The San Juan River

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Introduction:

The headwaters of the San Juan River begin on the western slope of the Rocky Mountains in southwestern Colorado. The headwaters, located at over 14,000 feet in elevation, are the beginning of what downstream is to become the second largest tributary to the Colorado River (San Juan River Basin Recovery Implementation Program, 1992). The San Juan River is located within the San Juan River Basin (Fig. 1) which drains approximately 38,000 square miles of southwestern Colorado, northwestern New Mexico, southeastern Utah, and northeastern Arizona. Many tributaries add to the San Juan with the largest being the Animas river. The San Juan River flows approximately 360 miles from headwaters in Colorado to the Glen Canyon National Recreation Area in Utah. There are approximately 7 diversions along the river concentrated between Navajo reservoir and Shiprock, NM. These diversions are used for irrigation, municipal purposes, and for the generation of power. Weirs constructed for diversion purposes are believed to prevent the upstream movement of native fish species. Historically, the Colorado squawfish and the razorback sucker were found much further upriver prior to the construction of the weirs and Navajo dam (NIIP Consultation, 1992, SJRBRIP, 1992).

Navajo Reservoir:

Navajo Reservoir built in 1962 by the Bureau of Reclamation stores approximately 1,036,000 acre feet of water (SJRBRIP, 1992; Gallup-Navajo Ind., 1984). A portion of this water, along with water attained via other tributaries, is allotted to many different parties. Water being an extremely valuable resource in this part of the country there are many interests with an opinion as to the best utilization of this resource. However, much of the water is claimed or otherwise has been promised to various peoples along the river. With the placing of the Colorado squawfish and the razorback sucker on the federal endangered species list a portion of the water, as yet undetermined, must be utilized to insure their survival via preservation of their habitat.

Endangered Species:

The Colorado squawfish was considered endangered in 1967 and with the passing of the Endangered Species Act in 1972 both the Colorado squawfish and later the razorback sucker (1981) were placed on the list. The inclusion of the Colorado squawfish and the razorback sucker to the endangered species list and the proposal by the United States Fish and Wildlife Service (USFWS) to designate segments of the San Juan River as critical habitat for the Colorado squawfish, razorback sucker, bonytail chub (*Gila elegans*), and the humpback chub (*Gila cypha*) raises further questions as to how much water can be diverted or otherwise used without negatively affecting these species (Federal Register, 1993). Historically, the bonytail chub was found in the San Juan River; however, they have been extirpated

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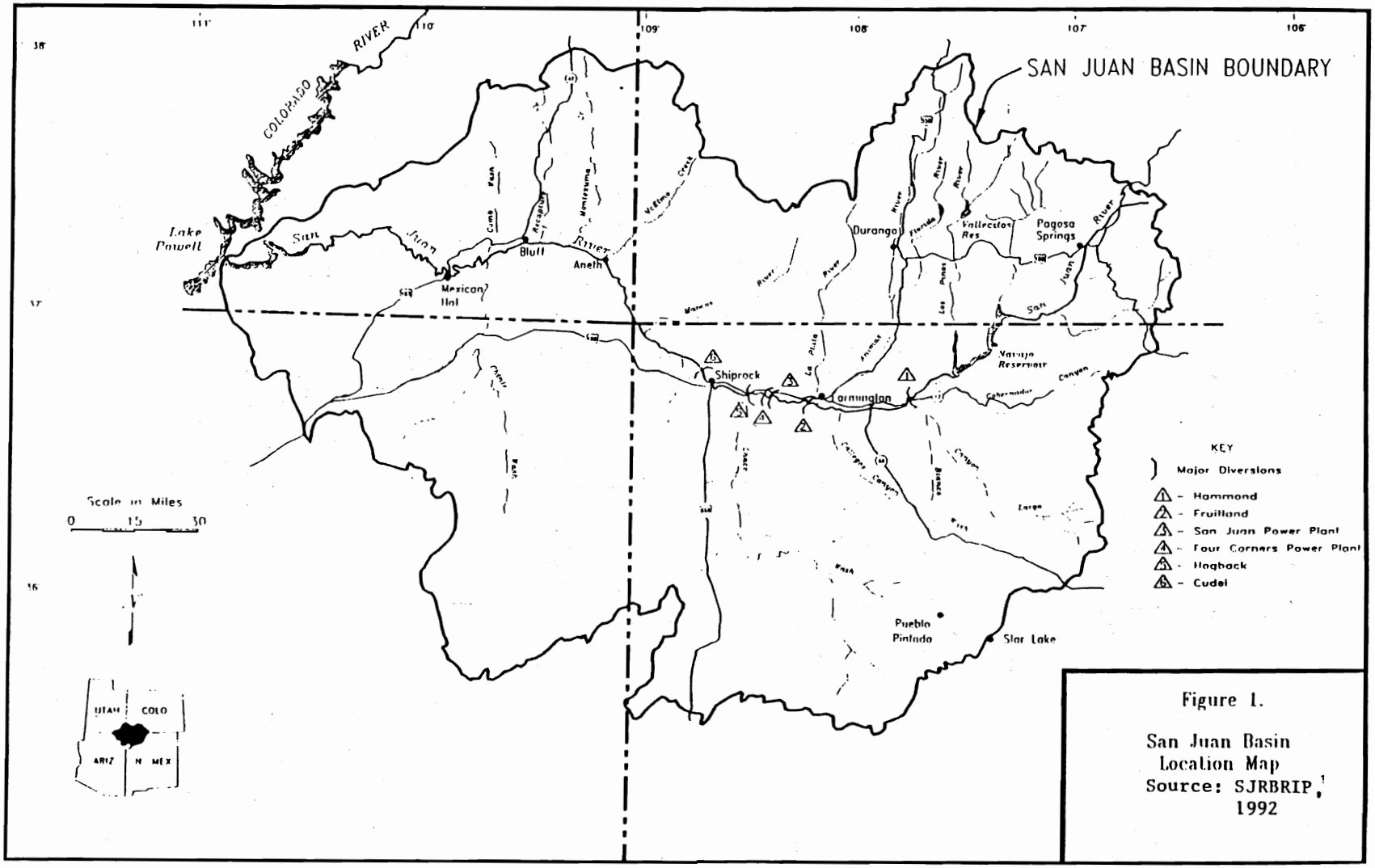

