

Irrigation Ditches in the Truckee Meadows

**Prepared for the
Regional Water Planning Commission**

by

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September 19, 2003

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1 – Introduction

The following section summarizes the existing ditch network in the Truckee Meadows. This includes discussion of ditches used for delivering irrigation water, hydroelectric power generation and delivery of raw water for drinking water treatment. It is recognized that several irrigation ditches divert Truckee River water downstream of the Truckee Meadows; however they fall out of the scope of this document. The information is divided into three main areas, historical development and uses, current uses, and conceptual future uses of the irrigation ditch network.

2 – Historical Background

A. Development of the Truckee Meadows Water Resources

The Truckee Meadows is not unlike other arid western watersheds in the development and management of its surface water resource. Unlike the eastern United States the proximity to the water source is not a limitation to resource development. Born out of this concept of bringing the water to the use as opposed to bringing the use to the water was the Appropriative Doctrine, which defines western water law. The Appropriative Doctrine can be roughly translated into “the first in time is the first in right”. This concept provided for the construction of irrigation ditches from the source, the Truckee River, to the place of use, the ranches throughout the Truckee Meadows, in a period that began in 1850.

The Truckee River watershed during the 20th century experienced rapid development in both water resource projects and population. Several upstream reservoirs were constructed to maximize the use of the water resource and ensure water delivery in the warm summer months when demand is high and the Truckee River historically would be reduced to a minimal flow. The upstream reservoirs are summarized in the following table (Truckee River Atlas, 1991).

Reservoir	Owner	Operator	Capacity (Acre-feet)	Construction Date
Lake Tahoe	TMWA/BOR	BOR	744,600	1913
Donner Lake	TMWA	TMWA	9,500	1930s
Martis Creek	U.S.C.O.E.	U.S.C.O.E.	20,400	1971
Prosser Creek	Bureau of Rec.	Bureau of Rec.	29,800	1962
Independence Lake	TMWA	TMWA	17,500	1939
Stampede	Bureau of Rec.	Bureau of Rec.	226,500	1970
Boca	Bureau of Rec.	WCWCD	40,870	1937

B. The Orr Ditch Decree

Irrigation diversion from the Truckee River into all of the irrigation ditches is regulated by several administrative documents. Specifically, the Orr Ditch Decree was signed and put into effect in 1944. This decree was the result of a lengthy court battle between the US Bureau of Reclamation and the Orr Water Ditch Company, et al. The case resulted from disputes arising when the U.S. Bureau of Reclamation sought to confirm water rights held for the Newlands Project. The result was a watershed adjudication that set priority dates for all existing water rights. The final decree incorporated several preexisting documents and agreements, specifically, the Truckee River Agreement of 1935 (U.S. v Orr Water Ditch Company, Final Decree, 1944). The Orr Ditch Decree is a comprehensive "rule book" of water rights in the Truckee River Watershed. It defines for each water right, among other things, the owner, date of priority, point of diversion, location of use, type of use, total area to be irrigated and the annual volume to be used (entitlement). The Orr Ditch originally identified approximately 32,000 acres to be irrigated throughout the greater Truckee Meadows (U.S. v Orr Water Ditch Company, Final Decree, 1944).

C. Federal Water Master Operation

The Orr Ditch Decree's mandate is administered by the U.S. District Court Water Master (Water Master). The Water Master is appointed by the 9th Circuit District Court and has the responsibility of regulating the upstream reservoirs and diversions from the Truckee River for irrigation purposes.

3 – Current Uses

Today the existing Truckee Meadows ditch network's primary purpose remains the delivery of irrigation water. However as the Truckee Meadows have developed the ditches have been utilized for additional uses, such as, stormwater conveyance, regional recreational features, and continued hydropower generation.

A. Irrigation Water Delivery

Even with the rapid urban/suburban development of the Truckee Meadows, irrigation of pasture and alfalfa continues. The large-scale ranch, 100+ acres, has typically been replaced by smaller ranchettes, which typically are 2.5 to 10 acres. Even with conversion of the large ranches approximately 40,000 acre/feet of irrigation water are diverted annually from the Truckee River today (Water Master, 2002). Within the Truckee Meadows the largest percentage of the irrigation application is the farthest geographically from the River. The majority of irrigated agriculture is south of South McCarran Boulevard. This requires delivery of water through the densest urban development in the Truckee Meadows prior to application. It has been a common practice to direct stormwater runoff from urban development into the ditch network for conveyance.

Of the original 15 ditches in the Truckee Meadows 10 remain in active use. The active ditches are illustrated in Figures included in the Appendix. The following table summarizes the irrigation ditches in the Truckee Meadows; the table is organized by ditch in an upstream to downstream order.

Name	Length (miles)	Typical Operational Flow (cfs)	Approximate Average Annual Acre Feet Diverted ¹	User type distribution, percent		
				Corporate	Public	Private
Steamboat	32	50	17,500	36	9	55
Coldron	5.5	unknown	40	0	0	100
Verdi Hydro	2.5	415±		0	100	0
Highland	12	95	30,000	29	58	13
Washoe Hydro	2.2	415±		0	100	0
Last Chance	17	20	4,000	20	7	73
Lake	14	15	3,500	8	1	91
Orr	34	40	11,000	24	5	71
Cochran	32	15	950	1	88	11
Pioneer	9	3	4,000	5	36	59

¹ 1989-2002, US Water Master Records

B. Stormwater Conveyance

The number of storm sewers directly terminating into irrigation ditches in the Truckee Meadows is unknown. While not typically acceptable to the private operators of the ditches the connections have been known for many years. Until recently there were never formal agreements between the private ditch operators and the municipalities to jointly manage the conveyance of stormwater through the irrigation ditches. In 2002 the City of Reno entered into agreement with the irrigation ditches south of the Truckee River to share in the costs of operation and maintenance of the ditches. Washoe County, as of the spring 2003, is in the process of negotiating a similar agreement. The operation and maintenance agreement allows the private operators to receive compensation for the increase labor and maintenance costs associated with the conveyance of stormwater through the ditch network.

