

Management Guidelines for OHV Recreation

Written by Tom M. Crimmins
In association with the
National Off-Highway Vehicle Conservation Council



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Management Guidelines for Off-Highway Vehicle Recreation

A resource guide to assist in the planning, development, operation, and maintenance of environmentally sustainable and quality OHV trails, trail systems, and areas.

Written by Tom M. Crimmins

In association with the
National Off-Highway Vehicle Conservation Council.

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A winding trail on vast western lands or a tight eastern forest trail both equal quality days for off-highway vehicle enthusiasts.

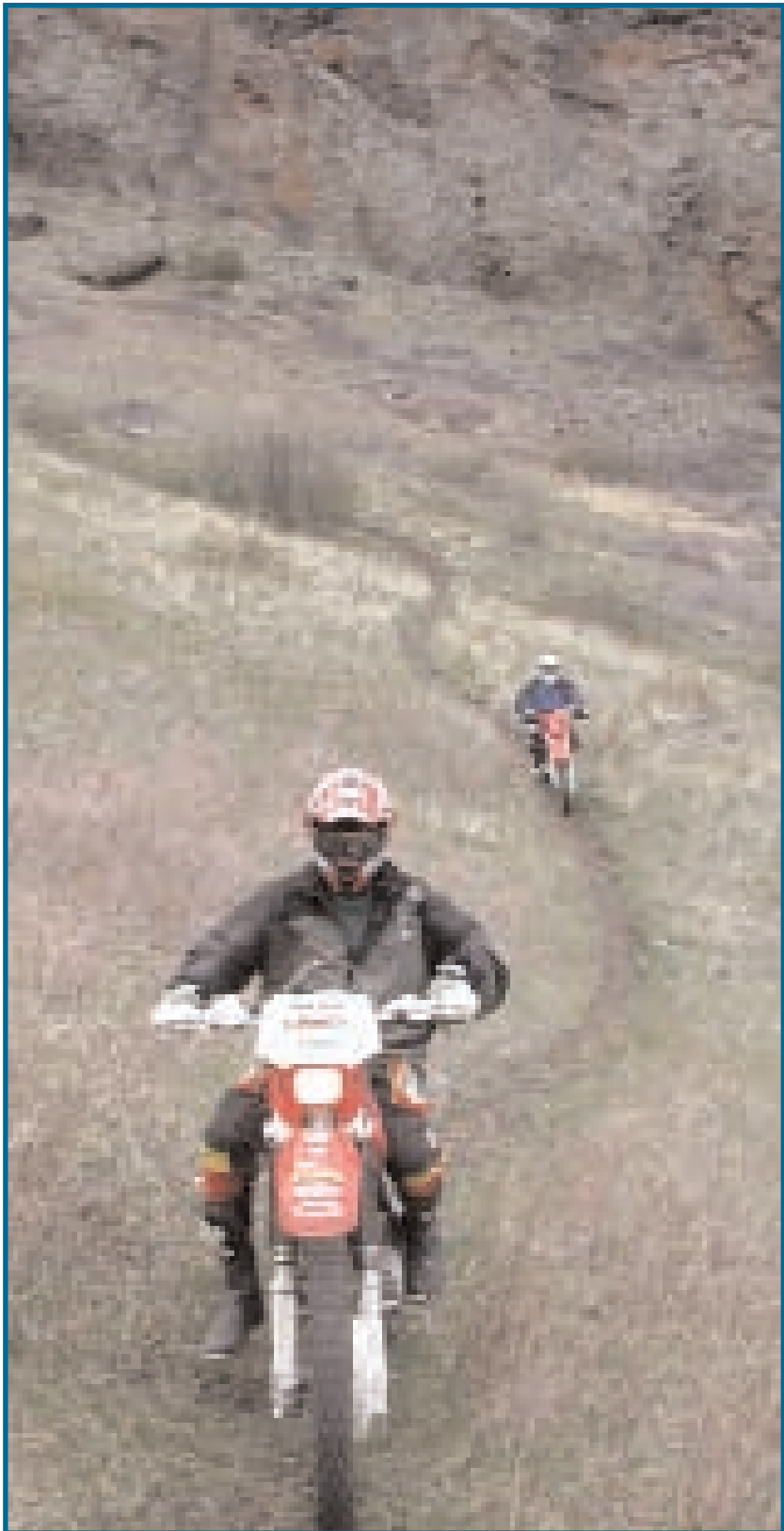


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Introduction

The Case for Management

Off-Highway Vehicle (OHV) use has been around for a long time. It started the first time Johnny took dad's Model A out across the hills behind the barn and increased when the GIs returned from World War II and started using military Jeeps out in the woods. Use continued to increase as population increased, and each new development in technology fueled the growth.

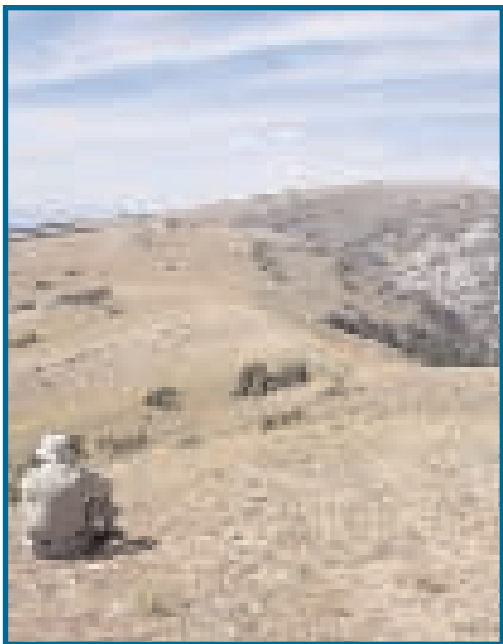
The first real focus on management of OHV use on public lands began in 1972 when President Nixon signed Executive Order 11644, and again in 1977 when President Carter signed an amendment in the form of Executive Order 11989. The Executive Orders required that the agencies identify "specific areas on public lands where use of off-road vehicles may be permitted and areas in which the use of off-road vehicles may not be permitted..." At this time the agencies identified three classifications that could be applied:

- **Open** – Areas that were open to cross-country travel.
- **Limited** – Areas that had some restrictions or limitations on motorized vehicle use.
- **Closed** – Areas where motorized vehicle use was prohibited.

During the initial planning stages, many national forests and Bureau of Land Management (BLM) areas were isolated and did not experience OHV use in significant amounts. Since establishing a system of designated routes or specific seasonal limitations required a substantial investment of time and money, many agency offices simply chose to identify specific areas where use would be prohibited and then classified the remaining lands as open. Those decisions may have been correct at that time and place.



Crossing Tillinghast Creek,
Lewis & Clark National Forest, Montana, Circa 1962.



Portions of the Centennial Mountains, straddling
the Continental Divide and the southeastern
state line between Montana and Idaho, are today
restricted to human and horse power.



In areas where active management is applied OHV
use can be managed, resources protected, and the
OHV enthusiast can have a satisfying recreational
experience. Haystack Area, New Mexico.

So, if we can all agree that the time has come to start actively managing OHV use, the question is what does it take to actually manage the use? Unfortunately, there is no "silver bullet" that will solve all the problems. There are, however, a number of essential actions, some more critical than others. But all are necessary to ensure a high probability of success.



Today things have changed. We have too many people, too many machines and too many traditional riding areas being closed to continue to ignore the fact that OHV activities, like all other recreational activities, must be managed. It is clear that OHV use is not a passing fad that will slowly lose its allure. The people are here now, and more are on the way. We have areas where the resources are being impacted and virtually all these impacts can be traced to a lack of management. In areas where active management is being applied, experience clearly shows that OHV use can be managed, resources protected, and the OHV enthusiast can have a satisfying recreational experience.

In this publication we will provide some general philosophies of OHV management as well as specifics. We will discuss route planning and active management once the routes exist on the ground. We will include as many examples as possible. However, keep in mind that what works in one area may not work in another. The key is to look to the examples to see what might work under your specific circumstances. Then keep what is useful and toss out the rest. It is critical to initiate active and sound management.

Killpecker Dunes designated
OHV Open Area, Wyoming.

User Needs and Desires

Before any decision is made or action is taken to provide OHV recreation opportunities, it is important to understand the full range of activities that may be desired. Once these activities are recognized, a manager can make a conscious decision on which segment of the OHV population can be served in a particular area.

Activities

The OHV public is a diverse group with diverse desires. An individual may participate in one activity at one time and a completely different activity at another. Riders may also participate in multiple activities during the same trip if opportunities exist. Some of these activities may include:



For experienced riders and drivers, the narrower the route the better.

Recreational Trail Riding

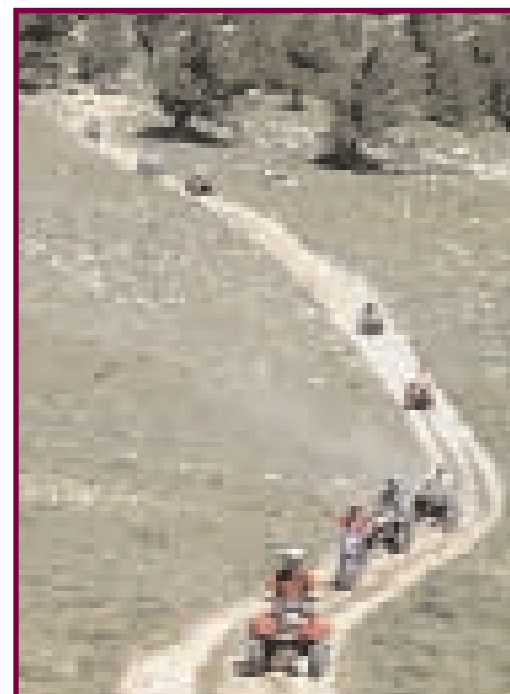
In most areas, this is the activity desired by the largest segment of the enthusiast population. This activity is best served by a series of interconnected loop trails that range in difficulty levels. In areas where large blocks of land are available, trail systems may consist of 50 to 100 miles or more of trail dispersed over the landscape. In other areas, where available land is limited, trail systems will be much more condensed and may range from 10 to 30 miles in length.

Non-Competitive Organized Trail Riding

This form of recreation is normally organized, insured, and makes money but is noncompetitive in nature. It can include both trail and highway segments and can cover a variable course length. The course can be marked or riders can navigate the course using landmarks and a route sheet.



Exploring the Hemingway Butte OHV trails by 4WD, BLM, Owyhee Field Office, Idaho.



Multiple-use route for hunting access and recreational trail riding and driving, Shoshone National Forest, Wyoming.

Competitive Activities

These may be in the form of an organized, sanctioned, insured and paid event where competitors are required to traverse a predetermined course with specific time constraints. They may also be held as speed events with competitors racing the clock with controlled start times to reduce trail congestion. These events may occur on the same trails available for recreational trail riding but can be in a more controlled environment. Holding competitive trail events may require that segments of the trails be closed to the recreational rider during the event. Competitive events usually require a minimum of two loops, ranging from 2 1/2 to 40 miles in length. Appendix A lists some of the specific competitive events that may be encountered.



Locations for competitive events are sought after and can generate significant entrance and participant fees.

Observed Trials

Observed trials has been described as motorcycle ballet. Trials riders attempt to ride over logs, boulders, or other obstacles in a slow, controlled manner without the rider putting his foot down on the ground. The machines are quiet, the speeds are slow, and impacts can be minimal. However, the needs of this activity cannot be provided on designated trails. Therefore, managers wishing to provide for this activity must work closely with the trials community to identify areas that may be opened for this use.

Motocross Tracks – Practice & Competition

Another form of competition enjoyed by OHV enthusiasts is motocross. This is a race that is held on a tight, turning, one-way course with a variety of natural terrain, man-made obstacles, or jumps. These events are usually head-to-head races where the fastest rider wins. When the tracks are not being used for actual races they can be used for practice by either competitors or by other riders wishing to improve their skills.



Motocross rider on a designed racetrack. Minnesota.

Hill Climbs – Practice & Competition

Hill climbs are a challenge and competition enjoyed by a small segment of the motorized recreation population. Challengers start at the bottom of a long, steep hill and try to reach the top of the hill without crashing. This can be an exciting activity for both participants and spectators, but it requires very specific terrain conditions.



Competition vehicles, whether motorcycle, ATV or 4WD, range from stock models off the dealership floor to custom hand-built vehicles.

Mud Bogs – Practice & Competition

In this activity, a participant traverses through an area of water and mud. This activity can occur under natural conditions where runoff and impacts can be controlled or in a man-made area specifically designed to contain water and mud. When conditions allow this use, users need to be informed why the activity is acceptable for the moment but not acceptable in a general trail environment.

Labor Day Hill Climb,
Halter Motorsports Park,
Loma, Montana.



Obstacle Courses

An OHV obstacle course will usually be a small area of natural or man-made features to test and enhance the participant's skills. Obstacles can be designed to replicate features that would be encountered on trails, or they may simply be features that focus on specific riding skills. These areas may also include features such as logjams, rock piles, or tire pits.

Open Areas

Some areas such as sand dunes, gravel pits, and other sites lend themselves to open cross-country riding. These areas are enjoyed by a sizeable number of the OHV population. In addition, smaller play areas may be incorporated into trail-riding areas to meet the needs of some riders. Play areas are smaller, confined, open areas where use is not limited to trails.

Other Uses

Other activities may include the use of an OHV for access to hunting and fishing sites, big game retrieval, antler collecting, and wood gathering. Consider these uses during the planning process. Also consider what specific decisions need to be made about the various uses.

While it may be possible to provide opportunities for motocross tracks, competitive areas, hill climbs, or mud bogs, along with a well-developed trail system, these activities usually require a more controlled environment than is generally available in a large trail system area. This document will focus on recreational and competitive trail riding. A more detailed discussion on the development of OHV parks, which can include more intensive activities, can be found in the *Park Guidelines for OHV's* by George E. Fogg and is available from the National Off-Highway Vehicle Conservation Council.



The OHV public is a diverse group with diverse desires for experiences ranging from technical single-track to wide-open dunes.

Vehicle Types

OHV enthusiasts use a diverse range of vehicle types in their search for a satisfying recreation experience. The following chart identifies most of the vehicles that may be encountered in an OHV area.

Motorcycle

- **Dual-Sport Motorcycle**
Street-licensed motorcycle that is used on streets, backroads and trails for touring, casual trail riding, and organized noncompetitive events and tours – fully equipped to meet street and highway requirements.
- **Enduro Motorcycle**
Off-highway motorcycle used for competition and recreational trail riding – usually equipped with headlights, taillights, and spark arrester.
- **Motocross Motorcycle**
Off-highway motorcycle built for use in closed-course motocross events – also used for off-highway competition and recreational trail riding when modified to meet State and Federal regulations pertaining to registration, sound levels, and spark arresters – may not comply with emission standards.
- **Trials Motorcycle**
Off-highway motorcycle built for competition, exhibition, and practice riding over extremely technical natural terrain and constructed obstacle courses.

