

UMATILLA COUNTY FLOOD MITIGATION PLAN

Prepared for:

Umatilla County Department of Resource Services & Development
216 SE 4th Street
Pendleton, OR 97801

Prepared by:

University of Oregon Community Planning Workshop
1209 University of Oregon
Eugene, OR 97403-1209

August, 1997

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August, 1997

EXECUTIVE SUMMARY

Background and Purpose

Recent flood events (February 1996 and December 1996/January 1997) caused widespread erosion of agricultural lands, road damage, and structural damage in Umatilla County. Based on the extent of the damages from these events, Umatilla County has twice been declared a federal disaster area. The severity of recent flood damage has underscored the need for county-wide flood response planning and flood mitigation measures.

Following the 1996 disaster declaration, the County was awarded a grant from the U.S. Department of Housing and Urban Development (HUD) to be used to establish flood mitigation/flood education efforts. The purpose of this report is to meet the requirements of the HUD grant and outline mitigation measures which can be taken throughout Umatilla County to minimize future flood damage. Recommended mitigation measures include general county-wide efforts and specific projects for identified flood problem areas.

Methodology

The Community Planning Workshop (CPW) reviewed existing literature on flood mitigation projects to identify examples of flood mitigation plans from other jurisdictions for use as reference materials and models. Following the literature review, CPW identified and interviewed organizations and individuals in Umatilla County. CPW interviewed representatives of local, state, and federal agencies, stakeholder groups, watershed councils, the Confederated Tribes of the Umatilla Indian Reservation, and others involved with flood control and/or flood mitigation efforts. Interviews were also conducted with representatives of groups affected by flooding, such as agricultural and residential landowners and city and county officials. Based on the results of interviews, CPW conducted site visits of some of the identified flood hazard areas around the County. Whenever possible, these site visits were conducted with County officials and/or agency representatives. Site visits provided a greater understanding of flood issues and possible mitigation measures. Based on site visits and interviews, CPW drafted recommendations for general mitigation measures and specific mitigation projects throughout the County.

Flooding in Umatilla County: Existing Risks and Problem Areas

Levees, dikes, and reservoirs were the primary method of flood control prior to the adoption of floodplain management and flood insurance policies in the 1970s. In the 70s and early 1980s, Umatilla County set policies to avoid floodway development, determine floodway boundaries, and establish zones where extra caution must be taken in land development (Umatilla County Comprehensive Plan, 1983). Despite the fact that these policies have been followed through the enforcement of local floodplain development regulations, flood insurance mapping, and other safeguards, the County still has numerous flood risks.

Most of the tributaries of the Umatilla and Walla Walla rivers are subject to flooding. The Federal Emergency Management Agency (FEMA) concluded in 1987 that 17,600 acres along the main stem of the Umatilla and 12,000 acres along its tributary streams are at risk from floods (FEMA, Flood Insurance Study, 1987). This area includes valuable agricultural land and many homes and structures. Flooding occurs to the same degree on most of the tributaries of the Walla Walla River. While the causes may differ, damage has been reported on nearly all major waterways in the County. The primary flood problems include structural damage, erosion of agricultural lands, high levels of gravel and debris deposition, and property loss.

Recent flooding has highlighted the following broad problem areas that must be addressed if mitigation efforts are to be successful.

- There is a need to identify and prioritize areas around the County in need of flood mitigation measures. For each of these areas, a range of non-structural and structural flood mitigation projects should be considered.
- Flood damages are so widespread and so diverse that mitigation efforts need to be planned on a watershed or drainage basin scale. Flood issues must be evaluated from the highlands down through the floodplain.
- There is a need for an increased level of public awareness and understanding of flood risks. Flooding will continue to happen and people and property will continue to be at risk. Many individuals may not understand their personal and property risks just as many do not understand the dynamics of rivers and the floodplain.
- The issue of in-stream work to remove debris or gravel or to add riprap or other erosion control materials is very contentious. On one hand, buildup of gravel and debris can lead to increased flood heights and property losses, while on the other hand in-stream work may exacerbate flood problems downstream and may be destructive to fish habitat.
- Finally, funding opportunities for flood mitigation work and flood damage prevention must be identified and taken advantage of.

Existing flood damage prevention measures

There are many methods of protecting buildings and property from flood damage. In the past, structural projects such as levees, dikes, and reservoirs were the primary method of preventing flood damage. In more recent years, non-structural methods such as watershed treatment and development regulations have provided a viable option to structural work. Flood damage prevention measures are described in detail for each of the following areas:

- | | |
|-------------------------|-----------------------|
| • Preventative measures | • Emergency Services |
| • Property Protection | • Structural Projects |
| • Watershed Treatment | • Public Information |

Flood damage is usually the result of many factors; it is difficult to identify a single factor as the sole cause of damage in a specific area. Because of this, flood mitigation efforts must incorporate a watershed perspective and a range of flood damage prevention techniques should be considered for each problem area.

Recommended Flood Mitigation Measures

Flood mitigation actions were recommended for general county-wide application as well as for specific geographic locations.

General county-wide recommendations

Table 3-1 illustrates the general county-wide mitigation recommendations.

Table 3-1
General Mitigation Recommendations

<u>Identifier</u>	<u>Action Item</u>	<u>Identifier</u>	<u>Action Item</u>
<u>Preventative Measures</u>		<u>Emergency Services</u>	
PREV-1	Review uses of floodplain/floodway as part of periodic review.	EMER-1	Evaluate the County's river gage network.
PREV-2	Seek updated and improved floodplain mapping.	EMER-2	Provide ground information to National Weather Service to better predict risk.
PREV-3	Identify urban drainage problems.	EMER-3	Adopt a County emergency flood response plan.
PREV-4	Inventory county roads and bridges; Develop additional road design standards.		
<u>Property Protection</u>		<u>Structural Projects</u>	
PROP-1	Explore options for acquiring land or establishing easements	STRU-1	Conduct inventory and maintenance evaluation of levees and dikes.
PROP-2	Provide additional information on elevation and floodproofing options.	STRU-2	Establish a "levee watch" program.
		STRU-3	Encourage watershed perspective in in-stream engineering projects (i.e. riprap).
<u>Watershed Treatment</u>		<u>Public Information</u>	
WATR-1	Promote streambank stabilization and bioengineering efforts countywide.	PUBL-1	Establish additional public information materials and expand public outreach efforts
WATR-2	Prioritize locations for debris/sediment removal.	PUBL-2	Encourage and promote watershed council involvement in flood mitigation.
WATR-3	Identify upland areas which contribute to flood problems; identify watershed treatment options.		

Specific Mitigation Projects

In addition to general county-wide recommendations, the following specific locations were identified for flood mitigation projects:

- Wildhorse Creek Basin
- Mill Creek
- East Birch Creek/Pilot Rock
- SW 44th Ave. Pendleton
- Riverside RV Park, Pendleton
- Adams, Helix
- Echo
- Ukiah
- Pine Creek/Dry Creek

Plan Implementation

In using the *Umatilla County Flood Mitigation Plan* (Plan), the next step should be to develop broad-based support for mitigation actions through public involvement and agency collaboration. The Plan needs to be provided to agencies, organizations, and interested public to begin the process of prioritization and identification of tangible, doable projects. The Plan should be viewed as an “open” plan; the information and recommendations included are for public knowledge and should be changed and modified as new ideas, information, and problems, arise. Any ranking or prioritization of recommendations has been purposefully left out of the Plan. Priorities should be defined by County residents and actions should be considered and implemented as time, funding, and circumstances dictate.

The Plan can be used in the following ways:

- as a catalyst for agency coordination and public involvement;
- to attract funding for mitigation projects;
- to qualify for the national flood insurance program's community rating system; and,
- as a source of ideas for long term flood mitigation implementation.

Ideally, over time the Plan will be used to serve each of these purposes.

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CHAPTER ONE

Introduction

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Introduction

1.1 BACKGROUND

In February of 1996, a period of heavy rain, warm temperatures, and snowmelt combined to produce some of the worst flooding in the history of Oregon. Throughout the state, rivers exceeded flood stage and caused an estimated \$280 million in damages to buildings, public infrastructure, and agricultural lands (Interagency Hazard Mitigation Team, 1996). In Umatilla County, flooding caused widespread erosion of agricultural lands, road damage, and structural damage. Based on the extent of the damage, Umatilla County was declared a federal disaster area along with 26 other Oregon counties through federal disaster declaration DR-1099-OR. In December of 1996 and January of 1997, weather conditions again combined to cause a serious flood event. Upon review of damages, the federal government once again declared Umatilla County a disaster area through declaration DR-1160-OR. The severity of these recent flood events in Umatilla County has underscored the need for county-wide flood response planning and flood mitigation measures.

Umatilla County (County) covers an area of 3,231 square miles in northeastern Oregon. The County is primarily made up of plains and rolling hills bordered by the Blue Mountains to the south and east and by the Columbia River to the northwest (see **Figure 1-1**). The County population is 65,500 with major population centers of Pendleton (pop. 15,900), Hermiston (11,050), Milton-Freewater (6,055), and Umatilla (3,310) (Oregon Secretary of State, 1997). Umatilla County is a major producer of agricultural products, including both dry land and irrigated agriculture. The northwest portion of the County provides a diversity of fruits and vegetables, including watermelons, potatoes, onions, and mustard. The central County is predominantly dry land wheat, much of which is in a three year rotation of wheat, peas, and fallow. The northeast portion of the County is known for its orchards while the southern portion of the County (south of Pilot Rock) is primarily used as range land for livestock. The average farm is approximately 3,000 to 4,000 acres, with 10,000 acre farms not uncommon.

Figure 1-1 provides a rough map of Umatilla County. There are two primary drainage basins in the County, the Umatilla River drainage and the Walla Walla River drainage. The Umatilla basin contains approximately 2,500 square miles of land drained by the Umatilla River from the Blue Mountains to the Columbia River. The Walla Walla basin contains 1,657 square miles of land draining into the Walla Walla river and then to the Columbia. Much of the Walla Walla basin is located in Washington. Although the County is sparsely populated, flood damage risks persist in many areas, largely as a result of human uses of floodplains and hydromodification efforts. There are many locations throughout the County, both urban and rural, which are at risk from both flash floods and long-developing high water events. This is due in part to highly complex and variable terrain (V. Thompson, NWS, pers. comm., 1997). National Weather Service Cooperative Weather Observing stations range in elevation from 640 mean sea level (MSL) at Hermiston, to

3346 ft. MSL in Ukiah. Several mountain ridges top 4000 ft. MSL and Tower Mountain Peak is listed at 6760 MSL (V. Thompson, NWS, pers. comm., 1997)

Following the 1996 disaster declaration, the County was awarded a grant from the U.S. Department of Housing and Urban Development (HUD). This grant, part of a Community Development Block Grant, was administered through the Oregon Economic Development Department (OEDD) and was to be used to establish flood mitigation/flood education efforts in the County. The purpose of this report is to meet the requirements of the HUD grant and outline mitigation measures which can be taken throughout Umatilla County to minimize future flood damage. Recommended mitigation efforts include general county-wide measures and specific recommendations for identified flood problem areas.

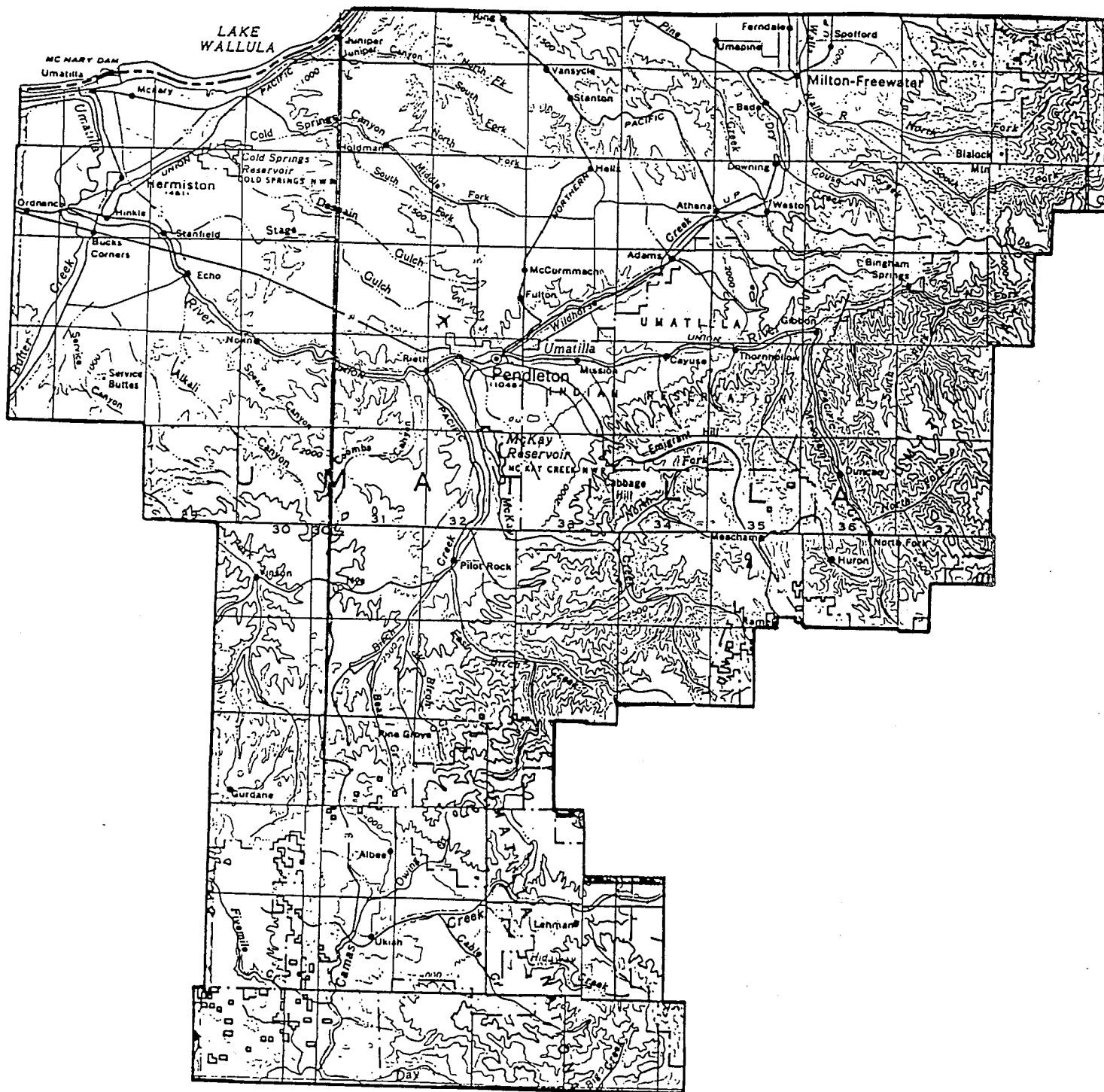


Figure 1-1
UMATILLA COUNTY AREA MAP

1.2 FEDERAL AND STATE HAZARD MITIGATION POLICIES

The *Umatilla County Flood Mitigation Plan* provides a link to current federal and state disaster planning efforts. The creation of comprehensive mitigation plans following natural disasters has become the recommended method of decreasing future risks (Federal Emergency Management Agency, National Mitigation Strategy, 1996). The Federal Emergency Management Agency (FEMA) defines hazard mitigation as “sustained action taken to reduce or eliminate long-term risk to people and property from hazards and their effects” (FEMA, NMS 1996). This definition refers to actions which are beneficial over the long term and taken in anticipation of future hazards. The Federal government, along with state and local jurisdictions, is trying to avoid reliance on emergency measures taken only in response to natural disasters. In doing so, FEMA is promoting a preventative approach to hazard mitigation.

Of the nation’s ten most costly natural disasters of all time, seven occurred between 1989 and 1994 (FEMA, NMS 1996). The extent of damage from these disasters prompted FEMA to establish a National Mitigation Strategy to guide hazard mitigation throughout the nation. The National Mitigation Goals are to 1) increase public awareness, and 2) significantly reduce the risk of loss of life and property. To reach these goals, the National Mitigation Strategy outlines the following methods:

- hazard identification and risk assessment;
- applied research and technology transfer;
- public awareness, training, and education;
- incentives and resources; and,
- leadership and coordination.

Although these methods are advocated at the national level, the National Mitigation Strategy relies on local hazard mitigation plans to carry out its goals. The federal government supplies guidance documents and technical assistance through FEMA, but local jurisdictions are typically responsible for producing their own mitigation plans and projects.

In Oregon, following the floods of February 1996, the State Office of Emergency Management (OEM) and FEMA-Region 10 established the Interagency Hazard Mitigation Team (IHMT). The IHMT is a cooperative effort to establish policies and recommendations for governmental action and the use of various funding sources to minimize future damages from natural hazards (IHMT, 1996). One of the operative policies forwarded by the IHMT is as follows:

Oregon’s policy focus is to learn from the flood and landslide events of 1996, and to apply this understanding to mitigate the loss of life and property from all future natural hazard events. As the recovery process proceeds, efforts will continue to reshape and articulate policies and plans in appropriate areas with mitigation as the cornerstone (IHMT, 1996).

The IHMT published mitigation-based reports following each of the recent disaster declarations. Each report describes the damage which occurred, and provides mitigation recommendations and action steps. One of the recommendations of the IHMT reports is for local jurisdictions to establish their own mitigation measures.

The *Umatilla County Flood Mitigation Plan* can act as an organizational force in meeting the mitigation goals advanced by federal and state agencies. Umatilla County has the opportunity to utilize the recommendations of this plan to prioritize problem areas and to involve the community in planning for structural and non-structural projects to reduce future flood risks and damages. Additionally, this plan can act as a conduit for the appropriation of hazard mitigation funds in the future. For example, in allocating funds for mitigation assistance projects, FEMA places priority on communities that have mitigation plans in place (IHMT, 1997). Additionally, the completed mitigation plan can qualify for "points" in FEMA's Community Rating System (CRS) which can qualify Umatilla County residents for lower flood insurance rates. These issues will be described in greater depth in the body of the report.

1.3 PROJECT METHODOLOGY

The Community Planning Workshop (CPW) reviewed existing literature on flood mitigation projects to identify examples of flood mitigation plans from other jurisdictions for use as reference materials and models. Included in this review were documents from the U.S. Army Corps of Engineers (USACE), U.S. Bureau of Reclamation (USBR), and various municipalities and jurisdictions throughout Oregon. Model plans developed by FEMA and other sources were used extensively to guide the development of this report. This report has been designed to connect with current state and regional flood mitigation planning efforts.

Following the literature review, CPW identified and interviewed organizations and individuals in Umatilla County. CPW interviewed representatives of local, state, and federal agencies, stakeholder groups, watershed councils, the Confederated Tribes of the Umatilla Indian Reservation, and others involved with flood control and/or flood mitigation efforts. Interviews were also conducted with representatives of groups affected by flooding, such as agricultural and residential landowners, and city and county officials. Interviews were conducted to gain a comprehensive understanding of the responsibilities and roles of various agencies and groups with regard to flood planning and damage prevention. Interviews also served the purpose of identifying problem areas around the County and gaining insight into potential methods of mitigating these problems. Throughout the interview process, CPW made connections between potential flood mitigation projects and existing and proposed in-stream work and water quality projects. These connections are described where relevant in the body of the report.

Based on the results of interviews, CPW conducted site visits to some of the identified flood hazard areas around the County. Whenever possible, these site visits were conducted with County officials, agency representatives, or local residents. Site visits provided a greater understanding of local flood issues and possible mitigation measures. Based on site visits and interviews, CPW

drafted recommendations for general mitigation measures and specific mitigation projects throughout the County. The draft report was submitted for review to the Umatilla County Department of Resource Services and Development and other interested parties on July 21, 1997. Reviewers were given two weeks to review the document and provide comments, suggestions, and concerns to CPW.

1.4 REPORT ORGANIZATION

Chapter Two, Flooding in Umatilla County: Existing Risks and Damage Prevention Measures, includes a brief historical description of flooding in Umatilla County and describes the general characteristics of the County which create flood risks. The chapter describes some of the problem areas around the County and includes an inventory and analysis of the flood damage prevention measures available to regulatory agencies and landowners.

Chapter Three, Recommended Mitigation Measures, provides recommended actions for improving the current system of damage prevention and flood response. The chapter provides general recommendations for actions which could be taken county-wide. Actions include preventative measures, property protection, watershed treatment, emergency services, structural projects, and public information. Chapter Three also includes a more detailed description of specific flood problem locations around the County. These areas were identified by County staff and agency representatives as some of the hardest hit by recent flood events or as areas which are particularly prone to future flood damage.

Chapter Four, Plan Implementation, describes how the Umatilla County Flood Mitigation Plan should be used. This Plan is written to be acted upon, and this chapter includes the next steps that should be taken by agencies and residents in Umatilla County to better plan for flood damage prevention. The chapter provides examples of methods to coordinate existing flood mitigation projects and incorporate new recommendations to create a balanced system of flood damage prevention.

Appendix A, Umatilla County Emergency Flood Response Plan, provides a description of the County's emergency response network in the event of a flood. The Emergency Response Plan includes information on flood risks and flood warning systems, notification, public information and coordination, and a listing of involved organizations and their responsibilities. The Response Plan also includes information on flood fighting and post-flood work.

Appendix B, Federal and State Funding and Assistance Programs for Flood Mitigation, includes a reproduction a document produced by the State Office of Emergency Management (OEM) and the Federal Emergency Management Agency (FEMA). This resource provides a comprehensive listing of funding sources, granting agencies, and offers of assistance from state and federal agencies.

Appendix C, Stanfield: A Case Study In Flood Mitigation Efforts, provides a brief case study of the City of Stanfield. Stanfield is an excellent example of an area which has enacted proactive and preventative planning to deal with flood problems.

CHAPTER TWO

Flooding In Umatilla County: Existing Risks And Damage Prevention Measures

CHAPTER TWO

Flooding In Umatilla County:

Existing Risks And Damage Prevention Measures

2.1 INTRODUCTION

Since the Flood Control Act of 1936 the federal government has been the major player in establishing flood damage reduction efforts and floodplain management projects (Interagency Floodplain Management Review Committee, 1994). Structural projects developed by the U.S. Army Corps of Engineers and Bureau of Reclamation to control flood waters have historically accompanied major infrastructure development, creation of farmland, and housing projects. Based on this work, floodplains were settled and developed with the belief that structural projects would protect these areas from floods (Interagency Floodplain Management Review Committee, 1994). In addition to federal efforts, state agencies, local jurisdictions, tribal authorities, and private landowners have traditionally conducted their own structural hydromodification projects to control water flow, provide irrigation for crops, or to settle and develop fertile floodplain areas. By the 1960s a broader approach to flood control was implemented in response to escalating flood damages throughout the nation (Gilmer, 1995). This included land use regulation, flood insurance, improved flood forecasting, relocation of structures, and land acquisition. These “non-structural” methods of flood damage prevention have become as important as existing structural methods. **Table 2-1** displays a timeline of some key federal laws which have combined to regulate floodwaters and floodplain development through non-structural means.

Table 2-1
Selected Federal Legislation Regulating Waterways and Floodplains

Year	Legislation
1964	Land and Water Conservation Act
1968	National Flood Insurance Act
1969	National Environmental Policy Act
1972	Clean Water Act
1972	National Dam Inspection Act
1973	Endangered Species Act
1973	Flood Disaster Protection Act
1974	Disaster Relief Act
1976	Federal Land Policy and Management Act
1977	Executive Order 11988, Floodplain Management
1980	Federal Crop Insurance Act
1986	Dam Safety Act
1986	Emergency Wetlands Resources Act
1986	Water Resources Development Act
1988	Disaster Relief And Emergency Assistance Amendments
1990	Protection of Wetlands, Executive Order
1990	Water Resources Development Act
1994	National Flood Insurance Reform Act
1994	Stafford Act, Section 404 Hazard Mitigation Grant Program

Source: Gilmer, 1995.

The evolution of flood damage prevention and protection in Umatilla County parallels the national model. Levees, dikes, and reservoirs were the primary method of flood control prior to the adoption of floodplain management and flood insurance policies in the 1970s. The 1970s also brought the comprehensive planning process to Umatilla County. Comprehensive planning refers to the process with which local cities and counties set findings and policies based on nineteen statewide planning goals established by the Land Conservation and Development Commission (LCDC). Based on an inventory of lands conducted as part of the County's comprehensive planning process, flooding was identified as the only major natural hazard risk in Umatilla County (Umatilla County Comprehensive Plan, 1983). Statewide Planning Goal 7, *Areas Subject to Natural Disasters and Hazards*, is focused on protecting life and property from natural events such as flooding, landslides, earthquakes, etc. The County's response to Goal 7 was to set policies to avoid floodway development, determine floodway boundaries, and establish zones where extra caution must be taken in land development (Umatilla County Comprehensive Plan, 1983). Despite the fact that these policies have been followed through the enforcement of local floodplain development regulations, flood insurance mapping, and other safeguards, the County still has numerous flood risks.

Umatilla County's floodplain provides very productive farmland and a pleasant place to live for County residents. The floodplain also provides recreational opportunities, irrigation water, and a vital and rich ecological system. Despite these productive uses, the risks of living and working in flood prone areas must be understood and planned for.

2.2 UMATILLA COUNTY FLOOD RISKS AND PROBLEM AREAS

Umatilla County averages only 12-15 inches of rainfall annually (Oregon Secretary of State, 1997). In addition, many of the County's waterways are reduced to very low flows during the summer and fall months. Despite this, Umatilla County suffers damage from many different types of flooding, including runoff, snowmelt, ice jams, flash floods, and thunderstorms. Perhaps the most common "type" of flooding occurs when unseasonably warm temperatures and heavy rainfall combine with melting snow to produce high water flow. The Blue Mountains often receive a substantial snowpack in the winter, which can exacerbate this problem.

