Pleasanton East-side Ditch Company
Tier-2 AWSA Proposal
Conservation of water through reductions of conveyance loss in the Pleasanton East-side Ditch, southern Catron County, New Mexico.

I. Extending the water supply through conservation.

The 20,000 ft. Pleasanton Eastside Ditch (PED) delivers surface flow diversions from the San Francisco River to 24 private water rights holders in the Pleasanton Valley of southern Catron County, New Mexico (Figures 1 & 2 appended). The ditch course crosses mostly private property of PEDCo members (85%), with minor reaches through non-member private properties (5%) and federal (USFS) holdings (10%). The present course of PED was set in the 1960's and state water law grants an easement that **"shall be adequate to allow for reasonable maintenance, use, and improvements to the ditch."** (NM Statutes: 73-2-5) A 15 ft. lateral easement from the ditch is documented in the PEDCo bylaws.

Approximately 925 acre feet of adjudicated water are delivered to members each year. However, the 50 year-old concrete lining of the Pleasanton Eastside Ditch has degraded (Figures 3 & 4) to the point that delivery to the southern-most (end-of-ditch) users is often compromised due to conveyance loss. Irrigation conveyance loss, the loss of water from the point of diversion to the point of use, occurs through seepage, leakage, and evaporation. Conveyance loss from an open ditch may be on the order of 50% depending on the nature of the ditch lining and its integrity, the nature of the ditch substrate, and the length of the ditch.[1-3] No measurements of conveyance loss exist for the Pleasanton Eastside Ditch, but end-of-ditch users frequently complain of half-full capacity during their scheduled irrigation period. We propose to increase the efficiency of water delivery to our members by either relining the degraded, open ditch, or by inserting a closed pipeline into the present ditch course (potentially both methods will be used). By reducing conveyance loss, we increase our capacity to ***meet the present and future water demands*** of our members. Additionally, ***conserving water extends the capacity of the basin to support natural ecosystems and/or other human water needs.***

A rough estimate of the amount of water potentially conserved by this proposed project is on the order of 1,480-1,670 a.f./yr., and was derived as follows:

1. From 03/16/2001 to 03/27/2008, forty-nine USGS streamflow measurements were recorded at the PED head gauge. Mean streamflow was 7.7 cfs. If we assume an ideal of 100% conveyance efficiency (no loss) and no withdrawals, we calculate 4,660 a.f./yr. would flow down PED and return to the river as instream flow:

$$\frac{7.7\ cf}{s} \times \frac{60\ s}{min.} \times \frac{60\ min.}{h} \times \frac{24\ h}{day} \times \frac{30.5\ days}{mo.} \times \frac{10\ mo.}{yr.} \times \frac{1\ a.f.}{43{,}560\ cf} \approx 4{,}660\ a.f.$$

2. If all PEDCo members exercise their rights we subtract that out (4,660 a.f./yr – 925 a.f./yr) and obtain ≈ 3,740 a.f./yr. of potential return flow.

3. The portion of this potential 3,740 a.f./yr return that is lost during conveyance is unknown. Much of the PED concrete lining is severely degraded. A study of irrigation conveyance in the lower Rio Grande valley of Texas indicates losses due to seepage through porous substrates such as those in the Pleasanton Valley may be on the order of 10 gal/ft^2/day. PED's internal surface area is approximately 140,000 ft^2 (7 ft. trapezoidal x 20,000 linear ft.). A crude estimate of our conveyance loss due to seepage would be:

$$\frac{\frac{10\,gal}{ft^2}}{day} \times 140{,}000\,ft^2 \times \frac{30.5\,days}{mo.} \times \frac{10\,mo.}{yr} \times \frac{1\,cf}{7.48\,gal} \times \frac{1\,a.f.}{43{,}560\,cf} \approx \frac{1{,}310\,a.f.}{yr}\,seepage\ loss$$

In addition to seepage losses, we have significant leakage from about 20 sites along the ditch course. These leaks are estimated at 20 gal/min each. Annual conveyance loss due to leakage can be estimated as:

$$20\,leaks \times \frac{\frac{20\,gal}{min}}{leak} \times \frac{60\,min}{h} \times \frac{24\,h}{day} \times \frac{30.5\,days}{mo.} \times \frac{10\,mo.}{yr} \times \frac{1\,cf}{7.48\,gal} \times \frac{1\,a.f.}{43{,}560\,cf} \approx \frac{540\,a.f.}{yr}\ leakage\ loss$$

In sum, we estimate our conveyance losses from seepage and leakage at 1,850 a.f./yr.

