

**National Park Service  
U.S. Department of the Interior**

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***Cost-Benefit and Regulatory Flexibility Analyses:  
Proposed Regulations for Trail Management in  
Mammoth Cave National Park***

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November 17, 2009

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## **Introduction**

This report presents the cost-benefit and regulatory flexibility analyses of the proposed regulatory action creating a new six mile loop trail designated for hiking and bicycling, reassigning use on existing trails, and redesigning parking areas pursuant to the Mammoth Cave Comprehensive Trail Management Plan. Quantitative analyses were not conducted due to lack of available data, and because the additional cost of conducting quantitative analyses was not considered to be reasonably related to the expected increase in the quantity and/or quality of relevant information. Nevertheless, the National Park Service (NPS) believes that these analyses provide an adequate assessment of all relevant costs and benefits associated with the regulatory action.

The results of the cost-benefit analysis indicate that the costs of the proposed regulatory action are justified by the associated benefits. Additionally, this proposed regulatory action will not have an annual economic effect of \$100 million, and will not adversely affect an economic sector, productivity, jobs, the environment, or other units of government.

The results of the regulatory flexibility analysis indicate no adverse impacts for any sector of the economy or unit of government, including small entities. Given those findings, the proposed regulatory action will not impose a significant economic impact on a substantial number of small entities.

On November 14, 2008, the park named Alternative 4 the Final Selected Action. Alternative 5 was chosen as the preferred alternative in the Comprehensive Trail Management Plan (NPS 2007); however, after overwhelming opposition from public comment, park management concluded that the slightly higher Value Analysis score for Alternative 5 does not outweigh the importance of selecting an alternative with a high level of public support that scored almost as high, as was the case with Alternative 4.

The purpose of the selected alternative is to improve overall conditions of the backcountry trails, decrease recreational impacts, and increase user satisfaction by keeping bicycle and horse use trails separate. The selected alternative will create a new 6-mile loop trail which will be for bicycle and hiker use only. All other north side trails will be designated for hikers and horseback riders, some of which will be improved to accommodate the high level of traffic.

## **Cost-Benefit Analysis**

### ***Statement of Need for the Proposed Plan***

Executive Order 12866 (58 FR 51735) directs Federal agencies to demonstrate the need for the regulations they promulgate. In general, regulations should be promulgated only when a “market failure” exists that cannot be resolved effectively through other means. A market failure exists when private markets fail to allocate resources in an economically efficient manner. A significant cause of market failure is an “externality,”

which occurs when the actions of one individual impose uncompensated impacts on others. For example, bicyclists and horseback riders within the park can impose costs associated with congestion and health and safety risks if both groups are required to use the same roads. Because these costs are not compensated through private markets, both groups have little incentive to change their behavior accordingly. The result is an inefficient allocation of park resources.

### **Alternatives Considered in the Current Analysis**

Complete descriptions of all alternatives are in the Comprehensive Trail Management Plan (NPS 2007).

#### ***Selected Action Alternative***

Alternative 4: This alternative will establish a new six mile loop trail permitting hiking and bicycle use only. A new multi-use trailhead parking area with access at Green River Ferry Road-North will be created and improvements will be made to Maple Springs and Lincoln trailhead parking areas.

#### ***Other Alternatives Considered***

Alternative 1: A No-Action Alternative is required by the National Environmental Policy Act for the purposes of providing comparison to alternatives considered.

Alternative 2: This alternative would establish Sal Hollow, Turnhole Bend, and Buffalo as multiuse trails year round. All other north side trails would be designated for hikers and horse users only.

Alternative 3: This alternative would establish Sal Hollow, Turnhole Bend, and Buffalo as multiuse trails on a seasonal basis for horse users; hikers and bicyclists would be permitted to use the trails year round. All other north side trails would be designated for hikers and horse users only.

Alternative 5: This alternative would establish First Creek Trail for bicyclists and hikers only. All other north side trails would be designated for hikers and horse users only.

### **Baseline Conditions**

The costs and benefits of an action alternative are measured with respect to its baseline conditions. Baseline describes conditions that would exist without the regulatory action. Therefore, all costs and benefits included in this analysis are incremental to the baseline conditions. That is, any future impacts that would occur without the selected alternative, as well as any past impacts that have already occurred,

are not included in this analysis. For this regulatory action, the baseline conditions are described in Alternative 1 in the Comprehensive Trail Management Plan (NPS 2007).

## Costs and Benefits

### *Benefits Transfer Meta Analysis*

All of the action alternatives will generate benefits in the form of enhanced visitor experience and safety for all park visitors. Economists term such benefits as *consumer surplus*<sup>1</sup>, which can be measured through benefits transfer meta analysis. A benefits transfer meta analysis combines information from existing valuation studies in the economics literature and statistically estimates the relationships between the consumer surplus estimated in those studies and important characteristics of the studies such as type of activity, type of resource, and type of valuation methodology used (Rosenberger and Loomis 2001). These estimated relationships then allow the analyst to calculate a consumer surplus value that is specific to the activity and resource under consideration. The results of the meta analysis for bicycling, hiking, and horseback riding are presented in Table 1.

