Jackson Creek Watershed Assessment

Prepared on Behalf of
Jackson Creek Stakeholders Advisory Committee

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Funding for this project provided by: Environmental Protection Agency, Oregon DEQ 319 Funds; U.S. Forest Service, Rogue River National Forest, Northwest Economic Initiative; and, Oregon Watershed Enhancement Board.

Rogue Valley Council of Governments
Central Point, Oregon
March 2001

Acknowledgments

This document represents the commitment, dedication, and efforts of many individuals, concerned citizens, and natural resource specialists from in and outside the Jackson Creek watershed. Foremost, we wish to thank the Jackson Creek Stakeholder Advisory Committee (SAC). This group of dedicated public citizens was established from a letter mailed March 24, 2000, to 400 residents, property owners, and community leaders in the watershed. The committee played an active role in reviewing, discussing, and critiquing the individual elements of the assessment. Their combined participation of more than 420 hours of volunteer time was invaluable and is very much appreciated. The Technical Advisory Committee (TAC) provided a companion effort, without which this document would not have been completed in a timely manner or with the professional perspective it conveys. The TAC donated a combined total of at least one thousand hours on this project, valued at more than $40,000. Their commitment to work together as a committee, provide assistance to the SAC, and to contribute written reports in a timely fashion was essential to the project.

Completion of the Jackson Creek Watershed Assessment would not have been possible without the financial support of the Oregon Watershed Enhancement Board, USDI Bureau of Reclamation, USDA Forest Service, Rogue River National Forest, and Oregon Department of Environmental Quality. Thank you all very much.

The Rogue Valley Council of Governments (RVCOG) provided staff support for the project. Corky Lockard led the effort as project manager with the assistance of Beth Franklin, Project Coordinator, and Susan Cross, Technical Assistant. Ms. Franklin's capabilities were integral and her proficiencies were demonstrated in coordinating the varied facets of the project. Her professional skills are evident in the *Issues and Concerns Element* of the document. Ms. Cross's contributions came at the end of the project, and her ability to identify with the project, provide technical assistance for the *Historical Element* and critique the document was very valuable. Robert Horton contracted with the RVCOG to analyze, and write the text of the Watershed Assessment, and synthesize the contributions of other authors. His skill is apparent in the *Socioeconomic Conditions Element* and throughout the entire manuscript.

We gratefully acknowledge contributions by everyone not mentioned who were instrumental in providing time and resources in completing this project. Your assistance was essential and is greatly appreciated.

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Abbreviations and Acronyms

BCVSA	Bear Creek Valley Sanitary Authority
BLM	Bureau of Land Management
BMP	Best Management Practice
CRP	Conservation Enhancement and Reserve Program
CZMA	Coastal Zone Management Act
CZARA	Coastal Zone Act Reauthorization Amendments
DEQ	Department of Environmental Quality
DOGAMI	Department of Geology and Mineral Industry
EPA	Environmental Protection Agency
GIS	Geographic Information System
GPS	Geographic Positioning System
OWEB	Oregon Watershed Enhancement Board
IWRM	Integrated Water Resource Management
LCDC	Land Conservation and Development Commission
MID	Medford Irrigation District
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
ODA	Oregon Department of Agriculture
ODEQ	Oregon Department of Environmental Quality
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ODSL	Oregon Division of State Lands
ODOT	Oregon Department of Transportation
OWRD	Oregon Water Resources Department
RRVID	Rogue River Valley Irrigation District
RVCOG	Rogue Valley Council of Governments
SAC	Stakeholder Advisory Committee
SB1010	Senate Bill 1010 (Agricultural Water Quality Management Area Plan)
SCS	Soil Conservation Service
SOHS	Southern Oregon Historical Society
SWCD	Soil and Water Conservation District
TAC	Technical Advisory Committee
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
USDA	United States Department of Agriculture
USFS	United States Forest Service

ABSTRACT

This document is the Jackson Creek Watershed Assessment, a subbasin in the Bear Creek watershed, in the Rogue River Basin of Oregon. It is prepared on behalf of and under the direction of the Jackson Creek Stakeholders Advisory Committee (SAC), which is a voluntary, non-regulatory citizen-directed group that unites diverse interests to improve watershed health in the Jackson Creek watershed. The assessment describes the *existing conditions* within the watershed, to provide information to local stakeholders and public agencies regarding watershed restoration needs and potential actions. It takes a *river to ridge top* approach that strives to integrate existing plans and efforts, and coordinate with other local and regional resource management entities. The SAC is supported by a Technical Advisory Committee (TAC) composed of local natural resource management professionals, and staffed by the Rogue Valley Council of Governments (RVCOG). The watershed assessment is part of the larger Bear Creek Watershed Assessment and Action Planning process in the Rogue River basin.

The Jackson Creek watershed is a diverse ecological region long recognized by ecologists as uniquely different from adjoining areas. It has some of the most contrasting climatic regimes in the Northwest, and a microclimate that is prone to rather severe flood, drought, and fire cycles. The landscape has been continuously modified since its settlement by Indian tribes some 6,000 years ago. The Watershed Assessment collects available information about the current condition and effects of change of the larger ecosystem in which it is located, historical geological and climatic disturbances, human actions, hydrology and water use, channel habitat, riparian and wetland assessments, fish and wildlife habitat condition and assessments, forest condition and plant communities in the Jackson Creek watershed, water quality, erosion, and sediment conditions, and state and federal regulatory requirements that affect the Jackson Creek community.

The watershed has been heavily impacted by multiple uses, which include forest harvest, mining, and alteration of the landscape. Agriculturalists have used the water from Jackson Creek for irrigation of some of the finest farm land in the Rogue Valley, and portions of the creek have been bypassed, blocked or rerouted for irrigation diversions and flood drainage. Many sections of the watershed streams are ephemeral, and supported by irrigation overflows. In recent years the area has experienced rapid urban development, which confine channels, limit riparian vegetation, and create drainage and water quality problems.

The Stakeholders Committee has formulated a Statement of Mission, and Goals to address the watershed restoration and protection needs identified from the technical information. Data on past and existing conditions is used to identify watershed restoration needs in the Jackson Creek watershed, in particular the regulatory and water quality requirements, fish habitat, riparian, and wetland restoration needs, and minimum water quality and stream flow needs. The watershed restoration needs were then prioritized by the SAC and TAC for restoration actions. The assessment will be followed by an Action Plan based on the Committee's goals and vision, and federal and state regulatory mandates. Both plans are working documents with an initial 5 year focus, that will be updated and reevaluated as information becomes available.

1.0 INTRODUCTION

1.1 Purpose.

This document is the watershed assessment for the Jackson Creek watershed, a subbasin in the Bear Creek watershed, in the Rogue River Basin of Oregon. It is prepared on behalf of and under the direction of the Jackson Creek Stakeholders Advisory Committee, which is a voluntary, non-regulatory group citizen-directed group that unites diverse interests to improve watershed health in the Jackson Creek watershed. The assessment describes the *existing conditions* within the watershed, to provide information to local stakeholders and public agencies regarding watershed restoration needs and potential actions. The assessment will be followed by an Action Plan that will be based on the Committee's goals and vision, and federal and state regulatory mandates. It takes a watershed-wide approach and strives to integrate existing plans and efforts, and coordinate with other local and regional resource management entities. Both plans are working documents with an initial 5-year focus, that will be updated and reevaluated as information becomes available.

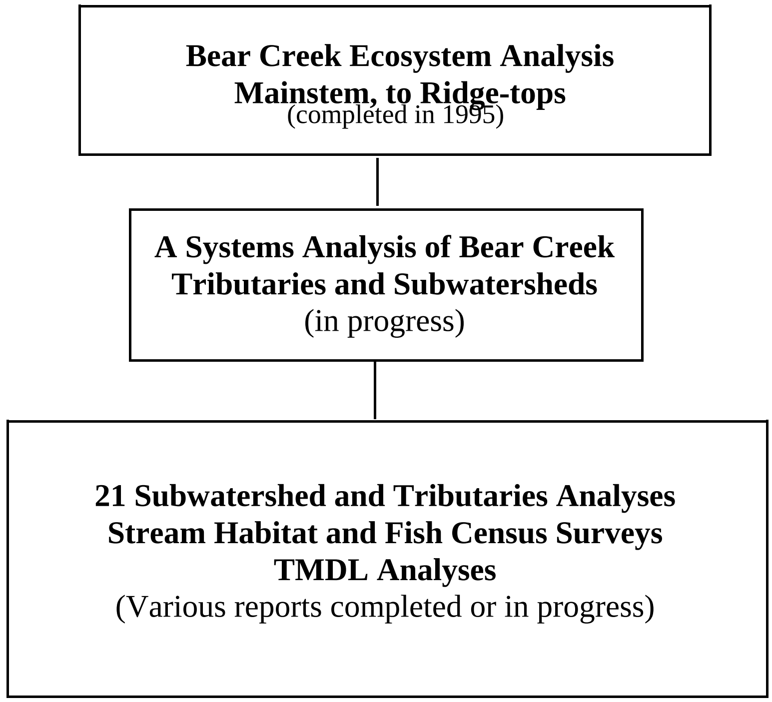
1.2. Context of this Study.

There have been multiple research and data collection efforts underway in the Bear Creek basin over the past decade, of which this watershed assessment is a key component. Multiple agencies have conducted analytic efforts that have been loosely coordinated, but still productive in results. A strategy has emerged from these efforts that unifies diverse activities that extend across agencies, citizen advisory groups, local governments, regulatory agencies, and scientific interests.

The unified strategy began to take shape in 1994 when water resources staff at the Rogue Valley Council of Governments (RVCOG) completed the first general Bear Creek Watershed Assessment and Action Plan. The plan employed an ecosystems approach, which essentially was a ridge-top to ridge-top presentation addressing ecosystem zones, historical trends and topographic levels of analysis. Of necessity, the first assessment focused on the Bear Creek mainstem and larger basin landscape, with only minimal attention given to the 21 subwatersheds within the basin.

Following this ecosystem presentation, several state and federal agencies have conducted additional watershed analyses and water quality data collection efforts. Oregon Department of Environmental Quality (ODEQ) and the RVCOG collected water quality data at multiple points on Bear Creek and tributaries. The United States Forest Service completed watershed analyses on Neil Creek and Wagner Creek, and initiated an analysis on Ashland Creek. The Bureau of Land Management is conducting subwatershed analyses encompassing tributaries west of Bear Creek.

The results of these activities shows a need for a study and action plan that links the multiple subwatershed plans into a systems presentation that show the relationships between the tributaries and subwatersheds combined, and to the basin level ecosystem presentation in the 1994 Bear Creek Watershed plan. Graphically, the strategy can be presented as below:



The Jackson Creek Watershed Assessment is a key component of the above strategy, and will fill a large gap in information. It also will lead to watershed restoration actions that will have effects far beyond the watershed, affecting water quality and fisheries in the larger Bear Creek basin and greater Rogue River basin coastal region.

Technical data and summaries of technical information supporting this document will be provided as the Technical Supplement to the assessment. Please contact the Rogue Valley Council of Governments, Water Resources Department for further information.

2.1. Jackson Creek Watershed Topography.

The Jackson Creek watershed is located on the lower northwest side of the Bear Creek basin, and enters Bear Creek about two miles northeast of Central Point, Oregon (see map of Jackson Creek watershed). Jackson Creek extends about 12 miles from its confluence at Bear Creek into the Siskiyou Mountain crest to the west.

Topography in the upper watershed has a profound influence on vegetation and water flow with very predictable contrasts. For example, steep topography creates aspect differences, namely north and south facing slopes. Vegetation on southerly aspects is adapted to warmer and dryer conditions, differing from that of northerly aspects with cooler temperature, less direct solar radiation and greater moisture availability. The upslope is forested mountainous topography, and historically, the valley floor was characterized by savanna grasslands interspersed by striated (multiple-interconnected-parallel) stream channels on the valley floor.

The Jackson Creek subbasin is 16,139 acres in size, and is characterized by forest, agricultural lands, residential and commercial lands, and the municipalities of Jacksonville and Central Point. Maximum relief in the watershed is 2,634 feet, and the average slope is about 12 degrees in the foothills. The mean elevation of the Jackson Creek watershed is 2,004 feet. The area of the catchment above 3,000 feet elevation comprises about 11 percent of the drainage. Mean annual precipitation for the watershed is slightly less than 635 mm (25 inches).

Table 2.1. Characteristics of the Jackson Creek Watershed.

Spatial Features:

Area: 25 Sq. miles **Conveyance:** Canals 8.5 miles **Wetlands:** 61 wetlands ≥1 Acre;
Roads 77 miles 10+wetlands ≤1
Acre
Streams 35 miles

Land use/Zoning Characteristics :

Aggregate	222 A.	Private Land holdings	14,626 A.
Commercial	2 A.	BLM Landholding	1,309 A.
Farm	4,267 A.	USFS Landholding	256 A.
Forest	7,924 A.		
Industria	l 7 A.		
Rural	2,048 A.		
Suburban	1,105 A.		
City	565 A.		

Table 2.2. Physical Features of the Jackson Creek Watershed.

Drainage Area	**16,191 acres**	**65.3 sq. km..**
Stream Length	**64,300 feet**	**19.6 km.**
Maximum Relief	**2,634 feet**	**803 m.**

Mean Slope	**20.7 percent**	**11.7 degrees**
Average Aspect	**111.6 degrees**	
Mean Elevation	**2,004 feet**	**611 m.**
Mean Annual Precipitation	**25 inches**	**634 mm.**

2.1.1. Climate.

Southwest Oregon has some of the most contrasting climatic regimes in the Northwest. The marine climate at Oregon's coast changes eastward to the dry, warm interior, which has a continental-like climate. A large transition occurs north to south, from the mild, moist climate of northwest Oregon to the Mediterranean climate of central California.

The Jackson Creek watershed is situated in a dry hot climatic portion of this region, within the eastern Siskiyou Mountains. The Bear Creek valley into which this watershed drains is the warmest and driest interior valley in western Oregon. Precipitation in the Bear Creek valley is much lower (about 10 inches lower) than the nearby valley at Grants Pass, about 12-15 inches lower than the Umpqua Valley near Roseburg, and at least 35 inches lower than at Cave Junction (about 60 miles downstream on the Rogue River), and with more extremes in temperature than neighboring valleys.

Mean rainfall for Medford between 1928-1999 is 18.98 inches (the maximum rainfall occurred in 1996 at 31.41 inches, and the minimum rainfall occurred in 1959 at 10.42 inches. Average rainfall for the Bear Creek subbasin from 1985-1994 (which was a drought cycle) was 14.24 inches. Annual rainfall from 1995-2000 was 22.5 in.

1985	10.69 (inches)	1990	13.50 (inches)	1995	21.77 (inches)
1986	17.07	1991	14.50	1996	31.41
1987	14.78	1992	14.98	1997	17.93
1988	13.70	1993	16.60	1998	28.72
1989	14.50	1994	12.10	1999	16.50
				2000	18.81

(Source: Medford NOAA office)

2.2. Jackson Creek Watershed Subbasins.

For purposes of analysis the watershed was subdivided into five subbasins, based upon the NRCS classification of subwatershed data base (see map).

2.0. THE JACKSON CREEK WATERSHED.

The Jackson Creek watershed is part of the Klamath geological province of southwest Oregon and northwest California, a large diverse ecological region long recognized by ecologists as uniquely different from adjoining areas. Vegetation diversity in the region is the product of a long history and a wide variety of contrasting environmental factors involving climate, geology, soils, topography and biological elements. Superimposed over this environmental grid are the effects of management activities, urban development and natural disturbances (particularly fire events), and other human uses

of the landscape. This broad array of site factors coupled with major regional and local environmental gradients create a wide variety of ecological communities in southwest Oregon landscapes. As a result the Siskiyou Mountains, which include this watershed, have a particularly rich mixture of species from adjoining regions and great diversity in habitats.

3.0. THE JACKSON CREEK WATERSHED PLANNING STRUCTURE.

3.1. Jackson Creek Stakeholders Advisory Committee.

The Jackson Creek Stakeholders Advisory Committee is formed in coordination with the Bear Creek Watershed Council, which is Chartered in accordance with HB2215. The Committee depends entirely on voluntary efforts and is not a regulatory or enforcement body, nor does it adopt plans or rules in a legal sense. Instead, the Committee makes recommendations to decision-makers, landowners, and managers on ways to protect and enhance the Jackson Creek watershed. Implementation of the recommendations in the Action Plan also will be a completely voluntary effort. The Jackson Creek Stakeholder Advisory Committee provides a framework for communication, collaboration, and cooperation among its member organizations and others. Staff support and technical assistance is provided to the Committee by the Rogue Valley Council of Governments under the purview of the Bear Creek Watershed Council, and is funded by the Oregon Watershed Enhancement Board, Environmental Protection Agency Oregon Department of Environmental Quality (319 Program), U.S. Forest Service Rogue River National Forest Northwest Forest Plan (Northwest Economic Adjustment Initiative), and local governments.

The Jackson Creek Stakeholders Advisory Committee was organized by local stakeholders, area residents, and representatives of local governments and organizations during a series of public meetings held during Spring 2000. The RVCOG arranged for staff support to organize the meetings, and begin the technical assessment. Technical information on watershed conditions was compiled and presented by the Technical Advisory Committee (a group of natural resources professionals) to the Stakeholders Advisory Committee (local representatives of the community and community organizations) during the public meetings. The Committee then identified stakeholder groups representing various interests that should be involved in the watershed assessment and planning process.

3.2. Stakeholders Groups.

The stakeholder groups identified by the Committee were:

- Area residents
- Agricultural interests (including irrigation districts)
- Bear Creek Watershed Council
- Cities of Central Point, Jacksonville, and Medford
- Developers (residential, commercial)
- Environmental organizations
- Fisheries management agencies
- Floodplain residents (100 year floodplain)
- Forest-land owners and forestry organizations (including ODF, USFS, BLM, and private timber companies)

- Jacksonville Woodlands Association, greenspace conservation and environmental educational organizations

- ♦ Jackson Soil and Water Conservation District
- ♦ Mining interests (rock quarries, and recreational gold panning, Oregon Department of Geology and Mineral Industry)

♦ Public land managers (OSU Extension Service, USFS J. H. Stone Nursery, and Parks and Recreation Departments of the respective cities)

- ♦ Public utilities (Pacific Power, Bear Creek Valley Sanitary Authority)
- ♦ Recreation interests, motorized off-highway vehicles, hiking, mountain bicycling etc.
- ♦ State, county, and city road maintenance departments

3.3. Public Involvement and Organization Process.

Information for this section contributed by John Morrison and Beth Franklin (RVCOG), and Debra Kidd (USBR).

The participation of local citizens and technical personnel is a critical component of the Jackson Creek Watershed Assessment, as local citizens will live in the watershed and protect and enhance its resources. It is necessary to inform the public about data, information, issues and concerns developed through the assessment process. Consequently, as part of this assessment, a public involvement program is being carried out so that:

- ♦ key issues can be accurately identified;
- ♦ stakeholders can meaningfully participate in the assessment process;
- ♦ public awareness and understanding of the assessment process and assessment results can be generated; and,
- ♦ a foundation of support for the assessment outcomes can be built as a result of the forgoing understanding and participation.

Communication among local citizens and interest groups provides for feedback and interaction throughout the process, and is directed at building consensus about decisions based upon a clear understanding of the problems, the options available, and the consequences of the decisions. Three broad strata for public involvement within the Jackson Creek Watershed are:

- ♦ **Stakeholders** - Those with very focused, often tangible interests in the matters covered by the watershed assessment. Frequently, stakeholders are such people as property owners, businessmen, community leaders, or others with a social, financial, or legal interest.

- ♦ **Organized Interest Groups** - Multiple organized groups within the community will be impacted by the actions taken as a result of the assessment. These groups have a need for timely, in-depth information about the assessment and action planning process, and will perform a key role in implementing watershed restoration activities. These groups include the Irrigation Districts, Jacksonville Woodlands Association, Motorcycle Riders Association, Jackson County Historical Society, local governmental agencies and political officials, local developers, and other interested organizations.

- **General Public** - The larger Jacksonville, Central Point, and Medford community.

Shown below is the strategy developed to implement the SAC Process and Community outreach process.

Figure 3.1. Public Involvement/Public Outreach Strategy

Phase	Technical Purposes	PI/PO Purposes	Communication Techniques
I	1. Conduct Assessment 2. Develop preliminary Action Plan 3. Identify demonstration projects	1. Involve SAC 2. Outreach to Interest Groups 3. Distribute information to General Public	The SAC maintains communication lines to general public, letters, phone calls, review and comment on documents. Send mailings to 430 tax lots adjacent to Jackson Creek, articles in Assoc. newsletters, speakers bureau, one-on-one meetings. Provide information materials to Cities of Central Point and Jacksonville, and distribute at library branches, press releases, articles in Jacksonville Review, feature story in Central Point Times.
II	1. Implement demonstration projects 2. Modify/refine Action Plan	1. Involve Interest Groups 2. Outreach to general public	Form work crews to participate in demonstration projects and conduct tours, hold a public meeting on refinement of the Action Plan, prepare a flyer in irrigation district billings and city utility bills, hold open house meetings, prepare media releases, and school projects.
III	Implement modified Action Plan	Develop guidance document for PI/PO Planning	Write and produce guidance document. Develop and implement distribution plan.

3.4. Technical Advisory Committee.

The Jackson Creek Watershed Technical Advisory Committee (TAC) is comprised of federal, state, and regional natural resources professionals and local officials. This group is charged with completing sections of the assessment associated with their technical expertise based on the guidelines provided by the Oregon Watershed Assessment Manual and providing technical assistance in making key decisions during the progress of the project.

The Technical Advisory Committee is composed of professionals from the following disciplines:

engineering, hydrology, fish biology, water quality and wetlands. The cities, agencies, and local community organizations represented by the Technical Advisory Committee include: Rogue Valley Council of Governments, City of Jacksonville, City of Central Point, Bureau of Reclamation, Oregon Water Resources Department, Oregon Department of Agriculture, Oregon Department of Fish and Wildlife, Oregon Department of Environmental Quality, and the U.S. Fish and Wildlife Service.

The committees also agreed to respect each other's areas of expertise and alternative points of view. The SAC agreed to rely on TAC for their technical expertise and the TAC agreed to respect the SAC's input and local experience on the land in the watershed. The Committee works closely with multiple local, state, and federal agencies and organizations. Implementation of the actions described in the Phase II Action Plan would not be possible without the commitment, collaboration, and technical expertise of these groups. A separate Technical Appendix supplements the watershed assessment, providing background information used in developing the watershed assessment.

Many Technical Advisory Committee members have provided in-kind assistance match for grant funding and have greatly contributed to the success of this project. The contribution of many hours of their time has provided this assessment with a thorough compilation and analysis of current data. Where time and available resources have allowed, limited on-the-ground field surveys were also performed. In instances where field surveys were not possible, the need for them has been noted and data gaps have been identified. Preparing watershed assessments is an iterative process that develops fully over time as further data is compiled, and ground-truthing, monitoring and enhancement activities take place. The assessment provides baseline data for the Jackson Creek watershed that will be added to as more is learned about the functioning of the watershed.

The Stakeholders Advisory Committee and the Technical Advisory Committee share many duties, including:

- Review and comment on all phases of the planning process, and on project actions,
- Input and direction on reports summarizing progress and accomplishments,
- Educating the public about the project and the decision-making process,
- Providing local perspective on the assessment, action plan, and monitoring plan.

3.5. Mission and Goals for the Jackson Creek Watershed.

On May 16, 2000 the Stakeholders Advisory Committee met and agreed upon the following Statement of Purpose to provide ground rules and a framework for discussion during the Watershed Assessment and Action Planning Process:

> ***"We are a Committee with a shared purpose. We each commit to partnering with our fellow members to successfully achieve our purpose. As a member of the Committee, I represent a unique constituency and perspective, I will communicate my perspective and act as the communication link to my constituency about the project. I consider each member of the Committee to be a valuable resource. I commit to hearing and integrating alternative points of view."***

The Committee then formulated a Statement of Mission, and formed Goals to address the restoration and protection needs identified from the technical information. Representatives of the respective stakeholder groups conducted several work sessions to define watershed mission and goals, and plan the administration of the program. The Goals were formed through a consensus process by stakeholders in an open group meeting on August 14, 2000. The Mission formulated was:

Mission: ***To protect and enhance the quality of life and natural resources of the Jackson Creek Watershed.***

Goals:

1. **Promote and enhance the beneficial human uses of natural resources in the Jackson Creek Watershed in balance with the economic livelihood of the Jackson Creek Watershed Communities.**

2. **Initiate and support natural resource data collection, analysis, and monitoring in the Jackson Creek Watershed (including surface and ground water sources).**

3. **Provide technical assistance and support funding for implementation of the Jackson Creek Watershed Action Plan and its component water quality improvements.**

4. **Assist and support Jackson Creek Watershed agriculture and irrigation districts in addressing SB1010 objectives.**

5. **Reduce contaminants in both surface and ground water sources to improve water quality.**

6. **Develop drainage, stormwater runoff, and flood management programs for the Jackson Creek system.**

7. **Develop upland forest and urban interface zone management plans to reduce fire hazards.**

8. **Promote management of vegetation in the watershed to increase native plant species, control exotic species, enhance riparian habitat, and reduce streambank erosion.**

9. **Protect and enhance existing wetlands and encourage development of new wetland areas.**

10. **Support and maintain a public involvement and education program to address the concerns of landowners, stakeholders, resource managers, and people in the Jackson Creek Watershed.**

The *Mission Statement* directed the selection of *Goals* for the program, which in turn leads to the formulation of *Objectives* for restoration, and *Actions* for implementation.

4.0. ISSUES IDENTIFIED THROUGH THE WATERSHED ASSESSMENT PROCESS.

Information for this section provided by the SAC and TAC, and summarized by Beth Franklin.

This section summarizes the comments and issues about the Jackson Creek watershed formulated by the SAC and TAC in group meetings. It is reported to better inform the people, city and county governments, state and federal agencies, the Bear Creek Watershed Council and fellow citizens of the social, economic, water quality, and natural resources issues and concerns within the Jackson Creek watershed. The issues will be addressed in the Jackson Creek Watershed Action Plan, which is the next phase of the watershed assessment process.

4.1. Method for Issue Identification.

Several methods were used to identify issues and concerns facing the Jackson Creek watershed. These included the following:

1) An open house was held for area stakeholders on April 25, 2000 to describe the purpose of the assessment and action planning process and the roles and responsibilities of different agencies.
2) Open communication between RVCOG staff, Stakeholders Advisory Committee (SAC) and the Technical Advisory Committee (TAC) was encouraged through a sharing of phone and e-mail lists, and accessibility of RVCOG staff to answer SAC committee questions via phone or in-person at meetings.
3) Public Works Managers of municipal governments were interviewed to identify municipal concerns.

4.2. Primary Issues, by Topic.

The following is a summary of issues and concerns identified by the Stakeholders Advisory Committee and the Technical Advisory Committee at meetings conducted for this purpose from April through August 2000. Written reports of technical information were also requested from both Technical and Stakeholders Advisory Committee members. Technical Advisory Committee members reviewed the technical assessments and suggested changes as needed. Five members of the Stakeholders Advisory Committee volunteered to review and comment on the technical assessment. These members were also given the Watershed Assessment Condition Evaluation - Appendix A from the Oregon Watershed Assessment Manual to provide a framework and guidelines for the types of critical questions to consider during their evaluation.

The issues and concerns were organized using a method of content analysis, in which similar comments are grouped to provide a distilled presentation of the issues and concerns expressed. The response to concerns and issues falls into the following categories: (1) regulatory, (2) data gap, further study needed, monitoring etc., (3) natural resources specialist response needed, or (4) referral to appropriate pages within this document. Part of the purpose of the assessment is to identify where further information is needed. A detailed listing of issues and responses is provided in Appendix B.

4.2.1. Program Organization and Coordination.

There was considerable concern expressed about the need for identifying a community vision, and classifying urban and rural problems associated with Jackson Creek watershed. Concerns included:

- How should improvements to Jackson Creek be made?
- How does the Jackson Creek Assessment and Action plan fit in with regulatory mandates? Is the watershed assessment a regulatory process?
- What are the social and economic impacts of current stream use?
- What are the potential opportunities for stream and watershed condition improvements in Jackson Creek?

4.2.2. Impact of Past Watershed Conditions.

Concern about the historic conditions focused primarily on change in landscape condition and how changes have affected the function of Jackson Creek and the watershed.

- Has Jackson Creek been rerouted in the past and how has this affected the Jackson Creek watershed?
- What historic information can be found regarding 1) wetlands in the Jackson Creek watershed, 2) Jacksonville reservoir's storage capacity, and 3) a comparison of historic and current aerial photos to see changes in land use patterns?
- Who had responsibility for maintaining Jackson Creek in the past and who is responsible currently?
- A community member noted that at one time Daisy Creek was used as a conveyance for effluent.

4.2.3. Channel Habitat Type Classification.

Concerns about channel habitat type included:

- Impacts of stream bank incisement and how to address this problem, particularly in the lower watershed.
- Questions regarding the accuracy of stream gradients and channel habitat type descriptions in the assessment.
- What can be done to improve the stream channel conditions?

4.2.4. Hydrology and Water Use.

Hydrology and water use issues included:

- Flood control
- Storm water management
- Maximum and minimum stream flows throughout the year
- Water quality concerns
- The role of irrigation and water transport by irrigation districts
- The accuracy of hydrologic modeling, and how Jackson Creek is currently functioning.

