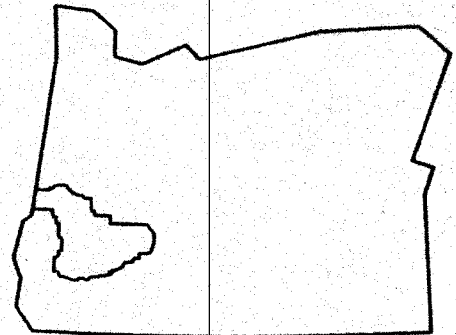


# FLOOD INSURANCE STUDY



## DOUGLAS COUNTY, OREGON AND INCORPORATED AREAS VOLUME 1 OF 2

COMMUNITY NAME	COMMUNITY NUMBER
CANYONVILLE, CITY OF	410060
DOUGLAS COUNTY UNINCORPORATED AREAS	410059
DRAIN, CITY OF	410061
ELKTON, CITY OF	410062
GLENDALE, CITY OF	410063
MYRTLE CREEK, CITY OF	410064
OAKLAND, CITY OF	410271
REEDSPORT, CITY OF	410065
RIDDLE, CITY OF	410066
ROSEBURG, CITY OF	410067
SUTHERLIN, CITY OF	410275
WINSTON, CITY OF	415593
YONCALLA, CITY OF	410069



Effective:  
February 17, 2010



Federal Emergency Management Agency

Flood Insurance Study Number  
41019CV001A

**NOTICE TO  
FLOOD INSURANCE STUDY USERS**

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. Please contact the Community Map Repository for any additional data.

Selected Flood Insurance Rate Map panels for the community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g. floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

<u>Old Zone</u>	<u>New Zone</u>
A1 through A30	AE
V1 through V30	VE
B	X (shaded)
C	X (unshaded)

Part or all of this may be revised and republished at any time. In addition, part of this FIS may be revised by a Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS report components.

This FIS report was revised on February 17, 2010. User should refer to Section 10.0, Revision Descriptions, for further information. Section 10.0 is intended to present the most up-to-date information for specific portions of this FIS report. Therefore, users of this FIS report should be aware that the information presented in Section 10.0 supersedes information in Sections 1.0 through 9.0 of this FIS report.

Effective Date:            February 17, 2010

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Elk Creek	Panels	24P-25P
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**PUBLISHED SEPARATELY**

Flood Insurance Rate Map Index

Flood Insurance Rate Map

**FLOOD INSURANCE STUDY  
DOUGLAS COUNTY, OREGON AND INCORPORATED AREAS**

**1.0 INTRODUCTION**

**1.1 Purpose of Study**

This Flood Insurance Study revises and updates information on the existence and severity of flood hazards in the geographic area of Douglas County, including the Cities of Canyonville, Drain, Elkton, Glendale, Myrtle Creek, Oakland, Reedsport, Riddle, Roseburg, Sutherlin, Winston, Yoncalla; and the unincorporated areas of Douglas County (referred to collectively herein as Douglas County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

**1.2 Authority and Acknowledgments**

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for Douglas County Unincorporated Areas, the City of Myrtle Creek, and the City of Roseburg were performed by the U.S. Geological Survey (USGS), for FEMA, under Inter-Agency Agreement No. IAA-H-17-75, Project Order No. 7. These studies were completed in February 1977, October 1976, and December 1975, respectively.

For the City of Glendale, hydrologic and hydraulic analyses were performed by the USGS, Water Resources Division, Portland District, for the FIA, under Inter-Agency Agreement No. IAA-H-8-76, Project Order No. 19, Amendment No. 1 and was completed in July 1977.

For the Cities of Canyonville, Elkton, and Riddle, hydrologic and hydraulic analyses for this study were performed by the USGS, Water Resources Division, for FEMA, under Inter-Agency Agreement No. IAA-H-9-77, Project Order No. 9. This work, was completed in September 1977, April 1978, and February 1978, respectively.

Hydrologic and hydraulic analyses for the City of Drain were performed by the USGS, Water Resources Division, Portland, Oregon for FEMA, under Inter-Agency Agreement No. IAA-339-R, Project Order No. 17. This work was completed in April 1978.

The hydrologic and hydraulic analyses for the Umpqua River and Scholfield Creek were performed by the USGS for the Douglas County Planning Commission in 1975. Conversion of the USGS Study for this report was performed by CH2M HILL NORTHWEST, INC, for FEMA, under Contract No. EMW-C-0283. This study was completed in April 1981.