4. Lining of two irrigation canal reaches in Boise, Idaho yielded reductions of conveyance seepage losses > 95%. If we can conservatively achieve an 80-90% reduction in our seepage losses by our proposed improvements, **we might expect to conserve something on the order of 1,480-1670 a.f./yr.**

Returning this conserved water to the river extends the water supply and the capacity of the basin to support natural ecosystems and/or other downstream human uses.

II. Description of the proposal and technical viability.

This proposed project is a ***water utilization alternative***. The project does not develop additional water from the Gila basin; however, the project would extend the water supply through conservation. We propose to increase the efficiency of water delivery to our members by either relining the degraded, open ditch, or by inserting a closed pipeline into the present ditch course (potentially both methods will be used).

This project is clearly technically viable. We will simply be improving the existing ditch. Lining of irrigation canals and ditches, or laying pipe into existing ditch courses, is a common practice worldwide where water conservation is a goal. PEDCo occasionally undertakes such projects internally on a small scale in the course of routine ditch maintenance and improvement (see Figure 5).

III. Estimated Costs

PEDCo is still researching options/costs for re-lining our ditch or laying pipe into the ditch course. We will continue to consult with appropriately experienced agency (e.g. NRCS)

personnel and materials suppliers. PEDCo recently laid 260 ft. of metal 36 in. pipe into a particularly leaky section of PED. Cost of that project was $40/ft. If we use that rate for the proposed 20,000 ft. project, we estimate $800,000 to install a pipe and perhaps $100,000 for administration and environmental compliance/mitigation. So a crude estimate of our project costs would be $900,000.

IV. Environment

We indicated above how a reduction of conveyance loss translates to a beneficial increase in the capacity of the basin to support natural riparian ecosystems. Southwestern riparian ecosystems support some of the highest diversities of plants and animals in North America.[4] The presence of surface water in an otherwise xeric landscape is the root cause of this diversity, but natural and man-made stresses on these habitats have greatly reduced some species populations over the past century. Our preliminary scoping of special status species (Table 1 appended) produced a list of special status species that includes 8 fish, 3 amphibians, 1 reptile, and 11 birds. Currently it is not clear if any of these species would be directly impacted by the proposed re-lining of the ditch or by the insertion of pipe into the ditch. We intend to consult with USFWS, NMDGF, and USFS biologists to determine what special status species may be impacted and to determine potential mitigations. Some loss of open water habitat and ditch-bank vegetation would be expected from relining and refitting operations, and additional bank-side vegetation habitats could be impacted as substrates become drier with decreased seepage/leakage from the improved ditch/pipe (Figure 5). We could possibly mitigate some of these impacts by selective use of open ditch vs. closed pipe.

V. Economic Impact

We have no data to quantify the economic impact of our proposal. Water from the Pleasanton Eastside Ditch is used by 24 private water-rights holders to produce alfalfa hay and small truck-farm crops; to irrigate permanent pastures, private orchards, gardens and native plant nurseries; and to supply livestock water. This project will help to insure continued use of senior water rights for agriculture in Catron County.

VI. Maintaining senior water rights

Pleasanton Eastside Ditch delivers surface flow diversions from the San Francisco River to 24 private water rights holders in the Pleasanton Valley. Water diversions from the San Francisco River into agricultural fields of the Pleasanton Valley date to at least 1880. The Pleasanton Eastside Ditch Company (PEDCo) is the governing entity that represents water users along the ditch. PEDCo was formally incorporated in 1962 at the time the old dirt-banked Pleasanton Eastside Ditch was concrete lined. Some 280 acres of adjudicated water rights are linked to the Pleasanton Eastside Ditch. Individually held water rights of PEDCo members vary from 0.75 ac. to 100 ac. with priority dates in the 1885-1895 range. PEDCo members generally hold senior water rights relative to the priority dates of other water rights in the San Francisco Basin of New Mexico (Figure 6). Water from the Pleasanton Eastside Ditch is used to produce alfalfa hay and small truck-farm crops; to irrigate permanent pastures, private orchards, gardens and native plant nurseries; and to supply livestock water. This project will help to insure continued use of senior water rights for agriculture in Catron County. Further, by decreasing conveyance loss we increase our capacity to ***meet the present and future water demands*** of our members and

conserving water extends the capacity of the basin to support natural ecosystems and/or other human water needs.