4.2.5. Plant Communities and Upland Vegetation.

Concerns about Native vegetation involved:

- Identification of the plant community types in the Jackson Creek watershed.
- How have plant communities changed over time?
- The Committee requested that potential plant communities be put into a GIS database.
- Can plant communities be managed for further diversity?
- Primary exotic species issues focused on blackberries and blackberry removal, Committee members were concerned about methods of blackberry removal (e.g., use of herbicide).
- Committee members want to know whether removal of blackberries would increase sediment loading into Jackson Creek.
- Committee members want further information regarding area regulations for blackberry removal, and methods for restoring native vegetation.
- Consideration of long-term plant community health and diversity of the watershed is a concern. Maintaining diversity will require blackberry removal, however blackberry eradication may not be possible.
- Committee members also requested a listing of other non-native plants or shrub species of concern and information regarding the management of these species.

4.2.6. Wetlands and Riparian Assessments.

Primary concerns regarding wetlands and riparian areas included:

- What was the historic extent of wetlands in the Jackson Creek watershed?
- Were any flood plain wetlands found along Jackson Creek?
- How do wetlands benefit water quality and streams?
- Committee members requested a glossary which defines terminology used in this portion of the assessment.
- Understanding local regulations regarding riparian setbacks and how landowners can comply with setbacks and riparian regulations.
- Committee members also wanted to know what landowners can do to improve riparian conditions in the Jackson Creek watershed.
- Concerns were also expressed regarding improving the ability of Jackson Creek to convey water and storm water while protecting riparian areas.

4.2.7. Sediment Sources.

Some SAC members questioned the severity of water quality problems caused by sediments in Jackson Creek. Concerns included:

- Identification of sediment sources associated with urban and rural land uses.
- Identification of sources of streambank erosion.

4.2.8. Channel Modification Assessment.

The following issues regarding channel modification were identified:

- How have water flow fluctuations modified the channel of Jackson Creek?
- How extensive have channel modifications been?
- Committee members also noted that Jackson Creek's channel incisement is a safety concern for community members.

4.2.9. Water Quality.

The majority of the concerns discussed centered around water quality. Water quality is a public safety concern in the Jackson Creek watershed. Issues and concerns identified included:

- What are the water quality parameters of concern for Jackson Creek?
- Are septic tanks a source of water quality problems?
- What are the base stream temperatures recorded from the headwaters to the reservoir and on down to the mouth of Jackson Creek?
- How does water quantity in Jackson Creek affect water quality?
- How do irrigation return flows affect overall water quality in Jackson Creek? Is there a possibility of transfer of water pollution from the irrigation ditches into creeks?
- Can vegetation along Jackson Creek filter E. coli bacteria and reduce nutrient loadings? How will proposed channel modifications affect water quality?
- How does water quality in Jackson Creek affect the domestic aquifer water quality?

Committee members also requested a map showing water quality test sites, and information describing how citizens obtain water temperature loggers to record temperature data. Committee members were also unfamiliar with the agencies and organizations who have responsibility for maintaining water quality in creeks, and would like information about who they can contact should they identify a problem.

4.2.10. Fish and Fish Habitat Assessment.

Fisheries concerns identified included the location of fish populations, spawning areas, and sites for habitat improvements in the Jackson Creek watershed. Committee members also wanted to know how stream and irrigation flows affect fish habitat. A committee member suggested that Jackson Creek be viewed as a stream with differing needs according to winter and summer seasons. Other questions and concerns were as follows:

- How should reaches be identified in Jackson Creek watershed?
- How could the problem of access be addressed for future wildlife survey efforts?
- What about other wildlife in Jackson Creek watershed (are amphibians present)?
- What are the costs of road improvements that would help ameliorate fish passage problems (e.g., Hanley Rd. Culvert replacement)?

4.2.11. Issues Identified by Municipalities.

Public Works managers of the cities of Central Point and Jacksonville were interviewed (February, 2000) to identify issues, and current engineering and construction actions relating to the watershed. Both cities are undertaking flood plain and drainage management actions and construction, and incorporating fish passage and water quality improvements.

- **Flood Control:** A major problem for the area is flood control and surface drainage. River channels must be left open for flood drainage, but many areas are confined by large patches of brush and blackberry vines. Residential and commercial development limits opportunity for management. Actions to maintain open channels for flood flows often conflict with goals for fish-friendly riparian overstory. The cities are seeking to manage river access to maintain flood drainage, but river channels and floodplains in many areas have been altered. Central Point is developing floodwater holding basins and wetlands in open areas as a partial solution, as exemplified by the day use parks in Griffin Creek between Beall and West Pine Streets. The cities have very limited jurisdiction and enforcement ability upon landowner alteration actions.

- **Water Quality and Stream Flow:** Water quality and flow conditions vary considerably by stream reach and seasonality, creating high variability in temperature, turbidity, contaminants, sediments, and streambank erosion. Some sections of streams dry up in summer months, and pool structure does not support native fisheries in many reaches. Irrigation overflows and drainage contribute a significant amount to summer stream flow in some reaches, and may even improve water quality in lowest flow periods. Some streamside residents have used the streams to dispose of garbage and trash, contaminating several stream reaches.

- **Irrigation and Storm Water Drainage:** Major portions of streams are used for irrigation transport and storm water drainage. Subsurface and storm water drainage adds poor quality water in some developed areas, which is highly variable in frequency and volume. Cities are implementing upgrades to sewage, septic tank, and storm water systems, but only about one-third of needed improvements have been addressed. Cities are constructing new culverts to enhance fish passage, sediment traps in storm water channels, catch basins, increase park and riparian areas, and limit effects of development upon water quality, wetland, and riparian areas. Several areas are designated for vegetative filter/wetland areas. The LCDC regulations affect city actions and improvements through restricting development to specific areas.

- **Riparian Ordinances**: The cities of Central Point and Jacksonville are considering adopting Goal 5 riparian setback ordinance, and using the City of Medford riparian ordinance as a model. Creek side variance is yet to be defined.

- **Exotic Vegetation**: There is extensive invasion by exotic plant species (blackberries, etc.) which limits access for improving riparian and wetland environments.

- **Groundwater Contamination**: An unknown number of private property wells are contaminated by surface water inflows. City governments encourage residents outside the urban growth boundary to connect to municipal wastewater systems.

6.0. REGULATORY MANDATES APPLICABLE TO THE JACKSON CREEK WATERSHED[1]

6.1. Legislative Mandates.

There are multiple Federal, State of Oregon, and local government regulatory mandates that apply to the Jackson Creek watershed, which include the Federal Clean Water Act of 1990, Coastal Zone Act Reauthorization Amendments of 1990, Endangered Species Act, Division of State Lands/Army Corps of Engineers Removal-Fill 404 permits, and Oregon Department of Environmental Quality water quality standards, SB1010 Agricultural Practices Act, Oregon Endangered Species Act of 1987, Jackson County riparian ordinances, and the cities of Central Point, and Jacksonville riparian ordinances. The federal mandates specify water quality and environmental requirements for state agencies to implement and oversee. The mandates apply to both public and private lands, and have enforcement provisions for non-compliance.

6.1.1. Federal Clean Water Act Mandates (CWA). The Clean Water Act of 1972 was enacted to "restore and maintain the chemical, physical, and biological integrity of the Nations's waters."[2] The CWA set national goals and policies for the restoration of water quality and eliminating of pollution in navigable waters to provide protection for fish and wildlife, recreation and other beneficial water uses.

The Act implemented point source and nonpoint source controls to achieve water quality standards. States were required to initiate and oversee planning and enforcement of water standards through creating *Total Maximum Daily Loads* (TMDL) for pollution and discharge in the public waterways. Point sources of pollution are controlled through the National Pollution Discharge Elimination System (NPDES) permit process, which is implemented by the states under EPA supervision. Nonpoint sources of pollution (which are the more numerous within a watershed, such as forestry, agriculture, and urban stormwater runoff) are to be regulated and managed through the use of "Best Management Practices."

The State is directed to establish "designated uses" of a waterway (for example, fish and wildlife or human consumptive uses), and set criteria to protect these uses through setting TMDLs. The water quality parameters which may cause a water body to be listed are: (1) aquatic weeds or algae, (2) bacteria (E. coli) - an indicator of fecal coliforms, (3) biological criteria, (4) chlorophyll A, (5) dissolved oxygen, (6) habitat modification, (7) flow modification, (8) nutrients, (9) pH,

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[1] This section is derived from Kelly Nolan , *Integrating the Planning Mandates of the Clean Water Act, The Coastal Zone Act Reauthorization Amendments of 1990, and The Endangered Species Act: Toward A Comprehensive Approach To Watershed Management Planning.* Northwest Water Law and Policy Project, Northwestern School of Law of Lewis & Clark College, and the Rogue Valley Council of Governments, Research Publication PO99-2, May 1999.

[2] 33 USC § 125(a)

(10) sedimentation, (11) temperature, (12) total dissolved gas, (13) toxics, and (14) turbidity.[3]

In addition, landowners proposing activities that discharge dredged or fill material into streams are required to obtain a "404 permit" from the Army Corps of Engineers, to protect water quality and beneficial uses of public waterways.

Local watershed councils and governmental entities are expected to develop watershed planning and management practices and priorities to comply with water quality standards, and protect future beneficial uses of the waterways. Failure to take appropriate and sufficient action can result in criminal penalties, fines up to $25,000/day, and restriction upon commercial operations. The ODEQ (in coordination with the Federal Environmental Protection Agency (EPA) is designated with responsibility for ensuring planning and compliance with the CWA, and is the main contact agency for this effort.

6.1.2. Federal Coastal Zone Act Reauthorization Amendments of 1990 (CZARA). The CZARA requires states to develop comprehensive and enforceable management programs regulating land and water uses and coastal development. The authority of this program extends upstream to all waters flowing to the sea from coastal states. The amendment requires that water quality standards be developed, and mandates compliance to those standards.

For the most part, watershed planning and actions to comply with the TMDLs and beneficial uses of the Clean Water Act will also satisfy CZARA requirements for the Jackson Creek watershed, although care must be taken to consult with all appropriate agencies.

6.1.3. Federal Endangered Species Act (ESA). The Endangered Species Act (ESA) of 1973 provides for listing of native animal and plant species as endangered, provides means for their protection, and specifies procedures for planning for recovery of species population. The ESA defines *endangered* as any species "in danger of extinction throughout all or a significant portion of its range," and *threatened* as any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. The US Fish and Wildlife Service (USFWS) is responsible for administering the law for inland fish, wildlife, and plants, and the National Marine Fisheries Service (NMFS) is responsible for marine and anadromous fish. All Federal, State, and private landholders are required to *consult* with the NMFS or USFWS before proceeding on any action that may affect endangered species. The ESA also applies broad *take* prohibitions to all threatened and endangered animal species. Failure to take action to restore habitat quality is also defined as a "taking," and can result in fines and penalties to local governmental entities and landholders.

Both federal and private landholders associated with public waterways are directed to prepare *Habitat Conservation Plans* (HCP) for the protection and recovery of endangered species, to be approved by the NMFS, and to be granted an *incidental take permit* for activities associated with

[3] Listing Criteria for Oregon’s 1998 303 (d)List of Water Quality Limited Water Bodies, ODEQ, October 1998.

anadromous fish-bearing streams. Watershed councils or local governmental entities can assume the planning, administrative, and monitoring responsibility for local landholders, but compliance and habitat restoration remains the responsibility of local landholders and managers.

> An ***"endangered species"*** is any species that is in danger of extinction throughout all or a significant part of its range (16 USC § 1532(6)).
> ***"Critical Habitat"*** is the area on which are found physical or biological features that are essential to the conservation of a species and which may require special management or protection (16 USC§ 1532(5)(A)).
> ***"Harm"*** refers to alteration of habitat or a threat to the potential for survival or recovery of a species.
> ***"Taking"*** refers to any activity that "harasses, harms, pursues, hunts, shoots, wounds, kills, captures, or collects a listed species, or attempts to do so, as well as any modification of habitat that would result in the above." (16 USC § 1532(19)).
> The **"NMFS 4(d) Rule"** is a provision whereby the FWS and NMFS can forestall enforcement of a *taking* action on behalf of state and local planning entities, as long as habitat restoration actions are beneficial or benign (16 USC § 1533(d)). The purpose of the rule is to enable communities to undertake restoration actions without threat of enforcement, when taking might occur within the process of restoring habitat quality.
>
> Landowners/managers are encouraged to prepare a ***Habitat Conservation Plan (HCP)*** to outline measures to minimize and mitigate impacts that may harm a species. Resource managers must apply for and be granted an ***"incidental take permit"*** for any action that results in a taking condition, before proceeding with the management action.

6.

1.4. Oregon State Endangered Species Programs. The Oregon Endangered Species Act of 1987 (ORS 496.172) gave the Oregon Department of Agriculture (ODA) responsibility and jurisdiction over threatened and endangered plants, and the Oregon Department of Fish and Wildlife (ODFW) responsibility for threatened and endangered fish and wildlife. Both of these agencies have entered into cooperative agreements with the USFWS to continue research and conservation programs for animal and plant species under the federal ESA. The Oregon Natural Heritage Program has a similar agreement with the USFWS for invertebrates.

The ODFW maintains a list of threatened and endangered species; currently 35 species of fish and wildlife are on the list. The Oregon Act requires state agencies to develop programs for the management and protection of endangered species, and requires agencies to comply with the guidelines adopted by the Oregon Fish and Wildlife Commission for threatened species.

Table 6.0. Federally Listed Wildlife Populations Affecting Jackson County.

Mammals			
Scientific Name	**Common Name**	**Federal status**	**ODFW status**
Canis lupus	**Gray wolf**	**LE**	**LE**

Lynx canadensis	**Canada lynx**	**LT**	**-**
Ursus Arctos	**Grizzly bear**	**LT**	**-**
Fish			
Onchorhynchus kisutch	**Coho salmon**	**LT**	**SC**
Onchorhynchus mykiss	**Steelhead**	**C**	**SV**
Birds			
Haliaeetus leucocephalus	**Bald Eagle**	**LT**	**LT**
Strix occidentalis Cairina	**Northern Spotted Owl**	**LT**	**LT**
Falco peregrines alatum	**American Peregrine falcon**	**-**	**LE**

LE = Listed Endangered. Taxa listed by the U.S. Fish and Wildlife service or the National Marine Fisheries Service (NMFS), Endangered under the Endangered Species Act (ESA), or by the Departments of Agriculture (ODA) and Fish and Wildlife (ODFW) of the state of Oregon under the Oregon Endangered Species Act 1987 (OESA**).**
LT = Listed Threatened. Taxa proposed by the USFWS or NMFS to be listed as Endangered under the ESA or by ODFW or ODA under the OESA.
C = Candidate. Taxa for which NMFS or USFWS have sufficient information or support a proposal to list under the ESA, or which is a candidate for listing by the ODA under the OESA.
SV = Species vulnerable
SC = Species critical

Reptiles and amphibians were also reviewed for this table, and none are listed as threatened, endangered or candidate species at this time. (For more information on listing status of reptiles, amphibians, insects, invertebrates, and plants see the Oregon Natural Heritage Website **www.heritage.tnc.org/nhp/us/or/index.html.** For plant populations refer to ONHP website Oregon State Sensitive Species Listing Categories)

6.1.5. Oregon Forest Practices Act. The Oregon Forest Practices Act requires forest operators to comply with best management practices to achieve water quality objectives developed within the boundary of the Coastal Nonpoint Source Control Program by the Board of Forestry. These objectives apply to riparian setbacks, harvest practices, and vegetation management. Water quality protections in federal forest practices must meet or exceed the effectiveness of the FPA practices. The Oregon Department of Forestry has already served as the lead agency for TMDL development on state and private forest lands in several basins.

6.1.6. Oregon SB1010 Agricultural Water Quality Management Act. In 1993, the state legislature approved Senate Bill 1010, which directs the Oregon Department of Agriculture (ODA) to provide for controlling nonpoint source pollution to protect water quality. The ODA is charged with developing *agricultural water quality management plans* (AWQMP), and consults with ODEQ to establish boundaries of responsibility, identify nonpoint sources of pollution, and develop control measures to achieve 303(d) water quality objectives. SB1010 directs ODA to work with farmers and ranchers to develop overall agricultural water quality management area plans for watersheds that are required by state or federal law to have such plans in place. Plan provisions are binding upon local landowners, and nonparticipation can result in enforcement actions.

A central objective of the WQMP process is to involve local citizens and landowners in plan formulation and implementation, and a plan for the Bear Creek subbasin has been in place since 1997. The objectives of the Bear Creek Subbasin Agricultural Water Quality Management Area Plan are:

1. Create a high level of awareness of water quality issues and problems among farmers in the watershed;
2. Promote practices which limit the movement of nutrients and animal wastes from agricultural lands into Bear Creek;
3. Promote practices which stabilize streambanks;
4. Promote practices which reduce sedimentation of streams due to soil erosion;
5. Seek to control water pollution as close to its source as possible; and
6. Seek funding necessary to achieve the mission statement.

6.1.7. Jackson County and Municipal Regulatory Measures. Oregon's Statewide Planning Goal 5 (*Natural Resources, Scenic and Historic Areas, and Open Spaces*, OAR 660-23-090) requires local jurisdictions to adopt programs that will protect natural resources, including riparian corridors. The rules provide two alternative ways by which a local jurisdiction may implement Goal 5 requirements: the "standard" process that requires an inventory of riparian areas, an assessment of their significance, and adoption of a program to achieve Goal 5. Alternatively, a jurisdiction may follow a "safe harbor" process by adopting a standard definition of significant riparian areas under OAR 660-23-090(5), and implementing the "safe harbor" provisions of OAR 660-23-090(8) as a program to achieve Goal 5. The safe harbor provisions specify use restrictions in riparian corridors and provide options for hardship variances and restoration in lieu of fully meeting the standards.

Jackson County ordinances require a 50 ft. setback for Class I (fish bearing) streams, a 25 ft. setback for Class II (non-fish bearing) streams, and overstory vegetation retained to 3x average width of stream to a maximum of 100 ft. Riparian and wetland areas are currently being inventoried.

Medford has mapped riparian areas within the city limits and requires riparian protection to 50 ft. from top of stream bank for Class 1 streams, and proposed a buffer area of 50 ft. from wetland boundaries. Central Point requires 25 ft. setback for riparian areas, but has not mapped riparian or wetland areas. Jacksonville requires 50 ft. riparian protection from top of stream bank, and goals for protection of wetlands are stated in Jacksonville's Comprehensive Plan.

6.3. Federal Public Land Management Plans.

The U.S. Forest Service and Bureau of Land Management manage over 50% of Oregon's land area within Jackson County, and over 1,500 A. are located within the Jackson Creek watershed. Federal laws require detailed watershed management plans for these lands, and the law also requires that the plans be consistent with the Clean Water Act and state environmental protection programs.

6.2. Nonregulatory State Fisheries and Watershed Plans.

6.2.1. Oregon Plan for Salmon and Watersheds (The Oregon Plan). In 1993, the Governor of Oregon directed state agencies to prepare a comprehensive and coordinated plan for conservation and recovery for coastal coho and steelhead stocks. The Oregon Plan was completed in 1995, and requires state agencies to coordinate their programs to conserve salmon, identify critical habitat areas for protection and monitoring, and enables citizen and local government planning efforts for ESA recovery. The Plan relies on four fundamental approaches to accomplish the goal of securing and protecting healthy fish habitat:

(1) Community-based action
(2) Government coordination
(3) Monitoring and accountability
(4) Making continuing improvements over time.

Watershed councils play a key role in developing watershed restoration plans and engaging landowners in restoration actions. Local entities (such as watershed councils) can apply to NMFS for exemption of enforcement of the *take* requirement under the 4(d) rule while taking action to comply with habitat restoration objectives. The Healthy Streams Partnership described below is a component of the Oregon Plan.

6.2.2. Oregon Healthy Streams Partnership. The Healthy Streams Partnership was formed in an effort to find cooperative solutions to water quality problems. The partnership is made up of representatives from the agricultural community, forestry, environmental groups, local government and state agencies, and the governor's office. The partnership uses existing regulations under the departments of Agriculture, Forestry and Environmental Quality to address water bodies that currently do not meet water quality standards. The partnership provides support to state agencies and, at the same time, ensures that landowners and other individuals will have extensive opportunity for input into decisions. Restoring Oregon's waters will meet the requirements of the federal Clean Water Act, settle lawsuits related to the act, and help ensure success of the Oregon Plan for Salmon and Watersheds to restore salmon and steelhead runs.

6.2.3. Oregon Watershed Enhancement Board (OWEB). OWEB supports the work of watershed councils and other parties by providing grant funds, technical assistance, and information, and is the primary source of state funding for investment in a variety of watershed enhancement projects. OWEB is designed to work closely with the Healthy Streams Partnership and the Oregon Plan for Salmon and Watersheds.

6.2.4. Oregon Comprehensive Land Use Plans. In 1961 the Oregon Legislature approved Senate Bill 100 and 101, which created the framework for statewide comprehensive land use planning. The program was directed by the Land Conservation and Development Commission (LCDC) to give priority consideration to land resources, including agricultural lands. The bills provided for the zoning of productive farmlands for "exclusive farm use" (EFU). Counties were allowed to specify the zoning process, to consider local topography, land type, and local concerns.

Statewide Planning Goal 14 requires cities to define an "urban growth boundary" (UGB), which protects EFU lands, and marks the outermost limit of growth and development in a city. Counties and municipalities are enabled to regulate use of land within these areas through taxation policy, land use zoning, and local ordinances.

At present, the cities of Medford, Central Point, and Jacksonville are in the process of developing storm water management plans and regulating the conversion of farmlands to residential and commercial development within the urban growth boundaries.

2.4. Jackson Creek Watershed Socioeconomic Conditions.

2.4.1. Area Population.

The population of Jackson County and southwest Oregon has been growing rapidly in recent years, primarily from in-migration of new workers from neighboring states and cities. Much of the expansion has occurred around the Medford and Ashland urban areas, reaching out to neighboring communities. Small towns which once were independent social and economic communities have been "absorbed," creating a rather homogeneous Bear Creek valley culture. This growth is expected to continue to increase steadily in the future, in-filling the agricultural and forest lands surrounding the Central Point and Jacksonville communities.

Table 2.4. Population of Jackson County, Oregon.

Jurisdiction	Population 1997	Forecast 2000	Forecast 2006	Forecast 2015
Ashland	18,560	19,340	20,938	23,349
Central Point	10,750	12,685	15,912	20,607
Jacksonville	2,050	2,165	2,549	3,260
Medford	57,610	59,858	67,142	79,764
Phoenix	3,770	3,985	4,419	5,159
Talent	5,010	5,151	5,788	6,510
Rural		62,780	65,229	68,200
Jackson County	169,300	177,876	197,775	229,477

Source: "Our Region," Rogue Valley Council of Governments, 1998.

2.4.2. Population Sectors.

The current population within the Jackson Creek watershed is estimated by local city officials at about 12,000 persons, which includes incorporated Jacksonville, Central Point, and rural environs. Key economic and resident sectors include:

- **Vegetable/Orchard Farmers** - Long term landowners, who produce for local and export consumption, have long used and managed the water flows in the valley, and are facing encroachment from residential development.
- **Stockmen** - Ranchers living in or leasing grazing lands in the Jackson Creek uplands
- **Local small business owners** - Entrepreneurs tied directly to and dependent upon local consumers, many have been multi-generational businesses, now facing increasing competition from regional shopping centers.
- **Residential commuters** - Residents of subdivisions on valley floor and hillside acreage/woodlot owners. They usually have chosen the area because of local character, environmental quality, or cost of living.

The core values of these groups center around a pronounced environmental awareness and appreciation of the beauty and rural character of the surrounding valley, an appreciation of the aesthetic qualities of Southwest Oregon and culture, and a desire for preservation of the local lifestyle and family wage jobs in order to attract and keep young people in the area. There is a sense of an increasing need to manage the natural resources to provide for quality of life for area residents, support the regional economy, provide recreation, and protect the natural beauty of the functioning ecosystems. There is also an awareness of the shrinking local dependence on natural resources such as timber and agriculture as the area evolves into a global economy. People are aware that a large share of the valley's income comes from outside transfer payments such as retirement dollars, and incoming migration of people from other regions.

2.4.3. Settlement Pattern and Culture.[1]

Prior to 1850 - Indian tribes settled in the Rogue Basin about 10,000 years ago, until their population was reduced through disease and the "Rogue Indian Wars" of the 1850s-1860s. Their economy was based upon hunting/gathering subsistence, which largely utilized the natural environment. They practiced controlled burning of meadows and hillslopes on an annual basis to encourage production of nuts, roots, berries, and deer forage. Most ethnologists claim that the burning practices were beneficial to the forest landscape, which was conducted during early spring and late fall months to limit burn areas.

1850-1930s - This period is significant for the start of mining, logging and sawmilling, farming and orchard development, irrigation and the beginning of business and service providers. Early settlers in the Jackson Creek watershed were farmers, miners, and loggers. Jacksonville and Central Point were distinct autonomous rural communities.

World War I brought a large change in the socio-economic function of the valley as did the installation of the railroad through Medford. Mining declined significantly by 1930, and logging and farming took up much of the slack in the later period.

For most of the 1900s the farming/orchard culture predominated in the area. They were major water users, and tributaries were sometimes rerouted to accommodate irrigation transfer and flow, and farmland drainage. Streams and tributaries were often used as dumping sites by area residents (there were numerous anecdotal reports of junk and dead animals in the streams), and for overflow sewage and drainage. Several sections of tributary channels went dry in summer months from both seasonal factors and water diversions.

1930-1950 - The Great Depression and World War II were dominant socio-economic factors affecting the Bear Creek valley. Logging and sawmilling increased to support the war effort, but really got in high gear after the war as did farming, cattle raising and building. Government jobs paid better than many other occupations in the valley during

[1] Paul Kangas and W.L. Moore contributed information for this section.

the war, hastening the decline in mining. Jacksonville lost its status as the county seat and also a large share of its population to Medford and vicinity.

1950-1980s - This period was noted for expansion of building and corresponding increase in the demand and supply of timber in the valley. Farming, orchards and stock raising also expanded. The latter part of this period saw population movement out of urban areas into the Rogue valleys, and an influx of people from other states, particularly from California. Commuter residents from Medford moved to Central Point and Jacksonville, seeking lower cost housing and a rural setting. The small towns became more suburban in culture, but still retained distinctive community identities. There was minimal regulation from cities, zoning/building requirements, and regulatory oversight. Residential development further eroded riparian/wetland protection.

1980-2000s - The robust economy of southwest Oregon fostered commercial development and in-filling along the I-5 corridor. Planned subdivisions became more frequent, as residents sought lower cost housing within commuting distance. Cities formalized and extended zoning and regulatory oversight, and towns expanded in infrastructure. Stormwater drainage and road systems were constructed, along with flood barriers. State and federal government regulation increased as a result of the Clean Water Act, and EPA/DEQ regulations. Development continued in the floodplains of Bear Creek tributaries, with buildings sometimes constructed on streambanks. Tributary streambanks were confined and/or channelized in many places, and wetland and riparian areas were modified by private landowners with little regulatory oversight. Some developers set aside wetland areas for parks and public-use areas. Residential development was regulated by LCDC Urban Growth Boundary requirements. Business parks and high-density subdivisions of up to 1,400 housing units with commercial areas replaced open farmlands.

Significant changes occurred in the management of federal forests during this period, centering around concepts of ecosystem management. Harvest levels on federal forests were reduced to 1/10th during the latter part of the period, but harvesting on private forests expanded. Tourism, recreation, government transfer payments, and local manufacturing and secondary processing of food and forest commodities became the foundation for the local economy.

2.4.4. Future Trends.

The Urban Growth Boundary has limited development potential in the Central Point-Jacksonville area, and is not likely to be changed in the future. Subdivision and residential/commercial growth will continue at a modest pace after current developments are finished. If current zoning regulations remain, much of the remaining farmland will then remain as agricultural land. Real estate appraisers expect that residential development is more likely to occur along the Griffin Creek corridor, while the Jackson Creek watershed will experience slow continued growth. The number of residences bordering stream channels will continue to increase. Residential in-filling of the southern-westside upslope forested area will also continue at a slow rate in future years.

7.1. Formulation of Restoration Priorities. Watershed data on past and existing conditions will be used to list and identify watershed restoration needs in the Jackson Creek watershed. In particular, regulatory and water quality requirements, fish habitat, and minimum flow needs were considered. The needs and recommended prioritization of habitat conditions will be developed by the Technical Advisory Committee, based upon the watershed assessment elements described in the preceding sections. The recommendations from the TAC will then be reviewed by the SAC for validity, and to prioritize restoration activities relative to the Mission and Goals for the Committee. The actions will then become the foundation for a Jackson Creek Watershed Action Plan, which follows in subsequent reports.

