

Environmental Assessment

Dredging of Lake Tuendae, Habitat for the Endangered Mohave tui chub

(Gila bicolor mohavensis)

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National Park Service
Mojave National Preserve

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I. PURPOSE OF AND NEED FOR PROPOSED ACTION

The National Park Service (NPS) proposes to dredge the western half of Lake Tuendae, a man-made lake located at Soda Springs, Mojave National Preserve. Lake Tuendae, a 1.2 acre excavated pond located at Soda Springs in the Mojave National preserve, is one of three remaining habitat areas containing the state and federally listed Mohave tui chub (*Gila bicolor mohavensis*). This fish species is lacustrine in nature and is dependent upon deep pools and slow-water slough conditions for survival. Gradual sedimentation of Lake Tuendae has resulted in shallow water depths that could potentially threaten the long-term viability of the chub population unless corrective action is implemented. Management actions to maintain this habitat are outlined in the Recovery Plan for the species (USFWS 1984). Dredging habitat areas to maintain optimum water depth is one such prescribed action. This action will increase depths in the western half of the lake from an average of approximately 2.75 feet to 6 feet. This project would take place in the late fall /early winter of 2001.

A. Background

Lake Tuendae sits on the western margin of Soda Lake, which is a large dry lakebed. Temperature extremes are common, as are gusty, sustained winds and large dust storms. Fine particles settle as winds subside. Over time, these particles accumulate in the lake.

Cattails (*Typha domingensis*) have encroached well into the western end of the lake as well. Recent assessments show cattails now extend approximately 40-50 feet toward the center of the lake. Such encroachment is a natural succession of shallow water habitat, but over time, this succession begins to shrink areas of open, deeper waters needed by mature fish. Excessive standing vegetation fosters accelerated sedimentation, as standing dead and live emergent vegetation catch and trap windblown sediment. Organic plant material, as well as accumulated waste produced by the fish and other organisms, add to the sediment load.

The reduction in water depths has reduced the suitability of habitat in the western portion of the lake. Fish using this area may be subject to increased predation by piscivorous birds. The lack of water volume also removes much of the thermal buffering afforded to fish residing in the deeper waters. Lowered dissolved oxygen levels, resulting from decreased water volumes and increased abundance of aquatic vegetation, can cause localized fish kills. If no corrective action is taken, Lake Tuendae will continue to accumulate excess sediment and aquatic vegetation over its entire area. Eventually, the western portion of the lake will be eliminated as Mohave tui chub habitat. Presently, the large amount of aquatic vegetation occupying a relatively small volume of water may result in significant water quality problems. Mass mortality of Mohave tui chub may occur if large amounts of vegetation suddenly died, resulting in eutrophication and an accompanying steep decline in dissolved oxygen levels in the water.

Alternative A is the agency Preferred Alternative. The NPS, in cooperation with United States Fish and Wildlife Service (USFWS), the California Department of Fish and Game (CDFG) and the California State University is responsible for maintenance of the Mohave tui chub habitat at Lake Tuendae. Habitat maintenance, as described in the Recovery Plan for the species (USFWS 1984) is necessary to preserve and perpetuate the species. Implementation of Alternative A will restore adequate depths to the western portion of Lake Tuendae, improving and expanding the total area of deeper waters available to fish. Past dredging operations at Lake Tuendae have been successful in restoring habitat with a minimum of incidental take of Mohave tui chub. The dredging operation is costly and must be performed on a recurrent basis, approximately every ten to fifteen years. However, efforts to reintroduce Mohave tui chub into natural habitats have not yet succeeded. For now, recurrent maintenance of existing man-made refugia is the sole option available to protect and maintain this endangered species.

Alternative A is also the Environmentally Preferable Alternative. Environmentally preferable is defined as "the alternative that will promote the national environmental policy as expressed in the National Environmental Policy Act's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources" (Forty Most Asked Questions Concerning Council on Environmental Quality's National Environmental Policy Act Regulations, 1981).

The goals characterizing the environmentally preferable condition are described in Section 101 of the National Environmental Policy Act (NEPA). NEPA Section 101 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." Alternative A preserves important natural aspects of our national heritage by sustaining suitable habitat for the Mohave tui chub, an endangered species. Important historic and cultural resources are preserved with the implementation of Alternative A, as the proposed action re-establishes the historic landscape of Lake Tuendae and the *Zzyzx* area.

The proposed action is consistent with proposed Mohave tui chub management activities as articulated in the Final Environmental Impact statement and General Management Plan for the Mojave National Preserve (NPS 2001).

B. Relationship to Statutes, Regulations or Other Plans

The proposed action is consistent with objectives outlined in the Mohave Tui Chub Recovery plan (USFWS 1984). As an endangered species may be adversely affected by the proposed action, formal Section 7 consultation with the United States Fish and Wildlife Service was initiated on June 10, 2001, as required by the Endangered Species Act of 1973, as amended. A Biological Opinion (Opinion) for the Dredging of Lake Tuendae, San Bernardino County, California (1-8-01-F-35) was issued to NPS on August 20, 2001.

The National Park Service is exempt from provisions of the California Endangered Species Act as the proposed action would be conducted by a federal agency within lands under federal jurisdiction. Issuance of a CDFG Section 2081 Incidental Take permit is not required. NPS is exempt from CDFG Code Section 1603, and a Stream/Lakebed Alteration permit will not be required from the state of California.

Mojave National Preserve has complied with Section 106 of the Historic Preservation Act of 1966. The proposed action has been determined as having no adverse impact on cultural resources. A Determination of No Adverse Effect has been prepared and has been forwarded to the California State Historic Preservation Office (SHPO) for concurrence. Additionally, the proposed action is consistent with guidelines as set forth in Director's Order #28: Cultural Resource Management.

II. PROPOSED ACTION AND ALTERNATIVES

A. Proposed Action

The objective of the proposed action is to restore lake depths and vegetation profile necessary to meet the physical and

physiological needs of the Mohave tui chub. This would be accomplished by dredging the western half of the lake from its present depth of approximately 2.75 feet to an overall average depth of 6 feet. Approximately 3,040 cubic yards of sediment and vegetation would be removed using an excavator with a 50-foot "superboom" extension arm.

This procedure would commence in late October or early November 2001. Prior to the implementation of dredging activities, the NPS and its contractor would erect a water-inflated coffer dam, with direction from USFWS and CDFG personnel. The Aquadam is basically a large plastic tube filled with water. The weight of the water would hold the dam in contact with the lake bottom. The barrier would split the lake into two halves, and be anchored to the north and south banks of the lake. In contrast to the semi-permeable barrier fabric that has been used in the past, the Aquadam would completely separate the two sections of the pond during dredging. Consequently, the water on the western side of Lake Tuendae could be drawn down much further than with the previously used barrier, while the water on the eastern side would remain at or near normal levels.

