
PLACER COUNTY GENERAL PLAN UPDATE



GENERAL PLAN BACKGROUND REPORT

TECHNICAL APPENDICES

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Appendix A

Large Water Systems

APPENDIX A

LARGE WATER SYSTEMS

This appendix includes detailed summary information for each of the 40 large water systems reviewed for Chapter 6 of the *Placer County General Plan Draft Background Report*. The following information is summarized for each system:

- District Overview
- Source Information
- Primary Transmission and Distribution
- Storage
- Treatment
- 1990 System Production
- Deficiencies and Limitations
- Existing Planned Improvements (where applicable)
- System Appraisal

Following each of these detailed summaries is an "executive summary" sheet that includes a location map and a summary description of the individual system. Finally, for each individual system described, there is a service boundary map.

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AGATE BAY WATER COMPANY

District Overview: The initial water supply permit for Agate Bay Water Company was issued in 1955 to Mountain Springs Water Company, predecessor of Agate Bay Water Company. The system currently operates under a permit issued in 1973. As the number of services increased and facilities were updated, it became necessary for jurisdiction to change from the Placer County Department of Environmental Health to the State Department of Health Services in 1972.

Agate Bay Water Company serves a residential subdivision area at the north end of Lake Tahoe near Camelian Bay. Many residences are occupied on a seasonal basis.

Source Information: The system is supplied by two sources, Lake Tahoe, and a spring. The spring provides most of the water for the system. Lake Tahoe water is transmitted to the system via a 1,700-foot pipeline and supplies about 100 residences too high for the spring source. Two intake pumps are capable of supplying about 170 gpm each. The Lake source is also used to supplement supply during peak demand.

Primary Transmission and Distribution: The system is composed of two parts, the lake system and the spring system. While the two are operated independently, they are connected by pipes with closed valves that enable supplemental supply in emergencies.

The spring source flows from a spring box by gravity to a 48,000-gallon steel storage tank. Water taken for the lake system supplies 100 houses located above the spring source. The lake system is equipped with two 25 H.P. pumps connected to a float switch in the tank.

Most of the system consists of 6-inch asphalt dipped and wrapped unlined steel pipe. About one third of the system mains are less than 4 inches in diameter. Distribution system mains are in good condition.

Storage: Storage facilities consist of two tanks: a spring tank and lake tank. The spring tank, which has a capacity of 48,000 gallons, is 16 feet above ground, cylindrical, and constructed of bolted steel. The lake tank is 24 ft. above ground, cylindrical, and constructed of bolted steel, with capacity of 210,000 gallons.

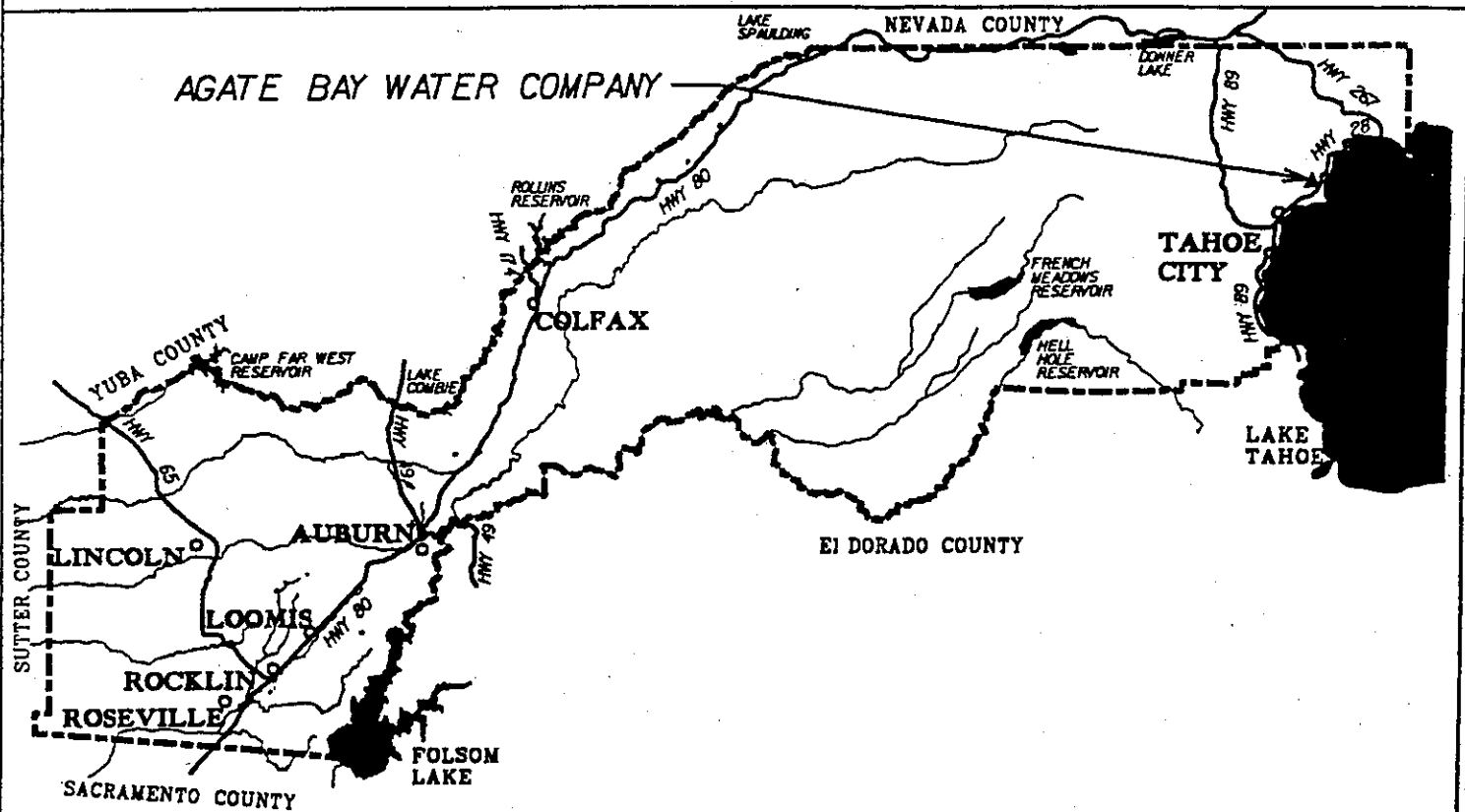
Treatment: The only treatment provided is disinfection of the lake water by chlorination.

1990 System Production: Currently, 540 service connections serve the system, none of which are metered. The system served an approximate total of 38.1 million gallons during the 1990 year. Maximum monthly production occurred during August and was approximately 8.190 million gallons while maximum daily production reached 264,193 gallons.

Deficiencies and Limitations: The biggest problem facing the Agate Bay Water Company is compliance with Surface Water Treatment Regulations. Additional sources and/or storage facilities will be necessary to meet peak demands unless a water treatment facility is constructed for the lake water.

System Appraisal: The Agate Bay subdivision is mostly built-out. Future demands to the system will be increased minimally over the next decade. A spring source supplying the system is able to provide adequate water supply during normal usage. Peak seasonal use, however, needs supplemental supply. The distribution system is in good shape; maintenance costs thus remain relatively low.

PLACER COUNTY WATER SYSTEMS



System Name: AGATE BAY WATER COMPANY

Address: P.O. BOX 331, CARNELIAN BAY, CA 95711

Contact Name: AL SCHWARTZ Phone: (916)-546-3270

Service Area Size: No. Connections: 540 Population Served: @ 2000

Services Provided: PRIMARILY RESIDENTIAL - LARGELY VACATION HOMES

Summary System Description

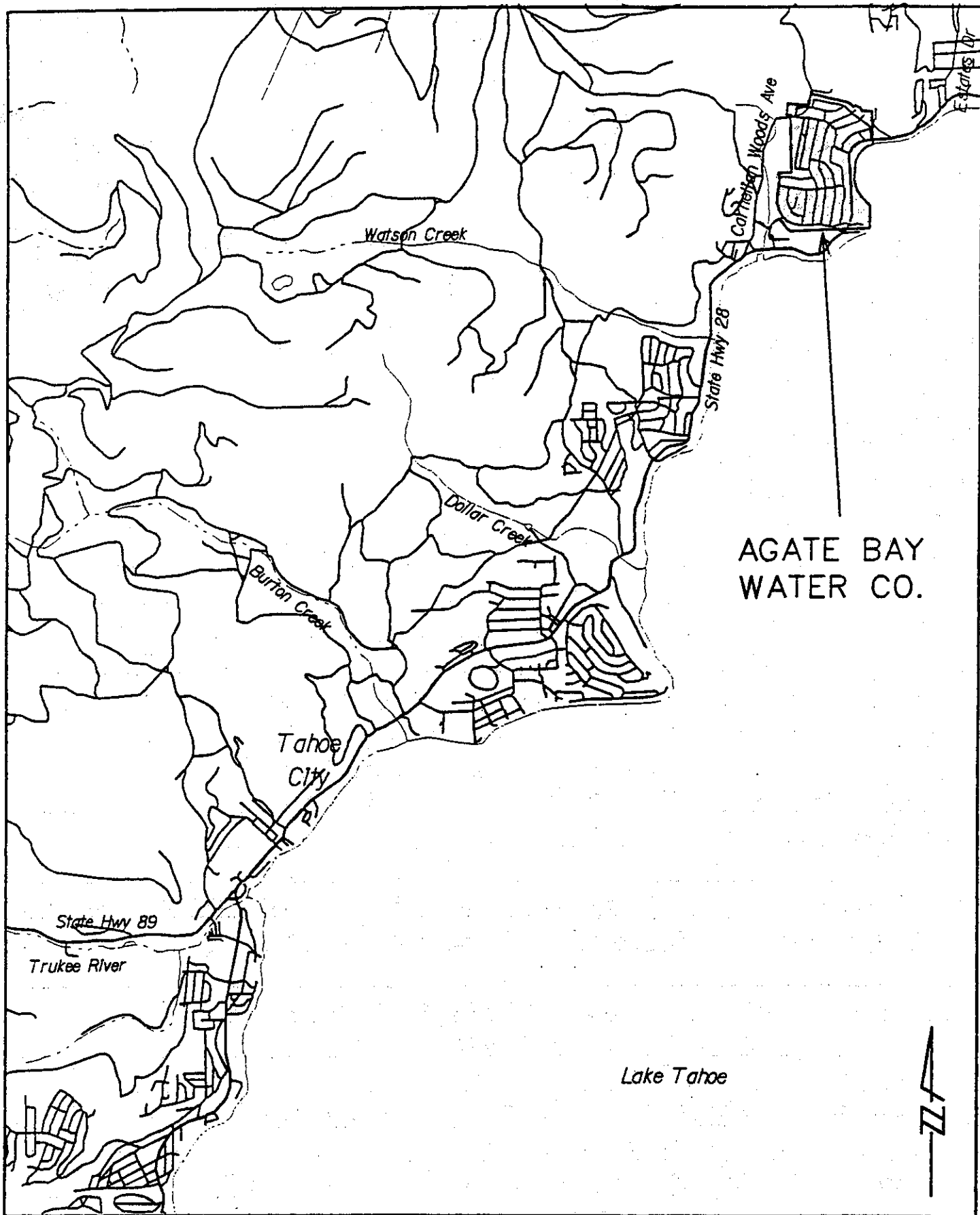
Source: HAS A LAKE TAHOE INTAKE EQUIPPED WITH (2) 25 H.P. PUMPS.
AND SERVED BY A SPRING SOURCE.

Transmission: LAKE INTAKE REACHES APPROXIMATELY 100 CONNECTIONS VIA A 1700 FT.
6 INCH PIPELINE WHICH ARE TOO HIGH FOR THE SPRING SOURCE.

Treatment: TREATMENT PROVIDED IS CHLORINATION OF LAKE WATER. NO
TREATMENT IS PROVIDED TO THE SPRING SOURCE.

Storage: STORAGE FACILITIES CONSISTS OF TWO TANKS, 1) A SPRING TANK WHICH IS
ELEVATED 16 FT. ABOVE THE GROUND SURFACE, STEEL BOLTED, AND HAS A 48,000
GALLON CAPACITY 2) A 210,000 GALLON ELEVATED (24 FT.) STEEL BOLTED.

Capacity Limitations: ABILITY TO COMPLY WITH SURFACE WATER TREATMENT
REGULATIONS.



AGATE BAY
WATER CO.

AGATE BAY WATER COMPANY

ALPINE SPRINGS COUNTY WATER DISTRICT

District Overview: The Alpine Springs County Water District provides water to four pressure zones within Alpine Meadows. The District was formed in 1963. Since its formation it has undergone several water permit amendments thus reaching its current supply status. Additionally, the District also is responsible for fire, sewer, greenbelt and recreation.

Three of the four pressure zones are interconnected, allowing supply to any zone from another in case of an emergency. For the most part the system is gravity fed, having pressure reduction valves between zones. Four horizontal and three vertical well sources supply the water system.

Water service connection fees and rate schedule for 1991 shown below.

Connection fee = \$525 - two-bedroom house

Rates:

Meter Size	Yearly Service Charge
3/4"	\$175.00
1"	\$186.00
1.5"	\$263.00
2"	\$475.00
3"	\$946.00

Up to 50,000 gallons/year is included in above rates. Service charges for excessive water use is shown below:

50,001 to 100,000 gallons/year	\$0.50/1,000 gallons
100,001 to 150,000 gallons/year	\$0.40/1,000 gallons
150,001 and up	\$0.30/1,000 gallons

Source Information: Water supply source for the Alpine Springs County Water District consists of four horizontal springs and three vertical wells. Well source No. 1 is located at the midpoint in the valley. The minimal dependable supply capacity of this source is estimated at about 75 gpm, with maximum obtainable reaching 100 gpm.

Wells No. 2 and No. 4 are located near the ski lodge at the western end of the valley. The wells and related distribution piping were constructed by the ski area for snow making. An agreement between the Alpine Meadows ski area and Alpine Springs County Water District allows usage of the wells between October 15 and April 15 without cost to the ski area. Usage is permitted in emergency situations to the ASCWD. Capacity characteristics are similar to Well No. 1, each having a reliable supply capacity of 50 gpm, and able to supply up to 140 gpm combined.

Well No. 3 is connected to zone 3. Its minimum capacity is observed at 25 gpm, with expected maximum capacity of 35 gpm.

Vertical wells 1 and 2 are located approximately 100 feet apart from each other. Well No. 1 is capable of providing a minimum capacity of 40 gpm and maximum of 60 gpm. Well No. 2 provides a minimum of 10 and a maximum of 20 gpm. These wells are used primarily as standby supplementing the horizontal wells during busy periods.

The ACW well is located at the entrance to Alpine Meadows, in the east end of the valley. This well has a reliable capacity of 40 gpm with a 50 gpm maximum limit.

Based on the foregoing discussion, the District's present water supply capacity is 290 gpm. This is well over the required amount to service the area. The following table further summarizes source information.

SOURCE SUPPLY INFORMATION
Alpine Springs County Water District

Source	Minimum Reliable Capacity	Maximum Reliable Capacity
Well 1	75 gpm	100 gpm
Well 2	100 gpm	140 gpm
Well 3	25 gpm	35 gpm
AMEW No. 1	40 gpm	60 gpm
AMEW No. 2	10 gpm	20 gpm
ACW No. 3	40 gpm	50 gpm

Primary Transmission and Distribution: The physical condition of all distribution facilities in Alpine Meadows is very good. Flexibility of supply to specific zones during emergencies is adequate. Almost all areas can be supplied from two directions by separate sources or storage tanks. Most distribution piping is composed of asbestos cement pipe ranging from 6" to 10" in diameter.

Storage: Total storage capacity available is 1.1 million gallons. However, not all storage capacity is available to all locations. Storage is available between (5) 100,000 gallon tanks and (1) 500,000 gallon tank. The tanks are all reportedly in good condition both structurally and sanitarily.

Treatment: The only treatment provided to the system is disinfection by chlorination once per year or as necessary.

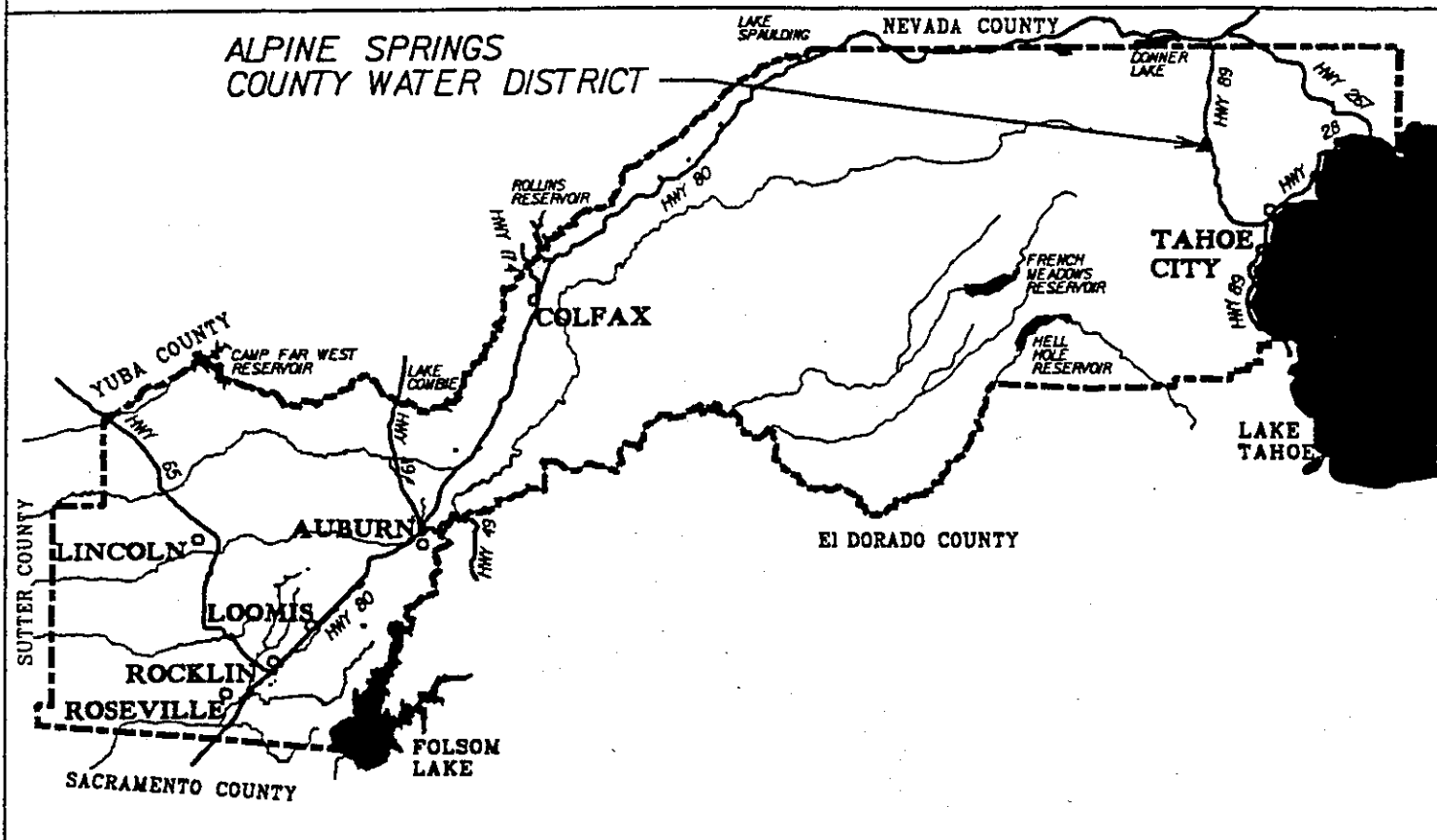
1990 System Production: Currently seven ground water sources serve a total of 532 general and residential and 3 commercial connections. The permanent population served is approximately 250 people. Maximum seasonal is substantially higher at 8,000, a significant seasonal influx.

Existing Planned Improvements: The District is currently in its third year of a five year long capital improvement program. All proposed projects outlined for completion to date are completed, and expects to meet all priority items by 1993.

Deficiencies and Limitations: Directly resulting from the ability of the District to recognize and obtain funding for continued maintenance and project retrofits, no significant deficiencies or limitations exist in the system.

System Appraisal: The Alpine Springs County Water District currently experiences few difficulties with operation and maintenance to its water system. Adequate water supply and interconnections throughout the system could allow for additional services within the district boundaries.

PLACER COUNTY WATER SYSTEMS



System Name: ALPINE SPRINGS COUNTY WATER DISTRICT

Address: DRAWER "E", TAHOE CITY, CA 95730

Contact Name: THOMAS G. SKJELSTAD Phone: (916) 583-2342

Service Area Size: 45 sq mi No. Connect.: 535 Population Served:

Services Provided: PRIMARILY RESIDENTIAL AND CONDOMINIUMS W/3 COMMERCIAL CONN.

Summary System Description

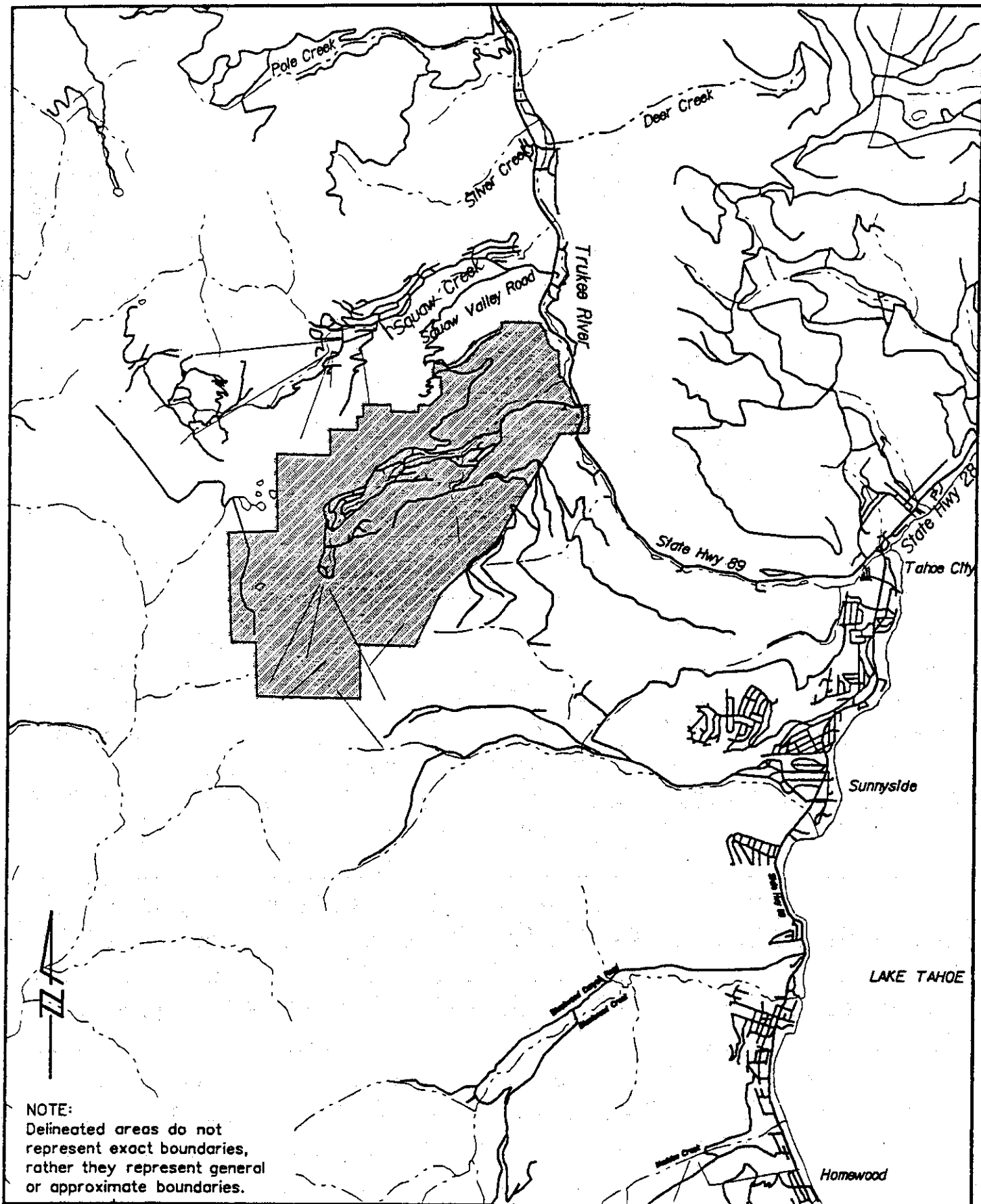
Source: 4 HORIZONTAL WELLS AND THREE VERTICAL WELLS ARE CAPABLE OF PROVIDING A MINIMUM SOURCE CAPACITY OF 290 GPM TO THE SYSTEM.

Transmission: ALL TRANSMISSION AND DISTRIBUTION LINES WITHIN THE SYSTEM ARE CONSTRUCTED FROM ASBESTOS CEMENT PIPE RANGING IN SIZE FROM 4 In. TO 10 In.

Treatment: DISINFECTION BY CHLORINATION IS PROVIDED TO THE SYSTEM ONCE A YEAR AND WHEN NECESSARY.

Storage: THERE EXISTS 11 MILLION GALLONS OF STORAGE AVAILABLE TO THE SYSTEM BETWEEN (5) 100 K TANKS AND (1) 500 K TANK.

Capacity Limitations: DUE TO AN AGGRESSIVE 5 YEAR CAPITAL MAINTENANCE PROGRAM, THERE ARE NO SIGNIFICANT DEFICIENCIES TO THE SYSTEM.



ALPINE SPRINGS COUNTY WATER DISTRICT

Water Service Area

CASTLE CITY MOBILE HOME PARK PUBLIC WATER SYSTEM

District Overview: Castle City Mobile Home Park is located near Newcastle. The park was inducted in 1966 and contains 200 mobile homes. The water treatment plant serving Castle City MHP was designed and constructed by Mr. Ronald Coleman, a Grade II operator and owner of the facility. The State Department of Health Services (DOHS) recommends connection to Placer County Water Agency (PCWA) by June 1993 in order to meet the new standards.

Source Information: The domestic water supply for the Castle City MHP is derived from PCWA's Rock Springs Canal. The Newcastle Canal is delegated as a backup source.

Primary Transmission and Distribution: The Castle City MHP distribution system, consisting of a 1,000 gallon elevated pressure tank and PVC pipe, does not meet California Water Works standards.

Storage: A 60,000 gallon ground level clearwell provides storage for treated water at Castle City MHP.

Treatment: Water treatment at Castle City MHP consists of coagulation, sedimentation, chlorination, and filtration. A flocculation tank, sand filters, and clearwell operate in series and produce a maximum of 50,000 gpd. Two pumps transmit treated water to storage.

1990 System Production: Castle City MHP serves an estimated population of 344 through 200 service connections.

Maximum daily water supply observed was 53,000 gallons, a maximum monthly supply of 1.6 million gallons, and an annual total of 16 million gallons in 1990.

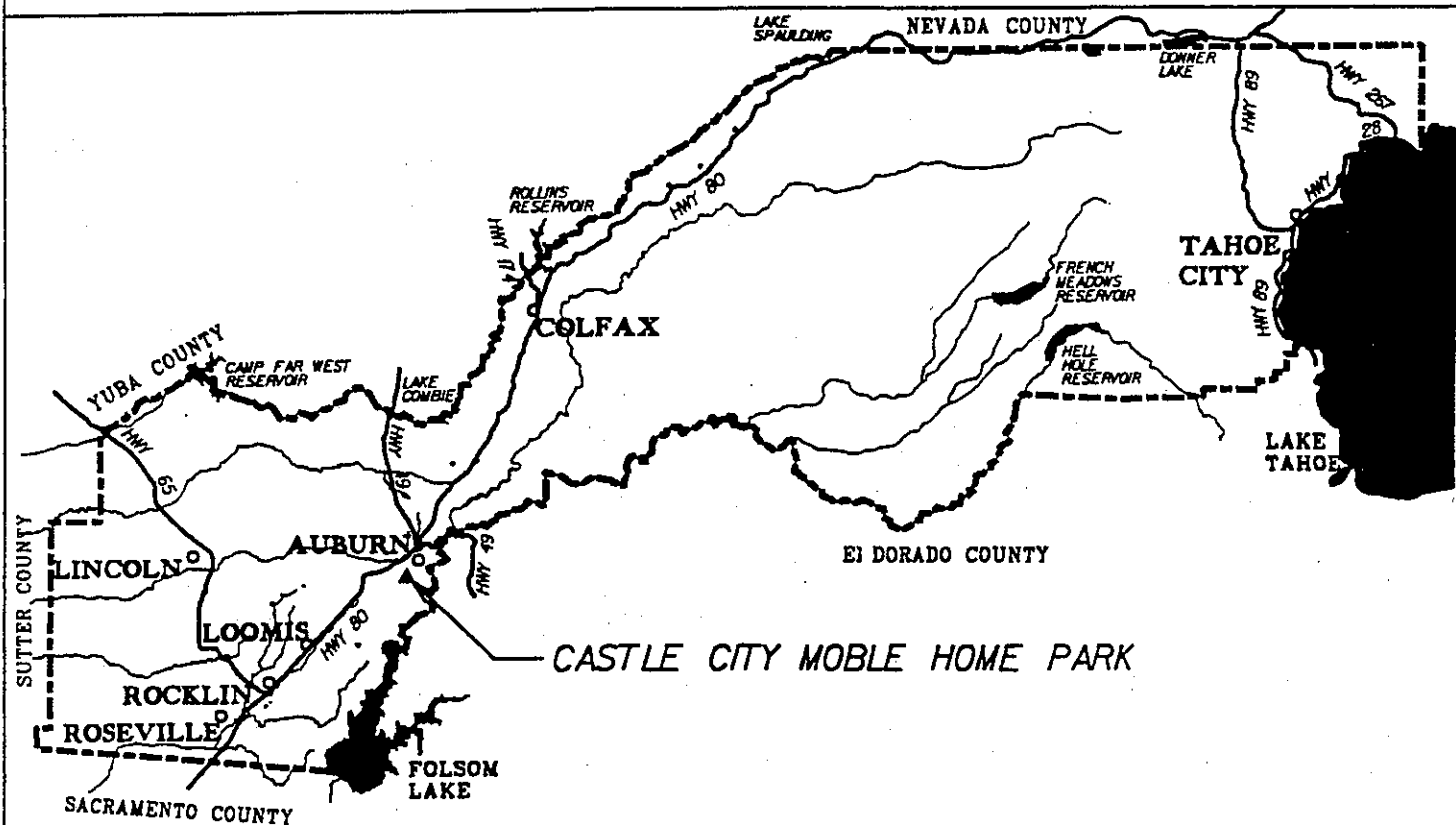
Deficiencies and Limitations: Implementation of the Surface Water Treatment Regulations (SWTR's) will require that the Castle City MHP modify their existing treatment plant. Addition of flocculation processes in the sedimentation tank, extended chlorine contact time in the clearwell, installation of blowoff hydrants at dead ends, implementation of alarm devices, and purchase of standby replacement equipment are recommended modifications.

Several operation and maintenance refinements are also needed at the Castle City MHP. These include monitoring and recording of turbidity levels in the combined filter effluent and chlorine levels in the clearwell effluent and periodic testing of individual filter performance. Initiation of a testing program determining bacteriological, chemical, and radiological water quality aspects is also required. The park needs to establish an effective cross-connection control program, draft an updated emergency notification plan, and prepare maps of the distribution system.

Existing Planned Improvements: Although development of the Castle City MHP property is not saturated and additional access to public utilities is attainable, there are no current plans for expansion.

System Appraisal: The water treatment system serving the Castle City MHP must make punctual improvements to comply with the SWTR's. Noted shortcomings include deficient flocculation processes, disinfection, alarm signals, and standby equipment and inadequate water quality monitoring itinerary, cross-connection control program, emergency notification plan, and distribution system maps. These improvements may warrant connection with PCWA, an alternative endorsed by the DOHS; however, a poor distribution system may delay this arrangement.

PLACER COUNTY WATER SYSTEMS



System Name: CASTLE CITY MOBLE HOME PARK

Address: 1588 LISA DRIVE, NEWCASTLE, CA 95658

Contact Name: RONALD COLEMAN Phone: (916)-663-3544

Service Area Size: No. Connections: 200 Population Served: 344

Services Provided: GENERAL AND RESIDENTIAL

Summary System Description

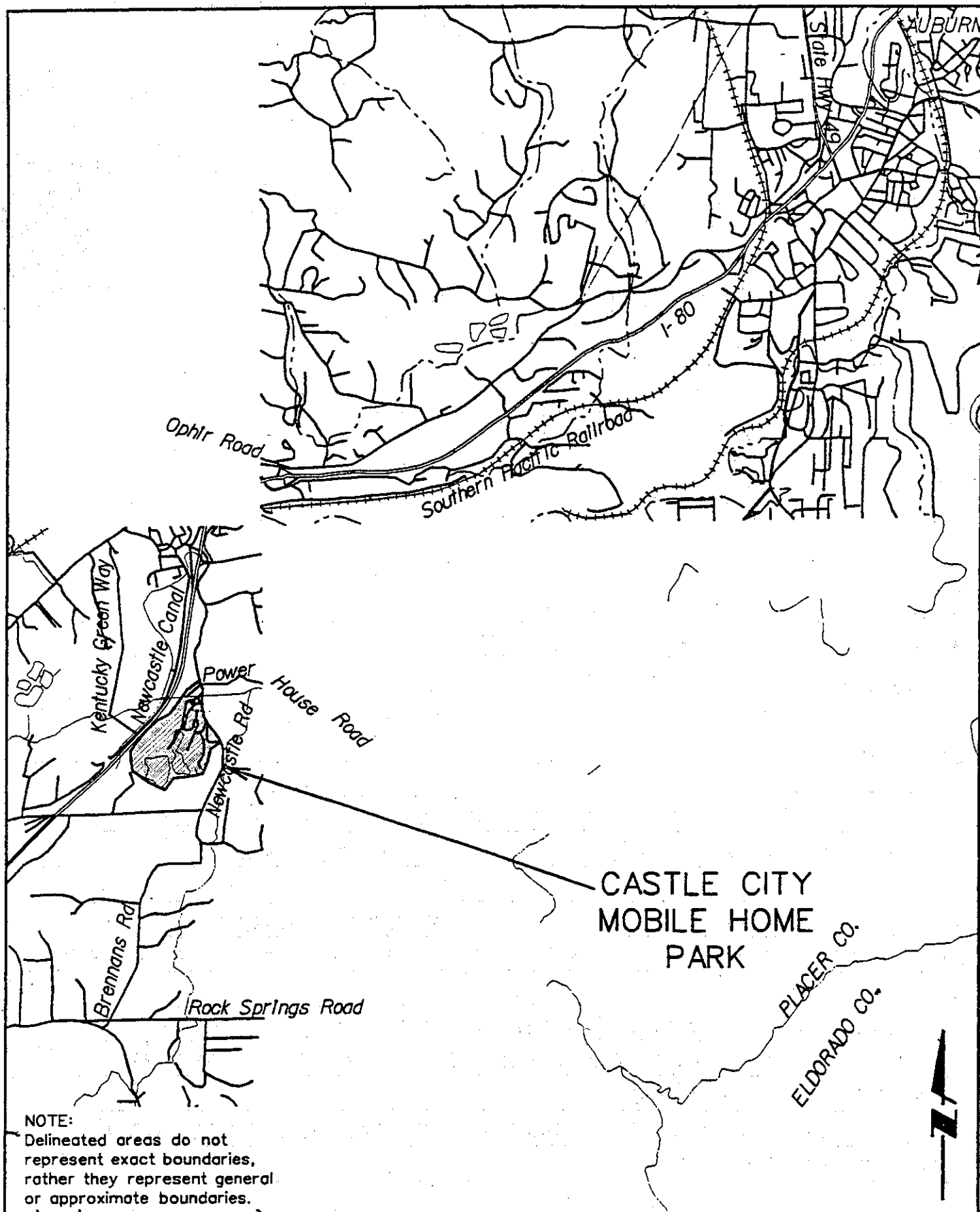
Source: WATER IS PURCHASED FROM PCWA OUT OF THE ROCK SPRINGS CANAL.
DURING EMERGENCY WATER IS DRAWN FROM THE NEWCASTLE CANAL

Transmission: WATER IS TRANSMITTED FROM THE ROCK SPRINGS CANAL TO THE
TREATMENT PLANT VIA 4000 ft. OF 3 in. PVC PIPE. THE SYSTEM IS IN GOOD CONDITION.

Treatment: WATER RECEVES TREATMENT AT THE TREATMENT PLANT. THE
TREATMENT PLANT COULD BE CONSIDERED A CONVENTIONAL FILTRATION PLANT,
AND DOES CONTAIN A FLOCCULATOR.

Storage: HAVE A TOTAL OF 120,000 GALLONS OF STORAGE BETWEEN TWO 60,000
GALLONS CONC. TANKS

Capacity Limitations: THE TREATMENT PLANT IS OLD AND LACKS MANY WARNING DEVICES,
AND MONITORING DEVICES REQUIRED BY THE SURFACE WATER TREATMENT REGULATIONS.
MONITORING DEVICES ARE NOT REQUIRED BECAUSE WE ARE SERVING FEWER THAN 500 PERSONS.



CASTLE CITY MOBILE HOME PARK Water Service Area

CHRISTIAN VALLEY PARK COMMUNITY SERVICES DISTRICT

District Overview: Christian Valley Park Community Services is located northeast of Auburn just off Highway 80. The District was formed originally in 1964 under jurisdiction of Placer County Health Department. With an increasing number of connections the District now operates under a water supply permit issued in 1978 under jurisdiction of State Department of Health Services.

The District purchases ditch water from PCWA out of the Bowman Canal providing treatment, storage and distribution. The service area is composed primarily of residential low density (1 - 5 ac lots).

Source Information: The sole source of supply to Christian Valley Park CSD is PCWA's Bowman Canal. This canal carries water originating in the Sierra Nevada Mountain Range and then makes its way through various reservoirs, streams and canals. The water shed is mostly undeveloped, but open to the public for recreation. Due to a few sparse residences having septic systems opportunity exists for contamination from sewage.

Primary Transmission and Distribution: Primary transmission and distribution is through the Bowman Canal. Primary transmission for the system is an 8 inch AC line which carries water from the treatment plant to the storage reservoir.

Asbestos Cement Pipe (4" - 8" diameter) is the primary means of distribution. Approximately 4000 ft. of 10 inch RCP and 4000 ft of 12 inch steel pipe are included within the distribution system.

The system contains a lower and upper pressure zone. The lower zone includes approximately 93% of the services. It receives water by gravity flow through a 10 inch steel main from the storage reservoir. Pressures for this zone range from 75 - 130 psig, thus requiring pressure reducing valves at most connections to system in the lower zone.

The upper zone experiences pressures ranging from 50 - 80 psig. The upper pressure zone is responsible for serving about 35 residences. A booster station having (2) 10 Hp. pumps supplies water to the upper zone. The present booster station has the capacity of 300 gpm.

Storage: The treatment plant's clearwell acts as the sole distribution storage reservoir for the system. This storage facility is an earthen reservoir with a capacity of approximately 1 million gallons and is covered with a Hypalon membrane.

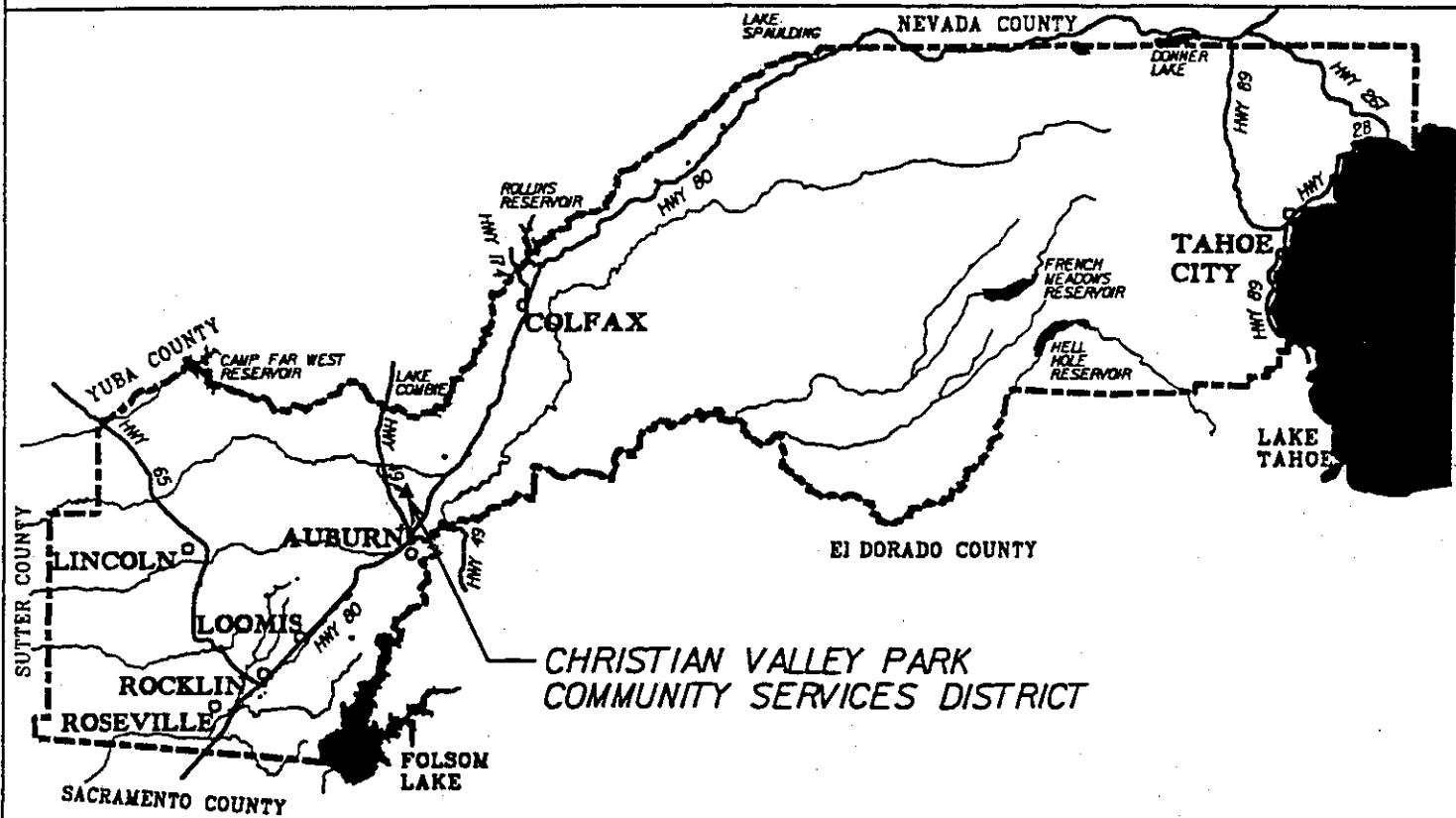
Treatment: Treatment provided by Christian Valley CSD is considered to be complete or conventional surface water treatment. Processes include chemical addition (alum and lime), rapid mix, flocculation, sedimentation, filtration, and disinfection. The design max flow rate through the plant is 700 gpm or 1 MGD.

1990 System Production: The system is comprised of one distribution system. This system is sole responsibility for serving 492 general and residential connections providing 128 million gallons of water during the 1990 calendar year.

Deficiencies and Limitations: Facilities are old and somewhat outdated. Problems will be encountered when the SWTR are imposed. There is no cross connection control program and the emergency notification plan is over 14 years old thus information is grossly outdated.

System Appraisal: Christian Valley's treatment process is conventional filtration with use of dual media pressure filters. Its facilities are old and lack most of the reliability features built into newer plants, and also required by Surface Water Treatment Regulations. The treatment plant is operated at rates allowing for acceptable performance and meets standards in terms of effluent turbidity levels. The District also lacks a watershed survey and certified operators.

PLACER COUNTY WATER SYSTEMS



System Name: CHRISTIAN VALLEY PARK COMMUNITY SERVICES DISTRICT

Address: 3333 CHRISTIAN VALLEY RD., AUBURN, CA 95603

Contact Name: ED BAILEY

Phone: _____

Service Area Size: _____ No. Connections: 492 Population Served: 1968

Services Provided: METERED RESIDENTIAL

Summary System Description

Source: WATER IS PURCHASED FROM P.C.W.A.'S BOWMAN CANAL

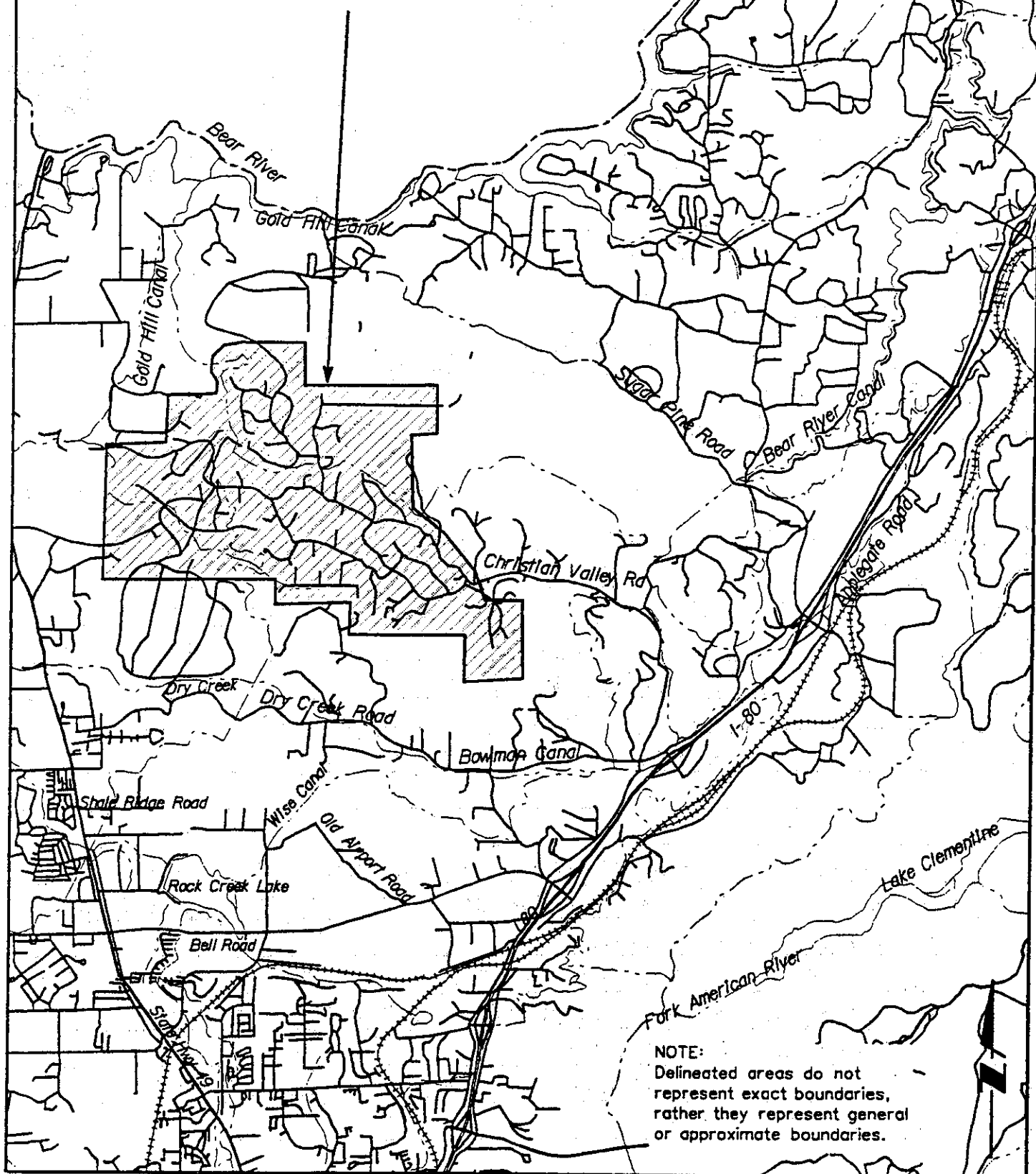
Transmission: PRIMARY TRANSMISSION TO CHRISTIAN VALLEY CSD IS THROUGH THE BOWMAN CANAL. WATER IS DRAWN FROM THE CANAL AND TRANSMITTED VIA AN 8 INCH AC. LINE TO THE TREATMENT PLANT.

Treatment: THE 700 GPM TREATMENT PLANT USES DUAL MEDIA FILTERS, PROVIDING FLOCCULATION, SEDIMENTATION, FILTRATION, AND DISINFECTION. ALUM AND LIME ARE ALSO ADDED DURING FLUCCULATION.

Storage: THE TREATMENT PLANT HAS A 1 MG HYPALON COVERED CLEAR WELL FOR STORAGE.

Capacity Limitations: THE FACILITIES ARE OLD AND SOMEWHAT OUTDATED. THERE EXISTS NO CROSS CONNECTION CONTROL PROGRAM, AND WILL EXPERIENCE DIFFICULTY IN MEETING THE SURFACE WATER TREATMENT REGULATIONS.

CHRISTIAN VALEY PARK
COMMUNITY SERVICE DISTRICT



CHRISTIAN VALLEY PARK
COMMUNITY SERVICE DISTRICT

CITIZENS UTILITY COMPANY OF CALIFORNIA - SABRE CITY

District Overview: The Sabre City area is located near Baseline Road along the northern border of Sacramento County and eastern border of Sutter County. The entire area is served by ground water supplied by Citizens Utilities wells. The District still operates under a permit granted in 1965. The permit is not indicative to the changes made to the distribution system since 1965. Under the permit Well #1 (Vandenburg) was to be replaced by a new well.

Primary Transmission and Distribution: The distribution system has one pressure zone. Pressures vary within the system from 50 - 70 psi. Main lines consist solely of Asbestos Cement piping ranging from 6" to 8" diameter. There are no low head lines within the system. Condition of piping, according to Citizens representatives, is excellent.

Source Information: The Sabre City system currently consists of two well sources, the Vandenburg well (300 gpm) and the PFE well (426 gpm). Production required by California Code of Regulations for this system is 550 gpm, resulting in a 151 gpm surplus.

The Sabre City area is interconnected with the Antelope Oaks system via two 8" water mains. Extensive expansion within the Placer County Citizens Utilities franchise areas is possible as a result of the interconnection as well as increased system reliability and fire flows.

Storage: Storage is not required for this system because existing source capacity exceed minimum flow requirements. It is worth noting that each well is equipped with a hydropneumatic tank; Vandenburg having a 3000 gallon and PFE having a 5000 gallon tank. The tanks primary use is to provide pressure regulation for the system.

Treatment: Both wells are equipped with chlorinators. The Vandenburg hydropneumatic tanks serves a dual purpose as a sand separator. No other treatment is provided to the system.

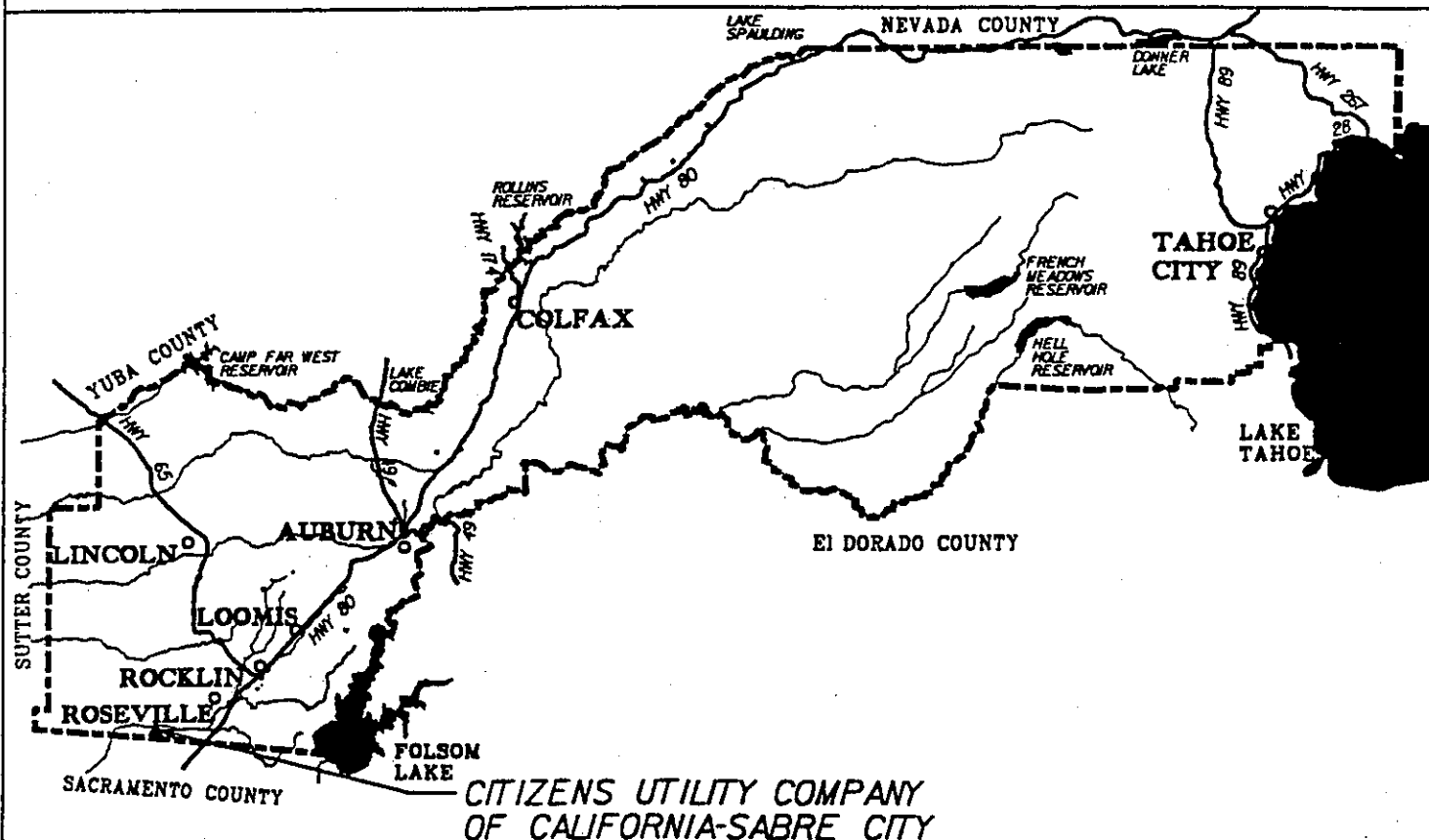
1990 System Production: According to the 1990 annual report, Sabre City wells delivered 124,434 million gallons of water to 223 flat rate paying customers. Customers are primarily general and residential (223 connections) and industrial (3 connections).

Expansion Possibilities: Limited only by lack of request.

Deficiencies and Limitations: There exists no apparent deficiencies or limitations to the Sabre City system.

System Appraisal: Citizens Utilities Company, California, Lincoln Oaks Service Area, serving Sabre City appears to have both adequate delivery and capacity to serve its customers. The quality of water is good, and all facilities seem to be updated and modernized.

PLACER COUNTY WATER SYSTEMS



System Name: CITIZENS UTILITY COMPANY OF CALIFORNIA-(LINCOLN OAKS) SABRE CITY
 Address: 3335 LONGVIEW DR., NORTH HIGHLANDS, CA 95660
 Contact Name: LARRY LUMSARGIS Phone: (916)-481-7350
 Service Area Size: 8,576 ac No. Connect.: 223 Population Served: N/A
 Services Provided: SERVE PRIMARILY FLAT RATE RESIDENTIAL W/3 INDUSTRIAL CONN.

Summary System Description

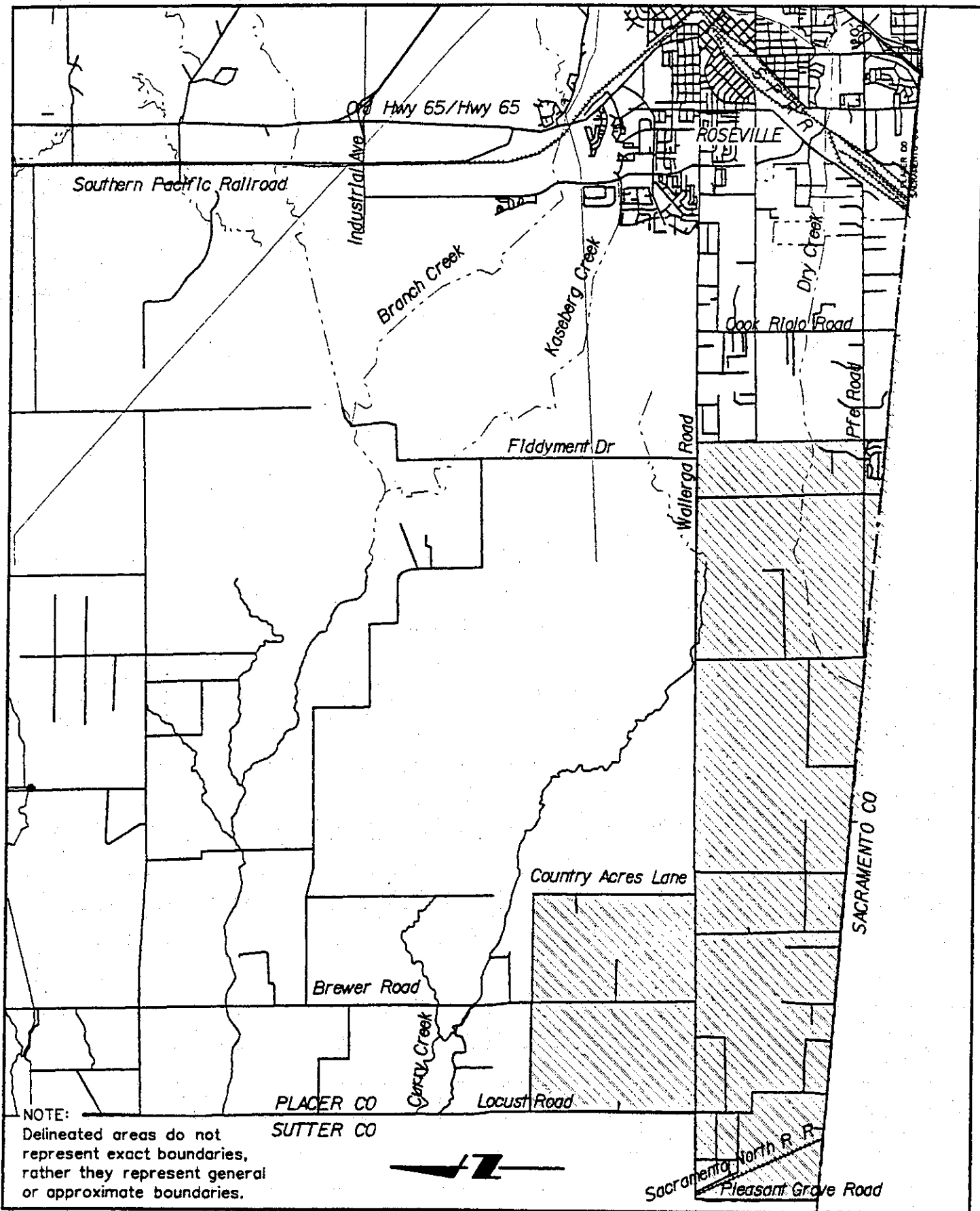
Source: CONSISTS OF TWO VERTICLE WELL SOURCES, THE VANDENBERG WELL (300 GPM) AND THE PFE WELL (426 GPM), TWO 8 In. INTERTIES TO A NETWORKED SUPPLY SYSTEM.