Table 7.0. Jackson Creek Restoration and Protection Activities. (Proposed Table)

	Assessment Element							
Watershed Enhancement Area	**Channel Habitat**	**Water Quantity**	**Plant Communities**	**Riparian./Wetlands**	**Sediment Sources**	**Channel Modification**	**Water Quality**	**Fish Use/Habitat**
1. Dean Creek								
2. Horn Creek; Lower Valley								
3. Niedermeyer, Walker Creeks, Upper Valley Floor								
4. Jacksonville								
5. S. Fork J.C., Miller Gulch, Sailor Gulch, Norling Gulch, Cantrall Gulch, Mainstem Jackson Creek								

Parameters: ***(Ranked High - Low)***

Channel Habitat ~ species, cover, wetland/flood-plain connectivity, stream condition, barriers.
Water Quantity ~ diversions, consumptive use, flow regime.
Plant Communities ~ riparian, uplands, forest, native, exotic, noxious weeds, bare ground.
Riparian/Wetland ~ habitat quality, % shade, vegetation species composition.
Sediment Sources ~ stream banks, quarry, irrigation returns, uplands, road related, burned areas.
Channel Modification ~ flood history, land uses, storage, stream capacity.
Water Quality ~ temperature, nutrients, fecal, sediment, land use, other.
Fish Use/Habitat ~ barriers, habitat, species, other.

The stormwater management plans of municipalities often contain inherent conflicts which are to some extent, mutually exclusive; to maintain clear channels for rapid transport of stormwater flows during flood events, while also providing riparian vegetation to maintain fish and wildlife habitat quality and aesthetic values. Planned unit residential subdivision development can facilitate watershed management, by designing stormwater conveyance and detention ponds into natural flow areas. Several developers have designed stream channel and riparian restoration projects, which can assist in maintaining water quality and flow. Stormwater channels may be designed as greenways, or public use areas (parks). Planned subdivisions also enable the formation of homeowner groups which could focus upon water management, wetland and riparian restoration, and environmental quality in their neighborhoods. The trend toward building in riparian zones may decrease as riparian protection ordinances increase, and future construction of residences and buildings will occur further away from riparian areas.

A key concern about watershed organizations is their impact on or capacity to respond to state and federal regulatory actions. Riparian ordinances put the burden of community watershed management upon both private landowners and public land managers, and restoration actions require coordination and technical assistance.

Recognition of the value of protecting and enhancing recreation and natural resources in Jackson Creek has increased. Lands are being purchased and developed for multiple uses around Jacksonville, and this trend will continue, along with the expansion of public interests, such as recreation and education.

Table 2.3. Characteristics of the Jackson Creek Sub-basins.

Subbasin/Stream	Acres	Main Channel Length (ft.)	Minimum Elevation	Maximum Elevation	% land use/type
1. Dean Creek	1862	19,611	1,216	1,900	75% agricultural 25% forest
2. Horn Creek, **Lower Jackson Cr.**	4417	25,807 23,039	1,251 1,201	2,750 1,333	70% agricultural 29% forest 1% rural residential
3. Walker Creek	3356	18,285	1,400	3,080	30% agriculture 65% forest 5 % rural residential
4. Jacksonville	505	10,870	1,480	1,675	100% urban
5. Upper Jackson	6001	21,370	1,675	4,084	95% forest 5% wooded residential

2.3. History of the Jackson Creek Watershed.[1]

The Jackson Creek watershed has been continuously modified by people since its settlement by Indian tribes some 6,000 years ago. There is evidence that Indians and early settlers burned Jackson Creek's forests regularly as a means of clearing underbrush for hunting and promoting the growth of tubers and seeds. Indians cleared the underbrush to ease their travel and to promote new shoot growth and acorn production. The early settlers burned to promote grass for livestock and to keep lands open for mining. Lightning also started many fires each summer, and since there was no means of controlling them, they would burn for months at a time. Journals from early explorers report that the valleys were usually thick with smoke all summer and fall. One account of the fires and their effects comes from The Jacksonville Sentinel, August 21, 1903, courtesy of the Southern Oregon Historical Society (SOHS);

> *"If the fires could be kept off the hills, in a few years they would be covered with a growth of fir, pine, oak and other trees that would make fuel and in time make logging timber."--- " The farmers and the town people should be equally interested with the timbermen in the preservation of the forests in this section, for tree-clad hills would mean less flooding in the winter and more water in the summer in the streams and the climate would be more equitable and not so dry and hot in the summer."*

Early settlers were well aware of the importance of landscape management. In another person's view of the fires;

> *"One of the greatest pieces of folly is preventing fires to be set in the hills and government reservations until brush and undergrowth become so high and thick that when the inevitable fire comes the whole forest is destroyed. Old settlers and Indians know that the only safe method is to annually burn off the undergrowth, when it is so thin that it would not endanger the big trees. Then the grass can grow and you have a beautiful forest instead of a fire trap."*(The Democratic

[1] The history of Jackson Creek was researched and written by Paul Kangas, Jacksonville City Forester, and Susan Cross.

Times, August 31, 1904)

Bare and fragile soils created by fires, miners and loggers were often subjected to high rainfall events and floods. The combination of these conditions created heavy erosion in Jackson Creek and its tributaries. One of these flood events took place in the winter after the 1955 Timber Mountain wildfire. The fire denuded thousands of acres of landscape, leaving little vegetation to hold the soil in place. The flood also caused great damage to the Jacksonville water system located in Jackson Creek.

2.3.1. Early Uses of Jackson Creek's Lower Valleys.

The valleys were developed very early for farming and orchards (see First Federal Township Survey T. 37 S. R. 2 W., December 1854, Courtesy of Jackson County Surveyors Office). Early settlers from eastern states noted that, *" Southern Oregon is pre-eminently a fruit-growing country, and with such is destined to rank second to none in the markets of the world.*"

Irrigation water was used in the Bear Creek valley as early as 1852, and, *"All available stream flow was taken by the early settlers under the donation claims laws"* (from the Mail Tribune, 1/1/1914, SOHS). In 1916, farmers put forward a proposal to form the Rogue River Canal Company to provide 30,000 acre feet of water to irrigate 20,000 acres (The Medford Sun, 12/17/1916, SOHS).

Early maps show that stream channels in the Jackson Creek watershed have been modified extensively through the years (1854 Surveyors map of T. 37 S. R.2 W. and other documents). John Black, a long-time resident living in the Forest Creek area stated that historically, large volumes of sediment were washed down many of the creeks as a result of hydraulic mining, causing streambeds in the valley to rise and streams to change direction. Along with those changes, the lower streams were greatly altered by irrigation activity. An 1854 map discloses where a portion of lower Griffin Creek, in sections 15 and 22, was likely re-routed to parallel Jackson Creek, rather than join it. Griffin Creek was then re-connected to a minor stream which enters Bear Creek upstream from the Jackson Creek- Bear Creek confluence. The early maps also show that Daisy Creek now flows into Griffin Creek, which now flows directly into Bear Creek. If these creeks were currently tributary to Jackson Creek, the watershed area of Jackson Creek would be more than double its present size. These stream changes may not be historically significant because they may have naturally changed course over time.

2.3.2. Mining Practices and Effects.

The impacts of early mining are apparent across the upper watershed. A considerable portion of the landscape for several miles around Jacksonville was heavily impacted (some say *churned)* by mining activity. Mineshafts, tailings, residence sites and water ditches remain from mining activity in the late 1800's and early 1900's. Surveyor's notes from 1854 stated that the North Fork of Jackson Creek, on the west boundary of section 31, had, "*extensive gold diggings*C*which extend for some distance above and down to Jacksonville.*" The surveyors noted that, "*the surface of all the ravines in this mile have been dug over by miners in search of gold*." (Jacksonville City. Survey, 37S- 2W, p.13; from the 1993 Historic and Cultural Resource

Inventory for the City of Jacksonville, prepared by George Kramer M.S., HP, Historic Preservation Consultant.) The digging occurred not only in the hills and valleys surrounding Jacksonville but also within the town and in tunnels beneath it. Evidence of mining can be found throughout the city and uplands, including numerous holes in the ground, shafts, tailings and several miles of contouring water ditches. Evidence of two water ditches can be found; one begins in the head of Miller Gulch in a natural wet area, "just below an old homestead site." It follows the south-facing slope of the drainage and once moved water eastward toward the mines to the west of Jacksonville. Another water ditch started at a "concrete dam" near the headwaters of Norling Gulch Creek and moved water eastward along the north facing slope and probably terminated near the historic Opp mine. (information on the Opp mine can be found at the SOHS.)

Two stamp mills, used to crush ore, were built on each fork of Jackson Creek. The one on the south fork was soon converted to a sawmill. The stamp mills were powered by steam, and the stamp mill on the west fork was used to process ore from the Opp mine. The Brickworks was located near the junction of the forks of Jackson Creek." The impact of these early activities on forest vegetation is reflected in the current landscape of the area today.

2.3.3. Logging and Sawmilling.

Logging and saw milling activity occurred simultaneously with the start of mining and community development in Jacksonville. An 1858 survey document indicates a sawmill was located at the confluence of the west and south forks of Jackson Creek. As described by John Black, another sawmill called the Iowa Lumber Company operated in later years in the Lily Prairie area. The sawmills of that era were powered by steam or water and the head-rig (main saw) was either circular or sash saws. Early logging was done with oxen and later by horses, followed by steam operated traction engines and crawler tractors. Early loggers were also farmers because they needed to provide feed for their draft animals.

An early resident reports, *"The old road up the west fork of Jackson Creek was near the creek, as was a sawmill. The road continued near, and usually in, the creek all the way up Norling Gulch Creek. When Model T's and Model A's were used for hauling logs, they often had to be eased down the steep roads with cables and chains. The railroad line followed close to the creek through the present-day Britt woods and climbed the south-facing slope of the west fork of Jackson Creek. The grade needed several switchbacks to arrive several hundred feet higher at its terminal point near the granite quarry on Cantrall Gulch Creek."* Evidence of the railroad grade can be found today. The railroad was used mainly for logging, and most of the black oak in the watershed was removed for fuelwood and for the steam engine at the stamp mill). The railroad stopped operating after an engine derailed, causing a fatality. Logging was well underway prior to World War I but subsided, along with mining during that period, as the labor force moved to support the Army."

Extensive logging activity occurred from the 1950's, in efforts to salvage burned timber, and continues to the present time. Boise Cascade Corporation did extensive logging in the Johns Peak and Miller Gulch areas in 1993 and re-logged the Johns Peak area in 1999. Most past and present logging activity was done with tractors, creating a rather dense network of skid trails throughout the watershed. Some of the older trails have re-vegetated and recovered. Other trails have been re-used in recent logging entries and have not fully recovered with respect to soil and vegetation. Many of the logging trails have been used by recreational vehicles (off-highway vehicles) for decades and provide opportunities for re-vegetation and erosion control. Recovery work is particularly needed on granitic soils where disturbance has occurred and has not recovered.

2.3.4. Jacksonville's Water Supply.

The upper Jackson Creek watershed has been a critical source of water supply for over 100 years, and has had many historical impacts upon the region's ecology. An article in the Jacksonville Sentinel dated August 21, 1903 (courtesy SOHS) stated: "Jacksonville is most seriously in need of a better water service, for the present city water supply is so small in quantity that it is practically no service at all so far as fire protection goes and the supplying of the town for household purposes and irrigation." At that time, fire protection was accomplished by a series of cisterns.

The Jackson Creek dam was placed in service in 1912, about 1½ miles up the west fork of Jackson Creek. The new Jacksonville waterworks was claimed to be one of the best in the state and comparable in quality to Portland's system. Over the years that the reservoir supplied water to Jacksonville, the system was apparently plagued with problems such as siltation, water quality and high maintenance expense. The highly eroded condition of hillslopes and frequent flood events in the watershed probably caused many of the sedimentation problems.

Jackson County acquired the watershed property through tax foreclosures in the 1930's, and deeded a good share of the property to the City of Jacksonville. The deeds were probably prompted by the fact that Jacksonville already had built the dam for its waterworks. The Beekman estate later deeded a forty-acre tract at the reservoir to the City. Jacksonville now manages 1800 acres of forestland in the upper watershed and several smaller tracts closer to town, which were acquired through the Jacksonville Woodlands Association.

After several decades of using reservoir water, the City found a better quality water source in a mine to the northwest of the reservoir. A pipeline brought water past the dam and down to the large storage tank in the Britt woods. The reservoir water remained as a ready source in case it was needed for fire. Jacksonville eliminated the need for the reservoir water when it tied into the Medford water system in the 1950's.

The quality of the dam and reservoir (with no maintenance) has been diminishing for decades. The gate tower, which held the crank for opening the valve for the twelve-inch outlet pipe, collapsed into the reservoir. In 1955, a flood covered the outlet pipes (a 20 inch and 6 inch pipe) with trash and apparently jammed the gate valve. In an attempt to free the gate valve of trash, "a dynamite charge was set off near the gate valve"(long time local resident John Black). The charge did not clear the trash and apparently damaged the valve, thus the status of the outlet pipe and valve is unclear. The dam was officially abandoned in the 1960's when the concrete step gates were removed from the concrete spillway. The step gates allowed the reservoir level to be raised or lowered by placing a board or other barrier across the steps. With the steps removed, the reservoir could not raise above the spillway floor level. It was predicted in a

1960's report that "the reservoir would be filled with sediment in a few years."

Almost forty years later, the reservoir is 1.6 acres in size, stores up to 7 acre-feet of water and has a mean depth of 4.4 feet (see survey map of 7/30/98, on file). The City changed its municipal water right to an irrigation right in the 1960's, which was not initiated in a timely manner. The State Water Resources Department reviewed the water right, years later, and canceled all of the City's water rights for the reservoir in 1981. The City of Jacksonville is considering applying for a grant from the Oregon Department of Economic and Community Development to develop a new application for a water right for municipal water use to allow storage in the reservoir at its current capacity. The primary non-consumptive uses would include wildlife, wetlands, recreation, emergency fire, and sediment storage.

5.0. TECHNICAL ASSESSMENT OF WATERSHED ELEMENTS [1]

5.1. Element 1: Historical Conditions of Jackson Creek.

Information for this section contributed by Ken Gerschler, City of Central Point Planner, Susan Cross, and Paul Kangas.

5.1.1 Natural Events Affecting the Jackson Creek Watershed.

A range of natural geologic and climatic factors have created the present topography of the Jackson Creek watershed, affecting water supply and groundwater storage, vegetation, erosion, and disturbance patterns. The geological effects on the local ecology occur with soils derived from granodiorite, quartz-diorite or granite, which greatly limit soil fertility and water holding capacity, and natural erosion. This in turn affects plant adaptation, production and composition of the landscape, which is a product of soil depth, texture, nutrient supply, drainage and rock fragment content. These all function together to either restrict or facilitate the potential for vegetative development of the landscape under the prevailing climate.

The topography produces a unique macro-climate, in that mountain ridges of the upper watershed may average nearly twice the precipitation received by the large open valley. Lower Jackson Creek and its mouth sit in the broad interior valley of central Jackson County with average annual precipitation of less than 20 inches in places. The climate is characterized by hot summers, late spring frost, a moderately cold winter and a comparatively long growing season. The foothill transition between valley and mountains (Jacksonville and north) is where Douglas-fir appears and averages about 22-24 inches precipitation. High ridges at the top of the watershed may average nearly 35 inches of precipitation annually. The toe slopes provide higher humidity/moisture availability adjacent to creeks or in narrow valleys, and the modification of available moisture with aspect, i.e., hot, dry, southerly slopes and moist, cool, northerly slopes. These conditions are repeated throughout much of this watershed.

5.1.2. Disturbance Patterns. The Rogue Basin of Southwest Oregon has a history of intense weather patterns with cyclic periods of flooding and drought. Most flood events occurred during the winter or late spring storms, shaping the landscape by altering stream channels over time through the forces of erosion and sediment deposition. One local event was reported this way:

> *On the night of Friday (12/6/1861), a heavy rain set in and continued to pour down heavily almost without intermission, until Sunday morning. This body of water pouring into channels which were yet full from the*

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[1] The guidelines and process of assessing watershed technical elements were taken from and conducted in conformity with the Oregon Watershed Assessment Manual, Governors Watershed Enhancement Board, Salem, Oregon, July 1999.

flooding of the preceding week, was too great for a considerable portion of the valley. The lower portion of our own town was submerged from the water of Jackson Creek and the valley was converted into a group of numberless small islands and lakes. Jacksonville and the immediate vicinity, has sustained no material damage but from other portions of the country we learn that the losses have been very serious. (Democratic Times, Ruby Lacy and Lida Childers; SOHS)

Major flood events recorded by the Southern Oregon Historical Society were:

Flood Years

1853	1927	total annual rainfall -18.99 in.
1858	1945	total annual rainfall -25.20 in.
1861	1948	total annual rainfall -23.88 in.
1866/67	1953	total annual rainfall -25.56 in.
1880	1955	total annual rainfall-19.91 in. (Followed by the Timber Mountain fire)
1890 (Major flood)		
	1962	total annual rainfall -23.13 in.
	1964	total annual rainfall -29.08 in. (Major flood, but smaller than 1890)
	1974	total annual rainfall -18.59 in.
	1997	total annual rainfall -17.93 in.

These events have also inspired human responses to flooding such as building flood barriers around Jacksonville in 1867, graveling sidewalks and roads instead of paving, and creating drainage channels to funnel water-flows (pg. 73, Jacksonville, Haines).

Drought also impacted the streams of southern Oregon as resource uses demanded more and more water. Water uses for mining, irrigation, and water storage for urban fire fighting caused people to alter stream channels, build dams, and to build irrigation ditches and canals. Wells were reported to have gone dry in 1870 and again in 1871. Danger from fires, ever present, became a real menace for Jacksonville, which relied exclusively on its private wells for water to fight the flames. The problem was discussed and it seemed apparent that the most sensible solution was to acquire the rights to the water of Jackson Creek and establish a water system (Jacksonville, Haines).

Critical drought years were:

Drought Years			Drought periods lasting more than two years		
1910					
1923/24	Total annual rainfall	11.56	1928-1930	Average rainfall	13.58
1930	Total annual rainfall	11.67	1933-1935	Average rainfall	14.04
1933	Total annual rainfall	11.09	1985-1994	Average rainfall	14.24
1949	Total annual rainfall	11.46		(Low- 10.69 in; high-17.07 in.)	
1954	Total annual rainfall	16.25			
1959	Total annual rainfall	10.42			
1976	Total annual rainfall	12.32			
1980	Total annual rainfall	15.89			

Source: National Oceanic and Atmospheric Administration, Medford, OR.

5.1.3. Historic Flow Pattern of Jackson Creek. The Southern Oregon Historical Society has several maps that indicate some of the modifications to Jackson Creek that occurred between the years of 1856, 1910 and 1932. The channel and riparian areas of Jackson Creek have been extensively modified since settlement, particularly by mining and agricultural interests. The upper reaches of the creek were modified significantly through mining activities that occurred above the City of Jacksonville. With hydraulic mining processing, water from Jackson Creek was used to rinse the tailings to settle gold from the gravel. Since the creek was a limited water resource (particularly during the summer months), stream water was recycled via a pump and ditch system back upstream and fed through the mining operations numerous times. This practice degraded water quality in the stream considerably.

Agriculturalists have used the water from Jackson Creek for irrigation of some of the finest farm land in the Rogue Valley, and portions of the creek have been bypassed, blocked or rerouted for irrigation diversions. Around 1900, a local farmer rerouted Jackson Creek into Horn Creek near the intersection with Taylor Road, with the intention of creating more useable farm area. Jackson Creek has meandered through the years, but has remained largely in the present configuration for the past 50 years, and follows the same general flow pattern that exists today. Most of the agricultural land is within the lower reaches of Jackson Creek, reaching from the northerly boundary of Jacksonville to the confluence of Bear Creek.

5.4. Element 4: Plant Communities Assessment.

Information and text for this section provided by Gene Hickman and Paul Kangas

The vegetative component of natural landscapes is one of the most visible features in a watershed. Its importance to the public, to ecological processes, and to watershed management often makes it a centerpiece for inventories and assessments. The Jackson Creek watershed is located in a diverse ecological region which has complex vegetation patterns, primarily because of the geology, climate, and soils, and how these have combined through history. Geologically, most of the mountains in the region are very old, and were never glaciated heavily during the Pleistocene era. It was a refusion area, where organisms could "hide" during periods of climatic change. Many species of flora present today probably originated in the Pliocene, before the last ice age of 18,000 years ago. As Dr.Frank Lang (Southern Oregon University botanist, retired) has noted, *"we are now building our homes and highways in an incredible precious region"* (Jefferson Monthly, November 2000, p.9).

Vegetation inventories are most meaningful when done on an ecological basis and with an ecosystem framework that relates vegetation to its home or environment. This approach has been used in other recent watershed assessments, and will be used here for discussing the vegetative resources of the Jackson Creek watershed.

Two regional vegetation-climatic zones were identified as (1) *Valley Floor Climatic Zone*, and (2) *Upland Dry Oak Conifer Zone,* and mapped within the watershed. The climatic zones are further defined by and subdivided by human uses of the landscape, creating an *Urban Interface Zone* between the valley floor and upland oak/conifer zone, and an *Agricultural Zone* in the valley floor. Local landscapes were classified as potential natural vegetation ecosystems mapped by correlating vegetation with the USDA-SCS soil survey. Potential natural vegetation units were mapped, brief descriptions and plant lists were provided, and management concerns were discussed.

5.4.1. Environmental Factors Affecting the Jackson Creek Ecosystem.

5.4.1.1. History of Forest Vegetation in the Watershed. The vegetation in the watershed has frequently been altered by natural events and man-caused activities. Naturally occurring fires with historical return intervals of 10 to 30 years are common on most upland forest landscapes in Southwest Oregon and the Jackson Creek watershed. First, return intervals were shortened by human intervention as fire was used extensively by Native Americans and the first white settlers to keep vegetation retarded for ease of travel, grazing, hunting and mining. Native Americans were reported to also use fire as a stimulant for acorn production on the oak trees. Frequent, low intensity ground fires were commonly encouraged as a means to remove low, dense, older vegetation in order to promote succulent pioneer species such as grasses, shrubs, and sprouts, preferred by deer and elk.

Long-term climatic changes also have a dramatic effect on the forests in southwest Oregon because of their location between the cooler, wetter Douglas-fir forests to the North and the drier mixed conifer forests to the south. Southwest Oregon forests will develop into older growth coniferous forests during extended periods of cool, wet weather. During extended drought periods, forests will be arrested in earlier stages of development, containing grass, brush and hardwoods, and repeatedly re-cycle to earlier vegetative species after fires or insects and disease events. Southwest Oregon experienced an extended drought period in the 1980's, which changed the species mix in the forest as many large pine and fir trees were weakened by the drought and then killed by insects. These conditions continue today in Southwest Oregon and in Jackson Creek as a result of drastically over-dense forest stands.

Bureau of Land Management (BLM), Medford District Office records of early 1900 vegetation surveys done by agents of the General Land Office indicate that Southwest Oregon landscapes in that period were much more open with less acreage in dense forest vegetation. The BLM and United States Forest Service have early photographic records that confirm the existence of extensive open landscapes in Southwest Oregon where forests exist today. Forested landscapes were more dispersed than today and fewer stands were multi-layered with tree and shrub species. Many early forests contained only grass and small shrubs on the forest floor. Forested tracts tended toward larger, thicker barked trees capable of surviving the frequent low-intensity fires. Wetter and cooler slopes, including creek bottoms and riparian areas often provided refuge for trees and other plants from fires. The plants in these cooler, wetter landscapes were often the seed source for the advancement of forests across the landscape.

Large and destructive wildfires that occurred in the Mid-West and West in the 1900's caused a war-like response from Congress and a new goal for the U.S. Forest Service to do all that was possible to eliminate wildfire. The campaign was largely successful after the war years in eliminating most fires in all but the driest periods. Current thinking is that the massive fire exclusion effort had negative long-term results and is the primary reason for the unprecedented volume of forest vegetation that began to develop in western forests. The dense stands of vegetation have the potential to fuel massive, stand-replacement wildfires.

The forests of the Jackson Creek watershed had evolved into a dense vegetated condition by the 1950's. In early September 1955, lightning storms started numerous fires in the Rogue Valley and in Northern California. A devastating wildfire, called the Timber Mountain Fire, covered 2,500 acres in the upper Jackson Creek Watershed (Mail Tribune Library). A large share of the timber and other vegetation in the watershed was destroyed or heavily damaged by the fire and the resources in the watershed were set back, ecologically, for decades. The effects of the wildfire are still evident in the upper watershed as brush and trees continue to recover in a vegetative succession process that started with grass and brush and has advanced to hardwood trees and conifers.

5.4.1.2. Geology and Soils. Geology is uniquely related to soil type because of its contribution to soil development, which directly affects Jackson Creek watershed vegetation. Examples of geological effects on the local ecology occur with soils derived from granodiorite, quartz-diorite or granite. Rock types such as granite have special effects on the properties of associated soils, greatly limiting soil fertility and water holding capacity. This affects plant adaptation, production and composition of the landscape. Soil characteristics important to plant adaptation and growth include soil depth, texture, nutrient supply, drainage and rock fragment content. These all function together to either restrict or facilitate the potential for vegetative development of the landscape to the maximum under the prevailing climate.

The most productive Southwest Oregon soils for Douglas-fir are those that formed in material derived from metamorphosed sedimentary and volcanic rock (Josephine County Soil Survey Report, p. 111). Vegetation on these coarse textured soils encounters increased doughtiness and lower fertility while forest managers encounter regeneration difficulties and high soil erosion potential.

In addition to geology, soil factors alone can alter the vegetation potential. For example, shallow foothill soils limit plant development and support white oak-grass savanna on low elevation southerly aspects, and wet, poorly drained soils of swales or bottomland support hardwoods with grass or sedge understories. A geology map of Oregon shows a large granitic area in the northwest side of this watershed.

5.4.1.3. Climate. The macroclimate of the Bear Creek basin is closely linked to local topography, in that mountain ridges of the upper watershed may average nearly twice the precipitation received by the large open valley. Lower Jackson Creek and its mouth sit in the broad interior valley of central Jackson County with average annual precipitation of less than 20 inches in places. Climate here is characterized by hot summers, late spring frost, a moderately cold winter and a comparatively long growing season. The foothill transition between valley and mountains (Jacksonville and north) is where Douglas-fir appears and averages about 22-24 inches precipitation. High ridges at the top of the watershed may average nearly 35 inches of precipitation annually.

Climate is the primary filter for vegetation regarding plant adaptation to any region. Examples include higher humidity/moisture availability on toe slopes adjacent to creeks or in narrow valleys, and the modification of available moisture with aspect, i.e., hot, dry, southerly slopes and moist, cool, northerly slopes. These conditions are repeated throughout much of this watershed, producing different climatic vegetation zones.

5.4.2. Watershed Vegetation/Climatic Zones.

Vegetation/climatic zones have been identified earlier for this locality by Hickman in a 1994 Bear Creek Watershed appraisal and Jackson Soil Survey publication after correlating climatic records and vegetation patterns with topography, elevation and soil/landscape features. Vegetation inventories and plant distribution patterns were used to delineate zones which are believed to be closely linked to climatic patterns. Climatic relationships are interpreted from vegetation through species presence and abundance, the growth form and vigor of some species, the topographic position of plant communities and the way communities are grouped together across the landscape.

Two vegetative/climatic zones were identified in the watershed. The lowest is the broad, dry, hardwood-conifer bottomland and valley floor. The remainder represents a foothill and mountain slopes zone with conifer forest landscapes that is vegetatively and climatically different than the valley. Vegetation zones for this watershed are delineated on the potential vegetation map.

Glossary for following section:

Alluvial fans - Sedimentary deposits of soil and gravel formed by flowing water in a river valley.
Forest fragmentation - Breaks within forest stands (usually meadows or farmland).
Geomorphology - Study of the effects of land forms, channel shape, and water flows.
Mesic regimes - Having a balanced supply of moisture.
Xeric regimes - A dry, often hot environment.

5.4.2.1. Interior Valley Floor Zone. This zone includes the entire central valley floor and foothills north of Jacksonville covering about 7,000 acres or 40% of the Jackson Creek watershed. Most of the zone is in private ownership and has been converted to agriculture, roads or urban/rural housing. Elevation of the valley ranges from 1,200 to about 1,800 feet. Precipitation for the zone probably averages 18-22 inches annually. Although summer temperatures can be very hot, winters are moderately cold and spring frost occurs in the valley as late as March. Soils in this valley have mesic (moderate) temperature regimes and xeric (hot, dry) moisture regimes. Soil maps and descriptions for this zone are available in the Jackson County soil survey report.

The historic native cover was largely very productive ponderosa pine forest, mixed oak/shrub savanna, meadow wetlands or dense hardwood riparian zones, depending on soil type. Interspersed throughout the area were a few droughty foothills with white oak grassland. Deciduous shrubs were prominent, particularly hazel, snowberry and poisonoak in the extensive bottomland tree sites. Riparian corridors were dense with shrubs under cottonwood, Oregon ash, big leaf maple, white and black oak, white alder, willow, and sometimes incense cedar or ponderosa pine.

Most of the zone (over 95%) has been converted from native cover to other land uses. Therefore, the vegetation section deals primarily with historic ecosystems and the few remnants visible today. Ecosystem mapping was based on the relationship of potential communities to their landscape positions and soil characteristics.

Management concerns in the zone for native/exotic vegetation are as follows. Forestry is not a significant land use in the Interior Valley Floor Zone, except as urban tree management, even though some valley floor soils have a very high productivity potential for ponderosa pine. The potential for wildfire ignition here would be high if fuels were available because of the long dry season and a variety of sources that can cause fires. Weeds (especially exotic grasses/forbs) are widespread and abundant in the zone. This is probably due to 1) the Mediterranean-like climate, 2) a wide variety of environmental communities present within the watershed, 3) disturbance sites that are vulnerable to weed invasion (urban development, agriculture, roads), and 4) the high potential for weed transport into the valley via traffic, agricultural supplies/products, and residential landscaping. Lastly, competition for the use of natural resources and their protection is a concern. Most of the people and industrial, residential and agricultural developments of the watershed are found here. Consequently, the demand for water, wood products, aesthetics, recreational opportunities, fish/wildlife protection, natural cover preservation areas and land for urban development is high.