Once the fish barrier is installed, Mohave tui chub (and the Saratoga Springs pupfish, a non-listed fish also inhabiting the pond) would be trapped using minnow traps. Captured fish would be placed in the eastern portion of the lake. Seining would be used to trap remaining fish. Fish trapped and relocated will be tallied by species. Generally, traps will not be left unchecked for more than three hours, and no traps will be left overnight. However, alternative methods of trapping, as described in the Opinion, may be undertaken under the direction of qualified personnel.

When trapping is complete, the water in the west portion of the lake is drawn down using small floating pumps. Prior to the pumping, NPS will determine the normal high and low levels of the eastern portion of the lake and physically mark them in at least three locations in order to provide a reference to biologists as to relative changes in water levels.

Intake areas on pumps would be secured with small gauge mesh to prevent any remaining fish from being drawn into pumps. Water would be discharged into an area just north and east of the lake, where it accumulates and percolates into the bed of Soda Lake. As the water level drops, personnel would monitor for fish that escaped trapping as they accumulate in small irregularities and shallow areas remaining in the west portion of the pond. Trapping and/or seining would be reinitiated to capture as many fish as possible.

NPS would obtain baseline information on dissolved oxygen levels and pH levels on both sides of the barrier before water drawdown and dredging. These parameters would also be measured on the east side each day during the operation, in the morning, mid-day and in the evening.

To initiate dredging, the excavator would enter the lake from the far western end of the lake. The excavator is a large tracked vehicle with an extending arm with a scoop or shovel on the end. The dredge begins scooping from either edge of the pond. Some of the spoils are placed in front of the excavator, as it moves forward, to form a more solid "road" surface upon which to work. Additionally, "landing mats" (steel mesh pads) are placed on the surface the "road" in order to augment the stability of the surface, preventing the excavator and associated equipment from sinking in the mud. If necessary, these landing mats are augmented with a geotextile fabric to increase their stability. As the excavator works its way forward, removed sediment soils would be loaded into a dump truck. To the greatest extent possible, plant debris (cattails) will be removed and separated from dredge spoils and disposed of off-site.

Prior to the dredging operation, approximately 3,040 cubic yards of dry dredge spoils from the 1991 dredging would be removed from its current location 500 feet northwest of the lake. These dry spoils would be transported via front-end loader and dump truck to the utility yard approximately 1,000 feet southwest of the lake. This raised "bone yard" area is highly disturbed by recent activities and is not associated with the known cultural and historic previous occupations of the site. Some materials from previous dredging operations are stored in this location. A solar panel, generator, weather station, and miscellaneous equipment items are staged here as well. Several options are being considered for complete removal of all spoils from Soda Springs in the near future.

Dredge spoils pulled from the lake would then be deposited in the same footprint from which the dry spoils were

removed. A portion of the coarse, dry material on hand would be used to cap the dredged material, which is expected to contain a high content of fine materials. Placing a covering of dry, coarse material will help minimize dust as the new spoils de-water and eventually dry. If any live fish are salvaged from dredge spoils, they would be placed in the eastern portion of the lake and any dead fish would be preserved for museum specimen preparation.

NPS shall ensure the integrity of the fish barrier is maintained throughout the operation. Dredging activities will be suspended if Mohave tui chub gain access into the west portion of the lake, and will not continue until the barrier is secured and all observed Mohave tui chub are returned to the eastern portion of the lake.

NPS will ensure that water depths in the eastern portion of the lake remain sufficient for Mohave tui chub. The Aquadam should be very effective in maintaining near normal depths in the east side of the lake, but some water may percolate under the dam over time. Water will be added as needed. The activity levels and patterns of fish will be observed prior to the onset of dredging and again immediately after dredging has commenced to monitor Mohave tui chub response to noise and general disturbance associated with dredging.

Of the approximately 4,500 square feet of standing and dead cattails on the west margin of the pond, approximately 1000 square feet (or an area of 100' x 10') would be retained for wildlife cover, nesting and feeding areas.

Upon completion of dredging activities, water is pumped back into the west portion of the lake from the well. The Aquadam would remain in place for a period of two weeks or until any observed water turbidity on the western portion of the lake dissipates. The dam would then be removed. The entire dredging operation is anticipated to last ten days, plus a maximum of 14 days to allow for turbidity dissipation and barrier removal.

The NPS Project Manager would closely monitor all contractor activities throughout the duration of the proposed action. All routes of travel, staging, equipment maintenance and fueling areas will be clearly marked. Storage and use of substances such as lubricants, hydraulic fluid, and fuel on site would be limited and restricted to designated areas. All storage vehicles would sit within a spill containment barrier, well away from the lake. The contractor would also provide spill containment materials and appropriate absorbent dams to use in the unlikely event that dredging equipment leaks fuel, oil or hydraulic fluid into the lake.

An NPS Biologist would be present during all dredging activities to monitor and provide assistance to the NPS contractor. Personnel from USFWS, CDFG and California State University would participate in various activities related to this project, either directly in the field or in a technical advisory capacity.

An Archaeological Monitor would be on site during the startup phase of the project to work with project staff and the contractor to lay out routes of travel, staging areas, and procedures that will not impact identified cultural resources on the site. In addition, the Archaeologist will monitor the initial loads of material removed from the lake. He/she will work with project personnel to establish what is "normal" content of dredge spoil and what will require further inspection by the archaeologist. An Inadvertent Discovery Plan would be in place prior to operation startup.

Any curbing, underground utilities other features that may be within routes of travel for heavy equipment would be covered and protected with boards and/or trench plates. Features or facilities otherwise identified as in the proximity of machinery movement or use, such as solar array panels or water mains, would be protected with protective barriers, marked, or otherwise made clearly visible to project staff.

B. No Action Alternative (Status Quo)

Under this alternative, no action would be taken to maintain or improve water depths or enhance Mohave tui chub habitat at Lake Tuendae. The lake is gradually becoming shallower as the result of vegetation decomposition and deposition of windblown soil. Under the No Action alternative, this trend would continue. Cattails would continue to proliferate into shallow areas of the pond, and sedimentation would continue, enabling the continued decrease of open water areas.

C. Alternatives Considered but Rejected

Manual removal of vegetation and sediments: Under this alternative, crews with hand tools would perform the work of sediment and vegetation removal. This alternative was rejected as it was deemed impractical to remove 3,040 cubic yards of vegetation and sediments manually. This procedure would be labor intensive, have a high potential for worker injury, and would take longer to complete. Tui chub would have to remain on the east side of the barrier for a longer period, causing additional stress on the fish, possibly increasing the potential for mortality.