All Terrain Vehicle (ATV)

- **Sport ATV**
An OHV used for recreational trail riding, touring, and competitive events.
- **Utility ATV**
An OHV used for farm, ranch, and trail maintenance work as well as an access and hauling vehicle for hunting and fishing. It may also be used for trail riding and occasionally for organized events.

Four-Wheel Drive

- **Long Wheel Base**
Vehicles that are used on streets, backroads, and trails for touring, casual trail riding, and organized events – may or may not be legal for street use.
- **Short Wheel Base**
Vehicles that are used on streets, backroads, and technical trails with the ability to perform tight radius turns for touring, casual trail riding and organized events – may or may not be legal for street use.
- **Rock Crawler**
Generally a custom-built machine designed to travel over extremely technical, natural, or man-made terrain and constructed obstacle courses – usually not equipped to meet street requirements.

Other Wheeled

- **Dune Buggy/Sand Rail**
Manufactured and custom-built vehicles used for recreational riding and competitive events over sand, sand dunes, and other open terrain – usually not equipped to meet street requirements.
- **Utility Type Vehicle (UTV)**
An OHV designed for two or more passengers sitting side by side. It may be used for farm, ranch, and trail maintenance work as well as an access and hauling vehicle for hunting and fishing.

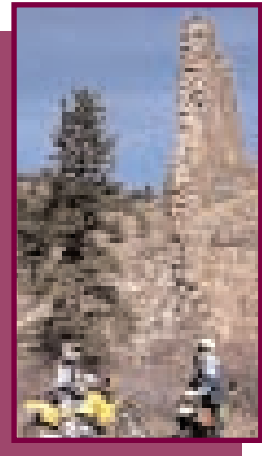
Snowmobile

A vehicle specifically built to travel over snow-covered surfaces for recreational touring, trail and cross-country riding, snowcross, and hill-climbing events.

With all of the above-mentioned vehicle types, specific equipment requirements with regard to lights, mufflers, spark arresters, flags, etc., are dependent on state laws and agency management policies. This information should be provided to visitors as part of the normal information process to improve compliance with specific requirements.

OHV Enthusiast Desires

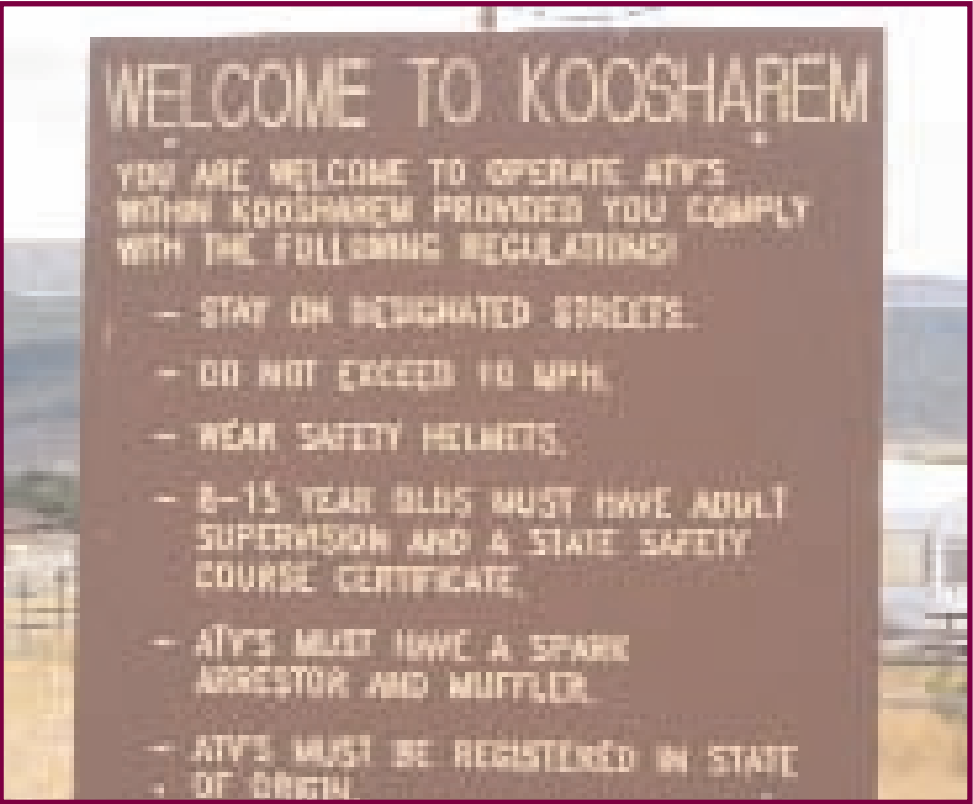
OHV enthusiasts generally seek the same type of outdoor recreation experience as any other outdoor recreationist. OHV enthusiasts use their machines to access scenic vistas, view wildlife, access historical sites, take photos, and experience and enjoy the outdoor environment with family and friends. They also use the machines as tools to access hunting and fishing locations and to retrieve big game animals that have been harvested. In addition, OHV use allows the enthusiast to experience challenge, excitement, and a sense of adventure and accomplishment.



Scenery and unique natural features enhance trail experiences.

There are a number of different features that OHV visitors look for when they go for a ride; the primary item is a loop trail. Like all trail users, OHV enthusiasts need and enjoy loop trails. They look for trails that have diversity in terrain and various levels of difficulty. Quality signing, which includes informational, directional and interpretive signing, enhances the visitor’s experience. Good maps of trail systems make travel easier, allow visitors to plan detailed trips and focus attention on the trail experience. Trailhead and staging facilities that provide adequate parking, restrooms, water, and picnic or camping opportunities also enhance the overall recreation experience.

OHV recreation is a dispersed recreation activity. Even though OHV enthusiasts may travel with their families or in larger groups, they still want to recreate in a dispersed setting where they feel some level of solitude and isolation. One key to successful OHV management is to disperse riders – spread them out; don’t box them in. When managers recognize the full range of user needs and desires, they are better able to develop a system that can satisfy those needs.



Community access satisfies OHV enthusiast’s service needs and can provide significant economic benefit to local businesses.



The use of off-highway vehicles by those with physical challenges readily opens opportunities to enjoy our public lands.

The 4 E's of OHV Management

The Keys to Success

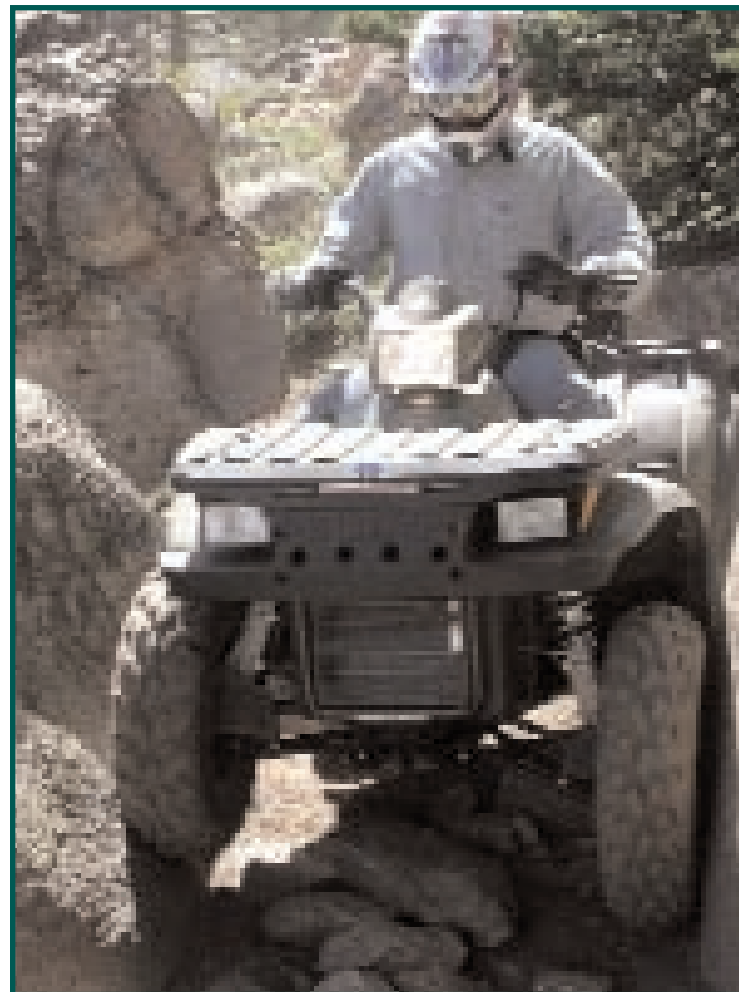
Riding ATVs and other OHVs is a very popular activity, which is reflected in the substantial annual sales of these vehicles. In addition, new technologies are extending the useful life of older vehicles. As a result, the population of vehicles is increasing along with the demand for riding areas and recreation opportunities for OHV enthusiasts. Land management budgets are facing increasing pressures. In some places OHV riding areas have suffered from management neglect. Environmental challenges are becoming more complex. Litigation is a constant threat.

With all of these challenges, the management of off-highway vehicles may seem daunting. However, the ability to develop and maintain quality riding opportunities and to protect the environment, while meeting all of the other challenges managers face, is still possible.

Virtually all successful OHV programs include many of the same elements and have managers that can visualize and apply the concept of the “4 E's of management.” The 4 E's are:

- **Engineering** – Designing the facilities to address issues.
- **Education** – Telling participants what is expected, important, and interesting.
- **Enforcement** – Identifying and dealing with problems.
- **Evaluation** – Making sure your actions are accomplishing your goals.

While at first glance it may appear that this concept only applies at a “local” level, the 4 E's concept can be used as a guide to check how decisions made at any level will impact the management of public lands on a local level. For instance; a national policy requiring bridges over all streams would have entirely different implications in Oregon than in Arizona. This “engineering” requirement would hamstring an OHV program that crosses numerous intermittent streambeds in the desert environment of Arizona. A policy like this clearly does not allow the management flexibility that local conditions may require.



Design is critical for quality opportunity, practical maintenance and protection of resources.

Agencies must continually review how upper-level management decisions affect the ability of local managers to manage OHV recreation on the ground. The 4 E's concept provides a checklist to compare how managerial decisions might affect the four most important elements of an effective OHV management program.

- How will this decision affect the ability of field offices to apply proper engineering?
- How will this decision help or hinder the various aspects of education?
- How will this decision help or hinder field offices' ability to make enforcement more effective?
- How will this decision affect the ability to monitor results?
- And, most important, does this decision help OHV managers with one or more of these elements?

Engineering

The concept of using engineering or facility design to address environmental and social issues is commonly used in recreation management. If a nonmotorized recreation site is overused, it is hardened. If a trail develops, it may be paved, obliterated, or have some other action taken to resolve or minimize the effects. This same concept can be applied to the management of OHV recreation. One principle to keep in mind: When visitors come to your forest or park to have fun, they will have fun. If they can have fun on the trails and areas you provide, that is what they will do. If not, they will still have fun, but the way they choose to have fun may cause management and environmental problems.



Technical trails lower speeds and increase the level of experience.



Well-designed systems entice rather than force the visitor to follow area rules and regulations.

Below are some examples of problems identified in OHV management. Following each example are possible solutions.

Speed – People travel too fast on the trails creating safety and resource problems.

Solutions: Keep the trails narrow. Shorten sight distances with twists and turns or by using the existing landscape and terrain. Avoid identifying one-way trails.

Visitors create problems as they search for challenges.

Solutions: Provide an opportunity for people to find a challenge in an appropriate manner. Play areas may be one way to help satisfy the need for a challenge. Maintain trails to provide challenges by leaving obstacles in or near the trail or by building trails with higher levels of exposure.

Off-route use occurs.

Solutions: The first challenge is to determine why people are riding off the provided routes. Is it because existing trails do not provide the desired opportunities or experiences? If so, increase trail mileage or improve diversity of the experiences available. Is it because people are trying to reach a desired location like a vista point or some other attraction? Consider developing a suitable route for them to use. Is it because riders are confused as to which routes to use? If so, install barriers, signs, or other trail delineation.

Route Proliferation – Enthusiasts explore and create new trails.

Solutions: See off-route use above. Review existing management directions. Some public lands are managed as open to cross-country travel, yet managers feel frustrated because of route proliferation. In these cases, route proliferation is condoned by the established management direction. Change it. Are new routes being developed for some other specific purpose such as wood gathering, big game retrieval, or campsite access? Decide if such activities are acceptable and let people know (see education).



Well designed trails are fun to ride and drain water from the tread.

Wildlife Disturbance – Vehicle use reduces the effectiveness of wildlife habitats.

Solutions: Where wildlife security is an issue, trails and routes can be located in a manner that provides increased screening. Trail locations can be modified to divert use away from key wildlife areas. Trails could be located closer to existing road corridors to increase habitat effectiveness. If seasonal disturbance is a problem, such as during breeding or calving or nesting seasons, apply seasonal closures that protect the area during critical periods but allow use for as much of the season as possible. When trails must cross riparian areas, locate them in such a way as to limit impact on wildlife.



Harden or bridge stream crossings where appropriate to reduce sediment delivery.

Water Quality – Trail erosion affects the watershed.

Solutions: Construct or reconstruct routes with rolling dips, undulating trail design, or trail grade breaks. Avoid installing multiple waterbars. Locate trails to reduce the number of stream crossings. Harden stream crossings where appropriate to reduce sediment delivery. Properly engineered trails control water, enhance rider experience, and require less intense, though still regular, maintenance.

Sound – Vehicle noise disturbs neighbors, wildlife, and other forest users.

Solutions: Locate routes in a manner that reduces sound transmission. Instead of putting a trail on the top of an open ridge, move it down the slope, away from sensitive areas. When possible, locate trails away from interface areas where housing development is encroaching on recreation areas. Managers might also consider lower sound level restrictions for particularly sensitive areas after appropriate analysis.



Sound field testing can be easily and quickly accomplished with the 20" SAE J1287 sound test.



NOHVCC Adventure Trail Activity Book.

Education

Experience has shown that most people want to do what is “right.” The problem is they may not know what that is. Many managers seem to believe that doing what is “right” is a matter of using common sense. That may be true for someone who is intimately involved with land management, but it is not true for many people using public lands for recreation. Another general principle to remember is that if you don’t tell people what you expect, you can’t complain when you don’t get what you want. A basic premise is that educated riders are responsible riders, and responsible riders keep riding opportunities open and reduce impacts.



