Analysis of Search Incidents and Lost Person Behavior in Yosemite National Park

Abstract
Every year thousands of people are reported lost or missing in wilderness areas and in response, a search and rescue (SAR) operation is launched to locate, stabilize, and extract those missing. Actually locating the subject is often the most difficult of these processes. This study attempts to improve upon search operations by analyzing lost person behavior at the “local” level. If a search manager knew what a lost subject was most likely to do when lost, then they could plan the search accordingly and return them to safety much quicker. Additionally, if National Park officials knew who was becoming lost, and when and where this occurred, steps could be taken to prevent these people from becoming lost in the first place. Eleven years (2000-2010) of Search and Rescue case incident reports from Yosemite National Park (2,308 in total) were examined and 213 searches were retained for analysis. It was determined that approximately 62% of incidents involve missing hikers. Nearly two thirds of the searches were for one subject and about two-thirds of these involved males. The mean age of missing persons was 36 years old. Most people were reported missing in July, on Saturday, and between the hours of 2 and 3 p.m. Almost half of people reported as missing were actually lost while others were merely separated from their party, or overdue. Contributing factors include losing the trail accidentally, failure to communicate the intended plan, and miscalculating the time or distance of the planned route, among others. Within a Geographic Information System (GIS) the Initial Planning Point (IPP), the point at which the person was last seen or known to be, and the found location was georeferenced for each incident using the point radius method. This allowed for a Getis-Ord Gi* analysis to be conducted of both the IPPs and found locations and “hot spots” were identified for each. The GIS also provided an environment for analyzing lost person behavior. Within Yosemite National Park lost hikers most often utilized route traveling in order to reorient themselves. Additionally, descriptive lost person behavior statistics for hikers were calculated, including: horizontal distance from the IPP to the found location, vertical elevation change from the IPP to the found location, dispersion angle from intended destination to the found location, and the track offset of the found location. These “local” results were then compared to “international” statistics presented by the International Search and Rescue Incident Database (ISRID) using a chi-square goodness of fit test. It was found that the ISRID data provided for horizontal distance from the IPP and track offset were not suitable for use in Yosemite while the data pertaining to vertical elevation change from the IPP and the dispersion angle could potentially be utilized for search planning.

URI
http://hdl.handle.net/1808/10846
Each year, Yosemite National Park responds to hundreds of calls reporting missing persons. Most often, a lost hiker or vacationer is found during the first 24 hours. YOSAR is a group of park rangers, technical climbers, helicopter pilots, and incident management staff who are directed by Keith Lober, the emergency services coordinator for Yosemite National Park. These skilled search and rescue operators are known around the world for their ability to make backcountry extractions of injured hikers; perform climbing rescues off of "big walls," such as El Capitan; search for missing hikers; and respond to multi-casualty incidents.