

ENVIRONMENTAL ASSESSMENT FOR FLYING W VICINITY

5.0 ENVIRONMENTAL CONSEQUENCES

This section of the EA forms the scientific and analytic basis for the comparisons of alternatives as required by 40 CFR 1502.14. This discussion of impacts (effects) is organized in parallel with Section 4.0 (Affected Environment) and is organized by resource area. For each resource area, a brief description of the methodologies used to evaluate the impacts is presented, followed by discussions of the No-Action Alternative and each action alternative. To the extent possible, the direct, indirect, short-term, long-term, beneficial, and adverse impacts of each alternative are described for each resource area. Cumulative impacts are discussed in the context of the definition given in 40 CFR 1508.7.

The impact analysis involved the following steps:

- Identifying the area that could be affected.
- Comparing the area of potential effect with the resources selected for evaluation.
- Identifying the intensity (negligible, minor, moderate or major), context (Are the effects site-specific, local, or even regional?), duration (Are the effects short-term or long-term?), and type (direct or indirect) of effect, both as a result of this action and from a cumulative effects perspective.
- Identifying whether effects would be beneficial or adverse (the criteria used to define the intensity of impacts associated with the analyses are presented in the methodologies of the individual impact topics).
- Identifying mitigation measures that may be employed to offset or minimize potential adverse impacts.

The impact analyses were based on professional judgment using information provided by park staff, relevant references and technical literature citations, and subject matter experts.

Impairment Analysis—The following excerpt is taken from the National Park Service Management Policies 2006 (section 1.4.5), “What Constitutes Impairment of Park Resources and Values.”

“The impairment that is prohibited by the Organic Act and the General Authorities Act is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.

“An impact to any park resource or value may, but does not necessarily, constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park’s general management plan or other relevant NPS planning documents as being of significance.”

Using these guidelines, resource specialists analyze potential effects to determine whether or not actions would impair park resources or values.

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Cumulative Impacts: The CEQ regulations, which implement NEPA, require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” (40 CFR 1508.7).

Intensity, Duration, and Type of Impact - Intensity thresholds are evaluated on a continuum scale from barely detectable (negligible) to substantial alteration of current conditions (major) with certain measurable milestones in between (minor and moderate). Duration of impacts are evaluated based on the short-term or long-term nature of alternative-associated changes on existing conditions. Type of impact refers to the beneficial or adverse consequences of implementing a given alternative. More exact interpretations of intensity, duration, and type of impact are given for each resource area examined. Professional judgment is used to reach reasonable conclusions as to the intensity and duration of potential impacts.

5.0.1 Cumulative Impacts

As mentioned above, in preparing NEPA documents such as an environmental assessment, the National Park Service is required to consider cumulative impacts that may occur to resources as a result of the proposed actions or potential past, present, or future connected actions. This environmental assessment includes, as elements of each of the action alternatives, two significant actions that require additional background information; 1) moving the location of the horse trail and thus, the official designation of a horse trail, and 2) closure of roads to vehicular traffic. As a result, the park must consider the cumulative impacts of these and other actions on park resources. These impacts will be analyzed in the following sections of this document under each of the issue topics (i.e. soils, vegetation, etc.), but a description and overview of potential cumulative impacts from the above two mentioned actions needs to be discussed further here.

Horse Use

According to current park policy as stated in the 2006 Superintendent’s Compendium, “Horse use is only permitted on unpaved roads and the following designated trails with the Riverways...” This statement is based on the 1984 GMP/DCP that determined horse use was an appropriate use and the 1991 Roads and Trail Study and Environmental Assessment that states horse use may occur on designated trails and roads and traces except where posted as closed to horses.

There is no designated horse trail in the Upper Current River area, but horse riding is permitted on unpaved roads throughout this area of the park. Lack of planning and management in this section of the park has resulted in the creation of a network of horse trails that may or may not be in areas appropriate for this use. A number of private horse trail ride operations and individual horse riders have used and continue to legally use the roads and traces within this section of the park. Currently it is legal for horseback riders to use all the roads and traces in the Flying W area and the existing vehicle fords.

Each of the proposed action alternatives has a designated horse trail through the Flying W area. In Alternative B and D, it is proposed that once the trail crosses the existing river fords, to move the horse trail out of the floodplain and on benches away from the bottomland riparian environment. This action would have beneficial results compared to leaving the horse trail in the floodplain adjacent to the river. In Alternative C the horse trail is left on the existing unmaintained river road. Because vehicles would no longer be allowed on the river road, if this trail location is selected it would become a designated horse trail. This may have positive benefits for people desiring to ride along the river but

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would have adverse impacts to the resources associated with the riparian environment. Horse manure deposited along the “river road” would readily wash into the Current River thus increasing the fecal coliform count. There are no horse trailheads, rider restrooms or similar facilities proposed in the Flying W Area in any of the alternatives.



The appropriateness and/or need for a regional horse trail in the Upper Current River must be analyzed through NEPA before the park can consider designating a regional horse trail in this section of the Riverways. At that time an assessment would be made as to where horse trails might occur, whether they would continue using existing unpaved roads or newly constructed trails, and whether there should be any support horse facilities such as trailheads, parking areas, vault toilets, and horse campsites. If through the above planning process or because of the new GMP process, a decision is made that horse use is not appropriate in the Upper Current River, the designated horse trail in the Flying W area would have to comply with that decision.

Resource impacts by horse use along the designated trail would be mitigated by the appropriate design, construction, marking and maintenance using the standards in the 2000 Edition of the U.S. Forest Service Trail Construction and Maintenance Notebook (<http://www.fhwa.dot.gov/environment/fspubs/00232839>). The two existing horse river crossings would not need to be improved with the addition of any material or work but would continue to be the rocky/gravel bottom that is found in the Current River. The ranger, trail crew and resource staffs would monitor the designated trail for noxious, invasive vegetation that may be brought into the area in horse manure. In addition the upper Current River area will be included in the park’s regular summer monitoring program to determine if bacterial or other contamination above the standards are occurring because of the horse or other visitor uses.

Roads

The 1991 Roads and Trails Study and Environmental Assessment for ONSR identifies the “river road” and the Flying W Road as park owned and unmaintained. These two roads or sections thereof, in addition to a number of user-created roads within Flying W, are proposed to be closed to vehicles under the three action alternatives (i.e. Alternatives B, C, and D). These actions must be analyzed with respect to the potential indirect and connected impacts that would occur outside of Flying W as a result of these actions.



The cumulative impacts to park resources from the closure of roads to vehicles at Flying W would be both beneficial and adverse. Closing roads in this area of the park would reduce the total number of river crossings that are being traversed by vehicles, decrease the direct impacts to resources caused by off-road vehicles, and limit 4-wheel drive travel through Flying W. The closure of most roads at the site would limit the extent of vehicle access to the rivers, which could be considered an adverse impact on visitor experience, but other users might see reducing the number of roads as beneficial to the visitor experience by limiting vehicle noise,

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providing places to hike, camp, and relax without sharing the area with vehicles. It can be expected that the beneficial impacts to the park's other resources would be significant.

5.1 Soils

Methodology

Numerous site visits, Ecological Classification System (Nigh et al. 2000) data, National Resources Conservation Services (NRCS) soils data, and professional knowledge of the area were used to estimate the effects of the proposed actions on soils.

Thresholds for Intensity, Duration, and Type of Impact:

- **Negligible** - Soils would not be affected or effects would be below or at the lower levels of detection. Any effects to soil erosion or productivity would be slight and no long-term effects would occur.
- **Minor** - The effects to soil resources would be detectable. Effects to soil erosion potential or productivity would be small, as would be the area affected (< 1 acre). If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.
- **Moderate** - The effects on soil erosion potential or productivity would be readily apparent and likely long-term. The resulting change to soil character would cover a relatively wide area (1-5 acres). Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
- **Major** - The effect on soil productivity would be readily apparent, long-term, and substantially change the character of the soils over a large area (> 5 acres). Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.
- **Duration:**
 - **Short-Term** - Lasting only during the construction period or no longer than the first growing season thereafter
 - **Long-Term** - A permanent post-construction impact.

ALTERNATIVE A – No-Action Alternative

Analysis: The No-Action alternative would result in no changes to the existing infrastructure at the Flying W site. The unmanaged network of roads and traces through the site would continue to be used for access to the gravel bars and river fords by vehicles and horseback riders. These activities would continue to degrade the soils and contribute to erosion from surface water runoff. Direct negative impacts to the riverbed would result from the continued crossing at the river fords by vehicles, ATVs, and horses. The walking trail from the parking area at the top of the bluff to the gravel bar at the north end of the site would continue to erode. Horse and foot traffic up and down this trail and associated surface water runoff have resulted in a trench with a depth of approximately 4 feet. The undefined parking area at the top of the bluff would continue to be used by visitors to the site. Horse and foot traffic to the Medlock Cave would continue to cause further damage to the river bank. Vehicles and horses would continue to use 0.7 miles of unmaintained road through the floodplain.

Cumulative Impacts: The No-Action alternative would result in continued degradation of the soils and a steady increase in soil erosion at the Flying W site through continued persistence and expansion of unmanaged roads and trails.

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Conclusion: The No-Action alternative would have **moderate long-term adverse impacts** to soils at the Flying W site as a result of continued erosion, loss of vegetation, and loss of the integrity of the riverbed.

Impairment: There would be no impairment of soils from this alternative.

