**SUSTAINABILITY ASSESSMENT – ATV PROGRAM 19**

**Appendix 9. All-Terrain Vehicle Sustainability Assessments: Considerations for B.S.A. Councils**

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**ABSTRACT:** *BSA Councils that are considering ATV programs should recognize that research has shown ATV's to be one of the most environmentally impacting forms of recreational activity. The sustainable management of ATV use is an expensive proposition requiring careful design, construction, and maintenance of ATV trails. Tight regulation of ATV use, including the amount, locations, season, and riding behaviors is also critical. Most federal and state land management agencies have discovered that they lack the expertise, staffing, and funding to sustainably manage ATV opportunities. The BSA is likely less prepared to accommodate ATV riding without high levels of environmental degradation.*

ATV's have a high potential to impact vegetation, soils, wildlife, water and the outdoor experiences of other visitors compared to other forms of recreational activity. ATV's combine a very powerful and loud engine with aggressive knobby tires on a vehicle that can easily go "off-trail." More significantly, adolescent male riders attracted to their power and ability to go anywhere often seek to test them on steep hills, mud and water, and in off-trail areas. Experience has shown that many youth lack the judgment and experience needed to use them safely or in a manner that protects natural and cultural resources. Addressing these challenges needs to be a core sustained focus of any BSA ATV riding program.

Research substantiates the greater impact potential of ATVs when comparing the soil loss on trails used by horses, hikers, bikes, and ATVs (Olive and Marion 2009). In this study hikers substantially outnumber ATV users yet ATV trails had thirteen times more soil loss. As noted in this research, these data are "… not presented to apportion blame to specific use types, rather to emphasize that managers seeking to accommodate horse and ATV uses should acknowledge their higher potential for eroding soil and incorporate improved trail design, construction, maintenance and visitor use management practices to ensure that the impacts of such uses are minimal and acceptable."

This research further provides insights applicable to the BSA ATV Youth Program: "Given the greater speed and range of these vehicles, and their substantial potential for eroding soil due to engine torque and knobby tires, managers of protected natural areas should be cautious in allowing their use until sustainable trail alignments are identified, developed and hardened, and adequate maintenance, monitoring, and visitor management programs are implemented to ensure unacceptable resource impacts do not occur." A single ATV rider does substantially greater environmental damage than a hiker or mountain biker, and they travel substantially further during a given recreational outing (i.e., they impact many more miles of trail due to their greater speed).

## Designing Sustainable ATV Trails

At its simplest, trail design can be reduced to perhaps five factors:

**Trail Grade** – erosion potential increases exponentially w/increasing trail grade. Keep ATV trails in gently sloping terrain. ATV use in flat terrain will become muddy while those on trail grades exceeding 10-12% will have a high potential for soil loss. Purchase a clinometer to measure trail grade and conduct a survey of your trails. Close trail segments to ATV use with grades in excess of 12%, or be prepared to apply a considerable amount of rock to the treads and monitor them closely for soil loss.

**Trail Slope Alignment Angle** – the alignment of a trail to the prevailing landform grade or aspect. Sustainable trails are aligned with the contour line or up to 45 degrees from it. Trails aligned with the landform grade or aspect (those that run straight up and down hill, or anywhere close to that) are nearly impossible to keep from eroding regardless of their grade. Avoid trail alignments within about 30 degrees of the fall-line at all costs. These are called "fall-aligned" trails – a bucket of water dumped on a slope will run straight down the "fall-line," - tread drainage features simply don't work because trail-sides are higher than incised treads.

**Substrate Rockiness** – High-impact trail uses like ATV's require substantial amounts of rock in tread substrates. If rock is not naturally-occurring then land managers need to put it there during trail construction or maintenance. Large angular aggregate (crushed stone, not rounded), like 2 to 3 inch rock and larger, will interlock and form a sustainable base, particularly when combined with clay or loam soils (not sandy or organic soils).

**Soil Moisture** – ATV trails should stay clear of all wet or seasonally wet soils, which are easily churned to mud and displaced or eroded by ATV tires. All permanent and seasonal creeks and streams must be bridged. ATV use should be prohibited whenever trail soils are wet, particularly in the spring and immediately following rainfall.

**Tread Drainage** – Traditional tread drainage features like water bars and drainage dips can't be sustained on ATV trails because their tires tear them up or loosen soil and fill them in quickly. ATV trails should be side-hill constructed with out-sloped treads and frequent ***grade reversals*** to shed water. A grade reversal is where the entire trail reverses grade for a short distance before continuing its ascent/descent. The density of grade reversals should match trail grade, with numbers of grade reversals increasing as needed on steeper trails so that water run-off is quickly diverted off-trail.

Note that most existing trails lack grade reversals and strongly out-sloped treads so your likelihood of sustainably using "existing" trails or woods roads is extremely unlikely – you will generally need to hire a trails professional to carefully design and construct sustainable ATV trails. Putting ATV use on well-graveled roads with grades <12% that can be periodically graded could be an exception.

## Managing Sustainable ATV Use

Sustainable ATV use management requires certain well-enforced regulations and low-impact practices:

1. ATV users must always stay on designated trails that have been designed and managed to sustain their traffic. Driving on trails designed for other users (hikers, mountain bikes, horses), creating new trails, and riding cross-country should be prohibited.
2. ATV users should be taught Tread Lightly and Leave No Trace practices to avoid or minimize the environmental impacts of their activity and to protect the experiences of other visitors.
3. ATV trails must be frequently maintained to halt any visible soil loss, tread widening, and tread muddiness. This requires constant vigilance to address these problems quickly when they first appear. A small mud-hole can become very deep and wide in less than a week, soil loss can grow from inches to feet in less than a month.
4. Trail condition assessments, combined with comparison to standards of quality (e.g., tread depth <1 one foot, tread width <6 feet, ruts in mud and water in mud-holes <6 inches) can help ensure the sustained maintenance of ATV trails and used to reduce overuse or shut down riding when standards

are exceeded. Ignoring substandard conditions and allowing them to worsen over time should not be permitted.

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***Note:*** though written for the design and management of mountain bike trails, the two IMBA references are excellent sources of information on sustainable trail design.

## Biography

Dr. Marion is a federal scientist with the U.S. Geological Survey who conducts research on recreation impacts in National Parks, National Forests, and other protected natural areas. He routinely consults with land managers on the design and management of sustainable trails and recreation facilities, visitor regulations, and educational low impact practices designed to avoid or minimize the impacts of recreation visitation. He is a former Scoutmaster and current Venture Crew Advisor, serves on his Council's Conservation Committee, and is the recipient of the Hornaday Gold Badge and Medal for his work in the Leave No Trace program. For additional publications on these topics see https://profile.usgs.gov/jeff_marion or contact him at jmarion@vt.edu

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