PHASE II:
FINAL RESTORATION PLAN
and
ENVIRONMENTAL ASSESSMENT
for the
CYPRUS TOHONO MINE NATURAL RESOURCE DAMAGE ASSESSMENT
SIF OIDAK DISTRICT, TOHONO O'ODHAM NATION

TRUSTEES:	Tohono O'odham Nation: Tohono O'odham Department of Natural Resources, Tohono O'odham Attorney General, North Komelik, Tohono O'odham Nation, Sif Oidak District, Tohono O'odham Nation, Department of the Interior: U.S. Fish and Wildlife Service, Bureau of Indian Affairs
LEGAL AUTHORITY:	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (as amended) (CERCLA Section 103, 42 U.S.C. 9601, *et. seq*.) Natural Resource Damage Assessment (43 C.F.R. Part 11) National Environmental Policy Act (42 U.S.C. §§4321-4347)
RESPONSIBLE FEDERAL AGENCIES:	Bureau of Indian Affairs, Authorized Official, Region 2, U.S. Fish and Wildlife Service, Cooperating Agency
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ACRONYMS

AGFD	Arizona Game and Fish Department
AO	Authorized Official
BIA	Bureau of Indian Affairs
CAP	Central Arizona Project
CBP	Customs and Border Protection
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CTC	Cyprus Tohono Corporation
DOI	Department of the Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
IPM	Integrated Pest Management
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
NRDAR	Natural Resource Damage Assessment and Restoration
NTHC	Nichol's Turk's Head Cactus
REA	Resource Equivalency Analysis
RP	Restoration Plan
SOD	Sif Oidak District
SX/EW	Solvent extraction/electrowinning
TMDL	Total Maximum Daily Load

TON	Tohono O'odham Nation
UDM	Undocumented Migrant
USFWS	United States Fish and Wildlife Service

INTRODUCTION

This Restoration Plan and Environmental Assessment (RP/EA) presents alternatives to restore natural resources, ecological services, and migratory birds injured from the release of hazardous substances by the Cyprus Tohono Mine into evaporation ponds, a pit lake, and calcine leach residue ponds that attracted migratory birds and other wildlife. Trust species injured as a result of the releases include migratory birds.

The Cyprus Tohono Mine is located in a rural area approximately 32 miles southwest of Casa Grande, Arizona (Figure 1). The Cyprus Tohono Mine lies in the Santa Rosa Basin southwest of the Slate Mountain Range at an elevation of approximately 1,800 ft and spans Pinal and Pima counties. It is located in the Sif Oidak District (SOD) of the Tohono O'odham Nation (TON) on 4,180 acres of leased land (Figure 2). The community of North Komelik is located approximately one mile west of the Cyprus Tohono Mine.

PURPOSE AND NEED

The Cyprus Tohono Mine released hazardous substances into evaporation ponds, a pit lake, and calcine leach residue ponds (Figure 3.). Elevated concentrations of arsenic, cadmium, copper, selenium, zinc, sulfuric acid, uranium (as a metal), uranium radionuclides, and adjusted gross alpha activity (a measure of alpha-emitting radionuclides including thorium-230, radium-226, and radon-222) were found in these waters. In addition, other hazardous substances were found present in some source areas. For example, concentrations of mercury, as high as 51 mg/kg, and silver, as high as 123 mg/kg, have been observed in the calcine leach residue ponds (Romig 2003).

Sulfuric acid, a listed hazardous substance, was used to leach copper ore from leach stockpiles. Raffinate, a weak sulfuric acid solution, was used in in-situ leaching and the solvent extraction/electrowinning (SX/EW) process. Surface lakes were formed because salt deposition into evaporation ponds and tailings ponds created a hydrophobic layer that repelled water, thus water would stand on top of ponds until it evaporated or slowly percolated. These pond waters were highly acidic and contained elevated concentrations of copper and sulfate (Golden Environmental Management 1999). The pH from these former surface ponds ranged from 2.2 to 2.55, copper concentrations from 100 to 460 mg/L, and sulfate concentrations from 1,800 to 6,500 mg/L.

Beginning in 2001, dead migratory birds were found in the pit lake, evaporation ponds, mill tailings ponds, calcine leach residue pond, and other tanks and vats.

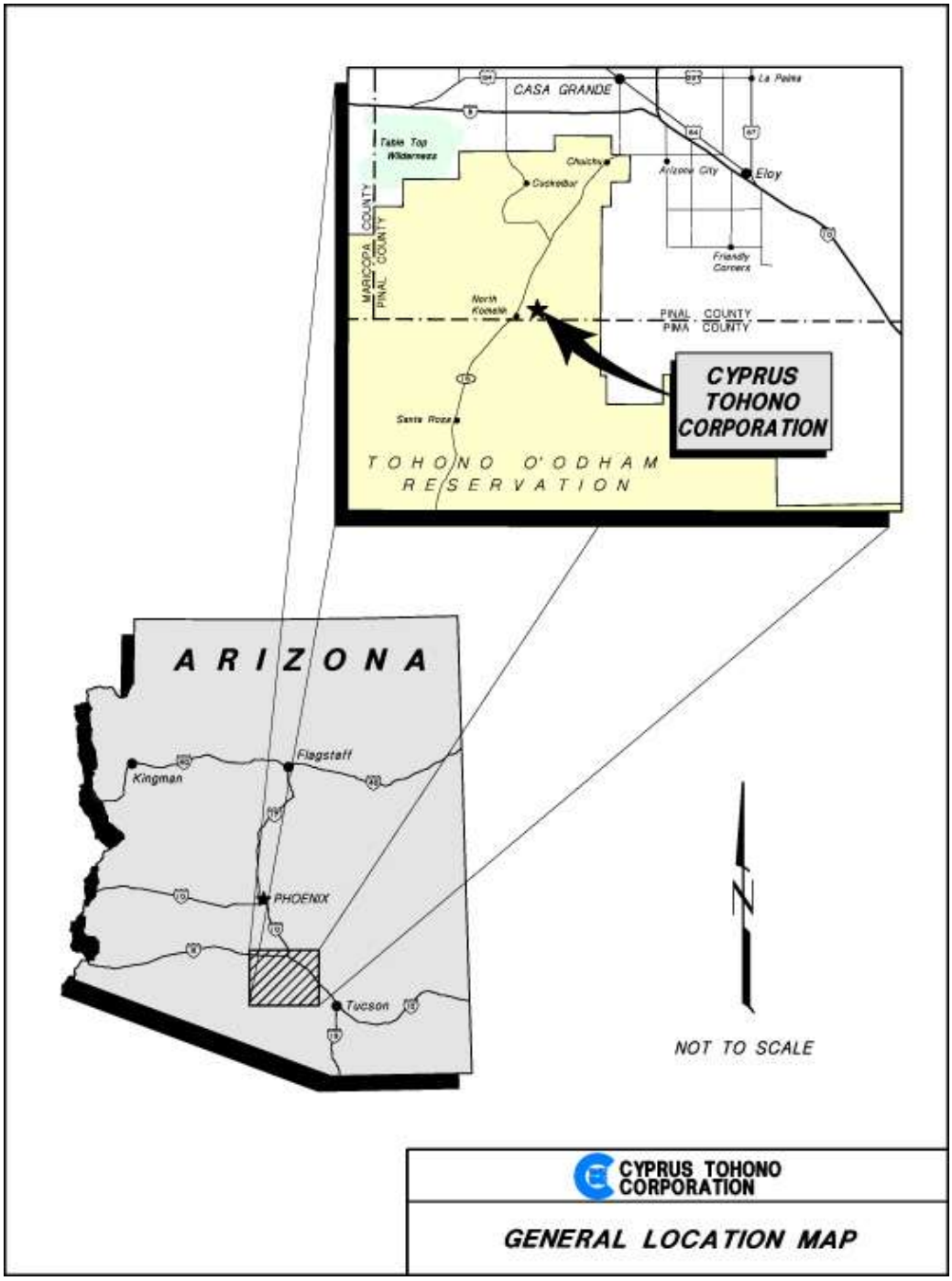

Figure 1. Location of the Cyprus Tohono Mine in Southern Arizona on the Tohono O'odham Nation.

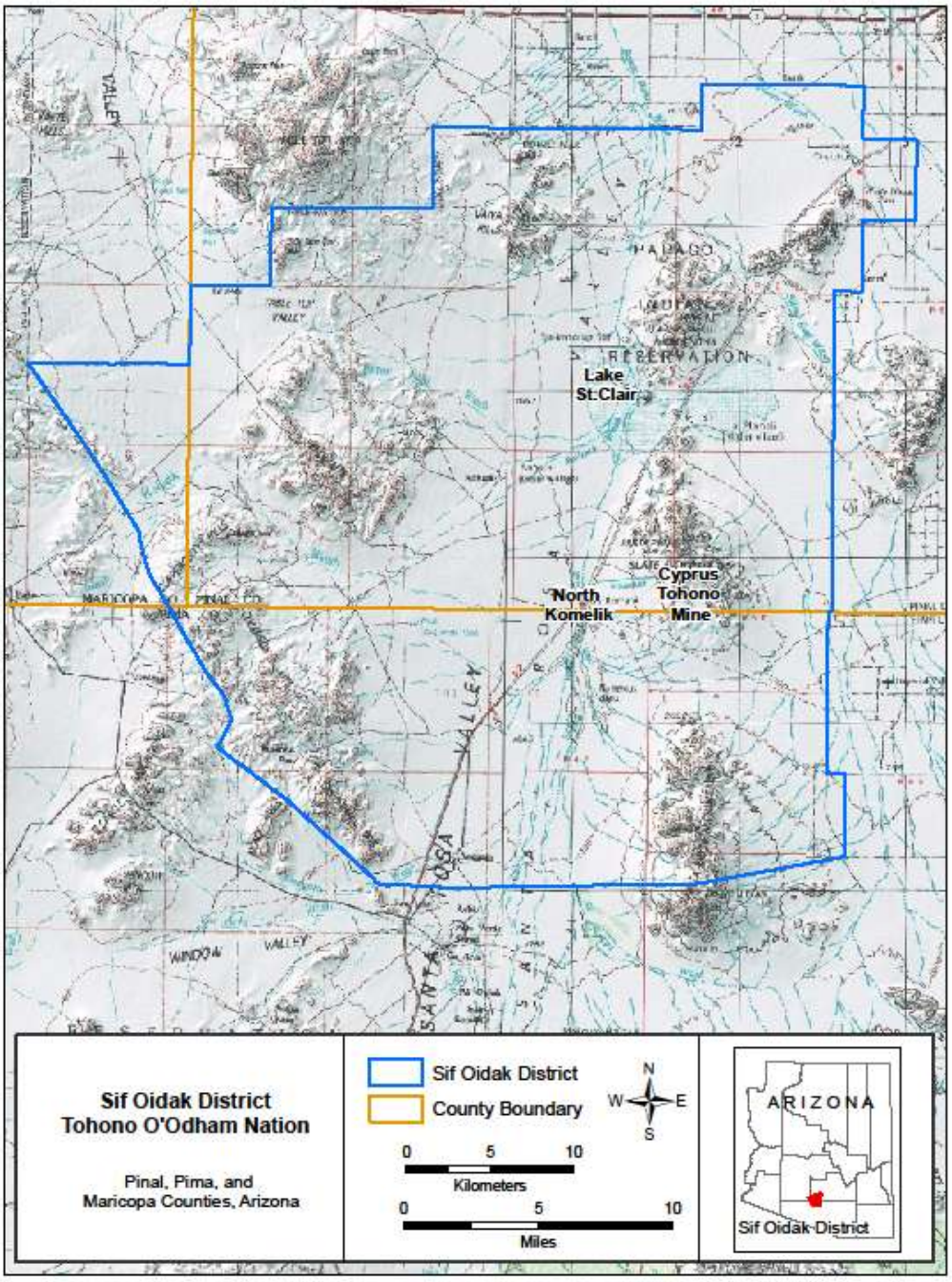

Figure 2. Sif Oidak District, Tohono O'odham Nation.

