large wood, debris and slash should be minimal on the forest floor.

The forest outside of the dispersal corridor, riparian reserves and the LSR should be in a range of seral stages and structural conditions that have the potential to develop into mature and old-growth characteristics. The

proportions of the various vegetation seral stages would be balanced so that no condition class greatly dominates, as is currently the case for the large pole class. It is assumed that the nonfederal timbered land will continue to be harvested on a 60 to 80 year rotation. This harvest rotation would continue to adequately supply requisite amounts of the young seral stage component. The federal lands would supply the mature and old-growth seral stages necessary to maintain species viability consistent with the Northwest Forest Plan and RMP. Federal lands that are suitable for forest production should be maintained at stand densities that provide for proper physiological functioning of the trees, maintaining a diverse species mix including mid-seral species and keeping tree mortality rates within the range of natural conditions.

The native valley habitats such as the oak savannahs and ponderosa pine stands are two important landscape components that could be very difficult to maintain at current levels. Most of the land where valley habitat occurs is owned by private citizens or local governments. Substantial long-term coordination would be necessary. The isolated parcels managed by the BLM in each sub-watershed would be managed to maintain or enhance the native valley habitat and to act as a hub from which to expand this habitat.

All sites with sensitive plant species should be managed to protect the existing populations, consistent with the forest plan. Sensitive plant species found on serpentine soils would be protected and the landscape managed to protect this fragile environment from encroachment by non-native plant species. Serpentine meadows would be burned periodically to maintain the native grass component and prevent encroachment by tree and shrub species.

It is recommended that the entire watershed be returned to a more frequent low intensity fire regime. This would incorporate a shift in the amounts of the different plant series away from the tanoak and white fir series and have a higher percentage of the watershed in the Douglas-fir and ponderosa pine series. Although much of the landscape was identified as high value, the dispersal corridor should be the highest priority for protection since it provides such an important ecological function. It is recognized this will be a long-term process and require a coordinated effort between federal and nonfederal entities. A proactive fuels management program is critical to reduce the risk of a catastrophic event.

2. Aquatic Systems

The other important ecological issue in the Deer Creek watershed is aquatic habitat. There are many miles of stream and associated riparian areas that can provide this habitat. Although the current overall condition of the habitat is “moderate” compared to other watersheds in the Rogue River basin, it is “poor” when compared to the reference condition. The desired future condition for streams in the Deer Creek watershed would be to have an abundance of large woody material in the streambed and along the streambanks with an adequate amount (8-15+ cfs) of relatively clean, cool water (<58FE) flowing during the summer months. Springs and seeps that provide the summer flow would be protected from disturbance and water diversions would be managed with a strong emphasis on maintaining in stream flows. Stream riffles would have bed substrate with a good mixture

of cobbles and gravels with only a small amount (<25%) of finer materials embedded. There should be numerous, deep, well protected pools intermixed with the riffles. The stream system of this watershed should be protected from activities that would reduce the quality and quantity of aquatic habitat.

Water use would be managed so that the available fishery habitat for spawning and rearing is utilized to its fullest potential and so that wetlands, seeps, and bogs maintain special status species. Native salmonid species survival will depend on managing the water system to maintain and restore their habitat

Riparian areas would consist of a dense canopy (>80%) of mature conifers and deciduous trees that provide good shading of the stream channel, annual leaf litter and large wood recruitment. An abundance of large logs (6 to 8 per acre) in various stages of decay would be scattered across the landscape. The streambanks should be in stable condition with some signs of natural meandering in the lower gradient streams.

Soil erosion from the mountain slopes would be reduced from the current rates by decreasing the amount of area currently disturbed and minimizing future disturbances, especially during the rainy season. Frequent, low intensity fire occurrences would keep the organic matter and soil microbe population from being drastically affected by catastrophic fire. Large decaying logs should provide a refugia for soil fungi and bacteria during the summer months. This is important for the special status plant and animal species as well. The forest floor should be shaded for the majority of the day especially during the summer months.

Human use of the Deer Creek watershed is anticipated to continue at current levels and above. Demand for the watershed's resources for domestic purposes, agriculture, timber production and recreational opportunities will increase as the human population increases.