Staging areas and campgrounds are effective outreach points for OHV enthusiasts.

Visitors need to know:

- What to expect during their visit – This should include the types of opportunities that exist, available trail experiences, and other users they may encounter during their visit.
- What types of restrictions are in place – Are vehicle types limited? Are seasonal closures in place?
- What is unique about the area – What features, species, and historical or cultural interpretive information may enhance the visitor’s experience and the value they place on protecting the area?
- What behaviors are appropriate – How do you expect visitors to behave?
- Where to go for specific information – Whom should they contact for more information?
- Why the rules exist – Compliance will increase when riders understand the issues and rationale behind rules/restrictions.



Kiosks need to provide maps, interpretive information, and the area’s rules and regulations. Bangs Canyon Recreation Area, Grand Junction, Colorado.

When it comes to providing information to visitors, or potential visitors, there are two things to consider—timing of the delivery and method of delivery.

The value of information is dependent on how usable it is when received. All visitors go through stages of any recreation activity. These are generally characterized as planning, participation and recollection phases. It is important to provide information at the needed time. It is also important to recognize that although the bulk of use may start at a local level, once you have implemented a managed trail system, the use pattern may eventually evolve as the site becomes a destination for non-local riders. For this reason managers need to use all of the tools available in the education toolbox.

Planning Phase

Information needed during the planning phase allows the visitor to structure the trip and sets visitor expectations. For example, if vehicle restrictions such as “no trails available for ATV use” are in place, the time to use that information is during the planning phase. It is too late to tell the visitor who arrives at your site with his family and a trailer load of ATVs that there are no trails available for them. Some people, when faced with the choice of disappointing their family or following all the rules, may choose to disobey some of the rules. Some good education axioms are “Know Before You Go” and “Find Out Before You Ride Out.”

Setting expectations early is important. If visitors are seeking a nonmotorized experience, they need to be directed to areas that meet their desires and steered away from areas that do not provide the experience they seek.

Websites are an effective way to convey general information about an OHV site and the opportunities available, as well as time-sensitive information necessary, during the planning phase of the recreation experience. Time-sensitive information such as fire closures needs to be posted as soon as implemented and needs to be removed as soon as conditions change. National surveys indicate that web information is a popular and growing source of information for OHV enthusiasts. A proven key to successful websites is to provide a “Current OHV conditions” link on the first page visited for your particular recreation area.

Recreation opportunity guides are valuable tools for the visitors looking for places to go or looking for particular experiences. Unfortunately, these are common victims of budget cuts and redirected priorities.

Participation Phase

Information on what behaviors are expected can be delivered during the participation phase. This is where on-site information is valuable.

Various methods of conveying information exist. Some of the methods include:

- Maps
- Signs
- Brochures
- Posters and information at trailheads
- On-site patrols



Maps help OHV enthusiasts stay on the trail and reach their destinations.



The San Bernardino National Forest Association OHV Volunteer Program takes education messages directly to forest visitors.



Maps and area brochures need to be readily available twenty-four hours a day and seven days a week. BLM Grand Junction Field Office, Colorado.

Signs are an excellent way to convey site-specific route information and to reinforce information provided on the maps. Signs show visitors where they can go and where they should not go. They can also provide information on trail difficulty levels, trail conditions, and interpretation. Some effective education signs that should be considered are “Use It, But Don’t Abuse It;” “The Future of This Trail (System) Depends on You;” and “Stay on Trail or Stay Home.”

Enforcement

Active and reasonable enforcement is critical to successful long-term management of OHV use. The general principle that applies to enforcement is that most people want to do what is right. Active management will make it easy for visitors to know and comply with regulations, but when you identify a problem, deal with it. Education should be stressed over citation. “A talking to” and a warning are often far more effective and positive than a ticket. In some jurisdictions a “fix-it ticket” may be appropriate. Remember, positive attitudes create positive programs, and the objective of enforcement is to obtain compliance with the rules.

When rule violations are identified, questions should be asked. Why are people behaving in this way? Are the signs in place? Are the rules clear? Is this something that a change in management will resolve? Is there an engineering solution to the problem? If everything has been done and problems persist, then it is time to bring in enforcement to take appropriate action.

Maps are critical to successful management of OHV activities. Depending on the specific management directions for an area, maps may not need to show every route available for use, but they must show the routes where OHV use is encouraged. Even in areas where use is limited to existing routes, a map of the system and loop trails will improve a visitor’s ability and desire to use the system rather than having to search for it. Maps also provide an opportunity to show the trail difficulty level and other restrictions such as seasonal closures. Maps need to be very clear, easy to understand and readily available. If a map covers a large area, Global Positioning System (GPS) waypoint data for specific areas and points can be very helpful to the visitor.



USFS enforcement staff and volunteer patrols provide a regular presence at the Oregon Dunes National Recreation Area.



Recognizing that the number of actual enforcement officers is limited, and they may not always be available, agency presence, whether they have enforcement authority or not, will improve compliance. In addition, it is important to build partnerships with local enforcement agencies. Their occasional visits to trails or trailheads can be beneficial in providing necessary law-enforcement presence. If visitors see uniformed personnel on the trails or at the trailheads, they know the area is managed and are more likely to comply with the rules. Trained volunteers are also helpful in gaining compliance. Volunteer hosts and trail patrols cannot be involved in direct enforcement, but they can share information with visitors and provide an agency presence, which will improve compliance.

Evaluation

Managers need to evaluate the effects of the recreational use on the facilities and the environment. It is equally important to evaluate the success of the programs from the perspective of the user and the effectiveness of the management actions you have taken.

The evaluation or monitoring process can easily take on a life of its own and can consume a significant portion of the budget, if you allow it to do so. Therefore, you must know what information you actually need before you start asking the questions.

Questions include:

- Are trail management objectives being met?
- Are user needs being satisfied?
- Are environmental issues being addressed?
- Is the activity in compliance with land management direction?

An effective evaluation process must be as simple as possible. The results of the analysis must be documented and readily available to the agency staff and to the public.

An example of a simple, yet effective, evaluation is photo point monitoring. It is a process that can be completed by volunteers with a minimum amount of training and can yield valuable data over time. Photo monitoring will show trends in trail condition, effectiveness of management actions, and life expectancies of trail structures.

Other forms of monitoring should focus on specific problems. For example, if the issue or concern is the effect of sediment on aquatic resources, monitoring needs to address the aquatic environment. Then, if problems are encountered, the causes and solutions need to be found and solved. It is of little value to simply measure soil movement on a trail and assume that any soil moved is reaching a stream.

Management of a quality motorized recreation experience requires an understanding of the 4 E’s. When issues are viewed in this context, there is a logical progression toward problem resolution. The riders, the environment and the managing agency will benefit from application of the 4 E’s.

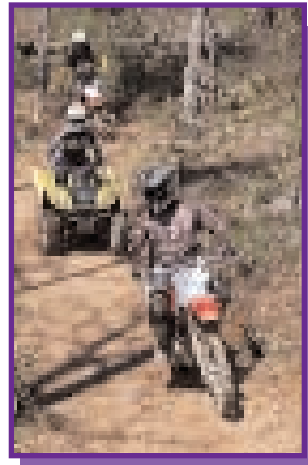
This approach can be a valuable tool for OHV managers on virtually every level, from the local area manager to the top level in the agencies.



Temporary trail counters verify visitor counts.

Developing the Vision

Before you, as a manager, even begin to start developing trails or a trail system, you must create the vision for the type of opportunities you want to provide and are able to provide, given resource constraints. You must decide on the types of vehicles to be accommodated and the manner in which that will be done, the range of opportunities that will be available, the facilities that will be provided and the management approach that will be used. These decisions should be based on an understanding of participant demographics enthusiast desires and needs, various recreational and resource uses of the land, and the capability of the land to support the various uses. The vision should be articulated in writing. As the site-specific planning process proceeds, the vision statement needs to be periodically reviewed, and, if necessary, modified to reflect any changes in thinking. Some of the questions that need to be answered in the vision statement include:



Minooka County Park,
Chilton, Alabama.

Type of Vehicles

- Will opportunities be provided for mountain bicycles, motorcycles, ATVs, four-wheel drive vehicles, or other special vehicles?
- Are all vehicles expected to use the same routes or trails, or are some separate routes available for the different vehicle types to satisfy specific needs?
- Is one vehicle type emphasized over others?
- How will other nonmotorized uses be accommodated?

Available Opportunities

- Are opportunities available for more intensive use, such as hill climbs, mud bogs, play areas, or obstacle courses?
- Will the trail riding experiences include the full range of difficulty levels for all vehicles?
- Will the area include designed areas for formal 4WD, OHM, and ATV training?
- Will emphasis be placed on providing unique riding experiences for the different vehicles?
- Will the area provide some single-track experience for motorcycle riders?
- Will the ATV experience include road and trail environments?
- Will events be allowed or encouraged, and, if so, under what conditions?

Facilities Provided

- To facilitate public access to the project area, will one or more trailheads be developed?
- Do camping facilities exist or will they be included in the project if needed?
- What type of sanitation facilities will be needed?
- Will the project include track-type facilities or other specific developments to provide desired opportunities?
- What types of trails and facilities are provided by other agencies or the private sector?

Management Approach

- Will agency personnel solely manage the project area?
- What types of collaborative opportunities exist to help with management?
- What type of volunteer workforce could be expected to assist with management?
- Will the project require an intensive management effort, or will infrastructure be developed to facilitate a less intensive management approach?

The processes described in this book allow a manager to take his or her vision and make it a reality.

The critical thing to remember is “Vision without action is a daydream, but action without vision is a nightmare.” *Don Howard, Creed Colorado*



System and Route Planning

OHV system planning is, by necessity, a sequential process. It involves identifying what you have, dealing with it, and making it better. It is a generally accepted principle that, in most areas, wheeled OHV use is a route-oriented activity. There are some notable exceptions, however, where cross-country travel is essential to enthusiast enjoyment and where existing site conditions can support it. These areas may include sand dunes, and other areas for wheeled use, where management determines that such use is appropriate. While this publication does not focus on snowmobile management in general, it is important to mention that cross-country travel is often essential to a quality snowmobile experience. This publication will focus on forest, grasslands, and other areas where a system of routes is the most effective way to manage wheeled OHV use.

Generally, riders will use routes that exist on the ground if they satisfy their needs and desires. Where existing routes fail to satisfy the riders, off-route travel will often occur, and new routes will become established. Since most user-created routes are not designed or constructed, they often create resource impacts, cause social user conflicts, and provide poor recreational opportunities. However, they should be reviewed during the planning process to determine if they fulfill a valid need and, if necessary, can be changed to meet resource considerations.

Many of the national OHV organizations recognize the difficulty of managing cross-country travel in forest environments. The Blue Ribbon Coalition has adopted the following position regarding use on designated routes and cross-country travel:

The Blue Ribbon Coalition supports the policy of limiting wheeled off-highway vehicle (OHV) use to existing roads and trails, in areas where cross-country use of OHV has been adequately studied and shown to cause adverse impacts. An open classification, which includes cross-country travel, can be appropriate in areas such as sand dunes, borrow pits, play areas, and other open lands.



Dependence on trails or roads in the wrong location may lead to increased degradation, decreased experience, and costly maintenance.



Heavy ATV traffic has little impact on this well-designed trail.

Making the Transition to Designated Routes

The sequential process discussed below identifies the steps necessary to identify and designate a system of routes that will protect resources and provide opportunities for satisfying recreational experiences. However, these steps will take time, money, and energy. What should be done in the meantime? Should managers just wait until they have the resources to do the entire job and live with the status quo until then? Living with the status quo is what has caused the situation that exists today. Something must be done immediately.

Some areas have been able to make the necessary commitment to do a complete job. They should, of course, continue. Other areas that do not have the resources to do the complete job at this time, but have identified unrestricted cross-country travel as the primary problem, can make a significant step toward resolving the issues.

The first step is to designate all existing routes as open and available for OHV use and then to prohibit cross-country travel except in appropriate areas. This will significantly reduce route proliferation and other problems caused by unrestricted cross-country travel and will allow the manager to focus on, and resolve, issues with specific routes. It will also allow managers to focus on smaller areas or to complete the system identification process in conjunction with other projects or area analysis.

Steps necessary to identify and develop a suitable OHV system are the same whether you are working on a large area or a smaller segment of the whole. The steps include:

Route Inventory

Most managers do not have the luxury of starting out with a blank slate. Routes exist and are being used. Some OHV routes may be the result of planned design and construction aimed at meeting specific needs and desires of forest visitors. However, in most cases the existing routes are the results of either visitors using trails developed for other uses or routes that were developed by riders initially riding cross-country.

It is really not important how the route was started. If it is currently being used, it should be included in the initial route inventory. The decision on whether the route will be retained or not will be made later in the process. Basing decisions on less than a complete inventory will call into question the quality of the final decision.

Current GPS technology allows for accurate inventories to be completed in a reasonable time and at a reasonable cost. Often, volunteers from within the riding community can be used to collect data. Whether agency personnel or volunteers are used to collect data, agencies need to be clear about the types of information collected. A sample GPS data dictionary is included in Appendix B. This sample data dictionary may include more information than is needed in the initial inventory and should be modified to meet specific conditions as needed. Keep in mind the amount of information you collect directly affects the amount of time and money spent. The more information you gather, the more time and money you will spend.



Collect usable data and use it.

During this phase it is important to recognize the different levels of inventory needed to accomplish the desired results. It may be desirable to accomplish the entire inventory job with an initial trip along the trail. However, a one-pass inventory requires more time, better equipment, and more funding than is commonly available. To complete an initial system identification, the critical information is route location, general information on route condition, and potential management issues. Volunteers using a good personal level GPS unit can accomplish this level of inventory. As routes are selected for potential inclusion into the final system, additional detail will be required and gathered.

During the initial data collection phase of the process, features that enhance a trail experience should also be located. These features may include vistas, waterfalls, lakes, streams, meadows, or hot springs. During the system layout phase of the process, trails can be located or relocated to provide visitors the opportunity to access these features.

The other items that need to be located and identified early in the process are support facilities. These could include trailheads, access points, campgrounds, food establishments, and fuel sources. It is also important to identify possible sites for special areas or facilities that may be desirable to enhance visitor enjoyment. These could include things such as “tot lots,” play areas, mud bogs, or race sites, if such uses are deemed appropriate in the particular area being considered.

You could also include conditions that influence system development. These conditions could include identification of riparian zones, core habitat for endangered or sensitive wildlife species and plant communities, cultural and historic resources, or other situations that might constrain or preclude trail or route locations.

