

Contract No. 1-07-32-L2695
Agreement No. 12-03-91-026

RESOURCE DEVELOPMENT PLAN

FOR

TONTO CREEK RIPARIAN UNIT (TCRU)

WILDLIFE MITIGATION

THEODORE ROOSEVELT DAM

BETWEEN

THE BUREAU OF RECLAMATION

DEPARTMENT OF THE INTERIOR

AND

THE UNITED STATES FOREST SERVICE

DEPARTMENT OF AGRICULTURE

PREFACE

This Resource Development Plan is made by and between the Bureau of Reclamation represented by the Arizona Projects Office of the Lower Colorado Region and hereinafter referred to as "BOR", and the Forest Service represented by the Tonto National Forest of the Southwestern Region and hereinafter referred to as "FS," pursuant to the Project Supplemental Agreement for Theodore Roosevelt Dam dated September 23, 1988.

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TCRU RDP LIST OF CORRECTIONS

Listed below are corrections and changes to the Tonto Creek Riparian Unit Resource Development Plan. These changes and corrections represent the consensus of representatives from all cooperating agencies (Forest Service, Bureau of Reclamation, Arizona Game and Fish Dept. and Fish and Wildlife Service) who attended a review of the April draft of this document on May 24, 1991. Spelling and grammatical corrections are not listed. Page numbers refer to the location of corrections as found in the edited version, not the April version.

Pages 10 - 12 - Threatened/endangered/sensitive species

The species that were previously listed were edited and numerous other species were added so that the TES species list matched the list for the TCRU biological evaluation.

Page 12 - Recreation - paragraph 1.

Waterfowl was added to the list of species hunted in the TCRU.

Page 13 - Riparian Objectives, paragraph 3.

This paragraph was added in its entirety to clarify that revisions in the plans objectives will be made as necessary and will be an interagency team effort.

Page 14 - Cottonwood/willow community (CW/WL), last paragraph.

A sentence was added to clarify that "increases" and "decreases" would be quantified by the interagency team following collection of baseline data.

Page 15 - Cattail Emergent Community (CE), last paragraph

Same as above.

Page 17 - Figure 5, last year listed

Corrected typo - second "Year 4" was changed to "Year 5"

Page 18 - Bottom of Figure 6.

Corrected typo - "Repeat year 1 treatment" changed to "Repeat year 2 treatment".

Page 18 - Sheep Driveway section

Entire section was added.

Page 19 - Public Information and Education, first paragraph.

Clarify that BOR funding levels for interpretive aspects of the TCRU are not fully determined but that the BOR and FS will cooperate to some level in funding interpretive facilities.

Page 21 - Off Highway Vehicle Management

Clarifies that road closures will be in accordance with the FS Resource Access Travel Management program. Also specifies that barriers and enforcement will be used in the road closure process.

Corrections - con't.

Page 22 - Implementation Schedules, first paragraph.

Paragraph added to indicate the possibility that, due to unforeseen circumstances, scheduled implementation could change. Also requires an addendum be sent to all cooperators in the event of such changes.

Page 22 - Funding Schedule chart

Chart is re-done to separate the estimated cost of interpretive services from the actual funding amount that the BOR has committed to at this point.

Page 28 - Section C, Grazing, Monitoring and Coordination Schedule

Several additions to the schedule. These are:

- a. Milepost added for selection of monitoring contractor in 1991.
- b. Milepost added for interagency team to meet in 1992, after collection of baseline data, to develop objectives.
- c. Each year after 1992, an item is added that the interagency team will meet to review objectives for adequacy.
- d. Each year after 1992, an item is added that requires the District Ranger act on the teams recommendations.

Page 25 - A.Monitoring, paragraph 2

Wording changed to strengthen statement. "Exclusion...will be considered" changed to "exclusion...will be implemented".

Page 26 - Non-Contract Monitoring

Entire section added to allow for cooperative monitoring efforts other than the contract monitoring to be incorporated into the project.

Page 27 - First sentence

Wording changed to strengthen statement. "...for consideration.." changed to "...will act..".

Page 27 - Second sentence

Wording changed to strengthen statement. "Exclusion...will be considered if" changed to "...option of excluding...will be implemented under the following conditions:"

Page 27 - All

Entire section is largely re-worded to make it more easily understood.

Page 28

Arizona Game and Fish Department title added (inadvertently omitted in original).

1. INTRODUCTION

The Tonto Creek Riparian Unit (TCRU) is one of the wildlife mitigation measures identified by an interagency team to implement the Fish and Wildlife Coordination Act requirements associated with the Roosevelt Lake, Plan 6, Central Arizona Project (Figure 1). The TCRU was established as a special riparian management unit with the management goal of achieving recovery of the degraded Tonto Creek riparian communities to the point where they approximate more nearly their ecological potential, and to mitigate the losses of 460 acres of riparian habitat at Roosevelt Lake and Lake Pleasant, Arizona.

The interagency team consisted of the Forest Service (FS), Bureau of Reclamation (BOR), the Arizona Game and Fish Department (AG&F), and the Fish and Wildlife Service (FWS). The FS is responsible for the development and implementation of this Resource Development Plan. BOR will fund the preparation and execution of the plan. The interagency team will continue to serve in an advisory capacity through the implementation and monitoring/adjustment phases of the plan.

Given the extensive area involved (approximately 5,900 acres), the extent of private ownership (approximately 34%), and the expense of project maintenance, the interagency team recommended the pursuit of riparian improvement through management of the livestock, rather than their exclusion. The Tonto Forest Land Management Plan, dated October, 1985, provided for livestock forage production, along with other uses in this area (Management Area 6J), however management needs in riparian areas features wildlife needs over recreation and grazing.

This Resource Development Plan (RDP) provides an opportunity to demonstrate the role of "proper management" in riparian recovery, while still accommodating multiple uses, including livestock grazing. The option of excluding livestock from the TCRU will be implemented should the grazing management program not meet the riparian recovery objectives. The fencing and livestock/wildlife water development projects described in this plan will be required whether livestock are present in the TCRU or not.

With the FS as the lead agency, an interdisciplinary planning team was formed to develop and recommend alternatives for the implementation of the TCRU concept, and the development of this plan. The planning team included agency, community, and public land user representatives. The team planning process utilized the concepts described by the FS as Integrated Resource Management (IRM). The IRM process is fully documented in Appendix 7.

2. DESCRIPTION OF TCRU RESOURCES

A. AREA DESCRIPTION

The lower 15.7 miles of Tonto Creek, from its confluence with Gun Creek, downstream to its terminus in Roosevelt Lake, comprises the TCRU. Stream elevations range from 2,500' at the upper level to 2,136' at Roosevelt Lake. Vegetation in the valley is typical of the Arizona Upland subdivision of the Sonoran Desert. Vegetation in the 955 square mile Tonto Creek watershed also includes elements of the Arizona Upland, semi-desert grassland, chaparral, Madrean Evergreen Woodland, and conifer types.

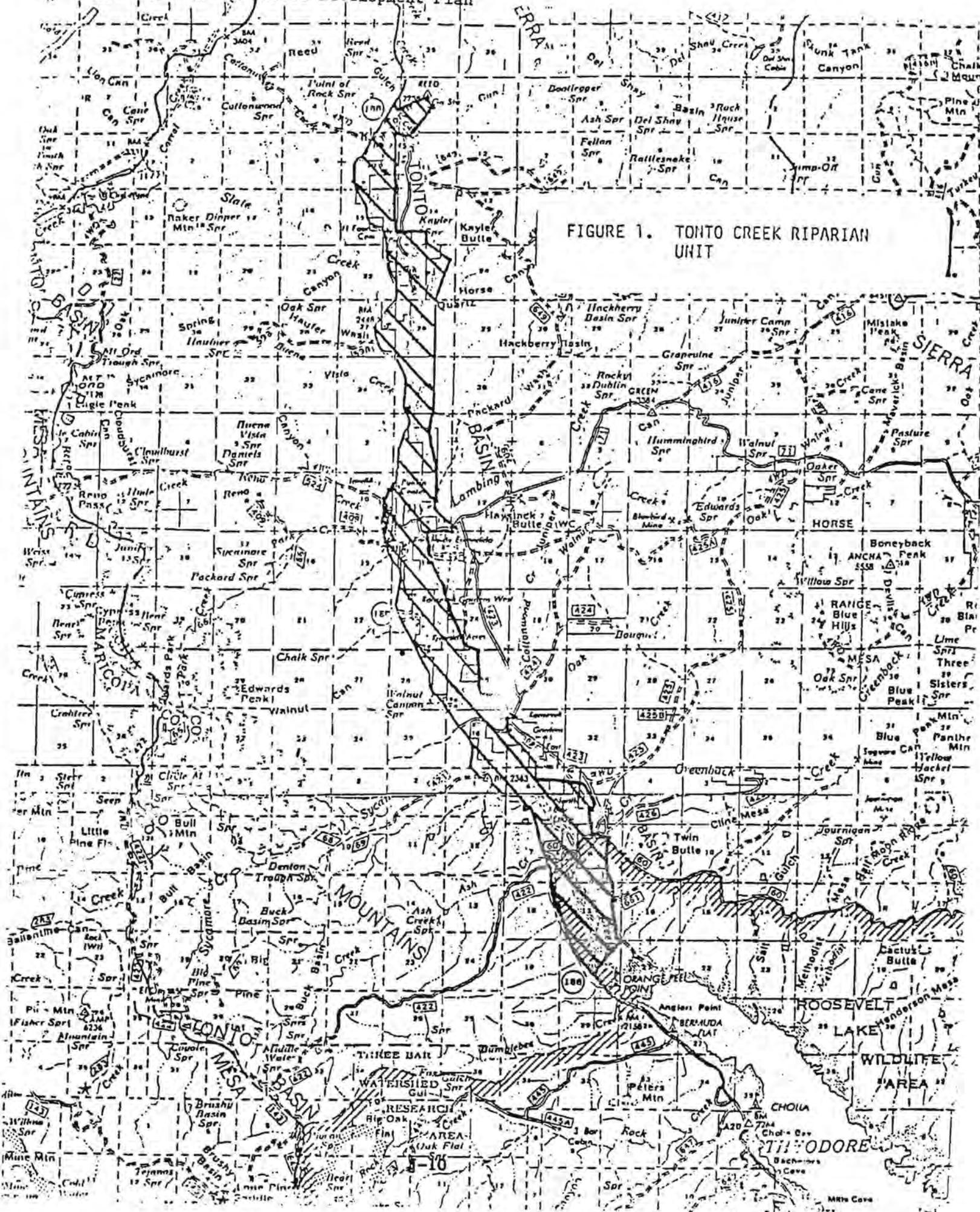


FIGURE 1. TONTO CREEK RIPARIAN UNIT

Included within the 5,900 acre TCRU are approximately 2,000 acres of private lands. Much of the private land is residential, including the community of Punkin Center/Tonto Basin, with approximately 1,100 residents. Some of the private land is within the floodplain of Tonto Creek, and comprises riparian area. Land ownership pattern is complex; some private lands are unfenced, and are grazed in common with FS lands, and some private lands are fenced. Fences do not always follow ownership boundaries, and fence locations change in response to changes in ownership.

FS administered lands along Tonto Creek are largely unfenced, and are included within the 130,000 acre Tonto Basin livestock allotment. A small portion of the TCRU is located within the Del Shay livestock allotment. Neither allotment currently has a formal livestock grazing management program.

B. HYDROLOGY

Tonto Creek originates in the Mogollon Rim northeast of Payson, Arizona and flows southward for approximately fifty miles to its terminus in Roosevelt Lake. The TCRU lies within the Lower Tonto Creek Basin. This basin is approximately 280 square miles, comprising about 30% of the 955 square mile watershed.

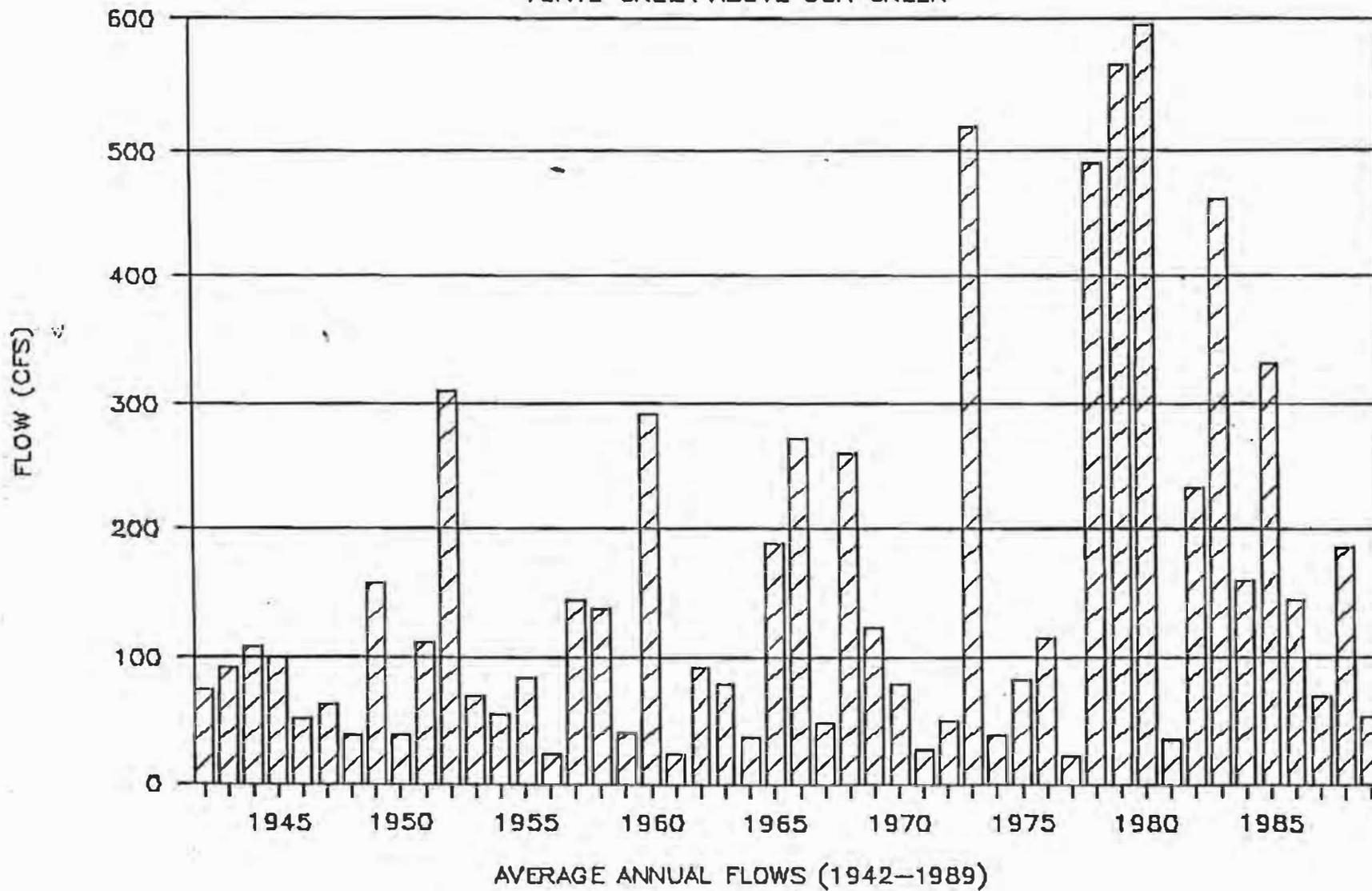
Tonto Creek flows through a highly permeable rock-rubble, gravel and sand alluvium which is as much as 65 feet thick. The gradient averages 23 feet per mile (0.4%). The channel and floodplain area are approximately 1/2 mile wide. The creek has the characteristics of a braided stream in several of its reaches in the lower basin. The absence of confining topography the reduction in channel gradient below Gun Creek, deteriorated watershed conditions, and a decade of above average precipitation and stream flow probably contributed to the braiding. It is also possible that Tonto Creek is 'agradng' as a result of the construction of Roosevelt Dam and an increase of the stream base level through the formation of a river delta where Tonto Creek enters into the lake. A report prepared by H.H. Schumann and B.W. Thompson of the USGS in 1972 estimated that average annual water yield prior to 1970 was about 80,000 acre feet. Since completion of that report water yield has averaged 174,600 acre feet. In 1980, flow was 432,000 acre feet. This period of abnormally high flows extended from 1973 to 1985. Average annual flows for the period 1942 through 1989 are shown in Figure 2.

The annual hydrograph for the Tonto Creek gauging station above Gun Creek (Figure 2) indicates that peak flows typically occur during two flow seasons. One peak typically occurs in the winter or spring in response to precipitation or snowmelt in the upper basin. A second peak typically occurs in the late summer from monsoonal precipitation. Of the 49 years of record, 55% of the peak flows have occurred in the winter or spring while 39% have occurred in the summer. In terms of magnitude of peak flows 21 of the 25 highest flows have occurred in the winter/spring period. The average peak flow of the winter/spring period is 20,700 cfs while that of the summer is 10,900 cfs.

Schumann and Thomsen estimated the average annual volume of water infiltrating the alluvium as 20,000 acre feet, (1942-1970). Annual ground water discharge is estimated at 17,000 acre feet, with 4,000 acre feet as subsurface discharge into Roosevelt Lake, and 13,000 acre feet discharged through evapotranspiration. Evapotranspiration was derived through an estimate of the distribution and density of riparian vegetation and irrigated alfalfa that existed in the channel and floodplain in 1967. The channel and floodplain were estimated as an area of 5,080 acres, and high density, medium density, and low density riparian vegetation comprised 17%, 53%, and

FIGURE 2

TONTO CREEK ABOVE GUN CREEK



23%, respectively. An analysis of 1989 aerial photographs shows that low density (basically bare ground) riparian vegetation has increased from 23% to 40% since 1967. This is likely due to scouring associated with the abnormally high flows in the late 70's and early 80's, and to a lesser degree by sand/gravel mining.

The water quality in Tonto Creek is good and generally suitable for most uses. Water quality standards for Lower Tonto Creek are intended to protect aquatic and wildlife uses including cold water fisheries, full body contact recreation, and irrigation and livestock watering uses. Water quality in the recent alluvium underlying Tonto Creek is of similar chemical composition to that of the surface water in the creek, indicating that this aquifer receives most of its recharge from infiltration of stream flow. The alluvium is the principal aquifer in the Lower Tonto Creek Basin and is the water source for most of the wells in the basin.

Streamflow diminishes as it enters the lower basin due to infiltration into the highly permeable alluvium that underlies the channel and floodplain of Lower Tonto Creek. The lower reaches of Tonto Creek are often dry in the summer.

C. RIPARIAN COMMUNITIES

Mr. Florence A. Packard settled in Tonto Basin in 1874. He described lower Tonto Creek as 'timbered with the local creek bottom type of timber from bluff to bluff, the water seeped rather than flowed down through a series of sloughs and fish over a foot in length could be caught with little trouble' (from interviews and an unpublished report by Senior Forest Ranger Fred W. Croxen, at the Tonto Grazing Conference, Phoenix, AZ 1926).

By contrast today, little more than about 10% of the riparian area is timbered with riparian woodland species, and at least 40% is sparsely vegetated rock rubble. The channel, rather than comprising stable sloughs with seeping flows, is badly scoured and braided, and stream flows are largely seasonal rather than perennial. Most native fish species populations have been reduced through habitat degradation.