The transportation system traversing this watershed would provide access for human activities while reducing sediment production below current levels. Roads located near riparian areas should be surfaced. Cut banks and fill slopes would be well vegetated so to provide slope stability. Human use of the transportation system would be managed so that use during rainy periods are minimized and roads used during this period are adequately surfaced. Roads that intersect fishery streams would be designed and maintained to provide fish passage to juvenile fish. Roads built in riparian areas would be constructed in a manner to minimize sediment production and maintain riparian habitat for terrestrial and aquatic plant and animal species.

Recreational use of the watershed, particularly off-road vehicles, would be managed so they do not adversely impact other uses of the watershed. Mining would be accomplished in a manner so as not to disturb sensitive plant and animal habitat. Withdrawing some of the land or streams from mineral entry should be considered if this activity has the potential to cause further degradation of sensitive species habitat. Special forest products, such as cutting firewood and mushroom picking, should be managed and monitored so it does not adversely affect sensitive species or cause additional negative affects on the roads, streams and riparian areas.

Table VI-1 summarizes some goals for the Deer Creek watershed related to the larger vision outlined above. It also notes some recommendations for achieving them.

Table VI-1: Recommended Broad Ecological Goals for the Deer Creek watershed

GOALS	PRIORITY AREA	MANAGEMENT ACTION RECOMMENDATIONS	ECOSYSTEM & LAND OWNERSHIP PATTERN LIMITATIONS
Maintain 80% of the commercial forest lands (matrix) within a relative density range of 35-65% to provide for proper physiological functioning of trees and to keep mortality rates within the range of natural conditions.	Matrix	Utilize thinning, group selection and/or prescribed fire to reduce the density of stands with high stocking.	Prescribed fire may be limited by proximity of rural residences
Maintenance and restoration of species and structural compositions of forests to within the range of natural conditions.	1. Matrix 2. Matrix 3. LSR Dispersal Corridors Refugia patches	1. Maintain and restore pine where ever possible through density management prescriptions. 2. Maintain the naturally occurring hardwood component through density management prescriptions. 3. Maintain multi-storied stands, including hardwood structure in that condition where they presently exist.	Prescribed fire use may be limited by the proximity of residences.
	LSR and Riparian Reserves	Provide for structural characteristics in even aged single structure stands of young, planted stands through gap introduction, variable spacing, thinning, and hardwood development enhancement.	
Restoration of seral stages of the major plant series to sustainable and desirable seral conditions within their historic range.	Section 17 in Dry Creek White Creek Old Deer Creek Campground	Utilize prescribed fire and thinning to restore white oak and pine series communities to more open, early to mid-seral conditions. Reduce invading Douglas-fir on these sites, restore native grasses and forbs.	Prescribed fire use may be limited by proximity of residences.

Table VI-1: Recommended Broad Ecological Goals for the Deer Creek watershed

GOALS	PRIORITY AREA	MANAGEMENT ACTION RECOMMENDATIONS	ECOSYSTEM & LAND OWNERSHIP PATTERN LIMITATIONS
Maintenance of a variety of seral stages, structures and species compositions across the watershed so that no one condition predominates.	1. Matrix: Clear Creek, Draper Creek, Crooks Creek 2. Matrix: McMullin Creek, Thompson Creek, Draper Creek 3.Section 3 of Squaw Creek	1. Maintain of develop a minimum of 20% of federal ownership in Old Growth/Mature forests for suitable, connectivity and dispersal habitat & winter thermal cover. Each subwatershed should try and attain this goal. 2. Develop and maintain Old Growth/Mature habitat patch size for interior habitat species(100 acres) 3. Space Old Growth/Mature patches spatially and temporally to effectively function as dispersal habitat throughout the watershed. Assume early seral stage condition will be provided in the watershed on the nonfederal lands.	Assume early seral stage conditions will be provided in the watershed on non-federal lands.
Maintain the watershed free of Port-Orford Cedar root rot (*Phytophthera lateralis*).	To be determined.	Check areas for root rot resistant trees and then treat non-resistant infected trees by removal or girdling. All treatments will be consistent with the Aquatic Conservation Strategy and Riparian Reserves guidelines.	Erosive soils and steep unstable slopes could limit the amount of acceptable disturbance to stream banks and channels.
Manage for old-growth characteristics in lands designated as LSR's in stands that were previously managed. Characteristics include snags, logs on the forest floor, large trees, and canopy gaps that enable establishment of multiple tree layers and diverse species composition.	Plantations, young (under 100 years) single storied Douglas-fir stands.	Accelerate development of old-growth characteristics through thinning, patch cuts hardwood enhancement and prescribed fire.	When thinning this type of stand a large amount of fuel is created. The problem is the treatment or removal of this material.
Eradicate, reduce and restrict the spread of non-native plant species	Brewer Spruce RNA Crooks Creek ACEC Illinois Valley BEA Meadows/Savannahs	Surveys for non-native species, monitoring, prescribed fire, hand pulling, bio inhibiting techniques. Work with the state and private citizens to develop plans. Use only native plant species to rehab disturbed areas.	Actions will be ongoing until actions on adjacent private lands address non-native species

