

GIS Analysis of Illegal Dumping in the Upper Cumberland and Recommendations for Abatement

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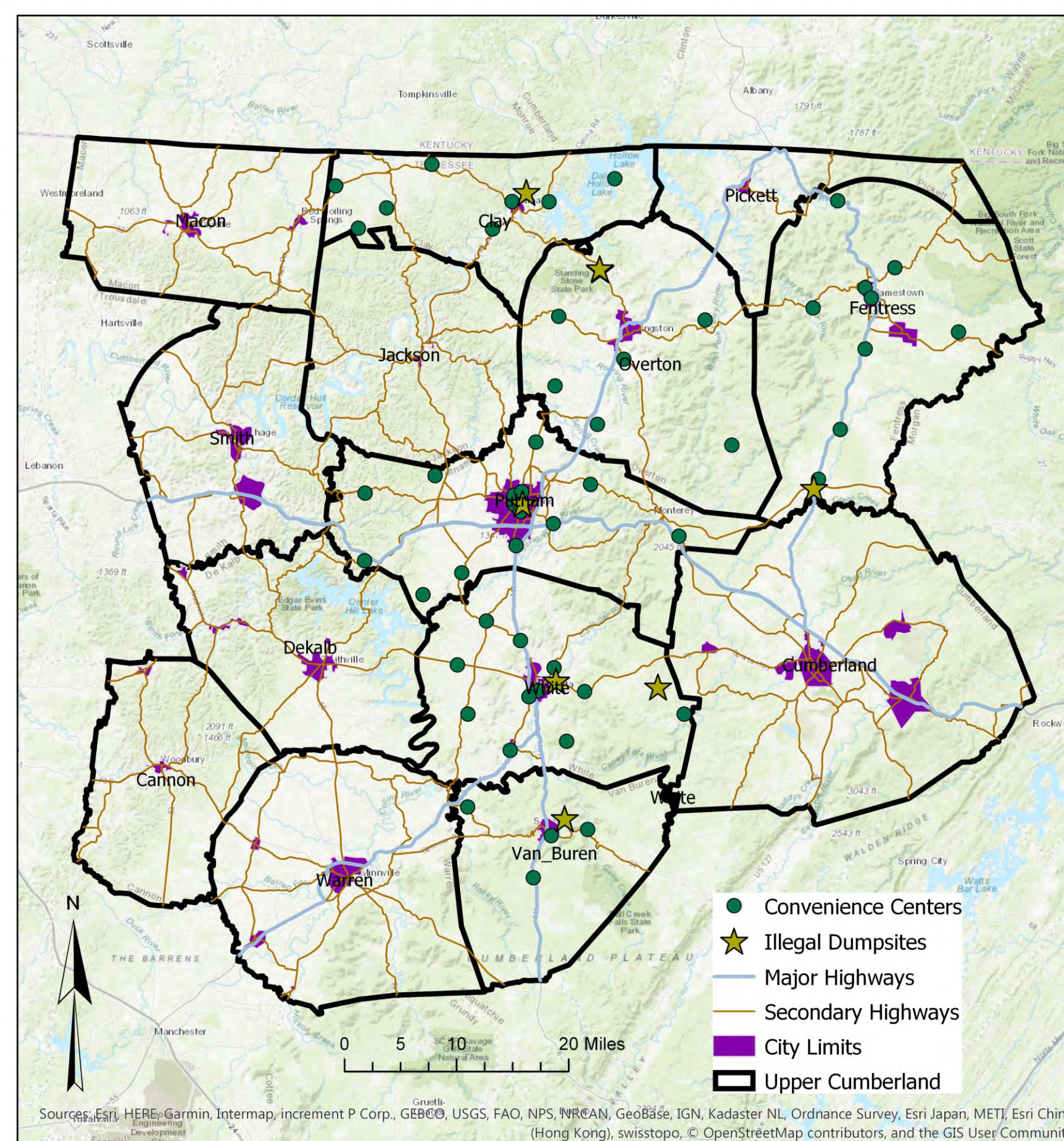
BACKGROUND

Illegal dumping is the intentional dumping of unwanted wastes in inappropriate locations. It is a widespread and costly practice that can:

- Encourage spread of disease by pests
- Alter stormwater flows and cause flooding
- Leach toxic compounds into groundwater and soil
- Engender community blight
- Deter ecotourism and lower property values

According to data obtained from Chuck Sutherland, Director of Informatics for the Upper Cumberland Development District (UCDD), there are over 180 reported dumpsites in the 14 counties of the Upper Cumberland region.

