Understanding Fire-Ant Distribution

Designing Sampling Schemes

EVS 430 Advanced Quantitative Methods

When my first daughter, Ananda, was learning to walk, we lived in New Orleans. There are a few public parks but many miles of levees, some of whcih were near our house. So that is where she learned to climb a hill. Like any average dad, I soon lost interest in watching her go up and down, and went off into my own world, lost in thought until I heard her scream. I ran to the top of the levee where she had buried her hands into a fire-ant mound. Her hands and arm were covered with ants. I grabbed her up, brushed off the ants, and head to the pharmacy for some Benadryl. Soon the little pustules started to appear, marks of my ineptitude as a father. Sad. We'll see photos in class.

The *red imported fire ant* is considered to be an invasive species, introduced to the U.S. from a ship that docked in Mobile, Alabama, in the 1930s, from which it has spread to much of the southern U.S. The fire ants form mounds that can be abundant in a small area, such as our sample site, shown in Figure 1.

Our sampling site is a 500×500 foot area with a levee through it. For each of the schemes, our budget limits us to at most 25 observations. Each observation is performed by driving a stake at the center of our observation location and using a 10 string from the stake to outline a circle in which to count the total number of mounds in the circle. Our task is to determine locations for sampling schemes to help answer each of the following questions:

1. What is the total number of mounds at the sample site? Design both a random and a systematic approach.

2. Are there differences in mound abundance between different land-use categories? Design a stratified random approach. What are your strata? Why?

Use the site figure provided, and plot sample locations separately for each scheme. (Be aware that fire ants don't live in the water nor on rooftops.)

After designing your scheme, consider the actually collecting of data. What sources of error and/or bias do you foresee? How might you mitigate them?

Submit a pdf file in IMRAD format. Make sure all figures are labelled.

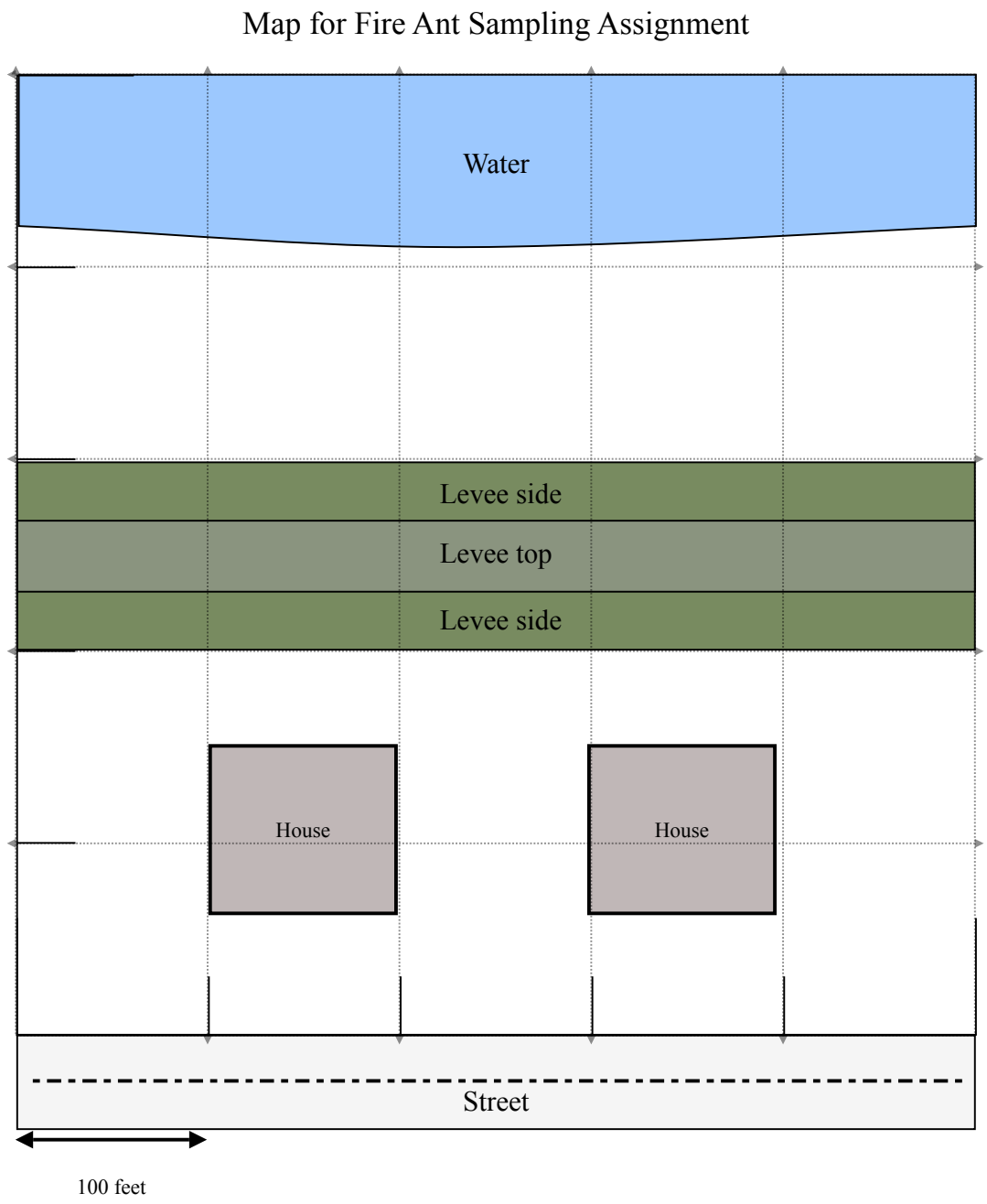

Figure 1: Sample site.