VII. Support

Upon submission of this proposal to NMISC, PEDCo intends to solicit letters of support from various government agencies and NGO's. These will be promptly forwarded to NMICS.

VIII. Benefit to Catron County

Short-term economic benefits will be realized locally during the proposed construction. Long-term benefits will come from sustained and/or increased agriculture in response to improved infrastructure.

IX. Agricultural Benefits

Pleasanton Eastside Ditch delivers surface flow diversions from the San Francisco River to 24 private water rights holders in the Pleasanton Valley of southern Catron County, New Mexico. Water diversions from the San Francisco River into agricultural fields of the Pleasanton Valley date to at least 1880. Water from the Pleasanton Eastside Ditch is used to produce alfalfa hay and small truck-farm crops; to irrigate permanent pastures, private orchards, gardens and native plant nurseries; and to supply livestock water. This project will help to insure continued use of senior water rights for agriculture in Catron County.

X. References

1. Fipps, Guy., 2000. Characterization of Conveyance Losses In Irrigation Distribution Networks In The Lower Rio Grande Valley of Texas. Final report to USDI Bureau of Reclamation Grant Agreement No. 98-FG-60-10_0 , 22 p. http://idea.tamu.edu/documents/report10.pdf

2. Contor, Bryce A. , 2004, Irrigation Conveyance Loss, Idaho Water Resources Research Institute Technical Report 04-008. 12 p. http://www.if.uidaho.edu/~johnson/DDW020_Leak_Asbuilt%20_9_2_04.pdf

3. Marsden Jacobs Associates, 2003, improving water-use efficiency in irrigation conveyance systems: a study of investment strategies. Pub: Land and Water Australia, 45 p. http://lwa.gov.au/files/products/river-landscapes/pr030493/pr030493.pdf

4. Brown, David E. (Ed.), 1982. Biotic Communities of the American Southwest- United States and Mexico. Desert Plants Vol. 4, No. 1-4.

5. NM State Engineer, 1965. Hydrographic Survey Gila River System, San Francisco Basin Maps.

6. Construction cost links:

   http://www.ut.nrcs.usda.gov/technical/technology/economics/cost-data/2011/P428UTIrrigationDitchLining.xls

