

**Final Report**

**Ichthyofaunal Surveys of Tributaries  
of the San Juan River, New Mexico**

**Prepared by:**

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**January 31, 2000**



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CONSULTANTS, INC.**

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## **EXECUTIVE SUMMARY**

Historical surveys of fish fauna have been conducted on most major tributaries of the upper San Juan River (Smith 1976, Anderson et al. 1993). Fish surveys that were conducted prior to 1970 are rare, however during the 1970's fish surveys became much more common and expanded into most drainages.

The objectives of this report were: 1) to compile historical fish collection information for the tributaries to the San Juan River downstream of Navajo Dam; 2) compile data collected as part of this project during the years 1992 – 1994; and 3) to compile, as practicable, collections made upstream of Navajo reservoir during the study period 1992 - 1994. Many of the fish collections that have occurred since 1994 are included in this report, however, these were not included as part of the original scope of work or objectives for this project.

This study area included all major tributaries of the San Juan River that originate in Colorado. The downstream boundary of tributaries within the study area was their point of confluence with the San Juan River. The results of some surveys conducted on the San Juan River upstream of Navajo Reservoir have also been provided. Tributaries of the San Juan River that were represented in these results include; the Animas, Florida, La Plata, Los Pinos, Mancos, Navajo, and Piedra rivers and Mc Elmo Creek. Also included were several smaller creeks or streams that are tributaries of the larger rivers. The smaller streams that were sampled consisted of Cherry Creek, Long Hollow Creek, Rock Creek, Stollsteimer Creek, and Navajo Wash.

The data presented in this report are the result of two main sources of information. These sources consist of: 1) a literature review of historical fish surveys and, 2) data collected by Miller Ecological Consultants (MEC) as part of a native fish habitat study (Miller et al. 1995). The literature review includes historical reports of fish surveys in the previously mentioned tributaries of the San Juan River.

Historical studies of fish in tributaries of the San Juan River provide an account of native and non-native species composition during a period of non-native introduction. The Animas River has been the site of more historical fish surveys and earlier sampling events than other tributaries. The earliest recorded sampling events (and other unconfirmed early reports) in the Animas River included only records of native fish species. By the 1950s, non-native fish had been detected in a reach of the Animas River upstream of the Colorado border. Non-native species have persisted in the Animas River since they were first reported; however, the composition and number of species have changed.

Because there are few records of fish surveys in other tributaries prior to 1970, it is likely that some non-native fish were already established in various tributaries before they were reported. However, one of the earliest surveys from the La Plata River (1966) only provided evidence of the existence of native fish. Although some non-native species had

been stocked in the La Plata River prior to this time, most non-native species were probably not established over a widespread area.

The expansion of non-native fish in tributaries of the upper San Juan River has been concurrent with a decline in certain native fish species. There have been several historical reports that suggest that native fish may have been relatively abundant in areas where recent surveys indicated they were rare or nonexistent (Jordan 1891, Koster 1957, Dean 1961, Olson 1962a). Several researchers have also commented on the decline of certain native species (Sublette 1977, Platania and Bestgen 1988, Platania and Young 1990). In fact, the data presented here suggests that roundtail chubs may have been common in some reaches of the Animas River. A review of historical fish surveys suggests that the establishment of species (and species composition) is a dynamic process. Future surveys will be necessary answer more questions regarding the balance of native and non-native fish fauna in tributaries of the upper San Juan River.

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## INTRODUCTION

Historical surveys of fish fauna have been conducted on most major tributaries of the upper San Juan River (Smith 1976, Anderson et al. 1993). Fish surveys that were conducted prior to 1970 are rare, however during the 1970's fish surveys became much more common and expanded into most drainages (Table 1). Only well documented surveys are presented in this study, although there have been numerous unconfirmed or "hearsay" reports. Most of the unconfirmed reports suggest that the native fish were once more numerous and widespread in distribution (Koster 1957). Some of the fish surveys presented here support this premise. In most cases historical surveys of fish fauna document the introduction and distribution of non-native fish species. Data for this report were supplied by the Colorado Division of Wildlife, New Mexico Department of Game and Fish, U.S. Fish and Wildlife Service, Utah Department of Wildlife and Southern Ute Indian Tribe.

The objectives of this report were: 1) to compile historical fish collection information for the tributaries to the San Juan River downstream of Navajo Dam; 2) compile data collected as part of this project during the years 1992 – 1994; and 3) to compile, as practicable, collections made upstream of Navajo reservoir during the study period 1992 - 1994. Many of the fish collections that have occurred since 1994 are included in this report, however, these were not included as part of the original scope of work or objectives for this project.

The primary objectives and goals of biologists have varied since fish fauna sampling began in this drainage. Many of the early objectives included the eradication of native fish species, and the introduction of non-native game species. Olson (1962a) reported that lethal levels of rotenone were used to eliminate native fish from sections of the Los Pinos, Navajo, and San Juan rivers. Several other reports from this time period recommend that non-native species be stocked in Navajo Reservoir and nearby sections of the San Juan drainage (Olson 1962b, Olson 1967, Graves and Haines 1968). Graves and Haines (1969) reported that prior to 1969, five non-native species including more than 1 million channel catfish and 4 million rainbow trout had been stocked into Navajo Reservoir. In fact, most of the sampling and fish related work prior to 1970 was directed toward the introduction of non-native fish or removal of native species. Native fish were often not reported during these early sampling events. After the late 1960s, the objectives for most fishery work in the San Juan drainage began to change. Although game fish species were important in many areas, the preservation of native species became an important objective as well. Smith (1976) conducted one of the earliest fish surveys that emphasized native and non-native fish populations. This work was followed by numerous studies that were designed to account for native as well as non-native species (Sublette 1977, Robertson 1977, Platania and Bestgen 1988, Platania 1990, Platania and Young 1990, Anderson, et al. 1993, Miller et al. 1995). Most fish fauna studies since the mid-1970s have emphasized the need for research involving native species.

The distribution of native and non-native species can be observed in the data provided by historical sampling. Earliest sampling efforts resulted in the capture of mostly native fish, while more recent sampling efforts have produced an increasing number of non-native species. Distribution and composition of native and non-native fish in tributaries of the San Juan River is dependent on numerous physical and biological variables. A comparison of historical fish surveys provides valuable insight into temporal changes in fish populations and composition in tributaries of the San Juan River.

**Table 1.** Number of collections by decade made in tributaries of the San Juan River.

	1934 – 1949	1950 - 1969	1970 - 1979	1980 - 1989	1990 - 1999
<b>Animas</b>	2	2	24	19	110
<b>Florida</b>			2	9	21
<b>La Plata</b>		1	24	2	80
<b>Mancos</b>			13	10	29
<b>Mc Elmo</b>			10	7	4
<b>Piedra</b>			2	7	6
<b>Los Pinos</b>			8	1	6
<b>Navajo</b>			9		7
<b>San Juan</b>				3	18

## Study Area

The San Juan River is a major tributary of the Colorado River and drains 99,200 km<sup>2</sup> in Colorado, Utah, Arizona, and New Mexico. From its origins in the San Juan Mountains of southwestern Colorado at elevations exceeding 4,250 m, the river flows westward for about 570 km to the Colorado River. The major perennial tributaries to the San Juan River are the Navajo, Piedra, Los Pinos, Animas, La Plata, and Mancos rivers, and McElmo Creek (Figure 1). In addition there are numerous ephemeral arroyos and washes contributing little total flow but large sediment loads.

Navajo Reservoir, completed in 1963, impounds the San Juan River, isolating the upper 124 km of river and partially regulating downstream flows. The completion of Glenn Canyon Dam and subsequent filling of Lake Powell in the early 1980's inundated the lower 87 km of the river, leaving about 359 km of river between the two bounding features.

This study area included all major tributaries of the San Juan River that originate in Colorado. The downstream boundary of tributaries within the study area was their point of confluence with the San Juan River. The results of some surveys conducted on the San Juan River upstream of Navajo Reservoir have also been provided. Tributaries of the San Juan River that were represented in these results include; the Animas, Florida, La



Plata, Los Pinos, Mancos, Navajo, and Piedra rivers and Mc Elmo Creek. Also included were several smaller creeks or streams that are tributaries of the larger rivers. The smaller streams that were sampled consisted of Cherry Creek, Long Hollow Creek, Rock Creek, Stollsteimer Creek, and Navajo Wash (Figure 1).

## **METHODS**

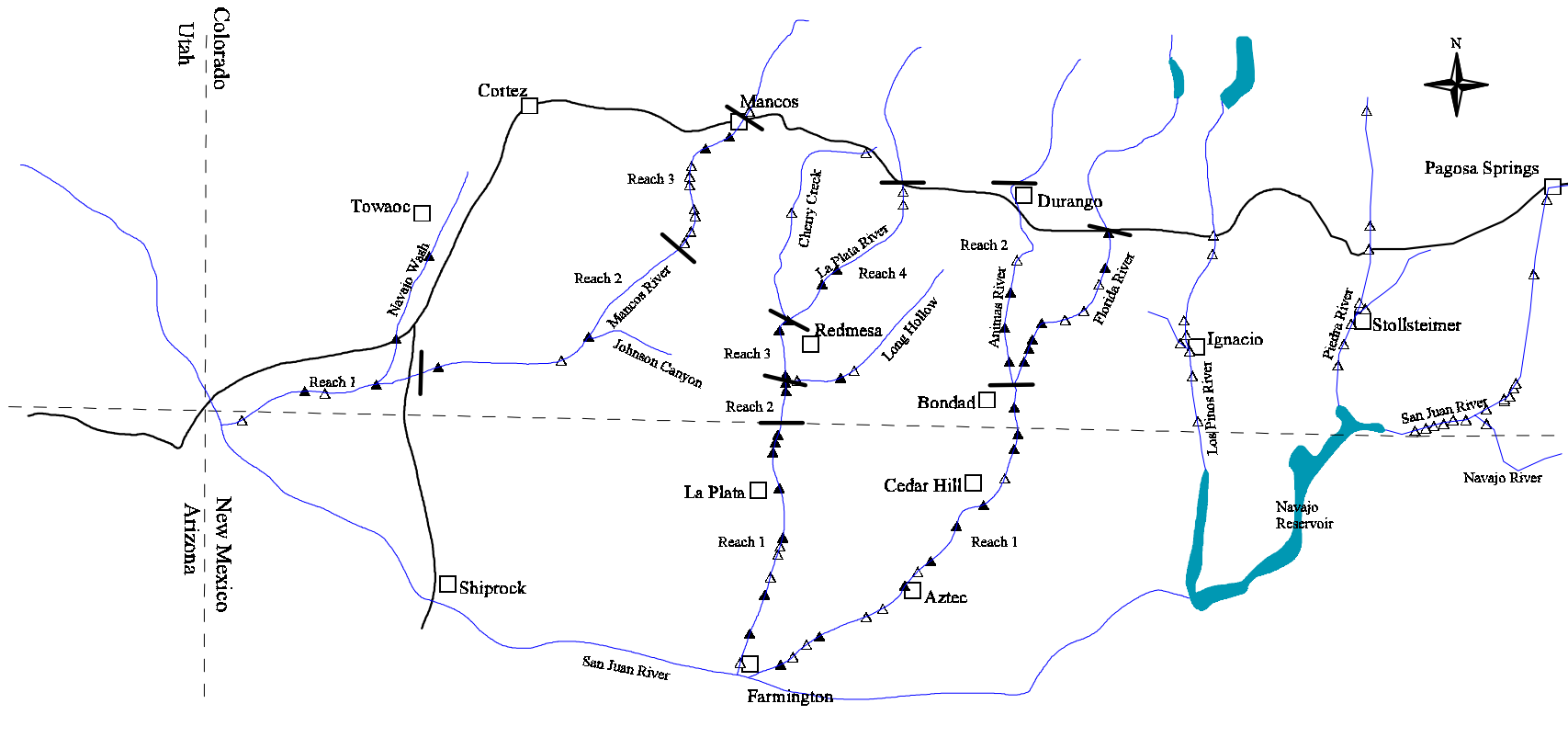
The data presented in this report are the result of two main sources of information. These sources consist of: 1) a literature review of historical fish surveys and, 2) data collected by Miller Ecological Consultants (MEC) as part of a native fish habitat study (Miller et al. 1995). The literature review includes historical reports of fish surveys in the previously mentioned tributaries of the San Juan River. All fish species reported within the study area were assigned a species code (Table 2).








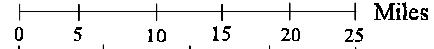
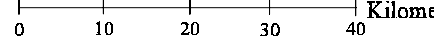
Tables are provided that summarize relative abundance of each species during each decade by tributary. During each decade that a species was collected a letter corresponding to the relative abundance was provided. The letter "A" indicates that the species was numerically dominant or abundant in samples. The letter "C" indicates that the species was common but not numerically dominant. The letter "R" indicates that the species was rarely collected in that river during that decade. The letter "P" was used when a species was reported in collections but numerical data were not provided.

Historical data and data collected by MEC are provided in Appendix A. All data was organized by location and time period. Appendix A contains a table with fish capture information, and a corresponding table that provides specific locations of sampling sites. In some cases data was not available or provided for certain sampling events. In instances where a precise date was not provided only the year was listed. When sampling events occurred but no fish were collected, the words "no fish" were placed in the column of the first fish species. Data that was considered questionable due to lack of information (site location, date, etc.) or was reported by inexperienced personnel was not presented in the results of this study.

Some of the larger tributaries below Navajo Reservoir have site locations that range over considerable distances. In these instances there was a noticeable change in species composition that probably resulted from change in elevation and gradient. These streams were divided into reaches based on changes in general physical characteristics. The data that is presented in Appendix A was sorted by reach and date.

**Figure 1. Study Area for Ichthyofaunal Surveys.**



<b>MILLER ECOLOGICAL CONSULTANTS INC.</b> 	<b>Legend</b>			<b>Scale</b>	
	 Roads  River	 Town  State Line	 Sample Site  Multiple Sample Site	 0 5 10 15 20 25 Miles  0 10 20 30 40 Kilometers	

**Table 2. Fish Species Codes.**

<b>CODE</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>
	<b>Salmonidae</b>	
ONCCLA	<i>Oncorhynchus clarki</i>	Cutthroat Trout
ONCMYK	<i>Oncorhynchus mykiss</i>	Rainbow Trout
ONCNER	<i>Oncorhynchus nerka</i>	Kokanee Salmon
SALFON	<i>Salvelinus fontinalis</i>	Brook Trout
SALTRU	<i>Salmo trutta</i>	Brown Trout
TRUXFON	<i>Salmo trutta x Salvelinus fontinalis</i>	Tiger Trout
	<b>Cyprinidae</b>	
CYPLUT	<i>Cyprinella lutrensis</i>	Red Shiner
CYPCAR	<i>Cyprinus carpio</i>	Common Carp
GILROB*	<i>Gila robusta</i>	Roundtail Chub
NOTCRY	<i>Notemigonus crysoleucas</i>	Golden Shiner
PIMPRO	<i>Pimephales promelas</i>	Fathead Minnow
RHIOSC*	<i>Rhinichthys osculus</i>	Speckled Dace
	<b>Catostomidae</b>	
CATCOM	<i>Catostomus commersoni</i>	White Sucker
CATDIS*	<i>Catostomus discobolus</i>	Bluehead Sucker
CATLAT*	<i>Catostomus latipinnis</i>	Flannelmouth Sucker
SUCKER		Unidentified Sucker
SUCKERX		Hybrid Sucker
	<b>Ictaluridae</b>	
AMEMEL	<i>Ameiurus melas</i>	Black Bullhead
ICTPUN	<i>Ictalurus punctatus</i>	Channel Catfish
	<b>Cyprinodontidae</b>	
FUNZEB	<i>Fundulus zebrinus</i>	Plains killifish
	<b>Poeciliidae</b>	
GAMAFF	<i>Gambusia affinis</i>	Mosquitofish
	<b>Centrarchidae</b>	
LEPCYA	<i>Lepomis cyanellus</i>	Green Sunfish
MICDOL	<i>Micropterus dolomieu</i>	Smallmouth Bass
	<b>Cottidae</b>	
COTBAI*	<i>Cottus bairdi</i>	Mottled Sculpin

\*Native species

## RESULTS

### Historical fish collections in tributaries of the San Juan River

The earliest credible fish surveys within the study area were conducted in the Animas River during 1934 and 1940. The locations for both of these sampling sites were between Aztec and Farmington. Collections confirmed the presence of *Catostomus latipinnis* (flannelmouth sucker), *Gila robusta* (roundtail chub), *Rhinichthys osculus* (speckled dace), and *Catostomus discobolus* (bluehead sucker). The latter two species were only collected in the 1934 sample. All fish reported during these sampling occasions were native fish (Table 3).

### Fish Sampling 1950 - 1969

Several sampling efforts were conducted on tributaries of the San Juan between 1950 and 1969. Most of the sites occurred on the Animas River; however, unlike the previous efforts these site locations were all located upstream from Aztec. Fish species in these collections consisted of native fish (flannelmouth sucker, bluehead sucker, *Cottus bairdi* (mottled sculpin), speckled dace, and roundtail chub) and the addition of six non-native fish species; *Catostomus commersoni* (white sucker), *Cyprinella lutrensis* (red shiner), *Oncorhynchus mykiss* (rainbow trout), *Pimephales promelas* (fathead minnow), *Salmo trutta* (brown trout), and *Gambusia affinis* (mosquitofish). The La Plata was also sampled once during 1966. Fish collected in the La Plata were all native species (flannelmouth sucker, bluehead sucker, and speckled dace). Roundtail chub were collected during only one sampling event within this time period. Fifteen individuals were collected on 15 Nov. 1963 at a location 1 mile North of Cedar Hill in the Animas River.

During 1961, fish sampling was also conducted on the San Juan River to provide pre-impoundment data on existing fish species (Olson 1962b). Results of these sampling efforts are noteworthy because they indicate the presence of Colorado pikeminnow and roundtail chub within an area which is now inundated. Olson (1968) later reported that roundtail chub constituted a large proportion (up to 77%) of gill net collections made at seven locations within Navajo Reservoir.

**Table 3 Historical Relative Abundance Assessments of Fish Species by Decade in the Animas River.**

Species	1930 - 1939	1940 - 1949	1950 - 1959	1960 - 1969	1970 - 1979	1980 - 1989	1990 - 1994
<b>Native Fish</b>							
Roundtail Chub	C	C	-	C	-	R	R
Speckled Dace	A	-	A	C	A	A	A
Bluehead Sucker	R	-	-	R	A	A	A
Flannelmouth Sucker	C	C	-	C	A	A	A
Mottled Sculpin	-	-	A	R	A	A	A
<b>NonNative Fish</b>							
Cutthroat Trout	-	-	-	-	R	C	C
Rainbow Trout	-	-	R	-	P	C	C
Kokanee Salmon	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-
Brown Trout	-	-	R	-	C	A	A
Red Shiner	-	-	P	-	-	R	-
Common Carp	-	-	-	-	P	C	C
Golden Shiner	-	-	-	-	-	-	-
Fathead Minnow	-	-	P	-	C	C	R
White Sucker	-	-	-	R	-	R	C
Black Bullhead	-	-	-	-	P	-	-
Channel Catfish	-	-	-	-	-	-	-
Plains killifish	-	-	-	-	P	-	-
Mosquitofish	-	-	-	C	-	C	-
Green Sunfish	-	-	-	-	-	-	-
Smallmouth Bass	-	-	-	-	-	-	-

P = present, abundance unknown, A = abundant, C = common, R = rare, - = not encountered.