Before moving on to the system planning phase of the process, managers should review existing planning documents to determine what activities are currently allowed and areas where plan amendments may be required if uses were to change. All of the above information should be developed into graphic format so that the next step of system layout can commence.



Destination points and vistas are important components of a quality recreation experience. Coal Creek OHV Area, Eastern Tennessee.

System Layout

Once the inventory process is completed, it is time to start identifying how existing routes can be used or connected to provide a system that meets visitor needs and achieves desired environmental and management objectives. We need to start with a few basic concepts.

Understand Rider Needs

Trails systems should be designed to meet local needs, provide desired opportunities, and offer a quality experience. This, of course, should not be done at the expense of other important concerns, but a system that does not meet rider needs will not be used and will not be supported. Occurrence of off-route use, other management issues and enforcement problems will be greatly increased when the trails do not provide an appropriate and enjoyable opportunity.

Adequate Experience

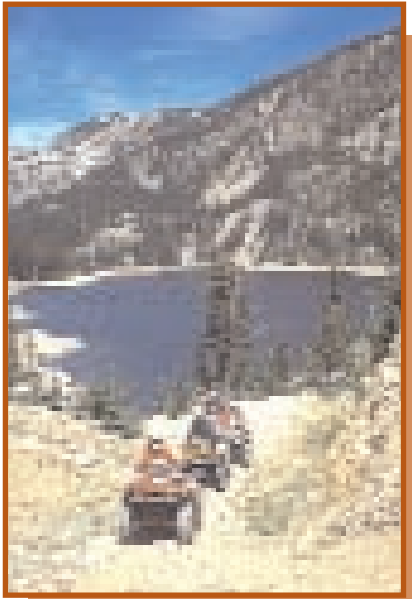
To be successful, any system must have a sufficient quantity of routes available to provide recreation opportunities for the time visitors spend at the site. The amount of trail necessary for a day-use site will be less than is necessary at a multi-day site. As a general rule, motorcycles will cover 25 to 100 trail miles per day depending on rider experience and trail condition. ATVs may cover 15 to 80 miles per day. For four-wheel drive vehicles, the experience is more a function of time than of mileage. For example, the famous Rubicon Trail in California may provide a 2- or 3-day experience on 16 miles of trail.

Mileage requirements are not ironclad. User needs and perceptions may vary by region. In the West, where large expanses of public land are available, visitors expect trail systems that measure 100 miles or more. In the East or Midwest where recreation areas are small, significantly less mileage may meet expectations. Again, this is a dispersed recreational activity, so the more spread out the people are, the better. Larger trail systems offer management flexibility and enhanced rider enjoyment. Miles = Smiles. Happy Riders = Compliant Riders = Happy Managers.

Loop Opportunities

All recreation enthusiasts look for variety in their various pursuits. For trail users, this means loop trails. An in-and-out trail may be satisfactory if the destination is so desirable that it overshadows the fact that visitors must use the same route in both directions. However, even in these cases, loop systems will always provide better experiences.

The quality of the recreational experience and the ease of management are greatly increased if OHV routes are interconnected to offer riders the opportunity to ride over a variety of loops. A system that provides multiple interconnected loops can provide riders an entire day of fun and entice them, rather than force them, to stay on the designated trails. The important thing to remember is that when visitors come to your recreation area to have fun, they will have fun. If they can have fun on the trails you provide, that is what they will do. If the trails are not fun, the visitor will still have fun, but it will probably result in undesirable behaviors and unacceptable impacts.



Destination trails can also be appropriate if they access desirable service facilities and points of interest.

The actual loop system employed and layout of the loops themselves will, by necessity, be dictated by the conditions on the ground and the issues that must be addressed. Several conceptual loop layouts that may be used include the Stacked Loops, Multiple Loops, Spoked Wheel, Primary/Secondary Loops or the Maze Loop system (see Appendix C).

Dual-Use Roads

As mentioned above, the ability to make loops and the ability to connect one riding area with another greatly increase the amount and, more important, the quality of the OHV experience. The most desirable way to accomplish these connections is with designated trails. However, we all recognize that trail connections may not be feasible in many situations. In these cases, connections may require the use of existing roads that are open to full-sized vehicles. This is an acceptable alternative, but it does require analysis and action by managers to make it useful for all enthusiasts.

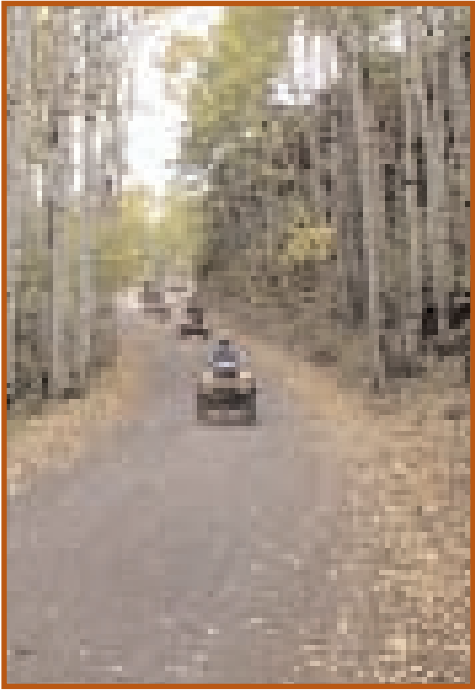
State laws and the definition of what constitutes legal use of a road vary significantly from state to state. Some states allow use of unlicensed vehicles on certain classes of roads. Other states may allow vehicle owners to license OHVs with a plate to have access to open roads. Some may require a driver’s license to use a low-standard road while others may not. In all cases, it is important that OHV managers understand the requirements and make necessary provisions to ensure that the identified route system is available and usable by all OHV visitors.

One way for most land management agencies to accomplish this objective is to specifically designate road segments that are incorporated into a trail system as combined use, shared use, or dual-use roads. Depending on agency requirements, this may require some specific planning action and specific signing. In some areas it may be as simple as assigning a trail number to the road segment. In other situations it may require a thorough engineering analysis to document the decision. In any case, it is critical that road segments included in a trail system be managed in such a manner that the users of the system, whether it be adults with unlicensed vehicles or youths without drivers’ licenses, be able to legally travel on identified systems.

Diversity in Trail Difficulty

OHV users seek a wide range of experiences and activities. By providing a trail system that includes a range of trail difficulties, the manager is giving the visitors the opportunity to structure their outings to meet the needs of any particular trip.

All systems should include some trails that can be rated as Easier and provide opportunities for families or novice riders to get out on the system for an enjoyable and relaxing ride. As a general rule, managers



Roads can be designated and managed to connect trail systems and complete desirable trail loops.



Though seemingly impossible a rock field, a vertical cliff or class 5 rapid are the pinnacles for many experienced outdoor enthusiasts.

should attempt to develop 10% to 15% of the system mileage in this category. These trails should be located closer to the trailhead or access point.

Systems should also include some trails that can be rated as Most Difficult and provide opportunities for the experienced riders who are seeking a challenge and adventure. A diverse system should include 10% to 15% of the system mileage in this category. These Most Difficult trails can be located further away from the trailhead or access point and can include shorter segments that provide alternate routes along the main system.

The remaining 70% to 80% of the system mileage should fall in the More Difficult category. This category of trail will satisfy the need for challenge by the novice rider and provide quality trail riding experiences for the intermediate as well as advanced rider. Since More Difficult trails will be a significant portion of the trail network, they can be located throughout the system and will normally provide the connections from the Easiest to the Most Difficult trail segments.

It is important to understand that Most Difficult trails can and must be developed without sacrificing environmental quality. There are a variety of factors that influence trail difficulty. These include grade, obstacles, surface conditions, tread width, and alignment as well as exposure or the openness of the trail. A level, smooth, well-drained, 6-foot-wide trail becomes “most difficult” when located on an open side slope with a 500-foot drop-off. There seems to be a perception among some managers that the only challenges enthusiasts want are hill climbs or mud bogs. This perception comes about from the fact that when trail systems do not include challenging sections, enthusiasts may search for a challenge. Hill climbs

and mud are the types of challenges that users can create on their own. On the other hand, a manager can design challenges into a trail system in an environmentally acceptable manner. Where trail systems are diverse and meet the needs of riders and managers, compliance with rules and regulations is significantly improved.

A system with a range of trail difficulties gives visitors the opportunity to structure their outing to meet their desires. Hatfield McCoy Trail System, West Virginia.



“Rock crawling – think slow!”
Special Use Permit event,
Middle Gila Conservation Partnership,
Florence Junction, Arizona.

Each trail segment or loop must have consistent difficulty. A basic principle in loop planning is that each trail segment/loop must end on a trail of equal- or lower-difficulty rating, never a higher-difficulty rating. Otherwise, you run the risk of forcing riders onto a trail that may be too difficult for their skill level. It is better to have consistency in a single loop opportunity and provide “Most Difficult” segments as alternative routes along an “Easier” or “More Difficult” loop if it is not possible to dedicate an entire loop to the “Most Difficult” category.

California Case Study

In one National Forest in California, managers had recognized the need to get control of OHV use in one popular area. They developed a plan with trailheads and access points, as well as a system of trails, that ranged from easy to difficult. As they began to implement their plan, they started with confining use areas at the trailheads, and then they began to reconstruct and sign the trails beginning with the Easier routes near the trailhead and progressing to the Most Difficult trails further out. On a field review of the site, the on-the-ground trail manager shared the following story. He told us: “As we were developing the system, we continued to have problems with some riders riding too fast or going off the trails. But once the system was complete, I had the ability to send riders to the trails they were seeking and my problems dropped off significantly.” He explained, “When I come into the trailhead in the morning, I can scan the visitors and can usually identify groups who may be a problem. On one particular day, I noticed a pair of guys who just fit the mold. I approached them to explain the rules and also let them know that a new Most Difficult trail had been added to the system. After learning that they were looking for some tough trail, I showed them how to find the new trail. I also commented that it was really tough, and if they tried it they needed to be very careful and be willing to turn around if it got too tough for them.” When I stopped at the trailhead at 2:30 that afternoon, my friends were back. I went over to talk to them. One bike was loaded, and the other rider was repairing his bike. I asked if they made it through the new trail. They explained how much fun they had and where they had problems. The field manager turned to the group of people on the review and said, “At 2:30 in the afternoon those people were no longer a problem. They were just two happy and satisfied visitors.”

There is controversy over whether or not managers should identify or post the difficulty level of any trail. Arguments against posting or mapping difficulty of trails include: 1. Possible increased liability, 2. Trail conditions that change quickly, and 3. Lack of a definitive standard or classification system. On the pro-posting side, arguments include: 1. Visitors can customize their trips to meet their specific needs, 2. Reduction in the chance for a rider to unintentionally get in over his head, and 3. Improve visitor experience. On the other hand, assigning difficulty levels is subjective, and a different symbol may be needed for each use type, increasing cost and perhaps creating confusion. The decision to post or not to post is a local decision. In the opinion of this author, the more information that is supplied to the visitor, the better and safer the visitor’s experience becomes, and happy visitors obey the rules.

Access to Desirable Features

With OHV activity, part of the experience is using the vehicle and the satisfaction that comes from building your expertise. However, another part of the experience is partaking of the outdoor environment and all it has to offer. Trail location can be used to greatly enhance this aspect of the activity. Trails and routes should be located to facilitate access to desirable outdoor locations. Things such as vista points, lakes, geologic features, and other scenic locations should be included along the trail system. In some cases it may be necessary to provide a short in-and-out trail to access these areas, but that should be considered in the system layout. When trails are built to areas where visitors may be expected to get off their vehicle and explore a little, the trail system should include well-defined parking and turnaround areas to reduce the urge to explore on the vehicle or impact trailside vegetation.

Access to Camping Opportunities

In many places, camping is an integral part of the OHV recreation experience. When camping is provided, enthusiasts need to have access routes from the campground to the trail system. It is not reasonable to expect visitors to load their vehicles and transport them to a trailhead if the campground is close to the trail system. If no connecting trails are provided, unauthorized routes inevitably develop as OHV enthusiasts try to reach the trails while avoiding the inconvenience of loading and unloading their vehicles.

When campgrounds are integrated into a loop trail system, it is important to ensure that the campground does not become part of the loop. Routes should not be designed that take a rider out one side of the campground and bring them back on the other side. It is most desirable to develop a short access trail that will allow riders to go from the campground to the trail system.

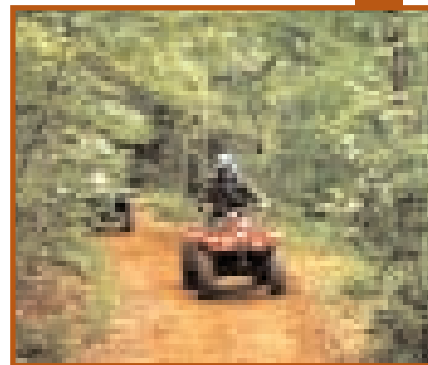
Support Facilities

Early on in the planning process, a decision needs to be made on the level of facilities that will be provided. These early decisions will be based on the anticipated use patterns, management needs, and opportunities to provide access to communities, private sector partners, or recreation providers. Trailheads developed for OHV use should generally include the same quality of facilities as trailheads for other users in the area.

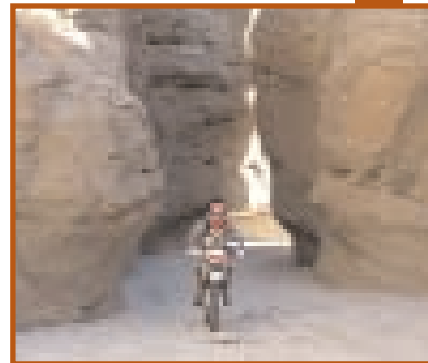
There are some essential design elements that need to be considered once a decision is made to provide a particular amenity. When considering a design for parking facilities, it is critical that the design includes opportunities for trailer parking. A significant portion of the OHV public uses trailers to transport their vehicles. Trailer types can



Natural arch,
Lewis & Clark National Forest, Montana.



Wayehutta National Forest OHV trail
with waterfall and mountain top vistas.
Cullowhee, North Carolina.



Crevice trail,
Anza Borrego desert, California.



Sitting around a campfire with family and
friends is the perfect ending for a day.

range from small, one- or two-place motorcycle or ATV trailers to large trailers capable of hauling multiple vehicles or incorporating vehicle hauling and camping capabilities in the same unit. Parking facilities should be provided to support the anticipated vehicle types.

