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Floods and ensuing damage have always been a problem for man. Initial reaction to the frequent destruction was to avoid siting permanent domiciles on flood-prone lands. As a result of increasing population and pressure for development, flood control structures were built. Instead of reducing flood losses, however, flood control projects encouraged development of more hazardous zones by giving a false sense of security to flood plain occupants. In the 1960's Congress began to evaluate alternatives to flood control and abatement projects in an attempt to retard and eventually eliminate further flood losses. In 1968 it sought to resolve the problems of aid to flood victims and reduce the increasing losses by enacting the National Flood Insurance Act (NFIA). If implemented the Act will furnish assistance to flood victims through insurance policies and

reduce further losses by establishing a mandatory set of minimum standards for land use on flood plains.

This study analyzes the problems and issues of implementing the NFIA in Oregon between enactment of the law in 1968 and June 1972. The study reveals that extensive revisions of local ordinances will be necessary if participating governments are to meet the minimum standards of the Federal Insurance Administration. The four standards most commonly omitted in the regulations promulgated by local governments are those pertaining to: fill in the floodway, raising utilities above the 100-year flood level, providing adequate drainage, and considering neighboring flood plain programs. A sample of flood plain occupants suggests that the availability of flood insurance and the potential flood hazard of an area are not widely known. In sum, the implementation of the NFIA proceeded slowly between enactment in 1968 and the summer of 1972. Even where it was accepted by local governments, the ordinance would not restrict flood plain use to the degree Congress intended.

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in Oregon

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TABLE OF CONTENTS

<u>Chapter</u>	<u>Page</u>
I. FLOOD PLAIN OCCUPANCE	1
Introduction	1
Flood Plain Use	2
Methods of Reducing Flood Losses	10
The Study	16
II. THE NATIONAL FLOOD INSURANCE ACT OF 1968, AS AMENDED	18
History of Flood Insurance	18
Legislative History of the National Flood Insurance Act	20
Amendments to the Act	26
The National Flood Insurance Act	33
Summary	38
III. THE STUDY AREAS	40
Introduction	40
Flood and Flood Plain Use in the Study Areas	41
Flood Plain Use	43
River Basins Containing Study Areas	46
The Willamette Basin	46
The Mid-Coast Basin	52
The Umpqua Basin	55
The Rogue River Basin	59
The South Coast Basin	62
The Umatilla River Basin	65
The John Day River Basin	69
Summary	72
IV. IMPLEMENTATION OF THE NATIONAL FLOOD INSURANCE ACT OF 1968, AS AMENDED	75
Introduction	75
Flood Plain Regulation	75
Federal Influence on Flood Plain Regulation	77
State Influence on Flood Plain Regulation	80
Local Flood Plain Regulation	84
Zoning	86
Subdivision Regulation	87

<u>Chapter</u>	<u>Page</u>
Building Codes	88
Miscellaneous Ordinances	89
Background for Flood Plain Management in the	
Study Areas	90
The Power to Zone	90
Cities	91
Counties	93
Recognition of Flood Plains as Unique	96
Flood Plain Regulation	98
Flood Plain Regulation in Oregon Before	
Regulation	100
Minimum Standards Applied by the Federal	
Insurance Administration	102
The Study Areas in Oregon	106
Clackamas County	106
Curry County	111
Douglas County	111
Grant County	115
Jackson County	117
Josephine County	120
Lane County	121
Multnomah County	125
Polk County	128
Umatilla County	128
Gladstone	130
John Day	134
Milwaukie	134
Myrtle Creek	136
Pendleton	137
Portland	139
Roseburg	141
Salem	143
Springfield	143
Winston	145
Summary	146
Impact of the Insurance Program on State	
Level Organization	147
Impact of the Insurance Program at the Local	
Level Organization	150

<u>Chapter</u>	<u>Page</u>
V. A SURVEY OF FLOOD PLAIN OCCUPANTS	153
Introduction	153
The Sample	153
The Questionnaire	155
Evaluation of the Results of the Questionnaire	157
Summary	168
VI. CONCLUSIONS	170
WORKING DEFINITIONS	178
ABBREVIATIONS	183
BIBLIOGRAPHY	185
APPENDIX A	
Suggested Resolutions to be Used When Applying for Flood Insurance	199
APPENDIX B	
Resolution No. <u>70-77</u> Springfield, Oregon	201
APPENDIX C	
Clackamas County Zoning Ordinance Amendment	203
APPENDIX D	
Interim Flood Plain Zoned Area Ordinance Douglas County	219
APPENDIX E	
Flood Plain Combining Zone - FP - Grant County	225
APPENDIX F	
Proposed Zoning Ordinance Flood Plain Combining District FP Jackson County	227
APPENDIX G	
Floodway District FW Josephine County	232
APPENDIX H	
Lane County Special Permit Area	233

	<u>Page</u>
APPENDIX I Flood Plain Overlay Zone - Marion County	236
APPENDIX J Flood Hazard District - Multnomah County	241
APPENDIX K F-H Flood Hazard Subdistrict Umatilla County	254
APPENDIX L Flood Hazard Combining Zone (FH) Ordinance Gladstone	259
APPENDIX M Ordinance No. 1262 Milwaukie	261
APPENDIX N Ordinance No. 2648 Ordinance Establishing Flood Hazard Areas; Providing for Construction Limitations; Establishing Permit and Variance Procedures; and Declaring an Emergency Pendleton	267
APPENDIX O Ordinance No. 134486 Portland	277
APPENDIX P Flood Plain Zone FP Ordinance Roseburg	279
APPENDIX Q FP - Flood Plain Section Springfield	281
APPENDIX R Section 4.410 Flood Plain Development Winston	283
APPENDIX S Questionnaire to Flood Plain Occupants in Lane County	289

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1.	Estimate of flood damage in U. S.	6
2.	Legislative history of flood insurance.	19
3.	Division of flood plain based on FIA recommendations.	37
4.	Geomorphic division of Oregon.	42
5.	Oregon drainage basins.	48
6.	Flood-prone areas - Willamette Basin.	49
7.	Flood-prone areas - Mid-Coast Basin.	53
8.	Flood-prone areas - Umpqua Basin.	57
9.	Flood-prone areas - Rogue River Basin.	60
10.	Flood-prone areas - South Coast Basin.	64
11.	Flood-prone areas - Umatilla River Basin	66
12.	Flood-prone areas - John Day Basin.	70

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Unincorporated and incorporated areas in Oregon eligible for flood insurance as of June 29, 1972.	3
2. Estimates of flood damages in U. S.	7
3. Estimated flood damage losses in the Willamette and Sandy River basins.	10
4. Proposed increased coverage under 1973 Administration bill.	32
5. Summary of flooding characteristics and flood damages for the study areas.	73
6. Dates of initial zoning, subdivision regulation, and building codes in the study areas.	92
7. County flood plain ordinances in effect April, 1973 - compared to the final standards of the FIA.	109
8. City flood plain ordinances in effect April 1973 - compared to the final standards of the FIA.	132
9. Frequency of Q10 on Q11 when Q3 is yes.	158
10. Frequency of Q4, Q10, and Q11 on Q7, Q12, and Q14.	160
11. Frequency of Question 12 on Question 9.	163
12. Frequency of Question 10 on Question 16.	163
13. Frequency of Question 4 on Questions 8 and 16.	165
14. Frequency of Question 11 on Question 13.	165
15. Frequency of Question 16 on Question 17 flood. Frequency of Question 16 on Question 17 flood relief.	166
16. Number and value of flood insurance policies sold in the study area as of June 1973.	167

THE PROBLEMS AND ISSUES OF IMPLEMENTING THE NATIONAL FLOOD INSURANCE ACT IN OREGON

I. FLOOD PLAIN OCCUPANCE

Introduction

Streams and rivers in Oregon have always flooded, but it is only recently that this has become important. With the first permanent European settlers in Oregon and their associated agricultural, commercial, and residential areas inundation took on new dimensions, as losses to the individual and the state economy rose. These losses have continued to increase in spite of millions of dollars spent on flood prevention structures. In 1968, a national flood insurance plan was enacted by Congress, as another federal disaster assistance program. The National Flood Insurance Act of 1968 (NFIA) was considerably different from other disaster relief policies; it required land use regulations in flood prone areas. This was the first assistance bill of Congress that included prerequisites designed to prevent and reduce flood losses by any means other than engineering techniques.

The study's purposes are to assess the issues and problems of implementing the NFIA in Oregon. This research seeks to determine the impact of land use regulations as required by Congress and the

attitude of flood plain occupants towards the insurance.

The study was limited to the twenty-one areas in Oregon eligible for flood insurance as of June 29, 1972 (Table 1). This date was selected because indepth research of the individual cities and counties was started in July 1972. Review of state planning and zoning legislation was limited to those acts in effect as of June 29, 1972. These were the laws by which the study areas initiated flood plain management programs. The only exceptions were brief discussions of SB100 of the 1973 Legislative Assembly, a land use planning bill which has far reaching land use controls, and SB300 of the 1973 Legislature, a bill authorizing the State Water Resources Board to delineate flood plains and floodways throughout Oregon. The Survey of the attitude of flood plain occupants, toward flood insurance, was restricted to Lane County. In July 1972, Federal Insurance Administration maps showing the 100-year flood plain were available for only Lane County and the City of Springfield. The flood-prone areas of Springfield were unoccupied agricultural lands. These areas were eliminated from the survey because they were unoccupied. The survey concentrated on a subdivision north of Eugene.

Flood Plain Use

Since early civilizations, people have clustered on the flood plain areas associated with rivers. Most notable of past riverine

Table 1. Unincorporated and incorporated areas in Oregon eligible for flood insurance as of June 29, 1972.

Unincorporated Areas	Incorporated Areas
Clackamas County	Gladstone
Curry County	John Day
Douglas County	Milwaukie
Grant County	Myrtle Creek
Jackson County (R)	Pendleton
Josephine County (R)	Portland
Lane County (R)	Roseburg
Marion County	Salem
Multnomah County	Springfield (R)
Polk County	Winston
Umatilla County	

R designates areas on the Regular Insurance Program.

Source: State Farm Fire and Casualty Insurance, Northwest Office, Salem, Oregon.

societies were the Egyptians along the Nile River, the Mesopotamians of the Euphrates-Tigris Valley, the inhabitants of the Indus River Valley of northwestern India, and the cultures of the Hwang Ho Valley of northern China. These rivers provided alluvium for the agriculture based economies and acted as a transportation link among districts. The flat flood plains were ideal for cultivation, irrigation, construction of buildings, and transportation facilities.

Development of these and other flood plains continued as populations increased, in spite of the possibilities of destruction of property and loss of life by floods. During a flood in 1642, an estimated 300,000 Chinese died; in 1939 ten million drowned, ultimately starved, or lost their homes due to the Hwang Ho floods (Russell, 1956, p. 460). In Europe civilization flourished in many river valleys, including among others, the Po River and Delta, and on the lowlands of the Volga, Rhine, Rhone, and Danube Rivers. Floods also took a toll in the Netherlands. For example the 1953 floods drowned about 1800 people (Russell, 1956, p. 460). In the United States, the Mississippi Valley floods in 1913, 1939, and 1951 claimed 732 lives, 250 lives, and 51 lives, respectively, and property losses were in the billions (Russell, 1956, p. 460).

Use of flood-prone areas increased in the United States when one cultural system was displaced by another. Flood plain use progressed from scattered, semi-permanent American Indian

villages and fields to the sparsely populated, colonial agrarian society. Pre-European Americans had adapted to flood danger by constructing their villages on higher ground adjacent to flood plains or by selectively settling in the flood plains on mounds or on a seasonal basis. In these ways they were able to farm alluvial lands, while avoiding occupancy of the flood plains during the peak flood months, and were able to live with all but the most devastating and unexpected floods. The colonial agrarian society was the first American occupancy system to establish individual, distinct property boundaries and permanent settlements on the flood plains. Seasonal shifting of home and field was impossible, because of the European system of ownership. As a result, during this period flood losses in America began to increase. Continued economic development and population growth, resulted in the concentration of urban and industrial land use on the flood plains. However, the basic uses of rivers and flood plains have remained the same: waste disposal, transportation, water supply, irrigation, including flat land for building, agricultural uses, and urban development. With this greater demand on rivers and associated lands flood damages have continued to rise (Figure 1 and Table 2). Figure 1 and Table 2 show the mean annual total flood damage losses in the United States.

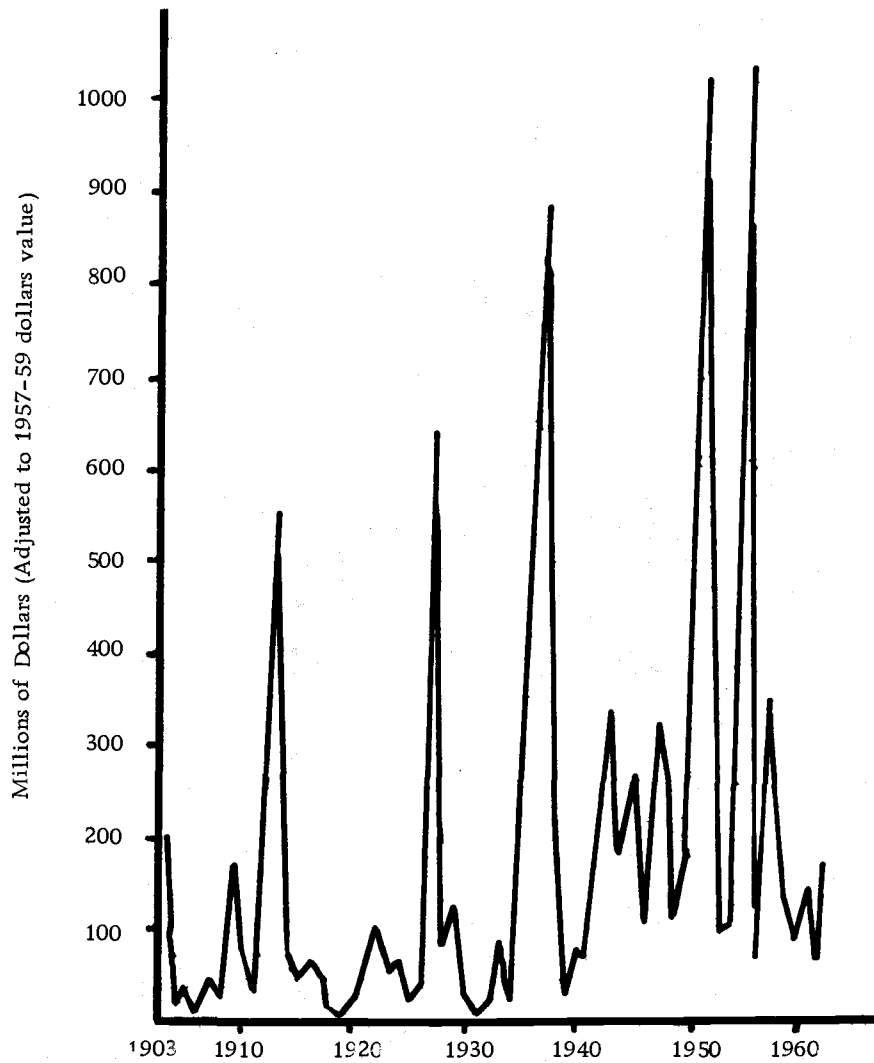


Figure 1. Estimates of Flood Damages in U.S. (adopted from H. Doc. 465, 1966).

Table 2. Estimates of Flood Damages in U. S.

Property Loss in millions of dollars due to floods	
Year	Loss
1969	788
1966	117
1967	375
1968	339
1969	901
1970	157

Source: Climatological Data, National Summary, No. 13, 1972.

Damage caused by flooding, along a particular reach of river, is directly related to the type of development along that stretch of flood plain. The cases of intensive land use, manufacturing and urbanization, along with open space uses, agriculture and greenways, best illustrate the extreme degrees of damage possible. In the former are concentrated expensive machinery and buildings while in the latter are crops and less vulnerable objects. There are 5000 to 7000 communities in the United States which are subject to some flooding (Berstein, 1972a). Communities focus development in a limited area. As a result only small areas are inundated, but property losses are high. Open space uses, on the other hand, are "relatively harmonious with the characteristics of these riverine areas" (Muckleston, 1973), p. 2). Such land uses do not force people to live

in hazardous areas; consequently when flooding does occur, fewer people and less property are affected.

Oregon is no exception to the general rule of increased flood plain development. Only the time sequence is somewhat delayed from that of much of the rest of the country. According to a knowledgeable observer¹ (Ingram, 1964, pp. 82-83), marked encroachment on the Willamette River flood plain began in the 1930's, when "people started clearing lands and building homes and other structures in the flood plain in an attempt to wrest it away from the rivers in defiance of nature." The most common form of flood plain encroachment is subdivision development, which increased during and after World War II. It is primarily this use which concentrates people and property on a limited space, so when there is a flood, damages are multiplied and monetary losses rise (Table 2). A good example is the 1964-1965 floods.

Late fall weather in 1964 was typical of the Willamette Valley climate for that time of year. Heavy, continuous precipitation began the last two weeks in November and the rate increased slightly in the first two weeks of December, saturating the ground. On December 14, the normal cycle began to change. This was caused

¹Fred C. Ingram was born and raised in the Willamette Valley and is a former Chief of the Project Planning Branch in the Portland District, U. S. Army, Corps of Engineers.

by a dry continental air mass of below freezing temperatures. The already saturated ground froze. Four days later, a moist Pacific maritime air mass moved eastward, overriding the weakening cold air mass, and creating record snowfalls in many locations in Oregon. By December 21, the warm air had replaced the cold air mass and an unusually heavy rain began. In Salem, the 32° F isotherm rose to 10,000 feet as surface temperatures reached the high 50's. During the last week of 1964 all the variables were active for the second worst flooding in Oregon history: the ground was saturated and frozen, snow was on the ground, and there was a heavy, warm rain.

The Willamette River rose to near record stages, being exceeded only by the legendary flood of 1861. Total damages in the Valley and its tributaries set a record of \$70,700,000 as water covered approximately 211,500 acres (U.S. Army, Corps of Engineers, 1969, p. 11-7). Keizer, north of Salem, experienced some of the worst flooding along the Willamette River. At the time of flood, Keizer was a subdivision of over 300 homes whose average value was \$26,000. The flood destroyed three homes. Mean water level was twelve inches in other flooded homes, causing average damages of \$1500 to land and improvements. Downstream from Keizer, between Willamette Falls and Portland, the first floor of paper mills, the Woodbury Industrial Park and numerous homes

were inundated. Damage in this reach of the River was in the millions of dollars.

Table 3. Estimated flood damage losses in the Willamette and Sandy River Basins.

Flood	Estimated Damages
1861	over \$1 million
1890	several million
1927	\$ 4, 161, 000
1943	\$34, 000, 000
1945	\$24, 600, 000
1964	\$70, 749, 000

Damages considers development and prices at the time of flood.

Source: Flood Control, Appendix VII, Columbia-North Pacific Regional Comprehensive Framework Study, 1971.

Methods of Reducing Flood Losses

There are three basic approaches to reducing these flood losses: corrective measures, preventive measures, and a combination of the two. Corrective measures, which attempt to keep the water away from man by controlling the spatial and temporal distribution of water, include dams, reservoirs, levees, walls, channel improvements, or watershed treatment, as well as evacuation, flood forecasting, flood-proofing, and urban redevelopment (TVA, 1962). The Corps of Engineers and the Soil Conservation Service are the primary national flood control agencies. The Corps'

projects are designed as flood protection works, for example, dams, levees, and channel improvements. It is the objective of these projects to control a flood once it has formed. They are most effectively utilized to protect selected flood-prone areas (U. S. Congress, House: 1966, p. 92). The Soil Conservation Service sponsors flood abatement projects which attempt to prevent floods before they form. The projects, such as reforestation, small dams, and erosion prevention programs, are limited to watersheds of less than 250,000 acres (Sewell, 1969, p. 439). States, or lower levels of government, no longer act independently of federal programs. Thus, the Corps and the Soil Conservation Service are the main flood control agencies in the country employing corrective measures.

Other corrective measures, such as evacuation, flood forecasting, flood-proofing, and urban redevelopment, are the responsibility of various levels of government and the general public. The armed services assist in evacuation, as do local boat clubs and the Coast Guard Auxiliary. Flood forecasting, the responsibility of the Weather Service using Corps and Geological Survey data, is provided to local governments and the news media for broadcasting. Flood-proofing is the responsibility of the private citizen. Urban redevelopment is a partly federal and local funded program.

Corrective means can reduce flood losses (U. S. Army, 1966, p. 24-26), however the effectiveness of these methods is limited to

specific reaches of a waterway and only to a certain flood stage. People gain a false sense of security from structures and may develop additional lands that are even more flood-prone (U.S. Congress, House. 1966, p. 8). The basic disadvantage of the corrective approach is that it treats the problem of flooding, rather than the cause of flood losses: constantly expanding flood plain development.

Preventive measures, on the other hand, keep man away from the water by directing and controlling flood plain occupancy. Preventive measures are normally considered to be flood plain regulation. They include zoning ordinances and subdivision regulations, and other measures, such as development policies, preservation or acquisition of open space, tax adjustment, and warning signs (TVA, 1962). The conscious manipulation of settlement patterns, by governmental agencies to reduce flood losses, is a relatively new concept (Solberg, 1971, p. 33). White (1942), Murphy (1958), and the Water Resources Council (WRC, 1972) have traced the use of preventive measures in the United States. According to Murphy, Pennsylvania was the first state to establish some type of flood plain management regulations in 1913. The law, enacted as a result of the Austin Dam failure in 1911, prohibits channel encroachment. In 1940, Los Angeles County became the first local level of government to institute a flood plain zoning ordinance (Murphy, 1958, p. 56

and p. 82). However, widespread interest in flood plain zoning did not come until the 1950's.

As of June 1972, Oregon had not established a statewide flood plain management program. The first attempt at requiring local zoning was Senate Bill 10 (Oregon Revised Statutes 215.505) of the regular Oregon Legislative Session in 1969. The law requires "each city and county to prepare a comprehensive plan and a zoning ordinance." (Logan, 1973). One of the law's goals is (Section 3, subsection 5) "To protect life and property in areas subject to floods." However, it made no special provisions for flood plain designations.²

Some local governments in Oregon enacted flood plain use requirements as early as 1965 (Chapter IV). Preventive measures have one notable disadvantage: they do not completely recognize that the people already living on flood-prone lands may be entitled

² Another statewide land use measure is Senate Bill (SB) 100 (Chapter 80, ORS 1973). The Bill, as passed by the 1973 Legislature, requires that statewide goals and guidelines be established by January 1975. Local governments are required to have their plans and ordinances in compliance by January 1976. Section 34 of the legislation cites flood plains as areas which will require special provisions. At the same Session, the Committee on Environment and Land Use, at the request of the State Water Resource Board, sponsored Senate Bill 300 of the 1973 Regular Session of the Oregon Legislature. If passed, the Bill would require the State Water Resource Board to delineate the 100-year flood plain and floodway and set minimum standards for use and development of these areas.

to some structural and monetary forms of protection.³

The third approach to reducing flood losses is a combination of the corrective and preventive measures. This approach recognizes that people who already live in flood-prone areas must be both physically and monetarily protected. This approach also recognizes that in order to reduce potential flood loss, additional flood-prone areas must not be developed for uses susceptible to extensive flood damage. At present, the principal technique of integrating corrective and preventive measures into a single prevention program is flood insurance (Chapter II).⁴

The National Flood Insurance Act of 1968 is designed to reduce increased flood losses through a system of social constraints on land use. The prerequisites for insurance are as follows: Maintaining a designated floodway, flood-proofing of structures, enacting and enforcing zoning ordinances, subdivision and building codes, and health regulations (Chapter II). Government control is directly

³There is debate whether any structural or monetary protection should be provided for flood plain residents. One side feels that those on the flood plain should pay their own way in disaster relief. On the other hand, Congress feels it has an obligation to provide the protection needed for flood plain residents. Congressional action is through flood protection activities and various forms of disaster relief legislation. Federal opinion is beginning to change as Congress and the Water Resources Council place more responsibility for living on the flood plain on those who inhabit flood-prone areas. However, Congress still feels it must provide some protection through the heavily subsidized insurance program.

⁴See Working Definitions.

related to the intensity and frequency of flooding. As a result, areas subject to inundation are under severe restraints, whereas, the areas less likely to be flooded are subject to fewer restrictions.

All social constraints of this nature entail consequences which are difficult to avoid. For example, some areas are flat and require little preparation for construction but because of land use regulations, are no longer open for development. Costs of construction are higher in that building codes require flood-proofing techniques, including structural regulations and subdivision requirements on sewerage and utility systems. The objection most often heard, however, is against government infringement on the rights of the owner to choose how he may use his land. If the law is properly enforced, the massive relief operations decrease and individuals no longer receive \$5000 grants from the federal government to restore their possessions. Land values in areas adjacent to the flood plains appreciate so that the individual who benefits from economic expansion is no longer the owner of the flood plain but the person who owns less flood-prone lands and the thrust of development continues. Valuable cropland and irreplaceable wetlands remain in their most productive natural form. Fewer flood control structures are necessary to protect flood-prone developments, saving billions of dollars. Thus there are both benefits and costs attributable to such social action.

The trend in future programs, to reduce flood losses, is based

on the idea of placing more of the responsibility for using flood-prone areas on those who actually occupy the plains. In the past, engineering techniques and land conservation measures were believed to be sufficient to prevent flood losses. However, through time it has become apparent that these practices alone were inadequate. Zoning regulations and other codes were initially employed to control flood plain development, but they were not considered complementary to structures to reduce losses. The NFIA was designed to integrate these two techniques into a program where they may complement each other. At the same time, the NFIA has intended to place more of the flood protection burden on those using the flood plain.

The Study

The study seeks to determine the issues and problems of implementing the National Flood Insurance Act of 1968 in Oregon. Research focuses first on the response of state, county, and city governments, to the land use standards required by Congress for local participation in the insurance program and second on the attitude of flood plain occupants towards the insurance.

Chapter II presents the legislative history of the NFIA and establishes the intent of Congress when it enacted the flood insurance program. Chapter III presents the characteristics of flooding and flood plain occupancy in the study areas. Chapter IV discusses the

characteristics of flood plain regulation by state, county, and city governments. The flood plain ordinances of the study areas are then compared to the standards of the NFIA to determine the extent to which the NFIA is being implemented. Chapter V is an analysis of the attitudes of a selected group of potential flood insurance purchasers. Chapter VI presents the summary and conclusions of the research.

II. THE NATIONAL FLOOD INSURANCE ACT OF 1968, AS AMENDED

History of Flood Insurance

Congressional interest in furnishing disaster insurance has been sporadic, waxing immediately after a major flood and then waning with the passage of time (Dacy and Kunreuther, 1969). The first legislation was proposed in 1951 after the devastating Midwest floods of that year (Figure 2). In a special message to Congress, President Truman requested a federal flood-relief plan that included funds for flood insurance. However, after extensive hearings no positive action was taken on the proposed flood insurance and interest declined. In 1955, unusually destructive floods renewed federal interest. After lengthy study, the 84th Congress authorized the Federal Flood Insurance Act of 1956 (PL 84-1016). Again Congress failed to pursue the matter, because no acceptable basis for actuarial rates was established (U.S. Congress, Senate, 1972). For eleven years the Act lay dormant for lack of funds (Berstein, 1971).

After Hurricane Betsy in September 1965 inundated about one-third of New Orleans, Congress authorized the Department of Housing and Urban Development to investigate the feasibility of flood insurance. Based on available data, the Department recommended the adoption of an insurance plan. Acting on these positive

Initial Legislation
by President Truman

Federal Flood Insurance Act of 1956

PL 84-1016

inactive

National Flood Insurance Act of 1968

S. 1985 S. 3497 H. R. 17989

PL 90-448

The Housing and Urban Development Act
of 1969 (PL 91-152)

S. 2864 and H. 13827

Extension of Certain Laws Relating to
Housing, Banking, and Urban Develop-
ment

S. J. Res. 176

PL 92-213

1950 '51

1955

1960

1965

1970

1975

Figure 2. Legislative history of flood insurance.

conclusions and on later committee hearings, Congress passed the National Flood Insurance Act of 1968. Section 1303 of the Act repeals all of the Federal Flood Insurance Act of 1956 except the authority to borrow from the Treasury. It is operated through the Federal Insurance Administration in the Department of Housing and Urban Development. In Oregon, the State Water Resources Board is the cooperating State agency, the liaison for technical data between federal and local officials, the Councils of Government is the administrative coordinator, and the State Farm Fire and Casualty Company in Salem is the insurance company issuing policies.

This chapter discusses the legislative history of flood insurance and the prerequisites for participation in the insurance program.

Legislative History of the National Flood Insurance Act

The National Flood Insurance Act of 1968 is Title XIII of the Housing and Urban Development Act of 1968, PL 90-448. PL 90-448 was reported to the Senate on May 15, 1968, as S. 3497 by Senator Sparkman of Alabama. The Bill was accompanied by Senate Report 1123 from the Senate Committee on Banking and Currency. Senate debate took place on May 23, May 24, May 27, and May 28, 1968. All references to Title XIII, were favorable to passage. On the final

day of debate, the Senate passed S. 3497 by a vote of 67 to 4 with 29 Senators absent.

S. 3497 was then forwarded to the House Committee on Banking and Currency; it was amended, and sent to the House on July 10, where it passed by a vote of 295 to 114 with 23 Representatives absent. A similar bill, H. R. 17989 (accompanied by House Report 1585) was tabled in favor of S. 3497.

As each chamber insisted on its amendments a conference was held. The conference report, H. Rept. 1785, was submitted and agreed to by the Senate and House on July 25 and 26, respectively. This compromise altered Title XIII in five ways. The conference report lists these alterations as follows (U. S. Congress, House. 1968, p. 160 and p. 161):

Extension of Coverage

The Senate bill gave the Secretary of HUD discretionary authority to extend flood insurance coverage to multi-family residential properties, larger business, farm, non-profit, and public property. The House bill (which authorized initial coverage of smaller businesses) authorized the Secretary to make recommendations to Congress for extended coverage but did not empower the Secretary to act. The conference substitute restores the House provision on initial coverage of smaller businesses and contains the Senate provision giving the Secretary discretionary authority to extend coverage.

Financing

The Senate bill authorized the same general Treasury borrowing authority provided in the Federal Flood Insurance

Act of 1956 (which limits borrowing to \$500 million plus such additional sums as the President may authorize). The House bill limited this authority to \$150 million and rescinded the unused portion of the Federal Flood Insurance Act authority. The conference substitute limits the borrowing to \$250 million and rescinds the balance of the 1956 authority.

National Flood Insurance Fund

The Senate bill authorized the Secretary to establish in the Treasury a fund to pay insurance claims as necessary to make premium equalization payments and to pay administrative expenses. The House provision is similar except that it did not provide for payment of administrative expenses. The conference substitute conforms to the Senate provision.

Federal Operation of the Program

In the event that the alternative federally operated program was undertaken, the Senate bill authorized the Secretary to operate the program through the facilities of the Federal Government by utilizing personnel of HUD and any other executive agency (and through insurance companies, agents, brokers, and organizations as fiscal agents). The House bill was similar except it had no expressed provision authorizing the use of HUD or other executive agency employees. The conference substitute conforms to the Senate provision.

Effective Date

The Senate bill contained a provision not in the House bill making the National Flood Insurance Act effective 120 days after enactment unless the Secretary extends the date to a maximum of 180 days. The conference substitute includes the Senate provision.

This compromise of S. 3497 became PL 90-448 when it was signed by the President of the United States on August 1, 1968. The statement issued by the President's office when he signed the Law

does not mention Title XIII, flood insurance.

The portion of the Housing and Urban Development Act of 1968 of interest is Title XIII, the National Flood Insurance Act of 1968. Senate Report 1123 states (p. 102): "This title is identical to the flood insurance legislation (S. 1985) that was passed by the Senate on September 14, 1967." Thus, it becomes more important to trace the development of S. 1985 than S. 3497.

S. 1985 is an administration proposal based on the recommendations presented in "Insurance and Other Programs for Financial Assistance to Flood Victims." This report was transmitted to the President by the Secretary of HUD as required by the Southeast Hurricane Disaster Relief Act of 1965 (PL 89-339), Section 5. The Senate Committee on Banking and Currency assigned the topic to its Subcommittee on Securities. Hearings were held June 26-28, 1967, which produced in Senate Report 549. Senate Report 549 states (p. 3):

More than 40 witnesses appeared before the subcommittee and all of these witnesses supported S. 1985. The legislation for a flood insurance program which is reported herein is strongly supported by numerous Members of Congress, the Administration, insurance authorities of the separate States, all major sectors of the private industry, city officials, the home building industry, and representatives of the American Red Cross.

Senator H. Williams and 29 co-sponsors reported the bill to the Senate on August 29, 1967, where it was discussed and minor points

clarified. It passed the Senate by voice vote on September 14, 1967.

Meanwhile, the House had not been inactive. H.R. 11197 was introduced in June 1967 as an administration proposal based on the same recommendations as S. 1985. Hearings were held on August 15, August 18, and September 19-21, 1967 by the Subcommittee on Housing under the Committee on Banking and Currency. Witnesses appearing before the subcommittee included the Under Secretary of HUD, state and local officials, and representatives from the American Insurance Association, the American Mutual Insurance Alliance, the National Association of Independent Insurers, the National Association of Mutual Insurance Companies, the National Association of Insurance Agents, the National Association of Mutual Insurance Agents, the Association of Flood Insurers, and the National Association of Home Builders. All supported the legislation. However, a few had objections or reservations about parts of the bill. D. H. Garlock, Second Vice President of Travelers Insurance Companies, opposed Senator Proxmire's amendment on the distribution of earnings from insurance premiums.⁵ Garlock felt the amendment would discourage insurance companies from actively participating in the program, since the federal government would have first claim on the monies remaining from premiums after paying loss claims. The

⁵For a fuller discussion see U. S. Congress, House. 1967. pp. 96-97, p. 99.

Proxmire Admendment was deleted from the final bill.

W. M. Smith, Manager of the Mid-Atlantic Office of the American Mutual Insurance Alliance, agreed and felt that small business should be included under the Act. C. L. Rue, Member of the Executive Committee and Board of Directors, National Association of Mutual Insurance Agents, also objected to the Proxmire amendment. Representative D. B. Fascell, 12th Congressional District of Florida requested that small businesses be included for coverage under the legislation. They were eventually included under the flood insurance provisions, and the amount of insurance available was increased. When S. 1985 was referred to the House Committee on Banking and Currency, an executive session was held on October 5. S. 1985 was adopted with amendments in lieu of H. R. 11197 and was ordered to the House with accompanying House Report 786.

The amended version of S. 1985 was reported on October 16 where it was discussed and passed on November 1, 1967. No vote is recorded in the Congressional Record.

A conference was necessary, because the House version wanted to

make insurance coverage available for smaller business properties, liberalize the coverage limitation for single-family dwellings, and assure that further congressional action is required before the program could be expanded to include other types of property (U. S. Congress, House, 1967.)p. 23).

The Senate disagreed, in that its version was more restrictive by not including those sections cited in the House version. Conferees were appointed by both chambers, but a committee meeting was never scheduled. This is as far as the 1967 versions of a flood insurance program progressed until S. 1985 was amended to the Housing and Urban Development Act of 1968 in both the House and the Senate.

Amendments to the Act

The Act was initially amended on December 24, 1969 by PL 91-152, The Housing and Urban Development Act of 1969. The Senate Committee on Banking and Currency reported the Housing and Urban Development Act of 1969 (S. 2864), accompanied by Senate Report 91-392 to the Senate on September 5, 1969. The original version of S. 2864 only recognizes the need to extend the insurance program for an emergency phase of eighteen months, from June 30, 1970, to December 31, 1971 (Section 407 and 410, PL 91-152). The extension became necessary because of the delay in establishing the required actuarial rates for flood-prone areas. The necessary studies which may be carried out by the Corps of Engineers, the U. S. Geological Survey, the Soil Conservation Service, the Tennessee Valley Authority, on which the actuarial rates are based, are "detailed, time consuming, and require expenditures of significant

manpower and money. . . " (U. S. Congress, Senate. 1972, p. 21). The studies must be done on an area by area basis in that the flood potential is different for each area. Without actuarial rates, communities would be ineligible for insurance, therefore, potential flood victims could not purchase insurance. This is the basis for the Emergency Program. In addition, the land use and control measures, originally designated as permanent, now had to be only adequate.

On the Senate floor, S. 2864 was further amended by Senators Cranston and Murphy of California on September 23, 1969 (Congressional Record, 1969, p. 26712). The amendment extended insurance coverage to losses from water-caused mudslides (Section 409, PL 91-152). Amended S. 2864 passed by a voice vote on September 23 and was sent to the House Committee on Banking and Currency the next day.

The House amended and passed by voice vote S. 2864 on October 10, 1969, in lieu of H. 13827, the Housing and Urban Development Act of 1969. Conferees were appointed by the House on October 27 and by the Senate on November 12, 1969. The Conference Report, House Report 91-740, was submitted to the House on December 10, 1969. Both Chambers agreed to the Conference Report on December 12, and the legislation became PL 91-152 on December 24, 1969. Neither the House nor the conferees altered those sections of S. 2864

which dealt with the flood insurance program (U. S. Congress, House. 1969).

The National Flood Insurance Act of 1968 was again amended in 1971 by PL 92-213, the Extension of Certain Laws Relating to Housing, Banking, and Urban Development. Senate Joint Resolution (S. J. Res.) 176 accompanied by Senate Report 92-448, was considered and passed by voice vote in the Senate on November 20, 1971. On December 6th the House amended and passed the same Resolution by a vote of 357 to 4. The amended Resolution was forwarded to conference. The difference between the House and Senate versions of the Resolution are as follows (U. S. Congress, House. 1971, p. 5):

The House amendment extended for 24 months to December 31, 1973, the period in which states and localities could adopt adequate land use and control measures in order to qualify for the National Flood Insurance Program. The Senate Resolution contained no such provision and none is contained in the conference report.⁶

Flood Insurance Coverage for Church Properties

The House amendment included church properties within the definition of those properties eligible to be covered under the National Flood Insurance program. The Senate Resolution contained no such provision. The conferees wish to state that the purpose of this provision is to cover only those church properties actively used for religious purposes and not those properties owned by churches for income producing purposes.

⁶This refers to Section 1305(c)(2) of the National Flood Insurance Act.

The conference results (U.S. Congress, House. House Report 92-727) were agreed to by both Chambers on December 13, 1971 and approved on December 22, 1971.

Section 2 of PL 92-213, which amends the Flood Insurance Act of 1968, extends the Emergency phase from December 31, 1971, to December 31, 1973, expands coverage to include church properties, and assures flood victims that, if they did not purchase insurance when available, they still could receive disaster assistance through December 31, 1973.

Recently, there were three Senate Bills which would have amended the 1968 Act. S. 2794 was introduced by Senators Williams and Case of New Jersey in November 1971. The bill would have increased the available coverage on flood plain property, e. g. to an aggregate of \$25,000 for a one family residence. In addition, it would have authorized acquisition of property that had been at least 50 percent destroyed. The Bill was referred to the Senate Committee on Banking, Housing, and Urban Affairs; a hearing was held on August 15, 1972, but no action was taken. Opinion on the bill varied. W. J. Woods, Mayor of Westwood, N. J. approved of increasing coverage, extending the time during which communities may meet the land use regulations, and purchasing destroyed homes. M. L. Stark, the Senior Vice President, Government Affairs Department of the American Insurance Association, favored increasing benefits and

purchasing destroyed homes, but was opposed to extending and liberalizing land use control measures. G. K. Bernstein, the Federal Insurance Administrator, testified that increased coverage was necessary and the Emergency Program needed to be extended; however, he emphasized that destroyed homes must be studied. Senator Williams reintroduced the Bill into the 93rd Congress, 1st Session as S. 269. The Bill was referred to the Senate Committee on Banking, Housing, and Urban Affairs on January 9, 1973.

The second Senate Bill to alter the 1968 Act, S. 3912, was introduced by Senator Schweiker of Pennsylvania and referred to the Senate Committee on Banking, Housing, and Urban Affairs. Companion bills were also introduced in the House (H. 16510 and H. 16521) by Representative Yatron and Flood of Pennsylvania, respectively. No hearings or other action was taken on the presentations. On January 16, 1973, during the 1st Session of the 93rd Congress Senator Schweiker introduced S. 390, National Flood Insurance Act Amendments of 1973. The Bill would (1) increase coverage, (2) increase the amount the government may borrow from \$2.5 billion to \$10 billion, (3) make flood insurance mandatory for government loans on homes in flood-prone areas, (4) make flood insurance available in states which have not complied with the requirements of Sections 1305 (c) or 1315, as long as the property is eligible for insurance under Section 1305 (a) and (b) with the rate set at

twenty-five percentum above the otherwise applicable rate for the area, and (5) would reduce the federal benefits to communities which do not participate in the insurance program. No hearings or action have yet been taken (Bernstein, 1972).