5.4.2.2. Upland Dry Oak Conifer Zone. The upland forest zone is defined as that portion of the watershed that is forested and contains diverse forest resources and habitats. It also has a reasonable separation in distance and elevation from urban influence, which allows forest resource management to be practiced.

The upland climatic zone occupies the center and west side of the watershed as mountains, foothills and old alluvial fans. It covers about 11,000 acres or 60% of the watershed. Elevations range from about 1,600 feet to about 4,000 feet on the western ridge boundary. Precipitation is estimated to average from about 22 inches at the Interior Valley edge to nearly 35 inches annually at its western boundary. Soils with mesic temperature regimes and xeric moisture regimes are typical of the zone.

Climatic conditions in the Dry Oak Conifer Zone favor conifer forests that include black oak and madrone. North aspects are characterized by Douglas-fir stands that may include madrone and minor ponderosa pine and/or incense cedar during initial stand development. South slopes and flat positions have site potentials for mixed ponderosa pine, incense cedar and Douglas-fir with both madrone and black oak. On all aspects and sites associated with granitic soils, sugar pine is usually a stand component and erosion concerns increase. Shrub cover associated with understories is mostly deciduous species, of which poisonoak, snowberry, deerbrush, hazel and oceanspray are very common. Brush fields normally develop after heavy timber harvesting and burns which persist for years while new stands develop. These are dominated by various combinations of deerbrush, whiteleaf manzanita, poisonoak, madrone and black oak. White oak and wedgeleaf ceanothus are additions on the driest sites.

Some characteristics of the zone have important impacts for management. The hot summers and long dry season greatly increase the length and severity of the fire season. Forest insect and disease problems can be severe on dry forest sites in drought cycles in overstocked stands and when trees are under high stress, producing problems with mistletoe and root rot for Douglas-fir, bark beetles for sugar pine and ponderosa pine. Also of concern is the competitive nature of aggressive hardwoods and shrubs/grass in brush fields, which decrease the potential for regeneration to establish, especially on harsh southerly slopes. Tree productivity is much lower here than in higher rainfall zones of the watershed which limit the returns from forestry and extends the length of the harvest rotation. Lastly, the rather large area of granitic soils, possibly 1/3 of the watershed, have higher erodibility and increased erosion/sedimentation problems for streams and reservoirs.

The general condition of the upland forest vegetation in Jackson Creek is in a recovering condition. Most of the vegetative types are still in developing stages from the 1955 wildfire or from past logging activity. The process and speed of the recovery varies with each site and species and is guided by other factors such as soil quality, rainfall, catastrophic events, and human activities.

5.4.2.2.1. Upland Forest Tree Species. The primary tree species in the upland forest are Douglas-fir, ponderosa pine, black oak, incense cedar, sugar pine, grand fir, and Pacific Madrone. The dominant species in Jackson Creek's upland forest is Pacific Madrone. It is a prolific seeder that will dominate openings created by disturbance and it sprouts from its base after fire has killed its top. The stump sprouts grow very fast because of a highly developed root system, thereby dominating the landscape rapidly. Some of these stands are so dense, 45 years after the fire, that other trees cannot establish in the understory due to lack of light. If the soil is of reasonable quality and moisture normal, Pacific Madrone would eventually overtake most areas established to grass and manzanita brush. The succession process is long-term, with Madrone starting in the cooler, wetter sites and eventually spreading outward. This process is occurring in the northeast portion of the watershed where large manzanita brush fields exist. Unfortunately, before the natural conversion process can be completed, a fire will usually destroy the vegetation and the site will revert back to grass and brush.

5.4.2.2.2. Differences in Upland Tree Species Related to Aspect. The species, proportions and dominance of trees that are present in the upland forest of Jackson Creek is very dependent on the aspect or direction that the slope faces. The north facing slopes are cooler and wetter and eventually succeed to Douglas-fir. Douglas-fir will usually maintain a seed source in these stands, even after most fires, and will re-seed itself. In the uplands of the Jackson Creek watershed, most north facing slopes were dominated by re-sprouting Pacific Madrone after the 1955 fire. As the Madrone matures, its growth pattern allows slow growing, overtopped Douglas-fir seedlings to eventually grow over the top of the Madrone, which will then shade the Madrone, causing its decline and mortality. Many of the Madrone stands on north facing slopes in the upland forests are presently being overtopped by Douglas-fir. Some other species present include: ponderosa pine, grand fir, sugar pine, black oak, willow, big leaf maple, poisonoak and ceanothus.

South facing slopes, on better soils in the upland forest were also predominantly covered by Madrone early after the fire. They will typically allow several species of conifers to become established because the Madrone on these sites is less dense due to the fact that site conditions are not as good. The conifer species that is best suited to these slopes is ponderosa pine. Other conifer species present in order of presence will be: Douglas-fir, incense cedar and sugar pine. Some other species present are: black oak, willow, manzanita, ceanothus and poisonoak.

East facing aspects, on better soils, in the upland forest are similar to the north facing slopes but will eventually contain a higher proportion of ponderosa pine than on the north slopes. Douglas-fir may have the most trees per acre on these slopes but it does not perform as well as ponderosa pine, incense cedar or sugar pine.

West facing slopes in the upland forest will have species and conditions similar but somewhat better than the south facing slopes. The southwest slopes are the hottest of any slope and would tend to be the harshest for vegetative growth.

5.4.2.2.3. Differences in Upland Vegetation Related to Soil. A primary factor that is significant to vegetative differences in the watershed is related to the quality of the soil. About one third of the upland forest located in the northern portion of the watershed contain granite-based (Tallowbox series) soils. These soils tend to be very low in organic content and are too porous to retain much moisture. Vegetative potential on these soils is reduced toward the ridges, where there is less moisture, and is also limited during drought periods. Most of the manzanita brush fields are located on these soils. The manzanita is perpetuated there because of a cycle of frequent fires and its ability to re-seed itself. The granite soils are very erosive, which further limits their potential. Where soils are rocky, shallow and moisture limited, black oak will be dominant and a limited number of other plants will be present.

Vegetation on soils such as the Carris-Offenbacher gravelly loams and the Vannoy and Manita loams seem quite productive on the cooler and wetter aspects in the upland watershed. As stated earlier under aspect, these soils are not as productive on the hotter south and west slopes. Steep slopes have not been found to be very erosive.

5.4.2.2.4. Riparian Vegetation in Upland Forests. The portions of streams considered to be in the upland forest zone are: The headwaters of Jackson Creek to the boundary of the City of Jacksonville's watershed property in section 25, T37S, R3W; the headwaters of Norling Gulch Creek to its confluence with Jackson Creek; the headwaters of Cantrall Gulch Creek to its confluence with Jackson Creek; the headwaters of Miller Gulch Creek to the first residences near the creek; and the headwaters of Walker Creek past the gravel quarries. The south fork of Jackson Creek is considered to be in the urban/forest interface zone.

Only the major species of trees and shrubs were recorded during the surveys. Surveys were done from roads adjacent to the riparian areas, at stream crossings and from viewpoints. Survey data recorded is as follows: Primary Tree species, Secondary Tree Species, Shrub Species, Estimated Distance, Property Owner if known, General Condition of riparian area. (Good, Fair, Poor).

HEAD OF W. JACKSON CREEK TO CANTRALL GULCH

PRIME TREES	SEC. TREES	SHRUBS	DISTANCE	OWNER	CONDITION
Pacific Madrone	Black oak	Ocean spray	2.5 Miles	Boise Cascade	Good
White Alder	Willow	Poisonoak		City of Jacksonville	
Big Leaf Maple	Cottonwood	Hazel			
Douglas-fir	Incense Cedar	P. Dogwood			
		Mock orange			
		Ceanothus			

HEAD OF NORLING GULCH CREEK TO JACKSON CREEK

PRIME TREES	SEC. TREES	SHRUBS	DISTANCE	OWNER	CONDITION
Douglas-fir	B. Cottonwood	Hazel	2 Miles	BLM	Good
Pacific Madrone	Willow	P. Dogwood	City of Jacksonville		
Big Leaf Maple		Mock Orange	Spaulding Lbr		
White Alder		Poisonoak			
		Ceanothus			

HEAD OF CANTRALL GULCH CREEK TO JACKSON CREEK

PRIME TREES	SEC. TREES	SHRUBS	DISTANCE	OWNER	CONDITION
Pacific Madrone	B. Oak	Hazel	4 Miles	City of Jacksonville	Fair
Douglas-fir	White Alder	Poisonoak	BLM		
Ponderosa pine	Willow	Ceanothus	Boise Cascade		
B. Cottonwood		Manzanita	M. Riders Assoc.		

JCT. CANTRALL GL. CREEK /JACKSON CR. TO PROP. BOUNDARY

PRIME TREES	SEC. TREES	SHRUBS	DISTANCE	OWNER	CONDITION
White Alder	Pacific Madrone	Hazel	1 Mile	City of Jacksonville	Good to reserv.
Big Leaf Maple		P. Dogwood		M.Riders Assoc.	Poor at reserv.
B. Cottonwood		Poisonoak		Fair below	
Douglas-fir		Ceanothus			

HEAD OF WALKER CREEK PAST GRAVEL QUARRIES

PRIME TREES	SEC. TREES	SHRUBS	DISTANCE	OWNER	CONDITION
B. Cottonwood	B. oak	Hazel	2 ½ Mile	Boise C.	1 3/4M New logging
White Alder	Douglas-fir	P. Dogwood	½ Mile	Jack. County	Fair
Big Leaf Maple		Willow	1 Mile	Pvt. Parties	Fair
Pacific Madrone		Poisonoak			
		Ceanothus			
		Blackberry			
		Mock orange			

HEAD OF MILLER GULCH TO FIRST RESIDENCES

Approximately three fourths of a mile of riparian area is within a part of upper Miller Gulch that was logged in 1993. The vegetation in these riparian areas are still in a recovering state. There are also some roads constructed in the upper drainage during the logging operation that affect the upper drainage. There is approximately one half mile of riparian area between the 1993 logging and the first residence. The species present is similar to Norling Gulch creek and the condition of this section is good.

5.4.3. Urban/Forest Interface Zone. The urban/forest interface zone is defined as that portion of the watershed that is largely forested but has intermingled residences throughout or the potential for them in the future. This zone is located in the mid-elevations of the watershed and extends to the valley floor or city boundaries.

The vegetation in the urban/forest interface zone is generally of poorer quality than in the upland zone. The lower elevations of this zone are subject to higher temperatures for longer daytime periods, and also receive less rainfall because they are in a rain shadow. Most storms passing over the higher elevations from the west deposit the largest share of their moisture in the higher elevations, creating a difference in average rainfall from the high to the low elevations of as much as 10 to 20 inches per year. Increased population density also tends to create fire control problems, road construction, increased tree damage, importation of exotic species, and forest fragmentation.

The conditions described above cause the forests in this zone to remain in their current vegetative state of development for a longer period of time. In order for these forests to advance ecologically, they must have cooler growing conditions, more moisture, and greater care. The cooler conditions and more rainfall are not likely to occur without climate change. The one factor that could advance these forests would be better forest management.

5.4.3.1. Urban/Forest Interface Zone Tree Species. As with the upland forest, the dominant species in the Jackson Creek urban/forest interface is Pacific Madrone. There are less coniferous forests in this zone for reasons stated above. Where conifers do exist, the prevalent species is ponderosa pine. In the hills surrounding Jacksonville, ponderosa pine trees are standing over madrone stands. During periods of drought or where understory vegetation is dense, you may also notice that many of the ponderosa pine trees are dead. Another difference in the species present in this zone is the increased incidence of both black oak and California white oak. It often grows in unison with madrone or may be more exclusive in stands, particularly on hotter south and west slopes, where it may also be accompanied by manzanita and ceanothus brush, grasses and poisonoak.

5.4.3.2. Riparian Vegetation in the Urban/Forest Interface Zone.

JACKSONVILLE WATERSHED PROPERTY BOUNDARY TO HWY 238

PRIME TREES	SEC. TREES	SHRUBS	DISTANCE	OWNER	CONDITION
Ponderosa pine	Pacific Madrone	Hazel	½ Mile	Private	Good, except
B. Cottonwood	Ore. Ash	Poisonoak		last property	
Big leaf maple		Ceanothus			
Douglas-fir		Willow			
White alder					

S. FORK JACKSON CREEK AND LOWER MILLER GULCH TO JCT AT HWY 238

PRIME TREES	SEC. TREES	SHRUBS	DISTANCE	OWNER	CONDITION
Ponderosa pine	B. oak	Ceanothus	3 ½ Miles	BLM	Good except
Douglas-fir	White alder	Hazel		Boise Casc.	near residences
B. Cottonwood		Poisonoak		Private	
Big leaf maple					
Pacific Madrone					
Willow					

S. FORK JACKSON CREEK TO JACKSON CREEK FORKS

The differences in vegetation in this section of the creeks riparian area are not significant from the previous section. The length is approximately one mile. The condition is classified as fair but there are portions near residences and at road crossings that should be considered as poor.

JACKSON CREEK FROM JACKSON FORKS THROUGH BRITT WOODS

The vegetation in this section of riparian area is similar to sections directly upstream. The length is approximately ½ mile. The condition is classified as good.

JACKSON CREEK FROM BRITT WOODS CROSSING THRU CITY

PRIME TREES	SEC.TREES	SHRUBS	DISTANCE	OWNER	CONDITION
B. Cottonwood Big leaf maple Ailanthus alt. B. locust Ore. Ash	Willow White alder	Blackberry	¾ mile	City J'ville Private	Poor-narrow, Residences, Poor species, etc.

5.4.4. Urban/Agricultural Zone. The urban/agricultural zone is defined as that portion of the watershed that contains cities and suburban communities and intensive agri/forestry operations. Vegetation in this zone contains urban forests, non-native species and cultured species. Riparian areas and their vegetation may be natural in some places but generally display a broad range of quality. Agricultural vegetation was not assessed.

5.4.4.1. Riparian Vegetation in the Urban/Agricultural Zone.

JACKSONVILLE CITY LIMIT TO HANLEY ROAD JCT. TO BEAR CREEK

The condition of the riparian vegetation from the Jacksonville city boundary to the Hanley Road junction and downstream is restricted by the road side location, intensive cropping, and residential development, and dominated by thick blackberry bushes. There is limited space or opportunity to restore natural vegetation in some of these areas.

Table 5.5. Estimated Acres in Watershed Zones.

UPLAND FOREST ZONE ACRES (BY GROUPS and ASCENDING ORDER OF SPECIES PRESENCE IN THOSE GROUPS)

SPECIES	ESTIMATED ACRES
DOUGLAS-FIR	
Pacific Madrone	
BIG LEAF MAPLE	
PONDEROSA PINE	
BLACK OAK	2,500 A. Combined
Pacific Madrone	
PONDEROSA PINE	
DOUGLAS FIR	
BLACK OAK	3,400 A. Combined
Pacific Madrone	
BLACK OAK	
PONDEROSA PINE	
DOUGLAS FIR	1,800 A. Combined
RECENTLY LOGGED TIMBERLANDS	700 A.
BRUSHFIELD CONVERSION TIMBERLANDS	100 A.
MANZANITA BRUSH FIELDS WITH MADRONE	500 A.
SUBTOTAL	9,000 A.

URBAN/FOREST INTERFACE ZONE ACRES

URBAN/FOREST INTERFACE (ALL SPECIES)	2,400 A.
URBAN/FOREST SUBDIVISIONS (ALL SPECIES)	1,400 A.
SUBTOTAL	3,800 A.

URBAN/AGRICULTURAL ZONE ACRES

FARM, ORCHARD, NURSERIES	2,400 A.
CITIES	700 A.
INDUSTRIAL	200 A.
SUBTOTAL	3,300 A.

WATERSHED TOTAL ACREAGE - 16,100 A.

5.4.5. Ecological Sites and Historic Potential Natural Vegetation.

Ecological Sites were interpreted from soil survey map units for the watershed as shown in two soil legends, which follow. Sites are based on a system, which stratifies natural landscapes using their potential to produce unique historic climax native plant communities. Potential vegetation refers to historic vegetation in the absence of disturbances, except after a period of normal recovery from historic burning. These plant communities, when combined with their natural environmental settings (climate, soil/geology, topography, living organisms) represent local ecosystems that are the basic components of natural landscapes.

In this study, considerable importance was given to recognizing soil-vegetation relationships. Natural vegetation patterns are closely related to local soil landscapes and to the geomorphology of an area. The Dry Oak Conifer Zone consists largely of mountain slopes differentiated by aspect, position on slope, microclimate, soil features and the geology that influenced soil development. Slopes are separated by small drainages and narrow valleys (not described in this report). They are conduits for much of the source material in large alluvial fans at the lower east flank of this zone and main valley floor. In the Interior Valley Floor Zone geomorphic surfaces consist mainly of flood plains, low stream terraces (former flood plains), high stream terraces of even older flood plains, and alluvial outwash fans from nearby uplands. The landforms of each surface have formed soils of different ages with different characteristics.

Eighteen ecosystems and variations are identified for the watershed. Vegetative potential is briefly described in thirteen Ecological Site Descriptions which follow ("Y" axis of Table 5.7). These site descriptions relate to those described in the Jackson Soil Survey Report. Management or disturbance responses are identified. An expanded species list with scientific code names is included with typical potential abundance (opportunity for management). This is not an exhaustive list but a result of sampling and listing of species thought to be native to the site. It should be noted that all species are not always present at each example of the site. Nor are all species resident continuously through all stages of succession associated with the site over time. A simple Plant Association Table (Table 5.7) was prepared to show plant species distribution and how these sites are vegetatively similar or contrasting.

Table 5.6. Plant Associations For Ecological Sites in the Jackson Creek Watershed.

Selected Native Species in Late Seral Stands (Potential) for Ecological Sites of the Jackson Creek Watershed.

Species List: (Selected from site description list **TREES**	Douglas-fir Forest	Douglas-fir Mixed Pine - F	Mixed Pine/Douglas-fir/Fescue	Pine - Douglas-fir/Fescue	Loamy Slopes 18-24" PZ	Deep Loamy Terrace 18-28"	Mixed Oak Terrace	Loamy Hills 20-35" PZ	Droughty Fan 18-24 PZ	Poorly Drained Bottom	Loamy Floodplain	Shallow Mountain Slopes 22-30"	Loamy Shrub Scabland 18-35
Sugar Pine		X	X										
Douglas-fir	X	X	X	X									
Madrone	X	X	X	X	X	X							
Incense Cedar	X	X		X		X							
Ponderosa Pine		X	X	X	X	X	X	X					
Black Oak	X	X	X	X	X	X	X	X	X				
White Oak					X	X	X	X	X	X	X		
Oregon Ash							X			X	X		
Bigleaf Maple											X		
White Alder											X		
Black Cottonwood											X		
SHRUBS													
Little Wild Rose	X	X											
Western Dewberry	X	X											
Oceanspray	X	X				X	X						
Deer brush	X	X	X	X		X	X						
Tall Oregon Grape	X	X	X	X	X	X	X						
Common Snowberry	X	X	X	X	X	X	X						
Poisonoak	X	X	X	X	X	X	X	X	X				X
Hairy Honeysuckle	X	X			X	X							X
Brewers Lupin			X									X	
Pacific Serviceberry				X	X	X	X	X	X				

Species List:	Douglas-fir Forest	Douglas-fir Mixed Pine - F	Mixed Pine/Douglas-fir/Fescue	Pine - Douglas-fir/Fescue	Loamy Slopes 18-24" PZ	Deep Loamy Terrace 18-28"	Mixed Oak Terrace	Loamy Hills 20-35" PZ	Droughty Fan 18-24 PZ	Poorly Drained Bottom	Loamy Floodplain	Shallow Mountain Slopes 22-30"	Loamy Shrub Scabland 18-35
Birchleaf Mt. mahogany				X	X			X					
Klamath Plum					X			X					
Willow						X	X			X			
Heartleaf Buckwheat												X	
Wedgeleaf Ceanothus													X
Skunkbush Sumac						X							
Wildgrape						X							
GRASSES													
Field Woodrush		X											
Mountain Brome	X	X											
Western Fescue	X	X	X										
California Fescue	X	X	X	X									
Blue Wildrye	X	X	X	X	X	X	X	X			X		
Tall Trisctum	X	X	X			X							
Pine Bluegrass			X	X		X		X	X			X	
Idaho Fescue			X	X	X	X		X	X			X	
June grass			X		X			X	X			X	
California Brome				X	X	X		X	X				
Lemon Needlegrass								X	X				
Bluebunch Wheatgrass								X	X			X	
Rush, Sedge										X	X		
Manna grass										X			

5.4.6. Vegetation Improvement Opportunities.

The forests in these zones are always trying to advance ecologically. They do this naturally (or with help) by establishing coniferous trees (ponderosa pine, Douglas-fir, cedar, sugar pine, grand fir) among the hardwood forests and brush fields. As these conifers advance, they attempt to overtop the hardwoods and become dominant in the forest stands.

The conifers in the upland forest zone have the best chance of surviving and maturing into dominant stands but usually need some competitive advantage over competing hardwood and brush species in order to grow freely and at a faster rate. The advantage can be gained during the conifers early to middle ages by an intervention that physically reduces the competing vegetation through some form of density control. Historically, this density reduction was done by fire. It can still be done by fire but with the urban interface expanding, it is becoming more likely that the density control will have to be done by some form of mechanical means (chainsaw, slashbuster machine, etc.). Accomplishing density control in the upland forests increases the tree growth, improves resistance to fire damage and adds to the health and diversity of the forest.

The practices needed to improve the vegetation in the urban/forest interface are much more imperative. Most of the conifers in this zone do not reach the dominant stage as single trees or in stands because they cannot survive periodic droughts and insect attacks. Therefore, these stands revert back to hardwood dominance. It is a necessity in advancing these forests to establish coniferous forests and also reduce the density of the hardwood and brush species. This has two benefits: 1) older, larger and less-dense coniferous stands are less likely to be damaged by fire, 2) more of the available moisture is available for the coniferous species in these stands.

In both the upland forest and the urban/forest interface, the management of vegetative density will promote older, larger and less-dense coniferous stands. These stands will be much more resilient to periods of drought and adverse climate change.

5.9. Element 9: Water Quality Assessment.

Information for this section contributed by Brad Prior, ODEQ.

Section 303(d) of the Clean Water Act of 1977, as amended by the Water Quality Act of 1987, provides direction for designation of beneficial uses and the limits of pollutants in surface waters.
These beneficial uses provide the basis for the assessment of water quality in the Jackson Creek watershed.

5.9.1. Beneficial Water Uses in Jackson Creek.

The Oregon Department of Environmental Quality (DEQ) designates beneficial uses of all tributaries of the Rogue River Basin, including the Jackson Creek watershed. The beneficial uses identified for Jackson Creek are:

- ♦ Industrial Water Supply
- ♦ Irrigation and Livestock Watering
- ♦ Anadromous Fish Passage, Rearing, and Spawning
- ♦ Resident Fish and Aquatic Life
- ♦ Wildlife

Of these listed beneficial uses, anadromous fish spawning and rearing and resident fish and aquatic life are most sensitive to degraded water quality. These species require cold, pure, oxygenated water and high quality habitats to support all stages of their life cycles. Once the water quality goals suitable for anadromous fish spawning and rearing and resident fish and aquatic life have been achieved, DEQ generally assumes that all other beneficial uses will be sufficiently protected as well.

5.9.2. Water Quality Parameters.

The principal water quality parameters of concern in this watershed are temperature and bacteria, and the RVCOG and DEQ monitor these parameters regularly. Other parameters (such as dissolved oxygen, sediment, and pH) have been judged to be within acceptable levels, or will be satisfied when temperature and bacteria standards are achieved.

5.9.2.1. Temperature. Stream temperature is influenced by riparian vegetation, stream morphology and hydrology, climate, geographic location, and irrigation practices. While climate and geographic location are outside of human control, the condition of the riparian area, channel morphology and hydrology have been degraded by human land use activities. Specifically, the elevated summertime stream temperatures measured throughout the Jackson Creek watershed result from:

1. Riparian vegetation disturbance that reduces stream surface shading.
2. Channel widening that increases the stream surface area exposed to heat inputs from

solar radiation.

3. Reduced summertime natural flows that may result from loss of saturated riparian and upslope soils that capture and slowly release cold stored water.
4. Return flows of high temperature irrigation water to the natural stream channel.
5. Urban run-off from increase in impervious surface areas in developed areas.

Degradation in the quality and quantity of riparian vegetation (such as has occurred all along the Jackson Creek stream channel) can lead to increased exposure of the water surface to solar radiation and higher stream water temperatures. Changes in channel morphology can also lead to increased stream temperatures, especially channel widening. As a stream widens, the surface area exposed to radiant heat sources and ambient air temperatures also increases, resulting in increased energy exchanged between the stream and its environment. Channel widening often is related to increased bank erosion and sedimentation of the streambed. Altered watershed hydrology can raise stream temperatures as natural instream flows are reduced. Stream water temperature is generally inversely related to natural flow volume; as flows decrease, stream temperatures tend to increase. Also, many land use activities that disturb riparian vegetation or the stream channel affect the connectivity of a stream to groundwater sources. Groundwater inflow tends to cool summertime stream temperatures and augment summertime flows. Reductions or elimination of groundwater inflow will have a warming effect on a stream such as Jackson Creek.

Jackson Creek, along with many other streams in the Bear Creek watershed, has been made an integral part of the irrigation water transport system for agricultural users. Large amounts of water (up to and including the entire stream flow) are repeatedly removed from the channel and replaced immediately downstream with water returned from irrigated fields. This irrigation return flow water, much of which has been allowed to flood over exposed, unshaded fields, is generally warmer than can be tolerated by salmon and other cold-water aquatic life.

5.9.2.2. Bacteria. Coliform bacteria are used as indicators of possible sewage contamination because they are commonly found in human and animal feces. Although they are generally not harmful themselves, they indicate the possible presence of pathogenic (disease-causing) bacteria, viruses, and protozoans that also live in human and animal digestive systems. Therefore, their presence in streams suggests that pathogenic microorganisms might also be present and that water contact might be a health risk. Since it is difficult, time-consuming, and expensive to test directly for the presence of a large variety of pathogens, water is usually tested for coliform organisms instead. Sources of fecal contamination to surface waters include wastewater treatment plants, on-site septic systems, domestic and wild animal manure, and storm runoff. In addition to the possible health risk associated with the presence of elevated levels of fecal bacteria, they can also cause cloudy water, unpleasant odors, and an increased oxygen demand.

A commonly tested fecal bacteria indicator is *Escherichia coli*, which is a single species in the fecal coliforms group. *E. coli* is a species of fecal coliforms bacteria that is specific to fecal material from humans and other warm-blooded animals. Studies conducted by EPA to determine the correlation between different bacterial indicators and the occurrence of digestive system illness at swimming beaches suggest that the best indicator of health risk from recreational water contact in fresh water is the presence of *E. coli*. Therefore, EPA now recommends *E. coli* as the best indicator of health risk from water contact in recreational waters; in 1997 Oregon changed its water quality standards and began requiring monitoring for *E. coli* bacteria.

Since there are no wastewater treatment plants in the Jackson Creek watershed, the most likely sources of the high bacterial levels in the stream water are manure from wild and domestic animals (including pets and livestock), failing septic systems, runoff from urban areas, leaking or cross-connected municipal sewer systems, irrigation water imported from other subwatersheds, and return flows of irrigation water.

5.9.3. Water Quality Conditions.

DEQ is responsible for designating streams in the State of Oregon which fail to meet established water quality criteria for one or more beneficial uses and filing a report with the US Environmental Protection Agency. This list of "Water Quality Limited Streams" is often referred to as the "303(d) list."

Jackson Creek has been tested for bacteria, dissolved oxygen, nutrients, pH, sedimentation, and temperature, and was listed under 303(d) criteria in 1998 for fecal coliform bacteria (year round) and temperature (summer) from the creek mouth up to its headwaters. The criteria that must be met for these parameters to be in compliance with clean water standards are:[1]

- Bacteria (E. coli) -Beneficial Uses Affected: Water contact recreation
  Standard: (I) A 30-day log mean of 126 *E. coli* organisms per 100 ml based on a minimum of five samples;
  (II) No single sample shall exceed 406 *E. coli* organisms per 100 ml.

- Temperature - Beneficial Uses Affected: Resident fish and aquatic life, salmonid fish spawning and rearing.
  Standards Seven (7) day moving average of the daily maximum shall not exceed 64° F (17.8° C) June 1 through September 30: Spawning through fry emergence October 1 to May 31 or water body specific as identified by ODFW biologists, or unless specifically allowed under a DEQ approved basin surface water temperature management plan.

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1 Oregon Department of Environmental Quality 303(d) list Decision Matrix (P-574).

