Name: _____

Lab 12: Mass Wasting

Part I. An Earthflow

Use the Lake San Cristobal Quadrangle for the following:

1. What is the elevation of Lake San Cristobal? Is the edge of the lake, where the water touches land, a contour line? Explain your answer briefly, in light of the definition of a contour line.

2. What is the elevation of the next contour line above the lake (a large contour line)? Using contours and elevations, which way is the Lake Fork of the Gunnison River flowing?

3. On the map, the Slumgullion earthflow is labeled "Slide" but it did not move as a coherent block. We first need to identify the extent of this earthflow. It occupies part of the valley of Slumgullion Creek; the creek used to flow down the middle of the valley before being displaced by the earthflow. Study the map spacing of the contours on the "Slumgullion Slide" and the map spacing of the contours on the hillsides to the north and south of the earthflow.

    a. Is the Slumgullion Slide steeper, shallower or about the same slope as its confining valley walls?

    b. Study the shape of the contours on the Slumgullion Slide. Sketch a few representative contours in the space below.

    c. Based on this, describe the surface of the earthflow.

    d. Sketch the **boundary** of the Slumgullion Slide on the attached photocopy. Pay particular attention to the edge of the earthflow within the Gunnison River valley. Also note that the photocopy shows the full extent of the flow, unlike the single quadrangle map. Label the scarp.

4. There is a lobe or bulge of the Slumgullion Slide pointing north along the Gunnison River valley. Why did the earthflow turn mostly to the north when it reached the valley floor of the Gunnison River?

5. How did Lake San Cristobal form?

6. How will Lake San Cristobal most likely cease to exist? What evidence suggests this process is already under way?

Part II. A Landslide

Use the Bonneville Dam Quadrangle for the following:

The Bonneville landslide took place about 500 years ago. Part of the steep slope along the north side of the Columbia River gorge gave way and slid down into the river, at least partially blocking its discharge. This landslide may have blocked the river entirely for a short period of time. Native American stories from this area include many references to the "Bridge of the Gods" that temporarily spanned the Columbia.

7. Locate the toe or frontal lobe of the Bonneville landslide.

    a. What is the approximate width of the Columbia River upstream from the landslide, in miles?

    b. What is the approximate width of the Columbia River at the landslide toe, in miles? What does this suggest about the effect of the slide on the river?

8. Find the scarp at the head of this landslide. List two place names at or along the scarp.

9. The lateral extent of the landslide is recognizable by its topography: It displays certain topographic features that the surrounding area does not. What are these features? As with the Slumgullion, what does this indicate about the surface?

10. Is the town of Stevenson built on the Bonneville landslide? Is the town of North Bonneville?

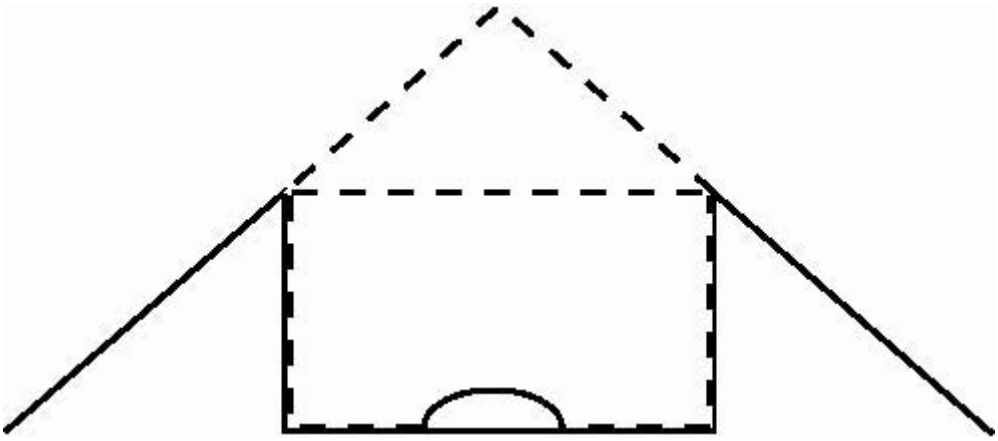
11. Why was this area chosen as the site of Bonneville Dam?

Part III. A Slump

Use the Mount St. Helens Quadrangle and the salt-and-pepper-shaker set (yes, really) for the following:

Mt. St. Helens before the 1980 landslides and eruptions was a nearly perfect cone; it was known as the "Mt. Fuji of Washington" in reference to the very symmetrical stratovolcano in Japan. On 18 May 1980 at 8:32 AM, a 5.1 earthquake accompanied (triggered?) the movement of three large slump blocks, forming the largest debris avalanche/landslide ever recorded. You will answer the following question: How much material was removed?

12. Below is a highly schematic cross-section through Mt. St. Helens from east to west. The missing volume is shown with a dashed outline, which may be approximated as a cylinder capped by a cone. Answer the questions below *by recording all elevations or distances on the figure*:



a. What is the approximate elevation of the present day crater rim?

b. What is the approximate elevation of the present day crater floor?

c. What is the difference in elevation between the crater rim and floor? Record this in feet and miles.

d. Mt. St. Helens was originally 9700 feet tall; show this elevation on the cross section.

e. What is the difference in elevation between the crater rim and former summit, in feet and miles?

f. What is the diameter of the crater, from rim to rim, in miles?

13. Calculate the missing volume in cubic miles. The volume of a cylinder is $V = \pi r^2 h$ and that of a cone is

$$V = \frac{\pi r^2 h}{3}$$

where *r* is the radius of the base and *h* is the height.

For a sense of scale, this volume is roughly the amount required to fill every building in Seattle with mud.