ALTERNATIVE B – Provide vehicle access to the northern end of Flying W for day-use activities

Analysis: This alternative would result in the closure of approximately 1.9 miles of roads and traces to vehicles, of which 0.7 miles are located in the Current River floodplain. Closure and rehabilitation of the existing 0.5 acre parking area at the top of the bluff and associated walking trail down to the gravel bar would involve the addition of clay fill. All of these improvements would eventually result in an increase in vegetative cover and associated stabilization of the soils at the site. New adverse impacts to soils would result from the construction of a 0.15 acre gravel parking lot, a 500-foot walking trail from the gravel bar to the parking lot, and an 800-foot gravel road with associated pulled ditches. Closure of the two river fords to vehicles would improve the condition of the riverbed at these locations. The designation of 0.9 miles of horse trail through the site, crossing the Current River at two fords, would continue to cause erosion at the designated fords and result in direct adverse impacts to the riverbed. Directing horse use up on to the fields and out of the floodplain would result in beneficial impacts to floodplain soils. However, soils in the fields, where horse use had previously been minimal, would be adversely impacted by increased horse use.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the upper Current River section of the park and increase the amount of vegetative cover that buffers the viewshed from and to the Current River. The connected actions (see Section 5.0.1; Horse Use) associated with the designation of a horse trail at Flying W would result in a slight decrease in the horse trail mileage within the site.

Conclusion: This alternative would have **minor long-term beneficial effects** on soils.

Impairment: There would be no impairment of the soil from this alternative.

ALTERNATIVE C – Provide walk-in access to the northern end of Flying W

Analysis: This alternative would result in the closure of approximately 1.9 miles of roads and traces to vehicles, of which 0.7 miles are located in the Current River floodplain. Closure and rehabilitation of the existing 0.5 acre parking area at the top of the bluff and associated walking trail down to the gravel bar would involve the addition of clay fill. All of these improvements would eventually result in an increase in vegetative cover and associated stabilization of the soils at the site. New adverse impacts to soils would result from the construction of an 8-car parking lot at the entrance to the fields. Closure of the two river fords to vehicles would improve the condition of the riverbed at these locations. The official designation of 1 mile of horse trail within the floodplain, crossing the Current River at two fords, would continue to cause erosion along the trail and result in direct adverse impacts to the riverbed. Frequent flooding of the trail would exacerbate soil erosion and require additional maintenance.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the upper Current River section of the park and increase the amount of vegetative cover that buffers the viewshed from and to the Current River.

Conclusion: This alternative would have **negligible effects** on soils.

Impairment: There would be no impairment of the soil from this alternative

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ALTERNATIVE D – Provide vehicle access to the northern and southern ends of Flying W for day-use activities

Analysis: This alternative would result in the closure of approximately 1.7 miles of roads and traces to vehicles, of which 0.7 miles are located in the Current River floodplain. Closure and rehabilitation of the existing 0.5 acre parking area at the top of the bluff and associated walking trail down to the gravel bar would involve the addition of clay fill. All of these improvements would eventually result in an increase in vegetative cover and associated stabilization of the soils at the site. New adverse impacts to soils would result from the construction of two 0.15-acre parking lots (one near the bluff and one at the southern end of the site at the edge of Field C) and their associated access roads. The construction of 0.4 miles of access roads would involve the addition of gravel. Closure of the two river fords to vehicles would improve the condition of the riverbed at these locations. The official designation of 0.9 miles of horse trail through the site, crossing the Current River at two fords, would continue to cause erosion at the fords and result in direct adverse impacts to the riverbed. Directing horse use up on to the fields and out of the floodplain would result in beneficial impacts to floodplain soils. However, soils in the fields, where horse use had previously been minimal, would be adversely impacted by increased horse use.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the upper Current River section of the park and increase the amount of vegetative cover that buffers the viewed from and to the Current River. The actions (see Section 5.0.1) associated with the designation of a horse trail at Flying W would result in a slight decrease in the horse trail mileage in the area.

Conclusion: This alternative would have **minor long-term beneficial effects** on soils.

Impairment: There would be no impairment of the soil from this alternative

5.2 Vegetation

Methodology

Numerous site visits, ONSR Ecological Land Type data, the Missouri Department of Conservation Natural Heritage Database, ONSR Vegetation Communities data, and the professional knowledge of the park's Terrestrial Ecologist were used to estimate the effects of the proposed actions on vegetation.

Thresholds for Intensity, Duration, and Type of Impact:

- **Negligible**—Direct or indirect impacts would have perceptible but small changes in native terrestrial plant community size, integrity, or continuity.
- **Minor**—Disturbance or reestablishment of regionally typical native terrestrial plant communities would be limited to less than one acre for terrestrial communities and to highly localized areas of small tributaries to the Current River.
- **Moderate**—Disturbance or reestablishment of 1 to 5 acres of regionally typical native terrestrial plant communities would occur.
- **Major**—Disturbance or reestablishment of more than five acres of regionally typical terrestrial plant community or any acreage of federally listed plant species.
- **Duration:**
 - **Short-Term** – The physical impact from the proposed actions would require less than one growing season for the full recovery of plant communities.

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- **Long-Term** – The physical impact from the proposed actions would require more than one growing season for the full recovery of plant communities.

ALTERNATIVE A – No-Action Alternative

Analysis: This alternative would result in continued degradation of plant communities at Flying W caused by off-road vehicle travel and horse use. The riparian forest adjacent to the Current River would continue to be degraded from unauthorized and unmanaged recreational use. Erosion occurring on the bluff at the northern end of the site would continue to prevent the establishment of unique plant communities at this location (Autry 1988).

Cumulative Impacts: Continued unmanaged use at Flying W would lead to further destruction of unique plant communities along the bluff, a gradual increase in impacts from recreational use within the floodplain forest adjacent to the river and along roads accessing the gravel bars, and the potential introduction of exotics and other undesirable vegetation.

Conclusion: This alternative would have **negligible short-term effects** and **moderate long-term adverse effects** on vegetation.

Impairment: There would be no impairment of vegetation as a result of this alternative.

ALTERNATIVE B – Provide vehicle access to the northern end of Flying W for day-use activities

Analysis: This alternative would greatly reduce the road mileage and off-road vehicle use within the Flying W site. The closure of user-created roads at the site would result in an increase in plant communities by reducing erosion potential and direct impacts from vehicles. The “river road” paralleling the Current River within the floodplain would be closed and allow native riparian vegetation to reestablish. This would result in a more stable vegetative buffer along the river in this area. There would be some clearing of vegetation for the construction of the horse trail and new parking area. Horse use through the area would continue and may increase in intensity along the newly located horse trail. Moving the horse trail through the Flying W site from the river road to a location on the uplands would increase the opportunities for the introduction of invasive species found in horse manure to this new site.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the upper Current River section of the park and increase the amount of vegetative cover that buffers the viewshed from and to the Current River. The connected actions (see Section 5.0.1) associated with the designation of a horse trail at Flying W would result in a slight increase in the horse trail mileage. The new trail location would result in adverse impacts to vegetation where the trail didn’t previously exist. The potential for the introduction of exotics and other undesirable vegetation would require continued monitoring and treatment.

Conclusion: This alternative would have **moderate short-term and minor long-term beneficial effects** on vegetation.

Impairment: There would be no impairment of vegetation as a result of this alternative.

ALTERNATIVE C – Provide walk-in access to the northern end of Flying W

Analysis: This alternative would greatly reduce the road mileage and off-road vehicle use within the Flying W site. The closure of user-created roads at the site would result in an increase in coverage by plant communities by reducing erosion potential and the direct impacts caused by vehicles. However,

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the “river road” paralleling the Current River within the floodplain would remain open as a designated horse trail. This would prevent the reestablishment of native riparian vegetation and increase the opportunity for further impacts to the floodplain. Designating a horse trail through the Flying W site would increase the opportunities for the introduction of invasive species found in horse manure. The construction of a new parking area at the entrance to the open fields would require a small area of additional disturbance.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the upper Current River section of the park. The actions (see Section 5.0.1) associated with the designation of a horse trail at Flying W along the river road would maintain the same horse trail mileage that currently exist. Closing all the user-created roads in the fields and enforcing no horses on this rehabilitated land would result in a beneficial impact to vegetation. The potential for the introduction of exotics and other undesirable vegetation would require continued monitoring and treatment.

Conclusion: This alternative would have **minor long-term adverse effects** on vegetation.

Impairment: There would be no impairment of vegetation as a result of this alternative.

ALTERNATIVE D – Provide vehicle access to the northern and southern ends of Flying W for day-use activities

Analysis: This alternative would reduce the road mileage and off-road vehicle use within the Flying W site. The closure of some user-created roads at the site would result in an increase in plant communities by reducing erosion potential and direct impacts from vehicles. The “river road” paralleling the Current River within the floodplain would be closed and allow native riparian vegetation to reestablish. This would result in a more stable vegetative buffer along the river in this area. Horse use through the area would continue and may increase in intensity along the newly located horse trail. There would be some clearing of vegetation for the construction of the horse trail, new access road, and two new parking areas. Moving a horse trail through the Flying W site from the river road to a location on the uplands would increase the opportunities for the introduction of invasive species found in horse manure to this new site.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the upper Current River section of the park and increase the amount of vegetative cover that buffers the viewshed from and to the Current River. The connected actions (see Section 5.0.1) associated with the designation of a horse trail at Flying W would result in a slight decrease in the horse trail mileage. The new trail location would result in adverse impacts to vegetation where the trail didn’t exist, although there would be moderate long-term beneficial effects to the river road as the native vegetation recovers in this riparian zone with the removal of horses. Closing all the user-created roads in the fields and enforcing no horses on this rehabilitated land would result in a beneficial impact to vegetation. The potential for the introduction of exotics and other undesirable vegetation would require continued monitoring and treatment.