Dredging without use of the fish barrier: Under this alternative, all fish in the lake, including the Mohave tui chub, would be trapped and placed in a holding tank. Dredging would commence without the need for a fish barrier. This alternative was rejected because a higher level of take would occur using this alternative. In deploying a barrier, only the fish on left the west side of the device are trapped and handled. Securing the use of, and appropriately staging a tank sufficiently large to contain the fish would be difficult. Additionally, logistics and costs of caring for the fish while they are in the tank, such as providing appropriate kinds of food, maintaining water chemistry and temperature, etc. would prove difficult and costly.

Placing wet spoils in the boneyard: Under this alternative, wet spoils would be deposited directly at the boneyard. Using a portion of the dry spoils already at this location, the wet spoils would be covered to prevent fine particles from blowing into the Zzyzx compound after the spoils dry. This alternative was rejected for a number of reasons. Drainage from the spoils would likely flow into high-use areas of the compound, and mitigation measures to control runoff were found to be impractical. As this location is in close proximity to the main compound, odors from spoils would be likely to affect guests and residents in nearby university employee housing units.

Placing wet spoils with existing spoils 150 feet northwest of the lake: Under this alternative, the site where the spoils from the 1991 dredging operation were deposited would be leveled and pushed north towards the playa. Wet spoils would be placed over the existing pile. Although this area is outside the normal visitor use area and screened from view by athel trees, adding more spoils to this area would enlarge the existing project-related footprint onto the relatively undisturbed playa area. Additionally, adding more spoils would increase the height of the existing pile significantly.

Removal of wet spoils from Zzyzx: Under this alternative, spoils would be transported off the site for disposal at a landfill. Spoils contain a high water and silt content and must de-water prior to transport. Removal is particularly costly due to the large volume of spoils on the site and the long distances involved in transport to the nearest facility that will accept the material. The dredging project budget is not sufficient to cover these costs. The National Park Service is investigating options for the future removal of all dried dredge spoils from Zzyzx.

Selection of an Alternative location for spoil placement: Several alternate sites were assessed as potential sites for dredge spoils by the natural and cultural resources staff. Three sites were examined that supplied adequate access to heavy equipment and were sufficiently large to accommodate spoils. However, all three were identified as associated with features of the Springer-era habitation of the site, and therefore were not suitable for soil placement.

III.

IV. AFFECTED ENVIRONMENT

A. General Setting

Lake Tuendae is a 1.2 acre man-made pond located on the western shoreline of the Soda Lake playa south of Baker, California (T12N R8E Section 11). This small lake is located on lands administered by the National Park Service (NPS), and cooperatively managed with a consortium of several California State University (CSU) campuses. CSU operates the Desert Studies Center, which is housed in the Zzyzx facility. The Desert Studies Center hosts various educational seminars and college courses on topics such as biology, anthropology, geography and history. The Zzyzx compound also serves as a transient living and research facility for students performing research projects within the Preserve and on adjacent lands.

B. Soils

The Soda lake basin is filled with clays and clayey sands. Exploratory wells two miles northeast of Soda Springs are 1,070 feet deep and remain in lake sediments and did not contact igneous rocks of the basin floor. Some studies infer the sediment thickness of the Soda Lake basin to be as great as 2000 feet (Billhorn and Feldmeth, 1985). This fine-textured soil is relatively stable in undisturbed areas of the lakebed where wet and dry cycles have formed a crust over the surface. When the crust is disturbed, soils are readily blown by wind, and large dust storms within the Soda Lake basin and vicinity are common. Soils near the project area are largely composed of these fine silty clays, with a varying component of sands, rock and coarser rubble washed from the mountains directly west. Many types of human activities, including past dredging operations have previously disturbed soils within the project area and the Zzyzx compound.

C. Water Quality

The chemical constituents of the Soda Springs well and Lake Tuendae reflect the history of the water in the Soda lake aquifer. The relatively high concentrations of the ions sodium, chloride, bicarbonate and sulfate are common in desert waters that have their origins in alkaline playa deposits. Available information indicates the artesian flow at Soda Springs has its origin in waters which flow beneath Soda Lake from the Mojave River Wash or Sink located to the south and west of Soda Springs. Deuterium isotope analyses of well water from Soda Springs indicate its source is from rainfall in the San Bernardino Mountains. As the water flows along the bed of the Mojave River, there is a gradual concentration of ions due to evaporation. Surface flows of the Mojave River occur only in Victorville and Afton Canyon, approximately 85 miles to the west of Soda Springs. As waters flow out of Afton Canyon, they percolate into the Mojave River Wash, which serves as forebay for recharge of the Soda Lake Aquifer. Clay layers beneath Soda lake allow water to be conducted northward under a sufficient pressure head to produce artesian flows at Soda Springs which are 6.4 to 10.4 above the water table elevation of the dry lake bed (Bilhorn and Feldmeth, 1985)

Lake Tuendae receives some ground water from the aquifer, but is largely maintained by water pumped from the Zzyzx well. The water is somewhat alkaline and it contains relatively high concentrations of ions and cations. (Feldmeth et al. 1984). In 1985, water in the aquifer was characterized as relatively low in salinity, with no problematic levels of arsenic, boron or heavy metals. Playa ground water is quite high in minerals. Testing of the Soda Springs well for various parameters took place in May 2000 and results were generally consistent with earlier analyses. Solute concentrations, pH and alkalinity may be somewhat higher in Lake Tuendae due to evaporative loss and organic input (Fulton, pers. comm.) Baseline testing of the waters of Lake Tuendae for parameters such as dissolved oxygen, conductivity, and turbidity would take place just prior to dredging, and at regular intervals each day for the duration of the project.

D. Wetlands and Riparian Zones

Lake Tuendae is a small, man-made lake measuring approximately 1.2 acres in size. In spite of its small size, it is the largest body of open water in the Soda Springs area. Lake Tuendae is an important source of water for the wildlife of the area, most notably birds and bats. Prominent emergent aquatic vegetation associated with the lake includes approximately 4,000 square feet of cattails on the western end of the lake. Bullrush (*Juncus spp.*) can be found to a minor extent among cattails, but it mostly inhabits small margin areas around Lake Tuendae and does not appear to be spreading significantly.

The western margin of Soda Lake features wetland or marshy areas, but their total extent and the amount of standing water associated with these areas vary with season and with the relative abundance of regional winter precipitation occurring from year to year. Immediately to the south and east of the Zzyzx facility a natural spring (MC Spring) occurs with water levels that are generally stable. This spring is approximately seven feet in diameter and five feet in

depth. Vegetation occurring in these wetter margin areas, and around MC Spring include cattails and rushes as dominant species, with saltgrass (*Distichlis spicata*) and pickleweed (*Allenrolfia occidentalis*) as associates.