The revised hydraulic analysis for the Umpqua River from the Pacific Ocean to U.S. Highway 101 was performed by the U.S. Geological Survey. This work was completed in October 1984.

The hydrologic and hydraulic analyses for Newton Creek were performed by the USACE, Portland District, for FEMA, under Interagency Agreement No. EMW-89-E-2968, Project Order No. 9. This restudy was completed in May 1989.

The hydrologic and hydraulic analyses for the restudy of Cow Creek were performed by the U.S. Army Corps of Engineers (USACE), Portland District, for FEMA, under Inter-Agency Agreement No. No. EMW-89-E-2978, Project Order No. 17. This restudy was completed in December 19, 1991.

The hydrologic and hydraulic analyses for the reach of the South Umpqua River in the vicinity of Newton Creek and the lower reach of Newton Creek were performed by the USACE, Portland District, under Interagency Agreement No. EMW-89-E-2978, Project Order No. 10, Amendment No. 1. This restudy was completed in December 1994.

The countywide update was performed by WEST Consultants, Inc. for FEMA under Contract No. EMS-20010-CO-0068. Work on the countywide update was completed in February 2009.

The digital base mapping information was provided by the Oregon Geospatial Enterprise Office (<http://www.oregon.gov/DAS/EISPD/GEO/index.shtml>), Oregon Parks and Recreation Department (<http://www.oregon.gov/OPRD/>), and the United States Fish and Wildlife Service Portland Office, 911 NE 11th Avenue, Portland, OR 97232-4181. This information was compiled from Oregon Water Resources Department (2006), OR/WA Bureau of Land Management (2000), U.S. Fish and Wildlife Service (2008), Oregon Parks and Recreation Department (2008), National Geodetic Survey (2007), the U.S. Census Bureau (2007), and the U.S. Department of Agriculture Farm Service Agency (2005) at a scale of 1:24,000. The coordinate system used for the production of the FIRM is Universal Transverse Mercator, North American Datum of 1983, Geodetic Reference System 1980. Differences in the datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of information shown on this FIRM.

### **1.3 Coordination**

The dates of the initial, intermediate, and final CCO meetings held for the previous FIS reports for Douglas County and the incorporated communities within its boundaries are

shown in Table 1, "Initial, Intermediate, and Final CCO Meetings". They were attended by representatives of FEMA, the U.S. Geological Survey, the communities, and the study contractor.

**Table 1. Initial, Intermediate, and Final CCO Meetings**

<u>Community</u>	<u>Initial CCO Date</u>	<u>Intermediate CCO Date</u>	<u>Final CCO Date</u>
Canyonville, City of	January, 1976	May, 1976	December 8, 1977
Douglas County Unincorporated Areas	March 20, 1975	-- <sup>1</sup>	March 15-16, 1977 September 23, 1997
Drain, City of	March 16, 1977	-- <sup>1</sup>	August 9, 1978
Elkton, City of	March, 1977	-- <sup>1</sup>	August 9, 1978
Glendale, City of	January 19, 1976 May 13, 1976	March, 1977	December 8, 1977 November 25, 1996
Myrtle Creek, City of	March 1975	-- <sup>1</sup>	September 23, 1976
Oakland, City of	-- <sup>1</sup>	-- <sup>1</sup>	-- <sup>1</sup>
Reedsport, City of	May, 1979	-- <sup>1</sup>	-- <sup>1</sup>
Riddle, City of	March 15, 1977	February 22, 1978	August 9, 1978 September 23, 1997
Roseburg, City of	March 20, 1975	-- <sup>1</sup>	May 13, 1976 September 23, 1997
Sutherlin, City of	-- <sup>1</sup>	-- <sup>1</sup>	-- <sup>1</sup>
Winston, City of	-- <sup>1</sup>	-- <sup>1</sup>	-- <sup>1</sup>
Yoncalla, City of	-- <sup>1</sup>	-- <sup>1</sup>	-- <sup>1</sup>

<sup>1</sup> Information not available

The initial community coordination meetings were held and attended by representatives of FEMA, USGS, Douglas County Planning Department, Douglas County Water Resources Survey, city officials, the study contractor, and the community. The purpose of the initial coordination meetings was to identify stream reaches to be studied, explain the study concepts, identify data sources, and establish communication and coordination procedures.