During this period the House also updated the flood program. On June 29, 1973 H.R. 8449 introduced by Representative W. A. Barrett (Pennsylvania) and fourteen co-sponsors, was reported to the House Committee on Banking and Currency. Leading the opposition to this bill was Representative C. C. Boggs of New Orleans who did not favor the land-use requirements of the flood insurance program. She insisted that the land-use regulations were too restrictive, particularly to projects in her district in New Orleans which were being constructed on reclaimed land that was subject to flooding. Her requests for more lenient regulations were not included in the bill as it went to the floor.

On the floor, Representative John Rarick of Louisiana lead the opposition to the bill. His amendment, which would have omitted the requirement for flood-prone communities to participate in the program, was defeated. On September 5, 1973 the House passed H.R. 8449 by a vote of 359 to 21. The Bill would: increase insurance (Table 4); increase total coverage by FIA from \$6 billion to \$10 billion; require insurance on all federally subsidized projects; require HUD to inform communities of their flood status within six

months; allows for an appeal of FIA flood status determinations; and requires flood-prone areas to participate in the insurance program by July 1, 1975 or lose federal assistance to projects in flood-prone areas.

Table 4. Proposed increased coverage under 1973 Administration bill.

	Subsidized Coverage		Total Coverage	
	Old Limit	New Limit	Old Limit	New Limit
Single family residential	\$17, 500	\$ 35, 000	\$35, 000	\$ 70, 000
Other residential	30, 000	100, 000	60, 000	200, 000
Nonresidential	30, 000	100, 000	60, 000	200, 000
Contents, residential	5, 000	10, 000	10, 000	20, 000
Contents, nonresidential	5, 000	100, 000	10, 000	200, 000

Upon clearing the Senate Banking, Housing, and Urban Affairs Committee, the Senate passed H. R. 8449 on December 18, 1973 after defeating three amendments by Senator J. B. Johnston of Louisiana. The first amendment would have allowed construction to the forty-year flood plain; the second would have changed the authorized flood level from the 100-year frequency to the fifty year flood level frequency; and the third amendment would have allowed communities to option for insurance. Four amendments were adopted, but only Senator Stevens' (Alaska) amendment which increased the eligibility

limits of flood insurance coverage in Alaska, Hawaii, the Virgin Islands, and Guam applied to flood insurance. As of October, 1973, the final Senate and House version were in conference.

The National Flood Insurance Act

The National Flood Insurance Act of 1968, as amended, is designed to relieve flood loss in two ways. First, the Act helps "victims of flood damage to restore their homes and business;" and second, the Act is designed to minimize "the future risk of flood losses in locations and situations where the risk of flood loss exceeds the prospect of gain from use of the site" (U. S. Congress, House. 1967. p. 10).

Until enactment of the federal flood insurance program, relief to flood victims came from public and private sources (U. S. Congress, House. 1966, p. 12). The primary agencies that assist flood victims are the Office of Emergency Planning, the Weather Service, the U. S. Army Corps of Engineers, the Small Business Administration, the Armed Forces, the Agricultural Stabilization and Conservation Service, and the American Red Cross. In addition, Congress has passed special legislation to aid major disaster victims. Both the Pacific Northwest Relief Act of 1965 and the Southeast Hurricane Disaster Relief Act of 1965 are included in this legislation. However, recently, the Federal government consolidated its relief acts into

the Disaster Relief Act of 1970, PL 91-606 (U. S. Office Emergency Preparedness, 1971). Legislation has been enacted to help flood victims of Hurricane Agnes, which devastated parts of the East coast in June 1972. Though these approaches are undeniably helpful to victims of floods, there are some notable disadvantages (U. S. Congress, House. 1967, p. 8).

First, the programs only partially assist victims in replacing their losses. Second, there is a delay between occurrence of the flood and declaration of the region as a disaster area, which makes it eligible for relief. Third, Federal funds are limited to the amount available for any program at one time. Fourth, a disaster may be considered major for a locality, but may not be of a scale to justify national concern. Finally, and of greatest significance, these programs may encourage the continued unwise use of flood plains, which experience has shown results in the need for increasing public financial assistance.

If implemented, the Act can, to a degree, rectify these disadvantages. Funds are made available promptly for restoration of property up to the amount insured.⁷ Protractive burdens to the federal government are also minimized as the demand for other forms of government aid, such as loans, declines. It can be expected

⁷See Section 1306 enclosed copy of the Act.

that demands for government aid may decline, since after December 31, 1973, flood victims will no longer be eligible for disaster assistance if insurance has been available for one year, but they failed to purchase it. Exceptions are low-income families (PL 92-213).

Finally, the Act discourages imprudent use of flood plains, by requiring local jurisdictions to adopt effective land-use control as a prerequisite to participation in the flood insurance program. As noted by the Federal Insurance Administration:

the requirements to adopt land use and control measures is of the essence of the program. Without it, there would be no incentive to reduce losses, and the program would encourage rather than discourage imprudent use of the nation's flood plains (Federal Insurance Administration, n. d.)

The intent of the legislation stems from the idea that directed and controlled use and development will more effectively reduce flood damage than reimbursing individuals (U. S. Congress, House, 1967, p. 10). In order to become eligible for insurance, a political jurisdiction must comply with a set of minimum standards (Federal Register, December 22, 1971, pp. 24759-24769). Once the proposed plan is accepted by the Federal Insurance Administration, properties within the political unit are eligible for insurance. The FIA prefers⁸

⁸ FIA does not require that the flood plain be divided into three zones. It is to the advantage of the local economic interests to use three zones. Three zones allows for more leeway in construction because the requirements for the floodway are more restrictive than for the special flood hazard zone. If the two zones are combined the more restrictive requirements are necessary.

but does not require, dividing the flood plain into three zones: the floodway, the flood plain having special flood hazard(s), and the remainder of the flood plain. These zones are subject to decreasing degrees of restriction (Figure 3).

The floodway is defined as "the channel of a river or other water course and the adjacent land areas required to carry and discharge a flood of a given magnitude" (Federal Register, December 22, 1971, p. 24760). The designated floodway for the purpose of insurance, is based on a flood of 100 years intensity. Within this belt, construction is limited to uses which do not endanger human life and that are not appreciably affected by flooding, for example, parks, golf courses, or used car lots. Modifications for flood-proofing existing structures are permissible as long as the water level of a 100-year flood will not be raised by that action. Fill is prohibited unless the capacity of the floodway remains unaltered.

The second zone, the flood plain area having special flood hazard, also referred to as the floodway fringe, is "that maximum area of the flood plain that, on the average, is likely to be flooded every 100 years (i. e., that has a 1-percent chance of being flooded each year)" (Federal Register, December 22, 1971, p. 24759). Construction in this zone must meet specific requirements: construction materials, including utilities must be resistant to flood damage, or be raised above the 100-year water level, or be flood-proofed to this

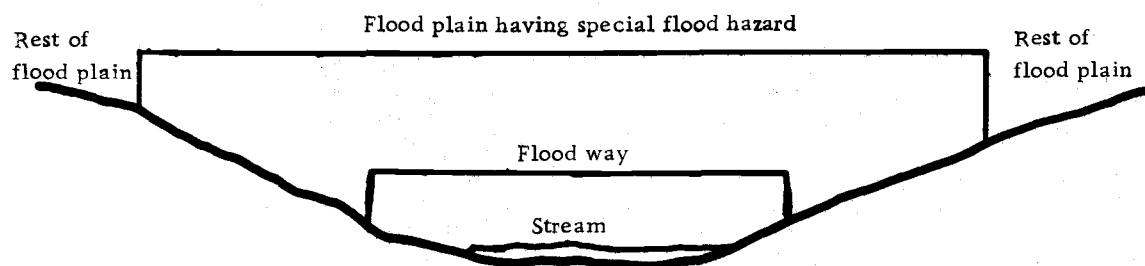


Figure 3. Division of flood plain based on FIA recommendations.

level; designs must be resistant to water damage, flotation, collapse, or lateral movement; subdivision drainage must be of a nature to minimize exposure time to floods; water supply and sanitary systems must be of a character to prevent contamination which might lead to a health hazard.

The remainder of the flood plain, that which is above the 100-year flood level, has no Federal restrictions. Development is guided only by regulations which may be imposed by local governments.

Appendix A is the format suggested by the Oregon State Water Resources Board to be used when applying for insurance. Appendix B is an example of an accepted application. The resolution was adopted by the City of Springfield.

Summary

Despite the increasing number of federal flood control projects, flood damage in the United States continues to rise. This unpredicted phenomenon is a result of continued encroachment onto flood hazard area. Rather than institute social constraints through land-use regulations, state and local governments have come to rely more on federal disaster assistance to flood victims and on federal flood control and abatement projects to protect flood plain occupants. Studies began to appear in the 1940's which showed these federal programs were self-sustaining as long as random flood plain

development was permitted. It was suggested that flood plain management was necessary to complement engineering structures in reducing flood losses.

The federal program formulated to encourage the prudent use of flood plains was the National Flood Insurance Act (NFIA) of 1968. Previous attempts at an insurance program were failures for various reasons and none required any form of flood plain management. The NFIA was designed to reduce losses on the 100-year flood plain through a mandatory set of minimum standards. These regulations are to be implemented at the local level through zoning laws, subdivision regulations, building codes, and miscellaneous ordinances. More restrictive requirements are applied to those parts of the flood plain with a higher frequency of inundation. An incentive to adopt these regulations is a subsidized insurance program available to families and business already in a flood-prone area.

III. THE STUDY AREAS

Introduction

This chapter presents the major characteristics of flooding and flood plain use in twenty-one study areas in Oregon. Chapter III serves as a background in the assessment of the implementation of the NFIA. Muckleston (1973) found that implementation of national land and water legislation may take place at differing rates at state and local levels of government. What occurs is a rapid realization of Congressional intent at some levels and implementation with difficulty and compromise at other levels.

Distribution of the study areas is skewed to the western third of the state, a result of the geographic location, the climatic regime, and the topography of the state. Characteristics of precipitation and flooding would not be significant if it were not for the spatial distribution of the population. People and associated socio-economic activities are concentrated in this sector of Oregon where over half the population live in the Willamette Valley. Smaller centers are Roseburg, Grants Pass, Medford, and along the coast.

Floods and Flood Plain Use⁹ in the Study Areas

Floods, by definition, are stream discharges which exceed bankfull stage (Pacific Northwest River Basins Commission, 1969, p. I-5. This runoff phenomenon is caused by several factors, including the duration, intensity, type, and amount of precipitation and is modified by the relief, rate of soil infiltration (Thornbury, 1965, p. 128), vegetal cover, and surface storage within the watershed (Rodda, 1969, pp. 405-418; Strahler, 1969, pp. 416-417).

Since precipitation is usually the key to flooding, the spatial and temporal distribution of precipitation in Oregon are briefly considered. Further the amount and type of precipitation a watershed receives significantly influences the regime of the streams and rivers. In Oregon, these variables are a function of the watersheds; distance from the coast, location on the leeward or windward side of mountain ranges aligned parallel to the coast, and elevation.

In general, the closer a basin is to the Pacific Ocean, the more precipitation it receives. Mountains modify this in several ways. First, orographic lift results in heavy precipitation on the crests and windward slopes of the Coast Range and Cascades (Figure 4).

⁹ Most of the description of the physical processes of flooding and the settling of the basins is modified from Emmer and Muckleston, 1971.

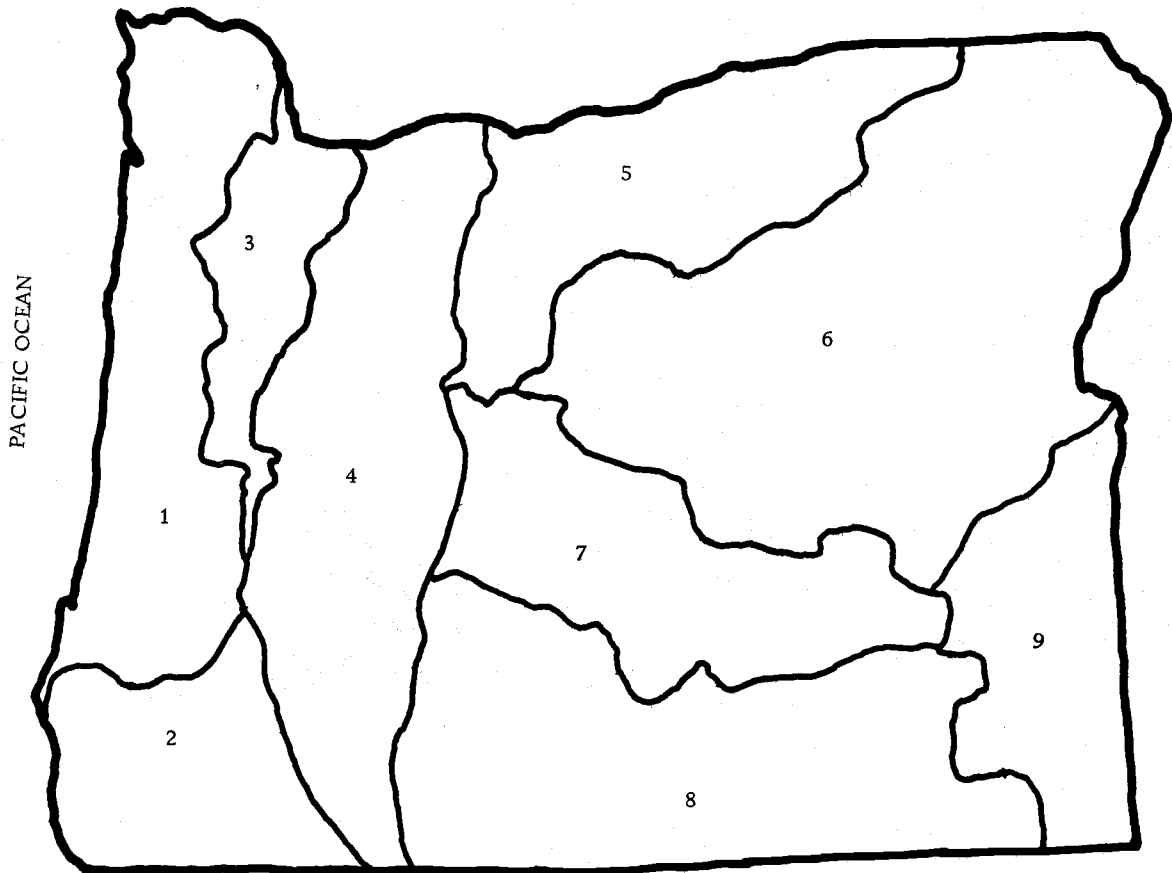


Figure 4. Geomorphic Divisions of Oregon (from Baldwin, 1964).

- 1 Coast Range
- 2 Klamath Mountains
- 3 Willamette Valley
- 4 Cascade Range
- 5 Deschutes-Umatilla Plateau
- 6 Blue Mountains
- 7 High Lava Plains
- 8 Basin - Range
- 9 Owyhee Upland

Also orographic lift in the mountains of eastern Oregon accounts for much heavier precipitation there than in the surrounding lowlands. Second, mountains also cause a rainshadow effect on their leeward side, especially in the state's eastern parts where large areas receive less than 20 inches of precipitation annually. Finally, at higher elevations a large proportion of precipitation is received as snow, so runoff is delayed until spring. Oregon's location in the mid-latitudes and on the western side of a continent accounts for maximum precipitation during late fall and winter.

Flow regimes in western and eastern Oregon are different. Floods west of the Cascades occur primarily in the winter, because of late fall and winter rains. However, floods in the eastern two-thirds of the state occur primarily from spring snow-melt in the mountains and to a lesser degree from summer thunderstorms.

Flood Plain Use

Flood plain use can be placed in two general categories: rural and urban development. Where they meet is a transition zone. Rural areas are unincorporated sections of counties over which the county commission has the power to plan and zone. In this category, agriculture is the principal activity on the flood plain. For example, the Corps of Engineers describes the economy of Marion County's Pudding River flood plain as being (U.S. Army, 1966, p. 33)..

". . . devoted almost entirely to agriculture. "

During floods, agricultural lands are subjected to extensive surface erosion through deep gullies and/or removal of topsoil. In some cases sand and gravel can be deposited on productive lands. To use the land farmers must remove the accumulated detritus and debris such as trees and brush from upstream logging wastes, driftwood, and vegetation eroded from stream banks, the debris once cleared will permit future cultivation and remove a potential flood hazard. Additional damage results because many crops cannot tolerate a prolonged period of submergence. In the Pudding River flood plain, damage data from the 1964 flood (U.S. Army, 1966, Table 12), emphasize the agrarian nature of the flood plain. Agricultural losses totaled \$373,000 or approximately seven times the residential and commercial losses.

A second broad category of flood plain use is in urban areas, and deals with residential and commercial property. Normally, these are within incorporated areas under the jurisdiction of some form of city government. The flood plain of the Willamette River in the vicinity of Oregon City is illustrative: it is "devoted to manufacturing, warehousing, and urban development" (U.S. Army, 1970, p. 12). Another example is the Clackamas River flood plain which is "highly developed" (U.S. Army, 1966, p. 35). Inundations on this type of flood plain are more destructive than in rural flood plains.

High water floats buildings from their foundations and saturates walls and supports. The contents are ruined by sediment deposition, staining, and corrosion. Landscaping is destroyed. Owners of commercial property suffer additional losses while facilities are closed for cleanup and repair. The 1964 flood on the Oregon City reach of the Willamette River flood plain suffered damages of \$140,000 to agriculture, \$878,000 to residential property, and \$6,430,000 to commercial and industrial tracts (U.S. Army, 1966, Table 12). The Clackamas River Basin had damages of \$415,000 to agriculture and \$1,256,000 to residential property.

The transition zone between urban and rural uses may be under the jurisdiction of either a county or city government, depending on the location of the incorporated limits. Exact boundaries can be only arbitrarily set for this zone because of its dynamic and complex nature.

As in other states, flooding is a serious problem in newly developed suburban areas of Oregon. The Keizer region north of Salem exemplifies the results of building in a flood-prone area. Extensive damage resulted when water from the Willamette River inundated adjacent lands in 1964.

Major damages occurred in the Keizer area, modern suburban residential development on the north edge of Salem. Over 300 houses, with an estimated average value of \$26,000 for house and lot, were affected, with flooding at depths up to 9 feet.

Three houses were washed off their foundations and completely destroyed. Average water depth in the houses was approximately 12 inches, and damages to land and improvements average \$1,500 each. Much of this area has developed within the past 10 years. In West Salem approximately 50 houses were flooded to an average depth of two feet, with an average damage of \$1,300 each (U.S. Army, Corps of Engineers, 1966, p. 70).

River Basins Containing Study Areas

Floods are dependent on a number of variables within a river basin. For this reason, the flood related characteristics of the study area are considered under the appropriate basins.

The Willamette Basin¹⁰

Ten of the twenty-one study areas are in the Willamette Valley. These include all of Multnomah, Clackamas and Marion counties and most of Polk and Lane counties as well as the cities of Gladstone,

¹⁰The hydrology, geology, geomorphology, and development of The Willamette Basin are examined in greater detail by the SWRB in the series Upper Willamette Basin (1961), Middle Willamette Basin (1963), Lower Willamette Basin (1965), and Willamette River Basin (1967) and by the USDA Economic Research Service in cooperation with the SWRB in USDA Report on Water and Related Land Resources Lower Willamette River Basin Oregon (1963) and Middle Willamette River Basin (1962). Flood control projects are discussed by the Willamette Basin Task Force of the Pacific Northwest River Basins Commission in Willamette Basin Comprehensive Study Water and Related Land Resources Appendix E Flood Control (1969) and by the Pacific Northwest River Basins Commission in Columbia-North Pacific Region Comprehensive Framework Study of Water and Related Lands Appendix VII Flood Control (1971).

Milwaukie, Portland, Salem, and Springfield (Figures 5 and 6). Most tributaries of the Willamette River have their headwaters either along the eastern slope of the Coast Range physiographic unit or along the western slope of the Cascades (Figure 5). The headwater areas are rugged and mountainous with steep slopes and intrenched streams. The Willamette Valley extends from level expanses in the upper valley to a series of hills in the lower valley. Elevations range from below ten feet along the Columbia River to over 10,000 feet in the Cascades and 4000 feet in the Coast Range. Infiltration varies from one formation and exposure to the next.

The Basin's climate is controlled by its elevation, its position relative to the Pacific Ocean, and mountain barriers. Precipitation in the rainshadow of the Coast Range varies from 30 to 50 inches per year. In the mountains, it may be as high as 140 inches annually. The USDA states that the "Intensity of precipitation and the proportion of precipitation that is snow increases with elevation" (1962, p. 14). Snow on the other hand, is only 2% of the precipitation on the Valley floor, but accounts for over 75% at elevations exceeding 7500 feet. Maximum precipitation is in the late fall and winter; minimum is in the summer.

Discharge from Coast Range tributaries differs from those in the Cascades, because most of the precipitation in the Coast Range is rain. The ground as described by the SWRB (1967) is generally

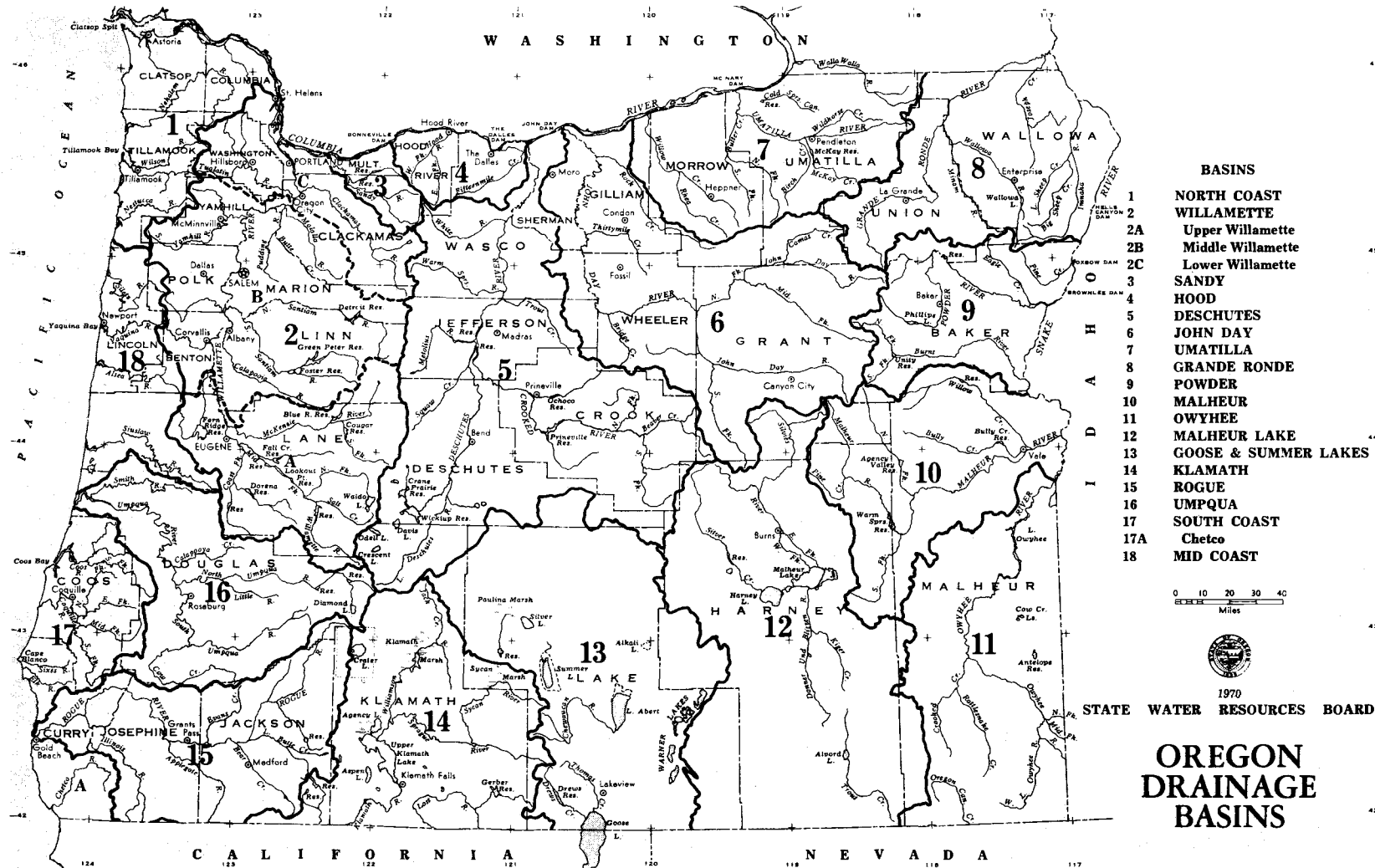


Figure 5. Oregon drainage basins.

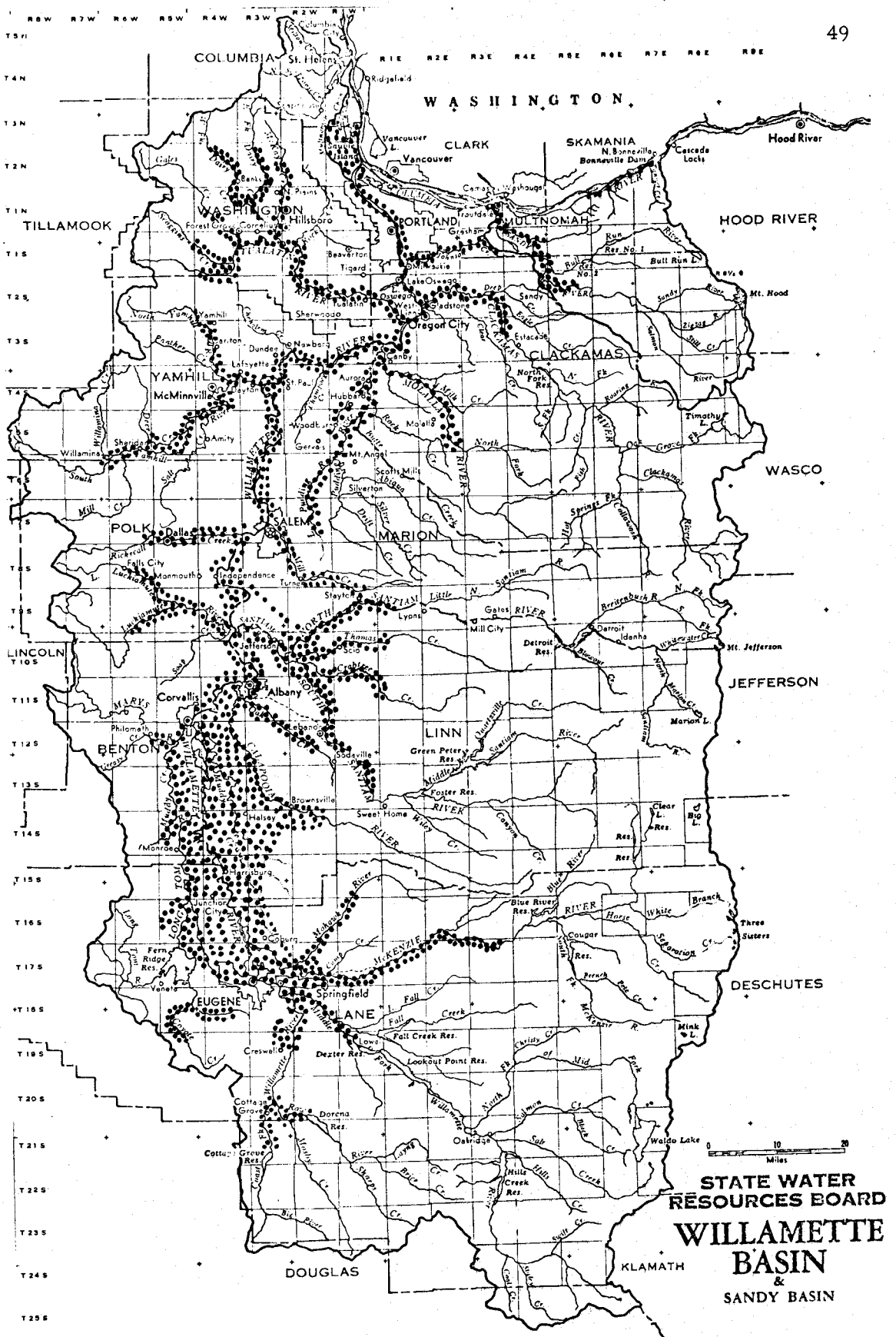


Figure 6. Flood-prone areas. Source: CNPCFS

impermeable and discharge closely corresponds to precipitation. The tributaries from the Cascades, unlike the Coast Range, have a more even runoff between late fall and spring. This is caused by precipitation accumulating at higher elevations as snow along with the high porosity of the ground. In addition, much of the stream flow along the Valley's east side is controlled by dams.

According to the Willamette Task Force, floods in the basin result from rain and or snow melt. Major floods occur from late fall to early spring when intensive, continuous rains fall on saturated or frozen ground and warm spells prematurely melt snow. These floods can last up to ten days. Tributary flooding tends to be "flashy." Figure 6 shows the flood plains of the basin.¹¹

Settlement density and type of land use on the flood plains of the rivers can be characterised as dynamic. When permanent settlers first established towns in Oregon, they built on the flood plains of the Willamette River (Corning, 1947). The flood of 1861, described by the U. S. Army Corps of Engineers as the greatest flood on record for the Willamette Valley, destroyed most of these towns. From then until the mid-thirties, Oregonians avoided extensive developments in flood-prone areas. Since the mid-thirties,

¹¹ More detailed maps of flood plains in the Willamette Basin have been and are presently being compiled by the U. S. Army, Corps of Engineers, the Soil Conservation Service and the Geological Survey.

Oregon flood plains have been increasingly developed (U. S. Army, 1966, p.87). The development of the Willamette River flood plains illustrates the increased use of these lowlands.¹²

Flood plain encroachment began between the major floods of 1927 and 1945, when there were few high stages and little damage. The increased use of flood plains was in four forms (U. S. Army, 1947, p. C-44):

Extensive additions to the towns of West Springfield, Junction City, and West Salem had been built; a great deal of suburban development had taken place along the river near the large cities; considerable improvements were made on rural properties; and agriculture use of flood plain lands was more intensive than in previous years.

From 1940 to 1947, the number of people living and employed on the 1861 flood plain increased from 178, 000 to 220, 000. Areas subject to flooding were developed, as a result the secondary floods (the minor flood peaks which may precede or follow the major flood peak) caused considerably more damage. This is particularly apparent along minor tributaries, such as Amazon Creek in Lane County. Originally, development was above all but the highest floods, but

¹² Only limited settlement studies of flood plains exist. For details on each of the study areas see the appropriate Corps of Engineer Flood Plain Information Study, State Water Resources Board Basin Report, U. S. Department of Agriculture River Basin Survey, and special federal and state publications on specific disasters. The Portland District of the Corps of Engineers is now preparing a flood plain use history and present status report for the Willamette Valley.

with increased development no land was available above even the smaller flood peaks. The result was the subdivision of lower flood plains which were subject to more frequent inundation.

In the past three decades, encroachment onto flood plains continued with increased population. During this period, construction of several large Corps of Engineer flood-control dams on Cascade tributaries may have contributed to a feeling of security by flood plain occupants.

The Mid-Coast Basin

Two of the study areas are partially within this Basin - a small part of Polk County and the western third of Lane County.¹³ The Mid-Coast Basin is a series of independent watersheds draining into the Pacific Ocean along the western slope of the Coast Range anticline (Figure 7). Within the Basin's 2361 square miles, the topography varies from mudflats, sea terraces, and rugged headlands along the coast to mountains in the interior. In the mountains, the streams have eroded steep-sloped valleys through the impervious sandstone and volcanic formations; nearer the ocean they flow

¹³The hydrology, geology, geomorphology, and development of the Mid-Coast Basin are diagnosed by the SWRB in Mid-Coast Basin (1965) and by the USDA Economic Research Service in cooperation with the SWRB in USDA Report on Water and Related Land Resources Middle Coast Drainage Basin Oregon (1964).

STATE WATER RESOURCES BOARD

MID COAST BASIN

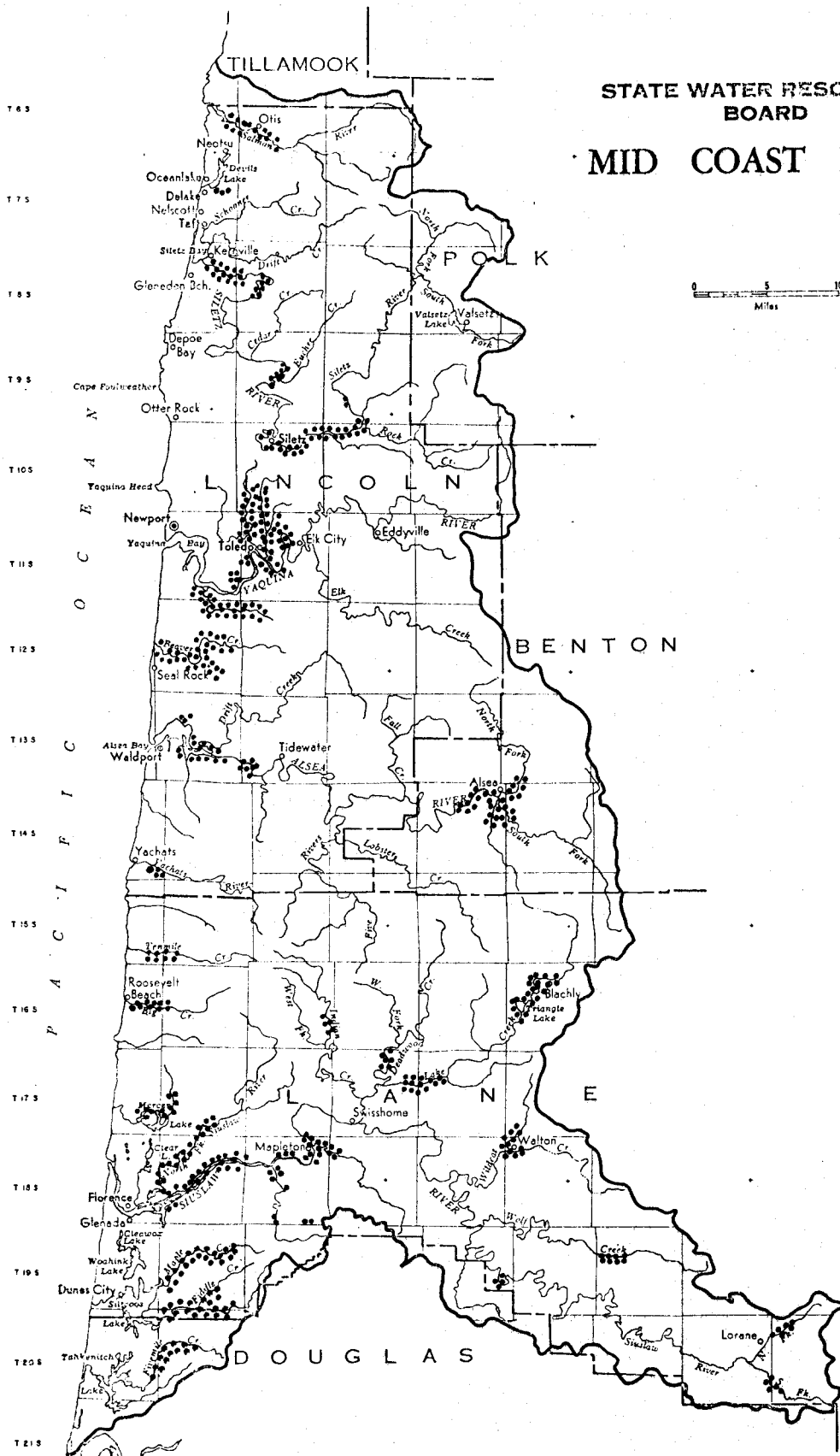


Figure 7. Flood-prone areas. Source: CNPCFS

through relatively wider valleys. Infiltration is classified by the USDA as dominantly moderate to slow throughout the basin, except for those coastal areas of dunes where infiltration is rapid.

The moderate, moist climate results from the ocean-mountain relationship and orographic precipitation. Precipitation increases from approximately 60 inches along the coast, to over 110 inches in the Coast Range, to less than 40 inches in the rainshadow at the upper reaches of the Siuslaw River. Regardless of elevation, maximum precipitation here, as along the rest of the coast is during late fall and winter. Minimum precipitation, as a consequence of shifting air masses offshore, is during the summer. Winter precipitation can take place as "moderate to heavy storms that may continue without interruption over prolonged periods" (SWRB, 1965b, p. 4).

Stream discharge almost mirrors precipitation, because of the small retention as ground water or snow. Maximum monthly discharge occurs in late fall and winter, the minimum is in the summer. Rapid basin runoff leads to extreme variation within a few days. The Alsea River, near Tidewater, has fluctuated from less than 4000 cfs to over 22,000 cfs and back to under 5000 cfs over a week-long period.

Basin floods result from rains at higher watershed elevations and from tides. Water rises rapidly, but peaks are of short duration. Problem areas are centered along the lower portions of streams

(Figure 7), the region where population is concentrated. The USDA reports 17,260 acres to be flood-prone. However, none of this land is in Polk County. The only town in this part of Polk County is Valsetz. There is very little agriculture along Rock Creek. The rest of the County is forest.

Farther south in the Basin, there are flood plains in Lane County, most along the lower reaches of rivers. Agriculture dominates interior land use whereas urban areas are concentrated along the coast. The State Water Resources Board (1965b, p. 13) reports urban development is spreading up the valleys encroaching on agricultural lands. Residences, vacation homes, and tourist accommodations are increasing outside incorporated areas. Development pressures are also felt along the estuaries as homes and commercial structures are built. Development along the Siuslaw River can be judged from damage estimates of the 1964-65 floods. Agriculture suffered \$68,000 damages, whereas residential and commercial interests lost \$278,000 (U.S. Army, 1966, Table 17).

The Umpqua Basin

Four study areas are in this basin: the cities of Roseburg, Winston, and Myrtle Creek and most of Douglas County are in the

Umpqua River Basin.¹⁴ The 4560 square miles of the basin are within parts of the Klamath Mountain, Cascade, and Coast Range physiographic regions of southwestern Oregon. The 211 mile Umpqua River discharges into the Pacific Ocean at Reedsport (Figure 8). Most streams have their headwaters in three mountainous regions within the basin. Except for the area near the confluence of the North and South Umpqua Rivers, the basin is rugged and has steep-sided canyons. The mountain valleys are seldom more than a mile wide across the floor. Infiltration rates vary according to local formations, exposure, and cover.

Climate within the basin depends upon the weather stations elevation and location relative to the mountains. Precipitation ranges from 25 inches annually in the area of the confluence of the North and South Umpqua Rivers to over 110 inches in the mountains. As in all of western Oregon, precipitation is at a maximum during the late fall and winter and at a minimum during the summer. Temperatures are controlled by elevation and the moderating effect of the Pacific Ocean. At Roseburg the mean January temperature is 41° F and the mean July temperature is 69° F.

Maximum stream discharge is a result of winter precipitation;

¹⁴The physiography and development of the Umpqua River Basin are surveyed by the SWRB in the Umpqua River Basin (1958).

