

FINDING OF NO SIGNIFICANT IMPACT

Tamarisk Management and Tributary Restoration Grand Canyon National Park

The National Park Service (NPS) proposes to eradicate tamarisk in side canyons, tributaries, developed areas, and springs above the pre-dam water level in Grand Canyon National Park (GCNP). The purpose of the Tamarisk Management and Tributary Restoration project is to restore more natural conditions and prevent any further loss or degradation of the existing native biota in side canyons along the Colorado River within Grand Canyon National Park. A second purpose of this EA/AEF is to determine the appropriate minimum requirements for accomplishing this project in the park's proposed wilderness.

Tamarisk (*Tamarix sp.*), commonly known as salt cedar, is an exotic (nonnative) shrub or tree that grows in dense stands along rivers and streams in the West. Tamarisk, introduced to the U.S. in the 19th century as an erosion control agent, spread through the West and caused major changes to natural environments. Tamarisk reached the Grand Canyon area during the late 1920s and early 1930s, becoming a dominant riparian zone species along the Colorado River in 1963 following completion of Glen Canyon Dam. The impacts caused by tamarisk in the Southwest are well documented (See Reference Section). These prolific nonnative shrubs displace native vegetation and animals, alter soil salinity, and increase fire frequency. Salt cedar is an aggressive competitor, often developing monoculture stands and lowering water tables which can negatively affect wildlife and native vegetative communities (Duncan 1996). In many areas, it occupies previously open spaces and is adapted to a wide range of environmental conditions. Once established in an area, it typically spreads and persists.

Preliminary surveys conducted in 157 Grand Canyon National Park side canyons indicate that tamarisk is in the early stages of invading tributaries from the main river corridor. Arresting the tamarisk spread from the river into side canyons is desirable while control is still feasible. This project would allow native vegetation to reestablish and regain dominant status without nonnative plant aggression. Follow up removal and monitoring of treated locations will help ensure native vegetation reestablishment. Tamarisk removal from park developed areas and rim locations would eliminate a potential seed source for further invasion and spread into the canyon.

PREFERRED ALTERNATIVE

The preferred alternative would control tamarisk through a combination of mechanical, chemical, and cultural (i.e. seeding) methods. The method selected would be site specific and determined by the restoration biologist or project leader, i.e., adaptive. The majority of the saplings and mature trees would be left on site to decompose, providing wildlife habitat. A brief description of each of the methods follows:

- *Manual Removal* - Seedlings in washes, streambeds, and non-sensitive areas would be manually removed. In addition to hand pulling, leverage devices (weed wrenches™) would be used for slightly larger seedlings and saplings to ensure that the entire root system is removed. Hand tools, including picks, pulaskis, and shovels may be used to loosen the soil surrounding the larger plants and then the entire root system would be removed.
- *Garlon Lance Injection* - The lance injector has proven highly effective in controlling woody plant species in Hawaii. The lance is a three- to four-foot long tool with four chambers. Small herbicide capsules (approximately $\frac{3}{4}$ " long by $\frac{1}{4}$ " in diameter) are placed inside the chambers, the lance is placed against the trunk of the tree, and as the top of the lance is pushed, the chamber opens and a capsule is inserted into the tree. The number of capsules inserted into the tree is based on the trunk's diameter and is determined by the applicator. The overall effectiveness of this method on tamarisk has not been determined, but is a method the park will use if proven effective over the next few years. Direct herbicide injection into the tree would eliminate the possibility of chemical spillage. It would also be safer for the applicators since there is less likelihood of herbicide contact. This method would

be used on large saplings and mature trees. Since the lance must be held at 45 degrees to the trunk, it would be difficult to use as the sole method in dense stands.

- *Hack and Squirt Method* - With this method, a hatchet or tree girdler (similar to a small saw) is used to cut downward into the water-conducting tissue (phloem) of standing trees. The herbicide mixture is then directly applied into the cut with a hand-pressurized sprayer (and fine spray nozzle) or 12cc syringe. On larger trees, two or more cuts would be necessary. The cuts would be made at about one to two meters above the ground. This method would be used in areas with scattered individual mature trees; it would be difficult to use as the sole method in dense stands.
- *Cut Stump Method* - Tree trunks are cut near ground level with handsaws and then stumps are sprayed with Garlon mixed with a penetrating agent (oil) or water. The mixture is absorbed by the plant's phloem and transported to the root; if the herbicide mixture is applied quickly (2-10 minutes), 90-95% control is possible. Pressurized hand or backpack sprayers allow precision herbicide application with minimum overspray or drift risk. This method would be used on a limited number of larger trees in dense stands and for smaller trees where manual removal would cause extensive soil disturbance.
- *Basal Bark Application* - The entire stem is treated with Garlon from near ground level up for about 30-38 centimeters. The chemical is applied with a backpack sprayer or hand held pressurized sprayer, both of which have small nozzles with coarse spray settings that allow for direct spraying with minimal drift or overspray. A paintbrush may also be used for small sapling application. This method is much less labor intensive, but is less effective on mature trees and would be used for smaller saplings and some seedlings. It is effective on trees up to one year and three meters tall.
- *Native Plant Restoration* - Native species restoration may be used in project areas listed in Phase III and some project areas listed in Phase II. Restoration would occur immediately after or within one year of herbicide treatment. All restoration efforts would use site-adapted native seed and/or plants. Restoration would seek to restore the natural conditions prior to tamarisk arrival and to prevent tamarisk re-invasion. Active restoration would include the collection of seed and/or cuttings from native plants in the project area. Any seed spreading or planting of cuttings would seek to replicate the composition and structure of the native plant communities. Extensive monitoring and maintenance would be conducted in these areas to ensure project success.