Many of the trees were cut for fuel and for cattle forage during droughts. Most riparian degradation, however, may be attributed to historic grazing practices and deterioration of the Tonto Creek watershed. Florence Packard, E.M. Watkins, C.C. Griffin, William Craig, Revilo Fuller, and other settlers testified to the density of perennial grasses in the Tonto Basin, including the lowest elevations, which today are largely characterized by sparse mesquite overstory and bare ground.

No current assessment of Tonto Creek riparian site types, successional stage, composition, or condition is available. Under a FS contract, a vegetation dominance type map was prepared for Tonto Creek by Ohmart (1981) based on photo interpretation, though no on-site data were gathered. This inventory is obsolete as a result of the flooding events during the 1980's. Ohmart's map described 656 acres of cottonwood/willow community (22 stands) and 1,223 acres of mesquite bosque (26 stands).

Existing riparian "communities", with communities being here considered as dominance types, include (1) cottonwood (2) cottonwood/willow (3) mesquite bosque (4) burrobrush/seepwillow and (5) cattail emergent. Riparian "site types" and the accompanying successional advanced "riparian associations" have not been described for Arizona. Szaro (1989) described only the Arizona riparian community types as based on the existing dominant species, without regard

to apparent condition or successional stage, thus providing no real benchmarks from which to assess potential for recovery or the establishment of management objectives.

1. Cottonwood community

Cottonwood (Populus fremontii) communities on Tonto Creek consist of decadent stands which have been isolated from recent flooding events by their position on elevated terraces which represent old flood plains. These stands are dominated by even-aged cohorts which are over-mature and mostly in a state of rapid decline. Other tree species are largely lacking, especially regeneration. A very few remnant ash (Fraxinus pennsylvanica) and Mexican elderberry (Sambucus neomexicana) can be found in sites inaccessible to livestock. The shrub and herbaceous understory is also depauperate as a result of livestock grazing.

2. Cottonwood/willow Community

This community differs from the cottonwood community only in being a wetter ecological site, which is usually indicated by perennial stream flow or a water table very close to the channel surface. Channel changes have resulted in the "drying" of some sites. Most stands are decadent and in decline, or are characterized by newly disturbed sites with cottonwood and willow seedlings/saplings whose growth is retarded by sustained livestock grazing pressure. Cottonwood and willows (Salix gooddingii) are adapted to floodplain ecology (frequent disturbance) and produce millions of short-lived seeds during the spring flooding period. Seedlings for both species require the presence of sand/gravel bars which retain moisture long enough for root development. Under natural conditions, cottonwood/willow communities are perpetually changing in response to normal channel changes and the presence of new sand bar deposits. These deposit sites represent the recruitment potential of this flood-dependent community. On Tonto Creek both willow and cottonwood recruitment is greatly reduced due to yearlong grazing by livestock. Cottonwood/willow seedlings are fairly abundant on the upper portions of the TCRU, though grazing mortality is high, and many plants 3-5 years old are less than 1 foot tall (should be 8-20'). Sites with cottonwood/willow potential are dominated by burrobrush and seepwillow, which are unpalatable to livestock. Some fairly good cottonwood/willow recruitment can be found in a portion of the TCRU near the Roosevelt Lake Gardens subdivision.

3. Mesquite Bosque

Mesquite (Prosopis spp.) bosque is characterized by mesquite which attain greater stature than those on drier upland sites. Bosque communities develop on well drained floodplains which are elevated above the current active channel and the saturated soils. Bosque has been reduced on Tonto Creek through channel changes and erosion of old terraces, agricultural clearing, fire wood cutting, mining (sand/gravel), residential development and by the long term lack of floodplain development (due largely to grazing practices).

4. Burrobrush/Seepwillow

This is the most extensive community type in Tonto Creek. Burrobrush (Hymenoclea salsola), seepwillow (Baccharis glutinosa) and desert broom (Baccharis sarathroides) dominate this community. These species are unpalatable to livestock, and all are prolific seed producers which rapidly invade disturbed sites.

This community occupies the extensive disturbed areas in Tonto Creek. As noted previously, the annual flows between 1973 and 1985 were more than twice (174,600 ac ft) that of the pre-1970 period (80,000 ac ft). These scouring floods, especially that of 1980 (432,000 ac ft), created extensive sand and gravel bars, while probably eliminating some remnants of the pre-1970 riparian communities. Sparsely vegetated sites have increased from 23% in 1967 (as noted by Schuman & Thompson, 1972) to about 40% at present. Newly formed sand/gravel bars provided ideal seed beds for cottonwood and willow, but as previously noted yearlong grazing pressure has prevented the recovery of these species, resulting in a dominance by these unpalatable shrubs.

5. Cattail Emergent Community

This community, dominated by cattail (*Typha latifolia*), bulrush (*Scirpus* sp.), sedges (*Carex* spp.), knotgrass (*Paspalum distichum*) and other species, has been reduced the most as a result of historic grazing practices and site deterioration. This community is probably what Florence Packard described when he referred to the numerous sloughs providing habitat for fishes, and it is present only in trace occurrence in the wettest sites around springs and areas where groundwater is close to the surface. Species in this community are highly palatable to cattle, and this community has high potential for rapid recovery.

6. Tamarisk Community

This community, dominated by tamarisk (*Tamarix* spp.), comprises a minor portion of the TCRU riparian area. Tamarisk plants occur sporadically in small numbers throughout the TCRU, but do not dominate these sites. Just downstream of the TCRU boundary, tamarisk comprises a major community on the Tonto Creek delta. This introduced species has the potential to increase in abundance on portions of Tonto Creek, particularly in the absence of native, competing species.

D. WILDLIFE

1. Mammals

Typical mammals within the TCRU include desert muledeer (*Odocoileus hemionus*), javelina (*Tayassu tajacu*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), rock squirrel (*Citellus variegatus*), desert pocket mouse (*Perognathus pencillatus*), Bailey's pocket mouse (*Perognathus baileyi*), cactus mouse (*Peromyscus eremicus*), Southern grasshopper mouse (*Onychomys torridus*), rock pocket mouse (*Perognathus intermedius*), Merriam's pocket rat (*Dipodomys merriami*), deer mouse (*Peromyscus maniculatus*), white-throated woodrat (*Neotoma albigula*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), bobcat (*Felis rufus*), ringtail cat (*Bassariscus astutus*), grey fox (*Urocyon cinereoargenteus*), and beaver (*Castor canadensis*). Coatimundi (*Nasua narica*) may occasionally inhabit the area.

Historically, grizzly bear (*Ursus horribilis*), wolf (*Canis lupus*), jaguar (*Felis onca*) and possibly ocelot (*Felis pardalis*) probably inhabited the area. The southwestern river otter (*Lutra canadensis*) probably also occurred.

Bats characteristically make use of riparian habitats due to the availability of foods (insects), water sources, and roosting sites. Knowledge of bat species use is largely non-existent. A September, 1975 mist net sample by the Arizona Game and Fish Department (Mapes and

Prondzinski, 1975) documented the presence of western pipistrellas (Pipistrellus hesperus), California myotis (Myotis californicus), and pallid bat (Antrozous pallidus). Other species commonly occurring in riparian areas include the silver-haired bat (Lasionycteris noctivagans), big brown bat (Eptesicus fuscus) and red bat (Lasiurus borealis). Other bat species of special interest which could occur on the TCRU area are discussed in Section E.

2. Reptiles/Amphibians

Reptile/amphibian species present in the uplands may be found within the mesquite bosque. Species more characteristic of cottonwood/willow community include desert spiny lizard (Sceloporus graciosus), spotted whiptail (Cnemidophorus exsanguis), western whiptail (Cnemidophorus tigris), tree lizard (Urosaurus ornatus), Eastern fence lizard (Sceloporus undulatus), Regal ring-necked snake (Diadophis regalis), common king snake (Lampropeltis getulus), Western hognose snake (Heterodon nasicus), gopher snake (Pituophis melanoleucus), long-nosed snake (Rinocheilus lecontei), black-necked garter snake (Thamnophis cyrtopsis), Mexican garter snake (Thamnophis eques), checkered garter snake (Thamnophis marcianus), Southwestern lyre snake (Trimorphodon lyrophanes), Arizona coral snake (Micruroides euryxanthus), western diamondback rattlesnake (Crotalus atrox), black-tailed rattlesnake (Crotalus molossus), western rattlesnake (Crotalus viridis), red-spotted toad (Bufo punctatus), Woodhouse's toad (Bufo woodhousei), Couch's spadefoot toad (Scaphiopus couchii), Plains spadefoot toad (Scaphiopus bombifrons), Western spadefoot toad (Scaphiopus hammondi), Southwestern toad (Bufo microscaphus), Great Plains toad (Bufo cognatus), Colorado River toad (Bufo alvarius), Canyon tree frog (Hyla arenicolor), Chorus frog (Pseudacris nigrita), lowland leopard frog (Rana yavapaiensis), and the introduced bull frog (Rana catesbeiana).

3. Fishes

Fish species present in perennial pools and springs include desert sucker (Pantosteus clarki), fathead minnow (Pimephales promelas), Sonora sucker (Catostomus insignis), red shiner (Notropis lutrensis), yellow bullhead (Ictalurus natalis), long-fin dace (Aqosia chrysoqaster), round-tail chub (Gila robusta), mosquitofish (Gambusia affinis affinis), carp (Cyprinus carpio), largemouth bass (Micropterus salmoides), speckled dace (Rhinichthys osculus), and green sunfish (Chaenobryttus cyanelus).

Historically, the Colorado River squawfish (Ptychocheilus lucius) and Gila topminnow (Poeciliopsis occidentalis occidentalis) were present, along with other native species. Gila topminnow have been introduced to Kayler Spring and its outflow, which is tributary to Tonto Creek. It is doubtful that topminnow persist in Tonto Creek.

4. Birds

A limited survey by the Bureau of Reclamation 1979-80, indicated at least 35 species, and 18 species regularly breed within the cottonwood/willow and mesquite communities, respectively (U.S. Dept. Interior, 1984). A limited BOR/FS survey during May 1990 identified 60 species within one small portion of lower Tonto Creek (U.S. Dept. Interior, 1990).

Tonto Creek is utilized by a diversity of migrating birds during the spring and fall, including waterfowl and shore birds.

Bird species of note to bird watchers include Coopers hawk (Accipiter cooperii), brown crested flycatcher (Myriarchus tyrannulus), ash-throated flycatcher (Myriarchus cinerascens), vermilion

lion flycatcher (Pyrocephalus rubinus), bridled titmouse (Parvus wollweberi), Bewick's wren (Thryomanes bewickii), Bells' vireo (Vireo bellii), various warblers, blue grosbeak (Passerina caerulea), indigo bunting (Passerina cyanea), Aberts' towhee (Pipilo aberti), summer tanager (Piranga rubra), western tanager (Piranga ludoviciana), cardinal (Cardinalis cardinalis), American bittern (Botaurus lentiginosus), snowy egret (Egretta thula), black-crowned night heron (Nycticorax nycticorax), bald eagle (Haliaeetus leucocephalus), and osprey (Pandion haliaetus).

Game birds include Gambel's quail (Lophortyx gambelii), mourning dove (Zenaidura macroura), white-winged dove (Zenaida asiatica), ground dove (Columbina passerina) and band-tailed pigeon (Columba fasciata). Turkey (Meleagris gallopavo) were very abundant historically, but are no longer resident. Potential for improvement of turkey habitat is good.

E. THREATENED/ENDANGERED/SENSITIVE SPECIES

The following species were considered in a biological evaluation for the TCRU. That document analyzed the potential effects to these species as a result of construction of the necessary improvements and the resulting changes in livestock use and distribution in and adjacent to the TCRU.

1. Hohokam agave (Agave murpheyi) and Tonto Basin agave (Agavesp. nov. delamateri) both federal candidate species, occur within the TCRU. Clones of these species occur on ridges and side slopes above the riparian community, but within the management area.
2. Arizona agave (Agave arizonica) an endangered species, is not known to occur in or adjacent to the TCRU. It is possible that habitat is present in foothills east and west of areas affected by the implementation of the TCRU.
3. Lowland leopard frog (Rana yavapaiensis), a federal candidate species, is documented in several locations along Tonto Creek. Habitat degradation and competition with introduced bull frogs (Rana catesbeiana), are limiting factors.
4. Chiricahua leopard frog (Rana chiricahuensis), a FS sensitive species, is not known from the TCRU. Tonto Creek within the TCRU is not typical habitat, however some adjacent streams and springs could provide habitat.
5. Mexican garter snake (Thamnophis eques megalops), a federal candidate, is expected, but not confirmed as present. This species apparently was present during a 1975 biological survey by the Arizona Game and Fish Department (Mapes and Prondzinski, 1975).
6. Narrow-headed garter snake (Thamnophis rufipunctatus), a federal candidate species, is not confirmed from the TCRU. Habitat is generally more suited to the Mexican garter snake but this species could also occur.
7. Desert tortoise (Gopherus agassizi), a federal candidate species, is not expected to occur naturally in or adjacent to the TCRU. One individual was observed near Punkin Center but due to the lack of suitable habitat, it is highly probable that this animal was a released or escaped captive.

8. Bald eagle (Haliaeetus leucocephalus) an endangered species, is known from the TCRU in the form of a sporadically active nest territory (unsuccessful to date). Wintering birds also use the TCRU.
9. Belted kingfisher (Ceryle alcyon) a FS sensitive species, is confirmed on the TCRU, though breeding is not.
10. Black hawk (Buteo gallus anthracinus) a FS sensitive species, is not confirmed on the TCRU, though potential habitat does occur.
11. Yellow-billed cuckoo (Coccyzus americanus occidentalis) a federal candidate, is not confirmed on the TCRU, though potential habitat does occur.
12. American bittern (Botaurus lentiginosus) a FS sensitive species, is confirmed adjacent to the TCRU, though breeding is not.
13. Least bittern (Ixobrychus exilis) a FS sensitive species, is not confirmed on the TCRU, though potential habitat does occur.
14. Ferruginous pygmy owl (Glaucidium brasilianum), an endangered species, is not known from the TCRU. Uplands adjacent to the TCRU support marginal habitat at best for this species.
15. Red bat (Lasiurus borealis), California leaf-nosed bat (Macrotus californicus), Southwestern cave bat (Myotis velifer brevis), Greater western mastiff bat (Eumops perotis californicus) are FS sensitive and federal candidate species which have not been confirmed on the area, though potential habitat occurs. Potential for habitat improvement is good.
16. Sanborn's long-nosed bat (Leptonycteris sanborni), an endangered species, is not known from the TCRU. Occurrence of this species in or adjacent to the TCRU is highly unlikely.
17. Yavapai pocket mouse (Perognathus amplus amplus), a federal candidate species, is not known from the TCRU, but potential habitat does occur on upland sites in and adjacent to the TCRU.
18. Maricopa tiger beetle (Cicindela oregona maricopa), a federal candidate species, is known from two miles north of the TCRU. The potential for this species to occur in the TCRU exists.
19. Gila topminnow (Poeciliopsis occidentalis), an endangered species, was transplanted into Kayler Spring within the TCRU. This population persists.
20. Gila roundtail chub (Gila robusta grahami), a federal candidate species, historically occurred in the TCRU. It still persists several miles upstream in Tonto Creek and individuals likely still find their way into the TCRU during high flows.
21. Woundfin (Plagopterus argentissimus), an endangered species, is not known from the TCRU. A reach of Tonto Creek was identified as a potential introduction site but this has not been done.

22. Spikedace (Meda fulgida), a threatened species, historically occurred in the TCRU but was extirpated from the drainage.

F. RECREATION

Hunting use is fairly intensive along Tonto Creek, especially for quail, dove, cottontail rabbit, javelina and waterfowl.

Some floating (rafting, tubing etc.) occurs on Tonto Creek during the spring peak flow, but this use is sporadic and the site is marginal in most years. Most floating use occurs upstream of the TCRU.

Bird watching, picnicking, and sporadic off-highway-vehicle use are other uses. Picnicking and camping are relatively minor activities due to the availability of better suited sites on nearby Roosevelt Lake.

G. HISTORIC/CULTURAL

Prehistoric Hohokam and Salado sites are very abundant within the TCRU, and are generally located on elevated benches near the stream. Tonto Creek no doubt provided diverse resources plus irrigation water for these ancient civilizations.

H. LIVESTOCK GRAZING

The Tonto Basin allotment (Figure 3) includes approximately 88% of the TCRU riparian area and 13.5 miles of Tonto Creek. This huge allotment of 130,000 acres extends across the Tonto Basin Valley, from the Sierra Ancha Mountains on the east to the Mazatzal Mountains on the west. The allotment is controlled by two trusts (George T. Cline Trust and Dorothy Wells Trust), and supports several families. A term grazing permit has been issued for 1149 cattle from January 01 through December 31 and 808 yearlings (annual recruitment) January 01 through May 31.

Livestock are managed through an Annual Operating Plan that generally consists of grazing higher elevations during summer and movement to lower elevations during winter. Due to a lack of fences with which to control livestock, the existing operating plan is ineffective, resulting in yearlong use of Tonto Creek by some livestock. Cattle establish "home ranges", as do other species, and periodic riding/moving is ineffective as a management tool for Tonto Creek. A formal Allotment Management Plan (AMP) is scheduled during for development on this allotment during fiscal year 1991. This AMP will include the development of fenced pastures and additional water sources, and it will be much more effective in terms of improving resource conditions and meeting resource objectives. Since this TCRU planning effort precedes the development of the AMP by one year, the AMP will incorporate the TCRU projects and grazing system, and coordinate TCRU livestock grazing treatments with those occurring in the AMP. TCRU management prescriptions identified in this plan will not be changed in response to needs in the AMP (remainder of the allotment). Changes in TCRU management will be made only for the purpose of enhancing riparian management.