Conclusion: This alternative would have **moderate short-term and minor long-term beneficial effects** on vegetation.

Impairment: There would be no impairment of vegetation as a result of this alternative.

5.3 Water Quality

Methodology

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Numerous on-site visits, NPS water quality datasets, USGS river gages (USGS 2006), and professional knowledge were combined to estimate the effects of the proposed alternatives on water quality.

Thresholds for Intensity, Duration, and Type of Impact

- **Negligible**—Very slight changes in water quality or hydrology. Impacts barely detectable.
- **Minor**—Changes in water quality or hydrology would be measurable, although the changes would likely be small and the effects would be localized. No mitigation measures would be necessary.
- **Moderate**—Changes in water quality and/or hydrology would be measurable and potentially long-term but would be relatively local. Mitigation measures would be necessary and would be effective.
- **Major**—Changes in water quality and/or hydrology would be measurable, long-term, and broad-scale. Mitigation measures would be necessary and their success would not be guaranteed.
- **Duration:**
 - **Short-Term**—Recovery in less than a year.
 - **Long-Term**—Permanent post-construction impact.

ALTERNATIVE A – No-Action Alternative

Analysis: This alternative would result in continued access to and crossing of the Current River at multiple locations by vehicles, ATVs, and horses. These activities have adverse effects on water quality within the river both through direct impacts (e.g. vehicle fluids, horse manure, and sediments entering the system; disturbance of the riverbed, etc.) and indirect impacts (loss of aquatic vegetation, introduction of bacteria from horse manure, etc.). Continued use of the network of user-created roads and trails within Flying W would result in increased sedimentation of the river.

Cumulative Impacts: Continued unmanaged use at Flying W would lead to further introduction of sediments, bacteria, and nutrients from recreational use within the site. The water quality of the Current River in the vicinity of the site would deteriorate with increased use of the area.

Conclusion: This alternative would have **moderate long-term adverse effects** on water quality.

Impairment: Impacts to the water quality of the river area caused by the unmanaged activities taking place at this site. The water quality is an issue because these activities are adding an unspecified impact. If allowed to continue unchecked, there would likely be impairment of water quality as a result of this alternative.

ALTERNATIVE B – Provide vehicle access to the northern end of Flying W for day-use activities

Analysis: This alternative would reduce impacts to water quality by closing the two river fords to vehicles and ATVs. The closure of the “river road” and other roads, rehabilitation of the bluff parking area and associated trail down to the gravel bar, and locating the horse trail out of the floodplain would help to improve the water quality of the Current River in the vicinity of the site.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the upper Current River section of the park and increase the amount of vegetative buffer within the riparian corridor. This vegetative buffer would also act to trap nutrients and sediment. The connected actions (see Section 5.0.1) associated with the moving and designating a horse trail would result in a slight decrease in the horse trail mileage at Flying W. ONSR water quality data from the Jacks Fork

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River has shown that bacteria levels increase when large number of horses cross the river and where horse trails parallel the river. These impacts could be mitigated by locating horse trails away from the river and by having no or as few river crossings as possible. Requiring riders to quickly move horses directly across the river and not linger in the water or on the gravel bars immediately adjacent to the river may mitigate and lessen bacteria levels. By educating the riders through use of signs, exhibits, volunteer trail patrol and outfitters talking to their customers can insure that riders spend less time in the rivers. Such actions should be evaluated by taking of water samples during times of peak rides within 100 meters downstream of the Schoolhouse Bluff crossing.

Conclusion: This alternative would have **minor long-term adverse effects** on water quality.

Impairment: There would be no impairment of water quality as a result of this alternative.

ALTERNATIVE C – Provide walk-in access to the northern end of Flying W

Analysis: This alternative would reduce impacts to water quality by closing the two river fords to vehicles and ATVs. The closure of the “river road” to vehicles and other roads and the rehabilitation of the bluff parking area and associated trail down to the gravel bar would help to improve the water quality of the Current River in the vicinity of the site. However, the official designation of a horse trail through Flying W within the floodplain would continue to have adverse impacts to water quality. Locating the trail within the floodplain, an area that is frequently flooded, would result in an increase of the amount of manure, nutrients and bacteria that are entering the river. This would change the threshold from minor to moderate adverse effects. Currently, horse riding legally takes place at the site. Additionally, this horse trail would cross the river at two locations within 1 mile of one another.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage and off-road vehicle use within the Upper Current River section of the park. The closure of user-created roads at the site would reduce opportunities for runoff to enter the river. The actions (see Section 5.0.1; Horse Use) associated with the designation of a horse trail at Flying W on a road where vehicles are prohibited may result in an increase in the horse use inside and outside of Flying W. ONSR water quality data has shown that bacteria levels increase in the Jacks Fork River during large-scale horse trail rides where horses cross the river. This would indicate that additional horse trail crossings and horse trails adjacent to the river in other areas of the park may adversely impact water quality. These impacts could be mitigated by locating the horse trail away from the river and by having no or as few river crossings as possible. Given the narrow, linear nature of ONSR, mitigation in this respect would be difficult.

Conclusion: This alternative would have **moderate long-term adverse effects** on water quality.

Impairment: There would be no impairment of water quality as a result of this alternative.

ALTERNATIVE D – Provide vehicle access to the northern and southern ends of Flying W for day-use activities

Analysis: This alternative would reduce some impacts to water quality by closing the two river fords to vehicles and ATVs. The construction of an additional parking area and associated access road at the southern end of the site would result in additional runoff potential at the site. The closure of the “river road” and other roads, rehabilitation of the bluff parking area and associated trail down to the gravel bar, and locating the horse trail out of the floodplain would help to improve the water quality of the Current River in the vicinity of the site.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the upper Current River section of the park and increase the amount of vegetative buffer within the

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riparian corridor. This vegetative buffer would also act to trap nutrients and sediment. The connected actions (see Section-5.0.1; Horse Use) associated with the designation of a horse trail at Flying W on a road where vehicles are prohibited may result in an increase in the horse use inside and outside of Flying W. ONSR water quality data has shown that bacteria levels increase in the Jacks Fork River during large-scale horse trail rides where horses cross the river. This would indicate that additional horse trail crossings and horse trails adjacent to the river in other areas of the park may adversely impact water quality. These impacts could be mitigated by locating the horse trail away from the river and by having no or as few river crossings as possible. Given the narrow, linear nature of ONSR, mitigation in this respect would be difficult. Requiring riders to quickly move horses directly across the river and not linger in the water or on the gravel bars immediately adjacent to the river may mitigate and lessen bacteria levels.

Conclusion: This alternative would have **minor long-term adverse effects** on water quality.

Impairment: There would be no impairment of water quality as a result of this alternative.

5.4 Floodplain

Methodology

On-site visits, National Resources Conservation Services (NRCS) soils data, Ecological Classification System data, and professional knowledge were used to estimate the effects of the actions on the Floodplain in the various alternatives.

Thresholds for Intensity, Duration, and Type of Impact:

- **Negligible**—Floodplains would not be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight, local, and would likely be short-term.
- **Minor**—Changes in floodplains would be measurable, although the changes would be small, would likely be short-term, and the effects would be localized. Developments within the floodplain would be restricted to minor facilities of 0.5 acre or less, which directly require proximity to stream course.
- **Moderate**—Changes in floodplains would be measurable and long-term but would be relatively local. Floodplain developments of between 0.5 and 1 acre which may not directly require proximity to stream course.
- **Major**—Changes in floodplains would be readily measurable, would have substantial consequences, and would be noticed on a regional scale. Floodplain developments greater than 1.0 acre which do not directly require proximity to stream course.
- **Duration:**
 - **Short-Term**—Impacts from temporary modifications to floodplain areas during construction would take less than one year to recover.
 - **Long-Term**—Construction and/or post-construction impacts to floodplains would take more than one year to recover.

ALTERNATIVE A – No-Action Alternative

Analysis: This alternative would result in continued adverse impacts to the floodplain at Flying W caused by off-road vehicle travel and horse use. Since additional facilities would not be constructed at the site, no direct impacts to the floodplain or any wetlands would occur. The riparian forest adjacent to the Current River would continue to be degraded from unauthorized and unmanaged recreational use. Erosion occurring within the floodplain along the “river road” would continue to prevent the

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establishment of vegetation at this location. This would adversely impact the ability of the riparian forest to filter sediments and nutrients during times of high water (i.e. floods).

Cumulative Impacts: The floodplain along the Current River in the vicinity of the site would deteriorate with increased use of the area although development would not occur.

Conclusion: This alternative would have **moderate long-term adverse effects** on floodplains.

Impairment: There would be no impairment of floodplains as a result of this alternative.