STATE WATER RESOURCES BOARD
1968
UMPQUA BASIN

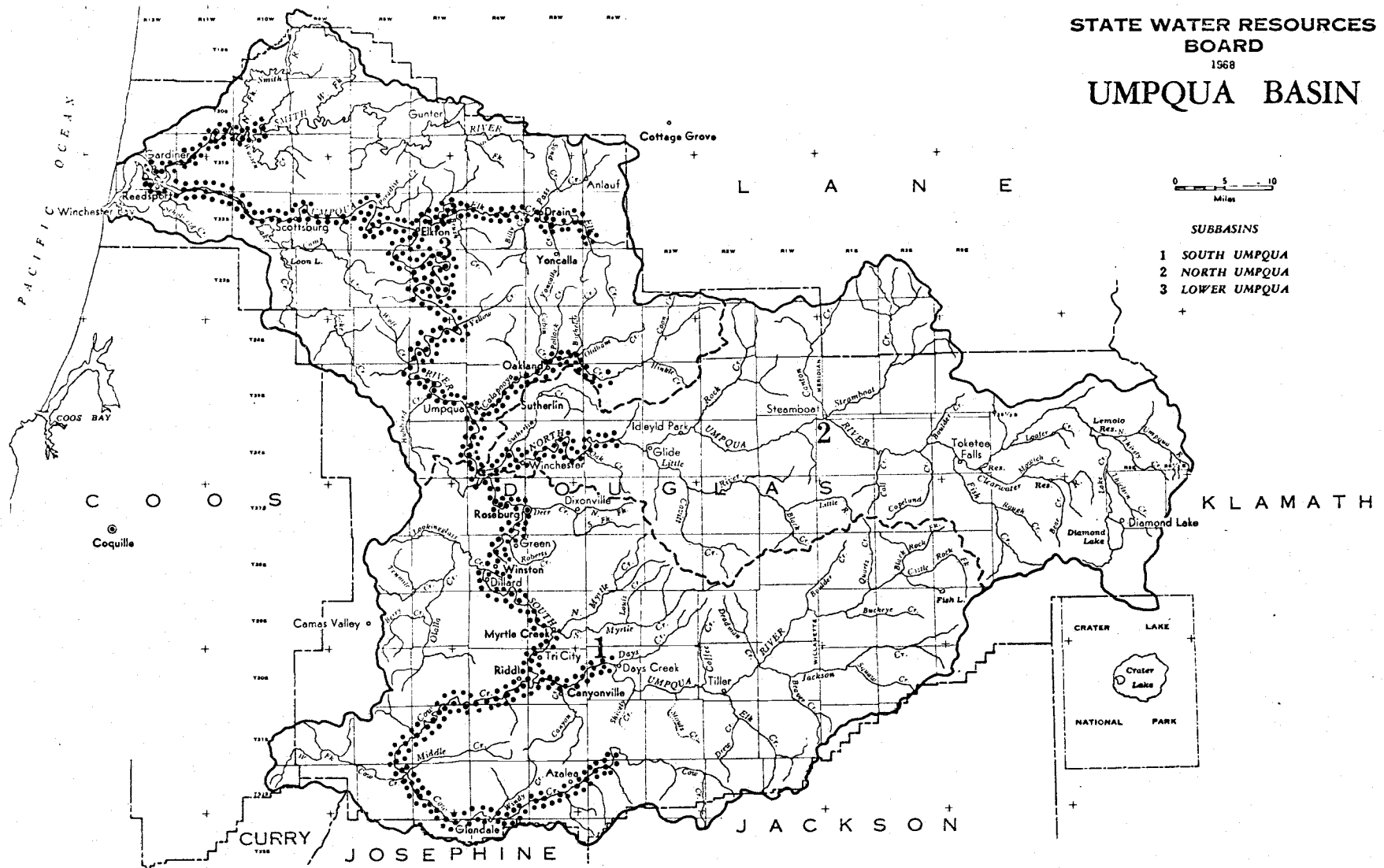


Figure 8. Flood-prone areas. Source: CNPCFS

minimum discharge is during the summer. Snowmelt during the spring keeps discharge relatively high. The North Umpqua drainage area has a large proportion of land at higher elevations and the ground is generally porous; thus water is retained to sustain flow later in the season. The South Umpqua basin, in contrast, has little land in snow accumulating elevations and the geologic formations are relatively impervious, resulting in a closer relationship between precipitation and runoff.

Floods for the most part are more a consequence of rainfall than snowmelt. The high water normally occurs in late fall to early spring. The hydrograph of the December 1955 flood in the SWRB report of 1958 shows that the river at Elkton rose from just over 6000 cfs on December 21 to almost 220,000 cfs on December 22 and fell below 6000 cfs on December 24. The Columbia-North Pacific Comprehensive Framework Study defines the flood susceptible areas of the Basin (Figure 8).

Residential and commercial development on the flood plains of the Umpqua Basin are concentrated along the South Umpqua from Cow Creek to the confluence with the North Umpqua and along the lower reaches of the Umpqua from Scottsburg to Reedsport. In the former, are the towns of Myrtle Creek, Dillard, Winston and Roseburg. Between these towns are some of the Basin's best agricultural plots. The 1964-1965 floods caused \$1,555,000 damage to agriculture

and \$2,481,000 damage to residential and commercial developments in Myrtle Creek-Roseburg reach of the River. On the tributaries to the main channel the Umpqua River, the flood plains are primarily devoted to agriculture. For example, losses in 1964 along Cow Creek were \$210,000 to agricultural interests, and \$89,000 to residential property (U.S. Army, 1966, Table 14). Downstream, between Roseburg and Elkton, development is mostly in agriculture. From Elkton to the mouth of the Umpqua River, agriculture and residences are thinly interspersed. At the mouth of the Umpqua River developments are concentrated in and around the towns of Reedsport and Scottsburg. During the 1964-1965 floods, agricultural damage in this reach of the River was \$280,000 with residential and commercial losses totaling \$4,447,000 (U.S. Army, 1966, Table 14).

The Rogue River Basin

Study areas in this basin¹⁵ include all of Josephine, most of Jackson County, and part of Curry County. Most of the basin's 5100 square miles (Figure 9) are within the Klamath Mountain physiographic region of southwestern Oregon, the remainder is part

¹⁵The physiography and development of the Rogue River Basin are surveyed by the SWRB in the Rogue River Basin (1959).

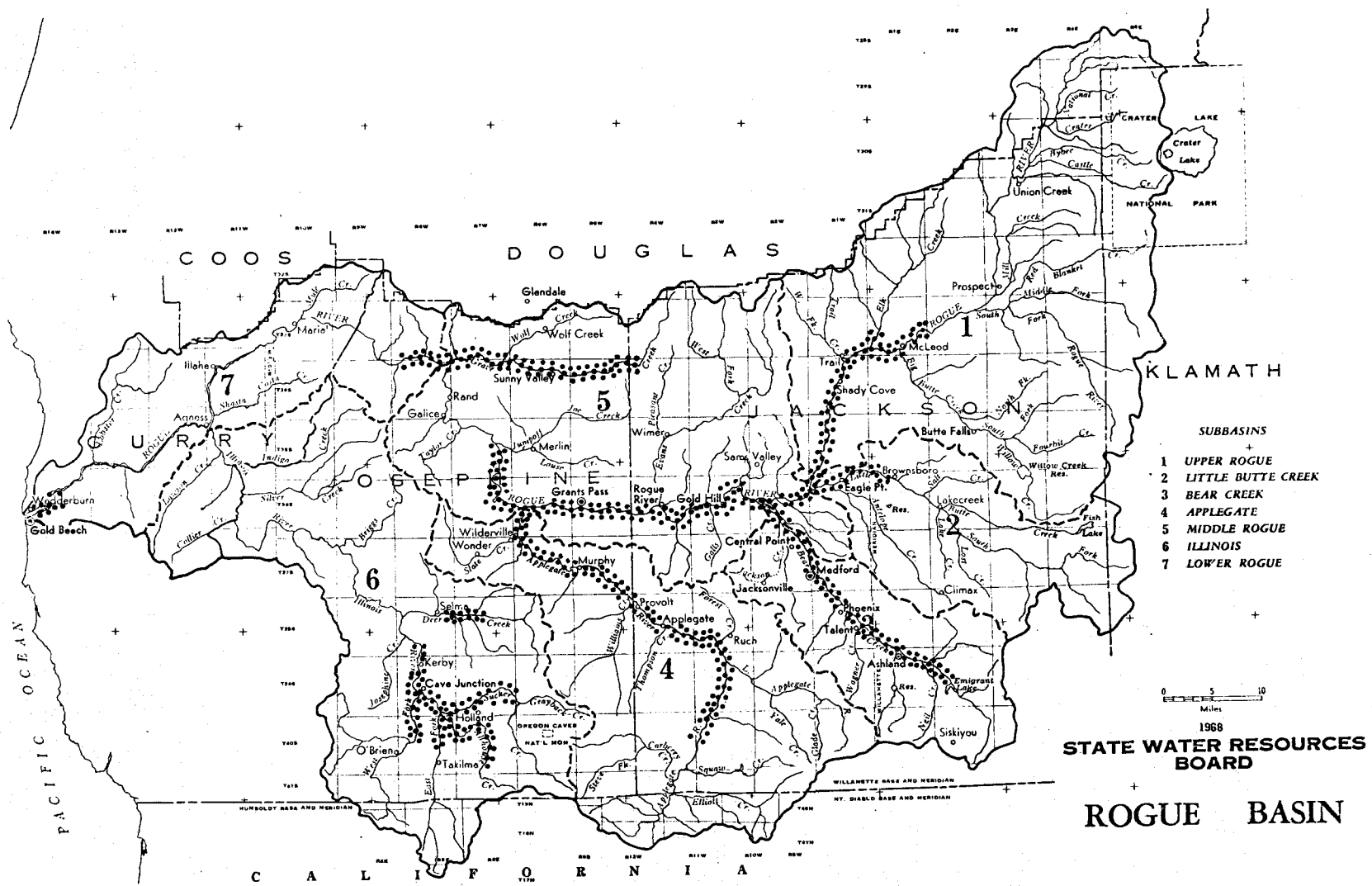


Figure 9. Flood-prone areas. Source: CNPCFS

of the Cascade region. The basin's eastern sector located in the Cascades is characterized by rugged mountains with narrow canyons and steep slopes. The middle of the basin is classified by the SWRB as the Central Valley. This area contains a series of tributary valleys, ranging up to 46,000 acres in size. The remainder of the basin is mountainous, the valleys being steep and narrow. Discharge is concentrated in the Rogue River which empties into the Pacific Ocean at Gold Beach.

Precipitation and temperature are strongly influenced by the mountains. Orographic precipitation is on the windward side of the mountains and a rainshadow is on the leeward side. Precipitation ranges from more than 120 inches per year along the crest of the Klamath Mountains to less than 18 inches annually in the Central Valley. Seasonal distribution reflects the basin's proximity to the Pacific Ocean and the pattern of shifting pressure cells and winds. Summer is the season of minimum precipitation, maximum occurs in the winter. Snowfall varies from a few inches in the valleys to more than 300 inches near the ridge line of the Cascades. Medford, representative of the populated Central Valley, has a mean January temperature of 37° F and a mean July temperature of 72° F.

Like the other areas, stream discharge also shows the influence of elevation. Lower streams have a peak discharge in the months of high precipitation. Streams at higher elevations have a discharge

dependent on snowmelt; consequently, they have a discharge skewed toward the spring months. The Rogue River shows the influence of winter rains more than spring snowmelt. In some areas discharge is modified by irrigation.

The flood plains of the Rogue River Basin are defined on Figure 9. Major floods normally occur in late fall and winter, although high water can occur as early as October. The SWRB describes the floods as "flashy" with extremely high peaks.

There are three areas of population concentration on the flood plain of the Rogue River: from Shady Cove upstream to beyond McLeon; from Gold Hill to Grants Pass; and along the lower reaches of the Rogue near Gold Beach. The other sections of the Rogue River and its tributaries are primarily devoted to agriculture. In the populated valley of Bear Creek, the Medford-Ashland area, residential development is on the high ground, with the flood plain used for agriculture. The Applegate River Valley is the same. Damages in the Applegate Valley during the 1964-1965 floods were \$1,158,000 in agricultural losses and \$41,000 in residential and commercial losses (U.S. Army, 1966, Table 15).

The South Coast Basin

Curry County lies partially within the Rogue River Basin and

the South Coast Basin.¹⁶ The South Coast Basin, totaling 2980 square miles, is divided into two noncontiguous sections by the Rogue River Drainage (Figure 10). The south section, in Curry County, lies entirely within the Klamath Mountains and Coast Range. The coastal front consists of rugged headlands, sea terraces, alluvial floodplains, and sand dunes. The interior is a mountainous area of steep narrow valleys. The SWRB reports the soils of the basin to be generally impermeable.

Orographic precipitation characterizes the basin. Minimum yearly precipitation is about 50 inches along the coast, whereas the maximum is over 120 inches in the mountains. Seasonal distribution shows a maximum during the late fall and winter. The minimum occurs during the summer. Temperatures are also influenced by the proximity of the ocean. At lower elevations along the coast and in the valleys, average annual temperatures range from 50° F. The SWRB cites Port Orford as typifying temperature conditions along the coast: average January temperature: 46° F; average August temperature: 59° F.

All headwaters are in the mountains, except near the coast

¹⁶The hydrology, geology, geomorphology, and development of the South Coast Basin are diagnosed by the SWRB in South Coast Basin (1963) and by the USDA Economic Research Service in cooperation with the SWRB in USDA Report on Water and Related Land Resources South Coast Basin Oregon (1962).

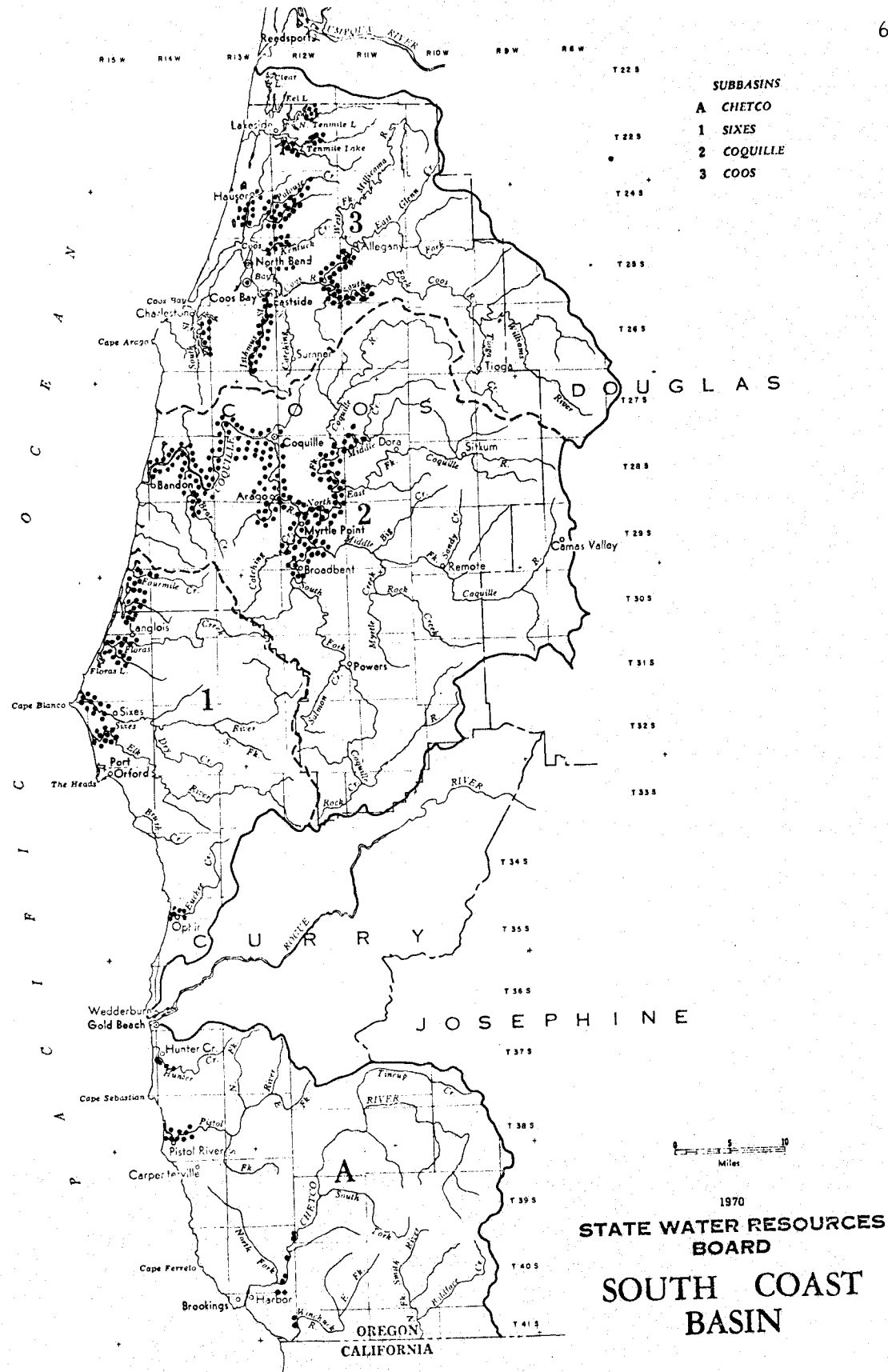


Figure 10. Flood-prone areas. Source: CNPCFS

where the separate stream valleys are short but steep. Discharge reflects precipitation so that maximum runoff is in the winter and the minimum in the summer. Because of the relative impermeability of the formations, streams rise rapidly after rains.

According to the SWRB, floods are the result of rapid runoff, tidal action, or both in the lower areas of the basin (Figure 10). Normal flood season is from November to March, but floods may occur from September to May.

Populations are concentrated in the coast's lower valleys. However, most residential or commercial development is on the high land adjacent to flood plains. Flood plains are used for agriculture, primarily pasture and hay. Up the stream valleys into the interior, there is little agricultural or commercial development. Where they exist, the interior flood plains are forested.

The Umatilla River Basin

Two study areas are within the Umatilla River Basin: the northern three-quarters of Umatilla County and the city of Pendleton.¹⁷ (Figure 11). The Umatilla River Basin covers 4554 square miles and is

¹⁷The physiography and development of the Umatilla River Basin are diagnosed by the SWRB in Umatilla River Basin (1963), and by the USDA Economic Research Service in cooperation with the SWRB in USDA Report on Water and Related Land Resources Umatilla Drainage Basin Oregon (1962).

located in two physiographic providences: The Blue Mountains and the Deschutes-Umatilla Plateau (Figures 4 and 11). The headwaters of the three main streams of the basin - Willow Creek, the Umatilla River, and the Walla Walla River, drain the north slope of the Blue Mountain anticline. These streams cross and drain the eastern half of the Deschutes-Umatilla Plateau. The 2666 square miles of the Umatilla River drainage area is the largest of the three. The Blue Mountains at the headwaters of the streams are a broad, level area characterized by steep canyons and narrow valleys. At lower elevations along the streams, the valleys become even wider. The igneous formations, especially the Columbia River basalt, are porous and permeable. The Deschutes-Umatilla Plateau is a slightly dissected, rolling syncline, the texture of which the USDA describes as "five types of terrace-like deposits" of heterogeneous deposits of alluvial, glacial, and igneous deposits. Infiltration in this type of material should be moderate to high.

Elevation has a marked effect on climate. In general, the area has low precipitation and extreme temperatures during summer and winter. Precipitation ranges from 50 inches in the mountains to less than eight inches at lower elevation with all areas experiencing dry summers. Snowfall is greatest in the mountains, averaging more than 150 inches in some areas.

Streamflow in this semiarid area shows a wide variation from

year to year. Seasonal distribution of streamflow, illustrates the heavy dependence of the discharge on snowmelt from the mountains. Maximum flow is during the spring, minimum in the summer. The amount is dependent on the watershed which accumulates snow. Daily extremes are the result of thunderstorms. Large discharge fluctuations are not uncommon in arid regions and can cause great loss of life and property. In Heppner, more than 200 people were killed by such a flood in 1903.

The SWRB differentiates between two causes and seasons of flooding. One cause is snowmelt associated with chinook winds combining with rain of wide extent and long duration. In this case, runoff is high inasmuch as the ground is frozen during the winter and early spring. The extent of flood naturally varies with the intensity of each contributing factor, but the resulting floods are the largest in the basin. The second cause is thunderstorms, which concentrate water on a small area over a short period of time. This normally occurs during the late spring.

The Umatilla River Basin is basically rural. Most of the flood plains (Figure 11) in Umatilla County are farmed. Around Pendleton, residential and commercial developments, for the most part, avoid the 100-year flood plain. Not all do, however, and some flood damage is possible. This is especially true along the Umatilla River east of Pendleton, which is mostly in the Umatilla Indian

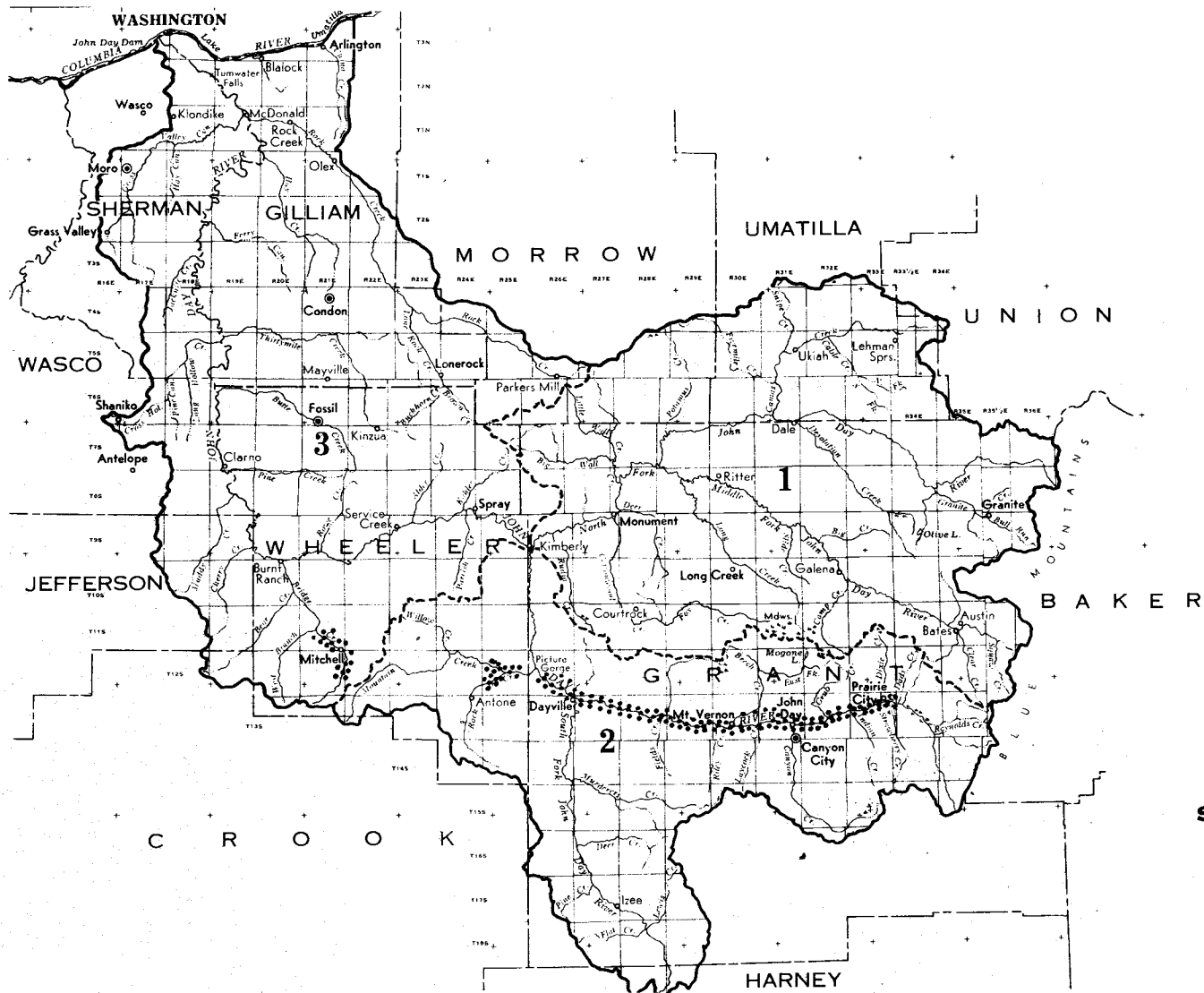
Reservation. Residential, commercial, and agricultural flood plain uses are interspersed.

The John Day River Basin

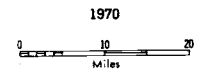
Three study areas are in this basin: the southern quarter of Umatilla County, Grant County and the city of John Day. The John Day Basin¹⁸ covers 8010 square miles in north-central Oregon (Figure 12). The headwaters of the John Day River rise in the Blue Mountain geomorphic region. The river passes through the Deschutes-Umatilla Plateau before discharging into the Columbia River. The geology is predominantly igneous extrusives, but areas of sandstone, shale, and alluvium are present. The Blue Mountains have some relatively wide, steep-sided valleys among the uplands. The Deschutes-Umatilla Plateau is a region of deeply intrenched streams separating broad, level uplands. Except for some small tributaries to the Columbia River, all precipitation which falls within the basin and exits as runoff must flow through the John Day River.

The climate is one of extremes with elevation having an important influence. Average annual precipitation ranges from less than ten inches per year near the Columbia River to more than 50 inches

¹⁸The hydrology, geology, geomorphology, and development of the John Day River Basin are treated by the SWRB in John Day River Basin (1962).



- SUBBASINS**
- 1 NORTH FORK JOHN DAY
 - 2 UPPER JOHN DAY
 - 3 LOWER JOHN DAY



STATE WATER RESOURCES BOARD

JOHN DAY BASIN

Figure 12. Flood-prone areas. Source: CNPCFS

annually in the Blue Mountains. Some mountain locations have recorded an average yearly snowfall of 190 inches, whereas Arlington, near the Columbia River, averages only 15 inches. Precipitation has a primary maximum during late fall and winter and a secondary maximum during the spring. Minimum precipitation is during the summer. Although mean temperatures depend on elevation, Condon in Gilliam County (elev. 2844 ft.) is used by the SWRB to represent the basin. The mean monthly temperature for the coldest month is 29° F in January, and the mean for the warmest month is 67° F in July.

In that the John Day River is in a semiarid region, the variation between high and low stages is extreme. Maximum discharge is the result of spring snowmelt, which is immediately followed by a summer minimum. The extreme was recorded in 1907 near McDonald Ferry at 27,800 cfs. Discharge is affected by elevation so that lower streams flood earlier and higher streams do not flood until late spring or early summer.

The SWRB attributes flooding primarily to spring snowmelt as it is affected by rain. They also cite thunderstorms as a second factor in flooding, but these are infrequent.

Flood damage is minimized because the flood plain is dominated by field agriculture (Figure 12). Some commercial and residential developments are on the flood plain, but these are mainly near John Day.

Summary

Stream flow that exceeds bankfull stage is classified as a flood. The type and extent of flooding in the study areas varies with the distance the watershed is from the coast, its position on the leeward or windward side of the mountains paralleling the coast, and elevations at the headwaters. Late fall and winter rains west of the Cascades, cause limited annual flooding and extensive high water every decade. Snowmelt and summer thunderstorms in the eastern two-thirds of the state, cause infrequent spring and summer flooding. The most severe flooding is in western Oregon, the third of the state where over half the people live (Table 5).

The pattern of flood plain use in the study areas is that of alternating regions of open space - agricultural and urban development. The Willamette River flood plain north and south of Salem is a type example. "There are major urban developments at Independence, Salem, West Salem, and Keizer, but only scattered developments elsewhere. Most of the flood plain is devoted to agricultural or related purposes" (U. S. Army, 1966, pp. 11-12).

Table 5. Summary of flooding characteristics and flood damages for the study areas.

Basin (Study Area)	Physiographic Regions	Precipitation Maximum Minimum	Flood Period	Flooding	Most Destructive Storm [*]	Damages [*] Dollars	Type of Flood Plain Occupance
Willamette Basin (Clackamas Co; Lane Co. Marion Co; Multnomah Co; Polk Co; Gladstone; Milwaukie; Portland Salem; Springfield)	Willamette Valley; Cascade Range Coast Range	late fall and winter Summer	late fall to early spring	rapid rise in temperature; melting snow on frozen ground plus continuous heavy rains	December 1964- January 1965	70,749,000	Mostly rural, but with extensive urban and suburban areas
Mid-Coast Basin (Polk Co; Lane Co)	Coast Range	late fall and winter Summer	late fall and winter	rapid-run-off of rains and along coast-tides	December 1964	approximately 346,000 for study area	urban along coast
Umpqua Basin (Douglas Co; Myrtle Creek; Roseburg; Winston)	Klamath Mt. Cascade Range Coast Range	late fall and winter Summer	late fall to early spring	combination of snowmelt and rain	December 1964	25,964,000	urban along coast and around Roseburg
Rogue River Basin (Jackson Co; Josephine Co; Curry Co)	Klamath Mt. Cascade Range	Winter Summer	Winter	rains more important in main channel	December 1964	16,382,000	urban along coast and in cen- tral Valley
South Coast Basin (Curry Co)	Klamath Mt. Coast Range	late fall and winter Summer	late fall and winter	rapid run-off of rains and along coast-tides	December 1964	unknown; but small for study area	urban along coast

Table 5. Continued.

Basin (Study Area)	Physiographic Regions	Precipitation Maximum Minimum	Flood Period	Flooding	Most Destructive Storm	Damages* Dollars	Type of Flood Plain Occupance
Umatilla Basin (Umatilla Co; Pendleton)	Blue Mountains Deschutes- Umatilla Plateau	Winter Summer	Spring; Summer	snowmelt; thunderstorms in summer	January 1965	828,700	Rural
John Day Basin (Grant Co; John Day)	Blue Mountains Deschutes- Umatilla Plateau	Winter Summer	Spring; Summer	snowmelt; thunderstorms in summer	December 1964	4,998,000	Rural

* Source: Pacific Northwest River Basins Commission, 1971.

IV. IMPLEMENTATION OF THE NATIONAL FLOOD INSURANCE ACT OF 1968, AS AMENDED

Introduction

This chapter deals with flood plain ordinances enacted by city and county commissions. The first third of this chapter discusses the advantages and disadvantages of federal, state, and local control of flood plains; the mechanics of governmental control over flood plain development, the flood plain programs affecting Oregon flood plains before the NFIA, and the minimum standards required by the Federal Insurance Administration.

The remainder of the chapter is a comparison of the laws passed by county and city commissions against the prerequisites for participation in the flood insurance program as established by the Federal Insurance Administration. Results of these comparisons shows the degree to which the NFIA has been implemented in the study areas. Participation under the NFIA requires land use regulations of flood plains.

Flood Plain Regulation

The National Flood Insurance Act of 1968, as amended, combines both preventive and corrective methods of reducing flood losses into a flood plain management program. Flood plain management

as defined through the minimum requirements for community eligibility for participation in the flood insurance program, is designed in such a way as to emphasize flood plain regulation. The minimum requirements are the result of the second objective of the Insurance Act which is to minimize "the future risk of flood losses in locations and situations where the risk of flood loss exceeds the prospect of gain from use of the site" (U. S. Congress, House. 1967. p. 10).

Planning is, of course, desirable before initiation and implementation of flood plain regulations. Framing desired community goals for future development, including the use of flood plains, is commonly formalized through a comprehensive plan. "A comprehensive plan is a blueprint to show how present and future improvements and land uses should be related" (Solberg, 1971, p. 3). Ideally, the comprehensive plan identifies present and potential problems decides which goals the community wishes to achieve, and presents flexible, practical solutions to attaining these goals. In each phase of the comprehensive plan, the agency involved would take into account the relationships among economic, civic, social, land use, and natural resource factors. Local governments would accomplish these goals by enacting ordinances, such as, zoning laws, subdivision regulations, building codes, and miscellaneous regulations.

Traditionally, planning has been the responsibility of the local government. However, because of the growing interrelationship among technology, population, and resources, federal and state influence on local planning is expanding. The federal government has assumed the dominant policy formulating role. The federal policies set the scope of the program, provide the funds to accomplish the formalized objectives, and most important, define and elaborate on the restrictions and prerequisites for participation in the program. The data necessary to implement the qualifications for the plan of action are supplied by the appropriate technically oriented federal and state agencies. In the case of flood plain management, the data ranges from the physical to the cultural-economic. As a result of the roles undertaken by the other levels of government, many local regulations enacted and implemented by city and county commissions are increasingly influenced and are becoming reactions to the federal and state policies. Flood plain regulations in Oregon are an example of such a governmental interrelationship.

Federal Influence on Flood Plain Regulation

Land use regulation is a non-federal responsibility concentrated at the "most local level possible.(Smith, 1970, p. 12).

Although the federal government has no direct role in telling local

entities how to use flood plains, numerous federal programs promulgated during the last decade are having an increased effect on the policies of local decision-makers. The U.S. Army Corps of Engineers supplies, upon request by local entities, flood plain studies that define areas susceptible to floods. These reports provide the essential engineering data necessary for flood plain planning, such as, water depths, velocities, duration of inundation, and time of flood rise (Phippen, 1970, p. 34). The Mid-Willamette Valley Council of Governments (Salem, Oregon) used the Flood Plain Information Willamette River and Tributaries in Marion and Polk Counties Oregon (Volumes I and II) to define the Intermediate Regional Flood in the Marion County Comprehensive Plan (1972). The 100-year flood plains defined by the Corps, were along the Willamette River from the Santiam River to the Wheatland Ferry, along the Santiam River from Mill City downstream to the Willamette, and along Mill Creek from Turner through Salem to the Willamette (Figure 6).

Under another federal program, the Department of Housing and Urban Development (HUD) furnishes funds for families, businesses, and factories to relocate off the flood plain. It also can provide funds for acquisition of flood-prone lands through its Urban Renewal Division (Griebenow, 1970, p. 6). The Metropolitan Development Office of HUD has public facility loans, a water and sewer program, and an open-space program (Glowacki, 1970, p. 3,

and Larson, 1969, p. 117). For example, Waterloo, Iowa, used these programs after a series of devastating floods between 1961 and 1969. Using HUD funds, the city purchased 600 flood plain acres along Black Hawk Creek. Some of this land was in open space and purchasing it prevented further encroachment onto the flood plain. The remaining one hundred and twenty-six acres were "deteriorated and dilapidated residential property" (Griebenow, 1970, p. 6). The effected families were assisted in relocating and unsafe structures that could not be moved were demolished. The land was filled with channel spoil and turned into an industrial park. Overall, the city recovered some valuable land from slums and blight and turned it into open space (Sheaffer, 1969, p. 128).

Another federal policy which affects flood plain use is Executive Order 11296 issued by President Johnson in 1966. This Order instructs all federal agencies to take into account the potential flood hazard in any of their plans, when federal structures, lands, loans, grants, or mortgage insurance are involved. One example of compliance is the action of the Department of Housing and Urban Development through a departmental order, "Statement on Policy Implementing the President's Executive Order No. 11.296," issued in May 1967 by Secretary Weaver. In brief, the statement directs HUD offices to take into consideration the possibility of floods as they administer

programs. Some of the HUD programs were applied to Black Hawk Creek in Iowa (p. 79).

The Tennessee Valley Authority Local Flood Relations Program is another federal program which influences local management of flood plains. Although limited to areas under the jurisdiction of the Tennessee Valley Authority, the program furnishes, upon request by local governments, an "appraisal of flood problems associated with industries, businesses, sub-divisions, roads and streets, public buildings, utilities, and many other proposed uses" (Weathers, 1970, p. 70). Studying the proposed solutions of the TVA may be beneficial in similar circumstances in other regions of the country.

Finally, flood insurance is available to local governments who can, if they wish, apply. Minimum land use regulations are mandatory to become eligible (Chapter II). Through these programs, the federal government tries to discourage growth where it is inconsistent with wise use of flood-hazard areas.

State Influence on Flood Plain Regulation

The role of state governments in flood plain regulatory programs is similar to that of the federal government in that state programs and legislation increasingly influence local land-use regulations. Normally, states function as the coordinating agencies between local and federal agencies and among local agencies. In

Oregon the Councils of Governments serve this function.¹⁹ The Councils are created to avoid overlap of federally funded programs. The principal role of Councils of Governments is to function as regional review boards. Each is composed of elected officials of cities, counties, and special districts forming the Council.

Until recently, few states had any statewide legislation designed to directly influence flood-plain use (Murphy, 1958, p. 18, pp. 56-59; Water Resources Council, 1972, p. 60).²⁰ In Oregon the 1969 Legislature voted Senate Bill (SB) 10 into law. This required planning and zoning by cities and counties.²¹

¹⁹ COG's do undertake some regional planning. Their programs include: a regional water quality management plan in the Mid-Willamette Valley; regional water, sewer and storm drainage plans; and, preparation of preliminary regional land use plans.

²⁰ Murphy (1958) cites only the following states as having any legislation to control flood plain use: Connecticut, Indiana, Iowa, Massachusetts, New Jersey, Pennsylvania, Washington. By 1972 the following states had local enabling acts with specific reference to flood hazards (Water Resources Council, 1972, p. 60): California, Connecticut, Hawaii, Illinois, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Nebraska, New Jersey, Pennsylvania, Texas, Vermont, Washington, Wisconsin.

²¹ The 1973 Legislature expanded on SB 10. Senate Bill 100, sponsored by Senators Hector Macpherson of Albany and Ted Hallock of Portland, establishes a statewide land conservation and development commission that will formulate and implement planning goals and guidelines by January 1975 and requires citizen participation. However, if passed, Senate Bill 300 would relate directly to the management and regulation of Oregon flood plains. Senate Bill 300 (Regular Session of the 1973 Oregon Legislature), was presented by the Committee on Environment and Land Use at request of the Oregon

Prior to consideration of Senate Bill 10, Oregon had only enabling acts and abbreviated forms of restrictions. The state had legislation permitting counties and cities to zone, to enact building codes, to institute subdivision regulations and miscellaneous ordinances.

In addition to direct legislation, two additional programs were designed to protect and provide for present and future public recreation benefits. Although they were not conceived as such, they do reduce flood losses. In 1967, the state passed a bill to create the Willamette River Park System (Willamette Greenway Program). This legislation provides that "... land can be developed for uses having a low flood damage potential while reserving the lands for future public enjoyment" (State Water Resources Board, 1972, p. 13). Consequently, the state may either purchase the land, or scenic easements, for the trail and park system. In 1970, Oregonians passed the Oregon Scenic Waterways System (ORS 390.805 to 390.925). Through this law selected state streams can be designated by the Governor (subject to the approval of the next legislature) as part

State Water Resources Board. It would require the State Water Resources Board to define the 100-year flood plain and floodway for all flood-prone drainages in the state. The Board would establish a minimum set of standards for flood plain use and development on these flood-prone lands. In addition, all state agencies and political subdivisions would take into account the flood problem in their respective programs and all final decisions would meet or exceed the minimum standards set by the State Water Resources Board.

of the system, because they and adjacent lands "possess outstanding scenic, fish, wildlife, geological, botanical, historic, archeologic, and outdoor recreation values of present and future benefit to the Public" (ORS 390.815). These laws preserve the natural setting of the lands for up to one-quarter of a mile from the water's edge. According to the State Water Resources Board (1972, p. 3), the Oregon Scenic Waterways System "set a publicly approved precedent for state responsibility for the use of areas within the flood plains." However, these selective programs contribute little to reducing flood damage since they apply to limited zones along sections of a few rivers. The remainder of the flood plain is still open for permitted uses.

The objective of flood plain regulation is to assure intelligent use of flood plains. To achieve this objective, state level regulation has a number of advantages (Water Resources Council, 1972, pp. 41-42). First, state agencies²² are more remote from those directly affected by flood plain regulations. There is not the personal contact which exists at the local level between the governed and the governing. State planners, in theory at least, can be more objective.

²²The term "state agencies" refers to state planning commissions, state water resource boards, and commissions, state engineers, and state development commissions. In Oregon there is a State Water Resource Board, a State Engineer, and the enabling legislation for a State Planning Commission.

Second, state agencies have more expertise than those at the local level for accumulating the technical data needed for defining flood plains and floodways of a particular intensity. The state agencies have more funds and personnel, although not necessarily enough, for compiling these reports than do local planners. Finally state agencies take a broader view in their planning process. State plans take into consideration the effects of an action on the region beyond the boundaries of the local units.

Local Flood Plain Regulation

Even though the federal and state governments are becoming more active in land use planning, local governments remain the primary institutions through which flood plain regulation programs operate (State Water Resources Board, 1972, p. 11). Advantages of local control are: first, few understand parochial problems better than the people who live in a community and thus their views are considered; second, there is more local participation in the planning process through elected officials, interested citizens groups, and committees directly involved; third, local programs encourage more local cooperation; finally, the laws are easier to enforce since officials understand the problems in greater depth.

At the same time there are some disadvantages to planning at the local level. Local decision-makers may be unwilling to

regulate flood plains for fear of limiting growth, of losing tax base, and/or of imposing the governmental will on influential land owners. Moreover, on a not uncommon occurrence, local planners do not consider the effects of their actions on adjacent areas. One of the best examples of short-sighted local planning happened along the Blackwater River in Missouri. In 1910 farmers decided to reclaim swampland by channelizing the River. They accomplished their purpose, but at the expense of the people downstream. Now flooding is common below the 18-mile realigned section and farmland erosion has increased (Miller, 1973, p. 24). In other cases local officials may lack the influence in their jurisdiction to pass and enforce land use regulations. In 1966 the Clackamas County Commission passed Commission Order No. 13596 which expanded zoning to all of Clackamas County. In 1968 a petition was circulated to repeal this Order. Measure 8, the repeal action, passed, and 462 square miles of zoned land was removed from regulation. The County Commission did not have the power, or influence, to assure permanent planning and zoning of their jurisdiction (Telford, 1969). In 1969, the passage of Senate Bill 10 assured the County Commission that further planning and zoning would remain in effect.

Local governments employ zoning ordinances, subdivision regulations, building codes, and miscellaneous ordinances to guide flood plain programs. These tools normally appear in combination to

achieve the desired level of administrative flexibility.

Zoning

The zoning ordinance is the primary tool for local land use management (Solberg, 1971, p. 3). Zoning laws are a means of separating incompatible land uses, such as heavy industry and single family houses. Separation is accomplished by restricting building size, specifying permitted uses, setting tract area regulations, and establishing population density regulations (Solberg, 1971, p. 3). In theory, the zoning ordinance applies to the entire community and is based on a set of explicit ideas of which land uses are most desirable for an orderly system of development. Zoning ordinances are usually not retroactive. They are aimed at guiding future development, with boundaries commonly established along some arbitrary line, such as a street or city limit line.