Figure 5.7. DEQ 303(d) Decision Matrix for Jackson Creek **(Jackson Creek mouth to headwaters).**

Parameter	Criteria for 303(d) listing	Season	Basis for Listing	Supporting Data or Information	Rationale for Not Listing	Listing Status
Bacteria	Water Contact Recreation; Fecal coliforms standard	Year Round	In 305(b) Report (DEQ 1994); RVCOG (1990)	Annual Average Fecal coliforms data ranging between 386-623 did exceed standard (400) between 1998-1990. (RVCOG 1990)		303(d) listed
Dissolved Oxygen (DO)	Salmonid Spawning Dissolved Oxygen 11mg/L.	October 1-March 31	DEQ Data	DEQ Data Site 402802 RM 1.5 17% (1 of 6) October through March values exceeded spawning dissolved oxygen standard (11 mg/l or 95% saturation with a minimum of 8.7 between 1988-1989 (Cold water fishery, spawning approximately, Oct-Mar)	Did not meet listing criteria	OK Not listed
Nutrients			NPS Assessment Segment 275: moderate, observation (DEQ 1988)		No supporting data or information	Need Data
pH		Fall- Winter-Spring	DEQ Data	DEQ Data (Site 402802; Rm 1.5): 0% (0 of 8) FWS values exceeded pH standard (6.5-8.5) between WY 1989-95	Did not meet listing criteria	OK Not listed
pH		Summer	DEQ Data	DEQ Data (Site 402802; Rm 1.5): 0% (0 of 8) FWS values exceeded pH standard (6.5-8.5) between WY 1989-1995.	Did not meet listing criteria	OK Not listed
Sedimentation			NPS Assessment- segment 275: moderate, data (DEQ, 1988)		No Supporting data.	Need Data
Temperature	Salmonid Rearing 64 F, (17.8 C)	Summer	Bear Creek Temperature Study (ODFW, 1992)	ODFW Data (2 sites: Lower near mouth and Upper): Monthly Average maximums of 75, 76 , 78, 70, 73, 74, no data in July, August, September, October 1992.		303 (d) listed

5.9.4. Findings, and Future Data Needs.

The most recent version of the Oregon 303(d) list shows that Jackson Creek fails to meet water quality standards for temperature 64° F, (17.8° C), and bacteria (fecal coliforms). Jackson Creek does currently meet water quality standards for (1) dissolved oxygen, (2) nutrients, (3) pH, and (4) sedimentation. Values for other water quality parameters for Jackson Creek such as: 1) aquatic weeds or algae, (2) biological criteria, (3) chlorophyl A, (4) habitat modification, (5) flow modification, (6) total dissolved gas, (7) toxics, and (8) turbidity are currently unknown. More data are needed to monitor any changes in the future.

5.3. Element 3: Hydrology and Water Use.

Mike Van Liew, Hydrologist, OWRD, and Paul Measeles, Hydrologist, ODA, contributed to this section.

5.3.1. Water Rights and Use. Water supply in the Jackson Creek Watershed consists of surface water, ground water, and reservoir storage. A report of the Oregon Water Resources Department (OWRD) Water Rights Information System (WRIS) system shows 31 primary diversions for surface water, 37 for ground water, and 6 for reservoir storage. Secondary diversions include 3 for surface water and 3 for ground water. The primary and secondary diversions consist of all the non-canceled water rights on Jackson Creek and its tributaries. The earliest surface water right on record with OWRD for the watershed is a 0.16 cubic feet per second (cfs) right dated 12/31/1853. The earliest ground water right on record is a 115 gallons per minute (g.p.m.) right dated 12/31/1920.

Terminology:

Baseflow = that portion of streamflow that consists of ground water which discharges to the stream.

Climate Generator = a computer model used to generate daily values of climatic variables such as precipitation, air temperature, wind speed and solar radiation based on long term records from a weather station. A climate generator is used to estimate climatic conditions for areas where little or no data are available.

Direct runoff = that portion of streamflow that flows over the land surface as a result of rainfall or snowmelt.

Evapotranspiration (ET) = a collective term for all the processes by which water in the liquid or solid phase at or near the earth's surface becomes atmospheric water vapor. It includes evaporation from rivers and lakes, bare soil, and vegetative surfaces; evaporation from within the leaves of plants (transpiration); and sublimation from ice and snow surfaces.

Exceedance- 50% exceedance flow is the amount of streamflow that occurs on average of one out of two years (50% of the time). This value is used to determine if water is available for the issuing of a new water right for surface water storage; 80% exceedance flow is the amount of streamflow that occurs on average four out of five years (80% of the time). This value is used to determine if water is available for issuing a new surface water right (OWRD).

Model Calibration = the process by which the values of model parameters are identified for use in a particular application. Calibration consists of the use of rainfall-runoff data and a procedure to identify the model parameters that provide the best agreement between simulated and recorded flows.

OWRD- Oregon Water Resources Department

SCS Runoff Curve Number = A procedure developed by the Soil Conservation Service to determine the amount of direct runoff that will result from a rainstorm of a given magnitude.

SWAT - Soil and Water Assessment Tool; USDA-SCS

WARS - Water Availability Report System

WRIS - Water Rights Information System

Table 5-1 is a compilation of primary diversion water use by stream reach for surface water, ground water, and reservoir storage. Values shown in the table are reported in cubic feet per second for surface and ground water, and in acre feet for reservoir storage.

Table 5-1. Surface, and Ground Water Use by Stream Reach on Jackson Creek.

Reach	Total (cfs)	Irrigation	Fish/Wildlife	Industrial/ Domestic
Surface/Stream Water				
Jackson Cr. > Bear Cr.	24.42	24.41	Water right applied for, but not granted	0.01
Dean Cr. > Jackson Cr.	0.75	0.74	0	0.01
Horn Cr. > Jackson Cr.	0.23	0.21	0	0.02
Walker Ck. > Jackson Cr.	1.21	1.21	0	0
Miller Gulch > S.F. Jackson Cr.	0.02	0	0	0.02
Rock Cr. > Miller Gulch	0.1	0.1	0	0
Ground Water				
Jackson Cr. > Bear Cr.	7.33	7.33	0	0
Dean Cr. > Jackson Cr.	0.6	0.6	0	0
Horn Cr. > Jackson Cr.	0.6	0.6	0	0
Jacksonville Reservoir (acre feet)	7	0	0	0
Total (cfs)	35.26	35.20	0	0.06

Source: Oregon Water Resources Department, 2000.

Note: Jacksonville Reservoir when constructed in 1903 was designed to retain 800 acre feet of water. Over the years the reservoir has filled in with sediment, and today retains approximately 7 acre feet of water.

As shown in Table 5-1, of the reported 35.26 cfs for primary use, diversion by surface water accounts for about 76% and ground water about 24% of the total water use. Irrigation comprises 99.7% of the surface water use. The largest portion of surface water use occurs in the last ½ mile of Jackson Creek below Dean Creek, where irrigation and agriculture account for 94% of the primary surface water diversions. Similarly, irrigation accounts for 99% of the primary ground water diversions in the stream reach below Dean Creek.

5.3.2. Water Availability. Water availability is the amount of water that is physically and legally available for future appropriation, based on the natural streamflow at the 80% flow exceedance level, the consumptive use of diverted water, and the instream water rights.[1] Table 5-2 is a water availability report for Jackson Creek that was developed from the OWRD Water Availability Report System (WARS) program.

Table 5-2. Water Availability for Jackson Creek at the 80% Flow Exceedance Level.

Month	Natural Stream Flow (cfs)	Net Minimum Flow(cfs)	Instream Water Rights (cfs)	Net Water Available(cfs)
1	6.1	5.63	14	-8.37
2	7.6	7.03	17	-9.98
3	7.03	6.55	14	-7.45
4	4.54	2.36	9	-6.64
5	2.86	-0.62	6	-6.62
6	1.65	-3.25	3	-6.25
7	0.57	-6.01	1	-7.01
8	0.33	-5.09	0.5	-5.59
9	0.27	-3.27	0.4	-3.67
10	0.3	-0.84	0.4	-1.24
11	0.71	0.61	2	-1.39
12	3.11	2.78	9	-6.22

As shown in the "Net Water Available" column of Table 5-3, all flows are negative, indicating that there is no water available in the Jackson Creek subbasin for future appropriation.

The estimated 50 % flow exceedance at the mouth of Jackson Creek ranges from 0.36 cfs in September to 17.1 cfs in February. The 80 % flow exceedance values range from 0.27 cfs in September to 7.6 cfs in February. Results of the WARS program for Jackson Creek are not unlike most of the other streams in the Rogue Basin, where surface water is unavailable for future appropriation.

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[1] The WARS program produces both the 50% and 80% values of flow exceedance, along with the associated water availability for each month. The 50% and 80% flow exceedance values refer to discharges that occur at least 50% and 80% of the time during a given month. The 80% flow exceedance value is used to determine if water is available for issuing a new surface water right. The 50% flow exceedance value is used to determine if there is sufficient water for the issuing of a water right for surface water storage.

5.3.3. Influence of Irrigation on Streamflow. Streamflows in Jackson Creek are significantly influenced by diversions and interbasin transfers as a result of irrigation practices by Medford Irrigation District (MID) and Rogue River Valley Irrigation District (RRVID) during the irrigation season. A complex system of canals, diversions and transfers exists within the watershed, including RRVID's use of Jackson Creek as a means of conveyance for delivering water to its respective points of diversion. The conveyance, transfer, and return flow of irrigation water results in substantially higher flows than would normally exist under more natural conditions. The magnitude of these differences is evidenced in Table 5-3 on a monthly basis by a comparison of measured streamflow discharges versus those predicted by the Soil and Water Assessment Tool (SWAT) without the influence of irrigation on the watershed.

Table 5-3. Streamflows on Jackson Creek and Bear Creek.

Irrigation Season	Non-Irrigation Season	Bear Creek Streamflow (cfs)	# measurements on Jackson Cr.	Streamflow on Jackson Cr.	Predicted Streamflow on Jackson Cr. by SWAT
May		131	6	39.4	6
June		73	12	34.6	1.8
July		31	3	27.9	1.3
August		32	5	28.1	0.6
September		35	5	24.1	0.4
October		34	11	8.7	0.4
	November	63	37	7	2.7
	December	161	N.D.	N.D.	15
	January	219	4	8.4	27
	February	221	4	14.5	31
	March	202	7	39.6	22
	April	199	5	71.3	13

Source: Oregon Water Resources Department, 2000.

Table 5-3 shows that monthly runoff discharges during the irrigation season are almost an order of magnitude greater than those that would be expected to occur under natural conditions. The significant impact of irrigation on Jackson Creek warrants the need for monitoring streamflow at a handful of sites along the channel during the irrigation season.

5.3.4. Measured Monthly Streamflow Data on Jackson Creek and Bear Creek. Miscellaneous streamflow measurements collected on Jackson Creek during the 1995 to 1997 period and a 62 year streamflow record for the U S Geological Survey gaging station on Bear Creek in Medford are also shown in Table 5-3. Also reported in the table are the monthly streamflow values predicted by SWAT in cfs.

Considerable differences may be noted between the streamflow values measured on Jackson Creek versus those predicted by SWAT. Two reasons may be cited for the significant differences. First of all, the predicted streamflow values estimated by SWAT do not consider the influence of water transfer from irrigation canals to Jackson Creek that occurs during the irrigation season. Second, the measured values of streamflow reported in the table represent an average of instantaneous observations obtained from a limited data set. These measured values therefore do not necessarily reflect the mean monthly flow conditions. The installation of a continuous streamgage recorder on Jackson Creek would provide an accurate way to monitor daily streamflow variations as well as the influence of irrigation diversions and transfers within the watershed.

5.3.5. Water Balance. The Soil and Water Assessment Tool (SWAT)[2] developed by the USDA Agricultural Research Service was used to estimate a monthly water balance for the Jackson Creek Watershed. The Watershed was divided into five sub-basins to account for topographic, soils, and land use differences on the catchment. Any hydrologic impacts associated with the diversion of water for domestic, municipal, or irrigation purposes were not included in the analysis. Since Jackson Creek is an ungaged stream channel, it was necessary to use gaged data from another watershed in the region to calibrate parameters governing the ground water (baseflow) contribution to surface runoff in the model.

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[2] Arnold, J.G., J.R. Williams, R. Srinivasan, K.W. King, and R.H. Griggs. SWAT: Soil and Water Assessment Tool. USDA ARS, Temple, TX., 1994.

Table 5-4. Water Balance for Jackson Creek, Based on 30 yr. SWAT Simulation.

Month	Precipitation (mm)	Evapo-transpiration	Direct Runoff (mm)	Baseflow (mm)	Total Water Yield (mm)
January	99	25	1.1	29.9	31
February	75	40	1.4	30.6	32
March	69	68	0.6	25.4	26
April	43	90	0.1	14.9	15
May	39	66	0.1	6.9	7
June	29	48	0	2	2
July	5	43	0	1.5	1.5
August	8	15	0	0.7	0.7
September	20	15	0	0.4	0.4
October	51	26	0.1	0.4	0.5
November	85	25	0.6	2.4	3
December	112	20	0.9	16.1	17
Total	633	481	4.9	131.2	136.1

Source: Oregon Water Resources Department, 2000.

Table 5-4 shows monthly values of evapotranspiration, baseflow, and direct runoff simulated by the model for a 30 year seasonal distribution of precipitation on the watershed. Simulation results reflect the impact of urban, residential, and agricultural development, but do not account for the diversion or transfer of water for domestic or irrigation purposes within the catchment. The highest rate of evapotranspiration simulated by the model occurred during the month of May, which accounted for about 16% of annual ET. Annual values of precipitation, ET, and total runoff estimated by SWAT were 633, 481, and 136 mm, respectively. Values of evapotranspiration and runoff are assumed to be estimated to within ±15%. Simulation results show that direct runoff and baseflow runoff from ground water respectively account for about 4% and 96% of the total runoff on the watershed. As shown in Table 5-4, direct runoff occurs primarily from November to March. Test results further show that evapotranspiration and runoff comprise 76% and 21% of annual precipitation, respectively. Deep aquifer ground water losses and changes in soil moisture storage account for the remaining 3% of annual precipitation.

5.3.6. Direct Runoff Comparison for Pre-development and Current Watershed Conditions.

Runoff curve numbers were changed in the model to reflect a pre-development watershed condition consisting almost entirely of forestland. SWAT was then rerun to estimate monthly values of evapotranspiration and runoff. Test results showed virtually no difference in the annual values of ET or total runoff. For the pre-development watershed condition, the model predicted an annual direct runoff amount of 1.0 mm compared to 4.9 mm for present day conditions. On a daily basis, however, the test results between current and pre-development conditions are much more pronounced. The simulation results with SWAT show that a daily rainfall volume of about 16 mm can produce as much as 1.5 mm of direct runoff for current conditions on the watershed. The model simulation shows the same amount of daily rainfall produces virtually no direct runoff for the pre-development watershed condition.

5.3.7. Hydrologic Condition Assessment. A hydrologic assessment of the Jackson Creek Watershed was conducted to identify land use activities that have the potential to impact the hydrology of the catchment. In this study the impacts of timber harvest, agricultural/rangeland development, and urban/residential development were analyzed. The five sub-basins used for developing a water balance with SWAT were also used to analyze the impacts of the different land use activities.

5.3.7.1. Impact of Timber Harvest. The peak flow generating processes for each of the sub-basins were analyzed to determine the impacts of timber harvest on runoff. Results of the analysis indicate that less than 25% of each of the sub-basins may be characterized as exhibiting rain-on-snow or spring snowmelt properties. Therefore, it was assumed that the potential risk of peak-flow enhancement due to timber harvest on the watershed was not appreciable.

5.3.7.2. Impact of Agricultural and Rangeland Development. The 2 year, 24 hour precipitation was used to assess the impacts of agriculture and rangeland on watershed runoff. The rainfall volume for a storm of this magnitude on the catchment is 2.5 inches. Using the runoff curve number method developed by the SCS and a curve number of 70 for the agricultural sub-basin in the watershed, the runoff depth was estimated as 0.46 inches. This compared to a background (pre-development) runoff depth of 0.00 inches for a runoff curve number of 45. Since the difference between the background and present day runoff depth was less than 0.5 inches, it was assumed that the potential risk of peak-flow enhancement due to agriculture and rangeland on watershed runoff was low.

5.3.7.3. Impact of Urban and Residential Development. The percentage of impervious surfaces in the Jackson Creek Watershed was calculated to assess the impacts of urban and residential development on runoff. The potential risk for peak-flow enhancement was found to be negligible for each of the sub-basins except for Jacksonville and Central Point municipalities. For the Jacksonville sub-basin, the potential risk was assumed to be high. Monitoring of runoff from the Jacksonville area must therefore be a priority in order to evaluate the potential impacts for flooding and water quality degradation in Jackson Creek.

5.3.7.4. Other Impacts. The Jacksonville Reservoir is the only reservoir present in the

Jackson Creek Watershed. Because of its small storage capacity, the impact of the reservoir on streamflow is relatively small, except that is does serve as a catchment basin for sediment from the foothills.   Although it is anticipated that the reservoir wetland results in improved water quality conditions for Jackson Creek, the impact on the water balance for the catchment is negligible.

5.3.7.5. Accumulative Impacts. Each of the events above have their separate effect upon the total landscape and ecosystem, but when the events are combined (as they are in reality), there can be a superordinate *accumulative* effect Bor in other words, the total effect is greater than the sum of the parts. For example, the effects of timber harvest or residential development affect soil water retention, wildlife, climate, and human uses of a landscape. This effect can also function for restoration efforts, in that one small restoration improvement can affect other ecosystems, producing a profound effect. Thus, it is important to look at the total effects of systems combined, as well as effects of specific actions.

5.8. Element 8: Channel Modification Assessment.

Information for this section contributed by Dick Link, Geologist, USBR, Boise, Idaho.

The issues of flood control, storm water management, and maximum/minimum stream flows in the Jackson Creek watershed are closely related. Flood control and storm water management problems have been exacerbated due to channelization of much of the creek, along with increased urban and residential development. The same factors that make flooding and stormwater management a problem also increase the difference between maximum and minimum flows in the creek.

Usually a stream is channelized to increase the drainage rate of the system, so that water moves through the stream at a greater speed. Channelization is also done to prevent lateral migration of a stream, so that structures such as roads are not impacted by erosion. Though channelization increases the velocity of water flow, it also decreases the storage capacity of the stream, because channelization involves shortening the length of a stream. The longer the stream, the greater its volume for water storage. Also, channelization usually results in loss of a stream's natural flood plain. Flood plains serve as pathways for high flows, and also absorb flood water for slow release to the stream after the flood has receded. In an unaltered stream, floodplains have a *50%* probability of receiving some streamflow each year. In a channelized stream, the probability of flooding is less than *50%* every year (because of channel deepening that normally accompanies channelization), but flood events are more catastrophic. This is because in an unaltered stream, the flood plain essentially acts as a buffer between developed property and the stream. Few channelized streams have any buffer between them and developed property.

Almost all of the stream channels in the Jackson Creek watershed have been altered extensively, especially below Jacksonville Reservoir. One prominent example is that early maps show that Daisy Creek and the stream draining the Jacksonville landfill site, and Griffin Creek once flowed into Jackson Creek (1854 Surveyors map of T. 37 S. R. 2 W. and other documents). These creeks now flow into Griffin Creek, which parallels Jackson Creek.

In later years, a portion of lower Griffin Creek, in sections 15 and 22, was likely re-routed to parallel Jackson Creek, rather than join it. Griffin Creek was then re-connected to a minor stream that enters Bear Creek upstream from the Jackson Creek - Bear Creek confluence.

5.8.1. Methodology For Assessing Channel Modification.

Channel modifications for Jackson Creek and key tributaries (Cantrall Gulch, South Fork, and Walker Creek) were identified through stereoscopic analysis of aerial photos, and mapped. A field visit was conducted to verify the aerial photo interpretation and evaluate on-site conditions. The area ranged from the headwaters through Jacksonville to Central Point.

Sources of channel modification included the following features:

- reservoirs, irrigation dams, and artificial impoundments
- small agricultural impoundments, cattle ponds, fire ponds
- dikes, levees (flood control)
- channelization (straightening, hardening, relocation, dredged channels)
- stream-bank protection (riprap, pilings, bulkheads)
- built-up areas in floodplains, wetlands
- extensive fill associated with road crossings and roads next to streams
- sand and gravel mining in/near channels, tailings deposits.

5.8.2. Findings.

The majority of noted channel modification areas were due to road interference/crossings, rural residences/farms, irrigation diversions and/or check structures, and urban zones. Impacts observed in the urban areas (Jacksonville and Central Point) were numerous and have been considered as one modification for the purpose of this assessment. Most channel modifications occur as point modifications and do not affect channel reaches. In addition to numerous bridge and culvert crossings, an extensive network of roadways parallel Jackson Creek for the majority of its length. Impacts from these roadways are more difficult to assess, as the heavy stands of blackberry vines along the channel prevent direct observation of fill encroachment into the channel in both the aerial photo interpretation and the ground verification completed for this study. Channel modifications due to fill encroachment have only been noted where the roadways occur in very close proximity to the stream channel.

The relatively dense vegetation along much of the stream channels obscures channel conditions both in the aerial photo interpretation and the ground reconnaissance and it is likely that some modifications have not been detected in this analysis. Channel modifications are numerous within the urban zones of Jacksonville and Central Point, but poor access to the channel in these areas prevented detailed mapping of these modifications. In particular, activities such as bank hardening and armoring, channel straightening and/or relocation, etc., are poorly known in the urban areas.

Increased urbanization and residential development leads to a decrease in permeable surfaces in the watershed, which increases the surges in runoff. This makes the flow in Jackson Creek flashier so that its response to storms is faster and more dramatic, and increases the probability of floods in the waterhed. Some possible options for reducing the risk of floods, improving stormwater management, and reducing the difference between minimum and maximum flows are:

> (1) *Re-establishing a flood plain and meandering channel for the area downstream of Jacksonville*. This is technically feasible, but may require re-routing some existing roadways, moving some structures away from the creek channel, and/or land acquisition.

> (2) *Develop off-channel storage for storm flows.* This option is also technically feasible, but would require construction of water impoundments and drainage channels. It would also require land acquisitions.

(3) *Improve the infiltration capacity of developed areas and partially re-establish flood plain/meandering channel.* This option is technically feasible, but would require improving the infiltration capacity of parking areas and other areas (e.g., using permeable pavement, drilling drain holes, using grassed roadways, using infiltration basins). Combining this with re-establishing floodplains/meandering channel in the publicly owned reaches of the stream may be sufficient to achieve the desired flood control and stormwater management improvements.

Identified channel modifications have been tabulated individually on the attached Channel Modification Inventory (see Form CM-1, in Appendix B). Additional analysis on channel modifications is needed, and at present, resources were not available to complete this analysis.

5.5. Element 5: Riparian Assessment.

This section contributed by Stephanie Eisenbarth, Environmental Engineer (EIT), USBR, Boise, Idaho.

The Jackson Creek watershed riparian and wetlands assessment was prepared from aerial photos and 7.5 quad maps obtained from BLM, and verified by a field survey on July 6th and 7th , 2000. The team consisted of a biologist, and geologist, and was assisted by the City of Jacksonville Forester Mr. Paul Kangas.

5.5.1. Methodology For Riparian Areas.

The waterway was followed until either 1,000 feet of streambed was covered, or changes were found in any of the following characteristics:

- Vegetation
- Size
- Channel habitat type
- Ecoregion
- Subwatershed region

The end of each Riparian Condition Unit (RCU) was assigned a number, ranging from 1 through 116 (58 sections with the left and right banks facing downstream numbered as separate units). Numbers N1 through N16 were used for Norling Gulch CreekC8 sections (left and right banks numbered as separate units). Numbers C1 through C20 (10 sections) were used for Cantrall Gulch Creek; numbers S1 through S16 (8 sections) were used for the South Fork of Jackson Creek; and numbers W1 through W38 (19 sections) were used for Walker Creek (detailed technical information and data are provided in the Appendix).

Glossary for this section:

Riparian area: The area adjacent to the stream channel that interacts and is dependent on the stream for biological integrity.

Riparian Condition Unit (RCU): A portion of the riparian area in which riparian vegetation type, size, and density remain approximately the same.

Riparian Recuitment Situation: Groups of RCUs that have similar characteristics and that may be treated similarly for the purposes of restoration and/or enhancement.

The Oregon stream ordering system was used to designate stream order:

Small	<2 cfs
Medium	2-10 cfs
Large	>10 cfs

From the aerial photos, the shade category for each RCU was determined using the following criteria:

Indicator	Shade	Code
Stream surface not visible, slightly visible, or visible in patches	>70%	H
Stream surface visible, but banks are not visible	40-70%	M
Stream surface visible; banks visible or visible at times	<40%	L

5.5.2. Riparian Recruitment Situation Description.

Following the riparian condition unit evaluation, it is important to decide if the current riparian conditions provide adequate or inadequate riparian recruitment potential. This requires a comparison of current conditions to the potential vegetation descriptions for the ecoregion. If current conditions are as good or better than the potential conditions for the ecoregion, (i.e., conifers better than hardwoods; large trees better than medium trees; and dense stands better than sparse stands) then recruitment potential is considered to be adequate. If current conditions are not as good as potential ecoregion conditions then recruitment is inadequate (See OWAM pp.v-i i to
v-i). Each Riparian condition unit is then evaluated to determine its riparian recruitment situation.

The watershed was divided into thirds topographically and each riparian/wetland was located as to being in the highest, middle, or lowest third of the watershed. Each wetland was given a modifier to classify its restoration or enhancement potential, with ratings of high, good and low. The following types of vegetation zones were identified in the Jackson Creek watershed (see Plant Communities Assessment Element #4).

UPLAND FOREST ZONE B forested, containing diverse resources and habitats, and separated from urban influence
FOREST/URBAN INTERFACE ZONE B largely forested, but has intermingled residences throughout and/or the potential for development
URBAN/AGRICULTURAL ZONE B contains cities and suburb communities, and intensive agri/forestry operations

The riparian recruitment situation within the upland forest zone is described as *adequate*, where no enhancement is needed. The land use and recruitment situation associated with the forest/urban interface zone is residential *development*, with narrow buffers between homes and the creek, and forestry stands consisting of areas of hardwoods. The urban/agricultural zone consists of areas where buffers are absent, lawns, or narrow sections between agricultural land and the creek. The recruitment situation within this zone can be described as either *development* or *agriculture*.

5.5.2.1. Jackson Creek Vegetation Zones.

The upland forest vegetation zone for the main stem of Jackson Creek contains Riparian Condition Units (RCU) 1 through 30, running from the headwaters to Cantrall Gulch C approximately 2.5 miles in length. The riparian recruitment zone, spanning both the left and right creek banks, is approximately 20 to 25 feet in width, with primary tree species including Pacific Madrone, white alder, big leaf maple, and Douglas-fir. Shrubs present include Ocean Spray, poisonoak, hazel, dogwood, mock orange, and ceanothus. From the headwaters, the creek initially runs through a moderately steep narrow valley, and then into a moderate gradient area where the channel becomes moderately confined. The creek bed consists of sand, gravel, and cobble, with no indication of erosion problems (fines). Shading is high. The riparian recruitment situation for this section is described as *adequate*.

RCU's 31 through 38 have high recreational use, with frequent off-highway vehicle traffic in this area. The creek flows into a small reservoir, which is approximately 0.25 miles in length, and then exits in various manners below the earthen dam. Overflow and leakage from the dam supplies a small amount of stream flow, which could be enhanced into a wetland area, either as a nature-park or educational center. The recruitment zone continues to span 20 to 25 feet, with primary tree species including white alder, big leaf maple, cottonwood, Douglas-fir, and shrubs similar to those found in the upland forest zone. Pacific Madrone is less prevalent. The channel flows along a low gradient, and continues to be moderately confined. The riparian recruitment situation for this section is described as *development*.

RCU's 39 through 62 make the transition from forest to urban area (forest/urban interface vegetation zone) as the creek enters and flows through Jacksonville. The recruitment zone reduces to 10 to 15 feet in width, with primary tree species including cottonwood, big leaf maple, locust, and Oregon ash. As the creek runs through Jacksonville, blackberry bushes begin to dominate the creek banks, with hardwoods becoming more and more dispersed, usually found within lawn areas. The channel flows along a low gradient and within a medium floodplain. There are several irrigation diversions/returns causing the creek flow to vary dramatically, and the creek bed contains more sediment from irrigation return flows. The riparian recruitment situation for this section is described as *development*.

RCU's 63 through 88 make the transition from urban to agricultural area (urban/ag interface vegetation zone) as the creek leaves Jacksonville, travels through suburbs, and into agricultural land. The first mile (RCU's 63 to 76) has a recruitment zone 10 to 15 feet in width, and consisting primarily of blackberry bushes. At this point, the creek turns away from the roadway and the recruitment zone increases to 20 to 25 feet in width, with primary tree species including cottonwood, big leaf maple, locust, and Oregon ash. This segment is also approximately 1 mile in length (RCU's 77-88). The creek then turns back to parallel the roadway and the recruitment zone decreases to 10 to 15 feet in width, dominated by blackberry bushes with a few widely dispersed hardwoods. The riparian recruitment situation for this section is described as *agriculture*.

RCU's 89 through 116 make the transition from agricultural to urban area (ag/urban interface vegetation zone) as the creek enters and flows through Central Point. The recruitment zone remains at 10 to 15 feet in width, and buffers vary, dominated by dense blackberry bushes with a few widely dispersed hardwoods including cottonwood, big leaf maple, locust, and Oregon ash. There are several irrigation diversions/returns causing the creek flow to vary dramatically, and the creek bed contains higher sediment loads. The riparian recruitment situation for this section is described as *development*.

