FLOOD PLAIN REPORT

Polk County, Oregon

Prepared for the
POLK SOIL AND WATER CONSERVATION DISTRICT
by the
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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POLK COUNTY FLOOD PLAIN REPORT

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INTRODUCTION

This flood plain report on Polk County, Oregon was prepared by the Soil Conservation Service of the U. S. Department of Agriculture pursuant to a request by the Polk County Planning Commission and the City of Dallas through the Polk Soil and Water Conservation Districts. The purpose of this report, and the accompanying map, is to define the generalized flood plain areas in Polk County.

This report provides general flood plain information to the Polk Soil and Water Conservation District, the Polk County Planning Commission, and the Mid-Willamette Valley Council of Governments. The report and the accompanying map are not intended for detailed use. Where detailed flood plain data is needed, a large scale flood plain study should be initiated and detailed hydrologic investigations should be used to establish precise flood plain areas and elevations.

In Oregon the Soil Conservation Service, as well as several other Federal agencies, are currently engaged in flood plain studies in cooperation with the State Water Resources Board. These studies are part of a unified national program for reducing flood losses, and the Soil Conservation Service is participating in these studies in accordance with recommendation 9(c) of the Task Force report on Federal Flood Control Policy. This program was sent by the President to Congress in August 1966 and is printed in House Document No. 465, of the 89th Congress. In the interest of coordination with other agencies and for the purpose of developing information to comply with the recommendations of House Document No. 465, the Soil Conservation Service developed a plan of work 1/ that was useful in preparing this flood plain report.

This cooperative flood hazard analysis study was also carried out under the authority of Section 6 of Public Law 83-566. As a basis for the development of coordinated programs, this law authorizes the Department of Agriculture to cooperate with other Federal and with state and local agencies when making investigations and surveys of rivers and other waterways. Under this authority there has been a cooperative agreement between the U. S. Department of Agriculture and the State Water Resources Board of Oregon to prepare Water and Related Land Resource reports for basins in the state. This flood plain report is complimentary to specific river basin studies that have been completed. This work is also complimentary to the Soil Conservation Service programs which furnish basic resource data for land use planning and helps to implement the directive in Executive Order 11296 that, "The heads of executive agencies shall provide leadership in encouraging a broad and unified effort to prevent uneconomic uses and development of the Nation's

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1/ *USDA-SCS Flood Hazard Analysis Plan of Work, Portland, Oregon, December 1968.*

flood plains...". This Executive Order and House Document No. 465 were followed by USDA Secretary's Memorandum Nos. 1606 and 1607 which directs its agencies to bring relevant programs to bear on the problem of managing flood losses.

GENERAL CONDITIONS AND PAST FLOODS

STUDY AREA

Polk County is located in the central portion of the Willamette River Basin in northwestern Oregon. The county is bounded on the east by the Willamette River, on the west generally by the mountains of the Coast Range, on the north by Yamhill County and on the south by Benton County.

Polk County is about 33 miles wide in an east-west direction and 24 miles long in a north-south direction. According to the "Conservation Needs Inventory" 2/ Polk County has a total area of 473,600 acres. Of this total, there are 472,800 acres of land and 800 acres of water surface. It has a range in elevations varying from 3725 feet (msl) on Laurel Mountain to 120 feet along the Willamette River in the vicinity of Lincoln. The 300 foot contour line is roughly parallel to the limits of agricultural crop land over most of the county, with the Eola Hills being a notable exception. 3/

Topographically, the county is comprised of three main divisions: (1) stream bottoms and low alluvial areas along the Willamette River; (2) the valley floor and related bench lands; and, (3) hilly and mountainous areas. 4/ Most of the study area lies within the Willamette Valley lowland physiographic province. This physiographic province had its origin as an erosional basin that was subsequently floored with a series of Pleistocene and recent alluvial deposits. These deposits form the gently sloping terraces and flood plains now present in the study area.