The Del Shay Allotment (Figure 3) includes approximately 12% of the TCRU, and about 2 miles of Tonto Creek. Difficulties in separating this allotment from the adjoining Tonto Basin Allotment were recently resolved by the permittee with the construction of new fencing. The Tonto

Attachment 2 - Resource Development Plan

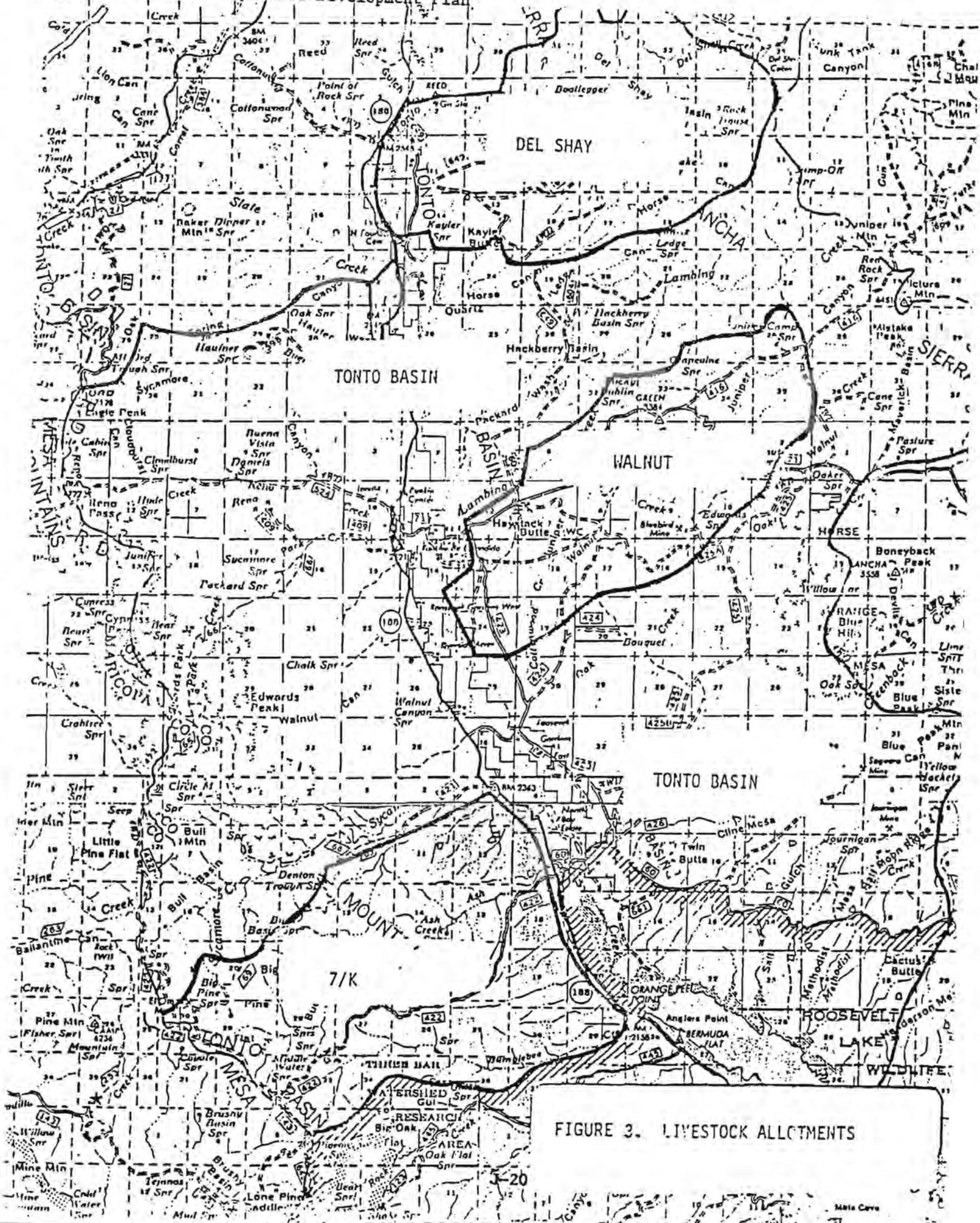


FIGURE 3. LIVESTOCK ALLOTMENTS

Creek riparian portion of this allotment is fenced from the remainder of the allotment, readily lending itself to improved management with only minor amounts of additional fencing.

An AMP will also be developed for this allotment during fiscal year 1991. TCRU management prescriptions identified in this plan will be coordinated with, and incorporated into the AMP which is developed for the remainder of the allotment.

3. RIPARIAN OBJECTIVES

The broad management goal is to accommodate recovery of riparian communities within the TCRU, to the point where they more nearly approximate their potential under today's conditions.

Developing quantifiable riparian recovery objectives for Tonto Creek is not technically feasible at present due to (1) a lack of data describing the existing riparian communities (2) a lack of riparian comparison areas which have not been significantly altered by land management practices and (3) a lack of knowledge regarding recovery rates for riparian sites (documentation of recovery on the San Pedro and Hassayampa Rivers will be of future value). Objectives tentatively described here will be refined by the interagency team with the necessary quantification once the baseline data are gathered in 1992.

Revisions of these objectives will be made if and/or when they are deemed necessary due to the acquisition of better information, impacts of natural events or other factors. Such revisions will be reviewed and agreed to by the interagency team.

A. Floodplain/Channel Geometry

Through the action of newly established riparian plants and improved plant vigor and growth, flood-borne sediment will be deposited in increasing quantities to re-establish flood plains. These newly deposited alluvial soils will provide improved habitats for riparian plants and they will also function as aquifers by storing flood water and later releasing it in a more sustained manner than occurs now. Newly formed flood plains will create better defined and more stable stream banks, and the Tonto Creek channel will change from a "braided" one to a deeper and more "defined" channel (or channels). This change in Tonto Creek geomorphology will also be greatly influenced by upstream watershed condition and by upstream hydrologic events (snowpack, precipitation intensity etc). Upstream watershed condition is deteriorated as a consequence of historic grazing practices and soil loss. Though large portions of the watershed are under improved grazing management programs, the complete recovery of the watershed will be a very long-term process, at best. The extent of Tonto Creek riparian recovery will ultimately be dictated by watershed condition, in conjunction with management of the TCRU. Recovery may be periodically "set back" as a consequence of the watershed condition. It is critical that this watershed/riparian relationship be understood when evaluating progress towards meeting the objectives of this plan.

Objective: Decrease the Tonto Creek width/depth ratio a minimum of ____%, as measured at nine representative cross sections.*

B. Cottonwood/willow community (CW/WL)

As previously noted, above normal Tonto Creek flows between 1973 and 1985 created extensive sand and gravel bars, while eliminating some of the pre-1970 riparian communities.

Concurrently, sparsely vegetated sites increased from 23% in 1967, to about 40% of Tonto Creek area at present. The newly formed sand/gravel bars provided ideal seed beds for both cottonwood and willow, however the recruitment of these species has been significantly reduced as a result of grazing practices. The existing CW/WL community is depauperate in terms of the sapling and sub-mature age-class cohorts as a result of poor recruitment, while mature age-class cohorts are being lost through senescence and flooding. Initially, improved grazing management will result in a "release" of established cottonwood and willow seedlings manifested by greatly improved growth rates. The extensive establishment of new seedlings will require suitable flooding and post-flood moisture conditions for successful germination and establishment, and several years could lapse before these conditions occur.

Objective: Establish a new CW/WL community on at least 20% of the riparian area (presently _____ acres), and increase the number of stands (presently _____ stands).*

Objective: Increase the density and frequency of seedling cottonwood and willow plants within the sites demonstrating potential for the CW/WL community (presently _____ willow and _____ cottonwood densities; and _____% and _____% willow and cottonwood seedling frequencies).

Objective: Increase the density, frequency, acreage and number of stands of sapling, pole and sub-mature CW/WL (presently _____ willow and _____ cottonwood saplings etc.; _____% willow and _____% cottonwood saplings etc.; and presently _____ acres and _____ stands).*

*Data to be provided from 1992 baseline inventory

Objective: Achieve the following species responses:

Goodding willow (*Salix gooddingii*) - major increase
Fremont cottonwood (*Populus fremontii*) - major increase
Seepwillow (*Baccharis glutinosa*) - moderate decline
Burrobrush (*Hymenoclea salsola*) - major decline
Desert broom (*Baccharis sarothroides*) - major decline
Elderberry (*Sambucus mexicana*) - slight increase
Ash (*Fraxinus pennsylvanica*) - slight increase
Deergrass (*Muhlenbergia rigens*) - major increase

Based primarily on baseline inventory data, the quantification of species increases and declines will be further quantified by the interagency team.

C. Burrobrush/seepwillow community (BB/SW)

This is presently the most extensive community within the riparian area of Tonto Creek. Much of this community has the potential for CW/WL. Wherever seepwillow dominates there is an abundance of cottonwood and willow seedlings which are being suppressed in their growth by yearlong livestock use. The role of BB/SW in a healthy riparian system should be as the pioneer community within the areas recently scoured as a result of floods and normal channel changes. It should not dominate most of the riparian area over time, as now occurs on Tonto Creek.

Objective: Reduce the acreage of the BB/SW community (presently _____ acres) by replacing much of it with the CW/WL community. *

D. Cattail Emergent Community (CE)

This community has been reduced the most. It will respond quickly due to the rapid growth and establishment rates of the dominant species. Descriptions of Tonto Creek by Florence Packard, the areas earliest settler, refer to Tonto flows as "seeping rather than flowing down through a series of sloughs". This suggests a tremendous potential for recovery of this community around permanent pools, and areas where the ground water is near the surface. As Tonto Creek begins reestablishing flood plains through the buffering effect of riparian plants and the deposition of flood-borne sediments, the potential for this community will increase greatly.

Objective: Increase the acreage and number of sites of the CE community (presently _____ acres and _____ sites) *

*Data to be provided from 1992 baseline inventory

Objective: Achieve the following species responses:

- Bermuda grass (Cynodon dactylon) - minor decline
- Cattail (Typha spp) - major increase
- Sedges (Carex spp) - increase
- Rushes (Juncus spp) - increase
- Bulrushes (Scirpus spp) - increase
- Scouring rush (Equisetum spp) - major increase
- Knot grass (Paspalum distichum) - major increase

Based primarily on baseline inventory data, the quantification of species increases and declines will be further quantified by the interagency team.

E. Cottonwood and Mesquite Bosque Communities

Objectives for these communities will include reduction in the composition of exotic species, and enhancement of the understory structural diversity.

F. Use Level and Residual Cover

The purposes of use level management are to meet other riparian-dependent resource needs, to minimize plant injury, and to provide an effective level of residual cover to dissipate flooding flow energy and filter and entrap suspended sediment.

Shrubs store carbohydrates within the stems, as well as the root system, thus they are vulnerable to browsing damage during certain seasons. Seedling and shoots are particularly vulnerable. Cattle use on browse species is minor during the growing season for herbaceous species. When herbaceous species are no longer available as a consequence of heavy utilization, or when they become cured, browse usage increases.

Objective: Achieve current annual growth utilization of 30% (volume) or less on deciduous, woody species such as cottonwoods and willows.

Perennial, herbaceous species growing within the wetland portions of the riparian area, have a growing season which probably extends into October/November. Re-growth, following

grazing, is an effective means of meeting the cover needs for floodplain function and bank stability.

Objective: Manage perennial, herbaceous, wetland plants (grasses, sedges, rushes etc.) to achieve 75% or more of the average un-grazed plant height by July 15th, each year.

G. Riparian Vegetative Structure

Riparian vegetative structure will change in terms of greater biomass and cover within various height categories.

Objective: Increase the canopy cover of vegetation within various height categories (to be determined).

4. PLANNED ACTIONS

A. Livestock Management

1. Tonto Basin Allotment

Livestock will be grazed in a three pasture system. Cross fences will be located at the Bar-X Road, and at Punkin Center (Figure 4). The north pasture will be approximately 2,000 acres in size and about 73% FS administered. The middle pasture (Punkin Center) will be about 1,400 acres and 31% FS administered. The south pasture will be about 1,900 acres and 83% FS administered.

Grazing will be prescribed for late winter/spring, with all use between January 1st and April 15th. Duration of grazing treatments will not exceed 7 weeks within a pasture, with the actual length of the grazing period to be dictated by animal impacts and plant response. The FS does not possess a forage capacity survey for Tonto Creek, though such a survey would have limited value due to the dynamic character of riparian communities, plus the rapid change which is expected to occur once management is implemented.

Forage capacities also vary, with the south pasture being the most productive. Two hundred pairs (cow/calf) will be the initial stocking rate, with initial adjustments to be made in either the numbers or duration of treatments, as necessary. Two hundred pairs for a maximum of 3.5 months (2 pastures used), is a maximum use of 700 AUM's, which on two-thirds of the TCRU (one-third rested) comprises a stocking rate of about 5.5 acres per AUM. Actual use may be much less than this initially. Forage capacity will increase greatly within one cycle (three years) of the management system.

If forage is sufficient to sustain the maximum grazing period of 7 weeks per pasture, treatments would include use in year 2 from January 1 through February 20; use in year 3 from February 20 through April 15; and non-use in year 4. Each pasture will go through this sequence (Figure 5).

		Jan	Feb	Mar	Apr	May
Year 1	Pasture 1 non-use Pasture 2 non-use Pasture 3 non-use					
Year 2	Pasture 1 _____ Pasture 2 _____ Pasture 3 non-use			_____		(graze max of 7 wks) (graze max of 7 wks)
Year 3	Pasture 1 non-use Pasture 2 _____ Pasture 3 _____			_____		
Year 4	Pasture 1 _____ Pasture 2 non-use Pasture 3 _____			_____		
Year 5	Repeat Year 2					

Figure 5. Tonto Basin Allotment Grazing Prescription

Advantages of this system include (1) short duration treatments (7 weeks or less) (2) annual growing season rest throughout most of the growth period for warm season species (3) maximum possible residual cover on the floodplain during two of three years for the spring season peak flow, and during each year for the "monsoon" peak flow (4) grazing during the period of maximum availability of green annuals, which reduces the impact on riparian plants, (5) non-use for a complete calendar year in one year of three and (6) flooding events during grazing use periods which will reduce the impacts of grazing use on floodplains.

Disadvantages of this system include (1) the difficulty of maintaining fences across Tonto Creek (2) a prevalence of private land in the middle pasture (3) possible livestock behavior problems as a result of established use patterns and (4) possible changes in private fencing. During some years, flooding events may occur in such a magnitude as to jeopardize livestock safety.

Projects (Appendices 1-4) required to implement the system include: eight cattleguards, eleven fences (totaling 13.9 miles), fence removal (0.2 miles), construction of 9 tanks (earthen reservoirs), and 12 springs (including about 22 miles of pipeline), and one horizontal well. Additionally, a reserve for 2 miles of fencing is established to meet unanticipated needs associated with private lands within the TCRU. Temporary electric fencing will be utilized for pasture fences which cross Tonto Creek, thus reducing problems associated with flood damage and maintenance.

2. Del Shay Allotment

Livestock will be grazed in a two pasture system (Figure 6). A minimal amount of fencing will create two pastures of roughly 300 acres each. In year 2 the grazing treatments will be planned for a 3 week period, during the period January 1st through April 15th, with use in the second pasture to follow the earlier grazing treatment (Figure 6). In year three, the sequence of grazing treatments is reversed, and in year four, non-use is provided in both pastures. As described

for the Tonto Basin Allotment, no forage survey capacity data are available, so the actual duration of treatments and livestock numbers will be based upon observed plant response and animal impacts. The initial stocking rate will be 75 yearling cattle, which if grazed for 6 weeks would utilize about 79 AUM's, at a stocking rate of about 8 acres per AUM. The 100 acres of private land within the riparian pastures sustains little forage due to the mining activity. The actual length of the grazing periods will be dictated by animal impacts and plant response.

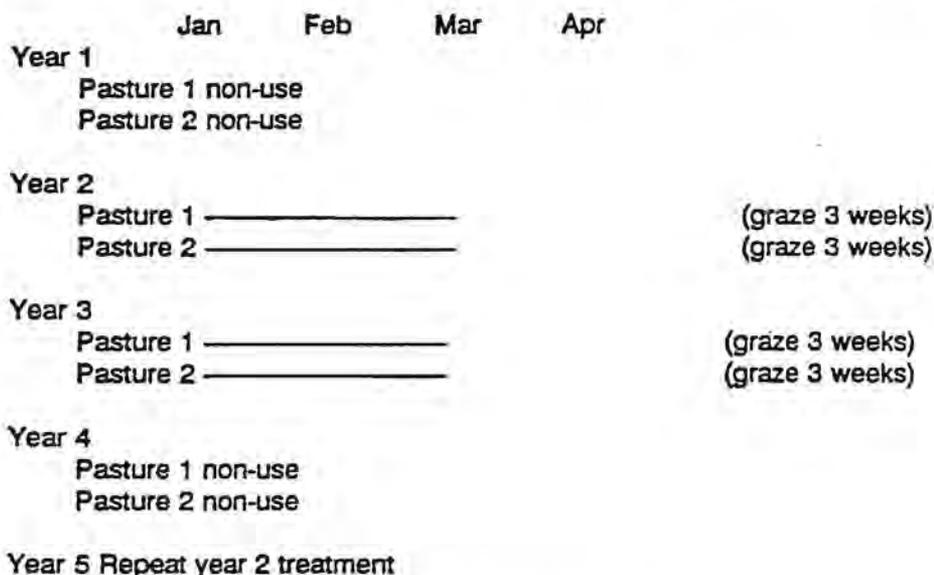


Figure 6. Del Shay Allotment Grazing Prescription

Advantages of this system include those described for the Tonto Basin allotment, except that this system provides even more growing season rest. The great amount of flexibility afforded the permittee makes the system more practical, particularly where small numbers of stock are involved.

Projects (Appendices 1-4) required to implement the system include: three small fences and one tank.

3. 7/K Allotment

This allotment previously included a portion of Tonto Creek, which provided a critical livestock water source. The allotment boundary was recently adjusted to exclude Tonto Creek, and watering livestock are being temporarily accommodated with a fenced water gap on Tonto Creek. Four water developments are proposed (Appendices 1-4) as a permanent alternative to the water gap.

4. Sheep Driveway

The Reno - Heber Sheep Driveway crosses a portion of the TCRU approximately two miles north of Punkin Center. Typically, a single band of sheep are driven on this route from the

desert to allotments on top of the Mogollon Rim during May of each year. Gates will be provided to allow sheep to cross the TCRU. They will be required to pass quickly through and will not be allowed to bed in the TCRU. Tonto Basin Ranger District personnel will be on site to monitor sheep passage. Gates will be locked and signed to prevent vehicle entry.

B. PUBLIC INFORMATION AND EDUCATION

A significant aspect of the TCRU project is public information and education. Riparian values, riparian recovery processes, livestock management, and the advantages of cooperative efforts (agencies, permittees, publics) are pertinent topics. A variety of interpretive services are described. The extent of BOR funding has not been determined, but the bureau will cooperate with the Tonto National Forest in developing and funding a portion of the interpretive facilities (Table 3). This program offers the agencies and the cooperators an exceptional opportunity to enhance public understanding and appreciation for a riparian recovery program of national significance.

1. Interpretive Trails

Three interpretive trails are proposed, which vary in length and recreational opportunity (Appendices 5, 6). Each trail will include a parking area which is graveled and properly signed. Parking will be limited to 4 to 5 cars so as to limit public usage. Each trail will provide a self-guided tour opportunity through the use of a brochure and numbered trail markers. Some interpretive signing (site specific) will be provided.

2. Observation Sites

Three highway 188 turnouts will be utilized as riparian observation sites. Interpretive signing will be utilized also.

3. Interpretive Signing

Signing will include "subject specific" interpretation on key trail locations, and "orientation" signs which mark the entrance to the TCRU on major access routes which cross Tonto Creek.

4. Interpretive Materials

Interpretive materials will include a self-guided brochure for each trail, a possible environmental study guide, interpretive drive material, and a video film. The video film will depict the historic and current Tonto Creek riparian values, a description of the riparian recovery program, and a discussion of the cooperative (agencies, permittees, publics) effort employed in the planning and implementation of the TCRU program. The video will be utilized in the new FS Tonto Basin District visitors center, along with other photographic displays of the TCRU.