ALTERNATIVE B – Provide vehicle access to the northern end of Flying W for day-use activities

Analysis: This alternative would reduce impacts to the floodplain by closing the two river fords to vehicles and ATVs. The closure of the “river road”, rehabilitation of the severely eroded bluff trail down to the gravel bar, and locating the designated horse trail out of the floodplain would help to lessen impacts. In time, closure of the “river road” and associated traces would result in the reestablishment of approximately 1.8 acres of riparian vegetation. This alternative recommends relocating the horse use from the unmaintained road within the floodplain and moving the horse use to a constructed and designated trail on the uplands. This horse trail would continue to cross the river at two locations and traverse the floodplain for a combined distance of approximately 1200 feet. Under this alternative, less than 0.1 acre of fill would be placed within the floodplain to rehabilitate the bluff trail.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the floodplain of the upper Current River section of the park and increase the amount of vegetative buffer within the floodplain. This vegetative buffer would also act to trap nutrients and sediment. The actions (see Section 5.0.1; Horse Use) associated with the relocating and the construction and designation of a horse trail at Flying W would result in a slight decrease in the horse trail mileage through this area. These impacts would be mitigated by locating the horse trail away from the river and by having as few river crossings as possible. Given the narrow, linear nature of ONSR, further mitigation by reducing the number of fords in the Flying W area is nearly impossible.

Conclusion: This alternative would have **minor long-term adverse effects** on floodplains.

Impairment: There would be no impairment of floodplains as a result of this alternative.

ALTERNATIVE C – Provide walk-in access to the northern end of Flying W

Analysis: This alternative would reduce impacts to the floodplain by closing the two river fords to vehicles and ATVs. The closure of the “river road” to vehicles and the rehabilitation of the severely eroded bluff trail down to the gravel bar would help to lessen impacts to the floodplain. However, the official designation of a horse trail through Flying W along the “river road” would have adverse impacts to the floodplain. Currently, horse riding takes place at the site. Under this alternative, less than 0.1 acre of fill would be placed within the floodplain to rehabilitate the bluff trail.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage accessible by vehicles in the floodplain of the upper Current River section of the park and slightly increase the amount of vegetative buffer within the floodplain. However, the designation of the horse trail within the floodplain would lessen the beneficial impacts from revegetation in a floodplain area. The actions (see Section 5.0.1, Horse use) associated with the designation and use of a horse trail in the floodplain at Flying W would result in the inability of the floodplain to revegetate with native, riparian plants. These impacts could be mitigated by locating the horse trail away from the river and by limiting the number of river crossings in this area to as few as possible.

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Conclusion: This alternative would have **moderate long-term adverse effects** on floodplains.

Impairment: There would be no impairment of wetlands and floodplains as a result of this alternative.

ALTERNATIVE D – Provide vehicle access to the northern and southern ends of Flying W for day-use activities

Analysis: This alternative would reduce some impacts to the floodplain by closing the two river fords to vehicles and ATVs. The construction of two parking areas and the addition of another access road within Flying W would result in more use of the site. The closure of the “river road”, rehabilitation of the severely eroded bluff trail down to the gravel bar, and locating the designated horse trail out of the floodplain would help to lessen impacts. In time, closure of the “river road” and associated traces would result in the reestablishment of approximately 1.8 acres of riparian vegetation. This alternative recommends relocating the horse use from the unmaintained road within the floodplain and moving the horse use to a constructed and designated trail on the uplands. This horse trail would continue to cross the river at two locations and traverse the floodplain at these crossings for a combined distance of approximately 1200 feet. Under this alternative, less than 0.1 acre of fill would be placed within the floodplain to rehabilitate the bluff trail.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the floodplain of the upper Current River section of the park and increase the amount of vegetative buffer within the floodplain. This vegetative buffer would also act to trap nutrients and sediment. The actions (see Section 5.0.1; Horse Use) associated with the relocating and the construction and designation of a horse trail at Flying W would result in a slight decrease in the horse trail mileage through this area. These impacts would be mitigated by locating the horse trail away from the river and by having as few river crossings as possible. Given the narrow, linear nature of ONSR, further mitigation in reducing the number of fords in the Flying W area is nearly impossible. The addition of a second parking area and access road at Flying W would result in an increase in recreational use of the site.

Conclusion: This alternative would have **minor long-term adverse effects** on floodplains.

Impairment: There would be no impairment of wetlands and floodplains as a result of this alternative.

5.5 Species of Concern

Methodology

On-site visits, Ecological Classification System data, ONSR cave data, wildlife references, and professional knowledge were used to estimate the effects of the proposed actions on Species of Concern in the various alternatives.

The Endangered Species Act terminology used to assess impacts to listed species follows:

- **No affect:** When a proposed action would not affect a listed species or designated critical habitat.
- **May affect/not likely to adversely affect:** Effects on special status species or designated critical habitat are discountable (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated) or completely beneficial.

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- **May affect/likely to adversely affect:** When an adverse effect to a listed species or designated critical habitat may occur as a direct or indirect result of proposed actions and the effect is either not discountable or completely beneficial.
- **Is likely to jeopardize proposed species/adversely modify proposed critical habitat:** The appropriate conclusion when the National Park Service or the U.S. Fish and Wildlife Service identify situations in which the proposed activities could jeopardize the continued existence of a proposed species or adversely modify critical habitat to a species within or outside park boundaries.

ALTERNATIVE A – No-Action Alternative

Analysis: This alternative would result in continued access to and crossing of the Current River at multiple locations by vehicles, ATVs, and horses. The Ozark hellbender would be impacted by changes to the riverbed and the introduction of nutrients, bacteria, and sediments into the Current River from continued horse use on the river road. Nutrients and sediments would be introduced through erosion and water run-off. Bacteria would enter the river in horse manure. Continued use of the network of user-created roads and trails within Flying W would result in increased sedimentation of the river and continued disturbance to gray bats roosting in Medlock Cave. The loss and degradation of gray bat foraging habitat (riparian forest) would continue as unmanaged use continued to expand.

Cumulative Impacts: The continued concentrated use by vehicles, horses, and people along the Current River adjacent to Flying W would have adverse effects on local populations of Ozark hellbenders and would adversely affect the suitability of the area as gray bat habitat.

Conclusion: This alternative **may affect/not likely to adversely affect** gray bats. This alternative is **likely to jeopardize proposed species** (Ozark hellbender).

Impairment: There would be no impairment of Species of Concern as a result of this alternative.

ALTERNATIVE B – Provide vehicle access to the northern end of Flying W for day-use activities

Analysis: This alternative would result in continued access to and crossing of the Current River at two locations by horses. The Ozark hellbender could be impacted by changes to the riverbed and the introduction of nutrients, bacteria, and sediments into the Current River. Nutrients and sediments would be introduced through erosion and water run-off. Bacteria would enter the river in horse manure. The likelihood of impacts would be greater if horses spend more time in the river and on gravel bars immediately adjacent to the river. Since hellbenders' primary means of respiration is cutaneous (through the skin), introduced toxins are readily absorbed and can cause either direct mortality or interference with physiological processes, effectively reducing individual fitness and recruitment (Mayasich and Phillips 2003). The closure of two river crossings and the "river road" to vehicles would have beneficial impacts on water quality in the area, at least in the short-term, therefore, providing an improvement to the health of the aquatic environment for Ozark hellbenders. Locating the designated horse trail out of the floodplain would also contribute to an improvement in water quality. Closure of roads, particularly the "river road", would result in fewer disturbances to roosting gray bats at Medlock Cave and eventually an increase in riparian forest cover used by gray bats for foraging.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the upper Current River section of the park and increase the amount of vegetative cover that buffers the viewshed from and to the Current River. The connected actions (see Section 5.0.1, Horse Use) associated with the designation of a horse trail at Flying W would result in a significant decrease in the horse trail mileage that is immediately adjacent to the river (reduction from over 1.0 miles to about

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1200 feet). In addition by relocating the horse trail away from the river road and closing of this road to horses and vehicles, horse/vehicle use is removed from the vicinity of Medlock Cave.

Conclusion: This alternative **may affect/not likely to adversely affect** gray bats. This alternative **may affect/not likely to adversely affect proposed species** (Ozark hellbender).

Impairment: There would be no impairment of Species of Concern as a result of this alternative.

ALTERNATIVE C – Provide walk-in access to the northern end of Flying W

Analysis: This alternative would result in continued access to and crossing of the Current River at multiple locations by horses. The Ozark hellbender would be impacted by changes to the riverbed and the introduction of nutrients, bacteria, and sediments into the Current River. Nutrients and sediments would be introduced through erosion and water run-off. Bacteria would enter the river in horse manure. Since hellbenders' primary means of respiration is cutaneous (through the skin), introduced toxins are readily absorbed and can cause either direct mortality or interference with physiological processes, effectively reducing individual fitness and recruitment (Mayasich and Phillips 2003). The closure of two river crossings and the "river road" to vehicles would have beneficial impacts on water quality in the area, at least in the short-term, therefore, providing an improvement to the health of the aquatic environment for Ozark hellbenders. However, continuing to permit river crossings at Flying W by horses would result in adverse impacts to Ozark hellbenders. Water quality in the vicinity of Flying W would continue to degrade if more horse use occurred within the floodplain. In addition, a designated horse trail along the "river road" could result in an increase in the disturbance to roosting gray bats at Medlock cave because of the proximity of this use to the cave entrance.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the upper Current River section of the park. The connected actions (see Section 5.0.1, Horse Use) associated with the designation of a horse trail at Flying W would result in progressively more horse use in the area. This would also result in an increase in the disturbance to roosting gray bats at Medlock cave.

Conclusion: This alternative **may affect/likely to adversely affect** gray bats. This alternative is **likely to jeopardize proposed species** (Ozark hellbender).

Impairment: There would be no impairment of Species of Concern as a result of this alternative.