C. Power Generation

Sierra Pacific Power Company (SPPCo) has maintained four power generating plants on the Truckee River. These four plants have the potential of generating a combined 10.1 megawatts of power. The following table summarizes the four power generating plants (Truckee River Atlas, 1991).

Facility Name	Construction Date	Capacity (megawatts)	Number of Units
Farad	1901	2.6	2
Fleish	1905	2.5	1
Verdi	1911	2.5	1
Washoe	1904	2.5	2

As of 2003, only three of the four power plants are operational. The impoundment structure for the Farad Plant diversion structure was destroyed during a flood event in 1997. SPPCo intends to reconstruct the dam and to renew power production. The project is currently in the design and permitting phase. These diversions from the Truckee River are different from an irrigation diversion in that there is not a consumptive use portion of the water right.

D. Raw Water Delivery

“Raw” water is a term to define untreated river water that is being conveyed for treatment into potable water. In the Truckee Meadows the Highland Ditch delivers raw water to the Chalk Bluff Water Treatment Plant (Chalk Bluff) seasonally. The average annual delivery of raw water to Chalk Bluff is approximately 30,000 af (Water Master, 2003). In the past the Steamboat Ditch delivered water to the Hunter Lake Treatment Plant. This practice no longer occurs, however the Truckee Meadows Water Authority maintains the ability and right to convey raw water through the Steamboat Ditch for treatment.

4 – Future Uses

The future operation and maintenance of the ditch network in the Truckee Meadows will largely be influenced by urban and suburban development. Competition for the region’s surface water resource will focus attention to the operation of the existing ditch system.

Another factor that could impact future uses of the ditch network are environmental regulations that are drafted to address water quality issues in surface water conveyance systems. Currently the operation and maintenance of the ditch network is exempt from several environmental compliance requirements. This is largely due to the fact that the system is dedicated for agricultural enterprises. If the primary use of a ditch changes, the exemption might not apply and operation and maintenance would be held to a different environmental compliance standard.

A. Irrigation Water Delivery

While the irrigated acreage has decreased approximately 70% from its original 32,000 acres, not all irrigated acreage will be developed in the Truckee Meadows. Agricultural irrigation will probably never disappear; this is somewhat assured by the type of development in the south Truckee Meadows and the interest of preserving areas of passive groundwater recharge within the Truckee Meadows. One of the larger challenges that the ditch network will face in the future is the continued urban and suburban development between the point of diversion and the point of application. This requires a long section of open ditch to meander through high-density development before its use as irrigation water. These long sections expose the ditches to considerable hazards associated with high-density landuse, such as, water quality contaminants entering the ditch section and being conveyed and applied to unknowing downstream users.

The increasing distance between the point of diversion from the Truckee River and the majority of places of application also contributes to significant transmission losses along the ditch section. These transmission losses are exacerbated by diversion rates reduced by the retirement of water rights, through a ditch section that was built to convey a greater amount of irrigation water.

B. Stormwater Conveyance

Stormwater conveyance has been recognized by the private operators and the municipalities to exist and to continue to occur. The executed agreements assume that there will not be any additional storm sewer connections without the review and authorization of the respective ditch company or operator. The ditch operators and municipalities will annually inspect the ditches for the effectiveness at conveying stormwater and conduct any necessary maintenance as needed.

C. Power Generation

It can be reasonably assumed that the four existing power generation facilities that currently divert water from the Truckee River will continue operation into the future.

Possible Actions by RWPC Through 2005

As previously identified the majority of ditch network within the Truckee Meadows is operated and maintained by private companies. Activities that evaluate or study the ditches should be closely coordinated with the individual ditch companies. With that understanding there are several areas in which the region could benefit by partnering with the ditch companies to evaluate to possibility of optimizing the function, use, and operation and maintenance of the ditch system.

1. Explore the opportunity to consolidate ditches. This could provide a myriad of benefits, such as, efficiency in operation and maintenance and optimization of the amount of water diverted from the Truckee River.
2. Continue to explore opportunities to acquire land and/or easement to utilize the irrigation ditches alignment as regional recreational amenities.
3. Evaluate the possibility of modifying the existing diversion structures in the Truckee River to minimize maintenance requirements, improve diversion efficiency, improve recreation safety use and remove fish migration barriers.