Transmission: ALL PIPING THROUGHOUT THE SYSTEM CONSISTS OF ASBESTOS CEMENT PIPE RANGING FROM 6-8 INCHES IN DIAMETER.

Treatment: TREATMENT CONSISTS ONLY OF DISINFECTION BY CHLORINATION. CHLORINATORS ARE LOCATED AT EACH WELL PUMP STATION.

Storage: STORAGE IS NOT REQUIRED BECAUSE SOURCE CAPACITY EXCEEDS MINIMUM FLOW REQUIREMENTS.

Capacity Limitations: SYSTEM DOES NOT APPEAR TO HAVE ANY SIGNIFICANT DEFECTS OR LIMITATIONS.



CITIZENS UTILITY CO. OF CALIFORNIA

Saber City Service Area

CITY OF LINCOLN - ZONE A AND ZONE B

District Overview: A water supply permit was granted by the state of California to the City of Lincoln and surrounding area in 1965. At this time the City of Lincoln purchased water from Pacific Gas & Electric Company from the Caperton Canal, and had a separate well and distribution system serving the airport. The system was also equipped with two reservoirs, an 8 million gallon used for storage and a 1 million gallon used for storage and Coagulation-sedimentation. Both reservoirs were open air and had no lining. Water supply came mostly from the Middle and South Forks of the Yuba River.

In 1978 under the Clean Water Act the open air reservoirs became a health hazard. Federal funding was provided to connect the city's distribution system to the PCWA Sunset Water Treatment Plant. The small water treatment plant was removed from operation. Utilizing State Water Bond Law monies, system changes included deactivation of the old water storage treatment facilities, installation of a 1.5 million gallon steel water storage tank, replacement of undersized mains in the distribution system, and purchasing treated water from PCWA.

A permit amendment for development of a new well to supplement water supply was issued in 1984.

Fees for residential connections to existing facilities within the City of Lincoln are \$2,755.25 plus a PCWA charge determined at the time a building permit is issued. Water service rates are as follows:

\$10.00/1000 gal. up to 10,000 gal.
 \$1.10/1000 gal. from 10,001 -> 20,000 gal.
 \$1.00/1000 gal from 20,001 -> 60,000 gal.
 \$0.95/1000 gal from 60,001 -> 350,000 gal.
 \$0.75/1000 gal 350,001 gal and up.

Source Information: The City of Lincoln has four supply sources (outlined below), from which to obtain water, one of which is not usable for domestic consumption, and is divided into two separate pressure zones, Zone A and Zone B.

Water drawn from the Caperton Canal is currently stored in a lake near the canal. The water is currently not utilized; however, discussions of how and where to utilize it are currently taking place among city staff. One such possibility would be landscape irrigation.

Zone A is provided with treated, settled and filtered water from the Sunset Water Treatment Plant. Water is purchased under contract from PCWA. Current entitlement is 3 MGD from the treatment plant, which has a maximum capacity of 6 MGD total. Interconnections between the Sunset plant and Foothill system in two locations, can provide water to the City of Lincoln in the event of Sunset plant failure.

Zone B is service by two wells each having approximately 750 gpm capacity.

The table below outlines the sources and capacities.

Source Type/Name	Capacity/Entitlement
14" transmission line from PCWA Sunset WTP	3.0 MGD
Well # 2	Approx. 750 gpm
Well # 4	Approx. 750 gpm
Caperton Canal (Raw Water)	2 miners inches (approx 0.05 CFS)

Primary Transmission and Distribution: Primary transmission of water to the City of Lincoln's Tank #1 is through 900 ft. of 14 inch main from PCWA's Sunset Treatment Plant. The water then travels through 10,200 ft. of 20 inch diameter and 900 ft. of 14 inch diameter to the city's distribution system.

The distribution system contains two pressure zones, Zone A and Zone B. Operating pressures within Zone A range around 95 psig. Pressures within Zone B range from 80 psi to 105 psi.

Types of pipe material encountered throughout the distribution system are cast iron, asbestos cement, ductile iron and PVC C900, sizes ranging from 4 - 16 inches in diameter. All new construction generally uses PVC C900 piping. Corrosion has created leak problems with some of the old galvanized service connections. There are also problems with brittleness on some of the 10 to 15 year old plastic services. Once identified these services are replaced by the City.

The City has some low pressure problems within the distribution system. This issue is being addressed in the new Public Facilities Element of the City Master Plan.

Storage: The City has 3.0 million gallons of storage available with two 1.5 million gallon storage tanks. The storage tank in the City corporation yard is used only for emergencies. The main 1.5 million gallon storage tank is located off Oak Tree Lane. Both tanks are in good condition.

Treatment: Treated surface water is provided to the City of Lincoln from the Sunset Water Treatment Plant. For further description of treatment see Foothill/Sunset section of this report.

1990 System Production: According to the 1991 annual reports combining both zones A and B, the max day produced by the system reached 3,228,000 million gallons during the month of July, serving a total population of approximately 7,575. Connection types and quantities are outlined below:

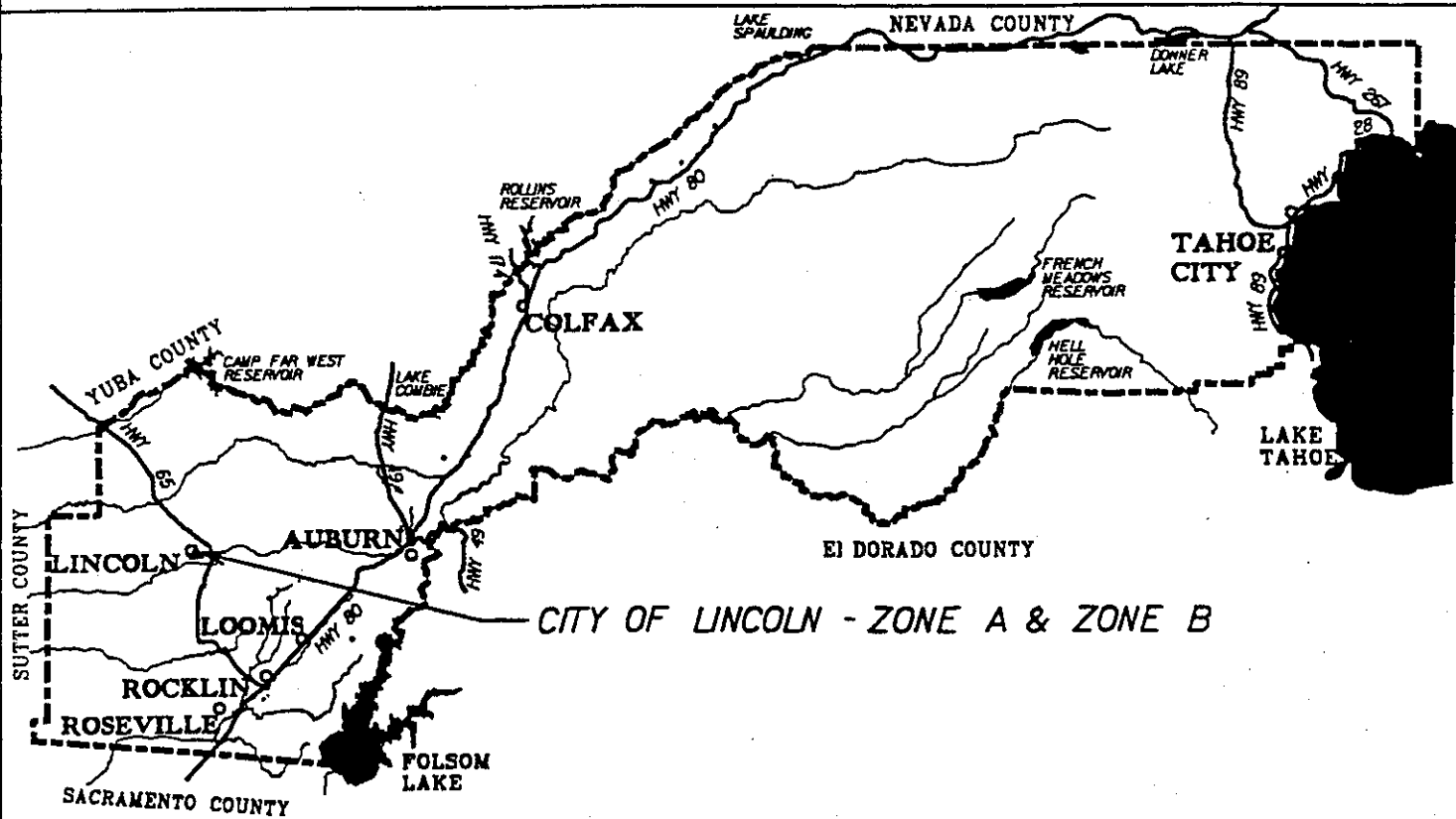
Type of Connection	Metered	Flat Rate	Total
General and Residential	2111	15	2126
Commercial	84	55	139
Industrial	19	10	29
Total	2214	80	2294

Deficiencies and Limitations: The last 900 feet of the transmission main to the distribution system necks down from 20 inch diameter to 14 inch diameter. The 14 inch restricts flow into the distribution system. Under the master plan in progress this issue is addressed.

The Sunset Treatment Plant is the only other major deficiency to the City of Lincoln distribution system. The plant is very old and due to the newly adopted surface water treatment regulations, much improvement is required to make the plant meet requirements. A master plan is underway concerning the Sunset area which should be referenced for future service to the City of Lincoln.

System Appraisal: The City of Lincoln provides adequate quantities and quality of water to its present customers. Recognizing the amount of possible future growth has allowed the City to prepare facilities required to serve future needs.

PLACER COUNTY WATER SYSTEMS



System Name: CITY OF LINCOLN - ZONE A (MAIN SYSTEM) & ZONE B

Address: 511 5TH ST., LINCOLN, CA 95648

Contact Name: SEAN D. CAREY Phone: (916) 645-8576

Service Area Size: No. Connections: 1874 Population Served: 5300 :

Services Provided: PRIMARILY RESIDENTIAL AND COMMERCIAL AND 9 INDUSTRIAL CONN.

Summary System Description

Source: FOUR SOURCES OBTAINING WATER, - ONE NOT FOR DOMESTIC CONSUMPTION.

1) 14" TRANSMISSION LINE FROM P.C.W.A. SUNSET WATER TREATMENT PLANT. 2. & 3)

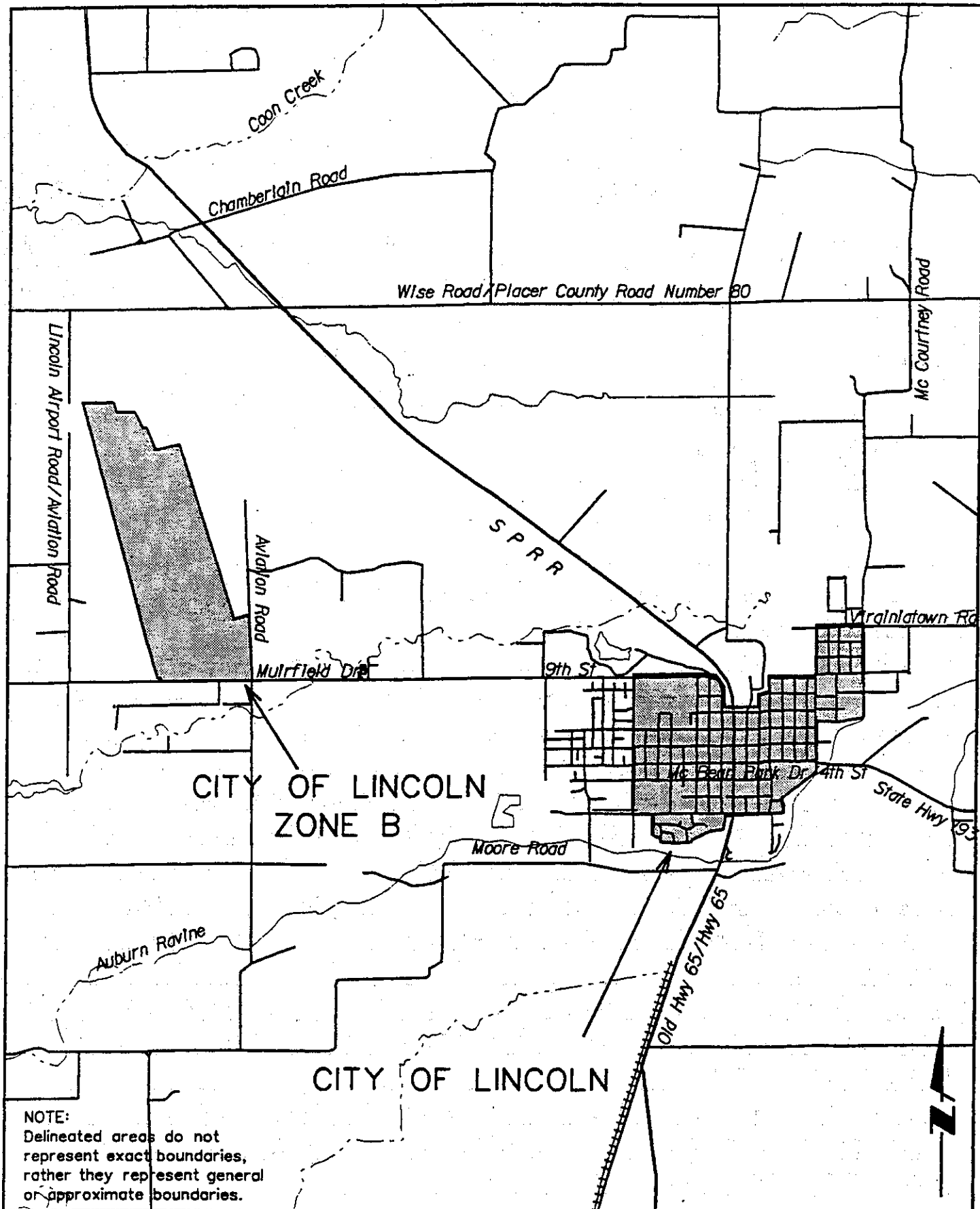
TWO GROUNDWATER WELLS 4) CAPERTON CANAL. ZONE B HAS 1 WELL PRODUCING 1500 GPM.

Transmission: PRIMARY SOURCE TRANSMISSION VIA A 14 INCH MAIN EXTENDING FROM P.C.W.A. SUNSET WATER TREATMENT PLANT. ZONE B - WELL PUMPS DIRECTLY INTO DISTRICT SYSTEM.

Treatment: ZONE A - TREATED WATER IS PROVIDED BY P.C.W.A.'S SUNSET WATER TREATMENT PLANT. THE WELLS ARE CHLORINATED. ZONE B - NO TREATMENT IS PROVIDED TO THE WELL

Storage: 3.0 MILLION GALLONS OF STORAGE IS AVAILABLE BETWEEN TWO 1.5 MILLION GALLON TANKS. ZONE A & B ARE INTERCONNECTED, THEREFORE STORAGE IS AVAILABLE TO BOTH ZONES.

Capacity Limitations: THE 14 INCH TRANSMISSION MAIN IS VIEWED AS RESTRICTING FLOW FROM THE TREATMENT PLANT. THE SUNSET TREATMENT PLANT NEEDS RENOVATION IN ORDER TO MEET SURFACE WATER TREATMENT REQUIREMENTS.



CITY OF LINCOLN **Water Service Areas**

CITY OF ROSEVILLE

District Overview: The current water supply permit for the City of Roseville was issued January 1971. Main water supply was and still is Folsom Lake. The permit was issued in response to major changes in the system, most prominently chlorination, coagulation, sedimentation, chemical addition and construction of rapid gravity sand filtration facilities. These processes constituted the first phase of construction of the City's water treatment plant. The treatment plant is located near the Barton Road and Roseville Parkway intersection in the City of Roseville.

The next addition to the treatment plant was completed in 1990. The expansion included addition of three filters, a 160 ft. diameter clarifier and installation of a new telemetry system.

With the recent expansion of the water treatment plant distribution system upgrades are currently underway. This includes main line replacement as well as extension of service area.

The recent drought has directly affected the City's main source, Folsom Lake. Quantity of water within the lake is obviously an issue, but perhaps more critical is the impact by treated sewage discharges from the City of Placerville. Normally a high degree of dilution is provided by the lake, however, since flow in the lake has dropped more than fifty percent, dilution is becoming a critical concern.

Currently the City is adding to the plant the ability to use reclaimed water. Such water would be used for irrigation of golf courses and other agricultural type uses.

From a water supply, treatment and distribution, reference point of view the City of Roseville is ready for buildout during future booms.

The City of Roseville have several different charges pending individual situations for water service by the city. Connection fees are charged based on a unit called DUE (1 DUE = \$1693). Connection fees and rate schedules are outlined for the 1991 year below:

Connection Fees-

5/8" meter =(0.7)DUE	3.0" meter =(11.7)DUE
3/4" meter =(1.0)DUE	4.0" meter =(20) DUE
1.0" meter =(1.7)DUE	6.0" meter =(41.7)DUE
1.5" meter =(3.3)DUE	8.0" meter =(60.0)DUE
2.0" meter =(5.3)DUE	10.0"meter =(96.7)DUE

Rate Schedules-

	<u>Metered</u>	<u>Flat Rate</u>	
	<u>Inside City</u>	<u>Outside City</u>	
5/8"-	\$7.25	\$11.50	Mobile Homes=\$6.75/unit
3/4" -	\$7.25	\$11.50	Home<4900 s.f.=\$7.25
1" -	\$9.50	\$15.50	Home 4901>8900 s.f.=\$9.50
1.5" -	\$16.00	\$26.00	Home 8901>12,000s.f.=\$11.75

Source Information: As previously stated Roseville's main source supply is Lake Folsom. In addition to Lake Folsom there are five deep water wells connected to the system to supplement supplies when necessary.

The City of Roseville contracts with the Federal Bureau of Reclamation for 32,000 ac-ft (28.5 million gallons) of water per year. The City is currently under contract with Placer County Water Agency for an additional 10,000 ac-ft of water per year, with an option for 10,000 ac-ft more. The Warren Act of 1911 resulted in no allocation of the Placer County Water Agency water in past years. The act states specific uses of agricultural water and prohibits classified agricultural water from entering a federal system. The act in effect makes no mention about the use of PCWA water being used for domestic use. Recently House Bill 355 amended the Warren Act enabling the City to use its allocation from Placer County Water Agency. (Jackson, Jerry 9/16/91, City of Roseville Public Works Dept., pers. comm.)

Two of the five wells have been disconnected from the distribution system as a result of Trichloroethylene contamination. Folsom lake is a one million ac-ft multipurpose reservoir that collects and stores water from the North and South Forks of the American River. The characteristics of Folsom Lake and the watersheds that feed it expose it to significant recreation, sewage, and runoff hazards.

The City obtains its water from an common 84 inch outlet structure at the base of Folsom Dam, shared also by San Joaquin Water District and the City of Folsom. The structure can supply up to 200 cfs using a combination of a 25 h.p., (2) 50 h.p. and a 75 h.p. pump. Ownership and maintenance of the structure is by the Bureau of Reclamation. 22,000 ac-ft of water per year is available to the City of Roseville via this structure with increased development and associated increase in water demand. The following table illustrates the above described water sources.

Available Source	Available Capacity	Comment
Folsom Lake	22,000 ac-ft	existing demand required
Folsom Lake	10,000 ac-ft	available with increased development
PCWA	10,000 ac-ft	via pipeline
PCWA	10,000 ac-ft	executable option
groundwater wells	5	two of the five are not in use due to TCE contamination

Reliability to the City of Roseville is excellent. Folsom Lake is somewhat susceptible to drought and contamination yet the groundwater wells are available to compliment the decrease in supply should it become necessary, additionally with the allocation from Placer County Water Agency.

Primary Transmission and Distribution: A 42 inch transmission line between the plant and the city provides for primary distribution to the city. Several other veins of 36 inch and smaller distribute water throughout the various sections of town. The condition of the transmission mains is reportedly in excellent condition.

The distribution system is divided into several pressure zones, resulting from the various elevation differences. Sizes of distribution mains range from 4 to 33 inches. Types of mains include cast iron, ductile iron, wrapped steel, asbestos cement and PVC C-900 pipe.

Storage: Storage takes place within locations. The first is a 200,000 gallon clear well under the treatment plant building. There is also a 2 MG steel tank located at the plant site. Additionally since the entire system works on gravity, the 7,000 feet of 42 " transmission line could be viewed as 500,000 gallons of storage capacity. The groundwater used by the wells is also considered a substantial source of storage.

There is a fifth location coming on line in the near future. It is a 4 MG reservoir.

Treatment: Water diverted from Folsom Lake receives complete surface water treatment and should have no problems meeting the newly implemented Surface Water Treatment Regulations. A 24 mgd expansion of the treatment plant was just completed thus making the capacity of the plant 48 mgd. Treatment at the plant includes coagulation, flocculation, conventional filtration, corrosion or pH control, and multi-point disinfection (chlorination).

The existing facilities have the provision for adding parallel raw water supply line and the inlet structure was designed to ultimately split the flow. The appendices at the plant such as clarifiers and filters have the provision to double the capacity of the new expansion from 48 mgd to 96 mgd, when necessary.

The three wells used as standbys are all chlorinated. According to City staff, when necessary to use the wells many complaints are filed concerning the quality of the water, therefore use of the wells is limited to emergencies only.

1990 System Production: According to the 1991 annual report the City served a total of 4,641.05 million gallons of water for the 1990 year. Max day flow was recorded to be 22.65 million gallons. Total population served was approximately 41,000 residents. The table below outlines the types, and quantities of connections served in 1990, not counting fire hydrants:

Type of Connection	Metered	Flat Rate	Total
General and Residential	188	15,254	15,442
Commercial	1,358	742	2,100
Total	1,546	15,996	17,542

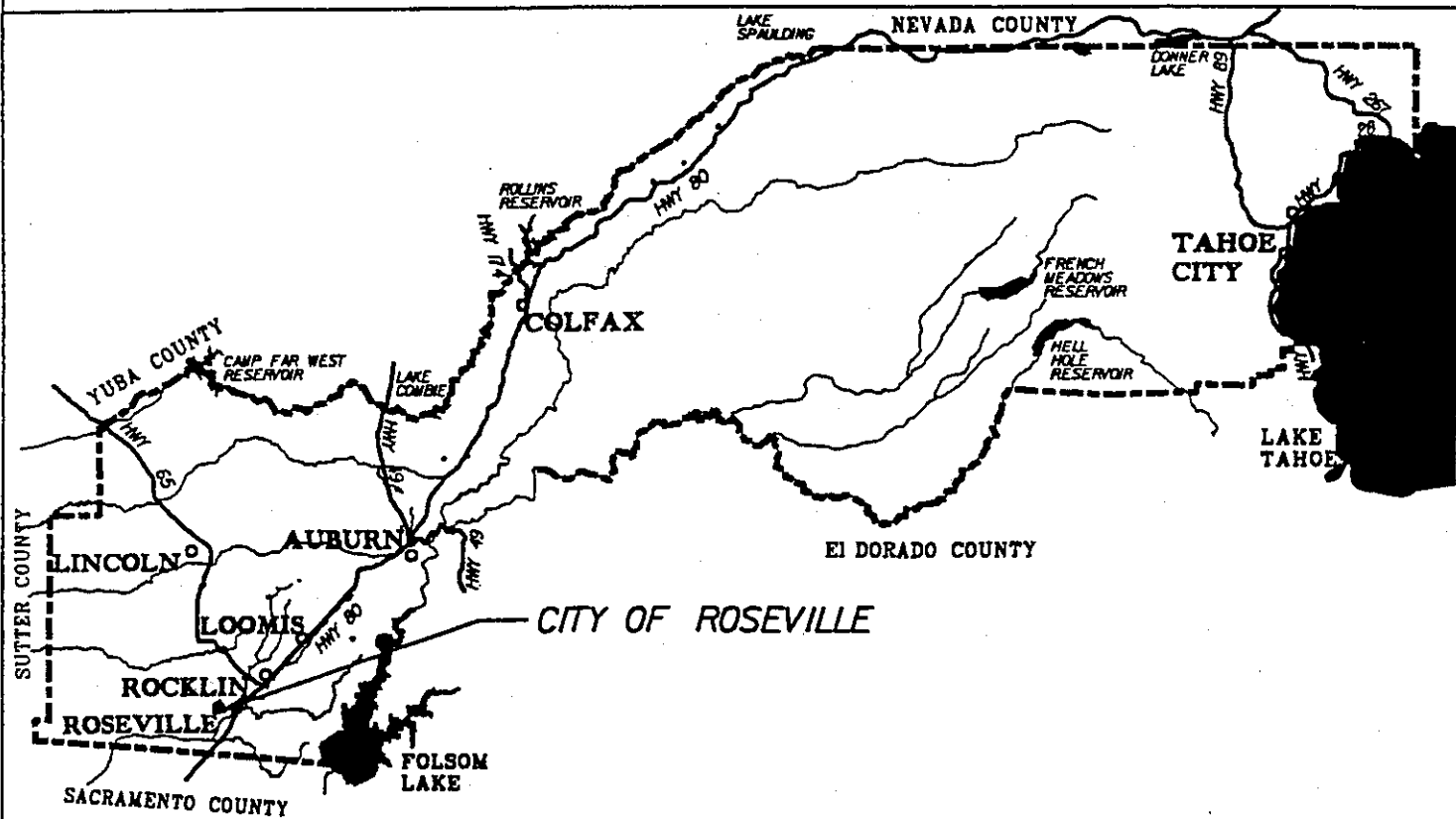
Deficiencies and Limitations: Research yielded no major sanitary defects within the system. The only problem being the reduction of flow within the American River not providing adequate dilution to the treated sewage from the City of Placerville.

Existing Planned Improvements: As stated in the District overview, the most recent planned improvement to the system is the promotion of a regional reclamation water system. This secondary water could be used for many agricultural purposes such as irrigation of golf courses and cemeteries. Additions to the plant are underway to make this improvement and should be completed by 1993.

The plant has provision for again doubling its capacity from 48 mgd to 96 mgd. Also it is planned to begin using the PCWA allotment when AB 355 is amended. The city is also considering additional groundwater wells.

System Appraisal: The City of Roseville provides an excellent quality of water to its customers. City Staff recognized the amount of growth coming to Roseville long ago and have prepared excellently to serve an increased population. Surface Water Treatment Regulations will have little to no effect on the treatment process as the new upgrade prepared for in advance. The only problem facing the City would be a continued drought. A continued drought may cause significant problems with water quality of Lake Folsom. However, even still with the recent AB 355 amendment about to take place, the city still remains in good shape for serving its existing customers.

PLACER COUNTY WATER SYSTEMS



System Name: CITY OF ROSEVILLE

Address: 316 VERNON ST., ROSEVILLE, CA 95678

Contact Name: JERRY JACKSON

Phone: (916) 781-0276

Service Area Size: No. Connections: Population Served:

Services Provided: RESIDENTIAL AND COMMERCIAL

Summary System Description

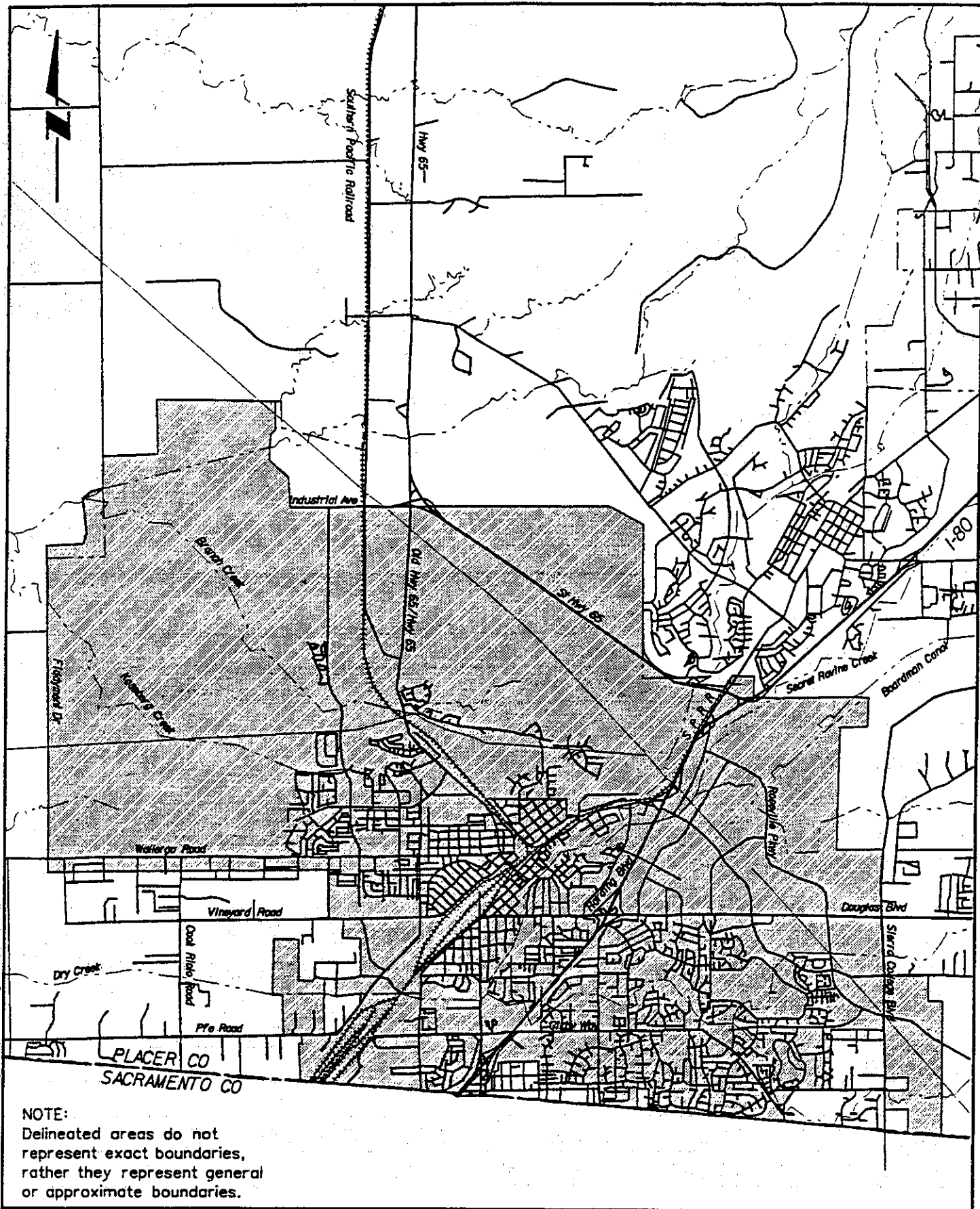
Source: THE MAIN SOURCE SUPPLY IS LAKE FOLSOM. IN ADDITION TO THE LAKE THERE ARE FIVE DEEP WELLS TO SUPPLEMENT SUPPLIES WHEN NECESSARY.

Transmission: A 42 INCH LINE BETWEEN THE TREATMENT PLANT AND CITY PROVIDES WATER. SEVERAL OTHER VIENS OF 36" DIA. AND SMALLER DISTRIBUTE WATER THROUGHOUT THE CITY.

Treatment: WATER FROM FOLSOM LAKE IS FULLY TREATED AT THE NEWLY EXPANDED 48 MGD TREATMENT FACILITY.

Storage: 27 MILLION GALLONS OF STORAGE EXISTS TO THE SYSTEM. ANOTHER 4 MG RESERVOIR WILL BE AVAILABLE IN THE NEAR FUTURE.

Capacity Limitations: BIGGEST PROBLEM IS FLOW REDUCTION WITHIN THE AMERICAN RIVER. REDUCED FLOW IS NOT ABLE TO PROVIDE ADEQUATE DILUTION TO TREATED SEWAGE FROM THE CITY OF PLACERVILLE.



CITY OF ROSEVILLE Water Service Area

FORESTHILL PUBLIC UTILITY DISTRICT

District Overview: Foresthill Public Utility District was formed in 1950 and received its original water supply permit in May 1955. Primary sources of water during this time period were from springs, and mine tunnels. Resulting from the drought years in the mid 70's Foresthill found it necessary to separate from the Auburn Dam project in 1976. Negotiations with the United States Bureau of Reclamation (USBR) led to the construction of a large storage reservoir. Contracts were signed in 1978 and funds were allocated to construct Sugar Pine Reservoir, and all appendices necessary to deliver water. Under the contracts no re-purchase of the reservoir nor facilities were required. Foresthill PUD simply buys water from USBR at \$85/ac-ft and is required to maintain all facilities for a period of 40 years.

Connection fees within the Forest Hill Public Utility District are \$2075/lot plus a \$500 meter installation fee and \$50 deposit. Water service is charged bi-monthly. A flat rate of \$24.00/bi-monthly is assessed. This flat rate includes up to 16,000 gallons of water usage. Water usage above 16,000 gallons is charged an additional \$1.00/1000 gallons.

Source Information: Two surface water sources are available to serve the District. Sugar Pine Reservoir and Mill Creek and two wells available as stand-by supply within the Todd Valley Estates subdivision. Sugar Pine Reservoir is located approximately 8.5 miles north of the District. Mill Creek intake is located approximately 4 miles north of the District.

Sugar Pine Reservoir is considered the primary source. The reservoir has 7000 ac-ft of capacity. Foresthill PUD is entitled to use 2800 ac-ft per year. Mill Creek also is capable of supplying an additional 150 ac-ft per year.

It is also worth noting that the District is also equipped with two groundwater well sources. These wells are used strictly as stand-by to the system, no disinfection is provided.

Primary Transmission and Distribution: The distribution system has one pressure zone which is split into two service areas; the Foresthill area and the Todd Valley Estates area. The Todd Valley Estates area was annexed into the Foresthill District in 1980. Prior to that it was serviced by and labeled Placer County Service Area #8. Before connection to the Foresthill system Todd Valley Estates had its own wells, which became a stand-by after the annexation.

Transmission from Sugar Pine Reservoir to the Water Treatment Plant located in the northeast corner of the District is through 8.5 miles of Ductile Iron Pipe ranging from 27 inch to 24 inch diameter. Some sections of the 8.5 mile stretch contain concrete and steel pipe. Leaving the water treatment plant a main trunk line of Asbestos Concrete Pipe Transit ranging from 21 inch to 10 inch diameter runs along Forest Hill Road from across the District from northeast to southwest. Resulting from an elevation at the Water Treatment Plant of 3420 ft. and elevation along the end of the trunk line of 2235 ft. there are 5 pressure reducing stations along the main trunk line.

The distribution system is comprised of pipes ranging from 12 inch to 2 inch diameter. Because of the large elevation differences within the District boundaries there are an additional 73-75 pressure reduction stations throughout the District.

The transmission and distribution system are reported to be in excellent shape. The primary distribution line is about 8 years old. All services within the District are metered. Unaccountable losses within the entire water system are shown to be about 3 % annually.

All newly installed pipe is required by the District to be PVC C900 CI 200. All pipe joints within the distribution system are required to be mechanically restrained.

Storage: Currently the District has three 450,000 gallon storage tanks. The tank is constructed of bolted steel and is 20 years old. With the construction of the Water Treatment Plant in 1983, the tank was relocated to the filter plant lot. Along with the relocation the tank was also re-coated and reconstructed. It is reportedly in excellent condition.

The District does not have any problems meeting the peak demands with current storage available. The District has, however, purchased two additional 450,000 gallon storage tanks to install to the system in the near future. These storage tanks are primarily to enhance firefighting capabilities.

Treatment: Quality of raw water coming from the reservoir and creek is excellent. Exposure to sewage and recreational hazards is limited to a few camp grounds surrounding the reservoir.

Foresthill is equipped with a 3 MGD gravity water treatment plant. The treatment processes provided include, grit removal, direct filtration, disinfection, and corrosion control. Other features of treatment include polymer injection.

The system is fed entirely by gravity with exception to one booster pump and hydropneumatic tank located at the treatment plant. This booster station serves a few services above the treatment plant.

1990 System Production: According to the 1991 annual report max day demand produced by the system reached 1.762 million gallons. The system reportedly produced 295.3 million gallons for the 1990 year. The system serves a total population of 5004. All connections are metered having a total number of active connections of 1403. The connections are dispersed as follows:

Type	Number
General and Residential	1331
Commercial	70
Industrial	2
Agricultural	4

Deficiencies and Limitations: No major deficiencies were noted within the entire system with the exception of various 2 in diameter distribution lines throughout the system. Currently all 2 in. distribution lines are being replaced. Since this is a fairly new system, well maintained and operated coupled with the excellent quality of raw water available, the Surface Water Treatment Regulations should have little effect of the system.

Existing Planned Improvements: Two important plans are currently being developed for the Foresthill area: the Foresthill Master Utility Plan and the Forest Hill Divide Plan. These plans are aimed at preparing the District for future development expected in the near future within the District boundaries.

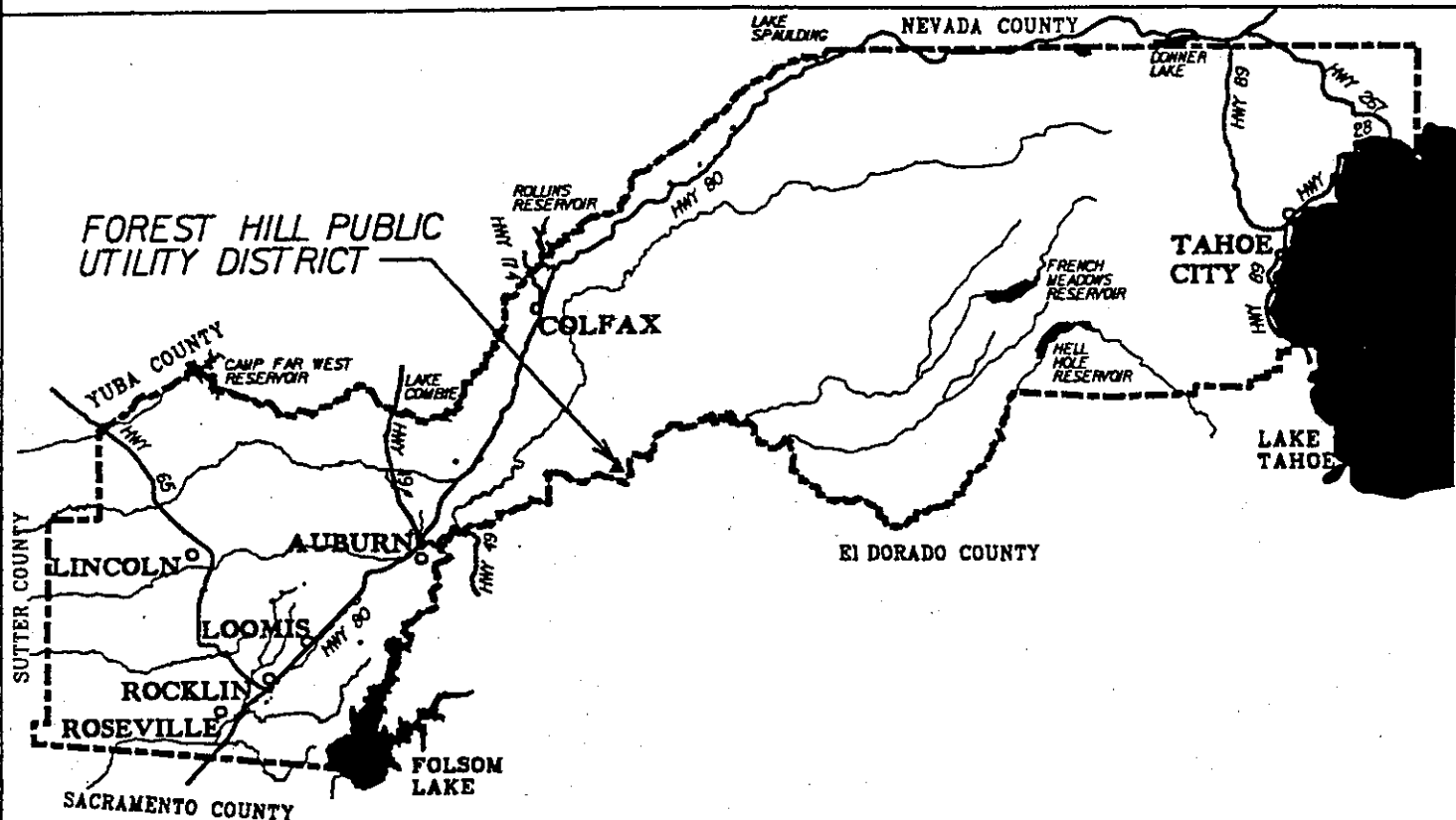
Additionally the Sugar Pine Dam has a provision enabling the dam to be raised 18 ft. additional elevation to increase capacity. The water treatment plant can also be easily doubled in size to 6 MGD.

System Appraisal: Since the construction of Sugar Pine Reservoir and the various other improvements, the Foresthill area has been in excellent shape to serve all customers. Even the recent drought in the late 80's and early 90's has had no effect on available supply to the area. In fact, since construction of the dam, it has spilled over every year since completion.

All connections in the District are metered. The District enforces a strict conservation program called Conservation by Price Indexing keeping water waste to a minimum.

Facilities within the District are in excellent shape and the District realizes the necessity of planning for the future, and has made provisions for capacity of both storage and treatment. Additionally the District has an active role in helping facility planned growth within the community.

PLACER COUNTY WATER SYSTEMS



System Name: FOREST HILL PUBLIC UTILITY DISTRICT

Address: P.O. BOX 266, FOREST HILL, CA 95631

Contact Name: KURT REED Phone: (916)-367-2511

Service Area Size: 13000 Ac. No. Connect.: 1403 Population Served: 5004

Services Provided: RESIDENTIAL, COMMERCIAL, INDUSTRIAL AND AGRICULTURAL

Summary System Description

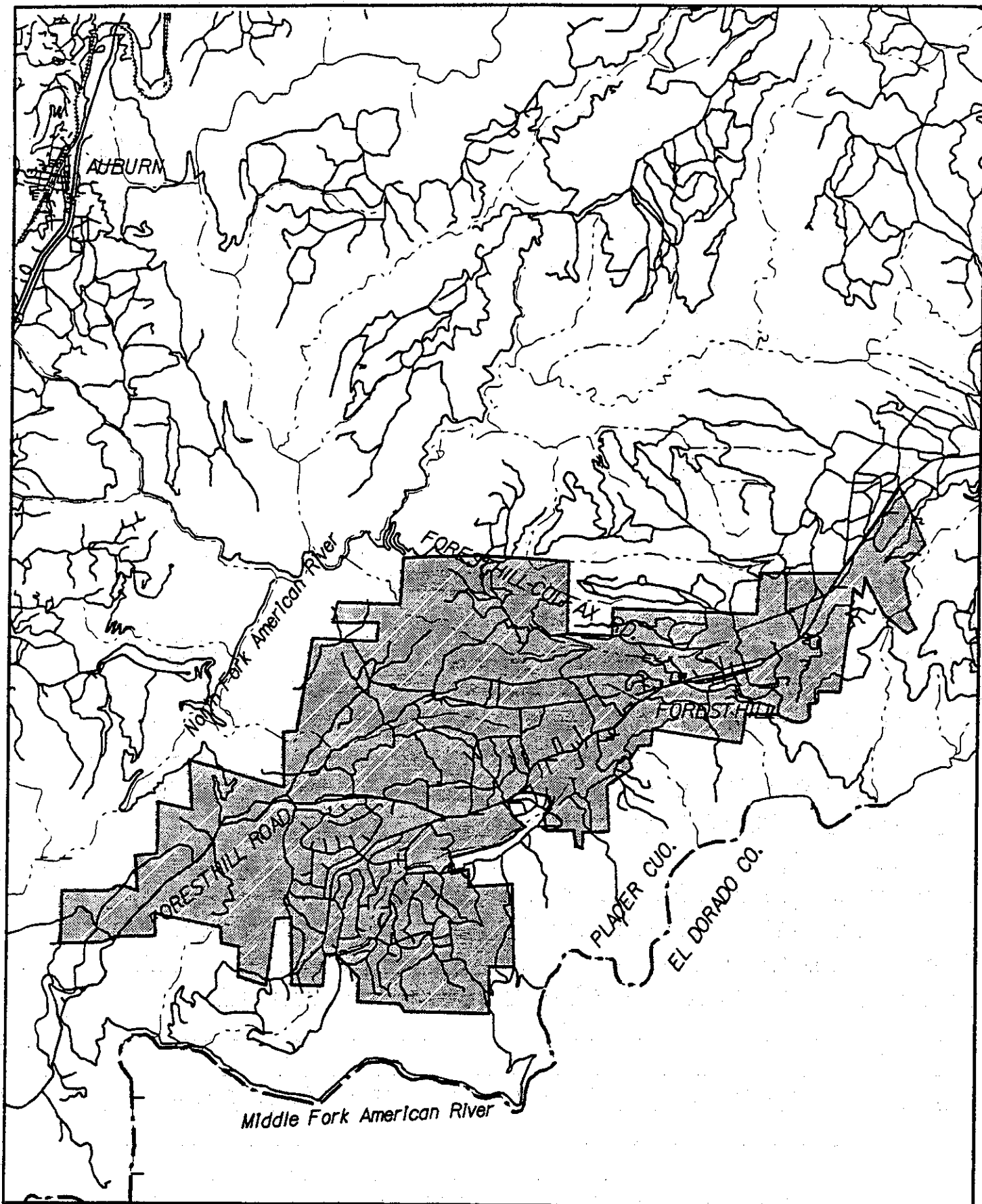
Source: TWO SURFACE WATER SOURCES ARE AVAILABLE; SUGAR PINE RESERVOIR AND MILL CREEK. TWO WELLS ARE ALSO AVAILABLE AS STAND-BY SUPPLY.

Transmission: TRANSMISSION FROM SUGAR PINE RESERVOIR TO THE WATER TREATMENT PLANT IS THROUGH 8.5 MILES OF 24 & 27 INCH DUCTILE IRON PIPE, AND THROUGHOUT DISTRICT RANGES FROM 21-10 INCH.

Treatment: A 3.0 MGD GRAVITY DIRECT FILTRATION WATER TREATMENT PLANT.

Storage: THE DISTRICT HAS THREE 450,000 GALLON STEEL BOLTED STORAGE TANKS.

Capacity Limitations: THE SYSTEM IS FAIRLY NEW, MOST PROBLEMS OCCUR AT LOCATIONS CONTAINING OLD 2 INCH DISTRIBUTION LINES.



FORESTHILL PUBLIC UTILITY DISTRICT

FULTON WATER COMPANY - MAIN AND LINKS SYSTEMS

District Overview: The water system began in 1928 under jurisdiction of Placer County Department of Health. Increased growth resulted in placement of the water system under jurisdiction of State Department of Health Services in 1973.

The main system is composed of three smaller systems which are now interconnected, Lake Forest, Cedar Flat, and Ridgewood water systems. The Main and Links water systems are operated under a common domestic water supply permit, issued in 1976.

Both systems are located on the north shore of Lake Tahoe just east of Tahoe City. Each system serves primarily residential services and are interconnected.

There are no connection fees to existing facilities within the Fulton Water Company service area. Water service is billed at a flat rate of \$174/yr.

Source Information: Source to the Main system is Lake Tahoe. Three lake intakes provide a total of 800 gallons per minute to the Main System. A single intake supplies the Links System. Two lake intakes are equipped with 25 h.p. turbine pumps and the third has a 40 h.p. submersible pump for the Main system. The Links system is equipped with a 1 h.p. submersible pump providing 20 gallons per minute. The lake intakes were originally separated to serve their respective satellite areas however with consolidation they were interconnected, making up the Fulton Water Company's Main and Links water systems.

Primary Transmission and Distribution--Main: Significant elevation variations result in three pressure zones for the Main system. The zones are labeled lower, middle and upper, with the majority of the systems services lying within the lower zone.

The lower zone receives water from the systems three lake intakes utilizing the Dinah, Cedar Flat, and Piney Wood Tanks for storage. Pressures in the lower zone range from 40 - 100 psi. The middle zone receives water from booster pumps at the Dinah and Piney Wood tanks. The booster stations pump up to the 20,000 gallon Fulton Crescent Storage Tank, which serves as storage for the middle zone. Pressures in the middle zone range from 40 - 100 psi. The upper zone is fed by the Fulton Crescent storage tank and booster station. The two 40 gpm booster pumps transport water to a 5,000 gallon hydropneumatic tank which regulates pressures ranging from 40 -80 psi.

Primary Transmission and Distribution--Links System: The Links system is comprised of an upper and lower pressure zone. The lower zone receives water from the Links intake (20 gpm) and utilizes the Links tank having 20,000 gallons of storage. The upper zone receives water pumped from the Links tank by a 3/4 h.p. jet pump at 10 gpm. Pressures in both zones range from 40 - 60 psi.

Water Main in Both Systems: Water main in both systems is constructed of various materials and sizes ranging from 1 inch to 6 inches in diameter. The following table outlines distribution mains, materials, sizes, and condition as of 1989.

Fulton Distribution System Mains for Main and Links Systems

Material	Size (inches)	Amount (L.F.)	Condition
Std. Screw Steel	1	12,000	poor
Std. Screw Steel	1.5-2.0	30,010	poor
Welded Steel	4	12,500	fair
Welded Steel	6	7,536	fair
Asbestos-Cement	4	980	good
Asbestos-Cement	6	3,710	good
C-900 PVC	6	1,500	good

The company maintains one primary transmission main line in the system, constructed of 6 inch PVC, recently replacing the old 4 inch steel main. The line carries water from the Lake Forest Intake to the Dinah Booster Station.

Storage--Main: The Main system utilizes four storage/booster stations located at Dinah, Cedar Flat, Piney Wood, and Fulton Crescent. Six storage tanks provide a total of 105,000 gallons of storage capacity to the system. The following chart outlines the storage facilities.

Tank Identification	Capacity	Material	Condition
Dinah Station	1,500 gal.	Steel	poor
Cedar Flat (2)	20,000 gal	Steel	fair
Piney Wood (2)	10,000/20,000 gal		redwood/fair
Fulton Crescent	20,000/5,000 gal		redwood/steelfair

Storage--Links System: Links system storage is provided by one 20,000 gallon steel tank. The tank receives water directly from the lake intake providing a pumping reservoir for the Links Booster. The tank is in fair condition.

Treatment: Chlorination is the only treatment provided for both the Main and Links systems. Chlorination takes place at each lake intake.

1990 System Production: According to the 1990 annual report, both systems combined serve an approximate permanent population of 2000, reaching up to 6000 during peak periods. The system delivered a total of 96 million gallons of potable water through 774 connections in 1990.

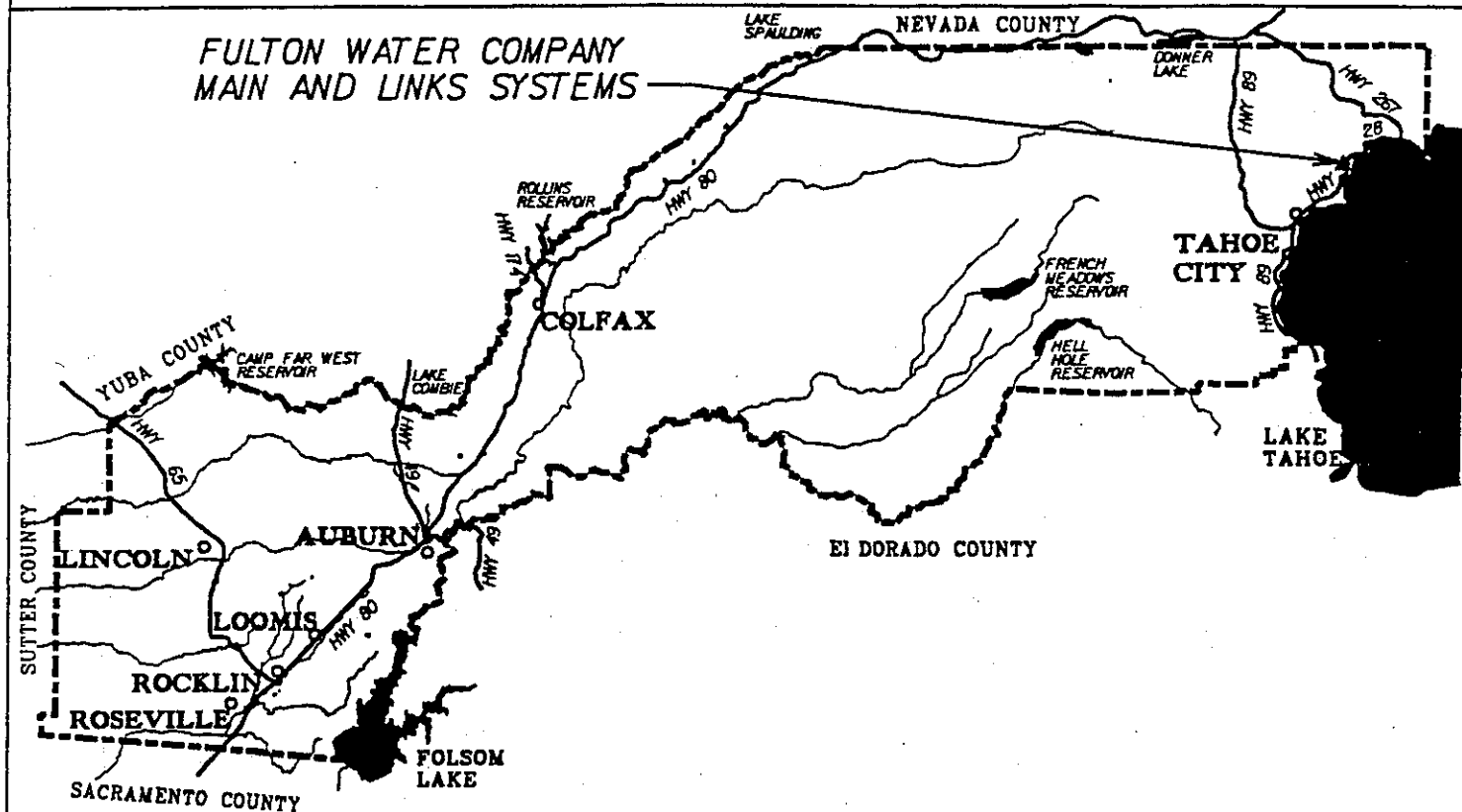
Deficiencies and Limitations: Age of the system is probably the greatest liability to the Fulton Water System. Much of the system is over 30 years old and under sized to withstand substantial growth experienced during the 70's and 80's.

Current treatment facilities are not expected to comply with the upcoming implementation of the Surface Water Treatment Regulations. The storage tanks also require additional maintenance and upgrades such as sealing the tops and minor improvements to telemetry monitoring.

Existing Planned Improvements: Fulton Water Company, aware of its deficiencies and limitations, created a five year planning schedule ending in 1993. Among improvements are transmission line and distribution system replacement and an additional inter-tie to the Camelian Heights water system.

System Appraisal: Fulton Water Company, both Main and Links systems, are in good condition. The biggest problem facing the future is compliance with Surface Water Treatment Regulations in 1993. Two options are currently being evaluated: 1) look at an alternative source supply such as groundwater; or 2) install facilities to treat the water at the lake intakes. The other existing problems generally require additional maintenance or updated testing programs.

PLACER COUNTY WATER SYSTEMS



System Name: FULTON WATER COMPANY - MAIN AND LINKS SYSTEMS

Address: P.O. BOX W, 515 NIGHTINGALE, TAHOE CITY, CA 96145

Contact Name: JOHN A. FULTON Phone: (916)-583-3644

Service Area Size: _____ No. Connect.: 774 Population Served: 2000-6000

Services Provided: ALL RESIDENTIAL

Summary System Description

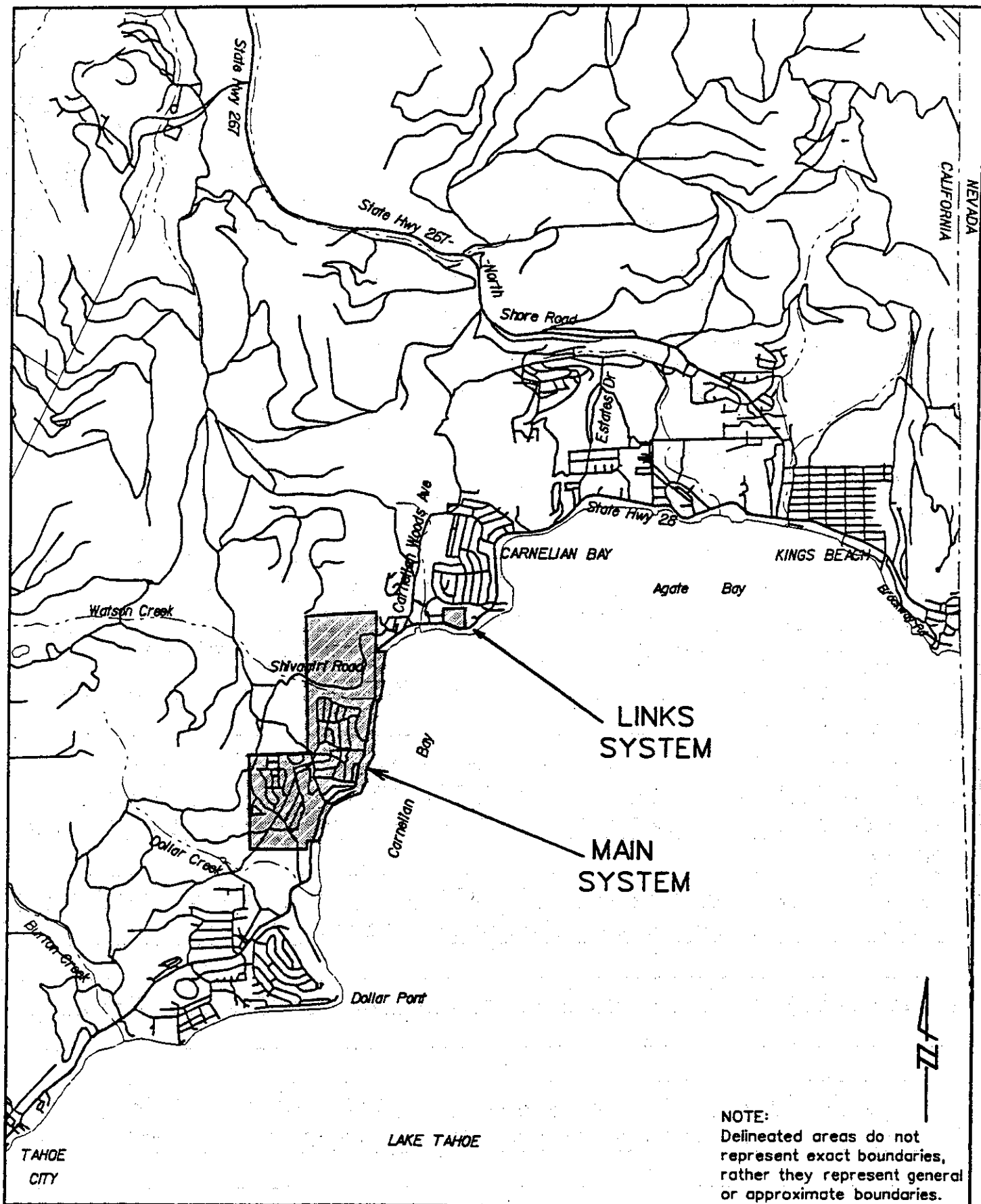
Source: SOURCE TO THE MAIN SYSTEM IS THREE LAKE TAHOE INTAKES PROVIDING A TOTAL OF 800 GPM. ONE LAKE TAHOE INTAKE SUPPLIES THE LINKS SYSTEM. PROVIDING 20 GPM.