E. Wildlife

Wildlife commonly observed at Zzyzx include several species often encountered in the central Mojave desert, such as western whiptail lizards (*Cnemidophorus tigris*) zebra-tailed lizards (*Callisaurus draconoides*) sidewinder rattlesnakes (*Crotalus cerastes*) pocket mice (*Perognathus spp.*), kangaroo rats (*Dipodomys spp.*), kit fox (*Vulpes macrotis*) and coyote (*Canis latrans*). Several bat species frequent the open waters of Lake Tuendae, including the Mexican freetail (*Tadarida brasiliensis*), pallid bat (*Antrozis pallidus*), and the California myotis (*Myotis californicus*). There are a number of resident riparian-dependent bird species found at Zzyzx year-round, including The American Coot (*Fulica americana*), Belted Kingfisher (*Ceryle alcyon*), Say's Phoebe (*Sayornis saya*), Black-tailed Gnatcatcher (*Poliophtila melanura*), and Pied-billed Grebe (*Podilymbus podiceps*). Winter residents include the Canada Goose (*Branta canadensis*); Green-winged and Cinnamon teal (*Anas crecca* and *A. cyanoptera*), and the Ruddy duck (*Oxyura jamaicensis*). The standing waters and riparian habitats of the Soda Springs area also host exceptional numbers of migrant birds during the spring and autumn months, which utilize this critical riparian area as a migratory stopover point. These include the Western White grebe (*Aechmophorus occidentalis*), Snowy Egret (*Egretta thula*), Great Blue Heron (*Ardea herodias*), American Bittern (*Botaurus lentiginosus*), the American White Pelican (*Pelecanus erythrorhynchos*). Greater Yellowlegs (*Tringa melanoleuca*), Black Phoebe (*Sayornis nigricans*), and several species of sandpipers (Family Scolopacidae) (California Desert Studies Center 1999).

The only threatened or endangered species known to occur in the immediate vicinity of Lake Tuendae is the Mohave tui chub, (*Gila bicolor mohavensis*), a fish species listed as endangered both by the State and Federally. Two chub populations currently inhabit waters of Soda Springs: a large introduced population in Lake Tuendae and a small native population in a small spring-fed pool named MC Spring. The Recovery Plan for the Mohave Tui Chub (USFWS 1984) articulates several chub habitat management actions, including dredging to remove accumulated sediments. The Mohave tui chub shares the aquatic habitat with the Saratoga Springs Pupfish (*Cyprinodon nevadensis nevadensis*), which was introduced to the lake in 1955. The Saratoga Springs pupfish is not a species listed as threatened or endangered.

F. Vegetation

During construction of Lake Tuendae and the associated health facilities at Soda Springs, several non-native plant species such as fan palms (*Washingtonia robusta*), oleander (*Nerium spp.*) and athel (*Tamarix spp.*) were introduced to increase shade and ornamentation in the immediate vicinity of Lake Tuendae. Natural vegetation of the affected area is characteristic of creosote bush scrub and alkali sink-playa edge plant communities.

Dominant native plant species found in the uplands of Soda Springs include creosote bush (*Larrea tridentata*), burrobrush (*Ambrosia dumosa*), saltbush species (*Atriplex spp.*), honey mesquite (*Prosopis glandulosa*), and Saltgrass (*Distichlis spicata*). Fan palms and saltcedar presently occur on the immediate upland perimeter of Lake Tuendae. Cattails (*Typha domingensis*), bullrush (*Scirpus olneyi*) and rush (*Juncus cooperii*) occur along the wetland edges of the lake and are particularly abundant on the western and eastern lake edges. Aquatic ditchgrass (*Ruppia maritima*) occurs in the shallower areas of the lake and occasionally forms dense mats throughout the lake. This species is particularly important for Mohave tui chub as it provides a preferred structure for egg attachment during spawning and is a thermal refuge for the chub in the summer months. This plant also serves a useful cover function, allowing fish to elude avian predators. No threatened or endangered plant species are known to occur in the immediate vicinity of Lake Tuendae.

G. Cultural Resources

The tribal affiliations of indigenous peoples utilizing the resources at Soda Springs prior to European man's arrival is not fully known, as tribal boundaries of desert peoples are indistinct. Both the Chemehuevi and the Vanyume have mentioned Soda Springs since contact times and U.S. Army reports from the mid 19th century cite attacks by "Pah-

utes" (Cameron 1984).

It is believed the first European to pass Soda Springs was Father Francisco Garces in 1776, as he traveled along the Mojave trail. Explorers Jedediah Smith visited Soda Springs in 1826 and 1827, followed by expeditions which included Kit Carson and Lt. John C. Fremont. Skirmishes between soldiers and native peoples prompted establishment of a permanent post at Soda Springs in 1864 (ibid).

The early 20th century brought mining and various minerals were collected in the vicinity of Soda Springs, including gold and salt. The Tonopah-Tidewater Railroad, which eventually stretched from Ludlow, California, to Gold Center, Nevada, was built in 1905-1906 to service mines throughout this desert area. Tracks were laid through Soda Springs in 1906, and the railroad was heavily used until about 1917. Service was eventually terminated as ridership declined, and the tracks were removed as scrap for the war effort in 1943. The railroad bed is north of Lake Tuendae (ibid).

Between 1944 and 1974, Curtis Howe Springer utilized the Soda Springs area as part of his health resort and spa facility, naming the area "Zzyzx". Over time, Springer constructed several buildings to accommodate guests, swimming pools and mineral bath areas, and he converted a portion of the old railroad bed into a landing strip. In addition to planting rows of athel trees and other ornamental plant species, he excavated Lake Tuendae, as well as the West Pond, a small pond about 800 feet to the south (ibid.). The BLM evicted Springer in 1974, as it was determined he occupied the site illegally. The Desert Studies Consortium, an affiliate of the California State University, Fullerton began rehabilitation of the buildings in 1977. Various educational seminars and meetings specific to desert-related topics are conducted at the center, as well as post-graduate and doctoral studies.

H. Recreational and Educational Use

The primary educational use occurring at *Zzyzx* consists of formal educational activities related to the Desert Studies Center (DSC). These include weekend seminars as well as weekday sessions of varied duration. Between October 11, 2001 and November 11, 2001, 269 guests are expected to attend weekend seminars at DSC. No research or education activities specific to the Mohave tui chub are scheduled for this time period.

Recreational opportunities include sightseeing, resource interpretation and nature study. No documented visitation records for recreation use of this type are available for this site. Field employees of the Preserve and residents at Soda Springs characterize sightseeing and recreational visitation as light.

III. ENVIRONMENTAL CONSEQUENCES

Impacts of each alternative were predicted based on the outcomes of previous dredging operations as documented, research of reference materials and studies of the Mohave tui chub, and discussions with State and Federal government biologists who participated in the management of Mohave tui chub habitat projects in the past.