ALTERNATIVE D – Provide vehicle access to the northern and southern ends of Flying W for day-use activities

Analysis: This alternative would result in continued access to and crossing of the Current River at multiple locations by horses. The Ozark hellbender would be impacted by changes to the riverbed and the introduction of nutrients, bacteria, and sediments into the Current River. Nutrients and sediments would be introduced through erosion and water run-off. Bacteria would enter the river in horse manure. Since hellbenders' primary means of respiration is cutaneous (through the skin), introduced toxins are readily absorbed and can cause either direct mortality or interference with physiological processes, effectively reducing individual fitness and recruitment (Mayasich and Phillips 2003). The closure of two river crossings and the "river road" to vehicles would have beneficial impacts on water quality in the area, at least in the short-term, therefore, providing an improvement to the health of the aquatic environment for Ozark hellbenders. Locating the designated horse trail out of the floodplain would also contribute to an improvement in water quality. Closure of roads, particularly the "river road", would result in fewer disturbances to roosting gray bats at Medlock Cave and eventually an increase in riparian forest cover used by gray bats for foraging. However, construction of a second parking area and access road on the bench adjacent to Medlock cave would result in additional use of

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the Medlock gravel bar by visitors. This would increase the amount of disturbance to roosting gray bats at Medlock cave.

Cumulative Impacts: The cumulative impacts of this alternative would reduce the road mileage in the upper Current River section of the park and increase the amount of vegetative cover that buffers the viewshed from and to the Current River. The connected actions (see Section 5.0.1, Horse Use) associated with the designation of a horse trail at Flying W would result in a significant decrease in the horse trail mileage that is immediately adjacent to the river (reduction from over 1.0 miles to about 1200 feet). In addition, by relocating the horse trail away from the river road and closing of this road to horses and vehicles, that would remove this use from the vicinity of Medlock Cave.

Conclusion: This alternative **may affect/not likely to adversely affect** gray bats. This alternative **may affect/not likely to adversely affect proposed species** (Ozark hellbender).

Impairment: There would be no impairment of Species of Concern as a result of this alternative.

5.6 Cultural Resources – Archeology

This topic includes an analysis of the archeological resources located at the three locational alternatives in the Flying W area.

Methodology

Over a period of years, the Ozark National Scenic Riverways archeologist, James E. Price, has conducted pedestrian surveys in the Flying W project area for the purpose of inventorying cultural resources sites, particularly prehistoric archeological sites. The park archeologist's knowledge combined with personal observation was employed to estimate the effect of the actions on the archeological sites in the project area. The three prehistoric sites in the project area were discovered and recorded by the park archeologist on October 3, 1985. Prehistoric archeological sites in the project area are 23SH231, 23SH232, and 23SH233. Each of the sites has been impacted either by heavy visitor use in the bluff area or by roads across them in open field areas. A plan for rehabilitating these three sites would be submitted to the Missouri State Historic Preservation Officer for consultation and an agreement would be reached on the methodology to be employed to avoid any adverse impacts to the sites.

Thresholds for Intensity, Duration and Type of Impact:

- **Negligible**—Impact is at the lowest levels of detection, barely perceptible, and not measurable.
- **Minor—Adverse**: disturbance of archeological site(s) and/or alteration of a pattern(s) or feature(s) of the landscape results in little, if any, loss of integrity. The determination of effect for Section 106 would be *no adverse effect*. **Beneficial**: maintenance and preservation of an archeological site(s). For Cultural Landscapes, landscape patterns and features preserved in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. The determination of effect for Section 106 would be *no adverse effect*.
- **Moderate—Adverse**: disturbance of archeological site(s) and/or alteration of a pattern(s) or feature(s) of the landscape would result in an overall loss of integrity. The determination for Section 106 would be *adverse effect*. A memorandum of agreement is executed among the National Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to

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moderate. **Beneficial:** stabilization of a site and/or rehabilitation of a landscape or its patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. The determination of effect for Section 106 would be *no adverse effect*.

- **Major—Adverse:** disturbance of archeological site(s) and/or alteration of a pattern(s) or feature(s) of the landscape would result in an overall loss of integrity. The determination of effect for Section 106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state or tribal historic preservation officer and/or Advisory council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).
- **Beneficial:** active intervention to preserve a site and/or restore a landscape or its patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. The determination of effect for Section 106 would be *no adverse effect*.
- **Duration:**
 - **Short-Term**—Disturbance only during construction activities.
 - **Long-Term**—Disturbance lasting longer than construction activities.

ALTERNATIVE A – No-Action Alternative

Analysis: Activities that are currently taking place now would continue into the future and in time would continue to generate adverse impacts and accelerate cumulative adverse impacts. Continued use of the roads across the three prehistoric archeological sites would gradually disturb and degrade these cultural resources.

Cumulative Impacts: Continued use of the roads would result in continued disturbance of three subsurface archeological sites, 23SH231, 23SH232, and 23SH233. Eventually mitigation would be required to ensure that further degradation of the sites did not occur. This mitigation would occur in consultation and concurrence with the Missouri State Historic Preservation Officer. Since the horse trail through this project area is but a small section of a much larger network of current horse trails in the Upper Current River area, only the potential impacts can be fully established for the current Flying W project area and not for the entire complex of trails outside the project area. The current trail extends both north and south of Flying W and numerous archeological sites lie both north and south of Flying W. Unmanaged horse trail use inside and outside the project area has the potential to impact both known and unknown cultural resources. Studies of cumulative impacts to these sites need to be fully assessed prior to establishing an official horse trail north and south of Flying W.

Conclusion: This alternative would have **major long-term adverse effects** on cultural resources located within the bounds of the defined subject area.

Impairment: The No-Action Alternative is an alternative with ongoing action through use of the roads and visitor use but no new federal action would be involved. There would be no impairment to cultural resources as a result of Alternative A.

ALTERNATIVE B – Provide vehicle access to the northern end of Flying W for day-use activities

Analysis: This alternative would have moderate short-term adverse impacts on archeological sites since it involves closure of existing roads and closure and stabilization of a badly eroded area at the bluff edge. No historic structure is located within the direct impact zone. Under this alternative, a vehicular road would be closed across prehistoric archeological site 23SH231. If closure of this road does not disturb soil on either side of the road or beneath the road and eroded areas near the bluff edge, there would be no impacts on this site. Construction of a road and parking lot would be constructed outside the bounds of this archeological site and there would be no impacts to it. The

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current horse trail would be relocated along the tree line at the western side of the Field B. A detailed Phase I cultural resources pedestrian survey would be conducted along this route for Section 106 compliance. This route is outside the bounds of any known archeological sites in the project area.

Cumulative Impacts: This alternative would directly cause beneficial impacts to archeological sites 23SH231, 23SH232, and 23SH233. This would be due to the fact that eroded roads across their surfaces would be closed, sterile soil fill placed in and on them and the area fully rehabilitated to appear as a traditional Ozark agrarian field without exposure of prehistoric cultural materials. Since the horse trail through this project area is but a small section of a much larger network of current horse trails in the upper Current River area, only the potential impacts can be fully established for the current Flying W project area and not for the entire complex of trails outside the project area. The current trail extends both north and south of Flying W and numerous archeological sites lie both north and south of Flying W. Studies of cumulative impacts to these sites need to be fully assessed prior to establishing an official horse trail north and south of Flying W.

Conclusion: Ground-disturbing undertakings in this area would have **moderate adverse short-term impacts** on three prehistoric archeological sites, 23SH231, 23SH232, and 23SH233. **Moderate long-term beneficial impacts** on the three sites would result since major vehicular traffic roads would be removed from these sites.

Impairment: There would be no impairment to cultural resources as a result of Alternative B.

ALTERNATIVE C – Provide walk-in access to the northern end of Flying W

Analysis: This alternative would have moderate short-term adverse impacts on archeological sites since it involves closure of existing roads and closure and stabilization of a badly eroded area at the bluff edge. No historic structure is located within the direct impact zone. Under this alternative a vehicular road would be closed across prehistoric archeological site 23SH231. A day-use pedestrian trail would follow the course of the current eroded road. If closure of this road does not disturb soil on either side of the road or beneath the road and eroded areas near the bluff, there would be no adverse impacts on this site. A road and parking lot would be constructed outside the bounds of this archeological site and there would be no impacts to it. The route of the horse trail would remain where it presently is located, along an old road running parallel to the Current River. This would have no adverse impacts on any cultural resource.

Cumulative Impacts: This alternative would not cause any cumulative adverse effects to any surface or subsurface prehistoric or historic archeological sites. Closing road segments would limit access to prehistoric archeological site 23SH231 to pedestrian use only and have a long-term beneficial impact on that cultural resource. Since the horse trail through this project area is but a small section of a much larger network of current horse trails in the upper Current River area, only the potential impacts can be fully established for the current Flying W project area and not for the entire complex of trails outside the project area. The current trail extends both north and south of Flying W and numerous archeological sites lie both north and south of Flying W. Studies of cumulative impacts to these sites need to be fully assessed prior to establishing of an official horse trail north and south of Flying W.

Conclusion: Ground-disturbing undertakings in this area would have **moderate adverse short-term impacts** on three prehistoric archeological sites, 23SH231, 23SH232, and 23SH233. **Moderate long-term beneficial impacts** on the three sites would result since major vehicular traffic roads would be removed from these sites.