The average dumpsite costs property owners or municipalities \$2,947 minimum or \$619 per ton of nonhazardous waste.



METHODS

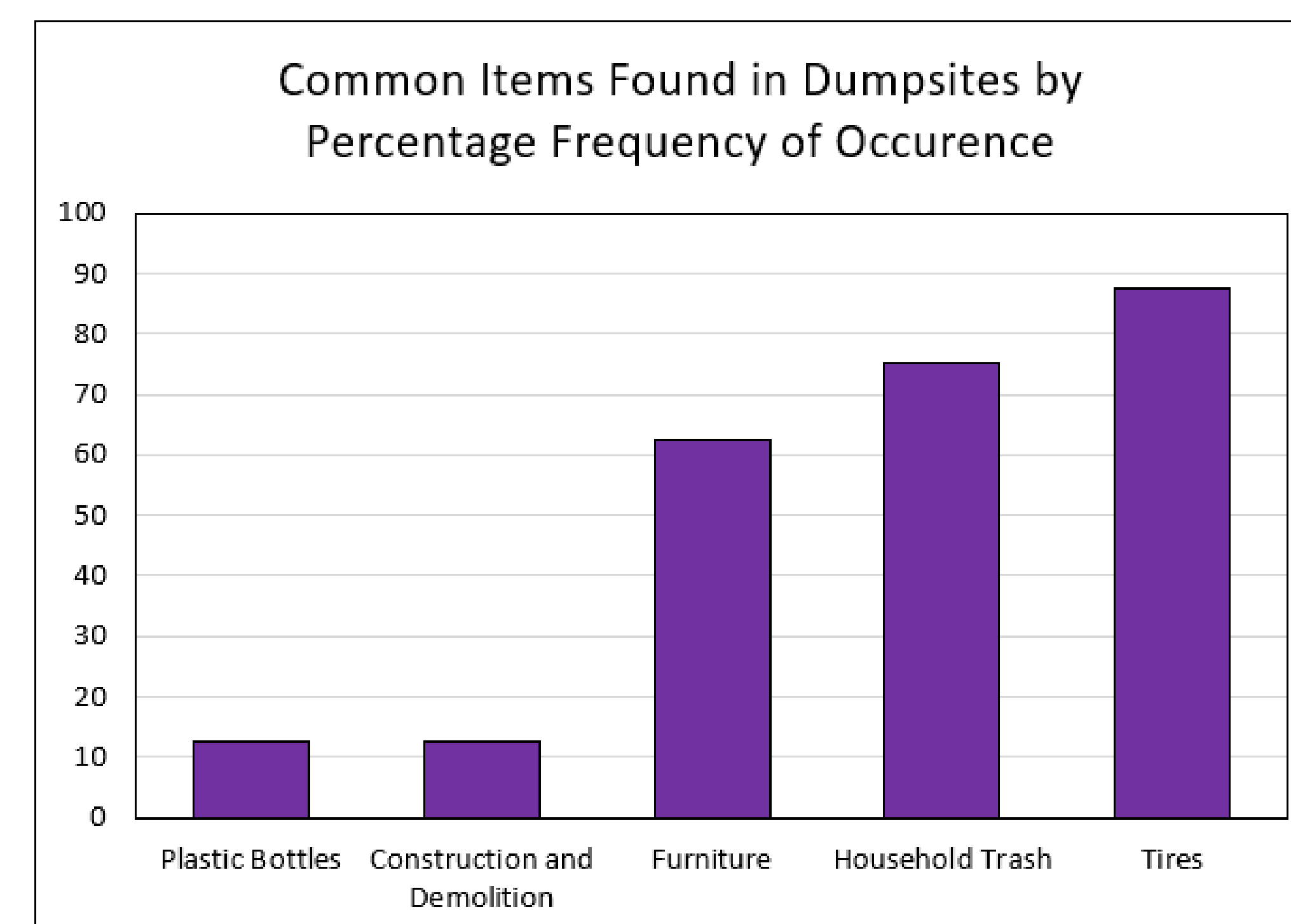
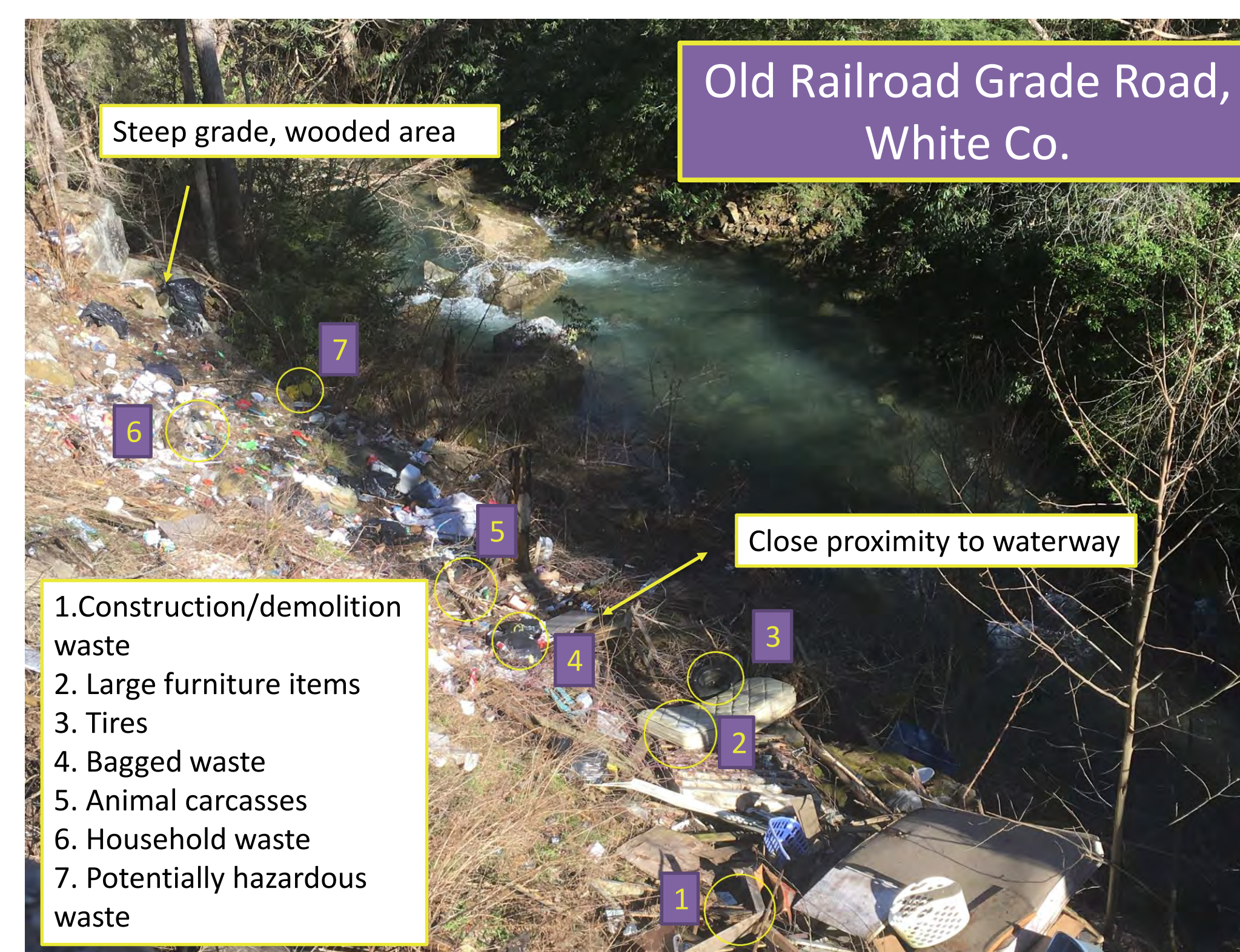
The purpose of this study was to compile the best available information in order to characterize dumpsites for analysis and decision making. Illegal dumping is a multifaceted issue, and we researched motivations for dumping, strategies for deterrence, and environmental, economic, health, and sociological impacts. We studied literature for existing or previously conducted abatement and prevention programs to determine the best practices.

