

Watershed Sketch Problem

Project 4-B

Learning outcomes

- Improve abilities in outlining watersheds (drainage areas) on contour maps
- Improve skills in measuring areas with a planimeter
- Practice skills in calculating and applying area conversion factors

Part 1 – Watershed delineation

A. Map scale and contour interval

1. The accompanying map is part of the Maxwell, Iowa, USGS topographic quadrangle map (1975)
2. The scale of the map is 1:24,000 (this is a representative fraction (RF), not feet per inch)
3. What is the scale of the map in feet per inch? 1 inch = _____ feet
4. What is the scale of the map in inches per mile? 1 mile = _____ inches
5. What is the contour interval? _____ feet
6. What is the index contour interval? _____ feet

B. Identify water features

1. In blue, trace over the streams on the map
2. In blue, trace over the outline of each lake and depression on the map

C. Identify summits

1. Place an orange dot on each summit on the map
2. Each orange dot should be within a closed contour

D. Identify ridges

1. In green, draw the major ridge lines on the map
2. A major ridge line runs north-south between West Indian Creek and East Indian Creek

E. Outline watersheds

1. Outline in red the watershed (drainage area) for each drainage outlet (1 through 10)
2. Each red line should begin at the drainage outlet and end at the drainage outlet
3. Your watershed outlines must follow ridge lines
4. Your watershed outlines will often go through summits
5. Your watershed outlines must not cross streams, valleys, or swales!
6. Your watershed outlines may cross saddles in ridges
7. Two drainage outlets must not share the same watershed (even only part)!
8. Two drainage outlets may share the same watershed outline (only part, however)

Part 2 – Measuring areas

F. Measure watershed areas

1. Using a planimeter, measure the area of each watershed in square inches
2. Go around each watershed boundary (clockwise) three times and compute the average
3. Write your area measurements on the accompanying Table 1

G. Compute the area conversion factor

1. From question A.3 above, what is the scale of the map in feet per inch? 1 inch = _____ feet
2. How many square feet are in one square inch? _____ square feet
3. How many square feet are in one acre? _____ square feet
4. How many acres are in one square inch? _____ acres ← this is the area conversion factor
5. There are 2.471 acres (ac.) in one hectare (ha.).
6. How many hectares are in one acre? _____ hectares ← this is the area conversion factor

H. Compute the area in acres

1. Using a calculator, convert the area in square inches to the area in acres for each watershed
2. Convert the area in acres to the area in hectares for each watershed

Grading criteria – 5% of Project 4

- 20% Worksheet answers (fill-in blanks)
- 30% Worksheet table 1 (area of watersheds)
- 50% Map delineation (water features, summits, ridges, watersheds)

Due – Monday, March 1, beginning of studio

Table 1. Area of watersheds

Drainage Outlet	Triple area (sq. in)	Average area (sq. in)	Watershed area (ac.)	Watershed area (ha.)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Total area				