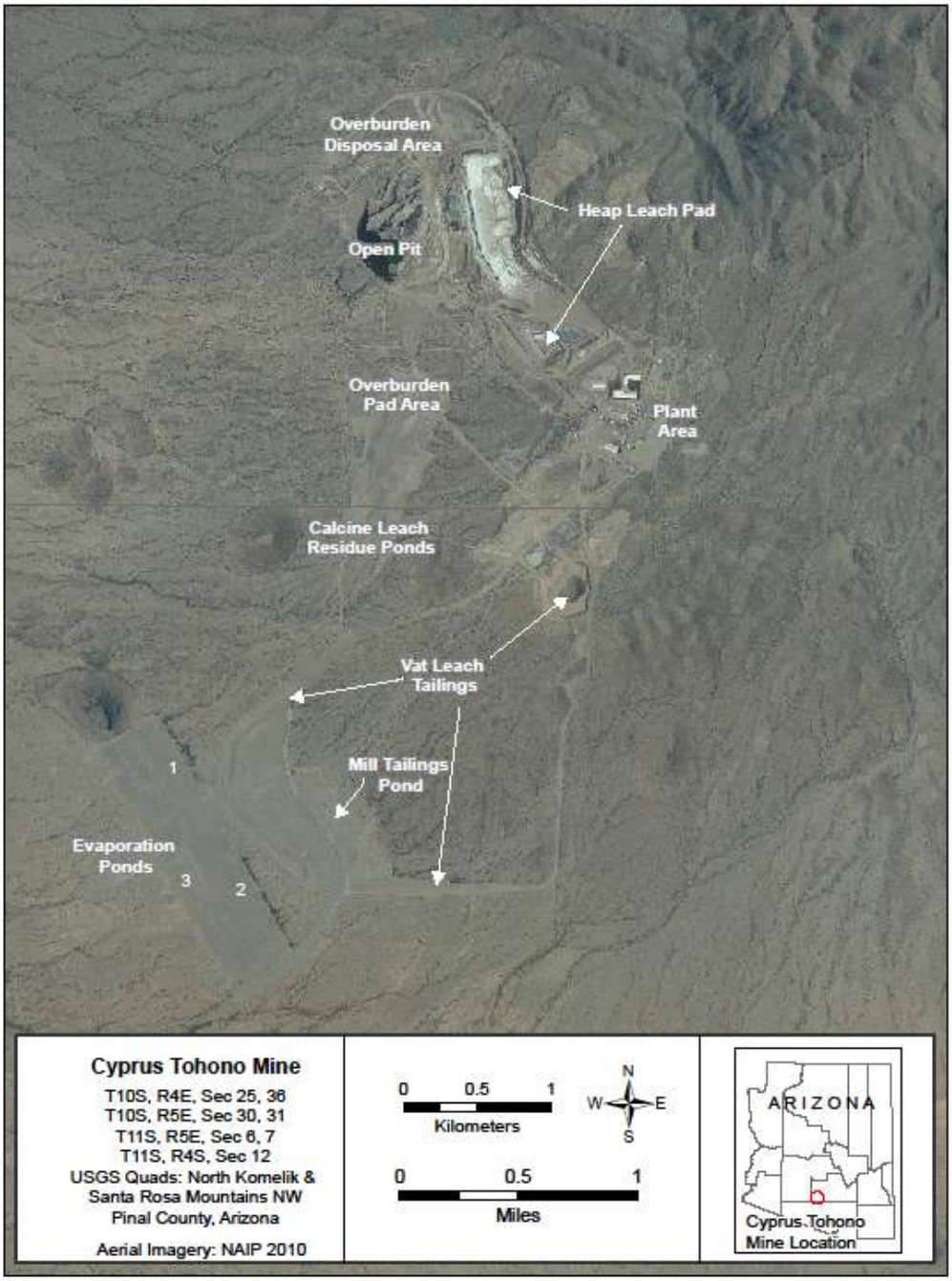

Figure 3. Cyprus Tohono Mine, Pinal County, AZ.

The Cyprus Tohono Mine Natural Resource Trustee Council (Trustee Council or Trustees), was formed which includes TON and the Department of the Interior (DOI). Tohono O'odham representatives that participate in the Trustee Council include the TON, the SOD, and the community of North Komelik. The DOI is represented by the Bureau of Indian Affairs (BIA) and the U.S. Fish and Wildlife Service (USFWS).The TON and DOI worked cooperatively with the Cyprus Tohono Corporation (CTC) to reach a negotiated NRDAR settlement on July 20, 2009 (U.S. District Court 2009). CTC agreed to compensate the Trustees with $746,290 to replace the birds and other non-groundwater natural resources lost as a result of the exposure.

The Trustees tasked a restoration planning team composed of DOI and TON representatives to develop a plan for how to use the settlement funds. The restoration planning team proposes to use the settlement funds to create new wetlands and/or enhance existing wetlands to create habitat for migratory birds to compensate the public for the birds injured as a result of the release of hazardous substances. Existing wetlands that could be enhanced include man-made earthen cattle tanks (charcos), wetlands created behind spreader dikes (low wide earthen dams across drainages) , and Lake St. Clair. All restoration actions would take place on the Sif Oidak District (Figure 3).

The purpose of this Restoration Plan/Environmental Assessment is to identify alternative restoration projects, evaluate the environmental impact of the alternatives, and select a preferred restoration alternative to compensate the public for injuries to natural resources caused by the release of hazardous substances at the Cyprus Tohono Mine. The natural resources injured were migratory birds, which will be replaced by creating replacement habitat. The alternative selected will lead to restoration, rehabilitation, replacement, or acquisition of equivalent resources for injured natural resources and the services those resources provided as compensation to the public for the injury of trust resources and services caused by the release of hazardous substances. Any selected alternative must be feasible, safe, cost-effective, address injured natural resources, consider actual and anticipated conditions, have a reasonable likelihood of success, and be consistent with applicable laws and policies. However, the completion of this RP does not constitute preapproval of any specific project.

AUTHORITY OF TRUSTEES

The Natural Resource Damage Assessment and Restoration (NRDAR) regulations (43 CFR 11) contained in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, more commonly known as the federal "Superfund" law) [42 USC 103, *et seq*.] authorize States, federally recognized Tribes (43 CFR 11.14(rr)), and certain federal agencies that have authority to manage or control natural resources, to act as "trustees" on behalf of the public, and to restore, rehabilitate, replace, and/or acquire natural resources equivalent to those injured by alleged hazardous substance releases. The Trustees worked together with the CTC, in a cooperative process, to assess natural resource injuries caused by the alleged releases of hazardous substances at the Cyprus Tohono Mine. The natural resource damages received through the negotiated settlement

must be used to restore, rehabilitate, replace, and/or acquire the equivalent of those natural resources that have been injured. Federal agencies are required to comply with the National Environmental Policy Act (NEPA) prior to commencing an action; the USFWS has taken the lead for NEPA purposes (40 CFR §1501.5) in developing the combined RP/EA. The BIA and TON are cooperating agencies in the preparation of the RP/EA.

The BIA is the lead agency on behalf of the DOI for assessment and restoration, and BIA's Western Regional Director is the designated federal Authorized Official (AO) for this site. The Federal AO is the DOI official delegated the authority to act on behalf of the Secretary to conduct a natural resource damage assessment and restoration planning and implementation. The AO represents the interests of the DOI, including all affected bureaus. The AO will select one of the alternatives analyzed in detail after soliciting and considering public comments and will determine, based on the facts and recommendations contained herein, including the public comments, whether this EA is adequate to support a Finding of No Significant Impact (FONSI) decision, or whether an Environmental Impact Statement (EIS) is required.

Settlement of Natural Resource Claim

The Natural Resource Damage Assessment was initiated in 2001. The Tohono O'odham Legislative Council passed Resolution 05-069 on February 17, 2005, requesting that any funds made available from the damages claim be spent primarily within the Sif Oidak District (Tohono O'odham Nation 2005).

The Memorandum of Understanding (MOU) forming the Trustee Council between the DOI and TON for the Cyprus Tohono Mine NRDAR was finalized on July 21, 2005. A cooperative agreement between the CTC and the Trustees was signed in August 2005 for the assessment of injury and calculation of damages. The cooperating parties estimated the claim amount for injured natural resources by using the Resource Equivalency Analysis (REA) method, which utilizes a process for valuing natural resource damages outlined in the NRDAR implementing regulations (43 CFR Part 11). The cooperating parties determined, through the REA model, that the public could be compensated for the injuries to migratory birds by the restoration, rehabilitation, and/or replacement of the equivalent of the natural resources injured by the release of hazardous substances.

A settlement was finalized on July 20, 2009, between the Trustees and CTC (U.S. District Court 2009). CTC provided a total of $825,000 to be distributed in two phases. Phase I of the restoration settlement concerned groundwater natural resource injury. CTC provided $78,710 in Phase I to replace water fixtures such as faucets and shower heads for residences in North Komelik. The United States EPA has not completed its response actions under CERCLA at the Cyprus Tohono Mine; therefore the NRDAR settlement only partially covered the Trustees' claims for groundwater natural resource injury. Ongoing investigation work continues by CTC, TON, and EPA to characterize the nature and extent of the groundwater contamination. Phase II of the restoration settlement concerned non-groundwater natural resources injury. CTC provided $746,290 in Phase II to replace non-groundwater resources, in particular, wetland habitat for migratory birds.

These funds are sufficient to restore approximately 20-40 acres of wetland habitat. This RP/EA addresses how these Phase II funds will be used.

The NRDAR guidelines require that the Trustees develop a reasonable number of possible alternatives for restoration. The selected restoration alternative must be consistent with statutory mandates and regulatory procedures that indicate that recovered damages are used only for the restoration of the natural resources injured, destroyed, or lost as a result of injuries due to the release of hazardous substances. Settlement funds shall be applied toward the costs of restoration, rehabilitation, or replacement of injured natural resources, and/or acquisition of equivalent resources, including but not limited to any administrative costs and expenses necessary for, and incidental to, restoration, rehabilitation, replacement, and/or acquisition of equivalent resources planning, and any restoration, rehabilitation, replacement, and/or acquisition of equivalent resources.

NATURAL RESOURCES AND SERVICES AFFECTED BY THE RELEASE

AFFECTED TRUST RESOURCES

HABITAT AND ASSOCIATED WILDLIFE

The release of hazardous substances occurred in the Arizona Upland ecological subdivision of Sonoran Desert in southern Arizona (Turner and Brown 1994). This is an arid to sub-arid region with low precipitation and high evaporation rates (Turner and Brown 1994). Temperatures range from below 15ºF to more than 120ºF. The mean monthly precipitation from 1951 to 1980 in the nearby town of Casa Grande ranged from 0.11 inches in May to 1.8 inches in August, with an annual average of 8.58 inches (Golden Environmental Management 1999). Most precipitation occurs as high-intensity thundershowers between July and September, with low-intensity rains during the winter. The vegetation in this area mainly consists of saguaro/paloverde forests with creosote bush and bursage shrubs as common associates (Turner and Brown 1994). Wildlife species are typical of Arizona Upland and include a wide variety of desert-adapted birds, reptiles, mammals, amphibians, and invertebrates.

These species include desert bighorn sheep (*Ovis canadensis*), mountain lion (*Felis concolor*), bobcat (*Lynx rufus*), bats, javelina (*Pecari tajacu*), mule deer (*Odocoileus hemionus*), amphibians, small mammals, and invertebrates. Desert wildlife may have been attracted to the mine's water bodies that appeared to have clean, uncontaminated water.

MIGRATORY BIRDS

The Tohono O'odham Nation is used as a nesting and foraging stop for migratory birds using the Pacific Flyway migratory route. During the natural resource assessment phase, we used the most frequent migratory bird species encountered during mortality events, the American avocet (*Recurvirostra americana*)[1], to quantify the total injury.

Migratory bird mortalities represent only a portion of birds lost because additional birds were likely exposed who were not discovered because they were scavenged, had left the ponds and died elsewhere, or suffered from sublethal effects. The settlement between Cyprus Tohono Mine and the Trustees relied on a REA to calculate the total number of lost bird years. The analysis used inputs including: 1) the number of birds exposed to hazardous substances, based on hazing data collected from 2002 to 2005 at the mine; 2) length of exposure at the mine; 3) toxicity due to exposure; 4) relationship between exposure and toxicity from laboratory studies; and 5) lifespan and reproductive rates from published scientific literature.

Migratory birds exposed to high copper and acid concentrations can be affected in a variety of ways including: 1) ingestion of hazardous substances while swimming, floating, or drinking from water bodies, 2) ingestion of lethal doses of sulfuric acid or metals from the exposure location, and 3) erosion and ulceration of the esophagus due to copper and acid toxicity (Hooper et al. 2007, Isanhart et al. 2011). Indirect effects of hazardous substances on migratory birds include reducing their ability to leave the exposure area. Sublethal effects include mild dehydration, reduction in body mass, lethargy, subtle shivering, anorexia, and reduced rates of food consumption (Hooper et al. 2007).

WATER RESOURCES

A documented release of pregnant leach solution which contained copper, sulfuric acid, and other hazardous substances, occurred July 25, 1994 (Kline 1994). An estimated 260,700 gallons of this solution leaked from a broken pipe to the west of the SX/EW plant to a spill containment sump, and an estimated 179,000 gallons overflowed the containment sump and flowed down a ditch for approximately 5,000 ft, soaking the soil (Kline 1994).