MITIGATION MEASURES

The following mitigation measures have been selected to minimize, reduce or eliminate impacts of the preferred alternative:

- Should presently unidentified archeological resources be discovered during project implementation, work in that location would stop until the resources are properly recorded by an NPS archeologist and evaluated under National Register of Historic Places eligibility criteria in consultation with the Arizona State Historic Preservation Officer (SHPO) and tribes as appropriate. If the resources are determined eligible, appropriate measures would be implemented either to avoid resource impacts or to mitigate disturbance. To the extent possible, a park archeologist would be on site during project implementation. In addition, tribal representatives would be invited to coordinate project implementation in locations of concern.
- In compliance with the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), the NPS would also notify and consult affiliated tribal representatives for proper treatment of human remains, funerary and sacred objects should these be discovered.
- All workers would be informed of penalties for illegally collecting artifacts or intentionally damaging any archaeological or historic property in the vicinity.

- Park staff would develop a site bulletin on project objectives and methods. Bulletins will be made available to affected backcountry users, including boaters and hikers. Postings could also be made on electronic discussion databases and the park's web page.
- During project implementation, additional invasive plant species would be mapped with a GPS unit, and the park's Restoration Biologist would be notified. If exotic plant species are found in project areas, all workers clothing and footwear and all tools and equipment will be cleaned at the project site to ensure that seeds or propagules are not transported to new locations.
- At least one person per project location would be a certified pesticide applicator. Garlon is a general use herbicide, and pesticide certification is not required for application. However, the park has adopted the policy of having trained and certified applicators on site during projects involving herbicides. Additional project personnel may apply the product under the certified applicator's supervision. All project participants would receive herbicide training from the project leader.
- All information and instructions on the herbicide label would be strictly followed. All herbicide containers would show the product label and would be leak- and spill resistant. All application equipment and chemicals would be stored in sealed ammunition cans or large silver boxes during transport on rafts, and all storage containers would have the product's specimen label and the Material Safety Data Sheet (MSDS) clearly displayed underneath a waterproof plastic sheet. The MSDS contains fire and explosive hazard data, environmental and disposal information, health hazard data, handling precautions, and first aid information. All trip participants would review the MSDS with the project leader and understand first aid instructions described on the MSDS.
- All herbicide and application equipment would be stored separately from food and personal items. Additional ammunition cans for disposal of used PPE (such as gloves, goggles, etc.) and herbicide containers would be included.
- A hazardous material (haz-mat) and safety plan would be developed and reviewed by the park's environmental protection specialist and safety officer and approved by the Director of the Science Center prior to project implementation. Project participants would understand and abide by the established Personal Protective Equipment (PPE) requirements and rules outlined in the safety plan. Rubber gloves, long sleeve shirts, and goggles are part of the PPE necessary for this project. A job hazard analysis (JHA) for exotic plant removal and herbicide application has already been prepared and would be reviewed with all project participants.
- According to Arizona's Department of Environmental Quality (ADEQ), Crystal Creek and Chuar Creek are listed as exceeding state surface water quality standards for arsenic and are designated as impaired on the 303(d) list. Rubber boots and any additional PPE proposed by ADEQ would be required for project participants working in these areas.
- All project participants would receive instruction on *Leave No Trace* procedures before working in the park's proposed wilderness. These procedures would apply to camping etiquette and project implementation. See Appendix C of the EA/AEF.
- Active native species restoration may be used in project areas listed in Phase III and some project areas listed in Phase II (refer to Appendix A - Project Implementation Phase Tables). Restoration would occur immediately after or within one year of herbicide treatment. All restoration efforts would use site-adapted native seed and/or plants. Restoration would seek to restore the natural conditions prior to tamarisk arrival and to prevent tamarisk re-invasion. Active restoration would include the collection of seed and/or cuttings from native plants in the project area. Any seed spreading or planting of cuttings would seek to replicate the composition and structure of the native plant communities. Extensive monitoring and maintenance would be conducted in these areas to ensure project success.
- To minimize soil compaction, the following mitigation measures would be incorporated into all action alternatives:
 - ❖ The minimum number of workers necessary to complete the work would be used.
 - ❖ The project leader would determine the access route that would cause minimal disturbance to sensitive soils and vegetation. Access to areas would use existing game and hiking trails wherever possible. If no trails exist, the project leader would determine whether single or multiple paths would be used to access the project site.

- ❖ The minimum number of trips to sensitive areas would be conducted for follow-up maintenance and monitoring.
- All project participants would be informed about special status species and what actions should occur if a special status species is encountered. To the extent possible, a wildlife biologist and botanist would be on site during project implementation. If a previously unknown or undiscovered threatened, endangered, or special status species is discovered in the project area, all work will cease until park staff evaluates the project impact on the discovery and conducts additional Section 7 consultation with the U.S. Fish and Wildlife Service.
- All project participants would receive tool safety training and would be required to use the appropriate PPE for each assigned task. The tools would be kept in appropriate storage locations at all times.
- The use of motorized transport is not necessary to accomplish project objectives (Refer to Appendix C, Wilderness Minimum Requirement Analysis); therefore, oar-powered rafts (14-foot minimum) would be the sole transportation to the project sites.
- To minimize visitor experience impacts, a project schedule would be provided to all river groups that launch during the project timeframe. The schedule would alert visitors to the potential of encountering work groups, and allow visitors to avoid contact. The project schedule would also be provided to backpackers through the park's backcountry office and park web site.
- During project implementation, to the greatest extent possible, less desirable campsites would be used to minimize contact with other backcountry users. In some situations, campsites may have to be shared with other user groups; however, visitors would have had the opportunity to avoid this by using the provided schedule.
- NPS staff would provide educational and informational messages to any groups encountered during project implementation. A project "Site Bulletin" would be developed and could be provided to interested parties.
- To minimize potential impacts to water quality, best management practices (BMP) would be used to minimize any potential sediment delivery to streams. BMPs include minimizing impacts to steep slopes by leaving standing vegetation on steep slopes or placing cut branches on steep slopes; using the minimum number of workers in areas with steep slopes or fragile soils; and applying native grass seed to steep slopes to help stabilize soils.
- Herbicide application would not affect turbidity; however, workers in the project areas may. According to the Arizona Department of Environmental Quality, Havasu Creek is currently listed as exceeding turbidity standards.
- All project participants would receive standard NPS white-water personal safety training, and would be provided with and required to use Personal Flotation Devices (PFD) at all times while on boats.
- The proposed project would be conducted outside of breeding seasons for the majority of park wildlife species in order to minimize impacts on productivity.
- Foot traffic (which can cause erosion, vegetation trampling, soil compaction, and be harmful to small animals, such as amphibians found in tributary habitats) in the removal areas would be kept to a minimum by only using the minimum number of people necessary for the removal work and by keeping their trips to a minimum. Under the preferred alternative, traffic would be less because trees are left in place and do not have to be removed from the drainages. This would also increase habitat for small mammals and cavity dwelling birds and bats.
- To minimize impacts from the control methods, the following specific mitigation measures will be adhered to:
 - ❖ Every attempt would be made to dispose of debris to minimize visual impact (i.e. off trail, out of the drainage).
 - ❖ Empty herbicide capsules would be removed from trees in the year following treatment.
 - ❖ Cut stumps would be hidden from view to the extent possible.
 - ❖ Soil would be tamped where manual removal is used to help minimize establishment of other invasive exotic species and to minimize visual impact.