TABLE 3. TCRU INTERPRETIVE SERVICES AND COSTS

<u>Site</u>	<u>Items</u>	<u>Cost</u>
TRAILS		
A	Red Hill Interpretive Site 1.25 miles	\$12,500
B	Bar X Observation Site Trail 1.00 miles	10,000
C	A + Observation Site Trail .2 miles	2,000
D	Sheep Trail Springs Pullout .1 miles	<u>1,000</u>
		\$25,500
PARKING AND ACCESS ROADS		
A	Red Hill Interpretive Site 4 Cars/.3 acres	\$ 8,300
B	Bar X Observation Site 4 Cars + Access road/.5 acres	12,500
C	A + Observation Site 4 Cars .12 miles access/.6 acres	15,000
D	Sheep Trail Spring Pullout 4 Cars/.3 acres	8,300
E	North Entry Pullout 5 Cars/.3 acres	8,300
F	South Entry Pullout 5 Cars/.3 acres	<u>8,300</u>
		\$60,700
INTERPRETIVE SIGNING		
Heavy Anodized Aluminum Sign Material		
48" x 30"	Tonto Creek Riparian Unit Orientation Signs - 9 aluminum, painted)	600
23" x 30"	Subject Specific Signs - 9 (heavy anodized aluminum)	6,400
		\$ 7,000
INTERPRETIVE MATERIALS		
A	Self Guided Brochure Printing	Cost Share Donation
A	Environmental Study Guide	Cost Share Donation
All	Interpretive Drive Material	Cost Share Donation
BENCHES OR PICNIC TABLES		
A	Two Benches or One Picnic Table	500
B	Two Benches or One Picnic Table	<u>500</u>
		\$ 1,000
	Grand Total	\$94,200

C. LAND OWNERSHIP ADJUSTMENTS

Both the BOR and FS are desirous of acquiring lands with riparian values within the TCRU in order to assure their protection from development and to improve management. FS acquisitions are acquired through exchange of lands, and are generally low in priority due to high cost and other factors. BOR acquisitions are on-going purchases (Figure 7) which are within the anticipated Roosevelt Lake 200 year flood level, or are needed for mitigation purposes. The FS should pursue partnerships which would facilitate additional purchases of private lands on Tonto Creek which have high riparian value.

1. FS acquisition through exchange (1988) of 160 acres near Kayler Butte

SEC 14 - SW 1/4 SW 1/4, T 7N, R 10E
SEC 23 - S 1/2 NW 1/4, NW 1/4 NE 1/4, T 7 N, R 10 E

2. BOR purchase (on-going) of 160 acres north of Punkin Center

SEC 2 - SE 1/4 NW 1/4, SW 1/4 NE 1/4, and W 1/2 SW 1/4, T 6 N, R 10 E

3. BOR purchase (on-going) of approximately 400 acres near the A-cross Road

SEC 5 - SW 1/4 NW 1/4, NW 1/4 SW 1/4, and S 1/2 SW 1/4, T 5 N, R 11E
SEC 6 - SE 1/4 NE 1/4, T 5 N, R 11 E

NW 1/4 SE 1/4, T 5 N, R 11 E

The FS is also utilizing non-riparian lands within the TCRU as offered lands in an inter-Forest exchange program designed to acquire private in-holdings of high public value in the Tonto Forest and other Forests. These offered lands, totaling 795 acres, include:

1. Township 6 North, Range 10 East

SEC. 11 - 40 acres
SEC. 12 - 80 acres
SEC. 13 - 185 acres
SEC. 14 - 80 acres
SEC. 23 - 270 acres
SEC. 26 - 100 acres

2. Township 7 North, Range 10 East

SEC. 23 - 40 acres

D. OFF HIGHWAY VEHICLE MANAGEMENT

Off-highway vehicles will not be authorized on FS lands within the TCRU. Road closures will be implemented according to the Forest Resource Access Travel Management program (RATM). As per RATM, travelways will be closed unless signed open. Various measures, including physically closing roads and enforcement, will be employed within the TCRU to assure compliance with the restriction. Any access which is created to develop improvements prescribed in this plan will be closed out after the project is completed.

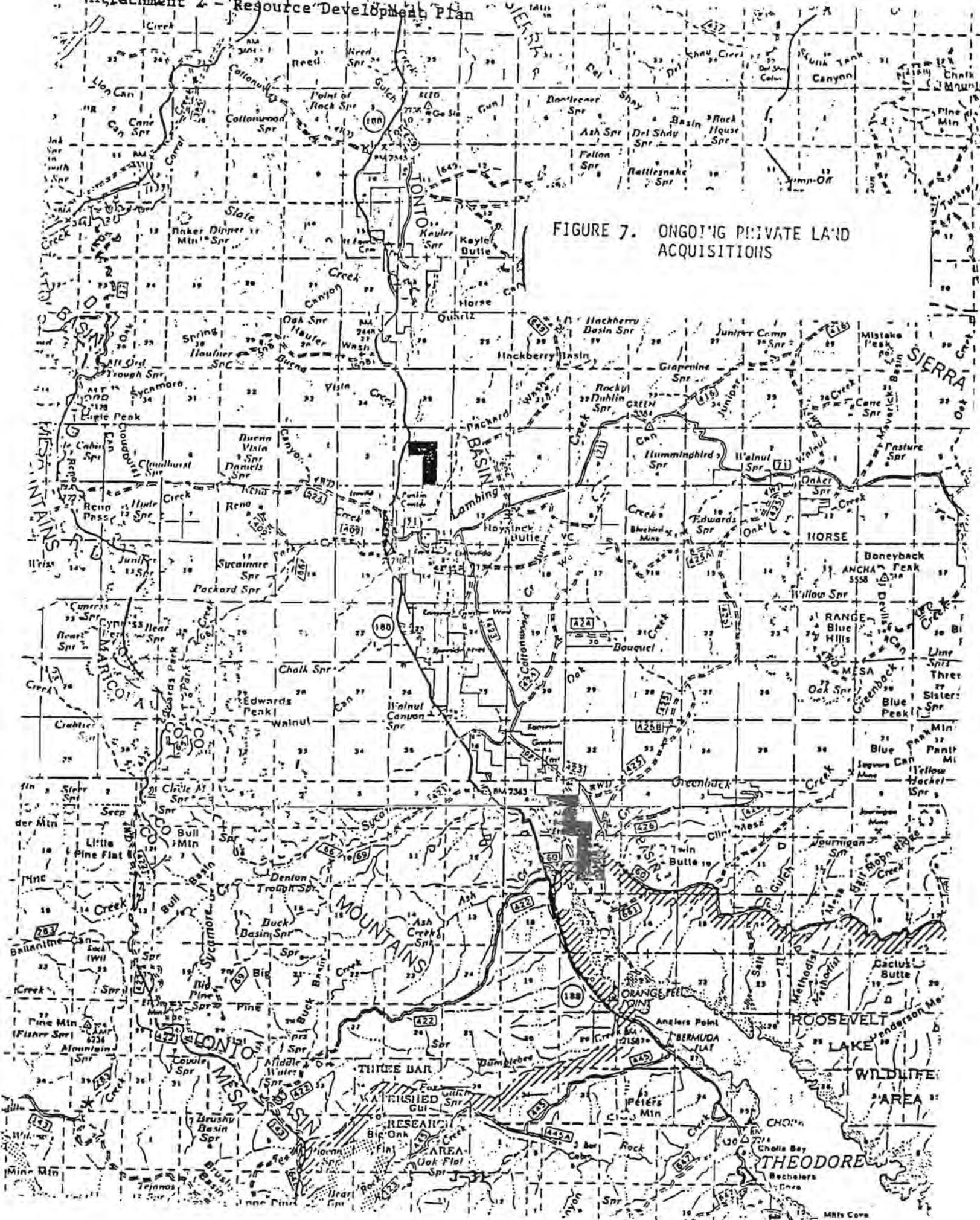


FIGURE 7. ONGOING PRIVATE LAND ACQUISITIONS

5. IMPLEMENTATION SCHEDULES

The following project and funding schedules are projected based on the best information currently available. Should unforeseen circumstances arise that would result in changes in these projected schedules, addendums of the schedules will be forwarded to all members of the interagency team.

A. PROJECT SCHEDULE

<u>Fiscal Year</u>	<u>Date</u>	<u>Item</u>
1990	Summer, 1990	Initial project planning Planning team develop alternatives (IRM Process)
1991	Winter, 1990/91 Spring, 1991 Wtr/Spr, 1991 Spr/Su, 1991 Summer, 1991 Su/Fall, 1991	TCRU resource development plan TCRU plan approval Project survey and design Archeological clearance for projects Award water development contract FS crews develop small water projects
1992	Fall, 1991 Winter, 1991/92 Winter, 1992/93	Award fencing contract FS crews develop small fencing projects FS crews develop interpretive services

B. FUNDING SCHEDULE

Estimated project costs, with 10% and 12% added for survey/design and administration, respectively, are shown below. Project cost estimates were made without the benefit of survey and design work, since this plan was prepared prior to an allocation of BOR funds. Actual project costs may vary from estimates as shown here.

<u>FY</u>	<u>Item</u>	<u>Construction & Survey/Design (10%)</u>	<u>Admin (12%)</u>	<u>Overall Total</u>	<u>BOR Funding Commitment</u>
1991	Water Developments	\$158,125	\$17,250	\$175,375	\$175,375
	Archeological Surveys	2,500	300	2,800	2,800
1992	Fencing & Cattleguards	\$176,275	\$19,230	\$195,505	\$195,505
	Off-highway vehicle management	2,200	240	2,440	2,440
1993	Interpretive Services	\$103,620	\$11,304	<u>\$114,924</u>	<u>\$10,000</u>
			TOTALS	\$491,044	\$386,120

The Service will submit funding requests at least 90 days prior to the beginning of each fiscal year in which project work is planned. Funding requests will be followed by a letter of approval from the Bureau. Funding by the Bureau for the TCRU is subject to the following conditions:

1. Quarterly billing requests will be sent with appropriate vouchers for labor, contracting, and materials to the Project Manager, Attention: Environmental Division, Code-150, Arizona Projects Office, P.O. Box 9980, Phoenix, AZ 85068.
2. The Wildlife Mitigation Program has allocated \$10,000 - \$20,000 for the interpretation of the TCRU. Any funding necessary above this amount must come from the participating partners, or from the Recreation Program as a recreation enhancement. Requests for funding and/or quarterly billing requests (in the event that funds are available and allocated for interpretation of TCRU facilities) will be sent with the appropriate invoices for labor and materials, time sheets, etc. to the Project Manager, Attention: Natural Resources Branch - Code 420, Arizona Projects Office, P.O. Box 9980, Phoenix, AZ 85068.
3. The performance of any obligations or the expenditure of any funds by the Government under this agreement is contingent upon obtaining the necessary appropriations and the funds being allocated, and made available for the work required hereunder.
4. This agreement may be amended, supplemented, extended or superceded at any time by sub-agreements thereto and/or by written concurrence between Reclamation and the Service.

The Bureau will assist the Service by acquiring a CAP allocation through the Salt River Project, for sufficient water for 9 earthen tanks, totaling 9 acre feet of water storage. This will assure timely development of critical waters.

C. GRAZING, MONITORING AND COORDINATION SCHEDULE

- 1991 - TPEC (federal agencies) meet to select monitoring contractor.
 - Contractor collects supportive data and initiates vegetation community mapping.
 - Interagency group selects sites for monitoring studies (including exclosures).
- 1992 - Livestock rest treatment (all pastures).
 - Contractor collects baseline vegetation data and establishes monitoring studies.
 - Interagency team meets to develop and finalize objectives.
- 1993 - Livestock grazing treatments start.
 - Contractor collects utilization and re-growth data, and completes photo-record.
 - Interagency team and grazing permittees review first grazing treatment (discuss problems, compliance, needed adjustments etc.) and reviews objectives for adequacy.

- Interagency team forwards concerns and recommendations to District Ranger.
- District Ranger acts on recommendations.
- 1994 - Contractor collects supportive data and completes photo-record.
 - Interagency team and grazing permittees review second grazing treatment (discuss problems, adjustments etc.) and reviews objectives for adequacy.
 - Interagency team forwards concerns and recommendations to District Ranger.
 - District Ranger acts on recommendations.
- 1995 - One grazing system cycle completed.
 - Contractor collects monitoring data and completes photo-record.
 - Interagency team reviews monitoring data and recommends modification or continuation of grazing system to the District Ranger.
 - District Ranger modifies (alters season, numbers, or both) or continues grazing system.
- 1996 - Contractor collects supportive data and completes photo-record.
 - Interagency team and grazing permittees review grazing treatment (discuss problems, adjustments etc.) and reviews objectives for adequacy.
 - Interagency team forwards concerns and recommendations to District Ranger.
 - District Ranger acts on recommendations.
- 1997 - Contractor collects supportive data and completes photo-record.
 - Interagency team and grazing permittees review grazing treatment (discuss problems, adjustments etc.) and reviews objectives for adequacy.
 - Interagency team forwards concerns and recommendations to District Ranger.
 - District Ranger acts on recommendations.
- 1998 - Two cycles of grazing system completed.
 - Contractor collects monitoring data, completes photo-record, and prepares final monitoring report.
 - Interagency team reviews monitoring data and recommends to the District Ranger the modification of the grazing system, the continuation of the grazing system, or the discontinuation of grazing in the TCRU.

- If livestock are to be excluded, the District Ranger makes a recommendation to the Forest Supervisor, who is the responsible official.

6. MONITORING AND MANAGEMENT ADJUSTMENTS

A. MONITORING

The purpose of monitoring is to evaluate progress towards meeting riparian management objectives, to provide managers the data needed to make necessary management changes, and to provide documentation to the Corps of Engineers regarding compliance with 404 permit conditions. An interagency review of monitoring data will be completed at the conclusion of one grazing cycle (3 years), and two grazing cycles (6 years) and necessary adjustments in the grazing system will be made.

If at the conclusion of the monitoring program it is determined that the grazing management program is not meeting riparian recovery objectives, the option of excluding livestock from the TCRU will be implemented by the FS.

An independent contractor will complete the bulk of the necessary monitoring. Specific monitoring program goals include:

1. Preparation of a report documenting historic and present land uses, floodplain/channel geomorphology, flow characteristics, and watershed character and condition.
2. Mapping of existing riparian community dominance types.
3. Implementation of an eight year monitoring program, to include a baseline inventory plus the vegetation and hydrologic response to two grazing cycles (6 years).
4. A quantification of riparian improvement after one cycle (3 years) through the use of the USF&WS HSI model or a substitute methodology to meet the requirements of the Corps of Engineers.
5. Preparation of a final riparian response analysis, utilizing appropriate statistical procedures, along with conclusions and recommendations for modification of the grazing management system.

Key components of the monitoring program will include, but not be limited to:

1. Community acreage and hectarage (CW/WL, BB/SW and CE).
2. Number of community stands or sites (CW/WL, BB/SW and CE).
3. Floristic composition and canopy coverage (CW/WL, BB/SW and CE).
4. Foliage structure, i.e. canopy vs height.

5. Deciduous woody species seedling and sapling density classes.
6. Deciduous woody species seedling, sapling, pole frequencies.
7. Deciduous woody species phenology.
8. Deciduous woody species size-age classes, plus acreage and number of stands for the various age cohorts.
9. Forage species utilization by livestock during the first grazing treatment and herbaceous re-growth following grazing.
10. Channel geomorphology.
11. Floodplain soils and channel substrate.
12. Ground water level.
13. Average weekly stream flows.
14. Water temperature.

B. NON-CONTRACT MONITORING

The contract monitoring is directed heavily towards responses by the vegetative communities, hydrologic regime and ground water systems. It is assumed that aquatic and non-aquatic wildlife resources will respond in concert with these parameters. However, every effort will be made to incorporate findings of other (non-contract) monitoring efforts that are applicable. BR, FS and AG&F will coordinate the assimilation of such efforts and determine the need for other strategies with regard to additional monitoring needs.

C. MANAGEMENT ADJUSTMENTS

The initial (1993) stocking rate of 200 pairs will be adjusted in either stock numbers or duration of the grazing period, based primarily on the browse use level (maximum 30% CAG) and herbaceous re-growth/residual cover goal (75% of un-grazed height) described in Objective F. Subsequent stocking level adjustments will consider both these criteria plus observed plant species responses as described in objectives.

A lack of suitable cottonwood/willow comparison areas and knowledge of recovery rates precludes a definitive characterization of anticipated Tonto Creek successional recovery. The interagency team must apply judgement in the future evaluation of recovery processes. Objectives of this plan serve as general indicators of expected species and physical site responses, based on existing information. On-going studies on other sites (Hassayampa, San Pedro etc.) will provide data on recovery responses for future use by the interagency team.

Annually, the interagency team will review the grazing program with the grazing permittees, and prepare written comments and proposed modifications for presentation to the

District Ranger. The District Ranger will act on these prior to the beginning of the next grazing season.

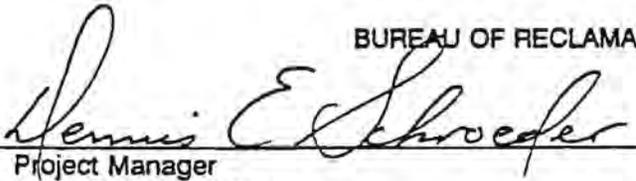
The option of excluding livestock from the TCRU will be implemented under the following conditions:

1. Poor compliance by the grazing permittees. Grazing system compliance is absolutely critical to the success of this plan. Compliance includes facility maintenance, trespass, stocking rate, and season and duration of use.
2. Poor economic viability for the permittees when using the TCRU as a part of the adjoining allotments, could precipitate a voluntary relinquishment.
3. A consensus of the interagency team members following two grazing system cycles (1998), that adequate progress towards meeting riparian recovery objectives is not being attained under the grazing management program..

IN WITNESS WHEREOF, the parties hereto have agreed to this Resource Development Plan for the use and development of the Tonto Creek Riparian Unit at Roosevelt Lake to be effective upon the last date of the signing of this agreement.

By: 
FOREST SERVICE
Forest Supervisor
Tonto National Forest

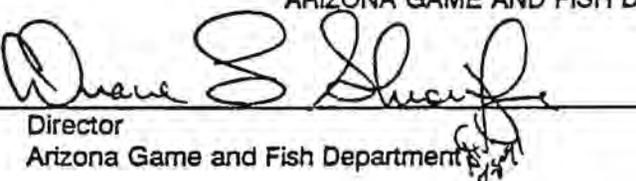
6/23/91

By: 
BUREAU OF RECLAMATION
Project Manager
Arizona Projects Office

7/26/91

Approved as to Legal Sufficiency: 
Field Solicitor

7/16/91

By: 
ARIZONA GAME AND FISH DEPARTMENT
Director
Arizona Game and Fish Department

7/18/91

By: 
FISH AND WILDLIFE SERVICE
Field Supervisor
Ecological Service, Fish and Wildlife Service

7/8/91

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Mapes S.L. and M.B. Prondzinski. 1975. A Floral and Faunal Inventory Of The Roosevelt Reservoir Study Area. Arizona Game and Fish Department. USDI Bureau of Reclamation Contract No. DI-BR-CAP_CB10-75-4.