While flooding can occur at any time of year, there are typically two annual flood periods in Umatilla County: late December or January and the typical spring runoff period of April and May. High flows on the Umatilla River and tributaries generally begin in February and last through June. Major floods in the area (such as the February 1996 flood) are usually a result of a rain and snowmelt combination and, while damaging, often last only 1 or 2 days (FEMA, Flood Insurance Study, 1987). Three dams in the County, McKay, Cold Springs, and Three Mile, create additional flood risk as a dam failure could lead to substantial inundation and a great deal of structural and agricultural damage.

Most of the tributaries of the Umatilla and Walla Walla rivers are subject to flooding. The FEMA concluded in 1987 that 17,600 acres along the main stem of the Umatilla and 12,000 acres along its tributary streams are at risk from floods (FEMA, Flood Insurance Study, 1987). This area includes valuable agricultural land and many homes and structures. Flooding occurs to the same degree on most of the tributaries of the Walla Walla River. While the causes may differ, damage has been reported on nearly all major waterways in the County. In addition to the main stems of both rivers, some of the worst flood damage has been reported along Mill Creek, Wildhorse Creek, East Birch Creek, McKay Creek, and Squaw Creek. Many other stretches of waterway throughout the County have been identified as having recurring flood problems. Problems include structural damage, erosion of agricultural lands, high levels of gravel and debris deposition, and property loss. Specific problem areas will be identified and described throughout this report, but most of the recommendations included are designed to be generally applicable to all areas with flood damage problems.

2.2.1 Records of Past Flooding

Records of past flooding in Umatilla County vary greatly depending on location. For example, records of flooding on McKay Creek and Mill Creek have been kept since the late 1800s while records on streams like Wildhorse Creek and Squaw Creek rely on anecdotal information from long term residents. This is due to the fact that river gages are typically installed in areas where a waterway runs close to structures or heavily settled areas. Gages are maintained by many different authorities, including the United States Geographical Survey (USGS), the National Weather Service (NWS), the Bureau of Reclamation (USBR) and local water control and irrigation

districts. Gages are owned by various authorities as well, including USGS, USBR, and the Bureau of Indian Affairs (BIA).

Tables 2-2 and 2-3 provide a review of gage information from sites on the Umatilla and Walla Walla Rivers. These tables show that most of the heaviest flooding takes place from December through February. The gage on the Umatilla River, located at Pendleton, has provided flood data for more than 100 years. Currently, bankfull stage in Pendleton is 6.4 feet and flood stage begins at 7.8 feet. The Umatilla River will cause moderate flooding at 8.0 feet and major flooding when the gage reads 11.0 feet (NWS, 1997). **Table 2-2** shows the ten highest flood stages and water flow levels ever taken from the Pendleton gage. For comparison purposes, the crest of the Umatilla River during the February 1996 floods was measured at 11.0 feet.

Table 2-2
Worst Floods on Umatilla River at Pendleton

Date of Flood Measurement	Stage (feet)	Flow (cubic feet/second)
December 14, 1882	12.5	17,000
May 30, 1906	12.1	15,500
January 30, 1965	12.1	15,500
February 22, 1949	12.1	15,400
December 12, 1946	11.6	13,700
December 29, 1945	11.6	12,400
January 25, 1975	11.5	14,082
April 1, 1931	11.5	13,500
December 23, 1964	11.4	12,300
February 8, 1997	11.2	13,432
Intermediate Regional Flood*		16,500
Standard Project Flood*		24,500
Bankfull level	6.4	3,380
Flood stage	7.8	6,139

Source: National Weather Service River Forecast Points Summary, 1997.

*The intermediate regional flood is a flood which has a one percent change of being equaled or exceeded each year. The standard project flood represents the reasonable upper limit of a flood likely to occur. Based on these numbers, there has only been one intermediate regional flood since gaging began.

The Walla Walla River near Touchet, Washington includes water drained from Mill Creek, Couse Creek, Pine Creek, Dry Creek, and others in Oregon. Of course, much of the land drained by the Walla Walla River is in Washington. Bankfull stage of the Walla Walla at Touchet is 10.0 feet and flood stage is considered 13.0 feet. **Table 2-3** shows the five worst floods on record since 1951 when continuous gaging began at his spot.

Table 2-3
Worst Floods on Walla Walla River near Touchet

Date of Flood Measurement	Stage (feet)	Flow (cubic feet/second)
December 22, 1964	18.9	33,400
February 12, 1985	15.5	12,200
February 24, 1986	14.9	10,100
January 6, 1969	14.1	14,600
January 30, 1965	13.7	15,800
Bankfull level	10.0	3,780
Flood stage	13.0	7,220

Source: National Weather Service River Forecast Points Summary, 1997.

High water events listed in **Tables 2-2 and 2-3** do not necessarily represent the most devastating floods in terms of damage claims and property loss. For example, according to the Farm Services Agency, flooding in 1995 was much more costly in terms of crop damages than the higher water events of 1996 and 1997 (K. Jordan, pers. comm., 1997). Flash floods, mudslides, and concentrated rainfall have produced a great deal of flood damage which was never included in a disaster declaration and may not have even been recognized as a "flood event". Despite this, the disaster declarations of the last two years have focused attention on county-wide flood problems and have highlighted some of the deficiencies in dealing with these problems.

2.2.2 Effects of Recent Flood Events

The disaster declarations following the floods of February 1996, and January 1997 served as a catalyst for planning efforts in many areas around the state. Like the massive flooding of the Mississippi River Valley in 1993, these flood events exposed the fact that many counties and municipalities were unprepared for a major disaster. Since the declarations, several counties and cities have taken steps to improve their flood response and mitigation efforts. Along with Umatilla County, the city of Vernonia and the Rogue Valley Council of Governments in Jackson and Josephine Counties are two examples of jurisdictions which are taking action to plan for flood mitigation.

Umatilla County has been hit hard by recent flooding. Erosion, property damage, and debris and gravel deposition have occurred along many of the waterways in the County. The federal disaster declarations have resulted in a comprehensive account of County flood damages. The February 1996 disaster relief effort included public assistance, which refers to funding given to public agencies, and individual assistance. Damage reports were extensive, including homes swept off their foundations in the Mill Creek area, road damage in the Wildhorse Creek area, and severe erosion from East Birch Creek. **Table 2-4** provides information from FEMA damage survey reports as of December 5, 1996.

Table 2-4
FEMA Public Assistance Obligations to Umatilla County Applicants
Flood Disaster 1099--February 1996

Recipient	Allocation
Umatilla County	\$285,209
Westland Irrigation District	\$187,024
City of Pilot Rock	\$124,917
Umatilla School District	\$64,043
Hermiston Irrigation District	\$25,378
Hudson Bay District Improvement Co. Inc.	\$24,462
West Extension Irrigation District	\$17,673
City of Umatilla	\$17,009
Walla Walla River Irrigation District	\$9,630
City of Athena	\$8,014
Stanfield Irrigation District	\$1,201
TOTAL	\$764,560

Source: FEMA P.5-Obligation Reports, 1996.(Obtained from Oregon Emergency Management).

The largest allocation of public assistance, to Umatilla County, was used primarily for road and bridge work with the largest single item the repair of Mill Creek road. The second largest disbursement went to the Westland Irrigation District for use for repairs on the Westland Irrigation Dam and debris removal from the area. Additional funding went for many different projects, including bridge strengthening and replacement and protection of water and sewer lines which were at risk due to erosion and gravel scour. The dollar amounts listed in **Table 2-4** represent the amount of public assistance the County received. In terms of individual assistance, the County received the following:

- \$161, 956 in disaster housing assistance from FEMA (54 households);
- \$20,394 in individual and family grants (6 cases); and
- \$522,400 in disaster loans from the Small Business Association (out of 22 loans, 20 were home loans). (J. Murray, Oregon Emergency Management Department, 1997).

The January 1997 disaster declaration provided Umatilla County with public assistance but did not provide assistance to individuals. **Table 2-5** provides funding obligated from FEMA.

Table 2-5
FEMA Public Assistance Obligations to Umatilla County Applicants
Flood Disaster 1160--January 1997

Recipient	Allocation
Umatilla County Public Works Department	\$234,723
Hudson Bay District Improvement Co. Inc.	\$10,966
Walla Walla River Irrigation District	\$4,606
TOTAL	\$250,295

Source: FEMA P.5-Obligation Reports, 1996.(Obtained from Oregon Emergency Management).

Two disaster declarations so close together reinforced the fact that local residents must be prepared for flooding at all times. Simply because a major flood event occurs in a given year does not preclude additional events from occurring soon after. In addition to raising awareness, these recent flood events have inspired a renewed commitment to flood mitigation and emergency flood response planning. Recent flooding has also highlighted the following broad problem areas that must be addressed if mitigation efforts are to be successful.

- There is a need to identify and prioritize areas around the County in need of flood mitigation measures. For each of these areas, a range of non-structural and structural flood mitigation projects should be evaluated.
- Flood damages are so widespread and diverse that mitigation efforts need to be planned on a watershed or drainage basin scale. Flood issues must be evaluated from the highlands down through the floodplain.
- There is a need for an increased level of public awareness and understanding of flood risks. Flooding will continue to happen and people and property will continue to be at risk. Many individuals may not understand their personal and property risks just as many do not understand the dynamics of rivers and of the floodplain.
- The issue of in-stream work to remove debris or gravel or to add riprap or other erosion control materials is very contentious. On one hand, buildup of gravel and debris can lead to increased flood heights and property losses, while on the other hand in-stream work may exacerbate flood problems downstream and may be destructive to fish habitat.
- Finally, funding opportunities for flood mitigation work and flood damage prevention must be identified and addressed.

The County is working to address each of these issues. Many local, state, and federal agencies and departments are responsible for some aspect of flood damage prevention. In addition, the Confederated Tribes of the Umatilla Indian Reservation (Tribes), watershed councils, irrigation districts, water control districts, and many landowners are also involved with flood mitigation work. Each of these groups has a distinct mission and area of concern and this may lead to a lack of coordination in some instances. For example, a landowner on a stretch of stream may receive a permit for some in-stream work while landowners on either side may be pursuing conservation easements. It is important that flood mitigation efforts are coordinated to the highest extent possible and that a balance of structural and non-structural solutions are evaluated. With a greater number of agency representatives and individuals apprised of a particular problem, the range of possible solutions will be expanded.

Policy-makers are increasingly recognizing the value of interagency coordination and cooperation in addressing flood damage prevention, mitigation, and in-stream habitat protection. One example of this is the "404" in-stream permitting process. Named for Section 404 of the Clean Water Act, the 404 process is a permitting system administered by the Division of State Lands (DSL), Oregon Department of Fish and Wildlife (ODFW), and the U.S. Army Corps of Engineers

(USACE) to regulate in-stream development work. Each permit is reviewed by a team of agency representatives to ensure a broad perspective of the project's potential impact on flooding and fish and wildlife habitat. Working as a team rather than as an individual agency may provide a more comprehensive view of the causes of problems and the effects of proposed solutions. Flood problems cannot be isolated to a particular spot, and a cooperative approach will consider solutions throughout the watershed rather than just immediately upstream and downstream of the project site.

The recent disaster declarations have raised statewide public awareness regarding flood risks and damages. Despite this, individuals still need a greater understanding of the dynamics of rivers and the dangers of living and working in the floodplain. The County Department of Resource Services and Development distributes information on flood risks and actions landowners can take to alleviate flood problems. In addition, two watershed councils, the Umatilla Watershed Council and the Walla Walla Watershed Council, are engaged in educational and technical assistance efforts in their respective watersheds to raise flood awareness and conduct flood mitigation projects. The Natural Resource Conservation Service (NRCS) and the Soil and Water Conservation District (SWCD) provide a great deal of the hands on work with landowners, advising them of their options and providing technical assistance. Other agencies such as the Farm Services Agency (FSA), Oregon Department of Fish and Wildlife (ODFW), and the Oregon State University Extension Office provide information and assistance in times of flooding, depending on the land use and type of problem.

The recent floods have highlighted a lack of funding as perhaps the largest obstacle in conducting flood mitigation work. Most of the problem areas have been identified for decades, yet there has simply been no funding to initiate projects. Most of the funding allocated recently to Umatilla County is earmarked for rebuilding, and recouping for property damages, crop losses, or structural repairs. Not much of this money is dedicated to planning for future floods.

This plan makes every attempt to identify funding sources for mitigation work (see **Appendix B**). Additionally, we recognize the value of current projects and planning efforts and use them as the basis for mitigation recommendations.

Umatilla County has the opportunity to capitalize on federal funding attention through a comprehensive, long term approach to flood mitigation work. Damage from the recent floods have shown how destructive future floods have the potential to be if additional mitigation measures are not taken.

2.2.3 Flood Damage Characteristics

Flooding is a natural and periodic function of waterways that is a necessary part of the ecological process of the floodplain. Streams naturally meander and create new channels over time, and flooding can lead to additional hydromodification which can redirect a channel over a matter of hours. If a newly created channel happens to run directly through developed property, serious

damage can result. Not all flood damage is a result of natural waterway dynamics of course. Other problems are a function of floodplain development and the siting of structures and crops.

Since the early 1970s, Umatilla County has restricted development in the floodplain. Despite this, there are many houses and structures which predate floodplain management regulations. On the Reservation, the Tribes have a long-standing policy of not siting structures in the floodplain but currently have no written regulations forbidding it (J. Davis, CTUIR, pers. comm., 1997). Developed property does not refer only to structures, but also to agricultural uses. Pastures, crops, farm equipment, and farm-related structures are often located within the floodplain. Anything of value sited in the floodplain will most likely be effected by flood waters to some degree.

To evaluate flood damage requires a comprehensive perspective of how waterways function and how land use practices and waterways interact. Flood damage is caused and exacerbated by so many factors that it is difficult to pinpoint a single cause, or even several causes, for any one problem area. Additionally, every stretch of creek in Umatilla County has a unique set of circumstances governing the extent of damage that results from flooding. Another factor that must be considered is that natural weather conditions are unpredictable on time scales which allow site specific mitigation. When a period of heavy rain and warm temperatures mingles with a five-foot snowpack in the Blue Mountains, high water (and property damage) will occur. **Table 2-6** provides a list of circumstances which can be considered the primary causes of flood damage. Keep in mind that flood damage is usually a function of a combination of many of these factors.

Table 2-6
Primary "Causes" of Flood Damage

-
- natural weather conditions
 - buildings/developed land/infrastructure in the floodplain
 - natural movement of waterways
 - debris/gravel accumulation
 - inadequate drainage of stormwater runoff
 - failure/degradation of levees, dikes, and diversion canals
 - blocked culverts
 - ice jams
 - lack of riparian vegetation/streambank support
-

As was mentioned, there are many different types of flooding in the County, ranging from flash floods to inadequate drainage to rivers overtopping their banks. Regardless of the causes of flooding, the damage which results can be described in three broad categories:

- erosion and property loss;
- structural damage; and,
- infrastructure damage.

Erosion and property loss

The most common type of flood damage in Umatilla County is property loss through erosion. High water velocities, bedload movement, large amounts of debris, and readily erodable soils combine to produce erosion problems throughout the County.

Topsoil in much of Umatilla County is very deep and there has traditionally been little incentive to preserve it. For example, in the Wildhorse Creek Basin it is estimated that the soil, primarily loess, is up to 150 feet deep (D. Olson, County Department of Resource Services and Development, pers. comm., 1997). With such deep and productive topsoil, agriculturists have by default adopted the attitude that there “will always be more” soil for use. Despite this, in times of heavy rain or high water, these soils erode profusely, filling drainage ditches and waterways, and covering roads. For example, NRCS staff has estimated that severe storm events (in specific areas) can lead to the erosion of over 100 tons/acre of top soil in one year from cropland fields in the Wildhorse Basin (B. Adelman, NRCS, pers. comm., 1997). Again, efforts to mitigate this problem have not been successful due to the depth of the soils and lack of real incentive among local landowners.

Additional agricultural losses because of erosion are found throughout the County, in both the Umatilla and Walla Walla basins. While erosion is the key issue, soil saturation, high water settling on fields, and damage from scour and deposition also threaten crops. Additionally, it is more difficult to obtain mitigation funding for agricultural damage than for residential damage. Most of the funding allocated by FEMA for flood mitigation projects is earmarked to prevent damage to “life and property”. Often, the interpretation of property is limited to land surrounding or protecting structures (FEMA, NMS, 1996). Agricultural losses are viewed as lower priority than structural risks or damages, although agricultural losses can represent significant monetary loss to landowners. For example, there have been several occurrences in the Milton-Freewater area of streams forming new channels and flooding out orchards (B. Wolcott, Walla Walla Watershed Council, pers. comm., 1997). Orchards are a high value crop and significant damage to an orchard can represent a tremendous hardship to the landowner. Recently, “high value” agriculture has been added to the list of damages available for priority funding (FEMA, NMS, 1996).

Erosion of non-agricultural property is also widespread. Even if land is not in use, no landowner easily accepts serious erosion of their property. In some cases, as with riparian areas along East Birch Creek and Mill Creek, erosion is creating risks to structures and homes. In other cases, the stream has re-channeled itself and the flow lane has been directed toward a new area, creating erosion problems where none previously existed. The NRCS provides technical assistance to landowners who are attempting to protect their property from erosion. Often, this assistance continues through the permit process and results in some type of in-stream structural work (e.g. riprap).

Structural damage

Structural damage is also a concern in Umatilla County, although it is not as widespread as agricultural erosion. The largest problem area for structural damage in the County has been Mill Creek, where 13 homes were seriously damaged in the February 1996 floods (D. Olson, County

Department of Resources Services and Development, pers. comm., 1997). Several of the homes were literally swept off their foundations while others sustained exterior and interior damage from fast flowing flood water. No lives were lost, but property loss and road damage was extensive. Many of the homes along Mill Creek were constructed prior to floodplain management regulations. Currently, a workforce of regulators, County staff, and landowners are working on mitigation projects for the Mill Creek area. The Mill Creek situation will be described in more detail in Chapter Three.

Outside of Mill Creek, the County does not have many homes or other structures at risk from fast flowing flood waters. Most of the additional structural damage is caused by runoff which has flooded basements and damaged the lower portions of structures. This type of damage is fairly common around the County and, while not a large monetary issue overall, flood damage of this sort is very costly to individual landowners. Some of the areas which have had recent structural damage of this type include Korvola Road and SW 44th Avenue in Pendleton and the towns of Adams, Helix, and Athena, where runoff from nearby fields has gotten into basements and damaged structures.

Infrastructure damage

Damage to roads and bridges is the most expensive flood repair issue in Umatilla County. Umatilla County has the second most miles of county road in the state; only Harney County has more (H. Phillips, County Public Works, pers. comm., 1997). This extensive road network suffers a great deal of damage during periods of high water or runoff. Many of the roads are remote and the majority of them are constructed of gravel and thus readily erode. Most road damage is caused by a lack of proper drainage, mud, silt, and debris flows, and scouring by waterways. Each year, the County Public Works Department has to replace culverts which have failed as a result of debris blockages and high water. Culvert and bridge replacement is expensive and time consuming.

Another problem is soil erosion from agricultural lands which flows over roads, causing damage and leading to clean-up costs. Drainage ditches and sediment collection ditches often get filled with sediment and then mud runs onto the roads, in some instances causing risks to public safety. For example, County Public Works has spent \$30,000 to \$35,000 in the last two years on the roads north of Adams alone because of erosion and wash outs (H. Phillips, County Public Works, pers. comm., 1997).

With flooding causing so much road damage, Public Works must prioritize their projects based on the severity of the damage. The projects selected are usually to repair damages which have resulted the destruction of access routes and bridges to and from homes. In the case of Mill Creek, much of the road and its accompanying culverts needed to be replaced following the February 1996 floods.

Another serious issue is the buildup of in-stream debris in waterways adjacent to roads. Debris buildup and increased bedload movement can lead to increased scour and erosion. This scour can undercut roads and cause serious damage. The only method of removing in-stream debris quickly

is to receive an emergency debris removal permit from the USACE immediately following a flood event. This was done in the case of West Birch Creek, where gravel and debris buildup had put West Birch Creek Road at risk. Public Works and the USACE removed a great deal of sediment from the creek and did some stabilization work of the road under this permit (H. Phillips, County Public Works, pers. comm., 1997). Without an emergency permit, however, no agency is entitled to do major in-stream debris removal work without going through the 404 permit process outlined earlier.

Many roads along waterways are at risk from future high water because of the large amounts of debris buildup. Cayuse Road and roads along Squaw Creek and Sand Hollow Creek have been identified by Public Works as some of the highest risk roads in the County (H. Phillips, County Public Works, pers. comm., 1997).

2.3 EXISTING FLOOD DAMAGE PREVENTION MEASURES

There are many methods of protecting buildings and property from flood damage. In the past, structural projects such as levees, dikes, and reservoirs were the primary method of preventing flood damage. In more recent years, non-structural methods such as watershed treatment and development regulations have provided a viable option to structural work. **Table 2-7** illustrates the primary methods of flood damage prevention used or available in the County.

Table 2-7
Flood Damage Prevention Measures

<u>Preventative</u>	<u>Emergency Services</u>
<ul style="list-style-type: none"> • Flood Hazard Overlay Zone • Additional development regulations • Building codes and standards • Drainage system maintenance and improvements 	<ul style="list-style-type: none"> • Flood forecasting/warning • Emergency flood response • Critical facilities protection
<u>Property Protection</u>	<u>Structural Projects</u>
<ul style="list-style-type: none"> • Flood insurance • Acquisition • Elevation/relocation of structures • Floodproofing 	<ul style="list-style-type: none"> • Reservoirs • Levees, dikes and riprap • Channel diversions/modifications
<u>Watershed Treatment</u>	<u>Public Information</u>
<ul style="list-style-type: none"> • Wetlands/natural processes protection • Erosion/sediment control 	<ul style="list-style-type: none"> • Information dissemination/outreach • Real estate disclosure

Source: Modified from Federal Emergency Management Agency, 1996; French & Associates, 1997.

While each of these methods will provide some degree of flood protection, relying on one method, such as a levee or dike, may not provide adequate protection. Utilizing a combination of measures is the most effective way to prevent or mitigate flood damage. Each of the methods of flood damage prevention used in Umatilla County is described below.

2.3.1 Preventative Measures

Controlling development and use of the floodplain is the most straightforward method of preventing flood damage. If there are no structures or important agricultural areas in the floodplain, there is much less risk of damage from floods. Of course, some of the most desirable land for living, farming, and recreating lies in floodplains. Property along waterways tends to be some of the most valuable land in the County, and access to water provides options for land uses which would not be feasible elsewhere. Floodplain management is a method of restricting development options in the floodplain while still allowing for certain uses (such as agricultural production). Umatilla County has a floodplain management ordinance in the form of the Flood Hazard Subdistrict or Overlay Zone. In addition to the Overlay Zone, the County has additional development regulations which restrict development in flood prone areas. Building codes and standards and drainage system improvements are other preventative measures in use or available to the County.

Flood Hazard Overlay Zone

The purpose of the Flood Hazard Subdistrict or Overlay Zone (F-H Zone) is to restrict development in the floodplain. According to section 152.350 of the County's Land Usage Regulations, the purpose of the F-H Zone is to "minimize flood losses through restrictions of uses which are dangerous to health, safety, or property in times of flood or which cause increased flood heights or velocities". Nothing can be placed in the floodway that would cause any rise in the established base flood elevation (BFE). The BFE is defined as the elevation of water estimated to result from a 100 year flood event. The boundaries of the F-H Zone, and the BFE, were identified by the FEMA in the "Flood Hazard Insurance Study for Umatilla County" on June 15, 1978 and March 4, 1987. FEMA established Flood Insurance Rate Maps (FIRMs) for Umatilla County which were subsequently adopted as the flood plain zoning map for the County. Boundaries delineated in the FIRMs can be changed by amendment based on new and improved flood information (Umatilla County Land Usage Regulations, 1997).

The F-H Zone also requires that all uses in the zone be provided with flood protection at the time of construction. The F-H Zone provides additional regulations on structures, subdivisions, and the use of fill. Applicants for development permits in F-H Zones must submit extra information and documentation from certified professionals that all materials used, sites selected, and construction methods adhere to floodproofing regulations, elevation requirements, and meet the original intent of the zoning designation (Umatilla County Land Usage Regulations, 1997). Finally, the F-H zone is viewed as a warning to land buyers that some uses are unsuited for the area because of the risk of floods. With few exceptions, the F-H Zone overrides other zoning designations and takes precedence.

Additional Floodplain Development Regulations

In addition to the F-H Zone, there are a number of other land use regulations which restrict development and use of flood prone areas. One example is the general provision for wetland drainage which provides standards for the removal of riparian vegetation to avoid sedimentation. The regulation states that a maximum of 25 percent of existing natural vegetation can be removed from the setback area, with some exceptions for use, maintenance, or placement of structural stabilization (Umatilla County Land Usage Regulations, Section 152.016,).

While not necessarily a regulation, the County has a goal of protecting open space throughout the County. Open space often includes the floodplain and wetlands. In order to meet the objectives of Statewide Planning Goal 5, *Open Spaces, Scenic and Historic Areas and Natural Resources*, the County advocates conservation and protection of open space and natural and scenic areas. Preserving natural areas and wetlands along the floodplain as open space protect valuable resources and ecological processes as well as safeguarding against flood risks. Open space in the floodplain can be protected by conservation easements, maintenance easements, or dedications from developers. These areas can then be used as water storage areas and riparian vegetation can act to slow water velocities.

The Natural Area Overlay Zone (Section 152.470) and Steep Slope Overlay Zone (152.515) provide additional restriction on development which is beneficial in avoiding flood damage. In the case of the Natural Area Zone, important environmental functions such as wetlands can be protected. This has an obvious benefit of providing storage of excess floodwaters. In the case of the Steep Slope Zone, extra regulations on development in steep areas keep structures out of areas prone to landslides which may occur during periods of high water or runoff.

Additional siting and development techniques such as cluster development, density control, and maintenance of buffers and greenways are also available for flood protection. Subdivisions and developed land can be designed to provide the same number of units at the desired density, but an open area or shared area can be retained to provide for flood water. Innovative developments which protect the floodplain should be encouraged. FEMA's floodplain mapping does not include much detail on the base flood elevation (BFE) in some areas. An additional regulation on subdivisions and large developments is that they are required to generate BFE information for all lots if this information is not available for the site.