Dredging operations, overseen by the Bureau of Land Management prior to NPS management of this area, have occurred at Lake Tuendae periodically since the early 1970's. Dredging alternated between clearing the east and west halves of the lake, with the most recent dredging in 1992 when the eastern half of the lake was dredged. Preliminary activities prior to dredging, such as erection of the barrier, trapping of fish, and site preparation were undertaken by staff members of the BLM, USFWS, and California Department of Fish and Game (CDFG). Research of files and field notes dating back to the late 1970's, and personal communications with employees involved with this project provided information on methods employed to prepare the site and dredge the pond. Post-project reports reported total species take, problems encountered during the operation and the remedies employed, immediate post-project effects, and suggestions for future operations, which have been incorporated accordingly.

Impairment

The National Park Service must consider the potential impacts of each alternative and the implications for impairment

to the resources of Mojave National Preserve. The Organic Act of 1916, which established the National Park Service, and its amendments state:

[The National Park Service] shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified... by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations. (16 USC 1)

NPS managers must always seek ways to avoid or minimize to the greatest degree possible adverse impacts on park resources and values. Through this law and the General Authorities Act, NPS managers have the discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the NPS 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 judgement of the responsible NPS manager, would harm the integrity of park resources or values, including opportunities that otherwise would be present for the enjoyment of those resources or values. Such an impact to any park resource or value may constitute impairment. However, an impact would more likely constitute impairment to the extent 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 to opportunities for enjoyment of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

A. Proposed Action

Impacts resulting from implementation of the proposed action have been assessed for each critical element.

Soils

Soil disturbance at the spoil deposition site would be minor. This site, approximately 800 feet north and west of the pond, is between two rows of athel trees. This area was used for deposition of dredge spoils from the 1991 dredging project, and as such, it is previously disturbed. Approximately 3,040 cubic yards of old spoils at this site would be removed using a loader to the "boneyard", approximately 1000 feet southwest of the lake. Approximately 3,040 cubic yards of new spoils will be placed in the footprint of the old spoils. Excavation activities are limited to removal of sediment and vegetation that has accumulated since the previous dredging of the west end of the pond and movement of old spoils to the boneyard. Heavy equipment (the dredge, dumptruck, loader) would be used only in previously disturbed, compacted areas, or on established roads, and only in areas authorized by NPS.

Impairment: Soil disturbance will be minor, and will occur only at pre-disturbed sites. Soils appear to support appropriate colonizing plant species after disturbance. No impairment of soil resources will occur.

Water Quality

The proposed action would result in short-term adverse impacts to the water quality of Lake Tuendae, as turbidity increases. This increased turbidity would occur within the lake during the operation and for a short period of time following dredging. Turbidity would be limited to the western half of the lake, as the Aqua dam would completely separate the two sides of the lake.

NPS does not anticipate that the overall water quality of the lake would be significantly affected by the operation and any detrimental effects would be alleviated in an estimated two-week time period. Baseline water quality parameters for the lake are fairly well documented and would be monitored throughout the project. The water of Lake Tuendae is not used for human consumption or bathing, therefore the proposed action will not result in hazards to public health.

Impairment: Effects to water quality resulting from implementation of the preferred alternative are expected to be temporary in nature, lasting throughout the dredging and until turbidity dissipates, approximately two weeks after the operation is concluded. The implementation of the preferred alternative will not result in impairment of water resources.

Wetlands/ Riparian Zones

The wetlands and riparian zone that characterizes Lake Tuendae would be affected by the proposed action as minor vegetation impacts would occur and faunal components of this habitat would be disturbed, as described below. However, the net effect of the proposed action would not decrease wetland or riparian habitat and would maintain standing water habitat. Only the standing cattails on the west end of Lake Tuendae would be removed, as described. A smaller area of emergent vegetation would be available to birds and other animals for cover, perching, nesting and feeding areas. Open water would increase, which birds and bats utilize for watering areas.

This project is determined by the NPS Water Resources Division to be exempt from a Statement of Findings requirement for effects on artificial wetlands. This exemption is granted because Lake Tuendae is a small, intentional, artificial wetland less than 5 acres in size (Leslie Krueger, pers.communication)

Impairment: The wetland and riparian zone that characterizes Lake Tuendae would not be impaired by implementation of the proposed action. Open water would increase, and a residual amount of emergent vegetation would be retained for wildlife use. As the vegetation here has repeatedly grown back after each dredging, the net effects of the proposed action are temporary in nature.

Wildlife

Generally, fauna inhabiting the western half of Lake Tuendae will be disturbed as a result of the proposal. There will be some loss of aquatic organisms, particularly insect larvae and a limited number of Mohave tui chub and the Saratoga Springs pupfish, as a result of dredging and perhaps from increased turbidity during/following dredging, direct contact with equipment, or from suffocation or dehydration. Some invertebrates that live among the cattails (either aerial portions or submerged parts) may be reduced in number as a result of the vegetation removal. However, these effects are temporary in nature

Some disturbance to area terrestrial fauna will result, particularly some bird species that may use the standing and dead cattails for cover or feeding areas. Any migratory birds arriving at the site during the project may be disturbed. This disturbance is temporary in nature. The project would take place in the late fall when no bird nesting activity is anticipated. Aside from the Mohave tui chub, no other Federal or State listed wildlife species are known to inhabit the lake or its immediate vicinity.

Removal of exotic tamarisk may affect birds that use these trees for perching and/or cover. No nests have been observed in these trees. Photos of this site from the 1970's do not feature these trees, as they are fairly recent invaders of the site (Fulton, pers. comm.). Removal of the exotic tamarisk is consistent with the Preserve's policy to eradicate this species when it is found to limit its spread into seeps and springs.

The proposed action would affect the Mohave tui chub, a species State and Federally listed as endangered. An unknown number of chub would be physically moved by trapping and seining, and as such, this activity would constitute a "take" of an endangered species, as defined in the Endangered Species Act of 1973, as amended.

The use of seines and minnow traps to remove Mohave tui chubs from the western portion of the lake would constitute some degree of harassment and some fish may be injured or killed in this process. The dredging operation would take place in late fall, when tui chub are still active but no longer spawning, and this helps to lessen mortality due to dredging. Additionally, Mohave tui chubs avoid the shallow west end of the pond.

No known mortality related directly to trapping or seining activities was noted in 1992, the most recent dredging operation. Some fish mortality was noted during water pumping operations when fish suffocated after becoming entangled in ditchgrass, but this was predominantly among Saratoga Springs pupfish. A limited number of chub (less than five) were noted to have died from direct contact with equipment (BLM, 1992). Based on precautionary measures designed into the proposed action, as well as additional mitigation measures, very few chub are anticipated to be lost due to seining, trapping, direct dredging, or as a result of increased turbidity within Lake Tuendae.