Flood plain zoning differs from normal zoning practices. Residences are not permitted in certain flood-prone areas. Flood plain regulations, then, are more restrictive. The flood hazard boundaries cross the common zone boundaries, resulting in requirements aimed at reducing flood damage being similar in all preexisting zones. The boundaries, which define flood hazard zones, are established by engineering techniques and do not reflect the existing land uses as is common in normal zoning practices. Flood zone

boundaries may intersect property lines at any angle, because they reflect topography and not property lines.

Subdivision Regulation

Subdivision regulations are designed to promote the general welfare of the community by directing land division. By this process, forethought is given to providing sufficient land for streets, open space, water and sewer service, and other necessities. Counties and cities impose subdivision regulations through local statutes, which can be used to manage flood plain development. Open space uses, such as playgrounds, which are mandatory in most subdivisions, can be required for land on which it is too hazardous to build residences. Homes that are in flood-prone areas can be required to have main sewer and water systems which will not be damaged by flood waters. Streets can be constructed to act as either avenues of egress for water, or as arteries of escape for residents. It can become mandatory that the degree of flooding of a plat be specified on the title, perhaps in terms of flood frequency. Thus, any jargon associated with engineering terminology, such as "lower flood plains inundated only by secondary peaks" is avoided. These are some of the requirements of the NFIA

Building Codes

Building codes, like zoning and subdivision regulations, are a local responsibility and are designed to improve the general welfare of the community. This is accomplished by protecting the building's occupants and adjoining property owners from hazardous construction and unsanitary conditions as well as from fire. Building codes are somewhat narrower in their aim and content than zoning and subdivision regulations. The aim of building codes is to regulate the physical structure of the buildings, i. e., the design and construction material employed in the structure. There are two approaches to building codes. In the first approach, specifications are established by the building ordinance by stating the construction methods and designated materials to be used. There is little choice as to how the building may be constructed. The other method governs performance by establishing the objectives of the code, as being at such a degree of stress. The builders are free to choose the combination of methods and materials which will meet these objectives. Either of these approaches can be used in building codes for flood-prone areas.

Murphy (1958, p. 98) lists four construction practices which can be used to reduce flood losses. First, a minimum first floor elevation is required for buildings on the flood plain. In this way

damage is reduced by removing damage-prone parts of the structure from the possibility of being inundated. Second, structures should be reinforced. Reinforced structures do not collapse as easily as normally constructed buildings and the reduction of debris reduces the material available for battering other homes in the flooded areas. Third, basements are prohibited below the minimum floor elevation which again reduces damages to possessions. Finally, buildings are anchored so that they will not float away. Anchoring reduces some damage to the structure as well as the probability that these buildings will float into other structures and cause more damage.

Like zoning ordinances, building codes cannot be applied uniformly to the flood plain, because of the different character of flood waters across the flood plain. Building codes are based on technical information that establishes the depth of water, the velocity, and its rate of rise for a particular zone. Codes for the floodway are more stringent than those for the 100-year flood plain, because of the more frequent inundation and higher velocities through this cross-section of the flood plain.

Miscellaneous Ordinances

Miscellaneous ordinances are the final tool of overall flood plain management. These ordinances include those regulations specifically designed and implemented to reduce flood damage.

Requiring the placement of signs, which define the limits of the desired flood plain, is one such ordinance. Another might require the purchase of flood insurance by residents of a flood plain when it is (or becomes) available.

Background for Flood Plain Management in the Study Areas

Until recently, no flood plains in Oregon were subject to special regulation. For the initiation of a flood plain regulation program a sequence of events must occur. First, county and city governments must have the authority to control land use within their jurisdiction; next, planners and decision-makers must perceive that flood plains differ from other lands because of periodic inundation and therefore must receive special attention. Finally, county and city councils must recognize that flood plain management is an acceptable complement to the engineering techniques in reducing flood losses. This series of conditions did not occur until the mid-1960's when federal and state policies stimulated and permitted enactment of flood plain regulations in Oregon.

The Power to Zone

By the early 1960's each of the counties and cities in the study had the power to control land use in its jurisdiction through zoning

laws, subdivision regulations, building codes, and miscellaneous ordinances and in most instances they had adopted some form of regulation (Table 6). City and county governments are granted the powers to plan and regulate for the conservation of natural resources and the protection of the public health, welfare, and safety.²³

Cities

Oregon cities acquire their powers to regulate development by the Home Rule provisions of the Oregon Constitution, by powers implied in city charters, by authority granted cities which lack charters and/or by the explicit powers authorized by state law.²⁴ The first three means of acquiring planning and zoning powers are implied through such phrasing as "to regulate their own affairs" or "take all action necessary or convenient for the government of its local affairs" (ORS 221.410). In 1919, the legislature passed explicit

²³ These are the general objectives of land use planning and zoning. For a detailed listing of objectives which apply to urbanizing communities, stable farm or declining farm communities, see Solberg, 1970 , pp. 3-4.

²⁴ For a more thorough discussion of planning and zoning in Oregon see Planning by Local Government in Oregon, Bureau of Municipal Research and Service, University of Oregon 1963, which this section summarizes. For a recent analysis of this topic see: Oregon Land Use Legislation Vol I, Analysis and Vol. II, Enacted Bills prepared by the Local Government Relations Division and the Oregon State University Extension Service (1973).

Table 6. Dates of initial zoning, subdivision regulation, and building codes in the study areas.

County unincorporated areas	Date of Zoning Ordinance	Date of Subdivision Regulation	Date of Building Code
Clackamas	1957	1955	1957
Curry	*	*	*
Douglas	1960	1955	1958
Grant	1949	*	*
Jackson	*	1959	*
Josephine	1961	1958	*
Lane	1949	1949	*
Marion	1960	1962	*
Multnomah	1955	1955	1955
Polk	1961	1960	*
Umatilla	1961	*	*
Cities			
Gladstone	1954	1956	1954
John Day	*	*	*
Milwaukie	1946	1960	1945
Myrtle Creek	1955	*	1950
Pendleton	1954	1955	1938
Portland	1924	*	1891
Roseburg	1955	*	1949
Salem	1926	1958	1939
Springfield	1939	1959	1940
Winston	1960	1960	1960

* Date unknown

Source: Bureau of Municipal Research and Service, 1963

measures permitting cities to control land development in their boundaries (ORS Chapter 227). They may also control development in areas within six miles of their corporate limits (ORS Chapter 92). The Bureau of Municipal Research and Service summarizes the law as follows (1963, p. 34):

The law on city planning provides that cities may adopt zoning regulations; may regulate the locations and nature of public facilities, including streets, sidewalks, public and private buildings, parks, sanitation, service of public utilities, regulate subdivision of land within the city and in some situations beyond its corporate limits to a distance of six miles; and may adopt building codes and setback requirements.²⁵

A number of additional state statutes permit some form of planning and regulation of city areas. These include ORS 449 on air pollution, ORS 492 on airports, and ORS 226 on land acquisition for civic purposes.

Counties

Acquisition of zoning powers by counties has been more recent than that of cities. Counties were limited to those powers granted by state statute until 1958 when they were allowed to seek home rule charters. The 1947 Legislature enacted laws authorizing counties,

²⁵Under the newly enacted Senate Bill 100 of the 1973 Legislature Assembly, cities and counties are required to adopt a comprehensive plan and enact zoning and other regulations to implement the plan. These ordinances must be in compliance with the yet to be established statewide goals.

but not requiring them, to plan and zone for unincorporated areas of the county (ORS 215). Expanded county planning powers were enacted in 1963 (Oregon Laws 1963, Chapter 619). A county planning commission may, but need not, be appointed and is directed to make a comprehensive land use plan for the county and may suggest appropriate ordinances for implementation of the plan. The Bureau of Municipal Research and Service (1963, p. 36) summarizes:

The proposed ordinances to carry out the comprehensive plan can include but are not limited to 1) zoning; 2) official maps. . . ; 3) conservation of natural resources; 4) the naming and renaming of public thoroughfares and the numbering of property; 5) controlling subdivisions; and 6) building codes (ORS 215.110; Oregon Laws 1963, Chapter 619, Section 7).

Senate Bill 10 of the 1969 Oregon Legislative Assembly (ORS 215.505) was an attempt to force county and city governments to enact land use plans and to zone the lands in accordance with these plans. The local commissions were given until December 31, 1971 to implement the laws objectives. If they did not comply with the law by this date so that there remained unregulated land anywhere in the county, the Governor was authorized to either take the lead in formulating a comprehensive land use plan and then administer appropriate zoning regulations or grant a reasonable extension of time for completion of the plan if the local jurisdiction was showing satisfactory progress toward the desired land and regulation. The

bill paved the way for statewide land use planning (Oregon State Water Resources Board, 1972, p. 3).

Under Oregon law interim zoning is permissible for up to three years. This allows time for consideration of the comprehensive plan. Subdivision of land in the unincorporated parts of a county, requires approval of the county planning commission or, if none exists, the county governing body (ORS 92). The city retains jurisdiction over the six mile zone around its borders, until the county specifically assumes control under the county planning law. Several miscellaneous Chapters of the ORS imply powers to counties for planning use of natural resources. These include ORS 203, the basic statutory powers of counties, ORS 449 on air pollution, and ORS 415 on county zoning districts and numerous special districts.

The powers to zone and regulate land use may be used to control development of the city and county in an orderly and systematic way. When these powers were first enacted in Oregon, there was no distinction between flood plains or other geomorphic land forms. The same laws applied throughout the local jurisdiction. They were based on a use criteria and on the attempt to avoid conflicts among competing uses. For example, residential and industrial sections were separated. Although residences could not invade industrial zones or vice versa except by getting a zone change or a variance,

each use could occupy a portion of the flood plain as long as it was within the use-based zone.

Recognition of Flood Plains as Unique

Evidence suggests that flood plains were first regarded as special categories of land use in Oregon in 1962, when the Metropolitan Planning Commission of Portland devised its own land use system. It was based on the Standard Industrial Classification Manual of the Federal Bureau of the Budget and on the code employed for transportation studies by the Bureau of Public Roads. The original manuscript, published in June 1962, as Methods and Classifications for a Land Use Inventory, employs a three digit numerical code to classify land uses. Code 101 designates "River, sloughs, etc., including adjacent land subject to flooding." A conversion table in the publication, which compares the Metropolitan Planning Commission Code to the codes of the Bureau of Public Roads and the Standard Industrial Classification, shows no equivalent flood area designation in either of the latter sources. It is therefore concluded that the Portland Planning Commission was the first in the state to accept areas subject to flooding as sufficiently distinct to warrant a separate class. The code revised and expanded in 1966 by the Bureau of Municipal Research and Service²⁶ and has since

²⁶The reports of this Bureau are not "automatically sent to

become known as the "Oregon Standard Land Use Code" (OSLUC).

Flood-prone areas are now coded 108, "Designated flood plains, flood basins (areas usually out of water but set aside for escape or retention of flood waters)." This is the code suggested for use throughout the state by the Bureau of Municipal Research and Service. The Bureau is the state-level cooperating agency for assisting local governments with planning programs. Although no specific data can be established as to when each jurisdiction became aware of the Portland zone use system, or if they instituted a flood plain land of their own, the local governments in question must have been cognizant of such a land use category when it became part of the "Oregon Standard Land Use Code" in 1966.

all county and city planning commissions." Depending upon the subject matter, each is sent to appropriate agencies.

The "Oregon Standard Land Use Code" was made available to city and county planning agencies in the state primarily through the several field offices of the Bureau which were in existence in 1966.

Several meetings with various planning groups were held both before and after the development and refinement of the "Oregon Standard Land Use Code" to obtain and disseminate information and suggestions. I have no record of the dates of such meetings (Keith, 1974).

Flood Plain Regulation

Although initiation of flood plain regulation programs by some planners and decision-makers occurred before the National Flood Insurance Act was passed, they did not necessarily employ this tool in guiding flood plain development. Gilbert White, a geographer now at the University of Colorado, was one of the first to recognize that engineering techniques could not completely solve the flood problem. He recommended in the mid-1930's that some form of flood plain management be instituted as a complement to the engineering techniques. Numerous studies have since been published by White and his associates at the University of Chicago, explaining approaches to flood damage reduction.²⁷ In 1960, Congress forewarned of the hazard of increasing utilization of flood plains when it enacted Section 206 of PL 86-645. The Section authorized the Corps of Engineers to furnish, upon request of local officials, Flood Plain Information Studies. These Studies were to provide "information on flood hazards to serve as a guide to such development, as basis for avoiding future flood hazards by regulation of use by States and municipalities..." (PL 86-645, Section 206).

²⁷ See for example White, 1964; White et al., 1958; Murphy, 1958.

House Document 465 (1966)²⁸ cites four reasons for the need of some form of flood plain regulation as a complement to the engineering approach (pp. 6-8):

1. New construction occurred within areas which had not been protected because of lack of feasibility or local cooperation.
2. Flood-prone lands adjoining protected areas were built up.
3. Similarly, along rivers where some portion of the flood plain has been provided protection by reservoirs, adjacent but vulnerable lower lying lands have been developed.
4. Lands which were protected according to efficient physical and economic criteria were visited by catastrophic floods exceeding the design flood.

Flood plain management is designed to reduce unwise development of flood plains. Federal policies such as Executive Order 11296 and the Corps of Engineer's Flood Information Series, encouraged local planners to consider some means of controlled development in order to reduce flood losses. But until local planners and decision-makers realized that flood-prone lands require special treatment, none considered flood plain management as a tool. As early as 1957 a report prepared by the Bureau of Municipal Research and Service for the Legislative Interim Committee on Local Government identified areas in Springfield and Lane County as subject to

²⁸ House Document 465, A Unified National Program for Managing Flood Losses, is a report by the Task Force on Federal Flood Control Policy. It defines the problems and recommends solutions to the increasing unwise use of the nation's flood plains.

flooding and recommended that (p. 59) "urban development should be discouraged because of flood hazard." Some subdivision control did exist in an effort to maintain drainage channels, but willingness to employ flood plain management did not come until seven years after the Bureau's report. In 1961, the State Water Resources Board requested the Corps of Engineers to furnish a Flood Plain Information Study for Lane County.²⁹ The study compiled specific information on floods, potential floods, and areas subject to inundation by floods of a 20 and 100-year frequency. The Summary Report (November 1964)³⁰ specifically recognizes flood plain management as an important tool in reducing flood losses. The report states in the Preface:

A locally instituted and enforced program of Flood Plain Management would be a valuable supplement to existing and future flood control works. It would tend to reduce the cost of future floods by placing a degree of responsibility for damage prevention on the users of the flood plain.

Flood Plain Regulation in Oregon Before Regulation

Only Lane County, Washington County, Roseburg, and Prineville are known to have instituted any form of flood plain regulation in Oregon before the National Flood Insurance Program took effect.

²⁹ Under provisions of Section 206, PL 86-648 approved July 1960.

³⁰ Appropriately released one month before the most costly floods in the history of the state, December 1964 and January 1965.

Both Lane and Washington Counties enacted their ordinances in 1965 as a result of the second most severe flooding in state history the previous winter. Restrictions on the Lane County special permit area, "the areas subject to flooding" are interpreted and approved by the county health department, the county engineer, the board of county commissioners, and the county surveyor. Specific details are not included in the ordinance, as for example, the extent of the special permit area, the flood height to which floor elevations are referred, and the parameters for a change in surface flow.

The Washington County ordinance defined the zoned areas as the fifty year flood plain. This is the boundary which the county department of public works and health department used as their reference datum. The regulations permitted some listed uses, for example, agriculture, parks, golf courses, and some selected uses which are not damaged or only slightly damaged by flooding such as airports, amusement parks, and mines. Surface water flow cannot be changed by any improvements while the placement and/or construction of wells and sewerage systems must not cause a health hazard. Homes, churches, schools, and so forth are specifically prohibited by the ordinance.

After these first two jurisdictions in Oregon enacted flood plain management programs, three years passed before Roseburg and Prineville enacted ordinances in 1968. The Roseburg public

works department was responsible for issuing permits, but there was no defined flood frequency on which to establish the extent of the flood plains. Permitted uses are farming and parks with recreation facilities and conditional uses for boat landings and launches, recreation facilities with a floor area of less than 2000 square feet, and mining. Minimum elevations for the first floor is at least three feet above an unspecified anticipated flood level. Access to the area had to be assured during flooding and sewerage systems and other improvements had to be of such construction as to not be a health hazard.

The Prineville ordinance was more refined than the other examples, although it did not specify flood frequency. It did, however, designate a floodway, or stream channel, which is the first known application of this concept in Oregon. First floor elevation, and access to property, in flood-prone areas had to be two feet above the water level shown on the map that accompanied the ordinance. Use of the floodway was restricted to uses which did not interfere with the free passage of water. Storage of material in the flood plain was limited to materials which did not float or cause a danger to other persons or property.

Minimum Standards Applied by the
Federal Insurance Administration

The National Flood Insurance Act of 1968, as amended, establishes a minimum set of federal standards that must be met in order for local jurisdictions to become eligible for the flood insurance program. When all these criteria are employed the most flexible flood

plain regulation program possible may be achieved. By this technique, local entities can permit use of flood plain as stipulated in the NFIA.

Guidelines for flood plain regulation are published in the Federal Register by the Federal Insurance Administration (Federal Register, 1971, pp. 24759-24769). Four degrees of land use control are possible. The guidelines which apply to a particular flood plain depend on the amount and kind of technical data supplied local planners by the Federal Insurance Administrator. The data issued by the Federal Insurance Administrator is:

1. A declaration that an area has a special flood hazard.
2. Identification of the boundaries of the special flood hazard area.
3. Surface water data for the 100-year flood.
4. Sufficient data to define the 100-year floodway.

With each additional piece of information, more strict land use controls apply. Thus, if the Administrator only declares that an area has a special flood hazard, the least stringent controls apply. If the Administrator can furnish all four pieces of data, the most restrictive set of minimum standards is applicable. This section is concerned with how the flood plain ordinances of each of the twenty-one study areas in Oregon as they existed in April 1973 compares to the most restrictive set of standards for riverine flood plains. The most restrictive standards on land use are used because eventually when the Administrator provides the necessary data all of the study areas must meet these requirements if they are to remain eligible for the insurance program.

Published standards of land use regulation can be classified into four groups: zoning laws, subdivision regulations, building codes and miscellaneous codes.³¹ The special flood hazard area (the 100-year flood plain) is zoned into a floodway and floodway fringe (Figure 3). The standards stipulate that the laws, ordinances, and codes enacted to reduce flood losses through land use and control measures take precedence over all conflicting statutes. The result is that nonconforming uses, which exist at the effective date of controls, can continue but cannot be expanded into the floodway. However, existing developments may be flood-proofed as long as the modifications and repairs do not increase the regional flood level. Floodway fill is also prohibited except where channel alterations offset any increase of flood heights. Land use, in the floodway and floodway fringe, is also subject to the other standards of the Administrator.

Under the Act's requirements, subdivision regulations must require proposed developments to incorporate practices that minimize flood damage. Sewer, gas, electrical, and water systems must be constructed, raised, or placed at such locations as to eliminate, or minimize, flood damage. Drainage must be designed and built to reduce exposure time of properties to flooding.

Building permits are mandatory for all proposed developments or improvements in the flood hazard area. On major repairs, flood

³¹ Division is for convenience and clarity. Some regulations may fit into two or more of the classes.

resistant materials and utilities are to be used in combination with construction methods and practices which minimize flood damage. Structures are to be protected against floods and designed, or modified, so that they can be anchored. Anchoring prevents the flotation, collapse, or lateral movement of structures. This prevents them from becoming hazardous to the health and safety of flood plain residents. New and replacement water and sewerage systems must be built to minimize, or prevent, flood water from entering or discharging from them. This applies to on-site waste disposal systems as well. The final building standard requires all new or substantially improved structures to have their lowest floor elevation (including basement) above the 100-year flood level. In the case of nonresidential structures, this requirement is modified. That is the building, its utility, and sanitary facilities may be flood-proofed below the 100-year flood level.

Only one of the F.I.A.'s printed standards can be placed in the miscellaneous category. Communities must assume a more regional view of the flood problem. They must take into account flood plain programs in neighboring areas. For example, without this stipulation, one area could develop flood plains while meeting the minimum standards for insurance. Development, however, could cause increased water heights and damage in adjacent jurisdictions even though no such problems occur in the restricted zone.

More restrictive laws, ordinances, and codes may be applied at the local level. Some communities may wish to list permitted and/or conditional uses for the floodway fringe. For example, only open space uses may be permitted in the floodway. Subdivision regulations can require streets to be at a designated height relative to a regional flood. This facilitates access to and from developments at time of inundation. Warning signs can be posted along the boundaries of the floodway and floodway fringe declaring the hazardous status of the area. Flood potential for each piece of property can be clearly stated and explained on titles to all plots in the special flood hazard area. Which extra limitations if any are to apply depends on the judgement of the local decision-makers.

The Study Areas in Oregon

Each of the flood plain ordinances which were available from the study areas in Oregon is summarized. The complete ordinances appear in Appendices C-R. Each ordinance is compared to the most restrictive standards of the FIA.

Clackamas County

Clackamas County is in the Northeastern corner of the Willamette Basin. The Clackamas, Sandy and Willamette Rivers are the main streams crossing the County. In 1971 the County

Commission enacted a Flood Hazard District (FHD) (Appendix C).

This Ordinance (Final Court Order No. 71-1151) was not a result of the flood insurance act (Manicini, 1972).

The Ordinance defined three sub-classes of flood plain. Where sufficient information is available, the flood plain is divided into a Floodway (FW) and a Floodway Fringe (FF). If sufficient data is not available upon which to divide the flood plain into two zones, the flood plain is designated a Flood Hazard (FH) Area. The Ordinance applies to the 100-year flood plain as defined by "a competent agency" (Section 29.07), such as the Corps of Engineers or the Soil Conservation Service. The Ordinance is a combining type which integrates the restrictions of this ordinance with those restrictions already applicable to an area.

Use of the Floodway Area is restricted by the Ordinance and must conform to the underlying zone. No structure, fill, or storage is allowed with any outright or conditional uses. Open space uses, such as general farming, grazing, horticulture, etc. and recreational uses, such as picnic grounds, hiking and riding, are permitted.

On the Floodway Fringe Areas, some structures may be built separately or in association with the uses permitted in the Floodway Areas. The structures must be three feet above the regional flood (100-year) level. The County Engineer or other designated official must declare that the use will not unduly restrict channel capacity.

Structures and facilities must be flood-proofed or protected. These may include anchoring, reinforced walls, pumps, sealed sewerage and water lines, and levees or channel modifications.

The Flood Hazard (FH) subclass is employed when the boundary between the other two subclasses can be defined. All uses are reviewed by the Clackamas County Board of Adjustment on a case by case basis. For each site the Board estimates the floodway and evaluates the effect of the use on public health, safety, and general welfare. All uses are subject to the regulations of the underlying classifications. Permitted uses are for agriculture, industry-commerce, recreation, residential uses (lawns, gardens, parking and play areas), and selected structures. Fill is allowed if it is not more than necessary for a beneficial purpose. Structures must be above the designated flood elevation, flood-proofed, and cannot cause an increase in flood water heights. The Board may require additional safety features, if they are considered necessary.

The flood plain ordinance adopted by the Clackamas County Commission seems to meet most standards published by the Federal Insurance Administrator for the ultimate restrictive use of county flood plains (Table 7). Only two sections of the ordinance appear to require some revision. First, no permits are required for developments or improvements in the areas defined as Floodway or Floodway Fringe. Permits are required under Section 1910.3b-4 of

Building Codes					Miscellaneous	Comments
9	10	11	12	13	14	
11A2	29.11A2		29.11A3c, d	29.11A3b, c, f		No structures, fill or storage of materials or equipment is allowed
11A3k	29.11A3k		j, c, k			
13E2c	29.13A2c	29.12	29.13E3a	29.14D4, 5b, c,	29.14C9	
13E3a	29.13E3a	29.14	29.14E5b	f, h, c, j		
			16.D2			No ordinance yet
			16.D2			G. Permits issued must not be detrimental to the intent of the flood plain ordinance
F2	16.F3	16.D2				
54	3.054	3.054				
0.1	3.80.2	3.78	3.80.5			3.76 Permitted Flood Plain Uses; 3.77 Conditional Flood Plain uses
						Section 8 Uses Permitted
	3B	2				Each permit subject to special requirements as necessary (Section 4)
			178.040.2e4			178.060 Subdivisions prohibited
				178.040.2		
.040	178.040					178.060

Building Codes					Miscellaneous	Comments
9	10	11	12	13	14	
5512	6.5512		6.5513.4	6.5513.2.3, .6, .8, .9, .10		No structures, fill, or storage allowed
5624	6.5755k	6.562	6.5775			
1561	3.1561	3.158	3.1582	3.1562 3.1564 3.1582		

ion methods and practices that minimize flood damage - 1910.3b5ii

account neighboring flood management programs - 1910.3b1

1 ft. - 1910.3d5

ent - 1910.3d3

Part 1910 -- Criteria for Land Management and Use (Federal Register, 1971, p. 24763) for any proposed flood plain development area having special flood hazard. Second, plans for development in the Floodway and Floodway Fringe must take into account neighboring flood plain management programs. The sections of the Clackamas County ordinance dealing with the Floodway and Floodway Fringe do not mention this (Section 1910.3b1). If the County is to meet the ultimate flood plain regulation requirements, these points must be acted upon.

Curry County

Curry County has not formulated any flood plain regulations.

Douglas County

Douglas County is practically coterminous with the Umpqua River Basin (pp.55-59). The flood plains affected by the Douglas County Flood Plain Ordinance are those inundated by the 1955 and 1964 floods along the Umpqua River, North Umpqua River, South Umpqua River, Calapooya Creek, Cow Creek, and their tributaries. The flood plains are shown in the Flood Plain Information Interim Report for Douglas County by the Corps of Engineers (1966). The Board of County Commissioners adopted the Interim Flood Plain Zoned Area Ordinances in December 1971 (Appendix D). The

Ordinance was implemented before the unincorporated sections of Douglas County became eligible for flood insurance. However, Mr. K. L. Cubic (1972) feels that Douglas County ". . . probably would not have Flood Plain management if the impetus of Flood Plain insurance had not been present. "

The Ordinance currently applies only to those areas defined in the 1966 Corps' Report. The County Planning Department acts as the primary enforcement agency. Technical assistance is provided through three County agencies: the Douglas County Water Resources Board evaluates compliance with building stipulations, maintenance of flood level monumentation, and miscellaneous field-assistance; the County Engineer handles cases involving fill, or removal, and roadway specifications; and the County Health Department Sanitation Section advises on the acceptability of sanitation systems.

Flood plains throughout the County are divided into three zones: the Floodway District (FW), the Floodway Fringe District (FF), or, if detailed technical information is not available, the Interim Flood Hazard District (FH). The Floodway and Floodway Fringe Districts are not defined in the Ordinance, but through evaluation of permitted land uses, they seem identical to those defined by the National Flood Insurance Act. The exact boundaries are established by the Planning Commission on the advice of the County Engineer. The Interim Flood Hazard District is an open zone, it may be used to stop flood plain

development on flood plains where insufficient information does not permit specific designation. Plans for development must be presented to the County Planning Commission and its advisors. If evidence indicates that the proposed construction violates the intent of the flood plain program, permits may be denied.

The Floodway and Floodway Fringe districts permit different degrees of development. In the Floodway District the allowable uses include:

- Agricultural uses - general farm, pasture; etc.
- Industrial Commercial - loading and parking areas
- Recreation uses - golf courses, parks
- Nonpermanent camp and trailer sites
- Marina
- Roads and bridges which do not raise flood heights
- Residential uses - lawns, gardens, parking areas
- Storage - materials not subject to water damage, and are anchored, or readily removable

Uses not permitted are:

- Permanent structures for human occupancy - homes, schools
- Subdivisions for residences
- Storage of materials hazardous to the health and safety of the public

Land uses in the Floodway Fringe District are more liberal than for the Floodway District. Any open space use allowed in the Floodway District may also apply in the Floodway Fringe District. In addition, homes can be built if the lowest floor is one foot above the 100-year flood level. This provision includes other buildings provided they are flood-proofed to regional flood level. Subdivision

regulations require home sites and streets be no more than one foot below the 100-year flood level. Sewerage and water supplies can be constructed, if when inundated they are not a health hazard. Each case is to be evaluated independently.

The present ordinance on flood plain regulation in unincorporated sections of Douglas County is deficient in several ways. These deficiencies must be corrected before the County can meet the most restrictive standards of the flood insurance program. First, no mention is made that floodway fill is prohibited, unless some form of stream improvement offsets a raised flood level (1910.3d6). Second, where development is permitted, building material and equipment are not required to be flood resistant (1910.3b5c'). Third, construction methods and practices, which would reduce and minimize flood damage, are not included in the ordinance (1910.3b5c').³² Fourth, the ordinance does not state that buildings must be anchored, so they will not collapse or float away and damage other structures in the flood-prone areas (1910.3b7ii). Finally, the Douglas County ordinance does not take into account neighboring programs (1910.3b1). These deficiencies, in the present law, may be somewhat offset by the provision permitting uses that are not detrimental to the intent

³²All such citations refer to the prerequisites for the insurance program as defined in the Federal Register, 36:24759 - 24769, 1971.

of the flood plain ordinance. It would appear that although this may cover omitted points, specific regulations are still required by the FIA standards.

Grant County

Grant County is the eastern third of the John Day River Basin (pp.69-71). The County flood plains are designated by the Water Resources Division of U. S. Geological Survey in Portland. Grant County Commissioners passed a Flood Plain Combining Zone FP (Appendix E) in September 1971. The Combining Zone is not the result of the Flood Insurance Act. Mr. B. C. Holman (1972) writes,

. . . Flood Plain Zoning in Grant County was developed as a result of the floods of December and January of 1964 and 1965. In Grant County, at least, we were not aware of flood insurance being available until September 28 of 1971.

The date cited as the first time the County Planning Commission was aware of flood insurance is debatable, because a five question survey which accompanied a HUD News Circular (HUD-No. 70-625) explaining the flood insurance program was mailed to 229 Oregon city and county planners in June 1971. The mailing included Grant County and all its incorporated areas. The survey was part of a research project through the Water Resources Research Institute of Oregon State University.

No specific flood frequency is cited in defining the areas to

which the ordinance applies. It is assumed the Ordinance applies to the 100-year flood plain. The flood plain is not divided into floodway or flood plain having special flood hazard. Therefore, all regulations apply to the entire plain.

The Grant County Ordinance superimposes the FP zone on already established zones. If a conflict exists, the FP requirements take precedence. Storage outside a building, other than a fence, is limited to materials which will not cause a safety or health hazard to other persons or property. Construction and fill are prohibited, if they retard water movement through the zone. Structures and roadways may be constructed, reconstructed, altered, occupied or used, if its finished floor elevation, or access route, is two feet above high water. A map must accompany a permit and show all property and structure locations relative to the channel and existing or potential dikes and revetments. The County Court enforces the Flood Plain Ordinance.

The Grant County Ordinance, as presently written, has several deficiencies. First, there is no division of the flood plain into a floodway or a floodway fringe (1910.3b2, 3d4). Second, there is no section which allows floodway fill if its affects on water level are offset by stream improvements (1910.3db). Third, provisions must be made so that utilities are raised or constructed to minimize flood damage (1910.3b7ii). Fourth, the building code sections of the

ordinance also needs clarification. Fifth, there is no specification that equipment and materials employed in flood-prone areas be flood resistant (1910.3b5i). Sixth, there is no notice that construction methods and practices are to be designed to minimize flood damage (1910.3b5iii). Seventh, the ordinance has no section on anchoring buildings (1910.3b6iii). Eighth, there is no provision that water and sewerage systems be designed to prevent contamination as a result of flood water (1910.3b8). And, finally, there is no provision that this set of flood plain regulations not interfere with programs in adjacent areas (1910.3b1).

Jackson County

Jackson County is the eastern half of the Rogue River Basin (pp.59-62). The Rogue River, the Applegate River, and Bear Creek are the main watercourses which cross the area. The County has a draft (Appendix F) of a Proposed Zoning Ordinance under discussion. The final form will take effect in June 1973. The draft contains a Flood Plain Combining District FP. The Jackson County flood plain management program was created so the County would be eligible for insurance. Mr. George Lewis (1972) writes, "The inspiration of such a program started with a petition bearing over two hundred signatures requesting that Jackson County participate in the National Flood Insurance Act of 1968." Consequently, Jackson

County became eligible for flood insurance in 1970. The ordinance superimposes flood plain restrictions on established zones.

Provisions of the flood plain ordinance apply to all properties and lands, bordering the Rogue and Applegate Rivers, and their associated tributaries, which were inundated by the 1964 flood. The Corps of Engineers and the Water Resources Division of the Geological Survey supply this information. The flood plain is not divided into a floodway or flood plain having special flood hazard. However, there are two use classifications. Permitted Flood Plain Uses are allowed on any part of the managed lands. These include open space uses, such as golf courses, parking areas, or agricultural uses, temporary structures (which can be removed during a flood season) and storage of materials which can be readily removed and are not a health or safety hazard.

Conditional Flood Plain Uses are allowed with approval of the Planning Commission. Some conditional uses include homes, structures associated with permitted uses, sewerage and water treatment plants, commercial uses where the combined zone permits, and flood prevention structures. A permit issued through the planning commission is necessary for conditional uses. Application for this document must state the intended use of the property and be accompanied by a map showing the plan for development relative to topography, stream channel, flood profile, and vegetation. The

Planning Commission may issue additional restrictions if it needs they are necessary.

A set of minimum standards applies to construction on the flood plain. Homes must have the lowest floor at or above the 1964 flood level; commercial buildings can have the lowest floor either at or above the 1964 flood level or flood-proofed to this level. Mobile homes or prefabricated homes must be anchored. Materials for construction must be resistant to flood damage. Fill can be used for roads, so long as it does not raise flood elevations. Finally, no new buildings or structures (including septic tanks) can be built on the ten-year flood plain. Enforcement of this ordinance is through the Jackson County Planning Commission.

The Jackson County Ordinance as it is now written does not meet final FIA standards. The Ordinance fails to divide the flood plain into a floodway or a floodway fringe (1910.3b2; 1910.3d4). Although no new structures can be built on the ten-year flood plain, the ten-year flood plain may not correspond to the floodway for the regional flood. Thus, the requirement may be too restrictive in some cases and not restrictive enough in others. The ordinance must eventually specify that utilities be raised and constructed to minimize flood damage (1910.3b7ii). A set of construction methods and practices has to be specified which will reduce flood damages (1910.3b5ii). The comment on construction methods and practices needs to be

qualified. Finally, the Jackson County Ordinance must take into account the neighboring flood plain programs, so as not to interfere with their implementation (1910.3b1).

Josephine County

Josephine County is largely within the Rogue River Basin (pp.59-62). Lowlands in the vicinity of Cave Junction, along the Applegate and Rogue Rivers near Grants Pass, and bordering Grave Creek are subject to flooding. In 1970, the County Commission adopted the Floodway District FW (Appendix G). The Ordinance applies to a small section of flood plain at the confluence of the Rogue and Applegate Rivers. The zoning is not a direct result of the insurance program, but instead was created from a need for gravel in Josephine County. Gravel is in limited supply in the County, but some people opposed its removal from this deposit. In order to accommodate gravel removal, a zone was devised which limited flood plain use, hence the Floodway District FW. Since the zone happened to fulfill the requirements for flood insurance, County officials applied and the county became eligible. No federal or state agency has yet been designated to define the 100-year flood plain and this ordinance does not specify to which flood frequency it applies. Since the ordinance was accepted by FIA, it can be assumed it refers to the floodway necessary for a flood of 100-years frequency. No

mention is made of the flood plain having special flood hazard (the floodway fringe).

Development within the boundaries of the Floodway District FW are:

- Farming
- Non-commercial park or playground
- Golf course or driving range; excluding miniature golf or a similar activity which utilizes intensive development on a relatively small parcel of ground
- Utility facilities necessary for public service
- Boat landing and docks
- Landing strips
- Sand and gravel removal operations

The Josephine County Planning Department is responsible for enforcing the ordinance through the District Attorney's and Sheriff's offices.

The flood plain zoning ordinance is markedly below the minimum regulations eventually necessary to maintain insurance. A revised county-wide ordinance (1910.3d) is required containing a flexible flood plain program, zoning laws, subdivision regulations, building codes, and miscellaneous ordinances.

Lane County

Lane County is at the southern end of the Willamette Valley (pp.46-52). The county's western third is part of the Mid-Coast Basin (pp.52-54). In 1965 the Board of County Commissioners passed Ordinance 3-65, providing for "Lane County Special Permit Area" (Appendix H). The ordinance was not the result of the Flood

Insurance Program. Mr. R. D. Ferguson (1971), Assistant Director of the Department of General Administration in Lane County, reported that the zoning regulations were a result of the 1964-1965 floods; Mr. Tom Kerr, the flood plain specialist for the Lane County Planning Commission, concurred.

The Special Permit Ordinance does not specify a particular flood plain, but it can be assumed that because this ordinance makes Lane County eligible for insurance the 100-year flood plain is used.

There are no specified permitted or forbidden land uses for the flood plain. The only land use controls were established by the pre-existing zone classifications which are: RA - Residential-Agricultural (Suburban Homesites and Agricultural Uses); M-2 - Heavy Industry; AGT - Agricultural; and unzoned. Construction in the permit area must meet certain regulations which are enforced by the Lane County Department of Health and Sanitation. First, the building site cannot be in an area which is subject to flooding so severe as to be hazardous to the health and safety of the community. Second, a minimum floor elevation is determined by the Department of Public Works. Since the Ordinance was accepted by FIA as satisfactory for flood insurance, it is assumed the elevation is at or above the 100-year flood line. Third, sewerage systems are to be built so inundation will not cause any health hazards. Fourth, no construction is allowed which will adversely affect flow. Finally,

transportation routes must be constructed to permit access for emergency operation. Section four of the ordinance provides that specific requirements may be applied to each plot to insure compliance with the objectives of preserving the public health, safety, and welfare. Appeals are permissible to the Board of County Commissioners.

The Lane County Special Permit Ordinance was one of the first ordinances in Oregon designed to counter increasing flood damage. To meet ultimate FIA standards, the law needs revision. The special permit area has to be divided into the floodway and floodway fringe, (1910. b2; 1910. 3d4). The revised flood plain ordinance must take precedence over conflicting laws and codes (1910. 3b3), which limits expansion onto the floodway (1910. 3d5). Fill must be accompanied by stream improvements (1910. 3d6). A section is needed on raising and constructing facilities and utilities to minimize flood damage (1910. 3b7ii). Three additions needed in the final version are: one requiring flood resistant materials and equipment (1910. 3b5i), another on construction methods and practices which minimize flood damage (1910. 3b5ii), and finally a section on anchoring buildings (1910. 3b6ii). Moreover, all these regulations must take into account the flood plain management programs of neighboring governments (1910. 3b1).

Marion County

Marion County is in the central part of the Willamette Basin (pp.46-52). The Corps of Engineers, the Soil Conservation Service and other technical sources are being used to define the regional flood plain along the Willamette, Pudding, and Santiam Rivers, and along Mill Creek and smaller streams. The County Planning Commission is discussing a Flood Plain Overlay Zone (Spring, 1973), (Appendix I). The National Flood Insurance Act was responsible for the County devising a flood plain regulation program. Mr. Dennis Lewis, Assistant Marion County Planner, believes that the flood insurance concept was very useful in supporting zoning designations proposed in the Comprehensive Plan. Mr. Glenn Akins, a planner for the Mid-Willamette Valley Council of Governments, feels that flood insurance actually accelerated by two or three years designations of flood plain hazard areas. He concluded that the insurance program served as a stimulus by motivating people to think about flood plains.

The draft copy of the Marion County Flood Plain Overlay Zone divides the regional flood plain into a floodway and the rest of the flood plain. Uses are restricted to those established by the combined zones. Structures are not permitted in the floodway but with the approval of the County Planning Commission, they can be

constructed in the rest of the flood plain. The applicant, who wishes to build in the flood plain, must supply proof that his development will not be affected by flood waters.

The ordinance requires a minimum floor elevation of one foot above the 100-year water level. Each structure, or land use, is evaluated by the Planning Commission. It has the option to modify plans by requiring flood-proofing measures (pumps, anchorage, water resistant materials, water tight doors), limitation on use, and/or protective measures. Storage is permitted on the flood plain if the materials are not hazardous to public health, safety, and welfare. Finally, proposed use must be evaluated in relation to other potential uses on the flood plain. This avoids placing too many restrictions on any one land owner.