Intermediate coordination meetings were held between FEMA, local officials and the study contractor to review plan and profile drawings showing water-surface profiles, floodway delineations, and flooded-area outlines. The dates of the Intermediate coordination dates are listed in Table 1.

Final community coordination meetings were held and attended by representatives of FEMA, local officials, the study contractor, and the community. All problems and concerns raised at the final meetings have been addressed in this study. The dates of the Final coordination dates are listed in Table 1.

The results of the City of Riddle restudy were reviewed at the final Consultation Coordination Officer meeting held on November 25, 1996, and attended by representatives of FEMA, the USACE, the Douglas County Planning Department, the City of Riddle, and Douglas County Natural Resources. All problems raised at the meeting have been addressed in this restudy.

## Countywide Update

An initial community coordination meeting for Douglas County was held on March 13, 2006. This meeting was attended by representatives of the Cities of Drain, Glendale, Myrtle Creek, Reedsport, Douglas County, Oregon Department of Land Conservation and Development, FEMA, and WEST Consultants, Inc. The results of the study were reviewed at the final Consultation Coordination Officer [CCO] meeting held on June 3, 2009, and attended by representatives of Douglas County, Cities of Drain, Glendale, Myrtle Creek, Winston and FEMA. All problems raised at that meeting have been addressed in this study. A separate final CCO meeting for the City of Reedsport was held on June 4, 2009 and was attended by representatives of the City and FEMA. All problems raised at that meeting have been addressed in this study.

## 2.0 AREA STUDIED

### 2.1 **Scope of Study**

This Flood Insurance Study covers the geographic area of Douglas County, Oregon, including the incorporated communities listed in Section 1.1.

The flooding sources studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction for the City of Myrtle Creek through 1981, the Cities of Canyonville and Glendale through 1982, the Cities of Drain and Elkton through 1983, the City of Reedsport through 1986, and Douglas County unincorporated areas through 1989. Table 2 lists the flooding sources studied in detail and the included segments.

**Table 2. Flooding Sources Studied by Detailed Methods**

<u>Flooding Source</u>	<u>Limits of Detailed Study</u>
Canyon Creek	Within the corporate limits of Canyonville
Cow Creek	From approximately 2,800 feet below Totten Creek upstream to Snow Creek. Approximately 20 miles, from 2,800 feet below Totten Creek to Galesville Dam, was restudied in 1999.
Lower Cow Creek	From its confluence with the South Umpqua River to the gaging station near Riddle. Restudied in 1999.
Deer Creek	From its confluence with the South Umpqua River to Tucker Creek
Elk Creek	From its confluence with the Umpqua River to 200 feet upstream of the eastern corporate limit of Elkton; and from the western corporate boundary of Drain to 300 feet upstream of the southern corporate boundary of Drain
Myrtle Creek	From its confluence with the South Umpqua River to the confluence of the North Myrtle Creek and South Myrtle Creek
North Myrtle Creek	From its confluence with South Myrtle Creek to a distance of approximately two miles upstream



South Myrtle Creek	From its confluence with North Myrtle Creek to a distance of approximately two miles upstream
Newton Creek	From its confluence with the South Umpqua River to approximately 1,200 feet upstream of Parker Road
Pass Creek	From its confluence with Elk Creek upstream to the northern corporate limit of Drain

**Table 2. Flooding Sources Studied by Detailed Methods (continued)**

Scholfield Creek	From its mouth in Reedsport to its confluence with Wind Creek
School Creek	Within the corporate limits of the City of Canyonville
Smith River	From its confluence with the Umpqua River to the confluence with Sulphur Springs
Umpqua River	From the Pacific Ocean to the confluence with the North and South Umpqua Rivers.
North Umpqua River	From its confluence with the South Umpqua River to Idleld Park
South Umpqua River	From its confluence with the North Umpqua River to Clough Gulch, 3 miles downstream from Days Creek

Subsequent study of flood flows in School Creek indicated supercritical stream velocities would occur in many areas due to the steep channel gradient. Encroachment on such flood plain was considered inadvisable, and the USGS recommended floodways not be delineated within the City of Canyonville. This action was approved by the U.S. Department of Housing and Urban Development and by City of Canyonville officials.

Flooding caused by Mill and Section Creeks in the City of Glendale was studied in detail. Preliminary investigation of Mill and Section Creeks revealed that most of the flooding would be contained in channel; therefore, the final study of these streams was approximate.