## **Fish Sampling 1970 - 1979**

### San Juan Tributaries downstream of Navajo Reservoir

Between 1970 and 1979 a considerable amount of sampling was conducted in tributaries of the San Juan. Rivers that were sampled included the Animas, Florida, La Plata, Mancos, Los Pinos, Navajo and Piedra rivers. Some smaller streams were also sampled during the 1970s including Cherry Creek, Long Hollow Creek, Navajo Wash and McElmo Creek. The presence or absence of various species was dependent on river system as well as elevation.

**Animas River.** During the 1970s the Animas River was sampled 24 times at locations that ranged from south of Durango near highway 160 to its confluence with the San Juan River. Native fish were most consistently present in collections in the reach between the San Juan confluence and the Colorado - New Mexico state line (reach 1). The native fish species that were collected in this reach included the bluehead sucker, flannelmouth sucker, mottled sculpin, and speckled dace. Non-native species, with the exception of the fathead minnow, were less common in collections from this area. Non-native fish occurring in reach 1 during this time period consisted of common carp, black bullhead, plains killifish, rainbow trout, fathead minnow, and brown trout. The section of the Animas River from Durango downstream to the state line (reach 2) supported the same native fish species as reach 1; however, the flannelmouth sucker was only present on one sampling occasion. Four non-native fish appeared in collections within this reach. Three of these non-native species (rainbow trout, cutthroat trout, and fathead minnow) were not consistently reported from sampling efforts in this area. The brown trout was the only non-native fish commonly found in samples from reach 2. No roundtail chubs were collected from the Animas River during this time period.

**Florida River.** The Florida River was sampled two times during the 1970s, and only the results of one occasion (11 Dec. 1975 at the highway 160 bridge) provided enumerated fish data. Results of this sampling effort indicated the presence of three native fish species; bluehead sucker, flannelmouth sucker and speckled dace, and two non-native fish species; rainbow trout and brown trout.

**La Plata River.** The La Plata River was sampled 21 times at sites ranging from highway 160 to its confluence with the San Juan River during the 1970s. Eighteen of these sampling events took place between the Colorado - New Mexico border and the San Juan River (reach 1). Fish commonly collected within this area included native fish (bluehead sucker, flannelmouth sucker, and speckled dace), and non-native fish (plains killifish and fathead minnow). Two other fish that were uncommon (only one individual was collected in 18 sampling events) in this reach were roundtail chub and the red shiner (Table 4). The remaining three sampling events were conducted in 1975 at locations that were dispersed over approximately equal distances between the state line and highway 160. Fish species collected at the location immediately north of the state line were similar to those collected at the lower sites with the addition of one non-native species

(brown trout). Fish collections located in the upper reaches of the La Plata were dominated by native fish (mottled sculpin and speckled dace). Non-native fish at these sites included rainbow trout, fathead minnow, brook trout and brown trout. No roundtail chubs were collected upstream of the state line during this time period.

Two tributaries of the La Plata River were sampled at three locations during this decade. Two sample sites at Long Hollow Creek produced numerous individuals of the native species bluehead sucker and speckled dace. The one sampling event on Cherry Creek indicated the presence of three native fish: bluehead sucker, mottled sculpin and speckled dace.

**Mancos River.** Fish sampling was conducted on nine occasions in the Mancos River between 1970 and 1979 (Table 5). Collection events on the lower Mancos near the state-line established the presence of two native fish (flannelmouth sucker and speckled dace), and three non-native fish (common carp, red shiner and channel catfish). Site locations further upstream, above the bridge at Highway 666, produced the same native fish species as the lower sites with the addition of the bluehead sucker and roundtail chub. Non-native fish species in this reach consisted of the red shiner, channel catfish, and fathead minnow. At the site locations furthest upstream (near highway 160), fish collections produced bluehead sucker, mottled sculpin, speckled dace and one flannelmouth sucker. Non-native fish reported from the upper reach of the Mancos River included the rainbow trout and fathead minnow.

Navajo Wash, a tributary to the Mancos, was also sampled on four occasions from 1970 to 1979. Bluehead sucker, flannelmouth sucker, speckled dace and roundtail chub were common in collections during this time. Non-native fish that were collected included the common carp, red shiner, channel catfish, and rainbow trout.

**Mc Elmo Creek.** Fish sampling was conducted on ten occasions at Mc Elmo Creek between 1970 and 1979. Upstream locations on Mc Elmo Creek appeared to have lower numbers of fish than sites located near the San Juan River confluence. Native fish that most consistently occurred in samples from Mc Elmo Creek included flannelmouth sucker and speckled dace. Three non-native fish (common carp, red shiner, and fathead minnow) were also common in fish collections (Table 6). Two native fish (bluehead sucker and mottled sculpin) additionally occurred in fish collections but not with regularity.

**Table 4. Historical Relative Abundance Assessments of Fish Species by Decade in the La Plata River.**

Species	1930 - 1939	1940 - 1949	1950 - 1959	1960 - 1969	1970 - 1979	1980 - 1989	1990 - 1994
<b>Native Fish</b>							
Roundtail Chub				-	R	-	C
Speckled Dace				C	A	C	A
Bluehead Sucker				C	C	-	A
Flannelmouth Sucker				C	C	C	A
Mottled Sculpin				-	C	-	R
<b>NonNative Fish</b>							
Cutthroat Trout				-	-	-	-
Rainbow Trout				-	R	R	C
Kokanee Salmon				-	-	-	-
Brook Trout				-	R	R	R
Brown Trout				-	R	R	C
Red Shiner				-	R	-	R
Common Carp				-	-	-	-
Golden Shiner				-	-	-	-
Fathead Minnow				-	A	C	C
White Sucker				-	-	-	-
Black Bullhead				-	-	-	R
Channel Catfish				-	-	-	-
Plains killifish				-	C	-	-
Mosquitofish				-	-	-	-
Green Sunfish				-	-	-	-
Smallmouth Bass				-	-	-	-

P = present, abundance unknown, A = abundant, C = common, R = rare, - = not encountered.



**Table 5. Historical Relative Abundance Assessments of Fish Species by Decade in the Mancos River (including Navajo Wash).**

Species	1930 - 1939	1940 - 1949	1950 - 1959	1960 - 1969	1970 - 1979	1980 - 1989	1990 - 1994
<b>Native Fish</b>							
Roundtail Chub					P	C	C
Speckled Dace					A	A	A
Bluehead Sucker					C	C	C
Flannelmouth Sucker					C	C	C
Mottled Sculpin					C	P	C
<b>NonNative Fish</b>							
Cutthroat Trout					-	-	-
Rainbow Trout					R	P	R
Kokanee Salmon					-	-	-
Brook Trout					-	R	-
Brown Trout					-	-	-
Red Shiner					C	C	C
Common Carp					P	P	R
Golden Shiner					-	-	-
Fathead Minnow					C	C	C
White Sucker					-	-	-
Black Bullhead					-	-	-
Channel Catfish					R	R	R
Plains killifish					-	-	-
Mosquitofish					-	-	-
Green Sunfish					-	-	-
Smallmouth Bass					-	-	-

P = present, abundance unknown, A = abundant, C = common, R = rare, - = not encountered.

**Table 6. Historical Relative Abundance Assessments of Fish Species by Decade in Mc Elmo Creek.**

Species	1930 - 1939	1940 - 1949	1950 - 1959	1960 - 1969	1970 - 1979	1980 - 1989	1990 - 1994
<b>Native Fish</b>							
Roundtail Chub					-	-	-
Speckled Dace					C	C	C
Bluehead Sucker					P	C	C
Flannelmouth Sucker					C	C	A
Mottled Sculpin					R	-	-
<b>NonNative Fish</b>							
Cutthroat Trout					-	-	-
Rainbow Trout					-	-	-
Kokanee Salmon					-	-	-
Brook Trout					-	-	-
Brown Trout					-	-	-
Red Shiner					C	C	R
Common Carp					C	C	R
Golden Shiner					-	-	-
Fathead Minnow					-	-	-
White Sucker					-	-	-
Black Bullhead					-	-	-
Channel Catfish					-	-	-
Plains killifish					-	-	-
Mosquitofish					-	-	-
Green Sunfish					-	-	R
Smallmouth Bass					-	-	-

P = present, abundance unknown, A = abundant, C = common, R = rare, - = not encountered.

## San Juan Tributaries upstream of Navajo Reservoir

**Los Pinos River.** The Los Pinos was sampled on eight occasions during the 1970s. Site locations ranged from highway 160 down to Navajo Reservoir. Fish collections included native fish (bluehead sucker, flannelmouth sucker, mottled sculpin, and speckled dace) and non-native fish (white sucker, rainbow trout, and brown trout). The white sucker was the least common of all species collected in the Los Pinos during the 1970s. Only three specimens were collected during eight sampling occasions. Species that were most consistently captured during this time period include the mottled sculpin, speckled dace, and brown trout.

**Navajo River.** The Navajo River was sampled on nine occasions between 1970 and 1979. Site locations ranged from Juanita, Colorado (near the confluence with the San Juan River) upstream to Chromo, Colorado (near the Navajo River headwaters). Results of sampling efforts indicated the presence of five native fish (roundtail chub, bluehead sucker, flannelmouth sucker, mottled sculpin, and speckled dace), and five non-native fish (white sucker, rainbow trout, fathead minnow, brown trout, and brook trout). Most consistently present in fish collections was the mottled sculpin and speckled dace. Roundtail chubs were only collected at the location near Juanita, Colorado. The white sucker was the most consistently occurring non-native species. Only one specimen of common carp was collected during this time period.

**Piedra River.** The Piedra River was only sampled on two occasions during the 1970s. Native fish that were represented in collections included; bluehead sucker, mottled sculpin and speckled dace. Non-native fish collected in the Piedra included the white sucker, cutthroat trout, rainbow trout and brown trout. Flannelmouth suckers were not present during these collection events in the Piedra River.

General trends in fish collections during 1970 - 1979 indicated that native fish generally dominate the collections, but several non-native fish species had become established in tributaries of the San Juan River. The white sucker was most common in the tributaries upstream of Navajo Reservoir. Mottled sculpin and trout species were more abundant at higher elevations, while other fish species seemed to prefer the mid to lower stream reaches. Roundtail chub were collected in the La Plata, Mancos, and Navajo River systems. White sucker were collected in the Los Pinos, Navajo, and Piedra River systems. Table 7 provides a summary of fish abundance estimates in tributaries upstream of Navajo Reservoir. The San Juan River upstream of Navajo Reservoir was not sampled during the 1970s.

**Table 7. Historical Relative Abundance Assessments of Fish Species by Decade in tributaries upstream of Navajo Reservoir (Los Pinos River, Navajo River, and Piedra River).**

Species	1930 - 1939	1940 - 1949	1950 - 1959	1960 - 1969	1970 - 1979	1980 - 1989	1990 - 1994
<b>Native Fish</b>							
Roundtail Chub					-	-	-
Speckled Dace					C	C	A
Bluehead Sucker					C	R	C
Flannelmouth Sucker					C	C	C
Mottled Sculpin					A	A	A
<b>NonNative Fish</b>							
Cutthroat Trout					R	R	C
Rainbow Trout					C	C	A
Kokanee Salmon					-	-	C
Brook Trout					-	-	-
Brown Trout					C	C	C
Red Shiner					-	-	-
Common Carp					-	-	R
Golden Shiner					R	-	R
Fathead Minnow					R	R	C
White Sucker					C	A	C
Black Bullhead					-	-	R
Channel Catfish					-	R	R
Plains killifish					-	-	-
Mosquitofish					-	-	-
Green Sunfish					-	-	R
Smallmouth Bass					-	-	-

P = present, abundance unknown, A = abundant, C = common, R = rare, - = not encountered.

## **Fish Sampling 1980 - 1989**

During the decade 1980-1989 sampling events continued on tributaries to the San Juan River. Rivers that were sampled included the Animas, Florida, La Plata, and Piedra. Smaller streams that were sampled included Mc Elmo Creek, Navajo Wash, and Rock Creek (a tributary to the Los Pinos River). The San Juan River upstream of Navajo Reservoir was also sampled. Data from several sampling events during this decade was either unavailable or not recorded. Those sampling occasions will be excluded from the following discussion.

### **San Juan Tributaries Downstream of Navajo Reservoir**

**Animas River.** The Animas River was sampled four times in reach 1 and fifteen times in reach 2 between 1980 and 1989. Native fish collected in reach 1 included bluehead sucker, flannelmouth sucker, mottled sculpin, speckled dace and roundtail chub. Non-native fish collected in reach 1 included white sucker, common carp, red shiner, mosquitofish, fathead minnow, rainbow trout and brown trout. Native fish in reach 2 consisted of bluehead sucker, flannelmouth sucker, mottled sculpin, and speckled dace. Non-native fish included the white sucker, common carp, cutthroat trout, rainbow trout, and brown trout.

During the 1980s there were some noticeable changes in the presence and absence of fish species in the Animas River. Black bullhead and plains killifish had been collected on several occasions during the 1970s, but did not occur in any collections during the 1980s. Red shiner were recorded for the first time since 1954, and white suckers were present in over 30% of the fish collections from the Animas River. Only one roundtail chub was collected between 1980 and 1989. It was collected within a 2.5 mile section of reach 1 located between Bondad bridge and Cogburn. This was the first occasion on which a roundtail chub had been collected in the Animas River since 15 Nov. 1963.

**Florida River.** The Florida River was sampled on nine occasions between 1980 and 1989. Native fish present in collections were similar to those collected during the 1970s with the addition of two species (flannelmouth sucker and roundtail chub). Two non-native fish (fathead minnow and white sucker) that had not previously been collected in the Florida River were also present in fish collections.

**La Plata River.** The La Plata River was only sampled two times during the 1980s. Both sampling occasions occurred during 1988 in the upper reaches (reach 3 and 4) of the river. Fish species present in collections were similar to those collected in upper reaches of the La Plata during the 1970s. Native fish collected included flannelmouth sucker, mottled sculpin, and speckled dace. Non-native species included fathead minnow, rainbow trout, brook trout, and brown trout.

**Mancos River.** The Mancos River and one tributary (Navajo Wash) were sampled a total of ten times between 1980 and 1989. The presence, absence, and distribution of

species was similar to results reported during the 1970s. In the lower two reaches of the Mancos River (reach 1 and 2) four native fish species were collected in samples. These fish included bluehead sucker, flannelmouth sucker, roundtail chub and speckled dace. Native fish in the upper Mancos (reach 3) consisted of bluehead sucker, mottled sculpin and speckled dace. Non-native fish species collected in the lower reaches included common carp, red shiner, channel catfish, and rainbow trout. At site locations within reach 3 non-native fish that were collected included rainbow trout, brown trout, and fathead minnow. The two fish collections in Navajo Wash produced bluehead sucker, flannelmouth sucker, speckled dace and roundtail chub. Only native fish were collected in Navajo Wash during these sampling events. Roundtail chubs were present in both of the samples taken at Navajo Wash, and in all but one of the collections taken from the lower two reaches of the Mancos River during this time period.

**Mc Elmo Creek.** Mc Elmo Creek was sampled on seven occasions between 1980 and 1989. The presence and absence of various fish species was similar to data recorded during the 1970s. Native fish collected included bluehead sucker, flannelmouth sucker, and speckled dace. Non-native fish included common carp, red shiner, and speckled dace.

#### San Juan Tributaries Upstream of Navajo Reservoir

**Piedra River.** The Piedra River was sampled on seven occasions during the 1980s. Native fish collected included bluehead sucker, flannelmouth sucker, mottled sculpin and speckled dace. Non-native fish that were common in collections included rainbow trout, brown trout, and white sucker. Three non-native fish that were collected but considered uncommon in occurrence (each collected only once in seven sampling occasions) included the fathead minnow, channel catfish, and cutthroat trout. Two sampling events during 1983 reported that the white sucker was the most common fish in collections.

**Los Pinos River.** The Los Pinos River was not sampled between 1980 and 1989, however one location on Rock Creek, a tributary to the Los Pinos, was sampled. One native fish (the speckled dace) and two non-native fish (fathead minnow and white sucker) were collected.

**San Juan River.** The San Juan River upstream from Navajo Reservoir was sampled on three occasions between 1980 and 1989. Results of fish collections indicated the presence of four native fish species (bluehead sucker, flannelmouth sucker, mottled sculpin, and speckled dace), and two non-native species (rainbow trout and brown trout).

General trends in fish collections between 1980 - 1989 indicated that the presence and/or absence of native fish was more consistent among collections than non-native fish species. The white sucker appeared to become more prominent in collections, while black bullhead and plains killifish were not found in any collections during this period. White sucker were reported from the Animas, Florida, Piedra, Los Pinos, and San Juan river systems. Roundtail chub were collected in the Animas, Florida, and Mancos river systems.

## **Fish Sampling 1990 - 1994**

Between 1990 and 1994 there were more recorded fish collections on tributaries to the San Juan River than occurred in all the years prior to 1990 combined. Rivers that were sampled included the Animas, Florida, La Plata, Mancos, Los Pinos, Navajo, Piedra, and San Juan. Smaller streams reported here included Cherry Creek, Long Hollow Creek, Mc Elmo Creek, and Stollsteimer Creek.

### San Juan Tributaries Downstream of Navajo Reservoir

**Animas River.** Recorded sampling efforts in the Animas River indicate that this stream was sampled at least 70 times during the early 1990s. Native fish that appear to be common throughout the Animas River include the bluehead sucker, flannelmouth sucker, mottled sculpin and speckled dace. Only one individual of roundtail chub was collected on one occasion during this time period. This suggests that this species has become rare in occurrence in the Animas River. Non-native fish that occurred commonly in collections included the common carp, white sucker, rainbow trout, brown trout, and in the upper reaches cutthroat trout. Fathead minnows and green sunfish were also collected, but on a less frequent basis.

**Florida River.** The Florida River has been sampled 21 times since 1990. Native fish collected included the bluehead sucker, flannelmouth sucker, mottled sculpin, speckled dace and roundtail chub. Although roundtail chubs were often present in collections they always constituted a small proportion of the total fish collected. Non-native fish in collections consisted of black bullhead, common carp, white sucker, green sunfish, fathead minnow, cutthroat trout, rainbow trout, and brown trout. Of the non-native fish collected the white sucker and brown trout were most common in occurrence. The white sucker (which was not found in collections made during the 1970s, and was the least common non-native fish collected during the 1980s) was found in more than 75% of all fish collections made on the Florida River during the early 1990s.