After mining activities in the pit ceased in July 1997, a lake began to form in the open pit. When sampled in June 1998, the water in the pit lake contained near neutral (pH 7.8) water with elevated concentrations of gross beta activity, nitrate, sulfate, total dissolved solids, and uranium(Golden Environmental Management 1999). The water in the pit lake

[1] Other mortalities recorded at Cyprus Tohono Mine included herons, shorebirds, waterfowl, raptors, nighthawks and passerines

was likely a mixture of deep mine water and leach fluids (Golden Environmental Management 1999).

In 1997 and 1998, stormwater accumulation caused the heap leach pads and process ponds to overflow, resulting in a discharge of 1 to 1.2 million gallons of pregnant leach solution to the pit (Stratus Consulting 2005). Overflow of an estimated 12 million gallons of solution from the heap leach pads to the open pit occurred during storm events in July 1998, December 1998, July 1999, and on August 8, 2000 (Environmental Protection Agency 2008). Between 1998 and 2002, the pit lake water fluctuated between approximately pH3 and pH5 (Cyprus Tohono Corporation 2002). The water also contained hazardous substances, including but not limited to copper, zinc, and uranium. Solvent extraction/electrowinning operations and cathode production was discontinued in the plant in February, 1999.

Water in the pit lake was treated in 2004 and 2005 to remove metals and raise the pH level. The treated water was discharged to an unnamed tributary of the Santa Rosa Wash (Environmental Protection Agency 2003). As of 2003, the pit lake contained approximately 142 million gallons of water.

Environmental Services

The overflow of heap leach pads and process ponds, availability of water with high acid concentrations in standing water bodies, increased availability of metals, and mortality of migratory birds at the Cyprus Tohono Mine potentially has affected other TON wildlife species of concern in the area. The potential loss of wildlife in the area would indicate an interruption in ecological service flows for the area. Ecological services that may have been interrupted include pollination, nutrient and energy flows, and natural pest (e.g. mosquito) control by insectivorous species. Other environmental services provided by a functional healthy wildlife and ecological community (i.e. abundance, biodiversity, aesthetics, and economic and recreational benefits) also were likely reduced at the Cyprus Tohono Mine, resulting in interim service losses to the ecological community and the public, although the losses were not quantified.

RESTORATION ALTERNATIVES

As provided by 43 C.F.R. § 11.93, this plan identifies how funds will be used for restoration, rehabilitation, replacement, or acquisition of equivalent resources.

Restoration Goals and Objectives

Under NRDAR, the goal of restoration projects is to make the public and environment whole for injuries to natural resources and their services resulting from releases of hazardous substances.

The term "restoration" is defined in the NRDAR regulations as "…actions undertaken to return an injured resource to its baseline condition, as measured in terms of the injured resource's physical, chemical, or biological properties or the services it previously provided…"(43 C.F.R. § 11.14(ll)).

The main goal for this restoration project is to replace migratory birds, particularly shorebirds, equivalent to the number of birds estimated in settlement negotiations, by creating approximately 20-40 acres of habitat in the Sif Oidak District. A second goal is to restore other wetland ecosystem functions, such as providing habitat for a wide range of other native species.

ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

ON-SITE RESTORATION

While on-site restoration is a first choice for many restoration projects, the Cyprus Tohono Mine is currently managed for continuing care and maintenance that would enable reopening at some unspecified future date. Although Cyprus Tohono Mine is in an inactive mode, it is still considered an active mine. Further injuries to wildlife could occur if chemicals migrated from the mine to an onsite restoration project. This alternative could be costly, technically infeasible, and have the potential for future injuries. Therefore, on-site restoration is not practical nor is it a viable restoration alternative.

PURCHASE LAND OFF-NATION

The restoration planning team considered purchasing land off-Nation and constructing a wetland on this purchased land. This alternative would include purchase costs, administrative costs, and wetland creation costs. The combined expenses of each of these activities were considered too costly to be achievable with the funds available.

PURCHASE EXISTING WETLAND OFF-NATION

The restoration planning team considered purchasing an existing wetland off-Nation which would be less costly than both purchasing land and building a wetland. To obtain credit for replacing bird-years lost by the incident, the wetland would need to be threatened by development or encroachment and the threats removed by the purchase. This alternative was dismissed because no suitable wetlands in the vicinity were found.

WILDLIFE REHABILITATION

The restoration planning team considered rehabilitating wildlife as a means to restore the number of birds lost from the release. However, it seemed unlikely that enough individuals would be saved to compensate for the loss.

WILDLIFE EDUCATION

Educating the community about wildlife was considered as an alternative. This item was dismissed as an alternative because alone it would not likely replace the lost bird years. It was kept as a strategy in each action alternative because it may increase community

support for the wetland creation/enhancement projects and ensure long-term success of the projects.

WILDLIFE RESEARCH

Wildlife research of migratory bird routes through the district was considered but rejected because it would not actually restore or replace migratory birds lost from the release. Monitoring is required in each action alternative as an important strategy to determine the success of each alternative.

BUFFELGRASS CONTROL

The restoration planning team considered buffelgrass control as a way of mitigating for the spread of invasive buffelgrass caused, in part, by the soil disturbance at the mine. This alternative was rejected because it would primarily benefit upland species rather than the wetland species affected by the releases and because injury to plants was not a part of the NRDAR claim.

ALTERNATIVES CARRIED FORWARD FOR DETAILED ANALYSIS

The restoration planning team considered a range of reasonable restoration alternatives before selecting the preferred alternative. The alternatives considered are:

Alternative A: No Action

Alternative B: Enhancement of Existing Wetlands on the TON

Alternative C: New Wetland Creation on the TON

Alternative D; preferred alternative: Mix of B and C

ALTERNATIVE A: NO ACTION

No restoration actions would be taken to compensate for the loss of natural resources and services. This alternative would take no further action to restore the natural resources and services injured at Cyprus Tohono Mine.

ALTERNATIVE B: ENHANCEMENT OF EXISTING WETLANDS

Existing wetlands would be enhanced to provide habitat for migratory birds and other wetland-associated wildlife. A total of 20-40 acres of additional wetland area would be constructed under this alternative.

Existing wetlands that are common on TON include charcos and the standing water created by spreader dikes. Charcos are earthen stock tanks/ponds used on the TON as a water source for cattle. Generally they are about one acre in size, have steep banks on at least three sides, take advantage of natural drainages to catch water, and have

established/mature mesquites surrounding them. Most were constructed with Natural Resource Conservation Service (NRCS) funding, but no funding for maintenance was provided. As a result, many of them have not been maintained and sediment has accumulated over time. Spreader dikes are earthen dams placed across drainages and are designed to slow the flow of water and to encourage/increase forage production for livestock. Sedimentation has filled in many of these over time.

Three to ten existing wetlands ranging in size from 2- 15 acres each would be enhanced to provide improved wetland habitat for migratory birds and other wetland-associated wildlife. The restoration planning team would prioritize wetlands for restoration according to the following design criteria: occurring within a NRCS ecosites suitable for holding water (clay bottom, loamy bottom, loamy bottom/clay bottom, loamy bottom/saline bottom/saline loam, saline bottom, saline bottom/loamy bottom/clay bottom), a record of high persistance, occurring at a distance from agriculture (> 0.62 mi), and occurring at a distance from housing/developments (>0.62 mi). The restoration planning team would select at least one wetland within potential Sonoran pronghorn habitat if it meets other selection criteria. Charcos would be excavated to expand their total area, flatten bottom and shoreline slopes, and vary the water depth. Wetlands behind spreader dikes would be excavated to expand their area, remove sediment/soil, and/or repair bottoms.

Water would be primarily from surface run-off because members of the local community prefer not to use groundwater as a source. Most potential existing wetlands are four to twenty-three miles from the Santa Rosa canal, the nearest source of Central Arizona Project (CAP) water, and the cost of installing pipe would be prohibitive for most. If CAP water is used, pipelines would be constructed using best management practices to minimize disturbance. Where possible, water control structures would be added to the wetlands to allow drainage for maintenance or non-native species control. Roads and water crossings to wetland enhancement sites may need to be improved to allow heavy equipment access to the sites.

Another possibility would be expanding Lake St. Clair by up to 20 acres. Seepage would be reduced by compacting soils or adding clay, bentonite, or a natural liner over part of the lake. If a liner is used, it would be sandwhiched between layers of geotextile pads for puncture protection. Newly compacted or added materials would be covered with a layer of sub-surface soil to allow invertebrate and plant growth without spreading invasive plant species that may be present in topsoil (Biebighauser 2011).

Approximately 67% of the wetland area would be designed to benefit the American avocet[2], primarily during the months of greatest use by the species. American avocets

[2] The American avocet was the species most affected by the hazardous substances. Waterfowl, egrets, passerines, raptors, and nighthawks were also injured.

prefer water depths of 4-8 inches, gradually-sloped bottoms, shoreline slopes of 12:1, and shorelines barren of vegetation (Robinson et al. 1997). We would attempt to discourage mesquite growth around the shorelines of these wetlands.

The remaining wetland area would have some areas of deeper water to support other species that require such depths. These wetland areas may also support emergent and shoreline vegetation to provide habitat for other migratory birds and wildlife that require denser vegetation than avocets,such as waterfowl and egrets. The denser shrubs and mesquite trees that are likely to self-establish around each of these wetlands would provide habitat for raptors, nighthawks, and passerines. This additional habitat would compensate for the loss of these birds. Additionally, the wetlands and surrounding vegetation would supply habitat for a variety of other wildlife.

During the design of this alternative the planning team conducted an analysis of potential threats to successful wetland restoration and developed actions to prevent or abate those threats. Actions that were chosen are outlined below:

- Enhanced wetlands would be fenced to protect wetland vegetation from trampling by livestock or humans and protect water quality for migratory birds. Fences would be pronghorn-safe and follow AGFD's wildlife fencing guidelines. Pipe corral (3 rail) is the preferred fencing material. Gates would be installed to facilitate removal of cattle that may break into the exclosure. We would also work with local ranchers to manage livestock found within the fences.

- Because fences would prevent cattle from accessing water, guzzlers or troughs equipped with wildlife escape ramps and incorporating additional bat-friendly design features (eg. no fences across water source), would be installed outside the fence to provide clean water for cattle. Alternatively, rock ramps, similar to boat ramps, would be installed. These ramps would be fenced on the sides and would allow cattle safe access to clean water yet prevent them from trampling riparian vegetation or getting stuck in the mud.

- The Sif Oidak District would be given a financial incentive for removing the newly fenced areas from forage production. Incentive funds would come from the settlement account.

- Early detection and control of invasive plants would be practiced. Invasive species found in similar habitat within the Sonoran desert include buffelgrass, Sahara mustard (*Brassica tournefortii*), fountain grass (*Pennisetum setaceum*), bermudagrass (*Cynodon dactylon*), onionweed (*Asphodelus fistulosus*), Johnson grass (*Sorghum halepense*), tree tobacco (*Nicotiana glauca*), and tamarisk (*Tamarix* spp.). Integrated pest management (IPM) techniques including manual control, chemical control, and prescribed fire may be used.

- Newly excavated areas that are intended to support vegetation would be seeded with a native seed mix of grasses and herbaceous plants to provide a head start and a competitive advantage over nonnative plants.

- Signs would be installed to inform visitors why they should avoid trampling the shoreline, disturbing birds, or introducing aquatic animals.

- Educational tours of Lake St. Clair would be offered to groups, such as schools, to provide educational opportunities about wetlands and invasive species.

- Volunteers, TON, and outside groups (e.g. Arizona Sonora Desert Museum) could give talks in schools and communities to foster support for wetland restoration and wildlife conservation.

- U.S. Customs and Border Protection (CBP) would be informed about the location of the wetlands to ensure they do not attract undocumented migrants (UDMs) and to advise CBP to not injure the wetlands.

ALTERNATIVE C: CREATION OF NEW WETLANDS

Three to 10 new wetlands would be created by excavation. A total of 20-40 acres of additional wetland area would be added under this alternative.

The restoration planning team would prioritize sites for wetland creation according to the following design criteria: occurring within NRCS ecosites suitable for holding water (clay bottom, loamy bottom, loamy bottom/clay bottom, loamy bottom/saline bottom/saline loam, saline bottom, saline bottom/loamy bottom/clay bottom), high persistance of water, occurring at a distance from agriculture (> 0.62 mi), and occurring at a distance from housing/developments (>0.62 mi). The restoration planning team would select at least one wetland within potential Sonoran pronghorn habitat if it meets other selection criteria.

Water would be primarily from surface run-off because the community prefers not to use groundwater as a source. Most water would be from surface run-off, although some wetlands may receive CAP water from the Santa Rosa Canal. If CAP water is used, pipelines would be installed following best management practices to minimize disturbance. Water control structures would be included in the wetland design to enable draining the new wetlands, if needed, for maintenance or invasive species control. Roads may need to be improved to allow heavy equipment access to the sites.