Since many OHV parking areas are unpaved and therefore unlined, it is important that the desired parking pattern be somewhat intuitive. Designing parking areas with different entry and exit points or an obvious circulation pattern will result in a more consistent parking pattern and therefore a more predictable capacity. Once in a parking lot, visitors will tend to park in a location and direction that gives them unobstructed access to the exit.

Parking capacities are a topic of much discussion. It is generally agreed that it is not necessary or cost-effective to size primary parking facilities to accommodate the peak weekend use if there is significant variation in use levels between normal weekend days and major holidays. However, it is desirable to provide less developed overflow parking to accommodate peak weekend use. Where overflow parking is not possible, the manager needs to recognize that overflow will occur and should be anticipated.

Parking development can be an effective tool to disperse and direct riders as necessary. Developing larger, easily accessible parking in one area and less developed parking at the access points will tend to focus and direct the use to the more developed site without the need for rules or regulations to force the riders to go to one place or the other.

Parking Availability can be used in part to influence the level of use on a trail system. However, a manager who expects to regulate site capacities solely on the basis of parking is setting up a significant management problem. Visitors, particularly those who have traveled a substantial distance to reach the site, will find a way to park and unload even if it disrupts traffic flow or impacts vegetation.

Another important component of the OHV recreation experience involves camping. For instance, if a decision is made to include camping facilities as part of the OHV development, it is important to recognize that many OHV enthusiasts generally do not fit well in the traditional spur type campgrounds. OHV users commonly travel in groups and appreciate the opportunity to cluster with other members of



Trailheads developed for OHV use should generally include the
same quality of facilities as trailheads for other users in the area.



Photo courtesy of Hungry Valley State Vehicular Area, California.

Placement of fire rings or tables may be sufficient to identify a site and direct visitors to an open area that can be configured to fit the group. Shade structures will always be picked by the first arriving visitors.



Shade structure and kiosk built by Two Rivers ATV
Club, Riverview OHV Park, Waterloo, Iowa.

their group. Placement of fire rings or tables may be sufficient to identify a site and direct visitors to an open area that can be configured to fit the group. Campground design also needs to recognize that OHV enthusiasts travel with a lot of equipment. Parking should be designed to accommodate this equipment, including motor homes, trailers, and off-highway vehicles. When parking at sites is sufficient to accommodate all the equipment, vehicle use outside parking areas will be significantly reduced. The publication *Park Guidelines for OHVs* by George Fogg shows some examples of campground design and placement options.

Within the OHV community, camping facilities need not be highly developed. Many enthusiasts travel and camp in an RV, so less developed sites may be appreciated. If available, water is desirable, but it is not critical to the use. The perceived need for restrooms varies with gender, but from a management standpoint, providing restrooms resolves potential sanitation problems that may develop if use is heavy. Other high-end development such as showers, etc., will be used and appreciated by many visitors, but if the choice is between building high-end camping facilities or more trails, all riders would support building trails.

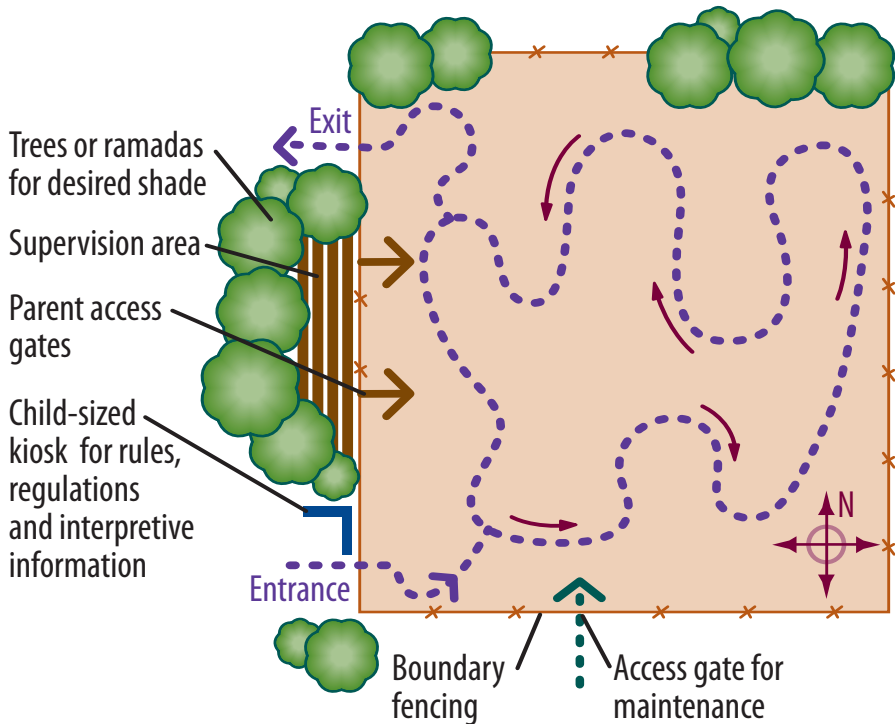


A new rider's needs should be considered in planning for OHV recreation.

Opportunities for Young Riders

OHV riding is a family activity. Where families recreate together, individual family members may participate at different levels. For example, when a family goes out together, they may ride together for a portion of the day. Then one or more adults and experienced young riders may desire a more challenging ride. Younger children may be left at the staging area with an adult member of the family. Youngsters in this situation are not usually ready to park their OHV and need a place to ride where they can be supervised. If a specific site is not provided, the temptation will be to ride around the staging area or campground. For safety reasons and to eliminate conflict with others in the area, a short, tight, twisty loop trail can be provided for young riders. This trail should have rolling bumps but no jumps. For improved safety, the trail should be designated as a one-way trail. This one-way

Children's Trail and Training Loop



A comfortable place to sit and relax encourages adult supervision while youngsters, with their high energy level, can keep going and going in a safe practice area.

designation should only be used in children's trails and in specific cases such as training loops for adults (see section on one-way trails).

The children's area should be located in a place that an adult in the campground or staging area can monitor it. It does not need to be directly adjacent to parking or campsites but should be within easy hearing range. Picnic tables or other areas should be provided where adults can sit and visually monitor the activities. The children's area should be signed with the same signs used on the regular trails and should also include responsible use signing to enhance the educational benefits to the young riders.

The area should be fenced and have a specific entry and exit point. The site should be specifically identified as a children's area to discourage older riders from using the area to show off for their friends.



Straight equals boring, which generally results in increased speeds and management concerns.

Avoid Fixation on Existing Trails

Few if any managers ever have the luxury of starting with a clean slate. Most lands being considered for OHV designation have a system of existing routes or trails. These may be the result of OHV use or of past management practices such as timber harvest, fire management, or livestock grazing. The routes may be usable in their current form and location, or they may have problems.

As a route system is being developed, all existing routes must be reviewed to decide if they contribute to a logical route system. Once that is determined, the next question is whether these routes are usable in their current condition, or do they have problems that need to be corrected. For routes that need some corrective action, the question becomes what type of changes are needed and how can they be accomplished. Here is one place management decisions can be made that could have a long-term negative effect on the overall cost and difficulty of ongoing management of the system. It is an opportunity for long-term management benefits to occur if the correct decision is made.

There are many techniques that can be used to fix problems associated with trails, but they can be extremely expensive to install and maintain. Therefore, the initial management question for a route that is needed in the system should be whether this segment of the trail can be relocated to resolve the problem. A trail that is in a wrong location may have to stay in that location if there are no alternatives. In this case, it may be justified to make a significant investment to resolve any issues. However, a better solution may be to relocate the trail and reduce long-term maintenance costs.

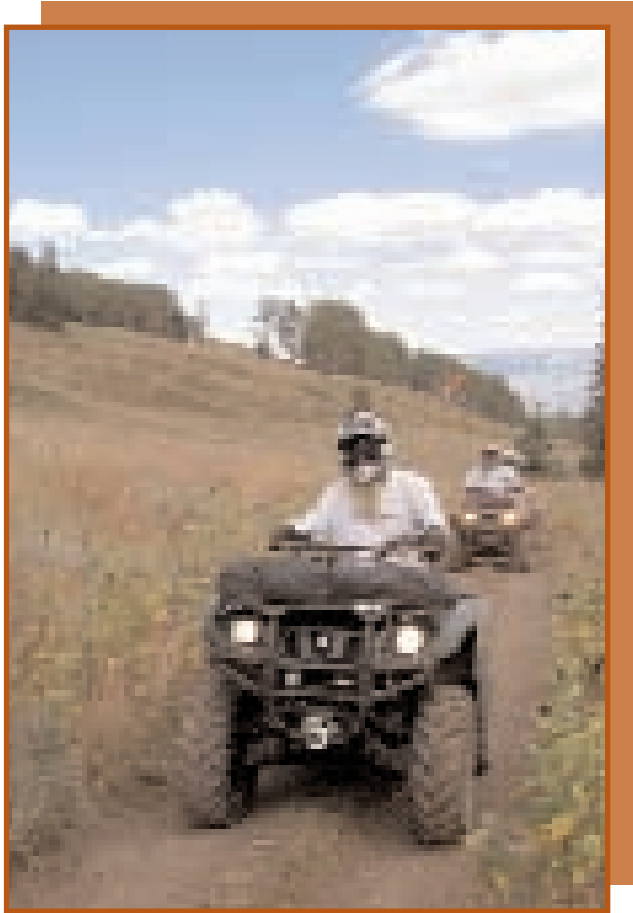
A good example of this is a trail that has developed along a fuelbreak that runs along the top of a steep ridge and is eroding severely. The steep sections of the trail could be hardened or major water control structures could be installed. The fact is that the steep sections of a fuelbreak may not be the best location for the trail, and reroutes may be the best way to solve the specific problems. When a trail is properly relocated, the overall quality of the experience improves, the mileages usually increase, and the environmental issues are resolved.

One-Way Trails

As a general rule, managers should avoid designating one-way trails, even though many riders will request them. There are several reasons for avoiding these trails. The first issue is speed: OHV riders tend to ride as fast as their comfort level allows. One-way trails increase this comfort level because riders assume they will not encounter oncoming travel. As a result, they increase their speed. Having riders aware that they may meet oncoming vehicles at any time will reduce trail speeds.

In addition, one-way trails may actually create safety problems rather than reducing them, as may be assumed. First, if every access point along a trail is not adequately signed or marked, and if the signing is not always maintained, visitors may travel the wrong way without knowing it. Riders may make a conscious choice to travel the wrong way if they encounter some type of vehicle problem on the way out of the trailhead and try to get back by the shortest route available. In either case, the wrong-way rider will encounter others who expect no head-on encounters. This is a clear prescription for disaster.

As a final consideration, one-way trails increase the need for trail mileage in any system. Trails ride differently when traversed in different directions. The scenery changes and the rhythm of the ride is different. All of this contributes to a feeling of diversity in the recreational experience. Therefore, having two-way trails improves the opportunities for creating different loops and may reduce the need for additional mileage.



Making riders and drivers aware that they may meet oncoming vehicles at any time reduces trail speed and increases safety.

Trail Design

Once a system has been identified, the process focus shifts to individual trails that make up a system. To ensure that each trail fits into a system and contributes to the overall system quality, there are a few general concepts that need consideration.

Trail Management Objectives

Each trail in a system must have clear, concise, and documented trail management objectives. In some cases, where situations change along a trail, specific trail management objectives may be appropriate for individual trail segments. These documents provide the building blocks of trail management and set the design and maintenance criteria for the trail now and in the future. Trail management objectives must give a manager a true vision of the trail including:

- **Trail Purpose** – Why does this trail exist?
What recreational experience will the trail provide?
- **Trail Description** – What does the trail look like?
What is the length, width, or surface?
- **Types of Use Desired** – Motorized or Non-motorized?
If motorized, which vehicles?
- **Management Strategy** – How will conflicting uses be managed? Will seasonal restrictions be needed?
- **Levels of Use Expected** – How many people are expected?
- **Maintenance Criteria** – What type of maintenance will be necessary and to what standard?

Trail management objectives help managers decide what facilities are necessary.



Environmental Protection

Agencies and trail managers have a clear responsibility to conduct management activities in a manner that addresses environmental concerns. Proper trail design is a major factor in achieving desired results.

Trail location is one of the primary factors in managing or avoiding potential impacts. Trails should be located or relocated to avoid sensitive areas such as riparian zones, cultural sites, and important wildlife habitats.

Another critical factor is the control and management of water. In any situation where water begins to affect the trail, water will win and the environment or the experience will suffer. For motorized trails, an undulating trail that allows multiple places for water to drain off the trail is far superior to trails that are built on a consistent grade. Where variations in trail grade are not possible, long rolling dips must be incorporated in the trail to provide water control.

Maintenance Efficiency

Trails should be designed and constructed in a manner that reduces long-term maintenance requirements. A good example of maintenance efficiency is demonstrated when water control structures are incorporated into the trail as rolling dips or undulating trail grade rather than relying on waterbars that can become ongoing maintenance problems.

Enthusiast Satisfaction

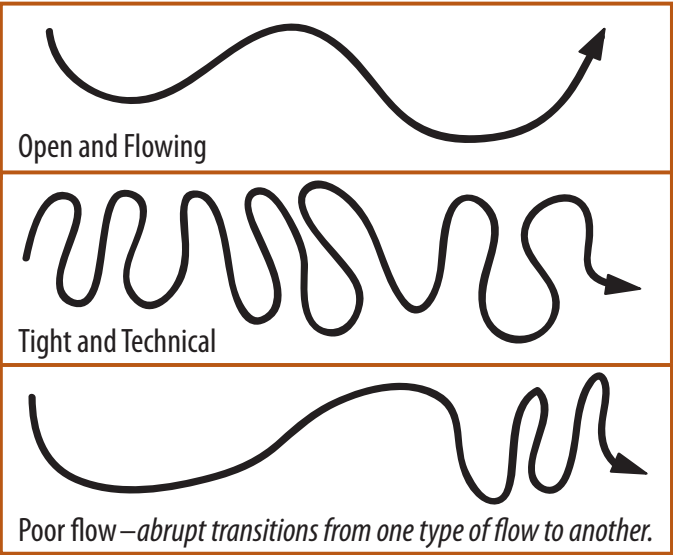
Trail design must ensure that the trail will provide the desired recreational experiences. A trail that is planned as a Most Difficult trail should be designed to include areas that will provide the challenges that a visitor would expect. For example, the trail could be routed through rocky areas to provide appropriate obstacles, downed logs could be left in the trail tread, or clearing limits could be reduced to add the challenge of encountering vegetation.