Impairment: There would be no impairment of cultural resources as a result of Alternative C

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ALTERNATIVE D – Provide vehicle access to the northern and southern ends of Flying W for day-use activities

Analysis: This alternative would have moderate short-term adverse impacts and long-term beneficial impacts on archeological site 23SH231 since it involves closing the road to the bluff and rehabilitating the highly eroded area near the bluff. This alternative would result in major long-term adverse impacts to prehistoric archeological site 23SH233, a large site on a natural terrace where the 6-car parking lot is proposed. Construction of the parking lot would necessitate a Phase II subsurface archeological testing project to determine if the site is significant and eligible for nomination to The National Register of Historic Places. If Phase II testing determined the site is eligible, a major archeological investigation would be necessitated for mitigation of adverse impacts through data recovery. This alternative would also result in major long-term adverse impacts to prehistoric archeological site 23SH232 since a road would be improved across it and the road would be graded and maintained far into the future. Construction of this road would necessitate a Phase II testing for determination of its significance and its potential eligibility for nomination to The National Register of Historic Places. If it were determined eligible for such status, a major archeological investigation would be necessary to mitigate adverse impacts prior to construction or improvement of the road. The current horse trail would be relocated along the tree line at the western side of the Field B. A detailed Phase I cultural resources pedestrian survey would be conducted along this route for Section 106 compliance.

Cumulative Impacts: If prehistoric archeological sites 23SH232 and 233 were found significant and mitigative measures were exercised on them, there would be no cumulative impacts. There would be no cumulative impacts on prehistoric archeological 23SH231 following road closure and rehabilitation of the road and the highly eroded area near the bluff. Since the horse trail through this project area is but a small section of a much larger network of current horse trails in the Upper Current River area, only the potential impacts can be fully established for the current Flying W project area and not for the entire complex of trails outside the project area. The current trail extends both north and south of Flying W and numerous archeological sites and cultural landscapes lie both north and south of Flying W. Studies of cumulative impacts to these sites need to be fully assessed prior to establishing of an official horse trail north and south of Flying W.

Conclusion: This alternative would have a **moderate short-term adverse effect** on archeological site 23SH231 and **major adverse long-term effect** on archeological sites 23SH232 and 233.

Impairment: There would be no impairment to any cultural resources as a result of Alternative D.

5.7 Visitor Experience

Methodology

Personal observation of what visitors currently experience combined with information obtained from NPS personnel on visitation patterns and law enforcement problems encountered, were used to estimate the effects of the actions in the various alternatives.

Thresholds for Intensity, Duration, and Type of Impact:

- **Negligible**—Visitors would not likely be aware of the effects associated with changes proposed for visitor use and enjoyment of park resources.
- **Minor**—Visitors would likely be aware of the effects associated with changes proposed for visitor use and enjoyment of park resources; however the changes in visitor use and experience would be slight and likely short term. Other areas in the park would remain available for similar visitor experience.

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- **Moderate**— Visitors would be aware of the effects associated with changes proposed for visitor use and enjoyment of park resources. Changes in visitor use and experience would be readily apparent and likely long term. Some visitors who desire to continue their chosen activity would be required to pursue their choice in other available local or regional areas.
- **Major**— Visitors would be highly aware of the effects associated with changes proposed for visitor use and enjoyment of park resources. Changes in visitor use and experience would be readily apparent and long term. The change in visitor use and experience proposed in the alternative would preclude future generations of some visitors from enjoying park resources and values. Some visitors who desire to continue their chosen activity would be required to pursue other available local or regional areas.
- **Duration:**
 - **Short-Term**—during construction
 - **Long-Term**—past construction and 10 years into future.

ALTERNATIVE A – No-Action

Analysis: Visitors floating the upper Current who pass the Flying W site on summer weekends would continue to encounter the “party scene” at the bluff because access to the bluff would remain open to vehicles. Raucous behavior, dangerous behavior (jumping from the bluff), loud boom boxes would continue to adversely impact opportunities to enjoy a quality experience on and around the Bluff. Visitors traveling via Flying W Road which brings them into Flying W from the nearest north/south paved highway (Hwy. K) would encounter a site without formal definition or signage which would continue to be riddled with user created traces and rutted muddy roads. Current uses would continue unabated. Visitors heading into the area via the old “river road” which parallels the Current River corridor would continue to have vehicular access across the two fords (to the north: the bluff ford; to the south the Bluff Schoolhouse ford). This intense and loud disturbance of motorized traffic would continue to cause an adverse impact on those seeking a quality experience. Equestrians who now pass through the Flying W site on a number of user-created trail routes and along the old “river road” would continue to be left to their own devices as to where they ride. Riders familiar with the area would not get lost or disoriented, but others may. Those riders seeking a quality experience would encounter off-road motorized vehicular use and a “party scene”, and for these visitors there would be a continued adverse impact. With continued unrestricted access, coupled with the absence of facilities to accommodate visitors, there would be a potentially escalating set of circumstances that ultimately cause moderate to major adverse impacts to the visitor experience.

Cumulative Impacts: Current uses at Flying W would continue without definition or clear parameters. The No Action Alternative would have the potential to affect a series of moderate to major adverse impacts on the nature of visitors’ experience over time.

Conclusion: Alternative A would result in **moderate adverse long term impacts** on the quality of visitor’s experience.

ALTERNATIVE B – Provide vehicle access to the northern end of Flying W for day-use activities

Analysis: Rehabilitation of the eroded and degraded agricultural fields, removal and rehabilitation of the user-created roads would enhance the visual quality of the pastoral scene and provide visitors with the chance to experience the pastoral qualities of the cultural landscape patterns evident at Flying W. Eliminating the ad hoc roads, and providing a stable hardened access road to a defined parking area would provide a moderate beneficial impact to the visitor’s experience. Overall, providing definitive facilities (parking, designated horse and foot trails, signage) for the purpose of accommodating the various day uses in Alternative B would result in a moderate beneficial impact on visitor experience. The present “anything goes” character of the site would no longer be the predominant message.

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Closing the two river fords would discourage and diminish off-road travel and the associated intrusive noise this brings. This would result in a moderate beneficial impact to the quality of the visitor experience, since accommodations for accessing the river would be provided in this alternative, and visitors would not need to utilize the “river road” and the two fords in order to get to the bluff gravel bar.

As no public restroom is to be provided, any visitors needing to relieve themselves would be left to their own devices. Toilet paper and human waste would continue to detract from a quality visitor experience. This would have a negligible to minor adverse impact to visitors’ experience as little change would occur in comparison to the current conditions.

Cumulative Impacts: Over time the actions proposed in Alternative B would result in increased visitor satisfaction for those who hope to enjoy the scenic and natural qualities of the park in a family oriented atmosphere. This would result in a cumulative moderate beneficial impact resulting in a quality visitors’ experience.

Conclusion: Alternative B would result in a **moderate long-term beneficial impact** to visitor use and experience.

ALTERNATIVE C – Provide walk-in access to the northern end of Flying W

Analysis: As in Alternative B, rehabilitation of the eroded and degraded agricultural fields, and the removal and rehabilitation of the user-created roads, would enhance the visual quality of the pastoral scene and provide those visitors (walking in to the site), with the chance to experience the pastoral qualities of the cultural landscape patterns evident at Flying W. In contrast to proposed actions in Alternative B, this alternative would not provide an accessible road into the site, nor provide for accommodations for parking or a foot trail within a reasonable walking distance for families hoping to spend the day picnicking and swimming on a gravel bar. This would have a moderate adverse impact on those visitors seeking a quality family oriented experience. However, there are several excellent alternative park day use sites within easy driving distance that do offer such accommodations so the resulting adverse impact is really minor in light of the context of the larger park.

In this alternative, floaters would continue to enjoy a stop on the Flying W gravel bars. Because vehicles would not be able to travel anywhere near the bluff (with the ford closures in effect and “on-site” access road & parking unavailable), floaters are far less likely to encounter the “party scene” and its attendant loud music and disruptive behavior. Floating this stretch of the river would result in a far more peaceful “river oriented” adventure, even on weekends, as the party crowds and off road vehicles head elsewhere. This would result in a moderate beneficial impact to visitors seeking a quality experience.

Horseback riders who now pass through the Flying W site on a number of user-created trail routes would be directed along the old “river road”, which in this alternative would become a designated (signed) horse trail. Since many riders currently use this route already (being parallel to the river with it’s opportunity for scenic view and a chance to water their stock), once the deep mud holes are filled in and hardened, the equestrian visitor would find a moderate beneficial impact to his/her trail experience. Floaters who seek to picnic or camp at the bluff gravel would definitely encounter horses since the “river road” cuts right across this gravel bar. This would result in the increased potential for visitor conflicts, and result in a moderate adverse impact to floaters seeking a quality family oriented experience.

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Cumulative Impacts: The cumulative impact to floaters experience at Flying W would result in a moderate beneficial impact to visitors seeking a quality experience. Equestrian use would increase and riders would experience a minor beneficial impact to their experience given a clearly blazed trail.

Conclusion: Alternative C would result in a **minor long-term beneficial impact** to visitor use and experience.

ALTERNATIVE D

Analysis: As in Alternatives B & C, rehabilitation of the eroded and degraded ag fields, removal and rehabilitation of the user-created roads would enhance the visual quality of the pastoral scene and provide visitors with the chance to experience the pastoral qualities of the cultural landscape patterns evident at Flying W.

Eliminating the ad hoc roads, and providing stable hardened access roads to two defined parking areas would provide a moderate beneficial impact to the visitor's experience.

As in Alternative B, providing definitive facilities (parking, designated horse & foot trails, signage) for the purpose of accommodating the various day uses in this alternative would also result in a moderate beneficial impact on visitor experience. The present "anything goes" character of the site would no longer be the predominant message.