This study was revised on April 21, 1999, to show modifications to flood hazards along an approximate 27-mile reach of Cow Creek. The creek was studied from its confluence with the South Umpqua River, upstream through the City of Riddle, Oregon, to USGS Stream Gage No. 1431000, a distance of approximately 7 miles, and from approximately 2,800 feet downstream of the confluence with Totten Creek to the Galesville Dam, a distance of approximately 20 miles. This restudy also shows modifications to flood hazards along Newton Creek and the South Umpqua River. Newton Creek was studied by detailed methods from its mouth to approximately 1,200 feet upstream of Parker Road, approximately 3.5 river miles. The South Umpqua River was studied by detailed methods from 1 mile downstream of the confluence of Newton Creek to just downstream of Interstate Highway 5, approximately 2.55 miles (Reference 1). The Douglas County Planning Department provided copies of orthophoto topographic maps of Cow Creek for use in this restudy (Reference 2).

This study was also revised to reflect the results of a Letter of Map Revision (LOMR)

issued on June 8, 1993, affecting the identified flood hazards for Deer Creek. A hydraulic analysis was performed and revisions were made to reflect a revised floodway boundary along Deer Creek from the confluence with the South Umpqua River to Douglas Avenue.

Approximate analyses were used to study flooding sources in areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and Douglas County. Table 3 lists the flooding sources, grouped by watershed, which were studied by approximate methods.

**Table 3. Flooding Sources Studied by Approximate Methods**

1. South Umpqua River, from Clough Gulch to Tiller
2. Confluence of North Umpqua River and South Umpqua River
3. Lookingglass Creek, Olalla Creek, Tenmile Creek
4. Elk Creek, Yoncalla Creek
5. Rice Creek, Willis Creek
6. Calapooya Creek
7. Section Creek, Mill Creek
8. Galesville Reservoir

## **2.2 Community Description**

Douglas County is located in southwestern Oregon. It is bounded by Coos County, the Pacific Ocean, and the Coast Range on the west, Curry County on the southwest, Lane County and the Coast and Cascade Ranges on the north, Jackson and Josephine Counties and the Klamath Mountains on the south, and Klamath County and the Western Cascade and High Cascade Ranges on the east.

Most of the county is mountainous and densely forested. Central valleys of broad floodplains and gently rolling upland hills extend from Days Creek northerly to Drain. The valleys along the Umpqua and South Umpqua Rivers are generally from 0.75 to 1.5 miles wide and are connected by fairly narrow canyons.

Elevations range from sea level at Reedsport, to approximately 3,000 feet at the summit of the Coast Range, and to approximately 8,000 feet along the crest of the Cascade Range. The elevation at Roseburg is less than 500 feet; the elevation at Glendale on upper Cow Creek is 1,400 feet.

The Umpqua, North Umpqua, and South Umpqua Rivers are the largest streams in Douglas County. The South Umpqua River heads in the Western Cascade Range and flows through the Klamath Mountains to join the North Umpqua in Garden Valley. The Western Cascade Range is composed of deeply dissected, moderately permeable rocks. The Klamath Mountains have steep slopes and poorly permeable rocks. The North Umpqua River heads in the highly permeable volcanic rocks of the High Cascade Range and flows through the Western Cascade Range to join the South Umpqua River. Above Garden Valley, the North Umpqua River is deeply entrenched and flows through

canyons that connect narrow valleys. The Umpqua River, which heads at the confluence of the North Umpqua and South Umpqua Rivers, flows through the Coast Range, which is characterized by steep slopes and poorly permeable rocks. The Umpqua River empties into the Pacific Ocean near Reedsport.

The climate of Douglas County, like that of western Oregon in general, is characterized by mild, wet winters and hot, dry summers. The pattern of annual precipitation reflects the orographic barriers of the Coast and Cascade Ranges. Average annual precipitation in the Coast Range varies from 50 to 110 inches; in the central valleys, from 25 to 50 inches; and, in the Cascade Range, from 50 to 75 inches (Reference 3). At high elevations, much of the winter precipitation occurs as snow.

Average temperatures at Roseburg range from an average daily minimum of 33°F in January to an average daily maximum of 84°F in July and August. The corresponding average daily minimum and daily maximum temperatures at Reedsport range from 37°F in January to 70°F in August (Reference 3).