Table VI-1: Recommended Broad Ecological Goals for the Deer Creek watershed

GOALS	PRIORITY AREA	MANAGEMENT ACTION RECOMMENDATIONS	ECOSYSTEM & LAND OWNERSHIP PATTERN LIMITATIONS
Reduce road densities to 1.5 miles per section (federal lands).	Draper Creek, Paradise Creek, South and North Fork Deer Creek, and Wildeer Ridge	High priority areas are those located on highly erosive soils and/or high road density and roads that access stands of large diameter POC. The primary method will be road decommissioning. Roads that may be necessary for future actions by may be barricaded or gated.	Road densities goals may not be attained due to road right of ways, primary connector roads, fire management and silvicultural requirements.
Maintain or improve water quality	1. South Fork Deer Creek, McMullin Creek, Thompson Creek 2. Paradise Creek, Upper South Fork Deer Creek, Draper Creek, McMullin Creek, Crooks Creek, White Creek	1. Enhance riparian areas through maintenance and development of species and structural diversity and late-successional forests. 2. Reduce sedimentation from roads through surfacing, closing and decommissioning. Eliminate the practice of sidecasting during road maintenance activities 3. Identify and protect unique wetlands	Water is over appropriated throughout the watershed and state issued water rights are very difficult and emotional issues. Save water through changes in irrigation techniques and domestic use conservation methods
Improve aquatic habitat	1. "Section 21" creek, Paradise Creek (see table 4 current condition chapter) 2. South Fork and North Fork Deer Creek, Crooks Creek, Dry Creek, Draper Creek & Paradise Creek	1. Replace culverts to improve fish passage. 2. Screen all water diversions and in compliance with state water resources guidelines. Create/restore quality fish habitat for use during the summer months by young fish.	A large percentage of the of the degraded riparian habitat and water diversions are located on private property.
In stream reaches that can not or will not be allowed to grow large conifers for structure provide manmade structures to substitute.	Private lands along the main stem of Deer Creek.	Form a cooperative management unit with the private landowners along Deer Creek. Provide educational programs to inform the public about benefits of structure in streams. Provide technical expertise on projects designed by the Cooperative.	Funding for these programs may be hard to find. Private citizens may not wish to join cooperative management area.
Maintain and/or improve special and unique habitats.	Entire watershed. Many of these habitats are located at low elevations near the rural interface areas. Examples of these habitats are pine oak woodlands, dry meadows, talus slopes and rock outcrops.	Use both mechanical methods and prescribed fire to reduce competing vegetation. Protect areas from road construction and logging	Funding. Prescribed fire use may be limited in the rural interface are due to proximity of residences.

Table VI-1: Recommended Broad Ecological Goals for the Deer Creek watershed

GOALS	PRIORITY AREA	MANAGEMENT ACTION RECOMMENDATIONS	ECOSYSTEM & LAND OWNERSHIP PATTERN LIMITATIONS
Restoration/Maintenance of the values associated with the RNA, ACEC BEA and unique habitats	1. Brewer Spruce RNA 2. Crooks Creek ACEC 3. Illinois Valley BEA and known plant population locations 4. Manzanita, Crooks Creek, Lake and No Name caves	1. Revisit and update management plan written in 1967. Decrease entry points to one main trail and establish better signing 2. Management plans developed and long term monitoring started. 3. Identification of special status plan populations and development of conservation agreements 4. Development of management plans for caves to protect and benefit wildlife, recreation and educational values	

A. MONITORING

Monitoring of management activities, both past and present, is essential to determine if the objectives of the proposed activities are being achieved. Monitoring will also determine how sensitive species are responding to recovery or management plans which were prepared to ensure their survival. Implement monitoring that is required by the ROD page E-1.