As the proposed action may adversely affect the Mohave tui chub, formal ESA Section 7 consultation with the USFWS is required prior to authorization of this activity. The formal consultation process with the USFWS was initiated on June 10, 2001. The USFWS issued their Biological Opinion for the Dredging of Lake Tuendae, San Bernardino County, California (1-8-01-F-35) to NPS on August 20, 2001.

Impairment: The USFWS concluded that the dredging of Lake Tuendae, as proposed, is not likely to jeopardize the continued existence of the Mohave tui chub. Dredging is not expected to result in the mortality of substantial numbers of Mohave tui chubs; additionally, past dredging of Lake Tuendae has improved its habitat quality. No impairment to threatened and endangered species will occur as a result of the proposed action. The impacts on other fauna are short-term and would not result in an impairment of these resources.

Vegetation

The removal of standing and dead cattails will occur in Lake Tuendae, which is one of the primary objectives of the pond dredging activity. Removal of this excess vegetation and accompanying silt accumulations is the only way to restore adequate water depths to the lake.

The loss of some aquatic vegetation by direct dredging and from increased turbidity during/following dredging is an expected outcome. Submerged vegetation, mostly ditchgrass (*Rupia maritima*), will be removed or disturbed.

Three to four deciduous tamarisk trees (*Tamarix* spp.) on the extreme western edge of the lake would be removed prior to dredging to accommodate equipment. These trees were not planted and are not a part of the cultural landscape; photos of this site from the 1970's do not feature these trees. Removal of the exotic tamarisk is consistent with the Preserve's policy to eradicate this species anywhere it is found to limit its spread into seeps and springs elsewhere in the Mojave desert.

Some vegetation on or immediately adjacent to the lake shorelines may be disturbed by heavy equipment use. The degree of this activity would be minor, including some partially crushed small shrubs and grasses. However, the area of primary activity, the zone between the west portion of the lake and the spoil deposition area, is previously disturbed and sparsely vegetated. Contractor activity would be monitored to prevent undue damage to plants. All ornamental plants (e.g. fan palms, athels) are not anticipated to be damaged by this action, but contractors will be required to replace any damaged plants or trees should this occur. Work activities, vehicular travel routes, and equipment staging and maintenance areas will take place only in pre-designated, flagged areas.

Approximately 1000 square feet of cattails will be retained on the western margin of the lake for wildlife use.

Impairment: Aquatic vegetation must be removed from Lake Tuendae to meet the objectives of the project. One thousand square feet of emergent vegetation will be retained for wildlife use. Deciduous tamarisk trees will be

removed, but they are a non-native invasive species. Some small shrubs and grasses may be damaged or destroyed in areas of vehicle travel between the lake and the spoil deposition site. However, this site has been previously disturbed from previous dredging projects and other activities, and it appears that plants reestablished successfully over time in this area. No impairment to vegetation resources will occur as a result of this project.

Recreational/Educational Opportunities

Disturbance to the Desert Studies Center (DSC) activities due to the proposed action include a temporary increase in noise levels, a temporary reduction of water available for DSC users, and possibly the production of some amount of odor during and after dredging activities. Visitors who arrive at the Soda Springs complex during the project may be inconvenienced by the presence of equipment and personnel, and the quality of their visit may be affected negatively by noise, etc. Access to the pond and chances to observe the Mojave tui chub may be restricted or unavailable for about 4-6 weeks during the project. During this time about 280 students researchers and general public would be impacted by the operation.

Impairment: Recreational and educational opportunities would not be impaired as effects of the project (noise, odor, access restrictions) are temporary in nature.

Cultural Resources

Lake Tuendae is a contributing property of the National Register District Nomination being prepared for Zzyzx and also is on the List of Classified Structures. The issues include both the direct and indirect impacts of the project on cultural resources of the historic site, especially the disposition of the sediment recovered by the dredging. On July 18, 2001 Acting Resource Manager, Mojave National Preserve, Dave Anderson, Desert Study Center Site Manager Rob Fulton, and Western Archeological and Conservation Center Archeologist Susan Wells met at Zzyzx to survey the areas potentially impacted by the proposed project. The results of the survey concluded that the dredging of Lake Tuendae, as described in the preferred alternative, would not adversely affect to cultural resources of the site. Consequently, this project is exempt from formal consultation with the State Historic Preservation Office (SHPO).

Heavy equipment used in this project can potentially cause damage to features at the Zzyzx complex, such as structures, curbing, and historic landscape features. Although the dredging of Lake Tuendae has taken place on at least two prior occasions in the past, and the site is considered as previously disturbed, undiscovered artifacts may be found during dredging activities. Moving and re-depositing dredge spoils may unearth, move, or damage cultural resources. If improperly performed, dredging may change the dimensions and appearance of Lake Tuendae.

Impairment: The proposal would result in minor, short-term impacts to the cultural scene. Mitigations will prevent damages, and over the long term, the proposed action preserves the historic landscape of Lake Tuendae. No impairment of cultural resources would occur.

Impairment Summary

The impacts identified as resulting from the implementation of the proposed action are temporary in nature and can be mitigated. Take of Mohave tui chub can be expected from the dredging operations in the form of capture, stress, and direct mortality. However, the number of fish that taken would be minimal and the benefits of this alternative will compensate for this loss.

The small number of individual Mohave tui chub expected to be taken through direct mortality would be replaced shortly after project completion as the Mohave tui chub rebounds in its improved habitat. Other aquatic organisms may suffer mortality, but the extent of this loss is also expected to be minimal, with complete recovery within several months to one year.

Implementation of the proposed action will result in the removal of silt and vegetation that have accumulated in the lake over the last 10-15 years. It is expected that silt and vegetation will again accumulate in the lake over the next 10-15 years after completion of the dredging. Dredging is a temporary measure to maintain the integrity of an artificial habitat for the Mohave tui chub, and so the impacts of this measure are temporary as well.

Increased turbidity and changes in water quality and chemistry may result but would be temporary, lasting only for the length of the project. The wetland and riparian features of Lake Tuendae would be modified temporarily, 10-15 years. About 3000 square feet of the existing 4000 square feet of cattails would be removed, thus opening up about 3000 square feet of open water area. As stated above, dredging is a temporary management strategy to control vegetation and reestablish adequate depths in the lake, and the effects would likely last for 10 to 15 years, until such time as cattails once again re-establish in the western area of the lake.

Two to five tamarisk trees growing on the western edge of the lake will be removed to accommodate dredging equipment. These trees are not part of the historic landscape. Tamarisk is a non-native, invasive species and removal is consistent with management policy to control the spread of this species within the preserve. Removing the tamarisk will benefit both the natural and cultural resources of the Soda Springs area.

All impacts listed above are temporary in nature and reversible either by management activity or as a function of the passage of time. The proposed action will not irreversibly damage the natural or cultural resources of Lake Tuendae or its immediate surroundings. The National Park Service concludes impairment will not result from the implementation of the proposed action.

