

## Mystery Landsat Images

### Part 1: Making Predictions

Look at the three Landsat Mystery Image pairs carefully. Predict what type of area you think each image represents.

*Predicted answers from students will vary based on their prior knowledge. Actual image area is listed below.*

Mystery Image 1: Agricultural area

Mystery Image 2: Coastal area

Mystery Image 3: Forested area

### Part 2: Identifying features in natural-color images

A **natural-color composite image** consist of blue, green, and red visible light portrayed in a natural manner. The appearance of the image often resembles a color photograph. Active vegetation appears green, bare soil and fallow (not cultivated) fields are brown, urban structures are white, and clean water is often blue.

Look at the **natural-color image** of **Mystery Image 1**.

1. What types of prominent land cover features can you identify? Support each claim with evidence.

**Hint:** Remember to think about tone, size, texture, pattern, site, or association in the image.

*Green areas are most likely grassy areas. The tan areas are likely to be fallow or uncultivated fields. The image contains circular green areas surrounded by tan-colored areas. The image site resembles patterns of center pivot irrigation fields. The green area is likely to be the growth of new crops.*

2. What do you think is the dominant land cover type in this image?

*Fields appear to be the dominant land cover type.*

Look at the **natural-color image** of **Mystery Image 2**.

3. What types of prominent land cover features can you identify? Support each claim with evidence.

**Hint:** Remember to think about tone, size, texture, pattern, site, or association in the image.

*The blue color is indicative of a water body. Note the thin white line that separates the dark blue from other colored features in the image. This white line is a typical pattern of sand on a coastline. Therefore, by association, the dark blue color is most likely an ocean. The lighter blue color is likely inland bay areas. The texture of the dark green/black color is similar to that of a tree-covered or forested area. The pattern on the upper-left corner of the image is similar to that of an airport runway. The shape of the tan areas is similar to a field pattern.*

4. What do you think is the dominant land cover type in this image?

*Forested areas (dark green/black color) or inland bay areas (light blue color) appear to be the dominant land cover types.*

Look at the **natural-color image** of **Mystery Image 3**.

5. What types of prominent land cover features can you identify Support each claim with evidence.

**Hint:** remember to think about tone, size, texture, pattern, site, or association in the image.

*The texture of the green color is rough. This is a forested area. The white lines are smooth and are most likely roads. The white and grey area at the bottom center of the image has a shape similar to a series of buildings (white color) with an adjacent parking lot (grey color).*

6. What do you think is the dominant land cover type in this image?

*Forested areas (green color) appear to be the dominant land cover type.*

### **Part 3: Using false-color images to identify features**

A **false-color composite image** consist of green, red, and near-infrared light portrayed in a false-color manner. Active vegetation appears red-pink, bare soil and fallow (not cultivated) fields are green, and urban structures are bluish-white. Clean water bodies appear black.

Residential areas, however, may have a speckled appearance of light blue/white and red. The light blue/white indicates buildings and pavement, and the red indicates the grass and trees that may line the streets and surround places where people live.

#### **Helpful hints to identify features in false-color images:**

- Red represents actively growing green vegetation. A large red area could be a forest.
- Black represents water. Black areas may be oceans, lakes, ponds, or rivers.
- Green usually represents fields in agricultural areas.
- Blue-white represents urban areas.

Look at the **false-color image** of **Mystery Image 1**.

7. What is the most dominant color in this image? What do you think this represents?

*Turquoise (greenish-blue) is the most dominant color in this image. It represents uncultivated fields.*

8. What other colors do you see in this image? What do you think they represent?

*Red represents cultivated fields.*

Look at the **false-color image** of **Mystery Image 2**.

9. What is the most dominant color in this image? What do you think this represents?

*There are two dominant colors in this image. Black represents the ocean. Dark red represents forests.*

10. What other colors do you see in this image? What do you think they represent?

*The lighter red color represents grass or crop areas. Light greenish-blue represents uncultivated field areas.*

Look at the **false-color image** of **Mystery Image 3**.

11. What is the most dominant color in this image? What do you think this represents?

*Red represents a forested area.*

12. What other colors do you see in this image? What do you think they represent?

*The turquoise (greenish-blue) likely represents buildings and parking lots. The white lines are roads.*

## Part 4: Analysis and Conclusions

13. Based on the evidence you have observed from your examination of both natural-color and false-color images, what type of area you think each image represents?

Mystery Image 1: Agricultural area

Mystery Image 2: Coastal area

Mystery Image 3: Forested area

14. How many different land cover types were you able to distinguish in the satellite images? Describe each one.

*Answers will vary. Students may list farmland field areas; vegetative areas such as forests or grass-field areas; coastal areas that include inland bay areas, and sand; and buildings, parking lots, and roads.*

15. Which land cover types are easiest to identify in the **true-color** images?

*Answers will vary. Grass field areas, uncultivated fields, and forested areas.*

16. Which land cover types are easiest to identify in the **false-color** image?

*Answers will vary. Forested areas are very prominent in the mystery image 3 as a very large red color feature. Water is prominent in mystery image 2. Roads in forested areas in false-color images are easy to identify.*

17. What land cover features on the ground do you think are difficult to identify on a satellite image?

*Answers will vary. Houses in residential neighborhoods with trees are difficult to identify.*

18. What other conditions at the time an image was taken might influence your land cover interpretation?

*The time of year the photo was taken might influence the land cover interpretation. An area that is snow-covered will be interpreted differently than if the area was not snow-covered.*

19. What is the dominant land cover type in your school's area?

*Answers will vary depending on the school's location. Urban schools will have many more roads and buildings surrounding the school. Rural areas may have more fields surrounding the school. Suburban schools may have residential neighborhoods surrounding the school with tree-covered yards.*

20. What would this school's area look like in a Landsat **true-color** image? Be specific.

*Answers will vary depending on the school's location. Urban schools will have many more roads and buildings surrounding the school. These may appear white. Rural areas may have more fields surrounding the school. These may be brown or green. Suburban schools may have residential neighborhoods surrounding the school with tree-covered yards.*

21. What would this school's area look like in a Landsat **false-color** image? Be specific.

*Answers will vary depending on the school's location. Urban schools will have many more roads and buildings surrounding the school. These may appear white and light blue. Rural areas may have more fields surrounding the school. These may be green or red, depending if the field is uncultivated or not. Suburban schools may have residential neighborhoods surrounding the school with tree-covered yards. These may have a lighter red appearance.*