



*Types of Topography as Related to Land Use
in Whitman County, Washington*

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MUCH HAS BEEN WRITTEN about the topography of the Palouse country, of which Whitman County, Washington, makes up a considerable portion. Some of the studies have pointed out characteristics of the area which affect erosion, snow drifting, crop yields, and other phenomena. In all of these studies, however, the topography has been considered as more or less of a homogeneous nature. The purpose of this study is to point out different topographic features which exist in the area and which materially affect the soil and water conservation programs adapted to it.

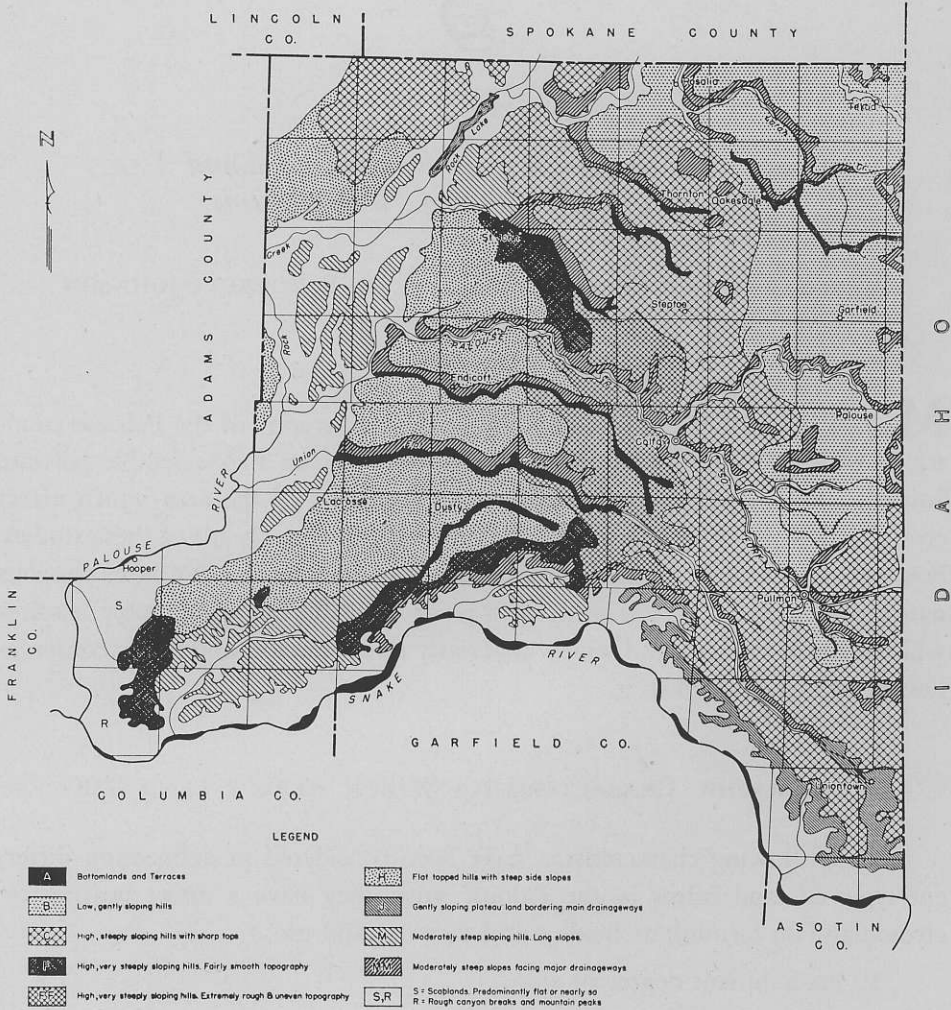
TOPOGRAPHIC CHARACTERISTICS WHICH AFFECT LAND USE

The following characteristics have been considered in delineating different types of land forms in the Palouse area; they have a direct bearing on erosion and on farming methods, and hence on land use:

1. Predominant degree of slope,
2. Length of slope,
3. Pattern of slope—extensive areas of rather uniform slope, or land that is broken up into different slope patterns which are more or less indiscriminately mixed,
4. Size of the topographic unit—a single hill or ridge that is generally small and confined to a single field or farm, or a more extensive unit,
5. Exposure or direction in which the slopes face.

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TOPOGRAPHIC TYPES
APPROXIMATE DISTRIBUTION OF DIFFERENT LAND FORMS
IN WHITMAN COUNTY, WASHINGTON

0 2 4 8
SCALE IN MILES

DESCRIPTION OF LAND FORMS

There are twelve different land forms or topographic units recognized in Whitman County. It is not the purpose of this paper to describe the different processes by which each was formed, but rather to describe each as it relates to proper land use.

Each land form is here designated by a letter, identifiable on the accompanying map legend.