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B. No Action

Impacts resulting from implementation of Alternative B, No Action, have been assessed for each critical element.

Soils

No impacts to soils would occur. No heavy equipment would be used at the site. No additional dredge spoils would be deposited at the proposed site.

Impairment: Since no action would occur, soils would not be impacted in any way. No impairment to soil resources would occur from the implementation of Alternative B.

Water Quality

Lowered dissolved oxygen levels, resulting from decreased water volumes and abundance of aquatic vegetation, could compromise water quality and cause localized fish kills at night.

The large amount of aquatic vegetation occupying a relatively small volume of water could result in significant water quality problems and potential mass mortality of Mohave tui chub. If large amounts of ditchgrass (*Rupia maritima*) suddenly died, eutrophication could result in a steep decline of dissolved oxygen levels.

Impairment: Water quality would be compromised and water volume would be diminished as long as excess sedimentation, accumulation of vegetative matter, and accompanying eutrophication were allowed to continue. Over the long term, water would disappear entirely as succession continued, with silt and plants occupying most, if not all, of the area of the lake. If vegetation and silt were removed at a later time, water quality (in terms of chemical and physical features) would again be comparable to what it is currently. No impairment would occur.

Wetland/Riparian Zones

There would be no immediate effect to the riparian or wetland zone over time. The process of cattail invasion and siltation would continue and standing water areas would decrease in size over the next decade. As emergent vegetation (cattails) continues spreading into shallow areas, more riparian vegetation would be available for birds as cover, feeding and nesting areas.

Impairment: Invasion of emergent riparian vegetation and accompanying siltation would reduce open water in lake

Tuendae, and over time, a large percentage would be eliminated. Dredging or other means to remove vegetation and silt would restore open water. Implementation of the no action alternative would not impair the wetland / riparian values of Lake Tuendae.

Wildlife

Since no vegetation would be removed from Lake Tuendae, birds using the cattails for cover and feeding areas would not be disturbed. Small invertebrates within the Lake would not be injured or killed. No Mohave tui chub would be injured, killed or harassed. Therefore, there would be no immediate effects on the Mohave tui chub as no action would take place. Deeper areas of the lake, with water depths of four feet or more, would continue to decrease in quantity and extent. A decrease in areas that afford the Mohave tui chub thermal protection and cover from prey will eventually adversely affect the population. With increases in the volume of vegetation and subsequent decrease in water volume, sudden die-off of accumulated vegetation could occur. Resulting compromised water quality, in the form of inadequate dissolved oxygen levels, could result in mortality to the Mohave tui chub within the lake. Lake Tuendae is one of three remaining artificial habitats established for the Mohave tui chub.

Over time, approximately five to ten years, water depths in the western portions of Lake Tuendae would decrease. The reduction in water depths will reduce the habitat suitability of the western portion of the lake. Fish using this area could be subject to increased predation by piscivorous birds, as shallow water affords them less cover from prey.

The lack of water volume, which could result over time, could also remove much of the thermal buffering afforded to fish residing in deeper waters. The western portion of the lake would eventually be eliminated as Mohave tui chub habitat. As waters become increasingly shallow, a sudden and widespread die-off of aquatic vegetation could compromise water quality and chemistry, and could trigger large-scale fish mortality within the lake. Cattails would continue to proliferate from the west end of the lake, providing increased areas for nesting, feeding and cover for birds and possibly other wildlife. Open water areas utilized by birds and bats would decrease.

Impairment: With no maintenance, the habitat will become less suitable for the Mohave tui chub and the size of the population in the lake will decrease. Fewer breeding individuals will remain, and the genetic viability of the population as a whole will be diminished. This would constitute a permanent negative effect on this population, thereby resulting in impairment to this resource.

Other wildlife resources, such as birds and invertebrates, may gain sites for nesting, perching, feeding and cover as emergent vegetation proliferates and continues its spread into shallow areas. Over time less open water will be available to resident and migratory birds as well as bats and other wildlife that may frequent the lake for water. Maintenance of the lake and removal of vegetation would reestablish open water areas. No impairment would occur.

Vegetation

Standing and dead vegetation at the western end of the pond would be retained. No vegetation would be disturbed. Sedimentation and the spread of emergent vegetation may be accelerated, as standing dead and live emergent vegetation catch and trap windblown sediment.

Impairment: Growth of emergent vegetation would continue until most or all open water areas were proliferated or filled in with silt. Some emergent vegetation would continue to sprout, as the bottom of the lake hits groundwater. However, most vegetation would die back. Vegetation surrounding the lake would not be affected. Maintenance of the lake, including removal of silt and dead cattails and rushes, could reinvigorate aquatic vegetation. No impairment would occur from the implementation of the no action alternative.

Recreation and Education Opportunities

Recreation and education opportunities would not be affected initially by the no action alternative, as no dredging activities would take place. No disturbance would result to students using the Zzyzx facility for educational seminars

and meetings. Project-related equipment, personnel or noise would not inconvenience visitors. With time, recreational and educational may diminish. Visitors and students may have less opportunity to view the Mohave tui chub as the habitat becomes more confined. With less open water, birdwatching opportunities may diminish. Researchers wishing to study the Mohave tui chub may have to seek opportunities to do so at the one of the two other man-made habitats suitable for the species. Genetic study of the Mohave tui chub would be limited, since genetic variability would be reduced.

Impairment: If the habitat for the Mohave tui chub declines and the population is reduced or lost completely, this will greatly reduce opportunities for genetic studies of the Mohave tui chub, as well as other important research pertaining to this species. Visitors will have less opportunity to view the species or may not see the species at all. Education and recreation opportunities directly associated with the Mohave tui chub would be impaired.

While the opportunities for viewing of other wildlife might increase with a greater percentage of vegetation in Lake Tuendae, other visitors may wish to see an unchanged cultural landscape depicting the features of the Zzyzx era. Since the historic landscape could be restored if vegetation were eventually removed, recreational opportunities would not be impaired.

Cultural Resources

Lake Tuendae, its ornamental vegetation, and its facilities components of the cultural landscape of the Zzyzx era, when Dr. Curtis H. Springer ran a resort facility at Soda Springs. Under the no action alternative, the progressive invasion of cattails into the western end of the lake would continue, and the cultural landscape would be modified over time.

Impairment: Lake Tuendae, as a feature of the cultural landscape of Zzyzx, would not retain its historic appearance. Over time, standing water would be minimized by the invasion of cattails. This appearance could be restored by removal of aquatic vegetation from the pond. No permanent impairment would take place as a result of the implementation of Alternative B.