Teams have travelled to reported dumpsites to verify their existence and characterize them using a standardized worksheet, GPS coordinates, rangefinders, and cameras. Sites are being characterized by content, area, slope, and proximity to streams, residential areas, roadways, convenience centers. We have documented coordinates for discovered illegal dumpsites and used ESRI ArcGIS to map and run preliminary analyses on the data.

DUMPSITE CHARACTERIZATION

Contents of a site can provide us with the information to determine the urgency and cost of cleanup, the motivations individuals might have for illegal dumping, and the age of a dump. Other properties, such as slope and size, can also be used to estimate severity of cost and environmental impact. Of the sites we visited, the most significant wastes by volume were tires, furniture, and household wastes. The table below contains a sample of site characterizations.

County	Road	Nearest Water Body	Nearest Convenience Center	Topography	Surface Area
Clay	Free Hills Rd	Cumberland River	11 min, 5.8 miles	Very Steep	3-4 acres
Fentress	Taylor Rd	Clear Creek	3 min, 1.3 miles	Nearly Level	0.9 acres
Overton	Old Celina Rd	Mill Creek	1 min, 0.4 miles	Very Steep	0.8 acres
Putnam	Denton Ave	Short Creek	8 min, 3.7 miles	Moderate	0.5 acres
Van Buren	Turkey Scratch Rd	Millstone Branch	6 min, 2.5 miles	Very Steep	2-3 acres
White	Old Railroad Grade Rd	Clifty Creek	11 min, 8.4 miles	Very Steep	3-4 acres
White	Sugar Camp Rd	Calfkiller River	4 min, 1.9 miles	Very Steep	4-6 acres



RESULTS

We produced as deliverables for the UCDD a report on sociological, economic, and environmental aspects of dumping; best practices; and reference material modelling grant, enforcement, prevention, and outreach strategies. Below is a list of key practices and considerations that we recommend as components of an effective abatement program in the region.

Information

1. Obtaining **information** is the first and most important step for effective planning and abatement.
2. **Accurate cost/benefit analysis** reveals it is generally more costly to clean up a dump site than to prevent it.

Understanding Motivations

1. Individuals dump because of **convenience, avoidance of cost, and because it has been a long-standing family practice** (legacy dumping).
2. Viable waste disposal locations must be made accessible, affordable, consistent, and known by the public. It is ideal for these locations accept all types of waste.

Enforcement

1. No environmental program will work without **enforcement**. Penalties are often the strongest motivator of behavior change for adults.
2. Enforcement needs support of education.

Education

1. Understanding **why** a behavior needs to change engages and further motivates the adult. Officials through the local and state executive, legislative, and judicial branches need understanding.
2. A person's outlook on the environment is formed in their early years, so **sustainability education** needs to be implemented in primary school years.

Grants

1. A **regional grant approach**, rather than efforts of individual municipalities, can be used to pool resources and experience to produce above average results across a larger area.

We developed a preliminary GIS database of dumpsites in the region and organized a cleanup to serve as an example and to increase public awareness and involvement. All brochures, worksheets, analysis models, database forms and organization methods can be used as groundwork for future efforts.

REFERENCES

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