Building codes and standards

Along with zoning and development regulations, local jurisdictions can include flood protection measures within their building codes. The State Building Code Division provides the option of allowing municipalities to establish stricter regulations on buildings in flood prone areas. As long as the municipalities meet the minimum requirements of the uniform codes, it is reasonable to include additional flood prevention standards if local conditions merit these standards. The local

jurisdiction must apply for an amendment to the State Building Code Division for an interpretive ruling for the local code change. As of the printing of this report, no Oregon jurisdiction had exercised this option.

Flood insurance rates (see below) are primarily based on the height of a structure's lowest floor above the BFE. In areas where the BFE has been computed, FEMA requires communities to have elevation certificates to verify that the lowest floor is above the BFE or that the building has been floodproofed. Elevation certificates are part of the public record and should be available for public information.

There are additional regulations on making "substantial improvements" to buildings in flood hazard areas. In FEMA's National Flood Insurance Program regulations, a "substantial improvement" is defined as any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure. Substantial improvements are regulated just like new development in that the lowest flood must be elevated above the BFE. Substantial improvements can refer to damage repairs, rehabilitation of the building, or additions to the existing building. In the case of repair or rehabilitation, the entire structure must be elevated above the BFE, while in the case of an addition only the addition must be above the BFE.

Drainage system maintenance and improvements

Maintenance or construction of drainage systems is another method of flood damage prevention. In terms of maintenance, it is important to keep natural and manmade drainage ways free of blockage and debris. Filling or blocking drainageways can lead to backup of runoff which can drastically increase flood damage. Responsibility lies with the landowner, developer, and local officials to identify and maintain natural and constructed drainageways.

Runoff is increased when ground cover is replaced by development and impermeable surfaces. Jurisdictions can adopt stormwater management regulations which require developers to build retention or detention basins along with development projects. These basins can minimize runoff by storing it and not allowing runoff rates to exceed the pre-development runoff rate. Developers and builders can incorporate stormwater management through landscaping, swales, trenches and other methods. These techniques can have aesthetic appeal and act to absorb or curtail runoff. Additional methods in more urbanized areas include providing adequate street drainage and culvert size to accommodate high levels of storm runoff. Improving storm sewers usually is simply a matter of expanding the capacity of the drainage system to handle a larger volume of water. Typically, this involves installing new and larger drainage pipes, bigger and more stable culverts and backflow prevention mechanisms. Like most structural methods of flood damage prevention, the prohibitive factor with sewer improvements is cost. Replacing culverts and adding new pipes is very expensive. Public Works does not have the budget to conduct this work on a preventative basis. Thus, most of the improvements made are a result of damage to the system, rather than the

danger of future failures. Currently, a drainage improvement project is taking place at Korvola Road and SW 44th Street in Pendleton which will incorporate some of the ideas listed here.

2.3.2 Property Protection

In 1968, the National Flood Insurance Program (NFIP) initiated the development of floodplain management ordinances as a primary safeguard against flooding. Outside of insurance, property protection measures such as acquisition, relocation, and elevation of structures can also provide very effective means of avoiding future flood damages. The Hazard Mitigation/Relocation Assistance Act of 1993 increased federal funding through the Section 404 Hazard Mitigation grant program to acquire, relocate, and/or elevate existing floodplain structures (Interagency Floodplain Management Review Committee, 1994). Since the act, 11,000 properties have been acquired, moved, or elevated, mostly in the Midwest (Interagency Floodplain Management Review Committee, 1994). Finally, many different floodproofing techniques can be utilized by landowners to protect their homes, structures, or property from high water.

Flood Insurance

The NFIP was established by the National Flood Insurance Act of 1968 in response to property losses and rising costs to taxpayers for flood relief (Interagency Floodplain Management Review Committee, 1994). Under the NFIP, new and substantially improved buildings must be elevated to or above the elevation of the 100-year flood and non-residential buildings must be floodproofed to the same elevation (Interagency Floodplain Management Review Committee, 1994). The NFIP makes federally backed flood insurance available to States and communities that agree to adopt and enforce floodplain management measures that meet or exceed the federal criteria. The NFIP was broadened and modified by the Flood Disaster Protection Act of 1973, which requires the purchase of flood insurance as a condition of receiving any form of federal financial assistance, such as mortgage loans from federally insured lending institutions (Interagency Floodplain Management Review Committee, 1994). The National Flood Insurance Reform Act of 1994 provides mitigation insurance and establishes a grant program for State and community flood mitigation planning and projects (FEMA, NMS, 1996).

Since its inception the NFIP has mapped floodplains in over 20,000 communities, and many communities have established floodplain management programs that are more comprehensive than NFIP requirements (FEMA, NMS, 1996). The NFIP makes it possible for landowners to obtain insurance protection at rates lower than would be possible on an actuarial basis. The NFIP discourages development and improvement in flood areas by limiting availability of low-cost insurance to existing structures. To participate, communities must have land use and control measures and Flood Insurance Rate Maps (FIRMs) illustrating the 100 and 500-year floodplains.

In Oregon, 256 cities and counties participate in the NFIP, including Umatilla County which joined in 1978. The County adopted their floodplain ordinance after FEMA completed its Flood Insurance Study and drafted FIRMs for the County.

The NFIP also provides a Community Rating System (CRS) which allows communities the chance to become eligible for lower insurance rates for their residents. Communities are "rated" based on the planning process they go through in drafting overall flood response plans and flood mitigation plans above and beyond minimum requirements for the NFIP. The CRS advocates a comprehensive planning process which includes a broad-base of public support. The FEMA has established standard criteria for earning "points" in the CRS. The goal of the CRS planning process is to provide a vehicle for developing community understanding of the dangers of flooding and to outline an overall plan to mitigate these risks.

The Federal Crop Insurance Program (FCIP) is another insurance program, administered through the United States Department of Agriculture (USDA). The FCIP provides coverage for 51 crops in the event of loss from natural disaster. The maximum coverage is 75 percent of the expected crop yield. To encourage participation, the federal government subsidizes crop insurance premiums up to 30 percent and pays administrative, actuarial, underwriting, and selling expenses. For those crops not on the FCIP list, the USDA has developed the Non-insured Assistance Program (NAP). The NAP program provides low interest loans to agricultural producers who have suffered at least a 35 percent loss of projected crop yield. The local agency responsible for administering the NAP is the Farm Services Agency.

Acquisition

Acquisition of property is an excellent method of avoiding future flood damage. Acquisition of flooded lands and buildings is typically appropriate for buildings which are repeatedly damaged from floods, dilapidated structures not worth moving, and structures which are too expensive to move (French & Associates, 1997). Many government agencies can be involved in acquiring land from landowners who do not wish to rebuild after a disaster. Local municipalities can purchase land, as can watershed councils and conservation or wildlife groups such as the Nature Conservancy. Perhaps the most common method of acquisition is through various federally funded programs such as the FEMA Hazard Mitigation grant program mentioned above. Through the FEMA program, lands are cleared and then titles are typically given to local governments to hold as open space, wetlands, recreational areas, or parks (IHMT, 1996). Ideally, when land is acquired, the purchasing body should look to acquire large, connected tracts to ensure that the land uses along that particular stretch of waterway are compatible.

Government buyout of flooded land is not common practice and was not conducted on a large scale until the Mississippi River Valley flood of 1993 (Floodplain Management Review Committee, 1994). There are numerous coordination problems and policy discrepancies which have yet to be resolved at the federal level (Floodplain Management Review Committee, 1994). Despite the uncertainty, the following federal programs provide funding for acquisition:

- Federal Emergency Management Act Section 404 Hazard Mitigation Grants;
- Department of Housing and Urban Development Community Development Block Grants (CDBG);
- National Flood Insurance Program Section 1362 Flood Damaged Property Purchase Program; and,
- Economic Development Administration (EDA) Grants (Floodplain Management Review Committee, 1994).

Elevation & relocation of structures

Another method of protecting property is through elevation and/or relocation of structures. This practice is most common with structures repeatedly damaged through recurring low-velocity flood events. The intent is to elevate the structures at least one-foot above the base flood elevation (100 year flood delineation) as represented on the FIRM. New structures are required to be elevated one-foot above the base flood elevation, so elevation is usually needed only in the case of structures built prior to the adoption of the NFIP development standards. Elevation is also required by law for residences which are judged to have been “substantially” damaged by a flood event (i.e. the damage equals more than 50 percent of value).

Table 2-8 provides five basic methods of elevating a structure. The type of flood damage an area receives should determine the method of elevation. This type of work should only be conducted by a certified engineer.

Table 2-8
Methods to Elevate Structures

<u>Elevation Method</u>	<u>Description</u>
Extended Foundation Walls	Builds existing foundation above the base flood elevation
Elevation on Piers	For structures originally built on pier block foundations
Elevation on Posts or Columns	A series of posts set in concrete and braced to support structure.
Elevation on Pilings	Wood pilings, usually used when soil is poor.
Elevation on Fill	A building pad is constructed of compacted soil above base flood elevation

Source: Modified from Gilmer, 1995.

Relocation is typically viewed as an option if the landowner has another accessible site in the area which is not in the floodplain. Relocation of a typical home averages approximately \$25,000 but can easily exceed \$50,000 (French & Associates, 1997). Relocation is recommended only if the cost of doing so is much less than the value of the building.

Each of the funding sources listed above for acquisition can also be used for elevation or relocation of structures.

Floodproofing

Floodproofing is defined in the Umatilla County Development Code as “a combination of structural provisions, changes, or adjustments to properties and structures subject to flooding, primarily for the reduction or elimination of flood damages to properties, water and sanitary facilities, structures, and contents of buildings in a flood hazard area” (Umatilla County Land Usage Regulations, 1997).

While various floodproofing measures can and should be taken by all property owners, floodproofing is most useful in areas which do not experience severe or deep flooding. There are many different methods of floodproofing a building, ranging from construction of barriers around properties to simply siting important aspects of the structure above the base flood elevation. Barriers can be small floodwalls, levees, or berms around a structure to hold back flood water at the base flood elevation and safeguard windows, doors, or the entire structure.

“Dry” and “wet” floodproofing are additional methods of protecting structures. Dry floodproofing refers to sealing or surfacing all areas below flood level to be watertight and water resistant. Wet floodproofing simply means constructing areas below flood level so that water can flow into them without causing a great deal of damage. Wet floodproofing includes moving costly and/or important items out of the path of floodwaters (e.g. electrical items and appliances). All of these methods can significantly reduce damage and clean up costs.

2.3.3 Watershed Treatment

Effective flood damage prevention measures require an approach that accounts for the entire drainage basin. This includes hydrology, hydraulics, and the condition of the basin’s natural resources. Since the 1970s it has become increasingly understood that preservation of the natural resources and functions of the floodplain is crucial for flood control (Gilmer, 1995). A flooding river cannot be analyzed apart from its watershed and the physical aspects of the surrounding environment. Watershed treatment refers to preserving or restoring natural areas to establish the natural functions of the floodplain. Watershed treatment for flood damage prevention includes protecting and restoring wetlands, stabilizing streambanks, and controlling erosion. These measures not only act as a safeguard for flood protection, but also protect and enhance fish and wildlife populations.

Wetlands/Natural Processes Protection

Wetlands provide a number of important functions in the floodplain. First, wetlands can store large amounts of water and slow water velocity. Wetlands also filter sediment out of waterways by providing an area where excess runoff can accumulate and settle. This sediment often

nourishes plant life and creates fish habitat. When wetlands are filled or impacted by development or land use, water storage capacity and sediment filtration is diminished, leading to accelerated flows, increased scouring of streambanks, and sediment deposition in other areas. Wetlands also provide vital habitat for fish and wildlife which is difficult to replace. Wetlands are crucial for many species of birds, both resident and migratory, and provide rearing grounds for many fish species, including anadromous fish.

Wetlands are most useful for flood reduction when left in their natural state. Acquisition of wetlands for conservation purposes is the most effective method of preservation. Programs such as the Natural Resource Conservation Service's Conservation Reserve Program, and the U.S. Fish and Wildlife Service's Partners for Wildlife program frequently acquire wetlands to preserve their important qualities. The Conservation Reserve Program offers to establish conservation easements along riparian areas on agricultural lands. These conservation easements can be established to retain natural wetland processes or to conduct riparian planting projects. Less successful are attempts to artificially create wetlands. Although flood storage capacity may be expanded, it is very difficult to create the natural hydrologic functions that exist with natural wetlands.

Erosion & Sediment Control

Much of Umatilla County's riparian zones are in use as pastures or croplands. In many areas, landowners are planting and harvesting right to the edge of waterways. A lack of riparian vegetation in many areas has led to erosion and sedimentation problems. The fact that Umatilla County has some very deep and erodible soils adds to the magnitude of the erosion problem. To control erosion, the use of natural processes such as streambank plantings and sediment retention are becoming widespread. This process, also referred to as bioengineering, uses channel or bank strengthening techniques that use vegetation in innovative ways in contrast to traditional bank sloping and structural riprap protection.

Streambank stabilization can be achieved by planting native vegetation along exposed riparian banks. Plants protect the soil surface from direct erosion by rainfall and runoff and plant roots hold the soil together and provide resistance to water flow. Plants also absorb and utilize a good deal of water, increasing infiltration into the soil and reducing water levels. Vegetation also filters out sediment and pollution, which could collect or accumulate downstream. In riparian areas which have been denuded of vegetation, each year's high water wears away a greater amount of soil than would be the case if vegetation was present.

There are many examples of current streambank stabilization efforts going on in the County. Both the Umatilla Basin and Walla Walla Basin Watershed Councils are involved in riparian planting projects. In several areas, the watershed councils have organized groups of landowners to undertake riparian planting projects. One example is a project along Couse Creek, where the Walla Walla Watershed Council, ODFW, and USFWS are collaborating on a streambank stabilization project. The Tribes have done a good deal of riparian work in the Wildhorse Creek

Basin and several other areas on the Reservation through the Umatilla Basin Anadromous Fish Habitat Enhancement Project. While this project is directed at improving fish habitat, the Tribes' work serves the added benefit of providing some measure of flood damage prevention. It will be important to monitor the successes and failures of this work to focus future streambank stabilization efforts.

NRCS, the Farm Services Agency, Oregon Department of Fish and Wildlife, and the US Fish and Wildlife Service all run programs directed at streambank stabilization work; planting, fencing, and establishing vegetative buffers. The USDA's Environmental Quality Incentive Program (EQUIP) focuses on agricultural erosion by establishing 5 year agreements with landowners to conduct stream work and buffer zone work. EQUIP provides up to \$10,000 in cost sharing for projects in "priority" areas which are chosen by the community. Unfortunately, the program, which is administered by the FSA, has a lot more applications than funding available. The area which has been chosen as priority for the EQUIP program is the Mission Creek area (K. Jordan, FSA, pers. comm., 1997).

Another agricultural-based preventative program is the NRCS' Conservation Reserve Program (CRP). This program has annual sign-ups for landowners to put portions of their property in grass or vegetation to hold the banks up. Landowners can sign-up for 10-15 year conservation easements. The program is devoted to highly sensitive lands and typically targets riparian buffer zones. NRCS does the planning for these projects and the landowner is responsible for the work, either themselves or a contractor. Projects usually involve 100 foot grass buffers, riparian planting, and fencing to keep out livestock.

Retention of sediment can be achieved on agricultural lands through conservation tillage, terraces, crop rotation, field borders, debris basins, sediment check dams, strip cropping or permanent vegetation buffers. All of these methods act to trap sediments and utilize them, rather than allowing them to be washed off the surface. As was mentioned previously, many landowners in Umatilla County simply lack the incentive to employ sediment retention measures because of the depth of the soils and a long history without retaining sediment.

2.3.4 Emergency Services

Emergency services provide what can be viewed as the last line of defense against flood damage. Flood forecasting and warning provides advance notice that flooding is imminent and that steps should be taken to relocate or move items out of the danger zone. Advance warning also provides an opportunity to ensure that critical facilities are protected and flood fighting materials are available. An updated and comprehensive emergency response plan is another important service which can be critical in the event of a flood. Emergency response plans identify the roles of various agencies in the event of a flood and ensure readiness.

Flood forecasting and warning

The National Weather Service (NWS) is responsible for flood forecasting and warning systems. Umatilla County is fortunate to have a NWS weather center located in Pendleton. The NWS Weather Center monitors weather patterns over much of Oregon and Washington. Most of Umatilla County is at risk from flash floods ("short fuse") and longer-developing ("long fuse") floods. The NWS can, in many cases, provide significant lead time to recognize the potential for either type of flooding. Through a network of satellite monitoring equipment and volunteer weather spotters, the NWS tracks storm activity, rainfall, and storm potential. This information is analyzed along with data from river gages, snowmelt potential information, and ground conditions to ascertain risk. The NWS has an official river forecast point on the Umatilla at Pendleton. Additional NWS telemetered gages are located on McKay Creek near Pilot Rock, the South fork of the Walla Walla River near Touchet, Mill Creek near Walla Walla, and the Umatilla River at three more sites: at Yoakum, near Gibbon and at Umatilla. A telemetered gage refers to a gage which is equipped with phone or satellite communications and provides regular information (V. Thompson, NWS, pers. comm., 1997). Snowmelt potential readings are taken from SNOTEL sites, which measure the water level of the snowpack. There are currently 4 SNOTEL sites in Umatilla County.

Based on the information gathered, flood watches and flood warnings are then issued depending on the circumstances and variables. The NWS is the official warning agency by statute: the Organic Act of 1890. A flood watch is issued by the NWS when conditions are right for either a short fuse or long fuse event. A flood warning is issued when a flood has started or is expected to occur. This information is transmitted via satellite or telephone to many different agencies and individuals, including the County Emergency Management Department. The flood threat recognition system tells the County Emergency Management Office that a flood is pending. The next step is to inform staff, critical facilities, etc. Flood warnings can be disseminated by sirens, radio, TV, public address announcement, telephone trees, and even door to door contact.

Prior to the flooding of February 1996, the County had 4 days notice that conditions were right for serious flooding (V. Thompson, NWS, pers. comm. 1997). The floods which led to the second disaster declaration in January of 1997 were also a long fuse event with a few days of warning lead-time. Additional warning information comes from the USACE, which keeps information on the character of flooding with relation to the computed stage height of various rivers. **Table 2-9** portrays an example of this type of information for the Umatilla River at Umatilla.

Table 2-9
Flood Character Information--Umatilla River at Umatilla

<u>Stage Feet</u>	<u>Character of Flooding</u>
23.0	Broad shelf of land on right bank of river opposite gage under water. Terrace one fourth mile north of gage under water
26.2	Flood waters reach Water Street in Umatilla.
27.0	Flood waters reach foundations of homes on Water Street.
30.0	Flood waters reach floor of grain elevator.
33.5	Flood waters reach intersection of 3rd and H Streets in Umatilla.

Source: U.S. Army Corps of Engineers, Flood Forecast Points, 1997.

Emergency flood response

Taking action to minimize damage *during* a flood event is perhaps the final flood damage prevention measure. An updated and comprehensive emergency flood response plan is one method of achieving this. An emergency response plan identifies responsibilities in the event of a flood, and provides a template for various parties to go about organizing relief efforts, flood fighting, and additional damage prevention. Along with this mitigation plan, the County Department of Resource Services and Development has commissioned the production of a county-wide emergency flood response plan. The emergency response plan is included in this report as **Appendix A**.

Critical facilities protection

Protecting critical facilities is one of the highest priorities in conducting a successful flood mitigation effort. Critical facilities can be defined as buildings and/or areas which are important during flooding or following a flood. **Table 2-10** provides a general list of facilities and locations which are important for flood relief and flood fighting efforts.

Table 2-10
Critical facilities in the event of a flood

<u>Buildings/locations important for flood response</u>	<u>Buildings which would create problems if flooded</u>
<ul style="list-style-type: none"> • emergency operations centers • police and fire stations • hospitals • selected roads and bridges • suppliers of needed materials • evacuation routes 	<ul style="list-style-type: none"> • hazardous materials facilities • water treatment plants • wastewater treatment plants • schools • nursing homes

Source: Modified from French & Associates, 1997.

Recent flooding in Umatilla County has not affected most critical facilities. Most of the key buildings, service providers, flood fighting materials, and evacuation routes in the County are out

of danger from flood damage. For more information on critical facilities in Umatilla County, see the Umatilla County Emergency Flood Response Plan (**Appendix A**).

2.3.5 Structural Measures

Construction of flood control structures has historically been the primary method of preventing flood damage. There is no question that levees, berms, reservoirs, and channel diversions have greatly improved conditions for agriculture, and established highly desirable areas for building homes. While these flood control structures provide the valuable service of channeling and controlling high water, they do have some shortcomings, including:

- They can disturb land and disrupt natural water flows;
- They require regular maintenance, which if neglected can have dangerous consequences;
- They are built to a certain flood protection level that can be exceeded by larger floods, causing extensive damage; and,
- They can create a false sense of security, as people protected by a project often believe that no flood can ever reach them. (French & Associates, 1997).

Despite these shortcomings, structural methods are relied upon more than any other flood damage prevention technique. The U.S. Bureau of Reclamation has constructed three reservoirs in the County, primarily for irrigation purposes but providing the ancillary service of storing flood waters. The USACE has constructed many levees and dikes in Umatilla County to protect farmland and homes and divert channels of waterways to provide irrigation water and create pastures. Riprapping of banks is another common structural method used to prevent flood damage. The NRCS and USACE are typically involved in helping landowners design and construct riprap projects to better control and absorb water flow.

Reservoirs

Reservoirs control flooding by holding high flows behind dams or in storage basins. During flooding, excess water is released or pumped out slowly at a rate the waterway can absorb without overtopping its banks. Umatilla County has three reservoirs: McKay, Cold Springs, and Three Mile. All three dams were constructed by the U.S. Bureau of Reclamation (USBR). The day-to-day operations of McKay Dam are still operated by the USBR, while Cold Springs is operated by the Hermiston Irrigation District and Three Mile is operated by the West Extension Irrigation District.

McKay Dam has a capacity of 65,500 acre feet for irrigation with an additional 6,000 acre feet for flood control (B. Richard, USBR, pers. comm., 1997). McKay Dam has had only one episode where an emergency release of water had to be made to protect the dam. This occurred in 1991,

and caused flood damage to approximately 50 homes along McKay Creek. The release rate during this period was approximately 3,500 cfs (cubic feet/second). In comparison, a release of 1,000 cfs is usually what is required to begin bank erosion on McKay creek. During the 1997 flood season, which was considered a wet year in Umatilla County, the release rate never exceeded 900 cfs from McKay Dam (B. Richard, USBR, pers. comm., 1997). Investigations, conducted under the USBR's Safety of Dams Program, revealed that the left abutment of McKay Dam could fail suddenly during an earthquake (very low probability) due to liquefaction of low density saturated materials. Modifications of the Dam is scheduled for the fall of 1997 which includes the installation of stability berms and drains located at the tow of the left abutment (B. Richard, USBR, pers. comm., 1997).

Cold Springs Dam is an off-stream dam and is not fed by a natural creek. To fill Cold Springs Reservoir, water is diverted from the Umatilla River via a canal to be used for irrigation purposes. Three Mile Dam is a diversion dam on the Umatilla River with a structural height of 24 feet. The dam diverts water from the Umatilla River into West Extension Irrigation District's canal for irrigation. Storage behind the dam is minimal due to sedimentation (B. Richard, USBR, pers. comm., 1997). Neither dam is specifically used for storing flood waters. Both Cold Springs and Three Mile are inspected at least once a year by the United States Bureau of Reclamation although the local irrigation districts are responsible for maintenance. During high water, when the USBR declares the reservoirs filled to capacity, the headgates on the Umatilla River are closed, cutting off the flow of water to Cold Springs.

Levees, dikes, and riprap (i.e. water control structures)

Levees, dikes, and riprap are all methods of controlling or modifying water flow. Levees and dikes can be defined as barriers of earth or fill material placed between the waterway and developed land (French & Associates, 1997). Levees are built to protect agricultural lands, developed land, housing, etc. Ideally, levees constructed along a section of river are coordinated with each other to ensure that flood control is consistent and flood problems are not being exacerbated downstream. For example, a new levee or riprap project constructed or sited poorly can deflect flow toward older levees and cause additional degradation and erosion problems.

Levees and dikes have been placed throughout Umatilla County by the USACE, state agencies, local entities, and private landowners. While levees certainly act to control flood waters, there are some problematic aspects of the current network of levees in the County. In many cases, the USACE has constructed a levee and then signed a contract with an organization (such as a diking or irrigation district) to conduct the maintenance of the levee. Because levees and dikes are earthen, they degrade over time and can become overgrown with vegetation. Repair and maintenance work on levees is expensive, time consuming, and often not of very high priority for the responsible entity. Many of the organizations responsible for levees and dikes do not have the resources to maintain them. The USACE inspects water control systems periodically and provides recommendations to the owner. If the maintenance contract is not honored by the owner, the USACE withdraws the levee from the inspection program and disqualifies it from emergency

assistance funding under Public Law 84-99. Public Law 84-99 authorizes the USACE to conduct emergency repair work following a disaster. If the levee is withdrawn from the program, it is not eligible for repair work funding.

Another common water control measure is riprapping banks to stabilize them and reduce water velocity. There are many different methods and materials which can be used to riprap banks; including rocks, gabions, and brush held together with wire "mattresses". All riprap projects, with the exception of those allowed as emergency work under Public Law 84-99, require a permit. Riprap projects must be designed by an engineer and evaluated by representatives of the Division of State Lands, Oregon Department of Fish and Wildlife, local NRCS office, and often several other agencies. Each of the agencies must evaluate the project based on their perspective, i.e. impact on fish and wildlife, flood control, impacts on area landowners, etc. Regarding flood control, the basic rule of thumb is that no water control projects (including riprap) can lead to a rise in the base flood elevation. Whether or not each project will increase the base flood elevation is a judgment call which must be agreed upon by the involved agencies.