Approximately 67% of the wetland area would be designed to benefit the American avocet, primarily during the months of greatest use by the species. American avocets prefer water depths of 4-8 inches, gradually-sloped bottoms, shoreline slopes of 12:1, and shorelines barren of vegetation (Robinson et al. 1997). We would attempt to discourage mesquite growth around the shorelines of these wetlands.

The remaining wetland area would have some areas of deeper water to support other species that require such depths. These wetland areas may also support emergent and shoreline vegetation to provide habitat for other migratory birds and wildlife that require

denser vegetation such as waterfowl and egrets. The denser shrubs and mesquite trees that are likely to self-establish around each of these wetlands would provide habitat for raptors, nighthawks, and passerines. This additional habitat would compensate for the loss of these birds. Additionally, the wetlands and surrounding vegetation would supply habitat for a variety of other wildlife.

During the design of this alternative we conducted an analysis of potential threats to successful wetland restoration and developed actions to prevent or abate those threats Actions that were chosen include:

- New wetlands would be fenced to protect wetland vegetation from trampling by humans and livestock and protect water quality for migratory birds. Fences would be pronghorn-safe and follow AGFD's wildlife fencing guidelines. Pipe corral (3 rail) is the preferred fencing material. Gates would be installed to facilitate removal of cattle that may break into the exclosure. We would also work with local ranchers to manage livestock found within the fences.

- Because fences would prevent cattle from accessing water, guzzlers or troughs equipped with wildlife escape ramps and incorporating additional bat-friendly design features (eg. No fences across water source), would be installed outside the fence to provide clean water for cattle. Alternatively, rock ramps, similar to boat ramps, would be installed. These ramps would be fenced on the sides and would allow cattle safe access to clean water yet prevent them from trampling riparian vegetation or getting stuck in the mud.

- The District would be given a financial incentive for removing the new wetland acreage from forage production.

- Early detection and control of invasive plants would be practiced. Invasive species found in similar habitat within the Sonoran desert include buffelgrass, Sahara mustard, fountain grass, bermudagrass, onionweed, Johnson grass, tree tobacco , and tamarisk. IPM techniques including manual control, chemical control, and prescribed fire may be used.

- Newly excavated areas that are intended to support vegetation would be seeded with a native seed mix of grasses and herbaceous plants to provide a head start and a competitive advantage over nonnative plants.

- Signs would be installed to inform visitors why they should avoid trampling the shoreline, disturbing birds, or introducing aquatic animals.

- Educational tours of Lake St. Clair could be offered to groups, such as schools, to provide educational opportunities about wetlands and invasives.

- Volunteers, TON, and outside groups (e.g. Arizona Sonora Desert Museum) could give talks in schools and communities to foster support for wetland restoration and wildlife conservation.

- U.S. Customs and Border Protection (CBP) would be informed about the location of the wetlands to ensure they do not attract undocumented migrants (UDMs) and to advise CBP to not injure the wetlands.

ALTERNATIVE D: PREFERRED ALTERNATIVE; ENHANCEMENT AND CREATION OF WETLANDS

Enhancement and creation of wetlands would be combined including: a) expand existing earthen charcos or standing water created by spreader dikes, b) expand Lake St. Clair, and c) create new wetlands. The restoration planning team would prioritize the most cost-effective creation of wetlands, giving consideration to the amount of the acreage. A total of 20-40 acres of additional wetland area would be added under this alternative.

Up to ten existing wetlands would be enhanced to provide 10-20 acres of new wetland habitat for migratory birds. The restoration planning team would prioritize wetlands for restoration according to the following design criteria: occurring within a NRCS ecosites suitable for holding water (clay bottom, loamy bottom, loamy bottom/clay bottom, loamy bottom/saline bottom/saline loam, saline bottom, saline bottom/loamy bottom/clay bottom), high persistance of water, occurring at a distance from agriculture (> 0.62 mi), and occurring at a distance from housing/developments (>0.62 mi). The restoration planning team would pick at least one wetland within potential Sonoran pronghorn habitat if it meets other selection criteria. Charcos would be excavated to expand their total area, flatten bottom and shoreline slopes, and vary the water depth. Wetlands behind spreader dikes would be excavated to expand their area, remove sediment/soil, and/or repair bottoms.

Up to ten new wetlands could also be created under this alternative. New wetlands would meet the design criteria described for existing wetlands.

Another possibility would be to expand Lake St.Clair by up to 10 acres. Seepage would be reduced by compacting soils or adding clay or betonite or a natural liner over part of the lake. If a liner is used, it would be sandwhiched between layers of geotextile pads for puncture protection. Newly compacted or added materials would be covered with a layer of sub-surface soil to allow invertebrate and plant growth without spreading invasive plant species that may be present in topsoil.

Water would be primarily from surface run-off, because the local community prefers not to use groundwater as a source. If CAP water is used, pipelines would be installed following best management practices to minimize disturbance. Water control structures would be included in the new wetland design to enable draining the new wetlands, if needed, for maintenance or invasive species control. Roads may need to be improved to allow heavy equipment access to the sites.

Approximately 67% of the wetland area would be designed to benefit American avocet, primarily during the months of greatest use by the species. American avocets prefer water depths of 4-8 inches, gradually-sloped bottoms, shoreline slopes of 12:1, and shorelines barren of vegetation (Robinson et al. 1997). We would attempt to discourage mesquite growth around the shorelines of these wetlands.

The remaining wetland area would have some areas of deeper water to support other species that require such depths. These wetland areas may also support emergent and shoreline vegetation to provide habitat for other migratory birds and wildlife that require denser vegetation such as waterfowl and egrets. The denser shrubs and mesquite trees that are likely to self-establish around each of these wetlands would provide habitat for raptors, nighthawks, and passerines. This additional habitat would compensate for the loss of these birds. Additionally, the wetlands and surrounding vegetation would supply habitat for a variety of other wildlife.

During the design of this alternative we conducted an analysis of potential threats to successful wetland restoration and developed actions to prevent or abate those threats. Actions included:

- New wetlands would be fenced to protect wetland vegetation from trampling by livestock and humans and protect water quality for migratory birds Fences would be pronghorn-safe and follow AGFD's wildlife fencing guidelines. Pipe corral (3 rail) is the preferred fencing material. Gates would be installed to facilitate removal of cattle that may break into the exclosure. We would also work with local ranchers to manage livestock found within the fences.

- Because fences would prevent cattle from accessing water, guzzlers or troughs equipped with wildlife escape ramps and incorporating additional bat-friendly design features (eg. no fences across water source), would be installed outside the fence to provide clean water for cattle. Alternatively, rock ramps, similar to boat ramps, would be installed. These ramps would be fenced on the sides and would allow cattle safe access to clean water yet prevent them from trampling riparian vegetation or getting stuck in the mud.

- The Sif Oidak District would be given a financial incentive for removing the newly fenced areas from forage production. Incentive funds would come from the settlement account.

- Early detection and control of invasive plants would be practiced. Species that could be invasive at the restoration sites include buffelgrass, Sahara mustard, fountain grass, bermudagrass, onionweed, Johnson grass, tree tobacco, and tamarisk. IPM techniques including manual control, chemical control, and prescribed fire may be used. Specifics would be developed as a part of an IPM plan.

- Newly excavated areas that are intended to support vegetation would be seeded with a native seed mix of grasses and herbaceous plants to provide a head start and a competitive advantage over nonnatives.

- Signs would be installed to inform visitors why they should avoid trampling the shoreline, disturbing birds, or introducing aquatic animals.

- Educational tours of Lake St. Clair would be offered to groups, such as schools, to provide educational opportunities about wetlands and invasives.

- Volunteers, TON, and outside groups (e.g. Arizona Sonora Desert Museum) could give talks in schools and communities to foster support for wetland restoration and wildlife conservation.

- CBP would be informed about the location of the wetlands to ensure they do not attract UDMs and to advise CBP activities not to injure the wetlands.

SUMMARY OF POTENTIAL RESTORATION ALTERNATIVES AND ACTIONS

Table 1 outlines the proposed and preferred projects that would restore natural resources lost or injured at the Cyprus Tohono Mine and provide additional resource services to compensate the public for the interim losses.

Each alternative contains a number of actions. The planning team ranked each action within each alternative for their potential effectiveness based on their ability to reduce or abate the threats and assigned a priority to each action (Table 2).

Table 1. Summary of Potential Restoration Alternatives

Alternatives	Project Description
A. No Action	No restoration or enhancement would occur.
B.Wetland Enhancement	Enhancement of existing charcos, spreader dikes, and Lake St. Clair to create more and better habitat for shorebirds and other wetland species.
C. Wetland Creation	Creation of new wetlands for shorebird habitat and other wetland species where none existed before.
D. Mixture of B and C (Preferred Alternative)	Enhancement of existing charcos, spreader dikes, and Lake St. Clair and create new wetlands where none existed before. Create additional and improved habitat for shorebirds and other wetland species.

Table 2. Restoration strategies, alternatives, priority, and effectiveness rankings.

Action	Details	Alternatives	Priority	Rating
Fencing and guzzlers/troughs/ramps	To reduce cattle trampling and provide fresh water. Could reduce trampling by undocumented migrants. Fencing in pronghorn introduction area will be pronghorn-safe.	B,C,D	1	Very Effective
Incentives for restoration	Provide a one-time cash incentive to the district for loss of pasture.	B,C,D	2	Effective
Early detection and control	Monitor for invasive plants and control immediately using IPM plan.	B,C,D	2	Effective
Inform CBP of the ponds	CBP may watch for UDM traffic more, and they may not trample the shorelines themselves if they are aware of the ponds' importance.		5	Less Effective
Offer tours	Offer access to some sites only during educational tours to provide education and prevent public trampling and introduction of nonnative species.	B,C,D	2	Effective
Off- site public education	Educate at schools & community forums about the value of wetlands and wetland birds.	B,C,D	2	Effective

Action	Details	Alternatives	Priority	Rating
Visitor education	Signs educating visitors about dangers of trampling and introducing invasive animals.	B,C,D	5	Less Effective
Retire grazing lease(s)	Retire lease(s) within watershed of wetlands when up for renewal within 0.6 mile zone.	B,C,D	2	Effective
Seed/plant with natives	Provides native plants a head start and competitive advantage over invasive plants.	B,C,D	2	Effective
Site away from development	Create new wetlands away (> 1) from development and enhance existing charcos that are far from development.	B,C,D	2	Effective
Site som ponds in potential Sonoran pronghorn habitat	Choose ponds for enhancement on the west side of the district in pronghorn habitat.	B,C,D	2	Effective
Site ponds where watershed is more contained	Put them in basins more likely to collect water based on topography.	C,D	2	Effective
Site project away from agriculture	Create new wetlands and enhance old wetlands in areas far from agriculture. (>0.62 mi)	B,C,D	2	Effective
Use CAP water	Stable water source. Available only where sites are close to Santa	C,D	1	Effective

Action	Details	Alternatives	Priority	Rating
	Rosa canal.			

CERCLA requires the federal government to promulgate regulations for developing natural resource damage claims. NRDAR [43 CFR § 11] outlines restoration planning, and provides that restoration plans should consider ten factors (identified at 43 CFR § 11.82) when evaluating and selecting among possible projects to restore or replace injured natural resources. Five factors were determined not to be applicable to this project. The factors in Table 3 below represent the remaining five factors which will be used, along with other criteria, to select the preferred alternative.

Table 3. Comparison of alternatives for their ability to meet NRDAR criteria.

NRDAR Criteria	**Alt A (No Action)**	**Alt B Wetland Enhancement**	**Alt C Wetland Creation**	**Alt D Mixture Of B And C (Preferred)**
Technical feasibility	+++	+++	++	+++
Cost-effectiveness	0	++	+	+++
The potential for additional injury resulting from the proposed actions	None	None	None	None
Consistency with relevant federal, state, and tribal policies	Y	Y	Y	Y
Compliance with applicable federal, state, and tribal laws.	Y	Y	Y	Y

PREFERRED ALTERNATIVE

Each restoration alternative and specific actions were evaluated based on effectiveness of actions within each alternative (Table 2) and NRDAR regulations (Table 3). None of the alternatives result in long-term, significant impacts to the existing environment. We recommend Alternative D as the preferred alternative. Alternative A would not restore the natural resources injured and we determined it is not a viable alternative. Alternatives B and C could restore natural resources injured, but might limit the location of restoration projects. Individual restoration sites would require on-site testing to determine if soils, topography, and other conditions would affect the ability of the sites to function as wetlands. If the limited sites available in Alternatives B and C failed such tests, opportunities for restoration would be lost. Alternative D provides the most flexibility and potential for success.