The County has a temperate maritime climate with clear, dry, moderately warm summers and wet, generally mild winters. Precipitation is mostly in the form of rain from storms originating over the Pacific Ocean. High intensity rain from thunderstorms are not common to the area. The mean annual precipitation ranges from over 200 inches in the mountains west of Dallas, to 90 inches at the base of the mountains and as low as 40 inches in the Willamette Valley along the Willamette River.

2/ *Oregon Soil and Water Conservation Needs Inventory, Oregon Conservation Needs Inventory Committee, Chairman, USDA, SCS, Portland, Oregon, January 1971.*

3/ *A Water and Sewer Plan of Polk County, Oregon, Mid-Willamette Valley Council of Governments; and Boatwright Engineering, Inc., Salem, Oregon 1968.*

4/ *Ibid. Mid-Willamette Council of Governments 1968.*

Of the land area in Polk County, there is about 93,848 acres of soils that have formed in alluvial sediments which occur on terraces and flood plains. 5/ These soils have developed under the influence of moderately high winter rainfall and dry summers without extremes of either summer or winter temperatures. In addition, those soils present within the flood plain area have developed under the influence of periodic flooding, that has added fresh sediment to some areas while scouring others. The principal soil series found within the study area that were flooded by a recent 100-year recurrence interval flood are: Abiqua, Camas, Chehalis, Cloquato, Cove, Newberg, McAlpin, McBee, Waldo, and Wapato. Most of the county did not have large scale soil mapping, as of the time of this study. However, it has been established that there are over 20,000 acres in a single soil association of well-drained alluvial soils (Chehalis, Cloquato, and Abiqua) that have a present flood hazard. 6/ This figure is of some significance since the Chehalis-Cloquato-Abiqua association of alluvial soils is currently receiving the greatest encroachment for urbanization.

Most of the flood plain is currently being used for agricultural production. The primary crops usage is for pasture, grain, orchards, grass seed, and cannery crops. Portions of the flood plain, immediately alongside the channels, are in brush or idle condition. Other areas of the flood plain particularly along Rickreall Creek, Ash Creek, South Yamhill River, and along the Willamette River north of Salem, are being encroached on by urban expansion.

FLOOD SITUATION

Flooding is widespread throughout the eastern half of the county, (see flood plain map). Floods are caused by heavy rainfall at a time when the soil is near saturation. The larger catastrophic floods are caused by heavy rainfall augmented by snow melt. Some of the more memorable floods are those that occurred in December 1937, February 1949, December 1955, January 1956, December 1964, January 1965, and January 1972.

SOURCES OF DATA USED

FLOOD RECORDS

Records of river stages and discharges in Polk County were initiated in 1905 when the U. S. Geological Survey and Oregon State Engineer's Office cooperatively established a stream gaging station on the Luckiamute River near Suver. The longest continuous record dates from 1934 on the South Yamhill River near Willamina. The U. S. Geological

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5/ Unpublished Data-USDA Soil Conservation Service, Portland, Oregon, 1972.

6/ Ibid. (USDA-SCS-1972)

Survey currently operates four continuous recording stream gages and two crest-stage gages in Polk County. The Office of the Oregon State Engineer maintains four continous recording stream gages. The Corps of Engineers maintained fifteen crest-staff gages between 1964-1968. One gage was operated from 1964-1968, ten gages were operated from 1966-1968 and four gages were operated from 1967-1968. There are a total of ten gages currently recording flood peaks in Polk County.

Annual peak discharge frequency curves developed from a study of maximum annual flood peaks for selected locations, are used to estimate the probability of occurrence of peak discharge values. For example, if the annual peak discharge values recorded at the stream gage on the Luckiamute River near Suver are ranked in decreasing order of magnitude, then the December 1964 flood can be shown to have a one percent chance of occurrence or a recurrence interval of once in one hundred years. 7/ 8/ Annual peak discharge frequency curves have been developed for six stream gages that were located within Polk County, or in the immediately adjacent area. Analysis of this annual peak discharge data to determine peak discharge frequency was made in accordance with the method prescribed by the Water Resources Council. 9/

The frequencies of the December 1964 flood for six stream gages are given in table 1. As shown in table 1, the December 1964 flood varies from an event that occurs on the average of about once in 25 years to a flood event that occurs on the average of once in 100 years. The 100-year recurrence interval flood is one that has a one percent chance of being equaled or exceeded in any given year.