The population of Douglas County was 93,748 in 1980 (Reference 4). The population was estimated to be 105,117 in 2000 (Reference 5). The majority of the population is concentrated along the Interstate 5 corridor between the Cities of Canyonville and Yoncalla. The economy of Douglas County is dependent primarily on forest products and agriculture. The floodplains of the South Umpqua and Umpqua Rivers are primarily agricultural land, although the community of Dillard is almost entirely on the floodplain of the South Umpqua River.

#### City of Canyonville

Canyonville is a small community that was founded in 1901, and is located in the southern part of Douglas County. The city is 20 miles south of Roseburg and is situated between the Coast Range to the west and the Cascade Range (which is higher) to the east. The population of the city was 1,255 in 1975 (Reference 6). The population was estimated to 1,293 in 2000 (Reference 5).

The economy of the area depends primarily on timber and related byproducts. Agriculture, mining, and recreational activities are also important.

The area has an average annual temperature of 54°F, with historic extremes ranging from -3°F in January 1962 to 110°F in August 1935 (Reference 7). The average annual precipitation is 35 inches, although rainfall patterns vary greatly due to orographic barriers. A large part of the Canyon Creek drainage is in a moderate rain shadow formed by Silver Butte and Canyon Mountain.

Most of the commercial area and the older residential structures are located on the west bank of Canyon Creek, well above the floodplain. Developing residential areas are on the surrounding hillsides and on creek frontage property east of Canyon Creek. Floodplain development along School Creek is very limited and consists of an occasional house, garage, or outbuilding.

The elevation of Canyonville is 747 feet. The elevation of Silver Butte, 7 miles

southwest of the city, is 3,483 feet. Canyon Creek originates in this mountainous area and flows northward in a very steep canyon until it reaches the narrow valley occupied by the community. The drainage area is 39.4 square miles at the mouth. The only well-defined tributary to Canyon Creek within the city is School Creek. School Creek drains an area of 1.13 square miles and enters Canyon Creek from the west, near the center of town.

The Canyon Creek and School Creek drainage basins are heavily forested except for clear-cut areas where timber has been harvested. Hydrologic soil classifications (primarily in the Josephine Association) indicate low to medium water-holding capacities (Reference 8).

Within the city, Canyon Creek is a deeply entrenched watercourse, with moderate to dense bank vegetation. The channel has areas of exposed irregular bedrock, but the primary bed material is rounded boulders, rocks, and gravel. Stream banks are stable due to the vegetation; large debris obstructions appear to be minimal.

The School Creek channel meanders through west Canyonville, and stream flows are severely obstructed by dense brush in some areas. Flood flows encounter eight small culvert systems within the city before reaching Canyon Creek.

#### City of Drain

The City of Drain was incorporated in 1887. It is located in northern Douglas County, near the confluence of Pass Creek and Elk Creek, 32 miles north of Roseburg, 4 miles north of Yoncalla, and 13 miles east of Elkton, at the upper end of a valley 2 miles long and 0.33 to 0.5 miles wide. The elevation at the railroad depot is 296 feet.

The population of Drain was 1,250 in 1976 (Reference 6) and has decreased to an estimated 1,021 in 2000 (Reference 5). The economy of the area is dependent on forest products and agriculture.

Elk Creek heads at an elevation of about 1,200 feet in the Calapooya Mountains, which are foothills to the western Cascade Range. These hills are characterized by volcanic, pyroclastic, and sedimentary rocks of low permeability (Reference 9). The slopes are steep and densely forested. Valley areas are small and are used for pasture rather than for cultivated crops.

Pass Creek heads in the Coast Range at an elevation of approximately 700 feet. The mountains are of estuarine and marine sediments of low permeability (Reference 9). The Slopes are steep and densely forested. The creek flows through a valley generally less than 0.25 miles wide.

Normal annual precipitation is 49 inches. Temperatures at Drain range from an average minimum of 42°F to an average maximum of 66°F. Extreme temperatures have ranged from -1°F to 108°F (Reference 7).

The commercial and residential development of Drain is partly on the floodplain and partly on the terrace and slopes above the floodplain. Upstream from the railroad, Elk Creek is confined between high banks in an undeveloped canyon.

The upstream segment of the Pass Creek floodplain near the northern corporate limit is rural in character. There are a few houses, with undeveloped pasture between them.