Closing the two river fords would discourage and diminish off-road travel and the associated intrusive noise this brings. This would result in a moderate beneficial impact to the quality of the visitor experience, since accommodations for accessing the river would be provided in this alternative, and visitors would not need to utilize the River Road and the two fords in order to get to the Bluff gravel bar.

As no public restroom is to be provided at either parking area, any visitor needing to relieve themselves would be left to their own devices. Toilet paper and human waste would continue to detract from a quality visitor experience. This would have a negligible to minor adverse impact to visitors' experience as little change would occur in comparison to the current conditions.

Horseback riders who now pass through the Flying W site on a number of user-created trail routes would be directed to ride on a new stable hardened and designated (signed) horse trail. For equestrians this clarification and designation would have a minor beneficial impact. Floaters who seek to picnic or camp at the Bluff gravel would encounter horses since the designated cuts right across this gravel bar. This would result in the increased potential for visitor conflicts, and result in a moderate adverse impact to floaters seeking a quality family oriented experience.

Cumulative Impacts: Over time the actions proposed in Alternative D would result in increased visitor satisfaction for those who hope to enjoy the scenic and natural qualities of the park in a family oriented atmosphere. This would result in a cumulative moderate beneficial impact resulting in a quality visitors' experience.

Conclusion: There would be **short-term minor adverse impacts** to visitor use following the limitations to immediate access to the river by vehicles. Actions proposed in Alternative D would result in a **long-term moderate beneficial impact** to visitor use and experience.

5.8 Park Operations

This topic includes a broad analysis of park operations providing an assessment of services and infrastructure which are required to support existing and/or proposed visitor facilities associated with

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visitor use at the Flying W site in a manner that promotes health and safety for both staff and visitors and provides protection of the park's resources as well as an enhanced visitor experience.

Methodology

Operational efficiency, for the purpose of this analysis, refers to the adequacy of assigned staffing tasks and the necessary procurement of materials for routine maintenance and repair of the existing and/or proposed facilities and the adjacent grounds. It also includes Law Enforcement and Resource Protection services provided by park rangers. The goal is to provide for a successful visitor experience while making a concerted effort to execute the necessary park operations in accordance with the park's mission to protect and preserve vital park resources. Facilities include access roads, trails, parking, trash receptacles, signage, interpretive information, and associated grounds maintenance. Park staff knowledge was used to evaluate the impacts of each alternative and is based on the current description of park operations presented in section 4.1.8 of this document.

Thresholds for Intensity, Duration, and Type of Effect:

- **Negligible**—Changes to stated requirements for park maintenance operations, facility functioning, and Ranger presence would be barely detectable and create no noticeable difference in existing conditions.
- **Minor**—Staffing requirements would change to some extent but not unduly impact the routine maintenance regime or protection ranger operations. Facility functioning in terms of visitor services and infrastructure would change to some extent but impacts to park staff workloads and expenditures would be minimal---and unlikely to adversely affect the visitor's experience or overburden staff.
- **Moderate**—There would be noticeable changes in terms of park operations. Maintenance staff levels, routine maintenance requirements, and ranger protection services could be affected and may need to be altered in response to such changes.
- **Major**—Changes would be substantial in all areas of operational efficiency.
- **Duration:**
 - **Short-Term**—one-time finite definitive changes occur due to construction and/or modification. Once tasks are completed---staff return to an established routine maintenance regime and ranger patrol operations.
 - **Long-Term**—changes which are instituted that alter the standard operating procedures (for Maintenance & Ranger Protection) and are expected to remain in effect 5 or more years.

ALTERNATIVE A – No-Action

Maintenance:

Analysis: Under Alternative A, the No-Action alternative, there would be no alteration to the existing routine maintenance regime at Flying W (refer to Section 3.2). Staffing levels would remain the same for the immediate future, pending any changes to present visitation patterns. The park Roads crew would continue to grade, brush-hog, and maintain the gravel access Road 2-3006 leading from State Hwy. K out to the existing Bluff parking area and turn-around on the north side of the Flying W site. Trash pick-up would continue to be provided. No additional expenditures of materials (for signs, or barrier gates, or road rehab/maintenance would be directed towards maintaining this site).

Cumulative Effects: Existing Maintenance staffing levels and assigned routine tasks associated with park operations at Flying W would not be altered. Current trends in visitor usage indicate that this popular site is receiving increasing use. This has the potential to create an indirect adverse effect in

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the future on maintenance operations since present levels of assigned staff may be unable to handle the increased amount of trash, and erosion/road damage due to intensified, unrestricted visitor use.

Conclusion: The No-Action alternative would have **minor short-term** and **moderate long-term adverse impacts** on park maintenance operations at Flying W.

Law Enforcement/Visitor Protection:

Analysis: Under Alternative A, the No-Action alternative, it is reasonable to assume that there would be a potential need for an increase in existing staffing levels (Ranger patrol). The existing network of ad hoc roads and the direct unobstructed access to the Bluff area where summer weekend partying is a draw, and coupled with the absence of posted signage/regulations, would continue cause adverse impacts to law enforcement operations. If new policy (curtailing cliff diving, restricting gravel bar access/parking by motorized vehicles, and limiting alcohol consumption) is implemented in 2007 and rangers begin enforcing these changes, it is expected that initially visitors would need a period of adjustment. Such changes put additional demands on Law Enforcement operations. In time, as the visiting public becomes familiar with the new restrictions, the LE staff workload may taper off somewhat. Emergency rescue operations would likely diminish once visitors are aware that they would be cited for diving of the Bluff. This would have a minor to moderate beneficial impact on LE Protection operations. It is possible that once new restrictions are enacted, that the party crowd at the Flying W Bluff would head elsewhere and visitor patterns would change. However, as long as the current physical conditions at Flying W remain unchanged with ad hoc roads allowing unlimited access, there would be continued minor adverse impacts to LE Ranger operations.

Cumulative Effects: Under Alternative A, the No-Action alternative, cumulative impacts affected by the No Action alternative would cause indirect minor to moderate adverse impacts to LE Protection operations since the existing site conditions would continue to allow for unfettered access to the river gravel bars at Flying W. Simultaneously, cumulative impacts affected by the implementation of new policy would cause indirect beneficial impacts to the LE operations over time.

Conclusion: Alternative A (No Action) would have **minor short-term adverse impacts** to LE Protection operations. In the long-term, these adverse impacts would be mediated somewhat by the implementation of proposed changes to park policy which is expected to have a **minor long-term beneficial** impact to LE Protection operations.

ALTERNATIVE B – Provide vehicle access to the northern end of Flying W for day-use activities

Maintenance:

Analysis: Under Alternative B, the proposed actions (see Section 3.2) would create a moderate adverse impact to maintenance staff work requirements, above and beyond the existing routine maintenance regime at Flying W. Staffing levels, heavy equipment needs, and the procurement of additional construction materials would increase during the period of time when the proposed rehabilitation and new construction is undertaken. Following the successful completion of the proposed actions the routine maintenance regime would be reinstated. Enacted modifications to the site in Alternative B would cause negligible to minor adverse impacts to the existing routine maintenance regime at Flying W. The park Roads crew would continue to grade, brush-hog, and maintain the gravel access Road 2-3006 leading from State Hwy. K out to the new Bluff parking area in the north side of the site. The new parking area and extended segment of the Rd. 2-3006 would expand the overall area requiring periodic grading and surfacing with crushed rock however, the new location of the parking area would present considerably less problems from damage caused by erosion. The installation of regulatory & guide signs, designated trails, parking spaces, and barrier gates should curtail off-road travel and reduce the proliferation of ad hoc use. Trash pick-up would

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continue to be provided. The park's trail crew would need to maintain the 0.9 mile designated horse trail by clearing brush and repairing tread and drainage, although because of the level nature of 0.7 miles of the trail along the open fields this would be easier to maintain than the designated trail in Alternative A or C.

Cumulative Effects: Existing maintenance staffing levels and assigned routine tasks associated with park operations at Flying W would not be impacted beyond the finite period of construction and rehabilitation. Further, in Alternative B, the redesign of the day use area in the north and a designated set of trails (equestrian & pedestrian), which would be undertaken to define and restrict visitor use, would actually lessen (to some degree) the work load to maintain the site to NPS standards.

Conclusion: Alternative B would have **moderate short term adverse impacts** to maintenance staffing requirements during the period of time when site rehabilitation and new construction are implemented. These actions would have a **minor long-term beneficial effect** on future maintenance operations.

Law Enforcement/Resource Protection:

Analysis: Under Alternative B, the construction of a hardened access road and parking area, a safe foot trail to the river, and a designated blazed hardened horse trail, should provide both visitors and rangers with a clearly defined destination and identified corridors of travel. Many would appreciate the new improvements. Other visitors would continue to head "off-road" to cross the agricultural fields down to the River Road to access the gravel bars. Motorized traffic (some visitors) would continue to attempt crossing at previously used river fords. With clearly defined and signed designated routes and parking areas, rangers would find that apprehending visitors who are traveling off the designated roads and trails to be a straightforward task. At first, as the public adjusts to the new conditions, this would cause a moderate adverse impact to Law Enforcement (LE) operations since LE ranger patrols may need to be more frequent. Regulatory sign installation should help to clarify what is expected of park visitors and combined with defined areas of use the actions proposed in Alternative B would have a beneficial impact on LE/Protection operations. Once the public becomes accustomed to the site changes rangers would resume regular patrols

Cumulative Effects: Cumulatively, the actions proposed in Alternative B would indirectly have a beneficial impact to Law Enforcement/Protection operations. Initially the site amendments would cause a moderate adverse impact to Le/Protection ranger staffing requirements. Over time, as the public becomes accustomed to the new facilities and the accompanying restrictions, there would be a indirect beneficial impacts to LE/Protection operations.