FLOOD PLAIN DELINEATIONS

In developing the generalized flood plain map, several sources of information were used that provided varying degrees of detail. These published and unpublished sources of data were provided by the Corps of Engineers, U. S. Geological Survey, Soil Conservation Service, Mid-Willamette Valley Council of Governments, Polk County and the City of Dallas, Oregon.

The combination method of flood plain mapping was used in establishing the boundaries of the flood delineations shown on the accompanying map. The method essentially consists of building up the map by: (1) evaluating the geologically formed flood plains and the flood plain features that have formed by the geologic history of the stream; (2) superimposing the available information about soils that occur on

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7/ *Unpublished Data-USDA, Soil Conservation Sercice, Portland, Oregon 1971*

8/ *Flood Plain Information, Willamette River and Tributaries in Marion and Polk Counties, Oregon, Portland District, Corps of Engineers, Portland, Oregon, May 1968.*

9/ *Uniform Technique for Determining Flood Flow Frequencies. Bulletin No. 15, Hydrology Committee, Water Resources Council, Washington, D. C., December 1967.*

TABLE 1

Polk County Flood Frequencies and Discharges, December 1964 Flood 10/ 11/ 12/

Permanent Station No.	Stream and Place of Determination	Drainage Area sq. mi.	Date	Gage Height feet	Peak Discharge cfs	Frequency Percent Chance
14-1895.....	Luckiamute River near Hoskins	34.3	12/22/1964	12.70	5,390	3.8%
14-1900.....	Luckiamute River near Pedee	115.0	12/22/1964	20.09	15,700	2.0%
14-1905.....	Luckiamute River near Suver	240.0	12/22/1964	34.52	32,900	1.0% 12/
14-1902.....	Waymire Creek near Falls City	3.46	12/21/1964	16.60	598	3.3% 12/
14-1907.....	Rickreall Creek near Dallas	27.4	12/22/1964	8.78	7,160	2.95 12/
14-1910.....	Willamette River at Salem (controlled)	7,280.0	12/23/1964	37.78	308,000	1.0% 11/
14-1925.....	South Yamhill River near Willamina	133.0	12/22/1964	17.07	19,600	1.0%

10/ *Floods of December 1964 and January 1965 in the Far Western States. Part 1. Description. USGS Water Supply Paper 1866-A. 1971.*

11/ *Postflood Report December 1964, January 1965 Flood. Portland District Corps of Engineers, July 1966.*

12/ *Unpublished USDA Data, Soil Conservation Service, Portland, Oregon 1971.*

the geomorphically identified flood plains and comparing the soils boundaries to the geomorphic boundaries; (3) superimposing the vegetational information that is available about the nature of the flood plain, upon the geomorphically identified flood plain, and comparing any boundaries indicated; (4) superimposing of any historical flood information on to the geomorphically identified flood plain and; (5) superimposing the available hydrologic information on top of the geomorphically formed flood plains.

In Polk County the sources of data for the combination method were accumulated over a period of years. Some of the first information obtained was historical flood data accumulated during the December 1964 and January 1965 floods by the Soil Conservation Service. Post flood maps, on an aerial photographic base, were made along portions of seven streams that were flooded in December 1964. These streams were Luckiamute River, Little Luckiamute River, Rickreall Creek, North Fork Ash Creek, Middle Fork Ash Creek, Mill Creek and Salt Creek. Numerous ground photographs were taken on these and other streams, including the Willamette River, of high water and debris lines. Flood damage surveys were periodically conducted. In 1966 the Soil Conservation Service as part of the Type II Willamette River Basin Investigation, mapped the geomorphically formed flood plain, on all the streams in Polk County except the Willamette River. The high geomorphic flood plain was identified as that one which would flood on an average of once in one hundred years, or in other words, be flooded by a flood event that had a one-percent chance of being equaled or exceeded in any one year. This was determined in the following manner.

