

# ***GEOMORPHIC DESCRIPTION SYSTEM***

**Version 4.2**

**03 / 01 / 2012**



**NATURAL RESOURCES CONSERVATION SERVICE**

**USDA**

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**Cover Photo:** Wind River Range, WY (N42.69° Lat., W109.16° Long.) approximately 25 miles southwest of Lander. Glaciated mountains with arêtes, horns, cirques, and tarns. View is towards the southwest. The snow patch, at lower, middle image, is on Wind River Peak's north flank. This peak and the adjacent north-south, sharp-crested ridge mark the continental divide. East Temple and Temple peaks are west of the divide. The larger tarns include Tayo, Frozen, Temple, and Deep Lakes. The underfit, southerly flowing stream in a U-shaped valley is Little Sandy Creek. Photo by Doug Wysocki, August 2007.

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## Acknowledgments

This document builds upon and in part is a testament to earlier geomorphologic publications focused toward Soil Survey. Two publications deserve specific mention -- John Hawley and Roger Parsons's *Glossary of Selected Geomorphic and Geologic Terms* (1980) provided landform definitions for the western USA; and Fred Peterson's landmark *Landforms of the Basin and Range Provinces defined for Soil Survey* (1981) devised a regional landform description guide combined with outstanding graphics. Soil scientists used the geomorphic and geologic terminology summarized in those documents during an important soil inventory era in the USA. The earlier contributions form a foundation and give inspiration for this endeavor and the companion document *Glossary of Landform and Geologic Terms*.

We dedicate special thanks and recognition to Dr. Erling Gamble (USDA - Soil Conservation Service, retired) who participated in the formative stage of the *GDS* and *Glossary*. His training with Dr. James Thorpe (Earlham College) and collaborative work with Dr. Raymond Daniels (USDA- SCS, retired), as well as his own growth in this profession are a thoughtful and constructive part of this work. The Soil Science Division of the USDA – Natural Resource Conservation Service supported this project.

The initial GDS release (1994) was an internal NRCS document. A condensed external GDS publication (Version 2.06) followed (Schoeneberger and Wysocki, 1998). This version (4.2) updates and replaces all previous GDS versions.

## FOREWORD

**Purpose:** This document provides a descriptive method and a technical guide for applying and understanding geomorphic and geologic concepts and terms for soil inventory used by the USA National Cooperative Soil Survey (NCSS) Program.

**Content:** Definitions, criteria, concepts, and operational guidelines presented here focus on soil inventory needs and applications. Our main goal is clear, consistent definitions and concepts with succinct presentation. Space precludes expansive treatment of all definitions or concepts included herein. Users who seek such should consult original cited sources and additional references.

**Sources:** This document is a primary source for geomorphic terminology and application for USDA-NRCS and National Cooperative Soil Survey programs. This Geomorphic Description System is contained, in part or in total, in key NRCS documents: National Soil Survey Handbook (*NSSH*), Part 629 (Soil Survey Staff, 2012); the Field Guide for Describing and Sampling Soils, version 3.0 (Schoeneberger, et al., 2012); National Soil Information System (*NASIS*), ver. 6.2 (NRCS, 2012). Information drawn from original sources is noted and given appropriate citation. We hope this facilitates access to original sources and encourages greater topical exploration and access to supplementary detail.

**Goal:** Describe and record what exists in the field. Choice lists and terms that follow constitute a minimal set of descriptors. Accurate, complete geomorphic field assessment may require additional adjectives, descriptors, or sketches to capture and convey pertinent information where established terms are lacking. Record the additional information as free-hand notes.

**Changes:** Soil Science and Soil Geomorphology are evolving scientific fields. Changes in this system should and will occur. Please send comments or suggestions to the authors at the National Soil Survey Center, USDA - NRCS, 100 Centennial Mall North - Rm. 152, Lincoln, NE 68508-3866

**Status:** This version contains new terms (highlighted in **bold**) that have been recently added. These changes may post-date and therefore may not be shown in other related documents. Updates will be made to all related documents at the first opportunity.

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## BACKGROUND

Landforms are visually recognizable earth surface features that provide humans a sense of location. In fact, humans have informally described landforms throughout history mainly as landmarks, obstacles to travel, or for their military value. Soil occurrence across the earth's surface corresponds remarkably well with landform type and distribution. Soil scientists during the soil survey process develop landscape models that quantify soil / landform relationships. Soil scientists can understand and convey much about soil distribution by employing landform description. Effective communication of such knowledge, whether among scientists, or between scientists and the general public, requires accurate and consistent landform description.

A long-standing need exists to clarify and communicate geomorphic concepts and terms in Soil Science, as well as, the National Cooperative Soil Survey. A broadly applicable set of geomorphic descriptors needs to be comprehensive, consistently defined, and follow an organized array. This *Geomorphic Description System (GDS)* addresses those needs by presenting, defining, and organizing terminology. Various considerations include, but are not limited to, time constraints, the need to blend formal and informal terms and concepts, and competing terms and philosophies serve to complicate the GDS design. Consequently, this system is a compromise between straightforward practicality and strict scientific rigor.

### Goals in building the GDS:

- 1) Foster national use of standard terms:
  - Enhance the utility and scientific credibility of geomorphic information contained in National Cooperative Soil Survey databases and products.
  - Improve technical communication both within and outside NRCS.
  - Encourage use of established, scientifically credible terms.
- 2) Maximize use of existing geomorphic information in NCSS databases and programs.

### Specific Objectives:

- 1) Comprehensively organize geomorphic and related terminology for use in the National Cooperative Soil Survey (NCSS) and Soil Science.
- 2) Update, revise, and improve geomorphic terminology in the NCSS:
  - Develop new concepts and terms where needed.
  - Clarify terms to minimize erroneous use.
  - Remove obsolete terms and concepts.
  - Minimize redundant, competing, and conflicting terms [e.g. watercourse terms: arroyo, coulee, drainageway, draw, gulch, gully, ravine, and wash].
- 3) Completeness (incorporate user-requested modifications and needs):
  - Fill gaps: add or create terms in response to requests; construct "suites of terms" that provide all pertinent options.
  - Focus on previously under-represented regions and minimize regional biases.

# INTRODUCTION

This system is a comprehensive presentation of geomorphic terms used in the National Cooperative Soil Survey Program (NCSS) and in the Soil Science profession at large. It enable's one to effectively describe the geomorphic setting and context of a given point or area on the Earth's surface: to convey it's form and content, and, where possible, to indicate what processes or environments have dominated it's evolution and contributed to it's present state, composition, and distribution.

Categories (e.g., *Landscape*), are called "data elements" in the National Soils Information System (NASIS) and defined in Appendix 1. Each category (e.g., *Landscape*) contains many choices (e.g., *mountains, plains*) that are tallied in lists. All geomorphic "choice-list" terms are defined in the Glossary of Geologic and Landform Terms - Part 629, National Soil Survey Handbook, (Soil Survey Staff, 2012), which should be considered a companion document (and reproduced here as Appendix 2).

Many terms are drawn from geology, whereas others are modified for, or are unique to, Soil Science. The terminology and definitions are generally in agreement with, but in some cases more comprehensive than those in the Glossary of Soil Science Terms (Soil Science Society America, 2012) and the Glossary of Geology (American Geological Institute, 2005).

## GDS Organization

The ***Geomorphic Description System (GDS)*** consists of three main sections:

- I) **Physiographic Location** : Where - Specifies an existing and named geographic area with a defined location.<sup>1</sup>
  
- II) **Geomorphic Description** :
  - What - Identifies a discrete land surface feature (separate entity) or assemblage of features.
  
  - How - Categorizes features by dominant origin process or geomorphic setting.
  
- III) **Surface Morphometry** :
  - Shape - Describes land surface shapes or geometry.
  
  - Pieces - Identifies a discrete portion of a geomorphically defined land area or slope segment.

[ <sup>1</sup> Note: Physiographic Location choice-lists contain area names that are geomorphically or geologically defined, but can include culturally or geo-politically defined areas. Thus the terms used in the Physiographic Location section (= geography) may not be consistent with Glossary definitions. ]

## Document Layout

This document presents the Geomorphic Description System with increasing detail in three ways.

- 1) A one-page, abbreviated outline of the major GDS sections (p. 9).
  - 2) A detailed outline with explanatory comments and examples (p. 10 - 13)
  - 3) The complete GDS: all data elements and choice lists (p. 14 - 62)
- Appendices: supplemental information - definitions, maps, etc. (p. 63 - 74).



# **GEOMORPHIC DESCRIPTION SYSTEM**

( VERSION 4.2, 03/01/2012 )

## **ABBREVIATED OUTLINE**

### ***PART I : PHYSIOGRAPHIC LOCATION***

- A) PHYSIOGRAPHIC DIVISION
- B) PHYSIOGRAPHIC PROVINCE
- C) PHYSIOGRAPHIC SECTION
- D) STATE PHYSIOGRAPHIC AREA (OPTIONAL)
- E) LOCAL PHYSIOGRAPHIC / GEOGRAPHIC NAME (OPTIONAL)

### ***PART II : GEOMORPHIC DESCRIPTION***

- A) LANDSCAPE
- B) LANDFORM
- C) MICROFEATURE
- D) ANTHROPOGENIC FEATURES

### ***PART III : SURFACE MORPHOMETRY***

- A) ELEVATION
- B) SLOPE ASPECT
- C) SLOPE GRADIENT
- D) SLOPE COMPLEXITY
- E) RELATIVE SLOPE SEGMENT POSITION
- F) SLOPE SHAPE
- G) HILLSLOPE - PROFILE POSITION
- H) GEOMORPHIC COMPONENT :
  - 1) HILLS
  - 2) TERRACES, STEPPED LANDFORMS
  - 3) MOUNTAINS
  - 4) FLAT PLAINS
- I) MICRORELIEF
- J) DRAINAGE PATTERN

# **GEOMORPHIC DESCRIPTION SYSTEM**

( VERSION 4.2, 03/01/2012)

## **DETAILED OUTLINE**

### **PART I : PHYSIOGRAPHIC LOCATION**

- A) PHYSIOGRAPHIC DIVISION**  
( Formerly called Region in earlier versions;  
Choices are expanded from Fenneman, 1931, 1938 )
  
- B) PHYSIOGRAPHIC PROVINCE**  
( Choices are expanded from Fenneman, 1931, 1938 )
  
- C) PHYSIOGRAPHIC SECTION**  
( Choices are expanded from Fenneman, 1931, 1938 )

-----  
[ These final two levels are optional and intended to allow use of more localized area names. ]

- D) STATE PHYSIOGRAPHIC AREA (OPTIONAL)**
  - To be developed in conjunction with, or obtained from, the local State Geologic Survey or its equivalent.
  
- E) LOCAL PHYSIOGRAPHIC / GEOGRAPHIC NAME (OPTIONAL)**
  - To be developed in conjunction with, or obtained from, the local State Geologic Survey.
  - May include area names found on USGS 7.5 or 15 minute topographic maps.

Example for Physiographic Location:

- A. Interior Plains
  - B. Central Lowland
    - C. Wisconsin Driftless Section
      - D. Wisconsin Dells
        - E. Robert's Ridge

## **PART II : GEOMORPHIC DESCRIPTION**

[ A term should only be used once in a microfeature-landform-landscape descriptive string. For example, if a term is used as a landscape term (e.g. *river valley*) it should not be repeated as a landform term in the same descriptive string. A different term that conveys additional information should be used (at either level); e.g. *flood plain* (Landform) *in a river valley* (Landscape), rather than a *river valley* (Landform) *in a river valley* (Landscape). ]

### **A) LANDSCAPE**

examples: badlands  
foothills

### **B) LANDFORM**

#### **1. Single Landform**

- occurrence on a single type of landform

examples: stream terrace, hill (singular: a pedon or point data)  
examples: stream terraces, hills (plural: pedons or map unit).

#### **2. Multiple Landforms:**

##### **a) Landform on a Landform** (nested landforms):

- Commonly used for locating a pedon or a small study site.  
- Listed in ascending order of scale.

examples: a blowout in a sand dune on a stream terrace.  
a mudflow on a cinder cone, in a caldera.  
a talus slope on an escarpment on a lava flow, in a valley.

##### **b) Occurrence across multiple landforms**

- Commonly used for locating a map unit, Official Soil Series Descriptions, deposits, or large study sites.

example: This map unit occurs on levees, crevasse splays, and sand bars.

### **C) MICROFEATURE (OPTIONAL)**

examples: gilgai  
tree-tip mound

### **D) ANTHROPOGENIC FEATURES**

example: borrow pit

## **PART III : SURFACE MORPHOMETRY**

### **A) ELEVATION:**

- The height of a point on the earth's surface, relative to mean sea level (msl); specify units.

examples: 106 m  
348 ft.

### **B) SLOPE ASPECT:**

- The compass bearing (in degrees, accounting for declination) that a slope faces, looking downslope.
- Generalized, "quadrant" descriptions (e.g., SSW = south by southwest) are too generic to be useful.

examples: 218°  
SW (*too general; obsolete*)

### **C) SLOPE GRADIENT:**

- The inclination of the land surface from the horizontal. Percent slope is the vertical distance divided by the horizontal distance, then multiplied by 100; e.g., 18%; commonly called "slope".

example: 17%

### **D) SLOPE COMPLEXITY:**

- Used to simplistically describe the relative linearity (simple) or irregularity (complex) of the ground surface leading downslope and through the point or map unit of interest.

examples: simple  
complex

### **E) RELATIVE SLOPE SEGMENT POSITION:**

- Used to subdivide long slopes, where useful.

example: lower third

- F) SLOPE SHAPE:**  
                                 DOWN SLOPE & ACROSS SLOPE  
                                         (Vertical)                        (Horizontal)
- examples: Concave - Convex  
                                                         Linear - Concave
- G) HILLSLOPE - PROFILE POSITION**  
                                 - 2 dimensional  
                                 - Used to describe location of a point or pedon along a longitudinal slope profile (down slope).  
                                 - Appropriate for use with point data, generally not recommended for map units.  
                                         examples: shoulder  
                                                         backslope
- H) GEOMORPHIC COMPONENT:**  
                                 - 3 dimensional  
                                 - Used to describe location of areas (e.g. map units, inclusions).
- 1) HILLS :**  
                                                 examples: head slope  
                                                         side slope
- 2) TERRACES, STEPPED LANDFORMS :**  
                                                 examples: tread  
                                                         riser
- 3) MOUNTAINS :**  
                                                 example: mountainflank
- 4) FLAT PLAINS :**  
                                                 examples: talf  
                                                         rise
- I) MICRORELIEF :** Microrelief refers to minor, relative elevational differences between adjacent areas or microfeatures).
- example: microhigh
- J) DRAINAGE PATTERN :** The configuration or arrangement, in plan view, of the stream courses in an area. It is related to the local geologic materials, geomorphologic features and history of the area; examples include dendritic, trellis, artificial, etc.; also called “drainage network”.
- example: dendritic

# GEOMORPHIC DESCRIPTION SYSTEM

( VERSION 4.2, 03/01/2012)

## PART I: PHYSIOGRAPHIC LOCATION

- A) **PHYSIOGRAPHIC DIVISION**  
( Choices are expanded from Fenneman, 1931, 1938, 1946)
- B) **PHYSIOGRAPHIC PROVINCE**  
( Choices are expanded from Fenneman, 1931, 1938, 1946)
- C) **PHYSIOGRAPHIC SECTION**  
( Choices are expanded from Fenneman, 1931, 1938, 1946)
- 
- D) **STATE PHYSIOGRAPHIC AREA** (OPTIONAL)
- E) **LOCAL PHYSIOGRAPHIC / GEOGRAPHIC NAME** (OPTIONAL)
- 

[ Note: The following map-unit descriptions (Fenneman, 1946) contain some concepts considered to be outdated (e.g., the Davisian landscape stages of youth, maturity, and old age). Nonetheless, the map units are largely sound and convey useful information. An italicized NASIS code, if available, follows each term (e.g., Coastal Plain *CP*). ]

### A) Physiographic Divisions

**Laurentian Upland** *LU*

**Atlantic Plain** *AP*

### B) Physiographic Provinces

#### C) Physiographic Sections

1. Superior Upland *SU*

[ Submaturely dissected, recently glaciated peneplain on crystalline rocks of complex structure. ]

2. Continental Shelf *CS*

[ Sloping submarine plain of sedimentation; *not delimited on NRCS map used in this document.* ]

3. Coastal Plain *CP*

a. Embayed section *EMS*

[ Submaturely dissected and partly submerged, terraced coastal plain. ]

b. Sea Island section *SIS*

[ Young to mature terraced coastal plain with submerged border. ]

c. Floridian section *FLS*

[ Young marine plain, with sand hills, swamps, sinks, and lakes. ]

d. East Gulf Coastal plain *EGC*

[ Young to mature belted coastal plain. ]

e. Mississippi alluvial valley *MAV*

[ Flood plain and delta. ]

f. West Gulf Coastal plain *WGC*

[ Young grading inland to mature coastal plain. ]

## Physiographic Divisions

### **Appalachian Highlands** AH

## Physiographic Provinces & Sections

4. Piedmont Province PP
  - a. Piedmont upland PIU  
[ Submaturely dissected peneplain on disordered resistant rocks; moderate relief. ]
  - b. Piedmont lowlands PIL  
[ Less uplifted peneplain on weak strata; residual ridges on strong rocks. ]
  
5. Blue Ridge Province BR
  - a. Northern section NOS  
[ Maturely dissected mountains of crystalline rocks; abundant altitudes. ]
  - b. Southern section SOS  
[ Subdued mountains of disordered crystalline rocks]
  
6. Valley and Ridge Province VR
  - a. Tennessee section TNS  
[ Second-cycle mountains of folded strong and weak strata; valley belts predominate over even-crested ridges. ]
  - b. Middle section MIS  
[ The same as previous section except that even-crested ridges predominate over the valleys except on the east side. ]
  - c. Hudson Valley HUV  
[ Glaciated peneplain on weak folded strata. ]
  
7. St. Lawrence Valley SL
  - a. Champlain section CHS  
[ Rolling lowland, glaciated; in part covered by young marine plain. ]
  - b. St Lawrence Valley - northern section NRS  
[ Young marine plain with local rock hills. ]
  
8. Appalachian Plateau AP
  - a. Mohawk section MOS  
[ Maturely dissected glaciated plateau; varied relief and diverse altitudes. ]
  - b. Catskill section CAS  
[ Maturely dissected plateau of mountainous relief and coarse texture (glaciated). ]
  - c. Southern New York section SNY  
[ Mature glaciated plateau of moderate relief. ]
  - d. Allegheny Mountain section AMS  
[ Mature plateau of strong relief; some mountains due to erosion of open folds. ]

## Physiographic Divisions

### **Appalachian Highlands** AH ( continued )

## Physiographic Provinces & Sections

- e. Kanawha section KAS  
[ Mature plateau of fine texture; moderate to strong relief. ]
- f. Cumberland Plateau section CPS  
[ Submaturely dissected plateau of moderate to strong relief. ]
- g. Cumberland Mountain section CMS  
[ Higher mature plateau and mountain ridges on eroded open folds. ]

### 9. New England Province NE

- a. Seaboard lowland section SLS  
[ Peneplains below 500 ft. elevation, postmaturely eroded and glaciated; few monadnocks. ]
- b. New England upland section NEU  
[ Dissected and glaciated peneplains on complex structural features; monadnocks. ]
- c. White Mountain section WMS  
[ Subdued glaciated mountain masses of crystalline rocks. ]
- d. Green Mountain section GMS  
[ Linear ranges of subdued and glaciated mountains and residual plateaus. ]
- e. Taconic section TAS  
[ Maturely dissected and glaciated mountains and peneplain on resistant folded strata. ]

### 10. Adirondack Province AD

[Subdued mountains and dissected peneplain, glaciated.]