Channel diversions and modifications

A diversion is simply a new channel that sends flood water to a different location. Ideally, diversions do not impact the waterway during normal flows. When the water level is high, the excess flow is diverted into a receiving area, to a wetland, or into an area where minimal damage will result. This is not a reference to irrigation canals which are purposefully constructed to provide irrigation water. Diversions are used only to re-direct harmful levels of flood water from the main channel of a waterway. Other channel modifications, such as dredging and drainage "tunnels" can also control the channeled flow of water during high flow periods. Channels can be dredged to make them deeper or wider or a series of ditches can be added to a stream to modify peak flows. This type of work is expensive and may not be feasible on a large scale in Umatilla County due to high erosion and sedimentation levels. Drainage improvements are similar to diversions in that they enable excess water to drain (usually via an underground channel). This is particularly useful for depressions or flat areas where water tends to collect or "pond" during periods of flooding.

2.3.6 Public Information

Public information activities can advise property owners, potential property buyers, and visitors about the flood hazards of the area. Materials published by FEMA, the USACE, the County Emergency Management Department, and other agencies provide information about how to protect homes and property from flooding. Additional materials are available which provide information on the dynamics of rivers and the natural and beneficial qualities of floodplains.

Information dissemination and outreach

Information and outreach on flooding can encourage people to take additional precautions with relation to flood risk. Information can be disseminated through mailings, the local library, schools, one on one site visits with landowners, and through postings at county offices and meetings with civic groups. The County Department of Resource Services and Development provides a number of FEMA publications which illustrate floodproofing techniques and the inherent risks of living in the floodplain. Representatives from the NRCS, SWCD, and FSA often provide information to landowners on flood risks and steps that can be taken to minimize these risks. For example, the FSA distributes a newsletter with flood damage information and offers post-flood workshops on ways to reduce damage. There are many other ways to provide outreach and information to the public. Outreach efforts should include information on how to avoid flood damage, and what to do when damage occurs. The County provides information on steps to take in the event of flooding and has checklists and procedures for evacuation.

Real estate disclosure

Federally regulated lending institutions must provide applicants for a property mortgage (where a house will be sited) that the property is in a floodplain as shown on the Flood Insurance Rate Map (FIRM). This requirement must be met five days before the closing of the purchase. Local real estate agents can also be required to disclose information about past flooding or sewer problems, regardless of whether the property is in a mapped floodplain. Early disclosure of floodplain information should be encouraged in all cases.

2.4 SUMMARY

This chapter has provided an overview of flood risks and damages in Umatilla County and an idea of which preventative measures are available to lessen future flood damage. Both short fuse (flash flood) and long fuse flood risks exist in Umatilla County. Virtually every stretch of creek in the County has experienced some level of erosion or bank damage as a result of high water. Recently, the federal disaster declarations have highlighted the County's damages and focused attention on expanding flood mitigation efforts and flood preparedness. While the floods of February 1996, and January 1997 have received the most attention, it is crucial to realize that many damaging and costly flood events have occurred in the last several years. Residents and officials in Umatilla County must be prepared for flooding at any time.

Flood damage is usually the result of many factors; it is difficult to identify a single factor as the sole cause of damage in a specific area. As a result of this, flood mitigation efforts must incorporate a watershed perspective and a range of flood damage prevention techniques should be considered for each problem area.

CHAPTER THREE

Recommended Flood Mitigation Measures

CHAPTER THREE

Recommended Flood Mitigation Measures

3.1 INTRODUCTION

In 1972, the State Water Resources Board published *Oregon's Flood Plains-A Status Report and Proposed Flood Plain Management Program*. The statewide objectives advanced in this report were as follows:

- delineation of critical flood prone areas;
- regulation of the floodplain as part of the comprehensive planning process;
- qualification for flood insurance;
- acquisition of flood prone lands
- endorsement of and assistance to structural floodplain projects; and,
- increased public awareness. (Water Resources Board, 1972).

To achieve these objectives, the state relied on county governments to take the lead on organizing floodplain management. Twenty-five years later, Umatilla County (and most other Oregon counties) has realized the state's goals and, in many cases, has expanded and improved on them. Technology and land practices have changed substantially, but the Water Resources Board's 1972 goals are largely the same goals advocated in this report. The one area which has changed since the 1970s is our understanding of floodplain dynamics. We now know that we cannot analyze waterways apart from their watershed. It is necessary to take a systemic approach to floodplain management that accounts for hydrology, hydraulics and the ecosystem. Additionally, we now have a greater breadth of mitigation options available which focus on the entire watershed. Examples are riparian planting efforts, conservation easements, wetland protection, and floodplain management measures.

Within Umatilla County, many agencies and organizations are involved with projects to lessen flood risks and mitigate damages. Some of these projects have been successful, and with many others it is too early to pass judgment. Supporting and expanding these existing efforts, as well as incorporating new mitigation measures, can achieve the County's goals of reducing damage costs and improving flood preparedness. The purpose of this chapter is to describe general mitigation measures and specific projects through which the County can meet these mitigation goals.

3.2 GENERAL COUNTY-WIDE FLOOD MITIGATION MEASURES

Floods are a natural occurrence; to prevent local rivers from flooding is not a realistic option. Rather than recommending high cost actions which would attempt to prevent flooding, we have focused on actions and measures which will minimize the effects of flooding when it occurs. Recommendations are designed to take advantage of existing programs and cooperative efforts between agencies. While we try to avoid making recommendations which would constitute a financial burden to the County, local agencies, or landowners, we recognize that many of the recommended actions will require funding which may not currently be available. Again, we stress the importance of cooperative efforts and the active pursuit of federal and state mitigation funding programs. In developing recommendations, we established four general planning and mitigation objectives:

1. recommendations must be consistent with County goals, Statewide Planning Rules, and state and federal mitigation efforts;
2. recommendations will provide methods of reducing flood threats to the health and safety of Umatilla County residents;
3. recommendations will provide methods of reducing property damage and lessening erosion risks from future floods; and,
4. bioengineering and the protection of natural floodplain processes is recommended as the preferred method of flood mitigation whenever possible.

Recommendations are presented in the same format with which flood damage prevention measures were presented in Chapter Two. This format was designed by French & Associates (1997) and presented in hazard mitigation workshops throughout Oregon following the two recent disaster declarations. **Table 3-1** provides a list of each of the recommended action items. Each action item has been given a four-letter "identifier" for ease of reference.

Table 3-1
General County-Wide Flood Mitigation Recommendations

<u>Identifier</u>	<u>Action Item</u>	<u>Identifier</u>	<u>Action Item</u>
<u>Preventative Measures</u>		<u>Emergency Services</u>	
PREV-1	Review uses of floodplain/floodway as part of periodic review.	EMER-1	Evaluate the County's river gage network.
PREV-2	Seek updated and improved floodplain mapping.	EMER-2	Provide ground information to the National Weather Service to better predict risk.
PREV-3	Identify urban drainage problems.	EMER-3	Adopt a County emergency flood response plan.
PREV-4	Inventory county roads and bridges; develop additional design standards if necessary.		
<u>Property Protection</u>		<u>Structural Projects</u>	
PROP-1	Explore options for acquiring land or establishing conservation/maintenance easements.	STRU-1	Conduct inventory and maintenance evaluation of levees and dikes.
PROP-2	Provide additional information on elevation and floodproofing options.	STRU-2	Establish a "levee watch" program.
		STRU-3	Encourage a watershed perspective in all in-stream engineering projects (i.e. riprap).
<u>Watershed Treatment</u>		<u>Public Information</u>	
WATR-1	Promote streambank stabilization and bioengineering efforts county-wide.	PUBL-1	Establish additional public information materials and expand public outreach efforts.
WATR-2	Prioritize locations for debris/sediment removal.	PUBL-2	Encourage and promote watershed council involvement in flood mitigation.
WATR-3	Identify watershed treatment options for upland areas.		

3.2.1 Preventative Measures

Because of financial or temporal constraints, preventative actions to mitigate flood damage are rarely implemented. This is simply a political reality: money and time are typically spent on the most pressing need (i.e. short term repairs at the expense of long range planning). This explains why funding provided following a flood is typically spent on repairs rather than actions which will prevent the damage from happening again. Despite this, preventative flood mitigation measures are perhaps the most valuable actions the County could take over the long term. The following four actions would be of great benefit in reducing future costs and providing a comprehensive approach to preventing future damage.

Actions

PREV-1	Review uses of floodplain/floodway as part of periodic review.
PREV-2	Seek updated and improved floodplain mapping.
PREV-3	Identify urban drainage problems.
PREV-4	Inventory County roads and bridges; develop additional design standards if necessary.

Action PREV-1: Review uses of the floodplain/floodway as part of periodic review

The County Department of Resource Services and Development is currently going through the periodic review process. Periodic review refers to a process of evaluating and updating the current comprehensive plan, development code, and land use regulations. Periodic review provides an opportunity to assess whether or not the current set of goals and regulations are serving the community adequately. As part of this review, we recommend that the County Department of Resource Services and Development review land uses along the County's waterways and identify areas which have the potential to be rezoned or reclassified. The goal of this work would be to identify flood prone areas which could potentially be zoned as open space, natural areas, etc. Rezoning would serve the purpose of disallowing uses of the floodplain which are sensitive to flood damage. An alternative to rezoning would be simply to identify areas which would be ideal locations for acquisition programs or for dedication as public space, wetlands, or conservation easements. Once these problem areas have been identified, local landowners could be contacted to see if any of these options could be worked out.

Responsible party: Responsibility for this work could be assumed by a number of agencies. All agencies who work with landowners could contribute to the list of potential acquisition or rezone areas. This includes NRCS, FSA, ODFW, watershed councils, and the Umatilla County Department of Resource Services and Development.

Potential funding sources: County periodic review funding, DLCD grants, part of regular agency budgets.

Action PREV-2: Seek updated and improved floodplain mapping

Umatilla County's Flood Insurance Rate Maps (FIRMs) were produced in the 1970s and early 1980s. In many areas around the County, the FIRMs do not provide a high level of detail with relation to the floodplain and floodway. Since the production of the FIRMs, changes in technology have made mapping techniques more accurate and detailed. The FEMA has the capability to digitize floodplains and floodways and provide very accurate maps for planners and policy makers. The FEMA's program for improving and updating floodplain maps is funded through surcharges on flood insurance policy holders. The annual mapping budget allows for the completion of about 250 studies per year nationally (Interagency Floodplain Management Review Committee, 1994). Unfortunately, there is a great deal more demand than availability of funding. Because of the demand, the list of locations to be mapped or re-mapped is prioritized based on the severity of damages and the length of time mapping has been requested. For example, stretches of Mill Creek will be surveyed and mapped in 1997 as a response to the recent heavy structural damage in the area.

Mapping of floodplains has been conducted recently on the Reservation. In the spring of 1997, the Tribes, along with the USACE, surveyed much of the main stem of the Umatilla River. The river was flown and mapped via aerial photos from the confluence of Wildhorse Creek to the east boundary of the reservation (J. Davis, CTUIR, pers. comm., 1997). The USACE also flew Squaw, Meacham, and McKay Creeks (J. Davis, CTUIR, pers. comm., 1997). This type of work is very important in identifying problem areas and determining the level of risk to structures and property. Although it is expensive, the County should pursue additional mapping by identifying areas where the level of recent flood waters exceeded the expected levels mapped on the FIRMs, or areas which have not been mapped or where the FIRMs are not specific enough and risk to structures and/or property is imminent.

Potential lead agencies: FEMA, Umatilla County Department of Resource Services and Development.

Potential funding sources: FEMA Disaster Mitigation Grants or mapping funding, USACE funding.

Action PREV-3: Identify urban drainage problems

There are several urban or semi-urban areas around the County which experience structural damage as a result of inadequate drainage. Examples of this problem can be found in Pendleton, Adams, and Helix (see **Chapter 3.3**). Most of the structures damaged are not in the floodplain; the damage is the result of topography and a failure or absence of existing systems to move water. Typically, whenever there are large storms and heavy rainfall, these problems recur and lead to flooded basements, road damage, and external structural damage. Currently, in Pendleton at 44th St., a planning process is underway and several alternatives have been developed for improving the area's drainage. A similar process should be conducted for other urban or semi-urban areas with chronic drainage problems. The County Department of Public Works, the City of Pendleton

Public Works Department, and City and County planners, should establish a process to prioritize these areas and pursue alternatives for drainage repair, maintenance, or construction of facilities.

Conducting an inventory of culverts in identified problem areas might be a first step in pursuing drainage improvements. Faulty or undersized culverts should be identified and prioritized for repair or maintenance. For new developments, the potential of requiring detention basins should be explored. Detention basins catch runoff before it reaches residential/business areas. Typically, the developer pays for these additions. We realize that the Department of Public Works already does much of the work described in this recommendation. Additional work to identify and prioritize drainage problems may require alterations of the current County budget.

Potential lead agencies: County Department of Public Works, Pendleton Department of Public Works, County Water Resources Department.

Potential funding sources: Existing Public Works or Water Resources budgets, Rural Investment Fund through OEDD.

Action PREV-4: Inventory county roads and bridges; develop additional design standards if necessary

Along with identifying drainage problems, particular attention should be given to identifying County roads and bridges which are in need of repair or maintenance. Once identified, these roads and bridges could be analyzed to evaluate the feasibility of retrofitting them up to higher standards of flood resistance. For example, one bridge which was washed out along Mill Creek in the February 1996 flood (the Klicker Bridge) has been re-engineered to allow high water to flow around it, rather than over it. This design lowers stream velocity and will lessen the risk of future failures. Alternatives such as this should be evaluated for other bridges and roads which have been damaged or are at risk. Again, the Department of Public Works already does this type of work each year. Despite this, a comprehensive inventory of the condition and risk of roads and bridges would provide a means to conduct preventative work rather than utilizing the budget to pay for repair work. In the long run, the costs of preventative work are much lower than repair work.

Potential lead agencies: County Department of Public Works, Oregon Department of Transportation.

Potential funding sources: Existing Public Works budget, County budget. Oregon Department of Transportation grants.

3.2.2 Property Protection

Methods of protecting property from flood damage vary by the severity of the damage. If the property is extremely prone to flooding or the cost of other options would be greater than the

cost of selling the property, acquisition may be the best alternative. If the flood damage risks are not as great, various elevation and floodproofing options should be explored by the property owner. Although it is not a requirement for some land uses, flood insurance should be carried by all floodplain property owners. For those property owners who purchased their land or built their home before the advent of the NFIP, insurance should still be strongly encouraged. The two recommended actions in this section do not represent new regulations or programs; they are focused on utilizing existing property protection measures more efficiently.

Actions

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| PROP-1 | Explore options for acquiring land or establishing conservation and maintenance easements. |
| PROP-2 | Provide additional information on elevation and floodproofing options. |
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Action PROP-1: Explore options for acquiring land or establishing conservation and maintenance easements

Since the massive flooding of the Mississippi River Valley in 1993, there has been movement at the federal level to establish a single agency responsible for flood mitigation. This agency would have a programmatic acquisition (buyout) program with funding authority independent of federal disaster declarations (Interagency Floodplain Management Review Committee, 1994). While Umatilla County does not have a large problem with structural flood damage, acquisition of property could be utilized effectively on agricultural lands to foster the establishment of conservation or maintenance easements in riparian zones. The NRCS' Conservation Reserve Program (CRP) is one program which already does this. As has been mentioned, the purpose of the CRP is to acquire farmland to create vegetation buffers and water storage areas. In addition to the CRP, other programs run by FEMA, the Department of Housing and Urban Development (HUD), and the FSA could also be utilized to acquire riparian property. Acquiring land in riparian areas for replanting or to take them out of agricultural use would lessen the erosion and sedimentation problem along many waterways in the County. Similar to Action PREV-1, the County should establish a priority list of locations where acquisition would be most useful. Typically, these would be areas where structures and property are at risk from recurring flood damage.

Potential lead agencies: NRCS, FSA, ODFW, watershed councils, Department of Land Conservation and Development (DLCD), County Department of Resource Services and Development.

Potential funding sources: FEMA, HUD, OEDD, Community Development Block Grants (CDBG), Small Business Administration Disaster Recovery/Mitigation Loans (SBA) funding. NRCS, FSA.

Action PROP-2: Provide additional information on elevation and floodproofing options

Flood-damaged buildings around the County should be evaluated and owners should be informed about elevation and floodproofing possibilities. FEMA's flood mitigation funding can be used for elevation of structures to one foot over the base flood elevation. Simple and accurate information should be provided to landowners which describes the options and costs involved with elevation. Following the February 1996 floods, one property owner in the Mill Creek area has decided to attempt to find funding for elevation.

With regard to floodproofing, site visits or "flood audits" can be conducted by flood experts from FEMA or the USACE to provide information and discuss low cost options for landowners. This action would be especially useful in areas where flood waters do not achieve high velocities or great depth.

Potential lead agencies: All local natural resource agencies could be involved with the identification and information process. FEMA or USACE could be responsible for flood audits.

Potential funding sources: FEMA mitigation grants, USACE technical assistance.

3.2.3 Watershed Treatment

Watershed treatment is a flood mitigation technique which could be implemented in virtually every waterway in Umatilla County. Bioengineering or streambank stabilization projects are valuable for both riparian and upland areas. Establishing a debris removal process has also been included as "watershed treatment" because of its obvious ramifications on biological resources and the health of the watershed.

Actions

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| WATR-1 | Promote streambank stabilization and bioengineering efforts countywide. |
| WATR-2 | Prioritize locations for debris/sediment removal. |
| WATR-3 | Identify watershed treatment options for upland areas. |
-

Action WATR-1: Promote streambank stabilization and bioengineering efforts county-wide.

Streambank stabilization projects are being conducted throughout the County by landowners, watershed councils, the Tribes, and various natural resource agencies. The Tribe's *Umatilla River Basin Anadromous Fish Enhancement Project* is an extensive effort to trap sediment and replant riparian zones along degraded streambanks. While the Tribe's efforts are primarily geared toward fish habitat protection, the projects also provide flood protection. The Oregon Department of Fish

and Wildlife (ODFW), and both watershed councils are also involved in planting projects with landowner groups. All streambank stabilization efforts need to be monitored, coordinated, and supported by local agencies. Projects which are successful in reducing sediment and erosion should be modeled and promoted in other locations. Agencies and organizations currently working on stabilization projects should always be identifying locations where riparian projects are needed. This includes identifying willing landowners who are interested in allowing riparian vegetation to be planted on their property. Ideally, a watershed council or local agency should be responsible for keeping this list of willing landowners, potential projects, and information about existing projects. This information should be readily accessible to agencies and the public.

Potential lead agencies: All local natural resource agencies, including ODFW, Division of State Lands (DSL), DLCD, SWCD, USFWS, NRCS, FSA, watershed councils, landowners.

Potential funding sources: Governors Watershed Enhancement Board, ODFW, USACE, existing funding sources such as NRCS' Conservation Reserve Program, the FSA's Environmental Quality Incentive Program. Seek collaborative projects between agencies where funding could be pooled.

Action WATR-2: Prioritize locations for debris/sediment removal

Removal or alteration of in-stream debris is a contentious issue. There are no "hard and fast" rules for when in-stream debris should be removed and when removal is harmful to fish and wildlife habitat. Floods carry a great deal of debris from up-river sources and deposit them down-river. In narrow areas, or areas obstructed by bridge pilings or shallow bars, large quantities of gravel, woody debris, and other flotsam can accumulate in large amounts. Silt dams, gravel bars, and "debris piles" can change the course of the waterway and, potentially, exacerbate future floods. These obstructions are often most dangerous when under bridges or blocking culverts. Quick and efficient removal of these obstructions can mean the difference between serious flood damage and a less harmful high water event. If certain debris piles or silt dams are not removed following a flood, they can make a subsequent flood more damaging. On the other hand, removing natural debris and sediment can have an adverse effect on fish and wildlife habitat, especially anadromous fish habitat.

Many property owners feel it is their right to remove a gravel bar or debris pile which is affecting their property. However, agencies responsible for in-stream habitat protection and water quality are charged with regulating in-stream work, and nearly all of this work requires a permit. Each debris removal case must be evaluated independently. Debris removal permits are only given after careful review from the ODFW, Division of State Lands (DSL), and other agencies.

Local agencies and organizations cannot set a debris removal policy because in-stream issues are a matter of state policy and, in the case of some endangered species, federal policy. Local and state agencies can continue to promote an understanding on both sides of the debris removal issue, however. In other words, landowners must understand the value of statewide regulations for fish and wildlife protection while fish and wildlife habitat advocates must realize that there are situations where debris removal is warranted and necessary to prevent future flood damage. The

County, local watershed councils, NRCS, ODFW, or another office can act as a clearinghouse of requests for debris removal. Requests can then be evaluated and acted upon based on priority.

Potential lead agencies: Division of State Lands (DSL) and other natural resource agencies such as ODFW or NRCS. Local landowners, watershed councils, County departments.

Potential funding sources: Agency collaborative agreements, normal agency operating budgets.

Action WATR-3: Identify watershed treatment options for upland areas

In conducting watershed treatment work, land uses throughout the watershed must be evaluated. Land conditions in upland areas or foothills may be just as important as conditions in riparian areas in terms of controlling flood waters. If hillsides surrounding a waterway are denuded of vegetation, either by development or livestock, runoff can be greatly increased. Not only does this lead to additional stream volume, but it also adds to the water velocity. For example, livestock grazing in the upland areas around East Birch Creek has reduced ground cover and limited the capacity of the area to absorb runoff. This has led to high water volume and increased bedload movement in the creek. Plantings of native vegetation, or perhaps debris catchments, should be considered for areas like this. An ideal group to charge with such work would be the local watershed councils. Both the Umatilla Basin Watershed Council and the Walla Walla Watershed Council are already involved with this type of work in the County, on Birch Creek and Pine Creek/Dry Creek respectively.

Potential lead agencies: Umatilla Basin Watershed Council, Walla Walla Basin Watershed Council, ODFW, NRCS.

Potential funding sources: ODFW grants, Governor's Watershed Enhancement Board funding,

3.2.4 Emergency Services

Flood planning and extensive mitigation work can be rendered worthless if the County's emergency services are not effective. In comparison to other cities and counties, during the 1996 floods Umatilla County was "ready" for flooding. Other jurisdictions around the state suffered damage to critical facilities and materials. The siting of the County's critical facilities and flood fighting materials is such that high water events do not cause significant damage or delay. Despite this level of readiness, there are some improvements which could be made to the existing system of flood forecasting and emergency response.

Actions

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| EMER-1 | Evaluate the County's river gage network. |
| EMER-2 | Provide ground information to National Weather Service to better predict risk. |
| EMER-3 | Adopt a County emergency flood response plan. |
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Action EMER-1: Evaluate the County's river gage network.

The County has a number of gages which provide a system of predicting flood risks and warning levels. This network of gages should be evaluated to determine if it provides an adequate level of detail and coverage for the County. The National Weather Service (NWS) has gages on the Umatilla River, McKay Creek and the Walla Walla River which provide detailed flood stage and river flow data. However, there are many flood prone areas around the County which are not monitored. For example, there are no NWS gages in the Wildhorse Basin or in the Squaw and Meacham Creek area. Additionally, not all of the NWS gages provide "real time" data or are connected via satellite to NWS offices.

The water content of local snowpack is also measured by NWS. There are four SNOTEL gages currently sited in the County. Given that most of the damaging flood conditions which occur in the County are a result of rapid snowmelt, these gages are very important. There may be areas where additional SNOTEL gages are needed as well. The County should meet with NWS and determine if the current system of river, rain, and snowpack gages provides an adequate safeguard.

Unfortunately, gages are expensive. A "full service" river gage with telemetry costs roughly \$100,000 to install properly while SNOTEL gages can cost approximately \$20,000 to install (V. Thompson, NWS, pers. comm., 1997). Gages which are destroyed or damaged are not repaired because of a lack of a dedicated funding source for maintenance. Funding options for gage maintenance and/or replacement should be coordinated between the County and NWS.

Potential lead agencies: National Weather Service, Umatilla County Emergency Management Department, State Water Resources Department (WRD), United States Geological Survey (USGS).

Potential funding sources: Existing NWS and County budgets.

Action EMER-2: Provide on-the-ground information to National Weather Service to better predict flood risks

The National Weather Service has an very effective system for determining storm conditions and flood risks. However, the NWS does not have a clear idea of the on-the-ground impacts of various flood stages and flow levels. For example, the NWS may be able to predict that the main stem of the Walla Walla river is going to crest at 10.7 feet. What they don't know, however, is what will happen on the ground when the river reaches 10.7 feet. This information has been collected by the USACE for some locations around the County (see **Table 2-8**). However, more detailed information of this type would greatly assist the NWS in their assessment of risk. If the NWS knew that at 10.7 foot flood stage at a certain spot on the Walla Walla, there was likely to be a flooded road and some structural flooding, they could alert the County Emergency Management Department to notify landowners in the area of expected damages. With on-the-

ground information, the NWS could provide specific geographic risk information in addition to flood stage predictions.

If actions **PREV-1** or **PREV-2** are carried out, it is possible that this improved and updated information could be relayed to the NWS to add to their database. Simply surveying landowners on where the floodwaters reached during certain high water events would be one method of obtaining this information. Ideally, a GIS layer could be produced which illustrates the land uses in the floodplain, including topography and flood level information.

Potential lead agencies: County Department of Resource Services and Development, DLCD, USACE, FEMA, National Weather Service.

Potential funding sources: County budget, FEMA funding, USACE funding.

Action EMER-3: Adopt a County Emergency Flood Response Plan

Along with the *Umatilla County Flood Mitigation Plan*, the County Department of Resource Services and Development has sponsored the production of an emergency flood response plan. The *Umatilla County Emergency Flood Response Plan* provides the template for what happens in the County in the event of a flood. The Emergency Flood Response Plan includes information on flood warning processes, flood forecasting, emergency access, critical facilities protection, flood fighting materials, and information on health and safety following a flood. This document is included as **Appendix A** of this report.