Site-Specific Factors

In addition to these general concepts, there are many site-specific factors that need to be considered when designing a new trail for new construction or redesigning an existing trail to better meet management requirements. These can include:

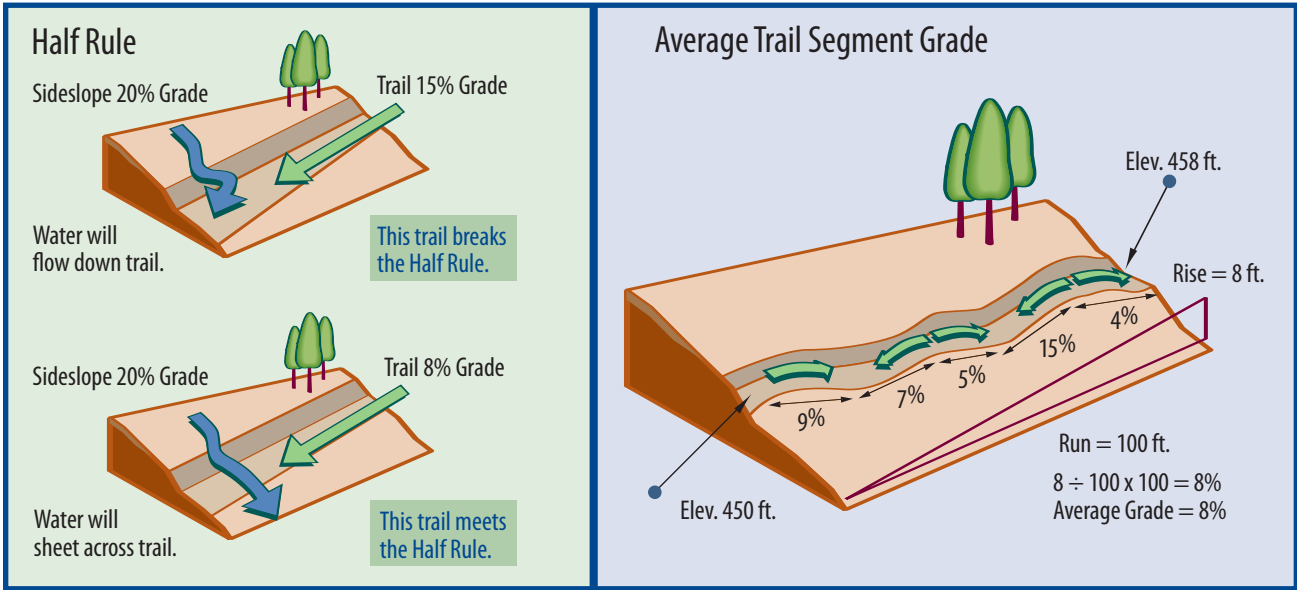
Flow

OHV trails must “flow” to increase ridability and create a high fun factor. Curvilinear alignments and undulating grades create flow. Curves must be circular and should be super-elevated. If a curve is parabolic rather than circular, it can be ridden more easily from one direction, but not the other, which may cause riders to fail to negotiate the corner. As flow decreases, the difficulty of the trail increases. If a change in the trail flow is required, designers should consider designing a transitional segment to avoid abrupt changes that could increase safety problems.



Grade

Trails should be designed to cross any slopes rather than go straight up or down the fall line. Trail grade should never exceed 50% of the cross slope of the area being crossed, to avoid channeling water.

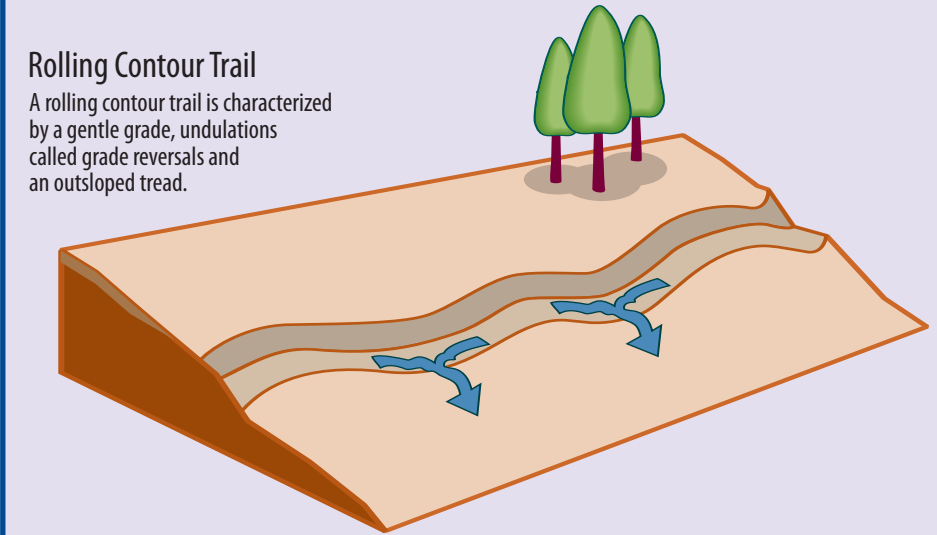


Water Control and Stream Crossings

Water control structures should be incorporated into the trail grade. Stream crossings should be located where the stream bottom is solid, stable or modified to support the expected uses. Stream banks should be hardened or stabilized, if necessary, to prevent unacceptable erosion or sediment delivery into the stream. When local regulations require and when crossings cannot be stabilized, streams should be bridged.

Rolling Contour Trail

A rolling contour trail is characterized by a gentle grade, undulations called grade reversals and an outsloped tread.



Soil Stability

Trails should avoid wet or boggy areas whenever possible. If it is necessary to cross a wet area, a suitable structure such as a turnpike, puncheon, or other armoring should be included in the trail design to ensure long-term sustainability of the crossing. Where multiuse trails are planned, the armoring method used must be compatible with all uses. For example, corduroy, which may be very effective for wheeled vehicle trails, is not compatible if horse travel is anticipated.

Intersections

Trail intersections should be designed to provide adequate visibility from all approaches. Designers should avoid four-way intersections, if possible, and instead use an offset to slow down riders.

Curves and Switchbacks

Turns and curves can be used as design features to reduce sight distances, increase difficulty, and therefore reduce speed. When multiple turns are necessary to gain elevation in steep country, use climbing turns rather than switchbacks, if possible. Climbing turns have a longer radius and provide for a more usable and enjoyable turn. Where switchbacks are used, the level of difficulty of the trail will increase. In addition, switchbacks may result in significantly more maintenance costs than climbing turns.

Vegetation and Clearing

The type of clearing on a trail can also be used to control speed or increase the level of difficulty on a trail. Narrow trails are appreciated by many riders and provide a better experience.



Mechanically constructed rolling dips or undulating trail grades provide water control and reduce maintenance.



Active Management

Once the trail system has been identified and is in place on the ground, the job is not over. It merely moves to the next phase. An essential element of every successful OHV project is the presence of an active management program. There never was a time when a recreation provider could simply put a facility in place and then let use occur without supervision. Managers would never think of building a campground and then not monitoring use and cleaning the site. An OHV trail system is no different than any other recreation facility provided for public use, in that it must be managed and maintained.

There are many aspects of an active management program that will be discussed in this chapter. There is a wide range of necessary work and a variety of ways to get the job done. The success of the program is directly dependent on the ability of the manager to prioritizing what needs to be done and then make it happen.

Information and Education

The availability of adequate information is critical to visitor satisfaction and enjoyment. This information can be provided in many different forms, but in every case it should be simple, complete, available and easy to understand. Some of the specific methods that can be used include:

Websites

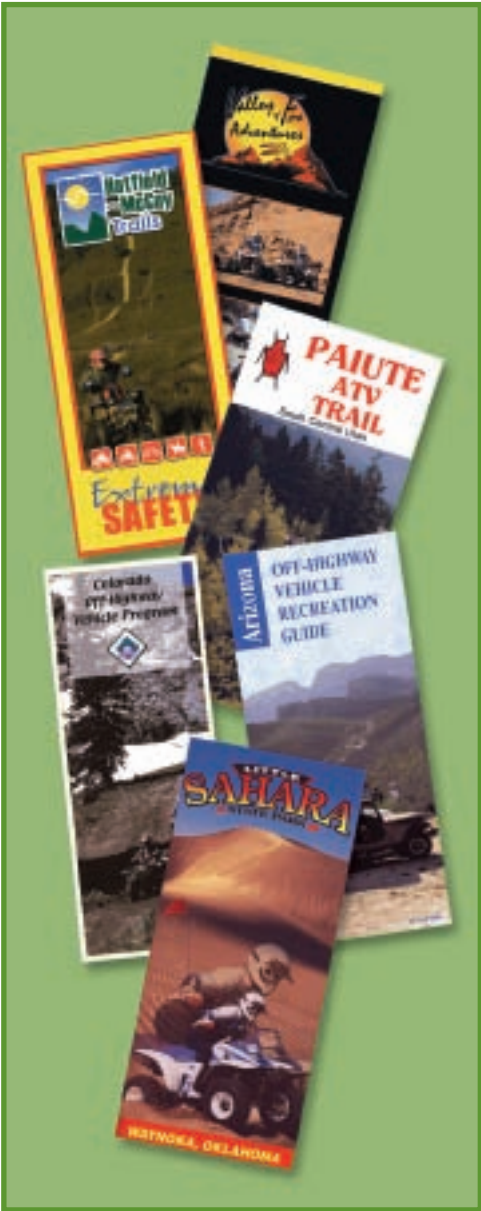
Websites can be very effective tools to convey up-to-date information for visitors to use when they are planning a visit. The information can be provided to many visitors in a cost-effective manner. In surveys of enthusiasts about sources of recreation information, the Internet ranks high. The reports show that Internet use has been growing over the years.

When providing Web-based information, it is critical that the information be regularly updated and reflect current conditions. Outdated information is worse than no information at all.

Websites provide good opportunities to increase rider understanding of some of the environmental issues and concerns on a riding area. Where possible, educational information can be presented in an entertaining manner to improve message retention. In addition, links can be provided to other outdoor ethics sites where the visitor can obtain information.

Brochures

Brochures are helpful communication tools for general information or rules and regulations. They can easily be mailed out when requested and can be produced at a reasonable price. Brochures can also be placed at hotels, motorcycle shops, and other sites that OHV riders frequent. A brochure that contains a simple route map may also provide valuable information to visitors who arrive at a riding area after an office is closed.



Signs

On the ground, signing is essential to the successful management of an OHV area. Signing should show the allowable uses on each trail. They should also show closures and restrictions and, where possible, indicate the reason for the closures or restrictions. To ensure better compliance, signing should be consistent between all management agencies within a given geographical area. Signing should be easy to understand, and the meaning of typical signs should be explained at trailheads, on maps, and in brochures.



Signs should provide useful information.

Maps

Where route systems are complicated, high-quality, durable maps are necessary. Maps should be simple and easy to understand. Maps are also a good way to convey responsible-use information and to explain rules and regulations. Maps should be available to visitors in the areas. If agency offices are closed on weekends, consider establishing a network of vendors to distribute the maps and other riding information. It is very useful to have maps available online, especially if they are in a downloadable format. Where possible, maps (printed and downloadable) should include GPS waypoint data if the public land trails and routes cover a significant area.



Interpretive signs add to the trail experience and increase length and quality of the ride.

Management Presence

Another essential component of active management is an agency or management presence. The most desirable approach is to have agency personnel on-site when visitors are using an area. If use occurs on weekends, recreation personnel should work weekends. Agency personnel can be used to accomplish routine trail maintenance as well as provide visitor services. Also, they usually have a better understanding of management issues and can provide more complete information to visitors. When agency personnel are patrolling an area, they should use the types of vehicles used by the riders. Patrol personnel on ATVs are more effective when they are talking to ATV riders. They are also able to get out on the trails. When riders occasionally see patrol personnel out on the trail, behavior naturally improves.



Agency personnel should be on-site when visitors are using the area.

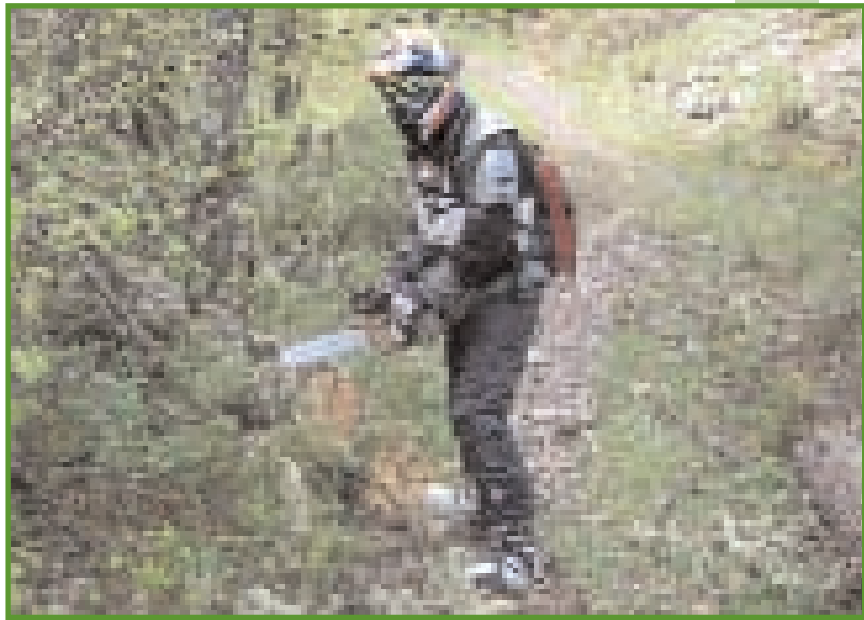
With funding constraints that agencies face, it may not be possible to provide patrol personnel whenever they are needed. In these cases, managers should consider establishing a volunteer patrol staff. These trail ambassadors need to be trained to understand agency policies and regulations. They need to be able to relate well to people, and they must understand that they have no enforcement authority. Their primary responsibility should be to provide visitor information and assistance. When properly equipped, they can quickly summon enforcement personnel as situations warrant.

Trail Maintenance

All trails must be maintained if there is any expectation of maintaining visitor experience, preserving the capital investment, and reducing environmental impacts. The level of maintenance may vary from year to year, but some minimal level of attention is required every year. It is critical that the intended difficulty level not be changed by over maintaining or under maintaining a trail. The Trail Management Objectives (TMOs) must be closely adhered to. Early in the season the trail should be opened to the standard required by the Trail Management Objectives. When logs and other obstacles are cleared, there is no reason for people to get off the route, and problems caused when people try to get around obstructions are eliminated. This is also a good time to identify and prioritize other maintenance work that may be needed on the trail, such as repairing drainage problems. It is also a good practice to try and visit the trails prior to the close of the season to ensure that drainage is functioning and the trail is ready for winter.



Trail rakes can pull soil from berms without requiring the operator to drive off the trail.