Transmission: TRANSMISSION AND DISTRIBUTION MAINS RANGE IN SIZE FROM 1 INCH TO 6 INCHES, WITH THE SMALLER DIA (1-2 INCH) IN POOR CONDITION.

Treatment: CHLORINATION IS THE ONLY TREATMENT PROVIDED TO BOTH SYSTEMS.

Storage: SIX STORAGE TANKS PROVIDE A TOTAL OF 105,000 GALLONS OF STORAGE TO THE MAIN AND ONE 20,000 GALLON TANK PROVIDES STORAGE TO THE LINKS SYSTEM.

Capacity Limitations: AGE OF THE SYSTEM IS THE GREATEST LIABILITY TO THE FULTON SYSTEM, MUCH OF WHICH IS OVER 30 YEARS OLD. COMPLIANCE WITH SURFACE WATER TREATMENT REGULATIONS WILL ALSO POSE SIGNIFICANT CHANGES.



FULTON WATER COMPANY

Water Service Areas

HIDDEN VALLEY COMMUNITY ASSOCIATION PUBLIC WATER SYSTEM

District Overview: The Hidden Valley CA System is located in Loomis a few miles north of Folsom Lake.

Raw water was previously transported by the Placer County Water Agency's Stallman Canal to a conventional water treatment plant. The Hidden Valley CA water treatment plant, which began operation in 1961, has a 200 gpm capacity and adequately served Hidden Valley CA, Lakeview Hills CA, and the Walden Woods subdivision. Until April 1991, the plant was jointly owned by Hidden Valley CA and Lakeview Hills CA.

Presently the water treatment plant is delegated for backup purposes and Hidden Valley CA receives treated water from PCWA's Foothill Water Treatment Plant via the Rock Crest pipeline. Should employment of the standby plant become necessary, PCWA will assume operational duties under a lease from Hidden Valley CA.

Hidden Valley CA is now categorized as a small water system. A transfer of regulatory jurisdiction from the State Department of Health Services to the Placer County Health Department was initiated when the system began purchasing treated water.

Source Information: Hidden Valley CA receives treated water from PCWA's Foothill water treatment plant via the Rock Crest pipeline.

Primary Transmission and Distribution: One water meter is used for the entire subdivision. The distribution system consists exclusively of PVC pipe and one pressure zone, where pressures typically range from 45 to 60 psi. A separate, parallel system is used for irrigation water.

Storage: Water storage facilities at Hidden Valley CA consist of a 115,000 gallon clearwell, a component of the standby treatment plant.

Treatment: Hidden Valley CA homeowner dues produce funding for purchase of treated water from PCWA. The average water demand of the Hidden Valley CA is 110 gpm.

1990 System Production: The Hidden Valley CA System serves an estimated population of 1,184 through 296 residential connections.

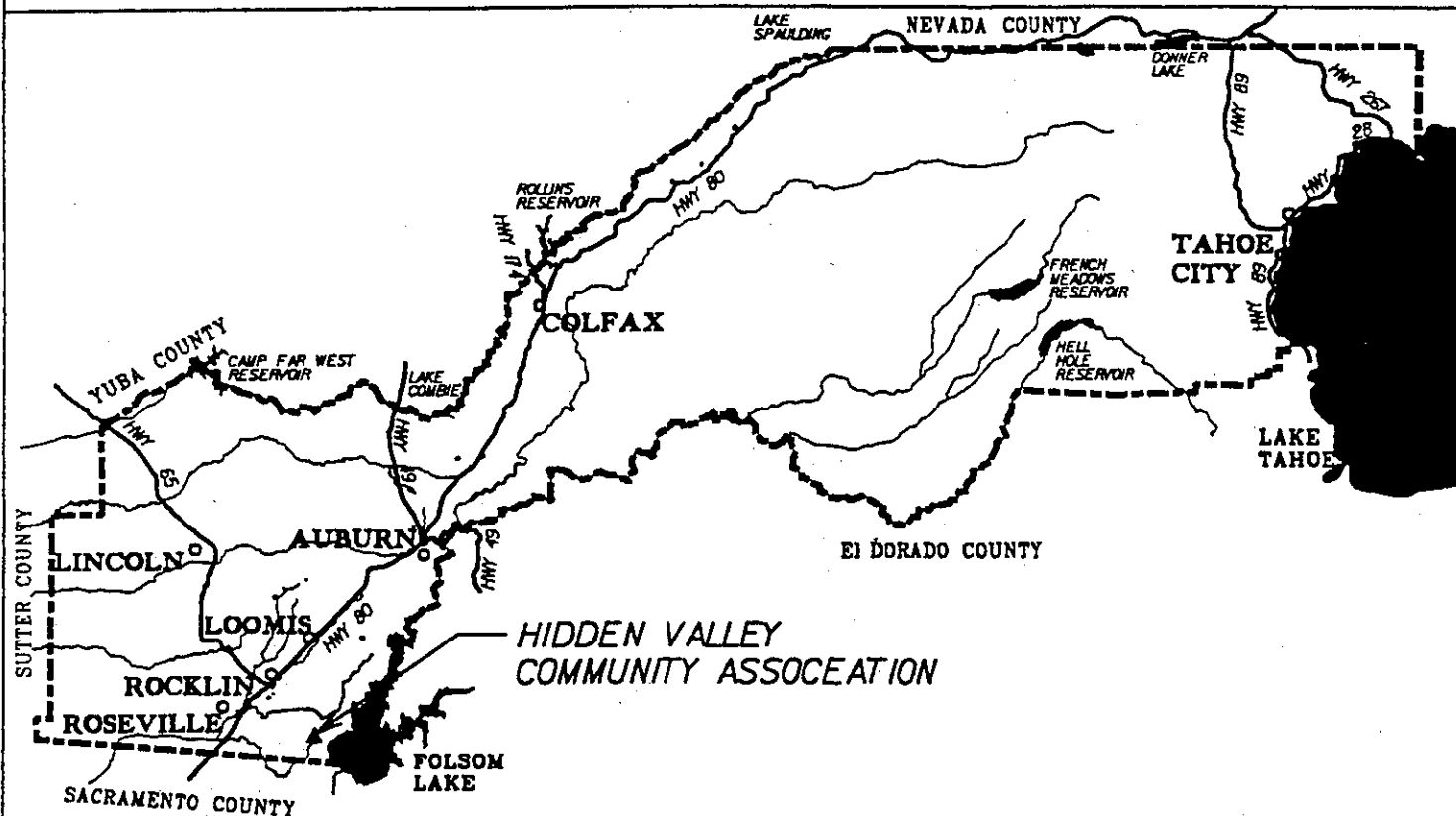
Hidden Valley CA produced a maximum daily water supply of 186,676 gallons, a maximum monthly supply of 5.6 million gallons, and an annual total of 50.169 million gallons in 1990.

Deficiencies and Limitations: Hidden Valley CA has not established an active cross-connection control program and the emergency notification plan is outdated.

Upgrades to the Hidden Valley CA plant are necessary to comply with the Surface Water Treatment Regulations to attain standby status permitting.

System Appraisal: The Hidden Valley CA System purchases treated water from PCWA's Rock Crest pipeline. The existing Hidden Valley CA conventional water treatment plant, although currently decommissioned, is expected to function as a standby source.

PLACER COUNTY WATER SYSTEMS



System Name: HIDDEN VALLEY COMMUNITY ASSOCIATION

Address: 7077 PINE GATE WAY, LOOMIS, CA 95650

Contact Name: LEROY LYON/BOB BAUMER Phone: (916)-739-4051

Service Area Size: No. Connect.: 296 Population Served: 1184

Services Provided: FLAT RATE RESIDENTIAL

Summary System Description

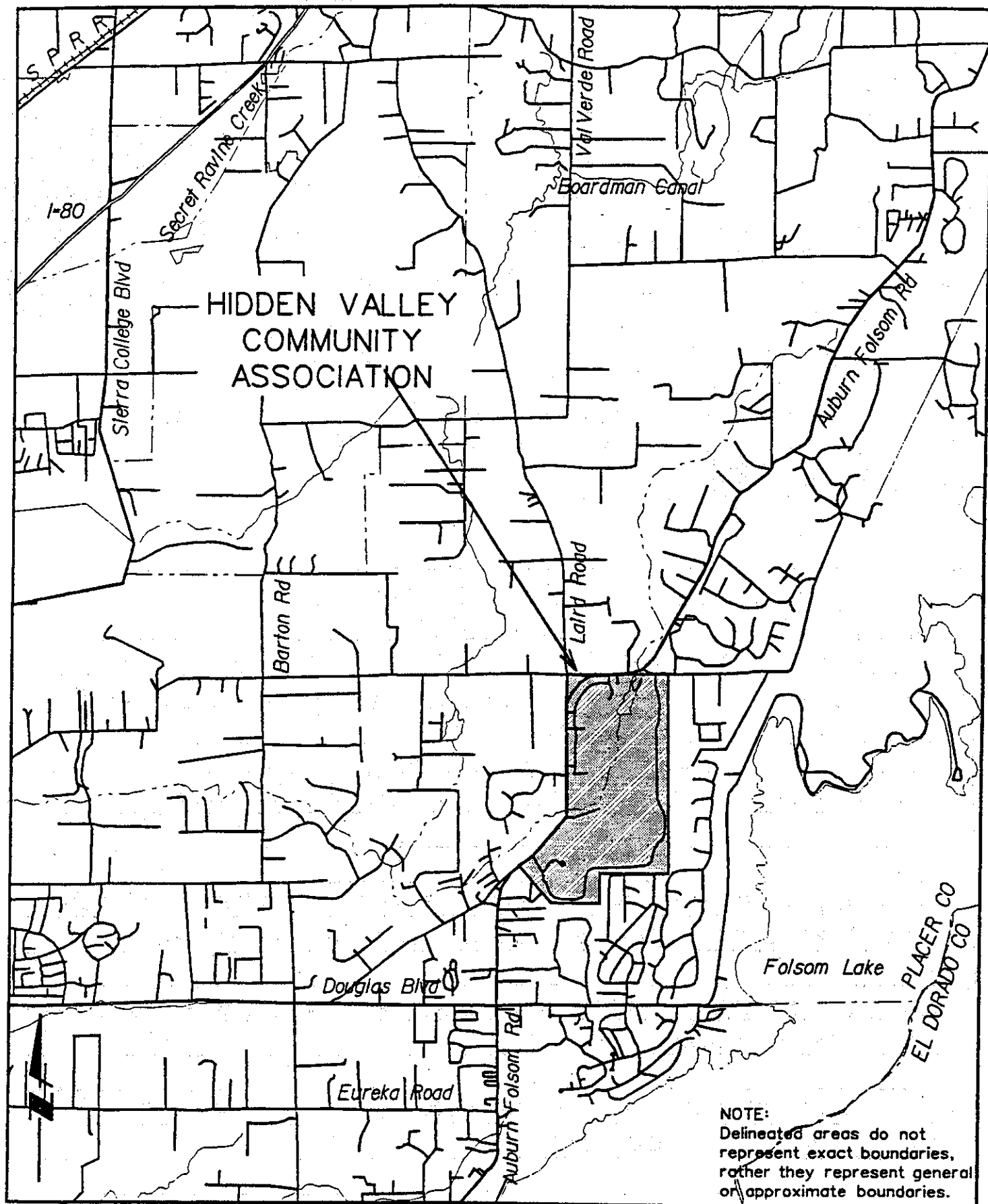
Source: PURCHASES WATER FROM P.C.W.A.'S FOOTHILL WATER TREATMENT PLANT.

Transmission: RECEIVES WATER THROUGH A CONNECTION INTO THE 12 INCH ROCK CREST PIPELINE. DISTRIBUTION PIPING CONSISTS EXCLUSIVELY OF PVC PIPE.

Treatment: TREATED WATER IS PURCHASED WITH HOME OWNERS DUES FROM P.C.W.A.'S FOOTHILL WATER TREATMENT PLANT

Storage: STORAGE CONSISTS OF A 115,000 GALLON CLEARWELL LOCATED AT THE ABANDONED WATER TREATMENT PLANT.

Capacity Limitations: SIGNIFICANT RENOVATION OF THE OLD WATER TREATMENT PLANT IS NECESSARY IN ORDER FOR IT TO BE USED AS A STAND-BY.



HIDDEN VALLEY COMMUNITY ASSOCIATION

Water Service Area

LAKE FOREST WATER COMPANY

District Overview: The Lake Forest Water System is located on the North Shore of Lake Tahoe, about 2 miles northeast of Tahoe City. The system is approximately 70 to 80 years old. Two sources supply the system, a spring source and Lake Tahoe.

Safe Drinking Water Bond Law monies have been retained to construct system improvements. Developing a vertical groundwater well is thought to be highest priority.

The Water Company has only one metered commercial connection, the rest being flat rate residential. An annual connection fee is observed in addition to monthly service rates. Current rate schedules for water service and connection fees within the District boundaries are as follows:

Commercial annual connection fee (1 1/2 inch meter)	\$262.00
Monthly Service rates per 100 c.u. ft.	\$1.52
Annual Flat Rate Per Service Connection Per Year	
For each single unit of residential occupancy	\$245.20
each additional on same premises	\$183.25

Source Information: The system has two sources supplies - a free flowing spring and Lake Tahoe. Spring water is captured by a cylindrical concrete collector which is buried and perched on a layer of filter sand. Flow from the spring source is estimated to be 17 gpm. Historically, little fluctuation of flow from the spring source is experienced.

The lake intake consists of a 4-inch steel line extending about 400 feet. Production capacity of the intake is unknown. The line is quite old, and believed to be submersed only 3 ft. during low lake level.

Primary Distribution and Transmission: The distribution system consists of one pressure zone, with static pressures ranging from 50 to 60 psi. Pressures are regulated by a redwood tank, floating on the system. Friction head losses, due to inadequately sized lines, cause pressures in some system areas to drop below 20 psi during peak usage.

System mains are constructed entirely of steel pipe varying in size. The following table breaks down the mains as follows:

DISTRIBUTION MAIN MATERIALS AND SIZES Lake Forest Water Company

Material	Size (in.)	Amount (lf)	Condition
welded steel	less than 2.5"	3230	poor
welded steel	2.5" to 3.5"	1755	poor
welded steel	4"	5513	poor
welded steel	6"	785	poor
std. screw steel	2" and under	1266	poor
galv. steel	3/4"	2541	poor

Depicted by the above chart, mains are in poor condition and undersized. Undersized character of the mains has resulted in poor fire protection rating. The system contains only one fire hydrant, and during testing, water outages and syphon conditions are experienced.

Two transmission facilities convey water to the system. The spring transmission main is about 400 ft. long consisting of a combination of parallel 2.5 inch PVC and 4 inch steel pipe. The PVC portion lies above ground, and is frequently vandalized.

The second main extends between the storage tank and distribution system, consisting of approximately 100 lf of 8 inch PVC - C900 and 3700 lf. of 4 inch steel pipe. The 8 inch PVC pipe also lies above ground exposing it to significant hazards.

The overall condition of the transmission mains is poor, including the newer PVC portion, both construction and installation are inadequate.

Storage: Storage is provided by a 100,000 gallon redwood tank. The tank is structurally sound, however significant sanitary hazards exists such as lack of a roof. Water from the spring source first enters the tank and then moves to the distribution system. Lake water first travels through the distribution system, then to the storage tank.

Treatment: The only treatment provided is disinfection of large water by chlorination. The chemical feeding equipment is quite old, and plans exist for replacement with a newer, more reliable pump. Current feed rate of the pump and resulting chlorine concentration is unknown.

1990 System Production: According to the 1991 annual report the system serves a total of 114 connections, 1 of which is commercial. Population fluctuates between 1000 permanent to 2000 seasonal. Month of maximum water use is determined to be July.

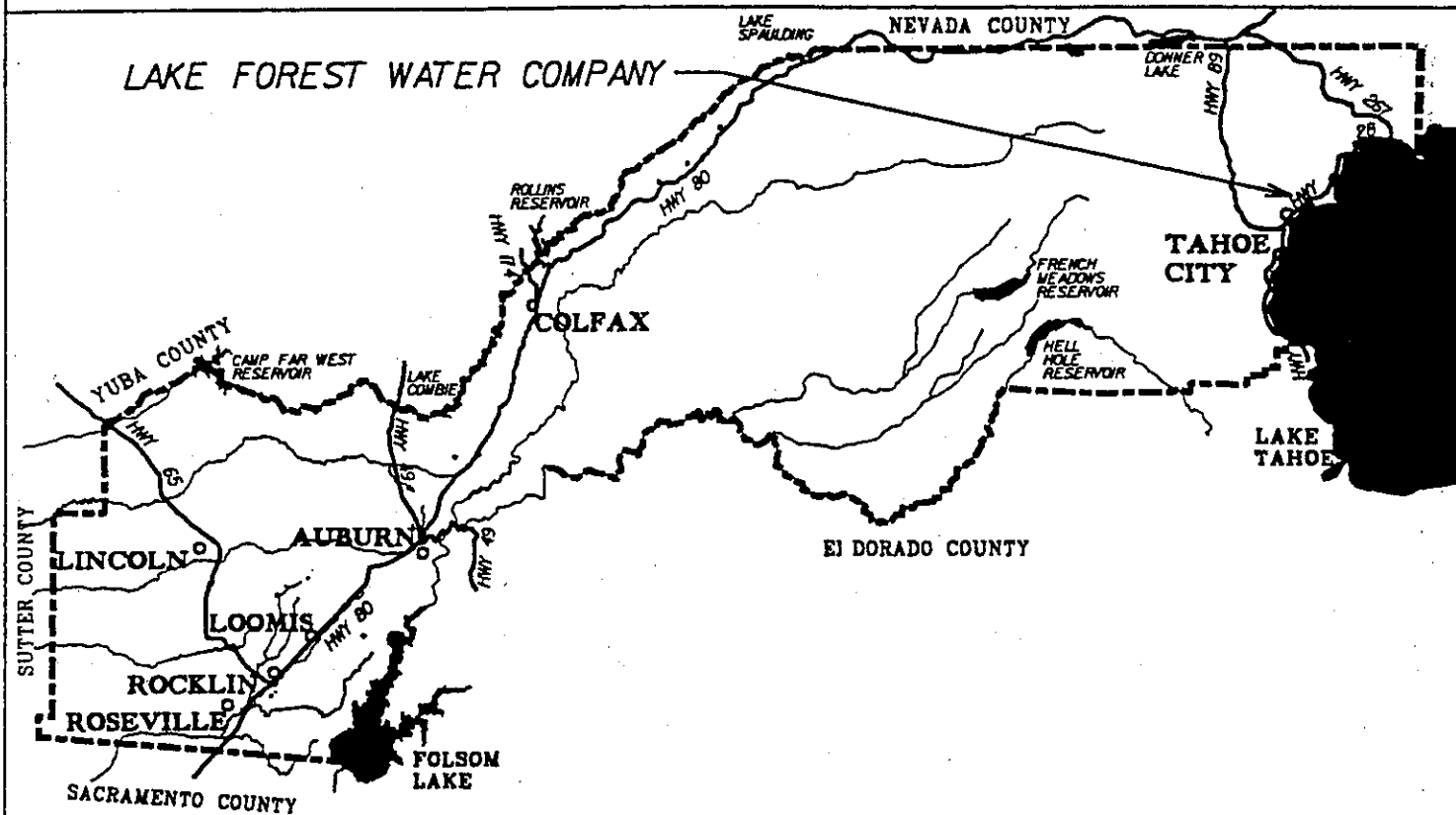
Deficiencies and Limitations: Deficiencies and limitations to the Lake Forest Water System are numerous. The system is in need of major rehabilitation efforts from most every aspect. Among the numerous deficiencies are main line deterioration and ability to comply with Surface Water Treatment Regulations, if adequate supply of groundwater fails.

Existing Planned Improvements: Most significant of planned improvements is developing a groundwater source to the system. Safe Drinking Water Bond Law monies have been secured to complete this task, however little action has been taken.

System Appraisal: While current service meets requirements established by state health standards, many system upgrades will be required to meet oncoming health standards. Perhaps the largest factor effecting future system function is component age. The system was recently purchased by its current proprietor, and prior operation and maintenance was neglected.

Development of a groundwater source is highest priority to the company. Once this task is complete, maintenance and system rehabilitation can proceed.

PLACER COUNTY WATER SYSTEMS



System Name: LAKE FOREST WATER COMPANY

Address: P.O. BOX 51, TAHOE CITY, CA 95730

Contact Name: DAVID ROBERTSON Phone: (916) 581-2623

Service Area Size: No. Connections: 114 Population Served: 1000-2000

Services Provided: ALL RESIDENTIAL AND ONE COMMERCIAL CONNECTION.

Summary System Description

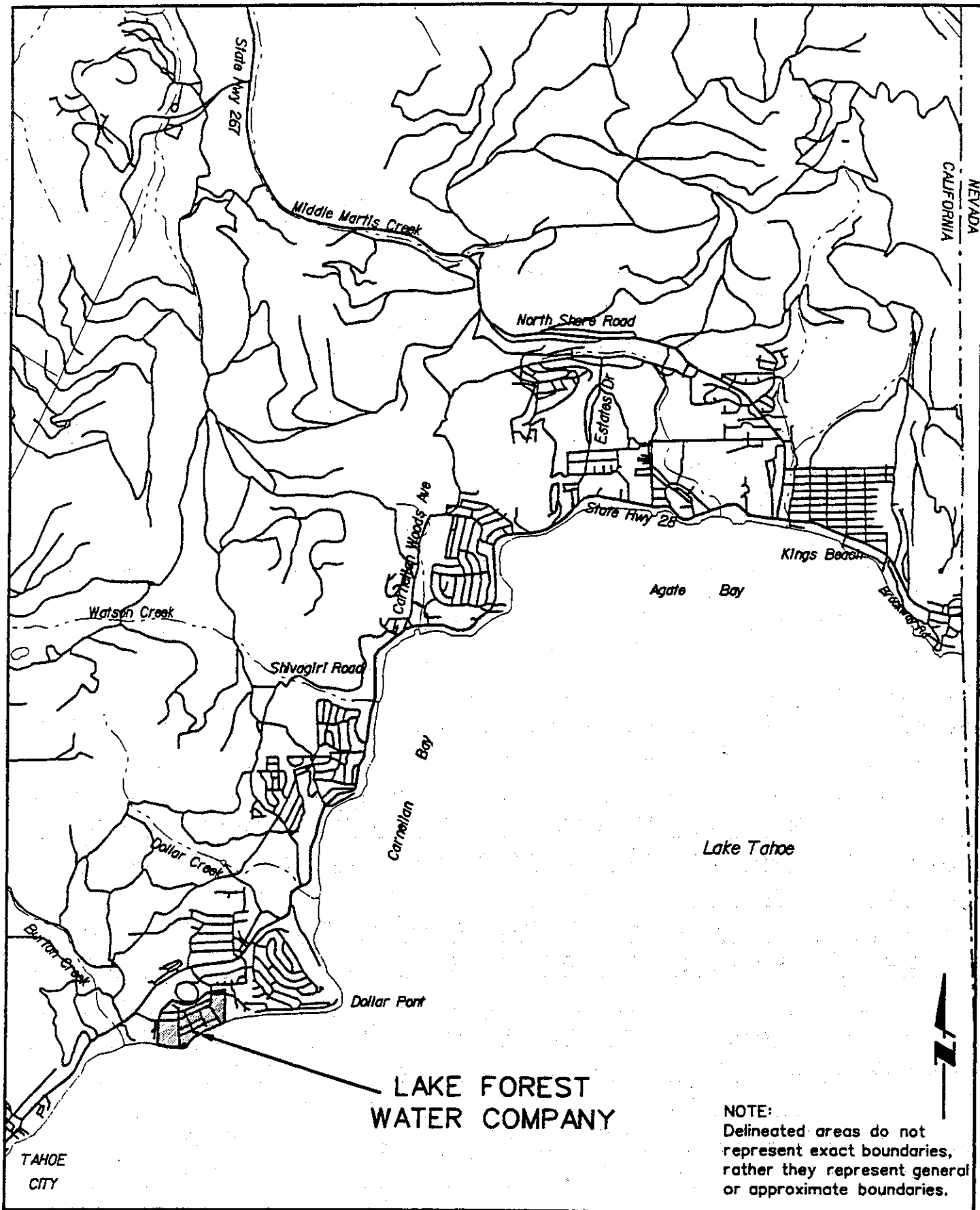
Source: THE SYSTEM HAS TWO SOURCES OF SUPPLY - A FREE FLOWING SPRING AND A LAKE TAHOE INTAKE. THE SPRING CAN SUPPLY ABOUT 17 GPM. CAPACITY OF THE LAKE SOURCE IS UNKNOWN.

Transmission: A 4 INCH STEEL TRANSMISSION LINE DELIVERS WATER TO DISTRIBUTE FACILITIES. ALL STEEL LINES ARE QUITE OLD AND DETERMINED TO BE IN POOR CONDITION.

Treatment: TREATMENT PROVIDED TO THE LAKE SOURCE IS DISINFECTION BY CHLORINATION. NO TREATMENT IS PROVIDED TO THE SPRING SOURCE.

Storage: A 100,000 GALLON REDWOOD STORAGE TANK FLOATS ONE DISTRIBUTION SYSTEM. THE TANK IS STRUCTURALLY SOUND.

Capacity Limitations: THE ENTIRE SYSTEM IS VERY OLD, AND OUT DATED. SIGNIFICANT SANITARY HAZARDS, AND PRESSURE LOSSES ARE EXPERIENCED THROUGHOUT THE SYSTEM DUE TO OLD UNDERSIZED MAINS. PROBLEMS W/COMPLIANCE TO SURFACE WATER TREATMENT REGULATIONS.



LAKE FOREST WATER COMPANY

Water Service Area

LAKEVIEW HILLS COMMUNITY ASSOCIATION PUBLIC WATER SYSTEM

District Overview: Lakeview Hills Community Association was incorporated in 1956 and is located in Loomis. Raw water was previously transported by the Placer County Water Agency's Stallman Canal to a conventional water treatment plant. The plant, with a 200 gpm capacity, was operated and jointly owned by Hidden Valley Community Association until April 1991. Presently, this plant is delegated for backup purposes and Lakeview Hills CA receives treated water from PCWA's Foothill water treatment plant via the Rock Crest pipeline. Should employment of the standby plant become necessary, PCWA will assume operation duties under a lease from Hidden Valley CA.

Connection fees within the Lakeview Hills Community Association subdivision are \$1000/lot. Water service billing is inclusive within the homeowners dues, and are estimated to be \$30.00/month.

Primary Transmission and Distribution: Lakeview Hills CA receives treated water from PCWA's Foothill water treatment plant via the Rock Crest pipeline. Five hundred residents are served by 146 service connections. One water meter is used for the entire subdivision. The lower section of the distribution system is composed primarily of PVC pipe.

Pressures in the upper area of the Lakeview Hills CA domestic water system, consisting of 56 to 65 lots, are maintained by a booster pumping station and a 12,000 gallon pressure tank. Normal static pressures range from 40 to 70 psi in the upper zone and 20 to 40 psi in the lower zone.

Storage: Water storage facilities at Lakeview Hills CA consist of a 115,000 gallon clearwell, a component of the standby treatment plant, and a 12,000 gallon pressure tank located at the booster pumping station.

Treatment: Lakeview Hills CA homeowner dues produce funding for purchase of treated water from PCWA.

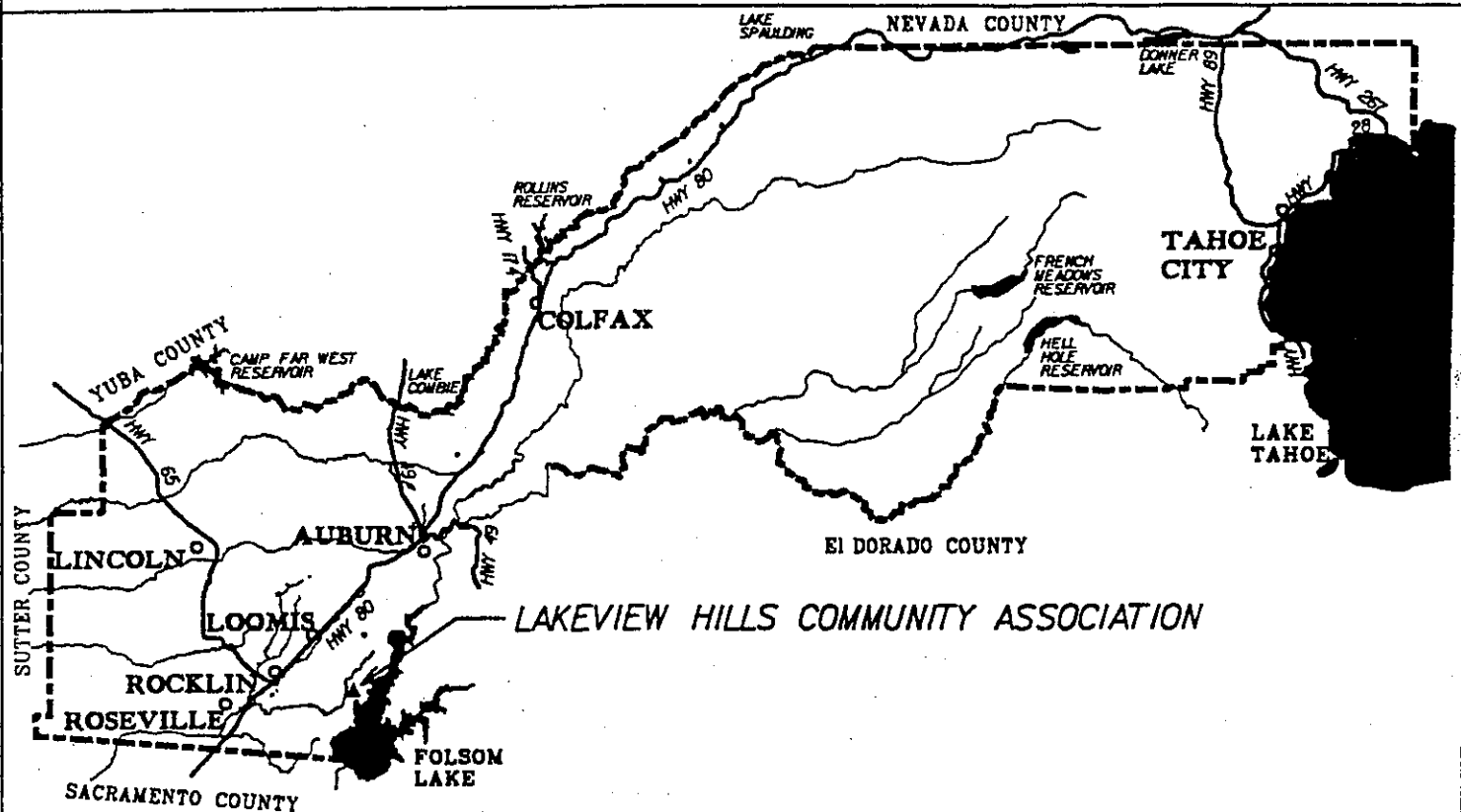
1990 System Production: The average water demand of the Lakeview Hills CA is 110 gpm.

Deficiencies and Limitations: The Lakeview Hills CA distribution system does not meet California Waterworks Standards. Faulty cross-connection control and inappropriate disinfection practices were cited by the DOHS in a February 1991 Annual Inspection Report. Several major leaks occurred in the PVC joints.

The Lakeview Hills CA emergency notification plan is outdated. A schematic of the distribution system is missing and valve maintenance and distribution system flushing programs are nonexistent.

System Appraisal: The Lakeview Hills subdivision is nearly built out, thus expansion is not an issue. Recent changes including the purchase of treated water from PCWA have helped to solve some of the operation and maintenance problems. The only physical liabilities to the system are various leaks with the distribution system.

PLACER COUNTY WATER SYSTEMS



System Name: LAKEVIEW HILLS COMMUNITY ASSOCIATION

Address: 8280 SOUTH LAKE CIRCLE, LOOMIS CA 95650

Contact Name: KENNETH G. ROBBINS Phone: (916)-791-1964

Service Area Size: No. Connections: 147 Population Served: 500

Services Provided: RESIDENTIAL FLAT RATE ONLY

Summary System Description

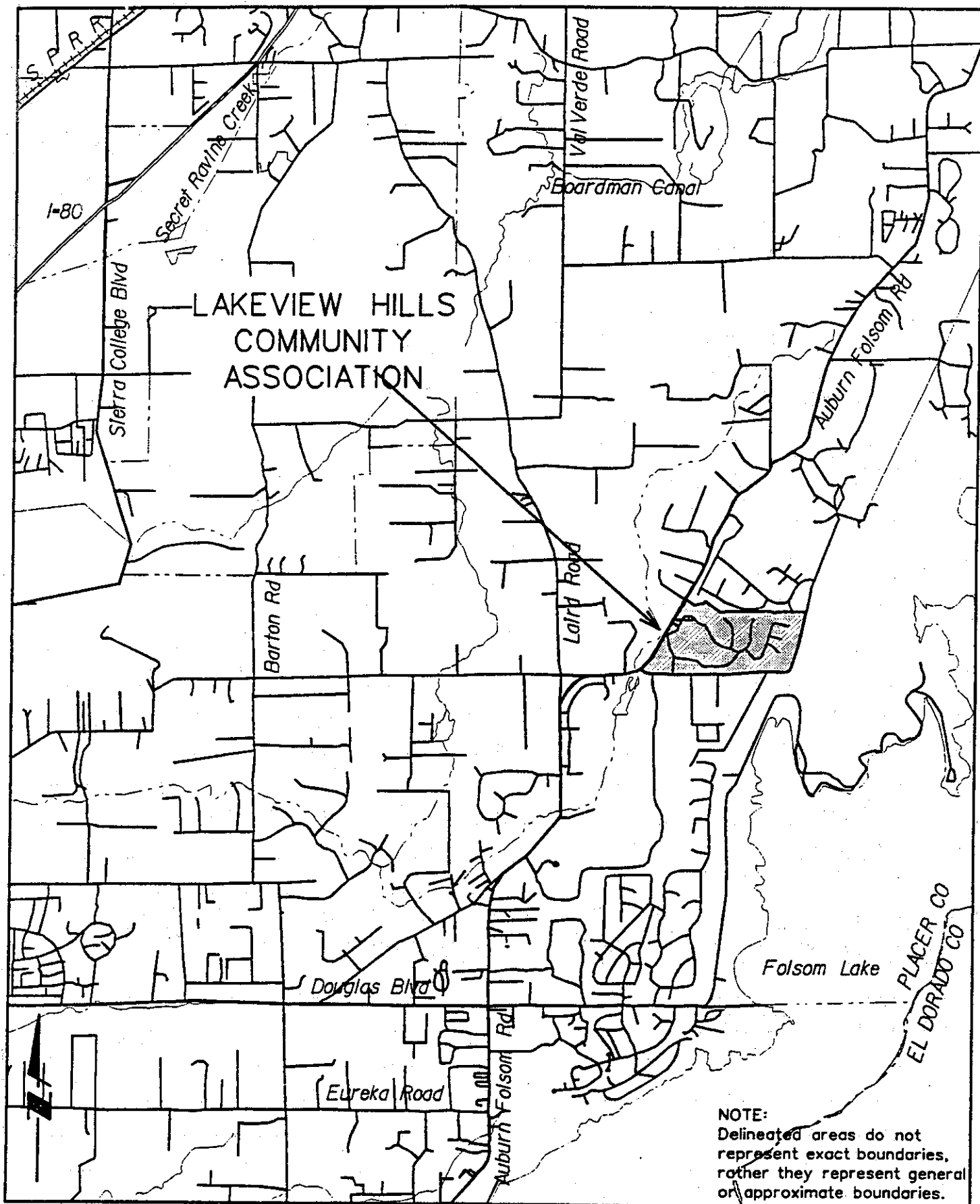
Source: PURCHASE TREATED WATER FROM P.C.W.A.'S FOOTHILL TREATMENT PLANT VIA THE ROCK CREST PIPELINE.

Transmission: PRIMARY TRANSMISSION TAKES PLACE WITHIN THE ROCK CREST PIPELINE. AN INNERTIE PROVIDES WATER TO THE DISTRIBUTION SYSTEM.

Treatment: "SAME AS SOURCE"

Storage: AVAILABLE STORAGE CONSISTS OF A 115,000 GALLON CLEARWELL AT THE OLD TREATMENT PLANT AND A 12,000 GALLON PRESSURE TANK LOCATED AT THE BOOSTER PUMPING STATION.

Capacity Limitations: NO SIGNIFICANT DEFICIENCIES



LAKEVIEW HILLS COMMUNITY ASSOCIATION Water Service Area

MADDEN CREEK WATER COMPANY

District Overview: Madden Creek Water Company serves the small town of Homewood on the west shore of Lake Tahoe. The systems service area included a total of 131 service connections, mostly residential with a few motels and commercial services.

Madden Creek Water Company began in 1963. Due to common ownership with Tahoe Cedars Water Company, in the early 70's regulatory responsibility was transferred to the State Department of Health. Currently the water company operates under a water supply permit issued in the early 80's. The permit was issued when supply source changed from a diversion on Madden Creek to a vertical well.

Source Information: The sole water source for this system is a vertical well which is referred to as the Silver Street Well. The well has an 8 inch diameter casing and is approximately 108 ft. deep. The well is equipped with a 15 h.p. submersible pump which produces water at a rate of 200 gpm.

Madden Creek also has a 2 inch interconnection with neighboring Tahoe Swiss Village water system.

Primary Transmission and Distribution: The distribution system for Madden Creek has one pressure zone maintaining pressures between 30 to 50 psi. Water mains are constructed of dipped and wrapped, galvanized and untreated steel pipe. Sizes of the mains range from 2 to 6 inches diameter, with the majority being 2 inch diameter. The distribution system is approximately 70 years old but is reportedly in good condition.

Storage: Storage for this system is provided by a 10,000 gallon concrete tank. The tank is approximately 70 -80 years old and reportedly in poor condition.

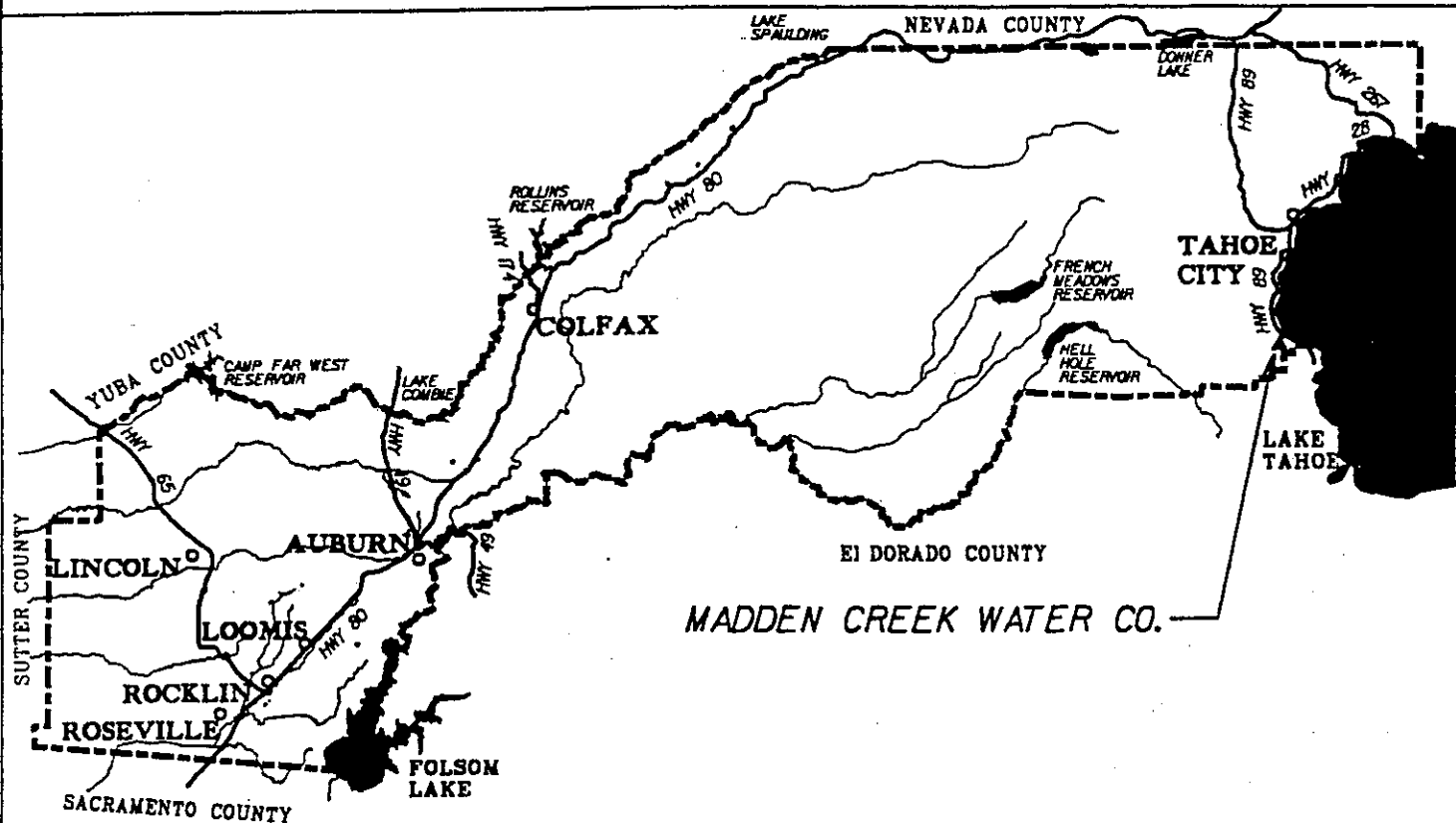
Treatment: There is no treatment of the water produced by the well, nor are there provisions to provide emergency chlorination should the need arise. Sand separation is provided at the well.

1990 System Production: According to the 1991 annual report, Madden Creek provided service to 131 service connections during the 1990 year. Population fluctuations ranged from 120 permanent up to 600 seasonal. Maximum day production totaled 271,000 gallons, with the month of July seeing maximum water use. Annual water produced by the system totaled 40.341 million gallons.

Deficiencies and Limitations: The largest deficiency facing the Madden Creek system is lack of auxiliary power for the well pump, and adequate storage should such an emergency occur. Also provisions to provide disinfection to the system, at least annually, are non-existent.

System Appraisal: The Madden Creek water system is small and very old, but is capable of continually supplying adequate supply of good quality water to its customers. Its source capacity is sufficient for meeting peak demands and there are no requirements to treat the well water. Adequacy and condition of the storage facility is also a rising concern to the water district. Age of the distribution system may cause future problems.

PLACER COUNTY WATER SYSTEMS



System Name: MADDEN CREEK WATER COMPANY

Address: P.O. BOX 264, TAHOMA, CA 95733

Contact Name: EARL B. MARR Phone: (916)-525-7555

Service Area Size: No. Connections: 129 Population Served: 120-600

Services Provided: RESIDENTIAL AND SOME COMMERCIAL

Summary System Description

Source: THE SOLE SOURCE OF WATER IS A WELL 108 FT DEEP WITH AN 8" CASING SUPPLYING 200 GPM TO THE SYSTEM.

Transmission: MAINS IN THE SYSTEM ARE CONSTRUCTED OF DIPPED AND WRAPPED, GALVANIZED AND UNTREATED STEEL PIPE. THE SIZES RANGE FROM 2 - 6 INCHES.

Treatment: NO TREATMENT IS PROVIDED TO THE WELL WATER. THE WELL IS, HOWEVER, EQUIPPED WITH A SAND SEPARATOR.

Storage: STORAGE IS PROVIDED BY A 10,000 GALLON CONCRETE TANK.

Capacity Limitations: ALL FACILITIES OF THIS SYSTEM ARE VERY OLD AND RENOVATION IS BECOMING A MAJOR EXPENDITURE.

MCKINNEY WATER DISTRICT

District Overview: The McKinney Water District service area is located near the Tahoma area on the west side of Lake Tahoe approximately nine miles south of Tahoe City. The service area ranges in elevation from 6280 ft. to 6440 ft. containing two pressure zones. The system is operating under a water supply permit issued in 1964 and an amendment granted in 1979.

The system contains two wells serving approximately 192 connections. One of the wells is used primarily as a standby.

No connection fees are charged for hook-up to existing facilities within the McKinney Water District. Water service is billed at a rate of \$108.00/yr/lot inclusive of a standby charge for vacant lots.

Source Information: McKinney Water District is supplied by two metered wells. Well #1 was drilled in 1963, is 355 feet deep, and equipped with a 40 h.p. motor driving the turbine pump. It has capacity to supply 600 gpm to the system. Well #2 was drilled in 1982, equipped with a submersible pump having capacity of 400 gpm. It is also equipped with a hydropneumatic tank and booster pump.

Well #1 produces water containing a fine sand when pumping over 200 gpm, therefore is only used when needed during peak demand, or emergencies. It is also equipped with a propane auxiliary motor for emergency use during power outages. Further emergency supplies could be obtained through an interconnection with the Tahoe Cedars domestic water supply system.

Primary Transmission and Distribution: The distribution system is reportedly in good condition, composed of 1400 ft. of 4 inch and 15,100 ft. of 6 inch diameter pipe. Primary pipe material is composed of wrapped or dipped steel pipe. System pressures range from 45 to 70 psi. All dead ends are equipped with blowoff valves for flushing purposes.

Storage: A 50,000 gallon redwood storage tank is located at the upper portion of the system. The wells pump directly into the tank and in-turn the tank supplies the system by gravity. The tank is reportedly in good condition.

Treatment: No treatment is provided to the system; however, a chlorinator is available for installation on either well, if necessary.

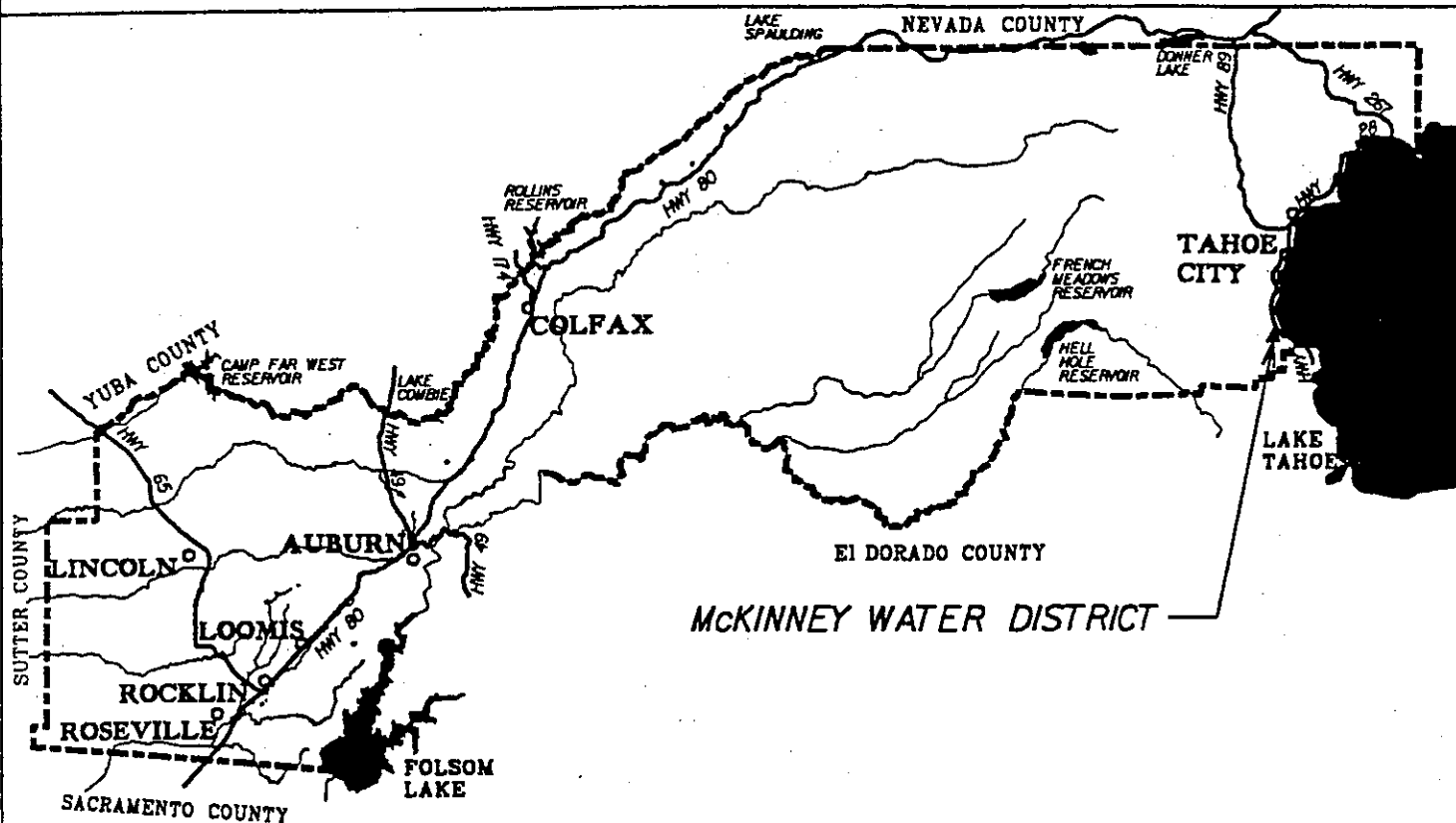
1990 System Production: According to the 1991 annual report, the system produced 15.0 million gallons providing service to 192 connections. As with most Lake Tahoe systems a significant difference exists between the permanent population and maximum seasonal. Permanent population is approximately 175 with maximum seasonal reaching 1000.

Deficiencies and Limitations: No major sanitary defects were reported for the McKinney Water system.

Existing Planned Improvements: The only planned future improvement is establishment of a capital replacement program for the distribution system.

System Appraisal: The McKinney Water District is a relatively simple straightforward system to understand and operate. All facts which comprise the system seem to be in good condition. Although storage is inadequate, provision to well #2 supplies adequate emergency storage.

PLACER COUNTY WATER SYSTEMS



System Name: McKINNEY WATER DISTRICT

Address: P.O. BOX 538, PALO ALTO, CA 94302

Contact Name: KARL KINKER/RICK LIERMAN

Phone: (415)-494-7565/(916)-538-4692

Service Area Size: No. Connections: 192 Population Served: 175-1000

Services Provided: ALL RESIDENTIAL

Summary System Description

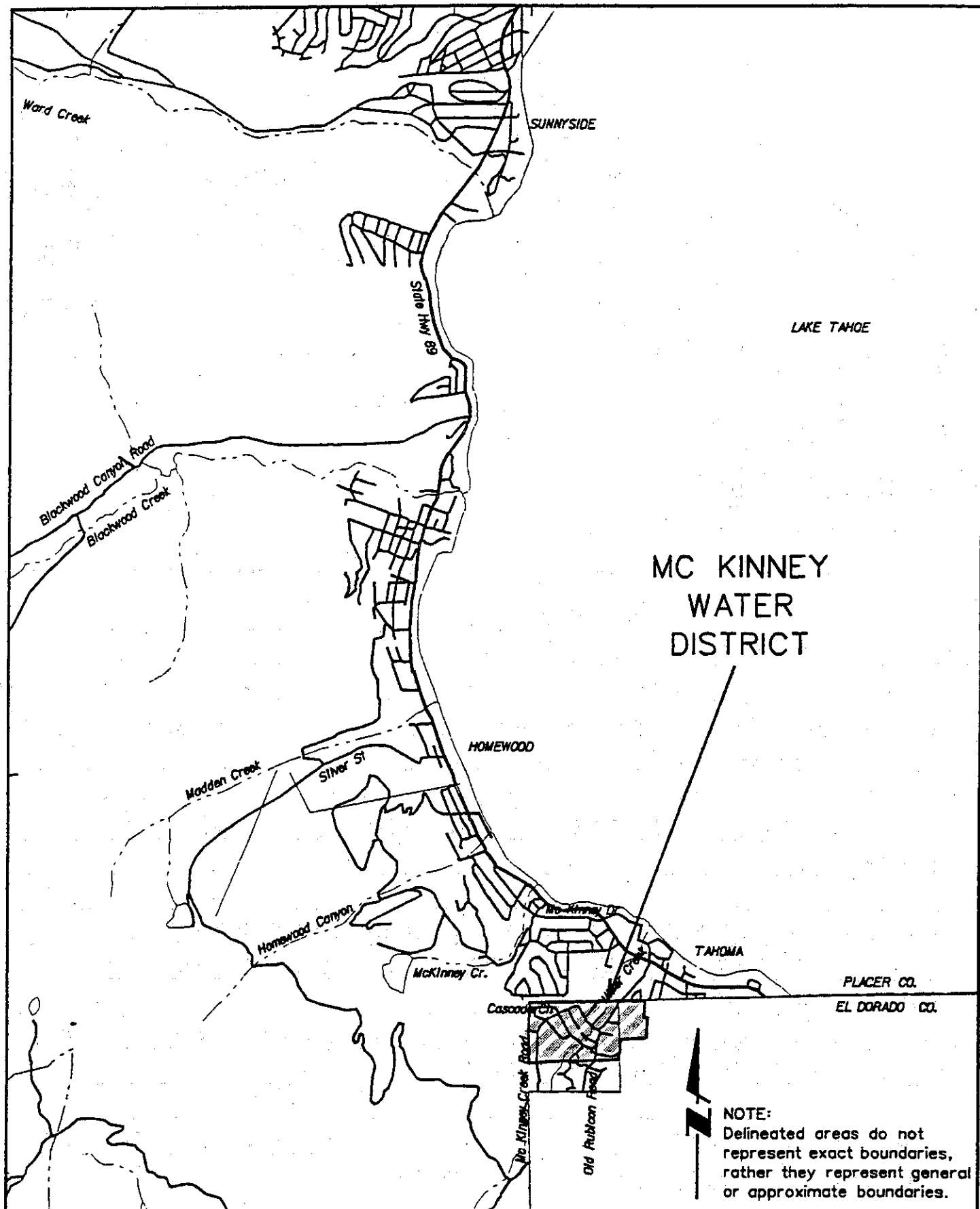
Source: THE DISTRICT IS SUPPLIED BY TWO METERED WELLS. CAPABLE OF PRODUCING 1000 GPM TOTAL.

Transmission: DISTRIBUTION SYSTEM IS IN GOOD SHAPE-COMPOSED PRIMARILY OF 4 & 6 INCH WRAPPED OR DIPPED STEEL PIPE. ALL DEAD ENDS ARE EQUIPPED WITH BLOWOFFS FOR FLUSHING.

Treatment: NO TREATMENT IS PROVIDED, HOWEVER A CHLORINATOR IS AVAILABLE FOR INSTALLATION ON EITHER WELL IF NECESSARY.

Storage: THE WELLS PUMP DIRECTLY UP TO A 50,000 GALLON REDWOOD STORAGE TANK, WHICH GRAVITY SUPPLIES THE DISTRIBUTION SYSTEM.

Capacity Limitations: MOST SIGNIFICANT ISSUE FACING THE DISTRICT IS ESTABLISHMENT OF A CAPITAL REPLACEMENT PROGRAM FOR THE DISTRIBUTION SYSTEM.



MC KINNEY WATER DISTRICT

Water Service Area

MEADOW VISTA COUNTY WATER DISTRICT

District Overview: The 2.5 MGD Meadow Vista water treatment plant was constructed in the late 70's as a gravity filter plant. Currently the plant adheres to a limited rating of 1.5 MGD with settling detention times and flocculation as limiting factors.

The District recently underwent a surface water treatment evaluation by the DOHS. Aside from additional monitoring and minor plant upgrades the most significant item lacked by the District was a water shed survey. The District is governed by a five member board of directors. Recently a large change in rate structure was adopted. Connection fees and rate schedule for 1991 within the Meadow Vista County Water District are as follows:

Connection Fees	
Facility fee	\$1,900
Meter set fee	\$425
Deposit	\$50
Service charge	\$50
Total	\$2,390

Basic water service is a flat rate of \$12.00/mo plus a \$2.00 PCWA surcharge. Water usage is billed at a rate of \$0.40/100 cu. ft.

Source Information: Source water is diverted from the Bowman Feeder Canal, which is fed from the Boardman Canal. The watershed is relatively uninhabited, however, it is open to the public for recreational purposes and both canals pass through sparse residential areas with septic systems and cross Southern Pacific Railroad tracks.

Past efforts have been attempted to located groundwater as an alternate source supply but all efforts have failed.

Primary Transmission and Distribution: Primary transmission facilities gravity feed directly into the plant from the Bowman Feeder Canal. From the plant, water then is transported to both the distribution system and storage tanks.

The distribution system is reportedly in fair shape. Most significant problems existing are maintenance and repair of steel lines. The distribution system is composed primarily of 14, 12, 10, 8, and 24 inch AC, PVC, and steel lines. Corrosion is not a problem within the system.