- ❖ When the hack and squirt method is used, tree cuts would be made on tree sides least visible to backcountry users.
- ❖ If pruning is necessary, a minimal number of branches would be cut to minimize visual impact.

ALTERNATIVES CONSIDERED

Grand Canyon National Park developed alternatives from key issues and objectives noted in Chapter One of the EA/AEF. The EA/AEF evaluated two alternatives: the preferred alternative (Alternative B) as described above, and a no action alternative (Alternative A). In developing alternatives, some actions were considered and dismissed; these are summarized at the end of Chapter 2. Under the No Action alternative, no tamarisk control would be attempted. The present trend of increasing numbers, ages, and distribution of nonnative tamarisk will continue. This trend has been well-documented in riparian areas throughout the southwest. This alternative would not allow for the preservation of high quality desert riparian ecosystems found within the park.

The preferred alternative was selected over the no action alternative because it would allow Grand Canyon National Park to meet objectives set forth in the park's General Management Plan and Resource Management Plan, and to realize the full range of national environmental policy goals as stated in §101 of the National Environmental Policy Act. The preferred alternative was also selected because it would allow for the preservation of high quality desert riparian ecosystems. In the Southwest, riparian areas account for less than 2% of the land, yet over 65% of Southwestern wildlife depend on riparian habitats. Grand Canyon National Park contains some of the nation's remaining pristine desert riparian areas, and under the preferred alternative these areas would be preserved, protected and restored.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

Environmentally preferable is defined as "the alternative that will promote national environmental policy as expressed in the National Environmental Policy Act §101." Section 101 of the National Environmental Policy Act states that "...it is the continuing responsibility of the Federal Government to ... (1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; (2) assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings; (3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences; (4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice; (5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources." The environmentally preferable alternative for this EA /AEF is based on these national environmental policy goals.

The Preferred Alternative (Alternative B) is the environmentally preferable alternative. This alternative strives to integrate the following GCNP General Management Plan objectives:

- Preserve and protect park genetic integrity and species composition, consistent with natural ecosystem processes.
- To the maximum extent possible, restore altered ecosystems to their natural conditions. In managing naturalized ecosystems, ensure preservation of native components through active management of nonnative components and processes.

This alternative also meets the following natural resource objective from the park's Resource Management Plan:

- Preserve park natural genetic integrity and species composition consistent with ecosystem processes, including the elimination of nonnative plant and animal species wherever possible.

Through use of an Integrated Pest Management (IPM) approach, Alternative B realizes the above objectives and promotes the most comprehensive protection and enhancement of natural and wilderness resources in park tributaries, side canyons, springs above pre-dam water level, and developed areas. This alternative

surpasses the no action alternative in realizing the full range of national environmental policy goals as stated in §101 of the National Environmental Policy Act. Although the no action alternative may achieve greater levels of protection for cultural resources, natural resources, and/or visitor experiences, Alternative B provides a high level of protection for natural and cultural resources while concurrently attaining the widest range of neutral and beneficial uses of the environment without degradation, maintains an environment that supports diversity and variety of individual choice and, integrates resource protection with an appropriate range of visitor uses.

WHY THE PREFERRED ALTERNATIVE WILL NOT HAVE A SIGNIFICANT EFFECT ON THE HUMAN ENVIRONMENT

As defined in 40 CFR §1508.27, significance is determined by examining the following criteria:

Impacts that may be both beneficial and adverse.

As fully discussed in the Environmental Assessment, the preferred alternative will not affect air quality; employee and visitor health and safety; environmental justice; floodplains; geology and topography; park operations; prime and unique farmlands; socioeconomic environment; and soundscape. The preferred alternative will affect the following:

Soils and Biotic Communities: Impacts from management activities in the preferred alternative may have a negligible to minor direct impacts on biotic communities on an extremely localized basis, primarily in access routes to a few project sites. Due to the fragility of microbiotic crusts, impacts could be long-term due to the crust's long recovery time. Most project access would cause negligible impacts to biotic communities. The preferred alternative would have a short-term, minor, adverse impact to the majority of soils in project areas, primarily due to soil compaction from worker presence but also due to soil disturbance during manual removal efforts. There would be a long-term, minor to moderate beneficial improvement in soil characteristics such as pH and salinity due to tamarisk removal. The cumulative effect of the preferred alternative in the proposed project areas, in combination with other past, present, and reasonably foreseeable future actions, would be adverse, of negligible to minor intensity.