### **Interior Plains** IN

### 11. Interior Low Plateaus IL

- a. Highland rim section HRS  
[ Young to mature plateau of moderate relief. ]
- b. Lexington lowland LEL  
[ Mature to old plain on weak rocks, trenched by main rivers. ]
- c. Nashville basin NAB  
[ Mature to old plain on weak rocks; slightly uplifted and moderately dissected. ]
- d. Possible western section WES  
[ Low, maturely dissected plateau with silt-filled valleys. ]  
(not delimited on map)

### 12. Central Lowland Province CL

- a. Eastern lake section ELS  
[ Maturely dissected and glaciated cuestas and lowlands; moraines, lakes, and lacustrine plains.]



## Physiographic Divisions

### **Interior Plains** *IN* ( *continued* )

## Physiographic Provinces & Sections

- b. Western lake section *WLS*  
[ Young glaciated plain; moraines, lakes, and lacustrine plains. ]
- c. Wisconsin driftless section *WDS*  
[ Maturely dissected plateau and lowland invaded by glacial outwash. (Margin of older, eroded drift is included). ]
- d. Till plains *TIP*  
[ Young till plains; moraine topography is rare, no lakes. ]
- e. Dissected till plains *DTP*  
[ Submaturely to maturely dissected till plains. ]
- f. Osage plain *OSP*  
[ Old scarped plains beveling faintly inclined strata; main streams are entrenched. ]

### 13. Great Plains Province *GP*

- a. Missouri plateau, glaciated *MPG*  
[ Glaciated old plateaus; isolated mountains. ]
- b. Missouri plateau, unglaciated *MPU*  
[ Old plateau; terrace lands; local badlands; isolated mountains. ]
- c. Black Hills *BLH*  
[ Maturely dissected domed mountains. ]
- d. High Plains *HIP*  
[ Broad inter-valley remnants of smooth fluvial plains.]
- e. Plains Border *PLB*  
[ Submaturely to maturely dissected plateau. ]
- f. Colorado Piedmont *COP*  
[ Late mature to old elevated plain. ]
- g. Raton section *RAS*  
[ Trenched peneplain surmounted by dissected, lava-capped plateaus and buttes. ]
- h. Pecos valley *PEV*  
[ Late mature to old plain. ]
- i. Edwards Plateau *EDP*  
[ Young plateau with margin of moderate to strong relief. ]
- k. Central Texas section *CTS*  
[ Plateau in maturity and later stages of erosion. ]

[ *This Division also includes portions of Alaska (see Alaskan Physiographic Areas) ]*

### **Interior Highlands** *IH*

### 14. Ozark Plateau *OP*

- a. Springfield-Salem plateaus *SSP*  
[ Submature to mature plateaus. ]
- b. Boston "Mountains" *BOM*  
[ Submature to mature plateau of strong relief. ]

## Physiographic Divisions

**Interior Highlands** *IH*  
( continued )

**Rocky Mountain System**  
*RM*

[ This Division also includes portions of Alaska (see Alaskan Physiographic Areas) ]

**Intermontane Plateaus** *IP*

## Physiographic Provinces & Sections

15. Ouachita Province *OU*  
a. Arkansas Valley *ARV*  
[ Gently folded strong and weak strata; peneplain with residual ridges. ]  
b. Ouachita Mountains *OUM*

16. Southern Rocky Mountains *SR*  
[ Complex mountains of various types; intermontane basins. ]

17. Wyoming Basin *WB*  
[ Elevated plains in various stages of erosion; isolated low mountains. ]

18. Middle Rocky Mountains *MR*  
[ Complex mountains, mainly anticline ranges; intermontane basins. ]

19. Northern Rocky Mountains *NR*  
[ Deeply dissected mountain uplands, not anticline ranges; intermontane basins. ]

20. Columbia Plateau *CR*  
a. Walla Walla Plateau *WWP*  
[ Rolling plateau with young incised valleys. ]  
b. Blue Mountain section *BMS*  
[ Complex mountains and dissected volcanic plateaus. ]  
c. Payette section *PAS*  
[ Young plateaus of prevailing weak rocks; broad alluvial terraces. Applies only to northern part. ]  
d. Snake River Plain *SRP*  
[ Young lava plateau. ]  
e. Harney section *HAS*  
[ Young lava plateaus, features of recent volcanism; ineffective drainage. ]

21. Colorado Plateau *CO*  
a. High Plateaus of Utah *HPU*  
[ High block plateaus, in part lava-capped; terraced plateaus on the south side. ]  
b. Uinta Basin *UIP*  
[ Dissected plateau; strong relief. ]  
c. Canyon Lands *CAL*  
[ Young to mature canyoned plateaus; high relief.]

## Physiographic Divisions

### **Intermontane Plateaus** *IP* ( continued )

## Physiographic Provinces & Sections

- d. Navajo section *NAS*  
[ Young plateaus; smaller relief than 21c, into which it grades. ]
- e. Grand Canyon section *GCS*  
[ High block plateaus, trenched by Grand Canyon.]
- f. Datil section *DAS*  
[Lava flows entire or in remnants; volcanic necks.]

### 22. Basin and Range Province *BP*

- a. Great Basin *GRB*  
[ Isolated Ranges (largely dissected block mountains) separated by aggraded desert plains.]
- b. Sonoran Desert *SOD*  
[ Widely separated short ranges in desert plains. ]
- c. Salton Trough *SAT*  
[ Desert alluvial slopes and delta plain, Gulf of CA]
- d. Mexican Highland *MEH*  
[ Isolated ranges (largely dissected block mountains) separated by aggraded desert plains.]
- e. Sacramento section *SAS*  
[ Mature block mountains of gently tilted strata; block plateaus; bolsons. ]

[ This Division also includes portions of Alaska (see *Alaskan Physiographic Areas*) ]

### **Pacific Mountain** *PM*

### 23. Cascade-Sierra Mountains *CM*

- a. Northern Cascade Mountains *NCM*  
[ Sharp alpine summits of accordant height; higher volcanic cones. ]
- b. Middle Cascade Mountains *MCM*  
[ Generally accordant summits; higher volc. cones]
- c. Southern Cascade Mountains *SCM*  
[ Volcanic mountains variously eroded; no very distinct range. ]
- d. Sierra Nevada *SIN*  
[ Block mountain range tilted west; accordant crests; alpine peaks near east side. ]

### 24. Pacific Border Province *PB*

- a. Puget Trough *PUT*  
[ Lowlands of diverse character; in part submerged.]
- b. Olympic Mountains *OLM*  
[ Generally accordant crests; local alpine peaks. ]
- c. Oregon Coast Range *OCR*  
[ Uplifted peneplain on weak rocks, dissected; monadnocks of igneous rock. ]
- d. Klamath Mountains *KLM*  
[Uplifted and dissected peneplain on strong rocks; extensive monadnocks ranges. ]

## Physiographic Regions

**Pacific Mountain** PM  
( continued )

## Physiographic Provinces & Sub-Provinces

- e. California Trough CAT  
[ Low fluvial plain. ]
- f. California Coast Ranges CCR  
[ Parallel ranges and valleys on folded, faulted, and metamorphosed strata; rounded crests of sub-equal height. ]
- g. Los Angeles Ranges LAR  
[ Narrow ranges and broad fault blocks; alluvial lowlands. ]

- 25. Lower California Province LC  
[ Dissected westward-sloping granite upland (in northern part). ]

[ This Division also includes portions of Alaska (see Alaskan Physiographic Areas) ]

## **Alaskan Physiographic Areas** (Warhaftig, 1965)

The following Alaskan-Peninsula physiographic areas are extensions of the preceding North American Physiographic Divisions (e.g., *Rocky Mountain System*). These Alaskan extensions are presented here, rather than intermingled with the previous Division / Province lists because they a) constitute a geographically coherent package (Wahrhaftig, 1965); b) these extensions were not contained within Fenneman's original work which dealt only with the conterminous US (Fenneman, 1931; 1938; & 1946), and c) Wahrhaftig's map-unit numbers are independent of, and inconsistent with Fenneman's. Wahrhaftig's original map unit scheme & numbers are retained here for simplicity in using his map of the Alaskan peninsula. [ *CAUTION*: Wahrhaftig's map-unit numbers should not be confused with similar map-unit numbers from Fenneman's map for the conterminous US. ]

## Physiographic Divisions

**Interior Plains** IN  
( continued )

**Rocky Mountains System**  
RM  
( continued )

## Physiographic Provinces & Sections

- 1. Arctic Coastal Plain Province --
  - a. Teshekpuk Hills section --
  - b. White Hills section --
- 2. Arctic Foothills Province AF
  - a. Northern Section --
  - b. Southern Section --

[ Note: The map-unit numbering sequence shown here is from Wahrhaftig (1965), and is independent of, and not consistent with, that of Fenneman ]

## Physiographic Divisions

**Intermontane Plateaus** IP  
( continued )

## Physiographic Provinces & Sections

- Arctic Mountains Province AM
  - 3. Delong Mountains section --
  - 4. Noatak Lowlands section --
  - 5. Baird Mountains section --
  - 6. Central & Eastern Brooks Range section -
  - 7. Ambler-Chandalar Ridge & Lowland section --
- Northern Plateaus Province --
  - 8. Porcupine Plateau section --
    - a. Thazzik Mountain
  - 9. Old Crow Plain section -- [ noted but not described ]
  - 10. Olgivie Mountains section --
  - 11. Tintina Valley (Eagle Trough) section --
  - 12. Yukon-Tanana Upland section --
    - a. Western Part
    - b. Eastern Part
  - 13. Northway - Tanacross Lowland section --
  - 14. Yukon Flats section --
  - 15. Rampart Trough section --
  - 16. Kokrine - Hodzana Highlands section --
    - a. Ray Mountains
    - b. Kokrine Mountains
- Western Alaska Province --
  - 17. Kanuti Flats section --
  - 18. Tozitna - Melozitna Lowland section --
  - 19. Indian River Upland section --
  - 20. Pah River Section --
    - a. Lockwood Hills
    - b. Pah River Flats
    - c. Zane Hills
    - d. Purcell Mountains
  - 21. Koyukuk Flats section --
  - 22. Kobuk-Selawik Lowland section --
    - a. Waring Mountains
  - 23. Selawik Hills section --
  - 24. Buckland River Lowland section --
  - 25. Nulato Hills section --
  - 26. Tanana - Kuskowin Lowland section --
  - 27. Nowitna Lowland section --
  - 28. Kuskokwim Mountains section --

[ Note: The map-unit numbering sequence shown here is from Wahrhaftig (1965), and is independent of, and not consistent with, that of Fenneman ]

**Physiographic Divisions**

**Intermontane Plateaus** IP  
( continued )

**Pacific Mountain System**  
PM  
( continued )

**Physiographic Provinces  
& Sections**

- 29. Innoko Lowlands section --
- 30. Nushagak - Big River Hills section --
- 31. Holitna Lowland section --
- 32. Nushagak - Bristol Bay Lowland section --
- 33. Seward Peninsula Province SEP
  - a. Bendeleben Mountains
  - b. Kigluaik Mountains
  - c. York Mountains

Bering Shelf Province BES

- 34. Yukon- Kuskokwim Coastal Lowland section --
  - a. Norton Bay Lowland
- 35. Bering Platform section --
  - a. St. Lawrence Island
  - b. Pribilof Island
  - c. St. Matthew Island
  - d. Nunivak Island

36. Ahklun Mountains Province --

Alaska - Aleutian Province AAC

- 37. Aleutian Islands section --
- 38. Aleutian Range section --
- 39. Alaska Range (Southern Part) section --
- 40. Alaska Range (Central & Eastern Parts) section --
  - a. Mentasta - Nutzotin Mountain segment.
- 41. Northern Foothills of the Alaska Range section --

Coastal Trough Province --

- 42. Cook Inlet - Susitna Lowland section --
- 43. Broad Pass Depression section --
- 44. Talkeetna Mountains section --
  - a. Chulitna Mountains
  - b. Fog Lakes Upland
  - c. Central Talkeetna Mountains
  - d. Clarence Lake Upland
  - e. Southeastern Talkeetna Mountains
- 45. Upper Matanuska Valley section --
- 46. Clearwater Mountains section --
- 47. Gulkana Upland section --

[ Note: The map-unit numbering sequence shown here is from Wahrhaftig (1965), and is independent of, and not consistent with, that of Fenneman ]

**Physiographic Divisions**

**Pacific Mountain System**

*PM*

( continued )

**Physiographic Provinces  
& Sections**

- 48. Copper River Lowland section --
  - a. Eastern Part
  - b. Western Part: Lake Louis Plateau
- 49. Wrangell Mountains section --
- 50. Duke Depression [ not described]
- 51. Chatham Trough section --
- 52. Kupreanof Lowland section --

Pacific Border Ranges Province *PBS*

- 53. Kodiak Mountains section --
- 54. Kenai - Chugach Mountains section --
- 55. St Elias Mountains section --
  - a. Fairweather Range subsection
- 56. Gulf of Alaska Coastal section --
- 57. Chilkat - Baranof Mountains section --
  - a. Alek Ranges subsection
  - b. Glacier Bay subsection
  - c. Chichagof Highland subsection
  - d. Baranof Mountains subsection
- 58. Prince of Whales Mountains section—

Coast Mountains Province *COM*

- 59. Boundary Pass section --
- 60. Coastal Foothills section --

[ Note: The map-unit numbering sequence shown here is from Wahrhaftig (1965), and is independent of, and not consistent with, that of Fenneman ]

**Other Physiographic Areas**

( not addressed by Fenneman, 1946; or Wahrhaftig, 1965 )

**Physiographic Divisions**

**Pacific Rim** *PR*

**Physiographic Provinces  
& Sections**

Pacific Islands Province *PI*

- a. Hawaiian Islands *HAI*
- b. Guam *GUM*
- c. Trust Territories \* *TRT*  
(e.g., Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Palau, Republic of Marshall Islands, etc.)
- d. Other

\* Most of the former US Trust Territories of the Pacific are now independent nations. This designation is used here solely to aid accessing archived, historical data.





## **PART II: "GEOMORPHIC DESCRIPTION"**

( Complete Choice-Lists and Topical Subsets )

There are various lists of terms within this section. These lists contain only the preferred "landform"-related terms as defined in the *Glossary of Landform and Geologic Terms*, National Soil Survey Handbook - Part 629 (NRCS, 2012) in an effort to encourage the national use of standard terms. Non-landform terms (e.g. geologic materials), undesirable terms (e.g. redundant synonyms, obsolete terms, etc.) retained in the *Glossary* for historical purposes, or legitimate landform terms not recognized in Soil Survey have been omitted from the following lists.

The first part of this section presents comprehensive alphabetical lists for Landscapes, Landforms, Microfeatures, and Anthropogenic Features. The second part of this section groups related terms into subsets of *Geomorphic Environment* or *Other Groupings* as an aid for locating related terms or appropriate contenders. Most of these subsets are based upon a common process of origin (i.e. *Geomorphic Environment*). Consequently, if the origin of a landform is known or can be inferred, a "short" list of appropriate terms can be quickly reviewed. One need not search through a long "master" list containing numerous, unrelated terms. **Note:** The lists are neither mutually exclusive nor a rigid hierarchical classification system. Some land features occur in more than one Geomorphic Process environment, or occur at more than one scale (e.g. *beach* occurs in both "Coastal Marine" and "Lacustrine" geomorphic process environments; *river valley* can occur as either a "Landscape" or as a "Landform"). Generally, terms are found on no more than two Geomorphic Environment lists.

Land features are commonly the result of multiple geomorphic processes. In assigning a landform term to a particular "Geomorphic Environment" list, emphasis is placed upon the dominant, near-surface process(s) evident in soil-forming materials. For example, a *kame* is a landform deposited by glaciofluvial processes and is usually modified by subsequent erosion. However, the dominant influence for the formation and attributes of a *kame* are glacial processes. Therefore, *kame* is included in the *Glacial Environment* list rather than the *Erosional* list.

Grouping terms by Geomorphic Environment places the emphasis on the agents, processes, and materials responsible for the formation of the landform. For example, a sand dune which occurs on a stream terrace is of eolian origin (the dominant agent is wind); dunes are listed with Eolian landforms. Fluvial processes may have provided the sand from which the dune was constructed and the underlying structure upon which it rests (stream terrace - a Fluvial-process landform), but eolian processes are responsible for the landform of primary pedological interest.

Unfortunately, not all surface features can be adequately grouped by Geomorphic Environment. Therefore, some additional groupings have been included. For example, a group is included for "Depressional" features. Obviously, "Depressional" is not a process per say. The land features in this category share a common attribute (they are all low areas or declivities), but were not all formed by the same processes. The features within each "Other Grouping" share a common setting or context, similar attributes or land use concerns rather than a common geological origin.

If you don't find a desired or adequate term in a particular *Geomorphic Environment* or *Other Group*, review other subset lists.

## PART II : GEOMORPHIC DESCRIPTION ( Outline )

### I) COMPREHENSIVE LISTS:

- A) **LANDSCAPES** ( broad or unique groups or clusters of spatially associated features ).
- B) **LANDFORMS** ( discrete, natural, individual features mappable at common survey scales).
- C) **MICROFEATURES** ( discrete, natural, individual features typically too small to delineate at common survey scales ).
- D) **ANTHROPOGENIC FEATURES** [ discrete, artificial (*human-made or extensively modified*), earth surface features ].

### II) GEOMORPHIC ENVIRONMENTS and OTHER GROUPINGS:

Landscape, Landform, and Microfeature terms grouped by process or common settings.

Lists are not mutually exclusive: some features occur in more than one grouping.