   http://www.usbr.gov/pn/programs/wat/publications/constcost.pdf

   http://www.usbr.gov/pn/programs/wat/reports/demoprojectyear10.pdf

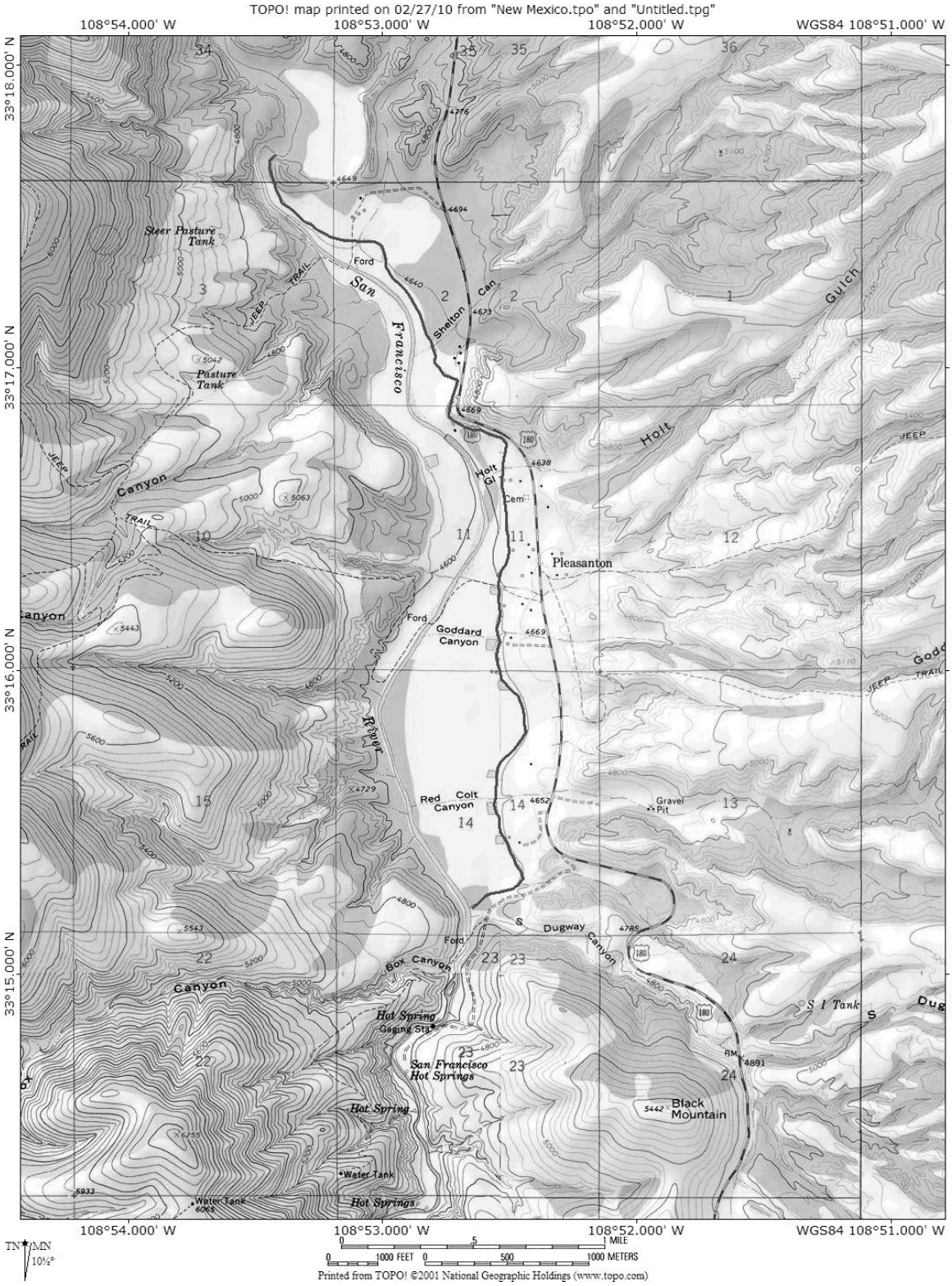

Figure 1. A topographic map of Pleasanton Valley with Pleasanton East-side Ditch indicated by the heavy black line in the center of map.