**La Plata River.** Between 1990 and 1994 the La Plata River was sampled 68 times, and two tributaries (Cherry Creek and Long Hollow Creek) were sampled three times for a total of 71 sampling events in the La Plata drainage. Native fish that appear to be abundant throughout the La Plata River include the bluehead sucker, flannelmouth sucker, and speckled dace. Roundtail chub were present in some collections from reach 1 and 2, however only one specimen was collected in reach 3. In a small section of reach 2, from the state line north for about 2 miles, roundtail chubs were numerous in collections. Non-native fish collected in the La Plata consisted of rainbow trout, brown trout and fathead minnow. Other non-native species that were less common in collections included black bullhead, red shiner, and brook trout. The two sampling sites on Long Hollow Creek produced three native fish (bluehead sucker, flannelmouth sucker and speckled dace), and one non-native fish (brown trout). Only bluehead suckers were captured at the site on Cherry Creek.

**Mancos River.** The Mancos River was sampled 29 times, and in three different reaches during the early 1990s. Results of these sampling efforts were similar to results from previous decades. Native fish were generally more common in fish collections than non-native fish. Native fish collected throughout the Mancos River consisted of bluehead sucker, flannelmouth sucker, speckled dace, roundtail chub, and in reach 3 mottled sculpin. Non-native fish consisted of common carp, red shiner, channel catfish, rainbow trout and fathead minnows. Most of the non-native fish were collected in reach 1 with the exception of rainbow trout which were only found in reach 3. Roundtail chub were relatively common in collections throughout the Mancos River.

**Mc Elmo Creek.** Mc Elmo Creek was sampled on 4 occasions from 1990 to 1994. Results of sampling suggest that three native fish (bluehead sucker, flannelmouth sucker, and speckled dace) were common. One non-native fish (fathead minnow) was common in all collections. Three non-native fish (common carp, red shiner, and green sunfish) were collected less frequently.

#### San Juan Tributaries Upstream of Navajo Reservoir

**Los Pinos River.** The Los Pinos River was sampled six times during the early 1990s. Results of recent sampling are similar to the results of sampling from previous decades, especially regarding the presence of native fish. Native fish collected included bluehead sucker, flannelmouth sucker, mottled sculpin and speckled dace. The non-native fish (white sucker, rainbow trout, and brown trout) collected during the 1970s were all present in recent collections, however eight species of non-native fish that had not previously been collected in the Los Pinos River were detected during the 1990s. Non-native fish that were collected for the first time during the 1990s included the black bullhead, channel catfish, golden shiner, green sunfish, cutthroat trout, kokanee salmon, and fathead minnow.

**Piedra River.** The results of six sampling events on the Piedra River during the early 1990s suggest that there had been little change in fish composition since the early 1980s. Native fish in this system consisted of the bluehead sucker, flannelmouth sucker, mottled sculpin, and speckled dace. Non-native species included white sucker, rainbow trout, brown trout, and one species that had not previously been collected in the Piedra River, the common carp. Stollsteimer Creek (a tributary to the Piedra River) was sampled once in 1992. Results of the single sampling event indicated that four native fishes (bluehead sucker, flannelmouth sucker, mottled sculpin, and speckled dace) and two non-native fish (fathead minnow and white sucker) were present.

**Navajo River.** During 1992 and 1993, a total of seven sampling events were conducted on the Navajo River. Fish species reported during these recent surveys were similar to those which were found during the 1970s with the exception of three non-native fish (black bullhead, common carp, and green sunfish) that were only found during recent sampling events. Other non-native fish that appear to be more established in the Navajo River included the white sucker, rainbow trout, fathead minnow, and brown trout. Native



fish that were present in most samples include the bluehead sucker, mottled sculpin, and speckled dace. The flannelmouth sucker was also collected, but only on two sampling occasions.

**San Juan River.** The San Juan River upstream from Navajo Reservoir was sampled on 18 occasions during the early 1990s. Four native fish species (bluehead sucker, flannelmouth sucker, mottled sculpin and speckled dace) were common in collections, while one native species (roundtail chub) was only present (usually in low numbers) during half of the sampling events. Nine non-native species (black bullhead, channel catfish, white sucker, common carp, smallmouth bass, fathead minnow, kokanee salmon, rainbow trout, and brown trout) were present in collections. The black bullhead, channel catfish, common carp, smallmouth bass and kokanee salmon are all species that had not been collected in the San Juan River prior to sampling conducted during the 1990s. The white sucker, rainbow trout, and brown trout were common in occurrence and seem to have well established populations.

General trends in fish collections from 1990 to 1994 indicate that fish communities have undergone some changes in species composition in several tributaries to the San Juan. Roundtail chubs have been collected from the Animas, Florida, La Plata, and Mancos rivers downstream of Navajo Reservoir, and the Navajo and San Juan rivers upstream from Navajo Reservoir. In most of these systems however, roundtail chubs appear to be restricted to a few specific locations (possibly confined by altitude, habitat and competition with non-native fish). Prior to 1964 roundtail chubs were found in most of the samples taken at the Animas River, and non-native fish were rare. Samples taken during the early 1990s indicated that five non-native fish had become established in the Animas River, and roundtail chubs were reported in less than 2% of the sampling events.

The white sucker appears to have established populations in the Animas, Florida, Los Pinos, Navajo, Piedra, and San Juan River upstream from Navajo Reservoir. From fish collection data it appears that the white sucker had become established in tributaries upstream from Navajo Reservoir, but was rarely collected in other streams during the 1970s. Sampling during the 1990s indicated that the white sucker had become common in the Animas and Florida Rivers, but was still undetected in the Mancos River, La Plata River, and Mc Elmo Creek.

### **Fish Sampling 1995-1999**

Fish sampling efforts have continued from 1995 through 1999 on the Animas, and La Plata rivers as part of the data collection effort for the proposed Animas La Plata Project (S. Whiteman, Southern Ute Indian Tribe, personal communication). Much of the recent work has been included in the data provided in Appendix A. Most of the presence/absence data was similar to data from previous years. The only new fish species located in these studies that was not previously reported was the johnny darter (*Etheostoma nigrum*). This species was collected from the Animas River during 1997 and 1998. Most of the recent fish collection data from the Animas River support the

establishment of white suckers in that system. Some of this data suggests that the frequency of hybridization among suckers may be increasing. Results of recent collections from the La Plata River indicate that the fathead minnow may be the most abundant non-native species in that system.

## **DISCUSSION**

Historical fish fauna surveys provide a temporal account of native and non-native species, and their abundance and composition. A brief discussion of distribution, abundance and habitat use for each species collected during historical fish surveys within the study area is provided.

### **Historical Fish Distribution**

#### Native Fishes

*Gila robusta* (roundtail chub): Roundtail chub are native to the San Juan drainage. The earliest reports of this species in tributaries of the San Juan River came from collections made in the Animas River during 1934. Subsequent sampling efforts in the Animas River through 1963 indicated that a larger population than occurs today may have been present. Since 1963 more than 60 sampling attempts in the Animas River have resulted in the capture of only two specimens of roundtail chub. Apparently this species has become rare in the Animas River, and established populations that were found historically no longer occur. Since the early 1970s roundtail chubs have been reported in collections from the San Juan River above and below Navajo Reservoir, and from most tributaries to the San Juan River below Navajo Reservoir. Some of the largest populations were reported from the Mancos River and Navajo Wash. Representatives of this species have also been found in the Florida River (a tributary to the Animas), which may account for the occasional occurrence of this species in the Animas River.

A habitat study to document seasonal habitat use by native species was conducted during 1994 (Miller et al. 1995). The results of that study provide the habitat associations listed below. During the 1994 habitat study representatives of all size classes were present in the data. The young-of-year (YOY) size class was encountered primarily in low velocity habitats (glide and particularly pool habitat). Most of the roundtail chubs encountered during this study were within the juvenile size class. Juvenile and adult roundtail chubs in this study were mostly found inhabiting areas of low velocity. Roundtail chubs were typically found in pool habitat and were often associated with woody debris. Although few roundtail chub adults were collected during this study the trends in habitat use were similar to those observed by the juvenile size class. Most adult roundtail chubs were collected from pool habitat. Glide habitat was occasionally occupied, but no adults were collected from riffle habitat.

*Rhinichthys osculus* (speckled dace): The speckled dace is a native fish in the San Juan River and its tributaries. Historically, this species has been one of the most frequently encountered fish in collections from the San Juan drainage. The earliest report of this

species in fish collections came from the Animas River during 1934. At this time it was reported as the most abundant species captured during the sampling event. Historical records from each decade suggest that the speckled dace has been one of the most numerous species in most tributaries of the San Juan River. Additionally, in larger tributaries where low numbers of speckled dace have been reported this species was probably under represented in the data because their small size makes them difficult to capture using certain sampling techniques. Speckled dace were common in fish collections throughout the 1994 habitat use study, however individuals representing the YOY age class were never collected. Juvenile and adult speckled dace were found occupying all three major habitat types. Habitat use data for juvenile speckled dace suggested that this size class occurred primarily in riffle habitat and areas of relatively high velocity. Large numbers of speckled dace in the adult size class were located in all three major habitat types.

*Catostomus discobolus* (bluehead sucker): The bluehead sucker is native to the San Juan drainage. This species has been reported during most collections since the earliest sampling efforts in this drainage. The bluehead sucker has been reported from every major tributary of the San Juan River, and is often among the most abundant of the species collected.

The bluehead sucker was well represented in collections by all three size classes during the habitat study. YOY bluehead suckers were found using all three major habitat types, however, most were collected from glide habitat. Juvenile bluehead suckers were mostly collected from pool habitat in the spring and glide habitat in the fall. Habitat use data compiled for adult bluehead suckers indicated that all three habitat types were again utilized, however most individuals were found in areas of relatively slow velocity.

*Catostomus latipinnis* (flannelmouth sucker): Flannelmouth suckers are native to the San Juan drainage, and occur in all major tributaries. This species was well represented and often one of the dominant species in most historical sampling efforts from 1934 to the mid 1990s. The only locations where the flannelmouth sucker was absent or occurred in low numbers was at the most upstream site locations or in small tributaries.

This species was well represented in collections by all three size classes during the 1994 habitat study. YOY flannelmouth suckers were found using all three major habitat types, but most occurred in glide habitat. Although all three major habitat types were used by juvenile and adult flannelmouth sucker most were collected from areas of low velocity.

*Cottus bairdi* (mottled sculpin): This species was reported from the Animas River in 1961. Since then it has been reported from most tributaries of the San Juan River. This species appears to be most numerous in the Animas River and tributaries upstream from Navajo Reservoir. In tributaries below Navajo Reservoir, mottled sculpin populations were found to be locally common in areas of suitable habitat, particularly in the upstream reaches of the La Plata River. During the habitat use study this species was only

represented by individuals in the adult size class. These fish were collected from all three major habitat types, however most were found in glide habitat.

## Non-native Fishes

*Oncorhynchus clarki* (cutthroat trout): Earliest reports of this species from fish surveys within the study area occurred during the 1970s when small numbers of cutthroat trout appeared in collections from the Animas and Piedra rivers. Since these early collections this species has also been reported from Los Pinos River, and Florida River. Historically, this species has been most common in collections from the upstream reaches of the Animas River. It is likely that most cutthroat trout occurred in samples as a result of attempts to stock this species as a game fish. Cutthroat trout were represented by few individuals during the habitat use study. Limited data suggests that this species frequents pool habitat.

*Oncorhynchus mykiss* (rainbow trout): The rainbow trout is a non-native species which occurs in the San Juan River drainage. Historically, this species was heavily stocked as a game fish in most tributaries of the San Juan River. Rainbow trout were stocked in the Animas River on a yearly basis for nearly 25 years (Smith 1976), and more than 4 million rainbow trout were stocked into Navajo Reservoir between 1962 and 1968 (Graves and Haines 1969). The earliest report of this species within the study area came from fish collections on the Animas River during 1954. By 1980 rainbow trout had also been reported from the Florida, La Plata, and Mancos rivers, and every major tributary upstream of Navajo Reservoir. Size and number of fish obtained in some studies suggested that natural reproduction might have been occurring by the 1980s at higher elevations in some tributaries upstream of Navajo Reservoir (Johnson 1987). Sampling during the 1990s indicated that the rainbow trout is continuing to increase in occurrence in most systems. At some of the upper site locations on the Animas River and tributaries upstream of Navajo Reservoir this species has become one of the most abundant fish in collections. The rainbow trout was represented by two size classes, juvenile and adult, in the compiled 1994 habitat use data. Most of the few specimens collected in the juvenile size class were found occupying glide habitat. Although adults were encountered in all three major habitat types, most were collected from pool habitat.

*Oncorhynchus nerka* (kokanee salmon): This non-native species was only reported from three sampling events during the historical fish sampling of tributaries to the San Juan River. Each report of kokanee salmon came from a tributary upstream of Navajo Reservoir during the early 1990s. It is likely that reports of this species were the result of spawning migrations from fish that had been stocked into Navajo Reservoir. Kokanee salmon were not encountered during the MEC habitat use study.

*Salvelinus fontinalis* (brook trout): This non-native species has been stocked in the Animas system and the La Plata River on several occasions since the early 1960s (Smith 1976). The brook trout was first reported from fish surveys within the study area during 1972. During this time the brook trout appeared in several collections from the Navajo

River. Since 1972 this species has been collected (infrequently) from the La Plata River and Mancos River. This species is usually restricted to the cooler temperatures at the upper reaches of streams. The brook trout was represented during the 1994 habitat use study by only two individuals. One juvenile individual was captured in riffle habitat, and an adult was captured in pool habitat.

*Salmo trutta* (brown trout): Earliest reports of brown trout in tributaries of the San Juan River came from collections made in the Animas River during 1954. The brown trout was introduced to the La Plata River during 1958 and has maintained small populations there since that time (Smith 1976). This non-native species was apparently established in all major tributaries upstream of Navajo Reservoir prior to collections made during the 1970s. By the 1990s the brown trout was also common in collections from the Florida River and La Plata River. Brown trout were not reported during historical sampling efforts on the Mancos River or Mc Elmo Creek.

Brown trout were represented in the compiled habitat use data by all three age classes. Only two YOY brown trout were encountered and both were collected from riffle habitat. Juvenile and adult brown trout were mostly encountered in pool habitat, although they were well represented in each available habitat type.

*Cyprinella lutrensis* (red shiner): The first reported collection of this non-native species in the San Juan drainage came from sampling which occurred in the Animas River during 1954. The red shiner was collected from the Mancos River and Navajo Wash during 1975, and was reported from the La Plata River during 1976. The earliest collections from Mc Elmo Creek occurred during 1978. Representative of this species have been reported in the Mancos River and Mc Elmo Creek during every decade since they were initially discovered. At some of the lower sites on the Mancos River this species was one of the most abundant of the species collected during the 1994 habitat study. Most red shiners and were found in glide habitat.

*Cyprinus carpio* (common carp): The common carp was apparently established by 1961 in the area now inundated by Navajo Reservoir (Olson 1962a). The earliest fish surveys to report this non-native species in tributaries of the San Juan River occurred during the 1970s. During this time the common carp was reported from three major tributaries: the Animas River, Mancos River (and Navajo Wash), and Mc Elmo Creek. It has since been collected from other tributaries upstream and downstream of Navajo Reservoir. These tributaries include: the Navajo River, Piedra River, and Florida River. Since the 1970s small populations of common carp have apparently become established at some locations (most of these areas occurring on the Animas River). Sampling at these locations has revealed that this species constitutes a relatively small numeric portion of the total species composition. Low numbers of large individuals were typical in collections where this species had become established. Common carp were only represented by a few individuals in the juvenile and adults size class during the 1994 habitat study. Regardless of size, common carp were only collected from glide habitat.

*Notemigonus crysoleucas* (golden shiner): The golden shiner was only encountered on two occasions during the historical sampling of these San Juan River tributaries. Both collections of this non-native species occurred in tributaries upstream of Navajo reservoir. Three individuals were collected from the Navajo River during 1972, and two individuals were reported from the Los Pinos River during 1992. The golden shiner was not encountered during the habitat use study.

*Pimephales promelas* (fathead minnow): Earliest reports of this non-native species in the study area of the San Juan drainage came from the Animas River during 1954. By the late 1970s this species had been reported from the Navajo River, and appeared to be well established in the La Plata River, Mancos River, Navajo Wash and Mc Elmo Creek. By 1992 the fathead minnow had been reported from all major tributaries of the San Juan River. After becoming established, the fathead minnow became a dominant fish species in at many locations. Streams with large populations of fathead minnows include the La Plata River, the lower Mancos River and Mc Elmo Creek. Due to the small adult size of this species it is often overlooked by the sampling techniques used in large rivers. It is likely that sizable populations of fathead minnows also exist in some systems that are difficult to sample. Fathead minnows were represented in the MEC habitat use data by adult and juvenile size classes. Representatives of both size classes were found inhabiting all three major habitat types. Juveniles were found primarily in glide habitat, while adult fathead minnows were collected mostly from pool habitat.

*Catostomus commersoni* (white sucker): Historical fish sampling in the San Juan drainage suggests that this non-native species has become established in several major tributaries. The first report of this species in the study area came from the Animas River during 1961. It was also reported with some frequency in early collections from tributaries upstream of Navajo Reservoir. Olson (1962b) indicated that this species had become established in the area now inundated by Navajo Reservoir. It is likely that the white sucker had become established in certain areas upstream of Navajo Reservoir prior to collections made during the early 1970s. The earliest reports of this species occurring in the Florida River came from collections made during 1983. By the early 1990s sampling efforts indicated that this species had become more common in the Florida River than in the Animas River. Sampling efforts at other locations during the 1990s indicated that the white sucker had become established (even dominant at some locations) in tributaries upstream of Navajo reservoir, however this species had still not been reported from most of the lower tributaries. As of 1998 the white sucker had not been reported from the La Plata River, Mancos River or McElmo Creek.

During the habitat use study the white sucker was represented in collections by all three size classes, however most were juveniles. Only one individual in the “young of the year” (YOY) size class was collected during this study. This fish was captured while occupying riffle habitat. Juvenile white suckers were captured from each habitat type. The data suggests that most juvenile white suckers reside in glide habitat. Adults were found in glide habitat and pool habitat. No white sucker adults were encountered in riffle habitat.

*Ameiurus melas* (black bullhead): Early records of this species in the study area include several sampling events which occurred during the summer of 1976 on the Animas River. These were the only reports of black bullheads until the 1990s. Since 1992 small numbers of black bullheads have been reported from several major tributaries of the San Juan River. The tributaries from which black bullheads have been reported include; the Los Pinos River, Navajo River, Florida River and La Plata River. This non-native species was represented by a few juvenile and adult individuals throughout the 1994 habitat study. Collections of black bullheads occurred in glide and pool habitat.

