**State Soils and Horizons Practice Sheet**

**Soil Horizons**

Introduction:

Go to <http://www.statesymbolsusa.org/states/united-states/washington> to see all the state symbols of Washington State.

**What is a State Soil?**

A state soil is a soil that has special significance to a particular state. Each state in the United States has selected a state soil, twenty of which have been legislatively established. These “Official State Soils” share the same level of distinction as official state flowers and birds. Also, representative soils have been selected for Puerto Rico and the Virgin Islands.

Areas with similar soils are grouped and labeled as soil series because their similar origins, chemical, and physical properties cause the soils to perform similarly for land use purposes. A soil series name generally is derived from a town or landmark in or near the area where the soil was first recognized.

Each series consists of soils having major horizons that are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the soil profile. A soil profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface downward to unconsolidated material. Most soils have three major horizons, called the surface horizon, the subsoil, and the substratum.

The surface layer has the maximum accumulation of organic matter and is the horizon of maximum leaching of clay minerals and of iron and aluminum oxides. Some soils have a subsurface layer below the surface layer.

The subsoil, which underlies the surface layer or subsurface layer, is the horizon of maximum accumulation of clay minerals, iron and aluminum oxides and other compounds. These compounds may have been leached from the surface layer and redeposited in the subsoil, or may have formed in place. Most likely, they occur as a result of a combination of both of these processes. The subsoil commonly has blocky or prismatic structure and generally is firmer and lighter in color than the surface layer.

The substratum is below the surface layer and subsoil. It consists of material that has been somewhat modified by weathering but is relatively unchanged by soil-forming processes.

http://soils.usda.gov/gallery/state\_soils/#list

Use the soil profiles on the next page to answer the following questions. Please highlight your answers and print off at home so you can turn it in.

Washington State Soil

1. How many horizons does the Tokul soil have?
2. Use the lines to the left of the soil profile to measure each horizon. Units are in feet.
3. What is the predominant soil type?
4. Tokul soil is one of the most productive soils in the world. It produces huge volumes of timber. Why is the Tokul soil so productive?
5. Why is this type of soil not great for building on?
6. Why do you think the soil is gray?

Kansas State Soil

1. How many horizons does the Harney soil have?
2. Use the lines to the left of the soil profile to measure each horizon. Units are in feet.
3. What is the predominant soil type?
4. Harney soil is responsible for much of the crops grown in the Midwest. Why is this soil so good for agriculture?
5. Why do you think the soil is predominantly brown?

Texas State Soil

1. How many horizons does the Black Houston soil have?
2. Use the lines to the left of the soil profile to measure each horizon. Units are in feet.
3. What is the predominant soil type?
4. Explain why the soil shrinks and swells (make sure you include soil type in your answer).
5. Why is this type of soil not great for building on?
6. Research: What document would developers need in order to determine whether a piece of property is buildable?

Soil Type Graph

Answer the soil type questions on the last sheet of this worksheet.

http://soils.usda.gov/gallery/state\_soils/#list



The name Tokul is derived from a small community and

creek in King County, Washington. The State of Washington has

more than 1,000,000 acres of Tokul soils. These soils are on the

western side of the Cascade Mountains along the Puget Trough,

from south of Seattle north to the Canadian border. Washington

was the first state to recognize soils that formed in volcanic ash

(Andisols) as a state soil.

Tokul soils are among the most productive soils in the world.

These soils support Douglas-fir and other conifer trees, which

are the source of Washington’s nickname,the Evergreen State.

The State of Washington has hundreds of soils that are

influenced by volcanic ash. These volcanic soils are used for

crop production, timber production, livestock grazing, recreation,

and watershed. Most areas of Tokul soils are used for timber

production, but some of the smaller areas are used as pasture

and for urban development. Tokul soils are limited as sites for

homes. Water perches above the dense glacial till during wet

periods, making steep slopes unstable.

Tokul Soil Profile

Surface layer: organic material

Subsurface layer: very dark grayish brown gravelly loam

Subsoil - upper: dark brown gravelly loam

Subsoil - lower: light yellowish brown gravelly loam

Substratum: light brownish gray and dark gray gravelly sandy loam

(very hard, dense glacial till cemented by a combination of iron,

aluminum, and organic matter)



The Harney series was adopted as the Official State Soil of

Kansas on April 12, 1990, when Governor Mike Hyden signed

Senate Bill 96. The name “Harney” (meaning people) is derived

from “harahey,” an ancient Wichita Indian term for “Pawnee

Indian,” stemming from when Coronado journeyed across

Kansas.

Harney soils have the ideal qualities of prairie soils. They are

recognized as prime farmland and have excellent properties for

producing food and fiber crops. These soils occur on about

4 million acres in west-central Kansas. Kansas is one of the top

producers of wheat, grain sorghum, and silage in the nation

because of Harney and other productive soils.

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**Harney Soil Profile**

Surface layer: dark grayish brown silt loam

Subsurface layer: dark grayish brown silty clay loam

Subsoil - upper: grayish brown silty clay loam

Subsoil - middle: light brownish gray, calcarous silty clay loam

Subsoil - lower: light gray, calcarous silt loam



The Houston Black series occurs on about 1.5 million acres in the Blackland Prairie, which extends from north of Dallas south to San Antonio. Because of their highly expansive clays, Houston Black soils are recognized throughout the world as the classic Vertisols, which shrink and swell markedly with changes in moisture content. These soils formed under prairie vegetation and

in calcareous clays and marls. Water enters the soils rapidly when they are dry and cracked and very slowly when they are moist. Houston Black soils are used extensively for grain sorghum,cotton, corn, small grain, and forage grasses. They also occur in several metropolitan areas, where their very high shrink-swell potential commonly is a limitation affecting building site development. The Professional Soil Scientists Association of Texas has recommended to the State Legislature that the Houston Black series be designated the State soil. The series was established in 1902.

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**Houston Black Soil Profile**

Surface layer: black clay

Subsoil - upper: black clay with slickenside (A polished, striated rock surface caused by one rock mass sliding over another in a fault plane.

Subsoil - lower: black clay with slickenside and calcium carbonate

Substratum: light olive brown clay

**Soil Type**

When soil is a mixture of different types, this handy tool can help you determine the name of the soil. As long as you know the percentage of each kind of soil, you can figure out the name of the soil. See if you can figure out how to use the soil type tool below. Follow the direction of arrows on the side of the triangle for the different percentages of soils given in the table. The first one is done for you.

|  |  |  |  |
| --- | --- | --- | --- |
| % Clay | % Silt | % Sand | Soil Type |
| 50 | 40 | 10 | Silty clay |
| 30 | 10 | 60 |  |
| 40 | 30 | 30 |  |
|  |  |  | Loam |
|  |  |  | Loamy sand |
|  |  |  | Sandy clay loam |