- 
- |   |                                                                                   |
|---|-----------------------------------------------------------------------------------|
| ↑ | 1. <b>Coastal Marine and Estuarine</b> ( wave, tidal, or shallow marine related). |
| ↑ | 2. <b>Lacustrine</b> (related to inland water bodies).                            |
| ↑ | 3. <b>Fluvial</b> [related to concentrated channel flow (e.g. stream)].           |
| ↑ | 4. <b>Solution</b> (dominated by dissolution and subsurface drainage).            |
| ↑ | 5. <b>Eolian</b> (wind dominated).                                                |
| ↑ | 6. <b>Glacial</b> (directly related to glaciers).                                 |
| ↑ | 7. <b>Periglacial</b> (related to non-glacial, cold climate).                     |
| ↑ | 8. <b>Mass Movement</b> (gravity dominated).                                      |
| ↑ | 9. <b>Volcanic and Hydrothermal</b>                                               |
| ↓ | 10. <b>Tectonic and Structural</b> (bedrock structures, crustal movement).        |
- 
- |   |                                                                                                                                                             |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ↑ | 11. <b>Slope</b> (generic slope forms, geometry, or arrangement rather than process).                                                                       |
| ↑ | 12. <b>Erosional</b> (dominated by non-channel, non-perennial water erosion).                                                                               |
| ↑ | 13. <b>Depressional</b> (low area or declivity terms, excludes permanent water bodies)                                                                      |
| ↑ | 14. <b>Wetlands</b> (related to vegetated or shallow wet areas, wet soils).                                                                                 |
| ↑ | 15. <b>Water Bodies</b> (permanent water features).                                                                                                         |
| ↓ | 16. <b>Subaqueous Features</b> [submerged features generally capable of supporting rooted plants ( <i>emergent or subaqueous</i> ), and adjacent features]. |

## PART II : GEOMORPHIC DESCRIPTION

[ Codes: Conventionally, the entire land-feature term is used (e.g. *dune field* ). Some data storage programs (e.g., NASIS) have shorthand codes developed for some terms. An italicized code follows each term (e.g., *meander belt MB* ) ; shown for historical purposes. ]

### I) COMPREHENSIVE LISTS (Landscapes, Landforms, Microfeatures, and Anthropogenic Features).

#### A) LANDSCAPES (broad and/or unique groups of spatially associated landforms.)

alluvial plain	AP	kegel karst	KK
alluvial plain remnant	AR	lagoon (water body; also Landform)	LG
badlands	BA	lake plain (also Landform)	LP
bajada (also Landform)	BJ	lava field (also Landform)	LF
barrier island (also Landform)	BI	lava plain (also Landform)	LV
basin	BS	lava plateau (also Landform)	LL
basin floor (also Landform)	BC	lowland	LW
batholith	BL	marine terrace (also Landform)	MT
bay [coast] (water body; also LF)	BY	meander belt	MB
bolson	BO	mountain range	MR
<b>breached anticline</b> (also LF)	<b>BD</b>	mountains (singular = Landform)	MO
<b>breaklands</b>	<b>BR</b>	mountain system	MS
breaks (also Landform)	BK	ocean (water body)	OC
caldera (also Landform)	CD	outwash plain (also Landform)	OP
canyonlands	CL	peninsula	PE
coastal plain (also Landform)	CP	piedmont	PI
cockpit karst	CPK	piedmont slope	PS
cone karst	CK	plains (also Landform)	PL
continental glacier	CG	plateau (also Landform)	PT
delta plain (also Landform)	DP	rift valley	RF
<b>dissected breaklands</b>	<b>DB</b>	river valley (also Landform)	RV
<b>dissected plateau</b>	<b>DI</b>	sandhills	SH
drumlin field	DF	sand plain	SP
dune field (also Landform)	DU	scabland	SC
estuary (water body; also Landform)	ES	sea (water body; also Landform)	SEA
everglades	EG	semi-bolson	SB
fan piedmont (also Landform)	FP	shield volcano (also Landform)	SV
fault-block mountains	FM	shore complex	SX
fluviokarst	FK	sinkhole karst	SK
fluviomarine terrace(also Landform)	FT	sound (water body; also Landform)	SO
<b>fold-thrust hills</b>	<b>FTH</b>	strait (water body; also Landform)	ST
foothills	FH	tableland	TB
glaciokarst	GK	thermokarst	TK
gulf (water body; also Landform)	GU	till plain (also Landform)	TP
hills (singular = Landform)	HI	tower karst	TW
ice-margin complex	IC	upland	UP
intermontane basin (also Landform)	IB	valley (also Landform)	VA
island (also Landform)	IS	volcanic field (also Landform)	VF
karst	KP		

**B) LANDFORMS** (discrete, natural, individual earth-surface features mappable at common survey scales).

<b>aa</b> lava flow	<i>ALF</i>	breaks (also Landscape)	<i>BK</i>
alas	<i>AA</i>	<b>breached anticline</b> (also Landscape)	<i>BRL</i>
alluvial cone	<i>AC</i>	broad interstream divide	<i>BID</i>
alluvial fan	<i>AF</i>	butte	<i>BU</i>
alluvial flat	<i>AP</i>	caldera (also Landscape)	<i>CD</i>
alpine glacier	<i>AG</i>	canyon	<i>CA</i>
anticline	<i>AN</i>	canyon bench	<i>CYB</i>
arete	<i>AR</i>	canyon wall	<i>CW</i>
arroyo	<i>AY</i>	Carolina Bay	<i>CB</i>
ash field	<i>AQ</i>	channel (also Microfeature)	<i>CC</i>
ash flow	<i>AS</i>	chenier	<i>CG</i>
atoll	<i>AT</i>	chenier plain	<i>CH</i>
avalanche chute	<i>AL</i>	cinder cone	<i>CI</i>
axial stream	<i>AX</i>	cirque	<i>CQ</i>
back-barrier beach	<i>BBB</i>	cirque floor	<i>CFL</i>
back-barrier flat	<i>BBF</i>	cirque headwall	<i>CHW</i>
backshore	<i>AZ</i>	cirque platform	<i>CPF</i>
backswamp	<i>BS</i>	cliff	<i>CJ</i>
bajada (also Landscape)	<i>BJ</i>	climbing dune	<i>CDU</i>
ballena	<i>BL</i>	closed depression (also Micro.)	<i>CLD</i>
ballon	<i>BV</i>	coastal plain (also Landscape)	<i>CP</i>
bar	<i>BR</i>	cockpit	<i>COC</i>
barchan dune	<i>BQ</i>	col	<i>CL</i>
barrier beach	<i>BB</i>	collapse sinkhole	<i>CSH</i>
barrier beach [relict]	<i>BBR</i>	collapsed ice-floored lakebed	<i>CK</i>
barrier cove	<i>BAC</i>	collapsed ice-walled lakebed	<i>CN</i>
barrier flat	<i>BF</i>	collapsed lake plain	<i>CS</i>
barrier island (also Landscape)	<i>BI</i>	collapsed outwash plain	<i>CT</i>
basin floor (also Landscape)	<i>BC</i>	colluvial apron	<i>COA</i>
basin-floor remnant	<i>BD</i>	complex landslide	<i>CLS</i>
bay [coast] (water body; also LS)	<i>BAY</i>	coral island	<i>COR</i>
bay [geom.]	<i>BYG</i>	coulee	<i>CE</i>
bay bottom	<i>BOT</i>	cove [geom.]	<i>CO</i>
bayou (water body)	<i>WC</i>	cove [water body]	<i>COW</i>
beach	<i>BE</i>	crag and tail	<i>CAT</i>
beach plain	<i>BP</i>	creep	<i>CRE</i>
beach ridge	<i>BG</i>	crevasse filling	<i>CF</i>
beach terrace	<i>BT</i>	cuesta	<i>CU</i>
berm	<i>BM</i>	cuesta valley	<i>CUV</i>
beveled base	<i>BVB</i>	cutoff	<i>CV</i>
blind valley	<i>VB</i>	debris avalanche	<i>DA</i>
block field	<i>BW</i>	debris fall	<i>DEF</i>
block glide	<i>BLG</i>	debris flow	<i>DF</i>
block lava flow	<i>BLF</i>	debris slide	<i>DS</i>
block stream	<i>BX</i>	debris spread	<i>DES</i>
blowout	<i>BY</i>	debris topple	<i>DET</i>
bluff	<i>BN</i>	deflation basin	<i>DB</i>
bog	<i>BO</i>	deflation flat	<i>DEF</i>
box canyon	<i>BOX</i>	delta	<i>DE</i>
braided stream	<i>BZ</i>	delta plain (also Landscape)	<i>DC</i>

depression	DP	flood-tidal delta slope	FTS
diapir	DD	flow	FLO
diatreme	DT	flute (also Microfeature)	FU
dike	DK	fluviomarine bottom	FMB
dip slope	DL	fluviomarine terrace (also Landscape)	FMT
disintegration moraine	DM	fold	FQ
distributary	DIS	foredune	FD
divide	DN	fosse	FV
dome	DO	free face (also Geom. Component – Hills, Mountains)	FW
drainageway	DQ	fringe-tidal marsh	FTM
drainhead complex	DRC	gap	GA
draw	DW	geyser	GE
drumlin	DR	geyser basin	GEB
drumlinoid ridge	DRR	geyser cone	GEC
dune	DU	giant ripple	GC
dune field (also Landscape)	DUF	glacial drainage channel	GD
dune lake (water body)	DUL	glacial lake (water body)	WE
dune slack (also Micro)	DUS	glacial lake [relict]	GL
earthflow	EF	glacial-valley floor	GVF
earth spread	ESP	glacial-valley wall	GVW
earth topple	ETO	glacier	GLA
end moraine	EM	gorge	GO
ephemeral stream (also Micro.)	EPS	graben	GR
eroded fan remnant	EFR	ground moraine	GM
eroded fan-remnant sideslope	EFS	gulch	GT
erosion remnant	ER	gulf (water body; also Landscape)	GU
escarpment	ES	gut [channel] (water body; also Micro.)	WH
esker	EK	gut [valley]	GV
estuary (water body; also Landscape)	WD	half graben	HG
faceted spur	FS	hanging valley	HV
fall (also material)	FB	headland	HE
falling dune	FDU	head-of-outwash	HD
fan	FC	headwall	HW
fan apron	FA	high hill	HH
fan collar	FOC	highmoor bog	HB
fanhead trench	FF	hill (plural = Landscape)	HI
fan piedmont (also Landscape)	FG	hillslope	HS
fan remnant	FH	hogback	HO
fan skirt	FI	homoclinal ridge	HCR
fault block	FAB	homocline	HC
fault-line scarp	FK	horn	HR
fault zone	FAZ	horst	HT
fen	FN	hot spring	HP
fissure vent	FIV	ice-contact slope	ICS
fjord (water body)	FJ	ice-marginal stream	IMS
flat	FL	ice pressure ridge	IPR
flatwoods	FLW	ice-pushed ridge	IPU
flood plain	FP	inlet	IL
flood-plain playa	FY	inselberg	IN
flood-plain splay	FM	inset fan	IF
flood-plain step	FO	interdrumlin	IDR
flood-tidal delta	FTD	interdune (also Microfeature)	ID
flood-tidal delta flat	FTF		

interfluve (also Geom. Component - Hills) <i>IV</i>		marine lake	<i>ML</i>
interior valley	<i>INV</i>	marine terrace (also Landscape)	<i>MT</i>
intermittent stream (also Microfeature)	<i>INT</i>	marsh	<i>MA</i>
intermontane basin (also Landscape)	<i>IB</i>	mawae	<i>MAW</i>
island (also Landscape)	<i>IS</i>	meander	<i>MB</i>
kame	<i>KA</i>	meandering channel	<i>MC</i>
kame moraine	<i>KM</i>	meander scar	<i>MS</i>
kame terrace	<i>KT</i>	meander scroll	<i>MG</i>
karst cone	<i>KC</i>	medial moraine	<i>MH</i>
karstic marine terrace	<i>KMT</i>	mesa	<i>ME</i>
karst lake	<i>KAL</i>	meteorite crater	<i>MEC</i>
karst tower	<i>KTO</i>	mogote	<i>MOG</i>
karst valley	<i>KVA</i>	monadnock	<i>MD</i>
kettle	<i>KE</i>	monocline	<i>MJ</i>
kipuka	<i>KIP</i>	moraine	<i>MU</i>
knob	<i>KN</i>	mountain (plural = Landscape)	<i>MM</i>
knoll	<i>KL</i>	mountain slope	<i>MN</i>
lagoon (water body; also Landscape)	<i>WI</i>	mountain valley	<i>MV</i>
lagoon bottom	<i>LBO</i>	mudflow	<i>MW</i>
lagoon channel	<i>LCH</i>	mud pot	<i>MP</i>
<b>lagoon [relict]</b>	<b>LAR</b>	muskeg	<i>MX</i>
lahar	<i>LA</i>	natural levee	<i>NL</i>
lake (water body)	<i>WJ</i>	<b>nearshore zone</b>	<i>NZ</i>
lakebed	<i>LB</i>	<b>nearshore zone [relict]</b>	<i>NZR</i>
lakebed [relict]	<i>LBR</i>	notch	<i>NO</i>
lake plain (also Landscape)	<i>LP</i>	nunatak	<i>NU</i>
lakeshore	<i>LF</i>	open depression (also Micro.)	<i>ODE</i>
lake terrace	<i>LT</i>	outwash delta	<i>OD</i>
landslide	<i>LK</i>	outwash fan	<i>OF</i>
lateral moraine	<i>LM</i>	outwash plain (also Landscape)	<i>OP</i>
lateral spread	<i>LS</i>	outwash terrace	<i>OT</i>
lava dome	<i>LD</i>	overflow stream channel	<i>OSC</i>
lava field (also Landscape)	<i>LFI</i>	oxbow	<i>OX</i>
lava flow	<i>LC</i>	oxbow lake (water body)	<i>WK</i>
lava flow unit (also Microfeature)	<i>LFU</i>	oxbow lake (ephemeral)	<i>OL</i>
lava plain (also Landscape)	<i>LN</i>	paha	<i>PA</i>
lava plateau (also Landscape)	<i>LL</i>	pahoehoe lava flow	<i>PAF</i>
lava trench (also Microfeature)	<i>LTR</i>	paleoterrace	<i>PTR</i>
lava tube	<i>LTU</i>	parabolic dune	<i>PB</i>
ledge	<i>LE</i>	parna dune	<i>PD</i>
levee	<i>LV</i>	partial ballena	<i>PF</i>
loess bluff	<i>LO</i>	patterned ground	<i>PG</i>
loess hill	<i>LQ</i>	pavement karst	<i>PAV</i>
longitudinal dune	<i>LDU</i>	peak	<i>PK</i>
<b>longshore bar</b>	<b>LON</b>	peat plateau	<i>PJ</i>
longshore bar [relict]	<i>LR</i>	pediment	<i>PE</i>
louderback	<i>LU</i>	perennial stream (water body)	<i>PS</i>
low hill	<i>LH</i>	pillow lava flow	<i>PIF</i>
lowmoor bog	<i>LX</i>	pingo	<i>PI</i>
maar	<i>MAA</i>	pinnacle	<i>PIN</i>
mainland cove	<i>MAC</i>	pitted outwash plain	<i>PM</i>
main scarp (also Microfeature)	<i>MAS</i>	pitted outwash terrace	<i>POT</i>
mangrove swamp	<i>MAN</i>	plain (also Landscape)	<i>PN</i>

plateau (also Landscape)	PT	scarp	RY
playa	PL	scarp slope	RS
playa dune (also Microfeature)	PDU	scree slope	SCS
playa floor (also Microfeature)	PFL	sea (water body; also Landscape)	SEA
playa lake (water body)	WL	sea cliff	RZ
playa rim (also Microfeature)	PRI	seep (also Microfeature)	SEE
playa slope (also Microfeature)	PSL	seif dune	SD
playa step (also Microfeature)	PST	semi-open depression(also Micro)	SOD
plug [volcanic]	VOP	shield volcano (also Landscape)	SHV
plug dome	PP	shoal (water body)	WR
pluvial lake (water body)	PLL	shoal (relict)	SE
pluvial lake (relict)	PQ	shore	SHO
pocosin	PO	shore complex	SHC
point bar	PR	sill	RT
point bar [coastal]	PRC	sinkhole	SH
pothole (also Microfeature)	PH	slackwater (water body)	WS
pothole lake (water body)	WN	slickrock (also Microfeature)	SLK
proglacial lake (water body)	WO	slide	SJ
proglacial lake [relict]	PGL	slot canyon	LCS
pyroclastic flow	PCF	slough	SL
pyroclastic surge	PCS	slump block	SN
raised beach	RA	snowfield	SNF
raised bog	RB	soil fall	SOF
ravine	RV	solution platform	SOP
recessional moraine	RM	solution sinkhole	SOS
reef	RF	sound (water body; also Landscape)	SO
ribbed fen	RG	spit	SP
ridge	RI	spur	SQ
rim	RJ	stack [coast]	SRC
<b>rise(also Microfeature)</b> (also Geom.		stack [geom]	SR
Component – Flat plains)	RIS	star dune	SDU
river (water body)	RIV	steptoe	ST
river valley (also Landscape)	RVV	stock	STK
roche moutonnée(also Microfeature)	RN	stoss and lee	SAL
rockfall (also Microfeature)	ROF	strait (water body; also Landscape)	STT
rockfall avalanche	RFA	strand plain	SS
rock glacier	RO	strath terrace	SU
rock pediment	ROP	stratovolcano	SV
rock spread	ROS	stream (water body)	STR
rock topple	ROT	stream terrace	SX
rotational debris slide	RDS	strike valley	STV
rotational earth slide	RES	string bog	SY
rotational rock slide	RRS	structural bench	SB
rotational slide	RTS	submerged back-barrier beach	SBB
sabkha	ABS	submerged mainland beach	SMB
saddle	SA	submerged point bar [coastal]	SPB
sag (also Microfeature)	SAG	submerged-upland tidal marsh	STM
sag pond (water body, also Micro.)	SGP	submerged wave-built terrace	SWT
salt marsh	SM	submerged wave-cut platform	SWP
salt pond (water body; also Micro.)	WQ	swale (also Microfeature)	SC
sand flow	RW	swallow hole	TB
sand ramp	SAR	swamp	SW
sand sheet	RX	syncline	SZ

talus cone	TC	valley (also Landscape)	VA
talus slope	TAS	valley border surfaces	VBS
tarn (water body; also Microfeature)	TAR	valley flat	VF
terminal moraine	TA	valley floor	VL
terrace	TE	valley-floor remnant ]	VFR
terrace remnant	TER	valley side	VS
thermokarst depression	TK	valley train	VT
thermokarst lake (water body)	W V	volcanic cone	VC
tidal flat	TF	<b>volcanic crater</b>	<b>CR</b>
tidal inlet	TI	volcanic dome	VD
<b>tidal inlet [relict]</b> (water body)	TIR	volcanic field (also Landscape)	VOF
tidal marsh	TM	<b>volcanic neck</b>	<b>VON</b>
till-floored lake plain	TLP	<b>volcanic pressure ridge</b>	<b>PU</b>
till plain (also Landscape)	TP	volcano	VO
toe (also Microfeature)	TOE	V-shaped valley	V V
tombolo	TO	wash	WA
topple	TOP	washover fan	WF
tor	TQ	washover-fan flat	WFF
Toreva block	TOR	washover-fan slope	WFS
translational debris slide	TDS	water-lain moraine	WM
translational earth slide	TES	wave-built terrace	WT
translational rock slide	TRS	wave-cut platform	WP
translational slide	TS	wave-worked till plain	WW
transverse dune	TD	wind gap	WG
trough	TR	window	WIN
tunnel valley	TV	wind-tidal flat	WTF
tunnel-valley lake (water body)	TVL	yardang (also Microfeature)	YD
underfit stream	US	yardang trough (also Microfeature)	YDT
U-shaped valley	UV		



**C) MICROFEATURES** (discrete, natural, earth-surface features typically too small to delineate at common survey scales).