Potential lead agency: Umatilla County Department of Emergency Management

Potential funding source: Already funded through a Community Development Block Grant to the Department of Resource Services and Development.

3.2.5 Structural Projects

There are several important actions would should be taken in the County to evaluate and maintain the current network of flood protection structures. Levees, dikes, and in-stream projects should be evaluated for their condition, risk, and collective impact on the hydrology and hydraulics of County waterways. Additionally, a "levee watch" program is recommended to obtain levee structural condition information during periods of high water. Lastly, for all necessary structural in-stream engineering projects, a watershed perspective is advocated to account for the overall waterway impacts of each project.

Actions

STRU 1	Conduct inventory and maintenance evaluation of levees and dikes.
STRU-2	Establish a "levee watch" program.
STRU-3	Encourage watershed perspective in in-stream engineering projects (i.e. riprap projects).

Action STRU-1: Conduct inventory and maintenance evaluation of levees and dikes

Levees, dikes and irrigation canals are not necessarily permanent structures. They are subject to degradation and erosion over time and require periodic maintenance and repair. Many of the levees constructed in Umatilla County were completed decades ago and have not been adequately refurbished. Poorly maintained levees/dikes risk failure or overtopping and may put landowners at greater risk from high water. Another problem with levees and dikes is uncertainty over ownership and maintenance responsibility. Because many of these structures are old and constructed by different agencies at different times under various programs, there is often disagreement over who is responsible for keeping them functional. The County needs a determination of the level of protection provided by various levees and dikes. In some cases, landowners who have constructed private levees or dikes do not have the money required to maintain or repair them. In other cases, the USACE has constructed a levee and left the maintenance up to a local owner, who has not followed up on this work. In every case, failure of a levee or dike can have catastrophic effects on property being protected by the structure.

There is a need to identify and document the location and ownership of all levees and dikes in the County. This work should determine existing condition and potential risks, and suggest maintenance options. The USACE conducts this type of work on many levees and dikes as part of Public Law 84-99. If repairs are not carried out, those levees lose eligibility for emergency service by the USACE. A levee "task force" of some type should be established to work with the USACE and other agencies in identifying, mapping, and describing the conditions of all existing levees and dikes in the County. Following the February 1996 floods, the Interagency Hazard Mitigation Team (IHMT) proposed that a levee task force be established to review structures at the state level. Perhaps Umatilla County could ask the Oregon Emergency Management Office to utilize this task force to conduct a county-wide levee and dike inventory. If not, a county-based task force should be created.

Potential lead agencies: State Water Resources Board or levee "task force", USACE, local diking districts, local irrigation districts, County Department of Emergency Management, cities, County Watermaster.

Potential funding source: FEMA grants, USACE funding, County budget, potential state funding.

Action STRU-2: Establish a "levee watch" program

Along with an inventory of levees and dikes, the County should establish a "levee watch" program. Essentially, this would entail a network of individuals or organizations throughout the County charged with evaluating their levee or dike system in times of high water. Ideally, the participating individual or group would be the owner or maintainer of the system, but, failing this, volunteers could be solicited. The National Weather Service has volunteer weather spotters; there is no reason that the County cannot have volunteer "levee watchers". Those involved with the levee watch process would simply provide information about damages to key structures or areas where structures are at risk from failing. They could have a direct dial-in to the County Emergency Management Department in times of high water. Emergency Management, in turn, is connected to the flood fighting and flood preparedness network.

Potential lead agencies: Umatilla County Emergency Management Department, local diking districts and irrigation districts, Water Resources Department.

Potential funding source: Existing agency budgets and County budget, volunteer services.

Action STRU-3: Encourage a watershed perspective in in-stream engineering projects (i.e. riprap projects)

This action could be considered a combination of structural project, watershed treatment, and public information. The goal of this action is to ensure that all in-stream structural work is conducted in a manner which takes a watershed perspective. This is already done in the County: ODFW, DSL, and other agencies cooperate on all in-stream engineering projects. This action encourages existing agencies to continue efforts to coordinate projects. It is crucial to encourage a watershed perspective which includes consideration of upstream and downstream impacts of projects on biological resources and water level.

Potential lead agencies: ODFW, DSL, watershed councils, USACE.

Potential funding source: No real cost other than agency time.

3.2.6 Public Information

There are many flood-related materials available to Umatilla County residents. In addition to written publications, many agencies offer periodic workshops, seminars, and public assistance on various aspects of flood protection. Despite this, there is a need for additional outreach and public information. The two recommendations in this section represent a variety of actions which could be taken to provide more flood information to the public. Each of the agencies responsible for some aspect of flood protection or control should take some responsibility for public outreach.

Actions

PUBL-1	Establish additional public information materials and expand public outreach efforts.
PUBL-2	Encourage and promote watershed council involvement in flood mitigation.

Action PUBL-1: Establish additional public information materials and expand public outreach efforts

Implementation of this general recommendation can take many forms. Many of the previous recommendations include elements of public information and outreach. Public information and outreach can range from a one-on-one discussion in the planning office to a workshop conducted to discuss floodproofing alternatives. Many agencies publish or provide materials describing flood assistance programs, riprap projects, the pros and cons of in-stream projects, and flood insurance information. There are other methods of getting flood information to the public, however. French and Associates (1997) have identified the following general methods:

- mass mailings or newsletters to floodplain residents;
- displays in public buildings, shopping malls, gathering places;
- newspaper articles and special sections;
- radio and TV news releases and interview shows;
- maps at city hall and at the library;
- a local floodproofing video for cable TV programs or to loan to organizations;
- National disaster education curriculum in schools;
- a detailed property owner handbook tailored for local conditions; and,
- presentations at meetings of neighborhood groups (French & Associates, 1997).

Each of these projects costs money, however. We recommend that partnerships be sought to share the cost of these projects and share in the outreach. Flood damage repair ends up costing everyone, from local government agencies to landowners to the taxpayer in general. It is a good investment for agencies to pool their resources to get flood information to the public to potentially lessen these costs.

Potential lead agencies: All natural resource agencies, watershed councils, civic organizations.

Potential funding sources: Partnerships between agencies. Utilize existing agency budgets.

Action PUBL-2: Encourage and promote watershed council involvement in flood mitigation projects.

Although watershed councils are not a new phenomenon, the formation of the Governor's Watershed Enhancement Board (GWEB) in 1995 ushered in the development of many new councils throughout Oregon. In fact, watershed councils have become one of the most popular methods of advocacy and action-oriented community work in the state. The Umatilla Basin

Watershed Council and the Walla Walla Basin Watershed Council are both fairly new, yet they have earned a good deal of credibility among landowners and natural resource agencies in the County. Both watershed councils can be extremely valuable in identifying flood mitigation projects, soliciting volunteers, providing educational materials and outreach, and seeking funding. In a time of decreasing agency funding to conduct environmental and community-based work, watershed councils will continue to play an active role as implementing agencies. Umatilla County is fortunate to have two established councils.

Responsible parties: All natural resource agencies, both watershed councils.

Potential funding sources: Existing agency budgets, GWEB funding.

3.3 SPECIFIC FLOOD MITIGATION PROJECTS

This section provides details on potential mitigation projects for a number of specific locations around the County. These locations have been identified by County planning staff, agency representatives, or watershed council representatives. In some cases, flood damage is frequent, with periodic high water events causing recurring erosion or structural damage. In other cases, severe flooding in the past two years has caused flood damage which did not exist previously. **Table 3-2** provides a list of these locations. These particular locations were selected for two reasons:

- 1) these areas have already been identified as problematic and efforts have been made by various parties to mitigate existing damages; and,
- 2) mitigation recommendations for these locations will be transferable to other areas around the County.

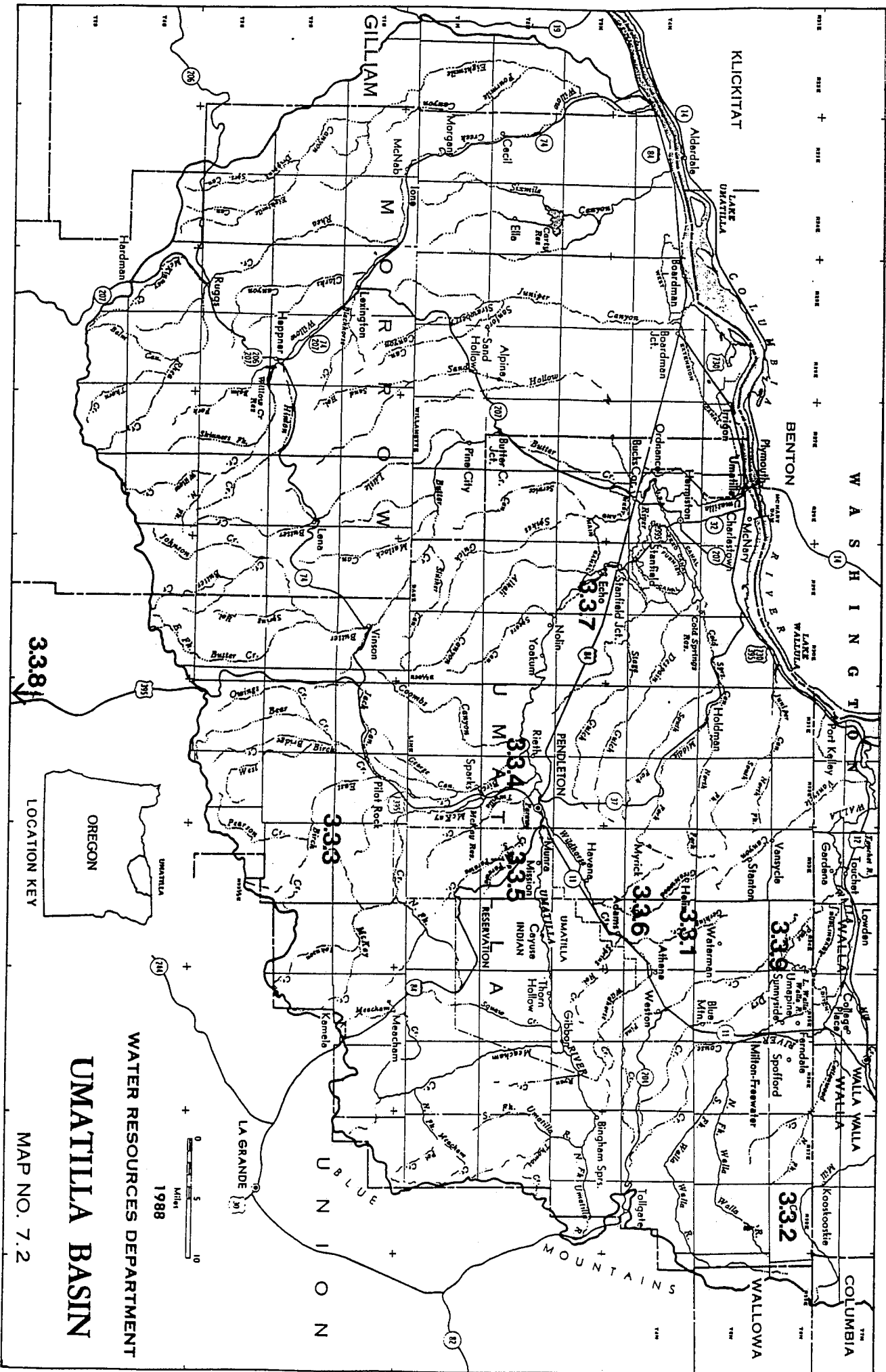
In other words, recommendations for erosion and sedimentation control work on an area like East Birch Creek could be conducted on many waterways around the County with similar conditions and characteristics. No two areas are exactly the same, but successful mitigation projects employed in one location should certainly be repeated in others. The locations listed in **Table 3-2** should not necessarily be considered the 9 worst flood problem areas, although they do represent some of the most costly flood damages and potential future damages in the County. Prioritization of locations for mitigation work should be a collective decision among local agencies and residents. Further, projects will be conducted as conditions, local motivation, and funding dictates.

Table 3-2
Specific Flood Mitigation Project Areas

Project #	Location	Brief Description of Primary Flood Issues
3.3.1	Wildhorse Creek Basin	Erosion of agricultural lands, sedimentation, runoff from fields.
3.3.2	Mill Creek	Structural damage and risk, road damage, heavy erosion.
3.3.3	East Birch Creek	Erosion, sedimentation, debris and gravel accumulation.
3.3.4	SW 44th Ave. Pendleton	Drainage problem, runoff from hills.
3.3.5	Riverside RV Park, Pendleton	Sediment and debris accumulation, risk of future damage.
3.3.6	Adams, Helix	Blocked drainage ditches, runoff, some structural damage.
3.3.7	Echo	Overtopping banks, high water flow risks.
3.3.8	Ukiah	Sediment and debris accumulation, risk of future damage.
3.3.9	Pine Creek/Dry Creek	Lack of vegetation, silt dams forming.

For each location included in **Table 3-2**, the following information is included: Specific location, a description of the flood problem, suggested mitigation measures for the problem, and a listing of agencies and groups that should be involved. Potential funding sources can be considered for various projects by looking through **Appendix B**. Wherever appropriate, existing flood mitigation work is included as part of the recommendation. Streambank stabilization projects, in-stream engineering work, and floodplain management efforts are widespread in these locations and these efforts should be encouraged and supported in all cases. **Figure 3-1** shows the general location of each of the selected mitigation projects. Each project is listed on the map by its chapter number (e.g. the Wildhorse Basin in marked by 3.3.1.)

LOCATION OF M. GATION PROJECTS



3.3.1 Wildhorse Creek Basin

Project area: Wildhorse Creek drains into the Umatilla River northeast of Pendleton. The Wildhorse Creek Drainage Basin includes agricultural areas encompassing the towns of Athena, Adams, and Helix, among others.

Description of the problem: The Wildhorse Creek Drainage Basin has severe erosion and sedimentation problems. As has been mentioned, the soils in the Wildhorse Basin are primarily windblown loess and can be up to 150 feet deep in some areas. These soils are highly erodible and, because of the volume, agricultural producers in the area have very little incentive to preserve them. During storms, these soils quickly liquefy and erode heavily. The NRCS estimates that during severe thunderstorms or when frozen ground sloughs off, erosion in the Wildhorse Basin can reach over 100 tons of topsoil per acre in some locations (B. Adelman, NRCS, pers. comm., 1997).

This volume of soil erosion leads to a myriad of flood damage problems. Substantial amounts of sediment is carried down the creek and tributaries and deposited in irrigation canals and drainage ditches. When ditches fill with sediment, the capacity to move water is diminished, thus creating additional runoff and re-channelization of streams. Several towns in the area have suffered recent damage because ditches could not absorb runoff coming from nearby fields. For example, much of the town of Athena is in Wildhorse Creek's floodplain. During recent flood events, water from Wildhorse Creek backed up onto streets in Athena, leading to basement flooding and standing water. Although this type of flood water does not typically have much velocity, it does cause minor structural damage.

Road damage is also widespread in the Wildhorse Basin; stemming from culvert blockages and simply from water and mud flows over the roads. Sedimentation in the area has damaged fish habitat as well, leading to several fish habitat enhancement projects. Currently, the Tribes are conducting habitat enhancement projects in the Wildhorse Basin at Greasewood Creek and several other tributaries. The Tribes are using sediment control devices and replanting of herbaceous and woody vegetation in the area to retain sediment and stabilize banks.

Recommended mitigation measures: Reducing erosion and sedimentation in the Wildhorse Basin will require a collective effort and a number of mitigation measures. These efforts must be viewed as long term, coordinated, and part of an overall erosion reduction plan for the area. Existing streambank stabilization efforts need to be monitored and coordinated. The recommended measures below are already occurring in the area. These efforts need to be coordinated and vigorously promoted.

- Encourage best management practices on fields. Best management practices on agricultural lands such as conservation tillage, terraces, crop rotation, field borders, debris basins, sediment check dams, strip cropping or permanent vegetation buffers need to be encouraged. Some landowners in the area have employed such techniques and they have reduced erosion

(B. Adelman, NRCS, pers. comm., 1997). These efforts are optional, so they must be strongly promoted as part of an overall erosion reduction plan for the area.

- Seek landowners willing to participate in conservation easement or riparian planting programs. Many landowners in the Wildhorse Basin farm right up to the streambank. One of the best ways to reduce erosion is to leave a vegetative buffer between the fields and the stream itself to catch sediments and absorb water velocity. Programs such as the Conservation Reserve Program and the Environmental Quality Incentive Program need to be promoted to landowners. The Tribes have secured easements to conduct their planting and sediment detention work; efforts such as this need to be expanded. Whether the purpose of the work is fish habitat enhancement or flood control, the results will be positive if sedimentation is reduced.
- Increase public information and outreach to landowners in the area. Agricultural producers in the Wildhorse Basin have traditionally farmed with little erosion safeguards. Many agencies have conducted public information campaigns to provide details on the up and downstream effects of erosion. Regardless, the programs listed above for best management practices and easements are voluntary or cost-share programs. Because of this, it will require multi-agency outreach efforts to increase participation in available erosion reduction programs.

Who is involved: Local landowners need to be sought to participate in programs for agricultural best management practices, replanting, or sediment detention. The NRCS, FSA, and SWCD are already conducting work in the area but these efforts need to be coordinated, especially in terms of the land acquisition and easement programs available. The Tribes and ODFW are also involved in fish habitat enhancement work and these efforts should be expanded and coordinated with acquisition programs.

3.3.2 Mill Creek

Project area: Mill Creek is located in the northeast corner of the County, with much of the creek located in Washington. The area of greatest concern (and damage) is southeast of Kooskooskie, Washington just inside the Oregon border.

Description of the problem: Flooding along Mill Creek during the February 1996 floods caused the worst structural flood damage in the County. The area is very rural in nature, characterized by narrow littoral canyons along the creek which were scoured by debris and gravel. Snow and ice built up in the creek in 1996 and then formed into ice floes which tore out large areas of streambank. Several bridges in the area were seriously damaged, leaving local residents stranded in some cases. Many of the houses in the area were built in the floodplain prior to floodplain management regulations. A total of 13 homes were seriously damaged in the floods, some swept off their foundations (D. Olson, County Department of Resources Services and Development, pers. comm., 1997). No lives were lost during the flood, but property loss and road damage were extensive. Much of the access road to homes along Mill Creek had to be replaced along with

associated culverts. In fact, the largest single allocation of flood repair funding used by Umatilla County went to road and bridge work in the Mill Creek area.

Following the extensive damage in 1996, a workforce was established to determine Mill Creek's eligibility for hazard mitigation funding and to identify mitigation projects. The workforce includes landowners, County planning staff, and representatives of natural resource agencies. A community meeting was held in April, 1997 to talk about the issues and things that could be done in the floodplain. Additionally, the FEMA is doing a mapping study of the Mill Creek area. Currently, part of the area is mapped and part is not. The FEMA has hired a contractor to map the portion of the creek which is currently un-mapped (A. Beier, County Department of Resource Services and Development, pers. comm. 1997). Because of the severity of the flood damage along Mill Creek, the area became a priority to be mapped by FEMA.

Another on-going project in the area is the development of a replacement bridge. As was mentioned in Chapter Two, the "Klicker Bridge" spanning Mill Creek was re-engineered to allow floodwaters to go around the bridge, dissipating velocity and leaving the bridge intact. Additional designs for bridges which will be safe for crossings, flood and debris tolerant and "fish-friendly" are in the discussion phase (A. Beier, County Department of Resource Services and Development, pers. comm. 1997).

Recommended mitigation measures: Mill Creek offers a very challenging situation for the establishment of flood mitigation options. As was mentioned, many of the homes along Mill Creek were constructed prior to floodplain management regulations. Because of this, some of these structures are sited in areas close to the floodway. Relocation is not an option for most landowners because the land area along the creek is limited. Funding may be available to help landowners with elevation of their homes. As of the writing of this report, one landowner in the area is pursuing elevation of his structure. According to County planning staff, landowners in the area are not interested in acquisition alternatives. Further, watershed treatment options may not be strong enough to protect the homes in the area's current condition. There is a great deal of debris and gravel in the area which may produce serious problems in the event of another large flood.

The workforce is addressing Mill Creek's alternatives. Detailed inundation maps by FEMA will serve to warn landowners of potential new flood dangers. Bridge research, construction, and engineering will lead to more stable structures and less road damage. The workforce is serving the purpose of public information, agency coordination, and collective planning. This approach would be useful elsewhere in the County (such as the Wildhorse Creek Basin).

In addition to supporting the work already being conducted by the workforce, there are two additional recommended mitigation measures for Mill Creek.

- Construction of berms or barriers around side canyons in the area. Some of the damage which occurred during the 1996 floods was a result of flash flood-type water and debris slides down side canyons where small streams drain into Mill Creek. These canyons can funnel debris

down through property and lead to extensive damage. Berms or barriers along these canyons could divert water and hold debris away from structures.

- Establish a debris removal policy for the area. Much of the gravel, sediment, and debris that remains in the floodplain may create a great deal more damage in the event of another major flood. The agencies on the workforce should consider a policy to remove some of this debris.

Who is involved: Many agencies are already involved in mitigation efforts along Mill Creek. County planning staff, the USACE, DSL, FEMA, and ODFW are all involved with the workforce. The DLCD awarded the County a \$50,000 grant to study the area. This grant is to be used for public education, elevation of structures, bridge work, and debris removal.

3.3.3 East Birch Creek

Project area: East Birch Creek runs northwest down from the Blue Mountains and foothills into the town of Pilot Rock in central Umatilla County. The most extensive damage occurs from the foothills to Pilot Rock.

Description of the problem: Erosion, sedimentation, and re-channelization are all problems which are occurring along East Birch Creek. The creek flows down out of the foothills through pasture lands and a number of homes and structures. The foothills have been grazed extensively by livestock and there is not a great deal of ground cover to absorb water runoff. Additionally, much of this land was private timber holdings which have been logged. The combination of these land uses has reduced absorption and led to a higher volume of water in the creek. The creek travels through a fairly narrow canyon which tends to accelerate water velocity and increase bedload movement. Closer to Pilot Rock, there are many homes located close to the creek and a great deal of property in the floodplain. There is a braided channel system in the lower reaches and the creek tends to meander, leading to deposition and erosion problems. The USACE has conducted some hydromodification work in the past and private landowners have modified the creek channels over the years in an attempt to reduce their own flood risks (L. Langheinrich, Umatilla Basin Watershed Council, pers. comm., 1997).

A group of landowners in the East Birch Creek area are currently working with the Umatilla Basin Watershed Council to plan and implement mitigation efforts in the area. This group consists of local stakeholders plus representatives of ODFW, USFS, SWCD, the City of Pilot Rock, and local private industry. The goal of the group is an overall watershed management plan (L. Langheinrich, Umatilla Basin Watershed Council, pers. comm., 1997). The plan will include maintenance of the uplands, riparian planting, and other watershed treatment techniques.

Recommended mitigation measures: The existing stakeholder group has identified projects throughout the watershed which can serve to mitigate water velocities, erosion, bedload movement, and sediment accumulation. The following methods have been identified by the group for the various stretches of creek.

- In the upper watershed, replanting efforts should be explored to absorb runoff and reduce water velocities. Local landowner Pioneer Resources/Kinzu planted 65,000 seedlings in the area, which should help in this effort. Another possibility for the uplands are diversions, storage basins, or similar techniques to control runoff.
- Along the middle section of the creek, riparian plantings will be the most beneficial flood mitigation option. Both herbaceous and woody vegetation would be helpful to prevent erosion and bank sloughing as a result of scouring. In-stream engineering projects could also be incorporated to create meanders and reduce erosion and scouring.
- To reduce bedload movement, public information efforts and outreach need to be increased to get the word out that modifying the channel causes erosion, and sedimentation accumulation problems which has upstream and downstream impacts. Additionally, replanting of the uplands and streambanks should also serve to reduce velocity and, thus, bedload movement.
- In the lower reaches of the creek, maintenance of sediment is needed in the braided channel system. As sediment and debris continues to accumulate, erosion and structural risk will continue to increase. Similar to the Mill Creek area, a debris/sediment removal policy should be explored as part of the local management plan. Representatives of ODFW and DSL are already involved in the local stakeholder group and would play the central role in developing such a policy. (L. Langheinrich, Umatilla Basin Watershed Council, pers. comm., 1997).

The most important mitigation work that can be done in the East Birch Creek area is to support the planning and implementation efforts of the existing stakeholder group. This group is locally based and has an excellent facilitator in the Umatilla Basin Watershed Council. Once the plan is produced to manage the watershed, agencies should assist the group with funding opportunities, resources, and technical assistance to implement the components of the management plan.

Who is involved: The Umatilla Basin Watershed Council is the facilitator of the local stakeholder group. The group already includes representation from an array of agencies and organizations. Representatives from funding agencies should also be included in planning projects and tactics. This should include FEMA, NRCS, FSA, and DLCD.

3.3.4 SW 44th Street/Korvola Road, Pendleton

Project area: In Pendleton, involving SW 44th Street, Korvola Road, Quinney Avenue, and Sunset Drive.

Description of the problem: Water damage from this area is a function of runoff and poor urban drainage. Water from storms comes down the fairly steep, denuded hills in the area and runs down Korvola Road into houses, yards, basements, etc. eventually ending up in McKay Creek. This is a recurring problem for the area. While there is not a lot of road damage, mud and debris flows

down the streets into homes. There has been some recent work in the area, including the installation of a culvert and drainage ditch.

Currently, a major planning analysis of this area is being conducted. The La Grande engineering firm of Anderson Perry is working with the County Public Works Department to explore drainage improvements. A citizens committee has been established to provide input to the process. Anderson Perry has developed four options, including utilizing the same type of drainage system, building a new ditch and improving drainage on Quinney St., road improvements to carry water more effectively, and re-routing water and building a drainage ditch. Depending on the selected option, the work will involve riprap, ditch excavation and construction, paving, installation of culverts and catch basins, and earthwork.