A type of topography consists of bottomlands with slopes under 3 per cent of gradient. It occupies narrow, alluvial valleys. (See also *T* topography.)

B type of topography consists of low, rolling hills. Slopes are predominantly moderate, short and fairly smooth and uniform. A high percentage of the land has slopes ranging from 7 to 25 per cent in gradient. Slopes average from 300 to 500 feet in length. A high proportion of the area is classified as Class II land (see footnote to Table 2 for definition of Land Capability Classes). The steeper slopes nearly always face the north and east, showing the influence of wind in modifying the topography.

C type of topography consists of fairly high, dune-shaped hills. Most of the literature published on the Palouse area describes this type of unit. It consists of hills or ridges with longer south and west slopes; sharp hilltops which are eroded to subsoil; and short, very steep north and east facing slopes which terminate rather abruptly into more gently sloping land leading into the drainage way between ridges and hills. A high proportion of the land in this unit lies on slopes with 15 to 35 per cent gradient, and the average slope lengths vary from 300 to 400 feet.

The individual hills are not generally extensive and often involve only one field or farm. The Land Capability Classes, although more evenly divided between Classes II, III, and IV than in the case of the *B* type of topography, are usually located on the hill in such a way that they can be farmed separately. This type of unit shows definite evidence of wind action in modifying its topography.

F type of topography consists of very large hills with high elevation. A large percentage of the slopes are very steep, and the slopes are moderately long. A substantial part of this area has slope gradients ranging from 25 to 40 per cent. The average length of slope is 500 to 900 feet. However, steeper leeward (northeasterly) and less steep windward (southwesterly) slopes also typify these lands.

Two subclasses in this type of topography are recognized: *F* type represents topography with the above characteristics with fairly smooth, uniform slopes. *FF* type represents topography with *F* characteristics but with very rough and irregular slopes. In both instances, a high proportion of the land is classified as Land Capability Class IV, and the areas of different capability classes are rather small and badly mixed. The hilltops are generally rounded, with sharp-topped connecting saddles or ridges. This type of topography shows less striking evidence of being modified by wind action than the *C* type.

H type of topography consists of fairly large hills with moderately high elevation. The hills are characterized by broad, gently sloping tops with very short, steep side slopes. Extensive areas of Class II land are found on the hilltops which generally face the south or west. The areas of Class IV land, usually found on the north and east slopes, are less extensive, but quite often are connected to form long, narrow bands. This type of topography shows considerable evidence of wind action in modifying its shape.

J type of topography consists of gently sloping plateaus bordering the main drainageways at a considerable elevation above the valley floor. The land seldom exceeds 15 per cent in slope gradient and hence a high proportion of it is Class II capability. The predominant slopes face towards the south and west and they are very long. The side slopes off these main ridges are fairly short. Hints of the steeper leeward and gentler windward slopes occur frequently in these areas.

M type of topography includes moderately steep sloping lands with fairly long, smooth slopes. Two subclasses in this type of topography are recognized:

M type represents complete hills or ridges.

MM type represents slopes bordering the main creeks and rivers. In the first subclass, the long slopes may face all directions on a single unit. In the second subclass, the long slopes face towards the creek or river, or generally in a south or west direction. In these instances, there are shorter side slopes leading left and right off the main ridge since the area is dissected with gullies or draws running out at a right angle from the main drainageway. Only occasional hints of the steeper leeward and gentler windward slopes are found in these areas.

This type of topography shows greater evidence of having been modified in shape by water action than by wind action.

S type of topography is predominantly scabland. Flood from glacial sources removed the deep mantle of silt loam soil which once covered all these

lands and left it with little or no soil on the underlying basaltic bedrock. It is generally flat or gently sloping, although it includes a minor percentage of cliffs and ledges and rocky talus slopes. Practically all of this land is in Classes VI, VII, and VIII.

R type of topography is predominantly precipitous and the intermingled very steep lands bordering the deep canyon of the Snake River. Slopes generally approach or exceed 100 per cent gradient, with little or no soil covering the basaltic bedrock. The land originally was covered with bunchgrass, but much of it now supports a mixed stand of sagebrush and cheatgrass. Although much of it is too steep and inaccessible for the grazing of domestic livestock, its sole use is for grazing. Practically all of this land is in Classes VI, VII, and VIII. (It also includes a number of buttes or hilltops which are ancient residual knobs projecting up through the basalt and the overlying soil mantle. They are thrown with this class only because both *S* topography and these knobs are grazing lands. They are really a separate class of land. They were originally covered with bunchgrass, but now are usually covered with a mixture of sagebrush and cheatgrass.)