**1) Common Microfeatures** (not used in association with the Landform "Patterned Ground").

bar	BA	pool (water body)	POO
channel (also Landform)	CH	pothole (also Landform)	PH
closed depression (also Landform)	CD	rib	RB
corda	CO	rill	RL
cutter	CU	ripple mark	RM
dune slack (also Landform)	DS	rise (also Landform) (also Geom. Component – Flat Plains)	RIS
dune traces	DT	rockfall (also Landform)	ROF
earth pillar	EP	roche moutonnée (also Landform)	POC
ephemeral stream (also Landform)	ES	sag (also Landform)	SAG
finger ridge	FR	sag pond (water body; also Landform)	SP
flute (also Landform)	FL	salt pond (water body; also Landform)	WQ
frost boil	FB	sand boil	SB
glacial groove	GG	seep (also Landform)	SE
groove	GR-	shoreline	SH
gully	GU	shrub-coppice dune	SCD
gut [channel] (also Landform)	WH	slickrock (also Landform)	SLK
hillock	HI	slip face	SF
hoodoo	HO	solifluction lobe	SOL
<b>ice wedge</b>	<b>IWD</b>	solifluction sheet	SS
<b>ice wedge cast</b>	<b>IWC</b>	solifluction terrace	ST
interdune (also Landform)	ID	solution chimney	SCH
intermittent stream (water; also LF)	INT	solution corridor	SCO
karren	KA	solution fissure	SOF
lava flow unit (also Landform)	LFU	solution pipe	SOP
lava trench (also Landform)	LT	splat cone	SPC
main scarp (also Landform)	MAS	spiracle	SPI
minor scarp	MIS	strandline	SL
mound	MO	swale (also Landform)	SW
nivation hollow	NH	swash zone	SZ
open depression (also Landform)	OP	tank (water body)	TA
perennial stream (water body; also LF)	PS	tarn (water body; also Landform)	TN
pinnacle	PI	terraces	TER
playa dune (also Landform)	PD	toe (also Landform)	TOE
playa floor (also Landform)	PF	tree-tip mound	TTM
playa rim (also Landform)	PR	tree-tip pit	TTP
playa slope (also Landform)	PSL	tumulus (tumuli = plural)	TU
playa step (also Landform)	PST	vernal pool (seasonal water)	VP
playette	PL	<b>volcanic pressure ridge</b>	<b>VPR</b>
pond (water body)	PON	yardang (also Landform)	YD
		yardang trough (also Landform)	YDT
		zibar	ZB

2) **Periglacial “patterned ground” Microfeatures:** [Singular forms (e.g. *circle*) are used for a single feature (pedon scale) whereas plural forms (e.g. *circles*) are used for map unit components].

circle	CI	palsa (= <i>peat hummock</i> )	PA
earth hummock	EH	polygon	PYG
high-center polygon	HCP	sorted circle	SCI
ice wedge polygon	IWP	stripe	STR
low-center polygon	LCP	turf hummock	TH
nonsorted circle	NSC		

3) **Other “patterned ground” Microfeatures:** [Singular forms (e.g. *hummock*) are used for a single feature (pedon scale) whereas plural forms (e.g. *hummocks*) are used for map unit components].

bar and channel	BC	linear gilgai	LG
circular gilgai	CG	mima mound	MM
elliptical gilgai	EG	pimple mound	PM
gilgai	GI	<b>puff</b>	<b>PU</b>
hummock	HU		

**D) ANTHROPOGENIC FEATURES** [discrete, artificial (human-made or extensively modified), earth surface features].

<b>anthroscape</b>	<b>ANT</b>	impact crater	IC
artificial collapsed depression	ACD	interfallow	IF
artificial levee	AL	landfill ( <i>see sanitary landfill</i> )	--
beveled cut	BC	leveled land	LVL
<b>bioswale</b>	<b>BS</b>	log landing	LL
borrow pit	BP	midden	MI
burial mound	BM	openpit mine	OM
conservation terrace ( <i>modern</i> )	CT	<b>polder</b>	<b>POL</b>
cut ( <i>railroad, etc.</i> )	CUT	pond ( <i>human-made</i> )	PO
cutbank	CB	quarry	QU
ditch	DI	railroad bed	RRB
double-bedding mound	DBM	reclaimed land	RL
( <i>i.e. bedding mound for</i>		rice paddy	RP
<i>timber; lower Coastal Plain</i> )		road bed	RB
drainage ditch	DD	road cut	RC
dredge-deposit shoal	DDS	sand pit	SP
dredge spoil bank	DSB	sanitary landfill	SL
dredged channel	DC	scalped area	SA
dump	DU	sewage lagoon	SWL
fill	FI	skid trail	ST
filled marshland	FM	spoil bank	SB
floodway	FW	spoil pile	SPP
furrow	FR	surface mine	SM
gravel pit	GP	tillage mound	TM
<b>headwall (anthro.)</b>	<b>HW</b>	truncated soil	TS
hillslope terrace ( <b>ancient</b> )	HT		

**II) GEOMORPHIC PROCESS or OTHER GROUPINGS** (Landscape, Landform, and Microfeature terms grouped by "geomorphic process" (e.g. *Fluvial*) or geomorphic setting (e.g. *Water Bodies*). Lists are not mutually exclusive; some terms occur in multiple groups.)

**1. COASTAL MARINE AND ESTUARINE** [Wave or tidal control or near-shore / shallow submarine].

*Landscapes:*

barrier island	<i>BI</i>	lowland	<i>LL</i>
bay [coast] (water body; also Landform)	<i>BY</i>	marine terrace (also Landform)	<i>MT</i>
coastal plain (also Landform)	<i>CP</i>	<b>ocean</b>	<i>OC</i>
<b>delta plain</b>	<i>DP</i>	peninsula	<i>PE</i>
estuary (water body; also Landform)	<i>ES</i>	<b>sea</b> (water body; also Landform)	<i>SEA</i>
<b>gulf</b> (water body; also Landform)	<i>GU</i>	shore complex	<i>SX</i>
fluviomarine terrace (also Landform)	<i>FT</i>	<b>sound</b> (water body; also Landform)	<i>SO</i>
island (also Landform)	<i>IS</i>	<b>strait</b> (water body; also Landform)	<i>ST</i>
lagoon (water body; also Landform)	<i>LG</i>		

*Landforms:*

atoll	<i>AT</i>	flatwoods	<i>FLW</i>
back-barrier beach	<i>BBB</i>	fluviomarine terrace (also LS)	<i>FMT</i>
back-barrier flat	<i>BBF</i>	foredune	<i>FD</i>
backshore	<i>AZ</i>	fringe-tidal marsh	<i>FTM</i>
bar	<i>BR</i>	<b>gulf</b> (water body; also Landscape)	<i>GU</i>
barrier beach	<i>BB</i>	<b>gut [channel]</b> (water body; also Microfeature)	<i>GU</i>
barrier cove	<i>BAC</i>	headland	<i>HE</i>
barrier flat	<i>BF</i>	island (also Landscape)	<i>IS</i>
barrier island (also Landscape)	<i>BI</i>	lagoon (water body; also Landscape)	<i>WI</i>
bay [coast] (water body; also Landscape)	<i>WB</i>	lagoon [relict]	<i>LAR</i>
bay bottom	<i>BOT</i>	longshore bar	<i>LON</i>
beach	<i>BE</i>	longshore bar [relict]	<i>LR</i>
beach plain	<i>BP</i>	mangrove swamp	<i>MAN</i>
beach ridge	<i>BG</i>	marine lake (water body)	<i>ML</i>
beach terrace	<i>BT</i>	marine terrace (also Landscape)	<i>MT</i>
berm	<i>BM</i>	<b>nearshore zone</b>	<i>NZ</i>
bluff	<i>BN</i>	<b>nearshore zone [relict]</b>	<i>NZC</i>
chenier	<i>CG</i>	point bar [coastal]	<i>PRC</i>
chenier plain	<i>CH</i>	raised beach	<i>RA</i>
coastal plain(also Landscape)	<i>CP</i>	reef	<i>RF</i>
coral island	<i>COR</i>	rise (also Microfeature)	<i>RIS</i>
cove [water]	<i>COW</i>	sabkha	<i>SAB</i>
delta	<i>DE</i>	salt marsh	<i>SM</i>
delta plain (also Landscape)	<i>DC</i>	<b>sea</b> (water body; also Landscape)	<i>SEA</i>
drainhead complex	<i>DRC</i>	sea cliff	<i>RZ</i>
estuary (also Landscape)	<i>WD</i>	<b>semi-open depression</b>	<i>SOD</i>
flat	<i>FL</i>		

shoal (relict)	<i>SE</i>	tidal flat	<i>TF</i>
shore	<i>SHO</i>	tidal inlet	<i>TI</i>
<b>shore complex</b> (also Landscape)	<i>SHC</i>	tidal inlet [relict]	<i>TIR</i>
<b>sound</b> (water body; also Landscape)	<i>SO</i>	tidal marsh	<i>TM</i>
spit	<i>SP</i>	tombolo	<i>TO</i>
stack [coast]	<i>SRC</i>	washover fan	<i>WF</i>
<b>strait</b> (water body; also Landscape)	<i>STT</i>	wave-built terrace	<i>WT</i>
strand plain	<i>SS</i>	wave-cut platform	<i>WP</i>
submerged-upland tidal marsh	<i>STM</i>	wind-tidal flat	<i>WTF</i>

*Microfeatures:*

<b>gut [channel]</b> (water body; also Landform)	<i>WH</i>	rise (also Landform)	<i>RIS</i>
ripple mark	<i>RM</i>	shoreline	<i>SH</i>
		swash zone	<i>SZ</i>

## 2. LACUSTRINE [Related to inland water bodies].

### Landscapes:

bay [coast] (water body; also Landform)	<i>BY</i>	lake plain (also Landform)	<i>LP</i>
<b>delta plain</b> (also Landform)	<b><i>DP</i></b>	peninsula	<i>PE</i>
island (also Landform)	<i>IS</i>	shore complex	<i>SX</i>

### Landforms:

backshore	<i>AZ</i>	longshore bar [relict]	<i>LR</i>
bar (also Microfeature)	<i>BR</i>	<b>nearshore zone</b>	<i>NZ</i>
barrier beach	<i>BB</i>	<b>nearshore zone [relict]</b>	<i>NZR</i>
barrier flat	<i>BF</i>	oxbow lake	<i>WK</i>
barrier island	<i>BI</i>	playa	<i>PL</i>
bay [coast] (water body; also Landform)	<i>BAY</i>	playa floor (also Microfeature)	<i>PFL</i>
beach	<i>BE</i>	playa lake (water body)	<i>PLL</i>
beach plain	<i>BP</i>	playa rim (also Microfeature)	<i>PRI</i>
beach ridge	<i>BG</i>	playa slope (also Microfeature)	<i>PSL</i>
beach terrace	<i>BT</i>	playa step (also Microfeature)	<i>PST</i>
berm	<i>BM</i>	pluvial lake (water body)	<i>PLL</i>
bluff	<i>BN</i>	pluvial lake (relict)	<i>PQ</i>
delta	<i>DE</i>	raised beach	<i>RA</i>
delta plain (also Landscape)	<i>DC</i>	sabkha	<i>SAB</i>
flat	<i>FL</i>	salt marsh	<i>SM</i>
flood-plain playa	<i>FY</i>	shoal [relict]	<i>SE</i>
foredune	<i>FD</i>	shore	<i>SHO</i>
headland	<i>HE</i>	shore complex (also Landscape)	<i>SHC</i>
island (also Landscape)	<i>IS</i>	spit	<i>SP</i>
karst lake	<i>KAL</i>	stack [coast]	<i>SRC</i>
lagoon	<i>WI</i>	strand plain	<i>SS</i>
lagoon [relict]	<i>LAR</i>	till-floored lake plain	<i>TLP</i>
lake (water body)	<i>WJ</i>	tombolo	<i>TO</i>
lakebed (water body)	<i>LB</i>	water-lain moraine	<i>WM</i>
lakebed [relict]	<i>LB</i>	wave-built terrace	<i>WT</i>
lake plain (also Landscape)	<i>LP</i>	wave-cut platform	<i>WP</i>
lakeshore	<i>LF</i>	wave-worked till plain	<i>WW</i>
lake terrace	<i>LT</i>		
longshore bar	<i>LON</i>		

### Microfeatures:

bar	<i>BA</i>	ripple mark	<i>RM</i>
playa floor (also Landform)	<i>PF</i>	shoreline	<i>SH</i>
playa rim (also Landform)	<i>PR</i>	strandline	<i>SL</i>
playa slope (also Landform)	<i>PSL</i>	swash zone	<i>SZ</i>
playa step (also Landform)	<i>PST</i>	vernal pool	<i>VP</i>
playette	<i>PL</i>		

**3. FLUVIAL** [Dominantly related to concentrated water flow (channel flow); includes erosional and depositional features, but excludes glaciofluvial landforms (see *Glacial*) and permanent water features (e.g. river; see *Water Bodies*)].

*Landscapes:*

alluvial plain	AP	delta plain (also Landform)	DP
alluvial plain remnant	AR	dissected breaklands	DB
badlands	BA	fan piedmont	FP
bajada (also Landform)	BJ	meander belt	MB
breaklands	BR	river valley (also Landform)	RV
breaks	BK	scabland	SC
canyonlands	CL		

*Landforms:*

alluvial cone	AC	flood-plain splay	FM
alluvial fan	AF	flood-plain step	FO
alluvial flat	AP	giant ripple	GC
arroyo	AY	gorge	GO
axial stream (water body)	AX	gulch	GT
backswamp	BS	gut [valley]	GV
bajada (also Landscape)	BJ	inset fan	IF
bar (also Microfeature)	BR	intermittent stream (also Micro.)	INT
basin-floor remnant	BD	levee	LV
block stream	BX	meandering channel	MC
box canyon	BOX	meander scar	MS
braided stream	BZ	meander scroll	MG
canyon	CA	natural levee	NL
channel	CC	overflow stream channel	OSC
coulee	CE	oxbow	OX
cutoff	CV	oxbow lake(water body)	WK
delta	DE	paleoterrace	PTR
delta plain (also Landscape)	DC	point bar	PR
drainageway	DQ	ravine	RV
drainhead complex	DRC	river valley (also Landscape)	RVV
draw	DW	semi-open depression	SOD
ephemeral stream (also Microfeature)	EPS	slot canyon	SLC
fan apron	FA	strath terrace	SU
fan collar	FCO	stream terrace	SX
fanhead trench	FF	terrace remnant	TER
fan remnant	FH	valley border surfaces	VBS
fan skirt	FI	valley flat	VF
flood plain	FP	valley floor remnant	VFR
flood-plain playa	FY	wash	WA
		wind gap	WG

*Microfeatures:*

bar	BA	gully	GU
bar & channel ( <i>patterned ground</i> )	BC	intermittent stream (also Landform)	INT
channel	CH	ripple mark	RM
ephemeral stream(also Landform)	ES	swash zone	SZ
groove	GR		

**4. SOLUTION** [Dominated by dissolution, and commonly, subsurface drainage].

*Landscapes:*

cockpit karst	<i>CPK</i>	kegel karst	<i>KK</i>
cone karst	<i>CK</i>	sinkhole karst	<i>SK</i>
fluviokarst	<i>FK</i>	thermokarst	<i>TK</i>
glaciokarst	<i>GK</i>	tower karst	<i>TW</i>
karst	<i>KR</i>		

*Landforms:*

blind valley	<i>VB</i>	pavement karst	<i>PAV</i>
cockpit	<i>COC</i>	pinnacle	<i>PIN</i>
collapse sinkhole	<i>CSH</i>	sinkhole	<i>SH</i>
interior valley	<i>INV</i>	solution platform	<i>SOP</i>
karst cone	<i>KC</i>	solution sinkhole	<i>SOS</i>
karstic marine terrace	<i>KMT</i>	swallow hole	<i>TB</i>
karst lake	<i>KAL</i>	thermokarst depression (also Microfeature)	<i>TK</i>
karst tower	<i>KTO</i>	yardang (also Microfeature)	<i>YD</i>
karst valley	<i>KVA</i>	yardang trough (also Microfeature)	<i>YDT</i>
mogote	<i>MOG</i>		

*Microfeatures:*

cutter	<i>CU</i>	solution pipe	<i>SOP</i>
karren	<i>KA</i>	thermokarst depression (also Microfeature)	<i>TK</i>
solution chimney	<i>SCH</i>	yardang (also Landform)	<i>YD</i>
solution corridor	<i>SO</i>	yardang trough (also Landform)	<i>YDT</i>
solution fissure	<i>SOF</i>		

**5. EOLIAN** [Dominantly wind related; erosion or deposition].

*Landscapes:*

dune field (also Landform)	<i>CK</i>	sand plain	<i>SP</i>
sandhills	<i>SH</i>		

*Landforms:*

barchan dune	<i>BQ</i>	paha	<i>PA</i>
blowout	<i>BY</i>	parabolic dune	<i>PB</i>
climbing dune	<i>CDU</i>	parna dune	<i>PD</i>
deflation basin	<i>DB</i>	playa dune (also Microfeature)	<i>PDU</i>
deflation flat	<i>DFL</i>	rise (also Microfeature)	<i>RIS</i>
dune	<i>DU</i>	sabkha	<i>SAB</i>
dune field (also Landscape)	<i>DUF</i>	sand ramp	<i>SAR</i>
dune lake (water body)	<i>DUL</i>	sand sheet	<i>RX</i>
dune slack (also Microfeature)	<i>DUS</i>	seif dune	<i>SD</i>
falling dune	<i>FDU</i>	slickrock (also Microfeature)	<i>SLK</i>
foredune	<i>FD</i>	star dune	<i>SDU</i>
interdune (also Microfeature)	<i>ID</i>	transverse dune	<i>TD</i>
loess bluff	<i>LO</i>	yardang (also Microfeature)	<i>TD</i>
loess hill	<i>LQ</i>	yardang trough (also Microfeature)	<i>YDT</i>
longitudinal dune	<i>LDU</i>		

*Microfeatures:*

dune slack (also Landform)	<i>DS</i>	shrub-coppice dune	<i>SCD</i>
dune traces	<i>DT</i>	slickrock (also Landform)	<i>SLK</i>
interdune (also Landform)	<i>ID</i>	slip face	<i>SF</i>
playa dune (also Landform)	<i>PD</i>	yardang (also Landform)	<i>YD</i>
playette	<i>PL</i>	yardang trough (also Landform)	<i>YDT</i>
rise (also Landform)	<i>RIS</i>	zibar	<i>ZB</i>



**6. GLACIAL** [Directly related to glaciers; includes glaciofluvial, glaciolacustrine, glaciomarine and outwash features].