The Flood Plain Overlay Zone would appear to almost meet the minimum standards required by FIA. Only a section requiring adequate drainage to reduce inundation time needs to be added (1910.3b7iii). There is no specific requirement for a building permit on the flood plain (1910.3b1). However, the consent of the Planning Commission is necessary for development. This fulfills the need for a permit.

Multnomah County

Multnomah County is at the confluence of the Willamette and

Columbia Rivers, Sandy River and Johnson Creek also cross the County. Multnomah County Commissioners enacted a Flood Hazard District in December 1971 (Appendix J). The ordinance is a product of the flood insurance program (Baldwin, 1972). Previous to this legislation the only tool officials could use to direct any development on county flood plains was the County Uniform Building Code, along with the subsurface sewerage disposal ordinances of the state and county.

Flood Hazard District applies to the 100-year flood plains. Where sufficient information is available to differentiate between them, the flood plains are divided into a floodway (FW) and a flood fringe (FF). If no division can be made between the floodway and the flood fringe, the entire area is treated uniformly and called a flood hazard area (FH). Boundaries are delineated by a "competent agency," such as the Corps of Engineers or the Soil Conservation Service. The three zones are combining.

Permitted uses in the Floodway are limited: no structures, fill, or storage are allowed except agricultural (general farming, pasture, etc.) recreational (parks, boat ramps, etc.) and any other land uses in the combined zones.

The possible uses for the flood fringe areas are greater than in the floodway zone. As long as a use is above the regional flood level, and does not restrict the floodway, development is permitted

on the flood fringe. Structures, fill and storage are allowed if the property is flood-proofed and protected. The measures may include anchoring against flotation, pumps, water resistant sewerage lines, and levees.

Flood hazard (FH) areas can be used for open space uses applicable to the floodway and flood fringe areas. However, a special permit is required from the Board of Adjustment for other developments. The structures have to meet the ordinance requirements. Fill is permitted as long as it is beneficial, not more than necessary, and protected from erosion. Structures must have their first floor, including basements, above the regional flood level. These structures are to be anchored and offer a minimum obstruction to flow. Electrical and heating equipment must be at or above the 100-year flood level. Storage, however, is possible if it is not hazardous to the health and safety of others.

The Multnomah County flood plain ordinance is almost complete. Only three sections remain to be included in the ordinance. First, floodway fill could be allowed if its effect on flood levels is offset by stream improvements (1910.3d6). Second, it should be stated that the flood plain ordinance takes precedence over conflicting laws and codes (1910.3b3). Third, the Multnomah County ordinance should take into account the flood plain management program of neighboring governments (1910.3b1).

Polk County

Polk County has not yet devised a flood ordinance.

Umatilla County

Umatilla County is in the Umatilla Basin. The flood plains in its unincorporated parts are for the most part agricultural (pp.65-69). In 1971, the County Commission adopted the F-H Flood Hazard Subdistrict (Appendix K) as part of the Umatilla County Zoning Ordinance. This is the first zoning ordinance regulating development in flood-prone areas. The ordinance is a direct result of the County becoming eligible for flood insurance (Perry, 1972, p. 2).

As of October 1972 only two reaches of flood plains had been designated as flood hazard districts. These two districts are the 100-year flood plains defined by the Corps of Engineers in their Flood Plain Information Reports on the Mission-Riverside Area near Pendleton, Oregon, Umatilla River (1969) and the Umatilla River Tributaries: McKay, Tutuilla and Wildhorse Creeks, Pendleton, Oregon, and Vicinity (1971). Other flood-prone regions will be named as the Corps' Flood Plain Information Reports become available. The flood plain subdistrict is not divided into floodway and flood plain having special flood hazard; therefore, the zoning regulations apply uniformly across the flood plain.

Almost any type of land use or fill is permitted on the flood plains if it does not raise flood heights or reduce the capacity of the cross-section to handle flood waters. But developers must meet the following conditions: First floors must be one foot above the 100-year flood level. That portion of the structure below the minimum elevation must be flood-proofed or otherwise protected. Second, all buildings must be anchored to prevent flotation. Third, subdivision lots and roads cannot be more than one foot below the 100-year flood level, and sewerage and water systems cannot create a health hazard if inundated. Fourth, buildings must be aligned with the long axis parallel to flood flow, to lessen obstruction. Fifth, electrical, heating, and other facilities must be above the 100-year flood level. Finally, mobile homes may remain on the flood plain as long as they are mobile. Storage of materials, which are dangerous to the health and safety of humans, animals and plants, is prohibited. Other materials may be stored, if they are readily moved or are firmly anchored.

The Umatilla County Planning Commission Office enforces this ordinance. A permit is issued after the applicant furnishes the required information, which includes maps showing the property relative to the channel, building dimensions, a valley cross-section, and building materials and construction.

The ordinance applies only to new uses and not pre-existing

ones. There is one exception. If a property is over eighty percent destroyed (fair market value using the Assessor's records), a structure replacing it must meet the requirements of the flood plain ordinance.

The Umatilla County ordinance, like Multnomah County is almost complete. However, in this instance, the flood plain is not divided into a floodway or a floodway fringe (1910.3b2; 1910.3d4). Another section should provide for adequate drainage to reduce inundated time (1910.3b7iii). Finally, the ordinance must consider other flood plain programs so as not to interfere with development (1910.3bi).

Gladstone

Gladstone is in the northeast corner of the Willamette Basin. Both the Willamette and Clackamas Rivers flow past the city. Flood plains along these two rivers are subject to the city's Flood Hazard Combining Zone (FH) Ordinance (Appendix L). No other form of flood plain zoning regulated development of flood-prone areas. The Flood Hazard Combining Zone (FH) is a direct result of the city applying for eligibility to the Flood Insurance Program. City Council Resolution 234 specifically states that city administrators will institute the necessary land use and management regulations of the National Flood Insurance Act. The ordinance was passed in 1971.

The ordinance applies to the 100-year flood plain as defined by the Corps of Engineers in the Flood Plain Information, Oregon City - West Linn - Gladstone - Jennings Lodge, Oregon (1970). The flood plain is not divided into a floodway and flood plain having special flood hazard, but is administered as a unit to which the ordinance applies equally.

The FH zone combines with the requirements of existing zones, but the FH zone regulations take precedence in the case of conflicting uses. Storage on the flood plain is limited to materials that are not hazardous to the health and safety of people and property in the surrounding areas. Structures may be built, reconstructed, occupied, and used after meeting three requirements. First, finished floor elevation and access routes must be at least two feet above the 100-year flood level. Second, a map must show the relation of the property, and proposed improvements, to the 100-year flood level, existing and proposed dikes and revetments. Third, the regulations which apply to the original zone classification must be met. The City Administrator enforces the flood plain zoning ordinance.

The Gladstone City ordinance needs a number of additions before it will meet the minimum standards for flood insurance. The flood plain must be divided into the floodway and the floodway fringe (1910.3b2; 1910.3d4). Two sections have to be added which prohibit expansion of non-conforming uses onto the floodway (1910.3d5) and

Building Codes					Miscellaneous	
	10	11	12	13	14	Comments
101	3.8401	3.8401				
					3.1503a.1.b.1	Perhaps the wording
			3.150.2b, .2e .4	3.1503a.1.b.1		3.1503a2b2e applies
				3.1503a.2.b, .2.3.,2, .3, .5		to the height require-
		3.1503a.2			3.150.3a2b1i	ments
						Would not furnish
						copy of the ordinance
12A	10A, 12A	12	10B, 12A	10B		Does allow for vari-
						ances Section 18-21
		1.1	1.1b	1.1c		Ordinance too general
16.2	3.606.2	3.606	3.606.1	3.606.1		
						No ordinance yet
						6 permitted uses, one
						general statement
						about preventing flood
						damages (Section
						3.03b)

Building Codes				Miscellaneous	
10	11	12	13	14	Comments
OF2	4.410F2		4.410E1e 4.410F3		No structures or storage of dangerous materials. Any development plans must be submitted to the City Engineer or Building Dept. for approval so that they do not violate the intent of the flood plain ordinance (4.410B).

1 methods and practices that minimize flood damage - 1910.3b5ii

ccount neighboring flood management programs - 1910, 3b1

t. - 1910.3d5

t - 1910.3d3.

which allow floodway fill under controlled circumstances (1910.3d6). The ordinance also lacks a section for subdivision regulations. Such a section must include raising or constructing utilities to minimize flood damage (1910.3b7ii) and drainage to minimize inundation time (1910.3b7iii). The ordinance must contain references to the need for flood resistant materials and equipment (1910.3b5i), construction methods and the practices which minimize flood damage, (1910.3b5ii) anchoring buildings (1910.3b6ii) and designing sewerage and water systems to prevent contamination from flood-waters (1910.3b8). The ordinance must take into consideration neighboring flood plain programs so as not to interfere with their implementation (1910.3b1).

John Day

John Day has not yet composed a flood plain regulation ordinance.

Milwaukie

Milwaukie, Oregon is adjacent to Portland in the south. Flood plains in the city are along Johnson and Kellogg Creeks, and the Willamette River. The first Flood Hazard FH Section of the Milwaukie Zoning Ordinance was adopted in October 1968. The Flood Hazard Section was not a direct result of the flood insurance program. However, the Act has influenced later actions of city

officials. Mr. Rod Sandoz, Milwaukie Planning Assistant, writes (1972): "it is my understanding that the City had a FH zone prior to Flood Insurance Act of 1968, although the Act was responsible for a push to include additional area." The original law (10-5.3.150, Ordinance No. 1183) has since been amended by Ordinance No. 1262 (Appendix M). The July 1972 amendment expands and clarifies the regulations applicable to the Flood Hazard Zone.

The revised Flood Hazard Zone is a combining zone that applies to the 100-year flood plain. The boundaries are based on the Corps of Engineers publication: Flood Plain Information: Milwaukie - Oak Grove - Lake Oswego, Oregon; May 1970. The flood plain is divided into two subclasses, the Floodway (FW) and Floodway Fringe (FF). These classes are based on the Corps' Report.

Uses in the Floodway Zone are limited to those uses in the underlying zone which do not need any structures, fill, excavation or storage. Some conditional uses are permitted if they can withstand regional floods without significant damage to themselves or other persons or property and if they do not significantly impede flow during a regional flood. These uses include marinas, docks, roadways, and storage of materials. In some locations sand, gravel, and other materials may be extracted.

More uses are allowed in the Floodway Fringe (FF). All those uses practical under the Floodway regulations are allowed and any

others, as long as they conform to the provisions of the pre-established regular zone. However, a permit is required from the Planning Commission. Before action is taken on the permit, the Commission must consider the danger to life and property by the structure, the health hazard, availability of alternate locations, accessibility during floods, and water velocity and depth at the site. The Commission has the option to require modifications to the facility, operational controls, limitations on use, construction of protective measures, and flood-proofing.

A number of additional sections must be included in the Milwaukie flood plain ordinance before it will meet the FIA final standards. For example, that fill can be permitted in the floodway if channel improvements offset any resulting water heights (1910.3d6). A minimum floor elevation at or above the 100-year flood level is mandatory for homes (1910.3d2). Commercial structures may be flood-proofed to this level (1910.3d3). Finally, the Milwaukie ordinance must take into account the flood plain management programs of neighboring governments when deciding on floodway uses (1910.3b1).

Myrtle Creek

Myrtle Creek will not supply a copy of its flood plain ordinance, if one exists.

Pendleton

Pendleton is the county seat of Umatilla County. Flood plains of the Umatilla River and its tributaries cross through the incorporated boundaries of the city. In 1971, the City Commission passed Ordinance No. 2648 (Appendix N), an Ordinance Establishing Flood Hazard Areas; Providing For Construction Limitations; Establishing Permit and Variance Procedures; and Declaring an Emergency. The Ordinance is known as the City of Pendleton Flood Plain Interim Zoning Ordinance of 1971. Pendleton did not have any flood plain zoning before becoming eligible for insurance. The Ordinance is the result of the insurance program (Marlow, 1972).

The ordinance applies to the 100-year flood plain. These flood plains are defined by the Walla Walla District of the Corps of Engineers in Flood Plain Information, Umatilla River Tributaries: McKay, Tutuilla and Wildhorse Creeks, Pendleton, Oregon and Vicinity, " March 1971. The ordinance applies to the entire flood plain as there is no distinction between the floodway and the flood plain having special flood hazard.

No structure or fill is allowed if it increases flood heights. If fill is permitted it is not to be greater than necessary and must serve some beneficial use. Buildings are to have their minimum flood elevation one foot above the 100-year flood level and any part

of the structure must be flood-proofed to this level. Structures are to be anchored to prevent flotation and aligned so as not to retard flood flow. Subdivision lots are not to be more than one foot below the 100-year flood level and accessible by roads which are not more than one foot below this level. Health hazards are avoided by requiring sewerage and water systems to be flood-proofed. Electric and heating facilities have to be above the flood level. Mobile homes must remain mobile. Material and equipment cannot be stored on the flood plain if they would form a health hazard.

The Pendleton Building Inspector is authorized by the City Manager to enforce the ordinance. Permits are required for construction, reconstruction, alteration, and occupancy of buildings, and the Pendleton Planning Commission reviews all permits. Non-conforming uses may continue but they may not be altered, extended, or replaced, unless they meet the provisions of the flood ordinance. Variances are possible if special hardships would result from unusual circumstances.

In order to meet maximum FIA standards, the flood plains in Pendleton, must be divided into the floodway or the floodway fringe (1910.3b2; 1910.3e4). A section must be added to permit fill in the floodway provided channel improvements will offset increased flood heights (1910.3d6). Another section must be included to provide adequate drainage and reduce the inundation period.

(1910.3b7iii). Finally, the Pendleton ordinance must consider the effects of this law on the flood plain programs of neighboring governments (1910.3b1).

Portland

The City of Portland is at the northern end of the Willamette Valley. Within incorporated boundaries are parts of the flood plains of the Columbia and Willamette Rivers, and Johnson Creek. The city Council passed a flood plain ordinance (Ordinance No. 134486) in April 1972. The ordinance applies to these three watercourses. Even though the City zoning code had a designation for flood plains in the early 1960's (101 in original code, 108 in the revised edition), it was not used to direct and control flood plain development in the City. Ordinance No. 134486 is the first regulatory statute designed to reduce flood losses. It is a direct result of the City applying for the flood insurance program. Section I states: "The Council finds that in order to qualify for flood plain insurance pursuant to the National Flood Insurance Act of 1968 that certain procedures relating to construction and building work in a flood plain area must be authorized" (Appendix O).

Although no flood plain is designated, the ordinance is assumed to apply to the 100-year flood plain. The Corps of Engineers, Portland District, is now in the process of defining the floodway and

flood plain having special flood hazard for the three waterways. The appropriate bureau of each city department is responsible for enforcing the section of the ordinance.

The Portland plan requires the review of building permits to insure the use is reasonably safe from inundation. Structures in flood-prone areas are to be anchored to prevent movement or collapse. The materials used are to be flood resistant and construction practices are to minimize flood damage. Subdivision regulations require 1) all proposals for development must minimize flood damage; 2) all utilities and facilities must be located, raised, or built to minimize or eliminate flood damage; 3) exposure time to water must be minimized by providing adequate drainage; and 4) water and sanitary systems are to be built to prevent contamination due to flooding.

The ordinance which now applies to Portland needs some revisions before it meets maximum standards. A revised ordinance must divide the flood plains into a floodway and a flood plain having special flood hazard (1910.3b2 and 1910.3d4). The ordinance must take precedence over conflicting laws, ordinances, and codes (1910.3b3), while preventing non-conforming uses from expanding into the floodway (1910.3d5) or allowing fill in the floodway, if the increased flood level is offset by stream improvements (1910.3d6). A section needs to be added which requires residences and

non-residences to be at or above the 100-year flood level, (1910.3d2), the latter may be flood-proofed to this level (1910.3d3). Finally, some provision must be made so that the regulations do not interfere with flood plain management programs in adjacent areas (1910.3b1). The provisions which do exist must be clarified, as to exact meaning, in order that they may be administered equally. Overall, those section, as now written, are too general and open to too broad an interpretation.

Roseburg

The City of Roseburg, the County Seat of Douglas County, is at the confluence of the South Umpqua River and Deer Creek. In January 1969, the City Council, adopted the initial Flood Plain Zone FP Ordinance No. 1737, (appendix P). The flood insurance program did not cause the Planning Commission to recognize the need for flood plain control (Gohn, 1972). The ordinance was passed before the Flood Insurance Act became law.

As the Flood Plain Zone is now written, it applies to three sections of Roseburg: Elk Island, Gaddis Park, and Templin Beach. The Planning Commission is using HUD "701 Grant" funds to update their Comprehensive Plan. The flood section of the Comprehensive Plan is being revised to meet minimum standards set by the flood insurance program. The United States Geological Survey is

furnishing the necessary information for defining the 100-year flood plain.

The Flood Plain Zone, before revision, did not divide the flood plain into floodway or flood plain having special flood hazard. The permitted and conditional use apply to the flood hazard area. Permitted uses are limited to farming and publicly owned parks and recreation facilities. Conditional uses are boat landing and launch facilities, open land recreation facilities of less than 2,000 square feet of floor area, and mining.

For any structures which are erected, constructed, established, or moved onto the FP zone, a Department of Public Works permit must be obtained. This agency must determine that the facility will not cause damage or injury to the health, safety, and welfare of present or future persons or activities. The first floor must be three feet above potential future floods. However, what the potential future flood may be is not yet defined. Subsurface sewerage systems are to be built so as not to endanger the health, safety, and welfare of residents in the flood area. Any improvement of property is not to raise flood elevations. Finally, access routes must be designed and constructed so they can be used during flooding. The Roseburg Building Department enforces the requirements of the Flood Plain Ordinance.

This ordinance needs some corrections and additions to meet

the FIA ultimate standards for the flood insurance program. First, the flood plain must be divided into a floodway and a floodway fringe (1910.3b2; 1910.3d4). Second, the ordinance must stipulate that floodway fill is permitted if channel improvements offset any increased water levels (1910.3d6). Third, a section must be added which requires utilities to be raised or constructed to minimize flood damage (1910.3b7ii). Fourth, provisions must be made to provide adequate drainage to reduce flood time (1910.3b7iii). Finally, the effects of the ordinance must be considered in relation to adjacent flood plain programs (1910.3b1).

Salem

Salem has not enacted a flood plain ordinance.

Springfield

The City of Springfield is at the southern end of the Willamette Valley. Limited sections of flood plains of both the McKenzie and Willamette Rivers (pp.46-52) are within the incorporated limits of the City and subject to its jurisdiction. The City Council adopted a FP - Flood Plain Section (Appendix Q) as part of its Zoning Ordinance in September 1970. The Flood Plain Section was formulated before the Council considered applying for the flood insurance program. Mr. Dick Johnson, the City Planner, wrote (1971),

" . . . the FP Section in our Zoning Ordinance was not drawn up with the Flood Insurance Act in mind. We wanted such a section regardless of any state or federal regulation. "

The Flood Plain Section of the Springfield Zoning Ordinance applies to the 100-year flood plain as defined by the Corps of Engineers. The Office of the City Engineer is responsible for establishing the specific flood plain boundaries. The work of this office is subject to Planning Commission approval. The boundaries may be adjusted in response to a changing flood crest which results from additional flood control measures. The flood plain is treated as a single unit to which the regulations apply uniformly. There is no division of the flood-prone area into floodway or flood plain having special flood hazard.

Development is limited, because of the nature of permitted uses. The following land uses are allowed and these must conform to established zone classifications:

- Parking area private
- Parking area public
- Parks, playgrounds, golf courses, or driving ranges
- Feeding, breeding and management of livestock and dairy cattle
- Raising and harvesting crops
- Other agricultural or horticultural uses or any combination thereof.

The ordinance is a combining type. For any construction a building permit, which sets minimum floor elevation, must be obtained

from the City Engineer. The floor must be at or above the 100-year flood level as this ordinance was accepted by FIA. Buildings, commonly associated with designated uses or allowed under the original zone are permitted. In each case the City Engineer is responsible for seeing that health or safety violations do not occur, which may harm other persons or property.

The Springfield ordinance is very brief and treats the entire flood plain as a floodway. There is little flexibility in the program since the ordinance establishes a list of permitted uses. This type of ordinance will, however, meet the FIA final minimum standards, because if the area is zoned to open space type uses other standards are not necessary.

Winston

Winston is a small town on the South Umpqua River in Douglas County. When the county applied for flood insurance it encouraged all the incorporated areas in the county to qualify. The City Council adopted Section 4.410 Flood Plain Development (Appendix R). The City adopted the resolution and became eligible for insurance (Hooten, 1972).

The ordinance is a copy of the Douglas County flood plain ordinance (Appendix D). The only differences are in specific names

and locations, in order that the ordinance apply to the City of Winston.

Comments on deficiencies and recommendations for Winston to meet FIA minimum standards are the same as those of Douglas County.

Summary

Flood plain regulations are only one part of the comprehensive plan. The plan defines community problems, sets the priority of community goals for the future, and offers practical solutions. Ideally, flood plain regulations are used to guide orderly and rational use of flood-prone areas. Although long thought to be a local problem, land use decisions are increasingly coming under the influence of policies initiated by federal and state agencies. While implementation of policies remains at the local level, federal and state agencies are now taking a more direct and active role in land use programs. Local governments have so far retained most of the power to enact the necessary zoning ordinances, subdivision regulations, building codes, and miscellaneous regulations, which will meet minimum federal and state standards. But the restrictions each flood plain ordinance contains will ultimately only reflect what is required by the NFIA. The local governments cannot change federal legislation.

Flood plain management is the most recent example of a federally instituted and locally implemented legislation. A flood plain regulation program, as required by the National Flood Insurance Act of 1968, is enforced through zoning laws, subdivision regulations, building codes, and miscellaneous ordinances. As of June 1972, twenty-one cities and counties in Oregon had qualified for the insurance program and must meet the minimum standards established by the Federal Insurance Administration. All ordinances discussed in this chapter must be revised and expanded to some extent if the minimum standards are to be met (Tables 7 and 8). The period of time needed for these revisions depends on the availability of data furnished by the FIA. As of now, the agencies which supply the necessary technical data to the FIA are the Corps of Engineers, the Geological Survey, and the Soil Conservation Service. Unfortunately, these agencies do not have the personnel to respond rapidly. Therefore, revisions will be delayed and development of flood-prone areas will not be directed in accordance with the NFIA.

Impact of the Insurance Program on State Level Organization

It is difficult, if not impossible, to separate all of the consequences of the Act from the normal evolution of flood plain management at the state level. Statewide land use regulations had been seriously discussed in Oregon for the past decade and Senate Bill

10 (1969) is a result of the pre-flood insurance activity (Alexander, 1971). The study did determine that the NFIA had only limited effect on state level organization. First, by July 1972, no new state enabling acts giving counties and cities enlarged powers to zone, plan, or establish subdivision regulations and building codes were passed in Oregon as a result of the Insurance Act. Oregon cities acquire their powers to regulate development by the Home Rule provisions of the Oregon Constitution, by powers implied in City charters, by authority granted cities without charters and/or by explicit powers authorized by state law. Counties were limited to those powers granted by a 1947 statute; however, in 1958 they were allowed to seek Home Rule charters. Expanded county planning powers were enacted in 1963.

Second, the study determined that in 1966, two years before the Act became operative, flood plains were already recognized by a state level agency (The Bureau of Municipal Research and Services) as unique and deserving a separate zone code.

Third, the possibility of managing the flood plain to reduce flood losses was available before the National Flood Insurance Act, although not widely used. Dissemination of the concept was through Section 206 of PL 86-645 in 1960. This statute authorized the Army Corps of Engineers to furnish, upon request of local officials, Flood Plain Information Studies. These studies were to provide

"information on flood hazards to serve as a guide to such development, as a basis for avoiding future flood hazard by regulation of use by States and municipalities. . ." (PL 86-645, Section 206).

The first such study in Oregon was begun in 1961 for Lane County. The Summary Report (November 1964) states,

A locally instituted and enforced program of Flood Plain Management would be a valuable supplement to existing and future flood control works. It would tend to reduce the cost of future floods by placing a degree of responsibility for damage prevention on the users of the flood plain.

Fourth, the State Water Resource Board, the state coordinator of water basin development, had a designated, fulltime flood plain specialist by 1965. No additional positions dealing with flood plains or their use are known to have been formed as a result of the NFIA.

Finally, the NFIA prompted the Bureau of Governmental Research and Service to issue Flood Plain Management for Oregon Cities and Counties (1969, revised 1971). This was the first state publication on flood plain management in Oregon. The report, partially funded through a Department of Housing and Urban Development 701 grant, is a brief discussion of the local government responsibility for managing flood plains, the legality and purpose of potential regulations, a summary of the management programs in effect by August 1969 in Lane and Washington Counties, and Roseburg and Prineville, and a review of the requirements of the Flood

Insurance Act of 1968. This volume informed jurisdictions throughout the state that legislation, in effect by 1969, was sufficient to enact flood plain regulations, and that these regulations may be designed to qualify the area for flood insurance.

Impact of the Insurance Program at the Local Level Organization

The National Flood Insurance Act and its accompanying regulations had greater impact at the local level of government than at the state level. Six counties and five cities initiated flood plain regulations in order to become eligible for flood insurance. Over fifty percent of the governments in the study areas would not have instituted flood plain regulations at least as soon as they did, had it not been for the assistance provided flood victims by the insurance program.

Standardization of technical reports, needed by local governments for participation in the insurance program, resulted in the designation of the 100-year flood level as the uniform flood plain limit. Of the four flood plain management programs in effect when flood insurance was enacted, only Washington County had defined a specific flood frequency, the fifty year flood plain. Lane County, Roseburg, and Prineville had defined the regulated areas as those subject to flooding thus providing no frequency on which

to systematically establish limits. If the practice of each planning unit setting its individual flood plain limits had continued, a major problem would have developed in statewide coordination of flood plain programs. Some programs may have been so vague and lax as to be ineffective in reducing flood losses by permitting structural development which would increase frequency and depth of flooding in adjacent areas.

In addition to defining the maximum extent of the flood plain, the standards for the NFIA divide the flood plain into the floodway and floodway fringe and designate the allowable uses for each. None of the four programs, in effect before the NFIA, had such a division of the flood plain or so specific a set of standards. The division of the flood plain is a more efficient allocation of the use of hazardous areas, because the degree of control is proportional to potential destruction. Thus, floodways are strictly regulated because they are subject to more frequent and destructive flooding than the floodway fringes.

All local flood plain management programs analyzed in the study need some alteration in order to meet the final minimum standards established by the Federal Insurance Administration. Regulations passed so far indicate decision-makers do not fully understand what is expected by the prerequisites for insurance. Even the most complete regulation, that of Clackamas County, has

omitted some requirements which must eventually be included to meet FIA regulations. In the study area regulations, four standards are most commonly omitted:

1. Section 1910.3d6 on fill in the floodway
2. Section 1910.3b7ii on raising utilities above the 100-year flood level
3. Section 1910.3b7iii on adequate drainage
4. Section 1910.3b1 on considering neighboring flood plain programs when instituting such a program.

V. A SURVEY OF FLOOD PLAIN OCCUPANTS

Introduction

The National Flood Insurance Act of 1968 is designed to relieve flood loss in two ways. First, it minimizes "the future risk of flood losses in locations and situations where the risk of flood loss exceeds the prospect of gain from use of the site," and second, it assists "victims of flood damage to restore their homes and business" (U.S. Congress, House, 1967, p. 10). The first objective was discussed in Chapter IV (pp. 75 to 152). Chapter V discusses the second part, that is, protection of flood plain occupants through subsidized insurance. This goal can only be achieved if the occupants know their homes can be flooded; if they are aware that subsidized insurance is available in the community; if they are willing to purchase it; and if they receive sufficient information on hazardous conditions from authorities. To determine the attitude of potential insurants, a survey was mailed to a sample of flood plain occupants in a study area.

The Sample

Lane County was chosen for the study, because it was one of

the study areas, in late 1972, for which FIA approved maps³⁸ showing the one-hundred year flood plain were available.³⁹ The sample was selected from four sections⁴⁰ and based on three qualifications.

First, the structure must have been built in a subdivision type tract within the limits of the 100-year flood plain as defined by the FIA. Tract homes are commonly built on slabs and are, therefore, more susceptible to flooding than rural homes. The latter are usually on some form of raised foundation. In addition, homes constructed on rural agricultural flood plains are usually built on land above most floods. Second, homes had to be constructed before the spring of 1965 because homes built after this date had to comply with the Lane County Special Permit requirement. That is, they had to have the lowest floor above flood waters. A photo mosaic, in the Lane County Planning Office and dated March 8, 1965, was used to

³⁸FIA Flood Hazard Boundary Maps No. 1-41-039-0000-06 through No. 1-41-039-0000-22, effective December 39, 1971.

³⁹The other study area for which FIA approved maps which define the 100-year flood plain were available at this date with Springfield.. Springfield was eliminated for the survey because the flood-prone area shown within the 100-year flood plain was unoccupied, agricultural land. Neither the Jackson County nor the Josephine County FIA maps show the 100-year flood plain.

⁴⁰T16S R4W S35 and S36; T17S R4W, S1 and S2. Based on the Willamette Meridan. FIA Flood Hazard Boundary Map No. 1-41-039-0000-14.

locate structures built prior to this date. Only structures identified as being a part of a subdivision were selected.

The third qualification limited the survey to houses which the county assessor's roll showed were occupied by persons who paid the 1972 property tax. It was assumed throughout the survey that a person who owned a structure will be more interested in protecting it than a renter, and would be better informed on alternative methods of attaining protection. The limitations imposed by the above qualifications resulted in a sample size of seventy-five. Although no social or economic criteria were established for the survey, the sample does suggest how some flood plain residents react to the flood hazard. It is emphasized, however, that conclusions for other study areas cannot be based on this sample. The sample is small and from only one of the study areas. The responses are further biased because the sample area is downstream from several large, locally-known Corps of Engineer flood control structures.

The Questionnaire

The seventeen question survey (Appendix S) can be divided into four parts. Part one is an introduction composed of questions one through three. The introductory phase of the questionnaire directs the respondents attention to the relation between the structure he owns and the subject of floods. Section two involves questions

four through eight and is designed to document if the flood plain occupant knows he is living in a hazardous area and how he feels about development on the 100-year flood plain. Section three, questions nine through fifteen, is used to test if the flood plain occupant knows about insurance and if he will purchase coverage under the program. The final questions seek to establish how most people in a hazardous area get their emergency information in time of, and just prior to, disaster.

The questionnaire was pre-tested on eight people who live on the 100-year flood plain in and around Junction City, Eugene and Corvallis, Oregon. Suggestions in clarifying questions and answers were incorporated into the survey before final distribution.

The survey was completed through the mail, although it was not initially intended as a mail survey. A post card explaining the purpose of the survey and background of the researcher was sent first. Two days later, the survey was sent with a cover letter again explaining the purpose of the survey and who the researcher was. The author then attempted to hand collect the survey during the evening (between seven and ten) five days later. Although it had been determined from review of other surveys that this technique would guarantee a larger response than a mail return, hand collection proved ineffective. Of the homes contacted most said they had not had time to answer the survey, or there was no one home.

The day following the attempted collection the survey was again mailed, this time with a self-addressed, stamped envelope included. The questionnaires were numbered and a week later a post card was sent to those who had not responded. This approach produced better results: fifty-four responses were received. Of the fifty-four, three people had moved and one was deceased. The questionnaire was forwarded to the three people who moved. They answered the questionnaire and returned it. The questionnaire to the deceased was returned unopened. All four were disqualified as the subjects no longer inhabited the structure referred to in the questions. Fifty questionnaires were considered valid for a 67% return.

Appendix S lists the results from the fifty valid questionnaires. From these results, frequency distributions were tabulated with the assistance of Dr. P. Schilling of the Experimental Statistics Department, Louisiana State University. Forty-nine variables were tabulated to determine the frequency distribution.⁴¹

Evaluation of the Results of the Questionnaires

Forty-nine of the fifty people, who responded to the survey, confirmed they owned the house in which they live. Eighteen of

⁴¹Only one answer was requested for Question 12. However, most people ignored the directions and marked numerous choices. The directions for Question 17 were also not followed.

the residents have lived in their homes for nine or more years. These people had first-hand experience with the 1964 flood, the last major flood in the area and the basis for the FIA maps. During that flood ten families had water in their street or in the immediate neighborhood, and eight others had water in their homes up to depth of thirty-six inches. One person experienced flooding in 1967 that left six inches of water in his house. No one else reported such a flood during this period. Half of the group whose homes were flooded said they had been flooded at least once. Five of the flood victims did not know flood insurance was available, but, of those who did know, none indicated they would buy it (Table 9).

Table 9. Frequency of Q10 and Q11 when Q3 is yes.

	Q11 is yes	Q11 is no	Q11 is Don't Know
Q10 is yes	0	3	0
Q10 is no	1	1	0
Q10 is Don't Know	2	1	0

Q3. Has this structure been flooded since you have lived here?

Q10. Is there any kind of insurance available which covers flood damage?

Q11. Would you buy insurance if it were available at 25 cents/year for each \$100 of value on contents and building? For example, \$50 per year on a \$20,000 house and \$12.50 on \$5000 contents.

Twenty-eight of the sample felt living in the 100-year flood plain was not overly hazardous, but none indicated they would live

within the five-year flood plain. The respondents seemed to understand the concept of a frequency of flood potential of an area although they could not relate these numbers to any actual flood heights. No one of the respondents, who experienced flooding, felt a flood of the 1964 magnitude would occur again and only one-third of the more recent residents thought such a flood was possible.

Fifty-four of ninety-one responses (Appendix S, Question 7) favored restricting development on the 100-year flood plain to open space uses and agriculture. Nonetheless, they felt that if the government permits development, it is responsible for warning citizens that their homes and property are subject to flooding, whatever the frequency. Most of the respondents stated that even after governments warn potential victims, the governments should still help flood victims through loans, tax breaks, and grants.

Only thirty-six percent of the respondents knew flood insurance was available (Table 10). Only four of the eighteen home owners who knew of insurance would purchase it. Judging from the responses in Table 10, most respondents would not object to zoning, subdivision regulation, and building codes for flood-prone areas, which limit uses to open space and agriculture. In other words, government could have a direct influence on disposal and use of private property provided it furnishes assistance to flood victims. These same people preferred dams, levees, and/or channel

Table 10. Frequency of Q4, Q10, and Q11 on Q7, Q12 and Q14.

		7A	7B	7C	7D	7E	7F	12A	12B	12C	12D	12E	12F	14A	14B	14C
Q4 is yes; Q10 is yes; Q11 is yes;	Total is 2		1	1	1	1	1	1	1		1			1	1	
Q4 is yes; Q10 is yes; Q11 is no;	Total is 7	1	2	2	1	3	5	4	2		3		1	2	3	1
Q4 is yes; Q10 is yes; Q11 is Don't know;	Total is 1				1				1							1
Q4 is yes; Q10 is no; Q11 is no;	Total is 2				2			2								2
Q4 is yes; Q10 is no; Q11 is Don't know;	Total is 1				1				1							1
Q4 is yes; Q10 is Don't know; Q11 is yes;	Total is 6	4	1			5	3	1	4	1	1			2	4	
Q4 is yes; Q10 is Don't know; Q11 is no;	Total is 3	2	1	1	2	1	1	1		1	1			1	2	
Q4 is yes; Q10 is Don't know; Q11 is Don't know;	Total is 6	2	1	1	2	3	2	5		1	2			1	5	
Q4 is no; Q10 is yes; Q11 is yes;	Total is 2					2	1		2							2
Q4 is no; Q10 is yes; Q11 is no;	Total is 4	1	1	1	1	1	4	1		2	1		1	3	1	
Q4 is no; Q10 is yes; Q11 is Don't know;	Total is 2					1	1		2							2
Q4 is no; Q10 is no; Q11 is yes;	Total is 3					3	1		2		1					3
Q4 is no; Q10 is no; Q11 is no;	Total is 1			1						1						1
Q4 is no; Q10 is Don't know; Q11 is yes;	Total is 2					1	2	1	1					2		
Q4 is no; Q10 is Don't know; Q11 is no;	Total is 6			1	1	4	3	1	1	1	1	3	1	1	4	1
Q4 is no; Q10 is Don't know; Q11 is Don't know;	Total is 2					2	1	1	1							2

Q4. Would you live in this location if you knew there was a one chance in a hundred your house would be flooded each year? The area is sometimes called the one-hundred year flood plain.

Q10. Is there any kind of insurance available which covers flood damage?

Q11. Would you buy insurance if it were available at 25 cents/year for each \$100 of value on contents and building? For example, \$50 per year on a \$20,000 house and \$12.50 per year on \$5000 contents.

Q7. Which of the following should be permitted in the flood plain that has a one chance in a hundred of being flooded each year?

- | | |
|-------------------------|----------------------------------|
| A Homes | D No restrictions on development |
| B Commercial structures | E Golf courses, open space uses |
| C Industry | F Agriculture |

Q12. If you needed help after a flood, what would be the most desirable way of restoring your property? Select one.

- | | | |
|-------------|-------------|-------------------|
| A Loan | C Grant | E Don't need help |
| B Insurance | D Tax break | F Other (specify) |

Q14. Do you feel government should try to reduce flood losses by permitting only selective uses of flood-prone areas by providing dams, levees, and/or channel improvements? Select one.

- | |
|---|
| A Selection uses |
| B Dams, levees, and/or channel improvements |
| C No government action necessary |

improvements to reduce flood losses. The popularity of the engineering approach remains high and might be a result of inadequate information on the part of the general public, as most feel more material is desirable. One resident commented: "The only available information now is from the neighbors." Information on floods and flood relief would most effectively be transmitted in order of preference, by newspapers, television news, radio, and television specials.

Table 10 shows some interesting clusterings of responses. Most people who answered affirmatively on Question 11 (Would you purchase insurance?) also selected insurance (12B) in Question 12, displaying a consistency not common throughout the survey. These people would also restrict development of the 100-year flood plain to open space uses and agriculture. Most of the sample that checked yes under Question 4 (Would you live on the 100-year flood plain?) do not favor restricted flood plain development. In contrast, those who checked no under Question 4 would be much more restrictive of flood plain uses, i. e., favoring open space development and agriculture. However, the same people who are opposed to intensive flood plain development would prefer more dams and levees. Most notably, of the ten respondents, who said they would live on the 100-year flood plain and knew about insurance, seven said they would not purchase and one did not know if he would purchase it or not. A seventy percent rejection rate is very high and suggests that

an indepth study is needed to determine if this sample area is representative of the state, and, if it is, why insurance is being rejected.

For the most part, people who chose a form of government help, to recover from flooding, were consistent in their choices (Table 11). In Questions 9 and 12, they ranked loans, tax breaks, and grants in decreasing order of preference. Given the choice of insurance, they would choose it as often as a loan. These are the people, it must be noted, who do not know the details of insurance, because seventy percent who are informed about insurance would reject it.

Eighty-eight percent of the respondents indicated that local authorities should warn potential victims that their homes and property were subject to flooding (Table 12); most of them also felt that insufficient information was presently available. Table 13 shows that sixty-eight percent of the respondents, who said they would not live on the 100-year flood plain, felt more information is needed; and that forty-six percent, who said they would live on the 100-year flood plain, still felt they should have more information. More information would indeed appear to be necessary as forty-four percent of the respondents did not know they lived on the 100-year flood plain. Some flood plain occupants do not have insurance, even though they would purchase it if they realized it was available. Whether many in the sample area would purchase insurance is debatable, however, as a majority of those in this sample who do know

Table 11. Frequency of Question 12 on Question 9.

		A	B	C
12A	18 yes	16	9	3
12B	18 yes	14	12	9
12C	7 yes	3	4	3
12D	11 yes	6	9	4
12E	3 yes	0	0	0
12F	3 yes	2	2	0

Q12. If you needed help after a flood, what would be the most desirable way of restoring your property? Select one.

- A Loan C Grant E Don't need help
 B Insurance D Tax break F Other (specify)

Q9. Do you think the federal government should help flood victims through any of the following:

- A Yes Loans A No
 B Yes Tax breaks B No
 C Yes Grants C No

Table 12. Frequency of Question 8 on Question 16.

	Q16 is yes	Q16 is no	Q16 is Don't know
Q8 is yes	9	27	8
Q8 is no	4	0	2

Q8. Do you feel local governments should warn citizens that their homes and property are subject to flooding, whatever the frequency?

Q16. Do you feel sufficient information on flooding is presented to the general public?

about insurance would not buy it. If these people do not purchase insurance (Table 14), they may receive little or no help from the government after the next flood, as insurance has been available for this.

Finally, the respondents indicated the four most effective ways to disseminate flood and flood relief information are through newspapers, television news, the radio, and television specials (Table 15). Since these are the most effective media by which to pass information, they may also be the best means by which to explain the flood insurance program. However, White (1973) reports people are rarely influenced by government administrators. He concludes (p. 163):

There is little evidence that information in reports, brochures, movies, and radios is linked with value shifts. Television does, however, have an element of immediacy that strengthens preferences and judgments developed from other sources.