#### City of Elkton

Elkton is a small community, incorporated in 1948, and is located in the northern part of Douglas County. The city is located 40 miles southwest of Eugene and is situated on the north bank of Umpqua River at the confluence of Elk Creek. To the east of Elkton lies the City of Drain, approximately 13 miles away. The population of the city was 126 in 1975 (Reference 6), increasing to a population of 147 in the 2000 census (Reference 5).

The average annual rainfall in the vicinity of Elkton is 49 inches, with maximum monthly accumulations usually occurring in December. The average annual temperature is 54°F with historic extremes ranging from -1°F in December 1924 to 108°F in July 1946 (Reference 7). The elevation of Elkton is 140 feet. The maximum elevation of the Elk Creek basin is 2,400 feet. Storm runoff seldom includes snowmelt because of these relatively low elevations (Reference 10).

The Elk Creek basin is densely forested in the mountainous areas; farm communities occupy the upland valley terraces. Hydrologic soils (primarily in the Nekia-Jory and Blachly-Bohannon Associations) indicate fair to good water-holding capacities (Reference 8).

#### City of Glendale

The City of Glendale, founded in 1901, is located in southern Douglas County. The city is situated on the toe of a densely forested ridge lying between the Rogue River and Cow Creek. The crest of the ridge, a few miles south of the city, is approximately 3,000 feet. The elevation at the Southern Pacific Railroad depot is 1,420 feet.

Cow Creek heads in the Klamath Mountains at an altitude of approximately 4,000 feet and runs along the northern boundary of the City of Glendale. Its tributaries in the City of Glendale are Mill Creek, which forms the eastern corporate limits, and Section Creek, which runs through the western end of the city.

The Glendale-Azalea Valley is approximately 0.5 miles wide, with a flat floodplain. The channel is quite wide and relatively shallow with the channel slope ranging from 8 to 21 feet per mile. The bottom is generally loose, well-graded gravel, with a few rock outcrops. The primary banks are from 6 to 10 feet high.

In alluvial valleys, such as the Glendale-Azalea Valley, channel-bank erosion and movement of bed material occur during every high-water season. The natural process is for the stream to cut away its bank on the outside of sharp bends and deposit fine material on the inside of bends. Eddies and crosscurrents affect the movement and deposition of material within the stream channel. Aerial photographs of the valley show evidence of old stream channels that were abandoned in years past, when new channels were cut during a flood. Small meanders and braiding of the low-water channel between the primary banks show the looseness of the bed material. Erosion of the primary banks and cutting of new channels can be expected to continue as part of the natural

geomorphic process.

The temperature at Riddle, 15 miles north of Glendale, ranges from an average minimum of 41°F to an average maximum of 68°F. Extreme temperatures at Riddle have ranged from -3°F to 110°F (Reference 7).

The population of Glendale was 760 in 1974 (Reference 11). The population was estimated to be 855 in the 2000 census (Reference 5). The economy, thus the population, of the area is dependent on forest products and agriculture.

Most of the commercial establishments of Glendale are located on Pacific Avenue, on the south side of the Southern Pacific Railway yards. Few residences are on the flood plain of Cow Creek. Much of the land north of Montgomery Street is undeveloped pasture, except for one block of Sether Avenue, which is residential development.

#### City of Myrtle Creek

The City of Myrtle Creek, incorporated in 1893, is in the southern part of Douglas County. The city is located at the confluence of Myrtle Creek and the South Umpqua River. It is approximately 15 miles south of Roseburg, the county seat. In 1974, the population of Myrtle Creek was 2,945 (Reference 11). The population has increased to 3,419 in 2000 (Reference 5). The economy of the area is predominately logging; a large mill is located in the city. Interstate Highway 5, a segment of U.S. Highway 99, and the Southern Pacific Railroad are the main traffic arteries in a north and south direction; county roads follow eastward and upstream along North and South Myrtle Creeks. Floodplain development includes log storage, warehouses, some residential development, a city park, and agriculture.

Myrtle Creek begins at the confluence of North and South Myrtle Creeks, near the southeast corporate boundary of the city. The drainage area at the mouth of Myrtle Creek is 117 square miles. North and South Myrtle Creeks drain parts of the western foothills of the Cascade Range.

The local terrain rises steeply from a wide floodplain on Myrtle Creek and from narrow floodplains on North and South Myrtle Creeks. The wedge-shaped area between North and South Myrtle Creeks, and just above their confluence, is low and slopes westward.