Index of Ditches

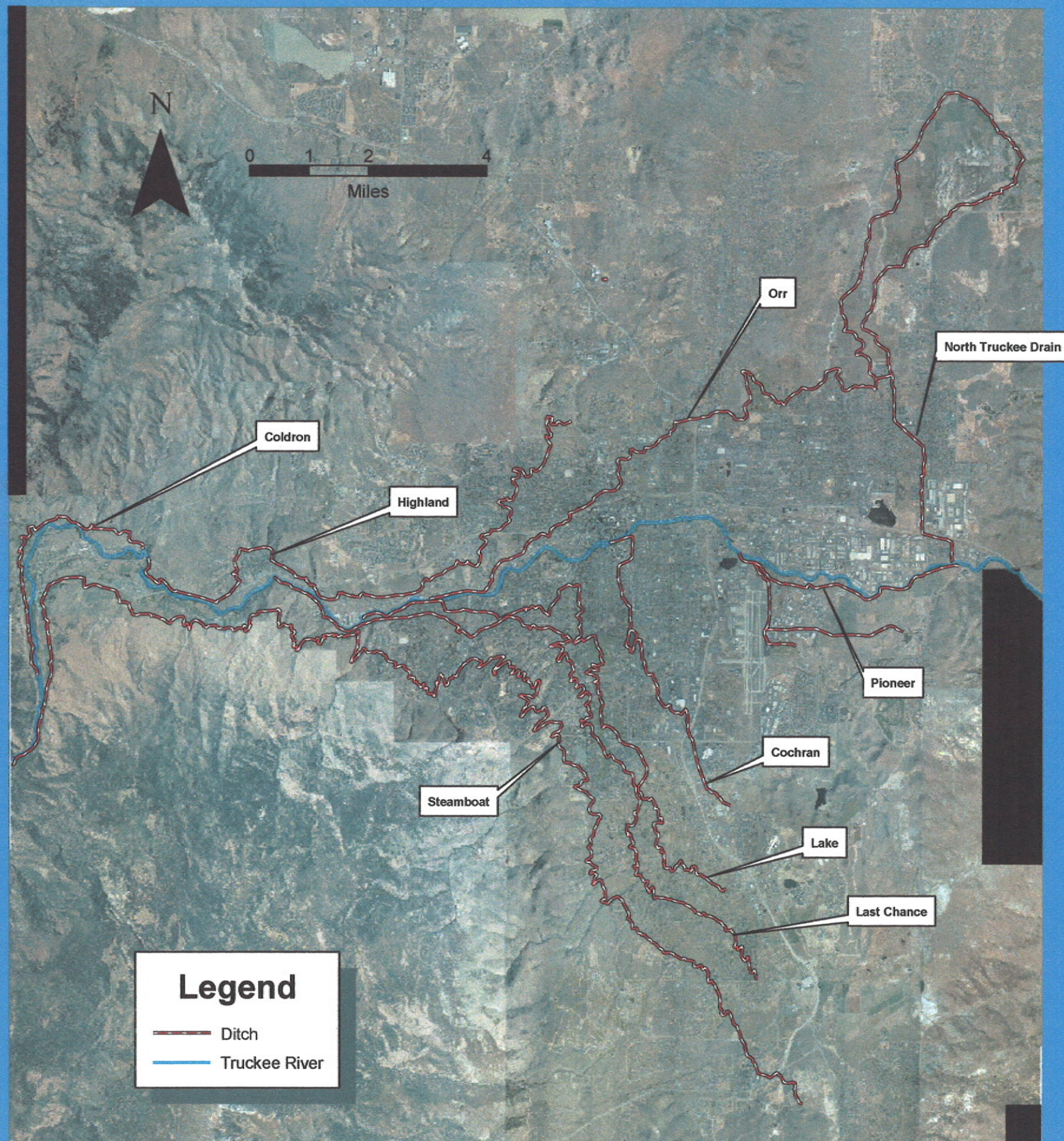


Figure 1

Title: Index of Ditches

**2003-2005 Comprehensive
Regional Water Management Plan**

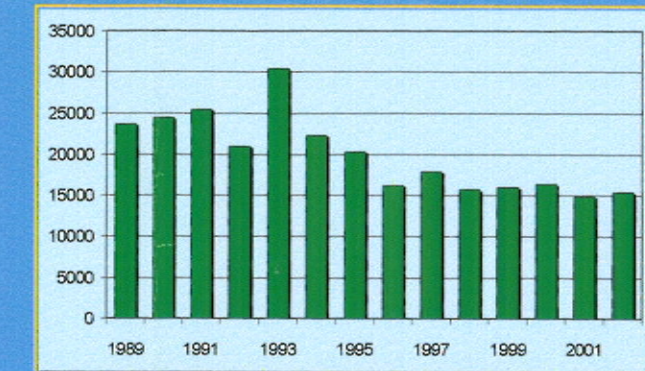


Steamboat Ditch Fact Sheet

Length = 32 Miles

Start = 0 River Mile (measured from NV/CA state line)

Terminus = Confluence with Steamboat Creek



Total Acre Feet Diverted (Annually)

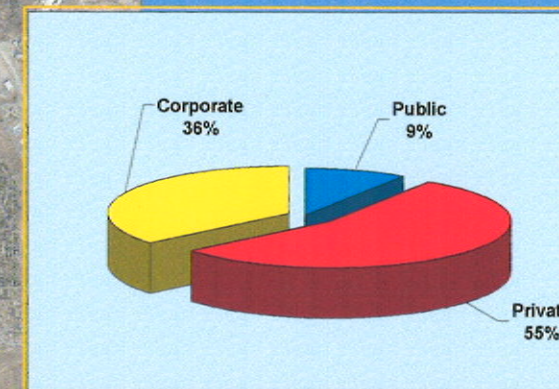
DATA SOURCE: US District Court Water Master Office, Truckee River Diversions

Irrigation Season Length = 160 days

Ownership = Steamboat Canal & Irrigation Company

Built = 1856 (approximate)

Typical Operational Diversion Rate = 50 cfs



User Type Distribution (2002)

DATA SOURCE: US District Court Water Masters Office

Type of Ditch:

Earth Lined.....95%

Concrete.....2%

Culvert.....3%

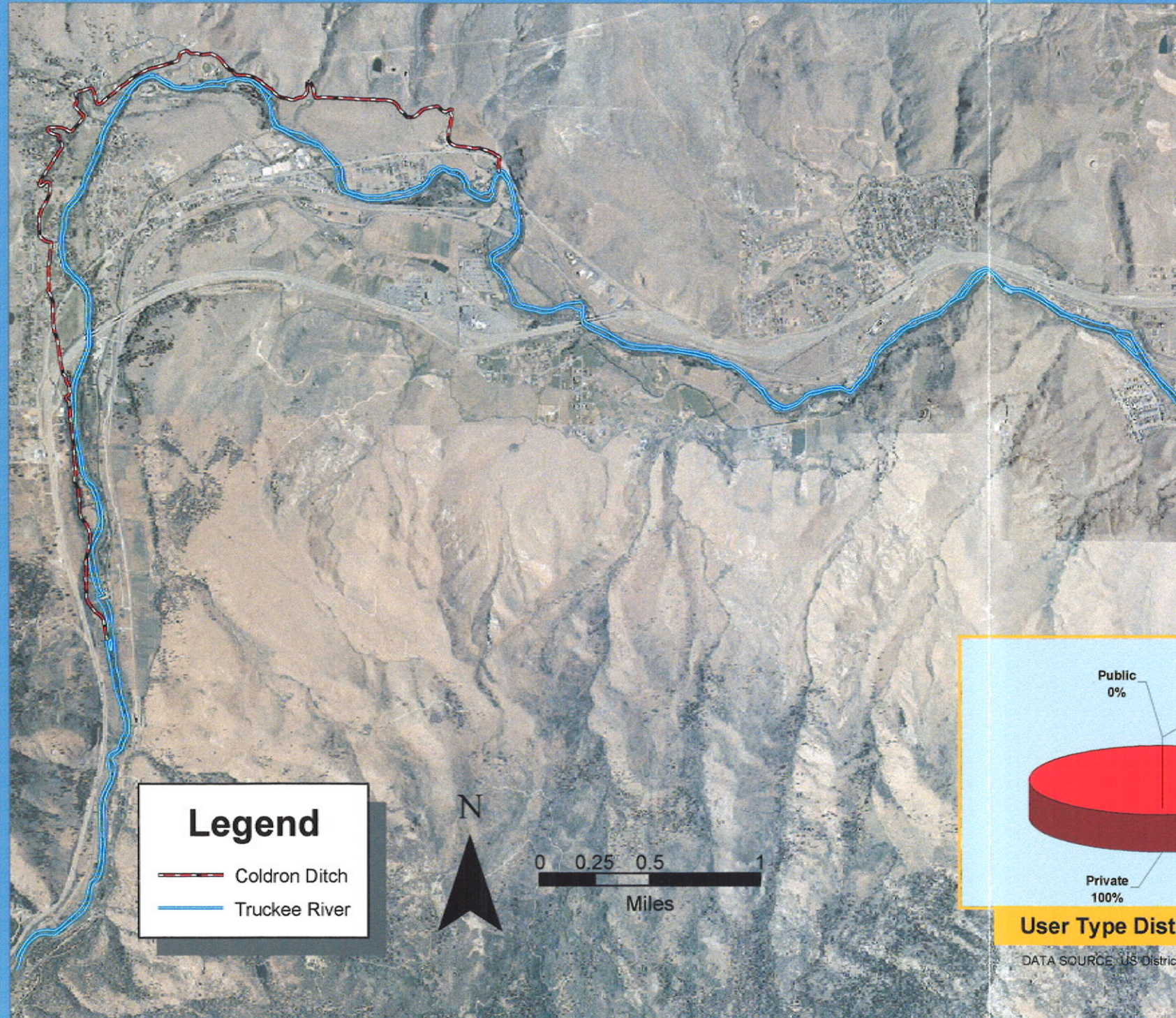
Figure 2

Title: Steamboat Ditch Fact Sheet

**2003-2005 Comprehensive
Regional Water Management Plan**



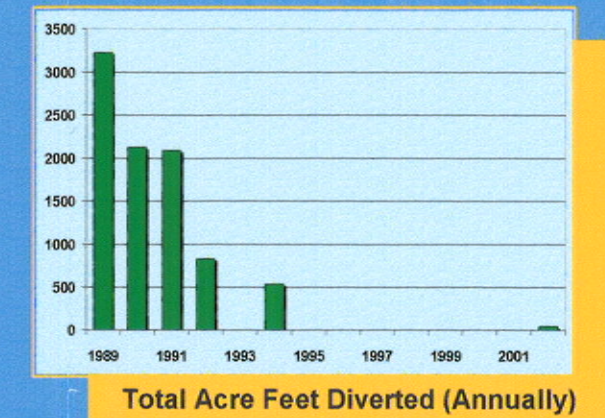
Coldron Ditch Fact Sheet



Length = 5.5 Miles

Start = 2.2 River Miles (measured from NV/CA state line)

Terminus = Truckee River near Verdi



DATA SOURCE: US District Court Water Master Office, Truckee River Diversions

Irrigation Season Length = 160 days

Ownership = Private Ditch Company

Built = Unknown

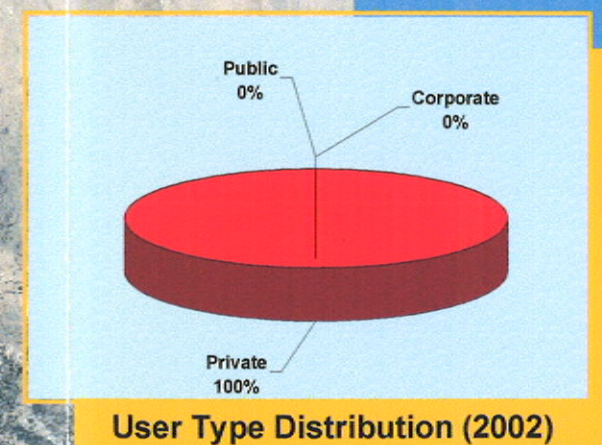
Typical Operational Diversion Rate = unknown

Type of Ditch:

Earth Lined.....100%

Concrete.....0%

Culvert.....0%



DATA SOURCE: US District Court Water Masters Office

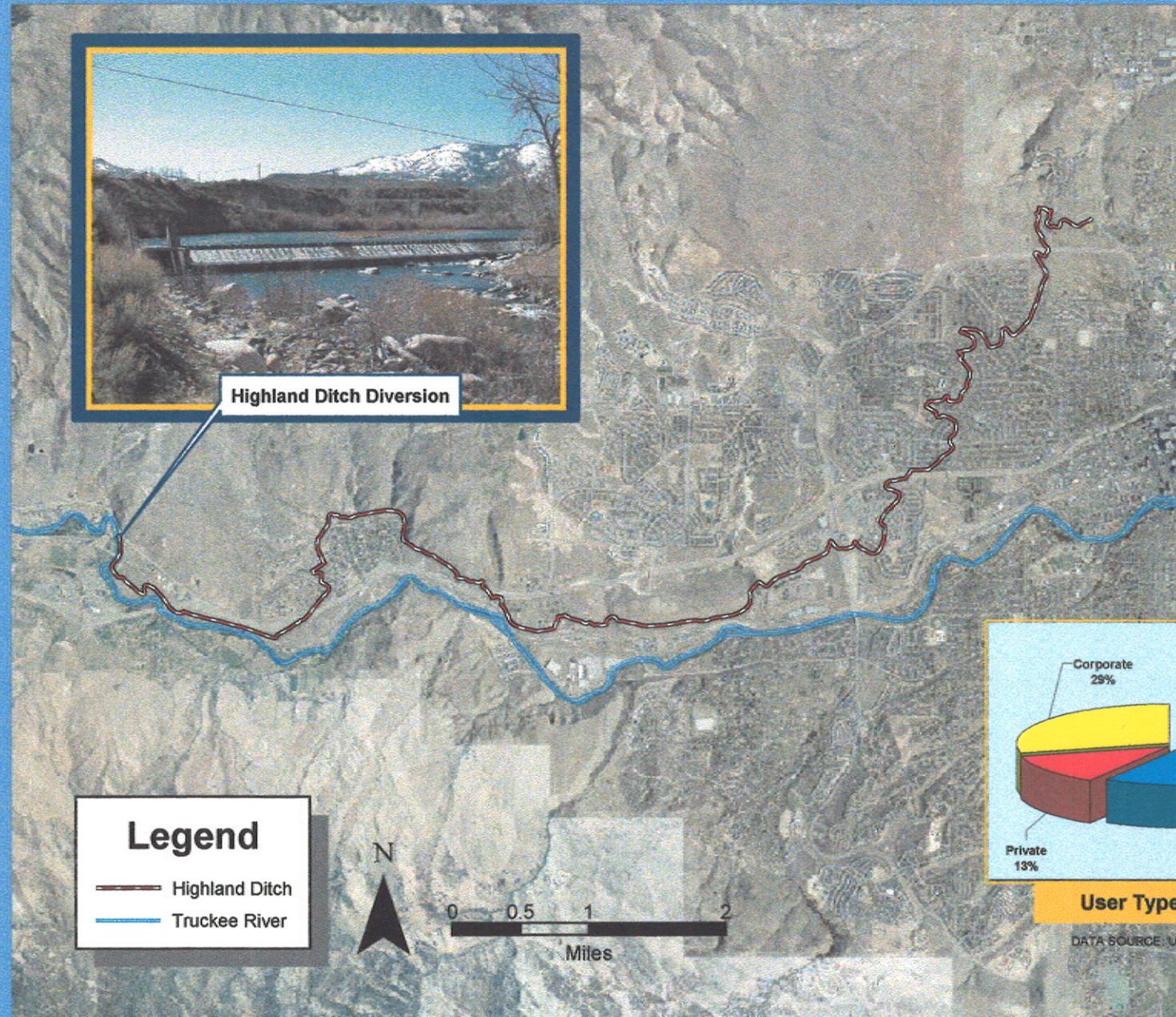
Figure 3

Title: Coldron Ditch Fact Sheet

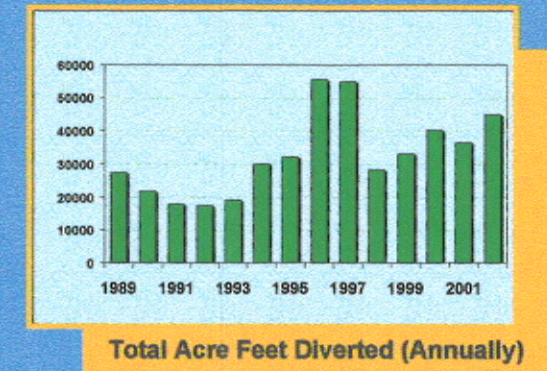
2003-2005 Comprehensive Regional Water Management Plan



Highland Ditch Fact Sheet

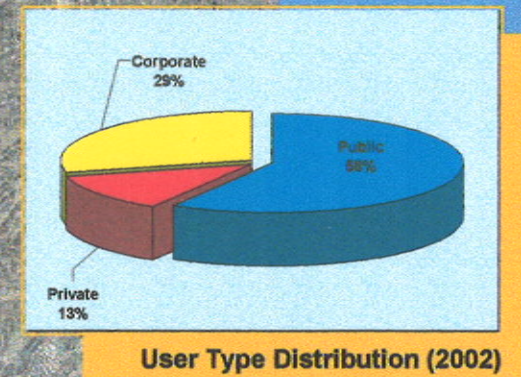


Length = 12 Miles
 Start = 7.06 River Miles (measured from NV/CA state line)
 Terminus = Ranch San Rafael Park



DATA SOURCE: US District Court Water Master Office, Truckee River Diversions

Irrigation Season Length = 160 days
 Ownership = Truckee Meadows Water Authority
 Built = 1880
 Operational Diversion Rate = 95 cfs



DATA SOURCE: US District Court Water Masters Office

Type of Ditch:
 Earth Lined.....41.9%
 Concrete.....53.6%
 Culvert.....4.5%

Figure 4

Title: Highland Ditch Fact Sheet

2003-2005 Comprehensive
 Regional Water Management Plan



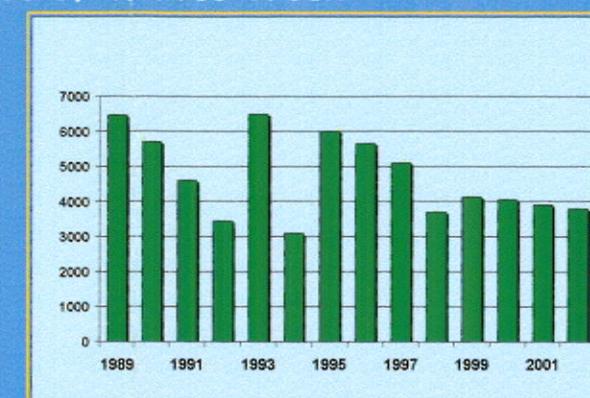
Last Chance Ditch Fact Sheet



Length = 17 Miles

Start = 10.01 River Miles (measured from NV/CA state line)

Terminus = Confluence of Whites Creek



Total Acre Feet Diverted (Annually)

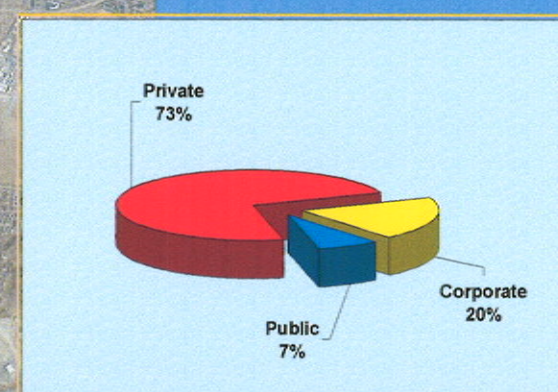
DATA SOURCE: US District Court Water Master Office, Truckee River Diversions