Figure 1.

San Juan Basin
Location Map
Source: SJRBRIP, 1992

and are currently found in Lake Mohave in southwestern Arizona (Jordan 1891; Sigler 1963; Sublette 1977). This population of bonytail chub found within Lake Mohave is old and may not be reproducing. This may be the reason for the very low observed recruitment. The humpback chub is also believed to have inhabited the San Juan. However, there is no substantial evidence other than partial skeletal remains of what archaeologists believe to be either a bonytail chub or humpback chub in an archaeological site along the San Juan River. (NIIP Consultation 1992; SJRBRIP 1992).

The once periodically flooding San Juan River was dammed and its flow controlled with the building of Navajo Reservoir in 1962. The environmental consequences entailed in post dam construction include the decrease of mean river temperature below the dam to the Animas river confluence, the mean decrease in volume (cfs), the halting of great flood stages (80,000 cfs), and riverbed geomorphology alteration (Fisheries Survey of the San Juan River 1987). With the decrease in mean flood stages there was also a correlated decrease in native fish species. Native fish species had adapted, over thousands of years, to the high sediment load, and the fluctuating flow of the San Juan. Major habitat alterations and the introduction of non-native fish species drastically affected the abundance and distribution of native species (Behnke 1980). (Figure 2)

Figure 2.
Non-native and native fish species of the San Juan River Basin:

Non-Native Fish Species:	Native Fish Species:
Cutthroat Trout	Roundtail Chub
Rainbow Trout	Bonytail Chub
Brown Trout	Colorado Squawfish
Kokanee Salmon	Speckled Dace
Northern Pike	Flannelmouth Sucker
Red Shiner	Bluehead Sucker
Sand Shiner	Razorback Sucker
Fathead Minnow	Mottled Sculpin
White Sucker	Colorado River Cutthroat Trout
Black Bullhead	
Channel Catfish	
Plains Killifish	
Mosquitofish	
Striped Bass	
Green Sunfish	
Bluegill	
Smallmouth Bass	
Largemouth Bass	
White Crappie	
Black Crappie	
Threadfin Shad	

Source: SJRBRIP, 1992

River Alterations

Radical riverine alterations, such as the construction of dams, caused dramatic changes in the river with regards to associated species. Detrimental influences upon native species through the introduction, either accidentally or intentionally, of approximately 23 non-native fish species. These fish species largely adapted to warmer water temperature increased in population. Competition, predation, and river alteration is believed to have caused native fish populations to decline (SJRBRIP 1992).

Controlling the river to best suit human needs caused other problems as well. Exotic invader plant species like tamarisk or salt cedar (*Tamarix ramosissima*) and Russian olive (*Elaeagnus angustifolia*) became established. Without the frequent flooding of the San Juan River the banks were no longer scoured and thus cottonwood were soon replaced with Russian olive and tamarisk. The encroachment of these species along the banks of the river channelized the river further. Generally cottonwood require flooding events to become established. Tamarisk is a phreatophyte; and Russian olive is tolerant of saline soils. Both grow very

rapidly. These species have replaced cottonwoods in many areas along the San Juan River.