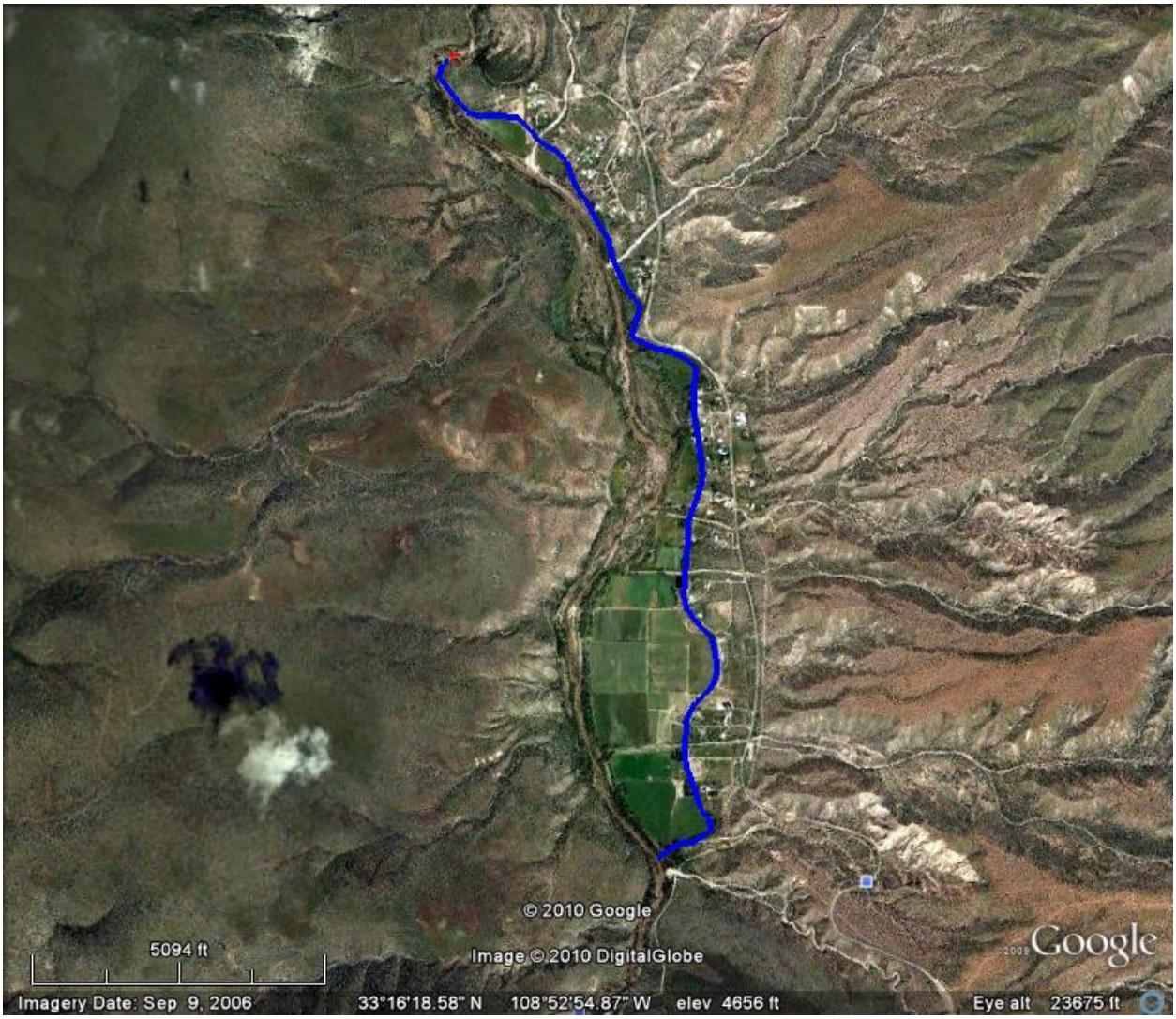

Figure 2. Satellite picture of Pleasanton Valley with the course of Pleasanton East-side Ditch indicated. The diversion dam at the north end of the valley is indicated by a red mark.

Figure 3. Typical reach of East-side Pleasanton Ditch showing 50 year-old degraded concrete lining which contributes to conveyance loss through leakage and seepage.

Figure 4. Bank lining of this section of East-side Pleasanton Ditch is completely degraded and contributes to conveyance loss through leakage and seepage.

Figure 5. Before and after photos of a degraded section of Pleasanton East-side Ditch that PEDCo recently repaired by inserting closed pipe. For reference, note the same tree appears upper left in both photos.