Storage: Available storage facilities include a 2.5 MG clearwell at the treatment plant and a 2 MG concrete reservoir. These facilities are considered adequate, being able to supply water for two to three days during power outages.

Treatment: The existing plant is a gravity filter plant, having capacity of 2.5 mgd.

1990 System Production: Meadow Vista County Water District water treatment plant is responsible for serving a total of 1,081 connections.

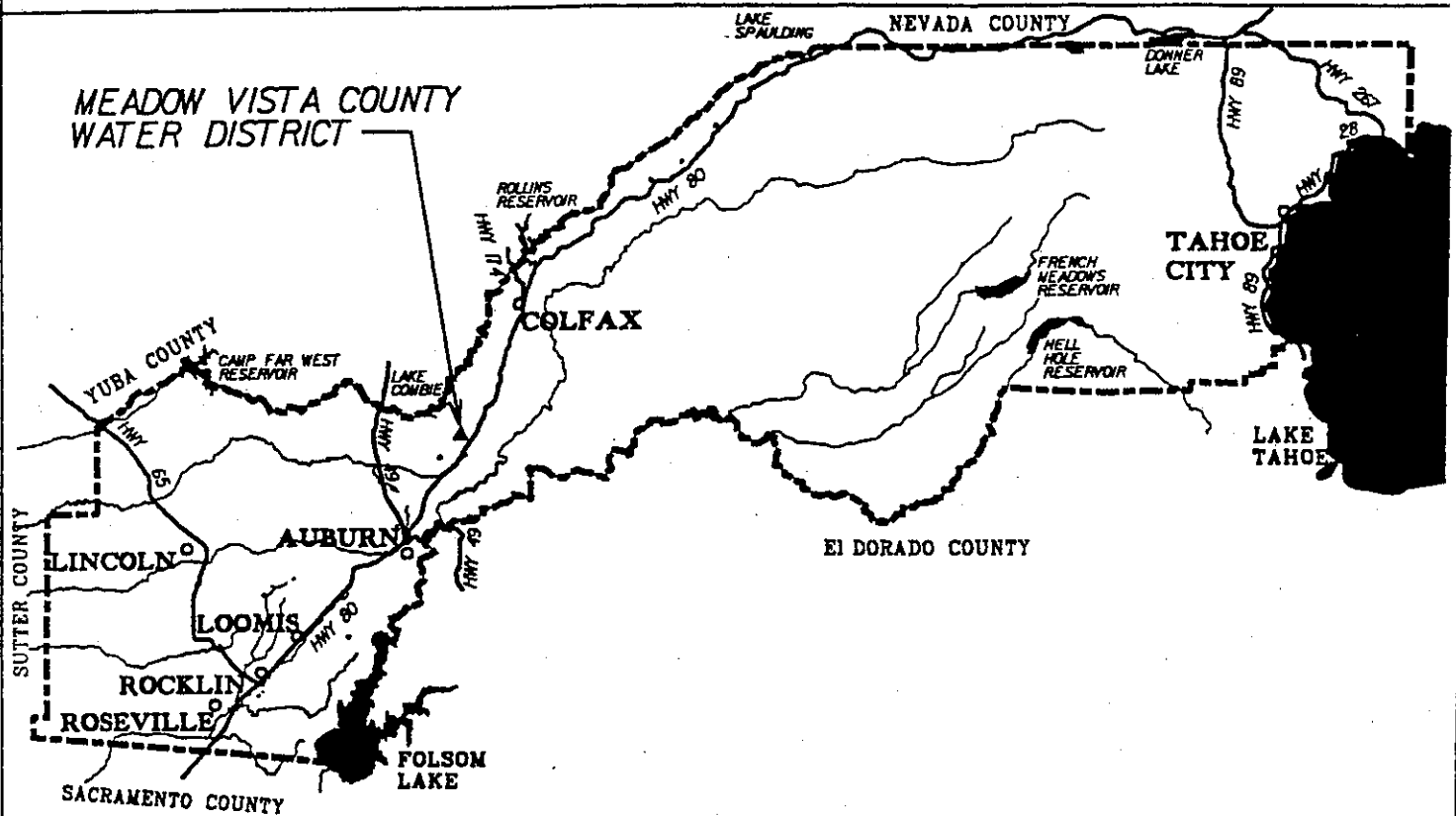
Maximum day demand during the 1990 year reached 1.8 million gallons. The month of maximum water use was July, serving a total of 48.5 million gallons for the 1990 year.

Deficiencies and Limitations: Recently an inspection was performed on the treatment plant regarding compliance with surface water treatment regulations. There are several areas targeted for improvement, however, most are directed toward operation and monitoring, opposed to lacking facilities or processes necessary to comply.

Existing Planned Improvements: Existing planned improvements are directed at providing service to a proposed large development project (Winchester). The treatment plant currently has enough capacity provided pretreatment capabilities can be improved to allow for full use of the 2.5 mgd capacity.

System Appraisal: Compliance with surface water treatment regulations and continued maintenance of transmission and distribution facilities are the two major issues concerning Meadow Vista County Water District. Compliance with the regulations by 1993 is expected to be possible. Due to a continual corrosion problem many of the main lines are currently being replaced when funding permits. Additional service area of the Winchester Development (if approved) will bring about significant funds further improving the system.

PLACER COUNTY WATER SYSTEMS



System Name: MEADOW VISTA COUNTY WATER DISTRICT

Address: 17000 PLACER HILLS ROAD, MEADOW VISTA CA 95722

Contact Name: NORMAN DEAN/FRED FAHLEN Phone: (916)-878-0828

Service Area Size: No. Connections: 1081 Population Served: 3200

Services Provided: TREATED POTABLE WATER AND FIRE

Summary System Description

Source: SOURCE WATER IS DVERTED FROM THE BOWMAN FEEDER CANAL, WHICH IS FED FROM THE BOARDMAN CANAL.
IS IN GOOD SHAPE.

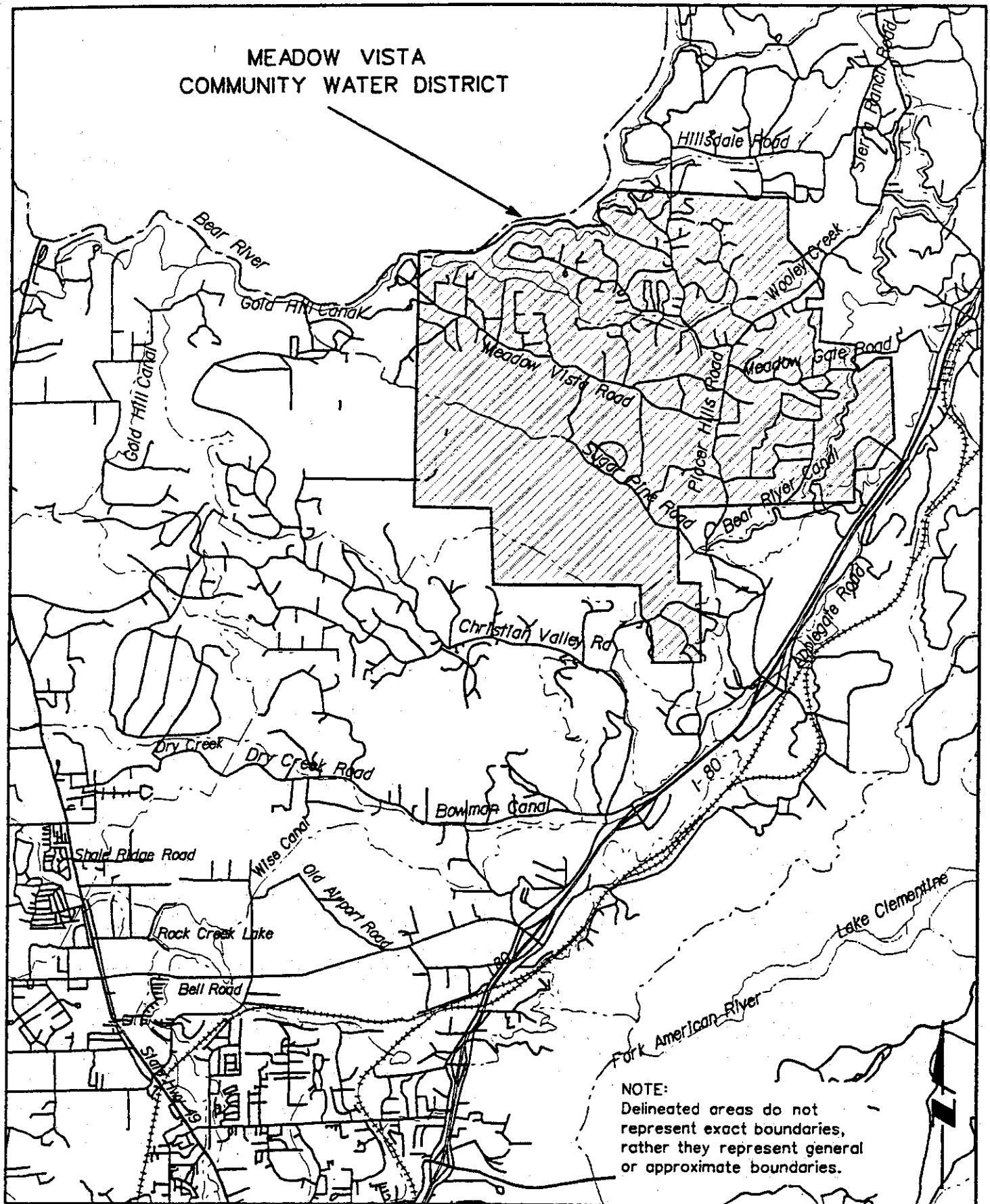
Transmission: A PUMPING STATION ON THE BOWMAN FEEDER CANAL TRANSPORTS WATER TO THE TREATMENT PLANT. THE DISTRIBUTION SYSTEM.

Treatment: THE DISTRICT HAS A CONVENTIONAL SURFACE WATER TREATMENT PLANT HAVING A CAPACITY OF 2.5 MDG, BUT DUE TO PRETREATMENT FACILITIES, IT'S RATED @ 1.6 MGD.

Storage: STORAGE FACILITIES INCLUDE A 2.5 M.G. CLEARWELL AND A 2 M.G. CONCRETE TANK.

Capacity Limitations: PRETREATMENT FACILITIES LIMIT THE PLANT CAPACITY, AND OPERATION/MONITORING DEVICES NEED TO BE IMPLEMENTED IN ORDER TO COMPLY WITH SURFACE WATER TREATMENT REGULATIONS.

MEADOW VISTA
COMMUNITY WATER DISTRICT



MEADOW VISTA CWD
Water Service Area

MIDWAY HEIGHTS COUNTY WATER DISTRICT PUBLIC WATER SYSTEM

District Overview: Midway Heights County Water District was formed in 1954, serving a rural area in Central Placer County. Connection fees are assessed through first years taxes, which total approximately \$3620.00/lot. A flat rate service charge of \$13.00/month plus \$1.12/100 cu.ft. is billed for the first 800 cu.ft. of water usage. Additional water usage is billed at a rate of \$3.00/100 cu. ft.

Source Information: Treated water is supplied to Midway Heights CWD by the Weimar Water Company.

Primary Transmission and Distribution: Treated water from Weimar WC is conveyed 2,300 feet by gravity through a 4-inch PVC pipe.

The distribution system contains 23 miles of PVC mains ranging in diameter from 2 to 8 inches. Although California Waterworks Standards require a minimum pipe size of 4 inches, the State Department of Health Services (DOHS) regards this deviation as justifiable. The system meets minimum pressure requirements and a separate irrigation system provides necessary fire flows.

Two hundred and thirty-one metered service connections are equipped with double check backflow prevention devices. System pressures vary from 32 to 170 psi and are regulated by seven pressure reducing stations.

Blue Oak Water Services is contracted to operate and maintain the distribution system.

Storage: A welded steel tank constructed in 1990, provides storage capacity of 140,000 gallons to the District.

Treatment: Treated water is purchased from Weimar WC, which conventionally treats raw surface water from the Boardman Canal.

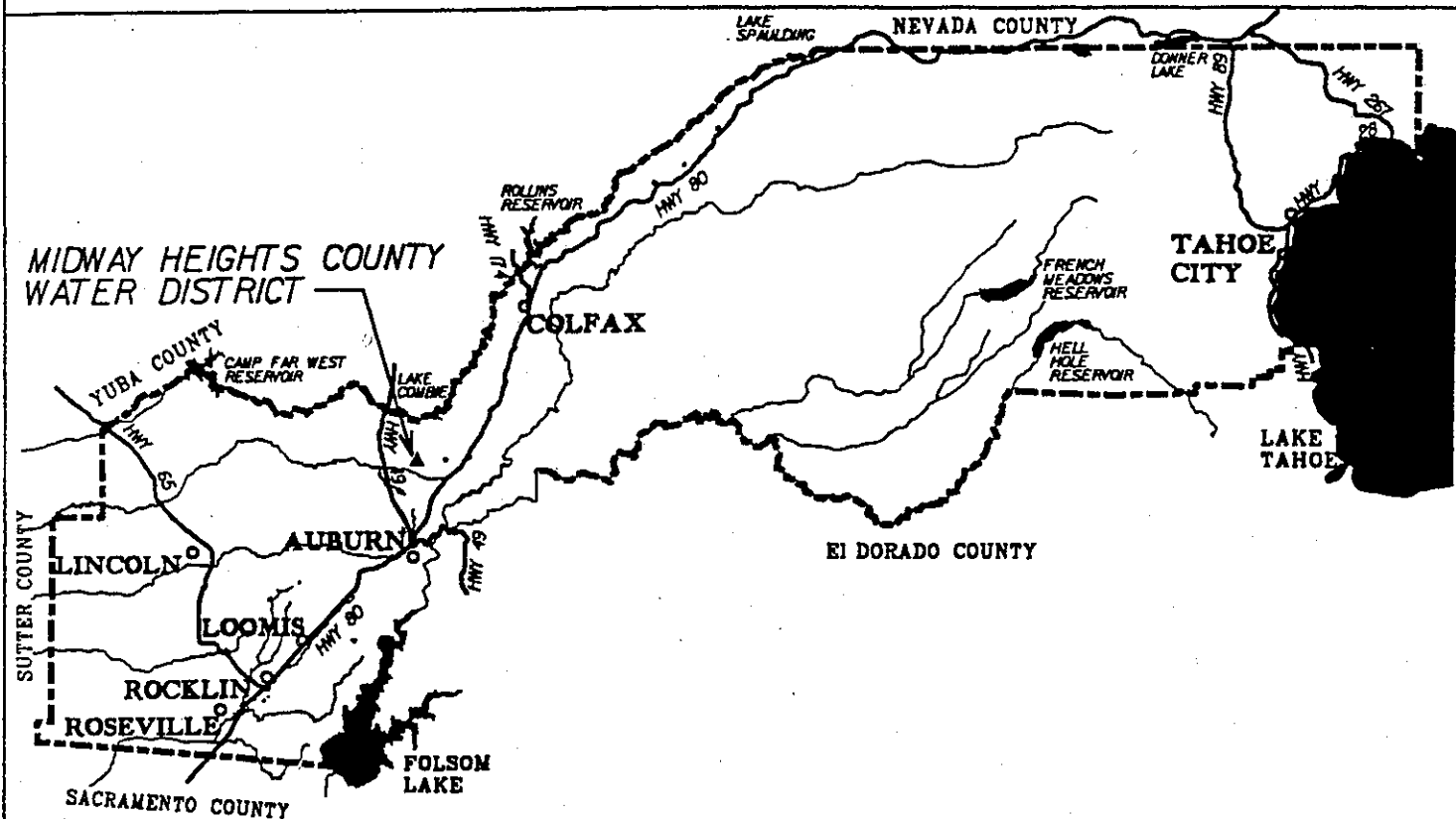
1990 System Production: Midway Heights serves an estimated population of 1,000 through 231 residential connections.

Midway Heights CWD recorded a maximum daily purchase from Weimar WC of 40,000 gallons and a maximum monthly purchase of 1,140,000 gallons in 1990.

Deficiencies and Limitations: After unresolved legal altercations between Midway Heights CWD and such regulatory agencies as the Placer County Health Department and DOHS, a consent decree was negotiated with the US EPA in 1988. In response to a court order, Midway Heights CWD made significant progression, including installation of a second distribution system for domestic water supply and complies with the requirements of the Safe Drinking Water Act. All services are connected to a potable water system.

System Appraisal: Midway Heights CWD recently constructed a new treated water distribution system and storage facility and added (treated) supply sources, while continuing to serve untreated water for irrigation purposes through the old distribution system. Treated water is supplied by Weimar WC. Recent improvements to the system were repercussions of a consent decree with the US EPA, which expounded Midway Heights as a public water system and subject to the requirements of the Safe Water Drinking Act.

PLACER COUNTY WATER SYSTEMS



System Name: MIDWAY HEIGHTS COUNTY WATER DISTRICT

Address: P.O. BOX 596, MEADOW VISTA, CA 95722

Contact Name: JIM MEHL

Phone: (916) 637 - 5485

Service Area Size: No. Connections: 231 Population Served: 1000 EST.

Services Provided: ALL SERVICE CONNECTIONS ARE RESIDENTIAL

Summary System Description

Source: PURCHASES WATER FROM WEIMAR WATER COMPANY

Transmission: TREATED WATER FROM WEIMAR WATER COMPANY IS CONVEYED THROUGH 2,300 FT OF 4 INCH PVC PIPE.

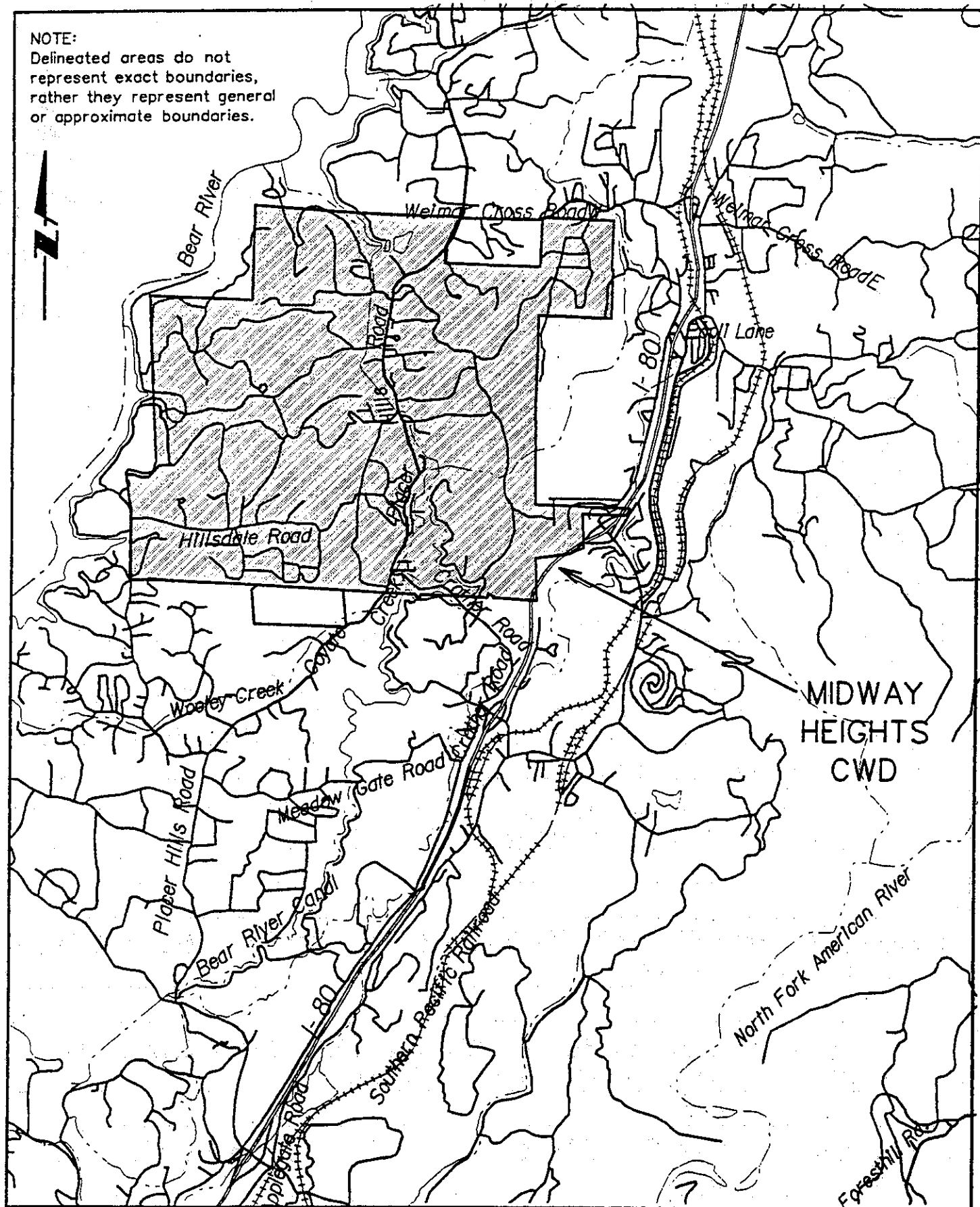
Treatment: WEIMAR WATER COMPANY PROVIDES FULL CONVENTIONAL TREATMENT TO WATER SOLD TO MIDWAY HEIGHTS COUNTY WATER DISTRICT.

Storage: A WELDED STEEL TANK CONSTRUCTED IN 1990 PROVIDES A STORAGE CAPACITY OF 140,000 GALLONS.

Capacity Limitations: RECENT IMPROVEMENTS INCLUDE INSTALLATION OF A SEPARATE DISTRIBUTION SYSTEM FOR DOMESTIC WATER. ALL SERVICES ARE CONNECTED.

NOTE:

Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.



MIDWAY HEIGHTS CWD
Water Service Area

NEVADA IRRIGATION DISTRICT - NORTH AUBURN SYSTEM

District Overview: The Nevada Irrigation District is a non-profit water district operated by land owners within its district boundaries, and governed by an elected five member board of directors. The District was formed in 1921 by local farmers and ranchers who needed a reliable year-around water supply. The District includes 287,000 acres within its district boundaries, serving a total of 19,500 customers.

While the water system is expected to encounter little problem complying with the Surface Water Treatment Regulations, a fee restructuring imposed by Department of Health Services is expected to affect the current rate structure.

A water supply permit was granted to N.I.D. by the DOHS in December 1971. Later, with Safe Drinking Water Bond Law funding, an amendment was filed inclusive of a 1187 foot mainline extension.

The North Auburn System serves a large commercial and residential area along Highway 49 on the northern edge of the City of Auburn.

Residential connection and rate schedule charges for 1991 are as follows:

- Connection Fee 5/8" meter = \$2120.00
- Connection Fee 3/4" meter = \$3230.00
- Vacant lot standby charge = \$4.00/month

A flat rate charge of \$25.70/bi-monthly covers the first 200 cu. ft. of water usage. Additional water use is billed at a rate of \$0.66/100 cu. ft.

Source Information: Direct source to the system is PG & E owned Rock Creek Reservoir, impounding water from the Wise Canal. The Wise Canal is part of P G & E's Bear River Canal system. This system is subjected to significant water shed hazards including runoff from private residences and small communities, Interstate 80 Freeway runoff and various other county roads, Southern Pacific Rail Road runoff, and recreation activities in upstream reservoirs.

An alternate supply source is N.I.D. owned Combie-Ophir Canal, diverting water from Lake Combie. Lake turbidity fluctuations constitute using this source a few times a year. Two emergency six inch inner ties with PCWA's Auburn system provide additional back-up supply.

Primary Transmission and Distribution: Water flows by gravity from Rock Creek Reservoir to the 3.0 MGD treatment plant via a 1256 foot long, 24 inch diameter, ductile iron transmission main. Following treatment, water is stored in a 600,000 gallon clearwell reservoir located at the plant site. Water is then pumped into the distribution system by three booster pumps. An auxiliary generator starts automatically, running the pumps, when normal power supply fails.

Most distribution system construction occurred in the early 70's; however, numerous pipeline extensions have been added corresponding to development throughout the years. One pressure zone exists throughout the system. The distribution system consists of Ductile Iron, Asbestos Cement, and PVC C-900 pipe, and is reportedly in good shape.

Storage: Six hundred thousand gallons of storage at the treatment plant, coupled with a 2.0 MG distribution storage tank provides storage to the system. The 2.0 MG tank is located on a hilltop near the Auburn airport, and is fed by booster pumps pressurizing the system located at the treatment plant.

Treatment: The 3.0 MG treatment plant provides full, complete treatment. The plant is equipped with dual media gravity filters, and has all necessary warning and emergency backup devices necessary to maintain confident safety factor. N.I.D. expects no problems in meeting the Surface Water Drinking Regulations.

1990 System Production: According to the 1991 annual report, 1,780 general and residential metered connections served a permanent population of 4,630 during the 1990 year.

Following information further describes operation production.

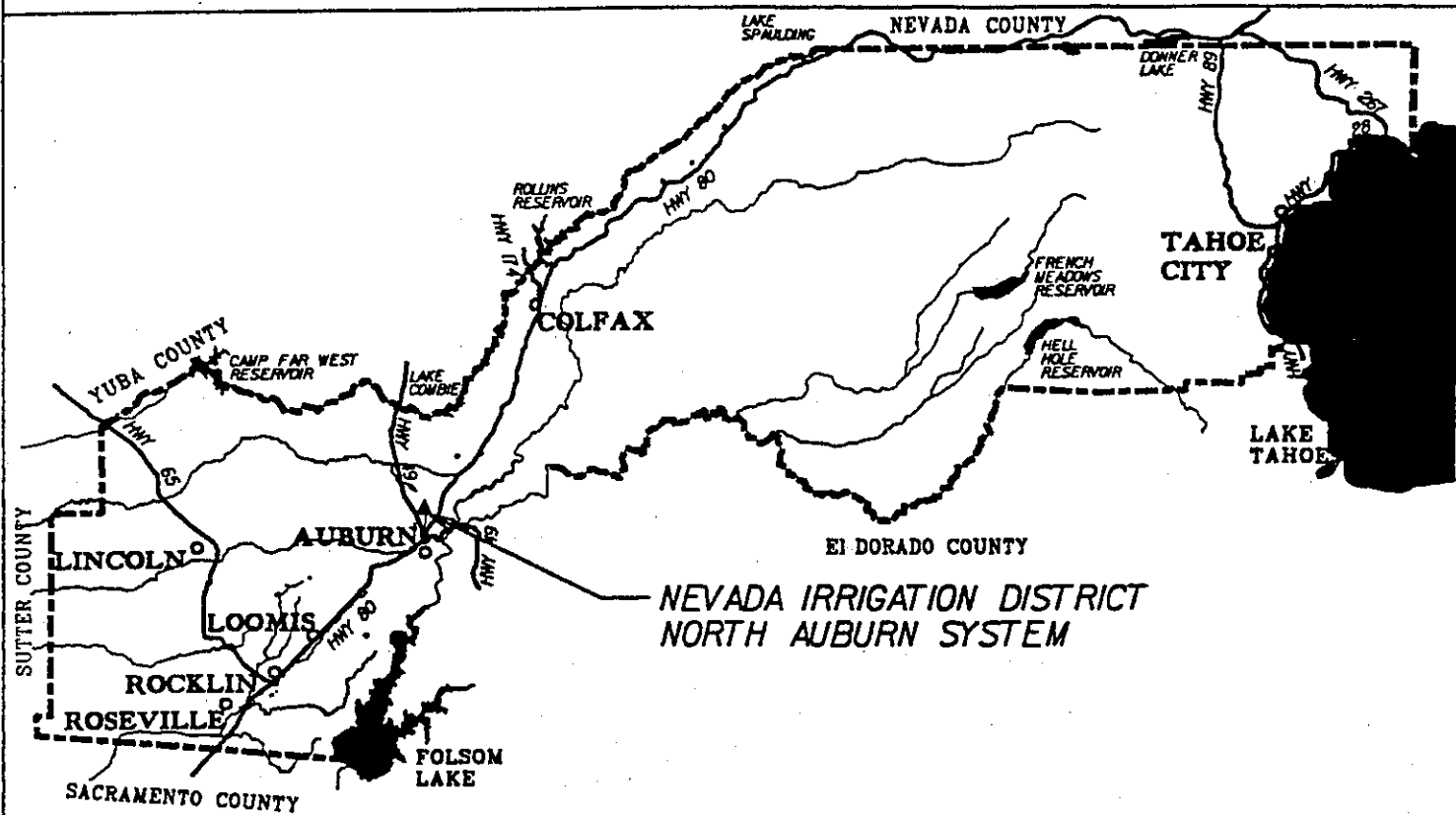
Maximum Day Water Production	2.750 million gallons
Month of Maximum Water Use	July
Annual Water Produced by System	470.257 million gallons

Deficiencies and Limitations: No significant deficiencies or limitations exist within the north Auburn Treatment Plant. Future development will require significant distribution system improvements, due to capacity restrictions with existing facilities. Two issues expected to impact administration are state fee increases and requirement of water shed surveys by the year 1995.

Existing Planned Improvements: Currently evaluation is underway looking at a 4.5 - 6.0 MGD expansion of the treatment plant.

System Appraisal: Nevada Irrigation District is presently in excellent condition. The upcoming expansion will further its ability to meet both existing and future development. Three major issues expected to have significant impacts, both administratively and physically, on the system are: 1) State mandated fee increases to the District pertaining to number of service connections, 2) Requirement of a water shed survey, and 3) Distribution system extensions impacting the already at capacity existing mains.

PLACER COUNTY WATER SYSTEMS



System Name: NEVADA IRRIGATION DISTRICT - NORTH AUBURN SYSTEM

Address: P.O. BOX 1019, GRASS VALLEY, CA 95945

Contact Name: WAYNE WAGNER Phone: (916)-273-6185

Service Area Size: No. Connections: 1780 Population Served: 4630

Services Provided: SERVICE TO GENERAL, RESIDENTIAL AND COMMERCIAL.

Summary System Description

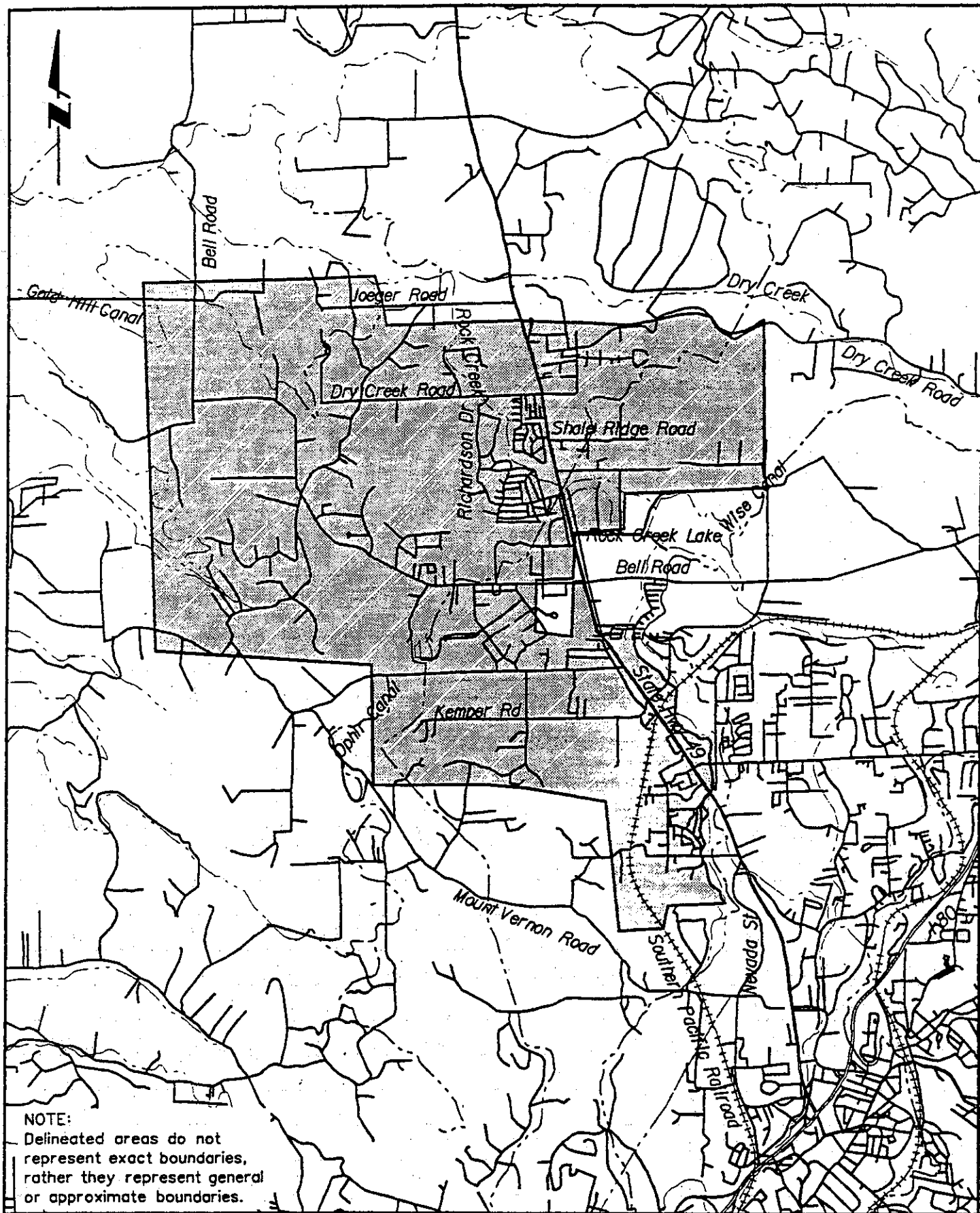
Source: DIRECT SOURCE TO THE SYSTEM IS P.G. & E. OWNED ROCK CREEK RESERVOIR IMPOUNDING WATER FROM THE WISE CANAL.

Transmission: WATER FLOWS BY GRAVITY FROM ROCK CREEK RESERVOIR TO A 3.0 MGD TREATMENT PLANT VIA A 1256 FT LONG 24 INCH DIAMETER DUCTILE IRON TRANSMISSION MAIN.

Treatment: A 3.0 MGD TREATMENT PLANT PROVIDES FULL CONVENTIONAL TREATMENT.

Storage: A TOTAL OF 2.6 MILLION GALLONS OF STORAGE IS AVAILABLE TO THE SYSTEM. BETWEEN A 600,000 GALLON CLEARWELL AT THE TREATMENT PLANT AND A 2.0 MILLION GALLON STORAGE TANK, LOCATED NEAR THE AUBURN AIRPORT.

Capacity Limitations: DISTRIBUTION MAINS THROUGHOUT THE SYSTEM ARE AT CAPACITY, THUS FURTHER DEVELOPMENT WILL REQUIRE SIGNIFICANT PIPING UPGRADES.



NEVADA IRRIGATION DISTRICT North Auburn - Water Service Area

NORTH TAHOE PUBLIC UTILITY DISTRICT: DOLLAR COVE, CARNELIAN WOODS, AND KINGS BEACH

District Overview: North Tahoe Public Utility District was incorporated in 1948 for the purpose of sewage collection and treatment. Poor water quality and service within early district boundaries became an issue which resulted in acquisition of the major water supplier by the District in the late 1960's. Since incorporation, the District has acquired five separate water systems within its sewerage service area.

The District water service areas are comprised of three physically separate areas. Within the Kings Beach area, Dollar Cove area, and Carnelian Woods area, the following system components are currently in use:

- > eleven pressure zones
- > three lake intakes
- > one well
- > seven storage tanks
- > approximately 45 miles of pipeline

Rapid development in the 1970's resulted in expansion of existing water systems, purchase or donation of additional systems, and improvements to existing facilities. Safe Drinking Water Bond Loan monies in the early 1980's funded source supply improvements posing significant health threats.

Current average system age is 30 years. Effective system life is estimated at 60 years. Much of the system has reached its effective life of forty to forty-five years, making restoration measures an impending endeavor.

The District is governed by a five member Board of Directors having three primary responsibilities; water service, sewer service, and recreation and parks.

Current rate schedule for the District is as follows:

CURRENT RATE SCHEDULE

Meter Size	Minimum Rate Per Month	Monthly Gallons Allowed	Daily Gallons Allowed
5/8" or 3/4"	\$ 25.96	7,500	250
1"	\$ 36.20	10,000	333
1-1/2"	\$ 53.36	15,000	500
2"	\$ 72.25	20,000	667
3"	\$105.57	30,000	1,000
Multiple Residential	Minimum Rate Per Month	Gallons Allowed	
	\$12.98	3,750	

All usage over the minimum shall be charged at \$1.60 per 1,000 gallons.

Meter Size	Connection Fee
5/8" or 3/4"	\$1,900
1"	\$2,660
1-1/2"	\$3,900
2"	\$5,270
3"	\$7,695

Source Information: Source supply to the District is provided by Lake Tahoe and one well. The District has three lake intakes. Concerning the amount of surface water used, the District operates under three different State water rights utilizing Lake Tahoe water: five permits, three licenses, and three pending applications for appropriative rights. In addition, two Statements of Diversion for riparian and pre-1914 rights are filed on an annual basis with the State Water Resources Control Board (SWRCB), Division of Water Rights.

The following table shows water rights allocation to the North Tahoe Public Utility District as of 1979:

WATER ALLOCATION
North Tahoe Public Utility District

Dollar Cove	54 acre-feet/annum (AFA)
Carnelian	140 AFA
Tahoe Vista/Kings Beach	1860 AFA

There has been no action on pending applications by the Division of Water Rights since 1972. There is no timetable for adjustments, adjudication or other action to resolve Lake Tahoe water rights as of this date.

Primary Transmission and Distribution--Kings Beach: The Kings Beach system is composed of three pressure zones. Source supply is derived from two lake intakes. Additional historical supply came from a reservoir and spring diversion, however sampling showed evidence of Giardia Lamblia cysts and the system was forced to discontinue use until adequate treatment or protection could be implemented. Future use of these sources is not contemplated.

The primary lake intake houses 125 hp and 100 hp pumps, with respective capacities of 1,000 gpm and 700 gpm. A standby generator located in an adjacent sewage pumping facility is able to provide power to one of the two pumps in the event of an emergency or power outage subject to the sewer pumping requirements being met. The secondary lake intake houses 40 hp and 125 hp pumps, with respective capacities of 245 gpm and 625 gpm.

Water is pumped from the lake through pressure zone 1 to two storage facilities: a 500,000 gallon steel tank in Kingswood Estates, and a 500,000 gallon steel tank in Kings Beach. The Kingswood Estates tank is too low to actually supply sufficient pressure, and is therefore viewed more as a booster pump reservoir. From the Kingswood Estates, tank water is boosted twice more to 120,000 gallon and 500,000 gallon storage tanks.

Primary Transmission and Distribution--Carnelian Bay: Carnelian Bay Subdivision and water distribution system began in the early 1900's. In 1930 the Carnelian Bay Water Company was formed and operated the system until district purchase in 1975. A lake intake was constructed in the early 1920's but has since been abandoned, although physical improvements still remain. In the early 1970's the Carnelian Woods project was developed, and its water system was purchased in 1974 by the District.

The Carnelian Bay/Carnelian Woods system is divided into four pressure zones, supplied by a high quality ground water well source. The well is equipped with a 60 hp pump supplying 359 gpm to a 500,000 gallon steel tank. Water is again lifted to a second 500,000 gallon steel tank.

Upper zone distribution facilities are relatively new ranging in size from 6 to 14 inches, with corresponding pressures ranging from 25 to 115 psi. Lower zones contain primarily 3 inch diameter mains and are quite old.

Primary Transmission and Distribution--Dollar Cove: The Lake Forest No. 3 subdivision and water system began in 1929, utilizing Dollar Creek as a source. In 1970 Chinquapin development began negotiations with North Tahoe Public Utility District for sewered and water service agreements. The District formally purchased the Dollar Cove water system in 1977 after several years of lease agreements. Use of the water dates back to 1917, with filing to the California Water Rights Commission in 1929 for approved water use.

The Dollar Cove system derives water from the Dollar Cove pump station, consisting of a lake intake and two vertical turbine 125 hp pumps. Each pump is rated at 1,000 gpm at 344 feet of head. Standby power is provided by a direct coupled natural gas engine.

Water is pumped to a single 350,000 gallon steel storage tank supplying the distribution system. Distribution system sizes vary and ages date back to 1937 with the average age being 26 years. Sizes range from 2 inches to 12 inches. A 2-inch inner-tie with Fulton Water Company is available for emergency supply.

Treatment: Treatment is not provided to the groundwater well in the Carnelian Woods area although provisions for disinfection have recently been installed, and only chlorine disinfection is provided to lake intakes.

1990 System Production: The following tables outline system production for each of the three physically separate water systems.

ANNUAL SYSTEM PRODUCTION

Main (Kings Beach)

Maximum Day Production	1.47 million gallons
Month of Maximum Water Use	July
Total Annual Water Usage	399.1 million gallons

The Main, or Kings Beach System, serves a total permanent population of approximately 5,000; however, this more than doubles during the seasonal population influx.

Connections are broken down as follows:

SYSTEM SERVICE CONNECTIONS

	Metered	Flat Rate	Total
General and Residential	2615	29	2644
Commercial	194	1	195
Total Active	2809	30	2839

CARNELIAN BAY-CARNELIAN WOODS SYSTEM PRODUCTION

Maximum Day Production	0.112 million gallons
Month of Maximum Water Use	August
Total Annual Water Usage	27.11 million gallons

The Carnelian Bay/Carnelian Woods System serves a total permanent population of 600; however, reaching up to 900 during seasonal population influx.

Connections are broken down as follows:

CARNELIAN BAY-CARNELIAN WOODS SERVICE CONNECTIONS

	Metered	Flat Rate	Total
General and Residential	228	0	228
Commercial	15	0	15
Total Active	243	0	243

DOLLAR COVE ANNUAL PRODUCTION

Maximum Day Production	0.11 million gallons
Month of Maximum Water Use	July
Total Annual Water Usage	21.30 million gallons

The Dollar Cove/Chinquapin System, serves a total permanent population of 800, however this more than doubles during seasonal population influx. Connections are broken down as follows:

DOLLAR COVE SERVICE CONNECTIONS

	Metered	Flat Rate	Total
General and Residential	255	0	255
Commercial	3	0	3
Total Active	258	0	258

Deficiencies and Limitations--General: The average age of the system is excessive. All systems have an average age of 30 years or greater. That means that there are significant lengths of line in service 60 years old or older. These lines not only have reached or exceeded their useful life but are also inadequate to supply reliable year round service, fire protection, and protect the delivered water quality.

The financial resources to alter a trend toward further aging are questionable. With little or no new growth the systems must rely on the existing customer base to fund all necessary improvements.

The District is within the Placer County Water Agency's jurisdiction. The agency, however, has not returned to the community services equivalent to the taxes generated. North Tahoe PUD, together with other eastern county entities, is seeking a return of funds to the area to help offset the increasing capital needs, regulatory costs, and changes in operation necessitated by new regulations.

Deficiencies and Limitations--Main (Kings Beach): The most significant deficiency within the Kings Beach service area is average age and size of distribution mains. The average diameter of water mains is 5.5 inches, and the average age of the pipe is 35 years. Excessive amounts of budget monies are spent each year in repairs and maintenance, which could otherwise be used for system upgrades and replacement programs.

The loss of Griff Creek and Mount Baldy Springs source, which were responsible for 1.2 million gallons of storage and approximately 1 million gallons per day of source capacity, placed further limitations on the system.

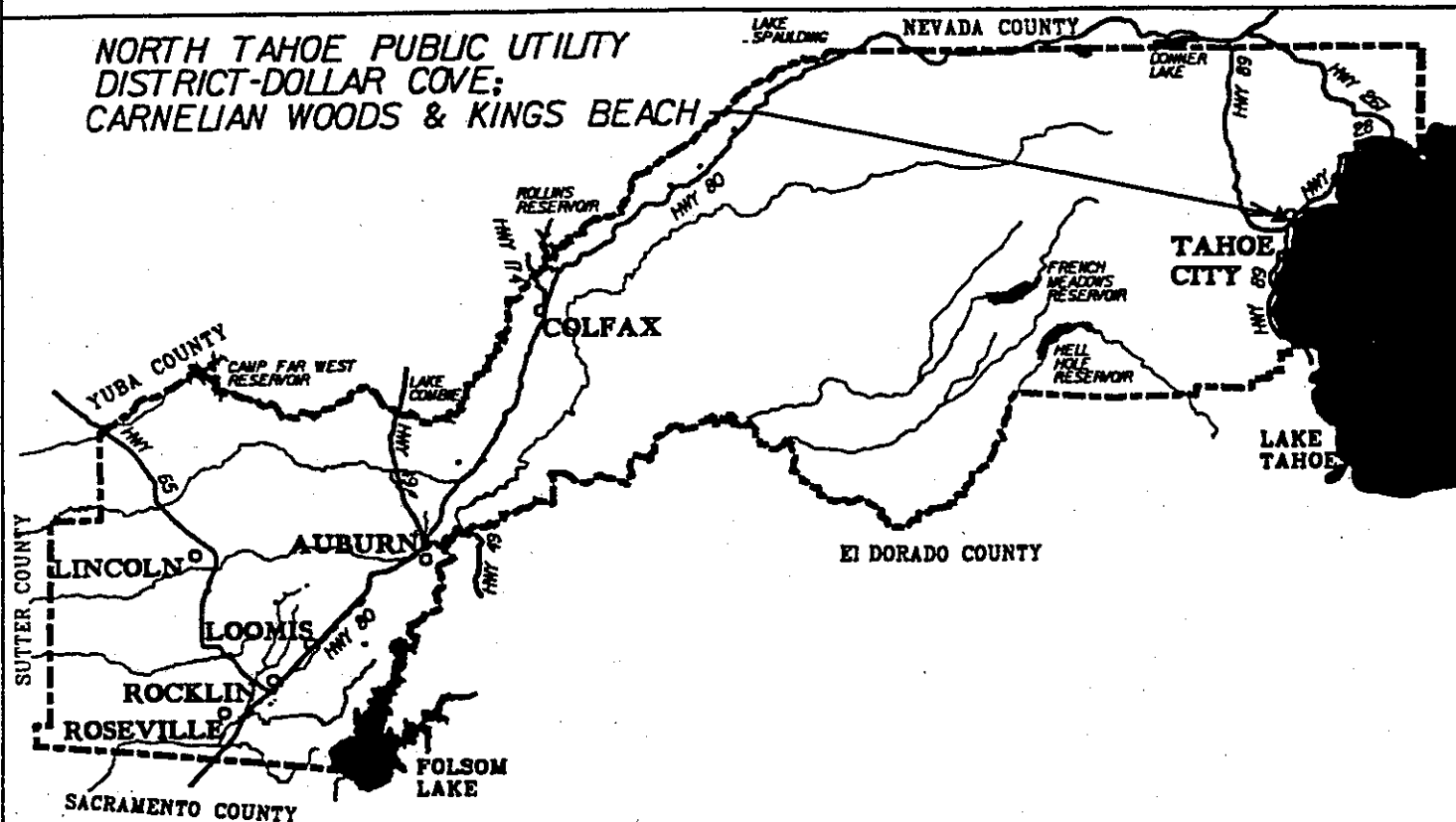
Deficiencies and Limitations--Carnelian Bay/Carnelian Woods: Lower zones in the Carnelian service area do not contain adequate looping or properly sized mains. Most mains are 3 inches diameter or smaller and have an average age of 32 years.

Deficiencies and Limitations--Dollar Cove: Deficiencies occurring within the Dollar Cove service area include undersized mains, inadequate looping and provision for fire flows, and burial depths too shallow to prevent frozen mains and increased maintenance costs. The distribution system average age is 30 years.

Existing Planned Improvements: The major existing planned improvements to the District includes new or modified sources to comply with the Safe Drinking Water Act, maintenance of a systematic replacement program and creation of an appropriate reserve fund.

System Appraisal: District awareness of its strengths and weaknesses is evident upon a review of their *Master Water Plan*. Development along the lake area is essentially halted. Funding of future replacement programs is underway and discussed in the *Master Water Plan*. Due to rising costs imposed on the District by the Surface Water Treatment Regulations, alternate sources of supply are being aggressively evaluated. A study in conjunction with the Bureau of Reclamation to locate significant ground water supply is underway.

PLACER COUNTY WATER SYSTEMS



System Name: NORTH TAHOE PUBLIC UTILITY DISTRICT-DOLLAR COVE; CARNELIAN WOODS AND KINGS BEACH
Address: P.O. BOX 139, TAHOE VISTA, CA 96148
Contact Name: LEON C. SCHEGG Phone: (916) 546-4212
Service Area Size: 2186 ac. No. Connect.: 340 Population Served: 5000 :
Services Provided: PRIMARILY RESIDENTIAL W/ SOME COMMERCIAL

Summary System Description

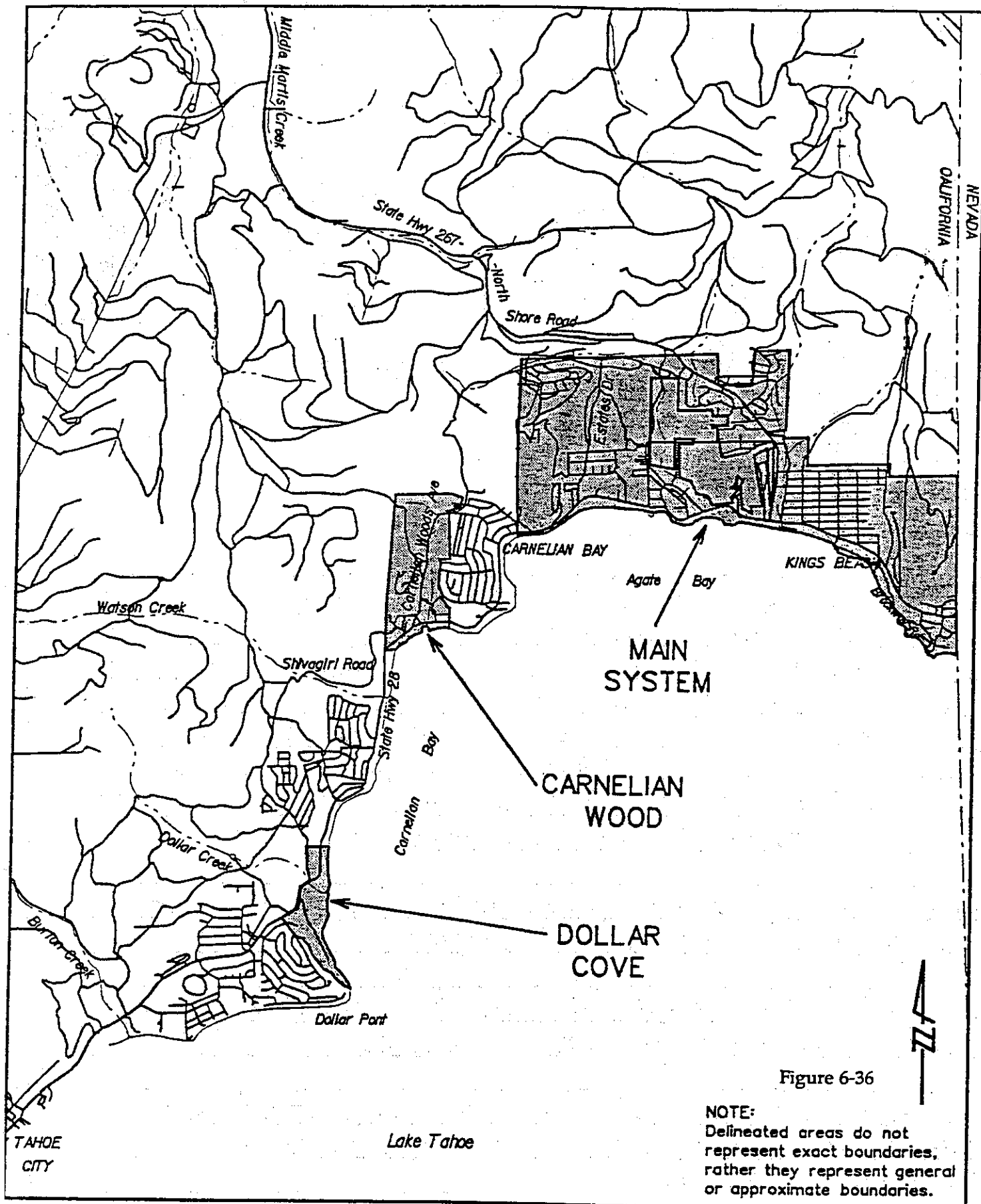
Source: THREE LAKE INTAKES AND 1 WELL SERVE THE DISTRICT NEEDS. THE DISTRICT HAS WATER RIGHTS TOTALING 2054 ACRE FEET/ANNUM OF LAKE TAHOE WATER.

Transmission: DISTRIBUTION SYSTEMS VARY WIDELY IN CONDITION. TRANSMITTING WATER TO STORAGE FACILITIES FOR GRAVITY DISTRIBUTION.

Treatment: ALL THREE OF THE LAKE INTAKES PROVIDE CHLORINATION TO THE SYSTEM. NO TREATMENT IS PROVIDED TO THE WELL WATER.

Storage: THE KINGS BEACH AREA HAS 162 MILLION GALLONS OF STORAGE AVAILABLE. CARNELIAN BAY HAS 1 MILLION GALLONS OF STORAGE AND DOLLAR COVE HAS 350,000 GALLONS OF STORAGE.

Capacity Limitations: AGE AND SIZE OF DISTRIBUTION MAINS CAUSE SIGNIFICANT MAINTENANCE PROBLEMS. COMPLIANCE WITH THE SURFACE WATER TREATMENT REGULATIONS IS ALSO A PROBLEM.



NORTH TAHOE PUBLIC UTILITY DISTRICT Water Service Areas

NORTHSTAR COMMUNITY SERVICES DISTRICT

District Overview: The Northstar County Service Area No. 21 (now the Northstar Community Services District) began operation in 1972. Initial beginnings included collection and treatment facilities.

In 1971, under form of a permit application, and in conjunction with the Martis Base Development Area, new facilities were proposed for the area. These facilities included such improvements as construction of distribution piping, a water treatment plant and a steel storage reservoir.

Water was originally extracted from Big Spring and Sawmill Flat Spring, considered groundwater sources, and piped to the water treatment plant providing full filtration. With increasing development in the late 80's and decreasing spring flows due to a lack of precipitation it became necessary to also extract water from reservoir "A". Reservoir "A" is a storage facility reserved for municipal and snow making purposes.

Current residential and commercial facilities served by Northstar CSD include the following:

- > 18 hole golf course
- > ski hill facilities for approx. 6,000
- > Recreation Center
- > Big Springs Lodge
- > Northstar Village (Commercial)
- > 598 residential lots
- > 654 condominiums

Recently, the Northstar area became independent of Placer County Water Agency, and is now referred to as Northstar Community Services District. The District is quite self-contained having its own staff, utility manager and a five member governing board of directors. However, Northstar CSD's services do not extend to wastewater treatment.

Fees are separated into metered and flat rates (shown below) with water connection fee of \$300. Fees are collected on a bi-monthly basis.

Metered		Flat Rate	
Meter Size	Bi-Monthly	Residence Type	Monthly
3/4"	\$ 22.95	Studio	\$ 6.89
1"	\$ 27.47	One Bed/One Bath	\$ 8.03
1 1/2"	\$ 36.65	Two Bed/One Bath	\$ 9.72
2"	\$ 45.76	Two Bed/Two Bath	\$10.33
3"	\$114.34	Three Bed/Two Bath	\$10.87
4"	\$182.92	Four Bed/Two Bath	\$11.47
6"	\$320.15		

Source Information: Northstar CSD is supplied by three sources: Big Springs, Sawmill Flat Spring and Reservoir "A". Recent utilization of Reservoir "A" resulted from golf course irrigation demands and successive below-average years of precipitation.

Primary Transmission and Distribution: Primary transmission of water from the reservoirs to the treatment plant takes place in 12 inch diameter AC pipe. The water treatment plant gravity feeds the

distribution system. Two of the three sources constantly supply water to the treatment plant in various quantity combinations. Valves at each source enable alternation of source supplies.

The distribution system primarily consists of 6 inch and 8 inch diameter AC pipe. The distribution system is reportedly in good shape.

Seven pressure zones exist within the distribution system, regulated by pressure reduction stations. Pressure zones within the distribution system are defined by a 150 foot elevation differential in each zone. Pressures range from 40 to 150 psig.

Storage: The system is subject to many radical changes in both demand and weather. Emergency shutdown of the treatment plant could have drastic effects on the system during peak demand hours including fire hazards.

Currently Northstar provides enough storage to supply the system during peak demand for two days including one fire. Storage consists of a 60,555 gallon clearwell located at the water treatment plant, and two 1 MG steel welded storage tanks.

Treatment: The Northstar CSD treatment plant is located on a hill above development. It is gravity fed by the springs and reservoir which in turn gravity feed the storage tanks and distribution system. The treatment plant was constructed in the early 70's, and has a capacity of 3.0 million gallons per day. Full conventional treatment can be provided by the plant consisting of coagulation, flocculation, sedimentation, filtration, and disinfection. The facilities include chemical feeding equipment for alum, lime and chlorination. Flocculation and sedimentation are provided by a clarifier basin, and filtration is provided by four multimedia sand and anthracite gravity filters.

Currently water bypasses the clarifier directly to the filters. No coagulant chemicals have ever been required while using the spring sources, however, disinfection and a polymer filter aid are mandatory when utilizing the reservoir.

1990 System Production: According to the 1991 annual report the system has a total of 2 approved groundwater sources (the springs) and one approved surface water source, reservoir "A". The following annual productions were recorded for 1990:

ANNUAL SYSTEM PRODUCTION Northstar Community Services District

Maximum Day Production	1.024 million gallons
Month of Maximum usage	July
Total produced by the system	129.3 million gallons

Northstar Community Services District serves a permanent population of 1,135 with a maximum seasonal population of up to 9,000. Service connections are as follows:

SERVICE CONNECTIONS
Northstar Community Services District

Service type	Metered	Flat	Total
General and Residential	484	654	113
Commercial	4	10	14
Agricultural	1	--	1
Total	489	664	1153

Deficiencies and Limitations: The Northstar CSD system is in good overall condition; however, some upcoming issues could impact system operation, capacity, and maintenance. These issues include implementation of the Surface Water Treatment Regulations.