Threatened, Endangered and Sensitive Species: The preferred alternative would have short-term, negligible to minor effect on the 21 listed plant, aquatic, mammal, and reptile species, and the three bird species, bald eagle, Mexican spotted owl, California condor, that occur in the vicinity of Grand Canyon National Park. The initial Biological Assessment for Phase I project sites, which the USFWS concurred with, stated that there would be *NO EFFECT* on the majority of these species under this alternative. The overall conclusion of the initial consultation with the USFWS on the southwestern willow flycatcher, was that the proposed action *MAY AFFECT – IS NOT LIKELY TO ADVERSELY AFFECT* the species (consultation dated January 15, 2001). With mitigation measures in place and continued contact and consultation with the USFWS for the additional phases, the preferred alternative would have short-term, negligible, if any, direct or indirect impacts to any of the park's listed species. The cumulative effect of the preferred alternative on the park's threatened, endangered and sensitive species, in combination with other past, present, and reasonably foreseeable future actions in the inner canyon, would be negligible to minor.

Vegetation: There would be short-term, negligible to minor, adverse impacts to non-target vegetation from methods used in the preferred alternative. There would also be long-term, minor to moderate, beneficial impacts to native vegetation from tamarisk removal. In combination with other past, present and reasonably foreseeable future actions, the cumulative effect of the preferred alternative would range in intensity from negligible to moderate, adverse and beneficial.

Water Quality and Wetlands: There may be overall short-term, negligible to minor, adverse water quality impacts under the preferred alternative. The impact of increased water temperature may be a long-term, minor adverse impact since it would not be realized until the overstory tamarisk fall over or are washed downstream. There would also be long-term, minor to moderate beneficial water quality and wetland impacts under this alternative since tamarisk would no longer usurp the majority of the water and nutrient resources in the area. The wetland functions would be restored over the long-term. There would be short-term, negligible, impacts to water quality due to the use of Garlon. The cumulative effect of the preferred

alternative on water quality and wetlands in the majority of the project areas, in combination with other past, present and reasonable foreseeable future actions, would be adverse, long term, and of minor intensity.

Wildlife: There would be long-term beneficial impacts to the majority of wildlife species once tamarisk is removed and native vegetation recovers. There may be short-term minor adverse impacts to some wildlife species, primarily due to trampling during control efforts. There may be short-term negligible adverse impacts to wildlife species that depend on tamarisk for nesting and habitat. Since the majority of the tamarisk trees would be left standing to die, the wildlife species utilizing tamarisk during project implementation would not be immediately displaced. The cumulative effect of the preferred alternative on wildlife in the majority of the project areas, in combination with other past, present and reasonable foreseeable future actions, would be adverse and beneficial, long term, and of minor to moderate intensity.

Ethnographic Resources and Traditional Cultural Properties: Indirectly, springs and collection areas, may be modified. For example, there could be an increase in water quantity and wetland health over time as the tamarisk is eradicated. An additional benefit is that once tamarisk tree have died, native plant species would recover and colonize. Walking through tamarisk thickets is difficult for visitors of all ages, especially the elderly. Tamarisk removal may benefit access by tribal members culturally affiliated with Grand Canyon. After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, *Assessment of Adverse Effects*), Grand Canyon National Park concludes that the implementation of the preferred alternative would have *no adverse effect* on the ethnographic resources, including traditional cultural properties. Consultation with the State Historic Preservation Officer was completed on April 8, 2002.

Archaeological and Historical Resources and Cultural Landscapes: The impact of the preferred alternative is at the lower levels of detection. For National Register properties, there is no short- or long-term change in any character-defining features of the resource (no adverse effect) because the disturbance would be concentrated in the drainages and not on the terraces where archaeological and historical materials are identified. In some instances removal of tamarisk may destabilize a dune, causing bank slump. In this case, it is possible that, through time, the destabilization of the dunes could cause destabilization of the terraces behind the dunes, where archaeological and historical sites are located. However, through monitoring effects reestablishment of native species would curtail this type of bank erosion. An archaeologist will accompany each tamarisk management expedition. Because of this involvement, there is confidence that mitigation measures would include avoidance and appropriate documentation of any inadvertent discoveries. If during implementation of the project previously unknown archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the state historic preservation officer and associated tribes, as necessary. After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, *Assessment of Adverse Effects*), Grand Canyon National Park concludes that the implementation of the preferred alternative would have *no adverse effect* on archeological and historic resources. Consultation with the State Historic Preservation Officer was completed on April 8, 2002.

Wilderness: Although direct adverse impacts of the preferred alternative would include short-term, minor and localized soil, vegetation and structure disturbance, benefits to the natural environment would include long-term recovery of natural systems and processes. The cumulative effect of the preferred alternative on the park's wilderness resources, in combination with other past, present, and reasonably foreseeable future actions, would be adverse, of minor intensity.

Visitor Experience: The implementation of the preferred alternative would produce short-term, negligible to minor adverse impacts to visitor experience and visual resources. Mitigation measures associated with this alternative should minimize impacts. This alternative creates long-term, minor to moderate, beneficial impacts on visitor experience through native riparian vegetation restoration. The cumulative effect of the preferred alternative, in combination with other past, present, and reasonably foreseeable future actions, would be adverse and of minor to moderate intensity.

Degree of effect on public health or safety.

The preferred alternative would have negligible, if any, effects on the health or safety of the public or employees. For more detailed information about the potential effects of Garlon 3a and Garlon 4 on humans, refer to USDA (1992) and SERA (1996). Both documents contain detailed analysis of toxicity, exposure, and reference dose for each of the products. The in depth analysis of the products contained in those documents reveal that the proposed use of these herbicides would result in negligible, if any, impacts to human health and safety. A safety plan, reviewed by the park's safety officer and approved by the Director of the Science Center, will be prepared for this project and include background information on the potential hazards during project implementation. The plan will also include detailed information on pesticide exposure, heat and cold related illnesses, lightning, flash floods, Africanized honeybees and animal bites. For each of these categories, detailed information, Standard Operating Procedures (SOPs), and safe operating procedures will be identified. Employees will be trained in the identification of Africanized honeybees and will be provided with standardized procedures that would be followed should a nest be located in a project area. Procedures will also be established for evacuation of campsites along the river if Africanized honeybees are located. All applicable NPS SOPs for work in backcountry areas will be included in the safety plan. For all project implementation tasks, appropriate Job Hazard Analyses will be included. Each Job Hazard Analysis will be reviewed and approved by the Director of the Science Center. The complete safety plan would be reviewed with all workers prior to project implementation. These mitigation measures would ensure employee and visitor safety.

Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

As discussed in the Environmental Assessment, the implementation of the preferred alternative will not affect floodplains and prime and unique farmlands. No wild and scenic rivers will be affected by implementation of the preferred alternative. No ecologically critical areas, including critical habitat for threatened, endangered, or proposed species, will be adversely affected by the implementation of the preferred alternative. Implementation of the preferred alternative would result in a "may affect, not likely to adversely affect" determination for threatened, endangered or sensitive species. Arizona Game and Fish Department concurred that appropriate provisions to protect Kanab ambersnails were outline in the EA/AEF preferred alternative and does not anticipate any impacts as a result of project implementation. Implementation of the preferred alternative would result in a "no adverse effect on archaeological resources, historic resources, and cultural landscape" determination in accordance with the requirements of Section 106 of the National Historic Preservation Act. Consultation with concerned tribal officials, Arizona State Historic Preservation Officer, and U. S. Fish and Wildlife Service has been completed.

Degree to which effects on the quality of the human environment are likely to be highly controversial.

There were no highly controversial effects identified during either preparation of the environmental assessment or the public review period.

Degree to which the possible effects on the quality of the human environment are highly uncertain or involve unique or unknown risks.

There were no highly uncertain, unique or unknown risks identified in the environmental assessment or during the public review period.

Degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration. The preferred alternative neither establishes a precedent for future actions with significant effect nor represents a decision in principle about a future consideration.

Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.

Impacts of the preferred alternative identified in the environmental assessment were to soils and biotic communities; threatened, endangered and sensitive species of plants and wildlife; vegetation; water quality and wetlands; wildlife; ethnographic resources; traditional cultural properties; archaeological and

historical resources; cultural landscapes; wilderness; and visitor experience. As described in the environmental assessment, a variety of past, present, and reasonably foreseeable future actions have affected or may affect resources in the Grand Canyon vicinity. However, the adverse impacts of the preferred alternative would be a relatively minor component of the overall minor cumulative impacts, due to the extent of the preferred alternative and the mitigation measures included with the preferred alternative. Foreseeable future actions in park developed areas were not considered as contributing to the project's cumulative impacts. No other additional restoration or management actions are planned in the park's tributaries and side canyons at this time. Additional disturbed land restoration activities are currently limited to the beaches along the mainstem of the Colorado River in the park and would not contribute to the cumulative impacts of this project. Trail maintenance projects proposed for the next decade would also not contribute to the cumulative impacts of this project since there are very few sections of trail in the tributaries and project areas. The NPS does recognize that park natural and cultural ecosystems are part of the greater Colorado Plateau ecosystem and would strive to integrate this project into other plateau planning and restoration efforts.

Degree to which the action may adversely affect districts, sites, highways, structures, or objects listed on National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

The implementation of the preferred alternative will have no effect on highways or districts. After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, *Assessment of Adverse Effects*), Grand Canyon National Park concludes that the preferred alternative would have *no adverse effect* on ethnographic resources, traditional cultural properties, archaeological or historic resources, or cultural landscape.

Degree to which the action may adversely affect an endangered or threatened species or its critical habitat.

The Federal and state listed plant species are not known to exist in the proposed project areas. This determination is based on specific knowledge of the areas, knowledge of the species in question, and professional judgment. The U.S. Fish and Wildlife Service concurs that there would be no effect on any of the Federal or state listed plant species under the proposed action alternative.

During herpetofaunal inventories in consecutive years (1999-2001), an amphibian search documented three sites where leopard frog tadpoles were observed and verified. Both are areas of high visitor use (Grand Canyon National Park Science Center, unpublished data), and none of the sites are in the proposed project areas; therefore, the preferred alternative would have no known impacts on established populations of leopard frogs.

One formerly listed species, American peregrine falcon (*Falco peregrinus anatum*), and one formerly proposed species, northern goshawk (*Accipiter gentillis*), occur in the park but are not on the U.S. List of Threatened and Endangered Species. This project would not impact these species.

Indirectly and cumulatively, triclopyr, the preferred herbicide for use in this project, has little if any potential to accumulate in aquatic organisms and is practically nontoxic to fish, invertebrates and mammals. The selective herbicide application methods used under this alternative would minimize any potential effects, which overall would be short-term and negligible. The project would not affect habitat considered critical for spawning or breeding of any of the listed species.

Occasionally, during the late fall and winter months, California condors (*Gymnogyps californianus*) will scavenge along the river corridor and some side canyon areas. They also may perch or roost for the night. Should the condors scavenge, perch or roost in areas of project implementation, all activity by the project crew would cease until the time that birds disperse and leave the immediate vicinity. With this mitigation measure in place, there should be no impact to the park's experimental population.

In the draft EA for the establishment of a wild population of Kanab ambersnails (*Oxyloma haydeni kanabensis* Pilsbry) within GCNP, eleven sites in are listed as optimum or desirable in biological and environmental conditions (USFWS 1998). The preferred alternative included the establishment of populations at Lower Deer Creek Spring, Upper Elves Chasm, and Key Hole Springs; tamarisk is not currently known to occur in these areas; therefore, there would be no direct effect on the populations from this alternative. Arizona Game and Fish Department in a letter dated April 8, 2002 confirmed this by the following statements: "Since tamarisk is not known to occur near any populations of Kanab ambersnail,

we do not anticipate any impacts as a result of this project. We feel that appropriate provisions to protect these species have been outline in the EA Action Alternative.”