It is critical that the intended difficulty level not be changed by over maintaining or under maintaining a trail.

It is best if agency personnel can do maintenance with help from volunteers. Trail maintenance skills improve with every new season, and long-term employees can become very effective in identifying problems and fixing them before they become major issues. The fact that agency crews may not be available is not a good reason to ignore trail maintenance needs. Without trail crews, managers need to look for more innovative ways to get the job done. The Adopt-a-Trail program is one way to get maintenance done by volunteers, and it also develops some rider “ownership” in the trail. Volunteer workdays are an effective way to get larger projects done. In any case, when volunteers are used, agency involvement is also required. Again, it is important to note that volunteers must understand and adhere to the Trail Management Objectives and not develop their own standards.

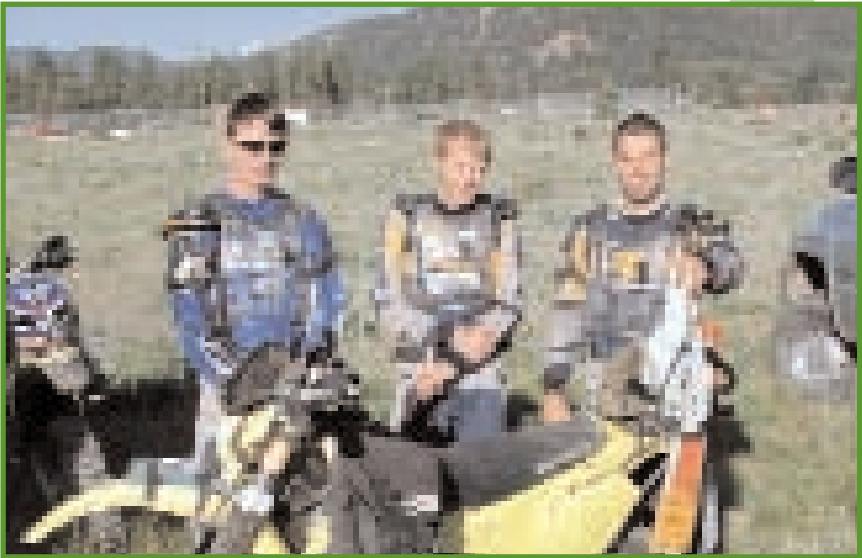
Volunteers

For most land management agencies, volunteers are the key to survival. This is especially true for OHV management programs. With budget cutbacks and shifting priorities, the money for trail maintenance and patrol personnel is shrinking, but the job is growing and still needs to be done. Recruitment and retention of volunteers is an ongoing process.

Agency Needs

Accomplishing Work

Some agencies primarily focus on using volunteers to accomplish specific tasks. The fact is that volunteers can accomplish amazing amounts of work, but the value of volunteerism is much more than the work that gets accomplished. There are times when it may be quicker and easier to use agency crews, if they are available.



The Colorado Trail Rangers, managed under Colorado State Parks, maintain trails and interact with the public.



Volunteers donate thousands of hours to maintain trails.

Building Understanding

When volunteers are involved in projects, there is an excellent opportunity to build a basic understanding of the associated management issues. Volunteers who understand why things are being done in certain ways can communicate that information to their peers and can help spread basic information to the entire riding community. Agency volunteer coordinators need to take the time and make the effort to help volunteers understand the project and how the project fits into the overall management picture.

Developing Program Support

Involved volunteers can be some of the best project supporters in the community. When they are involved in the process, they tend to develop a feeling of ownership in the success of the program. They may be very active and effective in generating financial support from other sources.

Volunteer Needs

The reasons people volunteer vary. Managers should try to identify volunteer motivations and place people into jobs that meet their objectives when possible. This is not as simple as asking volunteers their purpose in serving. Many times they have not taken the time to analyze it and don't really know all the things they are looking for. There are several things that all volunteers need.



Managers should try to identify volunteer motivations and place people into jobs that meet their objectives when possible.

Direction

With ever decreasing staff time there is a tendency to set volunteers up with a project, give them some basic training, and then turn them loose. This can create problems until it is clear that the volunteers and volunteer leaders fully understand what is expected and when to ask questions. As volunteers are learning any job, they need and deserve the same kind of attention that any new crew would get. As volunteers become more skilled, direct supervision can be reduced. However, having staff regularly working with volunteers allows a continuing dialog about what needs to be done, and more important, why it is being done.

Support

Volunteers have the ability to bring a lot of skills and resources to the project, in addition to general labor. They may have contacts that can provide project materials, heavy equipment, or highly skilled labor. That being said, it is important that the agencies provide as much financial support as possible to the project. Feeding or reimbursing volunteers for mileage, fuel, and some equipment maintenance will go a long way to improve volunteer satisfaction.

Respect

Volunteers are people and they deserve the same level of respect that is given to staff. Volunteers need to be managed, and if a particular individual is not performing satisfactorily, the manager must take appropriate measures to correct the problem. The approach to resolving issues should be the same as with any other employee. In addition, when projects are assigned, volunteers should get the same variety of projects that are assigned to regular crews.

Recognition

Recognition is an essential tool to maintain a corps of dedicated volunteers. Recognition does not need to be elaborate or expensive. An annual picnic or cookout is one way to show volunteers they are appreciated. Simple awards or small tokens of appreciation are effective ways to build volunteer commitment.

Involvement

Volunteer leaders need to be involved in some of the project planning. Taking an extra step to involve them in the planning process will pay dividends at project completion. It is also valuable if volunteers feel comfortable enough to offer suggestions on possible project improvements or changes that will allow a specific project to better fulfill rider needs, while also meeting project objectives.

Monitoring

Virtually every OHV manager is involved in some degree of monitoring. However, in many cases the process is subjective, inconsistent, and not adequately documented. If a manager goes out and rides a trail and determines that the trail is clear of obstructions, that there are no apparent problems, that the drainage is functioning and things look to be in good shape, that is a form of monitoring. The second step and one that is most often skipped is the need to document those determinations in a manner that makes the information clear to others.

Before managers begin to design a trail monitoring protocol, they need to have a good understanding of the questions that need to be answered. Once the questions are identified, then data collection methods can be developed to collect the data necessary to answer the questions. To ensure that monitoring can be reasonably accomplished, it is important to keep the process as simple as possible.



Simple awards or small tokens of appreciation, particularly given in the presence of their peers, are effective ways to build volunteer commitment.

Some of the questions that may be appropriate in an initial monitoring plan could include:

Are the trail management objectives being met?

This may simply require a review of the trail, its management objectives and a determination of whether the objectives are being met. If the trail is meeting the objectives, then simple documentation of that fact should be sufficient. If the objectives are not being met, then it is appropriate to identify management actions necessary to bring objectives into compliance.

What changes are occurring on the trail?

This question can only be answered after the trail condition has been documented for several years. The use of photo points offers a simple and effective method to document trail conditions and to indicate changes over time.

Are identified problems remaining stable or increasing?

Here again, the answer to this question results from documenting trail problems and then identifying change from year to year. Photo points are helpful in documenting trail problems and identifying changes. Where photo points indicate the need for additional information, other more detailed data collection methods should be used to determine the extent of the problem and its effects.

Have repairs been successful?

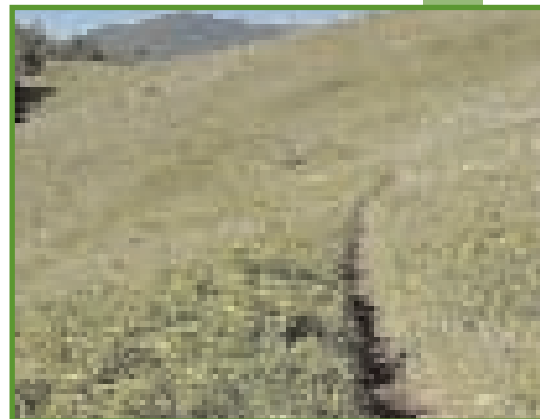
Documentation of repairs from prior years can be reviewed and revisited to determine if the repairs are working or if changes or other improvements need to be made. Photos can be helpful in documenting work that was done and any changes that have occurred.

Are environmental concerns being addressed?

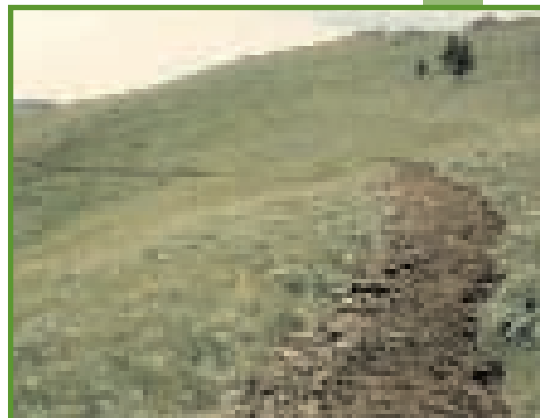
Annual monitoring reports should identify potential environmental issues that need to be addressed. Annual monitoring should look at the ongoing impacts and the success of any remediation efforts.

It is important to focus the data collection in a manner that answers the questions. For example, if there is a concern over the possible effects that sediment from the trail will have on the aquatic environment of a nearby stream, it is probably more important to be measuring stream conditions than soil movement on the trail. Then, if stream conditions are deteriorating, move back up the sediment stream to determine if the problems are with the trail.

After making the determination that the trail is the problem, it is essential that appropriate action be identified and implemented. It is not enough to simply identify and document the problem.



The use of photo points offers a simple and effective method to document trail conditions and to indicate changes over time.



Enforcement

Another essential element in a successful OHV program is quality law enforcement. It is human nature to improve behavior whenever law enforcement personnel are around. Most of us automatically take our foot off the accelerator when we are driving and see a traffic officer, even if we are not speeding. The same is true with recreationists. When law enforcement officers are in the area, we think a little more about how we behave. In addition, the presence of law enforcement officers, as well as other management personnel, shows that the agency cares about the area, and if the managers care then the visitors will respond.



In the Oregon Dunes National Recreation Area, law enforcement officers patrol by truck and ATV, allowing coverage of the entire dune system.

Objective

The ultimate objective of enforcement is to ensure compliance with rules and regulations. Many times this can be accomplished by taking the time to educate the rider and provide warnings when appropriate. However, there comes a time when the behavior changes from education, and warnings diminish to the point that additional pressure is needed. That is the time to bring out the ticket book and write the citations.

A good example of the above approach is in the case of vehicle registration. Initially, when riders may not know of the requirement, warnings are reasonable. But, after a year or two of education, a no-tolerance approach for failure to register will significantly improve compliance and in many states improve program funding.

Focus

Law enforcement efforts should be focused on solving problems. If registration compliance is high, there may be some small benefit for enforcement personnel to be at the trailhead checking stickers just to let visitors know that enforcement is on-site. However, if the real problem is off-route use or inappropriate behaviors in sensitive areas, the enforcement effort should be out on the trail or around the problem areas. If a problem has been identified with motorized incursion into closed areas, the enforcement efforts should be focused along the closure boundary in order to apprehend the offenders and prevent future problems.

Techniques

Enthusiasts respond much more favorably to enforcement efforts focused on the problem areas. They also respond favorably to enforcement officers who are out on the trail riding the same vehicles. By getting out on the trail on a motorcycle or an ATV, enforcement officers gain credibility and become much more effective because they are out where the problems may occur. They are also more effective in search and rescue and other safety-related activities since they are able to get to the immediate areas where they are needed.



"Amnesty Days": Giving stickers out to the quietest vehicles, providing information to clubs and at events or dealerships about stationary sound testing and how to keep their vehicles quiet all help build compliance and cooperation.

Clearly, officers must have discretion in how they handle any particular problem. But it is the responsibility of management to set the priorities for enforcement activities and provide guidelines for the conduct of those activities. This cooperation between management and enforcement will result in significant improvements in the quality of an area and in visitor experiences.

Public Outreach

With all the work that is involved in managing the visitors and the facilities, it is easy to lose focus of one important component of OHV management: local public or the project neighbors. Failure to consider the effects on the neighbors early in the process will lead to conflict, confrontation, and possible litigation.

Neighbors need to be involved early in the planning process to ensure that they understand the entire project and its effects. In addition, the local concerns need to be identified and addressed during the planning phase. Controversy and opposition are an element that must be addressed in nearly every OHV project. By getting neighbors and local stakeholders involved in the process and by allowing them to influence and understand the project design, the manager is better able to control public perception.

Summary

Management of OHV recreation can be a challenging experience, but it can also be very rewarding. OHV enthusiasts tend to be very appreciative of the efforts of land managers who work to provide systems of quality trails for their use.

The challenges, though at times difficult, can be overcome. The use can be managed to meet rider and agency objectives. Many OHV managers produce high-quality programs by applying the tools and the approaches presented in this book.

New managers may be able to take some of these guidelines and immediately improve program quality. However, it is also important for managers not to work in a vacuum. Maintaining a dialogue with other managers within an agency or in other agencies makes the job much easier. There are also a number of outside groups that may be able to offer expertise or information to help with the management job. Chances are that someone has already dealt with the problem you are facing. They may not be able to give you a simple solution, but they may help you avoid making the same mistakes. The primary focus should be to reach out beyond your administrative boundaries to find the tools and the help you need to get the job done.

References

George E. Fogg, *Park Guidelines for OHVs*, National Off-Highway Vehicle Conservation Council, 2002.

Joe Wernex, *Off-Highway Motorcycle and ATV Trails: Guidelines for Design, Maintenance and User Satisfaction*, American Motorcyclist Association, 1994.

Pennsylvania Trail Design Manual for Off-Highway Vehicle Trails, Pennsylvania Department of Conservation and Natural Resources, Prepared by Larson Design Group Inc., 2005.

Appendix A
OHV Event Descriptions

Organized events are an important aspect of an OHV experience for many enthusiasts. The types of events vary. Listed below are short descriptions of some of the events that managers may be called upon to consider as they manage OHV use.

Dual Sport

An on/off-road event where street-legal motorcycles are used. Only a rough time schedule is used primarily to get riders to catered lunch breaks or to get riders to a prescribed finish point before dark. Course length is typically greater than 50 miles, depending on trail difficulty. Alternate routes are provided to bypass more technically difficult sections. These events can vary widely in percentage of trail versus road use.

Match Trial

An off-road event where the participants ride a prescribed course multiple times. Riders may ride at their own pace but are timed over each section of trail. The object is to match your time over the trail sections and speed is not required. No timing devices are permitted so riding consistency is being tested. Awards are based on the least differential time over the prescribed trail sections.