The remaining section of Jackson Creek leaves Central Point, travels through suburbs and an agricultural area, and flows into Bear Creek. The recruitment zone is 10 to 15 feet in width, dominated by dense blackberry bushes. The riparian recruitment situation for this section is described as *agriculture*.

5.5.2.2. Norling Gulch Creek Vegetation Zone. The entire two miles of Norling Gulch Creek fall into the upland forest vegetation zone. The riparian recruitment area, spanning both the left and right creek banks, is approximately 20 to 25 feet in width, with primary tree species including Douglas-fir, Pacific Madrone, big leaf maple, and white alder. Shrubs present include hazel, dogwood, mock orange, poisonoak, and ceanothus. From the headwaters, the creek initially runs through a moderately steep narrow valley, and then into a moderate gradient area where the channel becomes moderately confined. The creek bed consists of sand, gravel, and cobble, with no indication of erosion problems (fines). Shading is high. The riparian recruitment situation for this Jackson Creek tributary is described as *adequate*.

Note: A 30" culvert is present where the road forks just upstream from the point at which Norling Gulch Creek joins Jackson Creek. It is questionable if this culvert is large enough to withstand flood conditions.

5.5.2.3. Cantrall Gulch Creek Vegetation Zone. The entire two miles of Cantrall Gulch Creek fall into the upland forest vegetation zone. The riparian recruitment area is approximately 20 to 25 feet in width, with primary tree species including Pacific Madrone, Douglas-fir, ponderosa pine, and cottonwood. Shrubs present include hazel, poisonoak, ceanothus, and manzanita. From the headwaters, the creek initially runs through a moderately steep narrow valley, and then into a moderate gradient area where the channel becomes moderately confined. The creek bed consists of sand, gravel, and cobble, with only little evidence of fines. Shading is high. The Motorcycle Riders Association owns 180 acres within this area; therefore, a large amount of recreational activity occurs along the main road as well as along side trails. Erosion problems do exist along some of these trails (thus, there are fines in some creek bed locations). There is evidence of past logging activities (Boise Cascade Timber Co.), including a logging road and several slip trails that are currently used by OHV's. A rock quarry (previous granite removal site) exists near where Cantrall Gulch Creek joins Jackson Creek. This quarry is currently used as a shooting range, and hiking area. Rip-rap has been installed around culvert areas, and the areas could be renovated by importing new soil and building vegetated terraces. Despite the issues that do exist for Cantrall Gulch Creek, the riparian recruitment situation for this creek is described as *adequate*.

5.5.2.4. South Fork of Jackson Creek Vegetation Zone. The entire 2 miles of the South Fork of Jackson Creek fall into the forest/urban interface vegetation zone. The first 1½ miles of creek (RCU's S1 through S12) contain a riparian recruitment zone that is 20 to 25 feet in width, with primary tree species including ponderosa pine, Douglas-fir, cottonwood, big leaf maple, Pacific Madrone, and willow. Shrubs present include ceanothus, hazel, and poisonoak. The creek initially flows through a moderately steep narrow valley, and then into a moderate gradient area where the channel becomes moderately confined. The creek bed consists of sand, gravel, and cobble, with only little evidence of fines. Shading is high. The riparian recruitment situation for this stretch of the creek is described as *adequate*.

The last ½ mile of creek (RCU's S13 through S16) contains a recruitment zone that is reduced to 10 to 15 feet in width, but with similar vegetation present as found in the upper 1½ miles, and flowing within the same channel habitat type. The density of residential housing increases in the last section of creek, with an increase in roadways, tree damage, and forest fragmentation. The riparian recruitment situation for this creek segment is described as *development*.

5.5.2.5. Walker Creek Vegetation Zones. The first 2 miles of Walker Creek (RCU's W1 through W18) fall into the upland forest vegetation zone. The riparian recruitment zone measures 20 to 25 feet in width, with primary tree species including cottonwood, white alder, big leaf maple, and Pacific Madrone. Shrubs present include hazel, dogwood, willow, poisonoak, ceanothus, blackberry, and mock orange. The creek initially flows through a moderately steep narrow valley, and then into a moderate gradient area where the channel becomes moderately confined. The creek bed consists of sand, gravel, and cobble, with only little evidence of fines. Shading is high. Rock quarries/gravel pits exist along this creek section, and there is evidence of high use along the road in this area. A potential wetland enhancement area is located near the headwaters. Despite the issues that exist, the riparian recruitment situation for this stretch is described as *adequate*.

The next 1½ miles (RCU's W19 through W30) fall into the forest/urban interface vegetation zone. The recruitment zone slowly reduces to 10 to 15 feet in width, and tree species give way to shrubbery, with blackberry bushes dominating. Pines give way to widely dispersed hardwoods. The channel flows along a low gradient and within a medium floodplain. Residences density increases, and buffers vary. The recruitment situation for this section of creek is described as *development*.

The remaining mile of Walker Creek before it joins Jackson Creek (RCU's W31 through W38) falls into the urban/ag interface vegetation zone. The recruitment zone remains at 10 to 15 feet in width, and is dominated by dense blackberry bushes. Residences give way to agricultural land, and buffer areas vary. Several irrigation diversions/returns cause the creek flow to vary dramatically. A possible wetland enhancement project exists at Hanley Farms, an historical farm in that area. The recruitment situation for this segment of creek is described as *agriculture*.

5.6. Element 6: Wetlands Assessment.

This section contributed by Jeff McLaughlin, Engineer, USBR, Boise, Idaho.

5.6.1. Wetland Characterization and Mapping. Wetland areas within the Jackson Creek Watershed were identified through using aerial photos, National Wetland Inventory maps, and 7.5 minute quadrangle maps, ranging from its headwaters through Jacksonville and Central Point to its confluence with Bear Creak. A majority of the wetlands identified are on private property, which were viewed from public roadways. A field visit was made to verify observations and evaluate conditions. The following attributes were recorded:

- Location and size (in acres) of the wetlands
- Surface water connections between the wetland and a stream
- Cowardin Classification code
- Characteristics of buffer zone
- Restoration/ Enhancement potential

Each wetland area identified was assigned an identifying number, consisting of Section-Township- range and identifying number for the wetland. Identified wetlands were plotted on NWI maps, 7.5 minute quadrangle maps and aerial photos. Each wetland was classified under the Cowardin Classification Code which consist of three letters. The first letter represents the class (e.g., palustrine, riverine, etc.). All the wetlands in this watershed fell into the palustrine class (P). This classification includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per thousand. The subcategories under this class has two letters and are as follows:

EM = Emergent: Dominated by rooted herbaceous plants, such as cattails and grass
FO = Forested: Dominated by trees taller than 20 feet
OW = Open Water: No vegetation evident at the water surface
SS = Scrub-Shrub: Dominated by shrubs and saplings less than 20 feet tall
UB = Unconsolidated Bottom: Mud or exposed soils

Each wetland area was then given a code to list the dominant land use within 500 feet of the wetland edge. The following codes were used:

FO = forest or open space
AG = agriculture (pasture, crops, orchards, range land)
R = rural (mixed or small scale agriculture, forest, and/ or rural, residential)
D = developed (residential, commercial, industrial)

Complete data tables and supporting information for the wetlands assessment are located in the Technical Supplement.

5.6.2. Wetlands Enhancement.

The assessment revealed only a few existing wetlands that are candidates for rehabilitation or enhancement in the Jackson Creek watershed. Most of the wetlands noted are mostly farm ponds or small wetlands confined by development on all sides. A few sites (6 to 8) warrant further study. One area that is a possible site for wetlands work is the old reservoir above the town of Jacksonville, which is largely silted in. There are several additional sites below the town of Jacksonville that are also candidates for restoration or enhancement.

The best options for creating new wetland areas involve reestablishment of flood plain wetlands and benches, or creation of new wetlands outside of the flood plain using irrigation canals, stormwater, or other sources to supply water, although obtaining water rights for wetlands can be problematic. The flood plain wetlands should be studied and incorporated into overall plans for the creek channel including vegetation management, flood flow studies, and fish passage issues. Flood plain wetlands can be of great benefit to native and anadromous fish particularly from the standpoint of providing rearing areas for juvenile fish and also as productive sources of aquatic insects and other fish food.

Given the extensive irrigation system throughout the lower portion of the basin, wetlands could be created almost anywhere where there is a source of either irrigation or drain water. Seed banks of wetlands plants are found in most agricultural soils and small berms, and excavations can contour the site to meet specific needs without harm to adjacent lands. The specific wetland design can be tailored to meet the goals of the project including creation of waterfowl and shorebird habitat, water quality improvement, increasing groundwater supplies, and any other needs identified by the SAC. Since most of the land within Jackson Creek is privately owned, agreements with landowners will be required for most wetlands development. Any wetlands using irrigation or drainage water will require new water rights, which must also allow for the seasonal irrigation water supply. Constructed wetlands tend to have relatively low maintenance costs associated with them, however, they are not maintenance free. Long term planning for water control and vegetation management is required. Costs for created wetlands are typically reasonable but vary from site to site depending on the size of the project and the complexity of the water delivery system.

5.2. Element 2: Channel Habitat Type (CHT) Assessment.

Information for this section contributed by Stephanie Eisenbarth, Environmental Engineer EIT, USBR, Boise .

5.2.1. Methodology. Aerial photos obtained from the Bureau of Land Management were used to identify and assess channel habitat type on Jackson Creek. The data were coded on 7.5 minute quadrangle maps, and marked on Mylar cover-sheets, along with various tributaries, towns, riparian condition units, channel modification sites, and gradient class segments. A field visit was made to verify and evaluate conditions on-site.[1]

Six gradient classes were used and they are expressed as a percent of gradient (for example, a stream that drops 10 feet in elevation over 100 linear feet of streambed has a 10% gradient):

Class 1 <1%	Class 2. 1-2%	Class 3. 2-4%
Class 4. 4-8%	Class 5. 8-16%	Class 6. >16%

Channel confinement was estimated according to the definition used in the OWEB watershed manual, which is *"the ratio of the bank-full width to the width of the modern flood plain."* [2] Bank-full width is defined as "*the width of the channel at the point at which over-bank flooding begins*." Confinement classes are defined as follows:

Confinement Class	Flood plain Width
Unconfined	>4 x bank-full width
Moderately Confined	>2 x but <4 x bank-full width
Confined	<2 x bank-full width

Once the gradient and confinement classes were determined, creek segments were then given a CHT designation, and CHT abbreviations.

5.2.2. Findings. Approximately 9.7 miles of creek within the Jackson Creek watershed are categorized within channel habitat types with high potential for riparian enhancement. These CHT's include low and moderate gradient channels with moderate confinement (LM, MM). The main stem of Jackson Creek, as well as each of the major tributaries, contains creek segments that fall within these CHT categories.

Low and moderate gradient channels are very responsive to enhancement activities, due often to their location within the watershed that provides a combination of active flood plain and hill-

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[1] The watershed was visited on July 6th, 2000, to validate the riparian, wetland, and channel modification assessments. The team consisted of a Biologist, Geologist, and a Field Technician, and was assisted by the Jacksonville Forester, Paul Kangas. Additional information was provided from a study by Rob Burns, USFWS.

[2] Oregon Watershed Assessment Manual. Oregon Watershed Enhancement Board, July 1999. p. III-8.

slope or terrace controls. These channels have the benefit of a flood plain that allows for both lateral and vertical movement of the creek. Possible enhancement could include bank stabilization, increased vegetation diversity within the less forested areas, and the addition of roughness features (large wood/debris and boulders) within the more forested areas.

Six channel habitat types recognized by geomorphologists, were found within the Jackson Creek Watershed, and are listed and defined as follows:

LOW GRADIENT CONFINED (LC)

- Stream gradientC<2%
- Valley shapeClow to moderate gradient hill slopes with limited flood plain
- Channel patternCsingle channel, variable sinuosity
- Channel confinementCconfined
- Oregon stream sizeCmedium to large
- Position in drainageCmiddle to lower end of drainage basin
- Dominant substrateCcobble to bedrock
- Channel responsivenessClow (controlled, incised creek-bed; low sensitivity)
- Riparian enhancement opportunitiesClow

LOW GRADIENT MEDIUM FLOOD PLAIN (FP2)

- Stream gradientC<2%
- Valley shapeCbroad, flat, or gentle landforms
- Channel patternCsingle to multiple channels, sinuous
- Channel confinementCunconfined
- Oregon stream sizeCmedium to large
- Position in drainageCmiddle to lower end of drainage basin
- Dominant substrateCsand to cobble
- Channel responsivenessChigh (high sensitivity)
- Riparian enhancement opportunitiesClow (unstable)

LOW GRADIENT MODERATELY CONFINED (LM)

- Stream gradientC<2%
- Valley shapeCbroad, generally much wider than channel
- Channel patternCsingle, with occasional multiple channels
- Channel confinementCvariable
- Oregon stream sizeCvariable, usually medium to large
- Position in drainageCvariable, often main-stem and lower end of main tributaries
- Dominant substrateCfine gravel to bedrock
- Channel responsivenessChigh (dynamic system, high sensitivity)
- Riparian enhancement opportunitiesChigh (high predictability, longevity)

MODERATE GRADIENT MODERATELY CONFINED (MM)

- Stream gradientC2 to 4%

- Valley shapeCnarrow valley with flood plain, or narrow terrace development
- Channel patternCusually single channel, low to moderate sinuosity
- Channel confinementCvariable
- Oregon stream sizeCvariable, usually medium to large
- Position in drainageCmid to lower portion of drainage basins
- Dominant substrateCgravel to small boulder
- Channel responsivenessChigh (dynamic system, high sensitivity)
- Riparian enhancement opportunitiesChigh (high predictability, longevity)

MODERATE GRADIENT HEADWATER (MH)

- Stream gradientC1 to 6%
- Valley shapeCopen, gentle V-shaped
- Channel patternClow sinuosity to straight
- Channel confinementCconfined
- Oregon stream sizeCsmall
- Position in drainageCupper, headwater
- Dominant substrateCsand to cobble, bedrock
- Channel responsivenessCmoderate (moderate sensitivity)
- Riparian enhancement opportunitiesCmoderate

MODERATELY STEEP NARROW VALLEY (MV)

- Stream gradientC4 to 8 %
- Valley shapeCnarrow, V-shaped
- Channel patternCsingle channel, relatively straight
- Channel confinementCconfined
- Oregon stream sizeCsmall to medium
- Position in drainageCmid to upper
- Dominant substrateCsmall cobble to bedrock
- Channel responsivenessClow (high stability, low sensitivity)
- Riparian enhancement opportunitiesClow

Table 5.0. Channel Habitat Types of Jackson Creek and Tributaries.

Drainage	River Mile	Channel Habitat Type
Mainstem Jackson Creek	0.00 to 3.75	Low Gradient Confined (LC)
	3.75 to 8.30	Low Gradient Medium Floodplain (FP2)
	8.30 to 9.90	Low Gradient Moderately Confined (LM)
	10.00 to 12.20	Moderate Gradient Moderately Confined (MM)
	12.20 to headwaters	Moderate Gradient Headwaters (MH)
South Fork Jackson Creek	0.00 to 1.00	Moderate Gradient Moderately Confined (MM)
	1.00 to headwaters	Moderate Steep Narrow Valley (MV)
Walker Creek	0.00 to 2.10	Low Gradient Medium Floodplain (FP2)
	2.10 to 2.50	Low Gradient Moderately Confined (LM)
	2.50 to 3.00	Moderate Gradient Moderately Confined (MM)
	3.00 to headwaters	Moderate Gradient Headwater (MH)

Note: The Channel Habitat type of Dean, Horn, Niedermeyer Creeks, and Miller Gulch, Sailor Gulch, Norling Gulch, and Cantrall Gulch were not measured.

5.2.3. Information Needs. Channel habitat types for most of the tributaries in the Jackson Creek watershed were not assessed (see above), and a detailed Rosgen survey is needed for both CHT and channel modifications. Most tributaries are ephemeral (seasonal) and subject to erosion, which needs to be controlled through vegetative controls.

5.10 Element 10. Fish and Fish Habitat Assessment.

Information for this section contributed by Alan Ritchey, Fisheries Biologist, ODFW.

Historically, Jackson Creek probably supported an active salmonid and trout fishery, reaching up to the foothills. Habitat quality has declined since settlement from problems associated with decreased water quality, quantity, and instream barriers. Today, steelhead have been observed only as far as Hanley Road and adjacent tributaries. The lower portion of Jackson Creek and tributaries support some anadromous fish habitat.

5.10.1. Fish Survey Methodology.

Fish use in Jackson Creek was investigated by ODFW in the spring of 1999 using backpack electrofishers to determine the upstream limit of salmonid fish use. This equipment works by temporarily stunning any fish in the vicinity of the electrofisher and allowing the operator to examine any fish present.

5.10.2. Fish Species and Location.

Native salmonids are cold water fish preferring temperatures below 64°F during the summer. As water temperatures increase above 68°F, salmonid condition and survival decreases. The oxygen level in water decreases and fish metabolism increases as water temperatures rise. The virulence of many pathogens present increases with higher water temperatures as well.

Three anadromous fish species may have been or are present in Jackson Creek (see table 5.8 below). Steelhead are an anadromous fish, spending a portion of their life cycle in both fresh water and salt water (see table 5.7 below). Summer steelhead spawning is concentrated from January to March. These fish spend 1-3 years in fresh water and 1-2 years in salt water prior to spawning. After only 2-4 months in salt water, a percentage of summer steelhead make a false spawning run. These fish called "half-pounders" overwinter in freshwater before migrating back to the ocean. Small streams and tributaries that tend to dry up in the summer are important summer steelhead spawning streams. Steelhead in the Rogue Basin have been petitioned for listing under the Endangered Species Act, but in both 1998 and 2001, the National Marine Fisheries Service (NMFS) determined a listing was not warranted.

Fall chinook spawning is concentrated from September through October. These fish generally migrate to saltwater in their first year and spend 1-4 years there. This species was also petitioned for listing under the Endangered Species Act. In 1999, NMFS determined this listing was not warranted.

Coho salmon have not been documented in Jackson Creek, but were likely present historically. In 1990 the State of Oregon listed all coho salmon south of the Coquille River, including the Rogue as "sensitive, classification: critical". Coho salmon were listed as "Threatened" in the Rogue Basin under the Endangered Species Act in 1997.

Table 5.7. Timing of Summer Steelhead Life Cycle Events for the Rogue Basin

Life Cycle	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma y	June	July	Aug	Sept
Early-run adult migration								**X**	**X**	**X**		
Half-pounder migration											**X**	**X**
Late-run adult migration	**X**										**X**	**X**
Adult spawning			**X**	**X**	**X**	**X**						
Eggs/fry emerge						**X**	**X**	**X**	**X***			
Fingerlings/ rearing	**X***	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X***	**X***	**X***	**X***
Juvenile migration		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X***	**X***		
Smolt out-migration							**X**	**X**	**X**			

X Indicates presence at the life cycle month stage.
X* Indicates *severe* *limiting* *factor* condition in the life cycle month stage.
(Determination by technical committee.

Summer steelhead fry emerge from the gravel in April and May, then migrate to the mainstem in May and June as the natal streams dry up. Smolts generally migrate downstream from March through June.

Table 5.8. Fish Status of Jackson Creek and Tributaries **(Surveyed Tributaries only).**

Note: All streams in the Jackson Creek watershed are ephemeral in some sections during summer months, thus fish presence is affected by this condition.

Stream	Fish Species	Barriers - River Mile
Jackson Creek Flows: Perennial	0.5 m Chinook 4.4 m Summer Steelhead 7 m Trout	RM 0.5 - culvert RM 1.0 - dam RM 1.5 - board dam RM 2.0 - board dam RM 4.4 - Hanley Rd. culvert RM 7.0 - dam RM 10 - Jacksonville Reservoir
Jackson Ck. Trib A Flows: Intermittent	1.4 m Summer Steelhead Sunfish	
S. Fork Jackson Creek Flows: Intermittent	None Observed	
Dean Creek Flows: Perennial	2 m Summer Steelhead Sunfish	RM 2 - Barrier
Dean Ck. Trib A Flows: Intermittent	0.3 m Summer Steelhead	RM 0.3 - Barrier
Cantrall Gulch Flows: Intermittent	None Observed	
Miller Creek Flows: Intermittent	Not Assessed	
Niedermeyer Creek Flows: Intermittent	Not Assessed	
Norling Gulch Flows: Perennial	Not Assessed	
Sailor Creek Flows: Intermittent	Not Assessed	
Walker Creek Flows: Intermittent	Not Assessed	

Anadromous fish use in Jackson Creek was documented to the Hanley Road crossing at river mile 4.4 where juvenile steelhead were observed just downstream from the riffle associated with this structure (ODFW, 1997). This road crossing culvert is not adequate to pass fish at most if not all stream flows. Steelhead were also documented in an unnamed tributary to Jackson Creek up to the Hopkins Canal crossing at river mile 1.4. This stream, identified as "Trib A to Jackson Creek", also contained Green Sunfish. Fish use in Dean Creek extended to a diversion dam at river mile 2.0. Steelhead were observed below the structure. Green Sunfish were found above the structure, but no salmonids. Two unnamed tributaries to Dean Creek were also documented with steelhead presence. Steelhead were found in "Trib A to Dean Creek" up to an irrigation ditch at river mile 0.3. Steelhead were observed in "Trib C to Dean Creek" up to river mile 0.1. Above this, stream access was denied by the landowner and the upstream limit of fish use could not be determined. An adult Fall Chinook was observed in Jackson Creek by ODFW staff in 1997 downstream from the Interstate 5 culvert. In 1997, three sites on Jackson Creek in and above the town of Jacksonville were surveyed for fish use and found not to be fish bearing. No fish were observed in South Fork Jackson Creek or Cantrall Gulch during 1997 surveys.

Green Sunfish were found at two sites in Jackson Creek. This introduced species is not believed to have a strong interaction with native salmonids. Green Sunfish prefer water temperatures between 68-82°F, thus can tolerate quite warm water.

Jackson Creek is not currently stocked with hatchery fish. Historical stocking could not be confirmed but may have occurred at some point. There is also no angling allowed on Jackson Creek to protect the limited fish production that occurs.

5.10.3. Fish Habitat Conditions. A detailed habitat survey of Jackson Creek does not exist at this time. The lack of this information creates a data gap that prevents a thorough assessment of fish habitat in Jackson Creek. The lower 4.75 stream miles were walked in 1973 by ODFW and a narrative of that survey is available. Due to the years that have passed and the lack of detail provided, this survey was not used to express current habitat conditions. However, some historical information about Jackson Creek as of 1973 can be obtained from this survey:

- Similar to present day, the road crossing at Hanley Road was considered a barrier to "most upstream fish passage".
- The stream was primarily composed of riffles with very few pools. The half mile surveyed above the Hanley Road culvert was found to have the best habitat of the area surveyed.
- Two separate sections had been channeled with all pools eliminated.
- Two flashboard irrigation diversions existed at stream miles 1.5 and 2.0. Both of these diversions were operating without fish screens.
- A number of septic systems were spilling into the creek.
- Five steelhead redds were observed in the section of creek that parallels Hanley Road downstream of the crossing.

Jackson Creek flows through the cities of Jacksonville and Central Point where development continues to occur that impacts the water and vegetation associated with this creek. City utility departments often remove debris from stream channels to prevent its accumulation in culverts, but this practice is counter productive to the benefits that the same debris provides for fish, by creating habitat cover and pool creation from scouring. Development along Jackson Creek has also led to the removal of riparian vegetation that is important for the shade, future habitat recruitment, and sediment control it provides.

5.10.3.1. Barriers to Fish Migration. Water flow in Jackson Creek can be regulated by a local irrigation district during the irrigation season. Flow is increased and decreased to meet the needs of district water users. Some users receive water from the canal system, while others divert water from the creek. The irrigation district must supplement stream flow with "out of basin" water to meet these requirements.

Water can be imported to Jackson Creek from diversions in the Little Butte and Bear Creek systems. If proper fish screening is not maintained, there is an opportunity for out of basin fish to be relocated to Jackson Creek with the irrigation water. It is not known to what extent this has occurred in the past or might still be occurring.   Fish passage is also stopped when the irrigation district installs flash board dam structures to divert water into irrigation canals. This is an annual event that occurs during the irrigation season of April 1-October 31. These structures are located at river miles 1.5 and 2. Others exist above known fish usage. There is an effort underway to modify district activities in Jackson Creek that will provide fish passage around these structures.

There are still water diversions operating in Jackson Creek without fish screens sufficient to protect juvenile fish from entering irrigation channels. A percentage of fish produced in Jackson Creek are likely lost every year due to the lack of fish screening devices on diversion structures. Fish screening efforts have improved from years ago due to advances in screening technology and government programs to assist users with the cost associated with installing fish screen devices.

Jackson Creek has a number of obstacles to fish passage besides those associated with the irrigation district. The seven public road crossings on Jackson Creek from the mouth to Hanley Road were investigated as a part of this assessment. The culverts at Interstate 5, Highway 99, and Taylor Road were found likely to be seasonal barriers depending on flow conditions. The Hanley Road culvert is considered a barrier to upstream passage in most years. There may be other barriers associated with private drives or diversions that would be identified should a complete habitat survey be conducted in the future.

5.10.4. Findings, and Future Data Needs.

Fish habitat and access to habitat in Jackson Creek and tributaries have been degraded by a number of factors related to human development in the watershed. While anadromous and resident fish are believed to inhabit portions of Jackson Creek, their current levels would likely increase with improved habitat conditions, water quality, water flow, and removal of barriers. ODFW recommends that Jackson Creek watershed improvements be oriented toward improving water quality/quantity first, as this would have the greatest beneficial impact on fishery productivity. More recent and complete fish population and habitat surveys are needed on Jackson Creek and tributaries.

5.7. Element 7: Sediment Sources Assessment.

Information for this section contributed by Paul Measeles, Hydrologist, Oregon Department of Agriculture.

Sediment sources in the Jackson Creek Watershed were identified in this assessment by reviewing available literature, talking to knowledgeable parties, running an erosion prediction model, and by limited field surveys. Relevant literature consisted of broadly scoped descriptions of the Bear Creek and Rogue River systems.

There have been several soil disturbance regimes in the history of the Jackson Creek watershed, ranging from extensive mining in the late 1800s, multiple timber harvests, livestock grazing, installation of agricultural drainage and canals, and road construction. The Jackson Creek watershed is mostly composed of soils derived from felsic intrusive igneous rocks.[1] These soils are predominantly coarse sandy and/or gravelly loams with relatively high infiltration rates (2 to 4 inches per hour) (USDA NRCS, 1989). The expected 25 year rainfall event in the basin is between 3.5 and 4.0 inches in 24 hours (NOAA, 1993), therefor runoff events are infrequent on undisturbed slopes. Grain size distributions of the soils have silt and clay fractions mostly of 30% or less (USDA NRCS, 1993), which means less of the soil profile is available to be transported with low energy flows. However, coarse sandy and/or gravelly loams also have low cohesive strength, so they can be more susceptible to physical disturbances such as vehicle and livestock traffic. Physical disturbances could therefore lead to increased erosion potential.

5.7.1. Sediment Source Assessment Methodology.

The Soil and Water Assessment Tool (SWAT), which is discussed in detail in the Hydrology section of this report, was also applied to estimate the amount of erosion that could result from agricultural land. Parameters used in this model were obtained by the Oregon Water Resources Department from in-house databases.

The field surveys consisted of visual examinations of a large percentage of the basin accessible from public roads. No field survey work was done upstream of the Jacksonville City Reservoir because this water body functions as a sediment trap for the upper watershed. Very little of the South Fork Jackson Creek drainage was visually assessed, due to time constraints. Most of the field survey work was done in mid-May 2000. One storm event which produced 0.16 inches of rain in 24 hours occurred the day before the field survey began.

Information supplied by the City of Jacksonville on their reservoir showed that it originally had been built with a capacity of 76 acre-feet in 1917, but by 1999 its capacity had been reduced to 7 acre-feet, indicating that 69 acre-feet of sediment have accumulated in the reservoir. Based on calculations from topographic maps, the source area for the reservoir is approximately 2,200 acres. Assuming a uniform and constant sedimentation rate over time, this would amount to a sediment loss of 0.005 inches per year for 82 years, or a total ground lowering of about 0.4

[1] USDA Soil Conservation Service, 1993, Soil Survey of Jackson County Area, Oregon.

inches of sediment throughout the 2,200 acres.

5.7.2. Identified Sediment Sources.

Current sediment sources identified in the Jackson Creek watershed were categorized as follows:

1. **Construction activities** -- all types of development-related earth moving and soil disturbing activities, with the exception of road-related sources
2. **Irrigation ditch sediment** -- erosion occurring within a ditch, and the sediment load from other sources that is carried by ditch water flow
3. **Agricultural runoff erosion** -- sediment mobilized on agricultural land, though not necessarily transported to a stream
4. **Road-related erosion**
5. **Quarry drainage** B sediment transported off of active and inactive quarries
6. **Forested land erosion** -- sediment mobilized on forested land, irregardless of timber harvest
7. **Streambank erosion** -- past erosion, and signs of instability which would suggest more erosion in the near future
8. **In-channel erosion** -- re-mobilization of sediment in channels, though not in irrigation ditches

Note that this sediment source assessment is not a sediment budget. Considering time restraints for this project, it was not possible to do a quantitative assessment of sediment movement through the watershed. Instead, this assessment was intended to describe the relative importance of the sediment sources identified.