Contamination

Riparian areas along the San Juan River which were regularly inundated with water during flood periods are no longer inundated. Declines in flood periods have caused concentration of contaminants in irrigation settling ponds which ultimately flow back, either through subsurface or surface flows, into the San Juan River. Evaporation from these irrigation ponds as well as decreased scouring of these riparian areas via flooding induce contaminant concentration and thus poor habitat for fish and waterfowl. The naturally, highly seleniferous San Juan Basin exacerbates the situation. Selenium found within these irrigation settling ponds concentrate to levels that may be dangerous to wildlife. Selenium, at high levels, has been found to affect reproduction and cause birth defects. It should be noted that the concentrations within the irrigation run-off ponds are high and pose a potential threat to wildlife. However, when the water from these ponds enters into the San Juan River these contaminants are diluted and the levels of these elements within the river are relatively low (Blanchard, P. Pers. comm.).

Oil and gas exploration and development within the San Juan River basin, including drilling in riparian areas, also affect the river. Carcinogenic polycyclic aromatic hydrocarbons (PAH's) bioaccumulate within the fatty tissues of fishes and other aquatic fauna. The PAHs are a major contributor to the pollution found in the San Juan. Oil exploration and development occurs most of the length of the river from below Navajo Reservoir, NM to Mexican Hat, Utah. External lesions linked to PAH's have been found on channel catfish and the flannelmouth sucker in irrigation drainage study sites. Of the channel catfish sampled 37% had lesions and of the flannelmouth suckers sampled 50% had lesions. Also, 77% of flannelmouth suckers sampled from the San Juan River were diagnosed to have eosinophilic foci (NIIP Consultation, 1992). The health of the river and associated ecosystem can be gauged from the health of resident fish species. Development and exploration for gas and oil must and should be done in a way as to minimize detrimental effects on the river and associated inhabitants.

Research

A seven year biological study initiated in 1991, as mandated by the USFWS concerning the Animas La-Plata Project (A.L.P.), will investigate the diversion of water from the Animas river into the Ridges Basin Reservoir and the subsequent effects on the endangered fish species found down river. This additional diversion from the Animas River is proposed to be offset by an increased flow release from Navajo Reservoir. The diversion and storage of water within the Ridges Basin reservoir will identify water resources for southwestern Colorado farmers, the Southern Ute Tribe, Ute Mountain Ute Tribe, and other municipal and industrial purposes (SJRBRIP, 1992).

Conclusion

The San Juan River is a beautiful river providing water for diverse needs to the people, communities, and wildlife existing along it's banks. The water is utilized by humans for irrigation, municipal purposes, power generation, and recreation; however, it should not be forgotten that there are inhabitants within the river who make the river their home and they have been there longer than human settlements. Parties interested in obtaining water from the San Juan River must work with the river to provide habitat for the flora and fauna which make up the riparian ecosystem. River straightening, damming, further allocations of water, and attempting further control of the river may result in further destruction of this ecosystem and perhaps the extinction of the endangered fish species.

References

Behnke, R.J., and Benson, D.E. 1980. Endangered and Threatened Fishes of the Upper Colorado River Basin. Cooperative Extension Service, Colorado State University, Fort Collins, Colorado. Bulletin 503A. 38pp.

Frentzel, Martin. 1991. Squawfish Protected in the Southwest.. Killed for $3 Bounty in the Rivers of the Northwest. Albuquerque Journal. pg.3, sec.C 7/11/91.

Jordan, D.S. 1891. Report of explorations in Colorado and Utah during the summer of 1889, with an account of the fish found in each of the river basins examined. Bulletin, U.S. Fish Commission. 89:1-40.

Sigler, W.F., and Miller, R.R. 1963. Fishes of Utah. Utah State Department of Fish and Game, Salt Lake City, Utah. 203pp.

Sublette, J.E. 1977. A survey of the fishes of the San Juan River basin with particular reference to the endangered species. Prepared for the United States Fish and Wildlife Service, Albuquerque, New Mexico. 45pp.

U.S. Bureau of Reclamation. 1984. Gallup-Navajo Indian Water Supply Project. U.S. Department of Interior. Bureau of Reclamation, Washington D.C.

U.S. Department of the Interior. 1993. Fish and Wildlife Service. 50 CFR Part 17 Federal Register 58:6578-6597.

U.S. Department of the Interior. 1992. NIIP-Section 7 Consultation. Fish and Wildlife Service. Albuquerque, New Mexico.

U.S. Department of the Interior. 1992. San Juan River Basin Recovery Implementation Program. Fish and Wildlife Service. Albuquerque, New Mexico. 44pp.