

## 15<sup>th</sup> International Symposium on Environmental Criminology & Crime Analysis

London, England (July 2007)

**Title:** Environmental Criminology and Optimal Foraging Models: Spatial Analysis and Geographic Profiling of White Shark Predation

**Author:** D. Kim Rossmo, Neil Hammerschlag, and R. Aidan Martin

**Presenter:** D. Kim Rossmo

**Body of Abstract:** Environmental criminologists (Brantingham, Felson) have used optimal foraging theories and concepts to understand crime for several years. Recently, we have also seen biologists and zoologists employ environmental criminology models to analyze animal predator-prey relationships. The role of the physical environment in how predators with mobile prey optimally forage in relation to prey encounter rates and competitors is largely unknown. In this study, we use GPS-referenced data of 340 natural predatory interactions between white sharks and Cape fur seals, environmental factors, and spatial analysis, including geographic profiling, to examine the three-dimensional pattern of white shark predation at Seal Island in False Bay, South Africa. Results reveal that shark prey search patterns at this site are non-random, with a well-defined anchor point or base located 100 m seaward of the southern end of Seal Island, the primary seal dispersion and exit point. This is not where prey concentration is greatest and appears to represent an optimal balance among prey detection and capture rates and inter-predator competition. Younger white sharks exhibit more dispersed prey search patterns and have lower success rates, suggesting refinement of hunting strategy with experience. These results are discussed in terms of both foraging theory and its application to predator-prey interactions, and their implications for environmental criminology and our understanding of criminal hunting behavior.

### **Author Biography/Affiliations:**

D. Kim Rossmo is a Research Professor, and the Director of the Center for Geospatial Intelligence and Investigation in the Department of Criminal Justice at Texas State University. He was formerly the Director of Research for the Police Foundation, and the Detective Inspector in charge of the Vancouver Police Department's Geographic Profiling Section. Kim has researched and published in the areas of policing, offender profiling, and environmental criminology. He is a member of the International Association of Chiefs of Police (IACP) Advisory Committee for Police Investigative Operations, an Adjunct Professor at Simon Fraser University, and a member of the editorial board for the journal *Homicide Studies*.