Sale of flood insurance in Lane County is relatively low. As of June 1973, only seventy-four policies have been sold (Table 16) in the state's second most populace county. By contrast, in Douglas County, with one-third the population of Lane County, residents have purchased four times the number of policies. The survey area in Lane County and much of the population in the county are downstream from several large flood control structures which have markedly lowered flood crests. In Douglas County, very little flood

Table 13. Frequency of Question 4 on Questions 8 and 16.

	Q8 is yes	Q8 is no	Q16 is yes	Q16 is no	Q16 is Don't know
Q4 is yes	24	4	10	13	5
Q4 is no	20	2	3	14	5

Q4. Would you live in this location if you knew there was one chance in a hundred your house would be flooded each year? The area is sometimes called the one-hundred year flood plain.

Q8. Do you feel local governments should warn citizens that their homes and property are subject to flooding, whatever the frequency?

Q16. Do you feel sufficient information on flooding is presented to the general public?

Table 14. Frequency of Question 11 on Question 13.

	Q13 is yes	Q13 is no	Q13 is Don't know
Q11 is yes	9	3	3
Q11 is Don't know	9	1	2

Q11. Would you buy insurance if it were available at 25 cents/year for each \$100 of value on contents and building? For example, \$50 per year on a \$20,000 house and \$12.50 per year on \$5000 contents?

Q13. Should the federal government require restrictive zoning laws, subdivision regulations, and building codes for flood-prone areas after they furnish aid to flood victims?

Table 15. Frequency of Question 16 on Question 17 flood.

	17A	17B	17C	17D	17E	17F	17G	17H	17I
Q16 is yes	5	7	10	8	0	1	2	1	0
Q16 is no	6	23	16	23	2	1	3	1	3
Q16 is Don't know	4	8	3	9	0	0	3	0	0

Frequency of Question 16 on Question 17 flood relief.

	17A	17B	17C	17D	17E	17F	17G	17H	17I
Q16 is yes	4	7	8	9	0	1	1	0	1
Q16 is no	8	20	14	19	1	3	3	1	4
Q16 is Don't know	3	8	3	8	0	0	1	1	0

Because of the confused reaction to the instructions, the cumulative responses are presented.

Q16. Do you feel sufficient information on flooding is presented to the general public?

Q17. From which of the following sources do you get your information about floods and flood relief? In each column, place a one (1) by your main source, a two (2) by the next source, and a three (3) by the third source.

FLOODS

<u>Question</u>	<u>Category</u>
A	TV specials
B	TV news
C	Radio
D	Newspapers
E	Local meetings
F	Circulars
G	Word of mouth (neighbors)
H	Other (specify)
I	No information on floods available

FLOOD RELIEF

<u>Question</u>	<u>Category</u>
A	TV specials
B	TV news
C	Radio
D	Newspapers
E	Local meetings
F	Circulars
G	Word of mouth (neighbors)
H	Other (specify)
I	No information on floods available

Table 16. Number and value of flood insurance policies sold in the study area as of June 1973.

Area	Number of Policies	Coverage
Clackamas County	239	3, 671, 000
Curry County	66	1, 013, 000
Douglas County	316	4, 283, 000
Grant County	3	40, 000
Jackson County	189	2, 687, 000
Josephine County	125	1, 502, 000
Lane County	74	1, 052, 000
Marion County	50	683, 000
Multnomah County	191	1, 743, 000
Polk County	8	118, 000
Umatilla County	44	611, 000
Cities		
Gladstone	3	67, 000
John Day	3	20, 000
Milwaukie	16	268, 000
Myrtle Creek	17	136, 000
Pendleton	8	99, 000
Portland	383	6, 047, 000
Roseburg	47	612, 000
Salem	14	188, 000
Springfield	2	34, 000
Winston	2	28, 000

Source: State Water Resource Board

control is present. It would appear that additional studies are warranted to determine the relationship, if any, between upstream flood control structures and the sale of flood insurance.

Summary

One of the objectives of the NFIA is to assist flood victims in rebuilding their homes and businesses. In order to produce the desired result, a flood plain occupant must know his home is in a hazardous area. Without this knowledge he has no reason to believe he needs insurance. He must be informed that flood insurance is available in the community so he can take advantage of the program. He must also be willing to purchase insurance in that the policies are the vehicle the government employs to assist flood victims to restore their homes and businesses. If flood plain occupants do not purchase insurance, the program is ineffective and it has not achieved one of its two major objectives. Before flood insurance can be widely sold, however, people must receive sufficient information on the availability of flood insurance and on hazardous conditions from authorities.

Forty-four percent of the respondents did not realize they lived on the 100-year flood plain; hence they had no reason to believe they needed any form of insurance. Sixty-four percent did not know or thought insurance was unavailable to cover flood damages. The

majority of the sample could not take advantage of a program they did not know was designed for their benefit. More information is necessary, but it is uncertain how effective it will be.

Of the respondents who knew they could purchase insurance through their local agent, seventy percent would not buy it, twenty percent would purchase it, and ten percent were undecided. Consequently in time of flood, only two or at the most three out of ten would be assisted by the program. Most of the residents questioned feel dams, levees, and channel improvements are the best means to reduce flood losses. These people, however, were most probably biased towards dams due to the proximity of numerous Corps of Engineers reservoirs on the Willamette and McKenzie River watersheds, upstream from the sample area.

VI. CONCLUSIONS

Oregon has a long history of serious floods, beginning in 1861 with the greatest flood on record and continuing to the multimillion dollar disaster in the winter of 1964-1965. After 1861, American settlers avoided the most flood-prone lowlands until the 1930's. A combination of population pressures and beginning of the Corps of Engineer's flood control programs resulted in economic development on the more hazardous flood plains, especially in the Willamette Valley. Increased structural flood control did not reduce flood losses, as had been predicted. To meet growing national demands for economic protection, Congress enacted a disaster assistance program, the National Flood Insurance Act of 1968, which if implemented would combine relief to flood victims and require land use controls designed to lessen the need for supplemental disaster programs.

This research demonstrates that through June 1972, state and local organizations responded very differently to the NFIA. Through June 1972, state organizations took little, if any, action on the flood insurance program. No new state acts giving counties or cities enlarged powers to zone, plan, or establish subdivision regulations and building codes were passed by the Oregon legislature as a result of the insurance act. The state organization for assisting local

planning commissions, the Bureau of Municipal Research and Service, had introduced the concept of flood plain zoning and management before the NFIA. The Act caused the Bureau to issue Flood Plain Management for Oregon Cities and Counties (1969, revised 1971), a publication on flood plain management. The report discussed the role of local governments in implementing flood plain regulation and informed jurisdictions throughout the state that legislation in effect by 1969 was sufficient for enacting flood plain regulations. Even the State Water Resources Board, the state agency designated by law (ORS 536.210-536.550) to study existing water resources and promote coordination between local, state, and federal water use plans, programs, and projects, did not respond in any special manner to the NFIA. In 1965, three years prior to enactment of the NFIA, the SWRB had a designated, full-time flood plain specialist. No additional positions dealing with flood plains or their use were formed as a result of the Act. It should be emphasized that it is difficult, if not impossible, to separate some consequences of the Act from the normal evolution of flood plain management in Oregon. New legislation has just been enacted by the 1973 legislature which may have been influenced by the NFIA. However, these acts are not discussed in this study because they had no effect on the programs studied.

When comparing the impact of the NFIA on the state level of

government and local governments, the NFIA and its accompanying regulations had a greater impact on local governments. Six counties and five cities initiated flood plain regulations in order to become eligible for flood insurance. Over fifty percent of the study areas would not have instituted flood plain regulations as soon as they did had it not been for the assistance provided flood victims by the insurance program.

Through participation in the insurance program all governments designated the 100-year flood level as the uniform flood plain limit. None of the four programs in effect in 1968 had a similar flood boundary. In addition to defining the maximum extent of the flood plain, the NFIA standards divided the flood plain into a floodway and a floodway fringe and designated permitted uses for each. This had not been in effect previously.

A review of the flood plain ordinances enacted by local governments revealed that all need some degree of alteration. Even the most complete regulation, for example that of Clackamas County, has omitted some requirements, which must eventually be included. For the regulations of all the study areas, four standards are most commonly omitted:

1. Section 1910.3d6 on fill in the floodway
2. Section 1910.3b7ii on raising utilities above the 100-year flood level

3. Section 1910.3b7iii on adequate drainage.
4. Section 1910.3b1 on considering neighboring flood plain programs when instituting such a program.

Results of the sample questionnaires indicated that many people would probably continue to live in flood-prone areas if they do not perceive the risk as being too high. In the case of the survey, the 100-year flood plain was not considered unsafe, but the five year flood plain was thought to be too perilous. Regardless of the chances people are willing to take, they will still turn to the government for assistance if a need should arise, either by loans, grants, or further construction of dams and levees. However, many of these same individuals refuse to assume part of the burden by being self-sufficient by encouraging legislation to prevent unrestricted development of flood plains or by purchasing flood insurance. A possible reason for the former is a fear of a loss of economic growth to the community while a cause of the latter is an uninformed public. Additional information should be disseminated through newspapers, radio, and television which explains the advantages and disadvantages of flood plain management.

The conclusions of this study on the impact of flood insurance on state, local, and individual decision-makers in Oregon are not always similar to results of studies from other areas. Since 1968, the FIA has been attempting to persuade decision-makers that the

flood insurance program is effective in reducing the use of hazardous areas and of compensating flood victims for their losses. When this study was begun in June 1972, only twenty-one areas in Oregon were eligible for insurance out of 265 potential applicants. Nationally, fewer than 1200 of an estimated 5000-7000 communities had applied for insurance by August 1972. Berstein (1972, p. 24) has found that since the NFIA Program was started many ". . . communities have adopted flood plain zoning ordinances and building codes for the first time, a step they probably never would have taken without the land use requirements of the flood insurance program." Half the selected communities in Oregon likewise initiated flood plain regulation as a result of the NFIA.

The flood insurance program requires local governments to enact flood plain regulations before insurance is available. The National Water Commission (1973, p. 157) states, "This feature of the program provides an effective incentive for better utilization of flood plain lands." But from studies in Oregon, it appears as if any regulation is acceptable to FIA no matter how limited in scope and restrictions. These abbreviated regulations are not of sufficient detail to be very effective in reducing developments on flood-prone areas.

In the eligible areas throughout the country a majority of the policies which have been sold are in the southeast, the

hurricane-prone states along the Gulf of Mexico. Relatively few policies have been purchased by people subjected to riverine flooding which is the dominant potential flood hazard in Oregon. Few Oregonians have purchased flood insurance, corroborating Bernstein's observation that (1972, p. 23) ". . . most property owners simply do not buy insurance voluntarily, regardless of the amount of equity they have at stake." According to Bernstein, the low purchasing rate for a policy is not that there is a lack of information on flooding and insurance, as most people in Lane County indicated, but that local agents do not aggressively sell flood insurance because they do not feel it is a money maker or that it is worth the effort. Bernstein and White (1973) agree that flood plain residents do not change their sets of values as a result of reports, movies, or radio. If their assumptions are valid, it is doubtful if increasing information would have any effect on sales.

Of all the federal programs which deal with flood plains, the National Flood Insurance Act seems to have caused more interest in flood plain management than the Corps of Engineers Flood Plain Information Series or Executive Order 11296 or HUD relocation projects. The awareness of new techniques to reduce flood losses could have a very important place in the planning evaluation of proposed flood control projects. No longer will projections be made on the potential intensive development of flood plains as use of these

areas will be restricted to less intensive uses. Flood control projects will be limited to protecting developed areas, where they do the most good. A new era in reducing flood losses began with the introduction of flood insurance.

Finally, the sample participants are not like the flood plain occupants described by the National Water Commission. The Commission states, "Wise use of flood-prone lands is also furthered by the fact that people are made aware of the flood hazard in areas in which flood insurance is offered." The generalization does not apply to the case of Lane County where people requested more information and the majority did not know they lived in a flood-prone area. Although Lane County residents may be atypical of residents in Oregon and many other parts of the country, further study needs to be done to determine the most effective technique of disseminating information.

Three recommendations for more effective implementation of the requirements for the NFIA can be made based on the study conclusions. First, the state must take a more active role in defining the 100-year floodway and the flood plain having special flood hazard. The federal agencies do not have the personnel, or the time, to complete all the necessary studies in the near future, and local governments do not have the expertise. This recommendation would have been achieved had the 1973 Legislature enacted Senate

Bill 300: the Bill would have required the State Water Resources Board to conduct such definitive studies of the flood plains.

Second, a series of workshops sponsored by the State Water Resources Board should be held periodically throughout the state. These meetings should be used to update information on the areas, refresh planners on acceptable flood plain management practices, and explain new federal and state programs as they are enacted. This was finally done in June 1973, over four years after the flood insurance program was enacted. Doubt about what is expected from them in implementing the requirements of the NFIA seems to be a characteristic of most planners. This is clearly evident in the incomplete and vague flood plain ordinances which now exist. Periodic conferences can help to rectify these shortcomings.

Third, more information on flood hazard and location of the flood plain should be presented to occupants on flood plains. Studies indicate that altering behavior of flood plain occupants is difficult, but even if only a few people heed the warning the results would be worth the effort.

WORKING DEFINITIONS

**⁴² Actuarial rate - the risk premium rates, estimated by the FIA for individual communities pursuant to studies and investigations undertaken by the FIA in accordance with Section 1307 of the National Flood Insurance Act of 1968 in order to provide flood insurance in accordance with accepted actuarial principles. Actuarial rates also contain provisions for operating costs and allowances.

Corrective measures - techniques employed to keep the water away from man.

** Eligible community - a community in which the FIA has authorized the sale of flood insurance under the program.

** Emergency Flood Insurance Program - the National Flood Insurance Program Authorized by the Act, as implemented on an emergency basis and without the need for individual community rate making studies in accordance with Section 1336 of the Act, 42 U.S.C. 4056.

Engineering structures - dams, levees, channel improvements, spillways.

⁴² From: _____ 1971 "Subchapter B - National Flood Insurance Program, Part 1909 - General Provision," Federal Register, Wednesday, December 22, vol. 36, No. 246, pp 24759-24769.

- *⁴³ Flood - a great flow of water along a watercourse or a flow causing inundation of lands not normally covered by water.
- * Flood control - the control of flood waters by the construction of flood storage reservoirs, floodwater retaining structures, channel improvements, levees, bypass channels, other engineering works, or vegetative changes.
- * Flood Damages - economic losses resulting from floods.
- * Flood frequency - the average interval of time between floods equal to or greater than a specified discharge or stage. It is generally expressed in years.
- ** Flood Hazard Boundary Map - an official map or plot of a community, issued or approved by the Federal Insurance Administrator, on which the boundaries of the flood plain and/or mudslide areas having special hazards have been drawn. This map must conform to the Special Flood Hazard Map and be of sufficient scale and clarity to permit the ready identification of individual building sites as either within or without the area having special flood hazard.
- * Flood plain - land bordering a stream and which receives overbank flow or all lands subject to inundation.

⁴³ From: Pacific Northwest River Basins Commission
1971 Comprehensive Framework Study of Water and Related Lands, Flood Control, Appendix VII, pp. 393-396.

- ** Flood plain having special flood hazard - that maximum area of the flood plain that, on the average, is likely to be flooded every 100-years, (i. e., that has a 1-percent chance of being flooded each year).
- ** Flood plain information reports - reports prepared to provide local governmental agencies with basic technical data to assist in planning for wise use and development of their flood plains.
- * Flood plain management - comprehensive flood damage preventing program which requires integration of all alternative measures (structural and nonstructural) in investigation of flood problems and planning for wise use of the flood plain.
- * Flood plain regulation - a general term applied to the full range of codes, ordinances, and other regulations relating to the use of land, water, and construction within a channel or flood plain area.
- ** Flood-prone area - a land area adjoining a river, stream, water course, ocean, bay, or lake, which is likely to be flooded.
- * Flood-proofing - a combination of structural changes and adjustments to properties subject to flood primarily for the reduction of flood damages.

- ** Floodway - the channel of a river or other water course and the adjacent land areas required to carry and discharge a flood of a given magnitude.
- ** Floodway fringe - see Flood plain area having special flood hazard.
- ** Land use and control measures - zoning ordinances, subdivision regulations, building codes, health regulations, and other applications and extensions of the normal police power, to provide standards and effective enforcement provisions for the prudent use and occupancy of flood-prone and mudslide areas.
- * Nonstructural flood control measures - measures such as zoning ordinances and codes, flood forecasting, flood-proofing, evacuation, flood fight activities, and upstream land treatment or management to control flood damages without physically restraining flood waters.
- Occupance of the flood plain - any form of utilization of the flood plain by man.
- Preventive measures - techniques employed to keep man away from the water.
- ** 100-year flood - the highest level of flooding that, on the average, is likely to occur once every 100 years (i. e., that has a 1-percent chance of occurring each year).

Regional flood - see 100-year flood.

** Special Flood Hazard Map - the official map designated by the FIA to identify (a) flood plain having special flood hazards or (b) mudslide area having special mudslide hazards.

* Watershed - all lands enclosed by a continuous hydrologic drainage divide and lying upslope from a specified point on a stream.

Wise use of the flood plain - development of a flood plain which assures future benefits from occupance exceed their costs to the country.

ABBREVIATIONS

cfs	Cubic feet per second
CNPCFS	Columbia North Pacific Comprehensive Framework Study
Co.	County
e. g.	for example
° F	Fahrenheit
ft.	Feet
FHA	Federal Housing Administration
FIA	Federal Insurance Administration Federal Insurance Administrator
Fig.	Figure
H. "number"	House Bill
H. Doc.	House Document
H. R.	House Resolution
H. Rept.	House Report
HUD	Housing and Urban Development, Department of
NFIA	National Flood Insurance Act
No.	Number
ORS	Oregon Revised Statutes
OSLUC	Oregon Standard Land Use Code
p.	Page
pp.	Pages

PL.	Public Law
R	Range
S	Section
S. "number"	Senate Bill
SB	Senate Bill
S. J. Res.	Senate Joint Resolution
SWRB	State Water Resources Board
T	Township
TVA	Tennessee Valley Authority
U. S.	United States
USDA	United States Department of Agriculture
VA	Veteran's Administration
W	West
WRC	Water Resources Council

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APPENDICES

APPENDIX A

SUGGESTED RESOLUTIONS TO BE USED WHEN
APPLYING FOR FLOOD INSURANCE

WHEREAS, certain areas of the (COMMUNITY) are subject to periodic flooding from the (STREAM(s)) (OCEAN) causing serious damages to residential properties within these areas, and

WHEREAS, relief is available in the form of flood insurance as authorized by the National Flood Insurance Act of 1968 as amended, and

WHEREAS, it is the intent of this (BOARD, LEGISLATURE, COUNCIL, ETC.) to comply with land use and management criteria regulations as required in said act,

WHEREAS, it is also the intent of this (BOARD, LEGISLATURE, COUNCIL, ETC.) to recognize and duly evaluate flood hazards in all official actions relating to land use in the flood plain areas having special flood hazards, and

WHEREAS, this (CITY, COUNTY) has authority in accordance with (O. R. S. _____) to adopt land use and control measures,

NOW, THEREFORE, BE IT RESOLVED, that this (BOARD, COUNCIL, ETC.) hereby assures the Federal Insurance Administration that it will take action as follows:

(1) Enact by December 31, 1973, and maintain in force for those areas, adequate land use and control measures with effective enforcement provisions consistent with the criteria set forth in Subpart A of Section 1910 of the National Flood Insurance Regulations,

(2) Take such other official action as may be reasonably necessary to carry out the objectives of the program. Such actions will include but not limited to:

- (a) Assisting the Federal Insurance Administrator, at his request, in delineating the limits of the flood plain having special flood hazard on available local maps of sufficient scale to identify the location of building sites.

- (b) After flood insurance is made available, furnishing representatives of appropriate Federal or State agencies or of the National Flood Insurance Association information, as requested, concerning new or substantially improved structures within the area of special flood hazard. This information will include floor elevations and, if there is a basement, the distance between the first floor and the bottom of the lowest opening where water flowing on the ground will enter.

- (c) Cooperating with Federal, State and local agencies which undertake to study, survey, map and identify flood-prone areas as well as cooperation with neighboring jurisdictions with respect to adjoining flood plains in order to prevent aggravation of the flooding problem.

BE IT FURTHER RESOLVED, that this (BOARD, COUNCIL, ETC.) hereby appoints (AGENCY OR OFFICIAL) with the responsibility, authority and means to implement the commitment made herein.

APPENDIX B

RESOLUTION NO. 70-77 SPRINGFIELD, OREGON

WHEREAS, certain areas of the City of Springfield, Oregon are subject to periodic flooding from the Willamette and McKenzie Rivers causing serious damages to residential properties within these areas, and,

WHEREAS, relief is available in the form of flood insurance as authorized by the National Flood Insurance Act of 1968 as amended, and

WHEREAS, it is the intent of this council to comply with land use and management criteria regulations as required in said act, and

WHEREAS, it is also the intent of this council to recognize and duly evaluate flood hazards in all official actions relating to land use in the flood plain areas having special flood hazards, and

WHEREAS, this city has authority in accordance with ORS Chapter 227 to adopt land use and control measures,

NOW, THEREFORE, BE IT RESOLVED that this council hereby assures the Federal Insurance Administration that it will take legislative action as follows:

(1) Enact by December 31, 1971, and maintain in force for those areas, adequate land use and control measures with effective enforcement provisions consistent with the criteria set forth in Subpart B of Section 1910 of the National Flood Insurance Regulations.

(2) State enabling legislation conferring authority to enact land use and control measures designed to reduce the exposure of property to flood loss is presently in effect in the form of Oregon Revised Statutes Chapter 227.

(3) Take such other official action as may be reasonably necessary to carry out the objectives of the program. Such actions will include, but not be limited to:

- (a) Assisting the Federal Insurance Administrator, at his request, in delineating the limits of the flood plain having special flood hazard on available local maps of sufficient scale to identify the location of building sites.
- (b) After flood insurance is made available, furnishing representatives of appropriate Federal or State agencies or of the National Flood Insurance Association information, as requested, concerning new or substantially improved structures within the area of special flood hazard. This information will include floor elevations and, if there is a basement, the distance between the first floor and the bottom of the lowest opening where water flowing on the ground will enter.
- (c) Cooperating with Federal, State and local agencies which undertake to study, survey, map and identify flood-prone areas as well as cooperation with neighboring jurisdictions with respect to adjoining flood plains in order to prevent aggravation of the flooding problem.

BE IT FURTHER RESOLVED that this council hereby appoints the City Engineer of the City of Springfield, with the responsibility authority and means to implement the commitment made herein.

ADOPTED this 14th day of September, 1970, by a vote of 6 for and 0 against.

Mayor

ATTEST:

City Recorder

APPENDIX C

CLACKAMAS COUNTY ZONING ORDINANCE AMENDMENT

FINAL COURT ORDER NO. 71-1151

DATE: DECEMBER 17, 1971

Adds Section 29, Flood Hazard District (FHD)"SECTION 29 FLOOD HAZARD DISTRICT (FHD)

- 29.01 Area of Application: The areas to which this district is to be applied are those areas which are subject to periodic flooding from stream flows by a regulatory flood. Also, this section of the Ordinance only applies in those areas where sufficient detailed information is available to properly implement this portion of the Zoning Ordinance.
- 29.02 Purpose of Classification: It is the purpose of this section of the Zoning Ordinance to promote the public health, safety and general welfare and to minimize flood losses by provisions designed to:
- A. Restrict or prohibit uses which are dangerous to health safety or property in times of flood or cause increased flood heights or velocities.
 - B. Require that uses vulnerable to floods, including public facilities which serve such uses be provided with flood protection at the time of initial construction.
 - C. Protect individuals, as much as possible, from buying lands which are unsuited for intended purposes, because of flood hazard.
- 29.03 Workings of Classification: Within the Flood Hazard District section of the Zoning Ordinance three (3) sub-classifications are established: Floodway (FW), Flood Fringe (FF) Areas, when possible to adequately define or differentiate between

the two, shall be indicated on the zoning map. The difference between these two areas is as set forth in Section 29.05. In those areas where it is not possible to differentiate between the Floodway and the Flood Fringe, due to lack of detailed information, a Flood Hazard (FH) Area is designated. Each of these three sub-classifications are as hereinafter described as to their workings and function.

29.04 Findings of Fact: The following two points outline the findings as to a need for a Flood Hazard District.

A. Flood Losses Resulting From Periodic Inundation

The flood hazard areas of Clackamas County, Oregon are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the County's tax base all of which adversely affect the public health, safety and general welfare.

B. General Causes of These Flood Losses

These flood losses are caused by the following: (1) the cumulative effect of obstructions in floodways causing increase in flood heights and velocities, and (2) the occupancy of flood hazard areas by uses vulnerable to floods or hazardous to others which are inadequately elevated or otherwise protected from flood damages.

29.05 Definitions: Unless specifically defined below, words or phrases used in this classification shall be interpreted so as to give them the same meaning as they have in common useage and so as to give this classification its most reasonable application.

A. Accessory Use or Structure - a use or structure on the same lot with, and of a nature customarily incidental and subordinate to, the principal use or structure.

- B. Flood - a temporary rise in stream flow or stage that results in water overtopping its banks and inundating areas adjacent to the channel.
- C. Flood Fringe - the flood fringe area is that land area which is outside of the stream's floodway, but is subject to periodic inundation due to periodic flooding.
- D. Floodway - the channel of a stream and adjacent land areas which are required to carry and discharge the flood water or flood flows of any river or stream associated with the regulatory flood.
- E. Flood Proofing - a combination of structural provisions, changes, or adjustment 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.
- F. Obstruction - any dam, wall, wharf, embankment, levee, dike, pile, abutment, projection, excavation, channel rectification, bridge conduit, culvert, building, wire, fence, rock gravel, refuse, fill, structure or matter in, along, across, or projecting into any channel, watercourse, or regulatory flood hazard area which may impede, retard or change the direction of the flow of water, either in itself or by catching or collecting debris carried by such water, or that is placed where the flow of water might carry the same downstream to the damage of life or property.
- G. Person - Any natural person, firm, partnership, association, or corporation, but this definition does not include any governmental unit.
- H. Reach - a hydraulic engineering term to describe longitudinal segments of a stream or river. A reach will generally include the segment of the flood hazard area where flood heights are primarily controlled by man-made or natural obstructions or constrictions. In an urban area an example of a reach would be the segment of a stream or river between two consecutive bridge crossings.

- I. Regulatory Flood - the regulatory flood is a flood which is representative of large floods known to have occurred generally in the area and reasonably characteristic of what can be expected to occur on a particular stream. The regulatory flood, for the purposes of this section of the County Zoning Ordinance, generally has an average frequency in the order of the 100 year recurrence interval flood determined from an analysis of floods on a particular stream and other streams in the same general region.
- J. Regulatory Flood Protection Elevation - the elevation to which uses regulated by this District are required to be elevated or flood proofed, which shall be three (3) feet above the regulatory flood elevation.
- K. Structure - Anything constructed or erected, on the ground or attached to the ground including, but without limiting, the generality of the foregoing: buildings, factories, sheds, cabins, mobile homes, and other similar items.

- 29.06 General Provisions: The following sections outline the manner and mode in which this section of the Zoning Ordinance shall be applied.
- 29.07 Flood Hazard Area Determination: This District shall apply to only those areas of Clackamas County where detailed hydrological studies have been prepared by a competent agency concerned with such studies; such as the U. S. Army Corps of Engineers or the Soil Conservation Service.
- 29.08 Warning and Disclaimer of Liability: The degree of flood protection required by the District is considered reasonable for regulatory purposes and is based on engineering and scientific methods of study. Larger floods may occur on rare occasions or the flood height may be increased by man-made or natural causes, such as ice jams and bridge openings restricted by debris. This District does not imply that areas outside the Flood Hazard District boundaries or land uses permitted within such district will be free from flooding

or flood damages. This Section of the Zoning Ordinance shall not create liability on the part of Clackamas County or any officer or employee thereof for any flood damages that result from reliance on this District or any administrative decision lawfully made thereunder.

29.09 Floodway (FW) and Flood Fringe (FF) Sub-classifications:
These two sub-classifications shall allow and control only those uses which are stated within each sub-classification. All regulatory and dimensional standards of the underlying zoning classification shall also apply to all uses allowed in these two sub-classifications.

29.10 Floodway (FW) Sub-classification:

A. Permitted Uses.

1. Any use permitted outright in the present zoning district provided that no structure, fill or storage of materials or equipment are proposed.
2. Conditional Uses under the requirements of the zoning district in which the land is located provided that no structure, fill or storage of material or equipment are proposed.
3. The following open space uses shall be permitted subject to the requirements of the zoning district in which the land is located and provided that no structures, fill or storage of material or equipment are proposed:
 - a. Agricultural uses such as: general farming, pasture, grazing, outdoor plant nurseries, horticulture, viticulture, truck farming, forestry, sod farming, and wild crop harvesting.
 - b. Private and public recreational uses such as: picnic ground, wildlife and nature preserves, hunting and fishing areas, hiking and horseback riding trails.

29.11 Flood Fringe (FF) Sub-classification:

A. Permitted Uses.

1. All uses permitted in Section 29.10
2. All other uses permitted in the zoning district provided that it is elevated above the regulation flood protection elevation and that it has been determined by the County Engineer, or other designated official, that the proposed use will not unduly restrict the capacity of the channels or floodway of tributaries to the main stream, drainage ditches, or any other drainage facilities or system.
3. Structures permitted if adequate flood-proofing or other protective measures are presented by an engineer to protect the structure and/or contents. Protective measures such as the following may be necessary:
 - a. Anchorage to resist floatation and lateral movement.
 - b. Installation of watertight doors, bulkheads, and shutters.
 - c. Reinforcement of walls to resist water pressures.
 - d. Use of paints, membranes, or mortars to reduce seepage of water through walls.
 - e. Addition of mass or weight to structures to resist floatation.
 - f. Installation of pumps to lower water levels in structures.
 - g. Construction of water supply and waste treatment systems so as to prevent the entrance of flood waters.
 - h. Pumping facilities for subsurface external foundation wall and basement floor pressures.

- i. Construction to resist rupture or collapse caused by water pressure or floating debris.
- j. Cut-off valves on sewer lines or the elimination of gravity flow basement drains.
- k. Elevation of structures and uses to above the flood hazard elevation at the location of the proposed development.
- l. Requirements for construction of channel modifications, dikes, levees and other protective measures.

29.12 Flood Hazard (FH) Sub-classification: The Flood Hazard Sub-classification shall be applied in those areas which are subject to periodic inundation from stream flows and which only the outer limits of the inundation area is described. The areal extent of the inundation area shall have been described by an agency of competent expertise. All proposed developments within those areas described as Flood Hazard Areas shall be subject to a Special Review permit procedure as hereinafter set forth.

29.13 Methods Used to Analyze Flood Hazard Areas: The Flood Hazard sub-classification relies upon a two-step process for reasonably analyzing the flood hazard affecting specific lands. (1) The official zoning maps of Clackamas County provides the first step by delineating the general Flood Hazard Area which has been determined to be subject to flooding based upon evidence of past flood events and scientific analysis of such areas. (2) The second step involves a determination of the flood hazard at the site of any proposed use. All uses, other than open space uses, are permitted by a Special Review Permit under the terms of Section 6.00 of this Ordinance and require a case by case evaluation by the Clackamas County Board of Adjustment. In determining the flood hazard at a particular site the Board shall, where applicable:

- A. Estimate the discharge of the regulatory flood which is representative of large floods known to have occurred in this region and which are reasonably characteristic of

what can be expected to occur on the particular streams subject to this section of the Zoning Ordinance.

- B. Determine the suitability of the particular site proposed for any Special Review Permit by:
1. Calculation of water surface elevations based upon a hydraulic analysis of the capacity of the stream channel and overbank areas to convey the regulatory flood.
 2. Computation of the floodway required to convey this flood without increasing flood heights to an extent which would cause substantial upstream or downstream damage to existing or reasonably anticipated future development. Computation of increases in flood heights caused by an encroachment is based upon the reasonable assumption that there will be an equal degree of encroachment on both sides of the stream within that reach. Generally, any increase in flood stages attributable to encroachments on the floodway of any river or stream shall not exceed .05 feet in urban areas and 1.00 foot in rural areas in any one reach or for the cumulative effect of several reaches.
- C. Evaluate the effects of the proposed use upon the public health, safety and general welfare in light of the purposes of this ordinance and the standards established herein.
- D. Permitted Uses: The following open space uses shall be permitted within the Flood Hazard Sub-classification to the extent that they are not prohibited by any other section of the Clackamas County Zoning Ordinance and provided that they do not require structures, fill, or storage of materials or equipment.
1. Agricultural uses such as: general farming, pasture, grazing, outdoor plant nurseries, horticulture, viticulture, truck farming, forestry, sod farming, and wild crop harvesting.

2. Industrial - Commercial uses such as: loading areas, parking areas, airport landing strips.
3. Private and public recreational uses such as: golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, boat launching ramps, swimming areas, parks, wildlife and nature preserves, target ranges, trap and skeet ranges, hunting and fishing areas, and hiking and horseback riding trails.
4. Residential uses such as: lawns, gardens, parking areas, and play areas.
5. Structures if adequately flood-proofed or otherwise protected as herein after required.

E. Special Review Permit: All other uses are permitted only upon application to and approval by the Clackamas County Board of Adjustment. Said approval shall be pursuant to the standards and conditions herein established.

1. Open Uses

- a. Accessory uses to the permitted uses.
- b. Circuses, carnivals, and similar transient amusement enterprises.
- c. Drive-in theaters, new and used car lots, roadside stands and signs.
- d. Extraction of sand, gravel, and other materials.
- e. Marinas, boat rentals, docks, piers, and wharves.
- f. Railroads, streets, bridges, utility transmission lines, and pipe lines.
- g. Storage yards for equipment, machinery, or materials.

- h. Kennels and stables.
- i. Other uses similar to those noted above.

2. Fill

- a. Any fill or materials proposed to be deposited must be shown to have a beneficial purpose and the amount thereof not greater than is necessary to achieve that purpose, as demonstrated by a plan submitted by the owner showing the uses to which the filled land will be put and the final dimensions of the proposed fill or other materials.
- b. Such fill or other materials shall be protected against erosions by rip-rap, vegetative cover, or bulk heading.
- c. Structures may be allowed to be constructed on fill if the first floor or basement floor is above the regulatory flood protection elevation. The fill shall be at a point no lower than one (1) foot below the regulatory flood protection elevation for the particular area and such fill shall extend at such elevation at least fifteen (15) feet beyond the limits of any structure or building erected thereon.

3. Structures

- a. Structures shall not be constructed for human habitation unless they can be so designed as to have the habitable portion of the structure above the designated flood elevation and the foundation constructed in such a manner as to withstand such inundation.
- b. The structure or structures, if permitted, shall be constructed and placed on the building site so as to offer the minimum obstruction to the flow of flood water.

1. Whenever possible, structures shall be constructed with the longitudinal axis parallel to the direction of flood flow, and
 2. So far as practicable, structures shall be placed approximately on the same flood flow lines as those of adjoining structures.
- c. Structures shall be firmly anchored to prevent floatation which may result in damage to other structures, restriction of bridge openings and other narrow sections of the stream or river; and
 - d. Service facilities such as electrical and heating equipment shall be constructed at or above the regulatory flood protection elevation for the particular area.
4. Storage of Material and Equipment
- a. Storage or processing of materials that are buoyant, flammable, explosive or could be injurious to human, animal or plant life in time of flooding is prohibited.
 - b. Storage of other material or equipment may be allowed if not subject to major damage by floods firmly anchored to prevent floatation or shall be readily removable from the area within the limited time available after flood warning.

29.14 Procedure and Standards for Special Review Permits: The following procedures and standards shall be used in the consideration of any Special Review Permit:

- A. Application: Application for any use permitted as requiring a Special Review Permit may be allowed only upon application to the Planning Department Office on forms furnished by the office and issuance of a Special Review Permit by the Board of Adjustment. Upon receipt of the application the Planning Department shall forthwith submit it to the Board of Adjustment.

- B. Procedure: Upon receiving an application for a Special Review permit involving the use of fill, construction of structures, or storage of materials, the Board of Adjustment shall, prior to rendering a decision thereon:
1. Require the applicant to furnish such of the following information as is deemed necessary by the Board of Adjustment for determining the regulatory flood protection elevation and whether the proposed use is located in the Flood Hazard Sub-classification Areas and other factors necessary to render a decision on the suitability of the particular site for the proposed use showing:
 - a. Plans in triplicate drawn to scale showing the nature, location, dimensions and elevation of the lot, existing or proposed structures, fill, storage of materials, floodproofing measures and the relationship of the above to the location of the channel.
 - b. A typical valley cross-section showing the channel of the stream, elevation of land areas adjoining each side of the channel, cross-sectional areas to be occupied by the proposed development, and high water information, if requested.
 - c. Plan (surface view) showing elevations or contours of the ground; pertinent structure, fill, or storage elevations; size, location and spatial arrangement of all proposed and existing structures on the site; location and elevations of streets, water supply, sanitary facilities, photographs showing existing land uses and vegetation upstream and downstream, soil types, and other pertinent information.
 - d. Profile showing the slope of the bottom of the channel or flow line of the stream, if requested.
 - e. Specifications for building construction and materials, floodproofing, filling, dredging, grading, channel improvement, storage of materials, water supply, and sanitary facilities.

2. Transmit one copy of the information described in subsection (1) to the designated engineer or other person or agency from which the Board of Adjustment shall request expert technical assistance in determining whether the proposed use is in the Flood Hazard Sub-classification Areas; in determining the regulatory flood protection elevation, and in evaluating the proposed project in relation to the flood heights and velocities; the seriousness of flood damage to the use, the adequacy of the plans for protection and other technical matters.
3. Based upon this technical evaluation the Board of Adjustment shall determine whether the proposed use is located within the flood hazard area, determine the specific flood hazard at the site and shall evaluate the suitability of the proposed use in relation to the flood hazard.

C. Factors of Consideration: Factors upon which the decision of the Board of Adjustment shall be based. In passing upon such application the Board of Adjustment shall consider:

1. The danger to life and property due to increased flood heights or velocities caused by encroachments.
2. The danger that materials may be swept on to other lands or downstream to the injury of others.
3. The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination and unsanitary conditions.
4. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner.
5. The importance of the services provided by the proposed facility to the community.
6. The requirements of the facility for a waterfront location.

7. The availability of alternative locations not subject to flooding for the proposed use.
8. The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.
9. The relationship of the proposed use to the comprehensive plan and flood plain management program for the area.
10. The safety of access to property in times of flood for ordinary and emergency vehicles.
11. The expected heights, velocity, duration, rate of rise and sediment transport of the flood waters expected at the site.
12. Such other factors which are relevant to the purposes of this Ordinance.

D. Conditions Attached to Special Review Permits: Upon consideration of the factors listed above and the purposes of this Ordinance, the Board of Adjustment may attach such conditions, to the granting of a Special Review Permit as it deems necessary to further the purposes of this portion of the Zoning Ordinance. The following such conditions, without limitation because of specific enumeration, may be included:

1. Modification of waste disposal and water supply facilities.
2. Limitations on periods of use and operation.
3. Imposition of operational controls, sureties and deed restrictions.
4. Requirements for construction of channel modifications, dikes, levees and other protective measures.

5. Flood proofing measures such as the following shall be designed consistent with the flood protection elevation for the particular area, flood velocities, durations, rate of rise, hydrostatic and hydrodynamic forces, and other factors associated with the regulatory flood. The Board of Adjustment may require that the applicant submit a plan or document certified by a registered engineer that the flood proofing measures are consistent with the regulatory flood protection elevation and associated flood factors for the particular area. The following flood proofing measures may be required without limitation because of specific enumeration:
 - a. Anchorage to resist floatation and lateral movement.
 - b. Installation of watertight doors, bulkheads, and shutters.
 - c. Reinforcement of walls to resist water pressures.
 - d. Use of paints, membranes, or mortars to reduce seepage of water through walls.
 - e. Addition of mass or weight to structures to resist floatation.
 - f. Installation of pumps to lower water levels in structures.
 - g. Construction of water supply and waste treatment systems so as to prevent the entrance of flood waters.
 - h. Pumping facilities for subsurface external foundation wall and basement floor pressures.
 - i. Construction to resist rupture or collapse caused by water pressure or floating debris.

- j. Cut-off valves on sewer lines or the elimination of gravity flow basement drains.
- k. Elevation of structures and uses to the flood hazard elevation."

APPENDIX D

INTERIM FLOOD PLAIN ZONED AREA ORDINANCE
DOUGLAS COUNTY

A. FINDING OF FACT

1. Flood Losses Resulting from Periodic Inundation.

The flood hazard area of Douglas County are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.

2. General Causes of These Flood Losses.

These flood losses are caused by: (1) the cumulative effect of obstructions in floodways causing increases in flood heights and velocities; (2) the occupancy of flood hazard areas by uses vulnerable to floods or hazardous to others which are inadequately elevated or otherwise protected from flood damages.