*Ictalurus punctatus* (channel catfish): The earliest reports of channel catfish in tributaries of the San Juan River came from sampling efforts on the Mancos River in 1975; however, Olson (1962b) reported this species during a pre-impoundment study of the Navajo Reservoir area. By 1992 this non-native species had also been reported from two major tributaries (the Los Pinos and Piedra rivers) upstream of Navajo Reservoir. During the 1994 habitat study this species was represented in the data by only two records. On both occasions an adult fish was captured in the Mancos River while occupying pool habitat.

*Fundulus zebrinus* (plains killifish): During 1976 this non-native species was collected from the Animas River and La Plata River. These were the only reported collections of plains killifish in the study area. It was not collected during the MEC habitat use study.

*Gambusia affinis* (mosquito fish): Earliest reports of this species in the upper San Juan drainage came from the Animas River during 1961. Since that time it has only been reported from two other sampling events. Both of these occurred on the Animas River during the 1989. These are the only historical records of this non-native species in the San Juan drainage. The mosquito fish was not encountered during the habitat use study.

*Lepomis cyanellus* (green sunfish): This non-native species appeared in low numbers over a widespread area of the San Juan drainage during the early 1990s. It was collected in the Florida River during 1991, and the Los Pinos and Animas rivers during 1993. During 1994 it was also reported from the Navajo River, and Mc Elmo Creek. Only the juvenile size class of green sunfish was represented in the 1994 habitat use study. These fish were encountered in all three major habitat types.

*Micropterus dolomieu* (smallmouth bass): The smallmouth bass was only represented by one individual during historical sampling events in the San Juan drainage. This single specimen was collected from the San Juan River upstream of Navajo Reservoir during 1992. The smallmouth bass was not reported during the 1994 habitat use study.

## CONCLUSIONS

The following are general conclusions that are supported by fish surveys on tributaries of the San Juan River:

- Most fish surveys have occurred since 1970.
- In most reaches of San Juan River tributaries native fish are still the dominant species.
- Populations of roundtail chub in the Animas River may have substantially declined following the introduction of non-native fish species.
- Self-sustaining populations of non-native fish species currently exist in all major tributaries of the San Juan River.
- The white sucker is established in the Animas River, but has not yet been reported from the La Plata River.

Historical studies of fish in tributaries of the San Juan River provide an account of native and non-native species composition during a period of non-native introduction. The Animas River has been the site of more historical fish surveys and earlier sampling events than other tributaries. The earliest recorded sampling events (and other unconfirmed early reports) in the Animas River included only records of native fish species. By the 1950s, non-native fish had been detected in a reach of the Animas River upstream of the Colorado border. Non-native species have persisted in the Animas River since they were first reported; however, the composition and number of species have changed.

Because there are few records of fish surveys in other tributaries prior to 1970, it is likely that some non-native fish were already established in various tributaries before they were reported. However, one of the earliest surveys from the La Plata River (1966) only provided evidence of the existence of native fish. Although some non-native species had been stocked in the La Plata River prior to this time, most non-native species were probably not established over a widespread area.

The expansion of non-native fish in tributaries of the upper San Juan River has been concurrent with a decline in certain native fish species. There have been several historical reports that suggest that native fish may have been relatively abundant in areas where recent surveys indicated they were rare or nonexistent (Jordan 1891, Koster 1957, Dean 1961, Olson 1962a). Several researchers have also commented on the decline of certain native species (Sublette 1977, Platania and Bestgen 1988, Platania and Young 1990). In fact, the data presented here suggests that roundtail chubs may have been common in some reaches of the Animas River. A review of historical fish surveys suggests that the establishment of species (and species composition) is a dynamic process. Future surveys will be necessary answer more questions regarding the balance of native and non-native fish fauna in tributaries of the upper San Juan River.



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## **APPENDIX A**



**Table A-1 (continued). Abundance of fishes collected from sampling sites on tributaries downstream from Navajo Reservoir (1934-1989).**

River	Reach	Date	Site	Species																			
				Native					Introduced														
				GILROB	RHIOSC	CATDIS	CATLAT	COTBAI	ONCCLA	ONCMYK	SALFON	SALTRU	TRUXFON	CYPLUT	CYPCAR	PIMPRO	CATCOM	SUCKER	SUCKERX	AMEMEL	ICTPUN	FUNZEB	GAMAFF
Cherry Creek	1	11/12/75			2	32			7														
Florida	1	12/11/75	HWY 160 Bridge		69	1			19			3		40									
Florida	1	07/29/83	About 1 mi. abv Animas River	1	10											1							
Florida	1	11/08/83	About 1 mi. abv Animas River						1							2							
Florida	1	09/17/84	About 2.5 mi. abv Animas River		18			3								9							
Florida	1	07/27/87	0.6 mi. above Animas R. Confl.		7	1			4							2							
La Plata	1	07/25/66	4 mi. North of La Plata		11	9		17															
La Plata	1	05/03/76	3 miles north of La Plata		53	15		14								1							
La Plata	1	05/03/76	1/4 mile east of La Plata		376	69		10								60						1	
La Plata	1	05/03/76	2.6 miles south of La Plata		6			2								10						21	
La Plata	1	05/03/76	7 miles south of La Plata		195	10		3								44							
La Plata	1	05/06/76	4 miles west of Farmington		135	104		60							1	18						1	
La Plata	1	05/07/76	10.5 miles south of La Plata		8			1								307						1	
La Plata	1	05/07/76	2 mi W-2 mi N of Farmington		21	2		17								21							
La Plata	1	08/15/76	3 miles north of La Plata					55															
La Plata	1	08/15/76	3 miles north of La Plata	1	13	156										117							
La Plata	1	08/15/76	2.5 miles south of La Plata		2											4						23	
La Plata	1	08/16/76	4 miles north of Farmington		41											21						12	
La Plata	1	08/16/76	2 mi W-2 mi N of Farmington		2			2								9						35	
La Plata	1	08/17/76	1/2 mile east of La Plata		25			4								110						5	
La Plata	1	08/17/76	1/4 mile east of La Plata			16																	
La Plata	1	08/17/76	4.5 miles south of La Plata		8	1		2								72						7	
La Plata	1	08/17/76	8 miles south of La Plata													5						5	
La Plata	1	08/17/76	10 miles south of La Plata																			21	
La Plata	1	08/17/76	5 miles north of Farmington		4	1		21								60							
La Plata	2	07/30/75	Bridge - 1/4 mi. N. of Stateline		207	63		46															
La Plata	3	03/15/88	0.5 mi above Long Hollow Crk Confl.		20			33						4		3							
La Plata	4	07/30/75	Just below HWY 160						43			3	2	5									
La Plata	4	07/30/75	County Road 122		19				1				2			2							
La Plata	4	05/11/88	CSU Experiment Station ?						1		1	1											
Long Hollow	1	07/30/75	Road 122		61	52																	
Long Hollow	1	07/30/75	Road 121 (131 ?)		36	23																	
Mancos	1	07/28/75	0.5 mi. NE stateline		2			1							4	1						2	
Mancos	1	11/11/75	0.5 mi. NE stateline					2							2	2							
Mancos	1	08/13/87	1.5 mi. NE stateline		1			5								2						3	
Mancos	1	07/12/89	1.5 mi. above San Juan River	P	P			P							P	P	P					P	
Mancos	2	07/29/75	HWY 666 Bridge - upstream		2	32		5								72		2					4
Mancos	2	07/29/75	Johnson Canyon Confluence		12	2		11															



**Table A-2. Site location descriptions for sites downstream of Navajo Reservoir (1934-1989).**

River	County	Date	Site	Sample #	Method	Time	Area	Township	Range	Section	Quarter
Animas	San Juan, NM	06/04/1934	Aztec	I. Rodehoff				30N	11W		9
Animas	San Juan, NM	06/12/1940	3 mi. N.E. of Farmington	C. Jackson				29N	13W		1
Animas	La Plata, CO	07/15/1954	4.5 mi. South of Durango		EL			34N	9W		5
Animas	La Plata, CO	07/15/1954	6.7 mi. South of Durango		EL			34N	9W		8
Animas	San Juan, NM	07/06/1961	4 mi. north of Cedar Hill	H. Olson				32N	10W		10
Animas	San Juan, NM	11/15/1963	1 mile north of Cedar Hill	H. Olson				32N	10W		28
Animas	San Juan, NM	10/20/1974	At the stateline	S. Patterson				32N	10W		15
Animas	La Plata, CO	12/10/1975	Above Bondad - 2 miles		EL			33N	9W		30
Animas	La Plata, CO	12/10/1975	Purple Cliffs		EL			34N	9W		8
Animas	La Plata, CO	12/10/1975	Weaselskin bridge (sunnyside)		EL			34N	10W		36
Animas	San Juan, NM	05/03/1976	2.5 miles south of Cedar Hill	J. Hayhurst				31N	10W		18
Animas	San Juan, NM	05/03/1976	3 miles north of Cedar Hill	J. Hayhurst				32N	10W		15
Animas	San Juan, NM	05/03/1976	7 mi E - 10.5 mi N of Aztec	J. Hayhurst				32N	10W		10
Animas	San Juan, NM	05/03/1976	Cedar Hill - US 550 Bridge	J. Hayhurst				31N	10W		4
Animas	San Juan, NM	05/04/1976	Farmington	J. Hayhurst				29N	13W		12
Animas	San Juan, NM	05/04/1976	Farmington	J. Hayhurst				29N	13W		21
Animas	San Juan, NM	05/05/1976	Aztec - US 550 Bridge	J. Hayhurst				30N	11W		8
Animas	San Juan, NM	05/05/1976	Flora Vista	J. Hayhurst				30N	12W		23
Animas	San Juan, NM	08/11/1976	2 miles southwest of Cedar Hill	G. Ayoroa				31N	10W		4
Animas	San Juan, NM	08/11/1976	3 miles north of Cedar Hill	G. Ayoroa				32N	10W		15
Animas	San Juan, NM	08/11/1976	4.5 miles south of Cedar Hill	G. Ayoroa				31N	10W		4
Animas	San Juan, NM	08/13/1976	1 mi. South of Flora Vista	G. Ayoroa				30N	12W		27
Animas	San Juan, NM	08/13/1976	Aztec	G. Ayoroa				30N	11W		3
Animas	San Juan, NM	08/14/1976	Farmington	G. Ayoroa				29N	13W		11
Animas	San Juan, NM	08/14/1976	Farmington	G. Ayoroa				29N	13W		15
Animas	San Juan, NM	08/14/1976	Farmington	G. Ayoroa				29N	13W		21
Animas	San Juan, NM	10/02/1977	Aztec	E. Suttkus				30N	11W		9
Animas	La Plata, CO	10/31/1978	Above Bondad - 2 miles		EL			33N	9W		30
Animas	La Plata, CO	10/31/1978	Purple Cliffs		EL			34N	9W		8
Animas	La Plata, CO	10/31/1978	Weaselskin bridge (sunnyside)		EL			34N	10W		36
Animas	La Plata, CO	09/08/1980	Above Bondad - 2 miles		BOAT EL			33N	9W		30
Animas	La Plata, CO	09/08/1980	Weaselskin bridge (sunnyside)		BOAT EL			34N	10W		36
Animas	La Plata, CO	09/16/1980	Purple Cliffs area	BREC 1 B	BOAT EL			34N	9W		8
Animas	La Plata, CO	09/22/1980	Below Bondad Bridge	BREC 3 B	BOAT EL			32N	9W		6
Animas	La Plata, CO	09/22/1980	Below Florida River Confluence	BREC 3 B	BOAT EL			32N	9W		6
Animas	La Plata, CO	09/30/1980	Above Bondad - 2 miles		CDOW 1			33N	9W		30
Animas	La Plata, CO	09/30/1980	Purple Cliffs		CDOW 3			34N	9W		8
Animas	La Plata, CO	01/26/1982	Pueblo Paving to Purple Cliffs - 2.4 mi.	CDOW 3 B	BOAT EL			34N	9W		
Animas	La Plata, CO	11/17/1982	Bondad bridge to Cogburn prop. -2.25 mi.	CDOW 1 B	BOAT EL			32N	9W		6,7
Animas	La Plata, CO	12/14/1982	Pueblo Paving to Purple Cliffs - 2.4 mi.	CDOW 3 B	BOAT EL			34N	9W		
Animas	La Plata, CO	12/15/1983	Handlebar cycle to Purple Cliffs - 2.4 mi.	CDOW 3 B	BOAT EL			34N	9W		
Animas	La Plata, CO	02/25/1985	Handlebar cycle to Purple Cliffs - 2.4 mi.	CDOW 3 B	BOAT EL			34N	9W		
Animas	La Plata, CO	12/01/1987	Handlebar cycle to Purple Cliffs - 2.4 mi.	CDOW 3 B	BOAT EL			34N	9W		
Animas	La Plata, CO	10/17/1988	Handlebar cycle to Purple Cliffs - 2.4 mi.	CDOW 3 B	BOAT EL			34N	9W		
Animas	San Juan, NM	10/03/1989	South Miller Ave. Bridge	S. Platania							
Animas	San Juan, NM	10/03/1989	Flora Vista	S. Platania							

**Table A-2 (continued). Site location descriptions for sites downstream of Navajo Reservoir (1934-1989).**

River	County	Date	Site	Sample #	Method	Time	Area	Township	Range	Section	Quarter
Animas	San Juan, NM	10/03/1989	Aztec	S. Platania							
Animas	San Juan, NM	10/03/1989	3 Miles north of Aztec	S. Platania							
Animas	San Juan, NM	10/03/1989	Cedar Hill	S. Platania							
Animas	La Plata, CO	11/15/1989	Handlebar cycle to Purple Cliffs - 2.4 mi.	CDOW 3 B	BOAT	EL		34N	9W		
Cherry Crk.	La Plata, CO	11/12/1975				EL		34N	12W	6	
Florida	La Plata, CO	12/11/1975	HWY 160 Bridge	CDOW 1		EL		34N	8W	9	
Florida	La Plata, CO	07/19/1982	20.7 mi. abv Animas R. -Lunt Ranch	FLC 2				34N	8W	19	
Florida	La Plata, CO	07/29/1983	About 1 mi. abv Animas River	BIOWEST - 1				33N	9W	31	
Florida	La Plata, CO	11/08/1983	About 1 mi. abv Animas River					33N	9W	31	
Florida	La Plata, CO	09/17/1984	About 2.5 mi. abv Animas River					33N	9W	20	
Florida	La Plata, CO	07/27/1987	0.6 mi. above Animas R. Confl.	FLC 1				33N	9W	31	
La Plata	San Juan, NM	07/25/1966	4 mi. North of La Plata	S. Koehn				32N	13W	15	
La Plata	La Plata, CO	07/30/1975	Bridge - 1/4 mi. N. of Stateline	CDOW #1		EL		32N	13W	10	
La Plata	La Plata, CO	07/30/1975	County Road 122	CDOW #2		EL		34N	12W	26	NW
La Plata	La Plata, CO	07/30/1975	Just below HWY 160	CDOW #3		EL		35N	11W	14	SW
La Plata	San Juan, NM	05/03/1976	1/4 mile east of La Plata	J. Hayhurst				31N	13W	3	
La Plata	San Juan, NM	05/03/1976	2.6 miles south of La Plata	J. Hayhurst				31N	13W	23	
La Plata	San Juan, NM	05/03/1976	3 miles north of La Plata	J. Hayhurst				32N	13W	22	
La Plata	San Juan, NM	05/03/1976	7 miles south of La Plata	J. Hayhurst				31N	13W	27	
La Plata	San Juan, NM	05/06/1976	4 miles west of Farmington	J. Hayhurst				29N	13W	7	
La Plata	San Juan, NM	05/07/1976	10.5 miles south of La Plata	J. Hayhurst				30N	13W	21	
La Plata	San Juan, NM	05/07/1976	2 miles west-2 miles north of Farmington	J. Hayhurst				29N	13W	5	
La Plata	San Juan, NM	08/15/1976	2.5 miles south of La Plata	G. Ayoroa				31N	13W	23	
La Plata	San Juan, NM	08/15/1976	3 miles north of La Plata	G. Ayoroa				32N	13W	22	
La Plata	San Juan, NM	08/15/1976	3 miles north of La Plata	G. Ayoroa	SE			32N	13W	22	
La Plata	San Juan, NM	08/16/1976	2 mi. north - 2 mi. west of Farmington	G. Ayoroa				29N	13W	5	
La Plata	San Juan, NM	08/16/1976	4 miles north of Farmington	G. Ayoroa				30N	13W	23	
La Plata	San Juan, NM	08/17/1976	1/2 mile east of La Plata	G. Ayoroa				31N	13W	3	
La Plata	San Juan, NM	08/17/1976	1/4 mile east of La Plata	G. Ayoroa				31N	13W	3	
La Plata	San Juan, NM	08/17/1976	10 miles south of La Plata	G. Ayoroa				30N	13W	21	
La Plata	San Juan, NM	08/17/1976	4.5 miles south of La Plata	G. Ayoroa				31N	13W	27	
La Plata	San Juan, NM	08/17/1976	5 miles north of Farmington	G. Ayoroa				30N	13W	21	
La Plata	San Juan, NM	08/17/1976	8 miles south of La Plata	G. Ayoroa				30N	13W	8	
La Plata	La Plata, CO	03/15/1988	0.5 mi. above Long Hollow Crk Confl.	CDOW #1A		EL		33N	12W	32	
La Plata	La Plata, CO	05/11/1988	CSU Experiment Station ?								
Long Hollow	La Plata, CO	07/30/1975	Road 122			EL		33N	12W	27	
Long Hollow	La Plata, CO	07/30/1975	Road 121 (131 ?)			EL					
Mancos	Montezuma, CO	07/28/1975	0.5 mi. NE stateline	CDOW 1		EL		32N	19W	28	
Mancos	Montezuma, CO	07/29/1975	HWY 666 Bridge - upstream	CDOW 1		EL		32N	17W	7	
Mancos	Montezuma, CO	07/29/1975	2 mi. S. of HWY 160	CDOW 1		EL		35N	14W	14	
Mancos	Montezuma, CO	07/29/1975	Johnson Canyon Confluence	CDOW 2		EL		33N	15W	15	
Mancos	Montezuma, CO	07/29/1975	Mancos Jr. High Bridge	CDOW 2		EL		36N	13W	28	
Mancos	Montezuma, CO	11/11/1975	HWY 666 Bridge - upstream	CDOW 1		EL		32N	17W	7	
Mancos	Montezuma, CO	11/11/1975	0.5 mi. NE stateline	CDOW 1		EL		32N	19W	28	
Mancos	Montezuma, CO	11/11/1975	Johnson Canyon Confluence	CDOW 2		EL		33N	15W	15	
Mancos	Montezuma, CO	11/12/1975	Mancos Jr. High Bridge	CDOW 2		EL		36N	13W	28	