#### City of Oakland

The City of Oakland is a small community that was founded in 1878, and is located in the north-central portion of Douglas County. The city is approximately 20 miles north of Roseburg and 2 miles east of Interstate 5. The population was estimated to be 954 in 2000 (Reference 5). The western corporate boundary lies along the east bank of Calapooya Creek.

#### City of Reedsport

The City of Reedsport is located in the northwest portion of Douglas County and was incorporated in 1919. Reedsport is situated on the south bank of the Umpqua River, 11 miles upstream from the river mouth on the Pacific Ocean, and is entirely surrounded by unincorporated areas of Douglas County. The city lies approximately 20 miles south of Florence and 27 miles north of the City of Coos Bay. The elevation varies from less

than 10 feet in the flat areas near the river to over 300 feet in the steeper portions of the city. The population of Reedsport was estimated at 5,010 in 1980 (Reference 12) and was estimated to be 4,378 in 2000 (Reference 5). The economy depends primarily on the wood products industry, commercial fishing, and tourism.

Total land area within the corporate limits of Reedsport is 1,331 acres. A total of 40 acres of vacant lands lie in the floodplain and are classified as unbuildable (Reference 13). Development in the floodplain is single-family residences, mobile homes, and commercial businesses. U.S. Highway 101, State Highway 38, and the Southern Pacific Railroad serve the Reedsport area.

The City of Reedsport has a temperate marine climate, with temperatures ranging from an average of 60°F in August to 44°F in January. Rainfall averages 77 inches per year, with more than 10 inches per month in the period of November through February (Reference 14). Sand, silty loams, sandstone, and siltstone are the predominant soil and rock types found in the area (Reference 14).

Scholfield Creek flows north through the central portion of Reedsport to its confluence with the Umpqua River. It has a length of 15 miles and drains an area of 22 square miles.

#### City of Riddle

The City of Riddle is in southern Douglas County, 2 miles upstream from the mouth of Cow Creek and 25 miles south of Roseburg. The City is situated on a terrace above the Cow Creek floodplain at the lower end of a 6-mile-long and 1- to 1.5-mile wide valley. The elevation at the railroad depot is 710 feet.

The population of the City of Riddle was 1,215 in 1976 (Reference 6). The population was 1,014 in 2000 (Reference 5). Normal annual precipitation is 32 inches. Temperatures in the City of Riddle range from an average minimum of 41°F to an average maximum of 68°F. Extreme temperatures have ranged from -3°F to 110°F (Reference 7). The economy of the area is dependent on agriculture, forest products, and mining.

Cow Creek heads in the Klamath Mountains at an altitude of approximately 4,000 feet and flows through these mountains for its entire length. The Klamath Mountains are composed of relatively impervious rocks (Reference 9). The slopes are steep, deeply dissected, and densely forested.

#### City of Roseburg

The City of Roseburg, the county seat of Douglas County, was incorporated in 1872. The city is on the South Umpqua River, 12 miles upstream from the confluence of the North Umpqua River and South Umpqua River, and at the mouth of Deer Creek. In 1974, the population of Roseburg was 15,530 (Reference 15), and has increased to 20,017 according to the 2000 census (Reference 5). Roseburg is the largest city in Douglas County, having 20 percent of the population of the county, more than three times the population of the second largest city. Interstate Highway 5 and the Southern Pacific Railroad are the main traffic arteries and lead in a north-south direction. Only local traffic moves in an east-west direction.

The weather records at Roseburg show the normal annual precipitation to be 33 inches; the maximum annual precipitation was 46.0 inches in 1891. The greatest 24-hour precipitation was 4.8 inches in November 1961.

The temperatures at Roseburg range from an average minimum of 33°F to an average maximum of 84°F. The maximum recorded temperature was 109°F in July 1946; the minimum recorded temperature was -6°F in January 1888. The normal annual snowfall is less than 6 inches; the greatest 24-hour snowfall was 13.5 inches in January 1969. Snow seldom remains on the ground for more than a week.

Most of the floodplain of the South Umpqua River in Roseburg contains residential development. There is a park, a school, and some commercial development along Harvard Boulevard in west Roseburg. The area along Newton Creek in northwest Roseburg is residential and park land. There is a great deal of commercial development along the lower 1/3 mile of Deer Creek, but upstream the floodplains are devoted mainly to residential development.