5.7.2.1. Construction Activities. Construction activities can be a source of sediment in a variety of ways, including placing fill in areas where it is likely to be transported to a stream during a storm or irrigation event, and removing vegetation and re-contouring landscapes so that disturbed soil can be more readily transported during storms. During the field survey some indications of construction-related sediment sources were identified, primarily in rural-residential areas. These consisted of fill placed without erosion control, so that sediment could move via sheetwash to streams; landscaping activities occurring near streambanks so that irrigation of plants would transport sediment; and earth moving activities occurring near drainage ditches without erosion control in place. None of these sediment sources were actively eroding during the time of the field survey, though they had the potential in a moderate storm event. Based on the time the survey was completed, general field observations suggest that construction activities are not a major contributor of sediment.

5.7.2.2. Irrigation Ditch Sediment. The Jackson Creek Watershed includes some 8.5 miles of main irrigation ditches which are used to divert and convey water from upslope streams and from upper portions of Bear Creek. At least five of these ditches drain into and/or cross Jackson Creek. Field observations suggested that most of these ditches have at least partially vegetated banks, and no indications of bank failure were observed. No spoils were observed piled alongside the ditch banks. Most of the ditch flow observed was carrying significant suspended sediment loads when compared to the suspended sediment load visible in Jackson Creek upslope of Jacksonville. Jackson Creek was running with little visible suspended load until reaching the confluence with an irrigation ditch (the Phoenix Canal) at milepost 34 along Highway 238. This confluence is also a diversion point, so that the ditch actually crosses through Jackson Creek, and some of the ditch flow is captured by the creek. During the field survey Jackson Creek was observed to be carrying suspended sediment from this point downstream to its confluence with Bear Creek. As mentioned above, at least four other ditches drain into the creek below Jacksonville.

Sediment load carried in the ditches has the same sources as those for Jackson Creek. Representatives of the Medford Irrigation District contacted as part of this assessment said that their ditches normally catch sediment-laden winter runoff from upslope sources. The ditches do not carry flow in the winter, so runoff deposits sediment, which is re-mobilized during irrigation season. The Medford Irrigation District said that much of this sediment is dammed up at their ditch gates and diversion dams, and released gradually during the irrigation season.

5.7.2.3. Agricultural Runoff Erosion. As stated previously, agricultural runoff erosion in this assessment refers to sediment mobilized on agricultural land, though not necessarily transported to a stream. Using this definition of agricultural runoff erosion enables the use of models like SWAT (previously described), which in turn is based on the Modified Universal Soil Loss Equation (MUSLE). This equation addresses sheet and rill erosion, but does not account for other erosion processes which may occur (e.g., gullying, soil creep, shallow sliding, dry ravel). No erosion scars or active erosion events involving processes other than sheetwash and rilling were observed on agricultural land during the field survey.

As of 1999, most of the agricultural land in production in the Jackson Creek watershed was being used for orchard, pasture, hay, and nursery crops. Generally, agricultural practices associated with these crops are at the lower end of the erosion potential hazard, as calculated using MUSLE-type equations (like the universal soil loss and revised universal soil loss equations). According to SCS soil surveys, soils mapped in agricultural land in the watershed are also considered to have a moderate to low erosion potential. Considering the crops, soil types, climate, and slopes in the watershed, the SWAT model calculated that agricultural runoff erosion would be less than 0.5 tonnes per hectare (less than 0.2 tons per acre).

5.7.2.4. Road-related Erosion. Road-related erosion involves all erosion processes and sources associated with road design, placement, and maintenance. This includes paved roads as well as dirt roads. Road-related erosion processes are varied, and involve both the roadbed and areas away from the roadbed as sediment sources. During the field survey, many road-related erosion problems were visible. These included the following:

> **Road ditches** - Road ditches in many areas of the watershed have partially blocked culverts and sediment deposits within the ditch. Both of these signs indicate erosion and transport of sediment within the road ditch network.
>
> **Road ditch drains** - Road ditch drains that were erosion problems were culverts discharging water from the road ditches away from the roadbed. Five of these were observed causing gullying of the slopes below the roadbed on the upper part of John's

Peak Road. Others were observed at the upper sections of Livingston Road.

Flow diversion and channeling - Road beds can divert flow from one area to another, thus concentrating water in a drainage not naturally sized to handle the increased flow. They can also channelize flow, leading to rilling and/or gullying of the roadbed. This was observed on some steeper portions of dirt roads within the watershed.

Stream crossings - These features can supply sediment directly to streams if they are not designed carefully. The fill used in stream crossings can readily impact streamflow, and the culvert pipe (or other water conveyance structure) can cause scouring of the streambed. One stream crossing was observed on an abandoned spur off of John's Peak Road with a partially-blocked culvert and noticeably eroding fill. Two other stream crossings - at Bridge 114 along Hanley Road, and the crossing at Ross Lane - were observed to have created large scour pools due to poorly designed water conveyance. Based on their appearance, there probably is very little sediment available to be transported from these areas, because the channels seem to have already adjusted to the increased flow energy.

5.7.2.5. Quarry Drainage. None of the quarries identified during the field survey were assessed first-hand, because access to private property was restricted. Stream channels visible downstream of four of the identified quarries did not show significant sediment loads. Ben Mundie, the geologist with the Mined Land Reclamation division of the Oregon Department of Geology and Mineral Industries (DOGAMI) responsible for inspections in Jackson County, stated that stormwater discharges from quarries historically have not been a problem in the Jackson Creek watershed, and current problems could largely be controlled through implementing "best management practices." The area should be monitored for future change in effects.

5.7.2.6. Forest Land Erosion. Forest land assessed during the field survey had few indications of erosional processes that would supply sediment to streams. No shallow or deep-seated landslide scars were observed, and the only gullying observed was the result of road drainage. Considering the nature of the soils, climate, and steepness of the upper watershed slopes, dry raveling could be a significant erosion process in forested lands, however, this process usually does not transport sediment to streams at a significant rate. Because of these factors, physical disturbances would have to occur to erode and transport significant loads of sediment from forest land. Physical disturbances are often associated with timber harvest operations, but at the time of the field survey nearly all harvest operations were taking place upstream of the Jacksonville Reservoir. There apparently have also been some recent timber harvest operations in the South Fork Jackson Creek drainage area, but this area was not visited due to time constraints.

5.7.2.7. Streambank Erosion. Streambank erosion for this assessment consists of the non-wetted portions of the channel (as observed in mid-May 2000) and the riparian zone of the stream. Factors that normally affect streambank erosion include natural strength of the soils, existence of vegetation with significant root mass, height and steepness of banks, energy of streamflows, and human/animal disturbances (including burrowing).

Most of the Jackson Creek channel downstream of the reservoir has been channelized (i.e., straightened and confined). Further, in most of the reaches, streams in the watershed have been disconnected from wetlands and floodplains. Most of the main tributaries observed have also been channelized within approximately one mile of their confluence with Jackson Creek. Rip-rap was observed through most of the urbanized areas of the stream, with a lesser amount in the reaches paralleling Highway 238. These areas would be prone more to in-channel erosion in the short term, though some bank failures were apparent in the reach paralleling Highway 238.

Lower reaches of Jackson Creek, below stream mile 4, are entrenched with bank heights reaching around 15 feet. These reaches have the potential to contribute sediment directly to the stream by bank failure due to over steepening, no matter how well vegetation is established. During the field survey there was some indication of recent bank failures in these areas, though these failures appeared to be (recently) impacting a relatively small amount (<5%) of the banks. Most of the reaches upstream of stream mile 4 had riparian vegetation sufficient to protect the streambanks from large-scale bank erosion, with the exception of the reach paralleling the highway. There were no indications of significant human/animal impacts, and it did not appear as if the energy of the stream would exceed the bank strength.

5.7.2.8. In-channel Erosion. In-channel erosion transports sediment previously deposited in a stream channel. Channel sediment deposits can be the primary source of suspended sediment in stream flow. Most of Jackson Creek and the few non-ditched tributaries observed had little indication of sediment accumulations in their channels (though it should be noted that the only areas where the channel bottom was visible was where the water was flowing clear). This implies that the stream is able to transport the majority of its sediment load to areas below Jacksonville. As noted previously, much of Jackson Creek has been channelized, resulting in increased sediment transport where a streams channel has been shortened (and therefore steepened) due to channeling. There may be sediment accumulations in the lower gradient reaches of the stream, most likely downstream of the Ross Lane crossing. Sediment deposited in irrigation ditches was previously discussed above.

5.7.3. Summary, and Future Data Requirements.

Considering the information obtained during this assessment, road-related erosion and irrigation ditch sediment appear to currently be the largest sources of sediment delivered to Jackson Creek. There is some indication that irrigation ditch sediment is in part the result of road-related erosion. Future research into sediment sources should involve a quantification of the road density in the basin, and a quantification of the amount of past erosion associated with these roads. A road-related erosion survey could be coupled with prescriptive treatments to address specific problem sites (e.g., replacing a failing culvert, outsloping a stretch of road, etc.) A detailed assessment of irrigation ditch networks should be done, along with an evaluation of the sediment sources to the ditches to determine if their sediment load from road-related, in-channel erosion, or other upslope sources.

A general field survey of the basin should also be done during or right after times of significant rainfall - preferably during the first large storms of the fall season to catch first-flush events. This would provide direct information on the importance of surface erosion from construction sites and agricultural land. As discussed previously, these types of land use did not appear to be major contributors of sediment, but there is a possibility that fall and winter management activities on these properties could mobilize more sediment than was apparent during the field survey done in May. Quarry drainage could also be more readily assessed during storms, with the assistance of DOGAMI to gain property access.

WILDFIRE ~ ISSUES AND CONCERNS:

This element was developed July 17, 2001 by the Jackson Creek Stakeholder Advisory Committee.

Wildfire is complicated by combination of problems:

1. Decades of fire prevention and vegetative growth has allowed forest and fuel density to reach unprecedented high level.
2. Many homes have been built and continue to be built in the forest interface, complicating fire control and causing increased risk of ignitions.

Forest access roads are important for fighting wildfire:

3. Adequate access to homes in the forest interface is needed for fire fighting.

Intense wildfire will usually cause the following:

4. Loss of stream, riparian and upland habitat and other natural resources.
5. Increased water temperature.
6. Increased erosion.
7. Increased peak flows.
8. Loss of setback of landscape vegetation.

Fuel break construction and maintenance are necessary to reduce the intensity and spread of wildfire.

9. Fuel breaks may not be as important, in a longer term, in a forest that successfully incorporates fire resilience.

The watershed needs to be made more resilient to damage by wildfire.

10. Reducing the density of vegetation in forested areas, including ladder fuels.
11. Growing larger trees that are mor fire resistant.
12. Converting brushfields to forested areas.

Water sources need to be developed and maintained for fire fighting.

Education in fire safety, prevention, spread and control of wildfires is needed for landowners in the watershed.

7.2 Next Steps.

The Jackson Creek Watershed Stakeholders Advisory Committee is responsible for implementing the Jackson Creek Watershed Action Plan. The watershed restoration and protection ratings provide the basis for identifying and implementing watershed restoration actions for the near future. The SAC and TAC will evaluate the restoration needs, develop a project prioritization process, and an action plan for implementation and funding. The action plan will also address existing data needs, and design a monitoring plan for filling data gaps and assessing the effectiveness of projects completed in the watershed.

The Action Plan will:

1. Identify geographically how issues will be addressed within the watershed, including identification of reach enhancement areas and prioritization of actions;
2. Identify and prioritize restoration actions and protections that link to goals and objectives of the Stakeholder Committee, and address data gaps and issues;
3. Identify community organizations and programs that will respond to actions identified;
4. Identify and implement continuing assessment and monitoring of environmental conditions in the Jackson Creek watershed.
5. Solicit and develop partners and cooperators in the watershed for project restoration activities.
6. Implement conservation activities in the watershed.

A schematic presentation of the Jackson Creek Action Planning process is presented on the following page.

Figure 5.7. DEQ 303(d) Decision Matrix for Jackson Creek **(Jackson Creek mouth to headwaters).**

Parameter	Criteria for 303(d) listing	Season	Basis for Listing	Supporting Data or Information	Rationale for Not Listing	Listing Status
Bacteria	Water Contact Recreation; Fecal coliforms standard	Year Round	In 305(b) Report (DEQ 1994); RVCOG (1990)	Annual Average Fecal coliforms data ranging between 386-623 did exceed standard (400) between 1998-1990. (RVCOG 1990)		303(d) listed
Dissolved Oxygen (DO)	Salmonid Spawning Dissolved Oxygen 11mg/L.	October 1- March 31	DEQ Data	DEQ Data Site 402802 RM 1.5 17% (1 of 6) October through March values exceeded spawning dissolved oxygen standard (11 mg/l or 95% saturation with a minimum of 8.7 between 1988-1989 (Cold water fishery, spawning approximately, Oct-Mar)	Did not meet listing criteria	OK Not listed
Nutrients			NPS Assessment Segment 275: moderate, observation (DEQ 1988)		No supporting data or information	Need Data
pH		Fall- Winter-Spring	DEQ Data	DEQ Data (Site 402802; Rm 1.5): 0% (0 of 8) FWS values exceeded pH standard (6.5-8.5) between WY 1989-95	Did not meet listing criteria	OK Not listed
pH		Summer	DEQ Data	DEQ Data (Site 402802; Rm 1.5): 0% (0 of 8) FWS values exceeded pH standard (6.5-8.5) between WY 1989-1995.	Did not meet listing criteria	OK Not listed
Sedimentation			NPS Assessment- segment 275: moderate, data (DEQ, 1988)		No Supporting data.	Need Data
Temperature	Salmonid Rearing 64 F, (17.8 C)	Summer	Bear Creek Temperature Study (ODFW, 1992)	ODFW Data (2 sites: Lower near mouth and Upper): Monthly Average maximums of 75, 76 , 78, 70, 73, 74, no data in July, August, September, October 1992.		303 (d) listed

Figure 7.1. Action Planning Process Overview

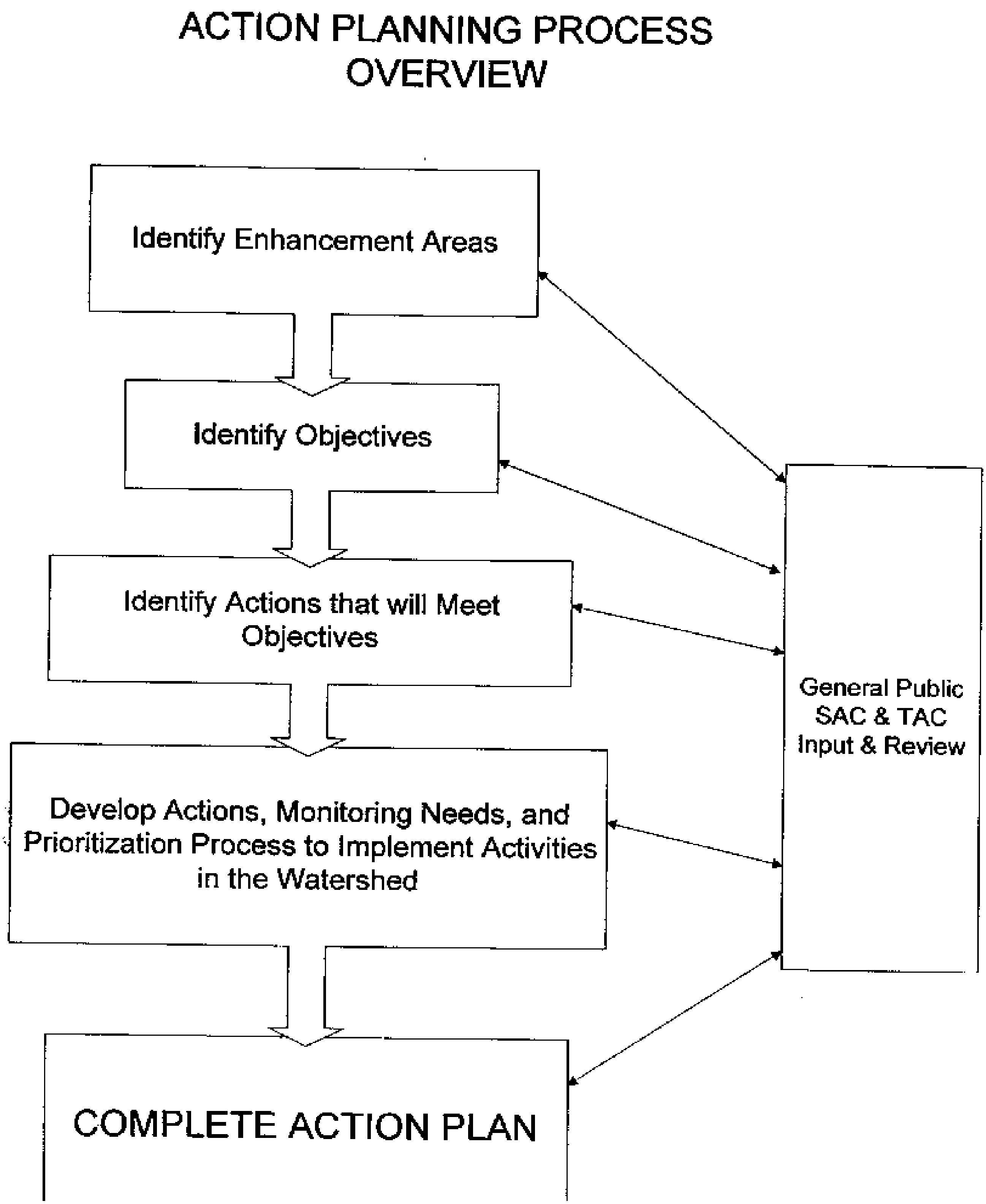

Table 2.1. Characteristics of the Jackson Creek Watershed.

Spatial Features:

Area:	25 Sq. miles	**Conveyance:**	Canals 8.5 miles	**Wetlands:**	61 wetlands ≥1 Acre;
			Roads 77 miles		10+wetlands ≤1 Acre
			Streams 35 miles		

Land use/Zoning Characteristics :

Aggregate	222 A.	Private Land holdings	14,626 A.
Commercial	2 A.	BLM Landholding	1,309 A.
Farm	4,267 A.	USFS Landholding	256 A.
Forest	7,924 A.		
Industria	l 7 A.		
Rural	2,048 A.		
Suburban	1,105 A.		
City	565 A.		

Table 2.2. Physical Features of the Jackson Creek Watershed.

Drainage Area	**16,191 acres**	**65.3 sq. km..**
Stream Length	**64,300 feet**	**19.6 km.**
Maximum Relief	**2,634 feet**	**803 m.**
Mean Slope	**20.7 percent**	**11.7 degrees**
Average Aspect	**111.6 degrees**	
Mean Elevation	**2,004 feet**	**611 m.**
Mean Annual Precipitation	**25 inches**	**634 mm.**

Table 2.3. Characteristics of the Jackson Creek Sub-basins.

Subbasin/Stream	Acres	Main Channel Length (ft.)	Minimum Elevation	Maximum Elevation	% land use/type
1. Dean Creek	1862	19,611	1,216	1,900	75% agricultural 25% forest
2. Horn Creek, Lower Jackson Cr.	4417	25,807 23,039	1,251 1,201	2,750 1,333	70% agricultural 29% forest 1% rural residential
3. Walker Creek	3356	18,285	1,400	3,080	30% agriculture 65% forest 5 % rural residential
4. Jacksonville	505	10,870	1,480	1,675	100% urban
5. Upper Jackson	6001	21,370	1,675	4,084	95% forest 5% wooded residential

Table 2.4. Population of Jackson County, Oregon.

Jurisdiction	Population 1997	Forecast 2000	Forecast 2006	Forecast 2015
Ashland	18,560	19,340	20,938	23,349
Central Point	10,750	12,685	15,912	20,607
Jacksonville	2,050	2,165	2,549	3,260
Medford	57,610	59,858	67,142	79,764
Phoenix	3,770	3,985	4,419	5,159
Talent	5,010	5,151	5,788	6,510
Rural		62,780	65,229	68,200
Jackson County	169,300	177,876	197,775	229,477

Source: "Our Region," Rogue Valley Council of Governments, 1998.

Table 5.0. Channel Habitat Types of Jackson Creek and Tributaries.

Drainage	River Mile	Channel Habitat Type
Mainstem Jackson Creek	0.00 to 3.75	Low Gradient Confined (LC)
	3.75 to 8.30	Low Gradient Medium Floodplain (FP2)
	8.30 to 9.90	Low Gradient Moderately Confined (LM)
	10.00 to 12.20	Moderate Gradient Moderately Confined (MM)
	12.20 to headwaters	Moderate Gradient Headwaters (MH)
South Fork Jackson Creek	0.00 to 1.00	Moderate Gradient Moderately Confined (MM)
	1.00 to headwaters	Moderate Steep Narrow Valley (MV)
Walker Creek	0.00 to 2.10	Low Gradient Medium Floodplain (FP2)
	2.10 to 2.50	Low Gradient Moderately Confined (LM)
	2.50 to 3.00	Moderate Gradient Moderately Confined (MM)
	3.00 to headwaters	Moderate Gradient Headwater (MH)

Note: The Channel Habitat type of Dean, Horn, Niedermeyer Creeks, and Miller Gulch, Sailor Gulch, Norling Gulch, and Cantrall Gulch were not measured.

Table 5-1. Surface, and Ground Water Use by Stream Reach on Jackson Creek.

Reach	Total (cfs)	Irrigation	Fish/Wildlife	Industrial/ Domestic
Surface/Stream Water				
Jackson Cr. > Bear Cr.	24.42	24.41	Water right applied for, but not granted	0.01
Dean Cr. > Jackson Cr.	0.75	0.74	0	0.01
Horn Cr. > Jackson Cr.	0.23	0.21	0	0.02
Walker Ck. > Jackson Cr.	1.21	1.21	0	0
Miller Gulch > S.F. Jackson Cr.	0.02	0	0	0.02
Rock Cr. > Miller Gulch	0.1	0.1	0	0
Ground Water				
Jackson Cr. > Bear Cr.	7.33	7.33	0	0
Dean Cr. > Jackson Cr.	0.6	0.6	0	0
Horn Cr. > Jackson Cr.	0.6	0.6	0	0
Jacksonville Reservoir (acre feet)	7	0	0	0
Total (cfs)	35.26	35.20	0	0.06

Source: Oregon Water Resources Department, 2000.

Note: Jacksonville Reservoir when constructed in 1903 was designed to retain 800 acre feet of water. Over the years the reservoir has filled in with sediment, and today retains approximately 7 acre feet of water.

Table 5-2. Water Availability for Jackson Creek at the 80% Flow Exceedance Level.

Month	Natural Stream Flow (cfs)	Net Minimum Flow(cfs)	Instream Water Rights (cfs)	Net Water Available(cfs)
1	6.1	5.63	14	-8.37
2	7.6	7.03	17	-9.98
3	7.03	6.55	14	-7.45
4	4.54	2.36	9	-6.64
5	2.86	-0.62	6	-6.62
6	1.65	-3.25	3	-6.25
7	0.57	-6.01	1	-7.01
8	0.33	-5.09	0.5	-5.59
9	0.27	-3.27	0.4	-3.67
10	0.3	-0.84	0.4	-1.24
11	0.71	0.61	2	-1.39
12	3.11	2.78	9	-6.22

Table 5-3. Streamflows on Jackson Creek and Bear Creek.

Irrigation Season	Non-Irrigation Season	Bear Creek Streamflow (cfs)	# measurements on Jackson Cr.	Streamflow on Jackson Cr.	Predicted Streamflow on Jackson Cr. by SWAT
May		131	6	39.4	6
June		73	12	34.6	1.8
July		31	3	27.9	1.3
August		32	5	28.1	0.6
September		35	5	24.1	0.4
October		34	11	8.7	0.4
	November	63	37	7	2.7
	December	161	N.D.	N.D.	15
	January	219	4	8.4	27
	February	221	4	14.5	31
	March	202	7	39.6	22
	April	199	5	71.3	13

Source: Oregon Water Resources Department, 2000.

Table 5-4. Water Balance for Jackson Creek, Based on 30 yr. SWAT Simulation.

Month	Precipitation (mm)	Evapo-transpiration	Direct Runoff (mm)	Baseflow (mm)	Total Water Yield (mm)
January	99	25	1.1	29.9	31
February	75	40	1.4	30.6	32
March	69	68	0.6	25.4	26
April	43	90	0.1	14.9	15
May	39	66	0.1	6.9	7
June	29	48	0	2	2
July	5	43	0	1.5	1.5
August	8	15	0	0.7	0.7
September	20	15	0	0.4	0.4
October	51	26	0.1	0.4	0.5
November	85	25	0.6	2.4	3
December	112	20	0.9	16.1	17
Total	633	481	4.9	131.2	136.1

Source: Oregon Water Resources Department, 2000.

Table 5.5. Estimated Acres in Watershed Zones.

UPLAND FOREST ZONE ACRES (BY GROUPS and ASCENDING ORDER OF SPECIES PRESENCE IN THOSE GROUPS)

SPECIES	ESTIMATED ACRES
DOUGLAS-FIR Pacific Madrone BIG LEAF MAPLE PONDEROSA PINE BLACK OAK	2,500 A. Combined
Pacific Madrone PONDEROSA PINE DOUGLAS FIR BLACK OAK	3,400 A. Combined
Pacific Madrone BLACK OAK PONDEROSA PINE DOUGLAS FIR	1,800 A. Combined
RECENTLY LOGGED TIMBERLANDS	700 A.
BRUSHFIELD CONVERSION TIMBERLANDS	100 A.
MANZANITA BRUSH FIELDS WITH MADRONE	500 A.
SUBTOTAL	9,000 A.

URBAN/FOREST INTERFACE ZONE ACRES

URBAN/FOREST INTERFACE (ALL SPECIES)	2,400 A.
URBAN/FOREST SUBDIVISIONS (ALL SPECIES)	1,400 A.
SUBTOTAL	3,800 A.

URBAN/AGRICULTURAL ZONE ACRES

FARM, ORCHARD, NURSERIES	2,400 A.
CITIES	700 A.
INDUSTRIAL	200 A.
SUBTOTAL	3,300 A.

WATERSHED TOTAL ACREAGE - 16,100 A.

Table 5.6. Plant Associations For Ecological Sites in the Jackson Creek Watershed.

Selected Native Species in Late Seral Stands (Potential) for Ecological Sites of the Jackson Creek Watershed.

Species List: (Selected from site description list	Douglas-fir Forest	Douglas-fir Mixed Pine - F	Mixed Pine/Douglas-fir/Fescue	Pine - Douglas-fir/Fescue	Loamy Slopes 18-24" PZ	Deep Loamy Terrace 18-28"	Mixed Oak Terrace	Loamy Hills 20-35" PZ	Droughty Fan 18-24 PZ	Poorly Drained Bottom	Loamy Floodplain	Shallow Mountain Slopes 22-30"	Loamy Shrub Scabland 18-35
TREES													
Sugar Pine		X	X										
Douglas-fir	X	X	X	X									
Madrone	X	X	X	X	X	X							
Incense Cedar	X	X		X		X							
Ponderosa Pine		X	X	X	X	X	X	X					
Black Oak	X	X	X	X	X	X	X	X	X				
White Oak					X	X	X	X	X	X	X		
Oregon Ash							X			X	X		
Bigleaf Maple											X		
White Alder											X		
Black Cottonwood											X		
SHRUBS													
Little Wild Rose	X	X											
Western Dewberry	X	X											
Oceanspray	X	X				X	X						
Deer brush	X	X	X	X		X	X						
Tall Oregon Grape	X	X	X	X	X	X	X						
Common Snowberry	X	X	X	X	X	X	X						
Poisonoak	X	X	X	X	X	X	X	X	X				X
Hairy Honeysuckle	X	X			X	X							X
Brewers Lupin			X									X	
Pacific Serviceberry				X	X	X	X	X	X				

Species List:	Douglas-fir Forest	Douglas-fir Mixed Pine - F	Mixed Pine/Douglas-fir/Fescue	Pine - Douglas-fir/Fescue	Loamy Slopes 18-24" PZ	Deep Loamy Terrace 18-28"	Mixed Oak Terrace	Loamy Hills 20-35" PZ	Droughty Fan 18-24 PZ	Poorly Drained Bottom	Loamy Floodplain	Shallow Mountain Slopes 22-30"	Loamy Shrub Scabland 18-35
Birchleaf Mt. mahogany				X	X			X					
Klamath Plum					X			X					
Willow						X	X			X			
Heartleaf Buckwheat												X	
Wedgeleaf Ceanothus													X
Skunkbush Sumac						X							
Wildgrape						X							
GRASSES													
Field Woodrush		X											
Mountain Brome	X	X											
Western Fescue	X	X	X										
California Fescue	X	X	X	X									
Blue Wildrye	X	X	X	X	X	X	X	X			X		
Tall Trisctum	X	X	X			X							
Pine Bluegrass			X	X		X		X	X			X	
Idaho Fescue			X	X	X	X		X	X			X	
June grass			X		X			X	X			X	
California Brome				X	X	X		X	X				
Lemon Needlegrass								X	X				
Bluebunch Wheatgrass								X	X			X	
Rush, Sedge										X	X		
Manna grass										X			

Table 5.7. Timing of Summer Steelhead Life Cycle Events for the Rogue Basin

Life Cycle	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
Early-run adult migration								**X**	**X**	**X**		
Half-pounder migration											**X**	**X**
Late-run adult migration	**X**										**X**	**X**
Adult spawning			**X**	**X**	**X**	**X**						
Eggs/fry emerge						**X**	**X**	**X**	**X***			
Fingerlings/ rearing	**X***	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X***	**X***	**X***	**X***
Juvenile migration		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X***	**X***		
Smolt out-migration							**X**	**X**	**X**			

X Indicates presence at the life cycle month stage.
X* Indicates _*severe*_ _*limiting*_ _*factor*_ condition in the life cycle month stage.
(Determination by technical committee.