At two gaging stations (Nos. 1905 and 1925) a stage-discharge relationship for the floods that were recorded at those gages was correlated to the adjacent geomorphic flood plains. The two gages selected were the Luckiamute River near Suver, and South Yamhill River near Willamina. For these stations the December 1964 flood was evaluated as a 100-year frequency event. (see table 1) The highest geomorphic flood plain surface adjacent to those gages that were flooded by the 1964 flood event was, therefore, classified as a maximum flood plain. 13/ On some tributaries such as Waymire Creek, the 1964 flood event did not represent a 100-year recurrence interval event. In addition, a 100-year frequency event did not occur throughout the entire length of even the Luckiamute River as shown in table 1. However, when this was the case, lower geomorphic surfaces would be the ones that were flooded rather than the maximum flood plain geomorphic surfaces.

When the maximum geomorphic flood plain surface was present, it was used to correlate the 100-year recurrence interval event. Where lower geomorphic flood plain surfaces were scarp bounded to terraces, they were used to correlate flooding in a 100-year frequency event. Rating

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13/ *Along stream valleys, there are higher geomorphic flood plain surfaces than those classified as the maximum flood plain, but for practical geomorphic mapping these higher alluvial surfaces are classified as terraces.*

curves for stations 1902 and 1907, which did not experience the 100-year frequency event in 1964, were extended to intersect the 100-year frequency event. When this was done, the stage for the 100-year frequency event was found to cross the correlated and mapped maximum flood plain geomorphic surface.

On streams for which there were no stream gages, their maximum flood plain geomorphic surface was correlated with the equivalent flood plain on gaged streams to determine their area expected to be flooded in a 100-year event. Periodic checks were made along the ungaged streams to determine if the elevations reached by flooding in December 1964 reasonably approximated the area shown flooded by the geomorphic surfaces. This was generally shown to be the situation.

The acres flooded for each of the tributary delineations are shown in table 2. These tributary delineations in the Middle Willamette River Basin are the same as those identified in 1962 in a cooperative survey by the State Water Resources Board and the U. S. Department of Agriculture. The total acres flooded in approximately the 100-year recurrence interval event in Polk County is 41,664 acres.

The scale of the flood plain map developed for this report is one half inch equals one mile. The original scale of the geomorphic flood plain maps, the historical December 1964 maps, and available soil maps was four inches equals one mile. In going to the smaller map scale for the report, some island areas that may not be flooded by the 100-year event are too small to be separately delineated. Therefore, there are some unflooded inclusions on the map. In addition, because of the small scale of the enclosed map, the blue boundary line delineating the blue flooded area (see enclosed map) is about 220 feet wide. From this discussion, it is obvious that this type of small scale map should not be used for zoning, but serves a very useful purpose when distribution and density of the flood problem is desired. More detailed information about flooded areas, however, can be obtained by contacting the Polk Soil and Water Conservation District Office in Dallas, Oregon.

FLOOD PLAIN REGULATION AND MANAGEMENT

REGULATION

Presently there are 11 multipurpose storage reservoir projects that control the runoff for about 40 percent of the drainage area above the southern limit of the Willamette River in Polk County. According to the Corps of Engineers, these reservoirs reduced flood stages during the natural December 1964 flood event along the Willamette River by seven feet at Salem, which is located in about the center of the reach of the Willamette River in Polk County. 14/ There are no

14/ *Flood Plain Information, Willamette River and Tributaries in Marion and Polk Counties, Oregon, Portland District, Corps of Engineers, Portland, Oregon, May 1968.*

TABLE 2

Polk County Acres Flooded by Tributary Areas

Triburary Area	Tributary Subbasin: Number and Letter	Acres Flooded 15/
Spring Valley	C3	608 16/
West Salem	C4	2,240 16/
Independence	C5	7,930 16/
Upper South Yamhill	K	1,978
South Yamhill River	L	672
Ash Swale	N	1,888
Salt Creek	O	2,451
Mill Creek	P	1,222
Mud Slough	Q	2,662
Rickreall Creek	R	3,488
Ash Creek	S	2,317
Little Luckiamute River	T	4,570
Luckiamute River	U	7,923
Soap Creek	V	1,715
Total		41,664

15/ *Acres Flooded figures were determined from the accompanying map, and represent approximately the number of acres that would be inundated by a flood that would occur on the average of once in 100 years.*

16/ *The acres given in the table represent that area flooded along the Willamette River in the December 1964 flood with structural controls in operation.*

large structures presently providing flood control on any of the tributaries to the Willamette River in Polk County, but there are 650 farm ponds, which provide an undetermined amount of multi-purpose uses.