ENVIRONMENT AFFECTED BY RESTORATION ALTERNATIVES

All of the proposed actions would occur in the SOD on the TON in south-central Arizona. The TON's land area is 4,453 square miles; the third-largest Indian reservation area in the United States (after the Navajo Reservation and the Uintah and Ouray Reservation). Southern Arizona is typified by steep, linear mountain ranges separated by sloping desert plains (Chronic 2002). Mountain pediments grade smoothly into the surface of the sloping valley fill. Both pediments and valley fill wear armor of desert pavement that partially protects the desert soils from ravages of wind and rain (Chronic 2002). The following analysis concentrates on this geographic area.

WATER RESOURCES

The SOD lies mostly on a flat plain bordered to the west by the Vekol Mountains and to the northeast by the Slate Mountains. This is an arid to sub-arid region with low precipitation and high evaporation rates (Montgomery Watson Harza 2005).

SURFACE WATER

The CTC site is located in the Sonoran desert, characterized by warm winters and hot summers and by occasional winter rains and short duration, intense summer thunderstorms (Montgomery Watson Harza 2005). The climate is arid with little precipitation, high temperatures, and high evaporation rates. Temperatures for Casa Grande range from 15°F to 119°F. The average annual temperature is approximately 70°F. The highest mean monthly temprature is 91°F (July) and the lowest is 51°F (January). The mean monthly precipitation from 1951 to 1980 in the nearby town of Casa Grande ranged from 0.11 inches in May to 1.8 inches in August, with an annual average of 8.6 inches (Golden Environmental Management 1999). The driest months are typically April, May, and June (approximately, 0.2 inches per month) (Montgomery Watson Harza 2005). As a result, most water sources are ephemeral. The Santa Rosa Wash is the main wash in the SOD and is an ephemeral watercourse. The Santa Rosa Wash watershed is

approximately 1,700 square miles (U.S. Geological Survey 1974). No impaired water bodies or reaches occur on SOD, and no TMDLs have been developed (Environmental Protection Agency 2012).

The potential impacts of climate change on frequency, duration, and timing of flows in the main watercourses of the district area are unknown. The ability of current water developments to supply reliable water to migratory birds as the climate changes is also unknown. However, precipitation is projected to drop by five percent by century's end (relative to average precipitation over the last three decades of the 20th century) for much of Arizona and New Mexico, based on results from 18 global climate models (Seager et al. 2007). A 10 percent decline could occur over the southern half of Arizona based on these estimates (Seager et al. 2007). Winter storms could enter the western United States in a more northerly position, bypassing the Southwest more often than it currently does. Summer precipitation may also decrease, but is more difficult to predict (Lenart 2008). Meanwhile, hotter temperatures are likely to bring higher evaporation rates, much as they do during summer compared to winter. As a result, dry spells between rains can have more severe impacts on the landscape, especially in spring and summer (Lenart 2008). It is possible some smaller current water sources may dry out in spring and summer. While the region is expected to dry out, it paradoxically is likely to see larger, more destructive flooding. Because warm air holds more water vapor than cooler air, climate models project a future increase in atmospheric water vapor along with the increase in global temperature. This creates conditions that potentially could lead to bigger and more frequent floods by causing more intense, heavy rainfall events (Lenart 2008). These floods could create flows that may fill the proposed wetlands. By increasing the acreage of existing wetlands, they may hold water longer. By increasing the number of wetlands, there would be more opportunities to catch rainfall and surface flows, which are often patchy across the landscape.

GROUNDWATER

The SOD is located in the Basin and Range physiographic province. The Basin and Range province is characterized by broad, gently sloping alluvial basins bounded by steeply sloping, north to northwest trending mountain ranges. The mountain ranges are a complex suite of igneous, metamorphic, and sedimentary rocks. The structural basins may be relatively deep and contain thick sequences of alluvial sediments. The SOD contains several bedrock outcrops including Owl's Nest, Komelik Mountain, Diabase, Garnet and Smelter Hills as well as several mountains such as the Slate Mountains, Vekol Mountains, etc. The Santa Rosa Basin is the largest alluvial basin in the SOD, and contains sedimentary deposits up to 6000 feet thick (Hydrogeophysics, 2007). Ground water levels in the alluvium are over 100 feet below ground, and there is no known ground water discharge to the surface within the SOD. Investigations at Cyprus Tohono Mine have shown that bedrock in the mountains bordering alluvial basins does contain groundwater, but the permeability and ground water flow rates are extremely low, and therefore potential water yields are very minimal, especially when compared to the alluvium(Cyprus Tohono Corporation 2010). `

Four hydrogeologic units have been identified near the Cyprus Tohono Mine and are assumed to be present throughout the entire SOD and include: Alluvium, Quaternary-Tertiary fanglomerate, Tertiary fanglomerate, and Older bedrock.

LAKE ST. CLAIR

Tat Momolikot Dam on the Santa Rosa Wash, built in 1974, was designed by the U.S. Army Corps of Engineers (COE) primarily with flood control in mind. Tat Momolikot Reservoir, also known as Lake St Clair, was originally planned as a multi-purpose reservoir to control floods and to provide irrigation and recreation. Based on the recent 2000-2007 data, the Tat Momolikot Reservoir follows a fairly consistent pattern throughout the year. The reservoir fills during the monsoon months of July and August to a maximum storage of about 800 acre-feet. Storage water is then lost to evaporation (30%) and seepage (70%) during the fall and winter and the reservoir is usually dry by May (Bovee and Hall 2008). The surface area of Lake St. Clair was about 400 acres in 2007 (D. Hartley, pers com).

BIOLOGICAL RESOURCES

HABITAT/VEGETATION

The SOD includes both the Lower Colorado River and Arizona Upland subdivisions of the Sonoran Desertscrub community as well as two small, remnant areas of Semidesert Grassland in the Vekol Valley on the western portion of the district. The dominant plant species found in the Sonoran Desertscrub communities include saguaro *(Carnegia gigantea)*, ironwood *(Olneya tesoto)*, foothills paloverde *(Parkinsonia microphyllum)*, cholla *(Cylindropuntia sp.*), prickly pear *(Opuntia sp.*), creosote *(Larrea tridentata)*, mesquite *(Prosopis sp*.) and white bursage *(Ambrosia dumosa).* The dominant plant species in the Semidesert Grassland portion is primarily tobosa grass *(Hilaria mutica);* although it appears that this community is shrinking.

THREATENED AND ENDANGERED SPECIES

Review of the USFWS List of Threatened and Endangered Species for Pima and Pinal Counties identified the Nichol's Turk's Head cactus (*Echinocactus horizonthalonius var. nicholii*), lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), Tucson shovel-nosed snake (*Chionactis occipitalis klauberi*), and Sonoran desert tortoise (*Gopherus agassizii*) as species with potential habitat in the project area.

Nichol's Turk's Head cactus

The Nichol's Turk's head cactus is federally-listed as an endangered species.

The Nichol's Turk's head cactus (NTHC) is a small, blue-green to gray-green, barrel cactus that is globose, becoming more columnar as it grows. Flowering occurs during mid-April to July, with 90 percent of blooms occurring in June (U.S. Fish and Wildlife Service 1986). The NTHC is self-incompatible, requiring pollen from another plant for

pollination. Preliminary studies examining population age-structure suggest that an immature cactus takes 11 to 13 years to reach a diameter of 0.78 inches and individual lifespan is estimated between 35 and 95 years. Young plants produce an average of one flower per year, but with increasing age can produce up to four flowers per year (U.S. Fish and Wildlife Service 1986;2009).

The cactus is found on limestone substrates along dissected alluvial fans, inclined terraces and saddles, bajadas, and debris flows. The cactus grows in open areas and partially to shaded areas underneath the canopy of shrubs and trees, or shouldered next to rocks on steep slopes and within limestone outcrops. Dominant plant species associated with NTHC include: creosote bush, foothill palo verde, triangleleaf bursage (*Ambrosia deltoidea*), white ratany (*Krameria grayi*), brittlebush (*Encelia farinosa*), prickly pear cactus, saguaro (*Carnegia gigantea*), ocotillo (*Fouqueria splendens*), and buckhorn cholla (*Cylindropuntia acanthocarpa*) (U.S. Fish and Wildlife Service 2009).

The NTHC occurs in four disjunct populations: 1) the Waterman Mountains in Pima County, Arizona; 2) the Koht Kohl Hills in Pima County, Arizona; 3) the Vekol Mountains including those near the vicinity of the Vekol Mine in Pinal County, Arizona; and 4) a population in the Sierra del Viejo Mountains in Sonora, Mexico. Two informal surveys for the cactus have been conducted on the TON. One study located approximately 623 plants (U.S. Fish and Wildlife Service 2009).

Lesser long-nosed bat

The lesser long-nosed bat was listed (originally, as *Leptonycteris sanborni*; Sanborn's long-nosed bat) as endangered in 1988 (U.S. Fish and Wildlife Service 1988). No critical habitat has been designated for this species. A recovery plan was completed in 1994 (U.S. Fish and Wildlife Service 1995).

The lesser long-nosed bat is a medium-sized, leaf-nosed bat. It has a long muzzle and a long tongue, and is capable of hover flight. These features are adaptations for feeding on nectar from the flowers of columnar cacti [e.g., saguaro; cardon (*Pachycereus pringlei)*; and organ pipe cactus (*Stenocereus thurberi*)] and from paniculate agaves (e.g., Palmer's agave (*Agave palmeri)*](Hoffmeister 1986). Lesser long-nosed bats are important pollinators for agave and cacti and are important seed dispersers for some cacti.

The lesser long-nosed bat is migratory. In spring, adult females, most of which are pregnant, arrive in Arizona and gather into large maternity colonies. Sif Oidak District is the location of one of only three known maternity colonies in Arizona (U.S. Fish and Wildlife Service 2007). Maternity colonies in Arizona are occupied from late April to July or August, then the bats move to post-maternity colonies in Southeast Arizona until September and on occasion, as late as November (Sidner 2005, U.S. Fish and Wildlife Service 2007) . It is presumed that they are tracking food sources, to feed on columnar cacti as they bloom and fruit in spring, then move to areas with paniculate agaves, which flower in the monsoon season (U.S. Fish and Wildlife Service 2007). Lesser long-nosed bats appear to be opportunistic foragers and extremely efficient fliers. They are known to

fly long distances from roost sites to foraging sites. Night flights from maternity colonies to flowering columnar cacti have been documented in Arizona at 15 miles, and in Mexico at 25 miles and 36 miles (U.S. Fish and Wildlife Service 2007). A substantial portion of the lesser long-nosed bats at the Pinacate Cave in northwestern Sonora (a maternity colony) fly 25-31 miles each night to foraging areas in Organ Pipe Cactus National Monument. The entire is SOD likely within the nightly foraging range of bats roosting at the maternity colony.

Sonoran desert pronghorn

Sonoran pronghorn is federally-listed as an endangered species.

The Service announced a final rule to establish two non-essential experimental populations of the endangered Sonoran pronghorn under section 10(j) of the ESA on May 5, 2011 (U.S. Fish and Wildlife Service 2011). Sonoran desert pronghorn potential habitat occurs on the remnant areas of semidesert grassland on SOD (U.S. Fish and Wildlife Service 2010c). The Vekol Valley is at the far east end of one of the potential reintroduction areas (U.S. Fish and Wildlife Service 2010c). Within their current range, Sonoran pronghorn typically exhibit a preference for creosote bush, bursage, paloverde-mixed cacti, and ephemeral wash habitats (U.S. Fish and Wildlife Service 2010c). Paloverde-mixed cacti habitat is used particularly during dry periods, when fruits of chain-fruit cholla provide a source of water and availability of moist forage is typically higher than in the creosote bush-white bursage community. Ephemeral wash habitat is likely used for thermal cover during hot periods and also provides nutritious forage. Sonoran pronghorn prefer habitats within about six miles of desert washes and water sources and avoid areas within about three miles of roads. Sonoran pronghorn relocation into the area containing the Vekol Mountains (Area D) would occur when habitat conditions at Cabeza Prieta National Wildlife Refuge are too poor to support additional wild pronghorn (*i.e.* those not in the captive-breeding pen) or when the population of Sonoran pronghorn within the current U.S. range is greater than 140 animals (U.S. Fish and Wildlife Service 2010c).

Tucson shovel-nosed snake

The Tucson shovel-nosed snake is a candidate for federal listing.

This snake inhabits creosote-mesquite floodplain environments in associated soils that are soft, sandy loams, with sparse gravel (U.S. Fish and Wildlife Service 2010b). The species has been documented south of Interstate 8, near the northern boundary of TON (U.S. Fish and Wildlife Service 2010d). The range of the Tucson shovel-nosed snake includes an area south of Interstate 8 near the northern boundary of the Tohono O'odham Reservation; and in the vicinity of the Santa Cruz Flats near Eloy and Picacho (U.S. Fish and Wildlife Service 2010d). Its range is thought to extend into the eastern portion of the SOD, although no surveys have been conducted and its presence has not been confirmed.