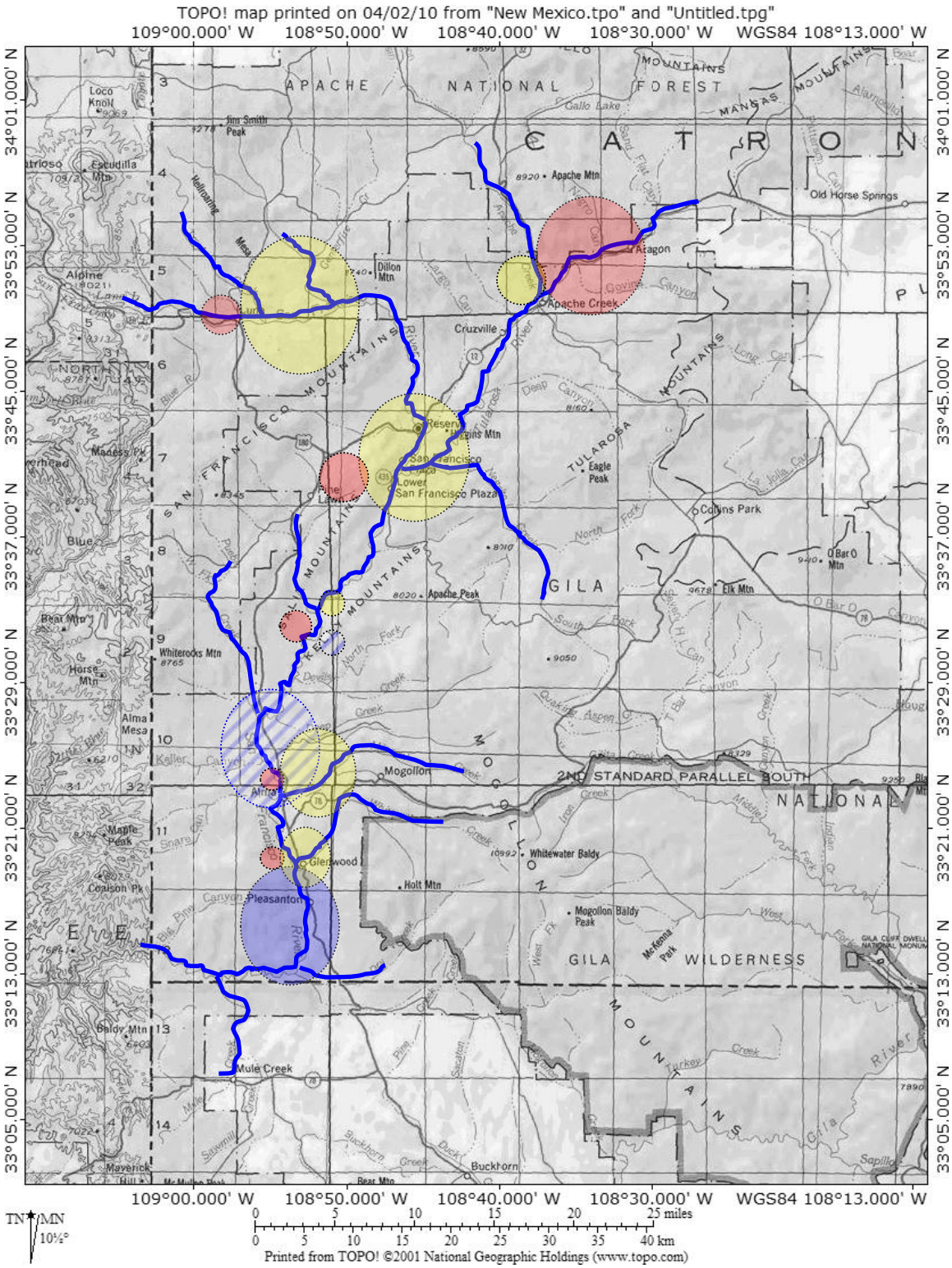

Figure 6. Distribution and relative priority of surface water rights in the upper San Francisco River basin of New Mexico above the PEDCo diversion.[5] PEDCo members hold approximately 280 acres of surface water rights (solid blue circle) and 96% are priority 1885 or earlier. There are some 1,945 acres of surface rights above the PEDCo diversion. Of these, 24% are senior (red circles), 16% are equivalent (striped blue circles), and 60% are junior (yellow circle) rights relative to an 1885 priority.

Table 1. A preliminary scoping of special status animal species extant, or historically present, in the Pleasanton Valley of the San Francisco River, New Mexico.*

Species	Scientific Name	Status**			Notes
		Fed	NM	USFS	
Fish					
Gila Chub	*Gila intermedia*	E	E	S	Historically present, but current status in San Francisco River basin uncertain, possibly extirpated.
Roundtail Chub	*Gila robusta*		E		Historically present in the San Francisco River, but no records of occurrence since 1958.
Longfin Dace	*Agosia chrysogaster*			S	Populations apparently stable and present.
Loach Minnow	*Tiaroga cobitis*	T	E	S	Range reductions within the Gila River Basin, but it persists locally
Spikedace	*Meda fulgida*	T	E	S	Historically present, but extirpated from San Francisco River.
Gila Topminnow	*Poeciliops occidentalis occidentalis*	E	T		Historically present at the southern end of the Pleasanton Valley, extirpated in the 1950's.