The tributaries that contain potentially suitable habitat for the southwestern willow flycatcher include, but are not limited to Shinumu Canyon, Tapeats Canyon, Deer Creek Canyon, Havasu Canyon, Kanab Canyon, Spring Canyon and Three Springs Canyon. These areas are included in Phase III of the proposed project along with Upper Carbon Canyon and the Lower Little Colorado River, which may also contain potentially suitable habitat based on initial Habitat Assessments completed in 1999. The park would have to consult with the USFWS after the completion of full survey protocol in these areas and would not proceed with any removal efforts until consultation is completed. If additional potential habitat is detected in other areas, consultation will need to be completed prior to any tamarisk management. With the adoption of these changes, the USFWS concurred with the "may affect, is not likely to adversely affect" determination for this project. The NPS will continue to maintain contact with the USFWS to ensure compliance with Endangered Species Act Regulations.

The preferred alternative, based on initial consultation with the USFWS, would have negligible to minor impacts on any of the park's threatened, endangered or sensitive species or their critical habitat.

Whether the action threatens a violation of Federal, state, or local environmental protection law.

The preferred alternative violates no federal, state, or local environmental protection laws.

IMPAIRMENT OF PARK RESOURCES OR VALUES

In addition to determining the environmental consequences of the preferred and other alternatives, National Park Service policy (*Management Policies*, 2001) requires analysis of potential effects to determine whether or not actions would impair park resources. The fundamental purpose of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of the park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment 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. Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. An impact to any park resource or value may 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;
- Key to the natural or cultural integrity of the park; or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's resources or values as a result of implementation of the preferred alternative.

PUBLIC INVOLVEMENT

Informal public involvement has been ongoing since 1998. The formal public involvement and consultation process was initiated in the fall of 2000.

October 30, 2000 - The park initiated consultation with surrounding tribal governments. A letter soliciting tribal thoughts and concerns was sent to eight tribal governments. Initial comments were received and incorporated into the planning process.

March 1, 2001 - A public scoping letter was sent to 325 individuals, agencies and organizations. The letter solicited the public's concerns, viewpoints, and comments regarding the planning and implementation of the proposed project. The scoping period ended on April 1, 2001; however, comments received after that date were also considered.

March 1, 2001 - A press release entitled "Grand Canyon National Park Initiates General Scoping on Proposed Tamarisk Management Project" was released. The press release stated that the park would accept comments on the project for 30 days.

March 5, 2001 – A follow-up letter was sent to the surrounding tribal governments. The letter included an invitation to an IDT meeting on March 12, 2001. Follow-up phone calls were made to the interested tribes. The second IDT meeting was held in Flagstaff on March 12, 2001. The primary objectives were to involve the interested tribal representative in the project planning process as part of the project IDT and to determine concerns/issues prior to drafting the EA/AEF for the proposed project.

March 31, 2001 – The park presented an overview of the project at the annual Guides Training Seminar in Marble Canyon, Arizona. Comments were solicited and incorporated into the project planning.

April 17, 2001 – A follow-up letter was sent to the surrounding tribal governments. The letter provided a summary of the March 12, 2001 IDT meeting.

April 26, 2001 - The park superintendent sent out a formal response to all parties that commented during the open scoping period.

February 28, 2002 - The EA/AEF was released to the public with a comment closing date of April 1, 2002. A press release was issued, the EA/AEF was placed on the park's website, and letters announcing the open comment period went out to the public. Copies of the EA/AEF were sent to all the agencies and individuals that requested a copy during the initial public scoping process and also during the open comment period.

CONCLUSION

The preferred alternative does not constitute an action that normally requires preparation of an environmental impact statement (EIS). The preferred alternative will not have a significant effect on the human environment. Negative environmental impacts that could occur are negligible to moderate, and could be short to long term in effect. There are no significant unmitigated adverse impacts on public health, public safety, threatened or endangered species, sites or districts listed in or eligible for listing in the National Register of Historic Places, or other unique characteristics of the region. No highly uncertain or controversial impacts, unique or unknown risks, significant cumulative effects, or elements of precedence were identified. Implementation of the preferred alternative will not violate any federal, state, or local environmental protection law.

Based on the foregoing, it has been determined that an EIS is not required for this project and thus will not be prepared.

Recommended: _____
Jeffrey Cross
Science Center Director, Grand Canyon National Park
Date _____

Recommended: _____
Joseph F. Alston
Superintendent, Grand Canyon National Park
Date _____

Approved: _____
Karen P. Wade
Intermountain Regional Director
Date _____

APPENDIX TO FONSI

Tamarisk Management and Tributary Restoration Grand Canyon National Park

The NPS received nine letters in response to our request for comments on the Grand Canyon National Park Tamarisk Management and Tributary Restoration Project (February 2002). Three of the letters were from tribes (Hopi Tribe, Hualapai Tribe and Navajo Nation), one from an agency (Arizona Game and Fish Department), and five from private individuals. The comment period ended April 1, 2002. An interdisciplinary team reviewed the letters and identified substantive comments. Substantive comments were considered to be comments which:

- question, with reasonable basis, the accuracy of information in the EA/AEF.
- question, with reasonable basis, the adequacy of EA/AEF.
- present reasonable alternatives other than those presented in the EA/AEF.
- cause changes or revisions in the proposal.

Below are the substantive comments received and the NPS response.

Comments Received from Agencies and Tribes:

Comment: On page 13, second paragraph, the document states that “several relatively new control methods” will be used for tamarisk removal. We recommend that NPS clarify whether those methods are listed under Preferred Alternative, or specify the new control methods it plans to use.

Response: Refer to attached ERRATA sheet for correction of this statement. The methods are included and fully described in the preferred alternative in the EA/AEF.

Comment: After reviewing the EA the Navajo nation does support the preferred alternative. In addition, the Navajo Nation does request that it be notified prior to any work done on Navajo Nation lands.

Response: The NPS acknowledges this request and also did so in the EA/AEF on page 8 with the following statement:

The NPS would acquire annual permits to work on tribal lands, and would only implement the project on tribal lands with a tribal representative on site or with tribal consent.

Comment: Overall, we feel that the document does a good job of addressing important issues surrounding the proposed actions and their impacts on the environment... Our main concern is with tribal involvement with the proposed activities on the Hualapai Reservation and funding for that participation.