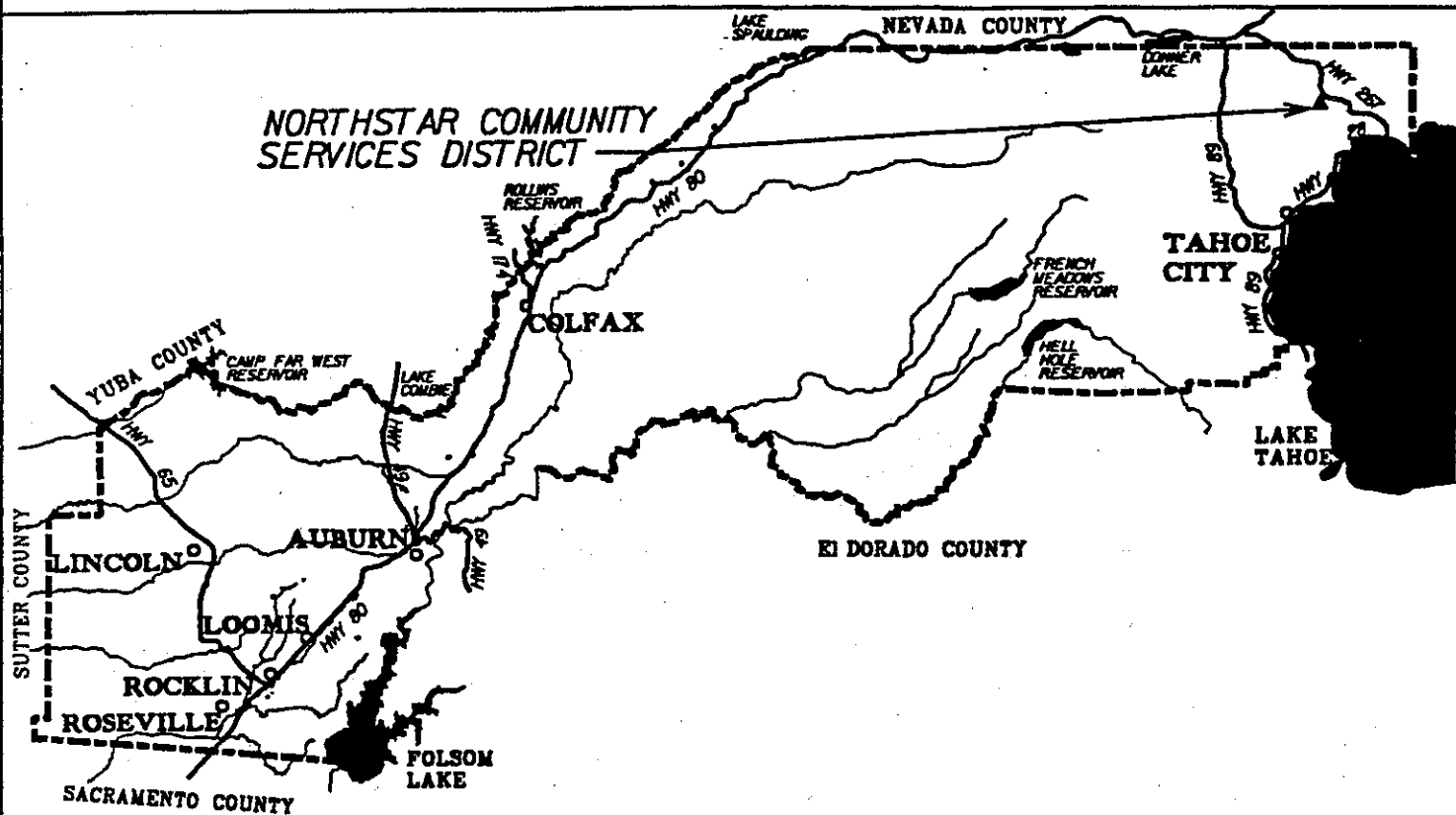
Increased development has made it necessary to utilize reservoir "A" to supply the system. This supply includes irrigating the golf course. A five hundred gpm well system was developed by Trimont Land Company for golf course irrigation but is currently not on line. No separate distribution system presently exists to irrigate the golf course; therefore, water being applied is potable water from the treatment plant.

A capital replacement funding program is currently nonexistent. The present fee rate structure matches only current operating costs of the system. No reserve funds are available to replace existing main lines, etc., with aging. It is also quite conceivable that, resulting from the Surface Water Treatment Regulations, additional improvements and an increased maintenance and monitoring program will become necessary, thus requiring additional expenditures.

Existing Planned Improvements: Water system improvements will coincide with expanded development within the Northstar CSD boundaries. Currently a 182 lot development is planned for the area. Corresponding with development, significant water system improvements will occur such as increased storage and further looping of the entire water line distribution system mains.

System Appraisal: Existing water supply and distribution systems are of sufficient quantity and size to serve both residential use and fire flows. A significant issue is creating a reserve capital replacement program. This program may be funded by increasing the service rates and connection fees or by other means. Creation of this program will enable the Northstar system to meet future improvements and adjustments as required under the Surface Water Treatment Regulations.

PLACER COUNTY WATER SYSTEMS



System Name: NORTHSTAR COMMUNITY SERVICES DISTRICT

Address: 51 TRIMONT LANE, TRUCKEE, CA 96161

Contact Name: JIM LOCHRIDGE Phone: (916)-562-0669

Service Area Size: No. Connections: 1153 Population Served: 1135-9000

Services Provided: RESIDENTIAL AND COMMERCIAL SERVICES

Summary System Description

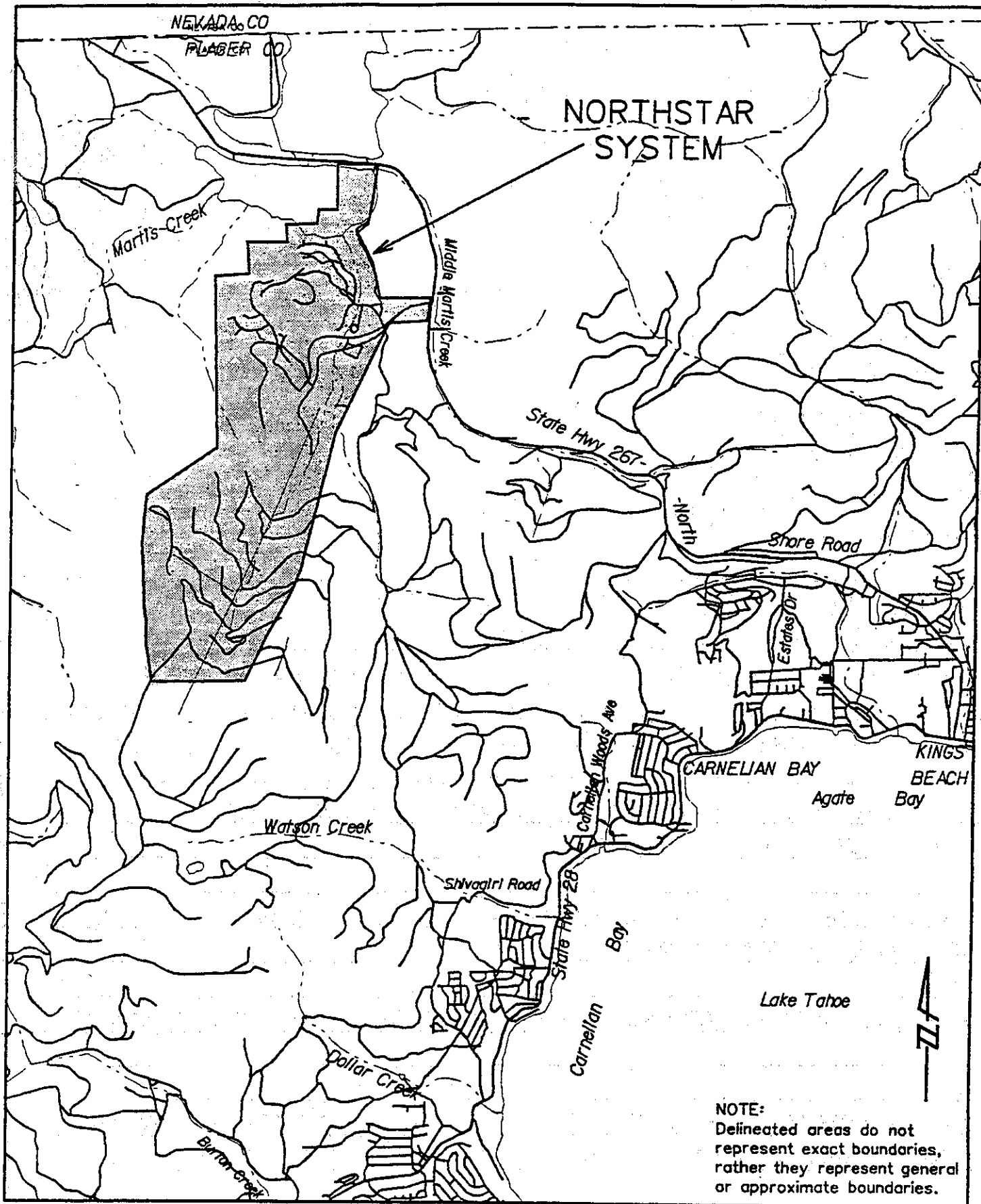
Source: SUPPLIED BY TWO GROUNDWATER SOURCES AND A RESERVOIR. THE GROUNDWATER SOURCES ARE SPRINGS.

Transmission: THE DISTRIBUTION SYSTEM IS IN GOOD SHAPE. TRANSMISSION MAINS ARE CONSTRUCTED PRIMARILY OF 6in. PIPE.

Treatment: A 3.0 MGD TREATMENT PLANT PROVIDES FULL CONVENTIONAL TREATMENT.

Storage: STORAGE TO THE SYSTEM TOTALS 2.061 MILLION GALLONS. COMPRISED OF (2) 1 MILLION GALLON STEEL BOLTED STORAGE TANKS AND A 60,555 GALLON CLEARWELL.

Capacity Limitations: TREATMENT PLANT UPGRADES ARE REQUIRED TO MEET SURFACE WATER TREATMENT REGULATIONS WHEN USING RESERVOIR 'A'. WATER USED TO IRRIGATE THE GOLF COURSE IS SUPPLIED FROM TREATMENT PLANT. WELL SYSTEM HAS BEEN DRILLED AND CAPPED FOR LATER USE BY TALMONT LAND COMPANY FOR GOLF COURSE IRRIGATION.



NORTHSTAR COMMUNITY SERVICE DISTRICT

Water Service Area

PLACER COUNTY SERVICE AREA #28 -ZONE 6 SHERIDAN

District Overview: The community of Sheridan is located along Highway 65 just north of the City of Lincoln. A population of approximately 600 reside within the small community. Groundwater is source supply to the Sheridan area. Two well sources supply a total of 200 service connections.

Source Information: Three well sources exist within the Sheridan water system, however one well is no longer used because of its close proximity to a sewer main feeding the town's evaporation ponds. The remaining two wells have a pumping capacity of 243 and 146 gpm.

According to the California Code of Regulations (CCR), Title 22, the current maximum production rate for all sources in this system is 389 gpm. This shows a 111 gpm deficit.

Primary Transmission and Distribution: The distribution system consists of a single pressure zone. Operating pressures within the system range from 43 - 67 psi. Original system mains consist of asbestos cement pipe. All newly added or replacement pipe is PVC C-900 CI 150. Existing pipe sizes range from 4-6 inches in diameter. Ongoing concern is raised from the fact that sewer and water mains were placed in a common trench during initial installation.

Storage: No storage to the system is provided because source capacity nearly meets minimum flow requirements established by Title 22 CCR.

Treatment: One of the wells is equipped with a chemical feed pump for chlorination, although continuous disinfection is not practiced.

1990 System Production: According to the 1991 annual report, the Sheridan system supplied 47.36 million gallons during the 1990 year serving 200 service connections. Maximum monthly production was experience in July.

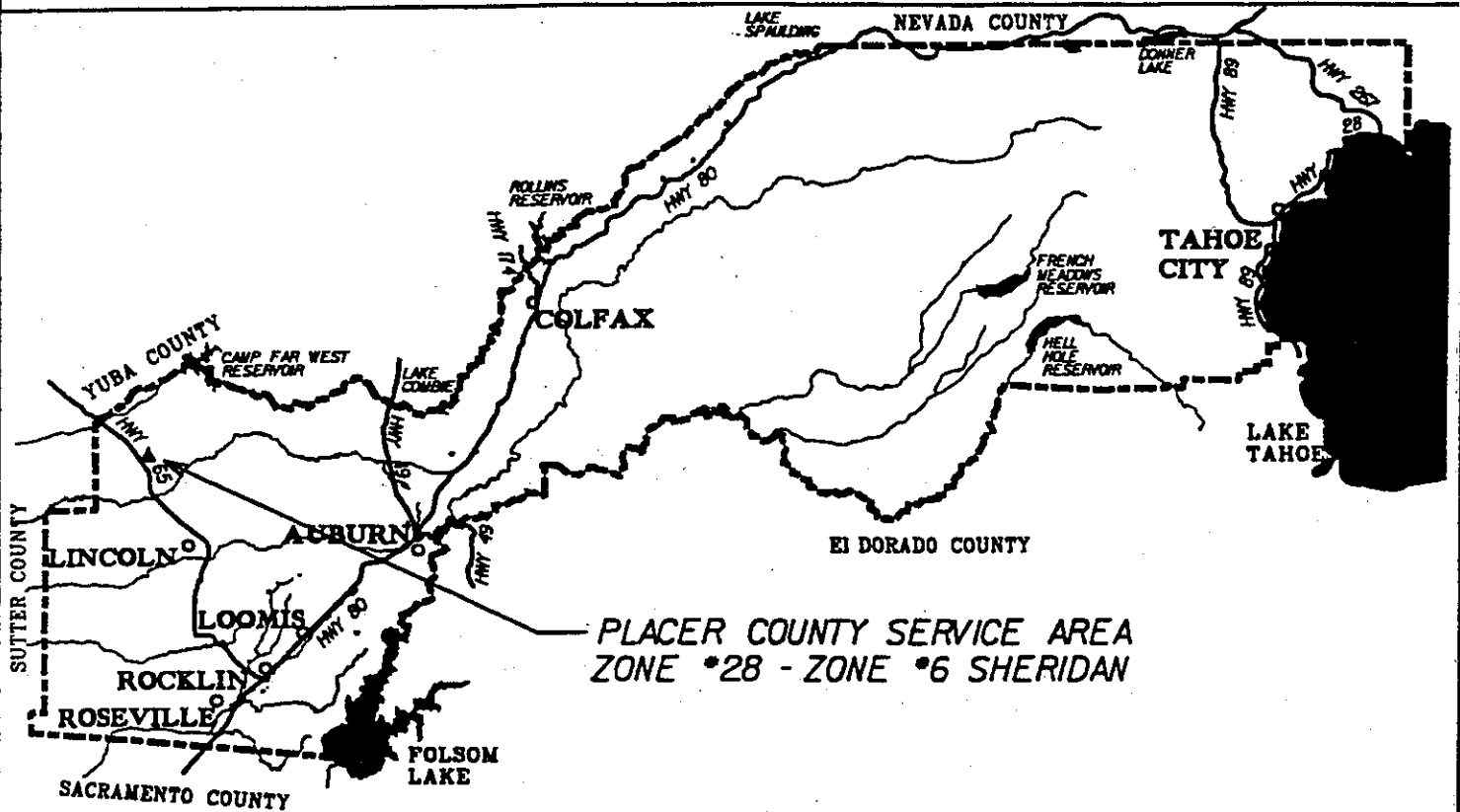
Deficiencies and Limitations: Recent well testing conducted by PG&E showed low pumping efficiencies from the existing wells. These low efficiencies limit supply to the system substantially. According to the California Code of Regulations (CCR), Title 22, the current maximum production rate for all sources in this system is 389 gpm. This shows a 111 gpm deficit. Recommended repairs to pumps could improve the system yield to 624 gpm, a 124 gpm surplus.

Ongoing concern is raised from the fact that sewer and water mains were placed in a common trench during initial installation.

Emergency power back-up is not available for pumps in case of a power outage.

System Appraisal: In general the system delivers adequate amount and good quality water to its customers. Retrofitting of pumps would appear to better enhance service and accommodate expansion possibilities. Close monitoring of water and sewer mains is a continued concern.

PLACER COUNTY WATER SYSTEMS



System Name: PLACER COUNTY SERVICE AREA ZONE *28 - ZONE *6 SHERIDAN

Address: 11444 B AVENUE, AUBURN CA 95603

Contact Name: DAVID BABITZ Phone: (916)-889-7513

Service Area Size: No. Connections: 235 Population Served: 576

Services Provided: RESIDENTIAL & TWO COMMERCIAL CONNECTIONS

Summary System Description

Source: TWO GROUNDWATER WELLS ARE CAPABLE OF PROVIDING 500 GPM TO THE DISTRIBUTION SYSTEM.

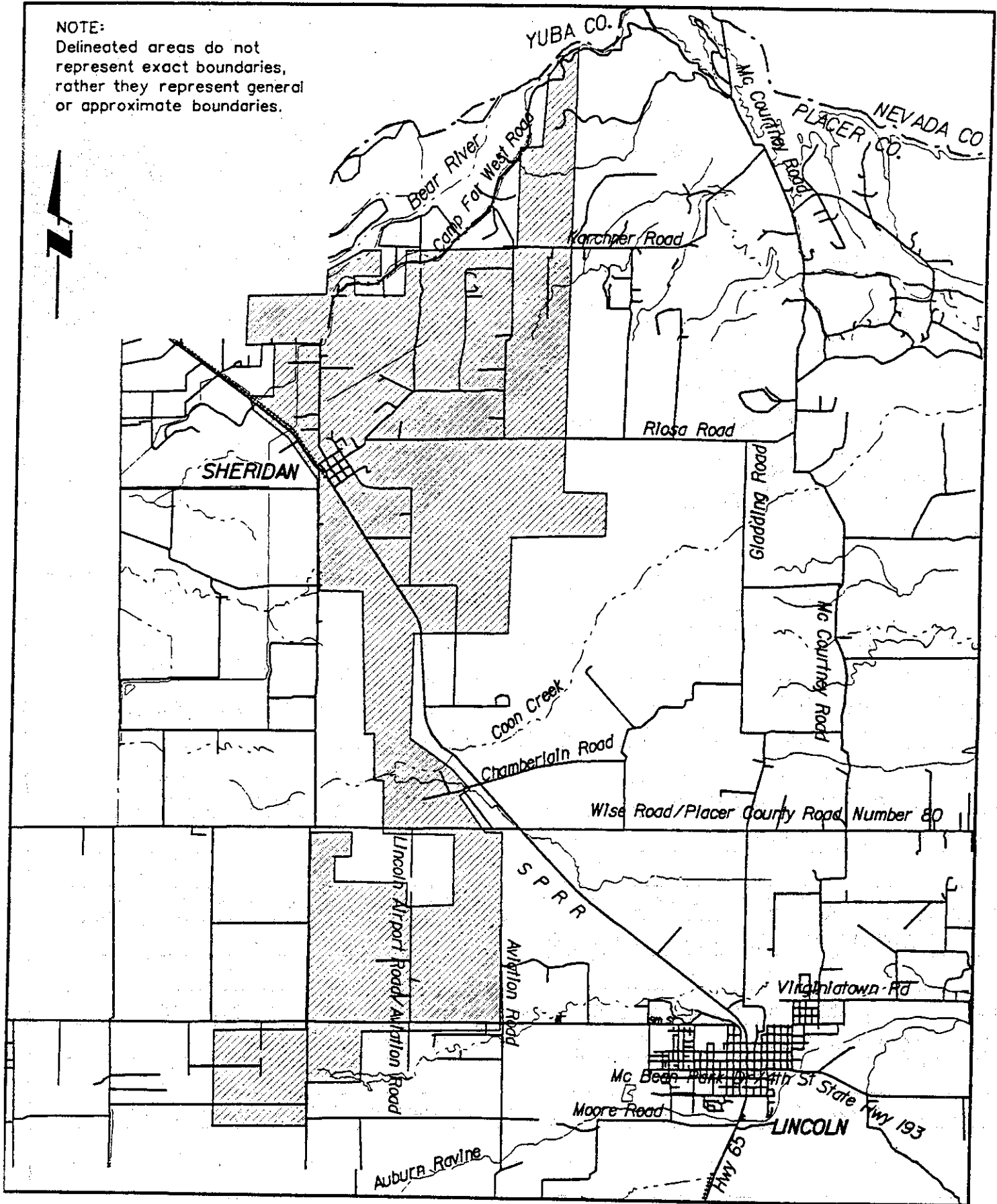
Transmission: THE DISTRIBUTION SYSTEM CONSISTS PRIMARILY OF ASBESTOS CEMENT PIPE RANGING IN SIZE FROM 4 TO 6 INCHES.

Treatment: WELL *2 HAS EQUIPMENT ENABLING CHLORINATION TO BE PROVIDED TO THE SYSTEM. ALTHOUGH DISINFECTION IS NOT CONTINUALLY PRACTICED.

Storage: BOTH WELLS ARE EQUIPPED WITH A 5000 GALLON HYDROPNEUMATIC TANK.

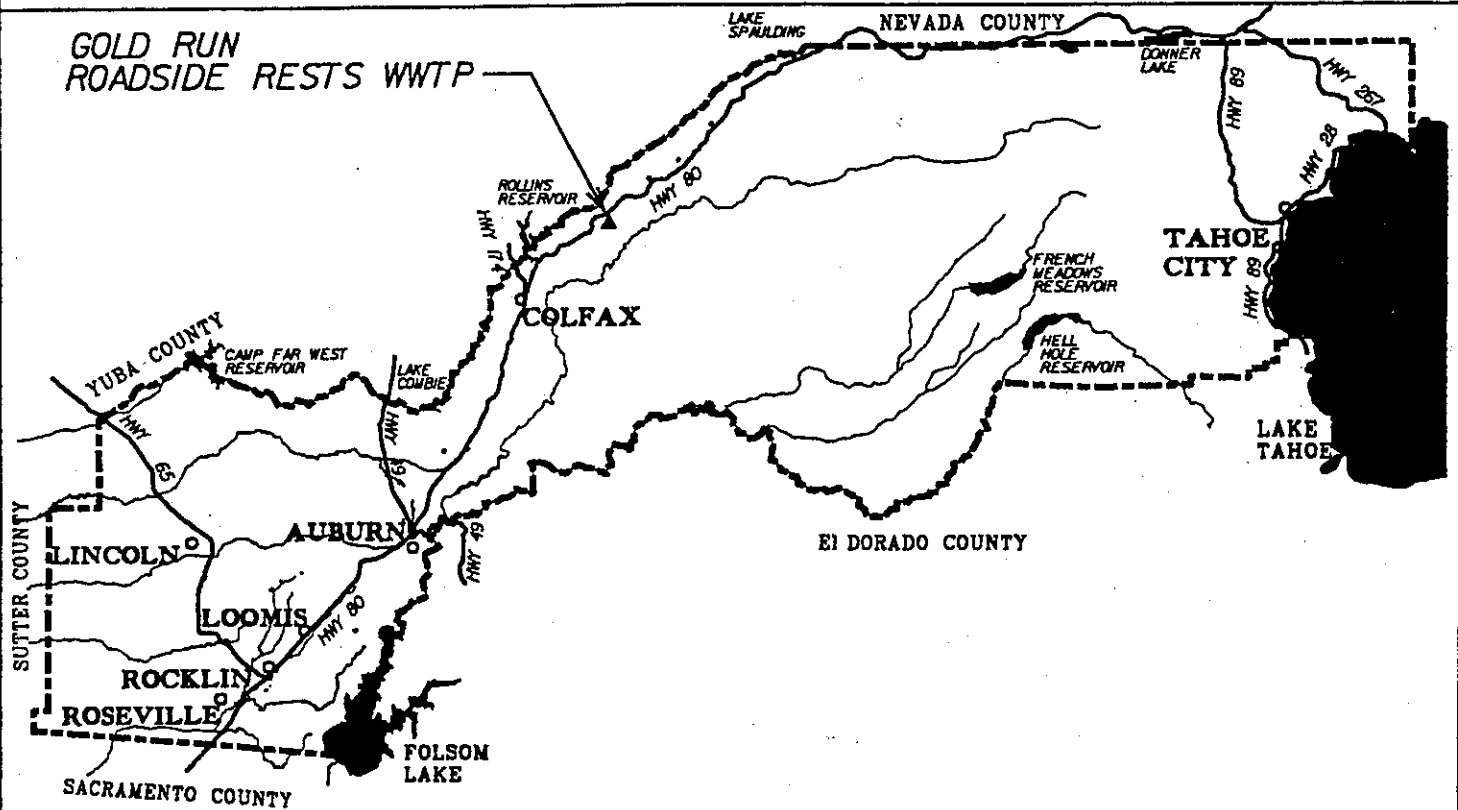
Capacity Limitations: ONE AREA OF ONGOING CONCERN IS THAT SEWER AND WATER MAINS ARE PLACED IN A COMMON TRENCH.

NOTE:
Delineated areas do not
represent exact boundaries,
rather they represent general
or approximate boundaries.



PLACER COUNTY SERVICE AREA ZONE #28 Sheridan Water Service Area

PLACER COUNTY WASTEWATER SYSTEMS



System Name: DEPT.OF TRANSPORTATION - GOLD RUN ROADSIDE RESTS WWTP

Address: HWY 80, GOLD RUN, CA

Contact Name: RICHARD SANNAR Phone: (916)-741-4295

Service Area Size: _____ No. Connect.: 2 Population Served: VARIES

Services Provided: WASTEWATER COLLECTION, TREATMENT AND DISPOSAL.

Summary System Description

Service Area Characteristics: ROADSIDE REST AREAS ON BOTH THE EASTBOUND AND WESTBOUND SIDES OF HWY 80 ARE SERVED BY THE SINGLE WASTEWATER FACILITIES. SIERRA NEVADA MOUNTAIN, WOODED TERRAIN.

Collection: WASTEWATER GENERATED BY RESTROOM FACILITIES ON BOTH SIDES OF THE HIGHWAY ARE COLLECTED AND CONVEYED TO THE WASTEWATER TREATMENT FACILITIES. HOOKUPS FOR RECREATIONAL VEHICLES TO DUMP ARE ALSO PROVIDED.

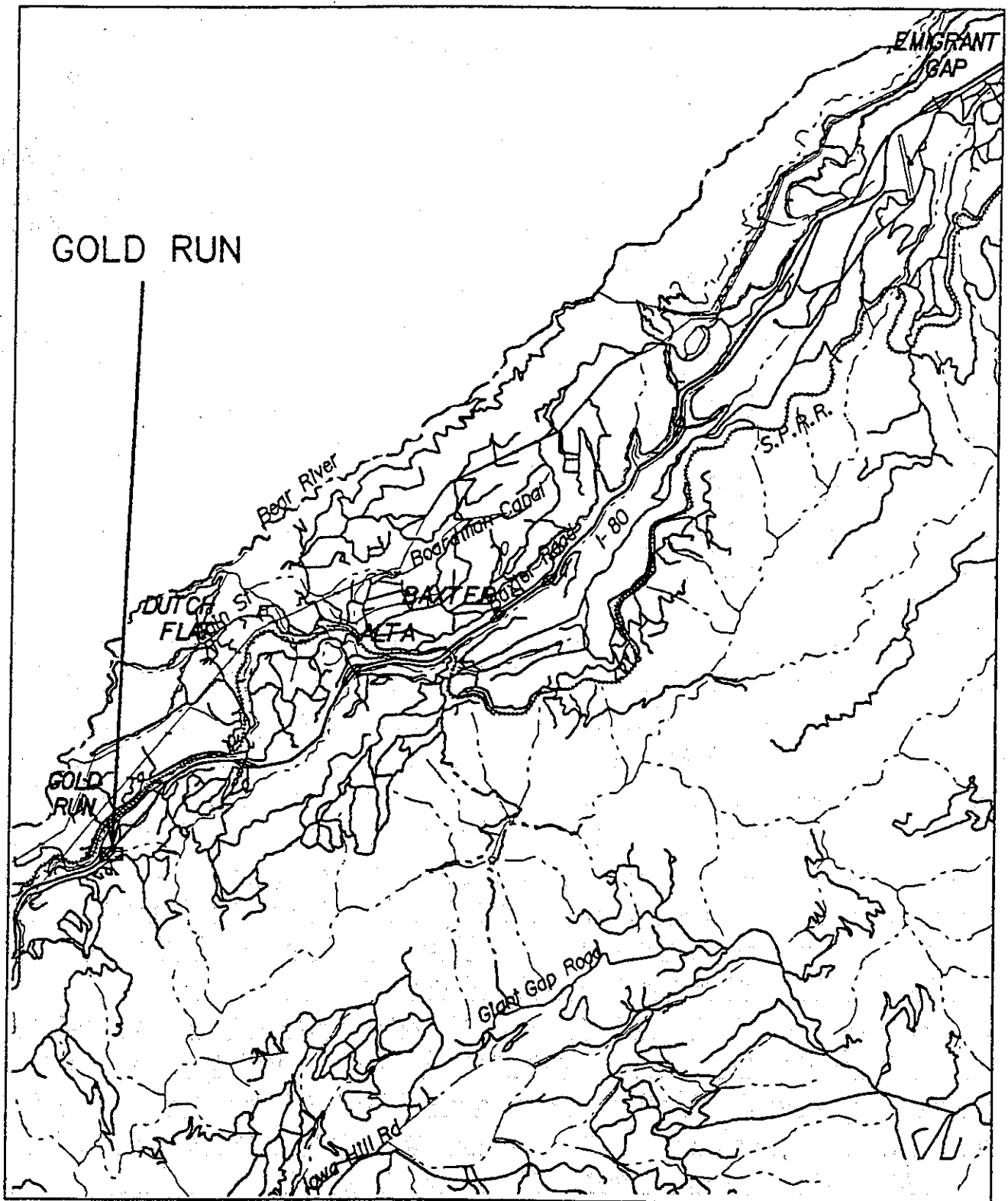
Treatment: PROVIDED BY SEPTIC TANKS, A STABILIZATION POND, A LEACHFIELD AND AN IRRIGATION SYSTEM. SPRAY EFFLUENT IS CHLORINATED.

Disposal: SPRAY IRRIGATION IS USED IN THE SUMMER MONTHS.

WINTER DISPOSAL IS TO A SUBSURFACE LEACHFIELD.

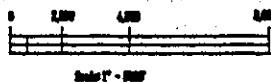
LEACHFIELD.

Capacity Limitations: MAXIMUM PERMITTED DISPOSAL OF 41,000 GPD.



Placer County General Plan

Figure — Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Streets
Waterways

Department of
Transportation-Gold Run

County Line
District Service Area

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

PCWA ALTA SYSTEM PUBLIC WATER SYSTEM

Agency Overview: The PCWA Alta System is situated on a ridge between the Bear River and the North Fork of the American River. The service area is located about 30 miles northeast of Auburn extending along the north side of Interstate 80. Service area elevations range from 3,300 to 4,100 feet. PG&E first applied for a domestic water supply permit in 1960 to serve the community of Alta. The Placer County Water Agency purchased the water system in 1985 extending the system to serve the Dutch Flat Terrace area, west of Alta.

Connection fees are assessed for connecting into an existing water service and new developments at \$3,418/lot plus \$125/lot for meter cost. Residential meters are generally 5/8" and are charged a flat rate of \$11.10/bi-monthly plus water usage @ \$0.453/100 cu.ft.

Source Information: Lake Spaulding is raw water source for the PCWA Alta System. PG&E's Towle Canal supplies the Alta Forebay, an impoundment with a capacity of 37.5 acre-feet. The Lake Spaulding watershed covers 225 square miles of the western slopes of the Sierra Nevada including Interstate 80, runoff from which is to contribute intermittent significant pollution.

Primary Transmission and Distribution: The distribution system consists of 4 and 6-inch steel pipe. Water pressures range from 20 to 250 psi within the service area.

Storage: A 100,000 gallon redwood clearwell, situated uphill from the treatment plant, provides gravity storage to the area.

Treatment: Water from Alta Forebay is pumped by a 5 hp pump through a 6-inch pipeline at a rate of 300 gpm. Chlorine and a sodium hypochlorite solution is injected prior to filtration. Three vertical pressure sand and anthracite dual media filters produce a maximum of 300 gpm.

The PCWA Alta System treatment plant is not equipped with pretreatment processes.

Chlorine residuals, turbidity levels, and pH are tested routinely.

1990 System Production: The PCWA Alta System serves an estimated population of 1,450 through 217 metered service connections. Except for 14 commercial connections, water consumption is necessarily restricted to household use.

PCWA Alta produced a maximum daily water supply of 378,600 gallons, a maximum monthly supply of 8,366 million gallons, and an annual total of 84.132 million gallons in 1990. The plant has a rated capacity of 430,000 gpd.

Deficiencies and Limitations: The PCWA Alta plant is not yet equipped to treat high influent turbidity. The plant is unattended and not equipped with automatic chemical dosage adjustment or shutdown mechanisms.

Chlorine contact time is considered inadequate.

The distribution pipelines do not have limited capacity for irrigation and fire protection and suffer substantial leaking.

Existing Planned Improvements: The current revision of the Surface Water Treatment Regulations (SWTR) will require that the PCWA Alta System submit an engineering report demonstrating that the existing plant, without pretreatment processes, can reliably produce water that meets new specific performance fundamentals. If water produced by the existing treatment operation fails to meet the requirements, provision of pretreatment processes such as rapid mixing, coagulation, flocculation, and sedimentation may become necessary. These processes will prevent excessive turbidity in treated water during periods of elevated turbidity and giardia contamination.

The Department of Health Services instructed PCWA Alta to provide an alarm signal, transmitted to an operator on a 24-hour basis, indicating high influent turbidity levels. This improvement is expected to be complete during mid-1992.

System Appraisal: The PCWA Alta System, which experiences a typical growth of 5 new connections each year, is currently at capacity, mainly due to substantial leaks in old pipe. Planned treatment plant expansion activities, assimilating the new SWTR's, include enlargement of filtration capacity and implementation of alarm instrumentation. A 1 mgd package water treatment plant will be transferred from the PCWA Bowman System to facilitate the Alta system about 1994 or 1995.

PCWA COLFAX SYSTEM PUBLIC WATER SYSTEM

District Overview: The City of Colfax is located 15 miles northeast of Auburn along Interstate 80.

Placer County Water Agency purchased the Colfax water system from PG&E in 1985. The treatment plant was constructed in 1970.

Connection fees are assessed for connecting into an existing water service and new developments at \$3,418/lot plus \$125/lot for meter cost. Residential meters are generally 5/8" and are charged a flat rate of \$11.10/bi-monthly plus water usage @ \$0.453/100 cu.ft.

Source Information: The PCWA Colfax System derives water from the Boardman Canal. The Boardman Canal diverts water from Jackson Meadows Reservoir, Bowman Reservoir, Lake Fordyce, and Lake Spaulding.

Primary Transmission and Distribution: Water flows by gravity from the Boardman Canal to the PCWA Colfax water treatment plant through a 14-inch diameter, 5,500 foot PVC transmission line. Distribution mains consists primarily of asbestos cement pipe ranging from 2.5 to 6-inches in diameter. The gravity supplied service area contains five pressure zones, between 40 and 100 psi. Elevations range from 2,400 to 2,550 feet.

Storage: Treated water is pumped to three tanks providing a combined storage capacity of 1.9 million gallons.

Treatment: Water supply is given complete treatment at the PCWA Colfax water treatment plant. Unit processes consist of chlorination, coagulation, flocculation, sedimentation, filtration, and corrosion control and produce a maximum of 1.3 mgd. Operators make daily adjustments to the chemical doses and check the equipment.

1990 System Production: The PCWA Colfax System serves an estimated population of 2,900 through 1,050 total service connections, including some 658 metered residential customers. The plant produced a maximum daily water supply of 1.274 million gallons, a maximum monthly supply of 24.351 million gallons, and an annual total of 169.656 million gallons in 1990.

Deficiencies and Limitations: Runoff from the Boardman Canal watershed is suspected by the Department of Health Services to contribute intermittent significant contamination. Some 100 residences with on-site sewage disposal systems are located above the canal between Colfax and Alta. A tributary area to the canal above Alta is used for cattle grazing, logging, and recreation. Additionally, the canal, whose course is parallel to Interstate 80 and near a Southern Pacific Railroad line, is subject to traffic pollution, including fuel and chemical spills. The Surface Water Treatment Regulations (SWTR's) specify unit process limitations having ramifications on the rated capacity.

Existing Planned Improvements: Treatment plant improvements stipulated by the SWTR's include construction of a clearwell and a backwash basin and installation of a recording turbidimeter for each filter. PCWA is currently analyzing these improvements and proposing adjustments. Rapid turbidity fluctuations, due to suspect quality of watershed runoff, are common at the PCWA Colfax plant. The SWTR's mandate a sanitary survey of the watershed area every five years which is required for all PCWA treatment plants. A proposed commuter train project, which is expected to increase the Colfax residential

population, will make water service a critical issue. Both the treatment plant and distribution system are currently at capacity.

System Appraisal: The PCWA Colfax System provides complete water treatment. Runoff from the Boardman Canal watershed is of adverse quality, making automobile and agricultural wastes a regular treatment consideration. These types of chemical hazards are not addressed by the SWTR's. Regulations for these items require plant shutdown. The SWTR's mandate improvements and specify limitations on unit processes which accords negative implications on the present rated capacity. Expansion planning is an immediate concern, particularly since the plant is at capacity and a population boom is expected in Colfax with the advent of a commuter train.

PCWA MONTE VISTA SYSTEM

District Overview: The PCWA Monte Vista service area is located about 30 miles northeast of Auburn on a ridge between the Bear River and the North Fork of the American River. The service area includes a mobile home park, a California Highway Patrol station, and two restaurants. Elevations in the service area vary from 3,200 to 3,440 feet.

Connection fees are assessed for connecting into an existing water service and new developments at \$3,418/lot plus \$125/lot for meter cost. Residential meters are generally 5/8" and are charged a flat rate of \$11.10/bi-monthly plus water usage @ \$0.453/100 cu.ft.

Source Information: The PCWA Monte Vista System derives water from a well, which produces a maximum of 7 gpm, and a canal. The Boardman Canal diverts water from the Bear River about two miles from Lake Spaulding.

Primary Transmission and Distribution: The distribution system consists of 6-inch steel pipe. Water pressures range from 20 to 85 psi in the service area.

Storage: A 60,000 gallon redwood clearwell, located uphill from the treatment plant, provides gravity storage to the subdivision.

Treatment: The PCWA Monte Vista System acquired the existing PG&E water treatment plant in 1988. The plant, originally constructed in the 1940's, provides chlorination and pressure sand filtration processes as well as the addition of chemical coagulation and disinfection solutions. However, the plant is not equipped with pretreatment sedimentation capability. The plant has a rated capacity of 68 gpm.

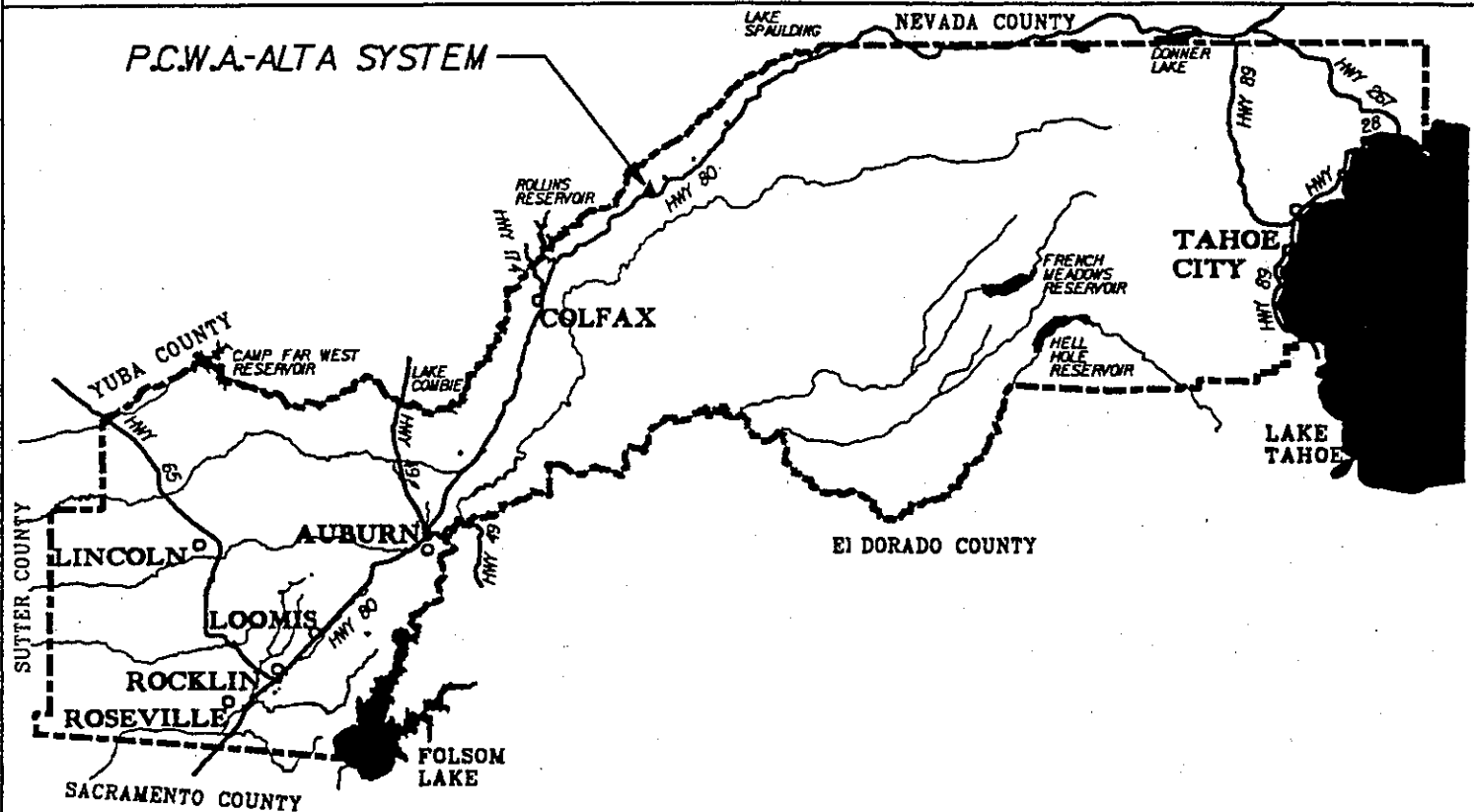
1990 System Production: The PCWA Monte Vista System serves an estimated population of 250 through 13 metered service connections. Water consumption is necessarily restricted to household use. PCWA Monte Vista produced a maximum daily water supply of 51,163 gallons, a maximum monthly supply of 0.749 million gallons, and an annual total of 6.984 million gallons in 1990.

Deficiencies and Limitations: The condition of the distribution system warrants substantial repair. The filtration plant is very old and lacks current facilities found on newer plants.

Existing Planned Improvement: The current revision of the Surface Water Treatment Regulations (SWTR) will require that the PCWA Monte Vista System submit an engineering report demonstrating that the existing plant, without pretreatment processes, can reliably produce water that meets new specific performance fundamentals. If water produced by the existing treatment operation fails to meet the requirements, provision of pretreatment processes such as rapid mixing, coagulation, flocculation, and sedimentation will become necessary. These processes will prevent overloading of the filters during periods of elevated turbidity and giardia contamination.

System Appraisal: Expansion and upgrade of the PCWA Monte Vista System to meet increased water demand and the SWTR's is under consideration. The plant is in good working order, and with retrofits should be able to continue serving its present demands. The Monte Vista area experiences relatively few new connections each year due to large lot zoning implementations.

PLACER COUNTY WATER SYSTEMS



System Name: P.C.W.A.- ALTA SYSTEM

Address: P.O. BOX 6570, AUBURN, CA 95604

Contact Name: EINAR MAISCH Phone: (916)-823-4850

Service Area Size: No. Connect.: 27 Population Served: 1450

Services Provided: SERVICE PROVIDED PRIMARILY TO RESIDENTIAL W/SOME COMMERCIAL

Summary System Description

Source: THE ALTA SYSTEM IS SUPPLIED BY THE ALTA FOREBAY, FED BY THE TOWLE CANAL, FED BY LAKE SPAULDING.

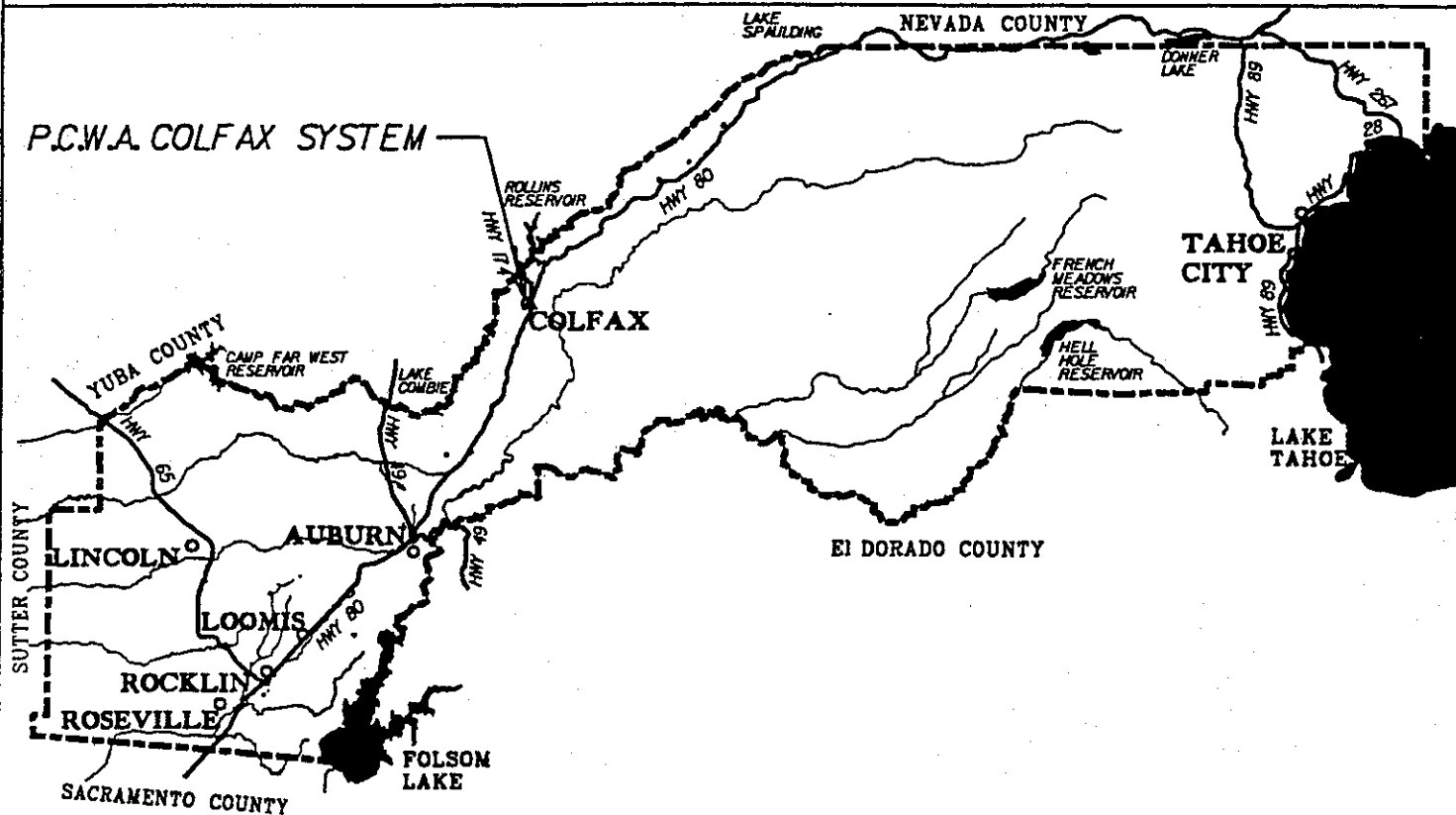
Transmission: THE DISTRIBUTION SYSTEM CONSISTS OF 4 INCH AND 6 INCH STEEL PIPE.

Treatment: TREATMENT CONSISTS OF DISINFECTION FOLLOWED BY PRESSURE FILTERS.

Storage: A 100,000 GALLON REDWOOD CLEARWELL PROVIDES GRAVITY STORAGE TO THE SYSTEM.

Capacity Limitations: THE TREATMENT PLANT IS OLD AND LACKS ABILITY TO EFFECTIVELY TREAT HIGH INFLUENT TURBIDITY, NOR IS THE TREATMENT PLANT EQUIPPED WITH AUTOMATIC CHEMICAL DOSAGE OR SHUTDOWN MECHANISMS.

PLACER COUNTY WATER SYSTEMS



System Name: P.C.W.A. COLFAX SYSTEM

Address: P.O. BOX 6570, AUBURN, CA 95604

Contact Name: EINAR MAISCH Phone: (916)-823-4850

Service Area Size: No. Connections: 1050 Population Served: 2900

Services Provided: RESIDENTIAL AND COMMERCIAL SERVICES

Summary System Description

Source: DERIVES WATER FROM P.G.&E. OWNED BOARDMAN CANAL WHICH IS FED BY LAKE SPAULDING.

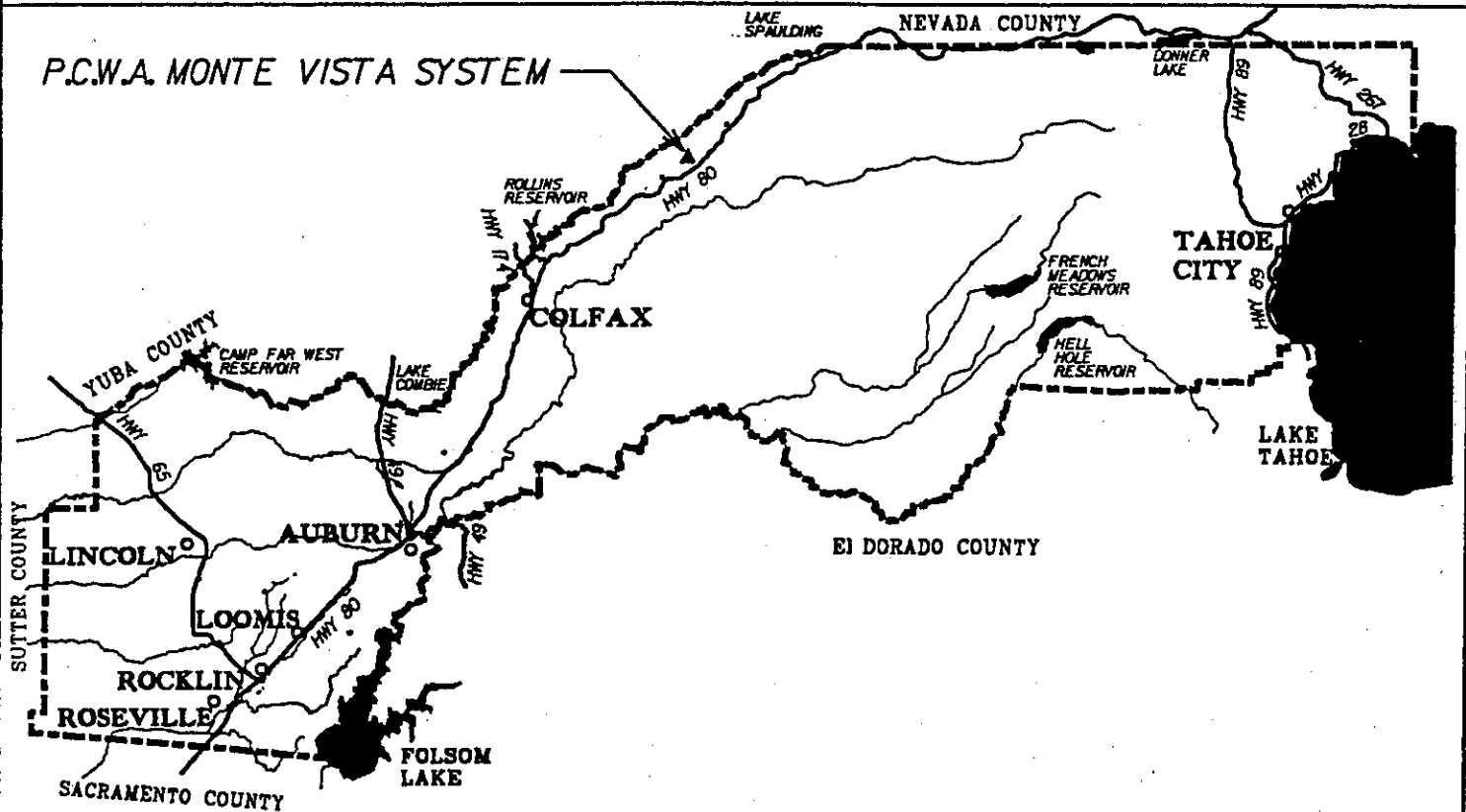
Transmission: WATER FLOWS BY GRAVITY FROM THE BOARDMAN CANAL TO THE WATER TREATMENT PLANT THROUGH A 14 INCH DIAMETER, 5,500 FT PVC PIPELINE.

Treatment: WATER SUPPLY IS GIVEN FULL CONVENTIONAL TREATMENT AT THE TREATMENT PLANT.

Storage: TREATED WATER IS PUMPED TO THREE TANKS PROVIDING A COMBINED STORAGE OF 19 MILLION GALLONS.

Capacity Limitations: THE SURFACE WATER TREATMENT REGULATIONS SPECIFY UNIT PROCESS LIMITATIONS WHICH REDUCE THE RATED CAPACITY OF THE FILTERATION PROCESS.

PLACER COUNTY WATER SYSTEMS



System Name: P.C.W.A. MONTE VISTA SYSTEM

Address: P.O. BOX 6570, AUBURN, CA 95604

Contact Name: EINAR MAISCH Phone: (916) 823-4850

Service Area Size: _____ No. Connect.: 13 Population Served: 250

Services Provided: RESIDENTIAL CONNECTIONS ONLY

Summary System Description

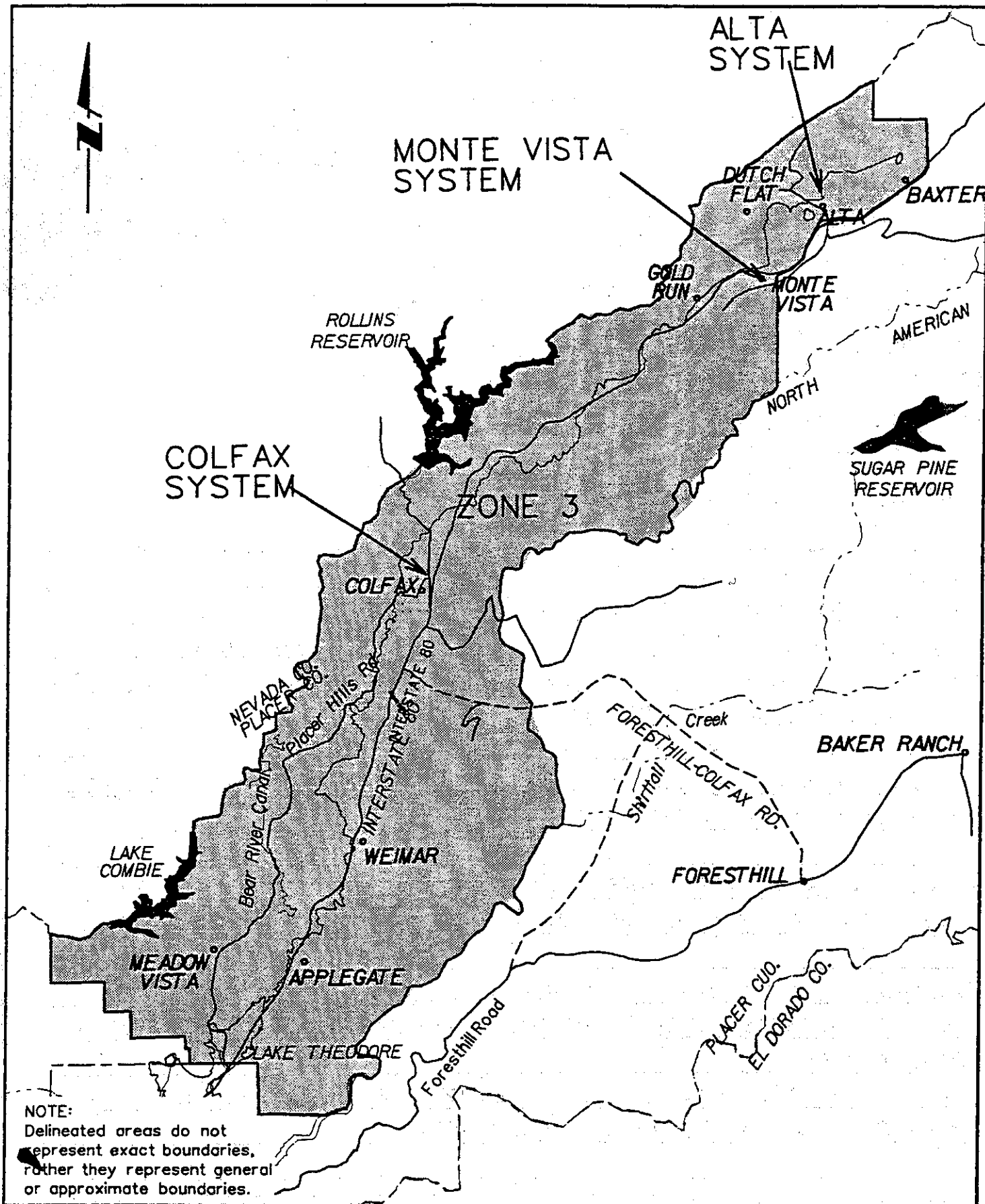
Source: THE MONTE VISTA SYSTEM DERIVES WATER FROM TWO SOURCES 1) A WELL PRODUCING 7 GPM AND 2) THE BOARDMAN CANAL.

Transmission: WATER IS TRANSMITTED TO THE WATER TREATMENT PLANT VIA A 6 IN., 10 FT. LONG PIPE. THE DISTRIBUTION SYSTEM CONSISTS OF 4 & 6 INCH PIPE.

Treatment: THE TREATMENT PLANT WAS PURCHASED FROM P.G. & E. IN 1988. THE PLANT WAS CONSTRUCTED IN THE 1940'S AND LACKS PRETREATMENT FACILITIES, RATED @ 68 GPM.

Storage: A 60,000 GALLON CLEARWELL LOCATED UPHILL FROM THE TREATMENT PLANT PROVIDES GRAVITY STORAGE TO THE SYSTEM.

Capacity Limitations: THE CONDITION OF THE DISTRIBUTION SYSTEM WARRANTS SUBSTANTIAL REPAIR. FILTERING PROCESSES AND LACK OF PRETREATMENT FACILITIES LIMITS THE TREATMENT PLANT RATING.