**Table A-2 (continued). Site location descriptions for sites downstream of Navajo Reservoir (1934-1989).**

River	County	Date	Site	Sample #	Method	Time	Area	Township	Range	Section	Quarter
Mancos	Montezuma, CO	10/08/1984	Near Mancos					36N	13W		
Mancos	Montezuma, CO	08/13/1987	HWY 666 Bridge - upstream	CDOW 1	EL			32N	17W	7	
Mancos	Montezuma, CO	08/13/1987	1.5 mi. NE stateline	CDOW 1	EL			32N	19W	20	
Mancos	Montezuma, CO	08/13/1987	Johnson Canyon Confluence	CDOW 2	EL			33N	15W	15	
Mancos	Montezuma, CO	07/11/1989	1 mi. S. of Jackson Reservoir	USFWS	EL						
Mancos	Montezuma, CO	07/11/1989	H Road Bridge	USFWS	EL			35N	13W	6	NW 1/4, NW 1/4
Mancos	Montezuma, CO	07/11/1989	Navajo Canyon Confluence	USFWS	EL			33N	15W	31	NW 1/4, NW 1/4
Mancos	San Juan, NM	07/12/1989	1.5 mi. above San Juan River	USFWS	EL			32N	20W	16	
McElmo	Montezuma, CO	08/30/1977	Colorado - Utah stateline	CDOW 1	EL			35N	20W	3	
McElmo	Montezuma, CO	11/02/1977	Colorado - Utah stateline	CDOW 1	EL			35N	20W	3	
McElmo	Montezuma, CO	11/02/1977	8.5 mi. above Colorado - Utah stateline	CDOW 2	EL			35N	19W	2	
McElmo	Montezuma, CO	11/02/1977	Goodman Canyon Confluence	CDOW 3	EL			36N	17W	2	
McElmo	Montezuma, CO	11/02/1977	South Oak St. in Cortez	CDOW 4	EL			35N	16W	2	
McElmo	Montezuma, CO	10/09/1978	8.5 mi. above Colorado - Utah stateline	CDOW 2	EL			35N	19W	2	
McElmo	Montezuma, CO	10/09/1978	Goodman Canyon Confluence	CDOW 3	EL			36N	17W	2	
McElmo	Montezuma, CO	10/09/1978	Colorado - Utah stateline	CDOW 1	EL			35N	20W	3	
McElmo	Montezuma, CO	09/12/1979	1/4 mi. above San Juan R. confluence	UTAH	EL			41S	25E	17	
McElmo	Montezuma, CO	09/12/1979	4.8 mi. above San Juan R. confluence	UTAH	EL			41S	25E	1	
McElmo	Montezuma, CO	07/01/1980	At San Juan River confluence	UTAH	EL			41S	25E	17	
McElmo	Montezuma, CO	07/01/1980	3 mi. above San Juan R. confluence	UTAH	EL			41S	25E	11	
McElmo	Montezuma, CO	09/24/1984	Near Ismay Trading Post	Fort Lewis College	EL			35N	20W	3	
McElmo	Montezuma, CO	08/12/1987	Colorado - Utah stateline	CDOW 1	EL			35N	20W	3	
McElmo	Montezuma, CO	08/12/1987	8.5 mi. above Colorado - Utah stateline	CDOW 2	EL			35N	19W	2	
McElmo	Montezuma, CO	08/12/1987	Goodman Canyon Confluence	CDOW 3	EL			36N	17W	2	
McElmo	Montezuma, CO	08/12/1987	South Oak St. in Cortez	CDOW 4	EL			35N	16W	2	
Navajo Wash	Montezuma, CO	07/28/1975	HWY 160	CDOW	EL			33N	18W	25	
Navajo Wash	Montezuma, CO	07/28/1975	2.5 mi. south of Towaoc, CO	CDOW	EL			331/2 N	17W	28	
Navajo Wash	Montezuma, CO	11/11/1975	HWY 160	CDOW	EL			33N	18W	25	
Navajo Wash	Montezuma, CO	11/11/1975	2.5 mi. south of Towaoc, CO	CDOW	EL			331/2 N	17W	28	
Navajo Wash	Montezuma, CO	08/10/1987	HWY 160		EL			33N	18W	25	
Navajo Wash	Montezuma, CO	08/10/1987	2.5 mi. south of Towaoc, CO		EL			331/2 N	17W	28	

**Table A-3. Abundance of fishes collected from sampling sites on tributaries upstream of Navajo Reservoir.**

River	Reach	Date	Site	Species																		
				Native					Introduced													
				GILROB	RHIOSC	CATDIS	CATLAT	COTBAI	ONCCLA	ONCMYK	ONCNER	SALFON	SALTRU	CYPCAR	NOTCRY	PIMPRO	CATCOM	SUCKERX	AMEMEL	ICTPUN	LEPCYA	MICDOL
Los Pinos		11/13/73	La Boca bridge		3		3							1			1					
Los Pinos		11/13/73	Severo Canal		2									3								
Los Pinos		11/13/73	Ignacio bridge		2		21	2			6			5								
Los Pinos		11/13/73						8			9			1								
Los Pinos		12/11/75	Hwy 160 bridge		1			73			46			13			2					
Los Pinos		12/11/75	6 miles South of Ignacio		2	3	1				2											
Los Pinos		12/11/75	3 miles South of Ignacio			1		2														
Los Pinos		12/11/75	1/4 mi. above Agency Bridge					1						3								
Los Pinos		03/19/92	Little braid' - below Hwy 160		28			36			1			61			18					
Los Pinos		07/14/92	Rodeo		20	7	1	8	1					7								
Los Pinos		07/14/92	Rock Creek		193	10								5		2	20	12		2		
Los Pinos		07/14/92	Railway Trestle		140	4	2	2						5		24	1				1	
Los Pinos		08/31/92	DLP2542			12	37	2			2			7			14	17		9		
Los Pinos		12/02/93	La Boca			1					6	22									1	
Navajo		10/20/71	Below OSO diversion dam					1						9						1		
Navajo		03/29/72	Edith, Colorado (stateline)					7			2			1						8		
Navajo		03/29/72	Below OSO diversion dam								1			3	6					1		
Navajo		04/18/72	Juanita, Colorado					65			5						3			60		
Navajo		06/20/72	Edith, Colorado (stateline)		9			14			4			13								
Navajo		06/20/72	Below OSO diversion dam					9						2	2							
Navajo		09/19/74	Edith, Colorado (stateline)		10	16	1	55			4					1						
Navajo		09/19/74	Below OSO diversion dam		22	18		22						11								
Navajo		10/18/77	Below OSO diversion dam		1	13		43						10								
Navajo		08/04/87	BIA A							1	1											
Navajo		08/04/87	BIA B							1	8											
Navajo		08/04/87	BIA C																			
Navajo		07/15/92	MRB0058		30	8		11			1				1		3	5				
Navajo		09/22/93	JEB1469		5	7		73									2			1		
Navajo		09/22/93	JEB1470		13	8		34			1			1			2		1			
Navajo		09/22/93	JEB1473		36	2		21			1					1	4					
Navajo		09/22/93	JEB1472		9	3	6									1	3		1			1
Navajo		09/22/93	JEB1471		4	1		15														
Navajo		09/22/93	JEB1471 (pool)		1			7	9							1	4					
Piedra		10/27/76	Bridge above Tres Piedres Ranch			24		53	1	12				13			1					
Piedra		10/27/76	Hwy 160		1			18						3								
Piedra		01/01/83	Near Stollsteimer			10	9	4									128			1		



**Table A-4. Site location descriptions for sites upstream of Navajo Reservoir.**

River	County	Date	Site	Sample #	Method	Time	Area	Township	Range	Section	Quarter
Los Pinos	La Plata	11/13/1973	La Boca Bridge	CDOW	EL			32N	7W	22	
Los Pinos	La Plata	11/13/1973	Severo Canal	CDOW	EL			32N	7W	10	
Los Pinos	La Plata	11/13/1973	Ignacio Bridge	CDOW	EL			33N	7W	8	
Los Pinos	La Plata	11/13/1973		CDOW	EL						
Los Pinos	La Plata	12/11/1975	HWY 160 Bridge	CDOW 4	EL			34N	7W	11	
Los Pinos	La Plata	12/11/1975	6 miles South of Ignacio	CDOW	EL			32N	7W	9	
Los Pinos	La Plata	12/11/1975	3 miles South of Ignacio	CDOW	EL			33N	7W	28	
Los Pinos	La Plata	12/11/1975	1/4 mi. above Agency Bridge - Ignacio	CDOW	EL			33N	7W	5	
Los Pinos	La Plata	03/19/1992	"Little Pine R. braid" - below HWY 160	CDOW 4A	EL			34N	7W	11	
Los Pinos	La Plata	07/14/1992	Rodeo	USFS (MRB0053-54)	EL			33N	7W	8	
Los Pinos	La Plata	07/14/1992	Rock Creek	USFS (MRB0055)	EL			33N	7W	17	
Los Pinos	La Plata	07/14/1992	Railway Trestle	USFS (MRB0056)	EL			32N	7W	22	
Los Pinos	La Plata	08/31/1992	DLP2542	(DLP2542)	EL	1735		32N	7W	7,8	
Los Pinos	La Plata	12/02/1993	La Boca	WJM/SUIT	EL	777		32N	7W	22	NE 1/4 OF NW 1/4
Navajo	Archuleta	10/20/1971	Below OSO diversion dam	CDOW 2	EL			32N	1W	23	
Navajo	Archuleta	03/29/1972	Edith, Colorado (stateline)	CDOW 1	EL			32N	1W	23	
Navajo	Archuleta	03/29/1972	Below OSO diversion dam	CDOW 2	EL			32N	1W	23	
Navajo	Archuleta	04/18/1972	Juanita, Colorado	CDOW	EL			32N	3W	14	
Navajo	Archuleta	06/20/1972	Edith, Colorado (stateline)	CDOW 1	EL			32N	1W	23	
Navajo	Archuleta	06/20/1972	Below OSO diversion dam	CDOW 2	EL			32N	1W	23	
Navajo		09/19/1974	Edith, Colorado (stateline)	CDOW 1	EL			32N	1W	23	
Navajo		09/19/1974	Below OSO diversion dam	CDOW 2	EL			32N	1W	23	
Navajo		10/18/1977	Below OSO diversion dam	CDOW 2	EL			32N	1W	23	
Navajo	Rio Arriba, NM	08/04/1987	1.5m upstream of Encarnacion Canyon	BIA A	EL			32N	2W	24	
Navajo	Rio Arriba, NM	08/04/1987	0.5m upstream of Encarnacion Canyon	BIA B	EL			32N	2W	23	
Navajo	Rio Arriba, NM	08/04/1987	Below La Juita Canyon	BIA C	EL			32N	2W	30	
Navajo	Archuleta	07/15/1992	MRB0058	USFWS - (MRB0058)	EL			32N	3W	3 or 14?	
Navajo	Rio Arriba, NM	09/22/1993	USFWS - JEB1469	USFWS - JEB1469	EL	1692		32N	1W	19	
Navajo	Rio Arriba, NM	09/22/1993	USFWS - JEB1470	USFWS - JEB1470	EL	1139		32N	2W	24	
Navajo	Rio Arriba, NM	09/22/1993	USFWS - JEB1473	USFWS - JEB1473	EL	863		32N	2W	23	SW 1/4
Navajo	Rio Arriba, NM	09/22/1993	USFWS - JEB1472	USFWS - JEB1472	EL	959		32N	2W	30	NW 1/4
Navajo	Archuleta	09/22/1993	USFWS - JEB1471	USFWS - JEB1471	EL	970		32N	3W	13	NW 1/4
Navajo	Archuleta	09/22/1993	USFWS - JEB1471 (pool)	USFWS - JEB1471 (pool)	EL	618		32N	3W	13	NW 1/4
Piedra	Archuleta	10/27/1976	Bridge above Tres Piedres Ranch	CDOW 2	EL			35N	4W	19	

**Table A-4 (continued). Site location descriptions for sites upstream of Navajo Reservoir.**

River	County	Date	Site	Sample #	Method	Time	Area	Township	Range	Section	Quarter
Piedra	Archuleta	10/27/1976	HWY 160					34N	4W	8	
Piedra	Archuleta	01/01/1983	Near Stollsteimer					34N	5W	35	
Piedra	Archuleta	01/01/1983	Near Pine Tree Canyon confluence					33N	5W	21	
Piedra	Archuleta	11/17/1983	1 mile North of HWY 160 Bridge	CDOW 1	EL			34N	4W	5	
Piedra	Archuleta	11/17/1983	Bridge above Tres Piedres Ranch	CDOW 2	EL			35N	4W	19	
Piedra	Archuleta	11/09/1987	Below Fassett Gulch Bridge	CDOW - A -1	EL			33N	5W	10	
Piedra	Archuleta	10/19/1988	Lower Piedra CG. - immediately below	CDOW - 1B	EL			33N	4W	5	
Piedra	Archuleta	10/19/1988	Below Tres Piedres Ranch Boundary	CDOW - 1C	EL			35N	4W	19	
Piedra	Archuleta	09/24/1991	1/4 mile above Indian Creek Confluence	CDOW - 3	EL			35N	4W	18	
Piedra	Archuleta	07/15/1992	Watt's	USFWS - (MRB0061)	EL			33N	5W	?	
Piedra	Archuleta	07/15/1992	Gallego's	USFWS - (MRB0062)	EL			33N	5W	?	
Piedra	Archuleta	07/16/1992	Taylor's	USFWS - (MRB0063)	EL			33N	5W	?	
Piedra	Archuleta	12/02/1993	Between Stollsteimer crk & Res. bndry	WJM/SUIT #2 (reference)	EL	690		33N	5W	2	NW1/4 of NE1/4
Piedra	Archuleta	12/02/1993	Bridge -about 2mi. below Stollsteimer crk	WJM/SUIT 1-1	EL	590		33N	5W	10	SW1/4 of SW1/4
Rock Creek	La Plata	06/24/1980	1/4 mi. west of HWY 172 -Los Pinos Trib.	CDOW 1				33N	7W	7	
San Juan	Archuleta	11/11/1987	1/2 mile East of Pagosa Junction	CDOW 1				32N	3W	5	
San Juan	Archuleta	10/11/1988	1/4 mile above Harvey Catchpole's Ranch	CDOW 5				35N	2W	24	
San Juan	Archuleta	10/24/1989	Perkins property	CDOW 3				34N	2W	23	East 1/2
San Juan	Archuleta	07/15/1992	MRB0059	USFWS - (MRB0059)	EL			32N			
San Juan	Archuleta	09/03/1992	Ends at Pagosa Junction	NMGF - (DLP2557)	BOAT EL	1856		32N	3W	8, 5, 4	
San Juan	Archuleta	09/03/1992	Begins at Pagosa Junction	NMGF - (DLP2558)	BOAT EL	1487		32N	3W	8, 7	
San Juan	Archuleta	09/03/1992	DLP2559	NMGF - (DLP2559)	BOAT EL	1351		32N	3W	18	
San Juan	Archuleta	09/03/1992	Ends 300m below Frijoles Canyon	NMGF - (DLP2560)	BOAT EL	853		32N	4W	19, 24	
San Juan	Archuleta	09/03/1992	Begins 300m below Frijoles Canyon	NMGF - (DLP2561)	BOAT EL	1808		32N	4W	24	
San Juan	Archuleta	09/03/1992	DLP2562 - A	NMGF - (DLP2562-A)	BOAT EL	1628		32N	4W	24	
San Juan	Archuleta	09/08/1992	LAA294	NMGF - LAA294	BOAT EL			33N	2W	21	SE
San Juan	Archuleta	09/08/1992	LAA295	NMGF - LAA295	BOAT EL			33N	2W	21	SE
San Juan	Archuleta	09/08/1992	LAA296	NMGF - LAA296	BOAT EL			33N	2W	28	NE
San Juan	Archuleta	09/08/1992	LAA297	NMGF - LAA297	BOAT EL			33N	2W	32	SW
San Juan	Archuleta	09/08/1992	Hersch Canyon	NMGF - LAA298	BOAT EL			33N	2W	31	SW
San Juan	Archuleta	09/08/1992	Trail Canyon	NMGF - LAA299	BOAT EL			32N	3W	1	NE
San Juan	Archuleta	09/09/1992	HWY 500 Bridge	NMGF - LAA300	BOAT EL			32N	3W	11	NW
San Juan	Archuleta	09/09/1992	Navajo Confluence	NMGF - LAA301	BOAT EL			32N	3W	10	SE
San Juan	Archuleta	09/09/1992	LAA302	NMGF - LAA302	BOAT EL			32N	3W	5	NW
San Juan	Archuleta	09/09/1992	0.6 mi. above Gomez Canyon	NMGF - LAA303	BOAT EL			32N	3W	9	SE
San Juan	Archuleta	12/02/1993	Upstream of Navajo Reservoir	WJM/SUIT 1-1	EL	880		32N	3W	18	NW1/4 of SE1/4
Stollsteimer	Archuleta	07/15/1993	Confluence with Piedra River	USFWS - (MRB0060)	EL			33N	5W	2	

