INTRODUCTION

This worksheet walks through Case One and Case Two of the *CSI Wildlife* Click & Learn, except for the Frequency Primer section at the end of Case One. A separate document, entitled "Frequency Primer," may be used for that section.

In this Click & Learn, you will analyze genetic evidence to solve two cases of elephant poaching based on real events.

PROCEDURE

As you go through the Click & Learn, follow the instructions below and answer the questions in the space provided.

CSI Wildlife Introduction

Read the introduction and watch the opening video.

1. What is a keystone species?

2. Dr. Wasser states that approximately 50,000 African elephants are killed each year. According to the video, it is estimated that there are around 470,000 African elephants. If these numbers are correct, approximately what percentage of African elephants are killed each year? Show your work.

3. In one or two sentences, summarize Dr. Wasser's research and how it is being used to conserve elephants.

Case One

Watch the video and read the introduction on the first slide ("**The Crime Scene**").

4. Explain the goal of the case.

5. Look at the map on the screen. List the region or countries the majority of African elephants inhabit.

Go to the next slide ("**How DNA Profiling Works**") and read through the **Background** section.

6. Look at the gel on the screen. What do the bands on the gel represent?

7. DNA profiling is also called DNA fingerprinting. A common misconception about DNA fingerprinting is that the analysis has to do with actual fingerprints. Explain one similarity and one difference between a human being's pattern of bands on an electrophoresis gel and a human fingerprint.

Read through the **Technique** section.

8. A scientist makes primers specific to a particular STR fragment. These primers are then used to amplify the STR fragment from 10 different elephants. Would you expect the fragments to be the same size in all the elephants? Explain your answer.

9. What is the relationship between the size of a DNA fragment and the distance it migrates in the gel?

Run the gel on the screen by pressing the **Start** button.

10. Which elephant (left or right) has both the largest and smallest fragments?

11. Approximately what sizes (in bp) are the largest and smallest fragments?

Read through the **Application** section.

12. Look at the gel on the screen. For Marker C, are the two elephants shown homozygous or heterozygous? How do you know?

13. Why do you think scientists use multiple markers to identify individual elephants?

Answer the questions in the **Review** section.

14. Show how you calculated the number of base pairs in the 10-repeat unit.

Go to the next slide ("**Finding a Match**") and answer the question, then watch the video on the "**Case Solved**" slide.

15. Name two properties of a good marker and explain why good markers are important.

Case Two

Watch the video and read the introduction on the first slide ("**The Crime Scene**").

16. In Case One, you were looking for a match with an individual elephant. How does Case Two differ from Case One?

Go to the next slide ("**Building a Reference Map**"). Read through the Background, Technique, and Applications sections.

17. For the gel in the **Applications** section, why does the lane for the ivory sample contain only two bands while the other lanes (A and B) have multiple bands?

18. If an ivory sample has two alleles that are also found in a population sample, does that tell you with certainty that the ivory sample came from that population? Explain your answer.

Answer the questions in the **Review** section.

19. If the scientist had collected 20 dung samples, would you expect more bands, fewer bands, or the same number of bands on the gel? Explain your answer.

Go to the next slide ("**Finding a Location**"). Answer the questions until you reach the **Eliminating North, East, or South** section.

20. The three populations that were chosen for further analysis are geographically distant from one another. Why does this approach make more sense than choosing three populations that are geographically close to one another?

21. In the "Eliminating North, East, or South" section, which population did you eliminate, and which marker(s) helped you make this choice?

22. In the next section, which population did you eliminate, and which marker(s) helped you make this choice?

Read through the last slide of Case Two ("**Case Solved**").

23. By analyzing many more markers and all the populations, Dr. Wasser linked these seized ivory tusks to which country?

Ivory Trade

Watch the video and read through the final slide ("**Stopping Illegal Poaching**").

24. Name two reasons elephant populations are threatened.

25. The introduction to the Click & Learn mentioned that elephants are a keystone species. Based on your knowledge of this term, explain in your own words why it is important to the ecosystems of Africa to save the elephant populations.