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Appendix 1 - Planned Fencing/Cattleguard Projects

Appendix 2 - Map of Planned Fences/Cattleguards

Appendix 3 - Planned Water Development Projects

Appendix 4 - Map of Planned Water Developments

Appendix 5 - Description of Planned Interpretive Services

Appendix 6 - Maps of Planned Interpretive Services

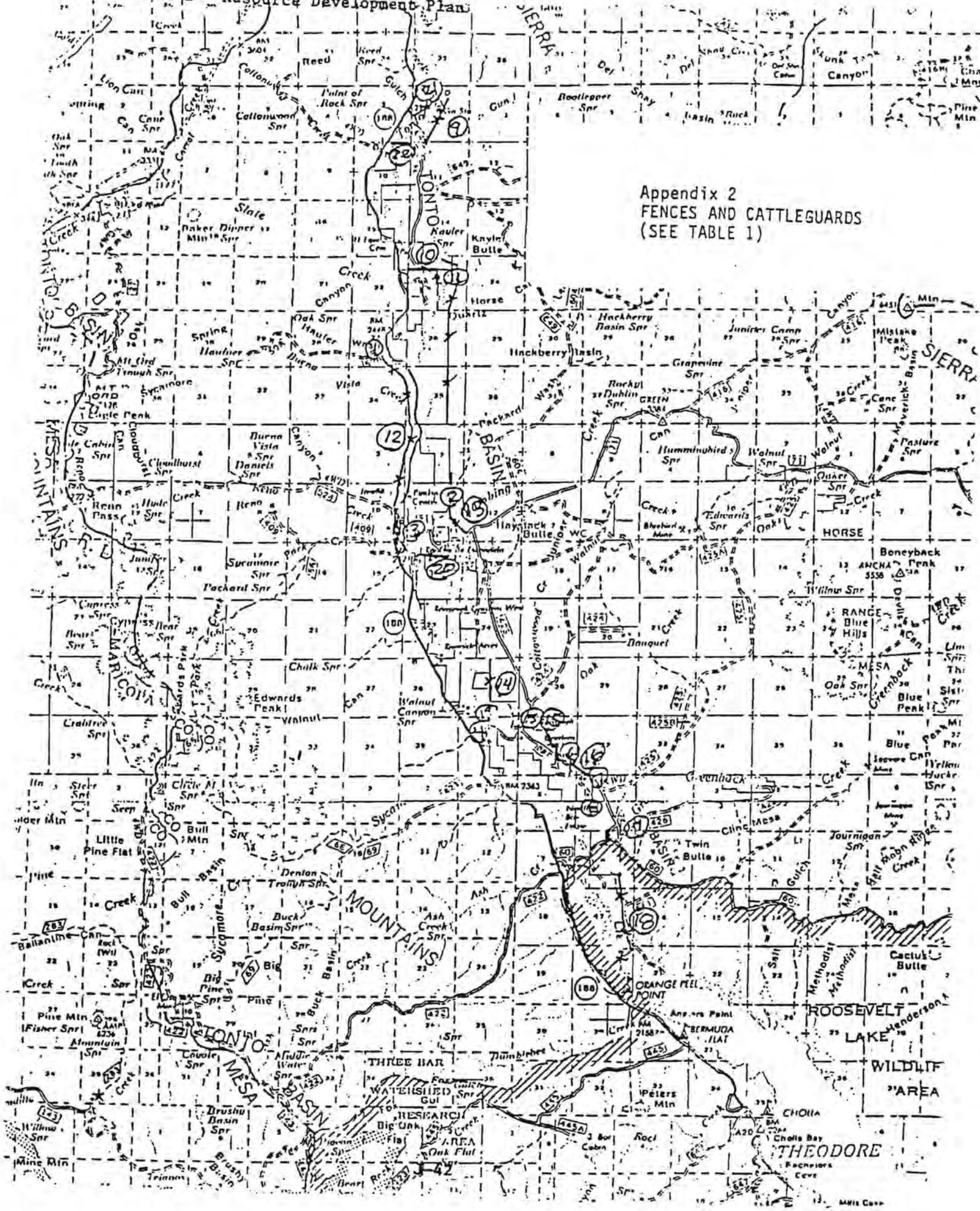
Appendix 7 - Record of IRM Planning Process

Attachme 2 - Resource Development Plan

APPE, X 1- PLANNED FENCING/CATTLEGUARD PROJECTS

NO.	NAME	PROJECT DESCRIPTION	ALLOT.	TSHP	RGE	SECTION(S)	COMMENTS	EST COST (\$)
1	Haufer Wash Cattleguard	single cattleguard	TB	7 N	10 E	SW SE 27	Haufer Wash Road # 598	5,000
2	1396 Cattleguard	single cattleguard	TB	6 N	10 E	SW NE 11	Road # 1396	5,000
3	Punkin Center Cattleguard	double cattleguard	TB	6 N	10 E	SW SW 11	FS land too close to channel?	8,000
4	Bar-X West Cattleguard	double cattleguard	TB	6 N	10 E	NE NW 36	Bar-X crossing, road # 470	8,000
5	Bar-X East Cattleguard	double cattleguard	TB	6 N	11 E	NW NW 31	Bar-X crossing, road # 470	8,000
6	Roos Gardens East Cattleguard	double cattleguard	TB	6 N	11 E	SE SE 31	Road # 470	8,000
7	Roos Gardens Sou Cattleguard	double cattleguard	TB	5 N	11 E	NW NW 5	Road # 470	8,000
8	A-Cross Cattleguard	double cattleguard	TB	5 N	11 E	NW NE 8	A-Cross Road # 60	8,000
9	Gun Creek Fence	standard 4-wire, 0.8 miles	DS	7 N	10 E	2,11		5,500
10	Kayler Dutte West Fence	standard 4-wire, 0.7 miles remove old fence 0.7 miles	TB	7 N	10 E	23	Removal and reconstruction, existing fence not on FS bdy	5,000
11	Tonto-East Fence	standard 4-wire, 3.2 miles	TB	7 N	10 E	23,26,35		17,600
12	Tonto-West Fence	standard 4-wire, 3.3 miles	TB	7 N	10 E	27,34		18,250
				6 N	10 E	2,10,11		
13	Lambing Creek Fence	standard 4-wire, 1.2 miles fence removal, 0.2 miles	TB	6 N	10 E	2,11		7,500
14	Tie-In Fence	standard 4-wire, 0.5 miles	TB	6 N	10 E	25		2,800
15	Oak Creek Gap Fence	standard 4-wire, 0.25 miles	TB	6 N	11 E	NW NW 31		1,400
16	Roos Gardens East Fence	standard 4-wire, 1.2 miles	TB	6 N	11 E	31		6,600
				5 N	11 E	5		
17	A-Cross Fence	standard 4-wire, 0.25 miles	TB	5 N	11 E	NW NE 8		1,500
18	Indian Point Fence	standard 4-wire, 2.2 miles	TB	5 N	11 E	8,17,20	Includes stream x-ing	12,100
19	South Pasture Fence	4-wire & electric, 0.5 miles	TB	6 N	10 E	25,36	Permittee constr. on private	1,400
20	Punkin Center Pasture Fence	4-wire & electric, 0.6 miles	TB	6 N	10 E	14	Permittee constr. on private	1,600
21	Del Shay North Fence	standard 4-wire, 0.7 miles	DS	7 N	10 E	2	Removal and new construction	5,000
22	Del Shay Cross-fence	4-wire & electric, 0.2 miles	DS	7 N	10E	NE 10	Stream x-ing	1,000
23	Monitoring Lvatk Enclosures	extra wire & stays, 3 each	TB				One in each pasture	3,000
	Fence Reserve	standard 4-wire, 2.0 miles					For unanticipated needs	12,000
							ESTIMATED TOTAL COST	160,250

Attachment 2 - Resource Development Plan



Appendix 2
FENCES AND CATTLEGUARDS
(SEE TABLE 1)

Attachment 2 - Resource Development Plan
 APPENDIX 3 - PLANNED WATER DEVELOPMENT PROJECTS

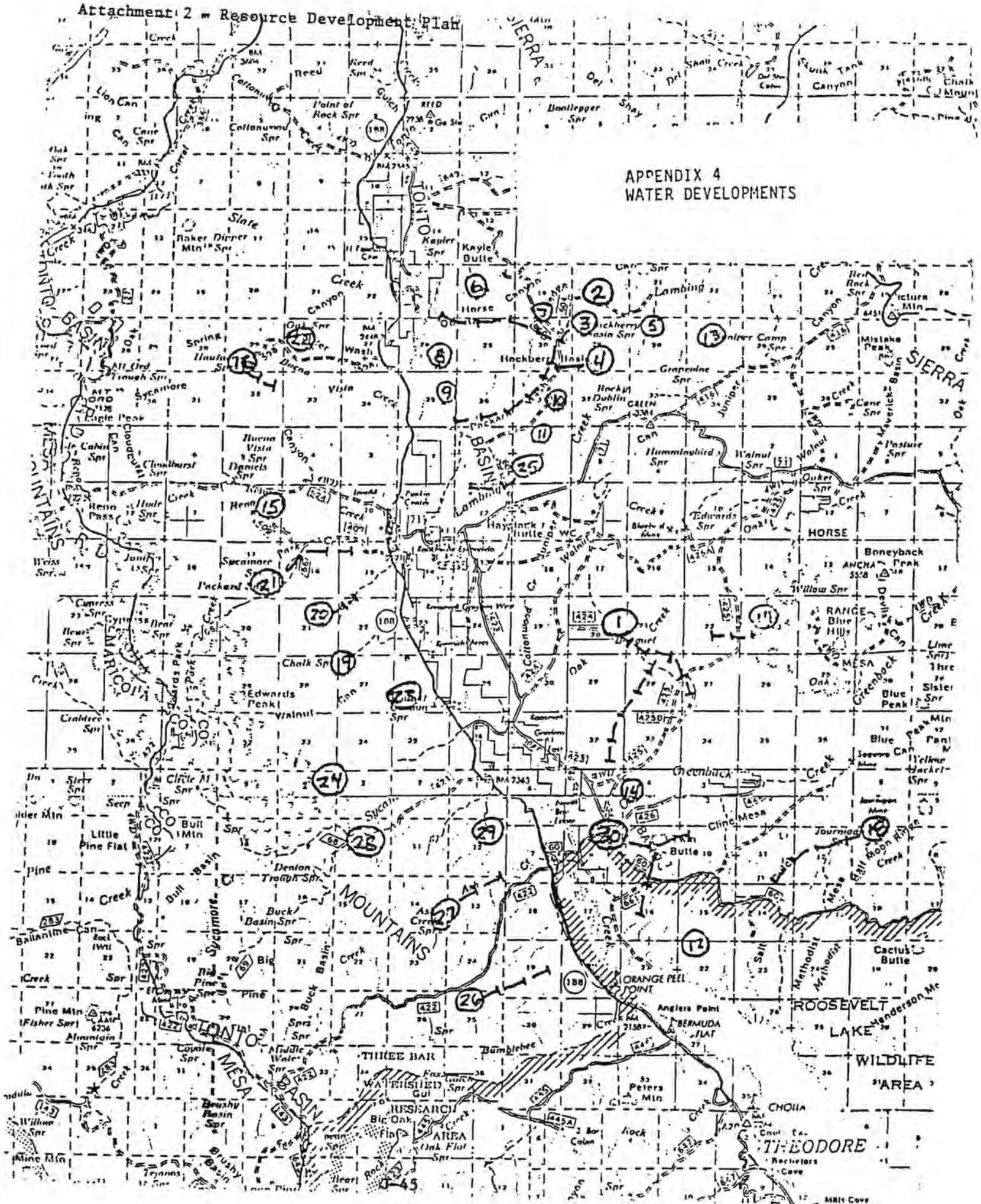
NO.	NAME	WATER	PROJECT DESCR.	ALLOT.	TSHP	RGE.	SEC	SUDDIV	PLACE OF USE	COMMENTS	TOTAL (\$)
1	Douquet Spr	Priv.	develop spring 1 mile golv pipeline	TB	6 N	11E	20	NE SE	6N 11E SEC 20 NE SE	Contract construction	18,500
-	-	-	3 1/2 mile pipeline	-	-	-	-	-	6N 11E SEC 28 NW NE	New drinker	-
-	-	-	1 storage tank	-	-	-	-	-	6N 11E SEC 28 SW SW	"	-
-	-	-	4 drinkers	-	-	-	-	-	6N 11E SEC 27 NE SW	"	-
-	-	-	-	-	-	-	-	-	5N 11E SEC 5 NE NE	"	-
2	Quartz Spr	FS	1 drinker	TB	7 N	11E	20	NW SE	7N 11E SEC 20 NW SE	FS construction	250
3	Hackberry Basin Spr	FS	develop spring 3 1/2 mile pipeline	TB	7 N	11E	29	NW NW	7N 11E SEC 29 NW NW	Contract construction	15,000
-	-	-	4 drinkers	-	-	-	-	-	7N 11E SEC 30 NE SE	New drinker	-
-	-	-	1 storage tank	-	-	-	-	-	7N 11E SEC 30 NE NW	"	-
-	-	-	-	-	-	-	-	-	7N 10E SEC 25 NW NE	"	-
-	-	-	-	-	-	-	-	-	7N 10E SEC 23 SE SE	"	-
4	Chinaberry Spr	FS	develop spring 2 1/2 mile pipeline	TB	7 N	11E	29	SE SE	7N 11E SEC 29 SE SE	Contract construction	9,000
-	-	-	3 drinkers	-	-	-	-	-	7N 11E SEC 31 SE NW	New drinker	-
-	-	-	-	-	-	-	-	-	7N 10E SEC 36 SW SE	"	-
-	-	-	-	-	-	-	-	-	7N 10E SEC 36 SW SW	"	-
5	Lambing Cr. Tank	Need	construct tank	TB	7 N	11E	28	NE SW	7N 11E SEC 28 NE SW	Contract construction	2,000
6	Horse Cr. Tank	Need	construct tank	TB	7 N	10E	24	SE NW	7N 10E SEC 24 SE NW	Contract construction	2,000
7	Quartz Ledge Tank	FS	enlarge exist. tank	TB	7 N	11E	30	NW NE	7N 11E SEC 30 NW NE	Contract construction	2,000
8	TCRU Tank	Need	construct tank	TB	7 N	10E	26	NE SE	7N 10E SEC 26 NE SE	Contract construction	2,000
9	Slim Pickins Tank	Need	construct tank	TB	7 N	10E	35	SE NE	7N 10E SEC 35 SE NE	Contract construction	2,000
10	Packerd Tank	Need	enlarge tank	TB	7 N	11E	31	SW NE	7N 11E SEC 31 SW NE	Contract construction	2,000
11	Hungry Tank	Need	construct tank	TB	6 N	11E	6	NW NE	6N 11E SEC 6 NW NE	Contract construction	2,000
12	Salt Tank	Need	construct tank	TB	5 N	11E	22	NE NW	5N 11E SEC 22 NE NW	Contract construction	2,000
13	Weak Spr horiz well	Need	horizontal well 1 drinker	TB	7 N	11E	27	SW NW	7N 11E SEC 27 SW NW	Contract construction	4,000
14	Lower Greenback Spr	Need	spring box, drinker	TB	5 N	11E	4	NW SW	5N 11E SEC 4 NW SW	FS construction	1,500
15	Reno Spr	FS	develop spring 1/2 mile pipeline	TB	6 N	10E	8	SE NE	6N 10E SEC 8 SE NE	Contract construction	4,000
-	-	-	2 drinkers	-	-	-	-	-	6N 10E SEC 9 NW SW	"	-
16	Haufer Spr (Water Wheel Spr)	Need	develop spring 3/4 mile pipeline	TB	7 N	10E	29	SW SW	7N 10E SEC 29 SW SW	Contract construction	8,000
-	-	-	2 drinkers	-	-	-	-	-	7N 10E SEC 32 NW NE	"	-
-	-	-	1 storage tank	-	-	-	-	-	-	"	-
17	Up.Schoolhouse Spr	Need	develop spring 3/4 mile pipeline	TB	6 N	11E	23	SE NW	6N 11E SEC 23 SE NW	Contract construction	4,000
-	-	-	2 drinkers	-	-	-	-	-	6N 11E SEC 22 NW SE	"	-
18	Journigan Spr	Need	develop spring 2 1/2 mile pipeline	TB	5 N	12E	7	NE NW	5N 12E SEC 7 NE NW	Contract construction	10,000
-	-	-	3 drinkers	-	-	-	-	-	5N 11E SEC 12 SE NW	"	-
-	-	-	-	-	-	-	-	-	5N 11E SEC 11 SE SE	"	-
19	Chalk Spr	FS	develop spring 0.3 mile pipeline	TB	6 N	10E	27	NW NW	6N 10E SEC 27 NW NW	FS construction	3,000
-	-	-	1 drinker	-	-	-	-	-	-	"	-

Attachment 2 - Resource Development Plan

APPENDIX 3 - PLANNED WATER DEVELOPMENT PROJECTS

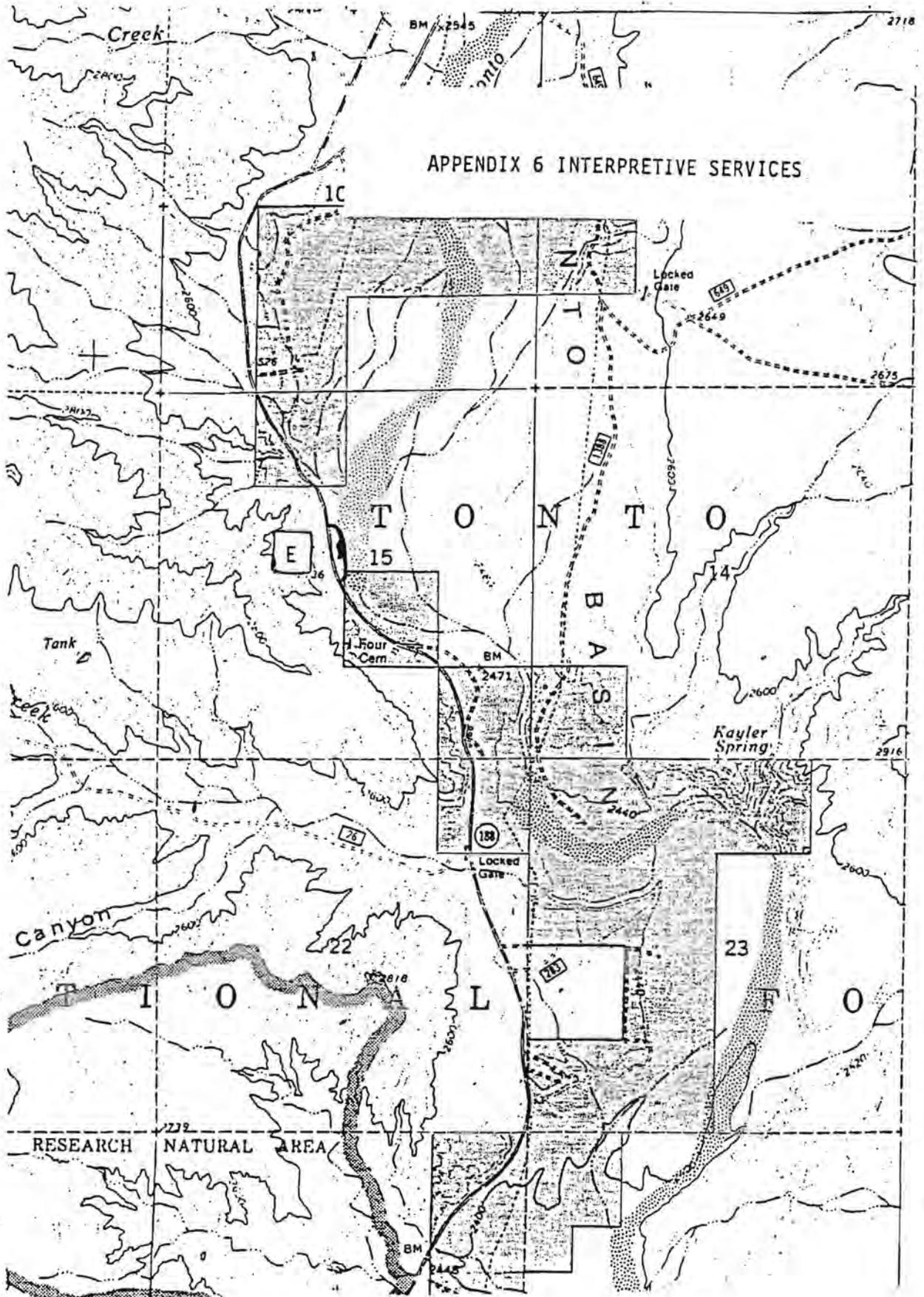
NO.	NAME	WATER	PROJECT DESCR.	ALLOT.	TSHIP	RGE.	SEC	SUBDIV	PLACE OF USE	COMMENTS	TOTAL (\$)
20	Corner Spr	FS	3/4 mile pipeline 1 drinker	TB	6	N	10E	21 SE NE	6N 10E SEC 21 SE NE	Contract construction	4,500
21	Packard Spr	Need	develop spring 2 miles pipeline 2 drinkers	TB	6	N	10E	17 SE SE	6N 10E SEC 17 SE SE 6N 10E SEC 16 NW NE 6N 10E SEC 15 SE NW		7,500
22	Lost Trap Tank	FS	New dirt tank	TB	7	N	10E	28 SW NW	7N 10E SEC 28 SW NW	Contract construction Transfer filling from Corner Tank	2,000
23	Walnut Canyon Spr	Need	300 ft pipeline 1 drinker	TB	6	N	10E	26 NW SW	6N 10E SEC 26 NW SW	FS construction	1,500
24	Mesquite Flat Spr	Need	600 ft pipeline 1 drinker	TB	5	N	10E	4 NE NE	5N 10E SEC 4 NE NE	FS construction	2,000
25	Hymnlick Spr	Need	develop spring 1 mile pipeline 2 drinkers	WN/TB	6	N	11E	6 NE SW	6N 11E SEC 6 NE SW 6N 10E SEC 1 SE SE	Contract construction drinkers in TB & Walnut	5,000
26	Shell Gulch Spr	Need	develop spring 1 1/2 mile pipeline 2 drinkers	7/K	5	N	10E	25 NE NE	5N 10E SEC 25 NE NE 5N 11E SEC 19 NE SE	Contract construction	6,500
27	Ash Creek Spr	FS	1 1/2 mile pipeline 2 drinkers	7/K	5	N	10E	14 SE SE	5N 10E SEC 14 SE SE 5N 10E SEC 13 NE NE		5,500
28	Sycamore Tank	FS	construct tank	7/K	5	N	10E	10 SE NE	5N 10E SEC 10 SE NE	Contract construction	2,000
29	Erosion Tank	FS	construct tank	7/K	5	N	10E	12 NW NE	5N 10E SEC 12 NW NE	Contract construction replace old tank same legal description	2,000
30	Greenback Well Pipe- line	FS	2 1/2 mile pipeline 2 drinkers 1 stor. tank (2,000)	TB	5	N	11E	8 NW NE	5N 11E SEC 8 NW NE 5N 11E SEC 10 SE NW 5N 11E SEC 16 SE NW	Contract construction from replacement well at new shipping corral	12,000
ESTIMATED TOTAL COST											143,750