Recommended mitigation measures: This project is included to illustrate a planning process which should occur in other locations around the County. This location is a good example of an urban drainage flood problem which is being dealt with. There are other urban areas around the County which experience recurring drainage problems and these areas should be included in flood mitigation efforts. One of the overall mitigation recommendations (Action **PREV-3**) is to identify and prioritize urban drainage problems. Usually, prioritization requires motivated local landowners to voice their concerns to County officials. In the case of SW 44th Street, there is a local citizens committee which has been involved in planning the improvements. These are efforts which should be emulated elsewhere in the County.

Who is involved: Local residents, County Department of Public Works, Pendleton Department of Public Works, private engineering firm of Anderson Perry.

3.3.5 Riverside RV Park, Pendleton

Project area: The Riverside RV Park, located along the Umatilla River just east of Pendleton.

Description of the problem: The Riverside RV Park is located along the main stem of the Umatilla River. During the February 1996 flood, the RV park suffered flood damage as a result of high water. A small levee along the south side of the park was unable to restrict the flood waters. One of the reasons for the high water was a debris pile which formed during the flood. Gravel, sediment, trees, and brush collected adjacent to the RV park and caused a back up onto the property. The USACE can conduct emergency removal of debris and in-stream sediment, but only under an emergency permit as described in Public Law 84-99. The RV park did not apply for or receive an emergency removal permit, so the debris pile remains adjacent to the park.

RV park residents feel that the debris pile should be removed to avoid damages from future floods. However, in-stream debris removal permits must be reviewed by representative of ODFW and DSL for impact on fish habitat and river dynamics. The RV park is under the jurisdiction of the Riverside Water Control District. About three-quarters of the Riverside Water Control District's jurisdiction is on the Confederated Tribes of the Umatilla Reservation. As such, there is

very little tax base to use for flood control projects, such as construction of a more effective levee.

Recommended mitigation measures: Removal or modification of the debris pile should be considered by County and City departments and agency representatives.

Who is involved: County and City of Pendleton planning departments, USACE, ODFW, DSL, and FEMA.

3.3.6 Adams, Helix

Project area: Two agricultural communities located northeast of Pendleton in the Wildhorse Creek Drainage Basin.

Description of the problem: These two communities were grouped together because of their geographic and flood damage similarities. Both communities suffered flood damage during the December 1996/January 1997 flood event. In Adams, Wildhorse Creek overflowed and ran down the main street, flooding some homes and basements. Spring Hollow and Sand Hollow creeks both empty into the Wildhorse right at Adams and the combined water volume led to banks overtopping and water running through town. Another problem in Adams is that runoff came down through fields and backed up in drainage ditches, ponding and then running down streets, depositing mud. There has been a good deal of road damage north of Adams in the last two years as well. The County Public Works Department has spent \$30-35,000 over the past two years because of erosion and wash out of local roads (H. Phillips, County Department of Public Works, pers. comm., 1997).

In Helix, the primary problems are also runoff from the nearby fields and the silting up of Greasewood Creek. In the December 1996/January 1997 flood, runoff from fields overtopped ditches and ran down streets into the city hall and other houses and buildings. The major reason for this runoff was that the existing ditches were full of sediment from the fields in the area. The drainage system in Helix relies on these ditches and, when they are full of soil there is no mechanism to guide water and mud. In addition, Greasewood Creek has silt accumulation problems which have added to backup and additional flood damages.

Recommended mitigation measures: The costs and benefits of all potential drainage improvement projects need to be evaluated, especially in areas like Adams and Helix. Major drainage improvements such as the work being considered for SW 44th Street in Pendleton may not be appropriate for all areas. When floodwaters are the result of runoff and most of the floodwaters are either standing water or low velocity, the costs of major drainage improvements may heavily outweigh the benefits. Given this, there are three recommended mitigation measures for Adams and Helix (and similar towns such as Athena):

- 1) ongoing maintenance of ditches, culverts, and sediment;
- 2) floodproofing; and,
- 3) improved farm practices.

Drainage ditches need to be maintained and cleared out often, especially during the winter. Soil buildup in ditches was the primary cause of flood damage in both towns. Along with ditches, culverts need to be maintained and evaluated for improvements or replacement. Blocked culverts can quickly lead to serious runoff problems. Both towns also received flooding from nearby creeks as a result of sediment build up. Similar to other recommendations, local residents should appeal to the DSL for debris removal permits if the problem becomes acute.

Individual floodproofing and general floodproofing options should also be explored. Since flooding in the two towns is not high velocity or high depth, this may be an attractive option. Small earthen berms, diversions, or barriers around homes or facilities can work very well. If they are created during a low-rainfall period and allowed to become grown over with vegetation or grass, berms can provide excellent protection from runoff.

Finally, landowners in the area need to keep water on their fields more effectively. Improving farm practices was mentioned in Recommendation 3.3.1 for the entire Wildhorse Drainage Basin. As was described there, public outreach and information should be provided to local landowners and encouragement to employ techniques such as conservation tillage, terraces, crop rotation, field borders, debris basins, or vegetation buffers.

Who is involved: County Department of Public Works and Department of Resource Services and Development. In the case of Helix, the City Public Works Department will be involved.

3.3.7 Echo

Project area: In and around the City of Echo in the western portion of Umatilla County.

Description of the problem: The City of Echo experiences flood problems during nearly every high water event. Much of the City is within the floodplain and this leads to a good deal of deposition of sediment and debris in the area. The irrigation canal north of Echo has failed in the past and this has led to flood damage. During recent flood events, the downstream flow was slowed by both debris and a diversion project. The diversion is located south of town and has been used to trap fish. Water is diverted around the structure then back into the river. In recent floods, downstream flow has backed up and caused erosion problems, encroached on homes, and led to some loss of property.

The banks throughout this portion of the Umatilla have been reinforced over the years. Both the USACE and the City have conducted in-stream engineering work in the past decade. In response to erosion or park land along the river, the City, along with the then Soil Conservation Service,

local irrigation districts, and the Oregon Department of Agriculture developed a cooperative project valued at approximately \$25,000 (D. Berry, City of Echo, pers. comm., 1997).

Continued erosion will lead to additional property damage and further risk to existing homes and structures.

Recommended mitigation measures: Echo is a good example of an area that would benefit from more extensive floodplain planning and possibly some in-stream engineering work. In terms of additional planning, the landowners in the area could be asked to co-sponsor a conservation easement or similar buffer zone along the river. The NRCS' Conservation Reserve Program would be one option along these lines.

If conservation easements and watershed treatment are not an option to stop erosion and encroachment, Echo should be considered as a high priority for in-stream engineering work to stabilize the bank. A multi-agency riprap project or similar engineering project may be the best option to deal with Echo's current problem. The area should be evaluated by engineers from NRCS and/or USACE to explore such options.

Who is involved: City of Echo, USACE, County Department of Resource Services and Development, NRCS, ODFW.

3.3.8 Ukiah

Project area: City of Ukiah in southern Umatilla County along Camas Creek.

Description of the problem: Ukiah presents another example of flood damage (or prospective damage) which is transferable to other areas around the County. Similar to the Riverside RV Park in Pendleton, Ukiah's biggest flood problem is risk from future flood waters. Flooding in 1996 and early 1997 brought a great deal of gravel and debris down Camas Creek and deposited it along the banks and bridges in town. The bridge is quite low at Highway 52 and it does not allow a lot of passage beneath. There is a good deal of sediment and debris around the bridge which could exacerbate damage to the bridge in the event of high water. Drainage ditches in the area are also filled with debris. Sediment and debris scouring may become a larger issue and lead to excess erosion in the area.

Currently, there is a group of landowners working on flood and debris issues. There are not many structures at risk in Ukiah, but the local roads run along Camas Creek. Damage to the highway or bridge in this area would be very isolating for local residents.

Recommended mitigation measures: Debris accumulation is the largest perceived flood risk in Ukiah (and many other areas around the County). The situation in Ukiah illustrates the importance of Action **WATR-2** which describes prioritizing areas for debris removal. Ukiah

should be considered as one of the top priority areas to pursue a study of the impacts of debris removal.

Who is involved: Local residents, NRCS, ODFW, DSL, County Departments.

3.3.9 Pine Creek/Dry Creek

Project area: The Pine Creek/Dry Creek area is in the Walla Walla Watershed, northwest of Milton Freewater.

Description of the problem: Pine Creek and Dry Creek have been combined because their flood issues are similar and interconnected. Although flood damages are not extreme in this area, silt dams are forming in the creeks and leading to increased flooding of adjacent agricultural areas. These silt dams are the result of a combination of natural flood deposits and agricultural practices in the local watersheds. Both crop production and grazing in the area have led to erosion of the riparian area and increased sedimentation.

Recommended mitigation measures: Similar to the East Birch Creek area, this area could benefit from multiple mitigation measures. In the Pine Creek/Dry Creek area there is both wheat farming and livestock grazing. Landowners involved with both of these businesses need to utilize best management practices to stabilize banks, reduce overland flow of runoff, and control erosion. The installation of easements or riparian buffers should be explored along both creeks. Riparian planting, and the replanting of areas denuded by livestock, should also be an integral part of restoring this area.

Who is involved: Walla Walla Watershed Council, local landowners, ODFW.

3.4 SUMMARY

Within Umatilla County, many agencies and organizations are working to lessen flood risks and damages. Some of these projects have been successful, and with many others it is too early to pass judgment. The general county-wide recommendations advanced in this chapter are designed to take advantage of existing programs and cooperative efforts between agencies. General flood mitigation projects include preventative measures, property protection, watershed treatment, emergency services improvement, structural projects, and public information and outreach.

Specific locations around the County were selected for mitigation projects because efforts have already been made to mitigate and because mitigation recommendations for these locations will be transferable to other areas. Although selected locations do represent some the most costly recent flood damages and highest potential risk of future damage, prioritization of locations for mitigation work should be a collective decision among local agencies and residents. Wherever

appropriate, existing flood mitigation work is included as part of the recommendation. Streambank stabilization projects, in-stream engineering work, and floodplain management efforts are widespread throughout the County and these efforts should be encouraged and supported in all cases.

APPENDIX A
Umatilla County Emergency
Flood Response Plan

UMATILLA COUNTY EMERGENCY FLOOD RESPONSE PLAN

Prepared for:

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August, 1997

APPENDIX A

Umatilla County Emergency Flood Response Plan

This appendix contains the Umatilla County Emergency Flood Response Plan (Response Plan). The Response Plan is designed to provide information, direction, and a planning guide in the event of a flood in Umatilla County. Although it is included as an Appendix, the Response Plan has been written as a stand-alone document. The Response Plan is also included as an Appendix within the Umatilla County Emergency Operations Plan (EOP).

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CHAPTER FOUR

Plan Implementation

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Plan Implementation

4.1 WHAT'S NEXT?

The Community Planning Workshop has proposed 17 general, county-wide recommended actions and 9 specific mitigation project locations. These recommendations are interrelated and the implementation of any and all of these actions would be useful not only for the specific location but for the entire watershed. The tools, authorities and programs are available at the federal, state, tribal, and local level to move toward implementation of each of the recommended actions. Officials understand the problems, know where the problem areas are, and understand that all actions impact the watershed. What is lacking is funding, organization, and a broad-based commitment to establishing a balanced flood mitigation program. This commitment requires local government, state and federal agency officials, organizations, and landowners to become involved and operate with and toward common goals.

So, the next step should be to develop this broad-based support through public involvement and agency collaboration. The *Umatilla County Flood Mitigation Plan* (Plan) should be provided to agencies, organizations, and interested members of the public to begin the process of prioritization and identification of tangible, doable projects. The Plan should be viewed as an "open" plan; the information and recommendations included are for public knowledge and should be changed and modified as new ideas, information, and problems, arise. Any ranking or prioritization of recommendations has been purposefully left out of the plan. Priorities should be defined by County residents and actions should be considered and implemented as time, funding, and circumstances dictate.

4.2 HOW TO USE THIS PLAN

A plan is only worthwhile if it gets used. Recognizing this, we have developed the Plan to be general enough to allow for additional input from residents and agency representatives, but specific enough to describe and recommend tangible actions. The Plan can be used in the following ways:

- as a catalyst for agency coordination and public involvement;
- to attract funding for mitigation projects;
- to qualify for the national flood insurance program's community rating system; and,
- as a source of ideas for long term flood mitigation implementation.

Ideally, over time the Plan will be used to serve each of these purposes.

4.2.1 A Catalyst for Agency Coordination and Public Involvement

The Plan is designed to be used as the template for planning and implementing short and long term flood mitigation projects throughout the County. Many of the recommendations included in the Plan involve some level of prioritization and/or identification of projects. The Plan describes these problem areas and details collective action which could be taken to mitigate damages. While the County Department of Resource Services and Development and the County Emergency Management Department will be the "owner" of the Plan, many agencies, organizations, and individuals need to be involved with review and implementation of the actions for the Plan to be worthwhile. In order to make this happen, the County needs to make the Plan available, and solicit comments and prioritization from the public.

It is very important that the planning and implementation of mitigation actions is a public process. The "public" in this case includes anyone interested in being involved in the mitigation process. Most likely, this will include owners and renters of flood prone homes, representatives of agencies and civic groups, watershed council members, and landowners. One way to use the Plan as a catalyst would be to schedule several "prioritization" meetings for the public or for targeted groups. Meetings such as this would not only provide information from the public on the type of projects they support, but it would also inform the public as to the long term intentions of Umatilla County planners and decision makers. Essentially, these meetings could be "town hall" style meetings, where potential mitigation projects are proposed and discussed among the attendees.

Another option may be to establish a committee or community action group to review the plan and create their own prioritization of options and actions. Using a broad-based, representative committee to establish a planning and implementation process may instill a greater sense of ownership and provide motivation and impetus toward action. People who invest time on a planning and implementation committee may have a stronger stake in seeing the Plan implemented (French & Associates, 1997).

Regardless of who makes the determination of which actions to implement, the Plan should be used to organize people. Flood damage is, unfortunately, something that many Umatilla County residents have in common. It is a topic which everyone can relate to in some way. Using this Plan as a template to discuss and prioritize flood mitigation actions may be a method to involve the community and instill ownership in the planning process.

4.2.2 Funding for Mitigation Projects

The first question asked in considering implementation of projects is "where will the money come from"? One of the primary purposes of this plan is to act as a method of attracting funding from federal or state sources. Many state and federal programs require a mitigation plan as a prerequisite to providing assistance for flood damage prevention work. Examples include FEMA's Hazard Mitigation Grant Program and the National Flood Insurance Program's Community

Rating System. Even if the possession of a mitigation plan is not a prerequisite for receiving funding, it can help lending institutions see how their money fits into what the community wants to do (French and Associates, 1997). In having a written mitigation plan, Umatilla County has a template which shows lenders what the local goals are and illustrates the potential for collective project financing. Having an adopted mitigation plan also shows that Umatilla County is committed to flood damage prevention and that money allocated to Umatilla County would be well spent.

Most of the recommended actions in this Plan can be funded by several different sources. In fact, it may be *necessary* to seek multiple lenders for many of the recommendations. Often, lending institutions are limited in what they can fund or they can only fund part of a project. In these cases, the lender can use the mitigation plan to see how their resources will be used in concert with other sources to achieve overall mitigation goals.

Finally, if several of the actions in the Plan are successfully implemented, this will reinforce the value of the Plan to lenders and may also help in attracting mitigation dollars. For a description of federal and state funding sources, see **Appendix B**.

4.2.3 The National Flood Insurance Program's Community Rating System

As was described in Chapter Two, the National Flood Insurance Program (NFIP) provides a Community Rating System (CRS) which allows communities the chance to become eligible for lower insurance rates for their residents. While the County cannot qualify for the CRS, communities in Umatilla County can use this plan to start their qualification process. Communities are given "points" by the NFIP based on the planning process they go through in drafting overall flood response plans and flood mitigation plans above and beyond the minimum requirements for the NFIP. The CRS advocates a comprehensive planning process which includes a broad base of public support.

In Umatilla County, the City of Stanfield is the only community currently involved with the CRS.

As **Table 4-1** illustrates, the FEMA has established standard criteria for earning "points" in the CRS.

Table 4-1
Community Rating System credits

Step	Maximum Points
a. Organize to prepare the plan	10
b. Involve the public	48
c. Coordinate with other agencies	18
d. Assess the hazard	10
e. Assess the problem	30
f. Set goals	2
g. Review possible activities	30
h. Draft an action plan	50
i. Adopt the plan	2
j. Implement, evaluate, and revise	10
TOTAL	210

Source: NFIP Community Rating System, Example Plans, 1996.

Communities need to go through each of the 10 steps listed in **Table 4-1** although not necessarily in the order presented. For example, the *Umatilla Flood Mitigation Plan*, if adopted, would qualify as steps d, e, f, and g. The community would need to complete the rest of the steps to qualify for lower rates.

The CRS encourages local governments to start new programs in many of the areas recommended in this Plan. For example, the CRS advocates expanded public information, technical assistance to property owners, open space preservation, higher regulatory standards, stormwater management, acquisition and relocation, and improved flood warning (FEMA, CRS Example Plans, 1996). If activities identified in a communities' Plan are neglected, FEMA can withdraw CRS classification and insurance premiums could revert to higher costs (French & Associates, 1997). The FEMA distributes a publication entitled *National Flood Insurance Program Community Rating System-Example Plans*. This publication describes the process communities must go through to earn "points" in the CRS. Communities interested in obtaining this publication can call FEMA Region 10 at (206)-487-4735.

4.2.4 A Source of Ideas for Long Term Flood Mitigation Implementation

Perhaps the most important function of this Plan is to set a course for flood mitigation work over the long term. Most flood mitigation efforts are geared toward existing development and short term damage repair. While this is of obvious importance, it is also crucial to protect natural floodplain processes and plan for future development. The actions recommended in the Plan provide a balance of short and long term actions which can protect existing development while also safeguarding County land from future flood events.

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Murray, Joseph. Oregon Department of Emergency Management. Salem, OR.
Olson, Dennis. Umatilla County Department of Resource Services and Development.
Pendleton, OR.
Myers, Bill. Rogue Valley Council of Governments.
Peterson, Jason. Anderson/Perry Architecture Services. La Grande, OR.
Phillips, Hal. Umatilla County Public Works. Pendleton, OR.
Richard, Bill. United States Bureau of Reclamation. Pendleton, OR.
Shaw, Todd. Confederated Tribes of the Umatilla Indian Reservation. Pendleton, OR.
Thompson, Valerie. National Weather Service. Pendleton, OR.
Wille, Steve. United States Fish and Wildlife Service. Portland, OR.
Wolcott, Brian. Walla Walla Watershed Council. Milton-Freewater, OR.

UMATILLA COUNTY EMERGENCY FLOOD RESPONSE PLAN

The United States Army Corps of Engineers (USACE) provides a standard outline for the production of emergency response plans. This outline is designed to provide specific action steps for small jurisdictions such as irrigation districts, diking districts, and drainage authorities. Despite this, we have applied the USACE's outline to Umatilla County as a whole, taking a more general approach. The *Umatilla County Emergency Flood Response Plan* (Response Plan) follows the USACE's outline as closely as possible.

1. INTRODUCTORY INFORMATION

1.1 Purpose

Emergency preparedness can be defined as "being prepared ahead of time with a plan of action for use when hazardous situations arise" (FEMA, Guide for All-Hazard Emergency Operations Planning, 1996). The Response Plan is designed to provide Umatilla County Emergency Management Staff with a template from which to guide emergency flood response efforts. The plan provides general county-wide flood response measures and can act as a template for the creation of similar readiness documents for other local jurisdictions.

The primary goal of the Response Plan is to provide a greater measure of protection to the life, health, and property of Umatilla County residents. Information dissemination must be timely, accurate, and efficient. A coordinated network of agencies, volunteers, and land owners is called for to achieve this goal. The Response Plan defines roles, responsibilities, and inter-agency relationships to respond to flood emergencies in an effective manner. The Response Plan will help to ensure that timely advance notice will be provided to land owners and local authorities of dangerous developing weather conditions. Further, this Plan will assist in providing local authorities with advance notice to prepare for possible evacuation of the public from affected areas.

In Umatilla County, a main stem flood event is declared whenever the gage on the Umatilla River at Pendleton reaches 7.8 feet. In the Walla Walla Basin, flood stage is declared when the Walla Walla River reaches 13 feet at Touchet, Washington. This plan will be implemented whenever there is a risk of flooding which could threaten life, wealth, and property.

1.2 Relationship to Other Emergency Preparedness Plans

To be effective, the Response Plan must be interconnected with other local emergency plans and/or warning or evacuation plans. The Plan is not meant to replace the existing network of emergency response; no new procedures are advocated and the proposed steps do not differ from

the information network already in place. What this Plan does do is coordinate existing information into a proven format devised by the United States Army Corps of Engineers (USACE).

Currently, there are several flood emergency management plans in place for various Umatilla County jurisdictions. The United States Bureau of Reclamation (USBR) has three updated emergency action plans addressing potential failures of McKay, Cold Springs, and Three Mile Dams. These plans provide extremely detailed and site specific information on evacuation, readiness, and the various stages of flood response and action. The USACE has emergency management plans for McNary Dam and other dams upstream of Umatilla County. Grant County Public Utility District provides the County with up-to-date copies of Priest Rapids Dam plans (D. Olson, Umatilla County Department of Resource Services and Development, pers. comm., 1997). Additionally, diking districts, irrigation districts, and some municipalities have established various levels of flood response systems. This Plan is not directed to replace such efforts. The information included in the Response Plan is specific to County-wide readiness and action, not to site specific details. Despite this, one intent of this document is to provide a template for other jurisdictions to use in forming their own site-specific flood response plans. If a connected and functional response effort is formed between County efforts and those of other jurisdictions, future floods will potentially cause much less damage.

The USACE recommend that emergency response or emergency action plans be developed for all diking districts, irrigation districts and levee maintenance entities. As part of Public Law 84-99, the USACE can supply emergency maintenance and repair service to levees and dikes which have been adequately maintained by the owner. Those levees and dikes which are part of an established flood response plan have a greater chance of being acted on quickly and effectively by the USACE during or following a flood event.

2. FLOOD WARNING SYSTEMS

2.1 Flood Risks

While some degree or type of flooding can occur at any time of year, there are typically two annual flood periods in Umatilla County: late December or January and the typical spring runoff period of April and May. High flows on the waterways in the County generally begin in February and last through June. Umatilla County is at risk from flood damage from many different "types" of flooding. The County has suffered flood damage from high runoff, snowmelt, ice jams, flash floods, and from single thunderstorms. Perhaps the most common type of flooding are the brief periods of high flows caused by rain and unseasonably warm temperatures melting snow in the Blue Mountains.

While the causes may differ, damage has been reported on nearly all major waterways in the County. Problems include structural damage, erosion of agricultural lands, high levels of gravel and debris deposition, and property loss. Given the many different types of flooding which can occur in Umatilla County, there are not many waterways which could be considered risk free. Steep topography increases runoff water velocity, stream flow, and debris flow. In many areas, lack of vegetation to slow runoff exacerbates flood risks.

In terms of risks from flood damage, the size of the stream can be misleading; small streams that receive substantial snowmelt or rain frequently overflow their banks and lead to damage. According to the Federal Emergency Management Agency (FEMA), six inches of moving water can knock a person off his or her feet and 12 inches of water flowing at 10 miles per hour carries the force of a 100 mile per hour wind (FEMA, Guide for all hazard planning, 1996).

Another risk comes from the three dams in the County: McKay, Cold Springs, and Three Mile. Failure of any of these reservoirs (especially McKay) could create substantial inundation and a great deal of damage. The USBR has developed emergency action plans for each of these reservoirs. Risk information for the dams in the County are kept by the USBR.

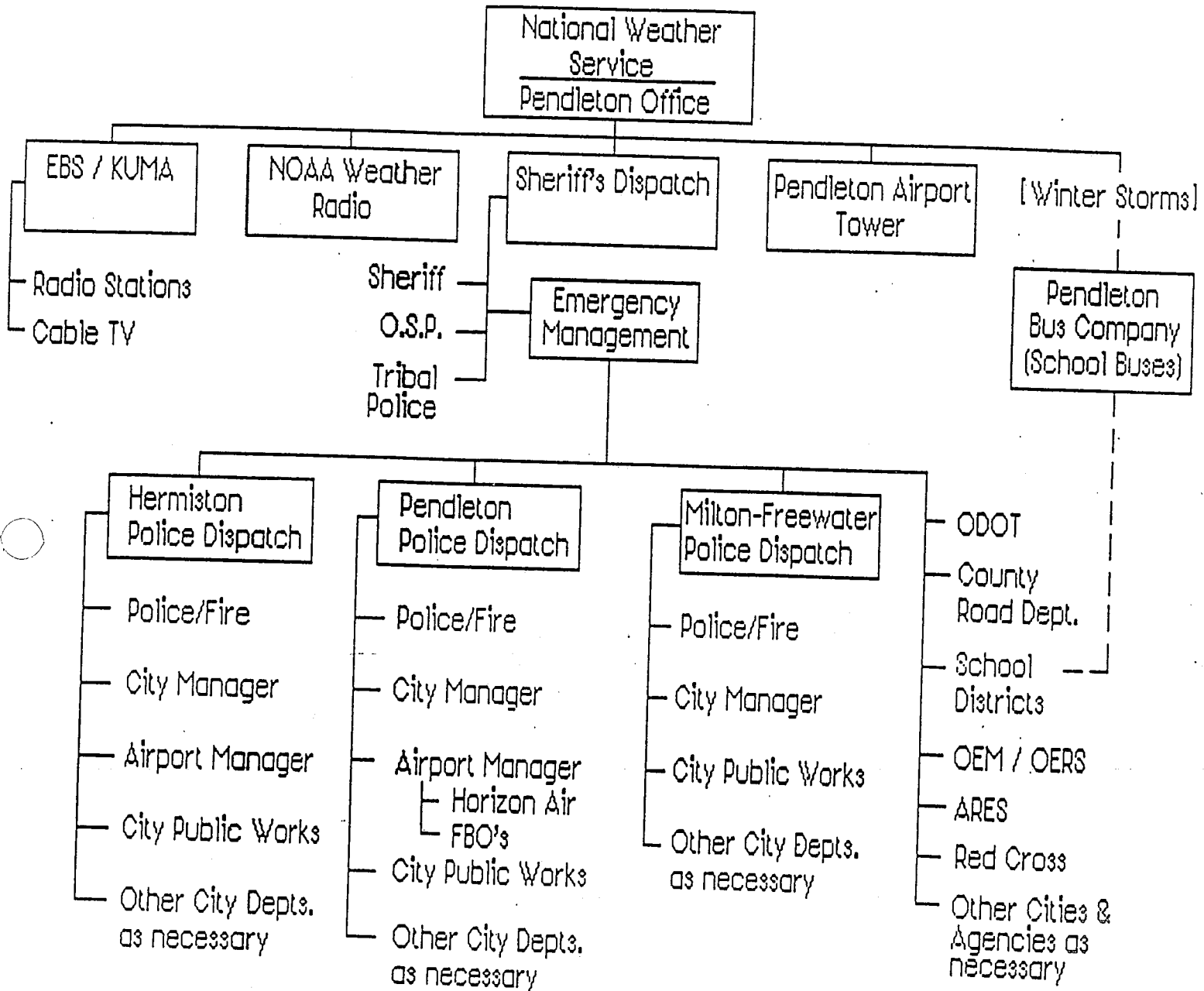
2.2 Gages and Waterway Monitoring

Identifying the risks from flooding, as well as expected flood elevation, is partly a matter of historical records. River gages and flood inundation records have been kept since the 1800's for some stretches of waterway in Umatilla County. However, simply because flood water has never reached a certain area does not mean it cannot. Development, changes in land use, removal of vegetation, and natural waterway meanders are just some of the aspects that can drastically change water levels and damage characteristics. Planners and emergency management staff must be aware of these changes and pass this information on to local landowners who may believe they are out of the flood inundation zone.