PLACER COUNTY WATER AGENCY Zone Three Water Service Areas

PCWA BIANCHI ESTATES SYSTEM PUBLIC WATER SYSTEM

District Overview: The PCWA Bianchi Estates System serves the residential subdivision Bianchi Estates No. 2. Water supply facilities and appurtenances were financed by the subdivision developer.

Current rate schedules for water service and connection within district boundaries are as follows:

Connection fees are assessed for connecting into an existing water service and new developments at \$3,418/lot plus \$125/lot for meter cost. Residential meters are generally 5/8" and are charged a flat rate of \$11.10/bi-monthly plus water usage @ \$0.453/100 cu.ft.

Source Information: PCWA Bianchi Estates has two approved groundwater sources: Well #1 providing approximately 550 gallons per minute and Well #2 providing approximately 500 gallons per minute.

Primary Transmission and Distribution: A 5 hp booster pump delivers water from the storage tank to a 5,000 gallon hydropneumatic pressure tank connected to the distribution system. A second booster pump is available for fire protection. The wells pump directly into the system.

Storage: A 120,000 gallon redwood storage tank is situated adjacent to the well pumps.

Treatment: Groundwater from the two wells is chlorinated as it enters the storage tank. Lime is added for pH adjustment.

1990 System Production: The PCWA Bianchi Estates System serves an estimated population of 135 through 46 metered service connections. PCWA Bianchi produced a maximum daily water supply of 488,000 gallons, a maximum monthly supply of 3.280 million gallons, and an annual total of 20.105 million gallons in 1990.

Deficiencies and Limitations: The Department of Health Services (DOHS), in a December 1989 inspection, found monitoring efforts not in compliance with Title 22 regulations. Sampling of each groundwater source for general mineral, general physical, and inorganic chemical composition must occur on three year intervals. Radiological monitoring of each source must be conducted every four years.

System Appraisal: The PCWA Bianchi Estates water system is considered by the DOHS competently operated and maintained and has adequate source supply. Long term plans indicate, however, that consolidation with the PCWA Foothill/Sunset System will streamline production.

PCWA BOWMAN/AUBURN

District Overview: The system currently operates under a permit issued in 1983. Under that permit significant changes to the PCWA system have taken place. One such change was interconnecting the Bowman water treatment plant with the Auburn water treatment plant. Because of this interconnection the two separate systems are considered to be one system functionally having two treatment plants.

The PCWA Bowman Water Treatment Plant was constructed in 1979 with a capacity of 5 MGD. Currently the plant is undergoing a 15 MGD expansion. The expansion is scheduled to come on line in the spring of 1995, and is anticipated to cost approximately 13.6 million dollars.

The PCWA Auburn Water Treatment Plant was constructed in the late 40's, having a capacity of 5 MGD. Because of the age of the plant a large amount of retro-fitting will be performed very soon resulting from implementation of the Surface Water Treatment Regulations.

Connection fees are assessed for connecting into an existing water service and new developments at \$3,418/lot plus \$125/lot for meter cost. Residential meters are generally 5/8" and are charged a flat rate of \$11.10/bi-monthly plus water usage @ \$0.453/100 cu.ft.

Source Information: The overall source of water to the Bowman/Auburn System, as to all PCWA's water systems is from PG&E's Boardman Canal, originating in Lake Spaulding.

Direct raw water supply to the Bowman treatment plant comes from a series of diversions from the Boardman Canal. Water is first diverted from the Boardman Canal to the Bear River Canal, then just prior to Halsey Forebay water is again diverted from the Bear River Canal to the Bowman Canal.

Direct raw water supply to the Auburn treatment plant just down stream of the Bowman plant is diverted directly from the Boardman Canal.

Primary Transmission and Distribution: The entire system is gravity based, including all distribution systems. Several pressure reduction stations account for the vast change in elevation between the 3 Placer county service zones. Primary transmission of water to the system takes place through a series of canals owned and operated by PG&E. The transmission begins in Lake Spaulding and enters the Drum Canal. The Drum Canal turns into the Towle Canal in the Alta Area and following the Alta Power House becomes the Cedar Canal. Once intersecting Interstate 80 around the Dutch Flat area canal again changes to become the Boardman Canal. A map and schematic provided will help in understanding the complex canal system.

The distribution system directly affiliated to the Bowman Plant is reportedly in good condition, and of adequate size to handle the additional 15 MGD expansion.

The distribution system directly affiliated with the Auburn System is reportedly at capacity. Further development will require additional upgrade to the pipes in order to accommodate adequate supply.

Due to the geographic location of the Bowman plant upstream of the Auburn plant, it is possible that during an emergency shut down of the Auburn Plant that the Bowman Plant will be able to provide service to the Auburn Plant area. However, the reverse is not true due to inadequate pumping facilities located near the Auburn Plant.

Storage: The entire system has a total storage capacity of 3 million gallons, with a 10 million gallon reservoir completed in December 1991. The Bowman plant has a million gallons of clear well capacity. The remainder of storage occurs within a one million gallon steel tank located at Channel Hill and a one million gallon steel tank along Bell Road.

Treatment: The existing Bowman Water Treatment Plant has a rated capacity of 5 MGD. Peak hour water system demands exceed this capacity during periods of high usage. Resulting from the necessity to increase the capacity of the water treatment facility State Safe Drinking Water Bond Law funds were issued to construct a 15 MGD expansion to the treatment plant. The existing 5 MGD treatment plants provide treatment including a mixing chamber, flocculation, settling basins, and dual media gravity filters, with the ability for disinfection.

The adopted Surface Water Treatment Regulations when, implemented in 1993, will effect the PCWA Auburn/Bowman System. Retrofits are underway to the existing 5 MGD water treatment plants will not meet the regulations. Only minor modifications are required for the Bowman plant.

1990 System Production: According to the 1991 annual report the system had a total of 7,645 connections, serving a population of approximately 11,000. The maximum day demand recorded for the Bowman plant was 5.849 million gallons, and for the Auburn plant was 4.948 million gallons. Month of maximum water use for the system was August. Connections for the system are outlined below.

Type of Connection	Metered	Flat Rate	Total
General and Residential	6,216	88	6,304
Commercial	696	8	704
Industrial	1	-	1
Agricultural (Raw Water)	121	514	635
Other Water Utilities	1	-	1
Total	7,035	610	7,645

Deficiencies and Limitations: Given the existing condition of the water system, treatment plants and distribution systems, the only major deficiency lies with the Auburn distribution system reaching capacity and modifications to the treatment plant, and expansion of the Bowman facility. Implementation of the Surface Water Treatment Regulations should not be a limitation to the systems existing treatment plants.

Other underlying limitations to the system include location and maintenance and operation of the canal system. The canals are primarily located next to roadways such as Interstate 80 subjecting them to contamination from car accidents and spills. Recreation is also a primary source of contamination throughout the canal system. Since operation and maintenance are performed by PG&E, the canal system is shut down for a three week period for cleaning and maintenance, which puts a strain on the system supply.

Existing Planned Improvements: As previously stated the Bowman area is undergoing a 15 MGD expansion project to the treatment plant. As the Auburn plant nears its peak capacity, the Bowman plant already exceeds its capacity. The 15 MGD expansion will enable service both systems. With treatment plant expansion, additional storage of 10 million gallons is also completed, offering some relief for the deficient treatment plant capacity.

Expansion construction is currently underway, however a 2 MGD "package" treatment plant was purchased and added to the Bowman facility until the expansion is completed. The 1 MGD "package" treatment

plant is then planned for shipment to serve the Alta Area, and a 1 MGD plant transferred to the Colfax system.

System Appraisal: In general, existing pipeline are quite old, although water delivered meets current regulatory standards mandatory implementation of the Surface Water Treatment Regulations are in effect in 1993, some retrofitting is expected. Turbidity spikes during high intensity storms occur with the existing treatment plants. Increased human activity throughout the county has greatly increased contamination possibilities both within the water sheds and the canal system.

Due to lack of capacity for the entire system a 15 MGD treatment plant expansion is underway, however a 2 MGD "package" treatment plant has been purchased for service until the 15 MGD expansion comes on-line. Concerted efforts are underway to identify and correct or add retrofits to the existing 5 MGD plants.

PCWA FOOTHILL/SUNSET WATER SYSTEM

District Overview: Placer County Water Agency has recently filed a permit combining the Foothill and Sunset service areas. The systems are already intertied and will be referred to hereinafter as the Foothill System.

The Foothill system is comprised of three water treatment plants, the new Foothill Treatment Plant, the old Foothill Treatment Plant, and the Sunset Treatment plant. The old Foothill Treatment Plant was constructed in 1979. The Sunset Treatment Plant was constructed in the late 1940's. Construction of the new Foothill Treatment Plant was completed recently.

Expansion of the Foothill Treatment Plant and completion of the Rock Crest Pipeline enabled PCWA to absorb other systems within their jurisdiction, thus simplifying and reducing their workload. Significant other systems now serviced by the Foothill System is Los Logos, Lakeshore Estates. Foothill system also now serves two other systems which are not under their jurisdiction, Hidden Valley Community Association, and Lakeview Hills Community Association subdivisions.

Presently the two Foothill Water Treatment Plants are capable of serving the entire combined Foothill System, except for the City of Lincoln.

Connection fees are assessed for connecting into an existing water service and new developments at \$3,418/lot plus \$125/lot for meter cost. Residential meters are generally 5/8" and are charged a flat rate of \$11.10/bi-monthly plus water usage @ \$0.453/100 cu.ft.

Source Information: The Foothill system draws water from two locations. PG&E's South Canal is the main source utilizing the Boardman Canal as a secondary source. The Sunset Treatment Plant draws water from Whitney Reservoir, supplied by the Caperton Canal.

Storage: Storage consist for the Foothill System is outlined below:

Reservoir Name/Location	Capacity	Material
Foothill WTP	10 MG/1 MG	Steel/concrete
Penryn	1 MG/0.05 MG	Steel/Redwood
Loomis	0.2 MG-elev	Steel
Rocklin	1 MG	Steel
Sierra Ridge	0.1 MG	Steel
Sierra Ridge Reservoir	0.14 MG	Hypalon Covered
Sunset WTP	2.5 MG-clearwell	Steel
Sunset/Whitney Ranch	3.0 MG	Steel
Stanford Ranch	2.5 MG	Steel

Treatment: The total combined plant capacities of all three water treatment plants is 33 MGD. Design flows for the plants are as follows: Sunset = 6 MGD, New Foothill = 15 MGD, Old Foothill = 12 MGD.

A great deal of modifications will be required to the Foothill systems water treatment plants in order to comply with the new Surface Water Treatment Regulations. A master plan is currently being developed for the Sunset System. The following table shows the capacities, filtration processes performed, and modification needs of each the treatment plants.

Treatment Plant	Capacity	Filtration Processes	Modifications Needs
Foothill WTP (New)	15 MGD	sedimentation, coagulation, flocculation, disinfection, filtration	Computer system
Foothill WTP (Old)	12 MGD	sedimentation, coagulation, flocculation, disinfection, filtration	Contact time
Sunset WTP	6 MGD	coagulation, disinfection, filtration	Mixing tank inoperable, contact time, need backwash capabilities

1990 System Production: According to the 1991 annual report the old Foothill Plant experienced max day demands of 12.402 million gallons. The Sunset Plant experienced max day demands of 5.567 million gallons. Both plants produced 2,422.433 and 926.235 million gallons respectively for the 1990 year. The Foothill Plant is responsible for 12554 active connections, 2590 of which are raw water agricultural connections. The Sunset Plant is responsible for 7 active connections, City of Lincoln being the primary service.

Deficiencies and Limitations: Many of the deficiencies and limitations lying within the two older water treatment plants are listed in the tabled information above. A limitation to the Sunset system is the capacity of the canal carrying raw water from South Canal to Whitney Reservoir. If current master planning calls for an expansion of the plant, the main transmission canal will also have to be enlarged.

Existing Planned Improvements: Existing planned improvements to the Foothill system include making modifications to the older treatment plants to meet the Surface Water Treatment Regulations. Depending of the outcome of the current master plan for the Sunset area, other improvements may be proposed in the near future which may significantly change the Foothill System.

Current plans include construction of a 36-inch pipeline from the Sunset Water Treatment Plant to Penryn. Once this pipeline is completed, then the City of Lincoln can also be served with the Foothill Water Treatment Plant.

Current plans are directed towards construction of a new 100 MGD plant over time to be constructed in another location along the Caperton Canal.

System Appraisal: The 15 MGD plant expansion helped to improve the water treatment and production situation in several areas within PCWA's jurisdiction. The expansion by no means alleviates current problems of treatment with the other two older yet necessary treatment plants. Capacity limitations may inhibit further growth within the area until further upgrades of both treatment plants and primary transmission systems are resolved.

PCWA LOS LAGOS SYSTEM PUBLIC WATER SYSTEM

District Overview: The PCWA Los Lagos System was recently incorporated into the PCWA Foothill/Sunset System.

Current rate schedules for water service and connection within district boundaries are as follows:

Connection fees are assessed for connecting into an existing water service and new developments \$3,418/lot plus \$125/lot for meter cost. Residential meters are generally 5/8" and are charged a flat rate of \$11.10/bi-monthly plus water usage @ \$0.453/100 cu.ft.

Source Information: Before assimilation with the PCWA Foothill/Sunset System, PCWA Los Lagos was supplied solely by water purchased from the San Juan Suburban Water District. San Juan SWD diverts their supply from Folsom Lake.

Primary Transmission and Distribution: The distribution system consists solely of asbestos cement pipe in sizes ranging from 8 to 14 inches in diameter.

The distribution system contains two pressure zones. Upper zone water pressures, regulated by a storage tank, vary from 55 to 65 psi. Lower zone pressure, supplied by a booster station equipped with three pumps, range from 85 to 95 psi. A 5,000 gallon hydropneumatic tank moderates fluctuations within the lower zone pressures.

Storage: A 0.6 million gallon steel tank provides storage for the PCWA Los Lagos System.

Treatment: San Juan SWD provides full conventional treatment. PCWA regularly obtains water quality reports from San Juan SWD and notifies their consumers.

1990 System Production: The PCWA Los Lagos System reported 131 total active connections in 1990. The calculated system demand is 82 gpm.

Deficiencies and Limitations: No significant deficiencies or limitations were discerned at the PCWA Los Lagos System.

Existing Planned Improvements: There are no existing planned improvements at PCWA Los Lagos System.

System Appraisal: PCWA Los Lagos System was recently incorporated into the PCWA Foothill/Sunset System. The Los Lagos subdivision is currently underway to achieve build-out. All facilities (piping) are in good shape.

PCWA NEWCASTLE SYSTEM PUBLIC WATER SYSTEM

District Overview: The PCWA Newcastle service area is located about 5 miles southwest of Auburn. Service area elevations vary from 800 to 1,300 feet.

Placer County Water Agency purchased the domestic water supply system serving Newcastle and Penryn from PG&E in October 1968.

Current rate schedules for water service and connection within district boundaries are as follows:

Connection fees are assessed for connecting into an existing water service and new developments at \$3,418/lot plus \$125/lot for meter cost. Residential meters are generally 5/8" and are charged a flat rate of \$11.10/bi-monthly plus water usage @ \$.453/100 cu.ft.

Source Information: The PCWA Newcastle System derives water from the Newcastle Canal, which is fed by the Boardman Canal. The Boardman Canal diverts water from the Bear River about two miles from Lake Spaulding. Runoff from Interstate 80, other roadways, and railroad lines is suspected by the Department of Health Services to cause a significant contamination hazard.

Primary Transmission and Distribution: The distribution system, supplied by the clearwell, has one pressure zone. System pressures range from 33 to 110 psi.

Storage: An uncovered 160,000 gallon clearwell provides storage for the PCWA Newcastle System. The clearwell is gunite lined.

Treatment: The PCWA Newcastle System, which was originally constructed in the 1940's, provides complete treatment. Treatment consists of clarification with internal flocculation, and dual media filters. Alum and chlorine are applied at the clarifier inlet and lime is added at the clearwell inlet for corrosion control. The plant's rated capacity is 330 gpm. The PCWA Newcastle plant is also equipped with a recording turbidimeter, portable generators, and an automatic shutoff switch activated by excessive effluent turbidity.

The plant has a rated capacity of 330 gpm.

1990 System Production: The Newcastle System serves an estimated population of 2,850 through 1,131 total service connections, including some 220 domestic customers.

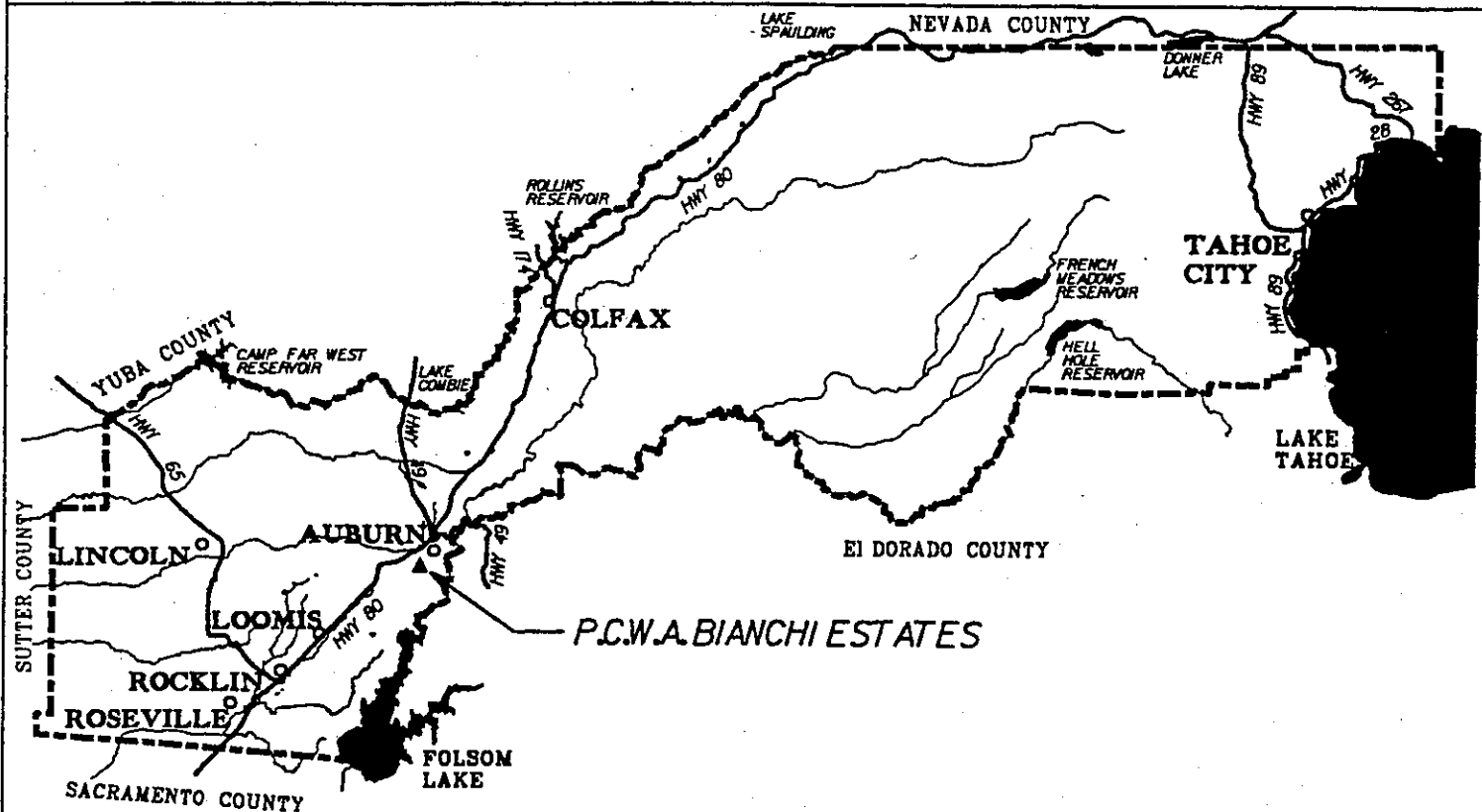
PCWA Newcastle produced a maximum daily water supply of 0.401 million gallons, a maximum monthly supply of 7.315 million gallons, and an annual total of 50.529 million gallons in 1990.

Deficiencies and Limitations: The condition of the distribution system warrants substantial repair, including to the chlorination facility, which is not equipped with failure alarms.

Existing Planned Improvements: PCWA has a signed contract with the Department of Water Resources to construct a pipeline from Auburn to Newcastle. Plans are to eliminate the Newcastle plant by 1994 or 1995. According to PCWA staff the Department of Health Services has approved this.

System Appraisal: The PCWA Water Systems Superintendent plans to abandon the Newcastle treatment plant. PCWA Newcastle System can be supplied either by gravity flow from PCWA Auburn or by pumping treated water from the PCWA Foothill System. The distribution system warrants some repairs.

PLACER COUNTY WATER SYSTEMS



System Name: P.C.W.A. BIANCHI ESTATES

Address: P.O. BOX 6570, AUBURN, CA 95604

Contact Name: EINAR MAISCH Phone: (916)-823-4850

Service Area Size: _____ No. Connect.: 46 Population Served: 135

Services Provided: ALL RESIDENTIAL

Summary System Description

Source: THE SYSTEM CURRENTLY HAS TWO WELLS PRODUCING 550 GPM AND 500 GPM.

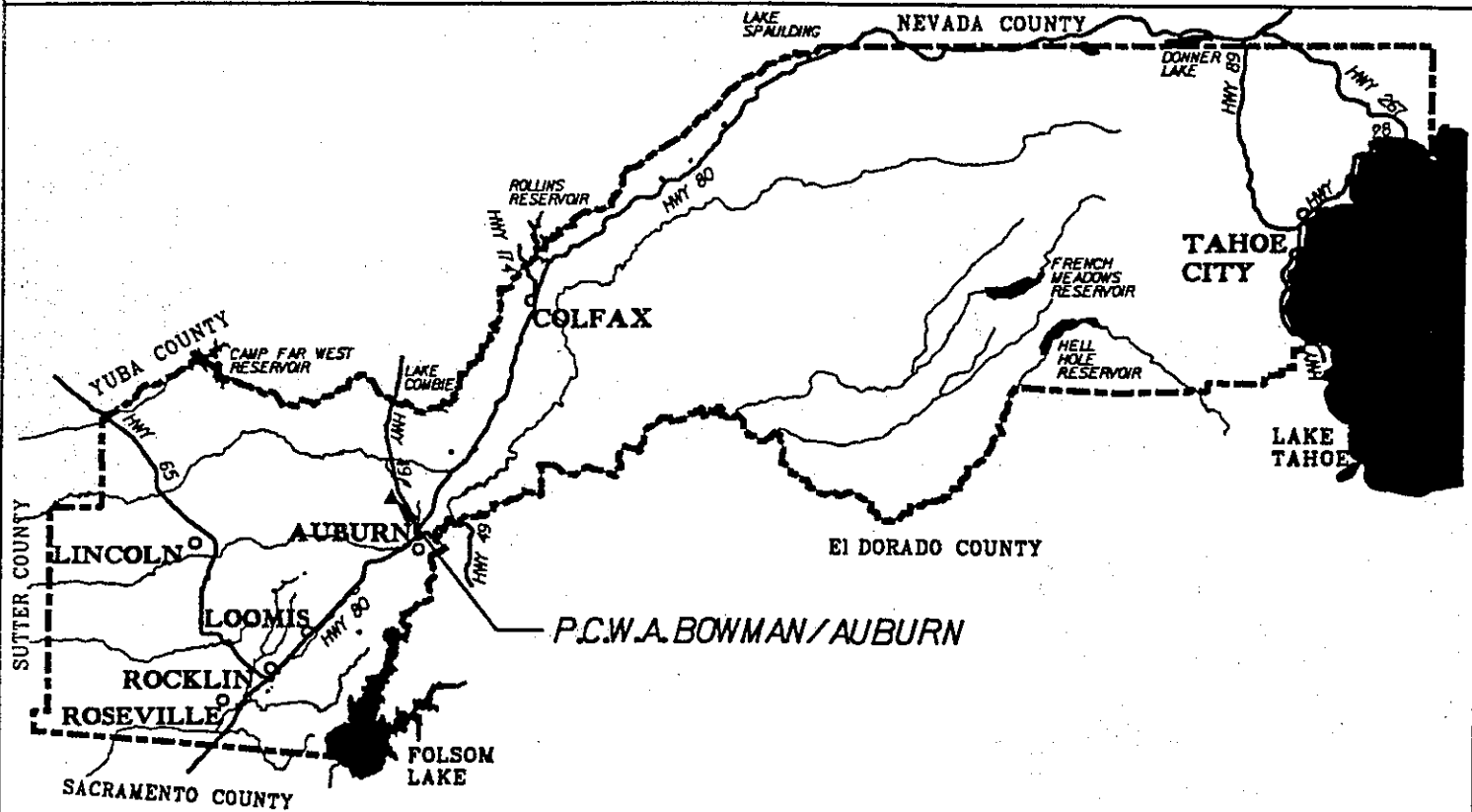
Transmission: A 5 H.P. BOOSTER PUMP DELIVERS WATER FROM THE STORAGE TANK TO A 5,000 GALLON HYDROPNEUMATIC VIA 8 INCH PIPELINE.

Treatment: DISINFECTION IS PROVIDED @ EACH WELL.

Storage: A 120,000 GALLON REDWOOD STORAGE TANK IS AVAILABLE TO SUPPLY THE HYDROPNEUMATIC TANK.

Capacity Limitations: THE SYSTEM IS SUFFICIENT HOWEVER LACKS BACK-UP POWER IN CASE OF AN EMERGENCY. FUTURE PLANS INCLUDE ABSORPTION OF THE BIANCHI SYSTEM WITHIN THE FOOTHILL SUNSET SYSTEM.

PLACER COUNTY WATER SYSTEMS



System Name: P.C.W.A. BOWMAN/AUBURN

Address: P.O. BOX 6570, AUBURN, CA 95604

Contact Name: EINAR MAISCH Phone: (916)-823-4850

Service Area Size: No. Connections: 7645 Population Served: 11,000

Services Provided: PRIMARILY RESIDENTIAL, COMMERCIAL AND AGRICULTURAL RAW WATER.

Summary System Description

Source: P.G. & E.'S BOARDMAN CANAL, ORIGINATING IN LAKE SPAULDING IS DIRECT SOURCE SUPPLY TO THE SYSTEM.

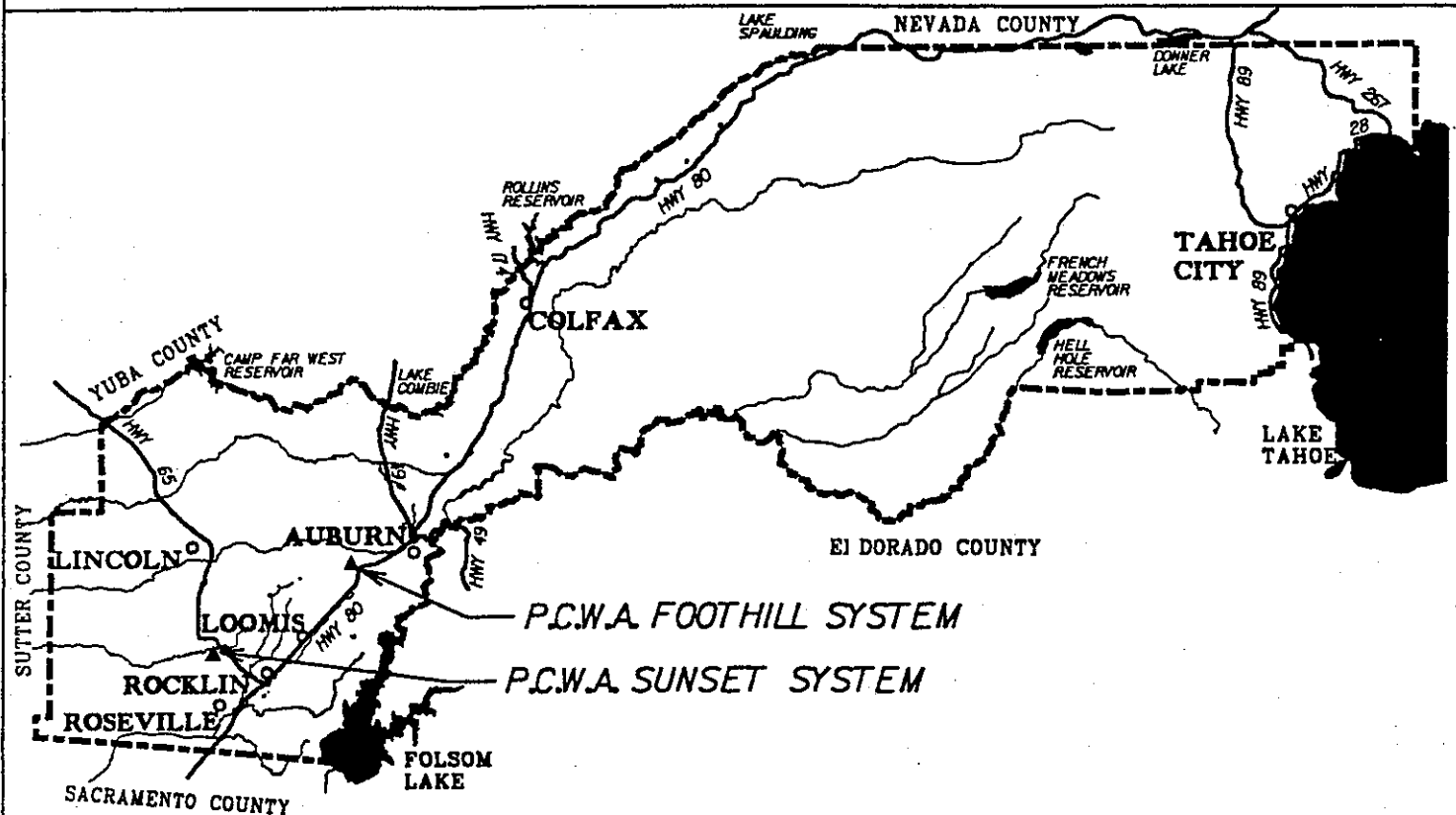
Transmission: WATER IS DRAWN FROM P.G. & E.'S BOARDMAN CANAL AND TRANSMITTED TO THE TREATMENT PLANTS.

Treatment: THE BOWMAN PLANT IS UNDER GOING A 15 MGD EXPANSION. THE EXPANSION WILL PROVIDE FULL CONVENTION TREATMENT. THE AUBURN PLANT IS RATED AT 5 MGD AND PROVIDES FULL CONVENTIONAL TREATMENT.

Storage: THE ENTIRE SYSTEM WILL SOON HAVE 13 MILLION GALLONS OF STORAGE AVAILABLE WITH COMPLETION OF A 10 MILLION GALLON STORAGE TANK.

Capacity Limitations: THE AUBURN DISTRIBUTION SYSTEM IS CURRENTLY OPERATING AT CAPACITY. ABILITY TO MEET SURFACE WATER TREATMENT REGULATIONS WITH EXISTING FACILITIES IS ALSO QUESTIONABLE. TURBIDITY SPIKES DURING STORMS ARE AN ONGOING CONCERN.

PLACER COUNTY WATER SYSTEMS



System Name: P.C.W.A. FOOTHILL/SUNSET WATER SYSTEM

Address: P.O. BOX 6570, AUBURN, CA 95604

Contact Name: EINAR MAISCH Phone: (916) 823-4850

Service Area Size: No. Connect.: 12554/7 Population Served:

Services Provided: RESIDENTIAL, COMMERCIAL AND AGRICULTURAL SERVICES

Summary System Description

Source: WATER FOR BOTH TREATMENT PLANTS IS DERIVED FROM THE BOARDMAN CANAL.

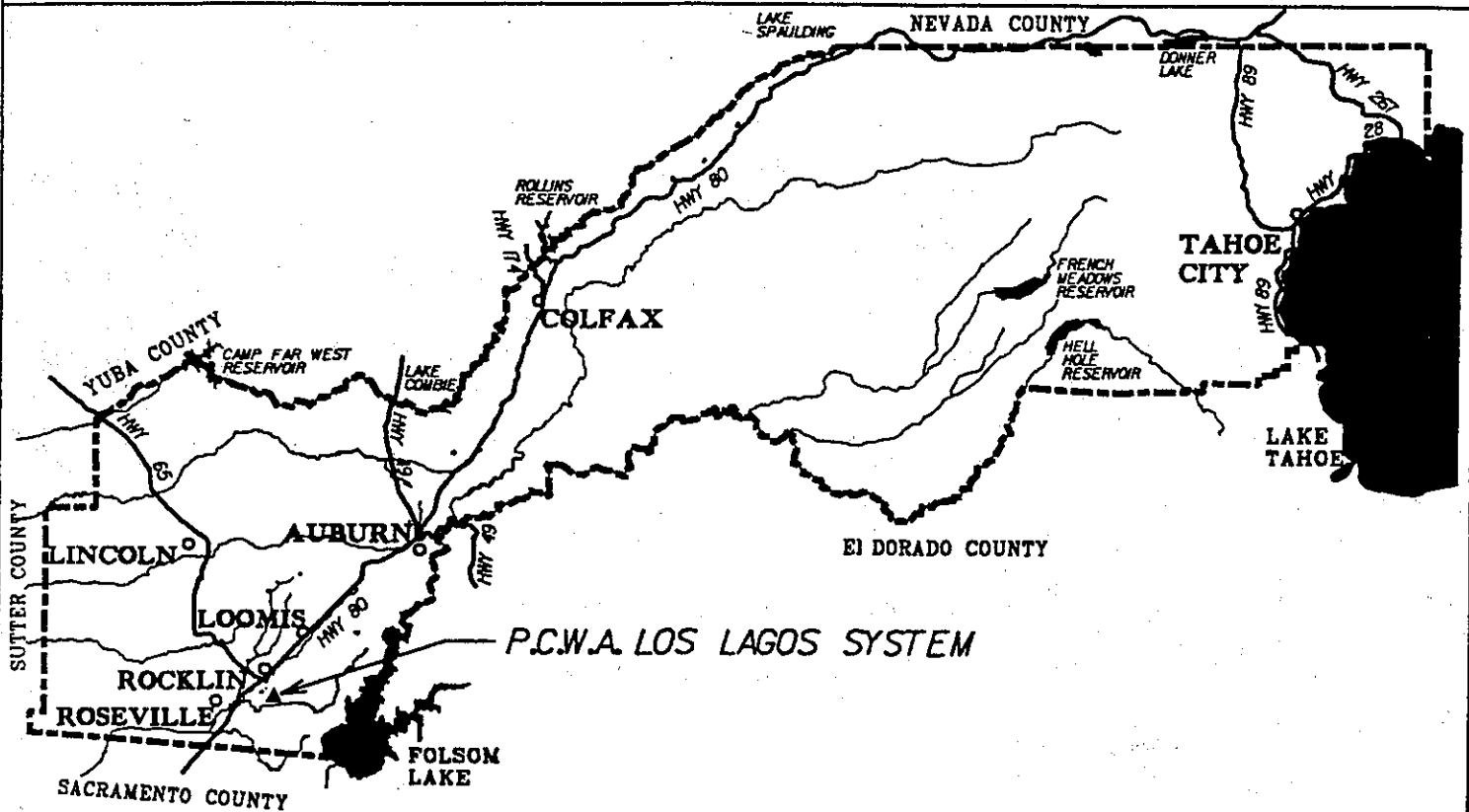
Transmission: WATER FLOWS BY GRAVITY TO BOTH TREATMENT PLANTS VIA 2-36 INCH PIPE TO THE FOOTHILL PLANT AND 18 INCH PIPE TO THE SUNSET PLANT.

Treatment: TOTAL COMBINED CAPACITY IS 33 MGD - SUNSET = 6 MGD, NEW.

Storage: 21.49 MILLION GALLONS OF STORAGE EXIST THROUGHOUT THE DISTRIBUTION SYSTEM BETWEEN 10 TANKS.

Capacity Limitations: DEFICIENCIES AND LIMITATIONS EXISTS WITHIN THE TWO OLDER TREATMENT PLANTS - NEEDING RETROFITTING IN ORDER TO MEET SURFACE WATER TREATMENT REGULATIONS. ALSO A 36 INCH TRANSMISSION LINE MUST BE INSTALLED FROM PENRYN TO THE SUNSET PLANT.

PLACER COUNTY WATER SYSTEMS



System Name: P.C.W.A. LOS LAGOS SYSTEM

Address: P.O. BOX 6570, AUBURN, CA 95604

Contact Name: EINAR MAISCH Phone: (916)-823-4850

Service Area Size: _____ No. Connect.: 131 Population Served: _____

Services Provided: RESIDENTIAL CONNECTIONS ONLY

Summary System Description

Source: OBTAINS WATER FROM THE FOOTHILL/SUNSET SYSTEM.

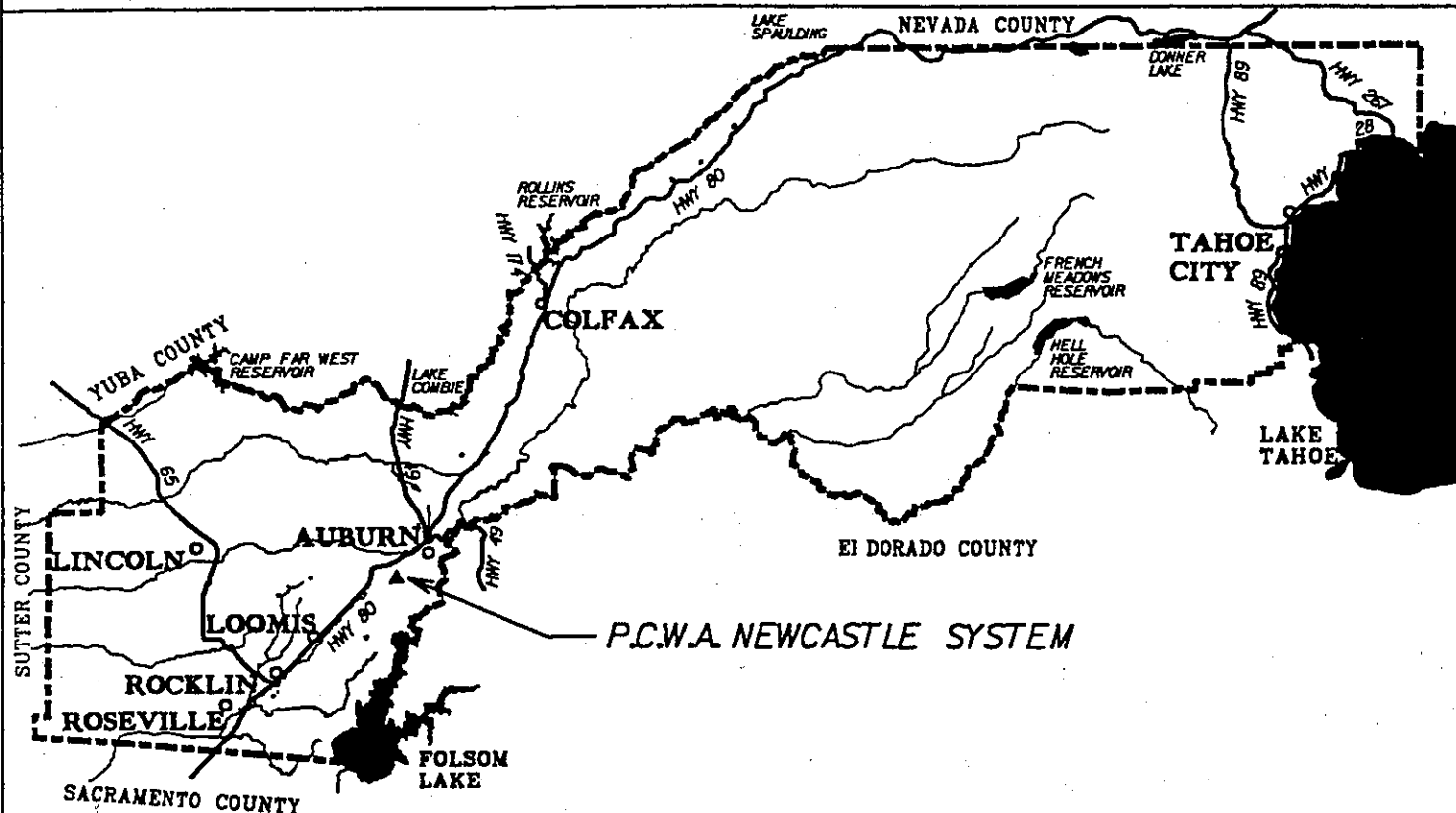
Transmission: WATER IS TRANSMITTED TO THE LOS LAGOS SYSTEM FROM THE FOOTHILL TREATMENT PLANT. THE DISTRIBUTION SYSTEM IS PRIMARILY ASBESTOS CEMENT PIPE RANGING FROM 8 TO 14 INCHES IN DIA.

Treatment: TREATMENT IS PROVIDED @ THE FOOTHILL WATER TREATMENT FACILITY.

Storage: SINCE ADOPTED INTO THE FOOTHILL SYSTEM, STORAGE IS PROVIDED FROM FOOTHILL SYSTEM TANKS.

Capacity Limitations: NO MAJOR LIMITATIONS AFFECT THE BUILT-OUT LOS LAGOS SYSTEM. THE SYSTEM WAS ABSORBED INTO THE FOOTHILL SYSTEM COMPLETELY IN 1990.

PLACER COUNTY WATER SYSTEMS



System Name: P.C.W.A. NEWCASTLE SYSTEM

Address: P.O. BOX 6570, AUBURN, CA 95604

Contact Name: EINAR MAISCH

Phone: (916) 823-4850

Service Area Size: _____ No. Connect.: 1131 Population Served: 2850

Services Provided: PRIMARILY RESIDENTIAL & COMMERCIAL CONNECTIONS

Summary System Description

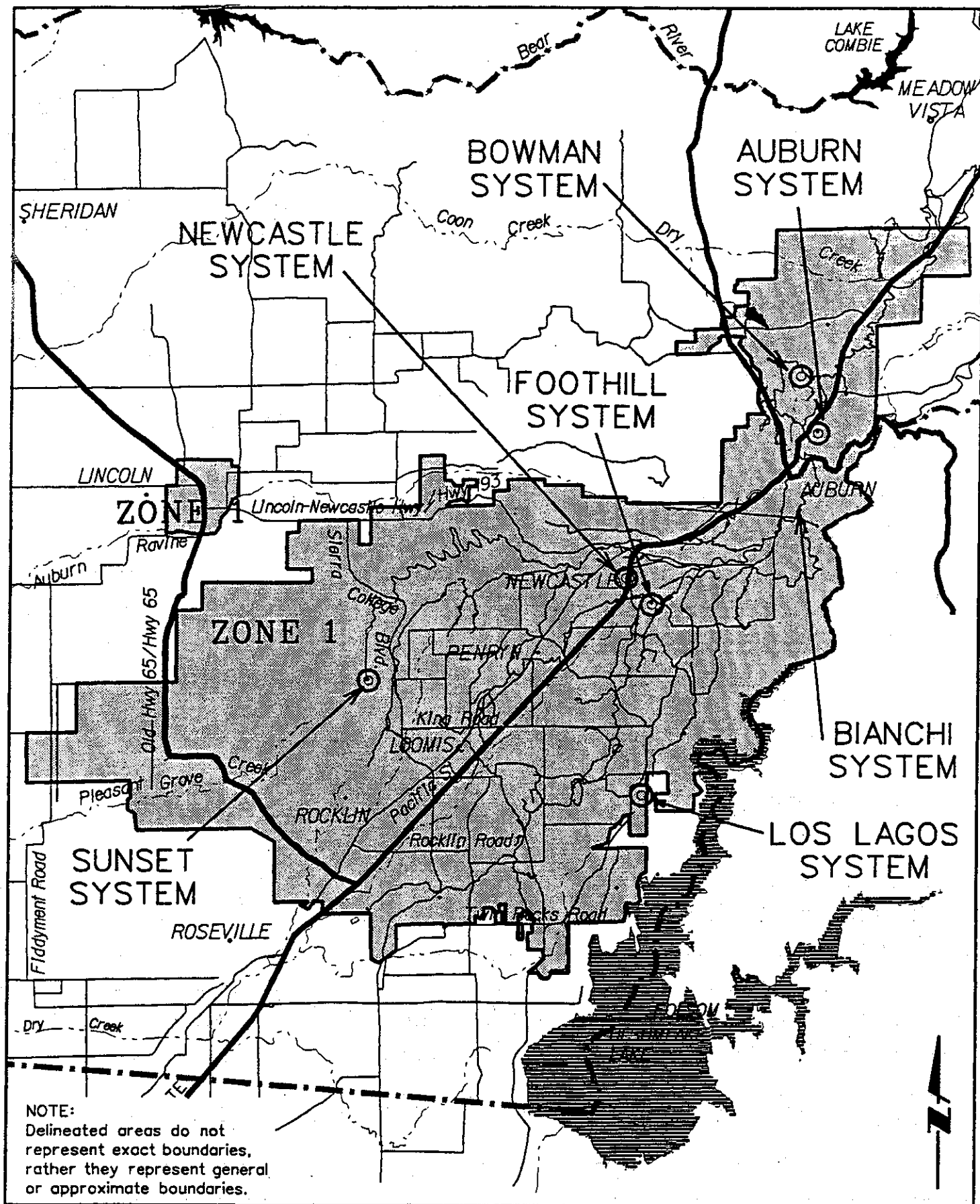
Source: THE NEWCASTLE SYSTEM DERIVES WATER FROM THE NEWCASTLE CANAL, FED BY THE BOARDMAN CANAL

Transmission: WATER IS TRANSMITTED FROM THE NEWCASTLE CANAL VIA A 12 INCH PIPE.

Treatment: THE TREATMENT PLANT, CONSTRUCTED IN THE 1940'S, PROVIDES COMPLETE TREATMENT. THE PLANT HAS A RATED CAPACITY OF 330 GPM.

Storage: A GUNITE LINED, UNCOVERED, 160,000 GALLON CLEARWELL PROVIDES STORAGE TO THE SYSTEM.

Capacity Limitations: THE TREATMENT PLANT NEEDS SOME RETROFITTING IN ORDER TO COMPLY WITH SURFACE WATER TREATMENT REGULATIONS, AND THE DISTRIBUTION SYSTEM WARRENTS SUBSTANTIAL REPAIR.



PLACER COUNTY WATER AGENCY Zone 1 Water Service Areas

PLACER ENERGY CENTER MAIN AND RESIDENCES

District Overview: Placer Energy Center is located at the end of Christian Valley Road about 8 miles north of Auburn. The site covers approximately 16 acres ranging in elevation from 1,500 to 1,745 feet. The administrative area (main) is served by the camps water distribution system consisting of ten buildings. Approximately 100 residents occupy the camp throughout the year. The water system began with site development by the Placer Fire Center, under the California Department of Forestry, originally using groundwater wells for supply sources. Eventually the wells were abandoned and replacement source became the Combie Ophir Canal.

Original treatment consisted of sedimentation, addition of alum as a coagulant, filtration, and disinfection. Inability to meet turbidity, and bacteriological requirements constituted installation of a package water treatment plant in 1988. This addition increased the systems ability to produce acceptable water, however, the standards were occasionally not met. A citation issued in 1991 resulting from failing to meet standards for turbidity in a domestic water supply. Plant improvements recently completed address citation requirements.

The residence system is located about 2 miles southeast of the camp along Christian Valley Road. It is comprised of two resident houses owned by the California Conservation Corps, and are occupied year around by employees. The residence water system is independent of the camp water system.

Since the facility is state operated and owned, there are no connection or water service fees applicable.

Source Information: Placer Energy Center's sole water source for the camp (main) system is provided by Nevada Irrigation District's Combie Ophir Canal. The California Conservation Corps pay Nevada Irrigation District for diversion of 1 miners inch (11.25 gpm) from the canal year around (5.913 MG per year). Water is diverted through a 2 inch PVC pipe to a 44,000 gallon raw water reservoir. The diversion structure and reservoir are located at the end of Witt Road in Christian Valley.

Placer Energy Center also utilizes a well source for the residences (two houses), located approximately 2 miles southeast along Christian Valley Road. The well is equipped with a 2 h.p. submersible pump and has capacity of 10 - 15 gpm.

Primary Transmission and Distribution: Primary transmission of water to the camp site from the 44,000 reservoir takes place in a 2 inch PVC line. Water is pumped from the reservoir to the treatment plant and stored in a 30,000 gallon storage tank located on a hill, feeding the gravity distribution system. System pressures range from 65 - 70 psi.

The well supplies the residences directly, switching on when necessary.

Storage: A total 84,000 gallons of storage is available to the main system. About half is potable water. There is no storage for the residences. The following table outlines the storage available to the system:

STORAGE

Placer Energy Center Main and Residences

Reservoir	Capacity	Storage Type
Raw Water on Witt Rd.	4,000 gallons	raw water
Clearwell at plant	10,000 gallons	potable water
Tank on Hilltop	30,000 gallons	potable water

Treatment: Recently improvements were completed in compliance to the above citation referenced, upgrading the plants operation and treatment processes. The plant performs full treatment at a capacity of 10 gpm. A bypass on the plant provides fire flow of 60 gpm.

The well at the residences has no treatment.

1990 System Production: The following table illustrates 1990 system production:

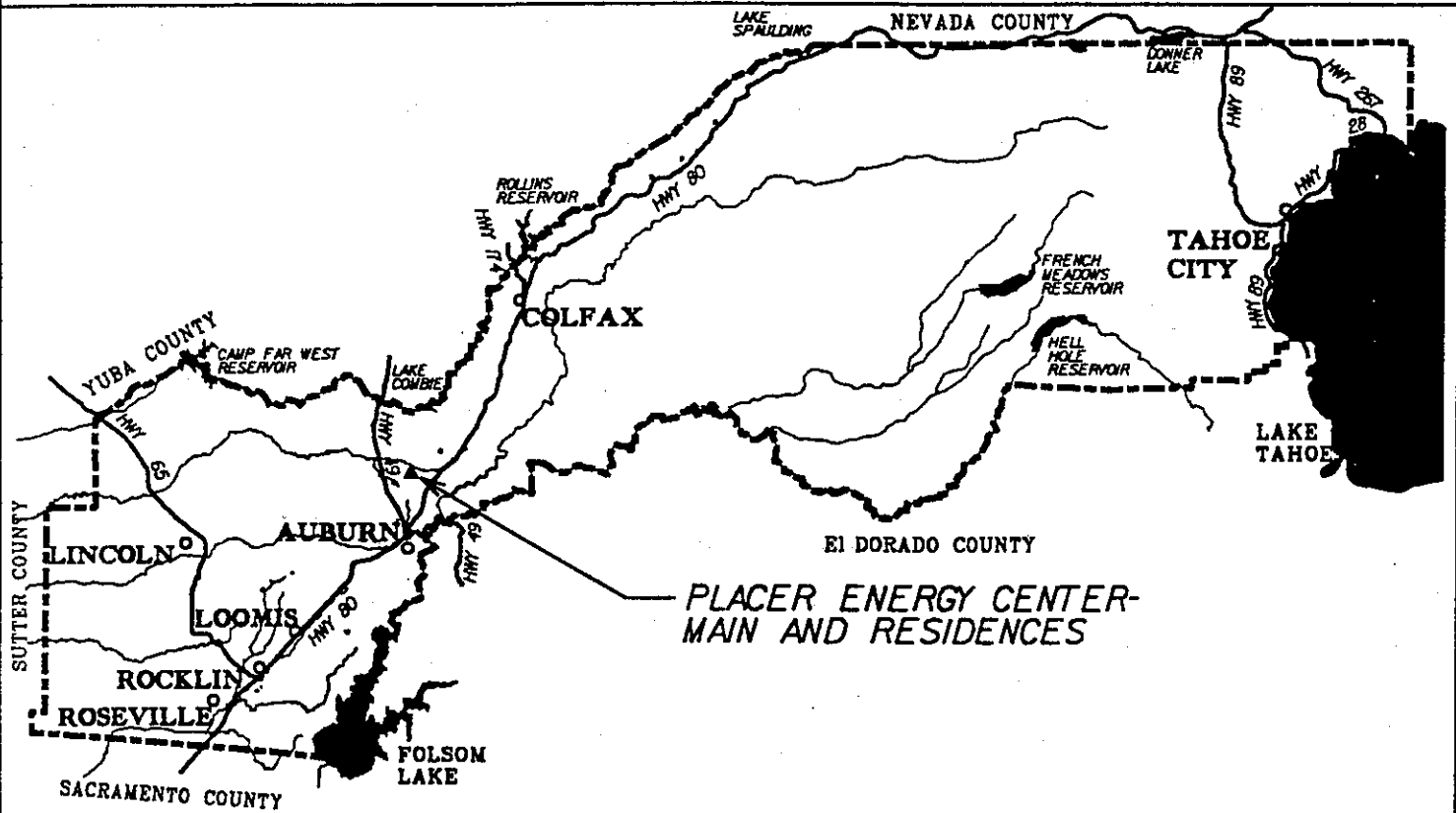
	Residences	Main
Maximum day demand	0.01221 MG	0.019 MG
Month of Maximum Water Use	August	August
Total Annual Water Produced by System	3 MG	-----
Number of Connections	120	2

Deficiencies and Limitations: Turbidity spikes during periods of heavy rain historically created problems for the treatment plant. Recent improvements required by the citation were directed at turbidity reduction during such periods meeting requirements. Since the improvements were recently completed, it is not known whether they will be successful.

Existing Planned Improvements: There are no planned improvements to expand facilities of the California Conservation Corps, nor build more residences. Ultimately connection into an alternative source supply such as Christian Valley Park CSD is being evaluated, but constitutes no course of action at this time for either the main or residences.

System Appraisal: Recent improvements to the water treatment plant should allow water delivery of adequate supply, meeting all water quality standards and state regulations. Some concern exists with the well serving the two residences regarding turbidity and bacteriological contaminates. No expansion for the area is planned. The cost of operating the treatment plant for such a small community are astronomical, thus connecting into the Christian Valley Park Community Services District is much more economical.

PLACER COUNTY WATER SYSTEMS



System Name: PLACER ENERGY CENTER-MAIN AND RESIDENCES

Address: 3710 CHRISTIAN VALLEY ROAD, AUBURN, CA 95603

Contact Name: CLAUDIA RODGERS Phone: (916)-823-4900

Service Area Size: No. Connections: 120/2 Population Served: 120/7

Services Provided: ALL RESIDENTIAL

Summary System Description

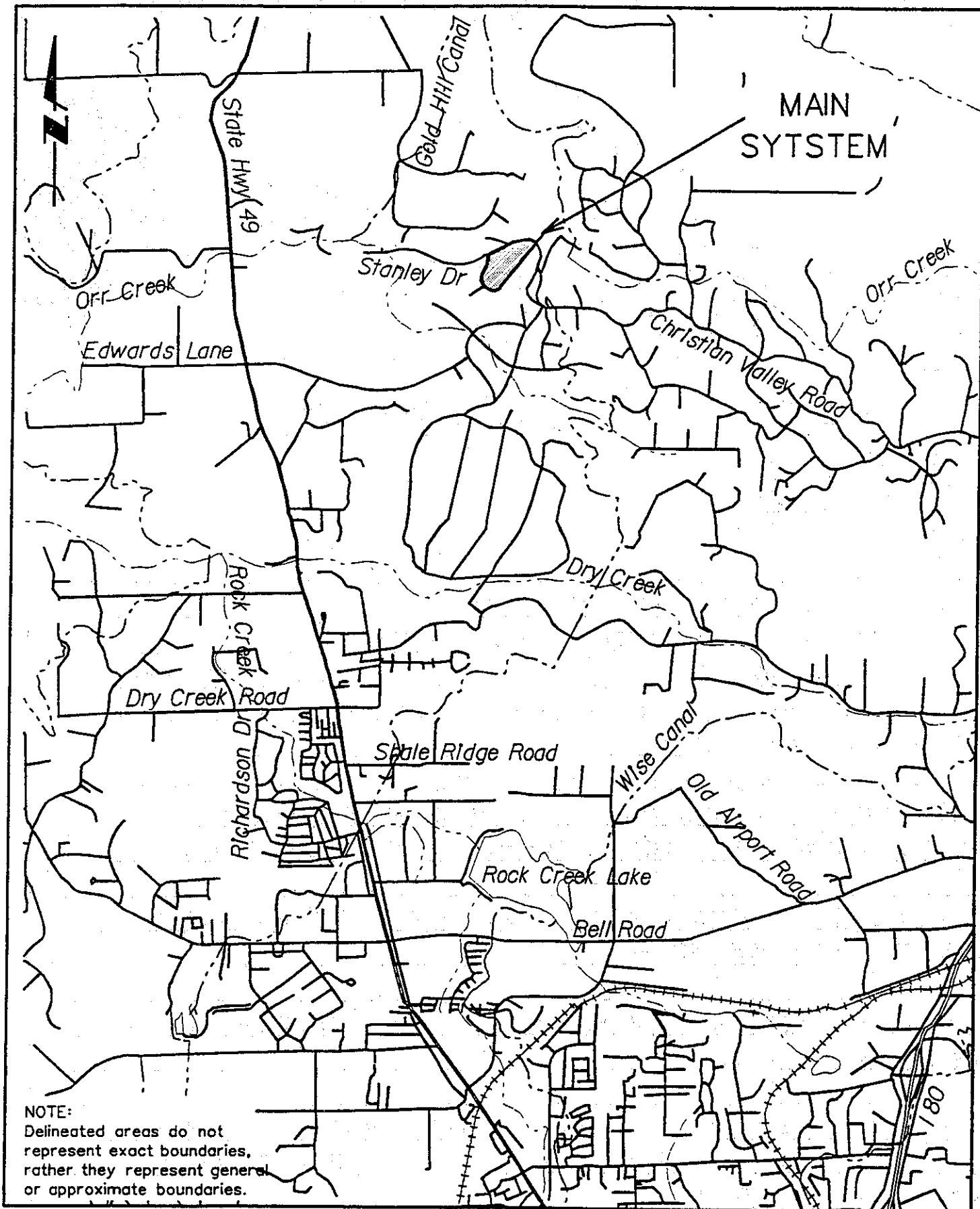
Source: THE MAIN (CAMP) SYSTEM IS SUPPLIED BY NEVADA IRRIGATION DISTRICT'S COMBIE OPHIR CANAL. THE RESIDENCES (TWO HOUSES) ARE SUPPLIED BY A WELL SOURCE.

Transmission: THE DISTRIBUTION SYSTEM IS QUITE OLD - THUS REQUIRING AN AGGRESSIVE MAINTENANCE PROGRAM.

Treatment: A RECENTLY CONSTRUCTED 3.0 MGD TREATMENT PLANT PROVIDES FULL CONVENTIONAL TREATMENT.