APPENDIX 4
WATER DEVELOPMENTS



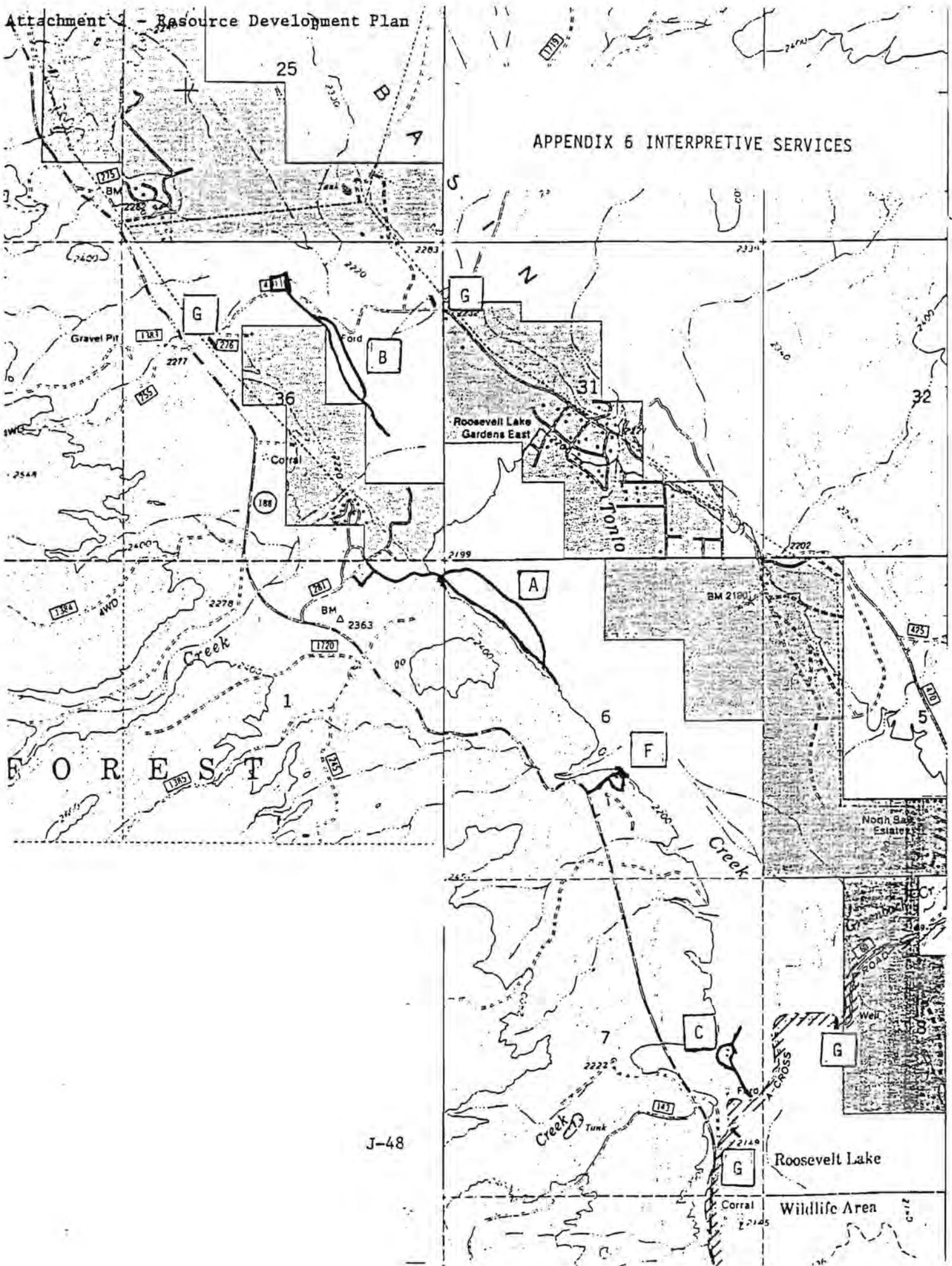
TONTO CREEK INTERPRETIVE SERVICES

- A. Red Hill Riparian Interpretive Trail - The trail will begin at the parking area directly adjacent to the Mad-as-Hell access road. There will be only a small sign indicating the beginning of the trail at the parking lot. The trail will then cross the desert terrain to the cliff's edge overlooking the riparian gallery. At that point there would be an interpretive sign and a trail guide container (brochures would be less susceptible to vandalism away from road). The trail will descend into the riparian gallery and be marked with numbers that would correspond with numbers in the interpretive trail guide. The trail will end at a low area that contains water in most seasons and then loop back. Parking would be limited to four cars so to limit the number of people on the trail. This trail will be ideally suited as an environmental study area for local school groups on field trips. A study guide with field projects and activities would need to be only a two or three page reference to other developed curriculum such as Project Learning Tree.
- B. Bar X Trail and Riparian Observation Area - The parking lot will be located under a large riparian canopy adjacent to an existing corral. Benches and/or a picnic table will be placed on the periphery of the parking area to encourage long term observation of the birds and other wildlife by seniors and handicapped people. An interpretive sign will be placed near the resting area, which addresses watchable wildlife. A trail will lead from the parking area deeper into the gallery for better wildlife observation. No formal interpretation will be available on this trail.
- C. A + Riparian Observation Site - The drive will encircle an old cabin site. A short trail will lead from the parking area under a large cottonwood tree where there will be a couple benches or a picnic table and a riparian interpretive sign with a specific focus.
- D. Sheep Trail Spring Pullout and Trail - The pull off is directly adjacent to State Highway 188. The pull out will be improved with parking space being created for four cars. A general TCRU orientation sign and a more subject specific interpretive sign will be placed overlooking the creek and a short trail will lead down to the creek bed.
- E. and F. North and South Entry or Orientation Sites - The two areas will be gravelled parking areas for up to 5 cars and observation decks with both TCRU orientation signs and subject specific interpretive signs. They will be the first and last stops in the Riparian Interpretive Drive. The pamphlets for this drive will be handed out at the Roosevelt Laek Visitor Center. The drive will include all site with subject specific signing and be an alternative to the interpretive walk. The sites would require signing on the road from other directions of approach to inform drivers to prepare for the pull outs.
- G. Tonto Creek Crossings - There will be one general TCRU orientation sign on each side of the creek for each crossing.

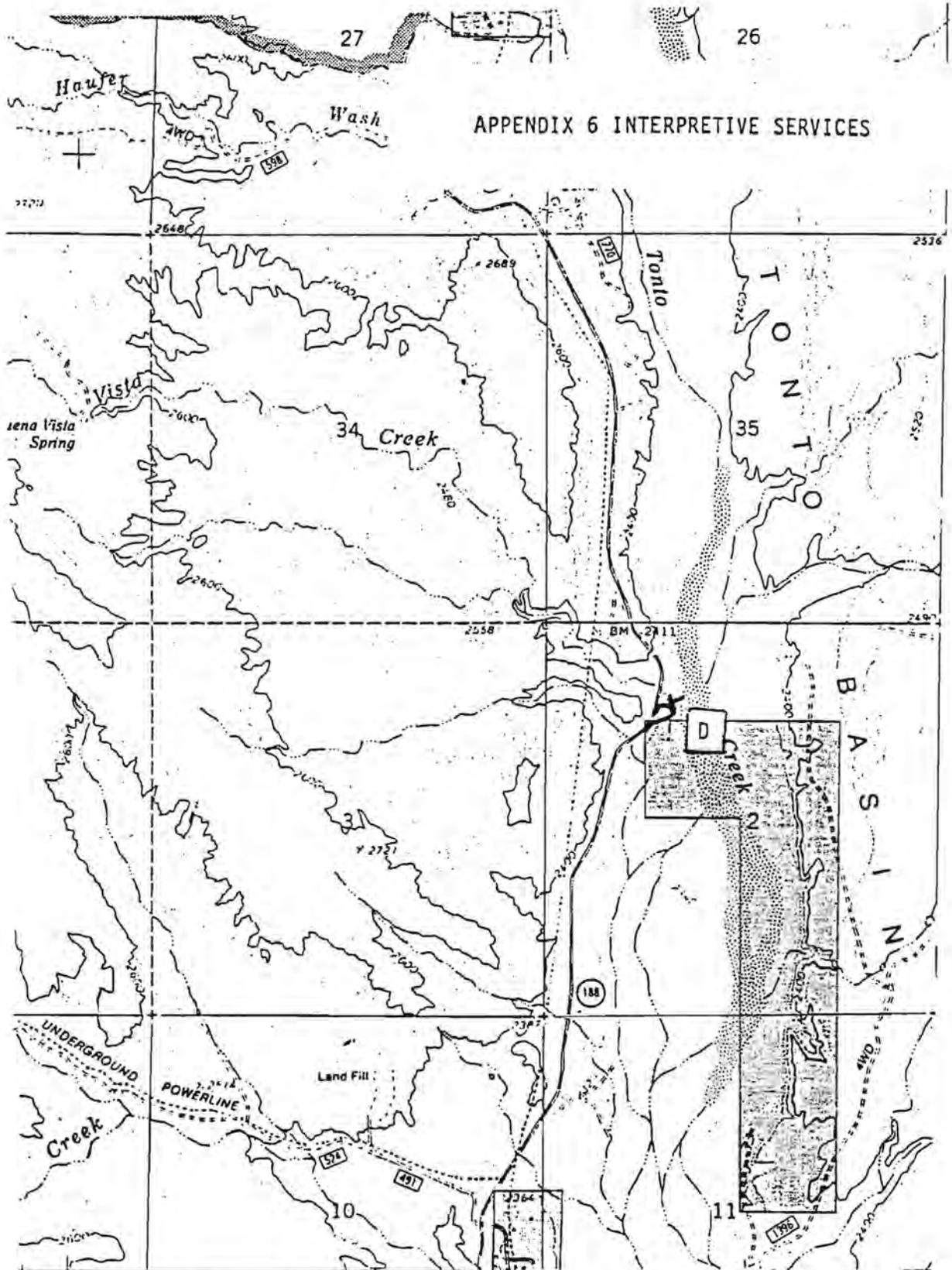


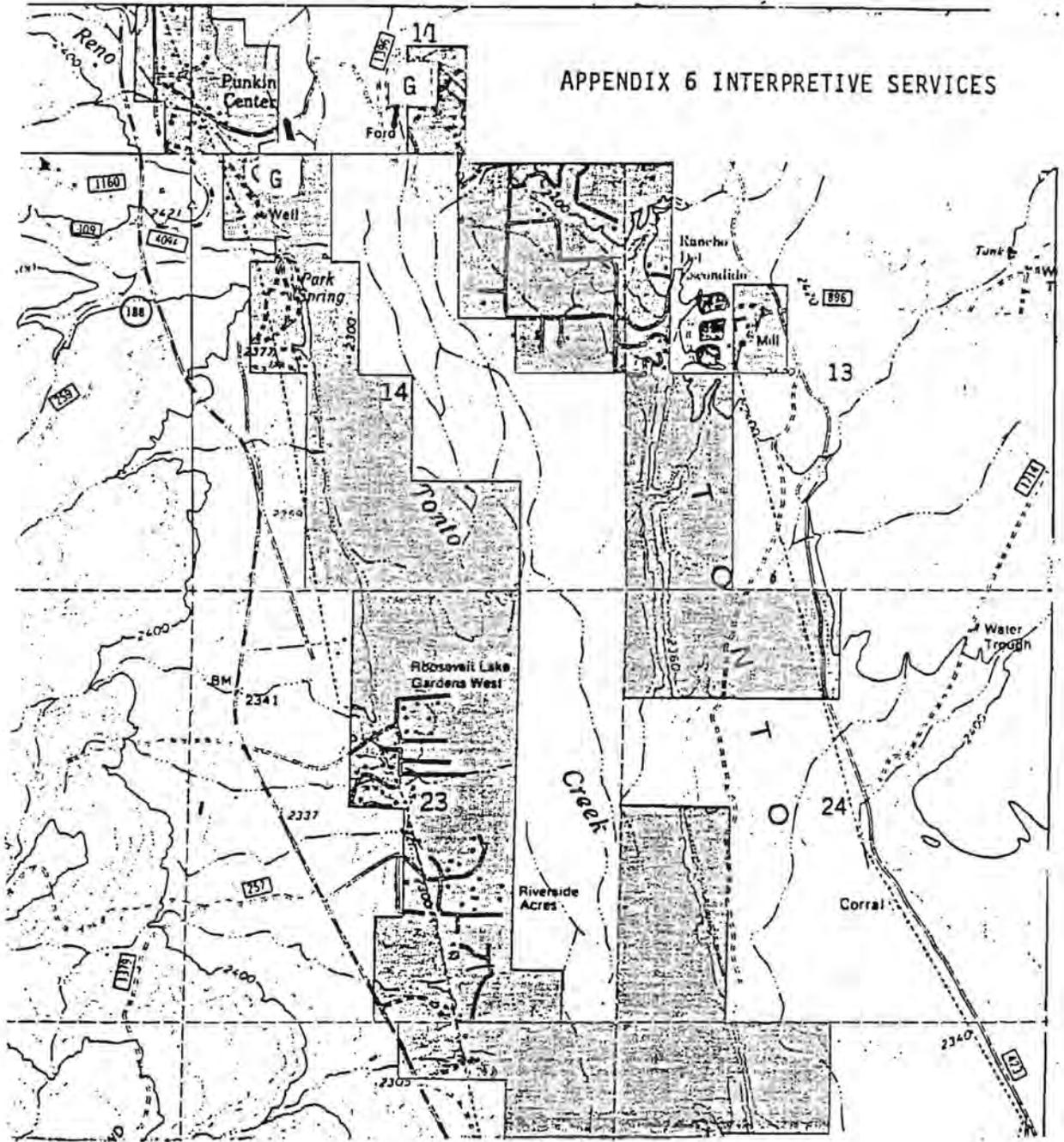
APPENDIX 6 INTERPRETIVE SERVICES

APPENDIX 6 INTERPRETIVE SERVICES



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APPENDIX 7

RECORD OF IRM PLANNING PROCESS

Each of the signatory agencies have been provided complete sets of Integrated Resource Management planning records. Due to their length, they have not been attached to this document.

These records are maintained at the Tonto Basin Ranger District Office, Roosevelt, Arizona.

BIOLOGICAL EVALUATION
TONTO CREEK RIPARIAN UNIT
TONTO BASIN RANGER DISTRICT
TONTO NATIONAL FOREST

Introduction

The Tonto Creek Riparian Unit (TCRU) is one of the wildlife mitigating measures identified by an interagency team to implement the Fish and Wildlife Coordination Act requirements associated with the Roosevelt Lake, Plan 6, Central Arizona Project. The TCRU was established as a special riparian management unit (Figure 1) with the broad management goal of achieving recovery of the Tonto Creek riparian communities to the point where they approximate more nearly their ecological potential. Riparian communities are degraded at present.

The interagency team consisted of the Forest Service (FS), Bureau of Reclamation (BOR), the Arizona Game and Fish Department (AG&F), and the Fish and Wildlife Service (FWS). The FS is responsible for the development and implementation of the TCRU management plan. BOR will fund the preparation and execution of the plan. The FWS and AG&F also participated in the planning team which developed alternatives for this management plan.

The TCRU comprises the lower 15.7 miles of Tonto Creek, from its confluence with Gun Creek, downstream to its terminus in Roosevelt Lake. The fenced management unit will enclose about 5,600 acres, of which about 71% is FS administered and 29% in private ownership (figure 1). Projects such as water developments which are supportive of the TCRU are located as much as 3 miles outside of the fenced unit, and are considered along with the fences as a part of this action (figures 3 and 4).

TCRU elevations range from 2,500' to 2,136'. Vegetation is representative of the Arizona Upland subdivision of the Sonoran Desert. Riparian communities along Tonto Creek include cottonwood, cottonwood/willow, mesquite bosque, burrobrush/seepwillow, and cattail emergent. These communities are more completely described in the Resource Development Plan (copy attached).

Tonto Creek riparian communities and the 955 square mile watershed are deteriorated as a consequence of historic grazing practices, leading to soil losses and changes in stream geomorphology. The most significant soil losses and ecological changes probably occurred before the turn of the century. Tonto Creek stream flows in the 1973 through 1985 period were more than twice the long term average, resulting in further channel changes and formation of sand/gravel bars. The potential for establishment of cottonwood and willow on new stream deposits has not been realized due to current grazing practices. The TCRU is included largely within the unfenced Tonto Basin Allotment, which comprises 140,000 acres. BOR riparian mitigation funding will allow the FS to implement the needed fencing, water development, planning, and monitoring work required to effectively manage Tonto Creek.