**Table A-5. Abundance of fishes collected from sampling sites downstream from Navajo Reservoir (1990-Present).**

				Species																						
				Native					Introduced																	
River	Reach	Date	Site	GILROB	RHIOSC	CATDIS	CATLAT	COTBAI	ONCCLA	ONCMYK	SALFON	SALTRU	TRUXFO N	CYPLUT	CYPCAR	PIMPRO	CATCOM	SUCKER	SUCKER X	AMEMEL	ICTPUN	FUNZEB	GAMAFF	LEPCYA	ETHEXI	
Animas	1	07/08/92	Bondad to Stalentine			7	6	22		1		6			2											
Animas	1	08/31/92	Cedar Hill - Aztec 1		24	1	6	9																		
Animas	1	08/31/92	Irrigation Ditch		67	47	31	20				2				2	2									
Animas	1	09/01/92	Cedar Hill - Aztec 2			21	9	11				10														
Animas	1	09/01/92	Cedar Hill - Aztec 3		2	64	39	12				14														
Animas	1	09/01/92	Cedar Hill - Aztec 4		3	66	35	26				10			1											
Animas	1	09/01/92	Cedar Hill - Aztec 5		2	37	41	14				9			4		1									
Animas	1	09/01/92	Cedar Hill - Aztec 6		18	26	46	48				11			2					2						
Animas	1	09/01/92	Cedar Hill - Aztec 7		8	47	52	23		1		10			3		1			1						
Animas	1	09/01/92	Cedar Hill - Aztec 8		12	34	47	40				4				1										
Animas	1	09/01/92	Cedar Hill - Aztec 9		42	64	53	30				6					3									
Animas	1	09/01/92	Cedar Hill - Aztec 10		96	159	111	27		1		4				3	4			2						
Animas	1	09/01/92	Cedar Hill - Aztec 11		12	79	106	7				3					4									
Animas	1	09/01/92	Cedar Hill - Aztec 12		15	102	113	5		2		9														
Animas	1	08/25/94	1.7 road mi. South from stalentine		2	69	125	12		1		18					4									
Animas	1	08/25/94	Abuts on CO-1 to 3/4 mi. N of stalentine																							
Animas	1	08/25/94	USGS guage N of Twin Crossing			121	131	13		1		26			2		10			1						
Animas	1	08/26/94	Begin down of big bend near Hwy 550		2	43	68	10				12			3											
Animas	1	08/26/94	Begin at aquaduct upstrm of Ceder Hill		3	127	133	10				25					3									
Animas	1	08/27/94	Miller St. bridge to H2O trtmnt plant		14	30	18	1				1			7											
Animas	1	08/27/94	Midway between Aztec & Flora Vista		8	26	41	3		2		5			6											
Animas	1	08/27/94	3 mi. upstream of Hwy 550 bridge		30	114	49	4				7								2						
Animas	1	08/30/94	Twin Crossing up from railroad bridge			3	1																			
Animas	1	08/30/94	USGS Gauging Satlon			2	2										1									
Animas	1	08/30/94	1/4 mi. down from Florida confluence			3																				
Animas	1	08/30/94	200 yds down from Florida confluence					2																		
Animas	1	08/31/94	1.7 road mi. South from stalentine		1	22	83	11				11			3		4									
Animas	1	08/31/94	Abuts on CO-1 to 3/4 mi. N of stalentine	1																						
Animas	1	08/31/94	USGS guage N of Twin Crossing		2	139	184	9		2		28					6			2						
Animas	1	09/01/94	Midway between Aztec & Flora Vista		6	10	41	4		3		3			5											
Animas	1	09/01/94	3 mi. upstream of Hwy 550 bridge		5	96	59	5				5					1									
Animas	1	09/01/94	Begin down of big bend near Hwy 550			39	83	5		1		6			5											
Animas	1	09/01/94	Begin at aquaduct upstrm of Ceder Hill			23	79					6					2									
Animas	2	10/17/90	Handlebar cycle-Purple Cliffs-2.4 mi.								213	123							P							
Animas	2	10/23/91	4-Corners Marine-Purple Cliffs-2.4 mi.						1	22		242							P							
Animas	2	07/01/92	Purple Cliffs to Stalentine		P	P	P	P		P		P			P		P									
Animas	2	07/06/92	Purple Cliffs to Basin Creek			5	5	15		6		6			2											
Animas	2	07/07/92	Weasekskin bridge to Bondad			5	6	18		3		8														
Animas	2	07/16/92	Goat Canyon			29	11			6		2					1									

**Table A-5 (continued). Abundance of fishes collected from sampling sites downstream from Navajo Reservoir (1990-Present).**

				Species																					
				Native					Introduced																
River	Reach	Date	Site	GILROB	RHIOSC	CATDIS	CATLAT	COTBAI	ONCCLA	ONCMYK	SALFON	SALTRU	TRUXFO N	CYPLUT	CYPCAR	PIMPRO	CATCOM	SUCKER	SUCKER X	AMEMEL	ICTFUN	FUNZEB	GAMAFF	LEPCYA	ETHEXI
Animas	2	07/16/92	La Posta			11	3			1							1								
Animas	2	07/16/92	S. of La Posta			3	4			2															
Animas	2	07/16/92	High Flume Canyon			20	3					1													
Animas	2	07/16/92	Pipeline Crossing			11		77																	
Animas	2	07/16/92	W. of Bondad Hill			27	6					1					1								
Animas	2	07/16/92	200m above takeout			40	10	3																	
Animas	2	09/15/92	Basin Crk		8	2		103				2					1								
Animas	2	09/15/92	Weaselskin Bridge		4		4	167		2		1													
Animas	2	09/15/92	La Posta Canyon		4	1	5	57				4			6		3								
Animas	2	09/15/92	Bondad Bridge			2	8	66								2	1						1		
Animas	2	11/17/93	32nd St. bridge-9th St. bridge			100	10	39	14	179		341					12								
Animas	2	11/18/93	4 Corners Marine-Hwy 160 bridge			160	4		21	89		185					6						3		
Animas	2	08/23/94	Dairy plant launch near Purple Cliffs			108	50	44	2	58		48			3		5						1		
Animas	2	08/24/94	3/4 mi. N of La Posta to 1/4 mi. S			225	120	30	8	4		42					17						5		
Animas	2	08/24/94	S of Basin Cr. to N of Weaselskin brdg		1	168	113	9	18	12		31					9						1		
Animas	2	08/25/94	3/4 mi. up of Bondad Brdg to USGS guage																						
Animas	2	08/29/94	S of Basin Cr. to N of Weaselskin brdg			73	32	4	12	3		1					5								
Animas	2	08/29/94	Dairy plant launch near Purple Cliffs			64	19	6		30		22			1		3						1		
Animas	2	08/30/94	At chub #2 launch site			7	1										4								
Animas	2	08/30/94	3/4 mi. N of La Posta to 1/4 mi. S			71	30	7	3	1		9					3						3		
Animas	2	08/31/94	3/4 mi. up of Bondad Brdg to USGS guage																						
Animas	2	09/01/94	Gateway Park to Hwy 160			495	11	143	3	208		196					7						1		
Animas	2	09/01/94	Midway between Aztec & Flora Vista		6	10	41	4		3		3			5										
Animas	2	09/01/94	3 mi. upstream of Hwy 550 bridge		5	96	59	5				5					1								
Animas	2	09/01/94	Begin down of big bend near Hwy 550			39	83	5		1		6			5										
Animas	2	09/01/94	Begin at aquaduct upslrm of Ceder Hill			23	79					6					2								
Animas	2	09/07/94	32nd St. bridge to 9th St. bridge			207	17	102	1	315		267					43						6		
Animas	2	07/30/96	West bank upstream of Basin Creek		9	20		47																	
Animas	2	07/30/96	Below K-Mart parking lot					37				2											7		
Animas	2	07/30/96	Riffle behind Durango High School			20		38		6															
Animas	2	07/31/96	1/4 mi. above High Flume Canyon		7			46																	
Animas	2	07/31/96	West bank upstream of Weaselskin Bridge		7	1		87		2		9				1							11		
Animas	2	09/16/96	32nd St. bridge to 9th St. bridge		1	75	12	24	3	198		243					8						6		
Animas	2	09/01/96	Gateway Park to Hwy 160			68	2	57	7	262		310					1						2		
Animas	2	07/16/97	West bank upstream of Basin Creek					25								1							97		
Animas	2	07/15/97	Below K-Mart parking lot					19		10															
Animas	2	07/15/97	Riffle behind Durango High School		1			5																	
Animas	2	07/16/97	1/4 mi. above High Flume Canyon					10															116		
Animas	2	07/16/97	West bank upstream of Weaselskin Bridge					25		1		25				1							133		7
Animas	2	08/01/97	Reach 1-Purple cliffs to Basin Creek		P	P	P	P	P	P		P			P		P					P			
Animas	2	08/02/97	Reach 2-Basin Creek to Weaselskin Bridge		P	P	P	P	P	P		P			P		P					P			
Animas	2	08/03/97	Reach 3-Weasleskin Bridge to Bondad		P	P	P	P	P	P		P			P		P					P			
Animas	2	07/16/98	West bank upstream of Basin Creek					15															2		1

**Table A-5 (continued). Abundance of fishes collected from sampling sites downstream from Navajo Reservoir (1990-Present).**

				Species																					
				Native					Introduced																
River	Reach	Date	Site	GILROB	RHIOSC	CATDIS	CATLAT	COTBAI	ONCCLA	ONCMYK	SALFON	SALTRU	TRUXFO N	CYPLUT	CYPCAR	PIMPRO	CATCOM	SUCKER	SUCKER X	AMEMEL	ICTPUN	FUNZEB	GAMAFF	LEPCYA	ETHEXI
Animas	2	07/16/98	Below K-Mart parking lot		1			12		11		16						3	X						1
Animas	2	07/17/98	Riffle behind Durango High School					13		3							1	1							
Animas	2	07/16/98	1/4 mi. above High Flume Canyon		1			18										3							
Animas	2	07/16/98	West bank upstream of Weaselskin Bridge		21			16								20		4							1
Animas	2	09/01/98	Gateway Park to Hwy 160		2	172	6	106	4	208		130							3						
Animas	2	09/08/98	32nd St. bridge to 9th St. bridge		1	88	8	27	1	132		94					31		6						
Animas	2	09/21/98	RM 48.4-49.0 Sample 98ANI18			14	1		22	54		25													
Animas	2	09/21/98	RM 49.0-49.4 Sample 98ANI17			35	17		38	92		43													
Animas	2	09/21/98	RM 49.4-49.8 Sample 98ANI16			86	16		30	50		11			1		4								
Animas	2	09/21/98	RM 49.8-50.1 Sample 98ANI15			37	26		19	22		19			3		5								
Animas	2	09/21/98	RM 50.1-50.7 Sample 98ANI14			45	30		37	19		8					2								
Animas	2	09/21/98	RM 50.7-51.1 Sample 98ANI13			54	18		34	19		16					3								
Animas	2	09/21/98	RM 51.1-51.5 Sample 98ANI12			49	24		44	24		15					4		1						
Animas	2	09/21/98	RM 51.5-52.3 Sample 98ANI11			12			44	125		16													
Animas	2	09/21/98	RM 52.3-52.7 Sample 98ANI10			42	13		11	48		17					3								
Animas	2	09/21/98	RM 52.7-53.1 Sample 98ANI09			53	5		6	37		24					5								
Animas	2	09/21/98	RM 53.1-53.7 Sample 98ANI08			9	14		8	33		21					2		1						
Animas	2	09/21/98	RM 53.7-54.0 Sample 98ANI07			21	40		4	20		21					8								
Animas	2	09/21/98	RM 54.0-54.6 Sample 98ANI06			44	2		7	40		21					2								
Animas	2	09/21/98	RM 54.6-55.0 Sample 98ANI05			21	5		4	27		15					1								
Animas	2	09/21/98	RM 55.0-55.5 Sample 98ANI04			40	24		2	16		11			1		2								
Animas	2	09/21/98	RM 55.5-55.8 Sample 98ANI03			35	19		1	23		43			3		2		1						
Animas	2	09/21/98	RM 55.8-56.2 Sample 98ANI02			26	10		2	11		3					4								
Animas	2	09/21/98	RM 56.2-57.0 Sample 98ANI01			79	18		7	66		52					3		2						
Animas	3	09/07/94	32nd St. bridge to 9th St. bridge			N	P			N		N													
Animas	3	09/20/94	32rd St. bridge to 9th St. bridge			N	P			N		N													
Cherry Crk.	1	02/04/92	Lamour Ranch			5																			
Florida	1	07/29/90	20.7 mi. abv Animas R. -Lunt Ranch		13																				
Florida	1	07/29/90	0.6 mi. above Animas R. Confl.		23																				
Florida	1	1991	20.7 mi. abv Animas R. -Lunt Ranch		1					1		3												3	
Florida	1	1991	0.6 mi. above Animas R. Confl.		16												6								
Florida	1	07/15/92	Salt Crk Confluence		14	2	1					1				3	2				1				
Florida	1	08/07/92	3/4 mi. above Animas R. Confl.		1	10	20	9				1				1	3							1	
Florida	1	09/16/92	Bondad Hill		18	14	5					3				4	7		5						
Florida	1	09/17/92	Airport Road		66	1																			
Florida	1	09/17/92	Gasplant		6							5				1	3				1			1	
Florida	1	08/24/93	Short Ranch		2	34	8	4				3				1	1	5						1	
Florida	1	08/24/93	Paxton Ranch		1	25	4	1									3		1						
Florida	1	03/31/94	Paxton's: E of Hwy 550 at Bondad Hill			15	3	29			1	6													5
Florida	1	03/31/94	Short's: up from Sunny Side School Brdg			99	9					8				8	11								
Florida	1	07/15/94	Immediately downstream of 'Florida 1'		5	124	11	5			1	7				1		1							
Florida	1	07/15/94	Paxton's: E of Hwy 550 at Bondad Hill		7	187	11	8	1		1	9				1	2	4							
Florida	1	07/16/94	Short's: up from Sunny Side School Brdg			215	3	3				9				1	8								



**Table A-5 (continued). Abundance of fishes collected from sampling sites downstream from Navajo Reservoir (1990-Present).**

				Species																						
				Native					Introduced																	
River	Reach	Date	Site	GILROB	RHIOSC	CATDIS	CATLAT	COTBAI	ONCCLA	ONCMYK	SALFON	SALTRU	TRUXFO N	CYPLUT	CYPCAR	PIMPRO	CATCOM	SUCKER	SUCKER X	AMEMEL	ICTPUN	FUNZEB	GAMAFF	LEPCYA	ETHEXI	
Florida	1	07/16/94	Short's: immediately up from 'Florida 2'	1	314	28	7			1		17				7	21		1							
Florida	1	09/09/94	Immediately downstream of 'Florida 1'	1	41	116	15	1		1		6				6	4		1					2		
Florida	1	09/09/94	Paxton's: E of Hwy 550 at Bondad Hill	4	102	65	10	8				2				1	6		1							
Florida	1	09/12/94	Short's: up from Sunny Side School Brdg	5	185	99	17			2		12				14	16		7					7		
Florida	1	09/12/94	Short's: immediately up from 'Florida 2'	1	157	68	12			1		4				2	13		1							
La Plata	1	02/05/92	1.5 mi. S. La Plata, 1 mi. E. HWY 170		6																					
La Plata	1	02/05/92	1mi S of Jackson lk-0.5mi E of hwy 170																							
La Plata	1	04/29/92	0.5 - 1.5 mi. S. of NM - CO stateline		P	P	P			P		P				P										
La Plata	1	04/30/92	0.5 - 1.5 mi. S. of NM - CO stateline		P	P	P			P		P				P										
La Plata	1	09/02/92	0.5 - 1.5 mi. S. of NM - CO stateline		P	P	P			P		P				P										
La Plata	1	09/02/92	DLP2554		141	7	44			2																
La Plata	1	11/30/93	1.5 mi. S. of NM - CO stateline		166	33	43			2		7	1			3										
La Plata	1	03/28/94	New Mexico: 2 mi. S of stateline		133	24	38			2						3				1						
La Plata	1	03/28/94	Site 2: N. M., 0.9 mi. N of Hwy140 brdg		233	10	82			3		1				7										
La Plata	1	07/21/94	New Mexico: 2 mi. S of stateline		537	97	256			3		1				22										
La Plata	1	07/22/94	Immediately downstream of 'site 2'	1	628	123	259			1						4										
La Plata	1	07/22/94	Site 2: N. M., 0.9 mi. N of Hwy140 brdg		794	169	388					2				14										
La Plata	1	07/22/94	Immediately upstream of 'site 2'	3	1891	120	361									77										
La Plata	1	09/14/94	New Mexico: 2 mi. S of stateline		554	83	212			2						17										
La Plata	1	09/15/94	Immediately downstream of 'site 2'	7	554	55	208			2						12										
La Plata	1	09/15/94	Site 2: N. M., 0.9 mi. N of Hwy140 brdg	2	1081	32	520					1				27										
La Plata	1	09/15/94	Immediately upstream of 'site 2'	1	1604	59	370			1		2				57										
La Plata	1	11/19/98	RM 26.0-26.4 Sample 98LAP26-30	2	717	102	156			5		1				18										
La Plata	1	11/19/98	RM 26.4-26.5 Sample 98LAP31		110	14	22			1		2				11										
La Plata	2	02/05/92	Bridge - 1/4 mi. N. of Stateline	1	15	5	3																			
La Plata	2	02/06/92	1/4 mi. below Long Hollow Crk Confl.	1	45		6					3				4										
La Plata	2	09/02/92	DLP2555	1	222	26	78			2		1				10										
La Plata	2	09/02/92	DLP2556		270	22	129			1		1				5										
La Plata	2	09/16/92	Below Long Hollow Crk		260	49	59			3																
La Plata	2	10/25/93	Van C. Smith's - 1		28		87			4		2				1				1						
La Plata	2	10/26/93	Jerry Baird's - 6	23	173	28	179			1						2										
La Plata	2	10/26/93	Van C. Smith's - 2		154	2	63			2		1				1										
La Plata	2	10/26/93	Van C. Smith's - 3	3	66	14	65																			
La Plata	2	10/26/93	Van C. Smith's - 4	1	7	7	41			2																
La Plata	2	10/27/93	Elmer Thompson's		54		46			8		2				3										
La Plata	2	10/27/93	Jerry Baird's - 2		44		36			5		1														
La Plata	2	10/27/93	Jerry Baird's - 3	5	169	39	157			3						2				1						
La Plata	2	10/28/93	Jerry Baird's - 5	17	42	8	36																			
La Plata	2	10/28/93	Jerry Baird's - 1	2	188	44	41			1		1				2										
La Plata	2	10/28/93	Jerry Baird's - 4	19	12	5	42									1										
La Plata	2	11/29/93	Long Hollow Crk Confl, Downstream		23		87				1					2										
La Plata	2	11/30/93	1/4 mi. S. of NM - CO stateline		19	41	44			2	1					1										
La Plata	2	03/29/94	Baird's: 1mi. N of stateline on Hwy 140	3	64	7	56			3		1				1										

**Table A-5 (continued). Abundance of fishes collected from sampling sites downstream from Navajo Reservoir (1990-Present).**