*Landscapes:*

continental glacier	CG	ice-margin complex	IC
drumlin field	DF	outwash plain (also Landform)	OP
glaciokarst	GK	till plain (also Landform)	TP
hills	HI		

*Landforms:*

alpine glacier	AG	kame moraine	KM
arete	AR	kame terrace	KT
cirque	CQ	kettle	KE
cirque floor	CFL	lateral moraine	LM
cirque headwall	CHW	medial moraine	MH
cirque platform	CPF	moraine	MU
col	CL	<b>nearshore zone</b>	NZ
collapsed ice-floored lakebed	CK	<b>nearshore zone [relict]</b>	NZR
collapsed ice-walled lakebed	CN	nunatak	NU
collapsed lake plain	CS	outwash delta	OD
collapsed outwash plain	CT	outwash fan	OF
crag and tail	CAT	outwash plain (also Landscape)	OP
crevasse filling	CF	outwash terrace	OT
disintegration moraine	DM	paha	PA
drumlin	DR	pitted outwash plain	PM
drumlinoid ridge	DR	pitted outwash terrace	POT
end moraine	EM	pothole (also Microfeature)	PH
esker	EK	pothole lake	WN
fjord (water body)	FJ	proglacial lake (water body)	WO
flute (also Microfeature)	FU	proglacial lake [relict]	PGL
fosse	FV	recessional moraine	RM
giant ripple	GC	roche moutonnée (also Micro.)	RN
glacial drainage channel	GD	rock glacier	RO
glacial lake (water body)	WE	snowfield	SNF
glacial lake [relict]	GL	stoss and lee	SAL
glacial-valley floor	GVF	swale (also Microfeature)	SC
glacial-valley wall	GVW	tarn (water body; also Microfeature)	TAR
glacier	GLA	terminal moraine	TA
ground moraine	GM	till-floored lake plain	TLP
hanging valley	HV	till plain (also Landscape)	TP
head-of-outwash	HD	tunnel valley	TV
ice-contact slope	CS	tunnel-valley lake (water body)	TVL
ice-marginal stream (water body)	IMS	underfit stream	US
ice pressure ridge	IPR	U - shaped valley	UV
ice-pushed ridge	IPU	valley train	VT
interdrumlin	IDR	water-lain moraine	WM
kame	KA	wave-worked till plain	WW

*Microfeatures:*

glacial groove	<i>GG</i>	pothole (also Landform)	<i>PH</i>
flute (also Landform)	<i>FL</i>	<b>rise</b> (also Landform)	<i>RSI</i>
ice wedge	<i>IWD</i>	roche moutonnée (also Landform)	<i>POC</i>
ice wedge cast	<i>IWC</i>	swale (also Landform)	<i>SW</i>
nivation hollow	<i>NH</i>	tarn (water body; also "Landform")	<i>TN</i>

**7. PERIGLACIAL** [Related to non-glacial, cold climate (modern or relict), and periglacial forms of patterned ground. Note: consider “*patterned ground*” as a Landform, but treat specific types of patterned ground, singular or plural, as Microfeatures.]

*Landscapes:*

coastal plain (e.g. North Slope)	CP	plains	PL
hills	HI	thermokarst	TK

*Landforms:*

alas	AA	pingo	PI
block field	BW	rock glacier	RO
muskeg	MX	string bog	SY
patterned ground	PG	thermokarst depression (also	
(see <i>Microfeatures</i> below for types)		Microfeatures )	TK
peat plateau	PJ	thermokarst lake (water body)	WV

*Microfeatures:*

circle	CI	polygon	PYG
earth hummock	EH	solifluction lobe	SOL
frost boil	FB	solifluction sheet	SS
high-center polygon	HCP	solifluction terrace	ST
ice wedge	IWD	sorted circle	SCI
ice wedge cast	IWC	stripe	STR
ice wedge polygon	IWP	thermokarst depression (also	
low-center polygon	LCP	Landform)	TK
nivation hollow	NH	turf hummock	TH
non-sorted circle	NSC		
palsa (palsen = <i>plural</i> ;			
= peat hummocks)	PA		

**8. MASS MOVEMENT (= MASS WASTING)** [Dominated by gravity, including “creep” forms; see Mass Movement Types table].

*Landscapes: These generic “Landscapes” are not Mass Movement features per say, but are commonly modified by, and include localized areas of, Mass Movement.*

breaklands	<i>BR</i>	hills	<i>HI</i>
dissected breaklands	<i>DB</i>	mountain range	<i>MR</i>
foothills	<i>FH</i>	mountains	<i>MO</i>

*Landforms:*

ash flow	<i>AS</i>	rockfall avalanche	<i>RFA</i>
avalanche chute	<i>AL</i>	rock spread	<i>ROS</i>
block glide	<i>BLG</i>	rock topple	<i>ROT</i>
block stream	<i>BX</i>	rotational debris slide	<i>RDA</i>
colluvial apron	<i>COA</i>	rotational earth slide	<i>RES</i>
complex landslide	<i>CLS</i>	rotational rock slide	<i>RRS</i>
creep	<i>CRE</i>	rotational slide	<i>RTS</i>
debris avalanche	<i>DA</i>	sag (also Microfeature)	<i>SAG</i>
debris fall	<i>DEF</i>	sag pond (water body; also Micro.)	<i>SGP</i>
debris flow	<i>DF</i>		<i>SGP</i>
debris slide	<i>DS</i>	sand flow	<i>RW</i>
debris spread	<i>DES</i>	scree slope	<i>SCS</i>
debris topple	<i>DET</i>	slide	<i>SJ</i>
earthflow	<i>EF</i>	slump block	<i>SN</i>
earth spread	<i>ESP</i>	soil fall	<i>SOF</i>
earth topple	<i>ETO</i>	talus cone	<i>TC</i>
fall	<i>FB</i>	talus slope	<i>TAS</i>
flow	<i>FLO</i>	toe (also Microfeature)	<i>TOE</i>
lahar	<i>LA</i>	topple	<i>TOP</i>
landslide	<i>LK</i>	Toreva block	<i>TOR</i>
lateral spread	<i>LS</i>	translational debris slide	<i>TDS</i>
main scarp (also Microfeature)	<i>MAS</i>	translational earth slide	<i>TES</i>
mudflow	<i>MW</i>	translational rock slide	<i>TRS</i>
rock glacier	<i>RO</i>	translational slide	<i>TS</i>
rockfall (also Microfeature)	<i>ROF</i>		

*Microfeatures:*

main scarp (also Landform)	<i>MAS</i>	solifluction lobe	<i>SOL</i>
minor scarp	<i>MIS</i>	solifluction sheet	<i>SS</i>
rockfall (also Landform)	<i>ROF</i>	solifluction terrace	<i>ST</i>
sag (also Landform)	<i>SAG</i>	terraces	<i>TER</i>
sag pond (w; also Landform)	<i>SP</i>	toe (also Landform)	<i>TOE</i>
sand boil	<i>SB</i>		

## 9. VOLCANIC and HYDROTHERMAL

### *Landscapes:*

caldera (also Landform)	<i>CD</i>	lava plateau (also Landform)	<i>LL</i>
foothills	<i>FH</i>	mountains	<i>MO</i>
hills	<i>HI</i>	shield volcano (also Landform)	<i>SV</i>
lava field (also Landform)	<i>LF</i>	volcanic field (also Landform)	<i>VF</i>
lava plain (also Landform)	<i>LV</i>		

### *Landforms:*

<b>aa</b> lava flow	<i>ALF</i>	lava tube	<i>LTU</i>
ash field	<i>AQ</i>	louderback	<i>LU</i>
ash flow	<i>AS</i>	maar	<i>MAA</i>
block lava flow	<i>BLF</i>	mawae	<i>MAW</i>
caldera (also Landform)	<i>CD</i>	mud pot	<i>MP</i>
cinder cone	<i>CI</i>	pahoehoe lava flow	<i>PAF</i>
diatreme	<i>DT</i>	pillow lava flow	<i>PIF</i>
dike	<i>DK</i>	plug dome	<i>PP</i>
fissure vent	<i>FIV</i>	pyroclastic flow	<i>PCF</i>
geyser	<i>GE</i>	pyroclastic surge	<i>PCS</i>
geyser basin	<i>GEB</i>	shield volcano (also Landform)	<i>SHV</i>
geyser cone	<i>GEC</i>	steptoe	<i>ST</i>
hot spring	<i>HP</i>	stratovolcano	<i>SV</i>
kipuka	<i>KIP</i>	volcanic cone	<i>VC</i>
lahar	<i>LA</i>	volcanic crater	<i>CR</i>
lava dome	<i>LD</i>	volcanic dome	<i>VD</i>
lava field (also Landscape)	<i>LFI</i>	volcanic field (also Landscape)	<i>VOF</i>
lava flow	<i>LC</i>	volcanic neck	<i>VON</i>
lava flow unit (also Microfeature)	<i>LFU</i>	volcanic pressure ridge (also Microfeature)	<i>PU</i>
lava plain (also Landscape)	<i>LN</i>	volcano	<i>VO</i>
lava plateau (also Landscape)	<i>LL</i>		
lava trench (also Microfeature)	<i>LTR</i>		

### *Microfeatures:*

corda	<i>CO</i>	spiracle	<i>SPI</i>
lava flow unit (also Landform)	<i>LFU</i>	tumulus (tumuli = plural)	<i>TU</i>
lava trench (also Landform)	<i>LT</i>	volcanic pressure ridge (also Landform)	<i>VPR</i>
spatter cone	<i>SPC</i>		

**10. TECTONIC and STRUCTURAL** [Related to regional and local bedrock structures, or crustal movement. In Soil Survey, structural and tectonic features are only recognized if they have some expression at or near the land surface].

*Landscapes:*

basin floor	<i>BC</i>	mountain range	<i>MR</i>
batholith	<i>BL</i>	mountains	<i>MO</i>
bolson	<i>BO</i>	mountain system	<i>MS</i>
breached anticline (also Landform)	<i>BD</i>	piedmont slope	<i>PS</i>
dissected plateau	<i>DP</i>	plateau	<i>PT</i>
fault-block mountains	<i>FM</i>	rift valley	<i>RF</i>
fold-thrust hills	<i>FTH</i>	semi-bolson	<i>SB</i>
foothills	<i>FH</i>	tableland	<i>TB</i>
hills	<i>HI</i>	valley	<i>VA</i>
intermontane basin	<i>IB</i>		

*Landforms:*

anticline	<i>AN</i>	half graben	<i>HG</i>
breached anticline (also LS)	<i>BRL</i>	hogback	<i>HO</i>
canyon bench	<i>CYB</i>	homoclinal ridge	<i>HCR</i>
culvert	<i>CU</i>	horst	<i>HT</i>
culvert valley	<i>CUV</i>	loderback	<i>LU</i>
diapir	<i>DD</i>	meteorite crater	<i>MEC</i>
dike	<i>DK</i>	monocline	<i>MJ</i>
dip slope	<i>DL</i>	scarp slope	<i>RS</i>
dome	<i>DO</i>	sill	<i>RT</i>
fault block	<i>FAB</i>	stock	<i>STK</i>
fault-line scarp	<i>FK</i>	strike valley	<i>STV</i>
fault zone	<i>FAZ</i>	structural bench	<i>SB</i>
fold	<i>FQ</i>	syncline	<i>SZ</i>
graben	<i>GR</i>	window	<i>WIN</i>

*Microfeatures:*

sand boil	<i>SB</i>
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**11. SLOPE** [Generic terms (e.g. hill) or those that describe slope form, geometry, or arrangement of land features, rather than any particular genesis or process].

*Landscapes:*

badlands	<i>BA</i>	mountain range	<i>MR</i>
breached anticline (also LF)	<i>BD</i>	mountains	<i>MO</i>
breaklands	<i>BR</i>	mountain system	<i>MS</i>
breaks	<i>BK</i>	piedmont	<i>PI</i>
canyonlands	<i>CL</i>	piedmont slope	<i>PS</i>
dissected breaklands	<i>DB</i>	plains (singular = LF)	<i>PL</i>
dissected plateau	<i>DI</i>	plateau (also Landform)	<i>PT</i>
fault-block mountains	<i>FM</i>	tableland	<i>TB</i>
foothills	<i>FH</i>	upland	<i>UP</i>
hills	<i>HI</i>		

*Landforms:*

beveled base	<i>BVB</i>	low hill	<i>LL</i>
block stream	<i>BX</i>	mesa	<i>ME</i>
bluff	<i>BN</i>	mountain (plural = Landscape)	<i>MM</i>
broad interstream divide	<i>BID</i>	mountain slope	<i>MN</i>
butte	<i>BU</i>	mountain valley	<i>MV</i>
canyon bench	<i>CYB</i>	notch	<i>NO</i>
canyon wall	<i>CW</i>	paha	<i>PA</i>
cliff	<i>CJ</i>	peak	<i>PK</i>
colluvial apron	<i>COA</i>	pediment	<i>PE</i>
cuesta	<i>CU</i>	plain (also Landscape)	<i>PN</i>
dip slope	<i>DL</i>	plateau (also Landscape)	<i>PT</i>
dome	<i>DO</i>	ridge	<i>RI</i>
escarpment	<i>ES</i>	rim	<i>RJ</i>
faceted spur	<i>FS</i>	rise (also Micro.; <i>Geom. Comp. – Flats</i> )	<i>RIS</i>
fault block	<i>FAB</i>	rock pediment	<i>ROP</i>
fault-line scarp	<i>FK</i>	scarp	<i>RY</i>
free face ( <i>also Geom. Comp. – Hills, Mountains</i> )	<i>FW</i>	scarp slope	<i>RS</i>
gap	<i>GA</i>	scree slope	<i>SCS</i>
headwall	<i>HW</i>	slickrock (also Microfeature)	<i>SLK</i>
high hill	<i>HH</i>	spur	<i>SQ</i>
hill (plural = Landscape)	<i>HI</i>	stack [geom]	<i>SR</i>
hillslope	<i>HS</i>	structural bench	<i>SB</i>
hogback	<i>HO</i>	talus cone	<i>TC</i>
interfluvium ( <i>also Geom. Component - Hills</i> )	<i>IV</i>	talus slope	<i>TAS</i>
knob	<i>KN</i>	tor	<i>TQ</i>
knoll	<i>KL</i>	valley	<i>VA</i>
ledge	<i>LE</i>	valley floor remnant	<i>VFR</i>
		wind gap	<i>WG</i>

*Microfeatures:*

finger ridge	<i>FR</i>	rise (also Microfeature) ( <i>also Geom. Component – Flat Plains</i> )	<i>RIS</i>
mound	<i>MO</i>	slickrock (also Landform)	<i>SLK</i>
rib	<i>RB</i>		
rill	<i>RL</i>		

**12. EROSIONAL** [Related dominantly to water erosion but excludes perennial, concentrated channel flow (i.e. fluvial, glaciofluvial), or eolian erosion].

