

AQUATIC TAPHONOMY: AN ANALYSIS OF HUMAN DECOMPOSITION IN NATURAL WATERWAYS OF NEW YORK CITY

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Abstract

Between 2013 and 2017, 201 descendants were recovered from natural waterways of New York City's five boroughs (Manhattan, Bronx, Brooklyn, Queens, and Staten Island). Using case documentation from the New York City's Office of Chief Medical Examiner's (OCME) Case Management System (CMS) software, decomposition and demographic data were assessed and recorded. Case photographs were used to analyze patterns of decomposition via a scoring system that correlates the presence and absence of skin slippage, skin marbling/dyscoloration, subcutaneous skin exposure, and bone exposure, to a specific stage in the decomposition process. Eleven anatomical regions were assigned individual scores that appropriately represented the extent of decomposition that occurred at the time the photographs were taken. The combination of case documentation and scoring were used to assess patterns of decomposition and estimate the post-mortem submersion interval (PMSI) from the human remains discovered in an aquatic (brackish) environment. Based on the estimated PMSI this study reveals that some anatomical regions skeletonize faster than others and certain regions are more likely disarticulate. As such, the information yielded from this study offers specific knowledge that can provide law enforcement and search and rescue organizations a better understanding of how submerged decedents decompose and move within the fluvial systems of New York City (NYC).

Keywords: Aquatic taphonomy, skeletonization patterns

Introduction

In comparison to the abundance of taphonomic studies conducted on terrestrial environments, research using human cadavers in aquatic environments is scarce. Most studies of aquatic taphonomic changes have been conducted in a controlled environment rather than in a free-flowing aqueous environment. Creating similar experiments in natural waterways would prove to be much more difficult logistically, legally, and ethically. By taking a retrospective approach and observing previous cases of decedents found in the natural waterways of NYC we can begin to understand the decomposition process within this specific environment and confirm or refute long standing anecdotal reports.

Objectives

This research aims to observe trends of skeletonization and decomposition in human remains recovered from natural waterways.

Methods

Case photographs, supplementary reports, investigation reports, autopsy reports, family identification forms, and police story reports were referenced for overall data collection. The photographs were used to analyze patterns of decomposition via a self created scoring system, the remainder were used for demographic information. Using the photographs, eleven anatomical regions were assigned individual scores that appropriately represented the extent of decomposition that occurred at the time the photographs were taken. These scores were then used in conjunction with case related reports and forms to assess/patterns of decomposition and fluvial transport of human remains discovered in an aquatic environment. Microsoft Excel was used to calculate basic statistical analyses (mean, mode, standard deviation) and record case related information (scoring, demographics, observations).

Results and Discussion

This study revealed that the cranium skeletonized the fastest, followed by the mandible, hands, and tibiae, with evidence of the skeletonization process at a minimum of 22 days. When estimating PMSI, note that the date the decedent(s) went missing does not necessarily correspond to the day the person died. Therefore, this information should be used tentatively when attempting to establish the relationship between PMSI and skeletonization. The regions most inclined to be disarticulated upon discovery are the hands, forearms, and feet. Most suicide cases came from the George Washington Bridge (68%; n=17) and were found within a 2.5-mile radius of the bridge. Specific areas in Manhattan (West Harlem Piers, Dyckman St. Marina, Pier 16, and Brooklyn Bridge Park) served as "hot spots" in which multiple decedents were recovered from.

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