

SCIENTIFIC PAPERS ADDRESSING TRAIL EROSION CAUSED BY MOUNTAIN BIKING

COMPILED MARCH 2016

Impacts from biking are similar to hiking. Horses have greater impact.

Wilson, J. P., & Seney, J. P. (1994). *Erosional impact of hikers, horses, motorcycles, and off-road bicycles on mountain trails in Montana. Mountain research and development, 77-88.*

Impacts from biking are similar to hiking. Erosion increases if riders are skidding, or trails are wet and/or too steep.

Chiu, L., & Kriwoken, L. (2003). *Managing recreational mountain biking in Wellington Park, Tasmania, Australia. Annals of Leisure Research, 6(4), 339-361.*

Impacts from biking are similar to hiking. Contact pressure from bike tires 0.35 kg/cm² is similar to feet 0.29 kg/cm². How much activity there is on a trail matters most.

Thurston, E., & Reader, R.J. (2001) *Impacts of experimentally applied mountain biking and hiking on vegetation and soil of a deciduous forest. Environmental management 27.3: 397-409.*

Mountain bike trails have similar erosion rates to other multi-use trails.

Olive, N. D., & Marion, J. L. (2009). *The influence of use-related, environmental, and managerial factors on soil loss from recreational trails. Journal of Environmental Management, 90(3), 1483-1493.*

Horses cause more severe erosional impacts than bicycles.

Svajda, J., Korony, S., Brighton, I., Esser, S., & Ciapala, S. (2016). *Trail impact monitoring in Rocky Mountain National Park, USA. Solid Earth, 7(1), 115.*

Bikes cause more erosion than hiking but only at very high usage levels.

Pickering, C. M., Rossi, S., & Barros, A. (2011). *Assessing the impacts of mountain biking and hiking on subalpine grassland in Australia using an experimental protocol. Journal of environmental management, 92(12), 3049-3057.*

Biking and hiking cause less trail degradation than horses or ATVs.

Marion, J. L., & Olive, N. (2006). *Assessing and understanding trail degradation: results from Big South Fork National River and recreational area. US Geological Survey.*

No difference in impact found between horses and humans but much more impact in wet conditions.

Deluca, T. H., Patterson Iv, W. A., Freimund, W. A., & Cole, D. N. (1998). *Influence of llamas, horses, and hikers on soil erosion from established recreation trails in western Montana, USA. Environmental Management, 22(2), 255-262.*

Erosion focuses in areas with higher slopes.

Goeft, U., & Alder, J. (2001). *Sustainable mountain biking: a case study from the southwest of Western Australia. Journal of sustainable tourism, 9(3), 193-211.*

Most conflicts between hikers and mountain bikers are of an interpersonal NOT social issue. This means their results show people do not have an inherent dislike of mountain biking, but have had negative experiences with individual mountain bikers.

Carothers, P., Vaske, J.J., and Donnelly, M.P. (2001) *"Social values versus interpersonal conflict among hikers and mountain bikers." Leisure Sciences 23.1: 47-61.*

Marion/Leung and White et al. show that trail width increases with more use but other metrics of degradation do not get worse. Marion/Leung found this for hikers, White et al found it for bikes.

Marion, J. L., & Leung, Y. F. (2001). Trail resource impacts and an examination of alternative assessment techniques. *Journal of Park and Recreation Administration*, 19(3), 17-37.
Width increases with use but not other metrics of degradation (hiking)

White, D. D., Waskey, M. T., Brodehl, G. P., & Foti, P. E. (2006). A comparative study of impacts to mountain bike trails in five common ecological regions of the Southwestern US. *Journal of Park and Recreation Administration*, 24(2), 21-41.

Trail corners are the sites with the worst erosion after a big event.

Hawes, M. (1997). *Environmental Impacts and Management Implications of the 1997 National Mountain Bike Championships*.

Informal trail creation causes negative vegetation and soil erosion impacts.

Havlick, D. G., Billmeyer, E., Huber, T., Vogt, B., & Rodman, K. (2016). Informal trail creation: hiking, trail running, and mountain bicycling in shortgrass prairie. *Journal of Sustainable Tourism*, 1-18.

Davies, C., & Newsome, D. (2009). *Mountain bike activity in natural areas: impacts, assessment and implications for management: a case study from John Forrest National Park, Western Australia*.

Studies have shown that mountain biking impacts trails in ways similar to hiking and less severely than horseback riding. However, the few quantitative studies exist do not adequately cover different riding styles and more work needs to be done.

Pickering, C. M., Hill, W., Newsome, D., & Leung, Y. F. (2010). Comparing hiking, mountain biking and horse riding impacts on vegetation and soils in Australia and the United States of America. *Journal of environmental management*, 91(3), 551-562.

Excellent resource from IMBA explaining findings up until 2007.

Marion, J. L., & Wimpey, J. (2007). *Environmental impacts of mountain biking: science review and best practices. Managing Mountain Biking, IMBA's Guide to Providing Great Riding. International Mountain Bicycling Association (IMBA) Boulder, 94-111.*

http://www.imbacanada.com/sites/default/files/Marion_Wimpey_Review%20and%20Best%20Practices.pdf