B. STATEMENT OF PURPOSE

It is the purpose of this Section to promote the public health, safety and general welfare and to minimize those losses described in Paragraph A. 2 by provisions designed to:

1. Restrict or prohibit uses which are dangerous to health, safety or property in times of flood or cause increased flood heights or velocities.
2. Require that uses vulnerable to floods, including public facilities which serve such uses be provided with flood protection at the time of initial construction.
3. Protect individuals from buying lands which are unsuited for intended purposes because of flood hazard.

C. GENERAL PROVISIONS

1. Lands to Which the Flood Plain Classifications Apply.

This Section shall apply to all lands within the jurisdiction of the County of Douglas and designated by ordinance as being located within the boundaries of the Floodway and Floodway Fringe or Flood Hazard Districts.

2. Rules for Interpretation of District Boundaries.

The boundaries of the Floodway and Floodway Fringe or Flood Hazard Districts shall be determined by scaling distances on maps adopted pursuant to this ordinance. Where interpretation is needed as to the exact location of the boundaries of the districts as shown on the Official Maps where there appears to be a conflict between a mapped boundary and actual field conditions, the Planning Commission with the advice of the County Engineer shall make the necessary interpretation.

3. Compliance.

No structure, land or water, shall hereafter be used and no structure shall be located, extended, converted or structurally altered without full compliance with the terms of the Section and other applicable regulations.

4. Abrogation and Greater Restrictions.

It is not intended by this Section to repeal, abrogate or impair any existing easements, covenants, or deed restrictions. However, where this Section imposes greater restrictions, the provisions of this Section shall prevail. All other ordinances inconsistent with this Section are hereby repealed to the extent of the inconsistency only.

5. Interpretation.

In their interpretation and application, the provisions of this Section shall be held to be minimum requirements and shall be liberally construed in favor of the governing body and shall not be deemed a limitation or repeal of any other powers granted by State Statutes.

6. Warning and Disclaimer of Liability.

The degree of flood protection required by this Section is considered reasonable for regulatory purposes. Larger floods may occur on rare occasions or the flood height may be increased by man-made or natural causes, such as log jams and bridge openings restricted by debris. This Section does not imply that areas outside floodway and floodway fringe district boundaries or land uses permitted within such districts will be free from flooding or flood damages. This section of the Douglas County Zoning and Land Use Ordinance shall not create liability on the part of Douglas County or any officer or employee thereof for any flood damages that may result from reliance on this Section or any administrative decision lawfully made thereunder.

D. ESTABLISHMENT OF FLOOD HAZARD DISTRICTS.

1. The flood plain areas within the jurisdiction of this Section are hereby divided into the following districts:
 - a. The Floodway District (FW)
 - b. The Floodway Fringe District (FF) or,
 - c. The Interim Flood Hazard District (FH)
2. The boundaries of the districts shall be shown on the Official Maps as adopted. Within these districts all uses not allowed as permitted uses shall require a special exception permit.

E. FLOODWAY (FW)

1. Permitted Uses.

The following open space uses shall be permitted within a Floodway District (FW) to the extent that they are not prohibited by any other ordinance.

- a. Agricultural uses such as: general farming, pasture, grazing, outdoor plant nurseries, horticulture, viticulture, truck farming, forestry, sod farming, and wild crop harvesting.

- b. Industrial-Commercial uses such as: loading areas, parking areas, airport landing strips.
- c. Private and public recreational uses such as: golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, boat launching ramps, swimming areas, parks, wildlife and nature preserves, game farms, shooting preserves, target ranges, trap and skeet ranges, hunting and fishing areas, hiking and horseback riding trails.
- d. Recreation trailer or camp sites, established and occupied on a nonpermanent basis but not including incidental buildings.
- e. Marina, boat launching ramps, boat rental, and boat sales provided that no principal building is located in the floodway unless it is designed and constructed to withstand, without major damage, the waters of a regional flood.
- f. Roads or bridges providing that such improvements or structures will not impede the waters of a regional flood.
- g. Residential uses such as: lawns, gardens, parking areas and play areas.
- h. Storage of material or equipment providing that it is not subject to damage by floods and is firmly anchored to prevent flotation, or it can be readily removed from the area within the limited time available after flood warning.

2. Restricted Uses.

The following uses shall not be permitted in a Floodway District (FW).

- a. Any permanent structure designed for human occupancy such as homes, apartments, mobile homes, schools, and churches.

- b. Storage or processing of materials that are buoyant, flammable, explosive or could be injurious to human, animal or plant life in time of flooding.
- c. Subdivision of land for residential purposes.

3. Special Provisions.

Additional processing of gravels such as concrete and asphalt manufacturing may be permitted as a temporary use subject to a public hearing and approval by the Planning Commission. Notice of the public hearing shall be given as required in Section XXX of this ordinance.

F. FLOODWAY FRINGE (FF)

The following uses shall be permitted in a Floodway Fringe District (FF) to the extent that they are not prohibited by any other ordinance.

- 1. Any open space use permitted in Subsection E. 1.
- 2. Structures designed for human occupancy if the lowest floor elevation is no less than one (1) foot above the elevation of a regional flood.
- 3. Other structures if they are floodproofed or otherwise protected to a point one (1) foot above the elevation of a regional flood.
- 4. Subdivision of land for residential purposes providing that the following requirements are met.
 - a. All lots shall contain a building site at an elevation of not less than one (1) foot below the height of a regional flood.
 - b. No portion of any street or road shall be at an elevation less than one (1) foot below the height of a regional flood including those necessary for ingress or egress of emergency vehicles.
 - c. Any sewerage system shall be designed and constructed so as not to create a health hazard during inundation by a regional flood.

- d. Any water supply system used for human consumption including wells, pipelines or other facilities shall be designated so as not to be subject to contamination during inundation by a regional flood.
 - e. Monuments shall be established and maintained within the subdivision showing the elevation in feet above mean sea level.
5. A certificate from a registered engineer or licensed land surveyor indicating compliance with the above elevation requirements shall be considered proof of compliance.

G. THE INTERIM FLOOD HAZARD DISTRICT (FH)

It being recognized that detailed technical information is not available, areas of the unincorporated portion of Douglas County may be declared an Interim Flood Hazard District (FH) in the same manner as described in Subsection C, GENERAL PROVISIONS. In such areas all permits granted under the provisions of the Douglas County Subdivision Ordinance, the Douglas County Subsurface Sewage Disposal Ordinance, and the Douglas County Building Permit Ordinance shall be submitted to the County Water Resources Office and County Engineer for their approval. If, on the basis of a report from any approving agency, including the County Planning Commission and County Health Officer, it is determined that the granting of said permit or subdivision would be detrimental to the intent of this ordinance then it may be denied or modified.

APPENDIX E

FLOOD PLAIN COMBINING ZONE - FP - GRANT COUNTY

Section 3.050. PURPOSE. The Flood Plain Combining Zone, -FP, is intended to closely control construction of buildings and the outdoor storage of materials in areas subject to repeated flooding in order to minimize property damage and danger to human life and public health. It is superimposed on or combined with those portions of other use zones which have been identified as situated within a flood plain.

Section 3.051. APPLICATION OF PROVISIONS. In any zone with which is combined an FP zone, the requirements and procedures of Sections 3.052 and 3.053 shall apply in addition to those hereinbefore specified for such zone, provided if conflict in regulations or procedures occurs, the provisions of Sections 3.052 and 3.053 shall govern.

Section 3.052. LIMITATIONS ON USE. In any zone with which is combined an FP zone, storage of materials outside a structure other than a fence shall be limited to items which will not float or otherwise create hazards to the health and safety of persons or property in the county or in downstream areas should the storage area be inundated.

Section 3.053. SETBACK. In a zone with which is combined an FP zone and the provisions of Sections 4.020 to 4.070 notwithstanding, no structure, including a fence, nor use involving a structure, open storage of materials or equipment, fill, or other use or activity which in any manner may hinder, designated as a floodway of a watercourse or stream channel identified on the zoning map.

Section 3.054. PROCEDURE. In a zone with which is combined an FP zone, a lot may be used and a structure or part of a structure constructed, reconstructed, altered, occupied or used only after the following procedural and substantive requirements have been met:

- (1) An applicant shall submit with his application for a zoning permit sufficient evidence to indicate that the proposed development will result in a finished floor elevation and access to the property that is at least 2.00 feet higher than the high water level shown on the

zoning map. This evidence shall include a sketch map showing:

- (a) The location of the property with reference to channel stations.
- (b) The existing topography and proposed grading plan for the property referenced to established channel elevations.
- (c) The location of existing and proposed uses and the finished floor elevation of existing and proposed structures.
- (d) The location of existing and proposed underground utilities.
- (e) The location of existing and proposed diking or revertments, if any.

APPENDIX F

PROPOSED ZONING ORDINANCE FLOOD PLAIN
COMBINING DISTRICT FP JACKSON COUNTY

Section 3. 73. Purpose. This district is intended to be applied to properties which lie within areas inundated by overflow waters during the historical flood of 1964 of the Rogue River, Applegate River, and their tributaries.

Further, it is the intent of this district to provide minimum regulations and standards for the protection of such properties and their improvements from damage and hazards which may result from flood waters.

Section 3. 74. Special Definitions.

1. "Flood Plain" means the area adjoining a stream channel that is subject to inundation by high water flow.
2. "Period of Annual Flood Risk" means November through March.

Section 3. 75. Application of Flood Plain Provisions.

1. In any zoning district where an FP zoning designation is combined with a primary district, the following regulations shall apply. If any conflict in regulation or procedure occurs with zoning districts herein before specified, the provisions of the Flood Plain Combining District shall govern.
2. The following documents together with all explanatory matter therein, is hereby adopted by reference and made a part of this ordinance.
 - a. Flood Plain Information Interim Report, Jackson County, Oregon, United States Army Corps of Engineers, December, 1965.
 - b. Water Surface Elevations and Channel Characteristics for Selected Reaches of the Rogue River and

Elk Creek, Jackson County, Oregon, United States
Department of the Interior, Geological Survey, 1970.

- c. Water Surface Elevations and Channel Characteristics for a Selected Reach of the Applegate River, Jackson County, Oregon, United States Department of the Interior, Geological Survey, 1970.

Section 3.76. Permitted Flood Plain Uses. The following uses will be permitted outright in an FP Combining District:

1. Agriculture, grazing, or managing, growing, and harvesting of timber and other forest products.
2. Golf course, park, playground, picnic grounds or swimming area which do not include buildings or structures.
3. Picnic tables and fireplaces designed and anchored to prevent flotation, collapse or lateral movement.
4. Boat launching ramp, landing and docks.
5. Wildlife preserve, game farm, fish hatchery, hunting, or fishing area, but not containing buildings.
6. Parking area, roadway, hiking or riding trail.
7. Boundary fence.
8. Temporary accessory structures and buildings that will be removed from the zoning district during the period of annual flood risk.
9. Fishing platform.
10. Incidental storage of material or equipment that is mobile and readily removable from the flood plain area after flood warning. Incidental material or equipment shall include only items which will not create a hazard to the health or safety of persons and property should the storage area be inundated by flood water.
11. Temporary diversion points for irrigation purposes.

12. Water gaging station.
13. Water pump and accessory structure.
14. Temporary emergency alteration of stream beds or banks as flood control measures immediately preceding or following periods of high water.
15. Utility wire and pipeline necessary for public service.
16. Signs, subject to the provisions of Article 5.

Section 3. 77. Conditional Flood Plain Use. The planning commission may permit the following uses within the Flood Plain Combining District after public hearing and subject to the conditions hereinafter set forth:

1. Single-family residence or mobile home on a lot.
2. Home occupation.
3. Recreational use with related buildings and structures.
4. Overnight recreational campground not occupied during the period of annual flood risk.
5. Aggregate resource extraction.
6. Airport or landing strip.
7. Marina.
8. Structures and buildings accessory to permitted uses.
9. Flood water storage impoundment.
10. Water or sewage treatment plant, or other utility building or structure.
11. Bridge.
12. Commercial use when permitted in the primary district with which the FP District is combined.

13. Dike, revetment, rip rap, berm, jetty or landfill operation.

Section 3.78. Application for a Conditional Flood Plain Permit.

An application for a FP permit shall be made to the planning commission on forms approved by the commission. The application shall set forth the specific uses intended for the property and shall be accompanied by a plot plan drawn to an indicated scale showing:

1. The location of the property with reference to river and stream channel and flood profile elevations.
2. Existing topography, vegetation, and use including location of dikes, revetments, and other flood control works.
3. The location of proposed uses, structures, roads, or other improvements.
4. Proposed grading plan for the property, if any.

Section 3.79. Procedure.

1. Notice and public hearing upon the application shall be the same as provided for conditional uses in Article 6.
2. The planning commission shall make every effort to coordinate application review and investigation with all appropriate federal, state, local, or other agencies.
3. Decisions of the planning commission on FP use applications shall be subject to the procedures and other provisions provided in Article 6.
4. In addition to the minimum standards of the following section, the planning commission may prescribe additional restrictions or limitations when granting a conditional FP use permit.

Section 3.80. Minimum Standards. A special flood plain building permit shall be obtained from the Jackson County Planning Department prior to construction of residential or

nonresidential building or structure in the flood plain. Construction shall be regulated in accordance with the following minimum standards:

1. A residential structure shall have the lowest floor elevated to or above the level of the 1964 flood.
2. A commercial or industrial structure shall have the lowest floor elevated to or above the level of the 1964 flood or be flood proofed up to the level of the 1964 flood.
3. Any subsurface sewage disposal or individual water system for a proposed structure shall be designed and installed in accordance with the standards set forth in the County Sewage Disposal Ordinance or any other local ordinance or regulation.
4. Prefabricated and mobile homes shall be anchored to prevent flotation, or lateral movement of the structure.
5. All buildings and structures shall be constructed with materials that resist flood damage, or are adequately protected from flood damage.
6. Landfill material may be used for roadway construction provided that drainage openings are designed so as not to restrict the flow of water and thereby increase upstream elevations.

APPENDIX G

FLOODWAY DISTRICT FW JOSEPHINE COUNTY

SECTION 8. Uses Permitted. In an FW district the following uses and their accessory uses are permitted:

- (1) Farming.
- (2) Non-commercial park or playground.
- (3) Golf course or driving range; excluding miniature golf or a similar activity which utilizes intensive development on a relatively small parcel of ground.
- (4) Utility facilities necessary for public service.
- (5) Boat landing and docks.
- (6) Landing strip.
- (7) Sand and gravel removal operations; crushing of gravels for not more than 180 working days in any one calendar year and provided the crushing operation is of a portable and temporary nature and further provided that the location of the crusher is at least 1000 feet from a residential zone.

SECTION 9. Lot Size. No requirements.

SECTION 10. Setback Requirements. No structure shall be located closer than 30 feet to a property line.

APPENDIX H

LANE COUNTY SPECIAL PERMIT AREA
LANE COUNTY

Ordinance 3 - 65

The Board of County Commissioners of Lane County ordains as follows:

SECTION 1. The Board of County Commissioners may from time to time designate certain areas of Lane County as "Lane County Special Permit Area" where the board has determined that such area is subject to flooding, or surface water, necessitating special building requirements to prevent property damage and safeguard the life and health of the people in such area and of the general public.

SECTION 2. In addition to the permit requirements of the Lane County Building Code Ordinances, no dwelling, or structure of public assembly as defined in ORS 460.210, shall be located, moved, erected or constructed in any "Lane County Special Permit Area" until a special permit therefore has been obtained from the Director of the Lane County Department of Health and Sanitation.

SECTION 3. Such special permits shall be issued by the Director of the Lane County Department of Health and Sanitation when, and only when, the director has determined that:

- A. The proposed site will not during potential future flooding be so inundated by flood water as to result in injury or serious danger of injury to property or to the health, safety and welfare of residents or potential residents of the immediate area.
- B. Finish floor elevation restriction on any proposed structure will place the finished floor of such structure at such an elevation as shall be determined for such structure by the Department of Public Works for Lane County based upon the level of flood water during potential future flooding so as to prevent damage to such structure in such flooding.

- C. Any subsurface sewage disposal system for a proposed structure will not during potential future flooding adversely affect or endanger the health, safety and welfare of residents or potential residents of the area.
- D. No improvements are proposed that will have a serious tendency to change the flow of surface water during potential future flooding so as to endanger the health, safety and welfare of residents or potential residents or other property in the area.
- E. That adequate provision has been made or is available for accessibility during potential future flooding so as to insure ingress and egress of emergency vehicles and services during potential future flooding.

SECTION 4. Such special permits shall specify special requirements so as best to insure that the conditions provided in Section 3 hereof will be met, and as will best promote the purposes stated in Section 1 of this Ordinance in accordance with general standards adopted by the department.

SECTION 5. Each "Lane County Special Permit Area" shall further be subject to all provisions of other Ordinances of Lane County.

SECTION 6. Appeal to Board of County Commissioners. Any person aggrieved by a decision of the Director of the Department of Health and Sanitation shall have the right to appeal therefrom to the Board of County Commissioners. Such appeal shall be made within 30 days from the date of the decision of the Director of the Department of Health and Sanitation.

- A. Manner of Taking Appeal: Appeal to the Board of County Commissioners under this Ordinance shall be taken by filing with said Board a written request for hearing and determination on such denial and setting forth the number officially designated on the application denied.
- B. Time of Hearing: Not later than 10 days after the taking of appeal pursuant to this section, the Board of County Commissioners shall hear the appeal in Public Session, provided, however, that the time for such hearing may be extended for not more than 10 additional days when such Board unanimously determines that such extension is

necessary for a fair and thorough hearing of such appeal. At the hearing the Board of County Commissioners shall consider evidence presented by the appellant, together with any reports, comments or information with respect thereto from any Public office or official theretofore considered by the Department, and any other evidence desired for consideration by the Board of County Commissioners and presented at such orally shall be reduced to writing in summary form, and all documentary evidence shall be considered public.

- C. Determination of Appeal: Not later than 10 days after the hearing provided for in this section, the Board of County Commissioners shall make a final determination on the denial appeal from, by order entered in the Journal of Administration. Such determination shall be limited to a finding as to whether or not the denial appeal from was proper.
- D. Action on Determination: If the Board of County Commissioners determines that the denial appealed from was not proper, the Department shall immediately grant the permit, in accordance with the determination of said Board.

SECTION 7. This ordinance being enacted by the Board of County Commissioners in the exercise of its police power and for the purpose of meeting an emergency, and being necessary for the immediate preservation of the public peace, health and safety, an emergency is declared to exist and this ordinance shall take effect immediately upon being enacted.

APPENDIX I

FLOOD PLAIN OVERLAY ZONE - MARION COUNTY

178.010. PURPOSE. It is the purpose of the Flood Plain Overlay Zone to (regulate the use of those) areas subject to periodic flood waters and to permit and encourage the retention of open land uses that are compatible and harmonious in nature. In advancing these principles and the general purposes of the Marion County Comprehensive Plan and Zoning Ordinance, the specific intent of this zone is:

1. To combine with present zoning requirements, certain restrictions made necessary for the known flood plains to promote the general health, welfare and safety of the County.
2. To prevent the establishment of certain structures and land uses in areas unfit for human habitation because of danger of flooding, unsanitary conditions or other hazards.
3. To minimize danger to public health by protecting the water supply and promoting safe and sanitary drainage.
4. To reduce the financial burden imposed on the public and governmental units by frequent and periodic flooding.
5. To permit certain uses which can be strategically located in the flood plain as herein defined and which will not impede the flow of flood waters, or otherwise cause danger to life and property at, above or below their locations (within the flood plain).

178.020. DEFINITIONS.

1. Accessory Structure - A detached, subordinate structure or portion of a main structure, the use of which is incidental to that of the main or principle structure or to the use of the land.
2. Flood - a temporary rise in stream flow or stage that results in water overtopping its banks and inundating areas adjacent to the channel.

3. Flood Plain - those areas subject to a 1% chance of flooding in any one year (100 - year flood) as delineated by the U. S. Army Corp of Engineers, Soil Conservation Service and other technical sources, as shown on the official zoning map of Marion County.
4. Floodway - the channel of a stream and adjacent land areas which are required to carry and discharge the flood water or flood flows of any river or stream associated with the regulatory flood.
5. Flood Proofing - a combination of structural provisions, charges, 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.
6. Main or Principle Structure - Anything constructed or erected on the ground or attached to the ground representing the primary or principle use of the land in which it is situated, including but not limited to: residences, mobile homes, churches, schools, etc.
7. Regulatory Flood - the regulatory flood is a flood which is representative of large floods known to have occurred generally in the area and reasonably characteristic of what can be expected to occur on a particular stream or river. The regulatory flood, for the purposes of this ordinance generally has an average frequency in the order of the 100 year recurrence interval flood determined from an analysis of floods on a particular stream or river and other streams or rivers in the same general region.

178.030. USES. All uses setforth in specific zones located within the floodplain overlay zone shall be permitted with the exception of structures used in carrying out permitted activities. Any deviation from the above must be approved by the Planning Commission under the provisions setforth in Section 178.040 of this ordinance. However Section 178.040 shall not be applicable to areas designated as flood - ways where use of structures to carry out permitted activities is prohibited.

178.040. CONDITIONAL USES. When authorized under the procedure provided for conditional uses in this ordinance, the following uses will be permitted in a flood plain overlay zone:

1. Main or Principle Structure. Structures used in carrying out permitted activities provided detailed engineered data is supplied by the applicant who bears the burden of proof

that such structures can be located in areas of plateaus or benches or upon manmade fills that would not be affected in any way by flood waters provided:

- a. Sewer and water systems meet the approval of appropriate agencies.
- b. Manmade fills, dikes or levees meet the approval of the Planning Commission. Upon review of plans to construct manmade fills, dikes or levees the Commission will consider among other things whether the preparation and use of land within floodplain areas will in any way create flooding problems in the future on other lands.

In addition, no building or structure shall be erected and no existing building or structure shall be extended or moved unless the main floor of said building or structure is placed a minimum of 1 foot above the elevation subject to flooding. No basement floor shall be below this 1 foot safety margin. Foundations of all structures shall be designed and constructed to withstand flood conditions at the site.

2. Accessory Structures. Structures used in carrying out permitted activities provided such structures will not be subject to substantial flood damage and will not increase flood related damages on other lands. These may include structures which can be readily removed from flood hazard areas during periods of high water.

Additional conditions that may be considered by the Planning Commission in reviewing the use of structures in flood plain areas shall include:

- a. Modification of waste disposal and water supply facilities.
- b. Limitations on periods of use and operation.
- c. Imposition of deed restrictions.
- d. Requirements for construction of channel modifications, dikes, levees and other protective measures.
- e. Flood proofing measures designed to be consistent with the flood protection elevation for a particular area:

1. Anchorage to resist floatation and lateral movement.
2. Installation of water tight doors, bulkheads and shutters.
3. Reinforcement of walls to resist water pressures.
4. Use of paints, membranes or mortars to reduce seepage of water through walls.
5. Addition of mass or weight to structures to resist floatation.
6. Installation of pumps to lower water levels in structures.
7. Construction of water supply and waste treatment systems so as to prevent the entrance of flood waters.
8. Pumping facilities for subsurface external foundation wall and basement floor pressures.
9. Construction to resist rupture or collapse caused by water pressure or floating debris.
10. Cutoff valves on sewage lines or the elimination of gravity flow basement drains.

178.050. STORAGE OF MATERIALS AND EQUIPMENT. Materials that are buoyant, flammable, (obnoxious, toxic) or otherwise injurious to persons or property if transported by flood waters are prohibited. Storage of materials and equipment not having these characteristics is permissible only if the materials and equipment have low damage potential and are anchored or are readily removable from the area within the time available after forecasting and warning.

178.060. OTHER CONSIDERATIONS. The evaluation of the effect of a proposed use in the flood plain causing increases in flood heights is based not just on the effect of the single use acting alone, but upon the reasonable assumption that other land owners within the hydraulic reach may need to be allowed to develop within the encroachment lines to an equivalent extent and therefore the culminating effects of such encroachments must be considered by the Planning Commission in making any decision.

178.070. NON-LIABILITY CLAUSE. The granting of approval of any structure or use shall not constitute a representation, guarantee, or warranty of any kind or nature by the County of Marion or the Planning Commission or by any officer or employee thereof, or the practicality of safety of any structure or use proposed and shall create no liability upon or cause action against such public body, officer, or employee for any damage that may result pursuant thereto.

178.080. RESTRICTIONS. Restrictions regarding height, rear yards, side yards, front yard setback, minimum lot area, signs, vision, clearance and parking space shall be the same as setforth in each specific zone located within the floodplain overlay zone area.

178.090. PROHIBITED USES. It shall be unlawful to erect, alter, maintain or establish in a flood plain overlay zone any building, use or occupancy not permitted or allowed in the foregoing provisions, except existing nonconforming uses, which may continue as provided in Sections 114.010 through 114.080.

Subdivisions are not consistent with the purpose and intent of this zone and are hereby prohibited.

APPENDIX J

FLOOD HAZARD DISTRICT - MULTNOMAH COUNTY

6.50 FLOOD HAZARD DISTRICT

6.51 PURPOSE

The purposes of this section are to promote the public health, safety and general welfare and to minimize flood losses by provisions designed to:

- a. Restrict or prohibit uses which are dangerous to health, safety or property in times of flood or which cause increased flood heights or velocities.
- b. Require that uses vulnerable to floods, including public facilities which serve such uses, be protected at the time of initial construction.
- c. Assure the development of lands only for uses which are suitable in relation to flood hazard.

6.52 AREA OF APPLICATION

This district shall apply to selected lands within the unincorporated area of Multnomah County, which are subject to periodic flooding from stream and river flows by a regulatory flood.

6.521 Findings of Fact

6.5211 Flood Losses resulting From Periodic Inundation.

The flood hazard areas of Multnomah County are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the County's tax base all of which adversely affect the public health, safety and general welfare.

6.5212 General Causes of These Flood Losses

These flood losses are caused by:

1. The cumulative effect of obstructions in floodways causing increases in flood heights and velocities, and
2. The occupancy of flood hazard areas by uses vulnerable to floods or hazardous to others which are inadequately elevated or otherwise protected from flood damages.

6.53 GENERAL PROVISIONS

This district shall apply to selected lands within the unincorporated area of Multnomah County according to the procedure established herein for amendment of the Zoning Map.

6.531 Flood Hazard Classification

Flood hazard areas shall be classified either Floodway (FW), Flood Fringe (FF), or Flood Hazard (FH). Floodway (FW) and Flood Fringe (FF) areas when possible to adequately define or differentiate between the two, shall be so shown on the Zoning Map. In those areas where it is not possible to differentiate between the Floodway and the Flood Fringe, due to lack of detailed information, a Flood Hazard (FH) areas shall be designated.

6.532 Flood Hazard District Determination

This district shall apply only to those lands where detailed hydrological studies have been prepared by a competent agency concerned with such studies; such as the U. S. Army Corps of Engineers or the Soil Conservation Service.

6.533 Warning and Disclaimer of Liability

The degree of flood protection required by the Flood Hazard District is considered reasonable for regulatory purposes and is based on engineering and scientific methods of study. Larger floods may occur on rare occasions or the flood height may be increased by man-made or natural causes, such as ice jams and bridge

openings restricted by debris. This district does not imply that areas outside the Flood Hazard District boundaries or land uses permitted within such district will be free from flooding or flood damages. This Section shall not create liability on the part of Multnomah County or any officer or employee thereof for any flood damages that result from reliance on this district or any administrative decision lawfully made thereunder.

6.54 FLOODWAY (FW) AREA

This Area shall allow and control only those uses which are stated within the designated Floodway (FW) classification. All regulatory and dimensional standards of the underlying zoning classification shall also apply to all uses allowed in this Area.

6.541 Permitted Uses

Subject to the other restrictions which apply, the following open space uses shall be permitted in a Floodway (FW) area provided they do not require structures, fill or storage of materials or equipment:

- a. Agricultural uses such as: general farming, pasture, grazing, outdoor plant nurseries, viticulture, horticulture, truck farming, forestry, sod farming, and wild crop harvesting.
- b. Private and public recreational uses such as: picnic grounds, boat launching ramps, parks, wildlife and nature preserves, fish hatcheries, hunting and fishing areas, hiking and riding trails.

6.542 Any use permitted in the underlying district provided the use does not require structures, fill or storage of materials or equipment.

6.55 FLOOD FRINGE (FF) AREA

This Area shall allow and control only those uses which are stated within the designated Flood Fringe (FF) classification. All Regulatory and dimensional standards of the underlying zoning classification shall also apply to all uses allowed in this Area.

6.551 Permitted Uses

6.5512 Any other use permitted in the underlying classification provided it is elevated above the regulatory flood protection elevation and a determination is made by the Director of the Department of Public Works that the use will not unduly restrict the capacity of the channels or floodway of tributaries to any main streams or rivers, drainage ditches, or any other drainage facilities or systems.

6.5513 Structures, fills or storage uses are permitted if adequate flood-proofing or other protective measures are incorporated as presented by an engineer to protect the structure and/or contents. Protective measures such as the following may be necessary:

1. Anchorage to resist floatation and lateral movement.
2. Installation of water tight doors, bulkheads, and shutters.
3. Reinforcement of walls to resist water pressures.
4. Use of paints, membranes or mortars to reduce seepage of water through walls.
5. Addition of mass or weight to structures to resist floatation.
6. Installation of pumps to lower water levels in structures.
7. Construction of water supply and waste treatment systems so as to prevent the entrance of flood waters.
8. Pumping facilities for subsurface external foundation wall and basement floor pressures.
9. Construction to resist rupture or collapse caused by water pressure or floating debris.
10. Cut-off valves on sewer lines or the elimination of gravity flow basement drains.
11. Elevation of structures and uses to above the regulatory flood protection elevation at the location of the proposed development.

12. Requirements for construction of channel modifications, dikes, levees and other protective measures.

6.56 FLOOD HAZARD (FH) AREA

This Area shall be applied to those specified lands which are subject to periodic inundation from stream or river flows where only the outer limits of the inundation area can be described. The areal extent of the inundation area shall have been described by an agency of competent expertise. All proposed developments within those areas described as Flood Hazard Areas shall be subject to a Special Review permit procedure as hereinafter set forth.

6.561 Permitted Uses

- 6.5611 Any open space use permitted in the Floodway (FW) Area and Flood Fringe (FF) Area.

6.562 Special Review Permit

- 6.5621 All other uses are permitted only upon application to and approval by the Board of Adjustment. Said approval shall be pursuant to the standards and conditions herein established.

6.5622 Open Uses

- a. Accessory uses to the permitted uses.
- b. Circuses, carnivals, and similar transient amusement enterprises.
- c. Drive-in theaters, new and used car lots, roadside stands and signs.
- d. Extraction of sand, gravel and other materials.
- e. Marinas, boat rentals, docks, piers and wharves.
- f. Railroads, streets, bridges, utility transmission lines and pipe lines.
- g. Storage yards for equipment, machinery or materials.
- h. Kennels and stables.
- i. Other uses similar to uses listed above.

6.5623 Fill

- a. Any fill or materials proposed to be deposited in the floodway must be shown to have a beneficial purpose and the amount thereof not greater than is necessary to achieve that purpose, as demonstrated by a plan submitted by the owner showing the uses to which the filled land will be put and the final dimensions of the proposed fill or other materials.
- b. Such fill or other materials shall be protected against erosions by rip-rap, vegetative cover or bulkheading.
- c. Structures may be allowed to be constructed on fill if the first floor or basement floor is above the regulatory flood protection elevation. The fill shall be at a point no lower than one (1) foot below the regulatory flood protection elevation for the particular area and such fill shall extend at such elevation at least fifteen (15) feet beyond the limits of any structure or building erected thereon.

6.5624 Structures

- a. Structures shall not be constructed for human habitation unless they can be so designed as to have the habitable portion of the structure above the designated flood elevation and the foundation constructed in such a manner as to withstand such inundation.
- b. The structure(s), if permitted, shall be constructed and placed on the building site so as to offer the minimum obstruction to the flow of flood water.
 1. Whenever possible, structures shall be constructed with the longitudinal axis parallel to the direction of flood flow, and

2. So far as practicable, structures shall be placed approximately on the same flood flow lines as those of adjoining structures.
- c. Structures shall be firmly anchored to prevent floatation which may result in damage to other structures, restriction of bridge openings and other narrow sections of the stream or river.
- d. Service facilities such as electrical and heating equipment shall be constructed at or above the regulatory flood protection elevation for the particular area.

6.5625 Storage of Material and Equipment

- a. Storage or processing of materials that are buoyant, flammable, explosive or could be injurious to human, animal or plant life in time of flooding is prohibited.
- b. Storage of other material or equipment may be allowed if not subject to major damage by floods or firmly anchored to prevent floatation or shall be readily removable from the area within the limited time available after flood warning.

6.57 PROCEDURE FOR SPECIAL REVIEW PERMITS

- 6.571 The applicant for any use permitted as requiring a Special Review Permit shall submit such application to the Planning Department.
- 6.572 Upon receiving an application for a Special Review Permit involving the use of fill, construction of structures, or storage of materials, the Board of Adjustment shall, prior to rendering a decision thereon:
 - 6.5721 Require the applicant to furnish such of the following information as is deemed necessary by the Board of Adjustment for determining the regulatory flood protection elevation and whether the proposed use is located in the Flood Hazard

Area classifications and other factors necessary to render a decision on the suitability of the particular site for the proposed use.

- a. Plans in triplicate drawn to scale showing the nature, location, dimensions and elevation of the lot, existing or proposed structures, fill, storage of materials, flood proofing measures and the relationship of the channel.
 - b. A typical valley cross-section showing the channel of the stream or river, elevation of land areas adjoining each side of the channel, cross-sectional areas to be occupied by the proposed development, and high water information, if requested.
 - c. Plan (surface view) showing elevations or contours of the ground; pertinent structure, fill or storage elevations; size, location and existing structures on the site; location and elevations of streets, water supply, sanitary facilities existing land uses and vegetation upstream and downstream, soil types, and other pertinent information.
 - d. Profile showing the slope of the bottom of the channel or flow line of the stream or river, if requested.
 - e. Specifications for building construction and materials, flood proofing, filling, dredging, grading, channel improvement, storage of materials, water supply and sanitary facilities.
- 6.573 One copy of the information described in subsection 6.5721 shall be transmitted to the Director of the Department of Public Works from which the Board of Adjustment shall request technical assistance in determining whether the proposed use is in the Flood Hazard Area classification; in determining the regulatory flood protection elevation, and in evaluating the proposed project in relation to the flood heights and velocities; the seriousness of flood damage to the use, the adequacy of the plans for protection and other technical matters.

- 6.574 Based upon this technical evaluation, the Board of Adjustment shall determine whether the proposed use is located within the flood hazard area, determine the specific flood hazard at the site and shall evaluate the suitability of the proposed use in relation to the flood hazard.
- 6.574 The decision of the Board of Adjustment shall be based upon the following factors:
- a. The danger to life and property due to increased flood heights or velocities caused by encroachments.
 - b. The danger that materials may be swept on to other lands or downstream to the injury of others.
 - c. The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination and unsanitary conditions.
 - d. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner.
 - e. The importance of the services provided by the proposed facility to the community.
 - f. The requirements of the facility for a waterfront location.
 - g. The availability of alternative locations not subject to flooding for the proposed use.
 - h. The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.
 - i. The relationship of the proposed use to the Comprehensive Plan and flood plain management program for the area.
 - j. The safety of access to property in times of flood for ordinary and emergency vehicles.
 - k. The expected heights, velocity, duration, rate of rise and sediment transport of flood waters expected at the site.
 - l. Such other factors which are relevant to the purposes of this Ordinance.

6.575 Conditions Attached to Special Review Permits

Upon consideration of the factors listed above and the purposes of the Ordinance, the Board of Adjustment may attach such conditions to the granting of a Special Review Permit as it deems necessary to further the purposes of the portion of the Zoning Ordinance. The following such conditions, without limitation because of specific enumeration, may be included:

- 6.5751 Modification of waste disposal and water supply facilities.
- 6.5752 Limitations on periods of use and operation.
- 6.5753 Imposition of operational controls, sureties and deed restrictions.
- 6.5754 Requirements for construction of channel modifications, dikes, levees and other protective measures.
- 6.5755 Flood proofing measures such as the following shall be designed consistent with flood protection elevation for the particular area, flood velocities, duration, rate of rise, hydrodynamic forces, and other factors associated with the regulatory flood. The Board of Adjustment may require that the applicant submit a plan or document certified by a registered engineer that the flood proofing measures are consistent with the regulatory flood protection elevation and associated flood factors for the particular area. The following measures, but not limited to the listed measures, may be required.
 - a. Anchorage to resist floatation and lateral movement.
 - b. Installation of watertight doors, bulkheads and shutters.

- c. Reinforcement of walls to resist water pressures.
- d. Use of paints, membranes, or mortars to reduce seepage of water through walls.
- e. Addition of mass or weight to structures to resist floatation.
- f. Installation of pumps to lower water levels in structures.
- g. Construction of water supply and waste treatment systems so as to prevent the entrance of flood waters.
- h. Pumping facilities for subsurface external foundation wall and basement floor pressures.
- i. Construction to resist rupture or collapse caused by water pressure or floating debris.
- j. Cut-off valves on sewer lines or the elimination of gravity flow basement drains.
- k. Elevation of structures and uses to the regulatory flood protection elevation.

6.58 DEFINITIONS

For the purpose of the District classification, the following terms are hereby defined:

- 6.5801 FLOOD. A temporary rise in stream flow or stage that results in water overtopping its banks and inundating areas adjacent to the channel.
- 6.5802 FLOOD FRINGE. The Flood Fringe area is that land area which is outside of the stream's or river's floodway, but is subject to periodic inundation due to periodic flooding.
- 6.5803 FLOODWAY. The channel of a stream and adjacent land areas which required to carry and discharge the flood water or flood flows of any river or stream associated with the regulatory flood.

- 6.5804 FLOOD PROOFING. A combination of structural provisions, changes, or adjustment 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.
- 6.5805 OBSTRUCTION. Any dam, wall, wharf, embankment levee, dike, pike, abutment, projection, excavation, channel rectification, bridge conduit, culvert, building, wire, fence, rock, gravel, refuse, fill, structure or matter in, along, across, or projecting into any channel, watercourse, or regulatory flood hazard area which may impede, retard or change the direction of the flow of water, either in itself or by catching or collecting debris carried by such water, or that is placed where the flow of water, might carry the same downstream to the damage of life or property.
- 6.5806 REACH. A hydraulic engineering term to describe longitudinal segments of a stream or river. A reach will generally include the segment of the flood hazard area where flood heights are primarily controlled by man-made or natural obstructions or constructions. In an urban area an example of a reach would be the segment of a stream or river between two consecutive bridge crossings.
- 6.5807 REGULATORY FLOOD. The regulatory flood is a flood which is representative of large floods known to have occurred generally in the area and reasonably characteristic of what can be expected to occur on a particular stream or river. The regulatory flood, for the purposes of this Section, generally has an average frequency in the order of the one-hundred (100) year reoccurrence interval flood determined from an analysis of floods on a particular stream or river and other streams or rivers in the same general region.
- 6.5808 REGULATORY FLOOD PROTECTION ELEVATION. The elevation to which uses regulated by this district are required to be elevated or flood proofed.

6.5809 STRUCTURE. For purposes of this Section, anything constructed or erected, on the ground or attached including but not limited to the following: buildings, factories, sheds, cabins, mobile homes and other similar items.

APPENDIX K

F-H FLOOD HAZARD SUBDISTRICT
UMATILLA COUNTYSection 3.150 PURPOSE

The purpose of the Flood Hazard Subdistrict is to promote and protect the public health, safety and general welfare and to minimize flood losses by provisions designed to:

- (1) Restrict or prohibit uses which are dangerous to health, safety or property in times of flood or which cause increased flood heights or velocities;
- (2) Require that uses vulnerable to floods, including public facilities which serve such uses, be provided with flood protection at the time of initial construction;
- (3) Protect individuals from buying lands which are unsuited for some purposes because of flood hazard.

Section 3.151 COMPLIANCE

A lot may be used and a structure or part of a structure may be constructed, reconstructed, altered, occupied or used in a Flood Hazard Area only as this section permits.

Section 3.152 LOCATION OF FLOOD HAZARD AREAS

The boundaries of areas delineated as Flood Hazard Areas in Umatilla County, Oregon, shall be the boundaries of those areas designated as "Intermediate Regional Flood" areas in the following "Flood Plain Information" reports prepared by the Corps of Engineers, U. S. Army Walla Walla, Washington District:

November 1969: Mission-Riverside Area near Pendleton, Oregon, Umatilla River.

March, 1971: Umatilla River Tributaries: McKay, Tutuilla and Wildhorse Creeks, Pendleton, Oregon, and Vacinity;

which are hereby established as the Flood Plain Zoning Map for Umatilla County. Future "Flood Plain Information" reports prepared by the Corps of Engineers, U.S. Army, and other delineations of Flood Hazard Areas may be added to this ordinance by amendment as hereinafter provided.