Table VI-2: Identified Monitoring Needs

MONITORING	PROPOSED LOCATION	METHODS	LIMITATIONS
Monitor proposed timber harvest activities to determine success of silvicultural prescriptions in obtaining the desired results.	McMullin Creek Thin	Stand exams, Post harvest review by specialists and the public for implementation monitoring	Funding
Monitor special status species habitat	LSR. Low elevation pine oak woodlands, talus slopes, caves and mines, rock outcrops and known *Cypripidium faciculatum* locations	Photo plots, Stand exams and satellite photo data.	Funding
Monitor spotted owl populations to determine the success of the recovery plan	LSR.	Use established spotted protocol.	Funding
Monitor Neotropical and resident bird population trends	Existing Breeding Bird Survey route	Use established protocol	Funding
Monitor spawning habitat and its use	Entire watershed-priority anadramous fish streams	Use established methods	Funding
Monitor water flows and temperature in all 6 sub-watersheds	Entire watershed	Install and monitor flow and temperature gauges	Funding
Monitor riparian and fish habitat projects to determine effectiveness of restoration projects	Streams where restoration projects will be located.	Photo points. Established stream survey protocols.	Funding

B. RECOMMENDED RESEARCH *(to be completed)*

C. DATA GAPS

During the preparation of this first iteration of the Watershed Analysis, some data gaps became apparent. These are briefly summarized in this section.

1. Botanical

Survey information on special status (including survey and manage) plants in the watershed.

Information on the location of special status nonvascular plants.

Information on the effects of fire on special status plants.

Effectiveness of special status plants protection strategies.

Location and extent of noxious weeds (mapping and identification) for future eradication and monitoring the success of eradication.

2. Wildlife

Information on absence/presence of the majority of the sensitive species, including survey and manage species.

Population levels of sensitive species (except spotted owls) in the watershed are not well understood.

The actual presence of some suspected species is not known.

Location and condition of special and unique habitats.

3. Fisheries/Aquatics

Physical and biological stream and riparian data analysis won't be completed until September 1996.

Habitat condition and trends.

Spawning surveys.

Stream inventory data available to date.

Riparian condition.

Distribution and relative abundance of trout.

Competition between fish species.

Relative importance of the anadromous fisheries in Deer Creek to the larger Illinois River and Rogue Rivers.

Habitat requirements of nonsalmonid fish.

The number of resting pools for chinook.

Habitat requirements and population status of the Pacific lamprey in Deer Creek.

Distribution, population status and habitat requirements of the tailed frog, foothill yellow-legged frog, Cascades frog, and Pacific giant salamander in the watershed.

The importance of Deer Creek and its tributaries for fluvial cutthroat and juvenile anadromous fish that rear in the Illinois River.

The presence, distribution, and relative abundance of the redside shiners in Deer Creek and its tributaries.

Absence/presence and distribution of resident trout in all streams in the watershed.

4. Air Quality

Emission levels in tons/acre. (Partial data gap).

Baseline emissions in tons/acre, plant association/type, weather, and fuel parameters. (Partial data gap).

Theoretical emissions in tons/acre, plant association/type, weather, fuel parameters. (Partial data gap).

Consumption Predictions in tons/acre, plant associations/type, weather, fuel parameters, plus CONSUME model predictions, RXWINDOW prescription model. (Partial data gap).

Fuel model; FBPS models (13).

Fuel profile - dead/down in tons/acre by timelag fuel classes, arrangement, continuity, age.

Fuel profile - (live) species, density, canopy closure, ground cover.

Duff levels (pre-burn and post-burn) measured in inches. Partial data gap.

Large woody material (pre-burn and post-burn). Need diameters, lengths, decay classes, and numbers per acre.

5. Human Uses

Human use and access - Transportation routes, activities planned, use patterns and types. (Partial data gap).

Water sources - Location of pump chances, heliponds, engine and tender fill points, ponds. (Partial data gap).

Water source issues - Conditions of water sources, issues associated with use (POC disease, wildlife, water rights, etc.).

TECHNICAL REFERENCES CITED

Agee, J.K. 1981. Fire effects on Pacific Northwest forests: flora, fuels, and fauna, p.54-66. In Proc., Northwest Fire Council 1981.