				Species																						
				Native					Introduced																	
River	Reach	Date	Site	GILROB	RHIOSC	CATDIS	CATLAT	COTBAI	ONCCLA	ONCMYK	SALFON	SALTRU	TRUXFO N	CYPLUT	CYPCAR	PIMPRO	CATCOM	SUCKER	SUCKER X	AMEMEL	ICTPUN	FUNZEB	GAMAFF	LEPCYA	ETHEXI	
La Plata	2	03/29/94	3a-K: Immediately upstream of 'site 3'	20	216	19	105					1		1		1										
La Plata	2	03/30/94	Immediately upstream of 'site 3a-K'	44	403	29	120																			
La Plata	2	04/01/94	Up to Long Hollow confluence		193	28	61			1		4				17										
La Plata	2	07/13/94	Immediately downstream of 'site 3'	30	1335	87	340					1				15										
La Plata	2	07/14/94	Baird's: 1mi. N of stateline on Hwy 140	8	447	61	134			2		2				16										
La Plata	2	07/25/94	Immediately upstream of 'site 3'	93	1755	122	394									14										
La Plata	2	07/27/94	Up to Long Hollow confluence	5	1286	462	458	1		3		11				20				1						
La Plata	2	09/16/94	Immediately downstream of 'site 3'	19	491	33	287					3				41										
La Plata	2	09/19/94	Baird's: 1mi. N of stateline on Hwy 140	11	207	12	185					1				62										
La Plata	2	09/19/94	Immediately upstream of 'site 3'	93	806	107	477				1					51										
La Plata	2	09/21/94	Up to Long Hollow confluence	3	430	205	213			3		11				7					2					
La Plata	2	11/21/97	Cherry Creek Confluence to Stateline	171	1125	440	1425	1	8	66		22				53										
La Plata	2	11/17/98	RM 29.7-30.0 Sample 98LAP09-14	34	307	19	104			1						27										
La Plata	2	11/17/98	RM 30.0-30.2 Sample 98LAP15-16	18	168	24	98					1				2										
La Plata	2	11/18/98	RM 31.5-31.8 Sample 98LAP17-19		72	12	79				4	1														
La Plata	2	11/18/98	RM 31.8-32.2 Sample 98LAP20-25	5	242	98	121	1	1	9		1				1										
La Plata	3	02/06/92	Cherry Crk Confluence, Downstream		30	3		1																		
La Plata	3	09/17/92	Cherry Crk. Confluence		45	5		2								1										
La Plata	3	08/23/93	Lower Section SU1		402		25																			
La Plata	3	08/25/93	Southern Ute #4		340	77	49			5		3														
La Plata	3	08/25/93	Southern Ute #3		602	62	46			4		2														
La Plata	3	08/25/93	Southern Ute #2		171	22	33			3																
La Plata	3	08/25/93	Southern Ute #1		24		2			4																
La Plata	3	10/29/93	Conrad W. Huntington's #1		84	1	22	3		10																
La Plata	3	10/29/93	Conrad W. Huntington's #2		732	27	22	13		4																
La Plata	3	10/29/93	Conrad W. Huntington's #3				23			4		4														
La Plata	3	11/29/93	Long Hollow Crk Confl, Upstream		401	10	31					3				11										
La Plata	3	04/01/94	Huntington's: co. rd. 100 E to prvt land		92	6	17	5		1																
La Plata	3	04/02/94	Southern Ute land-east from Red Mesa		621	21	100	3		10	2	1				1				1						
La Plata	3	07/26/94	Southern Ute land-east from Red Mesa		1138	77	429	11		7						19										
La Plata	3	07/27/94	Huntington's: co. rd. 100 E to prvt land	1	1895	155	339	36		3						1										
La Plata	3	09/13/94	Southern Ute land-east from Red Mesa		1088	153	461	2		4						18										
La Plata	3	09/14/94	Huntington's: co. rd. 100 E to prvt land		2861	149	152	28		2						4										
La Plata	3	11/16/98	RM 37.3-37.5 Sample 98LAP01-04		273	93	50	1		5		3				5										
La Plata	3	11/16/98	RM 37.5-37.8 Sample 98LAP05-08	1	632	253	98	16		11						4										
La Plata	4	02/04/92	Hesperus-dwnstm of bigstick divers.					10		2	4	3														
La Plata	4	02/05/92	1 mi. below Mormon Reservoir		15	6					1															
La Plata	4	09/17/92	County Rd 122					3																		
La Plata	4	09/17/92	County Rd 119		12											15										
Long Hollow	1	09/06/92	1/4 mi. upstream of La Plata Confl.		11	5	6					1														
Long Hollow	1	09/06/92	3 mi. from mouth at road xing (rd 122?).		30																					
Mancos	1	03/24/94	Ute Mtn Ute land at CO-NM stateline		4	1	36							51		6										
Mancos	1	03/24/94	(UMUT) Mancos R.-Navajo Wash confl.	41	16	6	90							10	1	8										



**Table A-6. Site location descriptions for sites downstream of Navajo Reservoir (1990 - Present).**

River	County	Sample Date	Site	Sample #	Method	Time	Area	Township	Range	Section	Quarter
Animas	La Plata, CO	10/17/1990	Handlebar cycle to Purple Cliffs - 2.4 mi.	CDOW 3 B	BOAT EL			34N	9W		
Animas	La Plata, CO	10/23/1991	4-Corners Marine to Purple Cliffs - 2.4 mi.	CDOW 3 B	BOAT EL			34N	9W		
Animas	La Plata, CO	07/01/1992	Purple Cliffs to Stateline	CDOW 1 B (Nehring)	BOAT EL						
Animas	La Plata, CO	07/06/1992	Purple Cliffs to Basin Creek	BREC 13	BOAT EL						
Animas	La Plata, CO	07/07/1992	Weaselskin bridge to Bondad	BREC 14	BOAT EL						
Animas	La Plata, CO	07/08/1992	Bondad to Stateline	BREC 15	BOAT EL			32N	9W	6,7,18,19	
Animas	La Plata, CO	7/16/92	200m above takeout	(MRB0071)	EL			33N	10W	36	
Animas	La Plata, CO	7/16/92	Goat Canyon	(MRB0064)	EL			34N	10W	36	
Animas	La Plata, CO	7/16/92	High Flume Canyon	(MRB0068)	EL			33N	10W	13,24	
Animas	La Plata, CO	7/16/92	La Posta	(MRB0065)	EL			33N	10W	1,12	
Animas	La Plata, CO	7/16/92	Pipeline Crossing	(MRB0069)	EL			33N	10W	24	
Animas	La Plata, CO	7/16/92	S. of La Posta	(MRB0067)	EL			33N	10W	12	
Animas	La Plata, CO	7/16/92	W. of Bondad Hill	(MRB0070)	EL			33N	10W	25	
Animas	San Juan, NM	8/31/92	Cedar Hill - Aztec 1	(DLP2541)	EL	1285		31N	10W	7,8	NW
Animas	San Juan, NM	8/31/92	Irrigation Ditch	(DLP2540)	EL	3036		31N	10W	8	NW
Animas	San Juan, NM	9/1/92	Cedar Hill - Aztec 10	(DLP2551)	EL	1260		31N	11W	34	SW
Animas	San Juan, NM	9/1/92	Cedar Hill - Aztec 11	(DLP2552)	EL	1228		30N	11W	4	NE
Animas	San Juan, NM	9/1/92	Cedar Hill - Aztec 12	(DLP2553)	EL	1633		30N	11W	9	NW
Animas	San Juan, NM	9/1/92	Cedar Hill - Aztec 2	(DLP2543)	EL	552		31N	10W	5	NW
Animas	San Juan, NM	9/1/92	Cedar Hill - Aztec 3	(DLP2544)	EL	1215		31N	10W	5	NW/SW
Animas	San Juan, NM	9/1/92	Cedar Hill - Aztec 4	(DLP2545)	EL	1092		31N	10W	7,8	8NW,7SE
Animas	San Juan, NM	9/1/92	Cedar Hill - Aztec 5	(DLP2546)	EL	1893		31N	10W	7,18	7SE,18NE
Animas	San Juan, NM	9/1/92	Cedar Hill - Aztec 6	(DLP2547)	EL	1477		31N	10W	18	(T31N,R11W,SEC13,SE)
Animas	San Juan, NM	9/1/92	Cedar Hill - Aztec 7	(DLP2548)	EL	1754		31N	11W	24	NW
Animas	San Juan, NM	9/1/92	Cedar Hill - Aztec 8	(DLP2549)	EL	1248		31N	11W	26	NE
Animas	San Juan, NM	9/1/92	Cedar Hill - Aztec 9	(DLP2550)	EL	1418		31N	11W	27	SE
Animas	La Plata, CO	9/15/92	Basin Crk	(WJM001, WJM002, WJM003)	EL	1560		34N	10W	13	SE1/4,SE1/4
Animas	La Plata, CO	9/15/92	La Posta Canyon	(WJM007, WJM008)	EL	2700		33N	10W	12	NW1/4,SW1/4
Animas	La Plata, CO	9/15/92	Weaselskin Bridge	(WJM004, WJM005, WJM006)	EL	2100		34N	10W	36	NE1/4,NW1/4
Animas	La Plata, CO	9/16/92	Bondad Bridge	(WJM009, WJM010, WJM011)	EL	1860		33N	10W	36	SE1/4,E1/4
Animas	La Plata, CO	11/17/1993	32nd St. bridge to 9th St. bridge, Durango	CDOW	BOAT EL			35N	9W		
Animas	La Plata, CO	11/18/1993	4 Corners Marine to Hwy 160 "high bridge"	CDOW	BOAT EL			35N	9W		
Animas	La Plata, CO	08/23/1994	Dairy plant luanch near Purple Cliffs	CO - 4	BOAT EL			34N	9W	9, 5U & 8U	
Animas	La Plata, CO	08/24/1994	3/4 mi. N of La Posta to 1/4 mi. S	CO - 2	BOAT EL			33N	10W	1 & 12	
Animas	La Plata, CO	08/24/1994	S of Basin Cr. to N of Weaselskin brdg	CO - 3	BOAT EL			34N	10-9W	24, 25, 19,30	
Animas	San Juan, NM	08/25/1994	1.7 road mi. South from stateline	NM - 6	BOAT EL			32N	10W	15	
Animas	San Juan, NM	08/25/1994	Abuts on CO-1 to 3/4 mi. N of stateline	Chub #1	BOAT EL			32N	9W	18	
Animas	La Plata, CO	08/25/1994	USGS guage N of Twin Crossing	CO - 1	BOAT EL			32N	9-10W	7 & 12	
Animas	La Plata, CO	08/25/1994	3/4 mi. up of Bondad Brdg to USGS guage	Chub #2	BOAT EL			33-32N	9-10W	36,6, & 7	
Animas	San Juan, NM	08/26/1994	Begin down of big bend near Hwy 550	NM - 4	BOAT EL			31N	10W	18	
Animas	San Juan, NM	08/26/1994	Begin at aquaduct upstrm of Ceder Hill	NM - 5	BOAT EL			31N	10W	4 & 5	
Animas	San Juan, NM	08/27/1994	Miller St. bridge to H2O trtmnt plant	NM - 1	BOAT EL			29N	13W	21	
Animas	San Juan, NM	08/27/1994	Midway between Aztec & Flora Vista	NM - 2	BOAT EL			30N	12W	13 & 24	
Animas	San Juan, NM	08/27/1994	3 mi. upstream of Hwy 550 bridge	NM - 3	BOAT EL			31N	11W	34	
Animas	La Plata, CO	08/29/1994	S of Basin Cr. to N of Weaselskin brdg	CO - 3	BOAT EL			34N	10-9W	24,25,19,30	

**Table A-6 (continued). Site location descriptions for sites downstream of Navajo Reservoir (1990 - Present).**

River	County	Sample Date	Site	Sample #	Method	Time	Area	Township	Range	Section	Quarter
Animas	La Plata, CO	08/29/1994	Dairy plant luanchn near Purple Cliffs	CO - 4	BOAT EL			34N	9W	9,5U & 8U	
Animas	La Plata, CO	08/30/1994	Twin Crossing up from railroad bridge	NET - 1	3/4" Trammel net			32N	10W	12	
Animas	La Plata, CO	08/30/1994	USGS Gauging Station	NET - 2	3/4" Trammel net			32N	9W	7	
Animas	La Plata, CO	08/30/1994	1/4 mi. down from Florida confluence	NET - 3	3/4" Trammel net			32N	9W	6	
Animas	La Plata, CO	08/30/1994	200 yds down from Florida confluence	NET - 4	3/4" Trammel net			32N	9W	6	
Animas	La Plata, CO	08/30/1994	At chub #2 launch site	NET - 5	3/4" Trammel net			32N	10W	36	
Animas	La Plata, CO	08/30/1994	3/4 mi. N of La Posta to 1/4 mi. S	CO - 2	BOAT EL			33N	10W	1 & 12	
Animas	San Juan, NM	08/31/1994	1.7 road mi. South from stateline	NM - 6	BOAT EL			32N	10W	15	
Animas	La Plata, CO	08/31/1994	Abuts on CO-1 to 3/4 mi. N of stateline	Chub #1	BOAT EL			32N	9W	18	
Animas	La Plata, CO	08/31/1994	USGS guage N of Twin Crossing	CO - 1	BOAT EL			32N	9-10W	7 & 12	
Animas	La Plata, CO	08/31/1994	3/4 mi. up of Bondad Brdg to USGS guage	Chub #2	BOAT EL			33-32N	9-10W	36.6. & 7	
Animas	La Plata, CO	09/1994	Gateway Park to Hwy 160	CO - 5	BOAT EL			35N	9W	30,29 & 32	
Animas	San Juan, NM	09/01/1994	Midway between Aztec & Flora Vista	NM - 2	BOAT EL			30N	12W	13 & 24	
Animas	San Juan, NM	09/01/1994	3 mi. upstream of Hwy 550 bridge	NM - 3	BOAT EL			31N	11W	34	
Animas	San Juan, NM	09/01/1994	Begin down of big bend near Hwy 550	NM - 4	BOAT EL			31N	10W	18	
Animas	San Juan, NM	09/01/1994	Begin at aquaduct upstrm of Ceder Hill	NM - 5	BOAT EL			31N	10W	4 & 5	
Animas	La Plata, CO	09/07/1994	32nd St. bridge to 9th St. bridge, Durango	CDOW	BOAT EL			35N	9W		
Animas	La Plata, CO	07/30/1996	West bank upstream of Basin Creek	CDOW 3F	EL						
Animas	La Plata, CO	07/30/1996	Below K-Mart parking lot	CDOW 4F	EL						
Animas	La Plata, CO	07/30/1996	Riffle behind Durango High School	CDOW 5F	EL						
Animas	La Plata, CO	07/31/1996	1/4 mi. above High Flume Canyon	CDOW 1F	EL			37N	10W	13	
Animas	La Plata, CO	07/31/1996	West bank upstream of Weaselskin Bridge	CDOW 2F	EL						
Animas	La Plata, CO	09/1996	Gateway Park to Hwy 160	CO - 5	BOAT EL			35N	9W	30,29 & 32	
Animas	La Plata, CO	09/16/1996	32nd St. bridge to 9th St. bridge, Durango	CDOW	BOAT EL			35N	9W		
Animas	La Plata, CO	07/16/1997	West bank upstream of Basin Creek	CDOW 3F	EL						
Animas	La Plata, CO	07/15/1997	Below K-Mart parking lot	CDOW 4F	EL						
Animas	La Plata, CO	07/15/1997	Riffle behind Durango High School	CDOW 5F	EL						
Animas	La Plata, CO	07/16/1997	1/4 mi. above High Flume Canyon	CDOW 1F	EL			37N	10W	13	
Animas	La Plata, CO	07/16/1997	West bank upstream of Weaselskin Bridge	CDOW 2F	EL						
Animas	La Plata, CO	08/1997	Reach 1-Purple cliffs to Basin Creek	S. Whiteman	EL						
Animas	La Plata, CO	08/1997	Reach 2-Basin Creek to Weaselskin Bridge	S. Whiteman	EL						
Animas	La Plata, CO	08/1997	Reach 3-Weasleskin Bridge to Bondad	S. Whiteman	EL						
Animas	La Plata, CO	07/16/1998	West bank upstream of Basin Creek	CDOW 3F	EL						
Animas	La Plata, CO	07/16/1998	Below K-Mart parking lot	CDOW 4F	EL						
Animas	La Plata, CO	07/17/1998	Riffle behind Durango High School	CDOW 5F	EL						
Animas	La Plata, CO	07/16/1998	1/4 mi. above High Flume Canyon	CDOW 1F	EL			37N	10W	13	
Animas	La Plata, CO	07/16/1998	West bank upstream of Weaselskin Bridge	CDOW 2F	EL						
Animas	La Plata, CO	09/1998	Gateway Park to Hwy 160	CO - 5	BOAT EL			35N	9W	30,29 & 32	
Animas	La Plata, CO	09/08/1998	32nd St. bridge to 9th St. bridge, Durango	CDOW	BOAT EL			35N	9W		
Animas	La Plata, CO	09/21/1998	RM 48.4-49.0 Sample 98ANI18	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 49.0-49.4 Sample 98ANI17	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 49.4-49.8 Sample 98ANI16	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 49.8-50.1 Sample 98ANI15	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 50.1-50.7 Sample 98ANI14	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 50.7-51.1 Sample 98ANI13	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 51.1-51.5 Sample 98ANI12	S. Whiteman	BOAT EL						

**Table A-6 (continued). Site location descriptions for sites downstream of Navajo Reservoir (1990 - Present).**

River	County	Sample Date	Site	Sample #	Method	Time	Area	Township	Range	Section	Quarter
Animas	La Plata, CO	09/21/1998	RM 51.5-52.3 Sample 98ANI11	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 52.3-52.7 Sample 98ANI10	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 52.7-53.1 Sample 98ANI09	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 53.1-53.7 Sample 98ANI08	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 53.7-54.0 Sample 98ANI07	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 54.0-54.6 Sample 98ANI06	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 54.6-55.0 Sample 98ANI05	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 55.0-55.5 Sample 98ANI04	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 55.5-55.8 Sample 98ANI03	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 55.8-56.2 Sample 98ANI02	S. Whiteman	BOAT EL						
Animas	La Plata, CO	09/21/1998	RM 56.2-57.0 Sample 98ANI01	S. Whiteman	BOAT EL						
Cherry Crk.	La Plata, CO	02/04/1992	Lamour Ranch	BOR #3	EL						
Florida	La Plata, CO	07/29/1990	0.6 mi. above Animas R. Confl.	FLC 1				33N	9W	31	
Florida	La Plata, CO	07/29/1990	20.7 mi. abv Animas R. -Lunt Ranch	FLC 2				34N	8W	19	
Florida	La Plata, CO	1991	0.6 mi. above Animas R. Confl.	FLC 1				33N	9W	31	
Florida	La Plata, CO	1991	20.7 mi. abv Animas R. -Lunt Ranch	FLC 2				34N	8W	19	
Florida	La Plata, CO	7/15/92	Salt Crk Confluence	(MRB0057)	EL			33N	9W	2	
Florida	La Plata, CO	08/07/1992	3/4 mi. above Animas R. Confl.	BREC 1	EL			33N	9W	31	
Florida	La Plata, CO	9/16/92	Bondad Hill	(WJM012)	EL	1500		33N	9W	30	SE1/4 SE1/4
Florida	La Plata, CO	9/17/92	Airport Road	(WJM019)	EL	900		34N	8W	19	SE1/4 SE1/4
Florida	La Plata, CO	9/17/92	Gasplant	(WJM018)	EL	540		33N	9W	1	SW1/4 NW1/4
Florida	La Plata, CO	08/24/1993	Paxton Ranch	WJM	EL	1200		33N	9W	30	S1/2, SE1/4
Florida	La Plata, CO	08/24/1993	Short Ranch	WJM	EL	1980		33N	9W	8	NE1/4, SE1/4
Florida	La Plata, CO	03/31/1994	Paxton's: E of Hwy 550 at Bondad Hill	WJM Florida 1	EL			33N	9W	30	SE1/4 of SE1/4
Florida	La Plata, CO	03/31/1994	Short's: up from Sunny Side School Brdg	WJM Florida 2	EL			33N	9W	8	NE1/4 of SE1/4
Florida	La Plata, CO	07/15/1994	Immediately downstream of 'Florida 1'	WJM 1-1	EL						
Florida	La Plata, CO	07/15/1994	Paxton's: E of Hwy 550 at Bondad Hill	WJM Florida 1	EL			33N	9W	30	SE1/4 of SE1/4
Florida	La Plata, CO	07/16/1994	Short's: up from Sunny Side School Brdg	WJM Florida 2	EL			33N	9W	8	NE1/4 of SE1/4
Florida	La Plata, CO	07/16/1994	Short's: immediately up from 'Florida 2'	WJM Florida 2+1	EL						
Florida	La Plata, CO	09/09/1994	Immediately downstream of 'Florida 1'	WJM 1-1	EL						
Florida	La Plata, CO	09/09/1994	Paxton's: E of Hwy 550 at Bondad Hill	WJM Florida 1	EL			33N	9W	30	SE1/4 of SE1/4
Florida	La Plata, CO	09/12/1994	Short's: up from Sunny Side School Brdg	WJM Florida 2	EL			33N	9W	8	NE1/4 of SE1/4
Florida	La Plata, CO	09/12/1994	Short's: immediately up from 'Florida 2'	WJM Florida 2+1	EL						
La Plata	La Plata, CO	02/04/1992	Hesperus-dwnstm of bigstick divers.	BREC #2	EL			35N	11W	26	SE
La Plata	La Plata, CO	02/05/1992	1 mi. below Mormon Reservoir	BREC #4	EL			34N	12W	33	NE
La Plata	La Plata, CO	02/05/1992	Bridge - 1/4 mi. N. of Stateline	BREC #5	EL			32N	13W	10	
La Plata	San Juan, NM	02/05/1992	1 mi S of Jackson lk, 0.5 mi E of hwy 170	BREC #7	EL			30N	13W	21	
La Plata	San Juan, NM	02/05/1992	1.5 mi. S. La Plata, 1 mi. E. HWY 170	BREC #6	EL			31N	13W	11	SW1/4,SW1/4
La Plata	La Plata, CO	02/06/1992	1/4 mi. below Long Hollow Crk Confl.	BREC #8	EL			32N	13W	3	NE1/4,NE1/4
La Plata	La Plata, CO	02/06/1992	Cherry Crk Confluence, Downstream	BREC #10	EL			33N	12W	7	SW
La Plata	San Juan, NM	04/29/1992	0.5 - 1.5 mi. S. of NM - CO stateline	NMGF	EL			32N	13W	15	
La Plata	San Juan, NM	04/30/1992	0.5 - 1.5 mi. S. of NM - CO stateline	NMGF	EL	1884		32N	13W	15	
La Plata	San Juan, NM	09/02/1992	0.5 - 1.5 mi. S. of NM - CO stateline	NMGF	EL	7034		32N	13W	15	
La Plata	San Juan, NM	9/2/92	DLP2554	(DLP2554)	EL	2289		32N	13W	22	NE
La Plata	San Juan, NM	9/2/92	DLP2555	(DLP2555)	EL	5601		32N	13W	10	SE
La Plata	San Juan, NM	9/2/92	DLP2556	(DLP2556)	EL	11879		32N	13W	10	SE