MANAGEMENT

Polk County is currently developing a comprehensive land use plan. The flood plain map accompanying this report will be one of the problem area maps to be included in the comprehensive land use plan. As envisioned by the Polk County Planning Commission, a map such as the attached flood plain map will show generalized area information about the flood hazard.

This report and map will be used by county departments, the Planning Commission, and its area advisory committees, as a general reference in preparation and consideration of the land use plan and flood plain management ordinances. The overall display of this information is important in communicating to the public the general nature and extent of flooding within the county. This report will be a useful document for the county sanitarian and building inspector to indicate where more detailed information will be necessary.

CONCLUSIONS

A large part of the flood plain lands in Polk County are subjected to flooding once or more every year from excess rainfall. Floodwaters are slow to recede and may stand on the flood plains for several days, resulting in significant flood damages. Several thousand acres of flood plain land are inundated by a flood event on the order of the 100-year average recurrence interval, and damages are extensive. For example, sedimentation and other land damages to agricultural lands resulting from the December 1964 flood amounted to approximately 355,000 dollars in the Polk County study area. 17/

The generalized flood plain delineated on the accompanying map is approximately the area that would be inundated by a flood with a 100-year average recurrence interval, with the present structural controls ir operation. In developing the generalized flood plain map, several sources of information that provide varying degrees of detail were used. The map was not developed for detailed zoning use, so where detailed information is needed, a large scale flood plain map should be prepared, and detailed hydrologic investigations should be made. However, the Soil Conservation Service will provide interpretation and technical assistance in the application of the data presented herein, and has available detailed hydrology and hydraulics information in specific areas of Polk County.

17/ *Report of Meeting on Erosion and Sedimentation, 1964-65 flood season; Water Supply and Water Pollution Control Subcommittee, Columbia Basin Inter-Agency Committee, Published by the Soil Conservation Service, Portland, Oregon, 1965.*

Polk County is currently developing a comprehensive land use plan. The flood plain map accompanying this report will be used in the formulation of the comprehensive land use plan. The Polk County Comprehensive Land Use Plan, when completed will become part of the regional Mid-Willamette Valley Council of governments comprehensive plan.

GLOSSARY OF TERMS

FLOOD

An overflow or inundation that comes from a river or other body of water and causes or threatens damage.

ANNUAL FLOOD

The highest momentary peak discharge in a year.

FLOOD CREST

The maximum height of the water surface during a flood.

FLOOD PEAK

The highest value of the stage or discharge attained by a flood, thus, peak stage or peak discharge.

FLOOD PLAIN

The area, usually flat or low-lying, adjoining a river, stream, watercourse, ocean, bay or lake, which has been inundated by a flood or can be reasonably expected to be so inundated in the future.

100-YEAR FREQUENCY FLOOD

The 100-year frequency flood is that magnitude of a flood which could be expected to be equaled or exceeded on the average of once every 100 years or have a one percent chance of being equaled or exceeded in any given year.

MAXIMUM FLOOD PLAIN GEOMORPHIC SURFACE

The maximum flood plain geomorphic surface is approximately that flood plain area which is flooded by a 100-year recurrence interval event, but excluding the lower geomorphic flood plains.

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

FLOOD PLAIN MAP
POLK COUNTY, OREGON

SUBBASIN 6
WILLAMETTE BASIN
JUNE 1971

SCALE 1:125,720

Base Map By Mid-Willamette Council of Governments

LOCATION MAP

POLK CO.

LEGEND

- City Limits
- Railroad
- Highways
- Perennial Streams
- Intermittent Stream
- Generalized Flood Plain
- Watershed Boundary & Letters

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