Conclusion: Implementing the proposed modifications presented in this alternative would have **moderate short-term adverse effects** on LE/Protection operations, but **minor long-term beneficial effects**.

ALTERNATIVE C – Provide walk-in access to the northern end of Flying W

Maintenance:

Analysis: Under Alternative C, implementing the proposed actions (see Section 3.2) would create a moderate adverse impact to the park's Maintenance Division, requiring additional staff time, materials, and equipment costs during the rehabilitation and construction period. Following the period of new construction the routine maintenance workload and associated materials and equipment costs to provide routine maintenance at Flying W would decrease. Thus the proposed actions, once implemented, would have an indirect minor to moderate beneficial impact on park maintenance operations. The park Roads crew would continue to grade, brush-hog, and maintain a stable gravel

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surface along the access Road 2-3006 leading from State Hwy. K out to the Flying W site. The new parking area for visitors who elect to access the site on foot would require periodic applications of crushed rock but the location is level and sited so as to cause little erosion. In this alternative, because vehicles would be restricted from entry to the open fields, the only maintenance operations preformed within Flying W would involve maintenance of the designated horse trail along the river. Because segments of this trail alignment are subject to seasonal flooding, this would have a moderate adverse affect on Trails crew workloads which would increase. It is noted that the creation of a designated trail for equestrians is intended to present considerably less problems from damage to the site caused by the current undefined horse use throughout the lower terraces and agricultural fields at Flying W. It is expected that the installation of regulatory signs at the gated entry to Flying W, and the creation of a definitive blazed horse trail, would lessen future on-site damage that would require maintenance attention.

Cumulative Effects: The proposed actions in Alternative C would cause moderate adverse impacts to park maintenance operations during site rehabilitation and the construction phase. Once completed, the actions in Alternative C would reduce the Roads crew routine maintenance work load. The routine maintenance of a designated horse trail would increase the workload of the park Trails crew. With vehicular access curtailed, visitation would be expected to taper off. Horse use would likely increase given the “designated” route. Trash pick-up near the popular north gravel bar would no longer be provided via the non-existent access road out to the bluff and this may increase debris in this area because the north gravel bar would likely continue to be a destination for floaters.

Conclusion: Alternative C would incur **moderate short term adverse impacts** to maintenance operations during the period of time when site rehabilitation and new construction are implemented, and incur **minor long-term adverse impacts** to the consequent routine maintenance.

Ranger Protection/Law Enforcement:

Analysis: Actions proposed in Alternative C would essentially remove all vehicular access from the Flying W site, excepting equipment brought in to mow the agricultural fields by the permittee, and park staff (most of whom would be from the LE Protection Division). Those visitors who have been accustomed to driving into the site to get to the gravel bars, particularly the Bluff gravel bar, would now have to arrive either by tube, canoe or on foot. Though hunters, and perhaps fishermen would be willing to trek in to the area, it is not expected that summer visitors looking to bring in picnic supplies for a day on the river would be tempted to make the long walk in from the parking area in the heat and in the absence of any foot trail. In that sense, under actions proposed in Alternative C, the Flying W site is not really a “day-use” area anymore than any other land bordering the river within the park boundary is somehow a “day-use” area. Since the Road 2-3006 would terminate at the edge of the first agricultural field at a newly installed gate with a new parking area and turn-around, off-road use now prevalent at the site would be far easier to control from a LE Protection operations stand point. Actions implemented in Alternative C would consequently have a moderate beneficial impact to LE Protection operations. A period of unrest and vandalism might be instigated with the closure of roads into this area, but would subside over time. Activity on the popular gravel bars would likely continue, but it is surmised that the wild party scene on the Bluff gravel bar with loud boom boxes and rowdy crowds would head elsewhere once quick access via 4-wheel drive vehicles is no longer available. Alternative C has no provision for accessing any of the gravel bars from above (via the agricultural field terraces by foot trails leading down to the river). Though LE staff would be able to drive into the site in an emergency, rescue operations that required an injured party to be packed out would be difficult indeed. This would cause moderate adverse impacts to LE/Protection operations in the event of an emergency. The indicated route for a designated horse trail follows the “river road” in Alternative C. Horses would be restricted to this trail (off limits to vehicles). It is expected that riders would stay on the blazed trail, given ranger reports that most all riders prefer a blazed route and are just “passing through”. Designation of a horse trail through Flying W would have negligible

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beneficial impacts to LE Protection operations. It must be noted though, that previous to actually “designating” a horse trail route, that LE staff have had little in the way of any directive to restrict horse use if riders were on a “road or trace” since so much of this site is criss-crossed with user-created roads/traces created by all manner of unrestricted travel.

Cumulative Effects: During the peak summer months, visitor use at Flying W would retreat to the periphery, and be limited for the most part to the gravel bars and those visitors who arrive by water (canoes and tubers). The immediate effect of implementing actions proposed in Alternative C would cause moderate short term adverse impacts to LE/Protection staff as some disgruntled visitors may protest the restrictions on vehicle access causing an increase in cases of vandalism. Over time, as the public became familiar with the changes effected by actions implemented in Alternative C, and visitor use patterns adapt to these changes, there would be minor to moderate beneficial impacts to LE Protection operations.

Conclusion: Implementing the proposed modifications presented in this alternative would have **moderate short-term adverse impacts, and moderate long-term beneficial impacts** to LE/Protection operations.

ALTERNATIVE D – Provide vehicle access to the northern and southern ends of Flying W for day-use activities

Maintenance:

Analysis: Under Alternative D, implementing the proposed actions (see Section 3.2) would create a moderate adverse impact to the park’s Maintenance Division, requiring additional staff time, materials, and equipment costs during the rehabilitation and construction period. Following the period of new construction the routine maintenance workload and associated materials and equipment costs to keep the expanded facilities at Flying W up to NPS standards would increase. Thus the proposed actions, once implemented, would have an indirect minor to moderate adverse impact on park maintenance operations. The park Roads crew would continue to grade, brush-hog, and maintain a stable gravel surface along the access Road 2-3006 leading from State Hwy. K out to the Flying W site. The addition of two new gravel road alignments and two new day-use parking areas, a 4000 ft. designated horse trail, and two pedestrian trails to the river would require increased staff time, equipment costs, and materials. These new modifications would cause adverse moderate impacts to the routine maintenance operations at the Flying W site. However, it is duly noted, that the creation of stable road surfaces and the installation of defined parking areas are intended to present considerably less problems from damage to the site caused by ad hoc use because of the current lack of clearly defined use. It is expected that the installation of regulatory & guide signs, designated trails, hardened clearly delineated access roads, defined parking spaces, and barrier gates should curtail off-road travel and reduce the proliferation of ad hoc use. Trash pick-up would also need to be provided for not one, but two day-use areas. The park’s trail crew would need to maintain the 0.9 mile designated horse trail by clearing brush and repairing tread and drainage, although because of the level nature of 0.7 miles of the trail along the open fields this would be easier to maintain than the designated trail in Alternative A or C.

Cumulative Effects: The proposed actions in Alternative D would cause moderate adverse impacts to park maintenance operations during construction and rehabilitation and thereafter. The actions in Alternative D the redesign of the day-use area in the north, the addition of a second day-use area in the south, and a designated set of trails (equestrian & pedestrian) which would serve to define and restrict visitor use may actually lessen (to some degree) the future work load to maintain this site to NPS standards.

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Conclusion: Alternative D would incur **moderate short term adverse impacts** to maintenance operations during the period of time when site rehabilitation and new construction are implemented, and incur **minor long-term adverse impacts** to the consequent routine maintenance regime.

Ranger Protection/Law Enforcement:

Analysis: In Alternative D, the construction of two designated hardened access roads and parking areas, safe foot trails to the river, and a designated blazed hardened horse trail, should provide both visitors and rangers with a clearly defined destination and identified corridors of travel. Many would appreciate the new improvements. Visitors who previously created ad hoc roads across the agricultural fields to reach the southern gravel bars would have a stable hardened surface. Because motorized vehicles would now be restricted from accessing the gravel bars via the agricultural fields or one the two ford crossings some would continue to head “off-road” seeking to get down to the River Road to access the gravel bars. Motorized traffic (some visitors) would continue to attempt crossing at previously used river fords. However, with clearly defined and signed designated routes and parking areas, rangers would find that apprehending visitors who are traveling off the designated roads and trails to be a straightforward task. At first, as the public adjusts to the new conditions, this would cause a moderate adverse impact to Law Enforcement (LE) operations since LE ranger patrols may need to be more frequent. Regulatory sign installation should help to clarify what is expected of park visitors and combined with defined areas of use the actions proposed in Alternative D would have a beneficial impact on LE/Protection operations. Once the public becomes accustomed to the site changes rangers would resume regular patrols

Cumulative Effects: Initially the site amendments would cause moderate adverse impacts to Le/Protection ranger staffing requirements, as the public becomes accustomed to the new facilities and the accompanying restrictions. Cumulatively, the actions proposed in Alternative D would indirectly have a beneficial moderate impact to Law Enforcement/Protection operations.

Conclusion: Implementing the proposed modifications presented in this alternative would have **moderate short-term adverse effect** on LE/Protection operations, but **minor long-term beneficial effects**.