Irrigation Season Length = 160 days

Ownership = Last Chance Ditch & Irrigation Company

Built = 1865 (approximate)

Operational Diversion Rate = 20 cfs



User Type Distribution (2002)

DATA SOURCE: US District Court Water Masters Office

Type of Ditch:

Earth Lined.....88%

Concrete.....10%

Culvert.....2%

Figure 5

**Title: Last Chance Ditch
Fact Sheet**

**2003-2005 Comprehensive
Regional Water Management Plan**



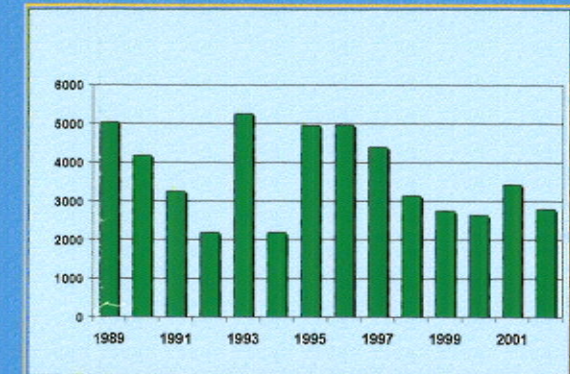
Lake Ditch Fact Sheet

Length = 14 Miles

Start = 12.3 River Miles (measured from NV/CA state line)

Terminus = Confluence with Thomas Creek

Contact
Marty Richards
815-7883 cell
852-5921 hm
John (ditch tender)
815-5831



Total Acre Feet Diverted (Annually)

DATA SOURCE: US District Court Water Master Office, Truckee River Diversions

Irrigation Season Length = 160 days

Ownership = Lake Ditch Company

Built = 1860 (approximate)

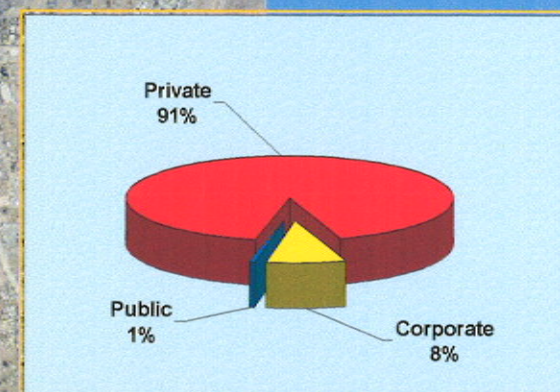
Typical Operational Diversion Rate = 15 cfs

Type of Ditch:

Earth Lined.....99%

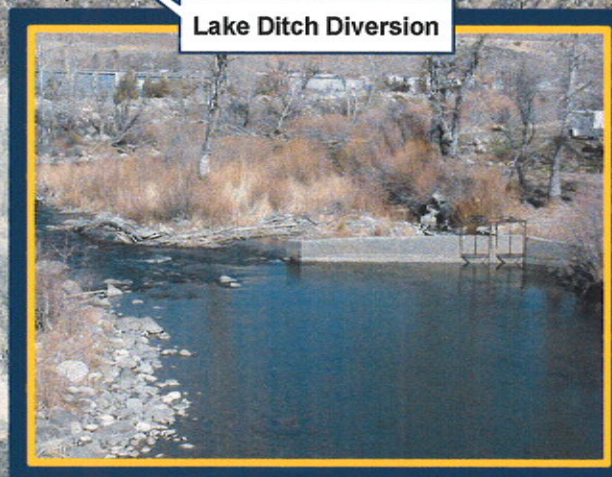
Concrete.....0%

Culvert.....1%



User Type Distribution (2002)