**Table A-6 (continued). Site location descriptions for sites downstream of Navajo Reservoir (1990 - Present).**

River	County	Sample Date	Site	Sample #	Method	Time	Area	Township	Range	Section	Quarter
La Plata	La Plata, CO	9/16/92	Below Long Hollow Crk	(WJM013, WJM014)	EL	900		33N	12W	3	NE1/4 SE1/4
La Plata	La Plata, CO	9/17/92	Cherry Crk	(WJM015, WJM016)	EL	360		33N	13W	12	SE1/4 SE1/4
La Plata	La Plata, CO	9/17/92	County Rd 119	(WJM017)	SE		43.94	34N	12W	33	NE1/4 NE1/4
La Plata	La Plata, CO	9/17/92	County Rd 122	(WJM020)	Too low to sample			34N	12W	26	
La Plata	La Plata, CO	08/23/1993	Lower Section SU1	WJM	EL	710		33N	12W	30	SW1/4, NE1/4
La Plata	La Plata, CO	08/25/1993	Southern Ute #1	WJM	EL	900		33N	12W	30	SW1/4, NE1/4
La Plata	La Plata, CO	08/25/1993	Southern Ute #2	WJM	EL	1200		33N	12W	30	SW1/4, NE1/4
La Plata	La Plata, CO	08/25/1993	Southern Ute #3	WJM	EL	1800		33N	12W	30	NW1/4, NE1/4
La Plata	La Plata, CO	08/25/1993	Southern Ute #4	WJM	EL	1200		33N	12W	30	NW1/4, NE1/4
La Plata	La Plata, CO	10/25/1993	Van C. Smith's - 1	BREC - STN #1	EL			32N	13W	3	SW1/4 of NE1/4
La Plata	La Plata, CO	10/26/1993	Jerry Baird's - 6	BREC - DS of E. Thompson's	EL	2045		32N	13W	3	SW1/4 of SE1/4
La Plata	La Plata, CO	10/26/1993	Van C. Smith's - 2	BREC - STN #2	EL			32N	13W	3	SW1/4 of NE1/4
La Plata	La Plata, CO	10/26/1993	Van C. Smith's - 3	BREC - STN #3	EL	1970		32N	13W	3	SW1/4 of NE1/4
La Plata	La Plata, CO	10/26/1993	Van C. Smith's - 4	BREC - STN #4	EL	277		32N	13W	3	SW1/4 of NE1/4
La Plata	La Plata, CO	10/27/1993	Elmer Thompson's	BREC - STN #5	EL	2572		32N	13W	3	NW1/4 OF SE1/4
La Plata	La Plata, CO	10/27/1993	Jerry Baird's - 2	BREC - STN #6	EL			32N	13W	3	SW1/4 OF SE1/4
La Plata	La Plata, CO	10/27/1993	Jerry Baird's - 3	BREC - STN #7	EL	4595		32N	13W	3	SW1/4 OF SE1/4
La Plata	La Plata, CO	10/28/1993	Jerry Baird's - 5	BREC - STN #9	EL	510		32N	13W	3	SW1/4 OF SE1/4
La Plata	La Plata, CO	10/28/1993	Jerry Baird's - 1	BREC - STN #10	EL	2637		32N	13W	3	SW1/4 OF SE1/4
La Plata	La Plata, CO	10/28/1993	Jerry Baird's - 4	BREC - STN #8	EL			32N	13W	3	SW1/4 OF SE1/4
La Plata	La Plata, CO	10/29/1993	Conrad W. Huntington's #1	BREC - J. Huntington's	EL			32N	13W	3	SE1/4 OF SE1/4
La Plata	La Plata, CO	10/29/1993	Conrad W. Huntington's #2	BREC - STN #11	EL			32N	13W	3	NE1/4 of SE1/4 & SE1/4 of NE1/4
La Plata	La Plata, CO	10/29/1993	Conrad W. Huntington's #3	BREC - STN #12	EL			32N	13W	3	SE1/4 of NE1/4
La Plata	La Plata, CO	11/29/1993	Long Hollow Crk Confl, Downstream	WJM	EL	2700		32N	13W	3	NE1/4, NE1/4
La Plata	La Plata, CO	11/29/1993	Long Hollow Crk Confl, Upstream	WJM	EL	2400		33N	12W	30	SW1/4, SW1/4
La Plata	San Juan, NM	11/30/1993	1.5 mi. S. of NM - CO stateline	WJM	EL	2057		32N	13W	15	SW1/4, SE1/4
La Plata	San Juan, NM	11/30/1993	1/4 mi. S. of NM - CO stateline	WJM	EL	2400		32N	13W	10	NW1/4, SE1/4
La Plata	San Juan, NM	03/28/1994	New mexico: 2 mi. S of stateline	WJM La Plata 1	EL			32N	13W	22	SW1/4 of NE1/4
La Plata	San Juan, NM	03/28/1994	Site 2: N. M., 0.9 mi. N of Hwy140 brdg	WJM La Plata 2	EL			32N	13W	15	SW1/4 of NE1/4
La Plata	La Plata, CO	03/29/1994	Site 3 (Baird's): 1mi. N of stateline on Hwy 140	WJM La Plata 3	EL			32N	13W	3	SW1/4 of SE1/4
La Plata	La Plata, CO	03/29/1994	3a-K: Immediately upstream of 'site 3'	WJM La Plata 3a-K	EL			32N	13W	3	SW1/4 of SE1/4
La Plata	La Plata, CO	03/30/1994	Immediately upstream of 'site 3a-K'	WJM La Plata 3b	EL			32N	13W	3	SW1/4 of SE1/4
La Plata	La Plata, CO	04/01/1994	Up to Long Hollow confluence	WJM La Plata 4	EL			32N	13W	2 & 3	NW1/4 of NW1/4, NE1/4 of NE1/4
La Plata	La Plata, CO	04/01/1994	Huntington's: co. rd. 100 E to prvt land	WJM La Plata 6	EL			33N	13W	13	SE1/4 of NE1/4
La Plata	La Plata, CO	04/02/1994	Southern Ute land-east from Red Mesa	WJM La Plata 5	EL			33N	12W	30	NW1/4 of NE1/4
La Plata	La Plata, CO	07/13/1994	Immediately downstream of 'site 3'	WJM La Plata 3-1	EL						
La Plata	La Plata, CO	07/14/1994	Site 3 (Baird's): 1mi. N of stateline on Hwy 140	WJM La Plata 3	EL			32N	13W	3	SW1/4 of SE1/4
La Plata	San Juan, NM	07/21/1994	New mexico: 2 mi. S of stateline	WJM La Plata 1	EL			32N	13W	22	SW1/4 of NE1/4
La Plata	San Juan, NM	07/22/1994	Immediately downstream of 'site 2'	WJM La Plata 2-1	EL						
La Plata	San Juan, NM	07/22/1994	Site 2: N. M., 0.9 mi. N of Hwy140 brdg	WJM La Plata 2	EL			32N	13W	15	SW1/4 of NE1/4
La Plata	San Juan, NM	07/22/1994	Immediately upstream of 'site 2'	WJM La Plata 2+1	EL						
La Plata	La Plata, CO	07/25/1994	Immediately upstream of 'site 3'	WJM La Plata 3+1	EL			32N	13W	3	SW1/4 of SE1/4
La Plata	La Plata, CO	07/26/1994	Southern Ute land-east from Red Mesa	WJM La Plata 5	EL			33N	12W	30	NW1/4 of NE1/4
La Plata	La Plata, CO	07/27/1994	Up to Long Hollow confluence	WJM La Plata 4	EL			32N	13W	2 & 3	NW1/4 of NW1/4, NE1/4 of NE1/4
La Plata	La Plata, CO	07/27/1994	Huntington's: co. rd. 100 E to prvt land	WJM La Plata 6	EL			33N	13W	13	SE1/4 of NE1/4
La Plata	La Plata, CO	09/13/1994	Southern Ute land-east from Red Mesa	WJM La Plata 5	EL			33N	12W	30	NW1/4 of NE1/4

**Table A-6 (continued). Site location descriptions for sites downstream of Navajo Reservoir (1990 - Present).**

River	County	Sample Date	Site	Sample #	Method	Time	Area	Township	Range	Section	Quarter
La Plata	San Juan, NM	09/14/1994	New Mexico: 2 mi. S of stateline	WJM La Plata 1	EL			32N	13W	22	SW 1/4 of NE 1/4
La Plata	La Plata, CO	09/14/1994	Huntington's: co. rd. 100 E to prvt land	WJM La Plata 6	EL			33N	13W	13	SE 1/4 of NE 1/4
La Plata	San Juan, NM	09/15/1994	Immediately downstream of 'site 2'	WJM La Plata 2-1	EL						
La Plata	San Juan, NM	09/15/1994	Site 2: N. M., 0.9 mi. N of Hwy140 brdg	WJM La Plata 2	EL			32N	13W	15	SW 1/4 of NE 1/4
La Plata	San Juan, NM	09/15/1994	Immediately upstream of 'site 2'	WJM La Plata 2+1	EL						
La Plata	La Plata, CO	09/16/1994	Immediately downstream of 'site 3'	WJM La Plata 3-1	EL						
La Plata	La Plata, CO	09/19/1994	Site 3 (Baird's): 1mi. N of stateline on Hwy 140	WJM La Plata 3	EL			32N	13W	3	SW 1/4 of SE 1/4
La Plata	La Plata, CO	09/19/1994	Immediately upstream of 'site 3'	WJM La Plata 3+1	EL			32N	13W	3	SW 1/4 of SE 1/4
La Plata	La Plata, CO	09/21/1994	Up to Long Hollow confluence	WJM La Plata 4	EL			32N	13W	2 & 3	NW 1/4 of NW 1/4, NE 1/4 of NE 1/4
La Plata	La Plata, CO	11/21/1997	Cherry Creek confluence to stateline	K. Lashmett 035							
La Plata	La Plata, CO	11/19/1998	RM 26.0-26.4 Sample 98LAP26-30	S. Whiteman							
La Plata	La Plata, CO	11/19/1998	RM 26.4-26.5 Sample 98LAP31	S. Whiteman							
La Plata	La Plata, CO	11/17/1998	RM 29.7-30.0 Sample 98LAP09-14	S. Whiteman							
La Plata	La Plata, CO	11/17/1998	RM 30.0-30.2 Sample 98LAP15-16	S. Whiteman							
La Plata	La Plata, CO	11/18/1998	RM 31.5-31.8 Sample 98LAP17-19	S. Whiteman							
La Plata	La Plata, CO	11/18/1998	RM 31.8-32.2 Sample 98LAP20-25	S. Whiteman							
La Plata	La Plata, CO	11/16/1998	RM 37.3-37.5 Sample 98LAP01-04	S. Whiteman							
La Plata	La Plata, CO	11/16/1998	RM 37.5-37.8 Sample 98LAP05-08	S. Whiteman							
Long Hollow	La Plata, CO	09/06/1992	1/4 mi. upstream from La Plata Confluence	BOR #9	EL			33N	12W	32	
Long Hollow	La Plata, CO	09/06/1992	3 mi. from La Plata at road xing (rd 122?).	BOR #11	EL						
Mancos	Montezuma, CO	08/20/1990	2 mi. N. of MV Natl. Park	USFWS -A	EL			35N	14W	23	NE 1/4, NW 1/4
Mancos	Montezuma, CO	08/20/1990	N. Boundary MV Natl. Park	USFWS -B	EL			35N	14W	26	
Mancos	Montezuma, CO	08/21/1990	Above S. bdry MV Natl. Park	USFWS -C	EL			34N	14W	12	NE 1/4, SE 1/4
Mancos	Montezuma, CO	08/22/1990	1/8 mi. below hwy 160 bridge	USFWS -f	EL			36N	13W	27	
Mancos	Montezuma, CO	08/22/1990	H Road Bridge	USFWS -D	EL			35N	13W	6	NW 1/4, NW 1/4
Mancos	Montezuma, CO	08/23/1990	0.5 mi. S of MV Natl. Park	USFWS -K	EL			34N	14W	11U	
Mancos	Montezuma, CO	08/23/1990	S. boundary MV Natl. Park	USFWS -J	EL			34N	14W	2U	
Mancos	Montezuma, CO	08/23/1990	Upstream of Trail Canyon	USFWS -L	EL			34N	14W	14	
Mancos	Montezuma, CO	03/22/1994	(UTUM) Down of Johnson Canyon confl.	WJM MANCOS 5	EL			33N	15W	22	NW 1/4
Mancos	Montezuma, CO	03/22/1994	(UTUM) Up of Johnson Canyon confl.	WJM MANCOS 6	EL			33N	15W	15	SW 1/4
Mancos	Montezuma, CO	03/23/1994	(UMUT) Site 3: Up from guage Hwy 666	WJM MANCOS 3	EL			32N	17W	7	SW 1/4
Mancos	Montezuma, CO	03/23/1994	(UMUT) At Moqui Canyon Confluence	WJM MANCOS 4	EL			33N	16W	34	S 1/2
Mancos	Montezuma, CO	03/24/1994	Ute Mtn Ute land at CO-NM stateline	WJM MANCOS 1	EL			32N	19W	20	W 1/2
Mancos	Montezuma, CO	03/24/1994	(UMUT) Mancos R.-Navajo Wash confl.	WJM MANCOS 2	EL			32N	18W	15	NW 1/4
Mancos	Montezuma, CO	07/18/1994	(UTUM) Down of Johnson Canyon confl.	WJM MANCOS 5	EL			33N	15W	22	NW 1/4
Mancos	Montezuma, CO	07/18/1994	(UTUM) Up of Johnson Canyon confl.	WJM MANCOS 6	EL			33N	15W	15	SW 1/4
Mancos	Montezuma, CO	07/19/1994	Immediately downstream of 'site 3'	WJM MANCOS 3-1	EL						
Mancos	Montezuma, CO	07/19/1994	(UMUT) Site 3: Up from guage Hwy 666	WJM MANCOS 3	EL			32N	17W	7	SW 1/4
Mancos	Montezuma, CO	07/19/1994	(UMUT) At Moqui Canyon Confluence	WJM MANCOS 4	EL			33N	16W	34	S 1/2
Mancos	Montezuma, CO	07/20/1994	Ute Mtn Ute land at CO-NM stateline	WJM MANCOS 1	EL			32N	19W	20	W 1/2
Mancos	Montezuma, CO	07/20/1994	(UMUT) Mancos R.-Navajo Wash confl.	WJM MANCOS 2	EL			32N	18W	15	NW 1/4
Mancos	Montezuma, CO	09/07/1994	Ute Mtn Ute land at CO-NM stateline	WJM MANCOS 1	EL			32N	19W	20	W 1/2
Mancos	Montezuma, CO	09/07/1994	(UMUT) Mancos R.-Navajo Wash confl.	WJM MANCOS 2	EL			32N	18W	15	NW 1/4
Mancos	Montezuma, CO	09/07/1994	Immediately downstream of 'site 3'	WJM MANCOS 3-1	EL						
Mancos	Montezuma, CO	09/07/1994	(UMUT) Site 3: Up from guage Hwy 666	WJM MANCOS 3	EL			32N	17W	7	SW 1/4
Mancos	Montezuma, CO	09/08/1994	(UMUT) At Moqui Canyon Confluence	WJM MANCOS 4	EL			33N	16W	34	S 1/2



**Table A-6 (continued). Site location descriptions for sites downstream of Navajo Reservoir (1990 - Present).**

River	County	Sample Date	Site	Sample #	Method	Time	Area	Township	Range	Section	Quarter
Mancos	Montezuma, CO	09/08/1994	(UTUM) Down of Johnson Canyon confl.	WJM MANCOS 5	EL			33N	15W	22	NW1/4
Mancos	Montezuma, CO	09/08/1994	(UTUM) Up of Johnson Canyon confl.	WJM MANCOS 6	EL			33N	15W	15	SW1/4
McElmo	Montezuma, CO	05/10/1994	8.5 mi. up from stateline	CDOW - STN #2	EL			35N	19W	2	NE1/4
McElmo	Montezuma, CO	05/10/1994	1/4 mi. E. of Ismay trading Post	CDOW - STN #1	EL			35N	20W	2	NW1/4
McElmo	Montezuma, CO	05/11/1994	S. Oak Street, Cortez	CDOW - STN #4	EL			35N	16W	2	NW1/4
McElmo	Montezuma, CO	05/11/1994	Bridge at County Road J	CDOW - STN #3	EL			36N	17W	2	NE1/4