Section 3.153 ZONING MAP

The official Flood Plain Zoning Map for Umatilla County with all explanatory matter thereon and attached thereto is hereby adopted by reference and declared to be part of this ordinance. The official copy shall have the same effective date as this ordinance and shall be signed by the County Court and the County Clerk and shall be maintained on file in the office of the County Clerk.

Section 3.154 LIMITATIONS ON ALL USES

No structure (temporary or permanent), fill, including fill for roads and levees, deposit, obstruction, storage of materials or equipment, or other uses shall be permitted in a Flood Hazard Area which, acting alone or in combination with existing or future uses unduly affects the efficiency or the capacity of the Flood Hazard Area or unduly increases flood heights.

Section 3.155 LIMITATIONS ON FILL

- (1) Any fill proposed to be deposited in a Flood Hazard Area must be shown to have some beneficial purpose and the amount must be not greater than is necessary to achieve that purpose, as demonstrated by a plan submitted according to Section 3.158.
- (2) Such fill or other materials shall be protected against erosion by rip-rap, vegetative cover or bulkheading.

Section 3.156 LIMITATIONS ON STRUCTURES

- (1) The lowest floor elevation, including the basement, of a structure designed for human occupancy shall be at least one ft. above the elevation of an Intermediate Regional Flood. Human occupancy includes a residential, commercial or industrial use but excludes a storage or warehouse building not in daily use.

- (2) The portions of a structure below an elevation one ft. above the elevation of an Intermediate Regional Flood shall be floodproofed or otherwise protected from significant damage by inundation.
- (3) In the case of land subdivision in a Flood Hazard Area, each lot intended as a site for a structure for human occupancy shall contain a building site and access road with a ground elevation no lower than one ft. below the elevation of an Intermediate Regional Flood; be accessible to a roadway no portion of which is less than one ft. below the elevation of an Intermediate Regional Flood; and be served by sewer and water supply systems designed and constructed to not create a health hazard during inundation by an Intermediate Regional Flood.
- (4) A permitted structure in a Flood Hazard Area shall be constructed and placed on the building site so as to offer the minimum obstruction to the flow of flood waters. Whenever possible, structures shall be constructed with the longitudinal axis parallel to the direction of flood flow and shall be placed approximately on the same flood flow lines as those of adjoining structures.
- (5) Structures shall be firmly anchored to prevent flotation.
- (6) Service facilities such as electrical and heating equipment shall be constructed above the elevation of an Intermediate Regional Flood.
- (7) A mobile home and a vacation trailer shall not be considered a structure for the purposes of this section, so long as there is no permanent foundation, wheels and tires in good repair are attached, and the unit is otherwise readily removable.

Section 3.157 LIMITATIONS ON STORAGE OF MATERIALS AND EQUIPMENT

- (1) The storage or processing of materials that are buoyant, flammable, explosive or that could be injurious to human, animal or plant life in time of flooding is prohibited in a Flood Hazard Area.

- (2) Storage of other material or equipment may be allowed in a Flood Hazard Area if not subject to major damage by floods, if firmly anchored to prevent flotation, or if readily removable from the area within the limited time available after flood warning.

Section 3.158 PROCEDURE

In a Flood Hazard Area, a lot may be used and a structure or part of a structure constructed, reconstructed, altered, occupied or used only after the following requirements have been met:

- (1) An applicant shall submit with his application for a zoning permit sufficient evidence to indicate that the proposed development will result in a finished floor elevation and access to the property that is at least 1.00 ft. higher than the elevation of an Intermediate Regional Flood. This evidence shall include sketches showing:
 - (a) The nature, location, dimensions and elevation of the lot, and its relationship to the location of the channel;
 - (b) Development plan showing existing and proposed elevations or contours of the ground; pertinent structure, fill or storage elevations; size, location and spatial arrangement of all proposed and existing structures on the site; location and elevation of streets and all existing and proposed underground utilities;
 - (c) A typical valley cross-section showing the channel of the stream, elevation of land areas adjoining each side of the channel, cross-sections of areas to be occupied by the proposed development, and high water information;
 - (d) Profile showing the slope of the bottom of the channel or flow line of the stream;
 - (e) Specifications for building construction and materials, floodproofing, filling, dredging, grading, channel improvements, storage of materials, water supply, and sanitation facilities.

- (2) An applicant shall submit with his application for a zoning permit sufficient evidence to enable the Planning Commission to review his construction methods and materials to determine that minimum flood damage will occur in the event of inundation. This evidence shall enable the Planning Commission to determine that:
- (a) Proposed repairs and renovations will use materials and equipment that are resistant to flood damage, and construction methods and practices that will minimize flood damage;
 - (b) New construction, including prefabricated and mobile homes will be protected against flood damage, will be designed or modified and anchored to prevent flotation, collapse or lateral movement of the structure, will use materials and equipment that are resistant to flood damage, and will use construction methods and practices that will minimize flood damage.

Section 3.159 DESTRUCTION OF NONCONFORMING USE OR
STRUCTURE

If a nonconforming structure in a Flood Hazard Area is destroyed by any cause to an extent exceeding 80 percent of its fair market value as indicated by the records of the County Assessor, a future structure on the site shall conform to this ordinance.

APPENDIX L

FLOOD HAZARD COMBINING ZONE (FH)
ORDINANCE GLADSTONESection 3.810. APPLICATION OF PROVISIONS.

In any zone with which is combined an FH zone, the requirements and procedures of Sections 3.820 through 3.840 shall apply in addition to those herein before specified for such zone, provided that if conflict in regulations or procedures occurs, the provisions of Sections 3.820 through 3.840 shall govern.

Section 3.820. LIMITATIONS ON USE.

In any zone with which is combined an FH zone, storage of materials outside of a structure other than a fence shall be limited to items that will not float or otherwise create hazards to the health and safety of persons or property in the city and environs should the storage area be inundated.

Section 3.840. PROCEDURE.

In a zone with which is combined an FH zone, a lot may be used and a structure or part of a structure constructed, reconstructed, altered, occupied or used only after the following procedural and substantive requirements have been met:

- (1) An applicant shall submit with his application for a building permit sufficient evidence to indicate that the proposed development will result in a finished floor elevation and access to the property shall be at least 2.00 feet higher than the Intermediate Regional Flood (100 year flood) as shown on Plates 25 and 27 of the Flood Plain Information, Oregon City-West Linn-Gladstone-Jennings Lodge, Oregon; prepared for Clackamas County, Oregon by the U. S. Army Engineer District, Portland, dated June, 1970. This evidence shall include a sketch map showing:
 - (a) The location of the property with reference to High Water Profile Plates 25 and 27 from Flood Plain Information, Oregon City-West Linn-Gladstone-Jennings Lodge, Oregon.

- (b) The existing topography and proposed grading plan for the property, referenced to established high water elevation noted above.
- (c) The location of existing and proposed uses and the finished floor elevation of existing and proposed structures.
- (d) The location of existing and proposed underground utilities.
- (e) The location of existing and proposed diking or revetments, if any.

APPENDIX M

ORDINANCE NO. 1262
MILWAUKIE

Section 3. 150 Flood Hazard Zone FH. In a flood hazard zone the following regulations shall apply:

1. Purpose. The FH zone is a superimposed zone applied in combination with existing regular zones for the purpose of promoting the public health, safety and general welfare, and to minimize flood losses by provisions designed to:
 - a. Restrict or prohibit uses which are dangerous to health, safety, or property in times of flood or cause increased flood heights or velocities.
 - b. Require that uses vulnerable to floods, including public facilities which serve such uses, be provided with flood protection at the time of initial construction.
 - c. Protect individuals, as much as possible, from buying lands which are unsuited for intended purposes, because of flood hazard.
2. Classification. Within the Flood Hazard District section of the Zoning Ordinance two (2) sub-classifications are established as delineated by the U. S. Army Corps of Engineers: Floodway (FW) and Floodway Fringe (FF). Each of these two sub-classifications are as hereinafter described as to their workings and function.
3. Limitations of Use. In an FH zone, an outright use or a conditional use permitted in accordance with the provisions of the pre-established regular zone shall be permitted only as provided below:
 - a. Floodway (FW) and Floodway Fringe (FF) sub-classifications. These two sub-classifications shall allow and control only those uses which are stated within each sub-classification. All regulatory and dimensional standards of the underlying zoning

classification shall also apply to all uses allowed in these two sub-classifications.

1. Floodway (FW) sub-classification permitted uses:
 - a. Any use permitted outright in the underlying zoning district provided that no structure, fill, excavation, or storage of materials or equipment are proposed.
 - b. Conditional uses permitted in the underlying zoning districts limited to the following:
 1. Marinas, docks, piers, etc. provided any structure or building shall be designed and constructed to withstand the waters of a regional flood without significant damage or obstruction of flow.
 2. A roadway, bridge or utility structure that will not significantly impede the waters of a regional flood.
 3. Storage of material or equipment that either is not subject to damage by a flood or is mobile and readily removable from the area within the limited time available after flood warning. If not subject to damage by a flood, the material or equipment shall be anchored to prevent flotation. Material or equipment stored shall be only items which will not create a hazard to the health or safety of persons, property, animals, or plant life should the storage area be inundated.
 4. Extraction of sand, gravel and other materials.

2. Floodway Fringe (FF subclassification permitted uses:
 - a. All uses permitted in 3. a. 1. above.
 - b. Structures or uses specified in the underlying zoning district provided that no building permit or other permit for construction or alteration of any structure or use shall be issued until plans have been reviewed and approved by the Planning Commission.
 1. In considering an application for a use or conditional use, permitted in accordance with the provisions of the pre-established regular zone within an area designated FH, the Planning Commission shall consider the following:
 - a. The danger to life and property due to increased flood heights or velocities caused by encroachments.
 - b. The danger that materials may be swept on to other lands or downstream to the injury of others.
 - c. The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination, and unsanitary conditions.
 - d. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner.

- e. The importance of the services provided by the proposed facility to the community.
 - f. The requirements of the facility for a waterfront location.
 - g. The availability of alternative locations not subject to flooding for the proposed use.
 - h. The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.
 - i. The relationship of the proposed use to the comprehensive plan and flood plain management program for the area.
 - j. The safety of access to the property in times of flood for ordinary and emergency vehicles.
 - k. The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters expected at the site.
 - l. Such other factors which are relevant to the purposes of this Ordinance.
2. Upon consideration of the factors listed above and the purposes of this Ordinance, the Planning Commission may attach such conditions to the granting of a special exception permit as it deems necessary to further the purposes of this Ordinance. Among such conditions without

limitation because of specific enumeration may be included:

- a. Modification of waste disposal and water supply facilities.
- b. Limitations on periods of use and operation.
- c. Imposition of operational controls, sureties, and deed restrictions.
- d. Requirements for construction of channel modifications, dikes, levees, and other protective measures.
- e. Flood proofing measures

Flood proofing measures such as the following shall be designed consistent with the flood protection elevation for the particular area, flood velocities, durations, rate of rise, hydrostatic and hydrodynamic forces, and other factors associated with the regulatory flood. The Planning Commission may require that the applicant submit a plan or document certified by a civil, structural, or naval architecture and marine engineering registered professional engineer that the flood proofing measures are consistent with the regulatory flood protection elevation and associated flood factors for the particular area. The following flood proofing measures may be required without limitation because of specific enumeration:

1. Anchorage to resist flotation and lateral movement.
 2. Installation of watertight doors, bulkheads, and shutters.
 3. Reinforcement of walls to resist water pressures.
 4. Use of paints, membranes, or mortars to reduce seepage of water through walls.
 5. Addition of mass or weight to structures to resist flotation.
 6. Installation of pumps to lower water levels in structures.
 7. Construction of water supply and waste treatment systems so as to prevent the entrance of flood waters.
4. Procedures. The following procedures shall govern the application of FH zones:
- a. An FH zone may be established by enactment of this Ordinance or may be established, altered, or revoked as amendments subject to the provisions of Article 9.
 - b. An FH zone shall be established in combination with other regular zones, and an area approved as an FH zone shall be identified on the zoning map or map amendments with the letters "FH" in addition to the abbreviated designation of the existing zoning.

APPENDIX N

ORDINANCE NO. 2648 ORDINANCE ESTABLISHING FLOOD
HAZARD AREAS; PROVIDING FOR CONSTRUCTION
LIMITATIONS; ESTABLISHING PERMIT AND VARIANCE
PROCEDURES; AND DECLARING AN EMERGENCY
PENDLETON

THE CITY OF PENDLETON ORDAINS AS FOLLOWS:

SECTION 1. Title. This ordinance shall be known as The City of Pendleton Flood Plain Interim Zoning Ordinance of 1971.

SECTION 2. Purpose. The purpose of this ordinance shall be to promote and protect the public health, safety and general welfare and to minimize flood losses by provisions designed to:

- A. Restrict or prohibit uses which are dangerous to health, safety or property in times of flood or which cause increased flood heights or velocities.
- B. Require that uses vulnerable to floods, including public facilities which serve such uses, be provided with flood protection at the time of initial construction.
- C. Protect individuals from buying lands which are unsuited for some purposes because of flood hazard.

SECTION 3. Compliance. A lot may be used and a structure or part of a structure may be constructed, reconstructed, altered, occupied or used in a Flood Hazard Area only as this ordinance permits.

SECTION 4. Abrogation and Greater Restrictions. It is not intended by this ordinance to repeal, abrogate or impair any existing easements, covenants, or deed restrictions. However, where this ordinance imposes greater restrictions, the provisions of this ordinance shall prevail. All other ordinances inconsistent with this ordinance are hereby repealed to the extend of the inconsistency only.

SECTION 5. Location of Flood Hazard Areas. The boundaries of areas designated as Flood Hazard Areas in The City of Pendleton shall be the boundaries of those areas designated as "Intermediate Regional Flood" areas in the following "Flood Plain Information" report prepared by the Corps of Engineers, U. S. Army, Walla Walla, Washington District: March, 1971: "Umatilla River Tributaries: McKay, Tutuilla and Wildhorse Creeks, Pendleton, Oregon, and Vicinity"; which is hereby established as the Flood Plain Zoning Map for The City of Pendleton. Future "Flood Plain Information" reports prepared by the Corps of Engineers, U. S. Army, and other delineations of Flood Hazard Areas may be added to this ordinance by amendment as hereinafter provided.

SECTION 6. Zoning Map. The official Flood Plain Zoning Map for The City of Pendleton with all explanatory matter thereon and attached thereto is hereby adopted by reference and declared to be a part of this ordinance. The official copy shall have the same effective date as this ordinance and shall be signed by the Mayor and City Recorder and shall be maintained on file in the office of the City Recorder.

SECTION 7. Definitions. As used in this ordinance the following words and phrases shall mean:

- A. Cross-section. A profile of the ground surface perpendicular to the center line of a stream or valley bottom.
- B. Flood. An overflow of water onto lands not normally covered by water and that are used or usable by man.
- C. Flood Hazard Area. The relatively flat area or lowlands adjoining the channel of a river, stream, or watercourse, or lake or reservoir, which has been or may be covered by an Intermediate Regional Flood.
- D. Floodproofing. A combination of structural provisions, changes, or adjustment to properties and structure 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.
- E. Intermediate Regional Flood. The flood that has a one percent chance of being equalled or exceeded in any single year.

SECTION 8. Limitations On All Uses. No structure (temporary or permanent), fill, including fill for roads and levees, deposit, obstruction, storage of materials or equipment, or other uses shall be permitted in a Flood Hazard Area which, acting alone or in combination with existing or future uses unduly affects the efficiency or the capacity of the floodway or unduly increases flood heights.

SECTION 9. Limitations on Fill.

- A. Any fill proposed to be deposited in a Flood Hazard Area must be shown to have some beneficial purpose and the amount must not be greater than is necessary to achieve that purpose, as demonstrated by a plan submitted according to Section 12.
- B. Such fill or other materials shall be protected against erosion by rip-rap, vegetative cover or bulkheading.

SECTION 10. Limitations on Structures.

- A. The lowest flood elevation, including the basement, of a structure designed for human occupancy shall be at least one foot above the elevation of an Intermediate Regional Flood. Human occupancy includes a residential, commercial or industrial use but excludes a storage or warehouse building not in daily use.
- B. The portions of a structure below an elevation one foot above the elevation of an Intermediate Regional Flood shall be flood-proofed or otherwise protected from significant damage by inundation.
- C. In the case of land subdivision, each lot intended as a site for a structure for human occupancy shall contain a building site and access road with a ground elevation no lower than one foot below the elevation of an Intermediate Regional Flood; be accessible to a roadway no portion of which is less than one foot below the elevation of an Intermediate Regional Flood; and be served by sewer and water supply systems designed and constructed to not create a health hazard during inundation by an Intermediate Regional Flood.

- D. A permitted structure shall be constructed and placed on the building site so as to offer the minimum obstruction to the flow of flood waters. Whenever possible, structures shall be placed approximately on the same flood flow lines as those of adjoining structures.
- E. Structures shall be firmly anchored to prevent flotation.
- F. Service facilities such as electrical and heating equipment shall be constructed above the elevation of an Intermediate Regional Flood.
- G. A mobile home and a vacation trailer shall not be considered a structure for the purpose of this section, so long as there is no permanent foundation, wheels and tires in good repair are attached, and the unit is otherwise readily removable.

SECTION 11. Limitations on Storage of Material and Equipment.

- A. The storage or processing of materials that are buoyant, flammable, explosive or that could be injurious to human, animal or plant life in time of flooding is prohibited in a Flood Hazard Area.
- B. Storage of other material or equipment may be allowed in a Flood Hazard Area if not subject to major damage by floods, if firmly anchored to prevent flotation, or if readily removable from the area within the limited time available after flood warning.

SECTION 12. Procedure. In a Flood Hazard Area, a lot may be used and a structure or part of a structure constructed, reconstructed, altered, occupied or used only after the following requirements have been met:

- A. An applicant shall submit with his application for a building permit sufficient evidence to indicate that the proposed development will result in a finished floor elevation and access to the property that is at least 1.00 feet higher than the elevation of an Intermediate Regional Flood. This evidence shall include sketches showing:

1. The nature, location, dimensions and elevation of the lot, and its relationship to the location of the channel.
 2. Development plan showing existing and proposed elevations or contours of the ground; pertinent structure, fill or storage elevations; size, location and spatial arrangement of all proposed and existing structures on the site; location and elevation of streets and all existing and proposed underground utilities.
 3. A typical valley cross-section showing the channel of the stream, elevation of land areas adjoining each side of the channel, cross-sections of areas to be occupied by the proposed development, and high water information.
 4. Profile showing the slope of the bottom of the channel or flow line of the stream.
 5. Specifications for building construction and materials, floodproofing, filling, dredging, grading, channel improvements, storage of materials, water supply and sanitation facilities.
- B. An applicant shall submit with his application for a building permit sufficient evidence to enable the Planning Commission to review his construction methods and materials to determine that minimum flood damage will occur in the event of inundation. This evidence shall enable the Planning Commission to determine that:
1. Proposed repairs and renovations will use materials and equipment that are resistant to flood damage, and construction methods and practices that will minimize flood damage.
 2. New construction (including prefabricated and mobile homes) will be protected against flood damage, will be designed (or modified) and anchored to prevent flotation, collapse or lateral movement of the structure, will use materials and equipment that are resistant to flood damage, and will use construction methods and practices that will minimize flood damage.

SECTION 13. Continuation of Nonconforming Structure. Subject to the provisions of ORS 215.130 and the provisions of Sections 13 through 17 of this ordinance, a nonconforming use or structure may be continued but may not be altered or extended. The extension of a nonconforming use to a portion of a structure which was arranged or designed for the nonconforming use at the time of passage of this ordinance is not an enlargement or expansion of a nonconforming use. A nonconforming structure may be altered or extended if the alteration or extension does not cause the structure to deviate further from the standards of this ordinance.

SECTION 14. Discontinuance of a Nonconforming Use. If a nonconforming use is discontinued for a period of one year, further use of the property shall conform to this ordinance.

SECTION 15. Change of Nonconforming Use. If a nonconforming use is replaced by another use, the new use shall conform to this ordinance.

SECTION 16. Destruction of Nonconforming Use or Structure. If a nonconforming structure is destroyed by any cause to an extent exceeding 80 percent of its fair market value as indicated by the records of the county assessor a future structure on the site shall conform to this ordinance.

SECTION 17. Completion of Structure. Nothing contained in this ordinance shall require any change in the plans, construction or alteration of a structure for which construction has commenced prior to the adoption of this ordinance, provided the structure, if nonconforming, is completed and in use within two years from the effective date of this ordinance.

SECTION 18. Authorization to Grant or Deny Variances. The Planning Commission may authorize variances from the requirements of this ordinance where it can be shown that owing to special and unusual circumstances related to a specific lot, strict application of the ordinance would cause an undue or unnecessary hardship. In granting a variance, the Planning Commission may attach conditions which it finds necessary to protect the best interests of the surrounding property or vicinity and otherwise achieve the purposes of this ordinance.

SECTION 19. Circumstances for Granting a Variance. A variance may be granted only in the event that all of the following circumstances exist:

- A. Exceptional or extraordinary circumstances apply to the property which do not apply generally to other properties in the same zone or vicinity, and result from lot size or shape, topography, or other circumstances over which the owners of property since enactment of this ordinance have had no control.
- B. The variance is necessary for the preservation of a property right of the applicant substantially the same as owners of other property in the same zone or vicinity possess.
- C. The variance would not be materially detrimental to the purposes of this ordinance, or to property in the same zone or vicinity in which the property is located, or otherwise conflict with the objectives of any county plan or policy.
- D. The variance requested is the minimum variance which would alleviate the hardship.

SECTION 20. Procedure for Taking Action on a Variance Application.

The procedure for taking action on an application for a variance shall be as follows:

- A. A property owner may initiate a request for a variance by filing an application with the City Manager, using forms prescribed pursuant to Section 26 of this ordinance.
- B. Before the Planning Commission may act on a variance application, it shall hold a public hearing thereon, following procedure as established in Section 31.
- C. Within five days after a decision has been rendered with reference to a variance application, the Secretary of the Planning Commission shall provide the applicant with written notice of the decision of the Commission.

SECTION 21. Time Limit on a Permit for a Variance. Authorization of a variance shall be void after one year unless substantial construction pursuant thereto has taken place. However, the Planning Commission may extend authorization for an additional period not to exceed one year, on request.

SECTION 22. Authorization to Initiate Amendments. An amendment to the text of this ordinance or to a Flood Plain zoning map may be initiated by the City Council, the City Planning Commission, or by application of a property owner. The request by a property owner for an amendment shall be accomplished by filing an application with the City Manager, using forms prescribed pursuant to Section 29.

SECTION 23. Public Hearings on Amendments. The Planning Commission shall conduct a public hearing on the amendment at its earliest practicable meeting after it is proposed and shall, within 40 days after the hearing, recommend to the City Council approval, disapproval, or modification of the proposed amendment. After receiving the recommendation of the Planning Commission, the City Council shall hold a public hearing on the proposed amendment.

SECTION 24. Record of Amendments. The City Recorder shall maintain records of amendments to the text and zoning map of the ordinance.

SECTION 25. Limitation on Reapplications. No application of a property owner for an amendment to the text of this ordinance or to the Flood Plain Zoning Map shall be considered by the Planning Commission within the one-year period immediately following a previous denial of such request, except the Planning Commission may permit a new application, if in the opinion of the Planning Commission, new evidence or a change of circumstances warrant it.

SECTION 26. Administration. The City Manager shall have the power and duty to enforce the provisions of this ordinance. The Building Inspector may be appointed an agent to issue building permits and to otherwise assist in the processing of applications.

SECTION 27. Building Permit. Prior to the Construction, reconstruction, alteration or change of use of any nonfarm structure or lot, or change of any land contours, a building permit for

such construction, reconstruction, alteration, or change of use or contour shall be obtained from the City Manager or his authorized agent.

SECTION 28. Appeals.

- A. An appeal from a ruling of the City Manager or his authorized agent regarding a requirement of the ordinance may be made only to the Planning Commission.
- B. An action or ruling of the Planning Commission pursuant to this ordinance may be appealed to the City Council within 15 days after the Planning Commission has rendered its decision. Written notice of the appeal shall be filed with the City Manager. If the appeal is not filed within the 15-day period, the decision of the Planning Commission shall be final. If the appeal is filed, the City Council shall receive a report and recommendation thereon from the Planning Commission and shall hold a public hearing on the appeal.

SECTION 29. Form of Petitions, Applications and Appeals.

Petitions, applications, and appeals provided for in this ordinance shall be made on forms prescribed by The City of Pendleton.

SECTION 30. Filing Fees. Applications required by this ordinance shall be accompanied by filing fees as follows:

Building permit	Based on Valuation
Variance	\$15.00
Amendment	\$35.00

SECTION 31. Public Hearings.

- A. Each notice of hearing authorized by this ordinance shall be published in a newspaper of general circulation in the City at least 10 days prior to the date of hearing.
- B. In addition, a notice of hearing on a variance or an amendment to the Flood Plain Zoning Map shall be mailed to all owners of property within 250 feet of the property for which the variance or Flood Plain Zoning Map amendment has

been requested. The notice of hearing shall be mailed at least 10 days prior to the date of hearing.

- C. Failure of a person to receive the notice prescribed in this section shall not impair the validity of the hearing.
- D. The notice provisions of this section shall not restrict the giving of notice by other means, including mail, the posting of property, or the use of radio and television.
- E. The Planning Commission and the City Council may recess a hearing in order to obtain additional information or to serve further notice upon other property owners or persons it decided may be interested in the proposal being considered. Upon recessing, the time and date when the hearing is to be resumed shall be announced.

SECTION 32. Severability. The provisions of this ordinance are hereby declared to be severable. If any section, sentence, clause, or phrase of this ordinance is adjudged by a court to be invalid, such decision shall not affect the validity of the remaining portions of this ordinance.

SECTION 33. Remedies. Any person violating a provision of this ordinance shall be subject to the provisions of ORS 215.180; 215.185; and 215.990.

SECTION 34. Emergency Clause. Inasmuch as it is necessary for the health, safety, comfort, and convenience of the people of The City of Pendleton that this ordinance have immediate effect, an emergency is hereby declared to exist, and this ordinance shall be in full force and effect from and after its passage and approval.

PASSED and approved December 30, 1971.

APPENDIX O

ORDINANCE NO. 134486
PORTLAND

An Ordinance establishing and authorizing review procedures for affected bureaus in the City of Portland governing construction work or building within the flood plain area of Johnson Creek, and the Willamette and Columbia Rivers and declaring an emergency.

The City of Portland ordains:

SECTION 1. The Council finds that in order to qualify for flood plain insurance pursuant to the National Flood Insurance Act of 1968 that certain procedures relating to construction and building work in a flood plain area must be authorized. These procedures shall be followed by the appropriate bureaus of each department in the City of Portland and are as follows:

1. Review all building permit applications for new construction or substantial improvements to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a location that has a flood hazard, any proposed new construction or substantial improvement (including prefabricated and mobile homes) must (a) be designed (or modified) and anchored to prevent flotation, collapse, or lateral movement of the structure, (b) use construction materials and utility equipment that are resistant to flood damage, and (c) use construction methods and practices that will minimize flood damage.
2. Review subdivision proposals and other proposed new developments to assure that (a) all such proposals are consistent with the need to minimize flood damage, (b) all public utilities and facilities, such as sewer, gas, electrical, and water systems are located, elevated, and constructed to minimize or eliminate flood damage, and (c) adequate drainage is provided so as to reduce exposure to flood hazards; and

3. Require new or replacement water supply systems and/or sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters, and require on-site waste disposal systems to be located so as to avoid impairment of them or contamination from them during flooding.

Now, therefore, the appropriate bureaus of each department of the City of Portland are hereby authorized and directed to follow the procedures as listed above.

SECTION 2. Inasmuch as this ordinance is necessary for the immediate preservation of the public health, peace and safety of the City of Portland in this: In order that there be no unnecessary delay in the implementation of these procedures; therefore, an emergency hereby is declared to exist and this ordinance shall be in effect from and after its passage by the Council.

APPENDIX P

FLOOD PLAIN ZONE FP ORDINANCE ROSEBURG

10-11.3.600

10-11.3.608

SECTION 3.600. Purpose. The purpose of the Flood Plain Zone FP is to minimize property loss, the danger of injury to persons and property and to reduce any potential health hazard, due to flooding conditions. Areas to be zoned under Sections 3.602 to 3.608 are limited to those with a potential for future flooding as defined in this ordinance.

SECTION 3.602. Uses Permitted. In an FP zone the following uses and their accessory uses are permitted.

- (1) Farming
- (2) Publicly owned park and public recreation facility.

SECTION 3.604. Conditional Uses Permitted. In an FP zone the following uses and their accessory uses may be permitted subject to the provisions of Sections 6.010 to 6.050:

- (1) Boat landing and launch facility
- (2) Open land recreation facility not requiring the use of any structure with greater than 2,000 square feet of floor area.
- (3) Mining

SECTION 3.606. Special Permit Required. In addition to the building permit requirements of the City of Roseburg, no building permitted in the FP zone shall be erected, constructed, established or moved in any FP zone until a special building permit therefor has been obtained from the Department of Public Works, said special permit shall be issued only after the Department of Public Works has determined that:

- (1) The proposed building site will not, during potential future flooding, be so inundated by flood water as to result in injury or serious danger of injury to property or to the health, safety and welfare of residents or future residents of the immediate area.

- (2) The first floor elevation of any proposed building the purpose of which is to shelter humans or animals shall be situated at least three (3) feet above the level of flood water during potential future flooding so as to minimize hazard to life and property.
- (3) Any subsurface sewage disposal system for a proposed building will not, during potential flooding, endanger the health, safety and welfare of residents or future residents of the area.
- (4) No improvements are proposed that will have a tendency to change the flow of surface water during future flooding so as to endanger the health, safety and welfare of residents or future residents or property in the area.
- (5) Adequate provision has been made to assure access during flooding.

SECTION 3.608. Lot Size, Yard and Density Requirements. In an FP zone the minimum lot size, yard and maximum density requirements shall be the same as the LR zone.

NOTE: For parking requirements see Section 3.800 et seq.

APPENDIX Q

FP - FLOOD PLAIN SECTION
SPRINGFIELDSection 3.01 Description and Purpose.

The FP Flood Plain subdistrict designation may be applied in any zone as hereinafter set forth where the area is subject to inundation by flooding or surface water. The area subject to flooding shall be as determined by the U. S. Corps of Engineers most recent data, designating the area subject to a 1% or 100 year flood. Its purpose is to minimize property loss, danger of injury and health hazards. To accomplish such purposes floor elevations will be established by the City prior to issuing any building permits.

Section 3.02 Permitted Uses.

The City Engineer may establish FP Flood Plain areas subject to Planning Commission approval by designating the boundaries thereof. Such designation shall be based upon objective flood plain and surface water data. Such designation shall be removed by the City Engineer upon it being established to his satisfaction that because of additional flood control measures, control of development through the establishment of minimum floor elevations is no longer necessary.

In any zone where the zone symbol is followed by the parenthetically enclosed letters "FP", only the following land uses are permitted, if said uses are permitted in such zone classification.

- (a) Parking area private;
- (b) Parking area public;
- (c) Parks, playgrounds, golf course, or driving ranges;
- (d) Feeding, breeding and management of livestock and dairy cattle;
- (e) Raising and harvesting crops;
- (f) Other agricultural or horticultural uses or any combination thereof.

Section 3.03 Permitted Buildings and Building Uses.

In any zone also designated "FP" the following buildings only are permitted:

- (a) Accessory building normal and incidental to the uses provided in Section 3.02.
- (b) Uses normally permitted in the zone classification upon approval of the City Engineer only where it appears no hazard to property, person or health would exist or be created by reason of such building and building use.

APPENDIX R

SECTION 4.410 FLOOD PLAIN DEVELOPMENT
WINSTONA. FINDING OF FACT1. Flood Losses Resulting from Periodic Inundation.

The flood hazard areas of the City of Winston are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.

2. General Causes of These Flood Losses.

These flood losses are caused by: (1) the cumulative effect of obstructions in floodways causing increases in flood heights and velocities; (2) the occupancy of flood hazard areas by uses vulnerable to floods or hazardous to others which are inadequately elevated or otherwise protected from flood damages.

B. STATEMENT OF PURPOSE

It is the purpose of this Section to promote the public health, safety and general welfare and to minimize those losses described in Paragraph A. 2 by provisions designed to:

1. Restrict or prohibit uses which are dangerous to health, safety or property in times of flood or cause increased flood heights or velocities.
2. Require that uses vulnerable to floods, including public facilities which serve such uses be provided with flood protection at the time of initial construction.
3. Protect individuals from buying lands which are unsuited for intended purposes because of flood hazard.

C. GENERAL PROVISIONS

1. Lands to Which the Flood Plain Classifications Apply.

This Section shall apply to all lands within the jurisdiction of the City of Winston and designated by ordinance as being located within the boundaries of the Floodway and Floodway Fringe or Flood Hazard Districts.

2. Rules for Interpretation of District Boundaries.

The boundaries of the Floodway and Floodway Fringe or Flood Hazard Districts shall be determined by scaling distances on maps adopted pursuant to this ordinance. Where interpretation is needed as to the exact location of the boundaries of the districts as shown on the Official Maps where there appears to be a conflict between a mapped boundary and actual field conditions, the Planning Commission with the advice of the City Engineer shall make the necessary interpretations.

3. Compliance.

No structure, land or water, shall hereafter be used and no structure shall be located, extended, converted or structurally altered without full compliance with the terms of the section and applicable regulations.

4. Abrogation and Greater Restrictions.

It is not intended by this Section to repeal, abrogate or impair any existing easements, covenants, or deed restrictions. However, where this Section imposes greater restrictions, the provisions of this Section shall prevail. All other ordinances inconsistent with this Section are hereby repealed to the extent of the inconsistency only.

5. Interpretation.

In their interpretation and application, the provisions of this Section shall be held to be minimum requirements and shall be liberally construed in favor of the governing body and shall not be deemed a limitation or repeal of any other powers granted by State Statutes.

6. Warning and Disclaimer of Liability.

The degree of flood protection required by this Section is considered reasonable for regulatory purposes. Larger floods may occur on rare occasions or the flood height may be increased by man-made or natural causes, such as log jams and bridge openings restricted by debris. This Section does not imply that areas outside floodway and floodway fringe district boundaries or land uses permitted within such districts will be free from flooding or flood damages. This section of the City of Winston Zoning and Land Use Ordinance shall not create liability on the part of the City of Winston or any officer or employee thereof for any flood damages that may result from reliance on this Section or any administrative decision lawfully made thereunder.

D. ESTABLISHMENT OF FLOOD HAZARD DISTRICTS

1. The flood plain areas within the jurisdiction of this Section are hereby divided into the following districts:
 - a. The Floodway District (FW)
 - b. The Floodway Fringe District (FF) or,
 - c. The Interim Flood Hazard District (FH)
2. The boundaries of the districts shall be shown on the Official Maps as adopted. Within these districts all uses not allowed as permitted uses shall require a special exception permit.

E. FLOODWAY (FW)

1. Conditional Uses

The following open space uses shall be permitted within a Floodway District (FW) to the extent that they are not prohibited by any other ordinance.

- a. Agricultural uses such as: general farming, pasture, grazing, outdoor plant nurseries, horticulture, viticulture, truck farming, forestry, sod farming, and wild crop harvesting.

- b. Industrial-Commercial uses such as: loading areas, parking areas.
- c. Private and public recreational uses such as: golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, boat launching ramps, swimming areas, parks, wildlife and nature preserves, game farms, shooting preserves, target ranges, trap and skeet ranges, hunting and fishing areas, hiking and horseback riding trails.
- d. Camp sites, established and occupied on a nonpermanent basis but not including incidental buildings.
- e. Boat launching ramps, boat rental, and boat sales provided that no principal building is located in the floodway unless it is designed and constructed to withstand, without major damage, the waters of a regional flood.
- f. Roads or bridges providing that such improvements or structures will not impede the waters of a regional flood.
- g. Residential uses such as: lawns, gardens, parking areas and play areas.
- h. Storage of material or equipment providing that it is not subject to damage by floods and is firmly anchored to prevent flotation, or it can be readily removed from the area within the limited time available after flood warning.

2. Restricted Uses.

The following uses shall not be permitted in a Floodway District (FW).

- a. Any permanent structure designed for human occupancy such as homes, apartments, mobile homes, schools, and churches.
- b. Storage or processing of materials that are buoyant, flammable, explosive or could be injurious to human, animal or plant life in time of flooding.

c. Subdivision of land for residential purposes.

3. Special Provisions

Additional processing of gravels such as concrete and asphalt manufacturing may be permitted as a temporary use subject to approval by the Planning Commission. Notice of the public hearing shall be given as required in Article 7 of this ordinance.

F. FLOODWAY FRINGE (FF)

The following uses shall be permitted in a Floodway Fringe District (FF) to the extent that they are not prohibited by any other ordinance.

1. Any open space use permitted in
2. Structures designed for human occupancy if the lowest floor elevation is no less than one (1) foot above the elevation of a regional flood.
3. Other structures if they are flood proofed or otherwise protected to a point one (1) foot above the elevation of a regional flood.
4. Subdivision of land for residential purposes providing that the following requirements are met.
 - a. All lots shall contain a building site at an elevation of not less than one (1) foot below the elevation of a regional flood.
 - b. No portion of any street or road shall be at an elevation less than one (1) foot below the height of a regional flood including those necessary for ingress or egress of emergency vehicles.
 - c. Any sewerage system shall be designed and constructed so as not to create a health hazard during inundation by a regional flood.

- d. Any water supply system used for human consumption including wells, pipelines or other facilities shall be designated so as not to be subject to contamination during inundation by a regional flood.
 - e. Monuments shall be established and maintained within the subdivision showing the elevation in feet above sea level.
5. A certificate from a registered engineer or licensed land surveyor indicating compliance with the above elevation requirements shall be considered proof of compliance.

G. THE INTERIM FLOOD HAZARD DISTRICT (FH)

It is being recognized that detailed technical information is not immediately available in certain areas about the City of Winston and that these areas may be annexed to the City at a later date, then these unincorporated areas would be declared an Interim Flood Hazard District (FH) in the same manner as described in Subsection C, General Provisions. In such areas all permits granted under the provisions of the Subdivision Ordinance of the City of Winston shall be submitted to the City Engineer and the Building Department for their approval. If, on the basis of a report from either the City Engineer or the Building Department, it is determined that the granting of said permit would be detrimental to the intent of this ordinance then it shall be re-submitted to the City Planning Commission to be denied or modified.

APPENDIX S

QUESTIONNAIRE TO FLOOD PLAIN OCCUPANTS
IN LANE COUNTY

1. Do you own the structure in which you live?

49 Yes 0 No 1 blank

2. If yes, for how many years have you lived here?

Number of years _____

3. Has this structure been flooded since you have lived here?

Year flooded

Depth of flooding

4. Would you live in this location if you knew there was a
- one chance in a hundred
- your house would be flooded each year? The area is sometimes called the one-hundred year flood plain.

28 Yes 22 No

5. Would you live in this location if you knew there was a
- one chance in five
- your house would be flooded each year? The area is sometimes called the five year flood plain.

_____ Yes 49 No 1 question mark

6. Do you think a flood of the same magnitude as the 1964 flood will happen again in your lifetime?

13 Yes 20 No 17 Don't know

7. Which of the following should be permitted in the flood plain that has a one chance in a hundred of being flooded each year?

13. Should the federal government require restrictive zoning laws, subdivision regulations, and building codes for flood-prone areas after they furnish aid to flood victims?

31 Yes 12 No 5 Don't know

Comments:

2 blanks

14. Do you feel government should try to reduce flood losses by permitting only selective uses of flood-prone areas or by providing dams, levees, and/or channel improvements.

Select one.

- a. 10 Selective uses
 b. 36 Dams, levees, and/or channel improvements
 c. 3 No government action necessary

1 blank

15. If you marked "selective uses" in question 14, what should these uses include?

16. Do you feel sufficient information on flooding is presented to the general public?

13 Yes 27 No 10 Don't know

Comments:

17. From which of the following sources do you get your information about floods and flood relief? In each column, place a one (1) by your main source, a two (2) by the next source, and a three (3) by the third source.

FLOODS

- a. 15 TV specials
 b. 38 TV news
 c. 29 Radio
 d. 40 Newspapers
 e. 2 Local meetings
 f. 2 Circulars
 g. 8 Word of mouth (neighbors)
 h. 2 Other (specify)
 i. 3 No information on floods available

FLOOD RELIEF

- a. 15 TV specials
 b. 35 TV news
 c. 25 Radio
 d. 35 Newspapers
 e. 1 Local meetings
 f. 4 Circulars
 g. 5 Word of mouth (neighbors)
 h. 2 Other (specify)
 i. 4 No information on flood relief available