Summer steelhead fry emerge from the gravel in April and May, then migrate to the mainstem in May and June as the natal streams dry up. Smolts generally migrate downstream from March through June.

Table 5.8. Fish Status of Jackson Creek and Tributaries **(Surveyed Tributaries only).**

Note: All streams in the Jackson Creek watershed are ephemeral in some sections during summer months, thus fish presence is affected by this condition.

Stream	Fish Species	Barriers - River Mile
Jackson Creek Flows: Perennial	0.5 m Chinook 4.4 m Summer Steelhead 7 m Trout	RM 0.5 - culvert RM 1.0 - dam RM 1.5 - board dam RM 2.0 - board dam RM 4.4 - Hanley Rd. culvert RM 7.0 - dam RM 10 - Jacksonville Reservoir
Jackson Ck. Trib A Flows: Intermittent	1.4 m Summer Steelhead Sunfish	
S. Fork Jackson Creek Flows: Intermittent	None Observed	
Dean Creek Flows: Perennial	2 m Summer Steelhead Sunfish	RM 2 - Barrier
Dean Ck. Trib A Flows: Intermittent	0.3 m Summer Steelhead	RM 0.3 - Barrier
Cantrall Gulch Flows: Intermittent	None Observed	
Miller Creek Flows: Intermittent	Not Assessed	
Niedermeyer Creek Flows: Intermittent	Not Assessed	
Norling Gulch Flows: Perennial	Not Assessed	
Sailor Creek Flows: Intermittent	Not Assessed	
Walker Creek Flows: Intermittent	Not Assessed	

Table 6.0. Federally Listed Wildlife Populations Affecting Jackson County.

Mammals			
Scientific Name	**Common Name**	**Federal status**	**ODFW status**
Canis lupus	**Gray wolf**	**LE**	**LE**
Lynx canadensis	**Canada lynx**	**LT**	**-**
Ursus Arctos	**Grizzly bear**	**LT**	**-**
Fish			
Onchorhynchus kisutch	**Coho salmon**	**LT**	**SC**
Onchorhynchus mykiss	**Steelhead**	**C**	**SV**
Birds			
Haliaeetus leucocephalus	**Bald Eagle**	**LT**	**LT**
Strix occidentalis Cairina	**Northern Spotted Owl**	**LT**	**LT**
Falco peregrines alatum	**American Peregrine falcon**	**-**	**LE**

LE = Listed Endangered. Taxa listed by the U.S. Fish and Wildlife service or the National Marine Fisheries Service (NMFS), Endangered under the Endangered Species Act (ESA), or by the Departments of Agriculture (ODA) and Fish and Wildlife (ODFW) of the state of Oregon under the Oregon Endangered Species Act 1987 (OESA**).**
LT = Listed Threatened. Taxa proposed by the USFWS or NMFS to be listed as Endangered under the ESA or by ODFW or ODA under the OESA.
C = Candidate. Taxa for which NMFS or USFWS have sufficient information or support a proposal to list under the ESA, or which is a candidate for listing by the ODA under the OESA.
SV = Species vulnerable
SC = Species critical

Table 7.0. Jackson Creek Restoration and Protection Activities. **(Proposed Table)**

Watershed Enhancement Area	Assessment Element: **Channel Habitat**	**Water Quantity**	**Plant Communities**	**Riparian./Wetlands**	**Sediment Sources**	**Channel Modification**	**Water Quality**	**Fish Use/Habitat**
1. Dean Creek								
2. Horn Creek; Lower Valley								
3. Niedermeyer, Walker Creeks, Upper Valley Floor								
4. Jacksonville								
5. S. Fork J.C., Miller Gulch, Sailor Gulch, Norling Gulch, Cantrall Gulch, Mainstem Jackson Creek								

Parameters: ***(Ranked High - Low)***

Channel Habitat ~ species, cover, wetland/flood-plain connectivity, stream condition, barriers.
Water Quantity ~ diversions, consumptive use, flow regime.
Plant Communities ~ riparian, uplands, forest, native, exotic, noxious weeds, bare ground.
Riparian/Wetland ~ habitat quality, % shade, vegetation species composition.
Sediment Sources ~ stream banks, quarry, irrigation returns, uplands, road related, burned areas.
Channel Modification ~ flood history, land uses, storage, stream capacity.
Water Quality ~ temperature, nutrients, fecal, sediment, land use, other.
Fish Use/Habitat ~ barriers, habitat, species, other.

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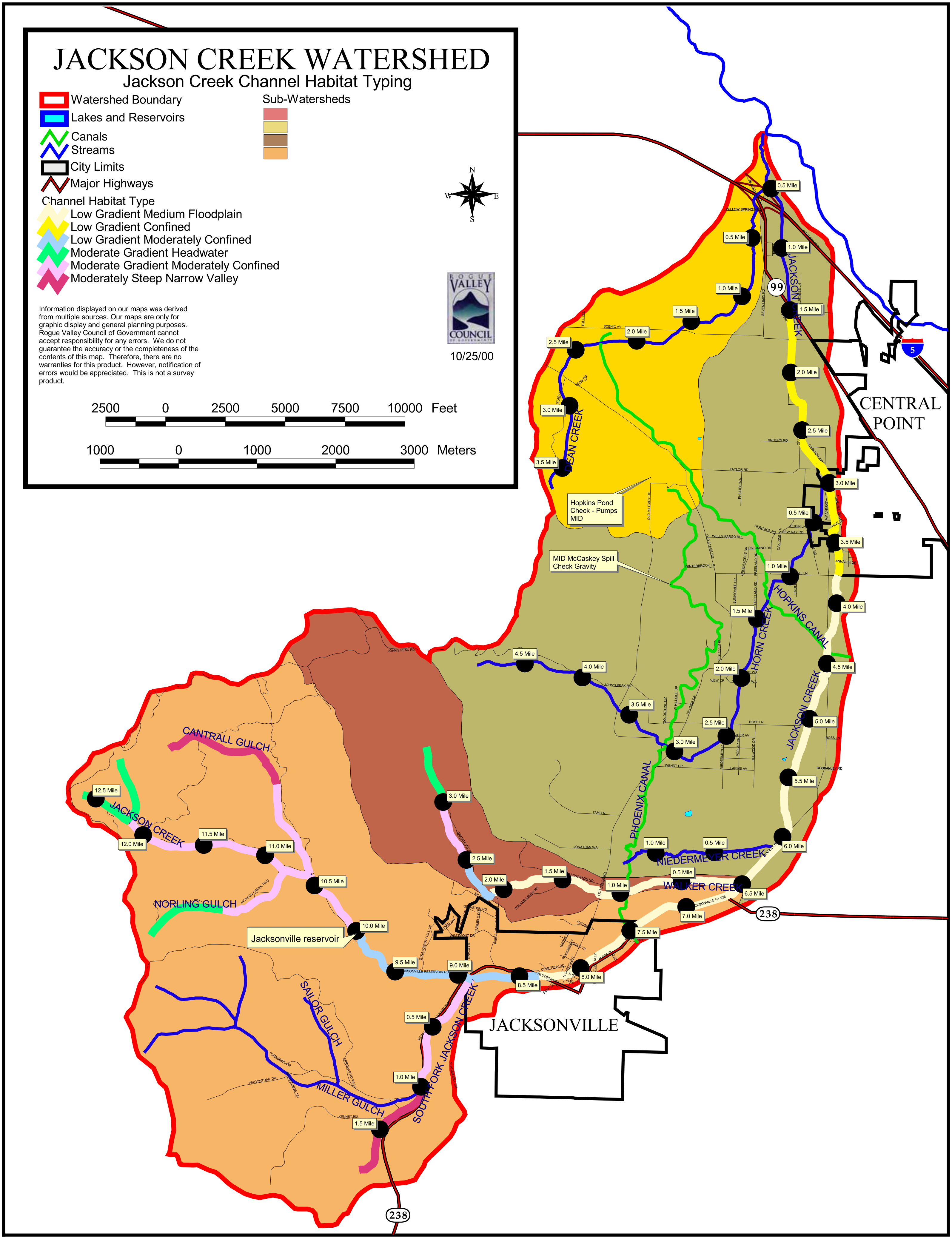

JACKSON CREEK WATERSHED
Jackson Creek Channel Habitat Typing
Watershed Boundary
Lakes and Reservoirs
Canals
Streams
City Limits
Major Highways
Sub-Watersheds
Channel Habitat Type
Low Gradient Medium Floodplain
Low Gradient Confined
Low Gradient Moderately Confined
Moderate Gradient Headwater
Moderate Gradient Moderately Confined
Moderately Steep Narrow Valley
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ROGUE VALLEY COUNCIL OF GOVERNMENTS
10/25/00
Information displayed on our maps was derived from multiple sources. Our maps are only for graphic display and general planning purposes. Rogue Valley Council of Government cannot accept responsibility for any errors. We do not guarantee the accuracy or the completeness of the contents of this map. Therefore, there are no warranties for this product. However, notification of errors would be appreciated. This is not a survey product.
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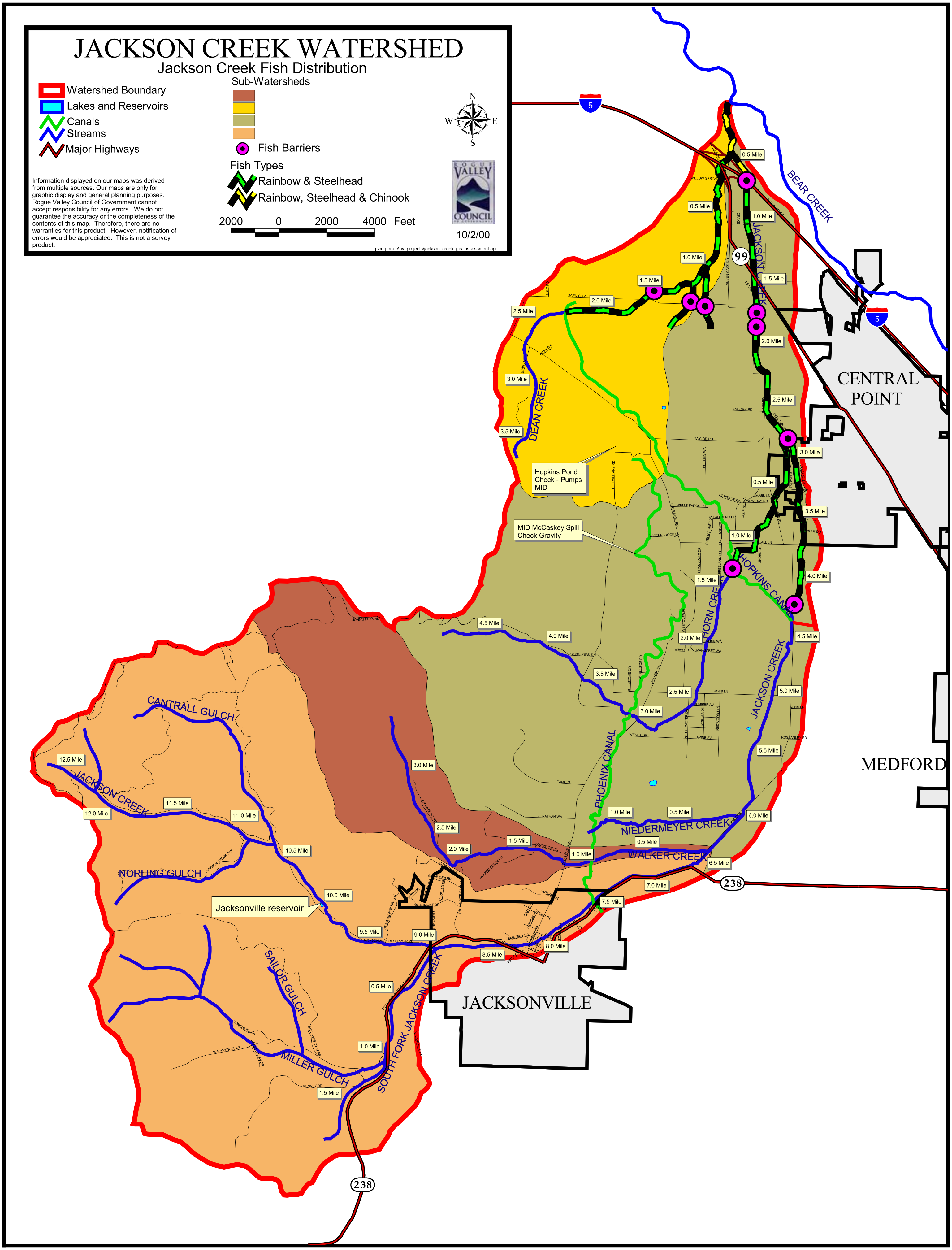
CENTRAL POINT
JACKSONVILLE
JACKSON CREEK
DEAN CREEK
HORN CREEK
HOPKINS CANAL
PHOENIX CANAL
NIEDERMEYER CREEK
WALKER CREEK
CANTRALL GULCH
NORLING GULCH
SAILOR GULCH
MILLER GULCH
SOUTH FORK JACKSON CREEK
Jacksonville reservoir
Hopkins Pond Check - Pumps MID
MID McCaskey Spill Check Gravity
99
5
238


JACKSON CREEK WATERSHED
Jackson Creek Fish Distribution
Watershed Boundary
Lakes and Reservoirs
Canals
Streams
Major Highways
Sub-Watersheds
Fish Barriers
Fish Types
Rainbow & Steelhead
Rainbow, Steelhead & Chinook
Information displayed on our maps was derived from multiple sources. Our maps are only for graphic display and general planning purposes. Rogue Valley Council of Government cannot accept responsibility for any errors. We do not guarantee the accuracy or the completeness of the contents of this map. Therefore, there are no warranties for this product. However, notification of errors would be appreciated. This is not a survey product.
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HORN CREEK
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PHOENIX CANAL
NIEDERMEYER CREEK
WALKER CREEK
CANTRALL GULCH
NORLING GULCH
SAILOR GULCH
MILLER GULCH
SOUTH FORK JACKSON CREEK
Jacksonville reservoir
Hopkins Pond Check - Pumps MID
MID McCaskey Spill Check Gravity
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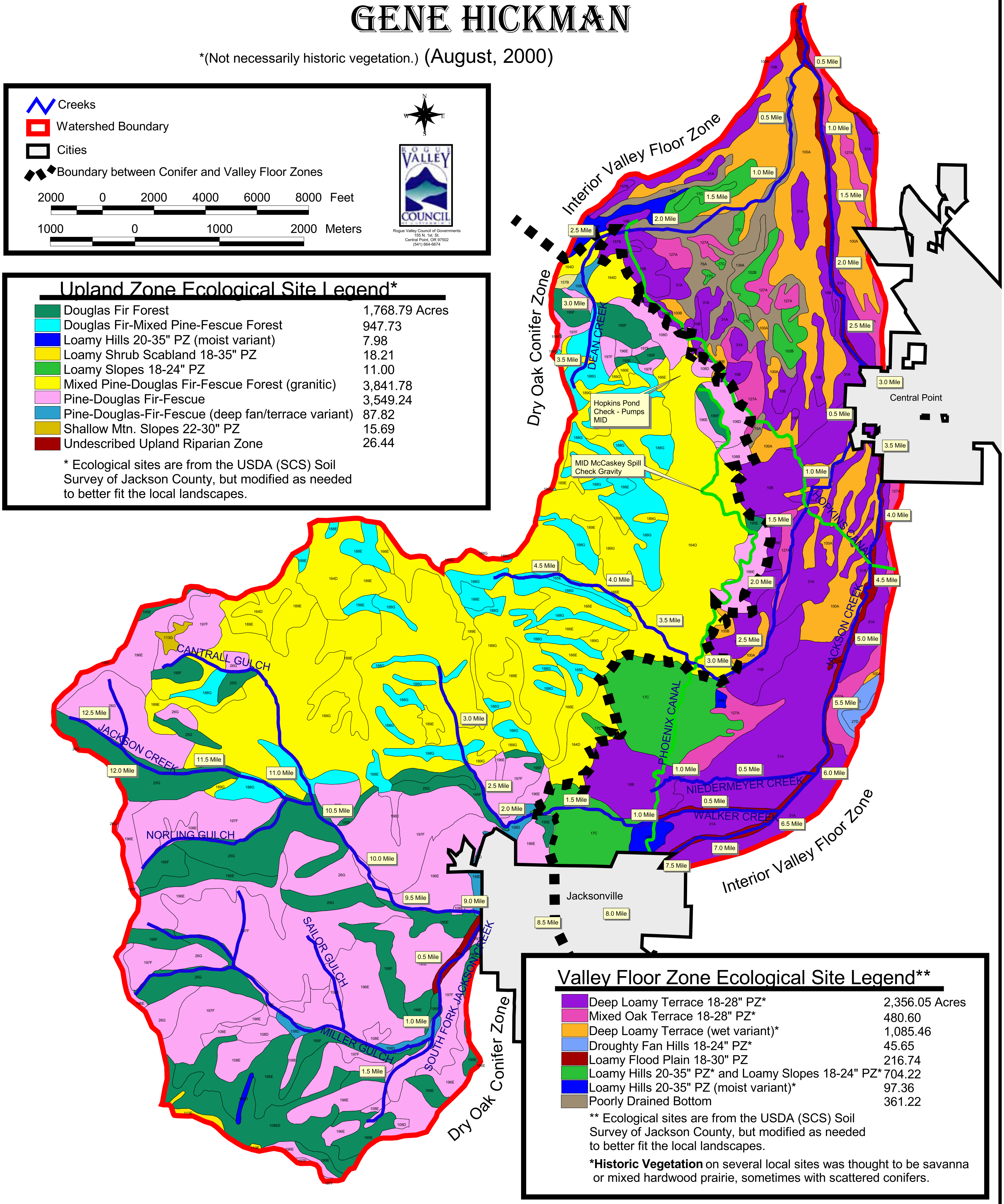
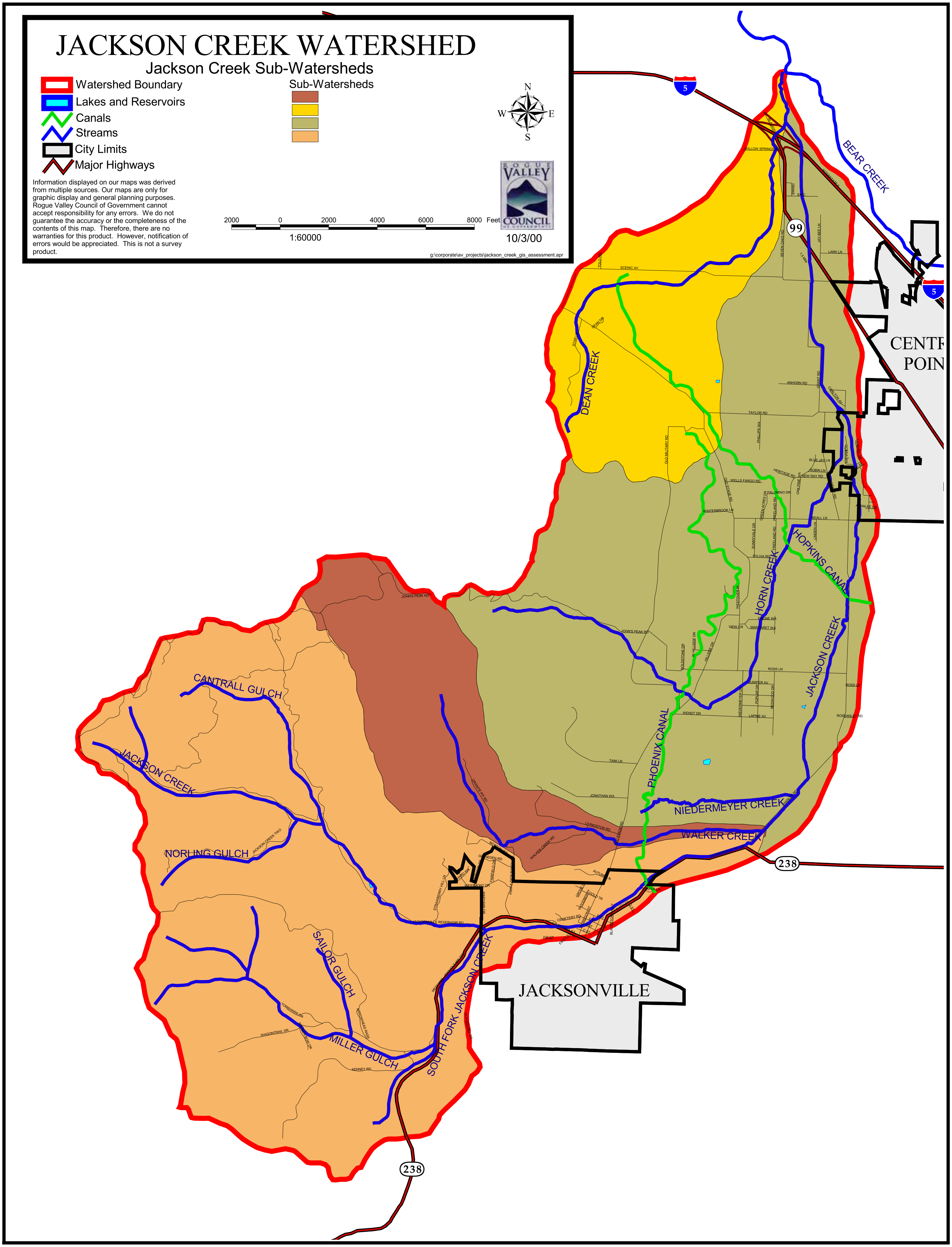
238

SOIL MAP UNITS AND POTENTIAL NATIVE VEGETATION OF THE JACKSON CREEK SUB WATERSHED*

GENE HICKMAN

*(Not necessarily historic vegetation.) (August, 2000)




JACKSON CREEK WATERSHED
Jackson Creek Sub-Watersheds
Watershed Boundary
Lakes and Reservoirs
Canals
Streams
City Limits
Major Highways
Sub-Watersheds
Information displayed on our maps was derived from multiple sources. Our maps are only for graphic display and general planning purposes. Rogue Valley Council of Government cannot accept responsibility for any errors. We do not guarantee the accuracy or the completeness of the contents of this map. Therefore, there are no warranties for this product. However, notification of errors would be appreciated. This is not a survey product.
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BEAR CREEK
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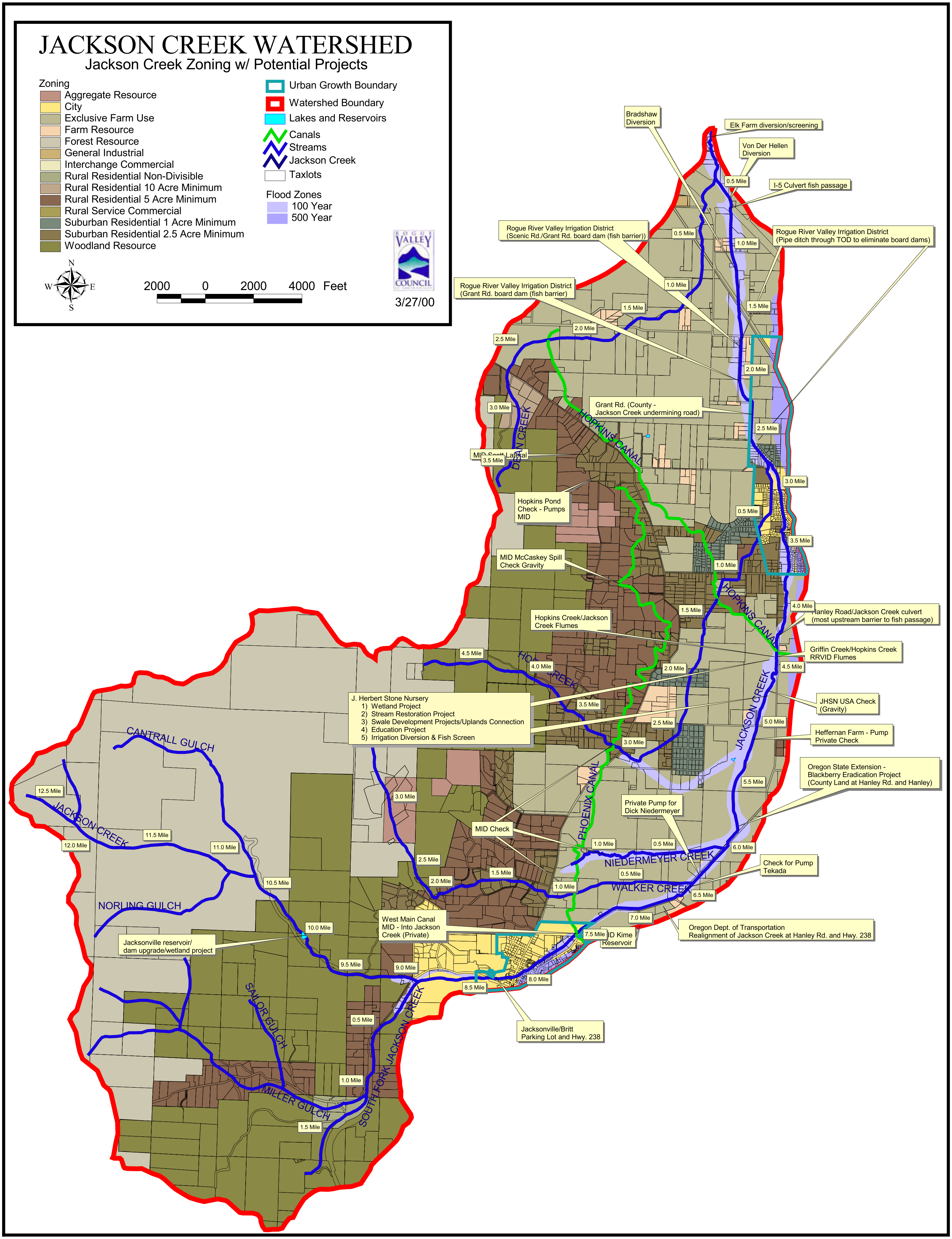
DEAN CREEK
HOPKINS CANAL
HORN CREEK
JACKSON CREEK
PHOENIX CANAL
NIEDERMEYER CREEK
WALKER CREEK
CANTRALL GULCH
NORLING GULCH
SAILOR GULCH
MILLER GULCH
SOUTH FORK JACKSON CREEK
JACKSONVILLE


JACKSON CREEK WATERSHED
Jackson Creek Zoning w/ Potential Projects
Zoning
Aggregate Resource
City
Exclusive Farm Use
Farm Resource
Forest Resource
General Industrial
Interchange Commercial
Rural Residential Non-Divisible
Rural Residential 10 Acre Minimum
Rural Residential 5 Acre Minimum
Rural Service Commercial
Suburban Residential 1 Acre Minimum
Suburban Residential 2.5 Acre Minimum
Woodland Resource
Urban Growth Boundary
Watershed Boundary
Lakes and Reservoirs
Canals
Streams
Jackson Creek
Taxlots
Flood Zones
100 Year
500 Year
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2000 0 2000 4000 Feet
ROGUE VALLEY COUNCIL
3/27/00
Bradshaw Diversion
Elk Farm diversion/screening
Von Der Hellen Diversion
I-5 Culvert fish passage
Rogue River Valley Irrigation District (Scenic Rd./Grant Rd. board dam (fish barrier))
Rogue River Valley Irrigation District (Pipe ditch through TOD to eliminate board dams)
Rogue River Valley Irrigation District (Grant Rd. board dam (fish barrier)
Grant Rd. (County - Jackson Creek undermining road)
MID Scott Lateral
Hopkins Pond Check - Pumps MID
MID McCaskey Spill Check Gravity
Hopkins Creek/Jackson Creek Flumes
Hanley Road/Jackson Creek culvert (most upstream barrier to fish passage)
Griffin Creek/Hopkins Creek RRVID Flumes
J. Herbert Stone Nursery
1) Wetland Project
2) Stream Restoration Project
3) Swale Development Projects/Uplands Connection
4) Education Project
5) Irrigation Diversion & Fish Screen
JHSN USA Check (Gravity)
Heffernan Farm - Pump Private Check
Oregon State Extension - Blackberry Eradication Project (County Land at Hanley Rd. and Hanley)
Private Pump for Dick Niedermeyer
MID Check
Check for Pump Tekada
West Main Canal MID - Into Jackson Creek (Private)
MID Kime Reservoir
Oregon Dept. of Transportation Realignment of Jackson Creek at Hanley Rd. and Hwy. 238
Jacksonville reservoir/ dam upgrade/wetland project
Jacksonville/Britt Parking Lot and Hwy. 238
DEAN CREEK
HOPKINS CANAL
HOPKINS CREEK
JACKSON CREEK
PHOENIX CANAL
NIEDERMEYER CREEK
WALKER CREEK
CANTRALL GULCH
NORLING GULCH
SAILOR GULCH
MILLER GULCH
SOUTH FORK JACKSON CREEK
0.5 Mile
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1.5 Mile
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