The required home range for this snake is approximately five acres. It usually rests by day under hiding cover such as shrubs including creosote bush, although it may occasionally be

found under surface objects such as boards (Arizona Game and Fish Department 2010a). Tucson Shovel-nosed snake is found in more productive creosote-mesquite floodplain vegetation types. It occurs where the soils are soft, sandy loams, with sparse gravel (U.S. Fish and Wildlife Service 2010b).

Sonoran desert tortoise

The Sonoran population of desert tortoise is a candidate for federal listing.

Sonoran desert tortoises are most closely associated with the Arizona Upland and Lower Colorado River subdivisions of Sonoran desertscrub and Mojave desertscrub vegetation types, most commonly on rocky, steep slopes and bajadas (Arizona Game and Fish Department 2010b, U.S. Fish and Wildlife Service 2010a). Washes and valley bottoms may be used in dispersal and in some areas, as all or part of home ranges. Most Sonoran desert tortoises in Arizona occur between 904 to 4,198 feet in elevation. Population genetics may be threatened by habitat fragmentation and barriers (roads, urban development, canals, railroads, etc.) in valley bottoms used for dispersal and exchange of genetic material (Arizona Game and Fish Department 2010b, U.S. Fish and Wildlife Service 2010a).

Tortoises escape extreme temperatures in burrows, which stay cooler in the summer and warmer in winter than outside temperatures. Tortoises require loose soil to excavate (usually shallow) burrows below rocks and boulders, but they may also use rock crevices. Tortoises become active in the spring as temperatures warm, then become less active as the season moves into the summer drought in May and June when much more time is spent in burrows where they conserve water and energy. The onset of the summer monsoon season signals the beginning of peak tortoise activity, dramatically rising in early August and peaking during August-September. After mid-October tortoises withdraw to winter hibernacula, which are similar shelters to those they use during activity seasons (Arizona Game and Fish Department 2010b).

Sonoran tortoise forage includes: dicot annuals, grasses, herbaceous perennials, trees and shrubs, subshrubs/woody vines, and succulents (Arizona Game and Fish Department 2010b). The most common food items in microhistological analyses included the woody vine *Janusia gracilis* and various mallows (Malvaceae)(Arizona Game and Fish Department 2010b).

MIGRATORY BIRD SPECIES

With the exception of domestic pigeons (*Columba livia*), house sparrows (*Passer domesticus*), and European starlings (*Sturnus vulgaris*), all birds in the restoration areas are protected under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-712) (U.S. Fish and Wildlife Service 2012). The Migratory Bird Treaty Act makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations. Little formal research has been performed to track the status of migratory bird species within

the Sif Oidak District. Several uncommon species known to utilize the area include golden eagle *(Aquila chrysaetos)*, cactus ferruginous pygmy-owl *(Glaucidium brasilianum cactorum)*, western burrowing owl *(Athene cunicularia hypugaea)*, and crested caracara *(Caracara cheriway)*. Agricultural areas provide important feeding areas for migrating Swainson's hawks *(Buteo swainsoni)*. The SOD is on the Pacific Flyway route and migratory waterbirds frequent the various charcos and Lake St. Clair. Other migratory birds, including numerous passerines, frequent the mesquites surrounding the charcos and Lake St. Clair.

In addition to the provisions of the Migratory Bird Treaty Act, all federal agencies are required to consider in planning documents, including NEPA documents, the effect of actions on all Birds of Conservation Concern by Executive Order 13186. Birds of Conservation Concern include some species not protected by the Migratory Bird Treaty Act. TON is within Bird Conservation Region (BCR) 33 (North American Bird Conservation Initiative 2012). Birds of Conservation Concern for BCR33 are listed on the 2008 Birds of Conservation Concern list (U.S. Fish and Wildlife Service 2008).

OTHER WILDLIFE SPECIES

Wildlife species are typical of Arizona Upland and include a wide variety of desert-adapted birds, reptiles, mammals, amphibians, and invertebrates (Turner and Brown 1994). Abandoned mines in the district provide roosts for bat species, such as California leaf-nosed bats *(Macrotus californicus)*, Yuma myotis *(Myotis yumanensis)* and cave myotis *(Myotis velifer)*. Other wildlife species of regional significance include the Great Plains narrow-mouthed toad *(Gastrophryne olivacea)*, Sonoran green toad *(Anaxyrus retiformis)*, Sonoran desert tortoise, and chuckwalla *(Sauromalus ater)*.

The Vekol Mountains have been identified as priority sites for conservation by the Sonoran Desert Ecoregional Assessment (Marshall et al. 2000) because they contain the following species and ecosystems of conservation concern:

- California Leaf-nosed Bat
- Cave Myotis
- Nichol Turk's Head Cactus
- Creosote bush-bursage group
- Palo verde-mixed cacti group

Old Mammon Mine, and the area around it, also has been identified as a priority site for conservation by the Sonoran Desert Ecoregional Assessment because it contains the following species and ecosystems of conservation concern:

- Lesser Long-nosed Bat
- California Leaf-nosed Bat
- Four-wing saltbush (Atriplex canescens-Ephedra viridis) shrubland
- Palmer alkali (*Frankenia palmeri-Atriplex*) heath shrubland
- Creosotebush-bursage group

- Palo verde-mixed cacti group

CULTURAL RESOURCES

The history of southern Arizona is commonly divided into the following broad temporal periods: the Paleoindian (12000-8000 B.C), Archaic (8000 -1700 B.C.), Early Agricultural Period (1700 B.C.-A.D. 150), Early Ceramic Period (A.D. 150-650), Hohokam Sequence (A.D. 650-1450), Protohistoric (A.D. 1450-1700), and Historic periods (A.D. 1700-Present). These periods and their timing differ somewhat for the lands of the TON located west of the Santa Cruz River Valley, but the general description listed below applies.

The Paleoindian period (12000-8000 B.C.) is the earliest known occupation of the American continent. This period is characterized by small, mobile groups of hunter-gatherers living at temporary campsites while searching the lands for food and other resources. Large mammals such as mammoth, mastodon, and bison were a major part of their subsistence. Ventana Cave of the western side of the TON has deposits that date back to this time period nearly 11,000 years ago. Clovis points, distinctive projectile points of this period, have been found at various sites in southern Arizona.

The Archaic period (8000-1700 B.C) is characterized by groups of people pursuing a mixed subsistence economy that included wild plant collecting and small game hunting. One Early Archaic period site, located in Ruelas Canyon, is described from the Tucson Basin. Middle Archaic period sites are reported from the bajada area around the Tucson Basin as well as the floodplain and mountain areas. Archaic sites are known from the Santa Cruz River and were found to be deeply buried. Archaic sites have also been identified on the TON.

During the Early Agricultural period (1700 B.C.-A.D. 150), domesticated plant species were first cultivated in the southwest. By 400 B.C., people were in large agricultural settlements along the Santa Cruz River floodplain. Canal irrigation was used and cultivated corn was a major food source. Wild plants were still gathered and hunting of small game continued. Ceramic artifacts were first produced in the Tucson Basin during this time period.

During the Early Ceramic period (A.D. 150-650), the manufacture and use of ceramic containers increased. Architectural construction became more substantial and formalized indicating more permanent settlements. Reliance on cultivated crops continued to increase. Population increased during this period also, likely related to the expansion of agriculture into floodplain lands adjacent to perennial streams.

The Hohokam sequence (A.D. 650-1450) is marked by the introduction of decorated ceramics such as red-on-buff ware in the Phoenix Basin and red-on-brown wares in the Tucson Basin. Over time ceramics become increasingly decorated with geometric figure and life forms such as birds, humans and reptiles. Canal irrigation systems were expanded with the use of organized labor over time. The spatial organization of pithouse

villages became more formally arranged around courtyard groups. Large communal or ritual features such as platform mounds and ballcourts were constructed at many village sites. Recent surveys on the TON have resulted in the location of large village sites dominated by multiple platform mounds (Peter L. Steer, Cultural Affairs Office, pers. Com. 2012). By A.D. 1450 the Hohokam cultural tradition changed, likely evolving into present day tribal groups encountered by Spanish explorers in the 16th century.

Little is known of the Protohistoric period (A.D. 1450-1700) from the time the Hohokam culture changed. On Kino's arrival in the area, he found Tohono O'odham living in the arid desert regions west of the Santa Cruz River and another O'odham speaking group, the Sobaipuri living in the San Pedro and Santa Cruz River valleys. There was a large Sobaipuri village located at Bac, where the Spanish missionaries constructed the San Xavier Mission church.

The Historic period begins with early Spanish exploration of what is now southern Arizona at the end of the 17th century. These early Spanish explorers noted various Native American groups living in the southwest including the O'odham. Father Kino traveled over various parts of the Tucson Basin and west into Papagueria in the 1690s. Father Bernard Middendorf arrived in the Tucson area in 1757 and within 15 years construction of the San Agustin Mission near the base of A-Mountain was started. By 1773, a church was completed at that site. In 1775, the site for the Tucson Presidio was selected on the east side of the Santa Cruz River. Spanish colonists established farms along the Santa Cruz River, mines in the surrounding hills, and grazed cattle. Spanish and O'odham farmers grew corn, wheat and vegetables. There was little Spanish activity to the west in Papagueria except for mining prospectors.

Mexico gained independence from Spain in 1821. Mexican settlers continued farming, ranching and mining in the Tucson Basin. The American Territorial and Statehood Period (AD 1856-present) begins with the end of the war with Mexico in 1848 and the 1853 Gadsden Purchase that resulted with Mexico ceding much of the Greater Southwest to the United States. The U.S. Army's first outpost was established in Tucson in 1856 and in 1873 Fort Lowell was moved from downtown to the north near the confluence of Tanque Verde Creek and Pantano Wash. Railroads arrived in Tucson in the 1880s bring new goods and services. The surrender of Geronimo in 1886 brought an end to Apache raiding. Settlement boomed and ranching and mining expanded to the west into Papagueria.

LAND USES ON TON

The reservation's land area is 4,453 square miles, the third-largest Indian reservation area in the United States (after the Navajo Reservation and the Uintah and Ouray Reservation). The Nation is rural, and land is used primarily for ranching. The CTC leases approximately 4,180 acres for mining. The community of North Komelik is approximately one mile west of the mine.

Local Socioeconomic Conditions

The TON consists of a population of 10,201 living in 1,932 households (U.S. Census 2010). Mean household income is low and percentage of population below poverty level is high compared to Pima County, Pinal County, and Arizona (Table 4). Natural resource occupations employ only a small percentage of the working population on TON (Table 5).

Environmental Justice

Executive Order (EO) 12898 (Federal Actions to Address Environmental Justice in Minority and Low-Income Populations) was signed in February 1994. This order was intended to direct Federal agencies "…to make achieving environmental justice part of its mission by identifying and addressing… disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the [U.S.]…" To evaluate compliance with the EO, minority and poverty status in the vicinity of the project was examined to determine if any minority and/or low-income communities would potentially be disproportionately affected by implementation of the Preferred Action.

Protection of Children

EO 13045 requires each Federal agency "to identify and assess environmental health risks and safety risks that may disproportionately affect children;" and "ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." This EO was prompted by the recognition that children, still undergoing physiological growth and development, are more sensitive to adverse environmental health and safety risks than adults. Approximately 22 percent of the population of Pima County is under the age of 18, and approximately 51 percent of the population of TON is under the age of 18 (U.S. Census Bureau 2012).

Table 4. 2010 Income and Poverty Statistics for Arizona, Pinal County, Pima County, and Casa Grande (U.S. Census Bureau 2012).

Population Attribute	Tohono O'odham Nation	Arizona	Pinal County	Pima County	Casa Grande
Population, 2010	10,201	6,392,017	375,770	980,263	48,571
Population, % change, 2000-2010	NA	24.6	99.9	16.2	92.6
Median household income, 2010 ($)	27,040	50,448	51,310	45,521	45,009
Per capita income, 2010 ($)	9,935	25,680	21,716	25,093	21,071
Percent of population below poverty level, 2010 (%)	41.2	15.3	13.5	16.4	17.5

Table 5. Employment on the TON in 2010 (U.S. Census Bureau 2012).

Occupation	Number Of Persons	Percent
Civilian employed population 16 years and over	2274	-
Management, business, science, and arts occupations	552	24.3
Service occupations	687	30.2
Sales and office occupations	658	28.9
Natural resources, construction, and maintenance occupations	232	10.2
Production, transportation, and material moving occupations	145	6.4

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ALTERNATIVES

ENVIRONMENTAL CONSEQUENCES BY ALTERNATIVE

Table 6. Environmental Consequences by Alternative.