Proposed Action

The TCRU will be managed as a special riparian management unit, with livestock grazing closely managed to meet the goal of accommodating recovery of riparian communities. Specific riparian objectives are described in the attached Resource Development Plan. These objectives will be refined and quantified following a 1992 baseline data gathering effort. The most significant changes will occur in the cottonwood/willow and cattail emergent communities. Cottonwood/willow will replace much of the sparsely vegetated burrobrush/seepwillow community. Cattail emergent communities will respond very quickly in the slough and backwater areas, which are largely dominated by bermuda grass and rock rubble at present.

Projects required to implement the TCRU plan include 30 water developments and 24 fencing and cattleguard projects. Projects are described in tables 1 and 2, and project locations are shown in figures 3 and 4. All fencing and some pipeline project areas (exceptions noted below) have been surveyed in the field for affected species, utilizing planned locations on maps. Of the 30 water developments, 9 have not been surveyed in the field, and thus are not considered on a site specific basis in this biological evaluation. The effects of changed livestock use patterns that will result from these projects is, however, analyzed herein. Proposed projects have not been surveyed and staked, necessitating a field examination of all project sites once they are staked, and the subsequent adjustment of project locations, if necessary, to avoid impacts to listed species.

A separate site specific biological evaluation will be completed for the following water developments, once field surveys are completed:

<u>Project Number</u>	<u>Description (locations in tables 1, 2)</u>
15	Reno Spring and pipeline
16	Haufer (Water Wheel) Spring and pipeline
17	Upper Schoolhouse Spring and pipeline
18	Journigan Spring and pipeline
20	Corner Spring and pipeline
21	Packard Spring and pipeline
24	Mesquite Flat Spring and pipeline
25	Lambing Creek Spring and pipeline
27	Ash Creek Spring

About 90% of the TCRU occurs within the Tonto Basin Allotment, and the remainder is in the Del Shay Allotment. Livestock will be grazed in the TCRU under grazing systems designed to accommodate rapid riparian recovery. Private in-holdings will be managed with FS lands, unless affected landowners elect to fence their lands. Neither allotment is under a formal grazing system at present, and some cattle are present in portions of Tonto Creek yearlong. Implementation of the TCRU will represent a drastic change in livestock use and management within the Tonto Creek corridor. The vast majority of both allotments occur outside of the TCRU, and grazing systems for these lands will be developed during FY 91, with planned implementation during FY 92 or 93.

The portion of the TCRU within the Tonto Basin Allotment will be managed in a three pasture system (figure 2), with a maximum of 7 weeks of early spring use in one pasture, and a maximum of 7 weeks of deferred spring use in the second pasture. The third pasture receives complete non-use for one year (see schematic diagram in attached plan). Initial stocking will be with 200 head of cattle (pairs). Duration of the grazing treatment will be adjusted downward during the first year of use, if necessary, based on observations of injury to woody plant species etc. Monitoring of the impacts of actual use

is much more valid than a forage capacity survey, particularly since a survey would be obsolete within a short time.

The Del Shay Allotment portion of the TCRU will be managed in a two pasture-three treatment system (figure 2), with a maximum of 3 weeks of early spring use in one pasture, mid-spring use in the second pasture, followed by non-use in both pastures in year three.

Monitoring will be completed primarily by an independent contractor. A review of progress towards meeting objectives will be completed after one grazing cycle (3 years) and two grazing cycles (6 years), and any necessary adjustments in the grazing systems will be made. The option of excluding livestock from the TCRU will be implemented should monitoring show that the grazing management program is not meeting the riparian recovery objectives.

Kayler Spring is a good water source that supports a small stream for about 1/4 mile to its junction with Tonto Creek. This spring is located on the north side of Tonto Creek at the boundary of the Tonto Basin and Del Shay Allotments. The spring and its associated stream support a population of Gila topminnow (*Poeciliopsis occidentalis occidentalis*) which was transplanted into the site in the early 1980's. The management team made the decision to include this spring into the TCRU to provide it protection through more managed grazing than it would be afforded through exclusion. Alternatives are being explored to limit or reduce the effects of grazing on this site when livestock are in the TCRU. Whatever management is decided upon for this spring, it is clear that the situation will be an improvement over the existing practices. Since the issue of grazing at this site is very site specific, it is felt that the overall effects of the implementation of the TCRU, including the overall changes in livestock use, can be addressed in this document separately from that issue. Prior to implementation of the TCRU, the issue of the management of Kayler Spring will be addressed in a separate biological evaluation.

Species Checklist/Surveys

Attached is a Threatened, Endangered and Sensitive list for the Tonto Basin Ranger District. Species or habitat that occur or potentially occur in the vicinity of the TCRU are identified on the list and are discussed briefly below.

1. Hohokam agave - *Agave murpheyi* - federal candidate (C2).

Known to occur in the Sonoran Desert, and is associated with saguaro, paloverde, creosote, and mesquite vegetation. Is found between 1,300-2,400 feet, in the Roosevelt area. There are 34 clones found in the U.S. and Mexico, they are typically associated with Oodham villages as a cultivar. One of only four known clones in Tonto Basin is located within the TCRU. This clone (NE NE sec 15, T 6N, R 10E) occurs on a butte top within a few feet of the fenced FS work center in Punkin Center. The clone is within existing highway 188 ROW fences, and is very secure in terms of potential risk of disturbance. Livestock make little or no use of this site. This will not change under the provisions of the TCRU.

2. Tonto Basin agave - *Agave* sp. nov. (*delamateri*) - federal candidate (C2).

This species is located on sites similar to *A. murpheyi* but may be found up to 3,600 feet. This species is also associated with cultural resource sites. This species is much more abundant within Tonto Basin than *Agave murpheyi*. At least 12 clones were recently discovered in the Globe Ranger District between Globe and Tonto Basin. About 15 clones are known to occur within Tonto Basin, and more are being found each year by FS personnel. One clone (NE NE

sec 23, T 7N, R10E) occurs within the TCRU, and five other clones occur outside of, but within 1/4 to 1/2 mile of the TCRU. No systematic agave surveys have been completed within the TCRU, though project sites and areas have been reviewed in the field. Potentially suitable habitat for both agave species does exist (edges of valley terraces associated with archeological sites), and there is the possibility that additional clones for both A. delamateri and A. murpheyi could occur within the TCRU. The Tonto Basin Ranger District will initiate surveys for agaves and other listed species during the spring of 1991 in an accelerated program to provide better resource data on agaves and other species.

3. Arizona agave - Agave arizonica - endangered.

This species is known from the southwest slopes of the Sierra Ancha and the New River Mountains to the west of the Verde River on the Tonto National Forest. The Agave is found in chaparral and woodland habitat with open stony slopes and benches at elevations between 3,000 and 6,000 feet. A map developed by the Arizona Desert Botanical Gardens is used to identify probable occurrence. Habitat for this species does not occur in or in relative proximity to the TCRU. Potential habitat may occur on adjacent mountain slopes. Formal surveys have not been conducted in the area for this species. No sightings have been recorded.

4. Lowland leopard frog - Rana yavapaiensis - federal candidate (C2).

Occurs in central and extreme northwestern Arizona within desert scrub, grassland, pine/oak woodland habitat types, usually below 3300 feet elevation. Generally restricted to permanent waters. This species occurs in Tonto Creek, throughout the TCRU, where permanent pools and springs occur. Introduced bull frogs are more abundant in Tonto Creek, than leopard frogs, and are doubtless significant predators and competitors. Introduced, predatory fishes are also doubtless a source of leopard frog mortality. Habitat degradation, particularly within the cattail/emergentriparian communities, along with changes in channel geomorphology and diminished aquifer recharge are the most significant threats to this species. Despite these major threats, the species is fairly common, and well distributed throughout the TCRU.

5. Chiricahua leopard frog - Rana chiricahuensis - federal candidate (C2).

Occurs locally in central and southeastern Arizona. Found in rocky streams and wetlands. The Chiricahua leopard frog is known to occur along Cherry Creek. This species is also generally restricted to permanent waters. It has not been found within the TCRU however suitable habitat may exist. This species would not be expected to be as prevalent as the lowland leopard frog, since the habitat is less typical. As such, impacts to it would be less, as would its impact upon other species.

6. Mexican garter snake - Thamnophis eques megalops - federal candidate (C2).

This semi-aquatic snake is associated with permanent lakes, large streams and rivers, rich springs and headwaters at low to intermediate elevations (up to 6200 ft.). Known to occur from central and southeast Arizona and west central New Mexico south into Mexico, with locations documented in the Verde and upper Gila River drainages. This species has not been confirmed on Tonto Creek. It has been found in a spring site, approximately 6 miles southeast of the TCRU. The abundant prey base (amphibians, small fishes, insects) and variety of riparian habitats, especially sloughs and spring-fed pools, makes this species a likely inhabitant. Leopard frogs are a known preferred food source. Riparian habitat degradation and introduced bullfrogs and predatory fishes are major limiting factors for this species. This species

probably has habitat requirements which are much in common with the leopard frog, though it can also inhabit riparian woodlands.

7. **Narrow-headed garter snake - Thamnophis rufipunctatus - federal candidate (C2).**

This garter snake is restricted to streams and rivers at intermediate elevations (2300-8000 ft.) from central Arizona into New Mexico and Mexico. Populations have been documented from the East Verde and Canyon Creek. This species has not been confirmed on Tonto Creek, though it could possibly be present. Habitat on Tonto Creek appears to be less suited to this species than to the Mexican garter snake, due to the lack of boulder and rock complexes which it seems to prefer. This species has been confirmed on the Salt River, approximately 25 miles from the TCRU.

8. **Desert Tortoise - Gopherus agassizi - federal candidate (C2).**

Frequents desert oasis, riverbanks, washes, dunes, and rocky slopes. Sonoran desert populations are most often associated with paloverde-mixed cacti vegetation types. Boulders, outcrops, natural cavities and caliche formations have been determined to be important habitat components for use as dens and borrows. Surveys for this species have not been conducted as yet on the Tonto Basin Ranger District. Habitats on the TCRU and its associated uplands is not typical of tortoise habitat. One tortoise sighting has been reported on Highway 188 just north of Punkin Center, just out of the TCRU. Since the habitat at this site would be considered marginal, it is suspected that this animal was a released or escaped captive.

9. **Bald Eagle - Haliaeetus leucocephalus - endangered.**

Resident nest sites occur along the Salt, Verde, and Bill Williams rivers on cliff ledges and in live trees or snags. Year-round foraging habitat occurs on the major reservoirs, rivers and streams. Wintering and migrant bald eagles are common below the Mogollon Rim with sightings from Canyon and Tonto Creeks and the East Verde River. One bald eagle nest occurs within the TCRU (sec 35, T 7N, R 10E). Known as the Sheep Nest, it was occupied, but unsuccessful from 1983 through 1988, and un-occupied during 1989, 1990 and 1991. A single adult eagle was seen displaying in and near the nesting tree during the spring of 1990. The reasons for the lack of nesting success are varied, and likely related to the indirect effect of riparian site degradation on the Tonto Creek fishery, which serves as the principal prey base. Since the mature/senescent cottonwood cohort is lacking on most of this portion of Tonto Creek, suitable nesting trees are also lacking. This isolated nesting tree could be marginal in relation to the adjoining fishery prey base. Other adverse affects recorded by "eagle watchers" include apparent mortality of adults (shooting?) and flooding induced turbidity during the incubation period which appeared to reduce the availability of prey fish.

Four additional bald eagle nesting pairs occur within about a 30 mile radius of the Sheep Nest. One nest occurs on Tonto Creek, about 12 miles upstream of the Sheep Nest (8 miles above the TCRU). The Arizona bald eagle population is expanding, and sites such as the Sheep Nest may represent marginal habitat which is capable of sustaining reproductive success only during very favorable years.

Bald eagles also utilize the TCRU as wintering and passage habitat, particularly in the cottonwood/willow gallery forest near the mouth of Roosevelt Lake. Juvenile and subadult bald eagles also utilize the TCRU at various times.

10. Belted Kingfisher - Ceryle alcyon - FS sensitive.

Associated with permanent, fish inhabited waters on the Forest, including the Verde River and Salt River drainages. Known to nest in stream banks with necessary perches and available fishing areas nearby. This species is commonly observed on the TCRU. Riparian degradation has doubtless adversely impacted the kingfisher through the loss of fishery resources and cavity sources.

11. Black Hawk - Buteogallus anthracinus - FS sensitive.

This hawk is found along perennial streams with mature riparian deciduous forests. They are known to occur in the drainages of the Gila, Salt, and Verde rivers, with documented nests along Cherry Creek and the East Verde. This species has not been confirmed on the TCRU. Improvement in riparian condition could result in the creation of suitable habitat for this "riparian obligate" species.

12. Yellow-billed cuckoo - Coccyzus americanus occidentalis - FS sensitive.

Occurs along wooded streams in the central and southern parts of Arizona. It is dependant on mature riverine woodlands and feeds heavily on tent caterpillar colonies associated with Fremont cottonwood. This species has been confirmed on the TCRU. Improvement in riparian condition could also result in the creation of suitable habitat for this "riparian obligate" species.

13. American Bittern - Botaurus lentiginosus and Least Bittern - Ixobrychus exilis - FS sensitive.

These elusive wading birds typically occur in the tall vegetation of fresh water marshes where they feed on small fish and amphibians. Neither of these species have been confirmed in the TCRU, however the American bittern was seen in a cattail/emergent community just south of the TCRU where Tonto Creek forms a delta as it enters Roosevelt Lake. Suitable habitat also occurs at this location for the least bittern. Riparian communities within the TCRU are currently degraded to the point where suitable habitat is virtually absent. Improvement in riparian condition could also result in the creation of suitable habitat for these species within the TCRU.

14. Ferruginous Pygmy Owl - Glaucidium brasilianum - FS sensitive.

Formerly nested throughout central and southern Arizona, now known primarily from southern Arizona. Nests commonly in saguaros and is commonly associated with riparian areas, from broadleaf forests to xeric washes. This species has not been observed in the TCRU. Habitats, though probably marginal, to exist. Limited saguaro stands occur adjacent to the project on slopes east of Tonto Creek.

15. Red Bat - Lasiurus borealis - federal candidate (C2).

Occurs along riparian corridors among oaks, sycamores and cottonwoods in central and southeastern Arizona. Are known to occur along Cherry Creek. Roost in shrubs, trees and even on the ground. No inventories of bat species have been completed on the TCRU. This species could possibly make use of the area, since it utilizes broadleaf riparian vegetation for roosting and relies on perennial water sources, and riparian areas for both flight corridors and excellent sources of food (insects).

16. Western Mastiff Bat - Eumops perotis californicus, S.W. Cave Bat - Myotis velifer brevis and Calif. Leaf-nosed Bat - Macrotis californicus - federal candidates (C2).

These species are residents that live in desert scrub habitat with caves or mines available for roosting. As stated, no inventories of bat species have been completed on the TCRU. These species could possibly make use of the area, since bats rely on perennial water sources, and riparian areas provide both flight corridors and excellent sources of food (insects). The cave bat and Calif. leaf-nosed bat have been collected 2 and 5 miles downstream of Roosevelt Dam, about 7-8 miles from the TCRU. The Mastiff bat has been collected at Tonto National Monument, about 10 miles southwest of the TCRU.

17. Sanborns' Long-nosed Bat - Leptonycteris sanborni - endangered.

This species is associated with upland habitat where agaves and saguaro are abundant. It is migratory, generally following the flowering of its food sources, and is highly mobile. Its presence is difficult to confirm because its feeding habits do not lend themselves to traditional capturing techniques. Some upland sites outside of, but adjacent to the TCRU support fairly good stands of saguaros which theoretically could support this species. This bat is not known from this area and the closest known record is about 80 miles from the TCRU at the Drive-in mine, Picacho Peak, Arizona.

18. Yavapai Pocket Mouse - Perognathus amplus amplus - federal candidate (C2).

This species is found in upland and desert scrub habitat that has sparse perennial cover with low to moderate shrub composition. It has been collected 3 miles north and 6 miles east of Globe. This pocket mouse has not been found within or near the TCRU but habitats on upland sites within and adjacent to the project appear to be characteristic of suitable habitat and its occurrence is likely.

19. Maricopa Tiger Beetle - Cicindela oregona maricopa - federal candidate (C2)

Found in riparian areas that have sand and silt substrates. This species is found in both the Salt River and Tonto Creek, but isn't prevalent in hotter desert habitats except along perennial streams. This species has been collected on Tonto Creek, approximately 2 miles north of the TCRU, but it was not found at a sample site within the TCRU about 1 mile above Roosevelt Lake (R. McKown, 1987). Major changes in the geomorphology of Tonto Creek, resulting in losses of floodplains and replacement with rock rubble have probably diminished suitable habitat for this species. Trampling by livestock is also an adverse impact. Its status within the majority of the TCRU is unknown.

20. Gila Roundtail Chub - Gila robusta grahami - federal candidate (C2).

A native of the Gila River system, this species was formerly present in most waters of the system but likely was more common in the smaller tributaries. It is dependant on deep pools associated with root wads and other large organic debris. Populations persist generally above barrier falls in such tributaries. The species has been documented in Tonto Creek above Gisela, Arizona where the creek is characterized by a narrow channel, steep falls and deep pools. One fish was collected by the Bureau of Reclamation within the TCRU during a 1989 sampling effort in a permanent pool. Individuals likely occur occasionally in the TCRU as a result of high flows upstream, however habitat features needed by the species are very limited within the project area.

21. Woundfin - Plagopterus argentissimus - endangered, and Spikedace - Meda fulgida - threatened.

Tonto Creek is historical habitat for the spikedace. It is not known if the woundfin was native to Tonto Creek. Both of these fish prefer swift water. The woundfin stays in silty water, avoiding clear water, while the spikedace is attracted to shallow, clear runs. A reach of Tonto Creek within the TCRU was identified as a potential introduction site for the woundfin in 1985 as an experimental, non-essential population. No woundfin have been introduced and at this time there are no plans to do so. No plans for re-introduction of the spikedace into Tonto Creek have been made.

22. Gila topminnow - Poeciliopsis occidentalis occidentalis - endangered.

Formerly abundant in small springs, seeps and streams in low to mid-elevations of the Gila drainage. No native population occur on the Tonto NF. However, introductions have occurred at some sites on the forest. As mentioned previously, a population of introduced topminnow persists in Kayler Spring within the TCRU. This site is a very discreet area and will lend itself to being managed as such. As such, the issue of the management of Kayler Spring will be addressed in a separate biological evaluation.

Effects On TES Species

General

The Tonto Creek riparian community described by settler Florence Packard in 1874, was "timbered with the local creek bottom type of timber from bluff to bluff, the water seeped rather than flowed down through a series of sloughs, and fish (probably Colorado River squawfish) over a foot in length could be caught with little trouble." Recovery to this pristine level is probably not attainable under today's conditions, due primarily to historic soil losses within the Tonto Creek watershed, and the subsequent changes in plant species and densities. Complete recovery of the watershed may require centuries. Riparian response, however, is very rapid, since the riparian area represents the nutrient and soil trap for the entire watershed, plus it sustains a much longer growing season than the uplands. Periodic riparian "setbacks" may occur in response to major hydrologic events in the deteriorated watershed. Riparian communities will not, however, return to the pre-management level, and recovery will be much quicker following each major flood damage event, due to the sediment which will be trapped and the likely persistence of portions of the improved riparian ecosystem.

Grazing management systems on the Tonto Basin and Globe Ranger Districts, which are less suited to riparian recovery than the planned TCRU system, have accomplished notable riparian recovery response within a relatively short time. They include Sedal Creek on the Sedal Allotment, 7-Mile Creek on the 7-Mile Allotment, Cottonwood Creek on the Roosevelt Allotment, and Tonto Creek on the 76 Allotment (just upstream of the TCRU).