*Landscapes:*

badlands	<i>BA</i>	foothills	<i>FH</i>
breached anticline (also Landform)	<i>BD</i>	hills	<i>HI</i>
breaklands	<i>BR</i>	mountain range	<i>MR</i>
breaks	<i>BK</i>	mountains	<i>MO</i>
canyonlands	<i>CL</i>	piedmont	<i>PI</i>
dissected breaklands	<i>DB</i>	piedmont slope	<i>PS</i>
dissected plateau	<i>DP</i>	plateau (also Landform)	<i>PT</i>
		tableland	<i>TB</i>

*Landforms:*

ballena	<i>BL</i>	notch	<i>NO</i>
ballon	<i>BV</i>	paha	<i>PA</i>
basin floor remnant	<i>BD</i>	partial ballena	<i>PF</i>
beveled base	<i>BVB</i>	peak	<i>PK</i>
breached anticline (also LS)	<i>BRL</i>	pediment	<i>PE</i>
canyon bench	<i>CYB</i>	plateau (also Landscape)	<i>PT</i>
canyon wall	<i>CW</i>	rock pediment	<i>ROP</i>
col	<i>CL</i>	sabkha	<i>SAB</i>
colluvial apron	<i>COA</i>	saddle	<i>SA</i>
cuesta	<i>CU</i>	scarp slope	<i>RS</i>
cuesta valley	<i>CUV</i>	slickrock (also Microfeature)	<i>SLK</i>
eroded fan remnant	<i>EFR</i>	stack [geom]	<i>SR</i>
eroded fan-remnant side slope	<i>EFS</i>	strike valley	<i>STV</i>
erosion remnant	<i>ER</i>	structural bench	<i>SB</i>
free face (also <i>Geom. Component</i> – <i>Hills, Mountains</i> )	<i>FW</i>	terrace remnant	<i>TER</i>
gap	<i>GA</i>	tor	<i>TQ</i>
hogback	<i>HO</i>	valley border surfaces	<i>VBS</i>
inselberg	<i>IN</i>	valley floor remnant	<i>VFR</i>
monadnock	<i>MD</i>	wind gap	<i>WG</i>
		window	<i>WIN</i>

*Microfeatures:*

earth pillar	<i>EP</i>	pinnacle	<i>PI</i>
finger ridge	<i>FR</i>	rib	<i>RB</i>
groove	<i>GR</i>	rill	<i>RL</i>
gully	<i>GU</i>	slickrock (also Landform)	<i>SLK</i>
hoodoo	<i>HO</i>	swale	<i>SW</i>



**13. DEPRESSIONAL** (Low areas or declivity features, excluding permanent water bodies).

*Landscapes:*

basin	<i>BS</i>	breaklands	<i>BR</i>
basin floor (also Landform)	<i>BC</i>	dissected breaklands	<i>DB</i>
bolson	<i>BO</i>	semi-bolson	<i>SB</i>
breached anticline (also LF)	<i>BD</i>	valley	<i>VA</i>

*Landforms:*

alluvial flat	<i>AP</i>	open depression (also Micro)	<i>ODE</i>
basin floor (also Landscape)	<i>BC</i>	playa	<i>PL</i>
basin floor remnant	<i>BD</i>	playa floor (also Microfeature)	<i>PFL</i>
box canyon	<i>BOX</i>	playa rim (also Microfeature)	<i>PRI</i>
breached anticline (also Landscape)	<i>BRL</i>	playa slope (also Microfeature)	<i>PSL</i>
canyon	<i>CA</i>	playa step (also Microfeature)	<i>PST</i>
canyon wall	<i>CW</i>	pothole (also Microfeature)	<i>PH</i>
closed depression (also Micro.)	<i>CLD</i>	pothole lake	<i>WN</i>
col	<i>CL</i>	ravine	<i>RV</i>
coulee	<i>CE</i>	sabkha	<i>SAB</i>
cove	<i>CO</i>	saddle	<i>SA</i>
cuesta valley	<i>CUV</i>	sag (also Microfeature)	<i>SAG</i>
depression	<i>DP</i>	semi-open depression	
drainageway	<i>DQ</i>	(also Microfeature)	<i>SOD</i>
drainhead complex	<i>DRC</i>	slot canyon	<i>SLC</i>
gap	<i>GA</i>	strike valley	<i>STV</i>
gorge	<i>GO</i>	swale (also Microfeature)	<i>SC</i>
gulch	<i>GT</i>	trough	<i>TR</i>
gut [valley]	<i>GV</i>	U-shaped valley	<i>UV</i>
intermontane basin	<i>IB</i>	valley	<i>VA</i>
kettle	<i>KE</i>	valley floor	<i>VL</i>
mountain valley	<i>MV</i>	V-shaped valley	<i>VV</i>

*Microfeatures:*

closed depression (also Landform)	<i>CD</i>	playette	<i>PL</i>
open depression (also Landform)	<i>OP</i>	pothole (also Landform)	<i>PH</i>
playa floor (also Landform)	<i>PF</i>	swale (also Landform)	<i>SW</i>
playa rim (also Landform)	<i>PR</i>	sag (also Landform)	<i>SAG</i>
playa slope (also Landform)	<i>PSL</i>	tree-tip pit	<i>TTP</i>
playa step (also Landform)	<i>PST</i>		

**14. WETLANDS** [ Related to vegetated and / or shallow wet areas, and wet soils.  
(Provisional list: conventional, geologic definitions, not legalistic or regulatory usage). ]

*Landscapes:*

<b>estuary</b> (also landform)	<i>ES</i>	[ Generally, there is no appropriate Wetland Landscape term; by default, choose the most appropriate Landscape term from another Process Environment or Grouping. ]
everglades	<i>EG</i>	

*Landforms:*

alas	<i>AA</i>	oxbow lake (water body)	<i>WK</i>
backswamp	<i>BS</i>	peat plateau	<i>PJ</i>
bog	<i>BO</i>	playa (intermittent water)	<i>PL</i>
Carolina Bay	<i>CB</i>	pocosin	<i>PO</i>
dune slack (also Microfeature)	<i>DUS</i>	pothole (also Microfeature)	<i>PH</i>
ephemeral stream (also Microfeature)	<i>EPS</i>	pothole lake (water body)	<i>PH</i>
estuary	<i>WD</i>	raised bog	<i>RB</i>
fen	<i>FN</i>	ribbed fen	<i>RG</i>
flood-plain playa	<i>FY</i>	sabkha	<i>SAB</i>
fringe tidal marsh	<i>FTM</i>	salt marsh	<i>SM</i>
highmoor bog	<i>HB</i>	seep (also Microfeature)	<i>SEE</i>
intermittent stream (also Microfeature)	<i>INT</i>	semi-open depression	<i>SOD</i>
lowmoor bog	<i>LX</i>	slough (intermittent water)	<i>SL</i>
mangrove swamp	<i>MAN</i>	string bog	<i>SY</i>
marsh	<i>MA</i>	swamp	<i>SW</i>
muskeg	<i>MX</i>	tidal flat	<i>TF</i>
		tidal marsh	<i>TM</i>

*Microfeatures:*

dune slack (also Landform)	<i>DS</i>	playette	<i>PL</i>
ephemeral stream (also Landform)	<i>ES</i>	pothole ( (also Landform)	<i>PH</i>
intermittent stream (also Landform)	<i>INT</i>	seep (also Landform)	<i>SEE</i>
		vernal pool (seasonal water)	<i>VP</i>

**15. WATER BODIES** [ Discrete “surface water” features, primarily permanent open water, which in Soil Survey Reports are commonly treated as the generic map unit “water” (e.g. *lake*), or as a spot / line symbol (e.g. *perennial stream*) ].

*Landscapes:*

bay [coast] (also Landform)	BY	<b>ocean</b>	OC
estuary (also Landform)	ES	<b>sea</b> (also Landform)	SEA
gulf (also Landform)	GU	<b>sound</b> (also Landform)	SO
lagoon (also Landform)	LG	<b>strait</b> (also Landform)	ST

*Landforms:*

axial stream	AX	playa lake	WL
bay [coast] (also Landscape)	BAY	pluvial lake	PLL
bayou	WC	pothole lake	WN
cove [ (water body)	COW	proglacial lake	WO
dune lake	DUL	river	RIV
estuary (water body; also Landscape)	WD	sag pond (also Microfeature)	SGP
fjord	FJ	salt pond (also Microfeature)	WQ
glacial lake	WE	sea (also Landscape)	SEA
<b>gulf</b> (also Landscape)	GU	shoal	WR
gut [ <b>channel</b> ] (also Micro.)	WH	slackwater	WS
ice-marginal stream	IMS	slough	WU
inlet	IL	<b>sound</b> (also Landscape)	SO
lagoon (also Landscape)	WI	<b>strait</b> (also Landscape)	STT
lagoon channel	LCH	stream (permanent water)	STR
lake	WJ	tarn (also Microfeature)	TAR
marine lake	ML	thermokarst lake	WV
nearshore zone	NZ	tidal inlet	TI
oxbow lake	WK	tidal inlet [relict] (water body)	TIR
perennial stream (also Microfeature)	PS	tunnel-valley lake	TVL

*Microfeatures:*

channel	CH	sag pond	SAG
gut [channel] (w; also LF)	WH	salt pond	WQ
perennial stream (also LF)	PS	tank	TN
pond	PO	tarn (also Landform)	TA
pool	POO		

**16. SUBAQUEOUS FEATURES** [ Discrete underwater features (that commonly can support rooted plants), and adjacent features, ordinarily found below permanent open water. [ *Historically, in Soil Survey Reports these underwater features have been included in the generic map unit "water" ]*. Subaqueous "Landscape" terms are obviously not terrestrial, but are **functionally equivalent** Earth surface features.

*Landscapes:*

bay [coast] (water body; also LF)	<i>BY</i>	sea (water body; also Landform)	<i>SEA</i>
estuary (also Landform)	<i>ES</i>	sound (water body; also Landform)	<i>SO</i>
gulf (water body; also Landform)	<i>GU</i>	strait (water body; also Landform)	<i>ST</i>
lagoon (water body; also Landform)	<i>LA</i>		
ocean (water body)	<i>OC</i>		

*Landforms:*

barrier cove	<i>BAC</i>	mainland cove	<i>MAC</i>
bay [coast] (water body; also Landscape)	<i>BAY</i>	marine lake	<i>ML</i>
bay bottom	<i>BOT</i>	<b>nearshore zone</b>	<i>NZ</i>
cove (water body)	<i>CO</i>	reef	<i>RF</i>
estuary (also Landscape)	<i>WD</i>	sea (water body; also Landscape)	<i>SEA</i>
flood-tidal delta	<i>FTD</i>	shoal	<i>WR</i>
flood-tidal delta flat	<i>FTF</i>	sound (water body; also Landscape)	<i>SO</i>
flood-tidal delta slope	<i>FTS</i>	strait (water body; also Landscape)	<i>STT</i>
fluviomarine bottom	<i>FMB</i>	submerged back-barrier beach	<i>SBB</i>
gulf (water body; also Landscape)	<i>GU</i>	submerged mainland beach	<i>SMB</i>
inlet	<i>IL</i>	submerged point bar [coastal]	<i>SPB</i>
lagoon (also Landscape)	<i>WI</i>	submerged wave-built terrace	<i>SWT</i>
lagoon bottom	<i>LBO</i>	submerged wave-cut platform	<i>SWP</i>
lagoon channel	<i>LCH</i>	tidal inlet	<i>TI</i>
lake	<i>WJ</i>	tidal inlet [relict]	<i>TIR</i>
lakebed	<i>LB</i>	washover-fan flat	<i>WFF</i>
longshore bar	<i>LON</i>	washover-fan slope	<i>WFS</i>

*Microfeatures:*

channel (permanent water)	<i>CH</i>	gut (channel; water body)	<i>WH</i>
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*Anthropogenic Features:*

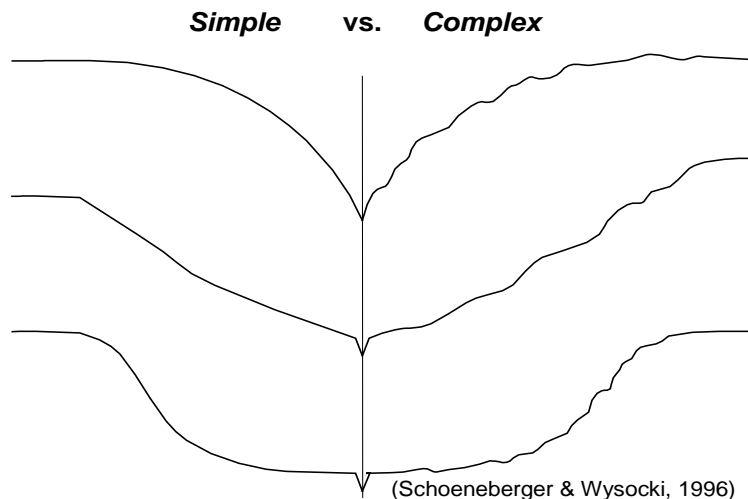
dredge-deposit shoal	<i>DDS</i>	dredged channel	<i>DC</i>
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## PART III : SURFACE MORPHOMETRY

- A) **ELEVATION:** The height of a point on the earth's surface, relative to mean sea level (indicate units); e.g. 106 m (or 348 ft.)
- B) **SLOPE ASPECT:** The compass bearing (in degrees, corrected for declination) that a slope faces, looking downslope; e.g. 218°
- C) **SLOPE GRADIENT:** The inclination of the land surface from the horizontal. Percent slope is the vertical distance divided by the horizontal distance, then multiplied by 100; e.g., 18%. NSSH 629

D) **SLOPE COMPLEXITY:**

	<i>Code</i>
	( <u>conventional</u> , <u>NASIS</u> )
simple	S
complex	C

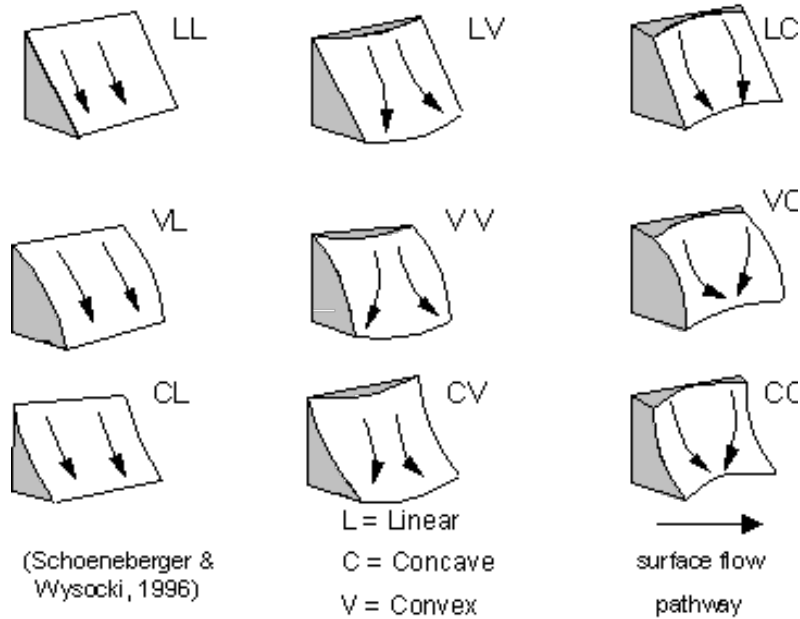


- E) **RELATIVE SLOPE SEGMENT POSITION:** If useful to subdivide long slopes, describe the relative slope location of the area of interest.

Relative Slope Segment Position	Code	Criteria
lower third	LT	on lower third
middle third	MT	on middle third
upper third	UT	on upper third

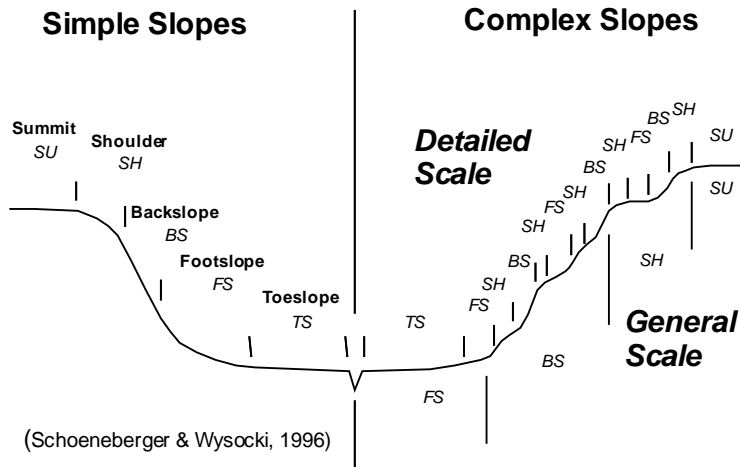
**F) SLOPE SHAPE:** Slope shape is described in two directions: 1) Up & Down slope (perpendicular (normal) to the contour), and 2) Across Slope (along the horizontal contour). e.g. Linear, Convex or LV.

DOWN SLOPE & SLOPE (Vertical)	ACROSS SLOPE (Horizontal)	Code ( <u>conventional</u> <u>NASIS</u> )	
Concave -	Concave	CC	CC, CC
Concave -	Convex	CV	CC, CV
Concave -	Linear	CL	CC, LL
Convex -	Concave	VC	CV, CC
Convex -	Convex	VV	CV, CV
Convex -	Linear	VL	CV, LL
Linear -	Concave	LC	LL, CC
Linear -	Convex	LV	LL, CV
Linear -	Linear	LL	LL, LL



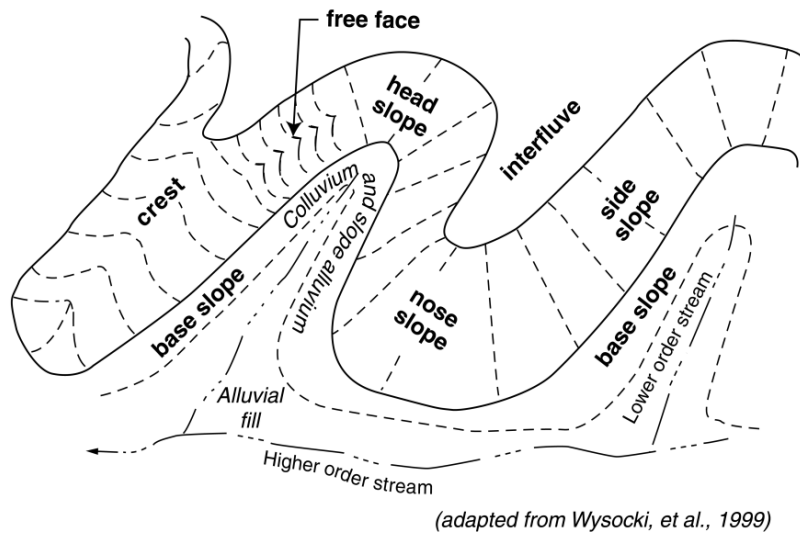
**G) HILLSLOPE - PROFILE POSITION :** (2 Dimensional )

	<u>Code</u>
summit	SU
shoulder	SH
backslope	BS
footslope	FS
toeslope	TS

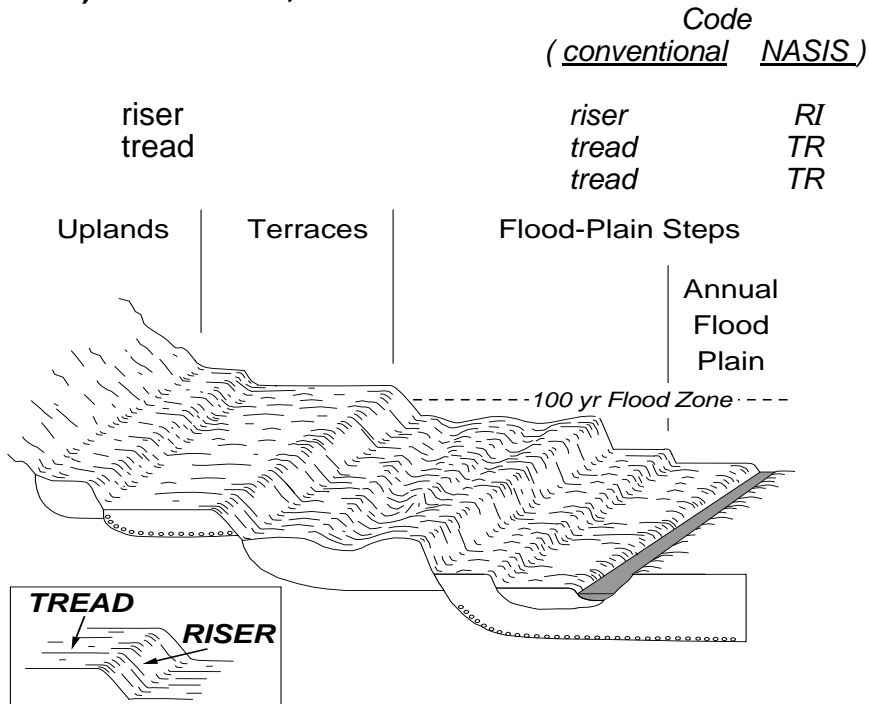


**H) GEOMORPHIC COMPONENT : ( 3 Dimensional )**

	Code
1) HILLS :	( <u>conventional</u> <u>NASIS</u> )
interfluve	<i>interfluve</i> <i>IF</i>
crest	<i>crest</i> <i>CT</i>
head slope	<i>head slope</i> <i>HS</i>
nose slope	<i>nose slope</i> <i>NS</i>
side slope	<i>side slope</i> <i>SS</i>
free face	<i>free face</i> <i>FF</i>
base slope	<i>base slope</i> <i>BS</i>