Response: Grand Canyon National Park currently has funding to initiate phase I of the project. This phase does not include any project sites on the Hualapai Reservation, or on any other tribal lands. Phases II and III of the project are not currently funded, and those phases do include sites on tribal lands. For the project sites on tribal lands, a primary goal of this large project is to develop partnerships with the tribes and to work jointly. Prior to the initiation of Phases II and III, additional funding proposals will have to be prepared and submitted. These proposals will strive to attain funding for the participation of both park staff and tribal representatives; however, there is currently no guarantee for any funding beyond the first phase of the project.

Comment: Why is the proposed work only in side canyons and not the mainstem?

Response: Due to the dominance and abundance of tamarisk in the main corridor, the park does not have plans to initiate any management actions in that area at this time. After eradication is complete in the side canyons and tributaries, the park may re-evaluate the potential for tamarisk control in the main corridor. However, there are a few sprigs in the main corridor, above the pre-

dam water level, at which work may occur in the near future. There are limited numbers of tamarisk at those springs, and the potential threats and impacts are high. The initial 63 tributaries were selected based on feasibility of control, and also the lack of potential habitat for special status species.

Comment: How do you know that native vegetation would reestablish and regain dominant status? The tamarisk might come back.

Response: Tamarisk management projects have been ongoing in many western parks and natural areas for several decades. There is an abundance of literature that documents the positive response of native vegetation following removal from tamarisk from a system. Please refer to Carpenter and Murray (1998) and the literature cited section (page 66) for guidance to the body of literature on tamarisk management. Park staff acknowledge that the primary seed source will still exist in the main river corridor and that follow-up maintenance will be necessary to ensure the success of the project (refer to page 16 of the EA/AEF).

Comment: Why the discrepancy under Project Objectives on page 6 of the EA/AEF – one bullet says 95% and the other says 5%?

Response: The project objectives on page 6 of the EA/AEF state the following:

The specific quantifiable objectives of this project are to:

- *Reduce tamarisk cover by 95% within project areas in Grand Canyon National Park over the next five years.*
- *Detect a 5% change in total vegetative cover, with a 95% confidence interval, in all tamarisk removal sites within the next five years.*

This is not a discrepancy. The objective is to reduce the tamarisk cover within the project areas by 95%. To illustrate, if the initial tamarisk cover in a project area is 80%, the objective would be met if post-project monitoring revealed that tamarisk cover is less than 4% (95% of the initial 80% cover would be removed). The second objective relates to the accuracy of the sampling techniques used in the monitoring system. What the second objective means is that we want to be 95% certain that the cover estimates are within $\pm 5\%$ of the true cover percentage. Without setting such targets it is possible to end up with data that is not capable of detecting biologically significant change.

Comment: Do you really want to remove tamarisk at Salt Creek and Burnt Springs? This is valuable habitat for numerous wildlife with no guarantee that you would get something better.

Response: Please refer to the table on page 81 of the EA/AEF. For Salt Creek and Burnt Springs, the table indicates that tamarisk and southwest willow flycatcher surveys will be completed before tamarisk control work begins. In addition, page 29 states that:

“Under the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.), the park is required to consult with the U.S. Fish and Wildlife Service prior to the planning or initiation of any park project. Consultation was initiated on December 15, 2000, and included the 63 side canyons listed in Phase I of the proposed project. Additional consultation will be required for the remaining Phases.”

A thorough analysis of the sites would be completed and future sites would be prioritized prior to the initiation of any management actions. In those canyons, it is possible that just the tamarisk individuals and small populations above the dense thickets of tamarisk and willow at the mouth of the canyon would be targeted for control.

Comments Received from Private Individuals:

Comment: The EA/AEF states that “Garlon lance injection has not been determined effective”, however the park plans on applying the capsules anyway? How are all the spent capsules going to be located years afterward?

Response: The Garlon lance injection system has not been determined effective on tamarisk to date, primarily because of the limited use of this method. However, this system has been used successfully on other invasive tree species in Hawaii. In addition, the herbicide in the capsules has been well documented as effective for tamarisk control. This project includes the concept of adaptive management and if this particular method is not successful, it would not continue to be used on the project. Detailed information will be maintained for each of the project sites. The information will include the number of trees treated with the various methods. The capsules would be injected into the trees and the removal will be part of the follow-up maintenance of this project. The injected trees would be located and then project participants would pull the empty capsules out of the tree bark and transport them to the South Rim for disposal.

Comment: The use of 14’ oar-powered rafts for herbicide transport increases the risks of spillage as compared to the use of larger, motorized rigs that rarely capsize. The use of motorized rafts would also reduce travel time between worksites and possibly reduce the total number of boats utilized, thus more effectively minimizing overall impact on visitor experience.

Response: Please refer to Appendix C of the EA/AEF, page 89, for the full Minimum Requirement Analysis (MRA). Under certain circumstances, the minimum tool may indeed be a motorized raft. However, after application of the MRA, the park determined that other reasonable alternatives to accomplish the project objectives are available. The 14’ oar-powered rafts are the minimum size that would be used; however, the NPS and outfitters most commonly use 18’ rafts. Additionally, the majority of the work for this project would be conducted during the non-motorized season. The herbicide transportation system for this project has been designed to minimize the risk of any chemical spillage. A hazardous material (haz-mat) and safety plan would be developed and reviewed by the park’s environmental protection specialist and safety officer and approved by the Director of the Science Center prior to project implementation.

Comment: Like it or not tamarisk is in the Southwest to stay. I really think that this is a fact of life that we cannot reverse. Tamarisk is not a real big “problem” in the side canyons. Without eradication or tamarisk from the river corridor – which I believe would be environmentally disastrous, trying to control or eliminate them from the side canyons is silly.