DATA SOURCE: US District Court Water Masters Office



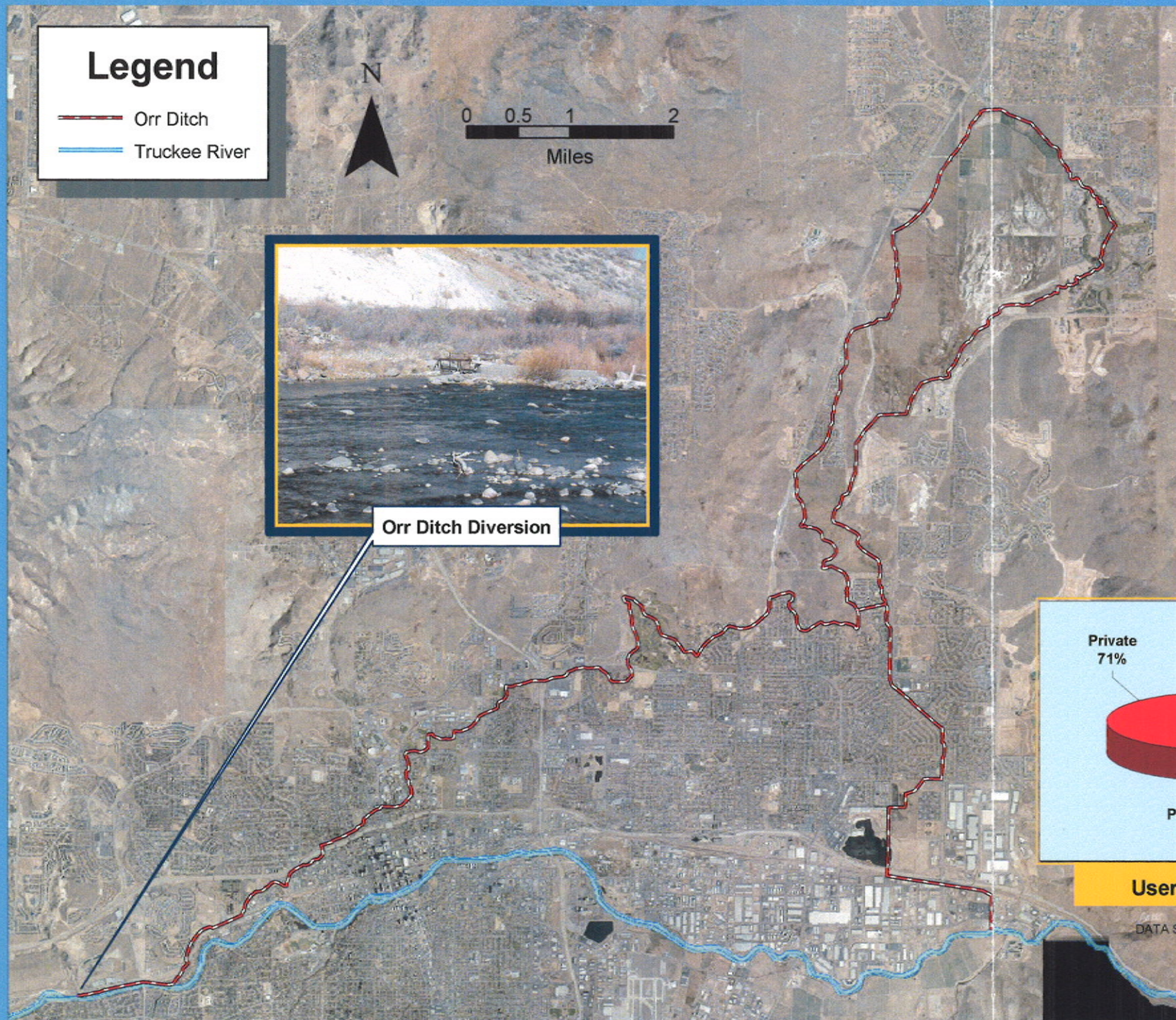
Lake Ditch Diversion

Legend

- Lake Ditch
- Truckee River



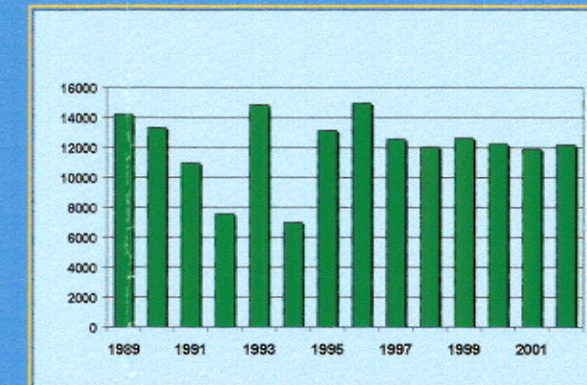
Orr Ditch Fact Sheet



Length = 34 Miles

Start = 13.31 River Miles (measured from NV/CA state line)

Terminus = Confluence of Truckee via North Truckee Drain



Total Acre Feet Diverted (Annually)

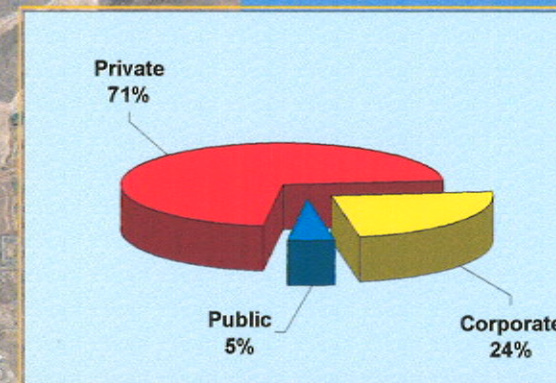
DATA SOURCE: US District Court Water Master Office, Truckee River Diversions

Irrigation Season Length = 120 days

Ownership = Orr Ditch Company

Built = 1870 (approximate)

Operational Diversion Rate = 40 cfs



User Type Distribution (2002)

DATA SOURCE: US District Court Water Masters Office

Type of Ditch:

Earth Lined.....60%

Concrete.....30%

Culvert.....10%

Figure 7

Title: Orr Ditch Fact Sheet

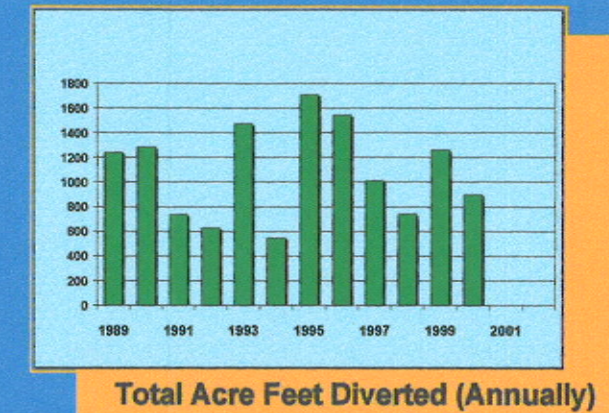
2003-2005 Comprehensive
Regional Water Management Plan



Cochran Ditch Fact Sheet

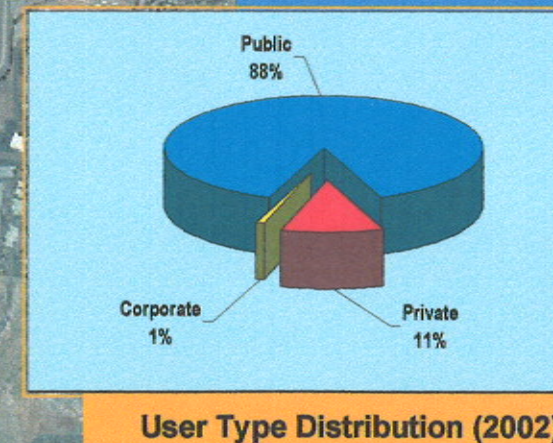


Length = 32 Miles
 Start = 17.2 River Miles (measured from NV/CA state line)
 Terminus = Confluence with Steamboat Creek



DATA SOURCE: US District Court Water Master Office, Truckee River Diversions

Irrigation Season Length = 160 days
 Ownership = Cochran Ditch Company
 Built = 1865 (approximate)
 Operational Diversion Rate = 15 cfs