The National Weather Service (NWS) provides flood warning information to the County Emergency Management Department. The NWS tracks weather systems and events and predicts both flash floods and “long fuse” flood events. For large river systems, such as the Umatilla, hydrological models are used by the River Forecast Center. For smaller stream systems around the County, there is a combination of gages and snowpack information, and volunteer weather spotters. The County is fortunate to house a major NWS weather center in Pendleton. The extent of the initial response will depend on warning lead time, which varies with the cause of the flooding and the distance a jurisdiction is from the origin of the flooding. Intense storms may produce a flood in minutes or hours, while long fuse events may take from several days to several weeks to occur.

Figure 1 represents the network of who is notified by the NWS in the event of a flood watch and flood warning. This plan is designed to organize events beginning once the County Emergency Management Department has been notified of a flood warning by the NWS.

Figure 1
Networks of Contacts for Flood Emergencies



Source: National Weather Service, Hydrologic Services Manual, 1997.

2.3 Mapping and Levee Monitoring

The USACE monitors the structural integrity of the County's levees, dikes, and water control devices. Those which are maintained by their owners are eligible for emergency maintenance and repair assistance from the USACE. The USACE attempts to maintain accurate and updated information on each system in the County and provide this information to the County. It would be very useful if the County Emergency Management Department had an updated and current assessment of which levee or dike systems were at risk and which are covered by the USACE's emergency maintenance and repair program. The County Emergency Management Department could then include these areas as a top priority in the levee watch system (see the *Umatilla County Flood Mitigation Plan*) and as a first priority for levee monitoring during flood events.

The USACE Operations, Construction, and Readiness Division, Portland District, is currently in the process of updating their own Flood Response Plan (FRP). One section of this plan is entitled "Flooding Characteristics". The USACE recently asked local governments to supply information on the characteristics of flooding in their area to add to the FRP. An example of this is included in **Table 1** (the same table has been included in the *Umatilla County Flood Mitigation Plan*).

Table 1
Flood Character Information--Umatilla River at Umatilla

Stage Feet	Character of Flooding
23.0	Broad shelf of land on right bank of river opposite gage under water. Terrace 1/4 mile north of gage under water
26.2	Flood waters reach Water Street in Umatilla
27.0	Flood waters reach foundations of homes on Water Street
30.0	Flood waters reach floor of grain elevator
33.5	Flood waters reach intersection of 3rd and H Streets in Umatilla

Source: U.S. Army Corps of Engineers, Flood Forecast Points, 1997.

Detailed information of this type is needed for all flood-prone areas in the County where major flood damage is possible. This type of information will help to better prepare for emergencies and will provide the County Emergency Management Department with a means to forecast damage and plan damage prevention measures more effectively.

With these efforts comes the obvious need for expanded mapping of the floodplain and floodway. Detailed mapping is required to identify flood prone areas and sensitive sites and to direct damage prevention efforts. The National Flood Insurance Program's Flood Insurance Rate Maps (FIRMs) are the first source of information for details of flood prone areas. However, the FIRMs were developed over a decade ago and, in some cases, lack detail. Additional and/or improved mapping should be included as part of the County's emergency response efforts. Additionally, the geography of local waterways and floodplains can be difficult to understand for those who are not familiar with it. For example, in the case of a rescue operation that is not familiar with local geography, an accurate map would be of the utmost importance.

Detailed response maps should be produced for the following local characteristics, areas, and key resources:

- Facilities and key resources which are critical to the flood response effort or for use as shelters;
- stream and river gages;
- levees and diking systems, especially those at risk or degraded in the estimation of USACE engineers; and,
- especially flood prone areas or areas likely to experience recurring flood damage.

3. NOTIFICATION, PUBLIC INFORMATION, AND COORDINATION

Information from the NWS will trigger the County Emergency Management Department to begin contacting key agencies and groups. See **Section 2.2** for a description of NWS processes.

3.1 Notification and Contact Information

In the event of a flood, the NWS will contact the County Emergency Management Department, which will then be responsible for organization, notification, and coordination of response efforts and resources. In case of a severe weather warning, Dispatch is to call the County Emergency Management Director, Coordinator, or on-call staff volunteer. If Dispatch cannot reach any Emergency Management representative, then Dispatch is to call:

Oregon State Police Tribal Police State Highway Department County Road Department Red Cross

Depending upon the type, time, and location of the expected weather event, Dispatch may need to call:

School Districts	Police and Others
Athena-Weston	Athena Police
Echo	Hermiston Police
Helix	M-Freewater Police
Hermiston	Pilot Rock Police
M-F Unified	Stanfield Police
Pendleton	Umatilla Police
Pilot Rock	Weston Police
Stanfield	State. Emergency Mgmt.
Ukiah	McKay Dam
Umatilla	Bureau of Reclamation
Morrow County	Farm Service Agency

3.2 Communications and Public Information

Umatilla County's Public Information Officer is responsible for transferring information to the public and media in the event of a flood. Flood warnings can be disseminated by radio, television,

sirens, public address systems, telephone trees, and even door-to-door contact (French & Associates, 1997).

Perhaps the most important facet of public information dissemination is to communicate risks to County residents. As was mentioned earlier, simply because flood damage has never occurred in certain areas does not mean that it cannot occur. Landowners need to be made aware that changes in land uses upstream and downstream of their property have direct ramifications on flood elevations. Landowners need to know that they are potentially in a flood zone, or are relying on a levee or dike which may not be properly maintained.

In addition to understanding property and site specific risks, the public should be aware of what a predicted flood level means to their property. For example, the information included in **Table 1** describes where the flood waters will be on the landscape at certain stage levels. Landowners need to know what various stages will mean to them.

In the event of flash floods, the NWS has a very small window of opportunity to get a warning through the Emergency Management Department and to local officials. Again, it pays to have accurate maps and a knowledge of past flooding patterns in each area. In the case of longer developing floods, information and action decisions need to be based on the estimated time necessary for evacuation. When evacuation is not feasible, the affected public needs to know where they should go and what routes they should take to get there. In times when evacuation is necessary the public should be provided information on the following:

- Expected elevation of flood waters, and instruction on when to evacuate;
- where to obtain transportation assistance to evacuate;
- designated travel routes and departure times;
- status of road closures (what routes must be avoided due to probable inundation);
- what to take or not to take to shelters; and,
- location of mass care shelters and other assistance centers (FEMA, Guide for All-Hazard Emergency Operations Planning, 1996).

Additionally, residents need to be made aware that they can listen to NOAA weather reports or local television or radio and get flood information.

3.3 Coordination of Resources

Firstly, in times when floods are not imminent, the Emergency Management Department should organize emergency flood response training for County staff, interested landowners, and prospective volunteers. Meetings or workshops should include:

- orientation to the emergency flood response plan and introduction to various responsibilities;
- flood protection facilities and maintenance of them;

- sandbagging procedures;
- location of critical facilities and materials; and,
- areas where volunteers will be needed in the event of a flood.

In addition, drills and exercises could be held to ensure that key participants understand their roles and duties. The result of this “practice” will be a more coordinated effort implemented by people who have experience working together (French & Associates, 1997).

When the Emergency Management Department has substantial lead time to prepare for a flood, there are a number of important resources which could be collected. These include:

- maps that identify the likely areas to be inundated by flood waters;
- all flood stage information available and any information pertaining to on-the-ground impact of various flood stages;
- a labor force (or at least a verbal agreement from volunteers) willing to perform flood fighting techniques;
- coordinating with the National Weather Service on gage information;
- identification of mass care facilities and/or shelter space;
- identify expected shortfalls in personnel and equipment;
- be familiar with requirements for requesting Federal disaster assistance;
- identify flood prone areas and site resources and equipment in those areas;
- establish capacity to take good records of damage and flood characteristics; and
- develop list of key private contractors whose services may be needed.

Regarding volunteers, the Emergency Management Department, with help from the American Red Cross and other local agencies should assemble volunteers to do sandbagging and levee monitoring. For those volunteers involved with sandbagging work, direct supervision from trained staff should be a requirement. Those involved with levee monitoring should be outfitted to provide effective service. Gear provides should include:

- rain gear;
- safety vest;
- flashlight;
- radio for communications with Emergency Management Office;
- cell phone;
- detailed maps; and,
- detailed instructions on communications, duties, responsibilities, and flood fighting techniques.

4. INVOLVED ORGANIZATIONS AND RESPONSIBILITIES

4.1 Organizations and their Responsibilities

The following are listings of essential duties during a flood. Each of the key County departments are listed. These lists of duties are modified from FEMA sample documents.

Emergency Management Department Staff

- Activate and operate the Emergency Operations Center
- Develop and initiate mutual aid agreements.
- Identify local contractors who may provide backup support.
- Develop resource lists.
- Develop and execute emergency exercises.
- Act as primary contact and liaison for all County departments, agencies, and affected landowners.

County Department of Public Works

- Coordinate all emergency public works and road department functions.
- Maintain debris removal whenever possible, including removal from drains, culverts, and arterials.
- Maintain debris removal from public right of ways, and in and around those structures where public safety and/or health are endangered.
- Perform emergency repairs to utilities and/or infrastructure.
- Place barricades where necessary to ensure public safety.

County Sheriff's Office

- Act as lead agency on assistance with search and rescue, evacuation, and site area security.
- Provide direction and support for other response departments.
- Coordinate assistance in those areas pertaining to law enforcement.

911 Communications

- Establish and maintain emergency power.
- Maintain two-way radio capabilities.
- Maintain and support other emergency communications as determined by the Emergency Management Director, and the Sheriff..

American Red Cross/Salvation Army

- Establish county-shelters.
- Provide first-aid services.

4.2 Direction and Control

Routine operations will be handled by individual departmental standard operating procedures. During heightened emergency conditions requiring activation of the Emergency Operations Center (EOC), the department head of each of the departments will coordinate activities from the EOC. Each department will name one alternate to cover any shift change or the absence of the primary responder.

It may also be necessary to staff individual disaster site Command Posts (incident command) with supervisory personnel. The major activity at the site will dictate overall departmental responsibility for the incident command. Each department's ranking person at the incident command will establish and maintain communications, direct emergency operations, and coordinate all requests for assistance through agency representatives at the EOC. When on scene capabilities are exceeded, outside assistance will be requested and coordinated from this point.

5. FLOOD FIGHTING

5.1 Equipment and Materials

Most flood fighting equipment is located in the County warehouse near the court house in Pendleton out of the floodplain. The County supply of sandbags numbers at least 10,000 at all times. The County's sandbag supply is to only be used for County roads or infrastructure. Sandbags for private property are the responsibility of the landowner. Umatilla County as a whole does not have a problem with critical facilities being shut down during an emergency. All of the County's shelters and key materials are located in easy-to-reach areas which are not in the floodplain.

The County Department of Public Works will supply heavy equipment when needed to remove debris or clear obstructed roads or damaged infrastructure.

5.2 Emergency Surface Water Removal

There are many areas around Umatilla County that suffer from recurring flooding. Many of these areas result in "ponding" or standing water remaining on the surface for a substantial time period. In other cases, ditches overtop their banks and cause damage to structures or infrastructure. In either case, when these areas flood, it often creates a safety hazard through road or infrastructure obstruction or damage. Areas which experience recurring surface water problems should be mapped and prioritized for action. Pumping these areas in times of high water may lessen risks to public safety. Storm drains, culverts, and low lying properties should be evaluated for the feasibility of emergency surface water removal during flood events.

5.3 Personnel and Support

In Umatilla County, flood fighting personnel are made up primarily of volunteers. While there is not an organized group of volunteers year round, County officials believe that in the event of major flooding, volunteers will be readily available. Volunteers will be used as sand baggers, levee patrol, and for whatever additional tasks are necessary. Coordinators of volunteers will be Emergency Management Staff, staff from Oregon State University Extension, and members of the Umatilla County Chapter of the American Red Cross.

The Red Cross, along with the Salvation Army, is in charge of providing shelters in Umatilla County. The Red Cross is responsible for safety provisions and first aid facilities during and after flood response efforts.

Engineering support during and after a flood is another crucial aspect of flood fighting. The USACE will provide a presence to evaluate flood control structures and determine damages and maintenance alternatives. The Umatilla County Department of Public Works will play a very large role in assessing damages, determining road closures and evaluating infrastructure and transportation options. Additionally, agency representatives from natural resource agencies like the Natural Resource Conservation Service (NRCS) and the Farm Services Agency (FSA) can also provide technical assistance.

Levee monitoring during a flood event is an important aspect of flood fighting. During a flood emergency, monitoring of levee conditions is necessary so that, in the event of damage, emergency maintenance can be initiated quickly. Levee monitors can be from local diking and irrigation districts, the Water Resources District, natural resource agencies, or volunteers. All monitors should be trained (ideally by USACE staff) for what to look for in a failing levee, how and whom to report it to, and how to construct emergency stabilization techniques. The USACE gives seminars on sandbagging techniques and other methods of flood damage prevention. These seminars should be expanded to include levee monitoring.

6. POST FLOOD WORK AND INFORMATION

6.1 Health and Medical Information and Public Services

Following a flood, residents need to know that most flood water is contaminated. They should avoid handling flood damaged items if at all possible. Provisions should be made by the Emergency Management Department to keep people informed of the health and sanitary conditions caused by floods: flood waters may carry untreated sewage, dead animals, and hazardous materials. A water quality monitoring program should also be established following each major flood event.

A Damage Assessment Team will be created to inspect structures and damages and make recommendations. The Damage Assessment Team is composed of representatives of the Assessor's Office, Zoning Officials, the Building Codes Agency, American Red Cross, and other qualified individuals.

The County Health Department and the Oregon Health Division, Drinking Water Section, are responsible for monitoring drinking water, providing vaccinations if needed, and medicine and first aid. The County Sheriff is responsible for patrolling roads to prevent looting of evacuated areas, and Public Works is responsible for clearing County roads and cleaning up debris and garbage (French & Associates, 1997).

Structures which have been inundated by flood waters require inspections for structural soundness and safety. The Damage Assessment Team is charged with inspecting flood-damaged structures to detect damage caused by water pressure or debris flows. The Damage Assessment Team should:

- identify buildings and structures that may threaten public safety;
- designate those buildings which may be occupied; and,
- identify those buildings which are to be condemned (FEMA, Guide for All-Hazard Emergency Operations Planning, 1997).

Local utility companies and the County Department of Public Works are responsible for informing the public when electricity, water, gas, and telephone services are restored.

6.2 Levee Maintenance and Repair

Maintenance needs of levees and dikes will be determined by the USACE or other qualified entities. For those levee or dike owners who qualify for emergency maintenance and repair through Public Law 84-99, applications and permits will be reviewed by the USACE and work will be conducted based on need.

APPENDIX B
Funding Sources For
Flood Mitigation Projects

APPENDIX B

Funding Sources For Flood Mitigation Projects

This appendix includes the *Federal Resource Directory*, developed by the Oregon Emergency Management Department and the Federal Emergency Management Agency in 1996. The *Federal Resource Directory* includes a listing and description of many federal and Oregon funding sources which can be utilized for flood mitigation projects. Although it is not included in the document, CPW has also provided the County with a copy of the *MOM Resource Directory*. The *MOM Directory* is a cooperative effort of the Federal Emergency Management Agency and the National Parks Service and provides listings of over 300 mitigation resources. This resource is provided via computer diskette. Although there is a great deal of duplication of funding program information, both the *Federal Resource Directory* and the *MOM Directory* provide valuable listings and descriptions of available resources to help with mitigation projects.

Federal Resource Directory

State of Oregon

Developed by
Oregon Emergency Management (OEM)
and the
Federal Emergency Management Agency
(FEMA)

September 25, 1996

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INTRODUCTION

Purpose

Implementation of Hazard Mitigation is complex and projects may be eligible for funding from a wide number of sources. FEMA is however frequently asked to fund projects which would more likely be funded by other agencies. This directory is intended to facilitate identification of the appropriate funding agency. It is also intended to facilitate the packaging of Federal programs.

How to Use this Publication

Part I of this directory summarizes programs potentially available to implement mitigation assistance and long term recovery from nine (9) Federal agencies representing fourteen (14) programs. A standard format identifies the agencies, programs, and contacts.

Note: Contact information in this directory is only for the State of Oregon. Since the programs are common throughout the region, interested users are advised to telephone the number in the directory to request the name and number of the contact in their state.

Part II is a summary matrix correlating mitigation issues with the funding agencies and programs. It is based on the following key words:

- flood control
- flood forecasting
- floodplain management
- habitat restoration
- infrastructure
- mitigation
- parks and greenway
- rural development
- watershed management
- wetlands

Once the agency programs have been identified in Part II the user is advised to return to Part I in order to locate the appropriate contacts.

PART I AGENCY DIRECTORY

US DEPARTMENT OF AGRICULTURE

FARM SERVICES AGENCY
NATURAL RESOURCES CONSERVATION SERVICE
RURAL DEVELOPMENT
US FOREST SERVICE

FARM SERVICES AGENCY

Debt Cancellation Conservation Easements

Contact: Tony Meeuwsen, Credit Director
Address: PO Box 1300, Tualatin, OR 97062
Phone: (503) 692-6830 ext. 225
Intent: To reduce the debt of delinquent borrowers in exchange for conservation easements placed on environmentally sensitive real property. Easement secures FSA loans.
Funds: Varies by individual
Eligibility: Individual land owners
Key Word: Rural Development

HR-2667- Emergency Farm Loans

Contact: Tony Meeuwsen, Credit Director
Address: PO Box 1300, Tualatin, OR 97062
Phone: (503) 692-6830 ext. 225
Intent: To assist counties where physical damage or loss substantially affected farming, ranching, or agriculture.
Funds: Annual appropriation by Congress
Eligibility: Farmers, ranchers and agriculture operators
Key Word: Rural Development

NATURAL RESOURCES CONSERVATION SERVICE

Cooperative River Basin Program

Contact: Russell A. Collett, Leader, Water Resources Department
Address: 101 SW Main Street, Suite 1300, Portland, OR 97204
Phone: (503) 414-3204
Intent: To provide planning assistance for development of coordinated water and related land resource programs. Priority is to solve upstream rural community problems with wetland preservation. (This is a cooperative program with other USDA agencies).
Funds: Technical assistance to local units of state government
Eligibility: Federal, state, regional and local governments
Key Word: Watershed Management

Emergency Watershed Protection Program

Contact: Russell A. Collett, Leader, Water Resources Department
Address: 101 SW Main Street, Suite 1300, Portland, OR 97204
Phone: (503) 414-3204
Intent: To assist in relieving immediate threat from future flood events. This program is intended to assist local governments to reduce the threat to private property.
Funds: Varies
Eligibility: Local governments e.g. counties, cities etc.
Key Word: Watershed Management

NATURAL RESOURCES CONSERVATION SERVICE

Technical Assistance

Contact: Mon S. Yee, Transition Leader
Address: 101 SW Main Street, Suite 1300, Portland, OR 97204
Phone: (503) 414-3266
Intent: Assist property owners to reduce flood damage by conducting soil surveys, soil erosion controls, preparing conservation plans to maintain watershed health source, and habitat restoration.
Funds: Services are gratis
Eligibility: Non-restrictive addressed at the local level
Key Word: Watershed Management, Habitat Restoration

Watershed Protection and Flood Prevention (PL 566)

Contact: Russell A. Collett, Leader, Water Resources Department
Address: 101 SW Main Street, Suite 1300, Portland, OR 97204
Phone: (503) 414-3204
Intent: Construction and technical assistance for improvements to protect, develop, and utilize land and water resources in small watersheds under 250,000 acres.
Funds: Max. \$10 million, with 50% local match.
Eligibility: State and local governments planning watershed projects in rural communities.
Key Word: Watershed Management

NATURAL RESOURCES CONSERVATION SERVICE

Wetlands Reserve Program

Contact: Roy Carlson
Address: 101 SW Main Street, Suite 1300 Portland, OR 97204
Phone: (503) 414-3201
Intent: To restore converted wetlands that are marginal croplands.
Funds: 50-100% of restoration costs and value of appraised easement
Eligibility: Landowners
Key Word: Wetlands

RURAL DEVELOPMENT

Business and Industry Loan Guarantees

Contact: Bud Fischer, Business and Cooperative Programs Director
Address: 101 SW Main Street, Suite 1410, Portland, OR
97204-3222
Phone: (503) 414-3366
Intent: Improve economic and environmental conditions.
Funds: Up to \$50,000,000
Eligibility: Rural areas outside a city of 50,000 or more population and its immediate adjacent urbanized areas. Priority given to applications for projects in open country, rural communities, and towns of 25,000 population or less.
Key Word: Rural Development

Community Programs Guaranteed Loans

Contact: Jerry Sheridan, Rural Utilities Program Director
Address: 101 SW Main Street, Suite 1410, Portland, OR
97204-3222
Phone: (503) 414-3360
Intent: Provide guarantee loans made by eligible lenders for water and waste disposal facilities and other essential community facilities including Public Safety facilities, Health Care facilities, and Public Service facilities.
Funds: Based on eligibility. Interest rate based on median income of community.
Eligibility: Public and private non-profit organizations. Borrowers in rural areas can receive \$10,000 for water and waste disposal facilities or \$20,000 for other community facilities.
Key Word: Rural Development

RURAL DEVELOPMENT

Emergency and Community Water Grant Assistance

Contact: Jerry Sheridan, Rural Utilities Program Director
Address: 101 SW Main Street, Suite 1410, Portland, OR
97204-3222
Phone: (503) 414-3360
Intent: To assist rural communities which have a significant decline in quality or quantity of drinking water with construction of water system improvements.
Funds: Up to \$500,000 grants for new water facilities; \$75,000 for partial replacement.
Eligibility: Public bodies in rural communities with populations not in excess of 15,000.
Key Word: Rural Development

Section 502 - Direct Rural Housing Program

Contact: Stan Schmidt, Single Family Housing Program Director
Address: 101 SW Main Street, Suite 1410, Portland, OR
97204-3222
Phone: (503) 414-3336
Intent: To help eligible applicants purchase, build or repair homes located in rural areas.
Funds: State allocation for Fiscal Year 1996 is \$13,666,000
Eligibility: Very low income applicants. Applicants must be without adequate housing and unable to obtain credit elsewhere. Applicants must demonstrate repayment ability and have an acceptable credit history.
Key Word: Rural Development

RURAL DEVELOPMENT

Section 504 Rural Housing

Contact: Stan Schmidt, Single Family Housing Program Director
Address: 101 SW Main Street, Suite 1410, Portland, OR 97204-3222
Phone: (503) 414-3336
Intent: To help very low income owner occupants in rural areas to repair / improve their homes and to remove health and safety hazards.
Funds: Lifetime grant maximum \$7,500. Maximum loan assistance - \$20,000.
Eligibility: Very low income applicants. Grants are only for applicants 65 year-old or older with the ability for loan repayment.
Key Word: Rural Development

Water and Waste Water Disposal Loans and Grants

Contact: Jerry Sheridan, Rural Utilities Program Director
Address: 101 SW Main Street, Suite 1410, Portland, OR 97204-3222
Phone: (503) 414-3360
Intent: To construct, repair, improve, expand, or otherwise modify rural water supply and distribution facilities; repair, improve, expand, or otherwise modify waste connection pumping treatment or other disposal facilities.
Funds: Interest rate based on median income of community.
Eligibility: Municipalities, counties, special purpose districts, Indian tribes, and non-profit corporations. Priority to communities smaller than 5,500.
Key Word: Infrastructure

US FOREST SERVICE

Community Assistance Rural Development Program

Contact: Janet Enderson Tyler
Address: Pacific Northwest Region, PO Box 3623 Portland, OR
97208-3625
Phone: (503) 326 6212
Intent: Rural development projects
Funds: Grants and loans
Eligibility: Communities
Key Words: Rural Development

Flood Program

Contact: Bruce McCamman
Address: Pacific Northwest Region, PO Box 3623 Portland, OR
97208-3625
Phone: (503) 326-3360
Intent: To correct damage caused by the 1996 flood on lands
adminstrated by the Forest Service.
Funds:
Eligibility: Internal
Key Word: Watershed Management