Response: Please refer to the response to the fourth comment in this section of the document and also Chapter 5 (page 59) of the EA/AEF for further information about the regulations, policies and laws that apply to the management of exotic species. Specifically, NPS Management Policies (2001 Section 4.4.4.2.) state the following:

All exotic plant and animal species that are not maintained to meet an identified park purpose will be managed - up to and including eradication - if (1) control is prudent and feasible, and (2) the exotic species:

- *Interferes with natural processes and the perpetuation of natural features, native species or natural habitat; or*
- *Disrupts the genetic integrity of native species; or*
- *Disrupts the accurate presentation of a cultural landscape; or*
- *Damages cultural resources; or*
- *Significantly hampers the management of park or adjacent lands; or*
- *Poses a public health hazards...; or*
- *Creates a hazard to public safety.*

High priority will be given to managing exotic species that have, or potentially could have, a substantial impact on park resources, and that can reasonably be expected to be successfully controllable.

The Policies also direct park superintendents to evaluate the impact of the exotic species, develop and implement an exotic species management plan, consult with federal and state agencies, and invite public review and comment. Grand Canyon National Park has used an NPS approved system to rank 132 out of the current 155 exotic plant species. The ranking system provides an objective framework to determine which species are the highest priority based on their present level of impact, their innate ability to become invasive and the feasibility of control. Tamarisk (*Tamarix ramosissima*), in tributaries and side canyons, ranked # 9 out of the 132 species and is therefore considered a high priority for control at this time.

Comment: Some of the numbers of tamarisk in the various side canyons are not accurate.

Response: Tamarisk surveys were initiated in 1998 and have been ongoing since that time. The park's Science Center retains all of the survey data which includes the date of the survey, the numbers of seedling, sapling and mature trees, the survey date, time spent on the survey, distance surveyed, and specific comments about the canyon and tamarisk populations. Southwestern willow flycatcher habitat assessments were also completed for the canyons in Phase I of the project; these surveys include information about water availability, vegetation density and characteristics, and species composition. The park has also initiated the mapping of the spatial distribution of tamarisk populations in the side canyons. This information has been used for project planning. Given the variable environments in the side canyons, the specific tamarisk numbers can only be construed as valid for the date of the survey and will be updated as the project progresses.

Comment: Do you actually have data showing that tamarisk is more prevalent in the tributaries now than it was five or ten years ago?

Response: Tamarisk surveys for this project were initiated in 1998. For some areas, several surveys have been completed over the past 5 years and the numbers have increased. Prior to the initiation of this project, vegetation surveys in side canyons were only conducted on a limited basis. The majority of the park's vegetation monitoring in the inner canyon has been conducted in the main Colorado River corridor. However, ancillary data and information document the spread of tamarisk in the side canyons. This spread can also be detected in historical photographs and aerial photography.

Comment: Your impacts to recreational users are not minimized by implementation during March, September, October, and November, they are just mediumized. Are there significant considerations that prohibit the work being completed during November through February?

Response: The herbicide treatment methods are most effective when the trees are moving resources throughout their internal systems and this movement is significantly slower during December, January and February. The first management trips are anticipated to launch in mid-October and mid-November, 2002, which is outside of the highest river use season. The primary eradication trips are not planned for March; however this month was included in the project implementation schedule because it will most likely be the month that monitoring and follow-up site visits will occur. Again, this month is also not within the highest river-use season.

Comment: You repeatedly state that your work will not take place during breeding seasons of birds. In my experience, during March, breeding birds are already beginning to arrive and establish territories.

Response: As stated above, the work completed in the month of March will primarily be vegetation monitoring along with some follow-up site maintenance, which is non-impacting work. The U.S. Fish

and Wildlife Service, along with park wildlife biologists, have reviewed the EA/AEF and have approved the initiation of this project.

Comment: You discuss the need for future monitoring, but monitoring is clearly not a part of the tamarisk removal project.

Response: Monitoring is a component of the tamarisk removal project. The quantifiable project objectives are stated on page 6 of the EA/AEF and the long-term monitoring system is summarized on page 16.

Comment: It is clear that you have made an effort to involve tribal members in your interdisciplinary team. But perhaps you have only considered the tribes in relation to impacts on cultural resources. The folks in the Navajo Nation who are responsible for wildlife and botanical resources are unaware of this project as far as I can tell. These folks should be involved, especially since you plan to remove tamarisk from a number of tributaries on Navajo Nation lands.

Response: Please refer to Appendix B for the detailed information about Public Scoping, which includes tribal scoping and involvement in the planning phases of the project. Tribal involvement was initiated with a letter on October 30, 2000. The letters were sent to the tribal chairperson or president, and were carbon copied to other natural and cultural resource specialists upon request. It is the responsibility of the tribes to ensure that the information is disseminated to the appropriate people for review. The park has fulfilled its obligation of tribal consultation. Please also refer to response to the third comment in this section.

Comment: Have you considered potential impacts to visitors using water for drinking from streams directly below treatment areas?

Response: Yes this was considered and analyzed. Please refer to the reference U.S. Department of Agriculture (1992) for a detailed risk assessment for herbicide use. Page III-E-22 of that document contains a table entitled "Moderate and High Risks to the Public from Herbicide Use on Riparian Sites", and triclopyr is not listed as posing a moderate or high risk under either routine-typical or routine-extreme scenarios in that table. The exposure categories analyzed include drinking water from the source of a backpack herbicide application at the water's edge. As a point of reference, the consumption of 6 pounds of peanut butter poses a 1 in 1 million risk of death, which is the lower level of the "moderate" risk category. The Arizona Department of Environmental Quality, which includes the Arizona Department of Water Resources, is on the list of scoping letter and EA/AEF recipients and did not have any concerns environmental or human risks associated with the implementation of this project.

ERRATA SHEET

Tamarisk Management and Tributary Restoration Grand Canyon National Park

p. 13, Alternative B, second paragraph, change first sentence to: Under this alternative, a combination of mechanical, chemical, and cultural methods would be used.

p. 15, Project Participants, change restoration biologist to: restoration biologist/botanist

p. 32, bottom of the page, bulleted list, first row, second bullet, change last word to: gooddingii

p. 58, last sentence, change to: The cumulative effect of the preferred alternative, in combination with other past, present, and reasonably foreseeable future actions, would be adverse and of minor to moderate intensity.