Agee, J.K. 1993. Fire ecology of Pacific Northwest forests. Island Press, Wash. D.C. 1993

Agee, J.K. 1990. The historical role of fire in Pacific Northwest forests. In Walstad, J., et al. (eds.), Natural and prescribed fire in Pacific Northwest forests: pp.25-38. Corvallis: Oregon State University Press.

Atzet, T.A. and D. L. Wheeler. 1982. Historical and Ecological Perspectives on Fire Activity in the Klamath Geological Province of the Rogue River and Siskiyou National Forests. USDA Forest Service, Siskiyou National Forest. Grants Pass, OR.

Atzet, T.A. and D. L. Wheeler, 1984. Preliminary Plant Associations of the Siskiyou Mountain Province. USDA Forest Service, Siskiyou National Forest. Grants Pass, OR 97526.

Atzet, T.A. and L. A. McCrimmon, 1990. Preliminary Plant Associations of the Southern Oregon Cascade Mountain Province. USDA Forest Service, Siskiyou National Forest,. Grants Pass, OR.

Bailey, V. 1936. The Mammals and Life Zones of Oregon. North Am. Fauna 55:1-416 p.

Barbour, R.B. and W.H Davis. 1969. Bats of America. The University of Press of Kentucky. Lexington, Kentucky.

Beschta, R.L. 1990. Effects of fire on water quantity and quality. In: Walstad, J., et al. (eds.), Natural and prescribed fire in Pacific Northwest forests. pp.219-32. Corvallis: Oregon State University Press.

Bingham, B.B. and J.O. Sawyer, Jr.. 1991. Distinctive Features and Definitions of Young, Mature, and Old-Growth Douglas-Fir/Hardwood Forests. In: Ruggiero, Leonard F., Keith B. Aubry, Andrew B. Carey, and Mark H. Huff, eds. Wildlife and Vegetation of Unmanaged Douglas-Fir Forests, USFS, USDA,

Pacific Northwest Research Station, Portland, OR. General Technical Report PNW-GTR-285: 363-377.

Brown, F.R. (ed.). 1985. Management of Wildlife and Fish Habitats in Forest of Western Oregon and Washington. Part 1--Chapter Narratives. pg 129-169. Pacific Northwest Region, USDA Forest Service, Portland, OR. Publication No. R6-F&WL-192-1985.

Chen, J., J.F. Franklin, and T.A. Spies. 1992. Vegetation Responses to Edge Environments in Old-growth Douglas-fir Forest. Ecological Applications 2(4): 387-396.

Cross, S. (pers. comm.). Prof. of Biology. Southern Oregon State University. Ashland, OR.

DeSante, D.F. and K.M. Burton. 1994. 1994 M.A.P.S. Manual: Instructions for the Establishment and Operation of Stations as part of the Monitoring Avain Productivity and Survivorship Program. The Institute for Bird Populations, Point Reyes Station, CA.

Evans, K.E. and R.N. Conner. 1979. Snag Management. In: Degraaf, R.M., Evans, D.E. (eds.) Proceedings of the Workshop on Management of North Central and Northeastern Forests for Nongame Birds. Gen. Tech. Rep. NC-51, USDA Forest Service, North Central Forest Experiment Station, St. Paul, MN

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. The Birder's Hanbook. A Field guide to the Natural History of North American Birds. Simon & Schuster Inc. New York. 1988.

Gaylord, K. (pers. comm). Fisheries Biologist. Boise Cascade Corporation. Central Point, OR.

Goggans, R., R.D.Dixon, and L.C. Seminara. Undated. Habitat use by three-toed and black backed woodpeckers, Deschutes National Forest, Oregon. Unpublished. Rep. Nongame Project 87-3-02. Oregon Dept. of Fish and Wildlife., Deschutes National Forest, Bend.

Harris, L.D. and P.B. Gallagher. 1989. New Initiatives for Wildlife Conservation: The Need for Movement Corridors. In: G. Mackintosh (ed.), In Defense of Wildlife: Preserving Communities and Corridors. Defenders of Wildlife, Washington, D.C. Pp. 11-34

Holland, D.C. 1993. A Synopsis of the Ecology and Current Status of the Wester Pond Turtle (*Clemmys marmorata*). U.S. Fish and Wildlife Service report.