Tonto Creek on the 76 Allotment has demonstrated significant recovery, with a grazing system which prescribes 3 months of annual winter use by cattle.

Riparian areas, which in 1985 consisted largely of rock rubble, with sparse canopies of burrobrush and seepwillow, now support excellent stands of cottonwood/willow saplings plus cattails, knotgrass, and scouring rush. Photo documentation of this response is available. The stream channel has narrowed significantly, and trapped alluvial materials are forming new floodplains, sloughs, and backwater areas. Beaver are also assuming a much more effective role in this process.

Riparian objectives for the TCRU are described in the attached Resource Development Plan. The most notable changes will be the extensive replacement of the sparsely vegetated burrobrush/ seepwillow community with a cottonwood/willow community, the restoration of the almost non-existent cattail emergent community, and a much improved riparian floodplain function and aquifer recharge. This will result in a narrower, deeper and better defined stream channel and more sustained stream flows.

Mid-size streams such as Tonto Creek are largely heterotrophic systems, deriving the bulk of their energy input from riparian vegetation. Woody species recovery will greatly increase the recruitment of woody debris to the Tonto Creek system. Woody debris is utilized by "shredder" aquatic insects as their food source. Both coarse and fine particulate organic matter will support more abundant and diverse aquatic macro-invertebrate populations, as will submergent and emergent plants in slough and backwater areas. Changes in channel geomorphology, through the action of plants, will result in more depositional areas where sediments accumulate. These areas will provide new habitats for macro-invertebrate species which are largely lacking now.

Enhanced flows, the creation of more pool habitat and an increase in energy input into the system will greatly increase habitat quality and quantity for riparian dependant reptiles, amphibians, fish and waterfowl. These species will in turn provide improved prey bases for top predators in the system. Recovery of the cottonwood/willow communities will ultimately provide better nesting and roosting habitats for riparian bird species and riparian roosting bat species.

Upland TES Species

The following species do not require riparian habitats for their survival. Impacts to these species would most likely be associated with construction activities outside of, and on the boundary of the TCRU, and livestock grazing activities that would be re-distributed as a result of the TCRU grazing plan.

Agave murpheyi and Agave sp. nov. (delamateri)

No livestock usage has been observed on the known clonal groups of these agave species. The principal impacts to be expected would include damage to the plants through construction activities, or livestock trampling and soil compaction. Trampling would not normally be expected, though it could occur through the poor placement of a fence or gate, in such a fashion as to concentrate livestock trailing where an agave might be vulnerable. The indirect effects of livestock related changes in plant species composition and plant structure, and its influence on agave regeneration and recruitment are not known. Simple observation of existing agave clones suggests that regeneration and recruitment are sustaining the clones, though long term monitoring studies are needed. Improved livestock management will allow upland plant communities to attain a higher successional level, though the successional stage most beneficial to "cultivar" agaves is unknown.

The Agave murpheyi clone should not be affected at all, since no projects will be implemented in the area, and livestock are not expected to utilize the ridgetop site where it grows. The site is isolated from the riparian area by some private fencing at Punkin Center, and there is no incentive for stock to utilize this area, as water is absent and the upland forage is much less preferred by livestock than riparian forage species.

The Agave delamateri clone on Kayler Butte will be within about 300 feet of a proposed fence. The fence will be situated in a saddle, while the agaves occur on a very steep slope below the

crest of the hill. This will isolate these plants from livestock which are utilizing the adjoining Tonto Basin Allotment. The agaves will be within the TCRU boundary, and the likelihood of stock climbing the extremely steep slope is remote. Both forage and water will be abundant along the Tonto Creek riparian area.

The principal risk to these agaves is damage through the development of fences and pipelines. Even though the project areas have been examined in the field, it is a FS requirement that fence and pipeline locations will be intensively searched once the projects have been staked, and prior to any construction activities. Fence and pipeline locations will be adjusted to avert damage to agaves, if it is found to be necessary.

Monitoring studies will be established on the agave clones within the TCRU prior to the implementation of the plan, and will include data on plant numbers, size, recruitment, plus permanent photo-monumentation.

Agave arizonica

If individuals or clones of this species occur on the grazing allotments associated with the TCRU, they would be found on the higher elevation slopes east and west of the area. Construction of the proposed improvements would be far removed from any sites and would not affect them. When livestock are removed from the TCRU, it is expected that they will tend to concentrate on the low elevation uplands adjacent to the exclosed area. For them to displace to higher elevation slopes would be behaviorally uncharacteristic. As such, changes in livestock distribution is not expected to have any affect on Agave arizonica, should it occur within the allotments.

Yavapai Pocket Mouse

Construction activities associated with the placement of necessary fences and watering facilities are not expected to impact individuals of this species. Most pipelines will be laid on the surface of the ground. Fenceline brush clearing could temporarily displace the mouse's foraging activities but this would be expected to be short term and very limited in scope.

The fact that livestock will be re-distributed from the riparian corridor to the adjacent desert uplands will potentially place a greater degree of cattle use on Yavapai pocket mouse habitat (should they occur there). Actual effects of livestock use on pocket mouse habitat has not been documented. This species prefers generally open desert scrub habitats with limited perennial cover, not a situation uncommon to grazed desert habitats. Undoubtedly the limiting factors for the species would be a supply of food (seeds) and protection of burrows. It is expected that a sufficient seed source will persist under the cover of shrubs and cacti (where it is currently most prevalent) in the presence of possibly increased grazing pressure. Burrow entrances are usually located at or near the bases of shrubs and would also be afforded protection.

Desert Tortoise

Despite the one record of desert tortoise observation in the vicinity, it is unlikely that suitable tortoise habitat occurs in or adjacent to the TCRU. As stated, it is of high likelihood that this individual was a released or escaped captive. The closest area that approaches typical habitat occurs on the hill slopes about four miles east of the TCRU. Here, isolated areas of granite boulders in palo verde-mixed cacti associations can be found, however the areas are discon-

tinuous and quickly rise to elevations considered to be above those where the species occurs. Should these areas support the desert tortoise, they are far enough removed from the TCRU and the upland habitats to which livestock will be re-distributed that they would not be affected.

Riparian and Aquatic Species

All of the remaining described wildlife species are either directly or indirectly dependent upon riparian communities for their habitat requirements. Many of these species have habitat needs and limiting factors in common, therefore the following discussions will lump such species.

Bald Eagle

The Sheep bald eagle territory will not be affected by construction related activities. The Tonto-west fence (project #12) is located west of highway 188, and cannot be viewed from the nest site. The Tonto-east fence is about 0.4 miles east of the nest site. Construction will be completed during the non-nesting season (July 1-Nov 30). The fence does not pose a collision risk, as the eagles flight patterns are upstream and downstream, and there are no suitable roost sites near the fence or between the nest and the fence.

As previously stated, the most likely reasons for the historic failure of this nest to successfully nest and fledge young are likely related to the indirect effects of riparian site degradation, including lack of suitable nest and perch trees, marginal production of a suitable prey base and high turbidity levels. As previously described, the middle and upper portions of Tonto Creek are nearly devoid of the mature and over/mature cottonwood cohorts at present. Actual livestock presence has not been documented as a behavioral conflict at any of the eagle nests monitored in the central Arizona population. It is felt that the habitat characteristics associated with this nest territory are so degraded that, short of cutting down the nest tree or drying up the creek, it would be hard to make it any worse.

Riparian objectives for the TCRU are described in the attached Resource Development Plan. The most notable changes will be the extensive replacement of the sparsely vegetated burrobrush/seepwillow community with a cottonwood/willow community, the restoration of the almost non-existing cattail emergent community, and a much improved riparian floodplain function and aquifer recharge. This will result in a narrower, deeper and better defined stream channel and more sustained stream flows. Recovery of cottonwood/willow communities will ultimately provide better nesting and roosting habitats for the bald eagle. Also, enhanced flows and the creation of more perennial pool habitat will greatly increase habitat quality for the prey species they require.

Livestock permittees will be instructed not to ride near the nest site during the nesting period. Nest watch records have documented a lack of response from this incubating pair when kayakers passed directly below the nest, and when an off-road-vehicle passed very near the nest. A FS seasonal nest area closure has not been deemed necessary to date due to the lack of human activity in the area, however a closure will be implemented in the future, should it appear to be required.

Common Black Hawk, Yellow-billed Cuckoo, Belted Kingfisher

These species also utilize riparian habitats for breeding/nesting. They are also dependant upon prey species which are largely riparian/aquatic community obligates. Implementation of the TCRU will not affect the black hawk nor the cuckoo since they do not occur there and

suitable habitat is currently lacking. Construction of the improvements will not infringe upon habitats used by the belted kingfisher and the change in livestock use will not be such that they will impair the feeding habits of this highly mobile species. As with the bald eagle, enhanced flow regimes, improved channel stability and increased vegetative composition are expected to improve the habitat necessary to support the aquatic prey of the black hawk and kingfisher, and the insect prey of the cuckoo.

American Bittern and Least Bittern

Since neither of these species, nor the habitat to support them, occurs in the TCRU, implementation of the project will not affect these species. The expected restoration of the cattail/emergent community will create habitat that these species could, in time, utilize.

Ferruginous Pygmy Owl

This species is an unlikely resident of the TCRU, however the potential for its presence will not be reduced by the implementation of the project. Saguaro habitats will not be affected, and riparian areas, with which the species shows a definite affinity, will be enhanced.

Lowland Leopard Frog, Chiricahua Leopard Frog, Narrow-headed Garter Snake and Mexican Garter Snake

While the lowland leopard frog can be found within the TCRU, visitations to known sites often reveal that one population or another has been washed out. The degraded condition of the aquatic habitat results in rather tenuous, short lived habitats. Even though the garter snakes and the other leopard frog haven't been found there, their existence is possible and the same could be said for their habitat. Construction of improvements associated with the project are removed from the riparian area itself and will not affect the species as they occur in Tonto Creek. Each spring that will be developed to support the TCRU will be analyzed (if not already done) prior to development. Should suitable habitat for these species be present at any of these sites, the development will be designed so that any free water and its associated vegetation will be maintained. The improvements will be supplied their water in such a way that only water excess to the habitat will be piped away. Should the opportunity exist, as seeps with little or no free water are developed, pools will be constructed at the source to create a free water habitat. Spring sources will be fenced to prevent livestock from accessing the source. Changes in livestock use of Tonto Creek could result in site specific impacts to existing habitat for these species, however it is doubtful that it would be greater than it already is under current management. Over the long term, improved aquatic conditions will result in an increase in the amount of habitat for these species and an improvement in its stability.

Red Bat, California Leaf-nosed Bat, Southwestern Cave Bat and Western Mastiff Bat

All of these bat species are dependant upon prey bases which are largely riparian/aquatic community obligates. While all but the red bat occupy desert habitats for breeding or roosting in caves or mines, they are seldom found far from water sources. The red bat roosts in riparian broadleaf trees. A lack of caves, mines or rock outcrops in or even near the TCRU, and the limited nature of the broadleaf component, makes the occurrence of these species unlikely. Construction activities associated with the TCRU would not affect roosting or feeding habitat for these species, even if they do occur. Changes in livestock distribution would not be such that needed habitat components would be affected either. The recovery of the riparian vegetation and aquatic habitats will likely increase the probability of red bat occurrence. The other

bats will still be limited by roosting/nesting habitat but should they occur, an increase in their insect prey base is expected to accompany the vegetative response.

Sanborn's Long-nosed Bat

As stated, the likelihood of the occurrence of this species is low. Where it is present, it is associated with saguaros and agaves in sufficient quantity to provide a nectar source. While agaves do occur in and adjacent to the TCRU, they are generally in isolated groups. No large, continuous stands occur. Some more continuous stands of saguaro do occur on hill slope uplands on both sides of the TCRU. Activities associated with construction of improvements will not, by design, impact saguaro plants. Also, any changes in grazing patterns will not result in impacts to saguaros, or most other cacti, since cattle generally avoid these plants. Therefore, even if this bat does migrate through the area, implementation of the TCRU will not affect the species.

Maricopa Tiger Beetle

The potential for this species' occurrence is low due to the degraded condition of area, high percentages of rock rubble and un-controlled livestock use. Construction activities will not affect habitat for this species. The controlled livestock management is expected to increase bank stability and sediment deposition which would provide improved habitat for this species. Therefore, implementation of the TCRU will not create effects to this species that would be detrimental.

Woundfin and Spikedace

Since neither of these species occur in Tonto Creek and there are no immediate plans for re-introduction, implementation of the TCRU will not affect these species. Tonto Creek riparian/aquatic habitat recovery could allow for consideration of future re-establishment of these species.

Gila Roundtail Chub

The single recorded occurrence of this species within the TCRU indicates that the species does occur upstream and can, periodically, be carried downstream to the TCRU. The literature indicates that this species will generally be out competed and preyed upon in such a stream until it is once again eliminated. Since the aquatic habitat in the TCRU is marginal for this species to the point where its occurrence is dependant upon upstream flood events, its continued occurrence is not expected. As such, the implementation of the TCRU plan would not detrimentally affect the viability of populations of this species. Even after riparian/aquatic recovery, the ability of this species to co-exist with non-native fishes in Tonto Creek is questionable.

Determination of Overall Effect

Planned riparian area improvements are expected to greatly enhance habitat conditions for all listed riparian dependant animal species. Negative effects will not occur. The desert tortoise and Yavapai pocket mouse are not expected to be affected by implementation of the plan. The agave species are not expected to be affected. The issue of management of Kayler Spring will be analyzed and documented in a separate biological evaluation before the actual grazing management portion of the TCRU is implemented. The planned actions are considered a highly beneficial change from the

present condition in terms of riparian area and aquatic recovery, and the various species which depend upon riparian and aquatic habitats will indirectly benefit through improved habitat quality. No planned actions will adversely affect any TES species or habitat. As such, it is the determination of this analysis that implementation of the Tonto Creek Riparian Unit will have no effect on TES species or their habitat.

Incidental Take

No take is anticipated as a result of the planned actions.

Consultation With Others:

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Lewis Myers, Tonto National Forest Riparian Coordinator

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Mike Ross, Tonto Forest Wildlife Biologist

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6/10/91
Date

Project Area Sensitive Species List

05/31/91

Project Name Tonto Creek Riparian Unit

Common Name	Scientific Name	Status	Species or Habitat			Comments
			Present	Potential	Absent	
Frog, Chiricahua Leopard	<i>Rana chiricahuensis</i>	ST			x	Below probable range; nearest record, Naegelin Rim
Frog, Lowland Leopard	<i>Rana yavapaiensis</i>	SC	x			Habitat present, none observed; within range.
Frog, Northern Leopard	<i>Rana pipiens</i>	SC		x		NQDB records unavail.; habitat present.
Bittern, American	<i>Botaurus lentiginosus</i>	SC		x		Habitat degraded, potential when restored
Bittern, Least	<i>Ixobrychus exilis</i>	SC		x		Habitat degraded, potential when restored
Black Hawk, Common	<i>Buteogallus anthracinus</i>	SC		x		Potential habitat, should improv. under plan
Cuckoo, Yellow-billed	<i>Coccyzus americanus occidentalis</i>	C2,ST		x		Potential habitat, should improv. under plan
Eagle, Bald	<i>Haliaeetus leucocephalus</i>	E,SE	x			Unsuccess. nest terr. habitat degraded, should improve.
Falcon, American Peregrine	<i>Falco peregrinus anatum</i>	E,SC			x	No suitable habitat, no species records or observ.
Flycatcher, Buff-breasted	<i>Empidonax fulvifrons</i>	SE			x	No suitable habitat.
Goshawk, Northern	<i>Accipiter gentilis</i>	SC			x	No suitable habitat.
Kingfisher, Belted	<i>Ceryle alcyon</i>	SC	x			Observed, habitat should improve
Osprey	<i>Pandion haliaetus carolinensis</i>	ST			x	Suitable habitat outside project (lake)
Owl, Mexican Spotted	<i>Strix occidentalis lucida</i>	C2,ST			x	No suitable habitat.
Pygmy-owl, Ferruginous	<i>Glaucidium brasilianum</i>	SE		x		Potential habitat, but no records or obser.
Chub, Bonytail	<i>Gila elegans</i>	E,SE			x	No suitable habitat.
Chub, Gila	<i>Gila intermedia</i>	ST			x	No suitable habitat.
Chub, Colorado Roundtail	<i>Gila robusta grahami</i>	C2,ST	x			Habitat not typical, unlikely to occur in #s
Pupfish, Desert	<i>Cyprinodon macularius macularius</i>	E,SE			x	No suitable habitat.
Squawfish, Colorado	<i>Ptychocheilus lucius</i>	E,SE			x	No suitable habitat.
Sucker, Razorback	<i>Xyrauchen texanus</i>	P,SE			x	No suitable habitat.
Topminnow, Gila	<i>Poeciliopsis occidentalis occidentalis</i>	E,ST	x			In Kayler Spr., separate B E
Beetle, Parker's Riffle	<i>Cyloepus parkeri</i>	C2			x	No suitable habitat.
Beetle, Tiger	<i>Cicindela oregona maricopa</i>	C2		x		Not observed, habitat could improve
Butterfly, Obsolete Viceroy	<i>Limenitis archippus obsoletus</i>	C3			x	No suitable habitat.

Bat, Little Brown	<i>Myotis lucifugus occultus</i>	SC	?		Prob. outside range, desert scrub ab. present
Bat, New	<i>Lasiurus borealis</i>	C2	x	x	Below known range
Bat, Sanborn's Long-Nosed	<i>Leptonycteris sanborni</i>	SC	x		Habitat present, degraded, should improve
Bat, SW Cave Bat	<i>Leptonycteris sanborni</i>	E,SE	?		Probably outside range, habitat questionable
Bat, Western Mastiff	<i>Myotis velifer brevis</i>	C2	?		Probably outside range, habitat questionable
Mouse, Yavapai pocket	<i>Eumops perotis californicus</i>	C2	?		Probably outside range, habitat questionable
Otter, River	<i>Perognathus amplus amplus</i>	C2	x		Habitat present, recorded 25 mi S of TCRU
	<i>Lutra canadensis</i>	C2,SE		x	No suitable habitat.
Snake, Mexican Garter	<i>Thamnophis eques</i>	C2,SC	x		Potential habitat in Tonto Cr. & some springs
Snake, Narrowheaded Garter	<i>Thamnophis rufipunctatus</i>	C2,SC	x		Potential habitat in Tonto Cr. & some springs
Tortoise, Desert	<i>Gopherus agassizii</i>	C2,SC	x		Low habitat capability, no observations.
Agave, Arizona	<i>Agave arizonica</i>	E		x	Best potential away from TCRU influence
Agave, Hohokam	<i>Agave murpheyi</i>	C2	x		Known clone, potential for others
Agave, Tonto Basin	<i>Agave sp. nov. (delamateri)</i>	C2	x		Known clones, potential for others
Cliffrose, Arizona	<i>Purshia subintegra</i>	E		x	No suitable habitat; out of known range.
Daisy, Fish Creek Rock	<i>Perityle saxicola</i>	C2		x	No suitable habitat
Fleabane, Pringle's	<i>Erigeron pringleyi/Erigeron anchana</i>	C2		x	No suitable habitat
Hedgehog, Arizona	<i>Echinocereus triglochiciatus arizonicus</i>	E		x	Out of known range, no suitable habitat
Snakebush, California	<i>Coubrina californica</i>	-		x	No suitable habitat