Impairment Summary

With the implementation of Alternative B, the potential is significant for resource impairment. Without corrective action, sedimentation and the proliferation of vegetation in Lake Tuendae will eventually eliminate habitat that meets the physical and physiological needs of the Mohave tui chub, and the population will eventually die off. The Mohave tui chub population in Lake Tuendae is considered the most robust population among the three artificial refugia established for the species. This population has been used as a source population for establishment of the other sites. The loss of this large population would constitute the permanent loss of genetic variability and viability for the species. For this reason, The National Park Service concludes that Alternative B, No Action, would permanently and irreversibly impair the Mohave tui chub population of Lake Tuendae. No impairment would occur to soils, water quality, wetland / riparian zones, wildlife, vegetation, recreational and educational opportunities, or cultural resources.

Cumulative Impacts

Cumulative effects are those impacts of any State and private actions that are reasonably certain to occur in the project area in the future. NPS is not aware of any local state or private actions that may affect the Mohave tui chub at Lake Tuendae.

In general, the continued overdraft of aquifers that are upstream of Soda Dry Lake and that eventually supply water to its aquatic systems is of concern to NPS. However, these are ongoing private activities over which NPS has no jurisdiction. There are currently no estimated or expected effects to the Mohave tui chub or Lake Tuendae from this

action.

The National Park Service does not have any planned management activities for Lake Tuendae aside from those activities connected to the maintenance of the Mohave tui chub population.

IV. LIST OF PREPARERS

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V. CONSULTATION AND COORDINATION

Six separate on-site meetings were conducted in 2000 and 2001 with representatives from U.S. Fish and Wildlife Service, California Department of Fish and Game, the National Park Service, the Bureau of Land Management, California State University Fullerton, Western Archaeological and Conservation Center (WACC) and the dredging contractor. Mojave National Preserve management staff scoped the project, and staff specialists provided comments and suggestions through the project review process.

Agencies

U.S. Fish and Wildlife and Wildlife Service

California Department of Fish and Game

Bureau of Land Management

National Park Service, Western Archaeological and Conservation Center

Individuals

Bransfield, Ray. Wildlife Biologist, USFWS, Ventura Field Office, Ventura, California.

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Parmenter, Steve. Fisheries Biologist, California Department Of Fish and Game, Bishop Field Office, Bishop, California.

Wells, Susan. Archaeologist, National Park Service, Western Archaeological and Conservation Center, Tucson, Arizona

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Appendix A: Project Stipulations for Proposed Action

Endangered Species

The following stipulations will be adopted to minimize take of the Mohave tui chub during operations by ensuring water levels and quality are monitored and maintained in the eastern portion of Lake Tuendae; by establishing well-defined operational procedures; and ensuring workers are educated fully on those procedures.

1. If the contractor fails to comply fully with reasonable and prudent measures as outlined by the Biological Opinion for the project, NPS will suspend operations until such time that the contractor is in compliance with its terms and conditions.
2. NPS shall designate an individual as a contract representative who will have the authority to ensure compliance with protective stipulations for the Mohave tui chub and assume responsibility for coordination with the Service.
3. The contractor's employees shall be informed of the occurrence of the Mohave tui chub in Lake Tuendae and the status of this species. They shall be advised of the potential impact of improper dredging activities to Mohave tui chub and the penalties for taking of a listed species.
4. NPS will obtain baseline information on dissolved oxygen levels and pH in the eastern area of the pond prior to the onset of dredging. This information shall be used to ascertain the impacts of dredging on water quality. NPS will also determine the normal high and low water limits of Lake Tuendae and mark these limits in at least three locations around the western portion of Lake Tuendae. These markers will serve to inform workers and biologists of changes in water levels.
5. Dissolved oxygen and pH levels will be monitored three times daily during dredging operations. One measurement will be taken prior to the commencement of dredging, and the following two will be taken mid-day and afternoon.
6. Minnow traps will be used prior to seining. Traps will not be left unchecked for more than three hours, nor will traps be left overnight. Alternate trapping methods and guidelines, as prescribed in the Opinion, may be implemented under the direction of qualified personnel.
7. The removal of Mohave tui chub by means of minnow traps shall continue until traps left for three hours are capturing less than two Mohave tui chub each. At that time, the NPS biologist will make a determination, after consultation with the Service and the California Department of Fish and Game (if possible), of the benefits to be gained by seining or further trapping.
8. NPS shall ensure the integrity of the fish barrier is maintained throughout the operation. Dredging activities will be suspended if Mohave tui chub gain access into the west portion of the lake, and will not continue until the barrier is secured and as many Mohave tui chub as possible are returned to the eastern portion of the lake.
9. NPS will ensure that water depths in the eastern portion of the lake remain sufficient for Mohave tui chub. The activity levels and patterns will be observed prior to the onset of dredging and again immediately after dredging has begun. These observations should provide some ability to discern whether Mohave tui chub activity levels or patterns are the result of noise and general disturbance associated with dredging or of stress induced by lower water levels.
10. If observation indicate Mohave tui chub are stressed by lowered water levels, dredging shall cease immediately. Dredging shall resume only after water levels have returned to pre-dredging levels.
11. Trapping of Mohave tui chub shall not occur between December 15 and March 1. If dredging continues during this period, the eastern portion of the lake shall be monitored to ensure that Mohave tui chub are not unduly stressed. If any stress is noted, NPS shall cease dredging operations and contact the Service.
12. Upon locating dead or injured Mohave tui chub, initial notification will be made to the Service's Ventura office within three (3) working days, with written notice to follow within five (5) working days. Care will be taken in handling remains. Remains will be preserved in appropriate solution immediately. Remains shall be provided to the California State University, Fullerton, per its instructions. Injured Mohave tui chub shall be released on the east side of the barrier unless they show evidence of disease.

Vegetation

1. An NPS representative will supervise contractors at all times. No destruction of vegetation, other than that prescribed as inherent to the dredging operation, will be permitted.
2. Contractors will not disturb any ornamental vegetation on the site. Contractors will be held financially responsible for damage resulting to ornamental vegetation resulting from their activities.

Wildlife

1. If any bird or mammal was found in the project area, work would cease until either the animal left the area; or the animal will be moved, if possible and appropriate.
2. Approximately 1,500 square feet of cattails will be retained for wildlife use on the western end of the lake.

Cultural Resources

1. A cultural specialist/archaeologist will be present to serve as monitor during the project
2. An Inadvertent Discovery Plan has been prepared in the event any cultural or archaeological resources are found.
3. If any artifact, or suspected artifact, was found or unearthed during the action, work would cease immediately and only would be reinitiated after clearance by a qualified archaeologist.
4. Curbing and other concrete features near the area will be adequately protected from heavy equipment damage.
5. Contractor specifications will provide for full site cleanup of roads and all project areas.

Recreation and Education Activities

1. NPS Interpretive Rangers and other park staff will be on the site to provide information to visitors.
2. NPS and its contractor will work cooperatively with CSU staff to insure students, seminar participants and residents are not unduly inconvenienced or negatively impacted by the dredging operation.