T type of topography (*A* and *T* topography are shown on the map by the same symbol; from their individual descriptions in the text, they are separable on the map) consists of terraces along the Snake River. They are generally either nearly level or gently sloping. They were originally bunchgrass land, but now they are generally in cultivation. They are mainly land of Classes II and III.

DISTRIBUTION OF DIFFERENT TYPES OF LAND FORMS

Table 1 shows the approximate distribution of the twelve land forms in Whitman County. Information is not yet available for that part of the Palouse area located in Spokane and Lincoln counties in Washington, and in Kootenai, Benewah, Latah, and Nez Perce counties in Idaho.

The accompanying map shows the approximate location of each type of topography in Whitman County. It is recognized that the map is general in nature, since a certain amount of intermingling of the land forms exists on the ground.

Table 1.—Approximate distribution of land forms
in Whitman County

Type of land form	Acres	Percentage of area
A	14,054	1+
B	213,865	15+
C	325,470	23+
F	46,436	3+
FF	66,356	5—
H	227,618	16+
J	24,385	2—
M	102,639	7+
MM	62,070	4+
S	161,612	12—
R	135,605	10—
T	6,770	1—
Total	1,386,880	100

DISTRIBUTION OF LAND CAPABILITY CLASSES ON DIFFERENT LAND FORMS

Table 2 shows the approximate distribution of Land Capability Classes within the various types of topographic units. The information was obtained (1) by measuring actual soil conservation survey maps of farms located in the various areas, and (2) by projecting the measurements within these samples to the larger areas on the map.

SIGNIFICANCE OF LAND FORMS IN PLANNING A CONSERVATION PROGRAM

The detailed discussion of soil and water conservation practices required on each land form is the subject of another paper. In general these requirements include the following: *A* type of topography requires simple agronomic practices and drainage. *B* and *J* types of topography require moderately complex agronomic practices. *C*, *H*, *M*, and *MM* types of topography require complex agronomic practices together with mechanical practices such as diversions and contour strip cropping. *F* and *FF* types of topography may require a change in type of farming from a cash grain to a livestock enterprise. *R* and *S* types of topography naturally require a livestock type of enterprise. *T* type of topography requires the intensive conservation practices of irrigation farming. These may be with or without livestock.

Table 2.—Approximate distribution of Land Capability Classes by different land forms and soil profile groups, Whitman County

Land form	Soil profile group	Class I*	Class II	Class III	Class IV†			Class VI, VII, and VIII
					Total	IVa	IVb	
		per cent	per cent	per cent	per cent	per cent	per cent	
A	1M‡	70	---	---	---	---	30	---
A	2M§	60	---	---	---	---	40	---
B	2M	6	50	26	18	9	2	7
C	1M	4	26	44	26	9	1+	15+
C	2M	3	28	45	24	13	3	8
F	1M	1—	35+	20	44	10	1—	33+
FF	2M	1—	30	21+	48	12	1	35
H	1M	5	56	21	18	6	1—	11+
J	1M	1	72	19	8	3	1—	4+
J	2M	1	61	26	12	5	1—	6+
M	1M	1—	27	53	19+	8	1—	11
MM	2M	1	25	55	19	9	0.5	9.5
S	---	---	---	---	---	---	---	---
R	---	---	---	---	---	---	---	100%
T	---	---	60	25	---	---	---	15%

* The four broad divisions and eight classes of land, defined by R. D. Hockensmith (U. S. Dept. of Ag., Farmers Bull. No. 1853), are:

1. Land suitable for cultivation with:

- I. Simple conservation practices
- II. Special conservation practices
- III. Intensive conservation practices

2. Land suitable for occasional or limited cultivation with:

- IV. Limited cultivated use and intensive practices

3. Land not suitable for cultivation but suitable for permanent vegetation with:

- V. No special restrictions or special practices
- VI. Moderate restrictions in use
- VII. Severe restrictions in use

4. Land not suitable for cultivation, grazing, or forestry:

- VIII. Ordinarily rough, sandy, wet, or arid land not suitable for cultivation, domestic grazing, or forestry production, but suitable for wildlife shelter and grazing.

† Class IV land has been divided into subclasses indicating the kind of conservation problem: *IVa*, problem of slope and topography; *IVb*, problem of wetness and drainage; *IVc*, problem of soil loss by erosion.

‡ *1M*: deep, friable, permeable, productive soil with no restrictions to plants or water in the profile.

§ *2M*: deep productive soil with a compact heavy-textured subsoil and moderate restrictions in permeability of the soil.

Land forms should be inventoried on the basic survey map of each farm in the same way as degree of slope, type and profile characteristics of the soil, degree of past erosion, present land use, and other factors are now mapped.

SUMMARY

The topography of the Palouse area in Whitman County is not homogeneous. Twelve different types of land forms have been recognized. Each land form imposes certain limitations and requirements on the soil and water conservation program planned for it.