#### City of Sutherlin

The City of Sutherlin was incorporated in 1911, and is located in the north-central portion of Douglas County along the Interstate 5 corridor. The city is approximately 12 miles north of Roseburg. The population was estimated to be 6,669 in 2000 (Reference 5). Portions of the northern and western corporate boundaries lie along the east bank of Calapooya Creek.

#### City of Winston

The City of Winston was incorporated in 1955, and is located in the central portion of Douglas County. The city is located approximately 9 miles southeast of Roseburg. The population was estimated to be 4,613 in 2000 (Reference 5). The confluence of Lookingglass Creek and the South Umpqua River is within the corporate limits. The eastern corporate boundary lies along the west bank of the South Umpqua River.

#### City of Yoncalla

The City of Yoncalla, is located in the northeastern Douglas County approximately 30 miles north of Roseburg. The city was incorporated in 1901. The population was estimated to be 1,052 in 2000 (Reference 5). Portions of the eastern corporate boundary lie along the west bank of Yoncalla Creek.

### **2.3 Principal Flood Problems**

The highest stream flows in the Umpqua River basin usually occur during November through March as a result of heavy winter rains augmented by snowmelt. Most of the flooding occurs in the valley areas of the South Umpqua and Umpqua Rivers, although the tributary streams of Cow Creek, Calapooya Creek, and Elk Creek also have extensive flood plains. Most of the land subject to flooding along the South Umpqua River is below Days Creek. Because these valleys are the most densely populated and intensively developed in Douglas County, the principal flood problems occur along this stream. A flood potential also exists along the Umpqua River between Elkton and the confluence of the North and South Umpqua Rivers. In the Glendale-Azalea valley of



Cow Creek, much bank erosion and channel shifting occurs during floods.

The valleys of the Umpqua River basin have a history of frequent flooding. Major flooding occurred in 1861, 1890, 1927, 1953, 1955, 1964, and 1971 (References 16, 17, 18, and 19). The flood of December 1964 was a widespread, outstanding flood throughout the entire basin, although it has been exceeded by storms concentrated in tributary basins. The primary cause of the flood was a 10-day period of sustained rainfall and mild temperatures which melted snow in the upper Cascade Mountain range. The flood of December 1964 had a recurrence interval of approximately 100 years on the Umpqua, North Umpqua, and South Umpqua Rivers. In the vicinity of Elkton, the flood was estimated to have a recurrence interval of 65 years (a 1.5-percent chance of occurring in any given year). In the Reedsport area, the flood that occurred in December 1964 was equal to the 100-year flood, with an estimated flow of 329,000 cfs (Reference 18). Water was 4 feet deep in most areas, flooding 300 homes, 177 commercial and industrial structures, and most of the public buildings (Reference 20).

The flood of December 1964 caused damage totaling \$25,732,000. Of this total, more than \$5 million was for agricultural damage, approximately \$6.5 million for residential damage, nearly \$3 million for commercial, nearly \$2 million for industrial, nearly \$3 million for utility, and more than \$6 million for highway damages (Reference 21).

Major flooding occurred in January 1974. Flow in the Umpqua River was estimated to be 262,000 cfs, with a return period of 28 years (Reference 18). Levees were constructed in 1970 in order to protect the low lying areas of the City of Reedsport previously flooded in 1964. The levee system prevented significant flood damages that could have occurred during this flood.

Very little is known about the floods of 1861 and 1890. At the gaging station on the Umpqua River near Elkton, local residents in 1935 pointed out a high-water mark of the 1861 flood, which was equaled by the December 1955 flood, and exceeded only by the flood of December 1964.

The flood of December 22, 1964, was the highest since at least 1890 on the South Umpqua River. A statistical analysis of the streamflow records shows the 1964 flood to be a 100-year flood. During this flood, a large area in the western part of Roseburg was inundated and many homes and commercial structures along the riverbanks suffered flood damage.

At the gaging station on the South Umpqua River near Brockway, the flood of February 1890 was 1.9 feet higher than the flood of February 1927, according to a resident who lived nearby at the time of both floods. The flood of 1890 was exceeded only by the flood of December 1964. It is difficult to determine the discharge of the floods of 1861 and 1890 because of probable changes in the hydraulic carrying capacity of the river channel over an extended period of time

The largest Cow Creek flood of record since 1928 occurred on January 15, 1974, exceeding the 100-year flood level. The 10-year flood level has been exceeded several other times since streamflow records began in 1928 at the gaging station near Azalea, located 17 miles east of Glendale. These flood levels occurred on October 29, 1950,