Poker Run/Turkey Run

An on/off-road event where participants follow a prescribed course. Contingency prizes are awarded at the end of the event by a random determination such as a poker hand or random drawing. Course length will typically vary depending on trail levels of difficulty but usually will exceed 50 miles.

Hare Scrambles

This is a form of closed-course competition that utilizes a trail loop of 3 or more miles in length. It normally utilizes a mass start with one or more checkpoints. Time duration is normally two or more hours depending on rider class.

Enduro

A competition on a prescribed course and time schedule where a set speed, though not necessarily the fastest speed, is the determining factor. Trail length may vary from 25 to more than 100 miles, but total ride length must exceed 50 miles. Rider progress is monitored through a series of checkpoints along the course.

Competitive 4x4 Rock Crawling

This activity is held in an “area” or “site” rather than a “trail.” A good site calls for small areas (10-30 acres) of natural rock / large boulder formations allowing a number of individual obstacles to be identified. Each obstacle (10-15) is marked for competitors to traverse on a predetermined course along with a maximum time limit per obstacle.

APPENDIX B
Sample GPS Data Dictionary for Detailed OHV Inventories

Route (Line) Roads & Trails

Road Type/Class (Menu)

Reclaiming [R]

Has not been used for long enough that there is intact woody vegetation growing that would be damaged by the passage of vehicles. Erosion and vegetation may block the way and cause the vehicle to get stuck or damaged.

Single Track [ST]

Hiking and biking; too narrow for a truck and, most times, an ATV. Can be up to 1/2-meter wide, not allowing ATVs or trucks.

Wide Trail [WT]

Allow ATV use but not full size vehicle.

Tertiary Road Unpav. [TRU] default

Generally a two-track that may or may not be usable by a two-wheel drive vehicle. No formal maintenance.

Secondary Road Unpav. [SRU]

Generally a regularly maintained one-lane road, with other roads of lesser quality branching from it. Connects primary roads and major points.

Secondary Road Paved [SRP]

A paved road that is not a highway, such as back roads. Often not striped. Connects primary roads and major points.

Primary Road Unpaved [PRU]

A regularly maintained road wide enough for at least two vehicles. Serves a large area, with many roads branching from it.

Primary Road Paved [PRP]

Major/Minor highway. Provides access between major points.

Road Material (Menu)

Kind of surface

Asphalt [A] Paved

Gravel (Overlay) [GO]

Material was brought in from offsite; road bed can be raised.

Gravel (Natural) [GN]

Surface is covered with natural gravel. Common in areas of decomposed granite and desert pavement.

Soil [S] default

The native ground; often may look like gravel, but gravel is skin-deep with soil underneath. Includes deep dust situations.

Packed Sand [P]

Usually in roads along wash bottoms.

Cobbles [C]

Usually in roads along wash bottoms.

Rock [R]

Loose rock that is rough to drive on; usually on steeper slopes on mountains.

Bedrock [B]

Exposed expanses of bedrock, usually due to erosion on an unmaintained road.

Use1 (Menu) Mandatory, actual use observed or use criteria listed below:

Undetermined [-]

Cannot be determined.

Motorcycle [M]

Can tell by tire tread and occasional broken accessory.

Bicycle [B]

Can tell by narrow tire tread. Do not ride ATVs on these trails.

2WD [T]

All paved roads, most secondary unpaved roads, and a few tertiary unpaved roads that are smooth enough for at least higher-clearance vehicles.

4WD [F] default

Can tell from roughness of road; erosion and/or steepness prevents two-wheel drive vehicles from using the road. Long-bed pickup trucks may run into trouble, especially crossing narrow washes. Some very steep segments may prevent GPSing using the ATV.

ATV [A]

Applies to most remote roads (especially many Tertiary Road Unpaved roads).

Hiking [H]

Single-track trails signed for hiking. Tread is often rougher than those used by ATVs, motorcycles, and bicycles. Some motorized trails may also be used by hikers.

Equestrian [E]

Horseback riding trails. Dung and hoof marks often a clue. Wild burro and other wildlife trails are not part of inventory.

Note: After “Use” entry determines type of vehicle, degree of difficulty can be assigned for the largest vehicle able to use route. These are subjective for planning purposes only. May change with maintenance.

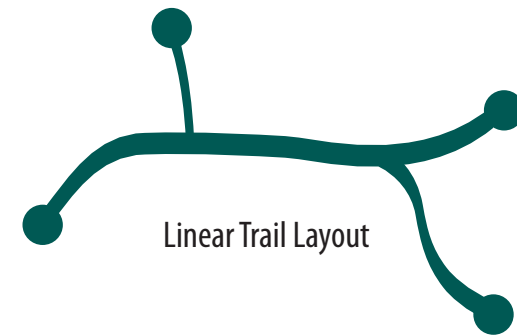
Degree of Difficulty Easiest More Difficult Most Difficult <i>Characteristics</i> <i>(reasons for</i> <i>degree of difficulty)</i> Width Slope Boulders Loose Rock Loose Surface Sideslope Vegetation-Dead Vegetation-Live Sand Mud Etc...	<i>Use Level (Menu)</i> <i>Heavy and Light are relative</i> <i>for each type of road.</i> Heavy [H] Moderate [M] Light [L] <i>default</i> Nonexistent [NE] Generally for reclaimed roads, with rare exceptions for recently abandoned roads. <i>Cross Slope</i> The angle of the trail's cross section from horizontal, in degrees. <i>Road Name/No.</i> (Text, 52 characters) Number or name of highway or designated back roads such as those in National Forests. Some hiking trails may have names. <i>Comment</i> (Text, 52 characters) Any comment that does not fit in other parts of the (Menu). <i>Person</i> (Text, 30 characters) Initials of person gathering data. <i>Maintenance (Menu)</i> Describes what the road needs done. Generally does not apply to unpaved secondary and tertiary roads and single tracks. Dust Abatement [DA} Shoulder Maintenance [SM} Striping [ST] Washboard [WB] Grading [GR} Aggregate Replace [AG]	<i>Width (Numeric) 1,0.5, 30.0, 2.5</i> Range from 0.5 to 30, in meters: default is 2.5, the width of most Tertiary Road Unpaved. <i>Hazards (Point) Dangers</i> <i>encountered on the way</i> <i>Type (Menu)</i> Mining Site [M] Mine shafts, adits, open pits, even if hazards are not obvious. Erosion [E] <i>default</i> Road badly eroded beyond what might be expected for the road type and may be hazardous to vehicles and drivers. Washout [W] Road is impassable due to severe erosion. Rest of road may be completely cut off or accessible via other roads. Water Xing [X] Crossing a perennial stream. Poor Visibility [PV] Due to vegetation or a tight turn around a cliff or rock. Overhanging Veg. [OV] Vegetation low enough to brush against vehicle or head, causing damage or injury. Flash Flood Area [FF] Long, narrow washes. Trash Dump [TD] Areas of extensive dumping or a large item worthy of being recorded for later removal. Hazardous Waste [HW] Suspicious barrels, smells, burned material, leaking containers. LEAVE SITE AND REPORT IMMEDIATELY!
<i>Use2 (Menu) Optional</i> <i>(See Use1 Menu)</i> Undetermined [-] Motorcycle [M] Bicycle [B] 2WD [T] 4WD [F] ATV [A] Hiking [H] Equestrian [E] <i>Use3 Menu) Optional</i> <i>(See Use1 Menu)</i> Undetermined [-] Motorcycle [M] Bicycle [B] 2WD [T] 4WD [F] ATV [A] Hiking [H] Equestrian [E]		

Point Sites (Point) Small Points of Interest Type (Menu) Campsite [C] <i>default</i> An area large enough for one or two tents or one or two vehicles. One or two fire rings. Scenic Overlook [SO] A picturesque view, often from a pass/saddle. Often where there is a dramatic change of view due to reaching a ridge or saddle (the wow! factor). Wildlife Water [WW] A developed Game & Fish wildlife water catchment made of a paved area funneling water to a tank and drinking facility. Usually has a fence around it and sign denoting restrictions. Stock Tank [ST] A developed reservoir for livestock, with water resembling a pond during wet times. Usually unsigned. Gate Cattleguard [C] You can drive across without stopping. Gate Swing [GS] Solid metal or wooden gate on hinges. Gate Wire [GF] Looks like a fence and has to be dragged away from the road. Loop wire ties it to rest of fence. Corral [CL] Enclosure for livestock, made of lumber or tree limbs; occasionally metal. Wildlife Viewing [WV] May be officially designated or an area where wildlife has been seen frequently.	Intersection [INT] Not required for every junction. Use only for junctions with a suspected or definite road that will require another trip. Dead End [DC] Not required for every dead end. Use as needed when a road seems to fizzle out or hits a fence not far from another road such as a highway. Trailhead [TH] The beginning of a hiking or equestrian trail from a road, often is designated, with parking facilities. Old Car [CAR] Abandoned cars or major car parts, of any age. Culvert [CV] Metal tube or very small concrete tunnel under road. Drainage Turnouts [TO] Road-like curves leading away from road itself to guide rainwater away from road.	Staging Area [SA] A large area where off-road events are often based. Often created by constant, unauthorized use and has numerous campsites and fire rings. Perimeter likely will include small islands of intact vegetation. Photo Points (Point) Photo # and optional comment Photo Points (Text, 30 Characters)/the photo number and optional comment to make identification easier. Format is LB 7-13 San Cristobel Panorama E. L is the first name (Leah) of person. B is for Barry M. Goldwater Range Project. 7 is roll number. 13 is photo number within that roll. “San Cristobel Panorama” makes photo identification easier, as given number may not always match number on slide or negative strip. “E” is for looking east; use if you think there may be confusion from lack of landmarks when the photo comes out. Use photo board for picture in most cases. Photos will generally show a typical setting for the road being GPSed, preferably with a scenic background that sets it apart from other roads. Occasional scenic views not showing road are also welcome. Use of photo board here is optional, keeping in mind that these photos may be used for displays and brochures.
Area Sites (Area) Large Points of Interest Type (Menu) Large Campsite [C] <i>default</i> A large campsite where a point GPS will not do, in excess of 20 meters in diameter. Stock Pens [S] Very large corrals. Parking [P] A large parking area. Scenic Overlook [SO] A large viewpoint, usually developed.		

APPENDIX C

Trail System Layouts

Linear Trail Layout (Point to Point) – The simplest trail layout has a point of origin and a destination. It connects two points or links two trails and is used when there are points of interest or destinations along a single narrow corridor. Additionally, this layout may be used to connect other trail systems where the terrain or land ownership restricts the trail to a single narrow corridor. This system may consist of several point-to-point trails that intersect. There may be multiple trailheads as well. The major disadvantage to this layout is that the rider must return to his point of origin over trail he has already ridden, or vehicles must be shuttled between trailheads. The linear trail layout is best used for long snowmobile trails or as a connecting system for other trail systems.



Linear Trail Layout

Single Loop System – A single loop system is used most often for a single, long distance all-day ride. However, it may also be used for a shorter-duration ride around large features such as a topographic feature, lake, reservoir or wetland. Trails of this system type are easy to develop and administer. There may be multiple trailheads along the loop. The trail must not exceed its difficulty rating over its entire length, unless bypasses are provided. This system may permit one-way or two-way traffic. The major disadvantage of a single loop system is that the rider's choices are limited.



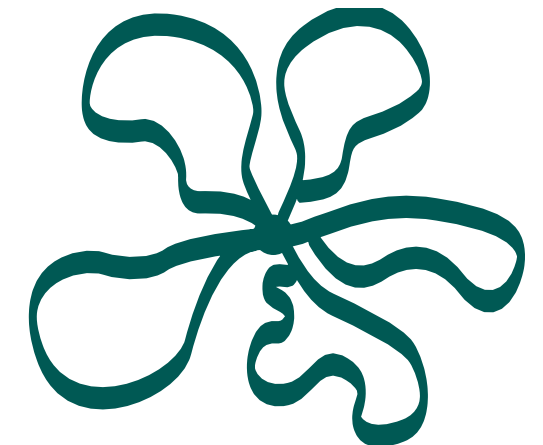
Single Loop System

Stacked Loop System – With this type of system the designer can develop multiple levels of difficulty, with each stacked loop becoming more difficult. The initial loop may be Easiest, followed by a More Difficult loop, with the final loop being Most Difficult. This system generally has only one trailhead. A stacked loop system can also be used to provide the user with a choice of the length and duration of the ride. Each loop offers a different experience and provides the rider with a more fulfilling and varied outing. This system type can allow a party of riders with varying skill levels to enjoy an outing together. All riders can ride the initial loops as a group, with the advanced riders following the Most Difficult final loop. The majority (average skill riders) would follow the More Difficult loop and meet the advanced riders as the loops rejoin. This system may permit one-way or two-way traffic.



Stacked Loop System

Multiple Loop System – The multiple loop system has a single trailhead, with several loops radiating out from the point of origin. Each loop may be of a differing level of difficulty, provide a different experience or provide access to a destination. This system provides the designer with the capability to meet a variety of user's expectations. This system may permit one-way or two-way traffic.



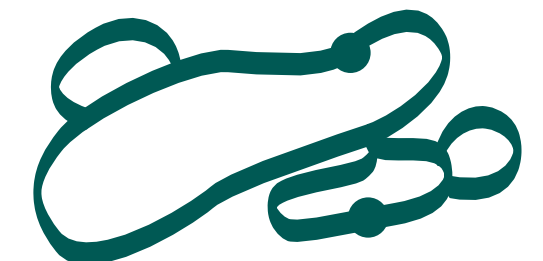
Multiple Loop System

Spoked Wheel System – This system consists of an outer loop that is connected by linear trails to a center trailhead, destination, or center loop. Multiple trailheads along the outer loop may also be used. A spoked wheel system can provide differing levels of difficulty for the spokes. The spokes can also be used to provide different experiences. This system may permit one-way or two-way traffic.



Spoked Wheel System

Primary and Secondary Loop System – This system has a primary loop, with multiple secondary loops. The secondary loops may offer a different level of difficulty, provide a different experience, or provide access to a destination. This system provides the designer with the most flexibility to meet user expectations for a variety of users. This type of system is ideal for multiple-use trails. Trailheads may be located around the primary loop. This system may permit one-way or two-way traffic.



Primary and Secondary Loop System

Maze System – The maze layout is a system of loops and linear trails that provides many alternative routes. A maze system can provide a variety of experiences but is usually of a single level of difficulty. This system can be used for orienteering events, where participants are required to visit checkpoints in a particular sequence. Users can become disoriented or temporarily lost in this system. A maze trail system should be well-mapped and well-marked. It is not suitable for multiple-use trails. This system should provide for two-way traffic.



Maze System

From: Pennsylvania Trail Design Manual for Off-Highway Vehicle Trails.