H101 Detecting Submerged Remains: Controlled Research Using Side-Scan Sonar to Detect Proxy Cadavers

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After attending this presentation, attendees should understand the application of side-scan sonar to forensic water searches, and specifically how this technology is used to detect submerged human remains. Controlled research will be presented that investigates the variables influencing side-scan sonar searches for submerged bodies.

This presentation will impact the forensic science community by explaining how this technology can be utilized in forensic water searches and the best parameters to employ when searching for a submerged body.

Searching for submerged bodies in water environments can be a challenging task for investigators. While traditional methods, such as cadaver dogs, dive teams, and underwater cameras are common methods for water searches, geophysical instruments and methods are being integrated into search protocols. The main advantages of incorporating geophysical methods for submerged body searches include: a more thorough search, a considerable decrease in search time, and a reduction in the personnel required to perform a detailed search. As a result, numerous law enforcement agencies have now incorporated side-scan sonar as the initial method for their search protocol. When water conditions are appropriate, this technology is used to locate submerged bodies that are usually then retrieved by divers. While side-scan sonar has become a valuable geophysical tool for forensic water searches, controlled research is paramount to determine the best practices for searches in various aquatic environments. Controlled research provides a structured environment in which to investigate variables that influence the effectiveness of the technology and to provide valuable experience for sonar operators. The purpose of this study was to conduct controlled research, using proxy cadavers, in order to evaluate the applicability of side-scan sonar technology and search methods. In addition, the best practices for employing this technology in forensic searches in freshwater ponds and lakes, in a humid, subtropical environment in Central Florida, were developed. Three pig carcasses (*Sus scrofa*), utilized as proxies for human bodies, were staked to the bottom of a large borrow pond, on a flat, sandy bottom. This set of pig carcasses represented medium-sized adult bodies (51 – 54kg). The specimens were monitored for a period of 81 days, which resulted in nearly skeletonized and disarticulated bodies. A dual frequency (900/1800kHz) side-scan sonar unit (deployed from a pontoon boat) was utilized to monitor the pig carcasses, and divers photographed the carcasses during each data collection event when water visibility was appropriate. Transects were conducted with a 20m swath width using both the 900kHz and 1800kHz frequencies. Results show that this technology successfully located medium-sized proxy carcasses on a flat, sandy lake bottom when experienced operators were conducting the search. In the initial stages of decomposition, the carcass (i.e., the acoustic shadow of the carcass) maintained the morphology of a pig that could be easily discerned. However, in later stages, the decomposing carcass was still detected with an accompanying shadow, but did not maintain the morphology of a pig. As decomposition advanced to disarticulation, the carcass progressed to a cluster of distinct features with little to no accompanying shadow. Also, the optimal towfish frequency was 900kHz because this frequency depicted a more discernible and consolidated carcass when compared to the higher resolution of the 1800kHz frequency. Therefore, in the appropriate conditions, side-scan sonar is an effective tool for locating submerged bodies in freshwater lakes and ponds, in a humid, subtropical environment. However, during the later stages of decomposition and disarticulation, it may be more difficult to locate a body since the disarticulated remains will no longer appear as a clustered group of features and may be devoid of a discernible acoustic shadow.

Submerged Bodies, Geophysical Searches, Side-Scan Sonar

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