Storage: 84,000 GALLONS OF STORAGE IS AVAILABLE TO THE SYSTEM. STORAGE IS DIVIDED BETWEEN A 30,000 GALLON TANK, A 10,000 GALLON CLEARWELL, AND A 44,000 GALLON RAW WATER POND.

Capacity Limitations: TURBIDITY "SPIKES" DURING PERIODS OF HEAVY RAIN REQUIRE CONSTANT MONITORING OF THE NEWLY RENOVATED TREATMENT PLANT.



PLACER ENERGY CENTER - MAIN SYSTEM Water Service Area

QUAIL LAKE WATER COMPANY

District Overview: Quail Lake Water Company is located on the west shore of Lake Tahoe near Homewood. The system is composed of two separate distribution systems and two sources of supply. The water company is investor owned (51%) by an independent entity, Perini Resorts.

The two separate systems are referred to as the "Main" and the "Chambers Landing System". The main is supplied by water flowing by gravity from Quail Lake pumped from Lake Tahoe. The Chambers Landing system serves a group of condominiums between Highway 89 and Lake Tahoe, having a separate domestic and fire protection system.

Major issues facing the Quail Lake Water Company is implementation of surface water treatment regulations. A well has recently been completed, and pending approval from Department of Health Services, the company can abandon its surface water supplies.

There is presently no connection charge for new services. Water service for the 1991 year was based on an annual rate of \$195.00/yr flat rate service plus \$203.00/year Department of Water Resources assessment.

Source Information: The Quail Lake Water Company relies on two sources, a Lake Tahoe Intake and Quail Lake. Quail Lake is a 15 ac lake which poses significant difficulties to the water system, freezing during the winter, and having an algae bloom causing excess turbidities. The Lake Tahoe Source supplies the Chambers Landing area.

Primary Transmission and Distribution: The distribution system consists of approximately 8 miles of 4 - 6 inch Asbestos Cement pipe, and is reportedly in good shape. It contains (2) pressure zones, the Chamberland and Main systems.

Storage: Currently there is no available potable water storage available. Existing plans include installation of a 400,000 gallon steel bolted storage tank in the near future with water law bond money.

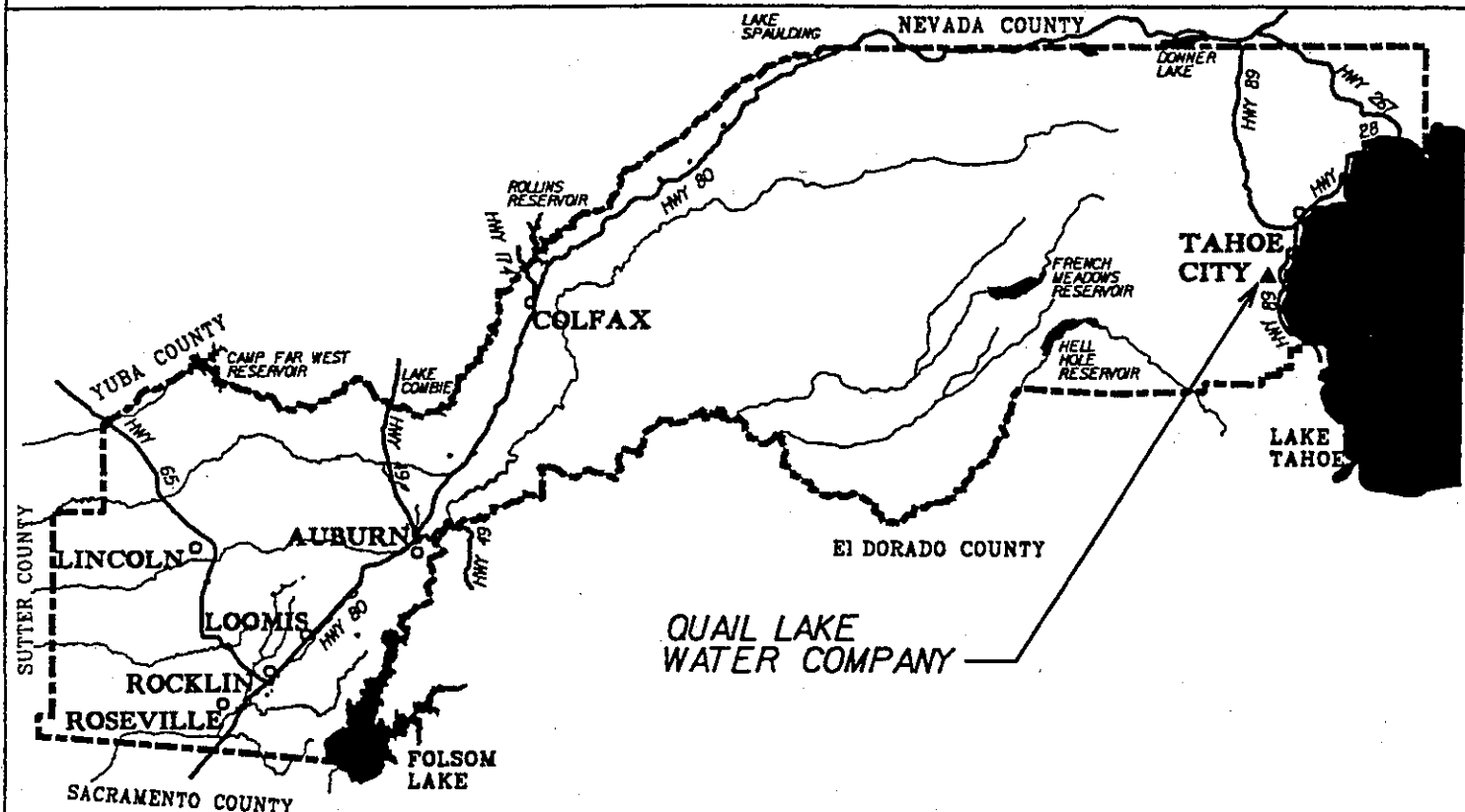
Treatment: The only treatment provided to the Lake Tahoe and Quail Lake supply sources is chlorination. Once the well approval process is complete, the surface water sources and their chlorination facilities will only serve as standby to the system.

1990 System Production: Currently there are 368 service connections to the system, of which 13 are metered. The system served an approximate total of 68,522 million gallons during the 1990 year. Maximum monthly production was approximately 11,115,360 gallons while maximum daily production was reached 358,360 gallons.

Deficiencies and Limitations: The most significant concern facing Quail Lake Water Company is compliance with Surface Water Treatment Regulations. Vegetation around the lake tends to provide an unpleasant odor and taste, and continual freezing each winter provides anaerobic conditions. Pending well approval as a source supply, the previous concerns mentioned will be alleviated.

System Appraisal: The Quail Lake Water Company is overall in good condition. Several maintenance programs are in the process being implemented such as, a cross-connection program and a lead notification program. With approval of the new well and development of other groundwater wells, the water company is in a excellent position for providing future service.

PLACER COUNTY WATER SYSTEMS



System Name: QUAIL LAKE WATER COMPANY

Address: P.O. BOX 2030, OLYMPIC VALLEY, CA 95730

Contact Name: PAT PATTERSON Phone: (916)-525-4596

Service Area Size: No. Connections: 368 Population Served: 75-350

Services Provided: FLAT RATE RESIDENTIAL SERVICES

Summary System Description

Source: THE WATER SYSTEM IS IN PROCESS OF ABANDONING THE 15 AC.

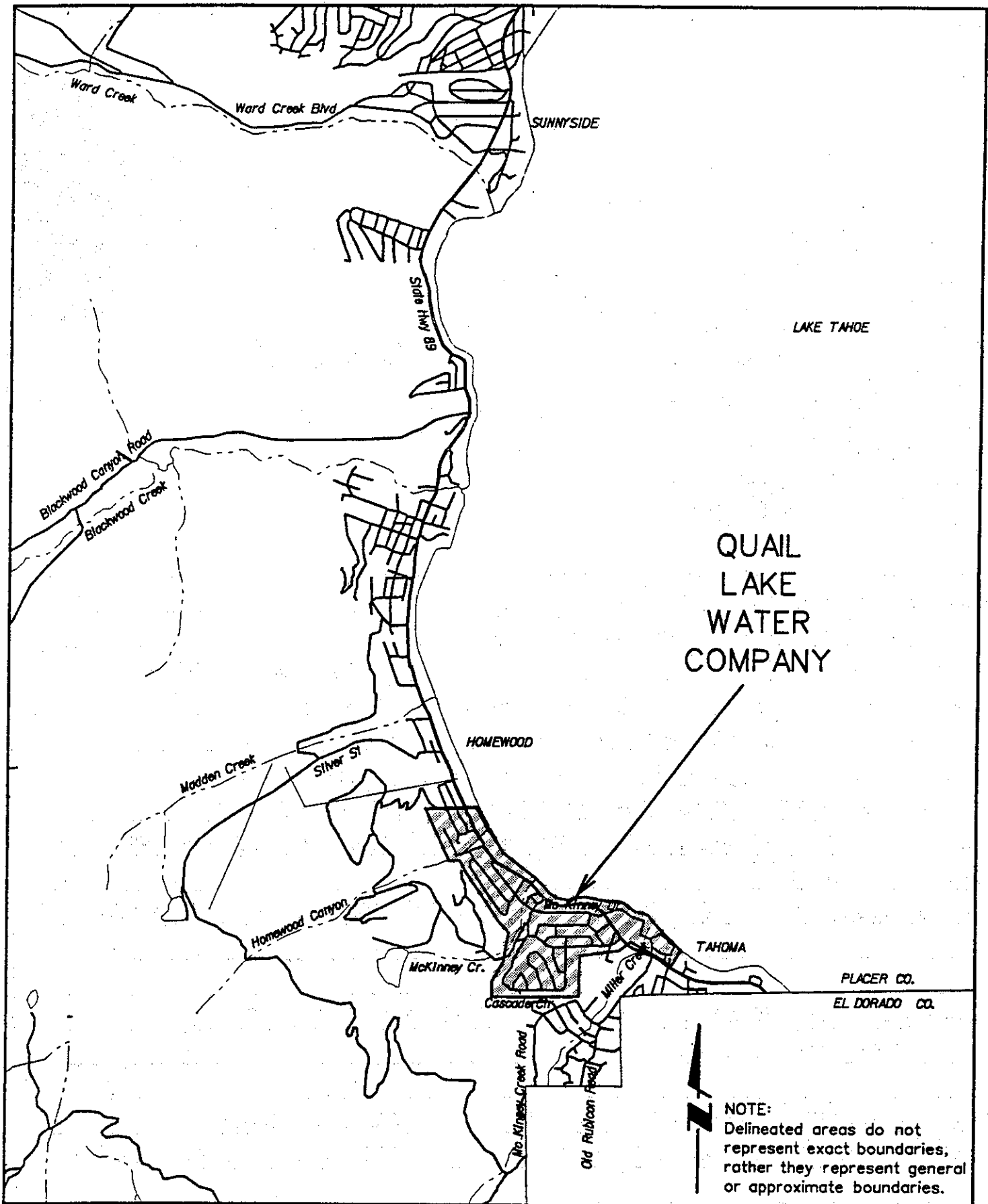
QUAIL LAKE RESERVOIR AND IMPLEMENTING A WELL SOURCE AS WELL AS UTILIZING A LAKE TAHOE INTAKE.

Transmission: DISINFECTION BY CHLORINATION IS THE ONLY TREATMENT PROVIDED.

Treatment: DISINFECTION BY CHLORINATION IS THE ONLY TREATMENT PROVIDED TO SURFACE WATER SOURCES.

Storage: CURRENTLY THERE IS NO POTABLE WATER STORAGE AVAILABLE, BUT FUTURE PLANS INCLUDE INSTALLATION OF A 400,000 STEEL BOLTED STORAGE TANK.

Capacity Limitations: ABANDONMENT OF BOTH LAKE SOURCES SUBSTITUTING FOR GROUNDWATER IS AN ISSUE OF CONSIDERABLE IMPORTANCE.



QUAIL LAKE WATER COMPANY

Water Service Area

ROCK CREEK MOBILE HOME PARK

District Overview: Rock Creek Mobile Home Park is located approximately three miles north of Highway 80 along Highway 49. Records indicate the system started and first well drilled in 1969. In 1973, the system having approximately 116 service connections, connected to Nevada Irrigation District through a metered double check valve assembly and pressure regulator. Nevada Irrigation District supplies water to the system when the pressure inside the park drops below 40 psi or during peak hours or fire flows. A second well was constructed in 1977 supplementing the system during drought periods.

Other than addition of spaces to bring the total to 225 services, very little has changed with the system to date. Recently one of the wells experienced high levels of arsenic and was shut down.

Following is the rate schedule and connection fees assessed during 1991:

Water service connection fee = No Charge

Residential service is a flat rate charge = \$20.20/bi-monthly yielding 200 cu-ft of water. Additional water usage is billed at a rate of \$0.66/100 cu-ft.

Source Information: The source supply for the system is a well and the Nevada Irrigation tie. With anticipation of more strict regulations and the additional cost of well maintenance, the park is looking to purchase all of its water from Nevada Irrigation District and abandon the well.

Primary Transmission and Distribution: The park is tied to the NID line with a six inch service at Highway 49. The service is metered through a 4 inch meter and then continues a 6 inch asbestos cement service loop around the park. Services are 3/4 inch galvanized steel.

Storage: At each well exists a hydropneumatic tank, however the tanks are not large enough to provide significant storage amount and viewed only as pressurizing the system. No other storage exists for the system.

Treatment: No treatment is provided at the well. Treated water is purchased from NID's North Auburn Treatment Plant through the inner-tie. For further description of treated water refer to section titled Nevada Irrigation District - North Auburn.

1990 System Production: The system used approximately 15.60 million gallons of water during the 1990 year, servicing 216 connections. The approximated permanent population served is 320. Peak period occurred during August and September.

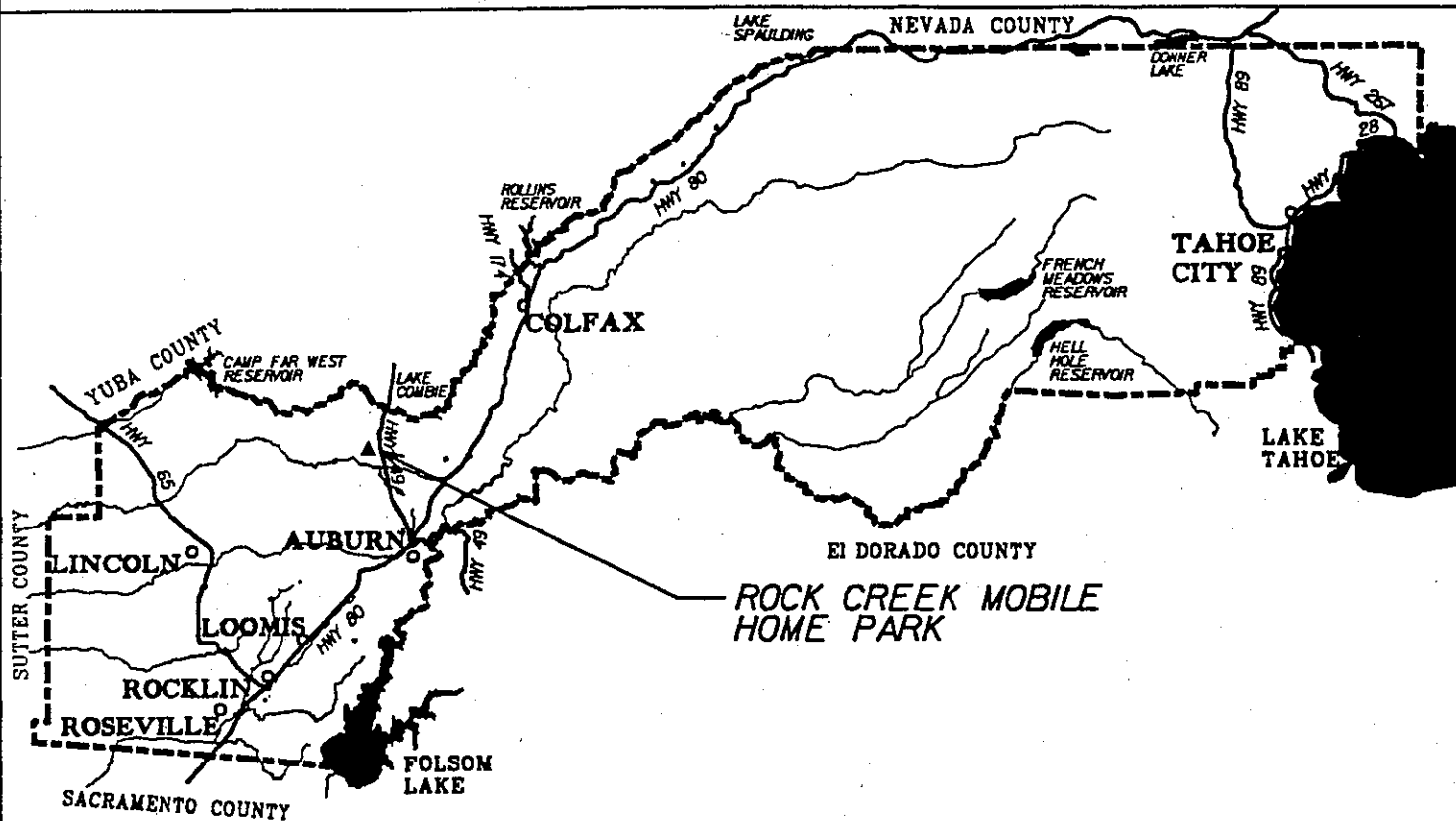
Deficiencies and Limitations: Newly adopted fourth coming well regulations soon will no longer justify economical operation and maintenance of the park's well. Water currently bought from NID is metered by NID and is looked upon as a service provided by the park to its owners. Meter installation currently underway will enable the park to charge residents for water usage, however, the water is purchased at a commercial rate, and is sold at a cheaper residential rate to costumers. This incurs an operating loss the Mobile Home Park which must be accounted for in charges for other services.

Lack of back-up supply is another deficiency, with the abandonment of the well. During large cut-backs due to drought or other considerations, or a mechanical emergency the system becomes quite vulnerable.

Existing Planned Improvements: The only planned improvements are installation of water meters on all connections enabling enforcement of conservation measures. All water meters should be installed by 1992.

System Appraisal: Rock Creek Mobile Home Park appears to be a simple straight forward system with few deficiencies. Water delivered to its customers is high quality and sufficient quantity. The park is built-out thus need not worry about expansion of its system in the future. Lack of a back-up source supply or at least significant storage in case of an emergency once the well has been abandoned may become an issue in the future.

PLACER COUNTY WATER SYSTEMS



System Name: ROCK CREEK MOBILE HOME PARK

Address: 3765 GRASS VALLEY HIGHWAY, AUBURN, CA 95603

Contact Name: BOB BAUMER Phone: (916)-885-0141

Service Area Size: No. Connections: 216 Population Served: 320

Services Provided: RESIDENTIAL ONLY

Summary System Description

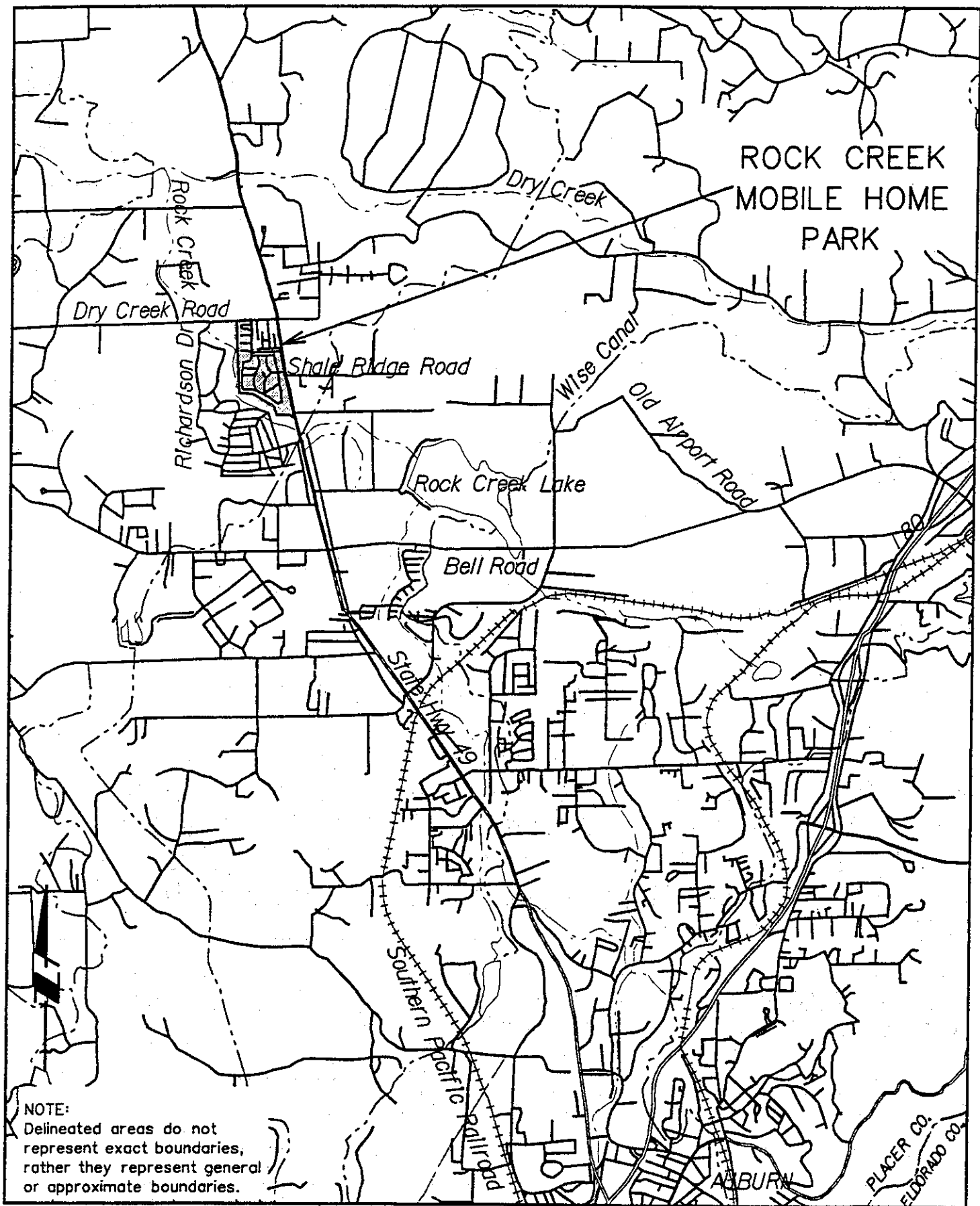
Source: SOURCE SUPPLY TO THE SYSTEM IS A WELL AND AN INNERTIE WITH THE NEVADA IRRIGATION DISTRICT. ANTICIPATING MORE STRICT REGULATIONS AND ADDITIONAL WELL MAINTENANCE COSTS, THE PARK WILL BEGIN PURCHASING ALL WATER FROM N.I.D.

Transmission: THE PARK HAS A 6 INCH INNER TIE WITH NEVADA IRRIGATION DISTRICT @ HIGHWAY 49.

Treatment: PURCHASED WATER IS TREATED AT THE NORTH AUBURN TREATMENT PLANT. NO TREATMENT IS PROVIDED TO WELL WATER.

Storage: NO SIGNIFICANT STORAGE EXISTS TO THE SYSTEM.

Capacity Limitations: THE PARK PURCHASES AND SELLS WATER INCURRING AN OPERATING LOSS WHICH MUST BE COMPENSATED FOR AMONG OTHER COSTS.



ROCK CREEK MOBILE HOME PARK

Water Service Area

SIERRA LAKES COUNTY WATER DISTRICT PUBLIC WATER SYSTEM

District Overview: Sierra Lakes CWD serves the Serene Lakes development which is located about 1.5 miles south of Soda Springs.

The combined annual fee for water service and wastewater management is \$675 of which \$270 is designated for water system purposes (\$160 is engaged for operation and maintenance and \$110 is reserved for repayment of a loan to the Department of Water Resources).

The combined Sierra Lakes CWD connection fee of \$3,750 is divided into four accounts: water system maintenance and operation expropriates \$657, while \$656 is reserved for water system capital improvements; \$1,219 for wastewater system maintenance and operation; and \$1,218 for wastewater system capital improvements. A combined connection fee increase to \$4,250 is scheduled on July 1, 1992.

The *Sierra Lakes County Water District Five Year Facilities Plan* discusses financing alternatives for facilities improvements. The total cost for wastewater management, water system, and operational upgrades is estimated at about \$3,000,000 for the planning period.

Source Information: Sierra Lakes CWD derives water from Lake Serena.

The *Sierra Lakes County Water District Five Year Facilities Plan* advises initiation of a study to determine the current water quality of Lake Serena. Algal growth and sediment buildup conditions warrant construction of a lake aeration system at the raw water intake.

A well drilled near the water treatment plant, which has a capacity of 60 gpm, provides a backup source of supply although groundwater is considered to have elevated iron and manganese levels.

Primary Transmission and Distribution: Raw water from Lake Serena is conveyed to the filtration plant through 1,400 feet of 12-inch diameter ductile iron pipe. Both the raw water transmission line and the 10-inch finished water transmission line from the plant to the storage tank are of sufficiently sized to handle two times the current flow.

The distribution system was predominately installed between 1961 and 1965 consisting of about 24,800 feet of 4-inch AC pipe and 8,500 feet of 6-inch AC pipe. Distribution system pressures range from 40 to 65 psi. Ten new fire hydrants are scheduled for installation by 1991 and replacement of 17 outdated hydrants is planned before 1995.

Storage: Water volume storage presently available is not adequate to meet operational, emergency, and fire flow demands. A 300,000 gallon underground reinforced concrete reservoir, situated at the highest elevation of the system (7,060 feet), currently provides storage for Sierra Lakes CWD. Calculations in the *Sierra Lakes County Water District Five Year Facilities Plan* demonstrate the need for 800,000 gallons of storage in 1995 and 910,000 gallons of storage by the year 2000.

Peak water use is estimated at 330,000 gpd by the year 2000. Average demand is expected to be 128,700 gpd in 2000.

Treatment: Two wet well structures located on the north shoreline of Lake Serena are supplied by a single intake line. Each wet well supports two pumps. Chemical pretreatment occurs at these pump stations.

The filter plant consists of rapid multi-media filters. The plant was designed to accommodate two additional filters without major renovations.

The new drinking water standards (SWTR), particularly the 0.2 NTU turbidity and 0.10 THM levels, will impact current water treatment methods at Sierra Lakes CWD.

Design and construction of well water treatment for iron and manganese is scheduled for completion by 1992. Given the proximity of the wastewater export pump station to Lake Serena and consequential possibility of inadvertent contamination, development of an alternate water supply is critical.

1990 System Production: Sierra Lakes CWD serves a maximum seasonal population of 2,600 through 500 total service connections.

Sierra Lakes CWD produced a maximum daily water supply of 0.192 million gallons, a maximum monthly supply of 2.567 million gallons, and an annual total of 22.914 million gallons in 1990.

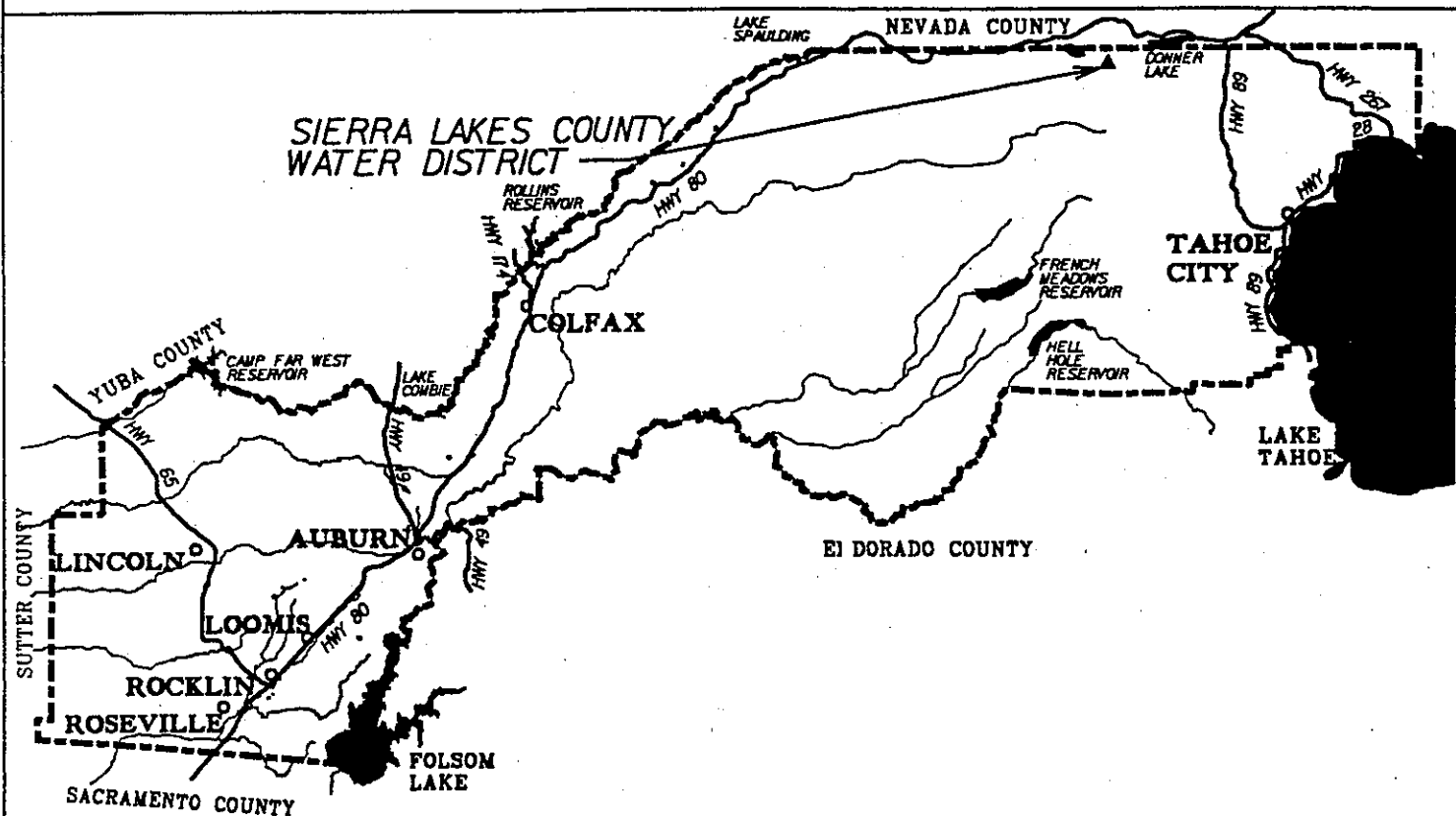
Deficiencies and Limitations: The Sierra Lakes CWD suffers insufficient storage capacity, nonexistent backup source water treatment, and ineffectual fire protection due to a lacking number of fire hydrants.

Existing Planned Improvements: The *Sierra Lakes County Water District Five Year Facilities Plan* projects growth to 740 units by the year 2000, a 64% increase from the number of 1990 service connections.

Planned improvements in response to this projected growth and the new SWTR include filter plant expansion, backup source water treatment, construction of supplementary water storage, installation and replacement of fire hydrants, and development of measures to protect Lake Serena water quality.

System Appraisal: The Sierra Lakes County Water District operates a water treatment and distribution service and wastewater collection system. The system is in good condition, most importantly, management recognizes and identifies future needs. With current planning and construction efforts being met, by the time full build-out of the area is achieved, all corresponding facilities and replacement programs will be implemented.

PLACER COUNTY WATER SYSTEMS



System Name: SIERRA LAKES COUNTY WATER DISTRICT

Address: P.O. BOX 826, SODA SPRINGS, CA 95728

Contact Name: ORIN BENNETT Phone: (916)-929-7100

Service Area Size: No. Connections: 500 Population Served: 2600 MAX.

Services Provided: PRIMARILY RESIDENTIAL WATER AND WASTEWATER SERVICES

Summary System Description

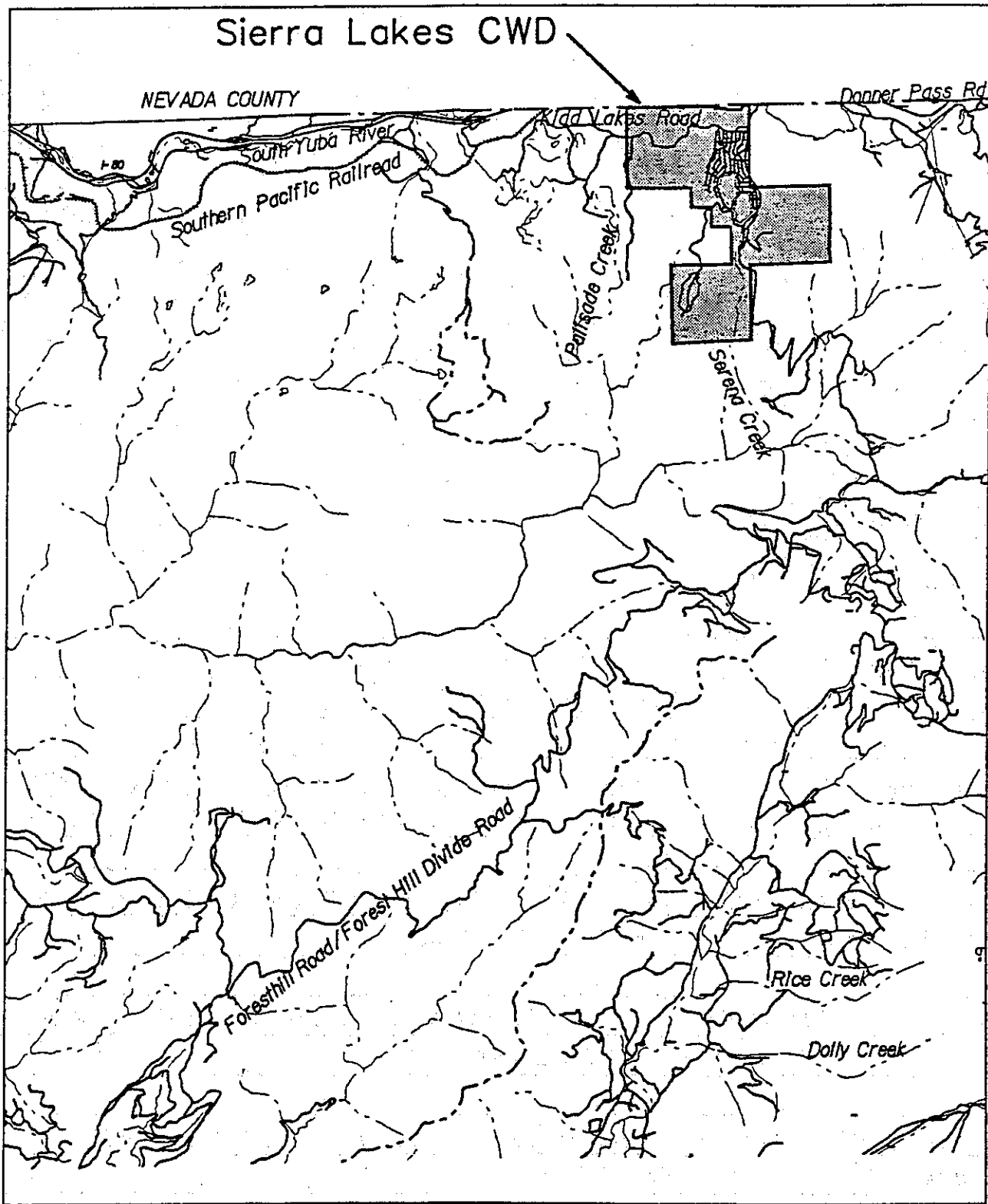
Source: THE DISTRICT HAS TWO RAW WATER SOURCE SUPPLIES - LAKE SERENA PRIMARY AND A WELL HAVING CAPACITY OF 60 GPM FOR BACKUP.

Transmission: RAW WATER FROM LAKE SERENA IS CONVEYED TO THE TREATMENT PLANT VIA 1400 FT OF 12 INCH DIA. DUCTILE IRON PIPE.

Treatment: CHEMICAL PRETREATMENT @ LAKE INTAKES IS FOLLOWED BY RAPID MULTI-MEDIA FILTERS @ THE TREATMENT PLANT.

Storage: A 300,000 GALLON UNDERGROUND REINFORCED CONCRETE RESERVOIR PROVIDES STORAGE.

Capacity Limitations: STORAGE IS INSUFFICIENT, BACK-UP WATER TREATMENT FACILITIES FOR THE WELL, AND AN INSUFFICIENT NUMBER OF FIRE HYDRANTS ARE MAJOR LIMITATIONS TO THE SYSTEM.



Placer County General Plan

Figure — **Water Service Area**

Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

Scale: 1" = 6000'

LEGEND

Sierra Lakes CWD

Streets	County Line
Waterways	District Service Area

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

SQUAW VALLEY COUNTY WATER DISTRICT

District Overview: Squaw Valley County Water District is a special district located in Eastern Placer County in Olympic Valley. Area covered by the District totals approximately 15 square miles (9,600 ac.)

Squaw Valley CWD was organized in 1964 to acquire existing water supply works, construct improvements, and make the necessary alterations to provide service within district boundaries. A water supply permit was granted by Placer Health Department in 1966. Due to the continual acquisition of service area connections, Squaw Valley CWD came under jurisdiction of the State of California Department of Health Services in 1976.

The Squaw Valley/Olympic Valley area contains various recreational features and is primarily noted for downhill skiing. Recently phase I of a new resort/golf course area has been completed in the Olympic Valley.

Source Information: Squaw Valley CWD relies entirely upon groundwater for its source supply. Olympic Valley is an 8 square mile (5,100 ac.) watershed tributary to the Truckee River basin between Lake Tahoe and Truckee, California. Principal water source for the valley is an alluvial aquifer covering the 400 acre valley floor, with average thickness of 80 feet. The aquifer is subject to seasonal fluctuation of the water table reflecting both recharge and discharge into Squaw Creek. The District is currently served by five vertical wells, outlined below:

WELL SOURCE SUPPLY Squaw Valley County Water District

Well No.	HP/GPM	Description
1	50/390	Pit well - submersible pump
2	40/340	DWT
3	15/110	Pit well - submersible pump
4	-----	DWT - not yet in operation
5	25/125	DWT - electric generator

Wells No. 1, No. 2, No. 3, and No. 5 are presently used to supply the existing system demand.

Primary Transmission and Distribution: Much of the existing distribution system was constructed in the early 60's. The system is composed primarily of steel, galvanized, and PVC pipeline. Approximately 25% of the distribution system has been replaced within the last 10 years. Although an actual main replacement program does not exist, the District maintains an active maintenance program, replacing old worn-out pipeline when necessary. Overall condition of the distribution system is good.

Storage: Three storage tanks provide a combined storage capacity of 1.78 million gallons. Storage is outlined in the following table.

STORAGE TANK FACILITIES* Squaw Valley County Water District

Tank Identification	Storage Material	Capacity (gal)
State Tank	Steel	1.15 M
East Tank	Steel	500,000
Zone 3	Steel	135,000

*Two redwood tanks were abandoned in 1991.

Treatment: Treatment is currently not provided on a daily basis, however, chlorination is provided throughout the system for disinfection purposes whenever necessary (usually two or three times each year). Additionally, a corrosion control effort is planned for the near future.

1990 System Production: According to the 1991 DOHS annual report, Squaw Valley CWD serves a total permanent population of about 800, rising to 20,000 during seasonal peak days. The District observes 550 general/residential metered connections and about 59 commercial connections. The following table outlines yearly service.

ANNUAL SYSTEM SERVICE Squaw Valley County Water District

Maximum Day Production by the system	1.472 million gallons
Month of Maximum Water Use	December
Total Annual Water Produced	126.398 million gallons

Deficiencies and Limitations: The only significant deficiency existing within the Squaw Valley CWD is its inability to meet peak water consumption demands during a power outage. Current status provides for about 16 to 20 hours of use for half of the source supply. The other half is reserved for fire demand. This supply issue is currently being rectified by purchasing a large diesel-powered standby generator to run the pumps during peak demand situations.

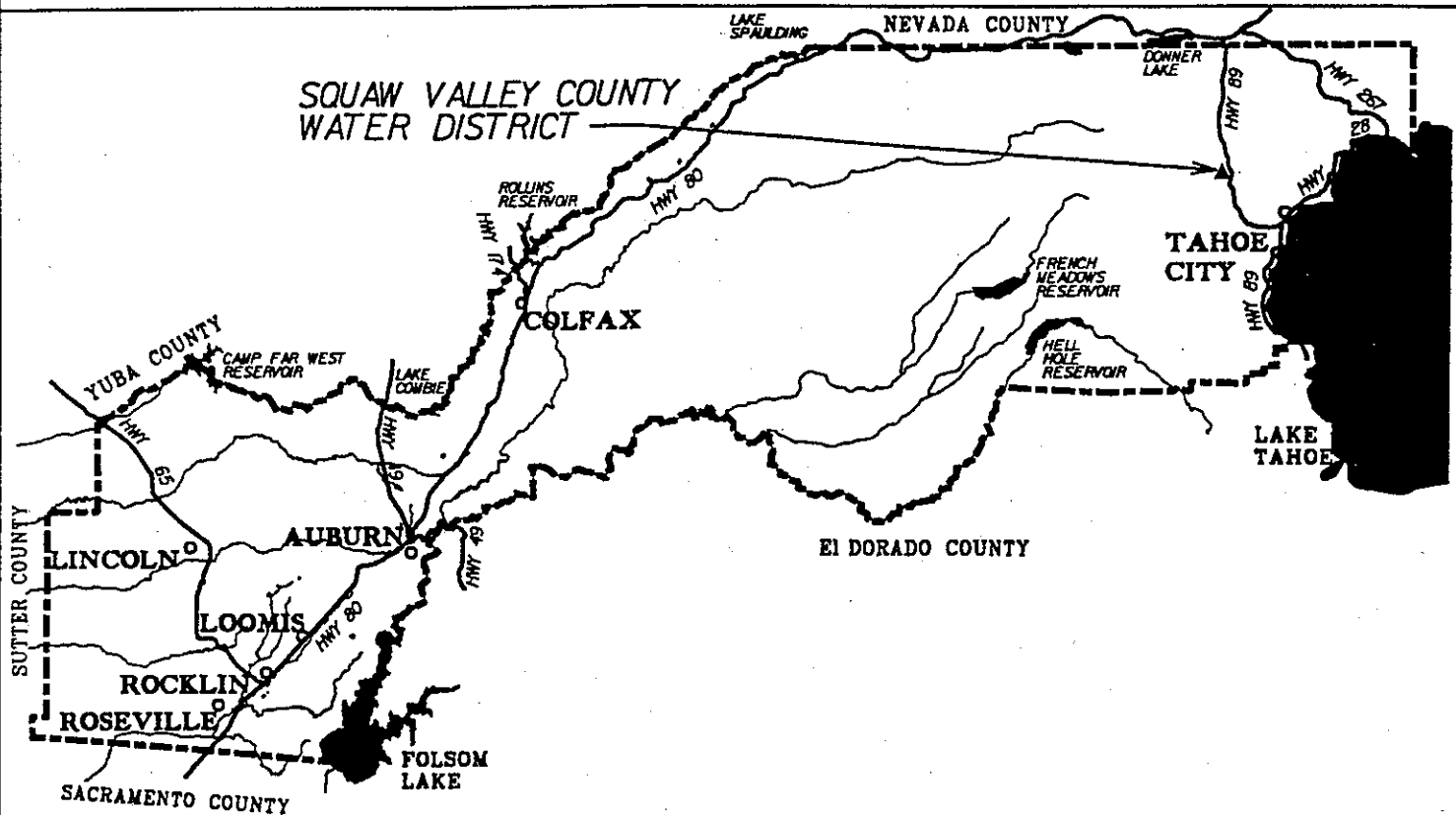
Existing Planned Improvements: Each year a report on water and sewer is prepared for the DOHS by the operations and maintenance supervisor. The report reflects improvements made in the previous year and includes a tentative list of upcoming improvements. The report prepared in 1991 lists tentative water improvements through 1994. Such improvements include:

- development of a new horizontal well
- some 6 inch main line replacement
- completion of a new telemetry system
- storage tank abandonment
- water main extension, 6 inch
- maintenance equipment replacement
- completion of a water and sewer master plan
- development of a computerized maintenance program

System Appraisal: The Squaw Valley CWD is in excellent overall condition. Water supply is evidently the major potential limiting factor regulating development within the district boundaries. Agreements

established between Perini Resorts, Squaw Valley Ski Corporation, other primary users of the source aquifer, and Squaw Valley CWD are designed to protect the Olympic Valley Aquifer from overdraft (Squaw Valley Water Management Action Plan). Planned projects include intensifying the telemetry and other associated projects in order to learn as much about the aquifer as possible.

PLACER COUNTY WATER SYSTEMS



System Name: SQUAW VALLEY COUNTY WATER DISTRICT

Address: P.O. BOX 2026, OLYMPIC VALLEY, CA 95730

Contact Name: RICHARD L. LIERMAN Phone: (916) 583-4692

Service Area Size: 15 sqmi No. Connections: 609 Population Served: 750-20K

Services Provided: RESIDENTIAL AND COMMERCIAL WATER AND WASTEWATER MANAGEMENT

Summary System Description

Source: THE DISTRICT RELIES ENTIRELY UPON GROUNDWATER FOR SOURCE SUPPLY.

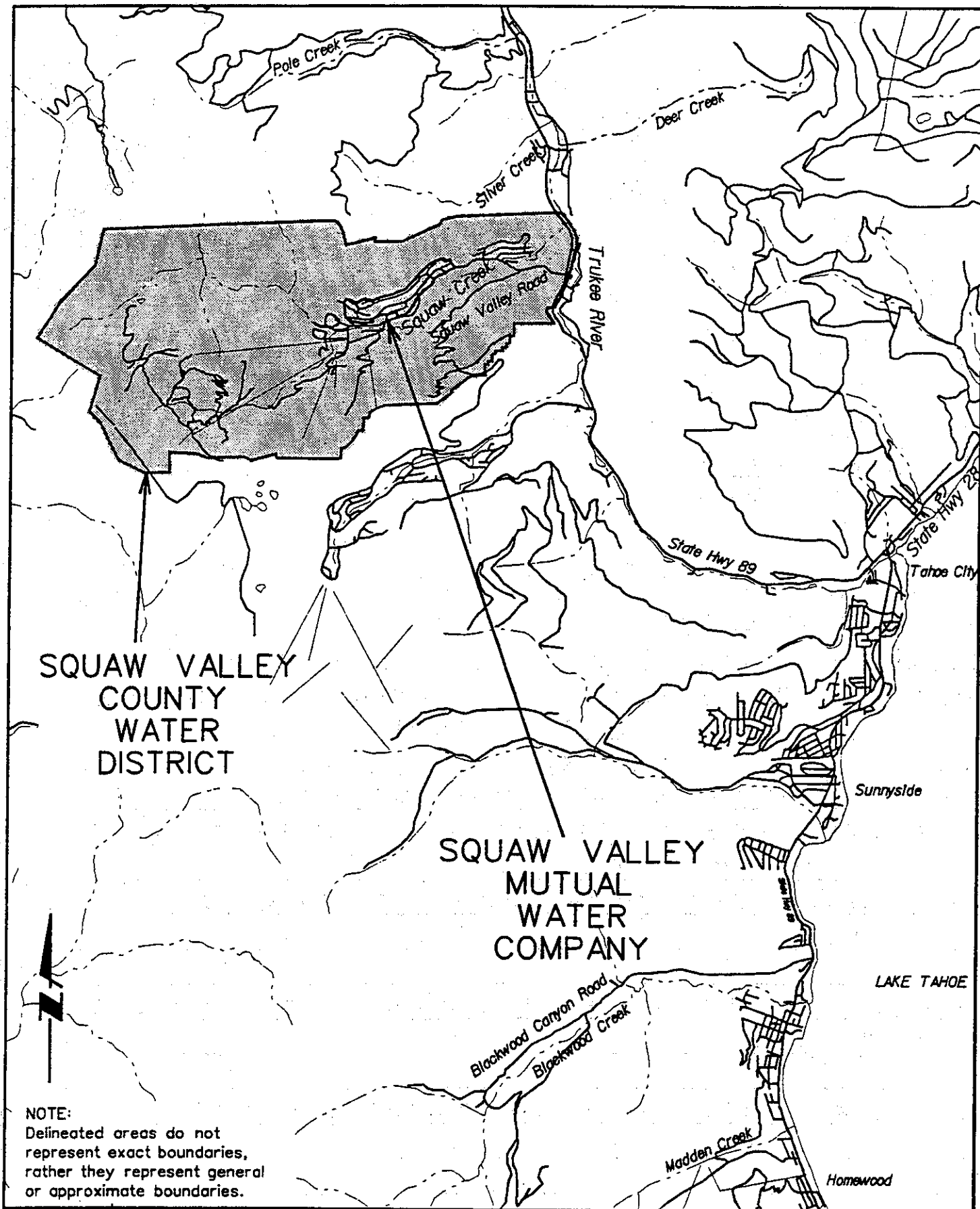
PRINCIPAL WATER SOURCE FOR THE VALLEY IS AN ALLUVIAL AQUIFER COVERING THE 400 AC. VALLEY FLOOR. 4 WELLS PROVIDE 885 GPM.

Transmission: DISTRIBUTION SYSTEM IS IN GOOD SHAPE - 25% REPLACED OVER LAST DECADE.

Treatment: NO TREATMENT PROVIDED ON A DAILY BASIS. CHLORINATION OF SYSTEM 2 - 3 TIMES PER YEAR.

Storage: HAVE 3 STORAGE TANKS PROVIDING 178 MILLION GALLONS OF STORAGE.

Capacity Limitations: LACK OF PAST KNOWLEDGE OF THE AQUIFER AND ITS CAPABILITIES IS A MAJOR CONCERN. BACK UP POWER FOR PUMPS DURING POWER OUTAGE IS ALSO A PROBLEM. NEW DATA IS BEING GATHERED ON THE AQUIFER WITH NEW TELEMETRY AT WELLS.



SQUAW VALLEY AREA WATER DISTRICTS

TAHOE CEDARS WATER COMPANY

District Overview: The Tahoe Cedars Water Company serves the small town of Tahoma located on the west shore of Lake Tahoe. The systems service area consists of 862 service connections. This report will acknowledge the system as a whole, however it should be noted that only about 100 of the 862 connections are within Placer County. The types of connections are primarily residential dwellings with a few motels and commercial services. The system utilizes a well for its source supply. The current water supply permit was issued in 1965.

Source Information: Source supply to the Tahoma area is a vertical well known as the Elm Street Well. This well has a 12-inch diameter casing and is approximately 180 feet deep. The well is equipped with a 50 h.p. submersible pump producing water at a rate of 450 gpm.

The system is also provided with a Lake Tahoe intake producing water at a rate of 175 gpm. The lake supply is used as an emergency supply source. The intake consists of two 3-inch lines extending a length of 275 feet into the lake and to a depth of 16 -18 feet below the water surface. Additionally, Tahoe Cedars has a 4-inch interconnection with neighboring McKinney Estates water system. The interconnection is used only for emergencies purposes. This intertie is capable of serving only the lower portion of the system, although a pump located at the lower storage tank is capable of pumping water to higher elevations.

The following table lists the sources and their respective uses and production capacities:

SOURCE SUPPLIES
Tahoe Cedars Water Company

Source Name	Use Status	Production Capacity
Elm St. Well	Main source supply	450 gpm
Lake Intake	Emergency	175 gpm
McKinney Intertie	Emergency	80 gpm

Primary Distribution and Transmission: Tahoe Cedars distribution system has one pressure zone maintaining pressures between 25 - 100 psi. Water mains are constructed primarily of dipped and wrapped steel pipe. The sizes range approximately as follows:

4-inch -----	60%
6-inch -----	39%
8-inch -----	1%

The mains are approximately 20 years old and reportedly in good condition.

Storage: Storage for this system is provided by a 124,000 gallon bolted steel tank. The tank is reportedly in good condition. A 10,000 gallon welded steel tank is available in the lower portion, but is no longer used unless needed as a pumping reservoir from the 4-inch intertie with the McKinney Estates system.

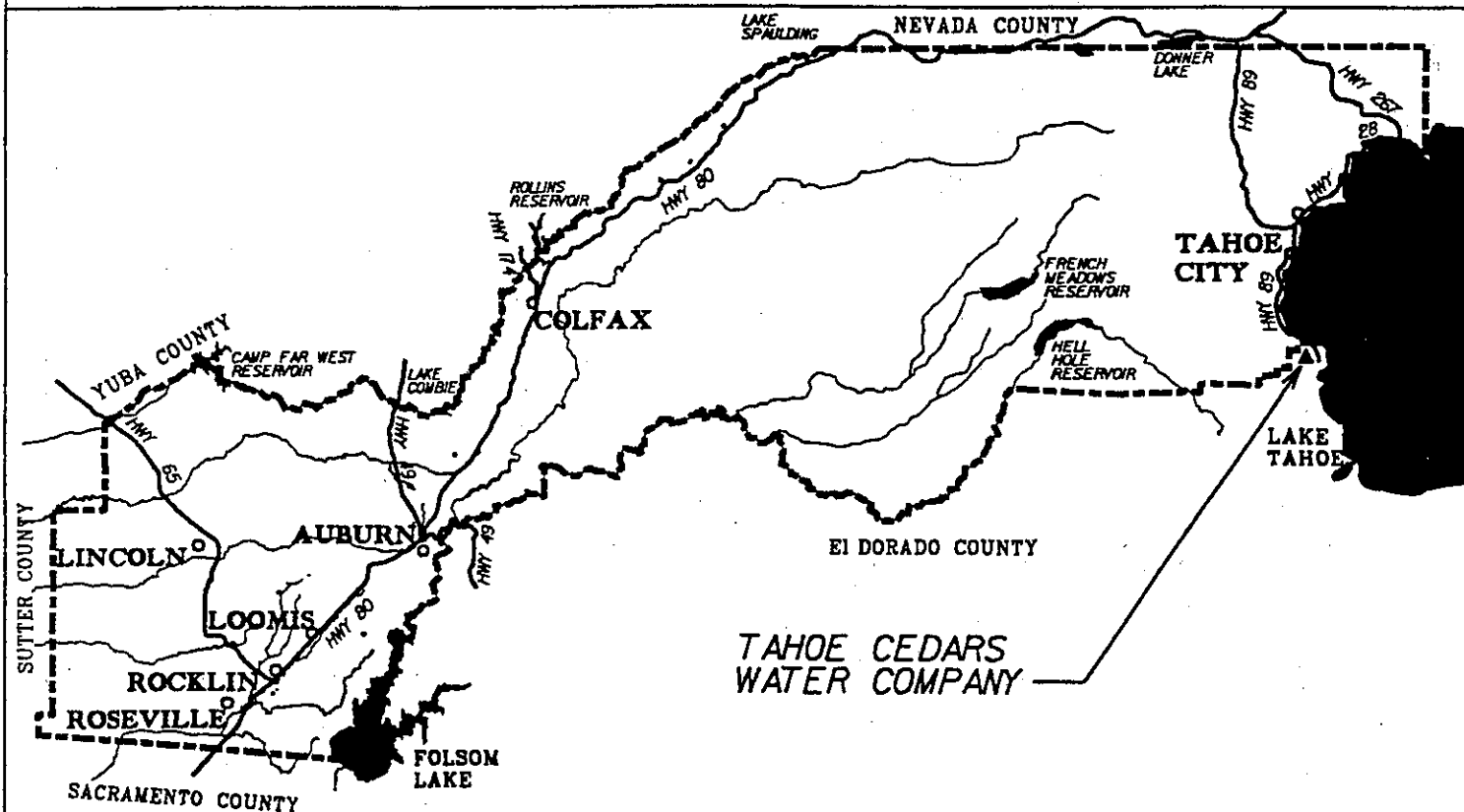
Treatment: The well source is not treated nor equipped with continuous chlorination capabilities. The lake source is, however, equipped with a gas chlorinator.

1990 System Production: The Tahoe Cedars service area consists of 862 service connections, 16 of which are metered. Only 250 of these connections are provided with water service all year around. The permanent population served is about 750 with seasonal fluctuations increasing up to 2,000. Connection types are primarily residential dwellings with a few motels and commercial services. According to the 1991 annual report the system produced a yearly total of 80,871,200 gallons.

Deficiencies and Limitations: Aside from some administrative requirements, and implementation of a cross connection control program, the Tahoe Cedars Water company has no significant deficiencies with supply, service, or sanitary hazards.

System Appraisal: The Tahoe Cedars water system is capable of continually providing an adequate supply of high quality water to its customers. The well source is capable of meeting peak demands and no treatment is currently necessary. A proposed new 200,000 gallon storage tank will further enhance service and reliability of the system.