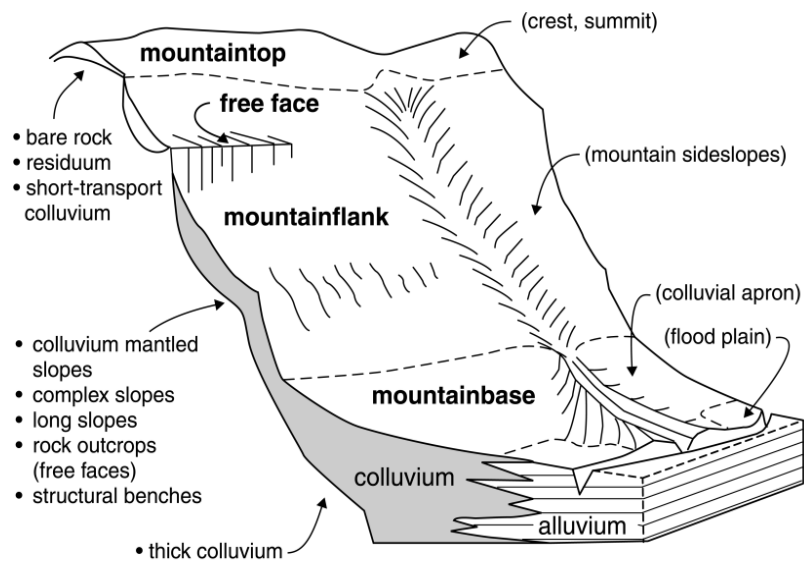


## 2) TERRACES, STEPPED LANDFORMS :



## 3) MOUNTAINS : [ under development - comments welcome ]

	Code	
	( <u>conventional</u> )	( <u>NASIS</u> )
mountaintop	---	<i>MT</i>
mountainflank	---	<i>MF</i>
upper third – mountainflank	---	<i>UT</i>
center third – mountainflank	---	<i>CT</i>
lower third – mountainflank	---	<i>LT</i>
free face	---	<i>FF</i>
mountainbase	---	<i>MB</i>

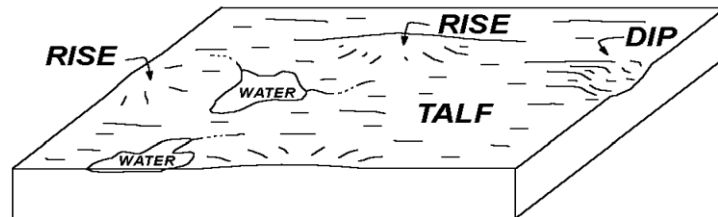


(adapted from Wysocki, et.al., 1999)



#### 4) FLAT PLAINS

	Code	
	( <u>conventional</u> )	<u>NASIS</u> )
dip	---	DP
rise	---	RI
talf	---	TF



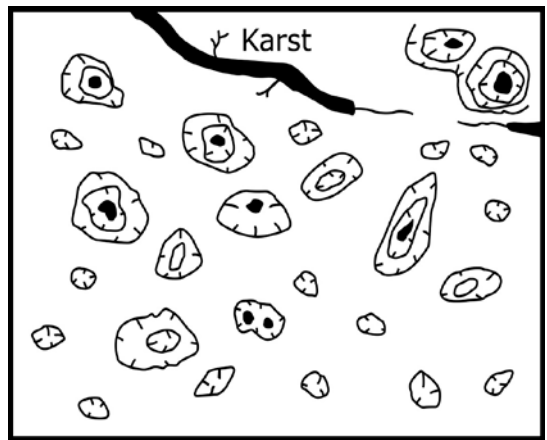
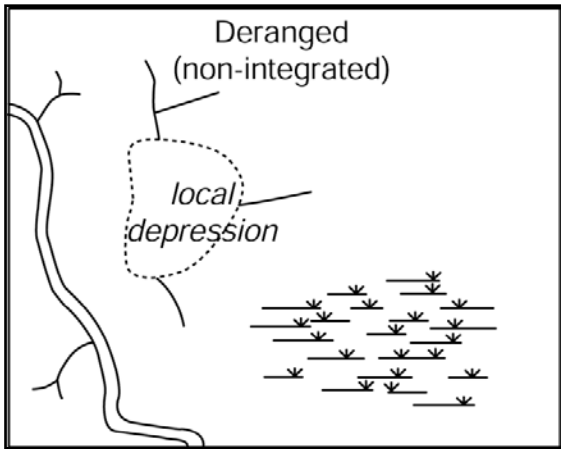
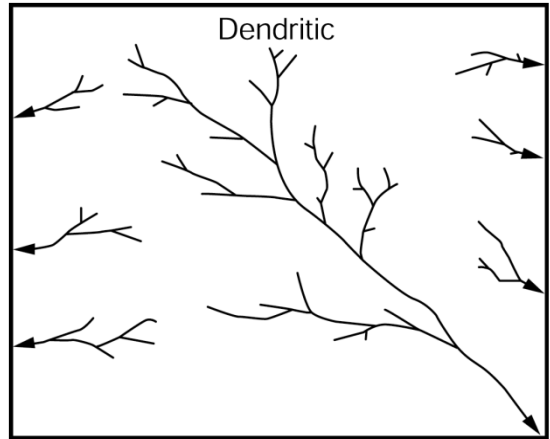
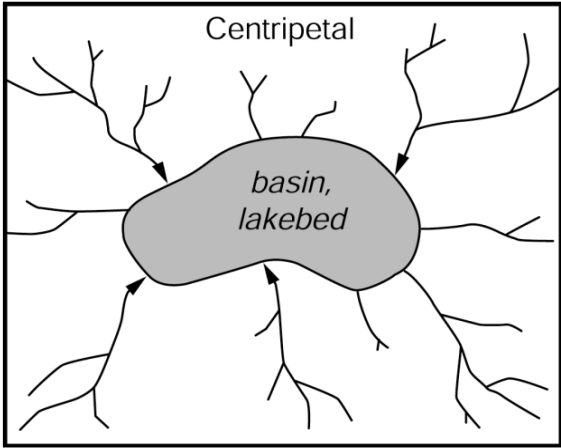
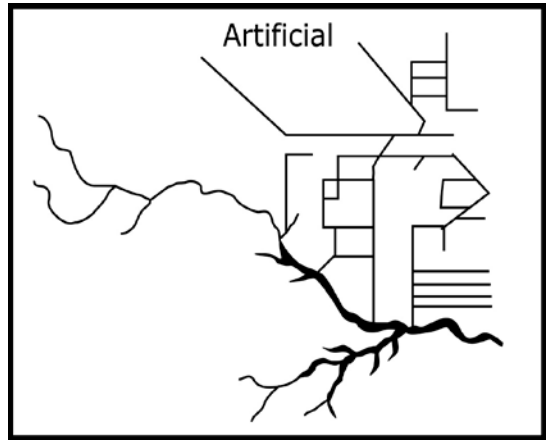
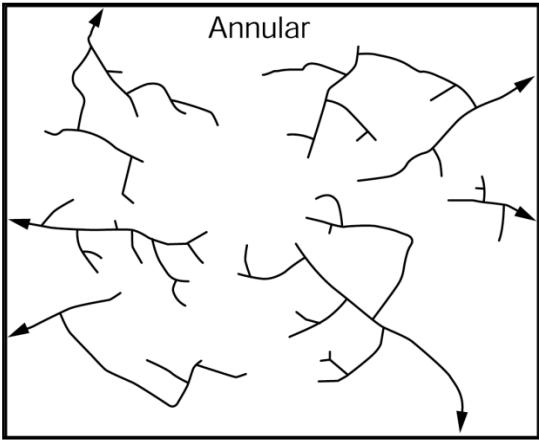
- very low gradients (e.g. slope 0-1%)
- deranged, non-integrated, or incipient drainage network
- "high areas" are broad and low (e.g. slope 1-3%)
- sediments commonly lacustrine, alluvial, or till

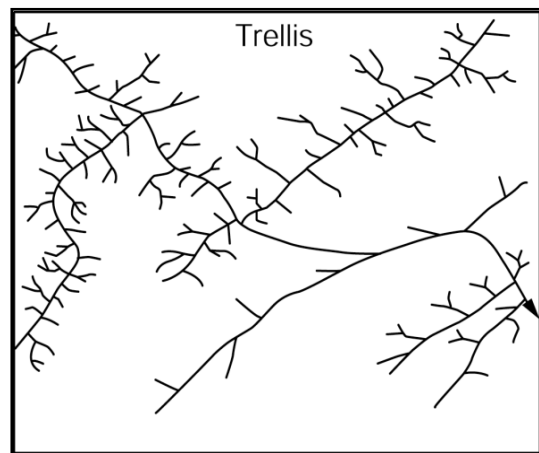
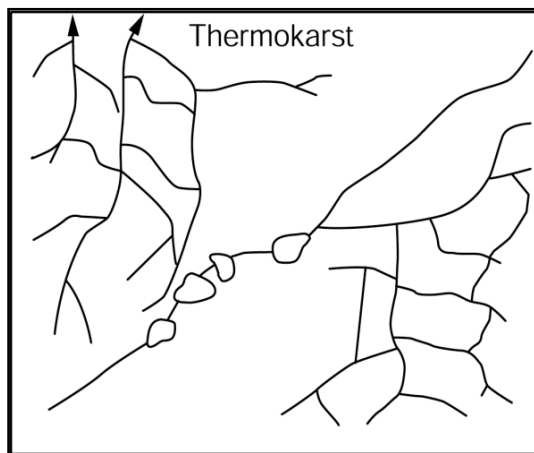
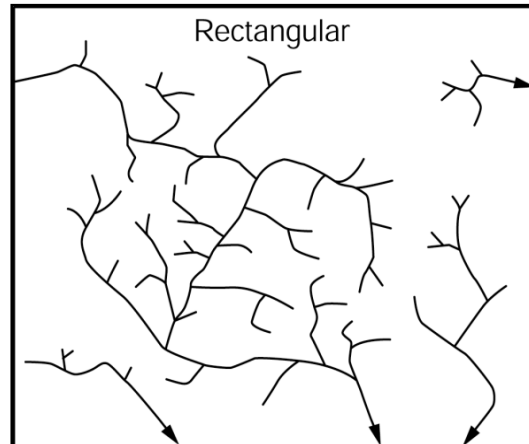
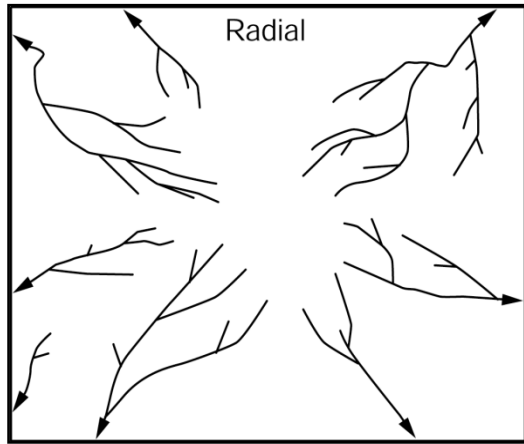
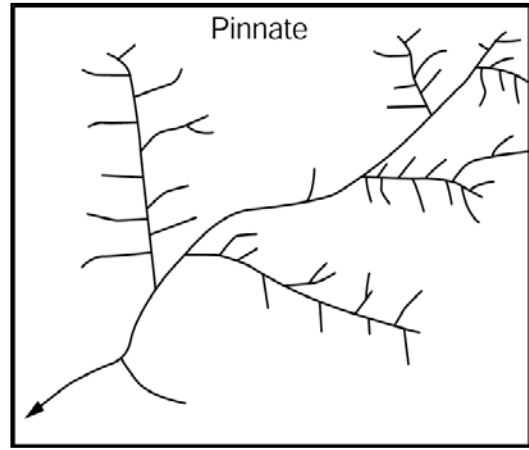
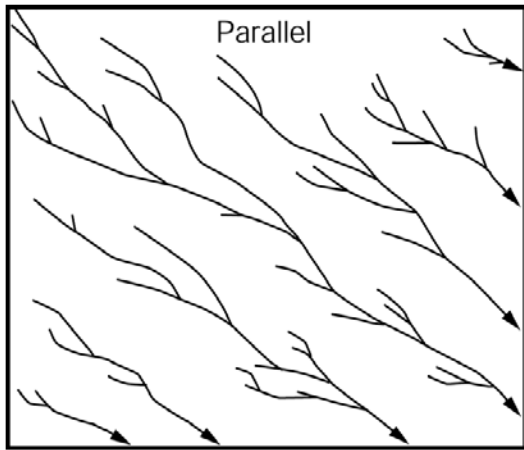
#### I) MICRORELIEF :

	Code	
	( <u>conventional</u> )	<u>NASIS</u> )
microhigh	---	MH
microlow	---	ML
microslope	---	MS

#### J) DRAINAGE PATTERN :

	Code
annular	AN
artificial	AR
centripetal	CE
dendritic	DN
deranged	DR
karst	KA
parallel	PA
pinnate	PI
radial	RA
rectangular	RE
thermokarst	TH
trellis	TR





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## APPENDIX 1: DATA ELEMENT DEFINITIONS

*[The following Data Elements (categories) are arranged by occurrence order in the GDS, not alphabetically.]. Definitions are consistent with the current NASIS data dictionary and NSSH, Part 629.]*

### Physiographic Location

A section within the Geomorphic Description System; it provides a hierarchical scheme for partitioning and identifying related portions of the earth's surface based on geography and physiography. SW

### Physiographic Zone

*[ Reserved for global / continental scale groupings; presently not populated . ]*

### Physiographic Division

A large portion of a continent of which all parts are similar in geologic structure and climate at a small scale (e.g. 1:5,000,000) and which has consequently had a unified geomorphic history, and whose pattern of relief or landforms differ significantly from that of adjacent areas. Examples: the Laurentian Upland, Atlantic Plain, Rocky Mountain System, and Interior Highlands in the U.S.A. *[ The highest level in the Physiographic Location part of the Geomorphic Description System ].* NASIS Data Dictionary

### Physiographic Province

A region of which all parts are similar in geologic structure and climate and which has consequently had a unified geomorphic history; a region whose pattern of relief or landforms differ significantly from that of adjacent region. A subset within a Physiographic Division; Examples: the Valley and Ridge, Blue Ridge, and Piedmont provinces in the eastern U.S.A., and the Basin and Range, Rocky Mountains, and the Great Plains provinces in the western U.S.A. *[ The second highest level in the Physiographic Location part of the Geomorphic Description System ].* SW & GG NSSH 629

### Physiographic Section

An area which all parts are similar in geologic structure and climate at a relatively small scale and which has consequently had a unified geomorphic history, and whose pattern of relief or landforms differ significantly from that of adjacent areas (= Fenneman's (1957) "Section"); i.e. a subset within a Physiographic Province. Examples: the Mohawk, Green Mountain, and Floridian Sections in the eastern U.S.A. and the Sacramento Section, Puget Trough, and Klamath Mountains in the western U.S.A. *[The third highest level in the Physiographic Location part of the Geomorphic Description System].* SW & NASIS Data Dictionary

## State Physiographic Area

An area of relatively local extent and whose parts are similar in geologic structure and climate and which has consequently had a unified geomorphic history, and whose pattern of relief or landforms differ significantly from that of adjacent areas; i.e. a subset within a Physiographic Section). [ *The fourth highest level in the Physiographic Location part of the Geomorphic Description System* ]. SW & NASIS Data Dictionary

## Local Physiographic / Geographic Name

The most localized description of physiographic location; commonly, local feature names found on USGS 7.5 minute topographic quadrangle maps (e.g., Robert's Ridge, Camas Prairie). [ *The fifth highest level in the Physiographic Location part of the Geomorphic Description System* ]. SW NASIS Data Dictionary

## Geomorphic Description

A section within the Geomorphic Description System; it provides a pseudo-hierarchical scheme for identifying natural features on the earth's surface at three relative scales (Landscape, Landform, Microfeature); human created features (Anthropogenic Features) are handled separately. SW

## Landscape

landscape [soils] – A broad or unique land area comprised of an assemblage or collection of natural landforms that define a general geomorphic form or setting (e.g. mountain range, lake plain, lava plateau). Landforms within a landscape are spatially associated but may vary in formation processes and age. SW  
NSSH 629

## Landform

landform - Any physical, recognizable form or feature on the earth's surface, having a characteristic shape, internal composition, and produced by natural causes; a distinct individual produced by a set of processes. Landforms can span a large range in size (e.g., *dune* encompasses a number of features including *parabolic dune*, which is several tens-of-meters long, and *seif dune* which can be up to 100 kilometers long. Landforms provide an empirical description of similar portions of the earth's surface features. SW & GG  
NSSH 629

## Microfeature

[soil survey] - Small, local, natural forms (features) on the land surface that are too small to delineate on a topographic or soils map at commonly used map scales (e.g. 1:24,000 to 1:10,000). Examples include *earth pillar, patterned ground, frost boil*. Compare - microrelief. SW NSSH 629

## Anthropogenic Features

An artificial feature on the land surface (including those in shallow water), having a characteristic shape and range in composition, composed of unconsolidated earthy, organic materials, artificial materials, or rock, that is the direct result of human manipulation or activities; can be either constructional (e.g. *artificial levee*) or destructional (e.g., *quarry*). SW. NSSH 629

## Surface Morphometry

- a) The geometry, orientation and relief of related portions of the earth's surface.
- b) A section within the Geomorphic Description System which provides a scheme for identifying and briefly describing geometry, orientation, position, and relief of portions of the earth's surface. SW

## Elevation [survey]

The height of a point on the earth's surface, relative to mean sea level (msl). Compare – relief. SW NSSH 629

## Slope Aspect

The compass direction (in degrees, and accounting for declination) that a slope faces, looking downslope; e.g.,  $287^\circ$ . Generalized prose or quadrant descriptions (e.g., “south by southwest”) is not preferred and considered obsolete. SW NASIS Data Dictionary

## Slope Gradient

- a) The inclination of the land surface from the horizontal. Percent slope is the vertical distance divided by the horizontal distance, then multiplied by 100; e.g., 18%. SW NSSH 629
- b) The difference in elevation between two points, expressed as a percentage of the distance between those points. SSM