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
Water Resources	No changes to water resources would occur.	Water quantity would increase for wildlife and may increase for cattle as wetlands are expanded and some locations that are currently dry are restored. An increase in water storage area to capture surface flows during projected incidents of increased flooding due to climate change may lessen the impact of reductions in surface	Water quantity would increase for wildlife and may increase for cattle as more water locations are added. An increase in water storage area to capture surface flows during projected incidents of increased flooding due to climate change may lessen the impact of reductions in surface water caused by increased evaporation and reduced	Water quantity would increase for wildlife and may increase for cattle as more water locations are added and wetlands are expanded. An increase in water storage area to capture surface flows during projected incidents of increased flooding due to climate change may lessen the impact of reductions in surface water caused by increased

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
		water caused by increased evaporation and reduced winter precipitation that are predicted by climate change models. Water quality for cattle would be better because it would be in guzzlers and/or troughs which would be cleaner. Rock ramps could also improve water quality because cattle would not be stirring up silts where they access water. Cattle would be safer from mud entrapment. Groundwater may be increased because flows would be slowed, allowing more time for	winter precipitation that are predicted by climate change models. Water quality for cattle would be better because it would be in guzzlers and/or troughs which would be cleaner. Rock ramps could also improve water quality because cattle would not be stirring up silts where they access water. Cattle would be safer from mud entrapment. Groundwater may be increased because flows would be slowed, allowing more time for infiltration. Ephemeral watercourses may also	evaporation and reduced winter precipitation that are predicted by climate change models. Water quality for cattle would be better because it would be in guzzlers and/or troughs which would be cleaner. Rock ramps could also improve water quality because cattle would not be stirring up silts where they access water. Cattle would be safer from mud entrapment. Groundwater may be increased because flows would be slowed, allowing more time for infiltration. Ephemeral

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
		infiltration. Water crossings along roads leading to sites may need to be improved to allow heavy equipment access. Best management practices would be used to prevent erosion and increases in runoff. If CAP water is used, this would also increase water quantity available for cattle. The Nation is not near its CAP allotment; therefore availability of CAP water for other uses would not be affected. Overall, impacts to water resources would be beneficial.	benefit from the slowed flows, which may decrease erosion. Water crossings along roads leading to sites may need to be improved to allow heavy equipment access. Best management practices would be used to prevent erosion and increases in runoff. If CAP water is used, this would also increase water quantity available for cattle. The Nation is not near its CAP allotment; therefore availability of CAP water for other uses would not be affected.	watercourses may also benefit from the slowed flows, which may decrease erosion. Water crossings along roads leading to sites may need to be improved to allow heavy equipment access. Best management practices would be used to prevent erosion and in increases runoff. If CAP water is used, this would also increase water quantity available for cattle. The Nation is not near its CAP allotment; therefore availability of CAP water for other uses would not be affected.

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
			Overall, impacts to water resources would be beneficial.	Overall, impacts to water resources would be beneficial.
Biological *Vegetation* Resources		Up to 40 acres of Sonoran Desert scrub or disturbed land would be converted to open water or wetland vegetation. Wetlands are much more limited and declining in the ecoregion than upland habitat (Latta et al. 1999, Marshall et al. 2000). Increased chance of invasive species colonization/establishment due to ground disturbance, but would be mitigated with native species	Up to 40 acres of Sonoran Desert scrub or disturbed land would be converted to open water or wetland vegetation. Wetlands are much more limited and declining in the ecoregion than upland habitat (Latta et al. 1999, Marshall et al. 2000). Addition of new watering sites may increase grazing in these new areas causing increased compaction and spread of invasive plants.	Up to 40 acres of Sonoran Desert scrub or disturbed land would be converted to open water or wetland vegetation. Wetlands are much more limited and declining in the ecoregion than upland habitat (Latta et al. 1999, Marshall et al. 2000). Addition of new and enhancement of old watering sites may increase grazing in these new areas causing increased compaction and

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
		planting, monitoring, and herbicide use if necessary. An IPM plan would be followed to ensure herbicide use is kept to a minimum and product guidelines would be followed. If CAP water is used, some habitat may be temporarily or permanently lost where pipes are dug. Net gain of wetland area would provide a positive/beneficial impact	Increased chance of invasive species colonization/establishment due to ground disturbance, but would be mitigated with native species planting, monitoring, and herbicide use if necessary. An IPM plan would be followed to ensure herbicide use is kept to a minimum and product guidelines would be followed. If CAP water is used, some habitat may be temporarily or permanently lost where pipes are dug. Net gain of wetland area would provide a	spread of invasive plants. Increased chance of invasive species colonization/establishment due to ground disturbance, but would be mitigated with native species planting, monitoring, and herbicide use if necessary. An IPM plan would be followed to ensure herbicide use is kept to a minimum and product guidelines would be followed. If CAP water is used, some habitat may be temporarily or permanently lost where pipes are dug.

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
			positive/beneficial impact	Net gain of wetland area would provide a positive/beneficial impact
Threatened and Endangered species	None	Lesser long-nosed bats have been observed drinking from livestock tanks and would benefit from increased availability of water for drinking because the tanks would be larger and more reliable. Foraging habitat would remain essentially the same because minimal columnar cacti destruction/alterations would be allowed. However, some columnar cacti may be lost when trenches are dug for delivery pipes for CAP	Lesser long-nosed bats have been observed drinking from livestock tanks and would benefit from increased availability of water for drinking because the tanks would be larger and more reliable. Foraging habitat would remain essentially the same because minimal columnar cacti destruction/alterations would be allowed. However, some columnar cacti may be lost when trenches are dug for delivery pipes for CAP	Lesser long-nosed bats have been observed drinking from livestock tanks and may benefit slightly more than Alternative B because the water sources could be larger and more dispersed across the landscape. Foraging habitat would remain essentially the same because minimal columnar cacti destruction/alterations would be allowed. However, some columnar cacti may be lost when trenches are dug for

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
		water or roads are improved. Wetlands would not be constructed at caves or mines, therefore no roosts would be disturbed. Surveys would be conducted to ensure ponds are not expanded into areas where other listed and candidate species occur (Sonoran desert tortoise, Nichol's turk's head cactus, and Tucson shovel-nosed snake). These species are not known to occur in potential project areas. Surveys would also be conducted in areas where pipes may be constructed to carry CAP water and	water or roads are improved. Wetlands would not be constructed at caves or mines, therefore no roosts would be disturbed. Surveys would be conducted to ensure ponds are not expanded into areas where other listed and candidate species occur (Sonoran desert tortoise, Nichol's turk's head cactus, and Tucson shovel-nosed snake). These species are not known to occur in potential project areas. Surveys would also be conducted in areas where pipes may be constructed to carry CAP water and	delivery pipes for CAP water or roads are improved. Wetlands would not be constructed at caves or mines, therefore no roosts would be disturbed. Surveys would be conducted to ensure ponds are not expanded into areas where other listed and candidate species occur (Sonoran desert tortoise, Nichol's turk's head cactus, and Tucson shovel-nosed snake). These species are not known to occur in potential project areas. Surveys would also be conducted in areas where pipes may be constructed

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
		areas where roads may need to be improved. Although some desert habitat for Sonoran desert tortoise would be converted to wetland, or impacted by construction of roads or CAP delivery pipes, it is an insignificant amount. NTHC and Tucson shovel-nosed snake require soils that are not suitable for wetlands and therefore their habitat would not be impacted by wetland enhancement. Some habitat may be impacted if roads are improved or pipes buried	areas where roads may need to be improved. Although some desert habitat for Sonoran desert tortoise would be converted to wetland, or impacted by construction of roads or CAP delivery pipes, it is an insignificant amount. NTHC and Tucson shovel-nosed snake require soils that are not suitable for wetlands and therefore their habitat would not be impacted by wetland enhancement. Some habitat may be impacted if roads are improved or pipes buried	to carry CAP water and areas where roads may need to be improved. Although some desert habitat for Sonoran desert tortoise would be converted to wetland, or impacted by construction of roads or CAP delivery pipes, it is an insignificant amount. NTHC and Tucson shovel-nosed snake require soils that are not suitable for wetlands and therefore their habitat would not be impacted by wetland enhancement. Some habitat may be impacted if roads are improved or pipes buried

*Attributes		Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
			for CAP water. If Sonoran pronghorn are reintroduced they may benefit from stable and reliable availability of water due to the use of pronghorn-safe fencing. Some habitat may be impacted if roads are improved or pipes buried for CAP water Overall, no significant impact.	for CAP water. If Sonoran pronghorn are reintroduced they may benefit from stable and reliable availability of water due to the use of pronghorn-safe fencing. Some habitat may be impacted if roads are improved or pipes buried for CAP water Overall, no significant impact.	for CAP water. If Sonoran pronghorn are reintroduced they may benefit from stable and reliable availability of water due to the use of pronghorn-safe fencing. Some habitat may be impacted if roads are improved or pipes buried for CAP water Overall, no significant impact.
	Migratory Birds	No impacts to most species. Lack of open water and wetlands may continue to limit ability of	Providing an expanded source of water would be a beneficial impact. Increasing the area of open water and wetland habitat would serve as a greater attractant to	Providing an additional source of water would be a beneficial impact. Increasing the area of open water and wetland habitat would serve as a greater attractant to	Providing additional sources of water would be a beneficial impact. Increasing the area of open water and wetland habitat would serve as a greater attractant to

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
	migratory waterbirds to use the SOD.	migratory waterbirds, and improve the stopover, wintering, and breeding habitat. Providing more reliable water sources would help offset decline in surface water that may occur as a result of climate change. Addition of CAP water would increase this benefit. Some habitat may be impacted if roads are improved or pipes buried for CAP water. Overall, a significant beneficial impact.	migratory waterbirds, and improve the stopover, wintering, and breeding habitat. Providing more reliable water sources would help offset decline in surface water that may occur as a result of climate change. Addition of CAP water would increase this benefit. Some habitat may be impacted if roads are improved or pipes buried for CAP water. Overall, a significant beneficial impact.	migratory waterbirds, and improve the stopover, wintering, and breeding habitat. Providing more reliable water sources would help offset decline in surface water that may occur as a result of climate change. Addition of CAP water would increase this benefit. Some habitat may be impacted if roads are improved or pipes buried for CAP water. Overall, a significant beneficial impact.

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
Other Wildlife Resources	None	Declining or at-risk bat species are likely to benefit from increased availability of drinking water. Other species likely to benefit include mule deer, mountain lion, bobcat, javelina, and all native amphibians present in the district. If CAP water is used, some habitat may be temporarily or permanently lost where pipes are dug. Some habitat may be impacted if roads are improved.	Declining or at-risk bat species are likely to benefit from increased availability of drinking water. Other species likely to benefit include mule deer, mountain lion, bobcat, javelina, and all native amphibians present in the district. If CAP water is used, some habitat may be temporarily or permanently lost where pipes are dug. Some habitat may be impacted if roads are improved.	Declining or at-risk bat species are likely to benefit from increased availability of drinking water. Other species likely to benefit include mule deer, mountain lion, bobcat, javelina, and all native amphibians present in the district. If CAP water is used, some habitat may be temporarily or permanently lost where pipes are dug. Some habitat may be impacted if roads are improved.

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
		Providing more reliable water sources would help offset decline in surface water that may occur as a result of climate change. Addition of CAP water would increase this benefit.	Providing more reliable water sources would help offset decline in surface water that may occur as a result of climate change. Addition of CAP water would increase this benefit.	Providing more reliable water sources would help offset decline in surface water that may occur as a result of climate change. Addition of CAP water would increase this benefit.
Overall Effects to Biological resources		Overall, net impacts to biological resources would be beneficial and not significant.	Overall, net impacts to biological resources would be beneficial and not significant.	Overall, net impacts to biological resources would be beneficial and not significant.
Cultural Resources	None	Cultural resource surveys would be completed for any ground-disturbing projects and a report prepared. Any cultural sites located in project areas would have to be evaluated for National Register eligibility and	Cultural resource surveys would be completed for any ground-disturbing projects and a report prepared. Any cultural sites located in project areas would have to be evaluated for National Register eligibility and	Cultural resource surveys would be completed for any ground-disturbing projects and a report prepared. Any cultural sites located in project areas would have to be evaluated for National Register eligibility and

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
		any project impacts evaluated. The Tohono O'odham Tribal Historic Preservation Office would evaluate surveys and any potential impacts. Wetlands would be placed to avoid cultural resources. CAP pipeline and road construction would be designed to minimize and mitigate for impacts. Wetlands may be constructed in areas where cultural crops may be grown using traditional and organic methods on small-scale demonstration gardens for educational purposes and sale.	any project impacts evaluated. The Tohono O'odham Tribal Historic Preservation Office would evaluate surveys and any potential impacts. Wetlands would be placed to avoid cultural resources. CAP pipeline and road construction would be designed to minimize and mitigate for impacts. Wetlands may be constructed in areas where cultural crops may be grown using traditional and organic methods on small-scale demonstration gardens for educational purposes and sale.	any project impacts evaluated. The Tohono O'odham Tribal Historic Preservation Office would evaluate surveys and any potential impacts. Wetlands would be placed to avoid cultural resources. CAP pipeline and road construction would be designed to minimize and mitigate for impacts. Wetlands may be constructed in areas where cultural crops may be grown using traditional and organic methods on small-scale demonstration gardens for educational purposes and sale.