Sonora Sucker	*Catostomus insignis*	SC	S	S	Present and apparently locally common.
Desert Sucker	*Catostomus clarki*	SC	S	S	Present and apparently locally common.
Amphibians					
Arizona Toad	*Bufo microscaphus microscaphus*		S	S	Present in riparian cottonwood/sycamore habitats.
Lowland Leopard Frog	*Rana yavapaiensis*	SC	E	S	Historical records from riparian habitats at the southern end of Pleasanton Valley. Current status??
Chiricahua Leopard Frog	*Rana chiricahuensis*	T	S	S	Populations greatly reduced over the past several decades. Status in Pleasanton Valley uncertain.
Reptiles					
Narrowhead Garter Snake	*Thamnophis rufipunctatus rufipunctatus*	SC	T	S	Resident in riparian habitats of San Francisco River Valley, especially the north and south ends of the valley where the walls close in and the stream substrate and banks become rockier.
Birds					
Bald Eagle	*Haliaeetus leucocephalus*	DM	T	S	Winter resident in riparian and adjacent uplands.

Common Black-Hawk	*Buteogallus anthracinus anthracinus*	SC	T	S	Summer resident (breeder) in riparian habitats of Pleasanton Valley.
Swainson's Hawk	*Buteo swainsoni*	C3		S	Summer presence in Pleasanton Valley, breeding status unknown
Peregrine Falcon	*Falco peregrinus anatum*	D	T	S	Forages in valley year round.
Green Heron	*Butorides virescens*			S	Records from a few km north at Glenwood State Fish Hatchery.
Belted Kingfisher	*Megaceryle alcyon*			S	Resident in Pleasanton Valley.
Elf Owl	*Micrathene whitneyi whitneyi*			S	Probable summer resident.
Mexican Spotted Owl	*Strix occidentalis lucida*	T	S	S	Resident in canyon habitats at southern boundary of the Pleasanton Valley.
Yellow-Billed Cuckoo	*Coccyzus americanus*	C	S	S	Summer resident in cottonwood/willow riparian woodlands.
SW Willow Flycatcher	*Empidonax traillii extimus*	E	E	S	There are historical records for the Willow Flycatcher in the Pleasanton Valley, but its current status here is unknown.
Bell's Vireo	*Vireo bellii*	SC	T	S	Occasional along lower San Francisco River in dense willow/seepwillow/mesquite.

Mammals					
Allen's Big-eared Bat	*Idionycteris phyllotis*	SC	S	S	Records for most of these bat species come from nocturnal netting surveys at the pond of Glenwood State Fish Hatchery a few km north of Pleasanton.
Big Free-tailed Bat	*Nyctinomops macrotis*		S		
Little Brown Myotis	*Myotis lucifugus occultus*		S	S	
Cave Myotis	*M. velifer brevis*		S	S	
Fringed Myotis	*M. thysanodes*		S		
Long-eared Myotis	*M. evotis evotis*		S		
Long-legged Myotis	*M. volans interior*		S		
Small-footed Myotis	*M. ciliolabrum melanorhinus*		S		
Yuma Myotis	*M. yumanensis yumanensis*		S		
Townsend's Big-Eared Bat	*Corynorhinus townsendii pallescens*	SC	S	S	
Western Red Bat	*Lasiurus blossevillii*	SC	S	S	
Spotted Bat	*Euderma maculatum*		T	S	
Big-Eared Bat	*Idionycteris phyllotis*	SC	S	S	
Desert Shrew	*Notiosorex crawfordi*			S	Sycamore, cottonwood, & rabbitbrush riparian habitats.
Arizona Gray Squirrel	*Sciurus arizonensis arizonensis*			S	Resident in riparian cottonwood/willow/walnut/sycamore forest.

Botta's Pocket Gopher	*Thomomys bottae*			S	Adapted to a wide range of habitats, but especially found in sandy soils of valley riparian and agricultural habitats.
Western Spotted Skunk	*Spilogale gracilis*		S		Rocky/brushy riparian habitats.
Ringtail	*Bassariscus astutus arizonensis*		S	S	Resident in rocky slopes/cliffs bordering the river.
Rocky Mtn. Bighorn Sheep	*Ovis canadensis canadensis*			S	Found on rocky slopes and cliffs at the southern end of Pleasanton Valley.
Mexican Gray Wolf	*Canis lupus baileyi*	E	E	S	Extirpated by the mid-1900's. Reintroduced in 1998 as Nonessential Experimental Population.

*Table reference: NM Dept. Game & Fish BISON-M database: http://www.bison-m.org/

** Status Key:

Federal (E – endangered, T – threatened, C – candidate, SC- FWS species of concern, D- downlisted)

NM (E-endangered, T- threatened, S-sensitive taxa (informal)

USFS (S- sensitive species)