DATA SOURCE: US District Court Water Masters Office

Type of Ditch:
 Earth Lined.....58%
 Concrete.....2%
 Culvert.....40%

Figure 8

Title: Cochran Ditch Fact Sheet

**2003-2005 Comprehensive
 Regional Water Management Plan**

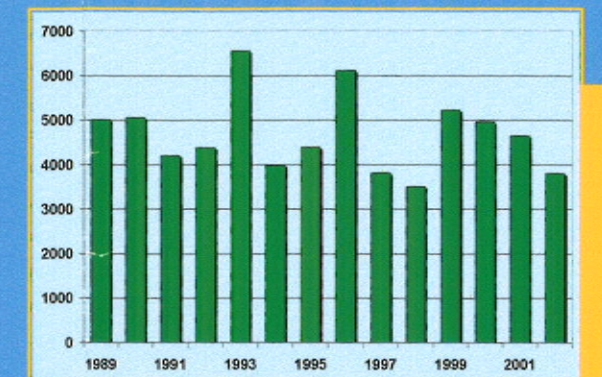
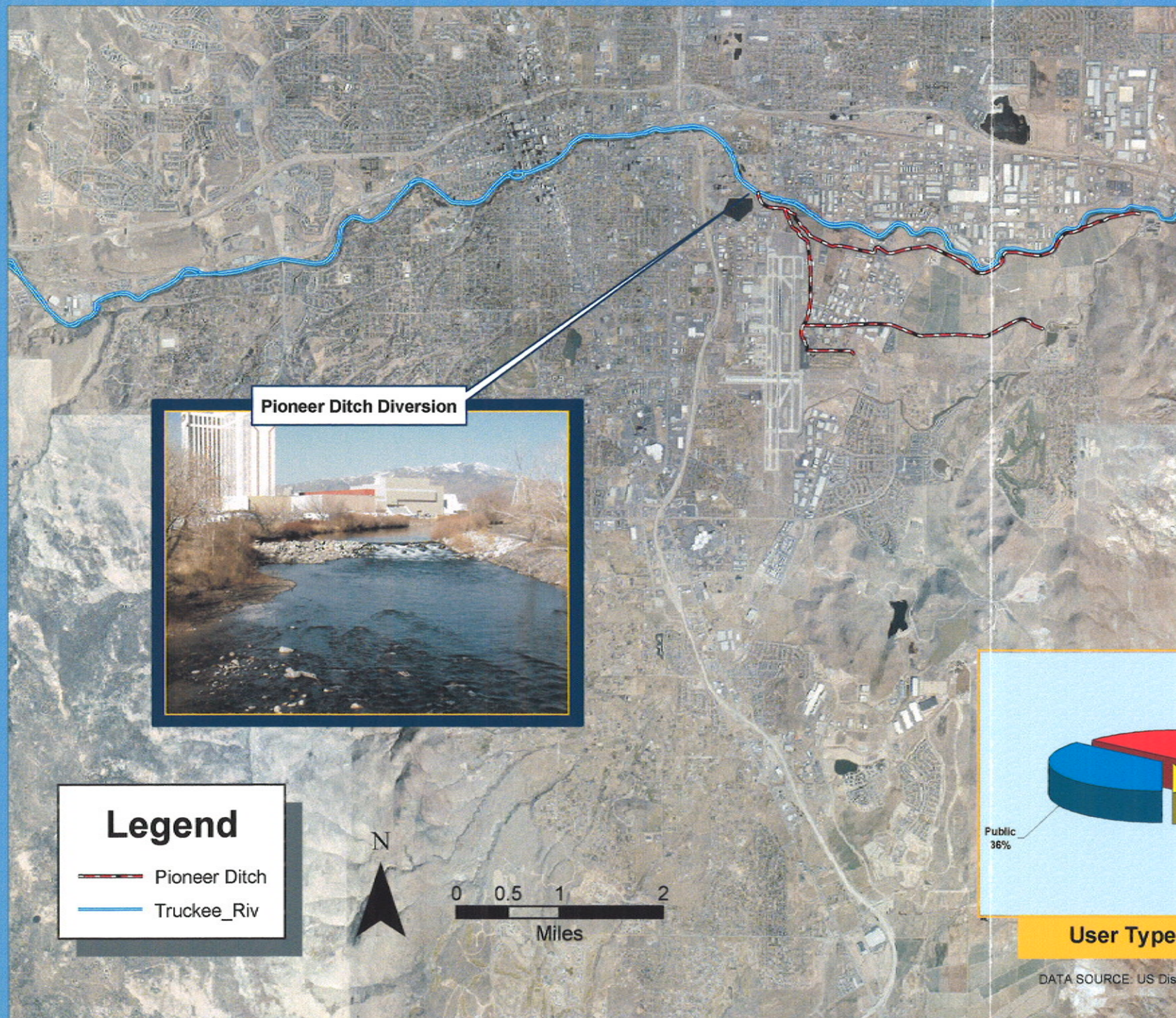


Pioneer Ditch Fact Sheet

Length = 9 Miles

Start = 20 River Miles (measured from NV/CA state line)

Terminus = Steamboat Creek



Total Acre Feet Diverted (Annually)

* Agricultural & Effluent Combined For 1997 -2002

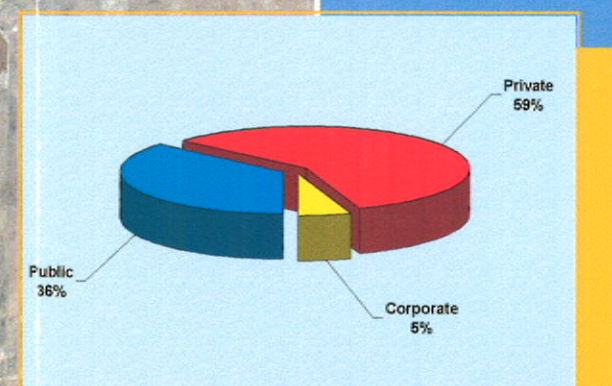
DATA SOURCE: US District Court Water Master Office, Truckee River Diversions

Irrigation Season Length = 160 days

Ownership = Private Ownership

Built = Unknown

Typical Operational Diversion Rate = approx. 3 cfs



User Type Distribution (2002)

DATA SOURCE: US District Court Water Masters Office

Type of Ditch:

Earth Lined..... 100%

Concrete..... 0%

Culvert.....0%

Figure 8

Title: Pioneer Ditch Fact Sheet

**2003-2005 Comprehensive
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