



Physical Anthropology Section – 2010

H39 Taphonomic Processes Involved With the Decomposition of Human Remains Within the Puget Sound

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After attending this presentation, attendees will understand the affect of factors (e.g., age, height, sex, position when recovered, amount of clothing at recovery, animal activities involving the remains, Postmortem Submergence Interval, and Accumulated Degree Days) on the decomposition of remains within the Puget Sound, Washington State, USA. Attendees will also have an understanding of Total Aquatic Decomposition Scores and Accumulated Degree Days and their utility in death investigation.

This research provides equations for the calculation of the Postmortem Submergence Interval and Accumulated Degree Days from the Total Aquatic Decomposition Scores of remains recovered from the Puget Sound. This information is important for death investigators/law enforcement personnel as an aid to the identification of individuals missing in the interval predicted by the equation. The presentation will impact the forensic anthropology community by adding to knowledge of taphonomic processes within aquatic environments (specifically the Puget Sound) and contributing to any further studies on aquatic or marine decomposition.

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Factors affecting the decomposition of human remains have been a topic of interest to Forensic Anthropology since its inception. However, only recently have the taphonomic processes involved with aquatic decomposition become foci in forensic research. Several studies have been done on fluvial systems but research on marine systems is relatively scant as recovery of remains from the open ocean can be problematic due to factors such as depth, weather, currents, etc. The Puget Sound is a large (~135x76 km), mostly enclosed body of saltwater that facilitates the recovery of a considerable number of remains. The aim of this project was to collect and analyze data on the taphonomic processes involved with decomposition within the Puget Sound.

Data from four of the eleven county coroner/medical examiners offices surrounding the Puget Sound, including Kitsap (N=5), Mason (N=3), San Juan (N=8), and Pierce (N=6) counties, were analyzed statistically for taphonomic processes which could affect the decomposition of human remains within the Puget Sound. Forty-four cases were originally examined; however, after the removal of cases from the sample due to extensive adipocere formation (N=3) and Accumulated Degree Days scores of less than ten (N=19), twenty two cases remained. Adipocere cases were removed as adipocere formation tends to retard decomposition. All cases were given Total Aquatic Decomposition Scores (TADS) and Accumulated Degree Days for the time of their submergence, from entry to recovery. The TADS are the sum of three Aquatic Decomposition Scores given based on the decompositional stage of an area of the body, these include Facial Aquatic Decomposition Score, Body Aquatic Decomposition Score, and Limb Aquatic Decomposition Score. The Accumulated Degree Days is the sum of the temperature (°C) of the water each day (or as near the day as possible given obtainable data) that the remains were submerged.

Both Accumulated Degree Days ($p=1.177 \times 10^{-10}$) and Postmortem Submergence Interval ($p=2.026 \times 10^{-7}$) were found to have an affect on Total Aquatic Decomposition Score using linear regression models. Equations for determining Postmortem Submergence Interval and Accumulated Degree Days from the Total Aquatic Decomposition Scores of human remains recovered in the Puget Sound were created. The equation for establishing Postmortem Submergence Interval is: $\log_{10}PMSI = ((TADS + 1.751) / 5.649) \pm 3.047$ and the equation for establishing Accumulated Degree Days is $\log_{10}ADD = ((TADS + 5.6607) / 7.4294) \pm 2.107$. The results of this study were compared to similar studies done on fluvial systems in the United Kingdom (Heaton, et al., in press). No significant difference ($p > 0.01$) was found between the decomposition rates within rivers in the United Kingdom and those seen within the Puget Sound when the data were subjected to an analysis of covariance (ANCOVA) test with Accumulated Degree Days as a control.

Marine Decomposition, Postmortem Interval, Puget Sound