## Slope Complexity

Used to simplistically describe the relative uniformity (smooth, linear or curvilinear = *simple*) or irregularity (*complex*) of the ground surface leading downslope and through the point of interest. SW NASIS Data Dictionary

## Slope Shape [ also called "Land Surface Shape" in SSM (1993) ]

**Slope Shape - Down Slope** [ e.g., "...up and down the slope..." under Land Surface Shape, SSM '93 ]

The geometric, two dimensional profile (shape) of the slope perpendicular to elevation contours. NASIS Data Dictionary

**Slope Shape - Across Slope** [ e.g., "...shape of the contour..." , under Land Surface Shape, SSM '93 ]

The geometric, two dimensional profile (shape) of the slope parallel to elevation contours. NASIS Data Dictionary

## Hillslope-Profile Position

Discrete slope segments found along a transect line that runs perpendicular to the contour, beginning at a divide and descending to a lower, bounding stream channel or valley floor; a discrete piece of a two-dimensional cross-profile of a hill. Positions are commonly separated from one another by inflection points along the line. In descending elevational order, the hillslope- profile positions of a simple hillslope include the *summit*, *shoulder*, *backslope*, *footslope*, and *toeslope*. Not all of these segments (positions) are necessarily present along a particular slope. Complex hillslopes include multiple sequences or partial sequences. Compare – geomorphic components – hills. SW, HP, & RR  
NSSH 629

## Geomorphic Component

A fundamental, three dimensional piece or area of a geomorphic setting (i.e., hills, mountains, terraces, flat plains) that has unique and prevailing kinetic energy dynamics and sediment transport conditions which result in their characteristic form, patterns of sedimentation and soil development. SW  
NSSH 629

### Geomorphic Component - Hills

A group of fundamental, three dimensional pieces or areas of hills. In descending elevational order, the geomorphic components of a simple hill are the *interfluvium* (roughly analogous to the summit); *crest* (a hill top or ridge top of converged shoulders); 3 variations of the hillslope, each distinguished by the surface shape and the nature of overland flow: *head slope* (converging surface or overland flow, especially at the head of a drainageway), *side slope* (parallel surface flow), and *nose slope* (diverging surface flow), *free face* (rock outcrop);

and the *base slope* (colluvium / slope alluvium apron at the bottom of the hill).  
SW NSSH 629

### Geomorphic Component – Terraces, Stepped Landforms

A group of fundamental, three dimensional pieces or areas of terraces, flood-plain steps, and other stepped landforms (e.g. stacked lava flow units). In descending elevational order, the geomorphic components are the *tread* (the level to gently sloping, laterally extensive top of a terrace or flood-plain step, or other stepped landforms); and the *riser* (the comparatively short escarpment forming the more steeply sloping edge that descends to another level or a channel). SW NSSH 629

### Geomorphic Component - Mountains

A group of fundamental, three dimensional pieces or areas of mountains. In descending elevational order, the geomorphic components of a simple mountain are the *mountaintop* (roughly analogous to the crest or summit); *mountainflank* (the long slope along the sides of mountains which can be further subdivided into three portions based on the relative slope location (*upper third-*, *middle third-*, or *lower third moutainflank*); *free face* (rock outcrop); and the *mountainbase* (colluvium / slope alluvium apron at the bottom of the mountain). SW NSSH 629

### Geomorphic Component - Flat Plains

A group of fundamental, three dimensional pieces or areas of flat plains. In descending elevational order, the geomorphic components of a simple, flat plain (e.g. lake plain, low coastal plain, etc.) are the *rise* [a broad, slightly elevated area with comparatively greater gradients (e.g., 1-3% slopes ], the *talf* [a comparatively level (e.g., 0-1% slopes), laterally extensive, non-fluvial area], and *dip* [a slight depression that is not a permanent water body nor part of an integrated drainage network]. Compare - Geomorphic Component - Terraces. SW NSSH 629

### Microrelief

a) [soil survey] Slight variations in the height of a land surface that are too small or intricate to delineate on a topographic or soils map at commonly used scales (e.g. 1:24,000 through 1:10,000). Choices include: *microhigh*, *microlow*. Compare - microfeature. SW NSSH 629

b) (not preferred; refer to *Microfeature*) Generically refers to local, slight irregularities in form and height of a land surface that are superimposed upon a larger landform, including such features as low mounds, swales, and shallow pits. GG NSSH 629

- (obsolete) Refers to differences in ground-surface height, measured over [lateral] distances of meters. Naturally formed features contrast with those that are tillage determined. SSM '93, p 76

## Drainage Pattern

The configuration or arrangement, in plan view, of the stream courses in an area, including gullies or first-order areas of channelized flow, tributaries, and main streams. It is related to the local geologic materials, geomorphologic features and geomorphic history of the area; major drainage pattern types include dendritic, trellis, artificial, etc., also called drainage network. SW, GG, WA

**\* CAUTION:** The data elements (categories) in this system are not always 1:1 substitutions or conversions for those of previous NRCS systems (e.g. PDP: Pedon Description Program); "replaces" does NOT necessarily mean "equivalent to", nor does it mean that all the entries within a data element are the same as in earlier versions of PDP. Conversions between databases should be done only after an item-by-item comparison.

**APPENDIX 2: Glossary of Landform and Geologic Terms; National Soils Handbook - Part 629, National Soil Survey Center, Lincoln, NE**

[ See the current contents of National Soil Survey Handbook, Part 629 “Glossary of Landforms and Geologic Terms” ( Soil Survey Staff, 2013); available at <http://ww.nssc.nrcs.usda.gov> ; look under “Standards for Soil Survey”.]

### APPENDIX 3: Excluded terms (formerly used but obsolete or redundant )

#### Excluded Glossary Terms: Landscape

karstland – NP (use *karst*)  
peneplain - NR

#### Excluded Glossary Terms:

##### Landform

active slope - NR  
(reactivated; FY2000)  
alluvial plain - NR (use *flood plain*; ok as a Landscape term)  
alluvial terrace - NP (refer to *stream terrace*)  
alpine - NR  
avalanche track - NR (use *avalanche chute*)  
backshore terrace - NP (refer to *berm*)  
bald – NP (use summit, mountaintop, etc.).  
barrier bar - NR (use *longshore bar*)  
beaded drainage pattern - NR (use *beaded stream pattern*)  
bench - NP (refer to *structural bench*)  
bottomland - NR (use *flood plain*)  
braided channel - NR (use *braided stream*)  
boulder field - NR (use *block stream*)  
coalescent fan - NR (use *coalesced alluvial fan*, or *bajada*)  
coalescent fan piedmont - NP (use *fan piedmont*)  
coppice-mound - NR (use *shrub-coppice dune*)  
crest - NR (ok as Geom. Component - Hills)  
crevasse splay - NR (use *flood-plain splay*)  
dead -ice moraine - NR (use *disintegration moraine*)  
doline - NP (use *sink hole*)  
dry wash - NP (refer to *wash*)  
elevated lake plain - NP (refer to *collapsed lake plain*)  
erosional outlier - NP (refer to *erosional remnant*)  
fan terrace - NP (refer to *fan remnant*)  
floodwall - NR (use *levee*)  
fluve - NP (refer to *drainageway*)  
hillside - NR (use *hillslope*)  
hill top - NR (use *summit*)  
interstream divide - NP (refer to *interfluve*)  
meta-stable slope - NR  
mountainside - NR (use *mountain slope*)  
offshore bar - NR (use *barrier beach, longshore bar*)  
remnant - NP (refer to *erosion remnant*)  
rise - NP- (ok as a Micro,, Geom. Component - Flat Plains)  
rotational slump - NR (use *rotational landslide*)  
sand ridge - NP (refer to *longshore bar or barrier beach*)  
sand volcano – NP (refer to *sand boil*)  
scroll - NP (refer to *meander scroll*)  
sidewall – NP (use glacial valley wall)  
slump – NR (use *landslide or rotational landslide*)  
splay - NP (refer to flood-plain splay)  
spur ridge - NR (use *spur*)  
stream channel - NP (refer to *channel*)  
structural back slope -NR (use *dip slope*)  
terrace slope - NR (use *riser*)  
trough end - NR (refer to *cove or cirque*)  
trough valley - NR (refer to *U-shaped valley*)  
trough bottom – NP (refer to *glacial-valley floor*)  
trough wall - NP (refer to *glacial-valley wall*)  
valley wall - NR (see *valley side*)

wave-cut terrace - NR (use *wave-*

*built terrace*)

**Excluded Glossary Terms: Microfeature**

catsteps - NP (refer to *terraces*)  
frost polygons - NR (use *patterned ground*)  
nets (nonsorted) - NP (refer to *patterned ground*)  
nets (sorted) - NP (refer to *patterned ground*)  
nonsorted polygons - NP (refer to *patterned ground*)

sheep tracks - NR (use *terraces*)  
soil ripples - NR (use *terraces*)  
sorted polygon - NP (refer to *patterned ground*)  
stone nets - NP (refer to *patterned ground*)  
swell - NR (ok as a Microfeature)

**Excluded Glossary Terms: Anthropogenic**

earth dike [use *levee (stream)*]

**Excluded Glossary Terms: Process / Morphology**

mass wasting – NP (use *mass movement*)  
slump (process), slumping – NR (see *rotational landslide, landslide*)

**APPENDIX 4: Maps ( examples of Physiographic Location )**

**General Outline of PART I ) PHYSIOGRAPHIC LOCATION**

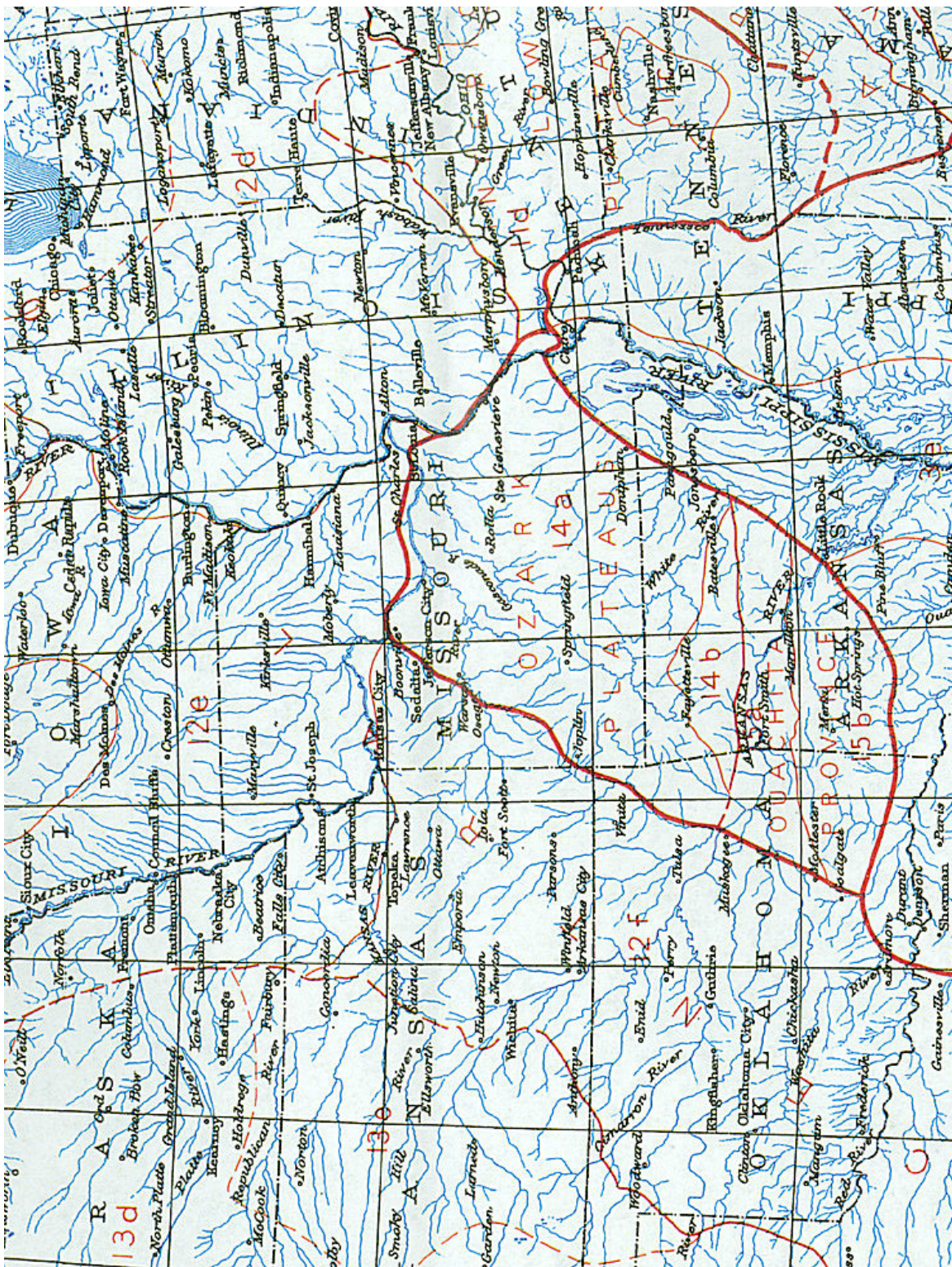
- A) PHYSIOGRAPHIC DIVISION**  
( Choices are expanded from Fenneman 1931, 1938)
  - B) PHYSIOGRAPHIC PROVINCE**  
( Choices are expanded from Fenneman, 1931, 1938)
  - C) PHYSIOGRAPHIC SECTION**  
(Choices are expanded from Fenneman 1931, 1938 )
- } Shown on 1 map  
( broken into third's )

[ Note: The three highest levels are primarily contained in Fenneman's 1946 map (reprinted 1957) and provided (in part or in total) here. Areas outside the conterminous US (Alaska, Pacific, Caribbean) are derived from Wahrhaftig, 1964 or are self evident from the Physiographic Location outline). ]

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**D. STATE PHYSIOGRAPHIC AREA (OPTIONAL)**

**E. LOCAL PHYSIOGRAPHIC / GEOGRAPHIC NAME (OPTIONAL)**

Map 1: Physiographic Areas of the Coterminous US [ Inset from Fenneman, 1946 (reprinted 1957) map ]





Map 2: State Physiographic Areas of ... [ choose a State; e.g. Ohio ].

STATE OF OHIO  
George V. Voinovich, Governor

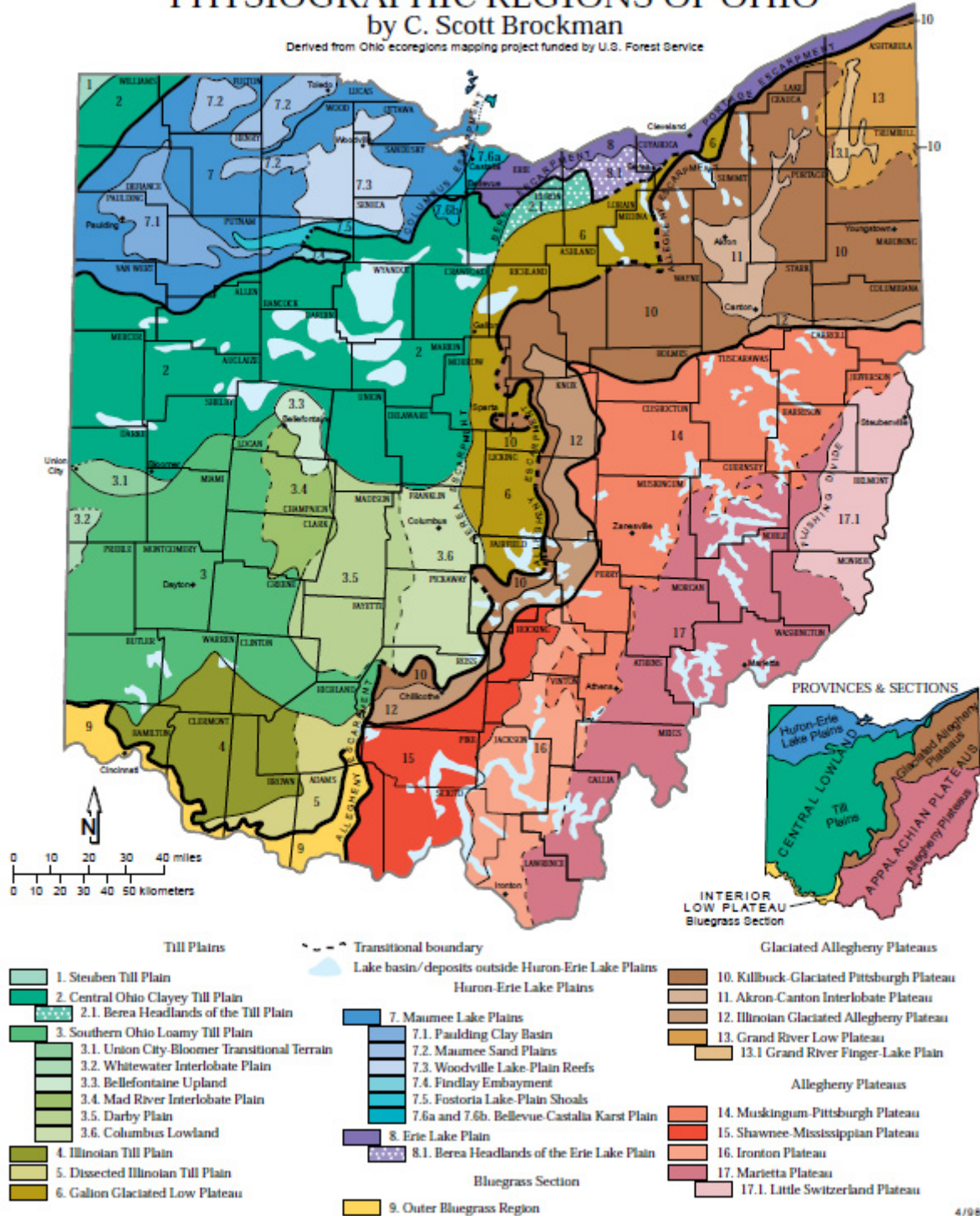
DEPARTMENT OF NATURAL RESOURCES  
Donald C. Anderson, Director

DIVISION OF GEOLOGICAL SURVEY  
Thomas M. Berg, Chief

## PHYSIOGRAPHIC REGIONS OF OHIO

by C. Scott Brockman

Derived from Ohio ecoregions mapping project funded by U.S. Forest Service



**Map 3: Local Physiographic / Geographic Areas of**

[ *choose a representative area; e.g.: A portion of a standard, USGS 7.5 minute topographic quadrangle map; or, Raisz, 1941* ]