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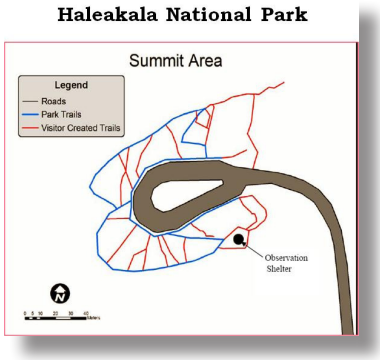
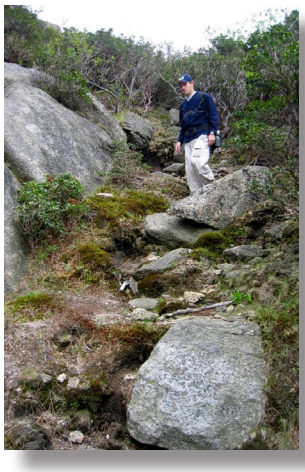
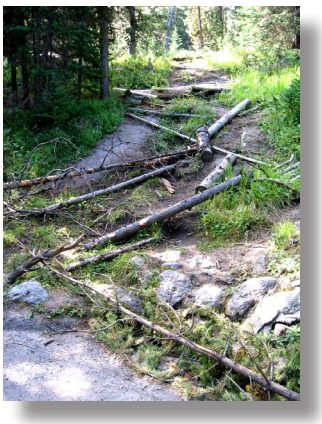
# Research and Management of Informal (Visitor-Created) Trails in Protected Areas





- ***The Challenge:*** The proliferation and degradation of visitor-created "informal" trails in protected areas can be a vexing management issue for land managers. Formal trail systems never provide access to all locations required by visitors seeking to engage in a variety of appropriate recreational activities. Traveling off-trail may be necessary to engage in activities such as nature study, fishing, or camping. Unfortunately, management experience reveals that informal trail systems are frequently poorly designed, including "shortest distance" routing with steep grades and alignments parallel to the slope. Such routes are rarely sustainable under heavy traffic and subsequent resource degradation is often severe. Vegetation impacts include trampling damage leading to loss of vegetation cover, changes in species composition, and the potential introduction and dispersal of non-native plants. Soil impacts include the pulverization and loss of organic litter, and exposure, compaction, and erosion of soil. Soil deposition in streams, disturbance to wildlife, and damage to sensitive historic resources are also possible.

- ***The Science:*** Our studies of informal trail impacts have been conducted in several National Park Service areas, including the Potomac Gorge (C&O Canal/George Washington Parkway), and Acadia, Haleakala, and Denali National Parks. We've refined research and monitoring protocols incorporating accurate GPS devices for efficiently and accurately assessing trail spatial distribution and resource conditions. We've also developed analytical techniques using GIS software to characterize the extent of landscape fragmentation caused by trails and to evaluate their sustainability. Finally, we've conducted several studies designed to evaluate the efficacy of alternative site management and educational practices designed to deter off-trail traffic and protect rare plants or sensitive sub-alpine vegetation and soils.

- ***The Future:*** Our results are being applied in many protected natural areas to characterize and monitor the extent of informal trail impacts over time. Future studies aim to further model off-trail hiking and impact, evaluate the sustainability of informal vs. formal trails, assess the efficacy of management efforts implemented to deter off-trail hiking, and document the extent of natural recovery on informal trails that are successfully closed to use.

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