<b>Activity</b>	<b>---Consumer Surplus per Visitor-Day---</b>	
	<b>(1996 dollars)<sup>a</sup></b>	<b>(January 2009 dollars)<sup>b</sup></b>
Bicycling	\$17.45	\$24.02
Hiking	\$31.76	\$43.72
Horseback Riding	\$31.76	\$43.72
<b>Average</b>	-	<b>\$37.15</b>

<sup>a</sup> Source: Rosenberger and Loomis (2001)  
<sup>b</sup> Indexed using the Consumer Price Index for all urban consumers (BLS 2009)

This meta analysis indicates that one visitor-day will generate \$24.02 in consumer surplus for bicycling and \$43.72 for hiking and horseback riding. Those values apply to new visitors that are drawn to the park by implementing the selected alternative. Current visitors, on the other hand, would experience a marginal increase in the consumer surplus they derive from their bicycle use, hiking, and horse use. For example, current bicyclists might experience an increase in consumer surplus equal to half the visitor-day value calculated above (\$12.01). To estimate the total consumer surplus generated by an action alternative, the resulting number of new visitors and the marginal increase in value experience by current visitors would have to be estimated. However, the information required to estimate those factors is not available and NPS was not able to estimate the

<sup>1</sup> Consumer surplus equals the maximum willingness to pay for an activity minus the costs involved to participate in that activity.

total consumer surplus generated by each action alternative. Nevertheless, positive benefits would be generated.

### *Cost Effective Analysis*

The selected alternative is expected to generate positive *net benefits*<sup>2</sup> given the strong public support. The value of net benefits can be estimated through a cost effective analysis. This analysis will determine the number of new visitors that are needed per year to offset construction costs associated with the selected alternative. The cost to NPS of the selected alternative will be \$832,750 (NPS 2007). The cost effective analysis determined the park will need to have at least 672 new visitors annually in order to generate positive net benefits. This number was determined by calculating the constant, which is the amount of annual new visitors that the selected alternative would need to attract in order to generate a present value of total consumer surplus that offsets the total construction costs. In that calculation, new visitor days were valued by the average of the 2009 consumer surplus values in Table 1 (\$37.15). Present value was determined by using a 3 percent discount rate. The Office of Management and Budget Circular A-4 recommends a 3 percent discount rate when analyzing the impacts to private consumption.

Table 2 illustrates that visitation levels in recent years are generally increasing. From 2006 to 2007, the park had 8,369 new visitors. NPS believes it is reasonable to expect annual increases to continue on a similar trend given the strong public support behind the selected alternative. Given that 672 is significantly less than 8,369, it is reasonable to believe the park will have enough new visitors to offset construction costs. In addition, this action does not involve additional measures that would increase costs to visitors, businesses, or local communities. It is reasonable to believe that local economies will experience increases in economic activity from the selected alternative.

<b>Year</b>	<b>Hikers</b>	<b>Horseback Riders</b>	<b>Bicyclists</b>	<b>Total</b>
2007	31,170	9,088	3,728	43,986
2006	24,004	9,459	2,154	35,617
<b>Total Change from 2006 to 2007</b>				<b>8,369</b>

Values obtained by electronic recording technology at trailheads in Mammoth Cave NP and reported by Double J Stables, who operates a horseback riding program in the park under a Commercial Use Authorization. (NPS 2007)

The construction costs of the other action alternatives range from \$225,150 to \$287,250 (NPS 2007). Since this range is well below \$832,750, it is expected that Alternatives 2, 3, and 5 will yield positive net benefits, however with the strong public

<sup>2</sup> Net benefit equals the total benefit received from a change in the state of a good or service, measured by the sum of consumer surplus minus associated construction costs.

support behind the selected alternative, it is very likely that the selected alternative will generate greater net benefits.

### **Uncertainty**

The number of new visitors and the marginal increase in value experienced by current visitors resulting from implementing the selected alternative is unknown. Therefore, the total benefits generated by this action cannot be estimated. Nevertheless, positive net benefits will be generated as illustrated in the cost effective analysis. Any uncertainty involved in this analysis is associated only with the magnitude of those benefits. NPS is not aware of any other sources of uncertainty.

### **Conclusion**

The results of this cost-benefit analysis indicate that greater net benefits will be generated by implementing the selected alternative as opposed to any of the other action alternatives. Given that, NPS concludes that the benefits associated with implementing the selected alternative justify the associated costs. Further, the selected alternative is not expected to have an annual economic effect of \$100 million, or to adversely affect an economic sector, productivity, jobs, the environment, or other units of government. The selected alternative will improve economic efficiency.

### **Regulatory Flexibility Analysis**

The Regulatory Flexibility Act of 1980, as amended in 1996 requires agencies to analyze impacts of regulatory actions on small entities (businesses, non-profit organizations, and governments), and to consider alternatives that minimize such impacts while achieving regulatory objectives. Agencies must first conduct a threshold analysis to determine whether regulatory actions are expected to have significant economic impact on a substantial number of small entities. If the threshold analysis indicates a significant economic impact on a substantial number of small entities, an initial regulatory flexibility analysis must be produced and made available for public review and comment along with the proposed regulatory action. A final regulatory flexibility analysis that considers public comments must then be produced and made publicly available with the final regulatory action. Agencies must publish a certification of no significant impact on a substantial number of small entities if the threshold analysis does not indicate such impacts.

This threshold analysis relies on the cost-benefit analysis, which concludes that the selected alternative will generate positive benefits and no costs to visitors, businesses, or local communities. In addition, this action will not impose restrictions on local businesses in the form of fees, training, record keeping, or other measures that would increase costs. Rather, this action would reasonably increase park visitation and thereby generate benefits for businesses, including small entities, through increased visitor spending. Given those findings, the selected alternative will not impose a significant economic impact on a substantial number of small entities.

**References**

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