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
		Cultural resources would benefit from the dissemination and appreciation for cultural crops.	Cultural resources would benefit from the dissemination and appreciation for cultural crops.	Cultural resources would benefit from the dissemination and appreciation for cultural crops.
Land Use	None	No changes anticipated.	No changes anticipated.	No changes anticipated.
Socioeconomic Conditions	None	The goal is to hire as many local people as possible to enhance the wetlands. Financial incentives would balance the loss of revenue from the loss of 20-40 acres of pasture. Net long-term access to pasture and water would not change because of troughs and guzzlers.	The goal is to hire as many local people as possible to create new wetlands. Financial incentives would balance the loss of revenue from the loss of 20-40 acres of pasture. Net long-term access to pasture and water would not change except some pasture may be more usable with addition of	The goal is to hire as many local people as possible to create and enhance the wetlands. Financial incentives would balance the loss of revenue from the loss 20-40 acres of pasture. Net long-term access to pasture and water would not change except some pasture may be more usable with addition of

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
		Possible minimal negative impact but mostly beneficial. Impacts may be perceived as negative despite plans to provide financial incentives. No significant impact.	new water sources. Possible minimal negative impact but mostly beneficial. Impacts may be perceived as negative despite plans to provide financial incentives. No significant impact.	new water sources. Possible minimal negative impact but mostly beneficial. Impacts may be perceived as negative despite plans to provide financial incentives. No significant impact.
Environmental Justice	No change	Both low-income and minority populations are dominant within the SOD. As a result, there is the potential for environmental justice issues to be encountered. However, the proposed project sites are intended to have a positive influence on the environment. No displacement of any	Both low-income and minority populations are dominant within the SOD. As a result, there is the potential for environmental justice issues to be encountered. However, the proposed project sites are intended to have a positive influence on the environment. No displacement of any	Both low-income and minority populations are dominant within the SOD. As a result, there is the potential for environmental justice issues to be encountered. However, the proposed project sites are intended to have a positive influence on the environment. No displacement of any

*Attributes	Alternative A No Action	Alternative B Existing Wetland Enhancement	Alternative C New Wetland Creation	Alternative D (Preferred Alternative) Wetland Enhancement And Creation
		people would occur as a result of the proposed action.	people would occur as a result of the proposed action.	people would occur as a result of the proposed action.
Protection of Children	No change	Based on observations made during field surveys, no children currently live in or adjacent to the project sites.	Based on observations made during field surveys, no children currently live in or adjacent to the project sites.	Based on observations made during field surveys, no children currently live in or adjacent to the project sites.
Cumulative Impacts	None	No similar projects are likely to be carried out at the same time in this area.	No similar projects are likely to be carried out at the same time in this area.	No similar projects are likely to be carried out at the same time in this area.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

For each alternative, all federal, state, and TON environmental and cultural regulations would be followed as appropriate. Surveys would be conducted for Threatened, Endangered, and Sensitive species and habitat in potential wetland areas, areas where new pipe from CAP would be buried, and areas where roads may need improvement to allow equipment access to the project sites. Surveys would be conducted for cultural resources. Permits from TON (particularly water resources and natural resources divisions), US Army Corps of Engineers, USFWS, and others would be obtained if deemed appropriate.

Based on the analysis in the draft document, the action alternatives (Alternatives B-D) would not cause any significant impacts to the environment.

MONITORING PROGRAM AND PERFORMANCE CRITERIA

A monitoring program would be developed and implemented to evaluate whether the goals to restore, rehabilitate, replace, or acquire the equivalent of the injured natural resources have been met. The first step is to determine baseline conditions for water, vegetation, wildlife before wetland restoration begins. The restoration planning team would implement a monitoring program for each project which would include provisions for project success and reporting to ensure the specific project objectives and restoration actions are conducted as intended. Such provisions include performance standards and criteria for each restoration action, guidelines for implementing corrective actions, and a schedule for frequency and duration of monitoring.

This project presents a great opportunity to test the benefits and hazards of artificial wildlife waters because of the number of wetlands to be built and the opportunity to conduct pre-treatment tests.

COORDINATION WITH THE PUBLIC

A public scoping meeting was held in July 22, 2009, at North Komelik, Tohono O'odham Nation, to discuss how the groundwater settlement would be distributed to complete Phase I of the Cyprus Tohono restoration implementation as well as invite public comment or suggestions for alternatives for the wildlife restoration plan/environmental assessment. Public comments included whether the $78,710 could come directly to a community account or if it has to filter its way from the Nation to the Sif Oidaf District to the Community. The rest of the comments focused on how/why there were two separate calculations of damages for groundwater and wildlife and why there was a one-time payment to the restoration planning team when the pit lake is still there affecting wildlife.

The Draft RP/EA was available for review and comment for 45 days. The public review period opened on October 11, 2012, and closed on November 26, 2012. A Notice of Availability was mailed to 45 interested parties. The Notice of Availability and Draft Restoration Plan/Environmental Assessment were posted on the Arizona Ecological Services Internet homepage (http://www.fws.gov/southwest/es/arizona/). The Notice of Availability was also available through legal notices in the Casa Grande Dispatch and an advertisement in The Runner, a weekly newspaper in Sells. The Draft RP/EA was also available at the Sif Oidak District office, the TON-Environmental Protection Office office in Sells, the Casa Grande library, and the USFWS office in Phoenix.

Public meetings were held on October 20, 2012, and November 7, 2012 at the Sif Oidak District to present the alternatives and solicit public comment.

We received one written comment on the Draft RP/EA during the 45-day public review and comment period. We received an additional 13 verbal comments/questions during the public meetings.

RESPONSE TO COMMENTS

Comment: One commenter was very excited about the planning for building ponds and wanted more information about the planning and how to do a pond project.

We will plan a meeting with the Sif Oidak District to invite participants to suggest wetland restoration sites. If the restoration planning team has not visited the site, a site visit would be scheduled. Field surveys are necessary to find or verify sites that meet the criteria in the preferred alternative and meet the restoration criteria. Then, the Trustees will work with TON and/or a contractor to build the ponds.

Question: If Lake St. Clair is improved/expanded, which direction would be expanded?

We do not know yet, other than it would not involve replacing the current dam. The Army Corps of Engineers controls the dam and its operation. Any work to be performed at Lake St. Clair would be contingent upon the Corps' approval. The direction of the lake expansion would be determined by topography, soils, and inflows.

Question: Which charcos would be enhanced?

We mapped a preliminary set of charcos that met the criteria described in Alternatives B and D, including: a) occurring within NRCS ecosites suitable for holding water (clay bottom, loamy bottom, loamy bottom/clay bottom, loamy bottom/saline bottom/saline loam, saline bottom, saline bottom/loamy bottom/clay bottom), b) a record of high persistence, c) occurring at a distance from agriculture (> 0.62 mi), and d) occurring at a distance from housing/developments (>0.62 mi). However, NRCS ecosites are based on GIS data that needs to be field verified, and soils and geology need to be tested at potential sites to determine suitability. Additionally, we will conduct surveys for cultural resources and threatened and endangered species before the final set of charcos are chosen.

Comment: One attendee liked the education concept.

Great. We feel education is important for maintaining support for the project. We hope that you will have a chance to participate.

Question: What is a spreader dike?

A spreader dike is a short, but wide earthen dam placed across a small drainage. They create shallow wetlands that are often ephemeral, in contrast to the high earthen berms of charcos and the larger perennial lakes created by larger dams, such as Tat Momolikot Dam.

Question: What is the incentive program?

A small portion of the settlement funds would be dispersed to the ranchers who volunteer to give up pasture acreage to the new wetlands. The amount of the incentives will be based on NRCS calculations of profit per acre and the availability of funds for dispersal. Only new wetland acres (30-45 acres) will be used in calculations. If a wetland is expanded, the original wetland acres will not be used in calculations.

Question: Is the SOD within migratory routes?

Yes, the entire Sif Oidak District is within the Pacific Flyway migratory bird route.

Question: Don't mesquite provide cover for predators as well as provide habitat for birds?

Yes, mesquite does provide cover for many predators, such as coyotes and hawks. Some wetland species, such as the migratory shorebirds, depend on clear sightlines to detect predators and will only use wetlands mostly barren of vegetation. Approximately 67% of the wetlands will be designed to provide this barren habitat for shorebirds. We will attempt to design the wetlands focused on providing shorebird habitat to minimize the mesquite (and other vegetation) cover around the edges. We clarified the wording in the EA to make this clear.

Other species, such as songbirds, use the cover of vegetation, such as mesquite, to hide from predators. The wetlands that are focused on providing habitat for these species will allow mesquite regeneration around the edges. Approximately 33% of the wetlands will focus on these other species.

Question: Might these enhancements increase hunters?

Hunting on the Tohono O'odham Nation is not allowed.

Question: Was there a study on whether the mine leaching affected cows?

No. We are unaware of a study to determine whether mine leaching affected cows. We did not consider cows in our NRDAR assessment because livestock are not a natural resource as defined by Section 101(16) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. § 9607 or 43 CFR Part 11.14(z).

Question: Have you thought of creating new charcos with liners?

Yes. We will try to pick locations (for charco restoration and creation of new wetlands) that will not require liners because liners are expensive. However, if we find no areas with suitable soil, we may use liners and reduce acreage accordingly so that the project would still be accomplished within our budget.

Question: Could we look outside of SOD if necessary?

Yes. TON Legislative Council Resolution 05-069 states that the Sif Oidak District has reviewed the proposed Memorandum of Understanding (forming the Trustee Council) and has passed Resolution of the Sif Oidak District Council No. 01-05-03 supporting the Nation's participation in the natural resources damage assessment and restoration process provided for in the Memorandum of Understanding, with the additional request that any funds made available from the damages claim be spent *primarily* (emphasis added) within the Sif Oidak District.

Comment: The fish ponds are designed to fill only during overflow from Lake St. Clair.

Use of the fish ponds depends on the ponds' soil type, ability to hold water, ability to catch water or use CAP water, and other factors.

Question: Is there a count of the dead birds?

The actual number of birds that died at the Cyprus Tohono Mine were counted. This number was used, along with hazing data, to estimate the total number of birds that were injured as a result of exposure to acidic mine water.

The USFWS investigation found a variety of types of bird carcasses or parts including shorebirds, waterfowl, hawks, and passerines, or songbirds. The USFWS law enforcement agent and environmental contaminant specialists found many bird carcasses during the September of 2001 investigation.

While a number of dead birds were observed at the site, the number of birds injured was likely much higher. Very quickly after the investigation, the mine worked with the USFWS to initiate monitoring and hazing activities to keep birds from utilizing the contaminated ponds with extremely low pH levels. In addition, they began activities that would either keep water from ponding on the tailings, or restrict access from inactive ponds.

An important point to remember when answering your question is that the CERCLA allows natural resource trustees to seek compensation for resources that are "injured." Injury is defined as more than just death; it is defined as "a measurable adverse change, either long or short term, in the chemical or physical quality or the viability of a natural resource resulting either directly or indirectly from exposure to a discharge of oil or release of a hazardous substance, or exposure to a product of reactions resulting from the discharge of oil or release of a hazardous substance."

Our estimates of birds injured were not limited to the number of birds that died on site on a discrete day because many others would have been exposed to mine contaminants and

flown away, only to die or become ill elsewhere. Ill birds would have been subject to increased predation, or – if they died -- their carcasses would have likely been scavenged by predators looking for an easy meal. The number of "injured" birds included more than just those carcasses counted on site during the initial report of a bird kill.

In many natural resource damage assessment evaluations, the natural resource trustees use either a model as a method to estimate injuries and judge the benefits provided by different proposed restoration actions valued against the injury estimate. This model is known as a Resource Equivalency Analysis (REA), which is a modeling technique that includes significant known resource-based considerations to calculate/estimate the number of birds that were injured as a result of releases of hazardous substances. The types of parameters used in the REA included inputs such as time of year (e.g., height of migration versus winter), size and toxicity of ponds over time and types of birds affected. The total loss is then used to determine the appropriate number of birds over time, which must be restored.

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