Ingles, L.G. 1961 Mammals of the Pacific States. Stanford Univ. Press, Palo Alto, CA. 506 p

Janes, S.W. 1993. Neotropical Migrant Bird Studies; Medford District: BLM. Unpublished report.

Janes, S.W. 1995. Bird Densities on the Panther Gap Timber Sale and other Avian Studies. Medford District BLM. Unpublished report.

Jarvis, R.L. and J.P. Leonard. 1993. Nesting and Foraging Ecology of the Band-tailed Pigeons-- a Neotropical Migrant in Western Oregon, Progress Report. Department of Fish and Wildlife, Oregon State University, Corvallis, OR.

Jimerson, T.M. and R. Max Creasy. 1991. Variation in Port-Orford Cedar Plant Communities along Primary Environmental Gradients in Northwest California. USDA Forest Service. Six Rivers National Forest. Eureka, CA.

Kauffman, J.B. 1990. Ecological relationships of vegetation and fire in Pacific Northwest forests. In: Walstad, J., et al. (eds.). Natural and prescribed fire in Pacific Northwest forests. Oregon State University Press, Corvallis, OR.

Marshall, D.B., M.W. Chilcote, and H. Weeks. 1992. Species at Risk: Sensitive, Threatened and Endangered Vertebrates of Oregon. Oregon Dept. Fish and Wildlife. Portland, OR.

Maser, C., B.R. Mate, J.F. Franklin, and C.T.Dyrness. 1981. Natural History of Oregon Coast Mammals. Pac. Northwest For. and Range Experiment Station. Gen.Tech. Rep. PNW-133. USDA Forest Service, Portland, OR. 496 p

Maser, C. and S.P. Cross. 1981. Notes on the Distribution of Oregon Bats. Pacific Northwest Forest and Range Experiment Station, U.S. Department of Agriculture. Research Note PNW-379.

McKinley, G. and D. Frank. 1995. Stories of the land: An environmental history of the Applegate and Upper Illinois valleys. Medford: Bureau of Land Management, Medford District.

McNabb, D.H., and F.J. Swanson. 1990. Effects of fire on soil erosion. In: Walstad, J., et al. (eds.), Natural and prescribed fire in Pacific Northwest forests. Oregon State University Press, Corvallis, OR. Pp159-76.

Noss, R.F. 1992. The Wildlands Project---Land Conservation Strategy. Pages 10-25 in Wild Earth. Special Issue: "The Wildland Project: Plotting a North American Wilderness Recovery Strategy." Cenozoic Society Inc., Canton, NY.

Oregon Natural Heritage Data Base. 1995. Rare, Threatened, and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Base, Portland, OR.

Pyne, S.J. 1982. Fire in America: A cultural history of wildland and rural fire. Princeton University Press. Princeton, NJ

Quaccia, B. (personnel communication). Wildlife technician. Rogue River National Forest, Applegate Ranger District.

Raphael, M.G. and M. White. 1984. Use of Snags by Cavity-nesting Birds in the Sierra Nevada. Wildlife Monograms 86. 66 p.

Ripple, W.J. 1994. Historic Spatial Patterns of Old Forests in Western Oregon. Journal of Forestry. Nov: 45-59.

Stein, W.I. 1990. *Quercus garryana* Dougl. ex Hook,: Oregon white oak. In: Burns, R. M., Honkala, B.H., tech. coords. Silvics Of North America: Volume 2, Hardwoods. Agric. Handbook. 654. Washington DC: Forest service, U.S. Department of Agriculture. pp. 650-660.

Tappeiner, J.C., P. M. McDonald, and D. F. Roy. 1990. *Lithocarpus densiflorus* (Hook. and Arn.)Rehd.: Tanoak. In: Burns, R. M.; Honkala, B. H., tech. coords. Silvics Of North America: Volume 2, hardwoods. Agric. Handbook 654. USDA Forest Service. pp 417-425.

USDI, Bureau of Land Management, Medford District. 1994. Proposed Resource Management Plan/Environmental Impact Statement, Vol. 1., Medford, OR.

Wilcox, B.A. and D.D. Murphy. 1985. Conservation Strategy: The Effects of Fragmentation on Extinction. American Naturalist 125: 879-887

Wolfer, M. (personnel communication). Wildlife Biologist. Oregon Department of Fish and Wildlife, Central Point, OR.