US FOREST SERVICE

Jobs in the Woods

Contact: Dave Heller
Address: Pacific Northwest Region, PO Box 3623 Portland, OR
97208-3625
Phone: (503) 326-6637
Intent: To provide a training program for watershed restoration.
Funds: Public private match
Eligibility: Communities
Key Words: Watershed Management

Urban and Community Forestry Program

Contact: Ken Cushing, Community Programs
Address: Pacific Northwest Region, PO Box 3623 Portland, OR
97208-3625
Phone: (503) 326-5602
Intent: To provide technical assistance and grants
for strategic community projects to mitigate
future flood damage. Public/private projects are
encouraged.
Funds: Forest services provides financial to the state
forestry program
Eligibility: Oregon Department of Forestry are the coordinators
Key Word: Watershed Management

US FOREST SERVICE

Watershed Restoration Program

Contact: Dave Heller
Address: Pacific Northwest Region, PO Box 3623 Portland, OR
97208-3625
Phone: (503) 326-6637
Intent: Programs to study landslides in the Federal watersheds
and to identify highest priority projects through
watershed analysis.
Funds: Not determined
Eligibility:
Key Word: Watershed Management

ECONOMIC DEVELOPMENT ADMINISTRATION

Flood Recovery Program

Contact: Ann Berblinger, Economic Development Representative
Address: Economic Development Representative, 121 SE Salmon,
Room 244, Portland, OR 97204
Phone: (503) 326-7200
Intent: Economic development planning and implementation to
assist in long-term economic recovery. Specific programs
include planning and strategy grants; technical assistance
grants to address specific adjustment problems and to
hire disaster recovery specialists to provide operations
assistance; revolving loan fund grants to provide gap
financing to small businesses; and infrastructure grants
for critical public facilities.
Funds: Emergency appropriation under P.L. 104-134. The
omnibus consolidated recessions and appropriations Act
of 1996.
Eligibility: Disaster impacted. State, communities, cities, counties,
planning & development organizations
Key Word: Rural Development

NOAA, NATIONAL WEATHER SERVICE

Flood Forecasting / Preparedness

Contact: Dan Keeton, Warning Coordination Meteorologist
Address: 5241 NE 122nd Avenue, Portland, OR 97230-1089
Phone: (503) 326-2340 x223
Intent: Collection, interpretation, and dissemination of up to date hydrologic data including interpretation of magnitude and frequency of past and expected water flows.
Funds:
Eligibility:
Key Word: Flood forecasting

Northwest River Forecast Center

Contact: Lee Krough, Service Hydrologist
Address: 5241 NE 122nd Avenue, Portland, OR 97230-1089
Phone: (503) 326-7401
Intent: Provide hydrologic support and forecasts.
Funds:
Eligibility: Other National Weather offices, and Federal Agencies.
Key Word: Flood forecasting

US ARMY CORPS OF ENGINEERS

DISTRICT PLANNING OFFICE
EMERGENCY MANAGEMENT OFFICE

DISTRICT PLANNING OFFICE

Flood Control Works: 1986 Water Resources Development Act, Section 1135

Contact: Jerry Weaver, Program Manager
Address: North Pacific Division, US Army Corps of Engineers,
CENPD-ET-OE 220th NW 8th Ave. Portland, OR 97209
Phone: (503) 326-3826
Intent: To modify structures or operations of water resources projects built by USACE for purposes of habitat restoration or to restore historic wetlands in flood areas.
Funds: 75% of study with 25% non-federal match.
Eligibility: State and local governments which operate and maintain
Key Word: Habitat Restoration

Flood Control Works: Floodplain Management Services

Contact: Jerry Weaver, Program Manager
Address: North Pacific Division, US Army Corps of Engineers,
CENPD-ET-OE 220TH NW 8th Ave. Portland, OR 97209
Phone: (503) 326-3826
Intent: Flood plain management guidance including: assistance in development of maps, flood hazard reports, mitigation measures, and technical services.
Funds: All services provided free to those eligible, others are charged a fee.
Eligibility: State, regional or local governments, and other non-federal public agencies.
Key Word: Floodplain Management

DISTRICT PLANNING OFFICE

Flood Control Works: Planning Assistance Program

Contact: Tyrae Mahan, Program Manager
Address: North Pacific Division, US Army Corps of Engineers,
CENPD-ET-OE 220th NW 8th Ave. Portland, OR 97209
Phone: (503) 326-6435
Intent: To assist states in the preparation of plans for
development, utilization, and conservation of water and
related land resources.
Funds: Up to \$300,000 per state plus matching federal funds
Eligibility: States, Tribes, cities, and other non-federal entities.
Key Word: Floodplain Management

EMERGENCY MANAGEMENT OFFICE

Flood Control and Coastal Emergencies PL 84-99

Contact: Gordon Taxer, Natural Disaster Program Manager
Address: North Pacific Division, US Army Corps of Engineers,
CENPD-ET-OE 220th NW 8th Ave. Portland, OR 97209
Phone: (503) 326-6865
Intent: To assist in preventing damage to life and property
caused by flooding event by repairing damaged flood
control structures.
Funds: N/A
Eligibility: State and local authorities with public sponsorship.
Key Word: Flood Control

Flood Control Works: Channel Clearing for Flood Control

Contact: Gordon Taxer, Natural Disaster Program Manager
Address: North Pacific Division, US Army Corps of Engineers,
CENPD-ET-OE 220th NW 8th Ave. Portland, OR 97209
Phone: (503) 326-6865
Intent: Clear stream channels to increase channel flow capacity,
decrease flooding, and reduce damage from debris carried
by flood waters when economically justified and in the
federal interest.
Funds: Up to \$500,000 (federal share)
Eligibility: Non-federal organizations
Key Word: Flood Control

EMERGENCY MANAGEMENT OFFICE

Flood Control Works: Emergency Stream Bank and Shoreline Protection (Section 14)

Contact: Gordon Taxer, Natural Disaster Program Manager
Address: North Pacific Division, US Army Corps of Engineers,
CENPD-ET-OE, 220th NW 8th Ave. Portland, OR 97209
Phone: (503) 326-6865
Intent: Prevent erosion caused by flooding from damaging public and non-profit facilities when economically justified and in the federal interest.
Funds: Up to 75%, Max \$500,000 (federal share) for each project.
Eligibility: Public and non-profit organizations
Key Word: Flood Control

Flood Control Works: Flood Control Projects

Contact: Gordon Taxer, Natural Disaster Program Manager
Address: North Pacific Division, US Army Corps of Engineers,
CENPD-ET-OE 220th NW 8th Ave Portland, OR 97209
Phone: (503) 326-6865
Intent: To support cost effective flood control projects in the federal interest.
Funds: Small projects (section 205): up to \$5 million per project.
Eligibility: State and local governments
Key Word: Flood Control

ENVIRONMENTAL PROTECTION
AGENCY

ENVIRONMENTAL PROTECTION AGENCY

Clean Water Act - Section 319

Contact: Jack Gakstatter, Water Programs Coordinator
Address: 811 SW 6th Avenue, 3rd Floor, Portland, OR 97204
Phone: (503) 326- 3250
Intent: Funding watershed resource restoration activities and non-point source pollution pursuant to the Clean Water Act. State DEQ's are involved in project selection. Projects must meet state water quality standards.
Funds: \$1.3 million per year per state
Eligibility: Public and private lands. (Private require 40% match)
Key Word: Watershed Management

Environmental Education Grants

Contact: Sally Hanst, Environmental Education Division
Address: 1200 6th Avenue, Seattle, WA 98101
Phone: (206) 553-1207
Intent:
Funds:
Eligibility: Public and non profit organizations
Key Words: Watershed Management

ENVIRONMENTAL PROTECTION AGENCY

Point Source Pollution (104B(3)) Grant Program

Contact: Paula Von Haagen
Address: 1200 6th Avenue, Seattle, WA 98101
Phone: (206) 553-6977
Intent: All actions which can result in reduced pollution including creation of watershed councils etc.
Funds:
Eligibility:
Key Word: Watershed Management

Wetlands Protection - State Development Grants

Contact: Joel Shaich, Aquatic Resources Coordinator
Address: 812 SW 6th Avenue, 3rd Floor, Portland, OR 97204
Phone: (503) 326-2716
Intent: To support development and enhancement of State and Tribal wetland protection programs
Funds: N/A
Eligibility: State agencies and Tribes with wetland related programs.
Key Word: Wetlands

FEDERAL EMERGENCY MANAGEMENT AGENCY

FEDERAL EMERGENCY MANAGEMENT AGENCY

Hazard Mitigation Grant Program

Note: FEMA's Disaster Assistant Programs are managed by Oregon Emergency Management

Contact: Dennis Sigrist, State Hazard Mitigation Officer
Address: 775 Summer Street NE
Salem, Oregon 97310
Phone: (503) 986-0239
Intent: To fund projects which will result in long term impacts and produce repetitive benefits over time. FEMA can support State and local governments in their hazard mitigation planning efforts. The Hazard Mitigation Grant Program provides funding for mitigation measures to any eligible applicant, but the process is greatly enhanced for those applicants that have projects specified in post-disaster hazard mitigation plans.
Funds: 75% Federal 25% State/local share
Eligibility: State and Local governments, special Districts, certain private/nonprofit entities, Indian tribes entities
Key Word: Mitigation

FEDERAL EMERGENCY MANAGEMENT AGENCY

Public Assistance: Infrastructure Repair/ Reconstruction & Programs

Note: FEMA's Disaster Assistance programs are managed by Oregon Emergency Management

Contact: Joseph Murray, Public Assistance Officer
Address: 775 Summer Street NE
Salem, Oregon 97310
Phone: (206) 986-0238
Intent: The Post disaster Infrastructure (Public Assistance) Programs are driven by Damage Survey Reports (DSRs). The DSR is a scope of work describing damages and permanent repair/reconstruction cost estimates; they can include cost effective mitigation measures. The Public Assistance under Section 406 of the Stafford Act authorizes funding for the permanent repair, restoration or replacement of damaged facilities in conformance with existing codes, specifications and standards. Cost effective mitigation is also eligible. The PA program also funds emergency work under Section 403 and the clearing of debris from public property under Section 407.
Funds:
Eligibility: State and Local authorities
Key Word: Infrastructure

US DEPARTMENT OF HOUSING AND
URBAN DEVELOPMENT

COMMUNITY PLANNING AND DEVELOPMENT

COMMUNITY PLANNING AND DEVELOPMENT

Community Development Block Grant

Contact: John Bonham, Director Community Planning Department
Address: 400 SW 6th Avenue, Suite 700, Portland, OR 97204
Phone: (503) 326-7012
Intent: Provides funds to low and moderate income communities to improve housing conditions. Funds can be used for economic development as well as for relocation, acquisitions, rehabilitation, and elevation of structures.
Funds: Varies.
Eligibility: States and local governments which fund projects to help low and moderate income communities.
Key Word: Mitigation

Contact: Jane Jensen-Davis
Address: Oregon Economic Development
775 Summer Street Salem, Oregon 97310
Phone: (503) 986-0135

US DEPARTMENT OF INTERIOR

BUREAU OF LAND MANAGEMENT
NATIONAL PARKS SERVICE
US FISH AND WILDLIFE
US GEOLOGICAL SURVEY

BUREAU OF LAND MANAGEMENT

Flood Program

Contact: Bob Rheiner
Address: PO Box 2965 Portland, OR 97208
Phone: (503) 952-6015
Intent: To correct damage caused by the 1996 flood on lands administered by the Bureau of Land Management.
Funds:
Eligibility: Internal
Key Word: Mitigation

Watershed Restoration

Contact: Bob Rheiner
Address: PO Box 2965 Portland, OR 97208
Phone: (503) 952-6015
Intent: Identify the highest priority projects within a watershed through a watershed analysis.
Funds:
Eligibility: Public lands (17 million) administered by BLM
Key Word: Watershed Management

NATIONAL PARKS SERVICE

Rivers, Trails, and Conservation Assistance Program

Contact: Michael Linde, Team Leader
Address: CCSSO, 909 First Ave. Seattle, WA 98104
Phone: (206) 220-4122
Intent: To provide technical assistance for greenway planning and other waterfront recreation and restoration or preservation projects.
Funds: Cost share, limited funds.
Eligibility: Local and Community groups.
Key Words: Parks and Greenway

US FISH AND WILDLIFE SERVICE

Partners for Wildlife

Contact: Maureen Smith, Coordinator
Address: 2600 SE 98th Ave, Suite 100 Portland, OR 97266
Phone: (503) 231-6179
Intent: To restore and protect wildlife wetland riparian and other wildlife habitat. Provides cost-share payments, design, technical assistance and implementation of restoration and management projects.
Funds: Varies on project
Eligibility: Private landowners including land trusts.
Key Word: Habitat Restoration

Technical Assistance for Emergency Flood Projects

Contact: Ron Garst
Address: 2600 SE 98th Avenue, Suite 100 Portland, OR 97266
Phone: (503) 231-6179
Intent: To provide Technical Assistance in three main areas 1) Assist the three federal flood response agencies (FEMA, NRCS, and COE) or state regulator; or response agencies in their evaluations of site specific damages. 2) Work with longer term rehabilitation efforts of the federal response agencies that have existing restoration authorities (NRCS and COE), public land management agencies, and state resource agencies to identify and design actions that are both flood damage responses and minimize impacts to fish and wildlife. 3) Provide to the planning efforts of federal, state, county, and local interests that are seeking a systems analysis of flood damages and opportunities to implement system level fixes to natural resource floodplain issues and reduce the losses (damages) that would otherwise occur in future floods.
Funds: Supplemental Appropriation
Eligibility: Federal agencies (COE, NRCS), state natural resources agencies and watershed and other local groups.
Key Word: Watershed Management

US GEOLOGICAL SURVEY

Flood Frequency Studies

Contact: Dennis Lynch, District Chief
Address: 10615 SE Cherry Blossom Drive Portland, OR 97216
Phone: (503) 251-3200
Intent: Collection, interpretation, and dissemination of up to date hydrologic data. Including interpretation of magnitude and frequency of past and expected water flows.
Funds: Joint effort with the NRCS
Eligibility:
Key Word: Flood Forecasting

SMALL BUSINESS ADMINISTRATION

SMALL BUSINESS ADMINISTRATION

Disaster Loan Program for Homeowners and Businesses

Contact: Rick Green, Coordinator
Address: PO Box 13795 Sacramento, CA 95853-4795
Phone: (916) 566-7258
Intent: Provide for three types of disaster loans: Home disaster loans, Business physical disaster loans, Economic Injury Disaster Loans (EIDL)
Funds: Home loan up to \$200,000, Business loan up to \$1,500,000 and injury loan up to \$1,500,000. (SBA can provide 20% additional loan funds for selective mitigation)
Eligibility: Home or business owners who qualify
Key Word: Mitigation

US DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

FEDERAL HIGHWAY ADMINISTRATION

Emergency Relief Program

Contact: John Gernhauser, Field Operations Engineer
Address: 530 Center Street NE, Suite 100, Salem OR 97301
Phone: (503) 399-5749
Intent: Emergency or permanent repair of public roads and bridges as a result of a disaster.
Funds: 100% funding for emergency repair, 89-100% of permanent repair.
Eligibility: States, only applicable to roads and bridges designated as Federal Aid System roads and bridges and public roads and bridges on Federal land.
Key Word: Infrastructure

PART II

KEY ISSUE DIRECTORY

Key Issue Directory

INDEXING SUBJECT	AGENCY/DEPT.	SUBORDINATE ENTITY	PROGRAM
Flood Control	US Army Corps of Engineers	Emergency Management Office	Flood Control and Coastal Emergencies PL 84-99
Flood Control	US Army Corps of Engineers	Emergency Management Office	Flood Control Works: Channel Clearing for Flood Control
Flood Control	US Army Corps of Engineers	Emergency Management Office	Flood Control Works: Emergency Stream Bank and Shoreline Protection (Section 14)
Flood Control	US Army Corps of Engineers	Emergency Management Office	Flood Control Works: Flood Control Projects
Flood forecasting	US Department of Commerce	NOAA, National Weather Service	Flood Forecasting / Preparedness
Flood forecasting	US Department of Commerce	NOAA, National Weather Service	Northwest River Forecast Center
Flood forecasting	US Department of Interior	US Geological Survey	Flood Frequency Studies
Floodplain Management	US Army Corps of Engineers	District Planning Office	Flood Control Works: Planning Assistance Program
Floodplain Management	US Army Corps of Engineers	District Planning Office	Flood Control Works: Floodplain Management Services
Habitat Restoration	US Army Corps of Engineers	District Planning Office	Flood Control Works: 1986 Water Resources Development Act, Section 1135
Habitat Restoration	US Department of Interior	US Fish and Wildlife Service	Partners for Wildlife
Infrastructure	US Department of Agriculture	Rural Development	Water and Waste Water Disposal Loans and Grants
Infrastructure	US Department of Transportation	Federal Highway Administration	Emergency Relief Program

Key Issue Directory

INDEXING SUBJECT	AGENCY/DEPT.	SUBORDINATE ENTITY	PROGRAM
Infrastructure	Federal Emergency Management Agency	Public Assistance	Infrastructure Repair/ Reconstruction & Mitigation Programs
Mitigation	Federal Emergency Management Agency	Mitigation Division	Hazard Mitigation Grant Program
Mitigation	US Department of Housing and Urban Development	Community Planning and Development	Community Development Block Grant
Mitigation	US Department of Interior	Bureau of Land Management	Flood Program
Mitigation	Small Business Administration		Disaster Loan Program for Homeowners and Businesses
Parks and Greenway	US Department of Interior	National Parks Service	Rivers, Trails, and Conservation Assistance Program
Rural Development	US Department of Agriculture	Farm Services Agency	Debt Cancellation Conservation Easements
Rural Development	US Department of Agriculture	Farm Services Agency	HR-2667- Emergency Farm Loans
Rural Development	US Department of Agriculture	Rural Development	Business and Industry Loan Guarantees
Rural Development	US Department of Agriculture	Rural Development	Community Programs Guaranteed Loans
Rural Development	US Department of Agriculture	Rural Development	Emergency and Community Water Grant Assistance
Rural Development	US Department of Agriculture	Rural Development	Section 502 - Direct Rural Housing Program
Rural Development	US Department of Agriculture	Rural Development	Section 504 Rural Housing

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Rural Development	US Department of Agriculture	US Forest Service	Community Assistance Rural Development Program
Rural Development	US Department of Commerce	Economic Development Administration	Flood Recovery Program
Watershed Management	US Department of Agriculture	Natural Resources Conservation Service	Cooperative River Basin Program
Watershed Management	US Department of Agriculture	Natural Resources Conservation Service	Emergency Watershed Protection Program
Watershed Management	US Department of Agriculture	Natural Resources Conservation Service	Watershed Protection and Flood Prevention (PL 566)
Watershed Management	US Department of Agriculture	US Forest Service	Flood Program
Watershed Management	US Department of Agriculture	US Forest Service	Jobs in the Woods
Watershed Management	US Department of Agriculture	US Forest Service	Urban and Community Forestry Program
Watershed Management	US Department of Agriculture	US Forest Service	Watershed Restoration Program
Watershed Management	Environmental Protection Agency		Clean Water Act - Section 319
Watershed Management	Environmental Protection Agency		Environmental Education Grants
Watershed Management	Environmental Protection Agency		Point Source Pollution (104B(3))
Watershed Management	US Department of Interior	Bureau of Land Management	Watershed Restoration

Key Issue Directory

INDEXING SUBJECT	AGENCY/DEPT.	SUBORDINATE ENTITY	PROGRAM
Watershed Management	US Department of Interior	US Fish and Wildlife Service	Technical Assistance for Emergency Flood Projects
Watershed Management	US Department of Agriculture	Natural Resources Conservation Service	Technical Assistance
Wetlands	Environmental Protection Agency		Wetlands Protection - State Development Grants
Wetlands	US Department of Agriculture	Natural Resources Conservation Service	Wetlands Reserve Program

APPENDIX C
Stanfield: A Case Study
In Flood Mitigation Efforts

APPENDIX C

Stanfield: A Case Study In Flood Mitigation Efforts¹

Introduction

The City of Stanfield provides an interesting case study in flood mitigation. Stanfield is a town of 1,755 located along the Umatilla River in west Umatilla County. The residents and city leaders of Stanfield have been involved for more than 30 years in flood planning and mitigation efforts. This brief case study of Stanfield is provided as a model for other municipalities and jurisdictions in Umatilla County interested in adopting proactive and preventative flood mitigation planning efforts.

Background

Stanfield is located at the mouth of Stage Gulch, one of the major tributaries of the Umatilla River. The Stage Gulch Drainage Basin encompasses 104 square miles and includes two irrigation canals, Furnish Ditch and Cold Springs Feed Canal. Stage Gulch has flooded many times over the past century, with particularly damaging flood events occurring in 1964 and 1979. Prior to the 1964 flood, siltation, erosion, and vegetation growth had decreased Stage Gulch's channel capacity to 350 cubic feet/second (cfs). Emergency efforts after the flood increased the channel capacity to 600 cfs, which represents the capacity for approximately a 20 year flood event (USACE, 1995).

Many studies were conducted from 1970-1985 to determine if improvements to Stage Gulch were feasible. A 1973 study by the United States Army Corps of Engineers (USACE) recommended a channel be built to carry 1260 cfs (enough to contain a 100-year flood event), but the proposal was not found to be cost-effective. A 1980 study proposed constructing a channel to meet the 20 year flood event (around 600-700 cfs), and this, too, was not economically feasible. In 1985, the United States Bureau of Reclamation looked at ways to reduce flooding from the two canals but these were also not worthwhile (USACE, 1995).

In 1984, detailed mapping of the floodplain by the USACE showed that in the case of a 100 year flood, much of downtown Stanfield would be 4-6 feet underwater. This served as a wake-up call for residents and city leaders, who enacted vigorous floodplain planning and mitigation efforts as a result. Knowing that major structural improvements were expensive, the City adopted a number of effective tactics.

¹ All of the information in this appendix has been summarized from the documents listed following the text. Please see these documents for more information on Stanfield.

Flood mitigation planning and action in Stanfield

Following the USACE's mapping of the floodplain, the City set up two flood hazard overlay zones which delineated the 100 year floodplain and floodway. The City also declared parts of the floodplain as permanent open space and much of the floodway, removed a trailer park in the floodplain, and developed a ditch maintenance plan. The standards on open space exceeded those established by the National Flood Insurance Program (NFIP). Additionally, the City passed the following flood-related regulations and/or restrictions:

- When key bridges are repaired or replaced, they must be redesigned to accommodate the 100 year flood flow;
- Landfill may be placed on a maximum of 35 percent of the site area;
- Permits are required for fences, free-standing walls, dikes, and hedges;
- Principal new structures are approved only after a public hearing and mailed notice to neighbors, FEMA, and the state floodplain coordinator;
- Backflow valves are required on new water and sewer installations;
- Wet floodproofing is required for small accessory buildings in lieu of elevation; and,
- Mechanical systems must be installed above the 100 year flood elevation (Randolph, 1989).

In addition, a task force was established made up of watershed residents and representatives of the Soil Conservation Service's (now NRCS) Small Watershed Program. This task force created a conservation and flood control effort which ensured a watershed wide perspective (Randolph, 1989). The Soil and Water Conservation District became the lead agency in implementing the actions recommended by the task force. These actions included watershed treatment work as well as flood control efforts.

Non-structural watershed treatment mitigation practices have proven to be an effective method of sediment and flood control for Stanfield. Soil conservation practices like agricultural tillage was employed on the property of 10 landowners in the area, encompassing 10,488 acres (USACE, 1995). It is estimated that these practices reduced 10 year peak flood flows by 14 percent. Additionally, in 1987 6,578 acres were held in the NRCS' Conservation Reserve Program (USACE, 1995).

To add to their comprehensive flood planning efforts, in 1991 the City of Stanfield developed a flood warning and response plan, including broadcasts of weather reports,

ditch monitoring, flow monitoring, evacuation procedures, and selection of shelters. Six years later, Umatilla County is duplicating Stanfield's efforts by producing an emergency flood response plan of their own.

What's happening now?

In 1990, the firm of Anderson Perry completed an implementation plan recommending improvements to Stage Gulch. These improvements will provide protection from a 100 year flood event. The plan calls for an 8 year implementation schedule, consisting of 6 phases of construction. Plans include widening the existing channel, excavating a new channel, replacing and improving culverts, removing bridges, relocating irrigation pipelines, water lines, and sewer lines (Anderson Perry, 1990). Continued watershed treatment is also recommended.

Currently, the City of Stanfield is in the process of finding funding to implement their improvement plan. The USACE is also looking at possible funding options for implementing the Stage Gulch improvements.

Conclusions

The residents of Stanfield learned of their huge flood risk in 1984 following the USACE's mapping of their floodplain. Since that time, the City has developed strict standards for development, enforced open space planning, adopted regulations which are more restrictive than the National Flood Insurance Program's, written a long term flood mitigation and improvement plan, and adopted an emergency response plan. Also, since the floodplain ordinances were adopted, 8 of Stanfield's 10 bridges have either been replaced to higher flood standards, abandoned, or removed (USACE, 1995). The residents of Stanfield have a history of being involved in volunteer efforts to mitigate flood risks and pitch in to protect their neighbors' land. In addition, continued focus on flood risks has instilled a high level of awareness among local residents as to flood dangers. The City has always looked at a balance of flood mitigation options, including structural measures and watershed treatment measures such as plantings and conservation. In short, Stanfield provides an excellent model of how to proactively plan for flood mitigation.

References

All of the information presented in this Appendix was summarized from the following documents:

Anderson Perry & Associates. 1990. *City of Stanfield Oregon, Stage Gulch Ditch Improvements Implementation Plan*. La Grande, OR.

Randolph, Steve. 1989. *Stanfield: A Case for Cooperation or, Organizing a Small Town to Fight an Extreme Flood Hazard*. Umatilla County Planning Department, Pendleton, OR.

United States Army Corps of Engineers. 1995. *Stanfield Flood Protection Plan*. Portland District. Portland, OR.