PLACER COUNTY WATER SYSTEMS



System Name: TAHOE CEDARS WATER COMPANY

Address: P.O. BOX 264, TAHOMA, CA 95733

Contact Name: EARL B. MARR Phone: (916)-525-7555

Service Area Size: _____ No. Connect.: 862 Population Served: 750-2000

Services Provided: RESIDENTIAL W/SOME MOTEL AND COMMERCIAL SERVICES

Summary System Description

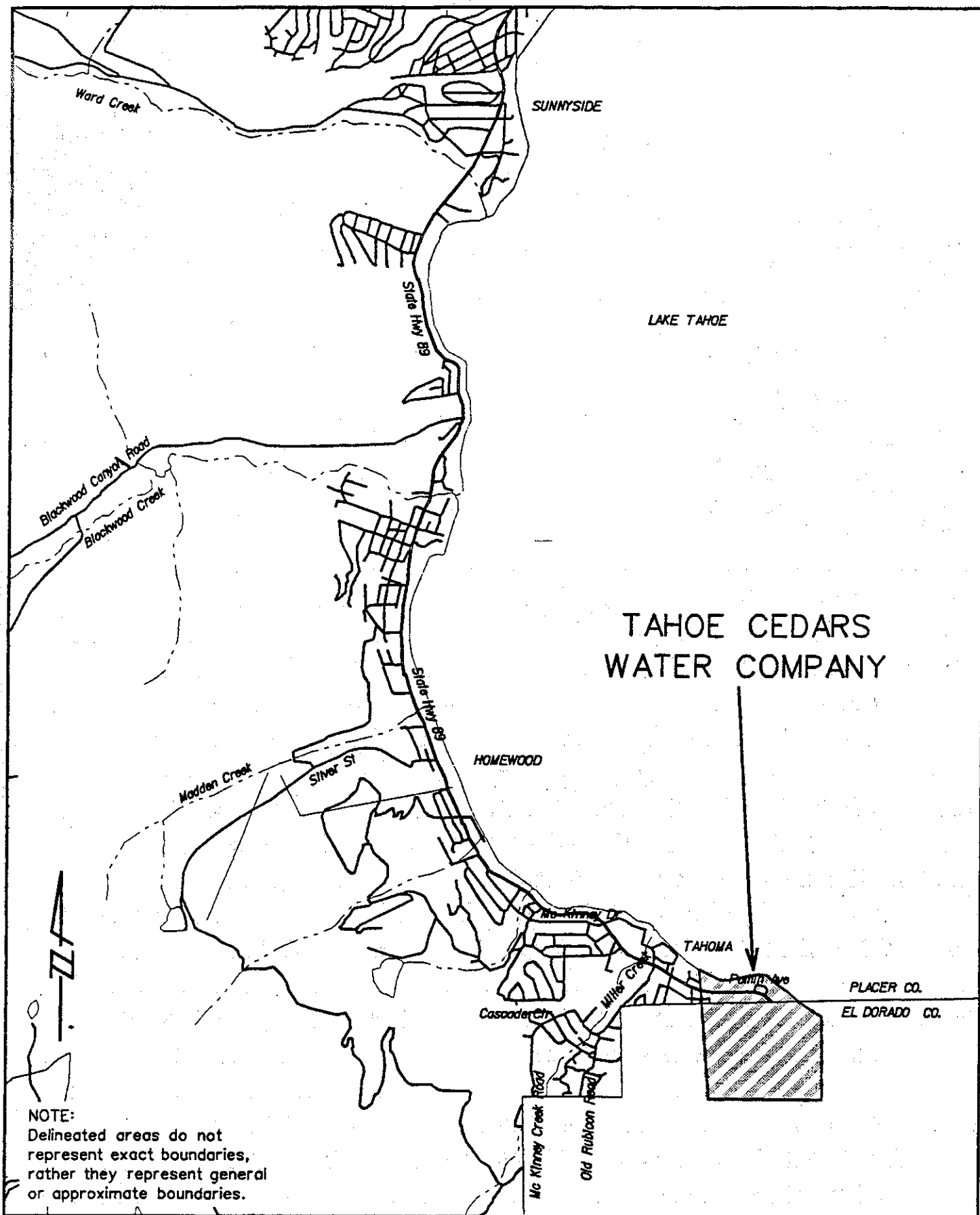
Source: PRIMARY SOURCES ARE; A VERTICLE WELL WITH CAPACITY OF 450 GPM,
A LAKE TAHOE INTAKE WITH CAPACITY OF 175 GPM, AND AN INTERTIE WITH
McKINNEY ESTATE WITH CAPACITY OF 80 GPM.

Transmission: THE DISTRIBUTION SYSTEM IS COMPRISED OF 4,6,& 8 INCH WRAPPED
AND DIPPED STEEL PIPE. MAINS ARE REPORTEDLY IN GOOD CONDITION.

Treatment: NO TREATMENT IS PROVIDED TO THE WELL WATER. GAS CHLORINATION
IS AVAILABLE FOR THE LAKE WATER SOURCE.

Storage: A 124,000 GALLON STORAGE TANK CURRENTLY PROVIDES STORAGE FOR
THE SYSTEM. FUTURE PLANS INCLUDE INSTALLATION OF AN ADDITIONAL
200,000 GALLON STORAGE TANK.

Capacity Limitations: NONE IDENTIFIED.



TAHOE CEDARS WATER COMPANY

TAHOE CITY PUBLIC UTILITY DISTRICT SUBREGIONAL, ALPINE PEAKS, AND MCKINNEY SHORES

District Overview: Tahoe City Public Utility District is comprised of four independent, unconnected, water systems: Tahoe City Subregional, Alpine Peaks, McKinney Shores, and Rubicon. The Rubicon service area is located in El Dorado County, thus is not discussed in this report.

The original water supply permit for Tahoe City Main was issued in 1969. The District is still operating under this permit with no amendments. District water supply stems from surface water (Lake Tahoe), groundwater, and spring sources. The District serves a combination of residential, commercial, camping, and governmental users. Only commercial users are metered.

Significant effort is being given, addressing growing concerns about upcoming water quality regulations (Surface Water Treatment Regulations). A recently completed water system master plan, evaluates options using groundwater verses filtration improvements with existing lake intakes. Study results recommend directing efforts towards utilizing groundwater as main source supply.

Tahoe City Subregional, serving the Tahoe City and surrounding developments, is the largest operating system in the District. The Alpine Peaks service area is located more than 4 miles from the Lake Tahoe Shore along the west side of the lake, serving an area referred to as Ward Valley. The McKinney Shores system is approximately 7 miles south of Tahoe City along Highway 29.

Following is the rate schedule and connection fees assessed during 1991:

Water service connection fee = \$800

Service Size	Metered	Flat Rate
3/4"	No	\$ 271.20/hr
1"	Yes	\$ 542.20/yr
1.5"	Yes	\$ 812.08/yr
2"	Yes	\$1,083.20/yr

The flat rate is in addition to \$1.65/1,000 gallons over 100,000 gallons/year.

Source Information: Three source types supply water to various service areas covered by the utility district; groundwater, lake water, and spring water. Supplying Tahoe City Subregional is three vertical wells and three lake intakes. Three wells have a combined capacity of 2790 gpm, and intakes can supply 2080 gpm.

No permanent interconnections with other systems exists. An emergency intertie can be made with Tahoe Park Water Company by bridging two fire hydrants.

Source Information--Alpine Springs System: The Alpine Springs system derives its water from two horizontal wells drilled into a natural spring area (Riley Spring) on the mountainside above Ward Valley. The wells gravity flow to the system at a combined maximum flow of 200 gpm. No permanent interconnections with other systems exists.

Source Information--McKinney Shores System: The McKinney Shores System derives water from a lake intake pumping station drawing water from Lake Tahoe. The intake line is 4 inch steel pipe

extending 675 from shore to a depth of 60 feet. A 15 h.p. submersible pump provides flow capacity of 150 gpm. Pump operation pump is controlled by storage tank water level. An emergency interconnection exists between this system and the Quail Lake Water Company.

Primary Transmission and Distribution--Tahoe City Subregional: Tahoe City Subregional distribution system contains two pressure zones. The lower zone pressures fluctuate from 25 - 105 psi. The lower zone receives water from all three lake intakes, a well and a spring for a combined flow supply capacity of 3000 gpm. The upper zone pressures fluctuate between 15 - 90 psi. The upper zone receives water from the systems booster stations and a well for a combined capacity of 2,800 gpm.

In recent years the District has adopted responsibility of small neighboring water systems adjacent the upper zone. Many times these systems were old and substandard, resulting in low pressure problems at higher elevations.

Several material types were used to construct distribution facility improvements historically. Materials include, thin wall welded steel, asbestos cement, PVC, polyethylene, polybutylene, and small amounts of ductile and cast iron pipe. Material amounts existing within the system currently are unknown. Sizes of water mains range from 2 -12 inches diameter and are considered to be poor/ fair condition. The District follows a program resulting in continual water main evaluation and replacement.

Overall assessment of the distribution system is fair. A significant amount of inadequately sized and poor condition mains are contained in the system, however a capital replacement program is in effect, helping to replace deteriorated mains each year.

Primary Transmission and Distribution--Alpine Peaks System: Alpine Peaks System contains two pressure zones with pressures fluctuating between 35 and 100 psi. The upper zone is served by the storage tank, while the lower zone is served directly by Riley springs through a pressure reducing station. Due to large elevation differences within district boundaries, a pressure reducing station is placed half-way down the system eliminating high pressure problems.

Water mains are constructed mostly of 6 inch and some 8 inch asbestos cement pipe, and are reportedly in good condition. Accurate maps exists mapping both location and size of mains throughout the system.

Primary Transmission and Distribution--McKinney Shores System: The McKinney Shores system contains one pressure zone maintaining a pressure range between 45 and 70 psi. Mains within the system are constructed primarily of 4 inch steel, 6 inch PVC, and 2 inch and 1 1/2 inch service connections. Condition of the mains is considered to be good.

Storage--Tahoe City Subregional System: Tahoe City Subregional is provided with a total storage capacity of 2.5 million gallons. The storage is divided among four locations throughout the district in five tanks, as shown in the following table.

TAHOE CITY SUBREGIONAL STORAGE FACILITIES

Tank Identification	Storage Material	Capacity (gal)	Number of Tanks
Bunker	redwood	0.5 MG	1
Tahoe Tavern	P.S. Concrete	0.5 MG	2
Highlands	steel	0.5 MG	1
Rocky Ridge	steel	0.5 MG	1

The Highlands and Rocky Ridge tanks serve both upper and lower pressure zones of the Tahoe City Subregional system. The Bunker tank serves the lower pressure zone. The Four Seasons tank normally serves the upper zone and lower tank serves lower pressure zone for the Tahoe Tavern area, however ability exists for these tanks to serve both pressure zones if necessary.

Storage--Alpine Peaks System: The Alpine Springs system contains one 500,000 gallon steel storage tank. The tank is gravity fed from Riley Springs.

Storage--McKinney Shores System: The McKinney Shores system contains one 12,000 gallon redwood storage tank. The tank is fed by a lake intake.

Treatment--Tahoe City Subregional: The lake intakes are exposed to significant contamination hazards such as recreation and sewage pumping stations. Disinfection by chlorination is the only treatment provided. No treatment is provided for the systems existing groundwater sources. Sodium hypochlorite is, however, added occasionally to the storage tanks maintaining the chlorine residual throughout the distribution system.

Treatment--Alpine Springs and McKinney Shores Systems: As with the lake intakes for the Tahoe City Subregional system, the only treatment provided is disinfection by chlorination.

1990 System Production: According to the 1991 annual reports for the 1990 year, the following tables show characteristic information pertaining to system production.

SYSTEM PRODUCTION INFORMATION

1990

Tahoe City Subregional	
Maximum Day Demand	-> unknown
Maximum Month Water Use	-> July/ 62.86 million gallons
Total Annual Water Use (1990)	-> 386.38 million gallons

Number of Services (not including fire hydrants)

Service type	Metered	Flat Rate	Total
general and residential		2260	2260
commercial	125	125	
Total Active Connections	125	2260	2385

Information listed in the above table serves a total permanent population of 8000 which increases up to 20,000 during peak seasonal use.

SYSTEM PRODUCTION INFORMATION 1990

Alpine Springs System
 Maximum Day Demand -> unknown
 Maximum Month Water Use -> July/ 1.0 million gallons
 Total Annual Water Use (1990) -> 6.90 million gallons

Number of Services (not including fire hydrants)			
Service type	Meters	Flat Rate	Total
general and residential	---	80	80
Total Active Connections	---	80	80

Information listed in the above table serves a total permanent population of 280 which increases up to 350 during peak seasonal use.

SYSTEM PRODUCTION INFORMATION 1990

McKinney Shores System
 Maximum Day Demand -> unknown
 Maximum Month Water Use -> July/ 2.26 million gallons
 Total Annual Water Use (1990) -> 10.43 million gallons

Number of Services (not including fire hydrants)			
Service type	Meters	Flat Rate	Total
general and residential	----	89	89
Total Active Connections	----	89	89

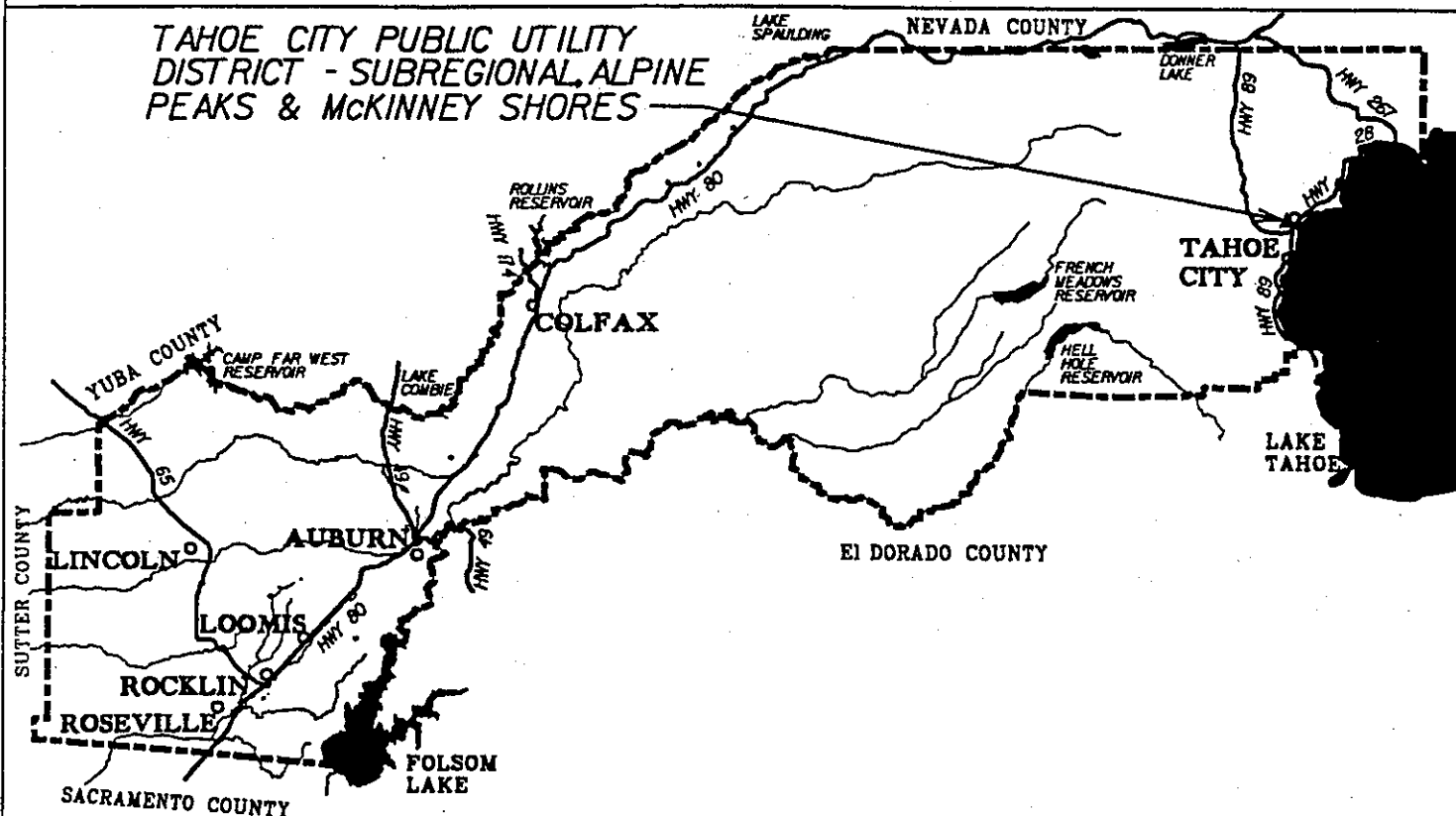
The information listed in the above table serves a total permanent population of 300 which increases up to 800 during peak seasonal use.

Deficiencies and Limitations: An issue facing the Tahoe City Public Utility District are upcoming compliance with Surface Water Treatment Regulations. The District is actively addressing this issue by directing efforts at finding and solely using groundwater as source supply. Other problems occurring are currently being addressed and resolved, such as the capital replacement program for main lines.

Existing Planned Improvements: Most significant of existing future plans are those directed at replacing Lake Tahoe as a source supply with groundwater. Additionally there are numerous capital replacement and upgrade projects, however, these are more directed at maintaining the existing system, as development expansion is limited.

System Appraisal: The Tahoe City Public Utility District plays a significant role in supplying water service to a high populous of the Tahoe Basin. The systems operated by the District are in good shape, or progressing to reach high standards. With little expansion ever expected to take place, financially the District recognizes the need to establish rates and regulations to fund and maintain adequate facilities. The most pressing objective facing the District are compliance with the Surface Water Treatment Regulations. Groundwater replacing the lake supply is a solution being closely evaluated and pursued.

PLACER COUNTY WATER SYSTEMS



System Name: TAHOE CITY PUBLIC UTILITY DISTRICT-SUBREGIONAL ALPINE PEAKS & MCKINNEY SHORES

Address: P.O. BOX 33, TAHOE CITY, CA 95730

Contact Name: DAVID ANTONUCCI Phone: (916)-583-3796

Service Area Size: No. Connections: 2554 Population Served: 8580-21,050

Services Provided: RESIDENTIAL AND COMMERCIAL WATER AND WASTEWATER

Summary System Description

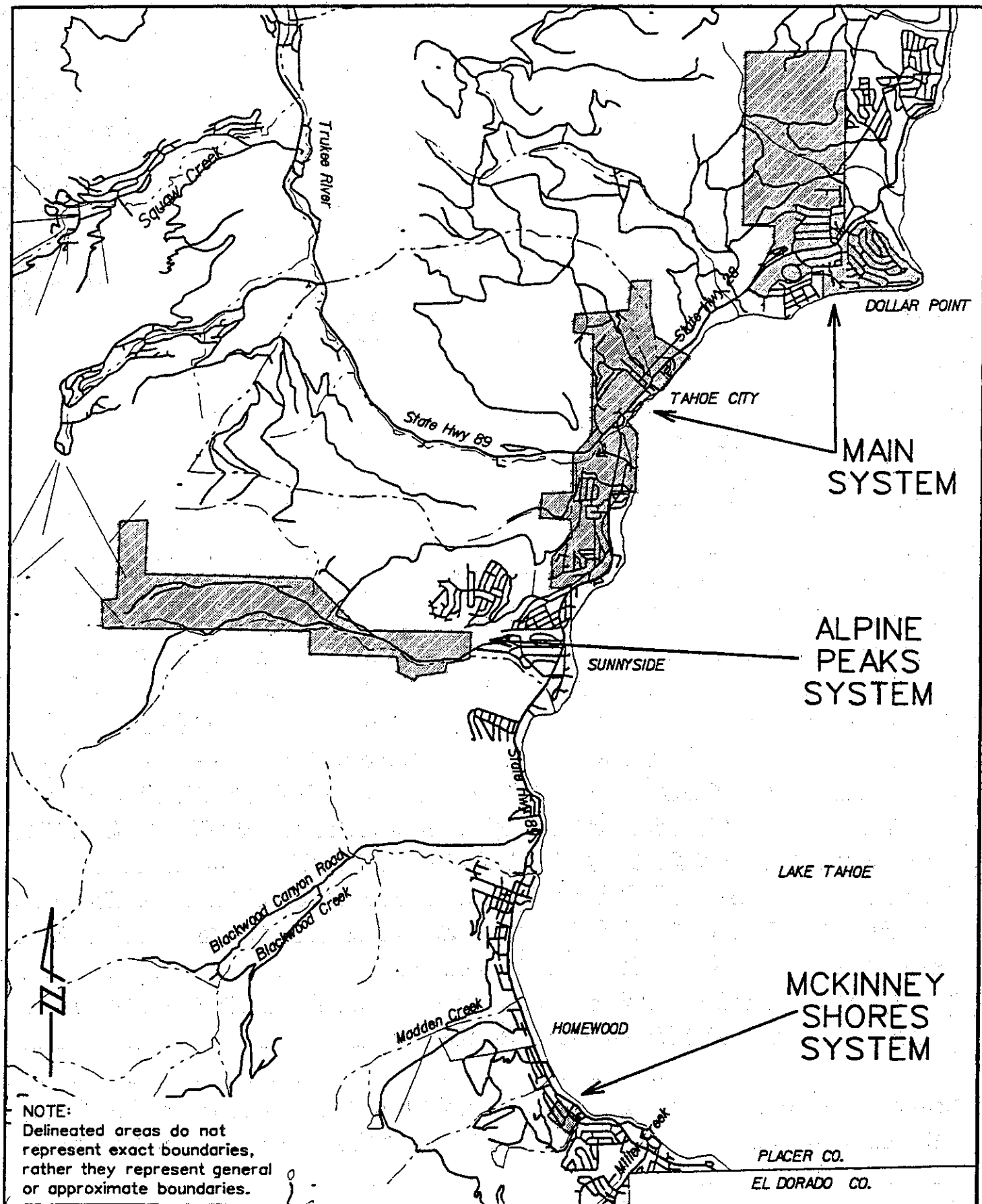
Source: THREE SOURCE TYPES SUPPLY WATER TO THE SERVICE AREAS: SUBREGIONAL- 3 VERTICAL WELLS AND THREE LAKE INTAKES; ALPINE PEAKS- TWO HORIZONTAL WELLS DRILLED INTO A NATURAL SPRING; MCKINNEY SHORES- ONE LAKE INTAKE.

Transmission: SEVERAL TYPES AND SIZE RANGES OF PIPES EXIST THROUGHOUT THE DISTRIBUTION SYSTEM. MUCH OF THE PIPE IS OLD AND UNDERSIZED AS A RESULT OF ADDITION OF SATELLITE DISTRICTS TO THE DISTRICT.

Treatment: ALL SURFACE WATER SOURCES ARE DISINFECTED BY CHLORINATION. NO TREATMENT IS PROVIDED TO GROUNDWATER SOURCES.

Storage: SUBREGIONAL HAS A TOTAL OF 2 MILLION GALLONS OF STORAGE AVAILABLE, ALPINE PEAKS HAS ONE 0.5 MILLION GALLON STEEL TANK, AND MCKINNEY SHORES HAS A 12,000 GALLON REDWOOD TANK.

Capacity Limitations: DISTRIBUTION SYSTEM RENOVATIONS AND COMPLIANCE WITH SURFACE WATER TREATMENT REGULATIONS ARE SIGNIFICANT ISSUES FOR THE DISTRICT.



TAHOE CITY PUBLIC UTILITY DISTRICT

Water Service Areas

TAHOE PARK WATER COMPANY MAIN SYSTEM, SKYLAND SYSTEM, AND NIELSON SYSTEM

District Overview: The Tahoe Park Water Company, Nielson and Skyland Systems are privately owned by a single owner. The Tahoe Park Water Company is located approximately two miles south of Tahoe City on the west shore of Lake Tahoe. Construction of the company dates back to 1908. Acquisition of two additional service areas (Skyland and Nielson Systems) resulted in a permit renewal in 1979. Relatively few system improvements have been made since the last renewal.

Areas served by the three systems are known as Tahoe Park, Miramar Heights, Sierra Estates, Skyland Area and Nielson Area. The Skyland and Nielson service areas are located along the west shore of Lake Tahoe about 2 miles south of Tahoe Park.

Source Information--Tahoe Park Main System: Sources for the Main system include a large spring and two separate lake intake pumping stations drawing water from Lake Tahoe. The spring is capable of supplying up to 400 gpm; however, it is very susceptible to fluctuations in precipitation, and is currently dry due to the drought. Water from the spring flows by gravity to the storage tanks, and is then pumped into the system.

The two lake intakes known as the Sequoia Street station and Sierra Estates station are capable of producing 550 gpm to the system. The Sequoia Street station is utilized as the primary source only when the spring is dry. The Sierra Estates station is used to assist meeting peak demands.

Two auxiliary sources are available during emergency situations: an interconnection with Talmont Water Company, and an ability to bridge two fire hydrants with Tahoe City Public Utility District.

Source Information--Skyland and Nielson Systems: The Skyland system receives water from a single lake intake station equipped with two 10 h.p. centrifugal pumps. The pumps, used on a rotation basis, are able to provide about 480 gpm to the system. There are no auxiliary sources or emergency connections to the Skyland system currently.

The Nielson System is served by a vertical groundwater well. The water is pumped directly into a hydropneumatic tank and then to the system. The well depth is 60 feet, having pumping capacity of 60-90 gpm. There are currently no auxiliary sources or emergency connections to the Nielson System.

Primary Transmission and Distribution--Main System: Although significant elevation variations exist, the Tahoe Park Main distribution system consists of one pressure zone. Pressures in the upper portion range from 35 -65 psi, pressures in the lower elevations range from 95- 125 psi. Most lower elevation services are equipped with pressure reducing devices.

Water mains are constructed of several materials and range from 2 to 6 inches in diameter. The following table lists distribution mains throughout the Tahoe Park Main system.

DISTRIBUTION AND MAIN MATERIALS AND SIZES

Material	Size	Amount (lf)	Condition
Std. Screw Steel	2 inches	12,000	poor
Welded Steel	2.5-3.5 inches	7,150	poor
Welded Steel	4 inches	3,600	poor
Welded Steel	6 inches	150	poor
Asbestos-Cement	6 inches	1,200	good
C-900 PVC	6 inches	10,150	new

The only true transmission main is contained in the Tahoe Park Main system. This main line is a 6 inch PVC C-900 approximately 1 mile long running between the Tahoe Park area along Highway 89 to the Sierra Estates area.

Primary Transmission and Distribution--Skyland and Nielson Systems: The Skyland has two pressure zones split by a pressure reducing station. Average pressures in the upper zone are 55 psi and 60 psi in the lower zone. Water mains are constructed almost entirely of 4 inch, 10 gage, double dipped and wrapped steel. The system is about 40 years old, and main lines are in poor condition.

The Nielson system is very small and consists primarily of 2 inch galvanized steel main lines. The mains are arranged in a "T" configuration, and are reportedly in good condition. One pressure zones exists having an average pressure of 60 psi. There is only one hydrant in the system which can not be effectively used for flushing purposes. Neither of the systems experiences sediment accumulation or bacterial growth problems.

Storage: A 45,000 gallon welded steel storage tank provides storage to the Tahoe Park System. The spring source is primary supplier to the tank; however, the capability exists to fill the tank with the lake intakes.

A 20,000 gallon redwood tank provides storage to the Skyland system. The tank is about 35 years old and considered structurally sound. The tank floats on the system, and is significantly smaller than recommended by the Water Works Standards. The system is quite vulnerable to power outages.

No significant storage is provided in the Nielson system. A hydropneumatic tank is located at the well site having only 3000 gallons of capacity.

Treatment: The lake intake sources of the Main and Skyland Systems are provided with disinfection by chlorination. The Nielson system does not provide any treatment.

1990 System Production: Following are system production tables for each of the three physically separate water systems.

Main System

Maximum Day Production ->unknown
 Month of Maximum Water Use ->July
 Total Annual Water Usage ->200 Ac.-ft.

The Main System serves a total permanent population of 1600 and a seasonal maximum of 3200.

Connections are broken down as follows:

	Metered	Flat Rate	Total
General and Residential	23	399	422
Commercial	4		4
Total Active	27		426

Skyland System

Maximum Day Production unknown
 Month of Maximum Water Use July
 Total Annual Water Usage unknown

The Skyland System serves a total permanent population of 210 and a seasonal maximum of 280.

Connections are broken down as follows:

	Metered	Flat Rate	Total
General and Residential	0	70	70
Commercial	0	0	0
Total Active	0	70	70

Nielson System

Maximum Day Production unknown
 Month of Maximum Water Use July
 Total Annual Water Usage unknown

The Nielson System serves a total permanent population of 12.

Connections are broken down as follows:

	Metered	Flat Rate	Total
General and Residential	0	6	6
Commercial	0	0	0
Total Active	0	6	6

Deficiencies and Limitations-- Main System: The spring source reliability is sensitive to previously yearly precipitation. Additionally, when using the well disinfection of the lake water can become somewhat diluted since the spring source receives no treatment.

Compliance with the surface water treatment regulations is also an issue which will soon have to be addressed for both the Main and Skyland systems. The condition of the Main distributions system is also questionable. Many of the lines freeze because of lack of ground cover and much of the system is quite old.

Deficiencies and Limitations--Skyland and Nielson Systems: Presently the Skyland and Nielson systems lack backup supplies during emergencies like power outages. Condition of the distribution system for these systems is also in question. The system is approximately 40 years old and much of the system is undersized.

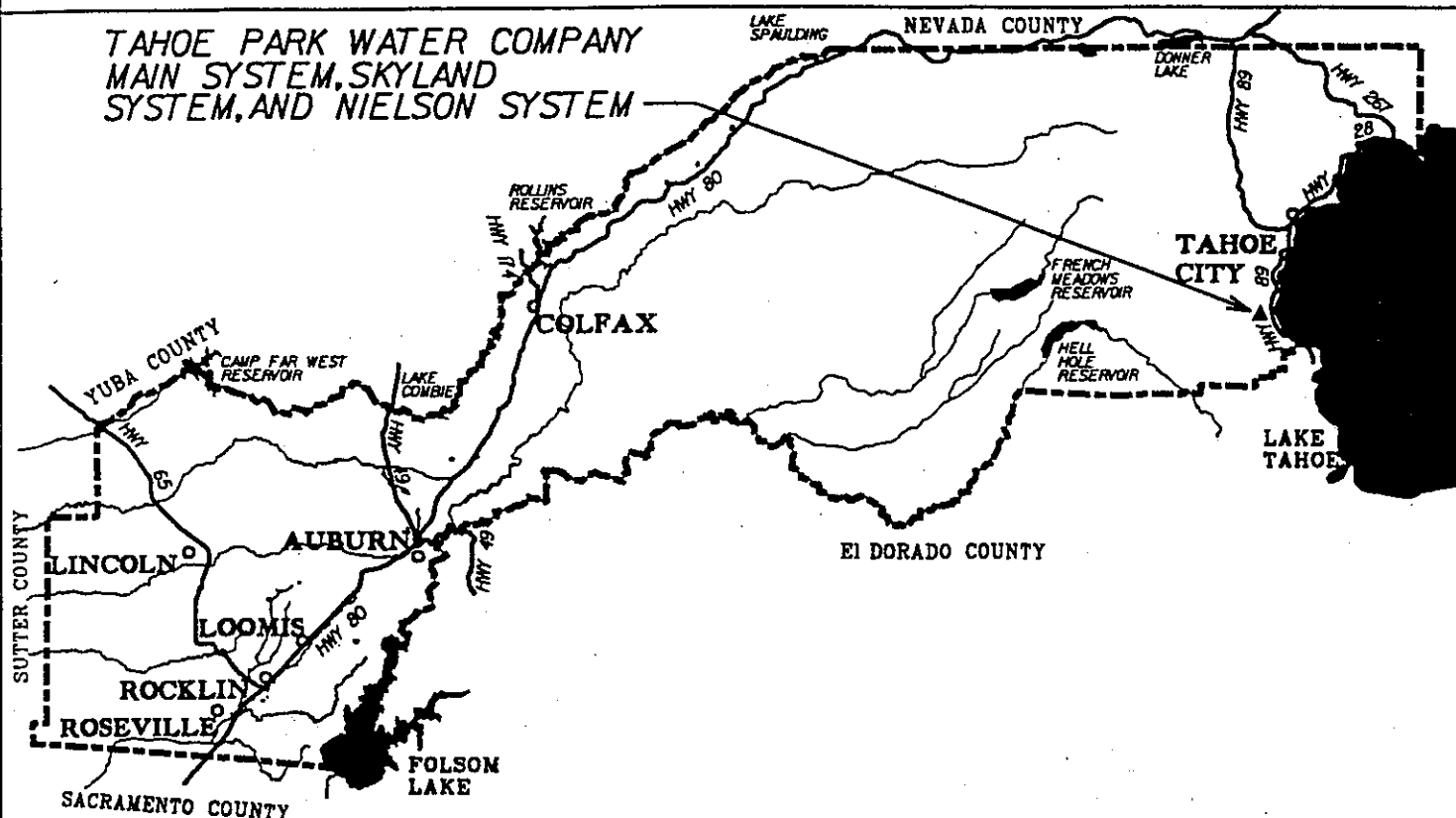
Existing Planned Improvements: Future plans include interconnecting the Skyland and Nielson systems, thus the Nielson well could serve as source to both. This would enable the Skyland system to abandon its lake intakes which would need to be in compliance with the surface water treatment regulations.

Research for an alternate groundwater supply is currently underway for the Main system. Also, attention is being given to replacement of old undersized mains for all three systems.

System Appraisal: The Tahoe Park systems are well maintained and capable of providing adequate quantities of good quality water. Major issues include a main replacement program, and compliance with the surface water treatment regulations.

PLACER COUNTY WATER SYSTEMS

TAHOE PARK WATER COMPANY
MAIN SYSTEM, SKYLAND
SYSTEM, AND NIELSON SYSTEM



System Name: TAHOE PARK WATER COMPANY-MAIN, SKYLAND, AND NIELSON SYSTEMS.

Address: P.O. BOX 51, TAHOE CITY, CA 95730

Contact Name: DAVID ROBERTSON Phone: (916)-581-2623

Service Area Size: No. Connections: Population Served: 3200/280/12

Services Provided: PRIMARYLY RESIDENTIAL MAX.

Summary System Description

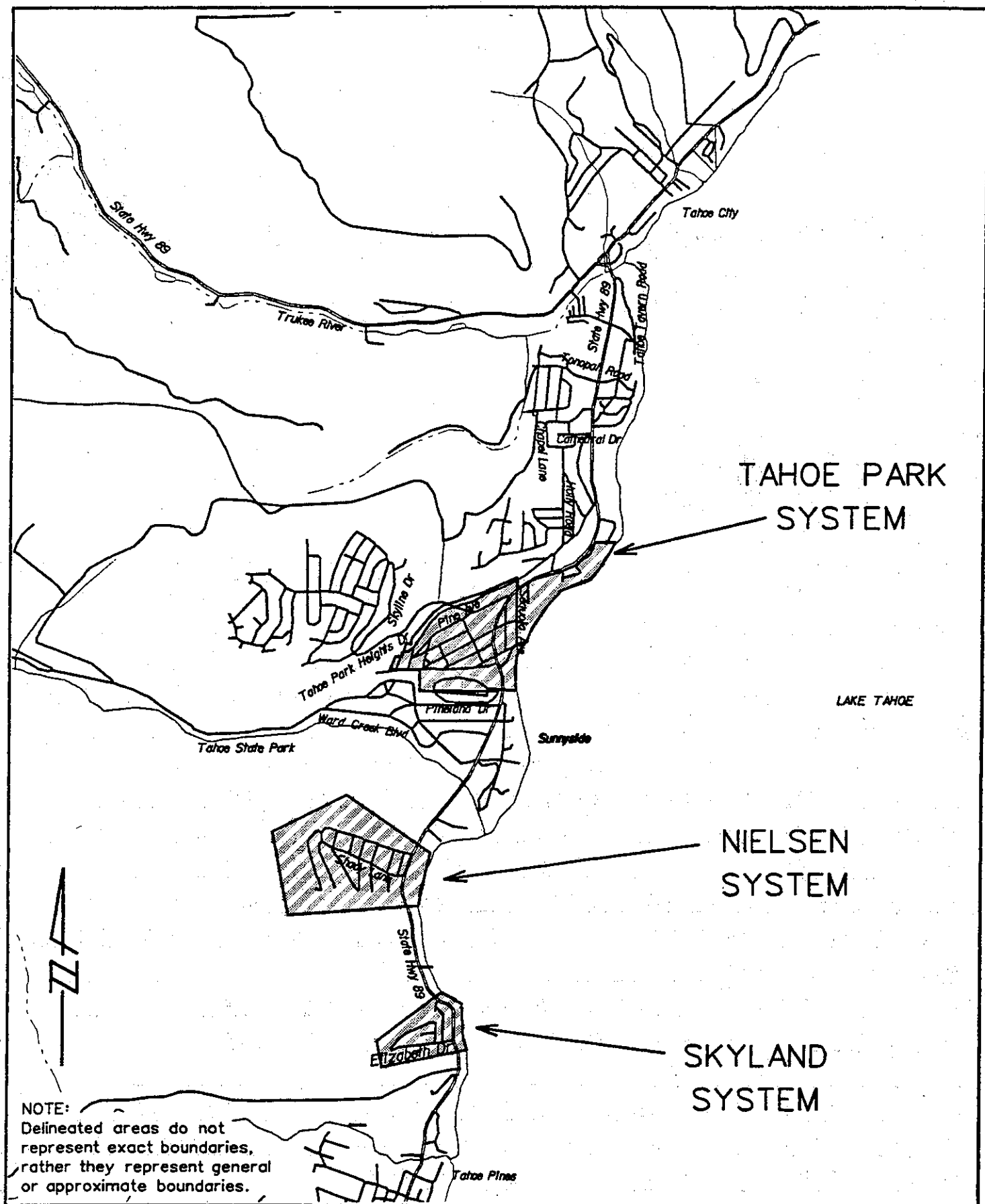
Source: MAIN SYSTEM-INCLUDES A LARGE SPRING AND TWO LAKE TAHOE INTAKES
TOTALING 950 GPM. SKYLAND-HAS A SINGLE LAKE TAHOE INTAKE TOTALING 480 GPM
AND THE NIELSON SYSTEM IS SERVED BY A WELL PRODUCING 60-90 GPM.

Transmission: THE DISTRIBUTION SYSTEM IS COMPRISED OF A WIDE VARIETY AND
RANGE OF PIPE TYPES AND SIZES. MUCH OF THE DISTRIBUTION SYSTEM IS UNDERSIZED
AND IN POOR CONDITION.

Treatment: THE LAKE INTAKES ARE PROVIDED WITH DISINFECTION BY
CHLORINATION. THE NIELSON WELL DOES NOT PROVIDE ANY TREATMENT.

Storage: A 45,000 GALLON WELDED STEEL TANK SUPPLIES GRAVITY STORAGE TO
THE MAIN SYSTEM. A 20,000 GALLON REDWOOD TANK FLOATS ON THE SKYLAND SYSTEM,
AND NO STORAGE IS PROVIDED TO THE NIELSON SYSTEM.

Capacity Limitations: THE SPRING SOURCE FLUCTUATES WITH YEARLY PRECIPITATION.
COMPLIANCE WITH SURFACE WATER TREATMENT REGULATIONS FOR LAKE INTAKES AND
DISTRIBUTION SYSTEM CONDITIONS ARE SIGNIFICANT FUTURE ISSUES.



TAHOE PARK WATER COMPANY

Water Service Areas

TAHOE SWISS VILLAGE UTILITY/TAHOE PINES

District Overview: Tahoe Swiss Village Utility/Tahoe Pines was first granted a water supply permit to operate a domestic water system serving an area between Tahoe Pines and Homewood by Placer County Environmental Health Services in 1963. This Utility operates two systems to serve the combined area. The State Department of Health Services assumed jurisdictional responsibility in the mid 70's. The systems are privately owned and operated.

Source Information: Both systems appropriate water from intakes on Lake Tahoe. The Tahoe Swiss Village Utility intake extends 300 ft. long and is 37 ft. deep. The Tahoe Pines intake is 500 ft. long and 47 ft. deep. System intake structure depths fluctuate with changes in lake level.

Primary Transmission and Distribution: Upgrades over the past decade have renovated the distribution system. The Tahoe Swiss Village Utility intake transmission line is 4 inch and 6 inch pipe extending through the service area to a booster station. The booster station in turn feeds two 12,000 gallon redwood storage tanks. The Tahoe Pines transmission line intake is 4 inch and 6 inch pipe and extends across the service area to a 50,000 gallon storage tank. Distribution lines, considered to be in good shape, are composed primarily of 2,426 feet of steel and C-900 PVC pipe. An interconnection between the systems exists, and is balanced using a Cla-Val at the Tahoe Swiss lower tank. During emergencies Tahoe Swiss Village Utility, Inc. is able to provide service to the system using any one of three sources.

Storage: Three storage tanks are available between the two systems: one 50,000 gallon welded-steel tank and two 12,000 gallon redwood tanks serving the entire service area. The tanks are reportedly in acceptable condition.

Treatment: The only treatment provided is disinfection by chlorination. Each lake intake pump station is equipped with a hypochlorinator operating when the intake pump is activated. Chlorine residual is measured at various points within the system.

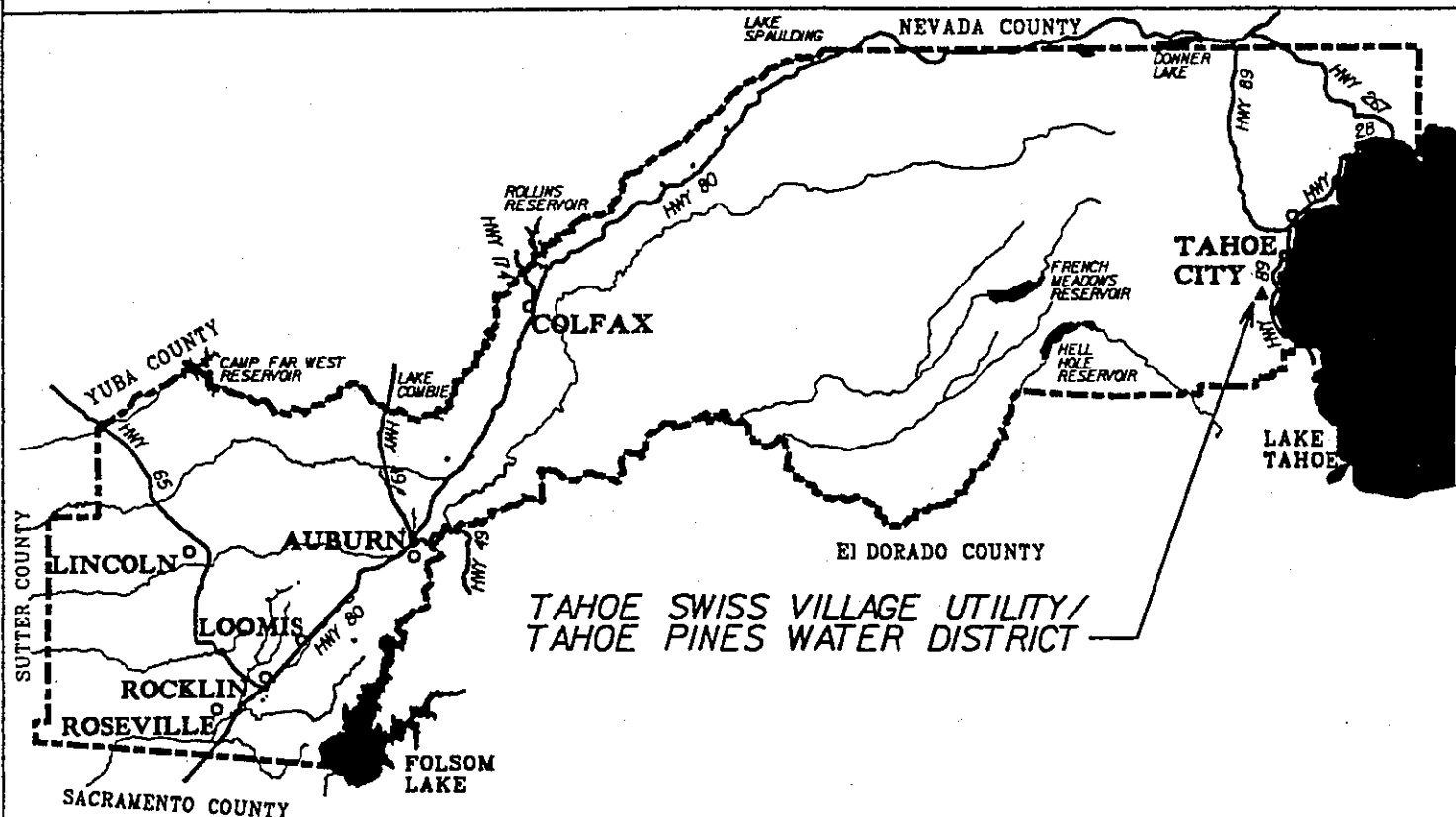
1990 System Production: The systems serve a total of 340 active connections. The system produced an estimated 64 million gallons during the 1990 year with August as the peak month.

Deficiencies and Limitations: No major deficiencies or limitations which prohibit the ability to serve water of adequate quality and supply currently exist. Nevertheless, compliance with newly adopted surface water treatment regulations (SWTR) is an issue which is being addressed. Given the extensive permit process in the Lake Tahoe basin, compliance could become a major issue.

Existing Planned Improvements: Among the most significant planned improvements is compliance with the newly implemented SWTR. Current action to design state-of-the-art treatment facilities is underway. Full compliance with surface water treatment regulations is required by 1993, and it is expected that Tahoe Swiss Village Utility will achieve compliance in an acceptable time frame. Rehabilitation of a spring is also considered a necessary improvement.

System Appraisal: The Tahoe Swiss Utility Inc. service area is privately owned and operated. The distribution and storage facilities are in excellent condition. The most significant issue facing the areas is compliance with surface water treatment regulations. The decision has been made to pursue research, design, and construction of a water treatment facility for both lake intakes and design a spring reconstruction.

PLACER COUNTY WATER SYSTEMS



System Name: TAHOE SWISS VILLAGE UTILITY INC.

Address: P.O. BOX 102, HOMEWOOD, CA 96141

Contact Name: STEVE GLAZER Phone: (916) 525-6659

Service Area Size: No. Connections: 340 Population Served:

Services Provided: EXCLUSIVELY RESIDENTIAL CONNECTIONS

Summary System Description

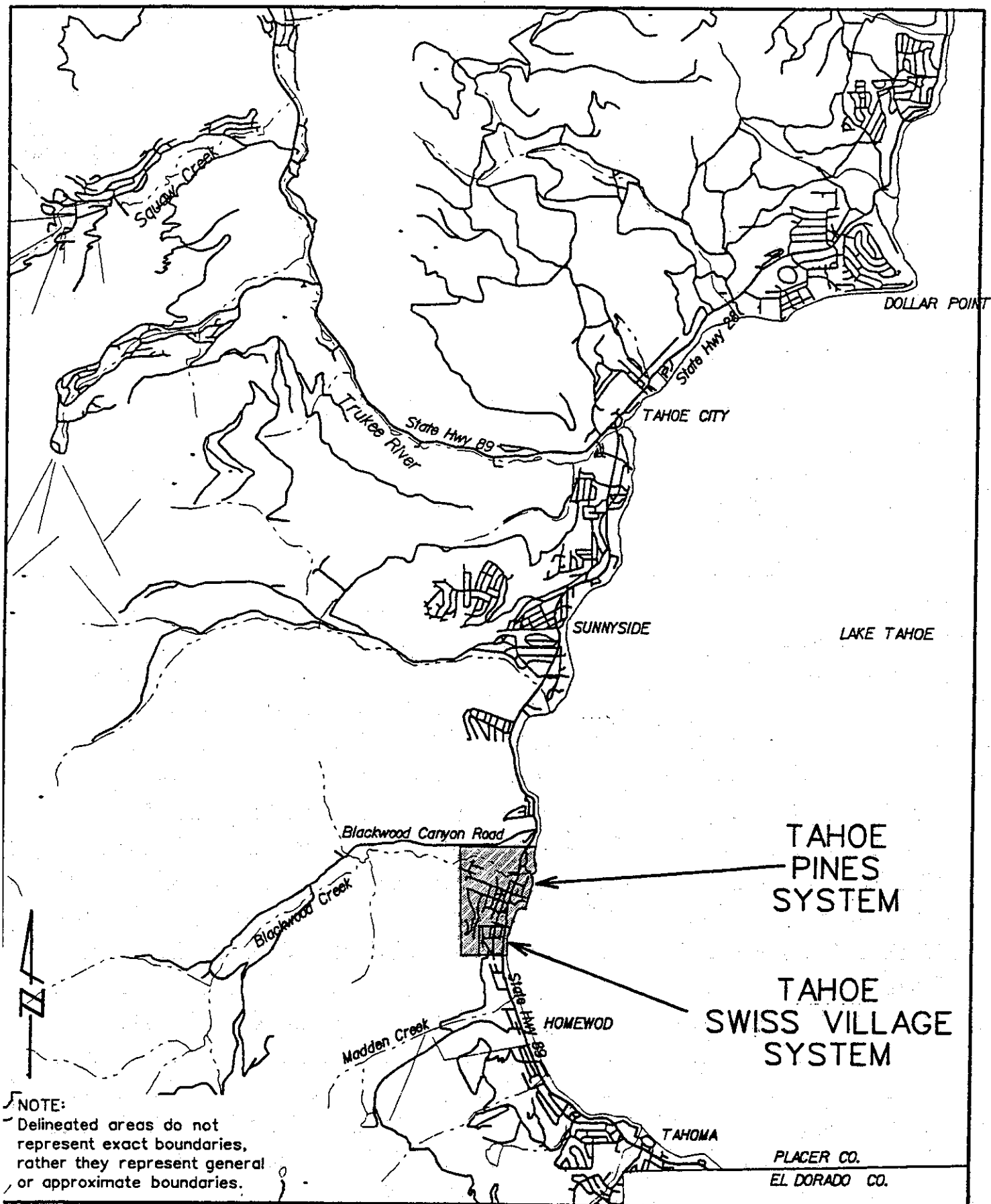
Source: TWO LAKE INTAKES ON LAKE TAHOE. THE SWISS VILLAGE INTAKE IS APPROXIMATELY 300 FT. LONG AND 37 FT. DEEP. THE TAHOE PINES INTAKE IS 500 FT. LONG AND 47 FT. DEEP. THE SYSTEM ALSO USES A 150 FT. DEEP WELL LOCATED AT ST. MICHAELS WOODS AND A SPRING AT THE WEST END OF GRAND AVE.

Transmission: WATER IS TRANSMITTED THROUGH THE SERVICE AREAS VIA A 2, 4 & 6 INCH PIPE TO STORAGE TANKS WHICH GRAVITY FEED THE RESPECTED DISTRIBUTION SYSTEM.

Treatment: THE ONLY TREATMENT PROVIDED IS DISINFECTION BY CHLORINATION.

Storage: 74,000 GALLON OF STORAGE ARE AVAILABLE BETWEEN BOTH SYSTEMS; A 50,000 GALLON WELDED STEEL TANK SERVES THE TAHOE PINES DISTRIBUTION SYSTEM AND (2) 12,000 GALLON REDWOOD TANKS SERVE THE SWISS VILLAGE.

Capacity Limitations: CURRENT EFFORTS ARE DIRECTED TOWARDS IMPLEMENTING WATER TREATMENT PROCESSES TO COMPLY WITH SURFACE WATER TREATMENT REGULATIONS.



TAHOE SWISS VILLAGE UTILITY Water Service Areas

TALMONT RESORT IMPROVEMENT DISTRICT

District Overview: Talmont is located on the west side of Lake Tahoe, approximately 2 miles southeast of Tahoe City. Until 1990 Talmont was regulated by Placer County Environmental Health Department. Its undergoing jurisdictional change with a permit application to Department of Health Services.

The District is governed by a five member elected board of directors. The elected supervisor always sits on the board. The subdivision has not changed much since it was constructed in the 1960's. It is expected that full potential buildout will never be reached.

Source Information: Talmont Resort Improvement District is supplied by a well, located on Washoe Way and constructed in 1959. The well is approximately 250 ft. deep. It is equipped with a 50 h.p. submersible pump providing approximately 250 gpm. Talmont also has one intertie with Tahoe Park Water Company. The intertie consists of a 2 inch connection to a booster pump located in the well pump building. The intertie is used only during emergencies and can transmit water both directions.

Primary Distribution and Transmission: Large elevation variations within the district boundaries of Talmont Resort Improvement District constitute three pressure zones within the distribution system. Pressure reducing valves regulate pressures throughout the system keeping them between 40 - 50 psi.

Water is pumped from the well to a steel bolted reservoir called the Skyline tank, which serves as source for the Silver Tip tank. A 50 h.p. booster pump at the Skyline tank supplies the Silver Tip tank. The Silver Tip tank supplies the lower distribution system. Booster pumps (10 hp and 8 hp) operating alternately, supply the Mont Clair tank which in turn gravity feeds the middle pressure zone. A booster pump at the Mont Clair also supplies the upper pressure zone.

Ninety-five percent of the distribution mains in the Talmont system are constructed of asbestos-cement pipe. Eighty-five percent of the lines are 6 inch and ten percent is 8 inch diameter. The remaining five percent is made up of 6 inch cast iron. Overall condition of the mains is considered to be good.

Storage: The system is provided with a total storage capacity of 381,000 gallons between three storage tanks. The storage tanks are outlined in the following table.

STORAGE TANKS

Tank Name	Location	Material	Size	Condition
Skyline	lower zone	steel bolted	60,000	good
Silver Tip	middle zone	steel bolted	110,000	good
Mont Clair	upper	steel bolted	210,000	good

The Skyline tank, constructed in 1985, acts as a pumping reservoir and receives water directly from the well 500 feet below. Water from this tank is pumped to the Silver Tip tank prior to entering the distribution system.

The Silver Tip tank receiving water from the Skyline tank serves the lower pressure distribution zone. It also acts as a pumping reservoir to the Mont Clair storage tank. The tank was constructed in the 1960's and is being replaced in the near future.

The Montclair tank is the upper-most tank receiving water from the Silver Tip tank pumping station. This tank floats on the middle zone of the system and also acts as a pumping reservoir for a booster pump supplying the upper pressure zone.

The tanks are all telemetry controlled through phone lines. The provided storage capacity more than doubles the 160,000 gallons of storage required by Water Works Standards. Under normal conditions enough storage is provided to supply the District for approximately one week.

Treatment: Water produced and distributed by this system receives no treatment. The bacteriological and chemical quality of the water is reported excellent. The well is not equipped with chlorination facilities nor does it have connections or taps necessary for emergency disinfection.

1990 System Production: The systems service area consists of approximately 260 service connections, all of which are flat rate charged, serving a permanent resident population of 450. Seasonal variations can cause substantial population increases up to 1500. According to the 1991 annual report the system provided a maximum monthly water use of 8.2 million gallons during the month of July. The system provided a total 63.4 million gallons for the 1990 year.

The system is equipped with water meters between each storage facility. These water meters allow for monitoring of water use and also assist in leak detection.

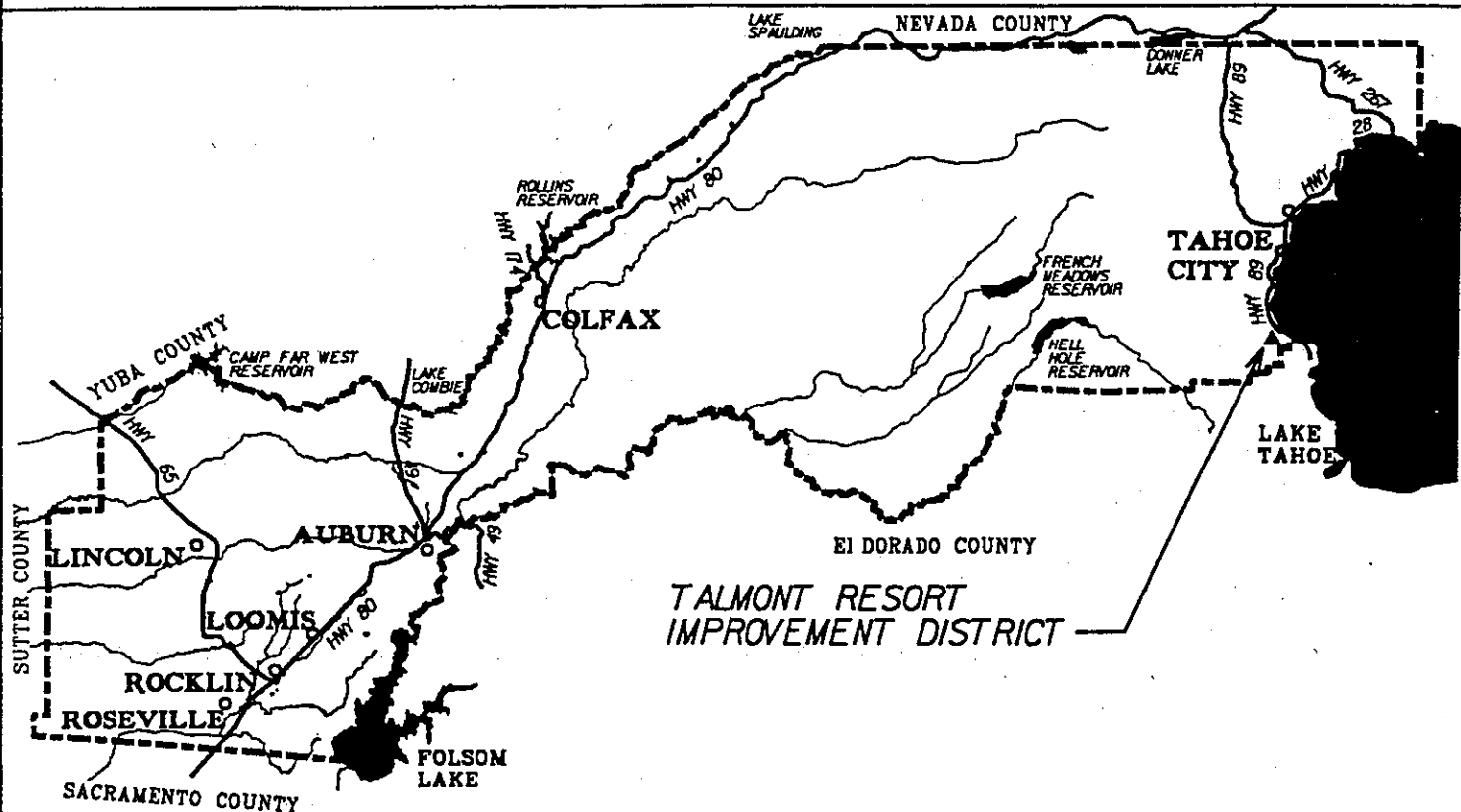
Deficiencies and Limitations: The Talmont Resort Improvement District experiences no significant difficulties or limitations which prohibit supplying water of adequate quality and quantity.

Existing Planning Improvements: Like most water systems within the Tahoe Basin, development within Talmont Improvement District service area boundaries is quite stagnant and is projected to remain that way for quite some time. The most significant improvement planned is replacement of the 110,000 gallon steel tank. In the mid 80's the District began implementation of a capital improvement fund. This fund provides for main replacement and other maintenance costs such as storage tank maintenance; however, replacement of a storage tank using current funds would more than deplete the account. Therefore, a one time assessment fee applied to all residents is going to pay for replacement this time.

The depth of a sanitary seal on the well or whether the seal actually exists is currently unknown. Surface water is not a great health threat; however, probability always exists for contamination.

System Appraisal: As previously stated, development within Talmont Resort Improvement District service areas is stagnant. Adequate water delivery of sufficient quality and quantity exists to the system. The major function of the District is maintenance and operation, of which funding from the capital improvement program is expected to greatly assist. Another important issue is the sanitary seal on the well. Little is known about this characteristic, and research will probably be needed for future requirements.

PLACER COUNTY WATER SYSTEMS



System Name: TALMONT RESORT IMPROVEMENT DISTRICT

Address: P.O. BOX 1294, TAHOE CITY, CA 95730

Contact Name: LOU BIRO Phone: (916)-583-4976

Service Area Size: No. Connections: Population Served: 450-1500

Services Provided: PRIMARYLY RESIDENTIAL

Summary System Description

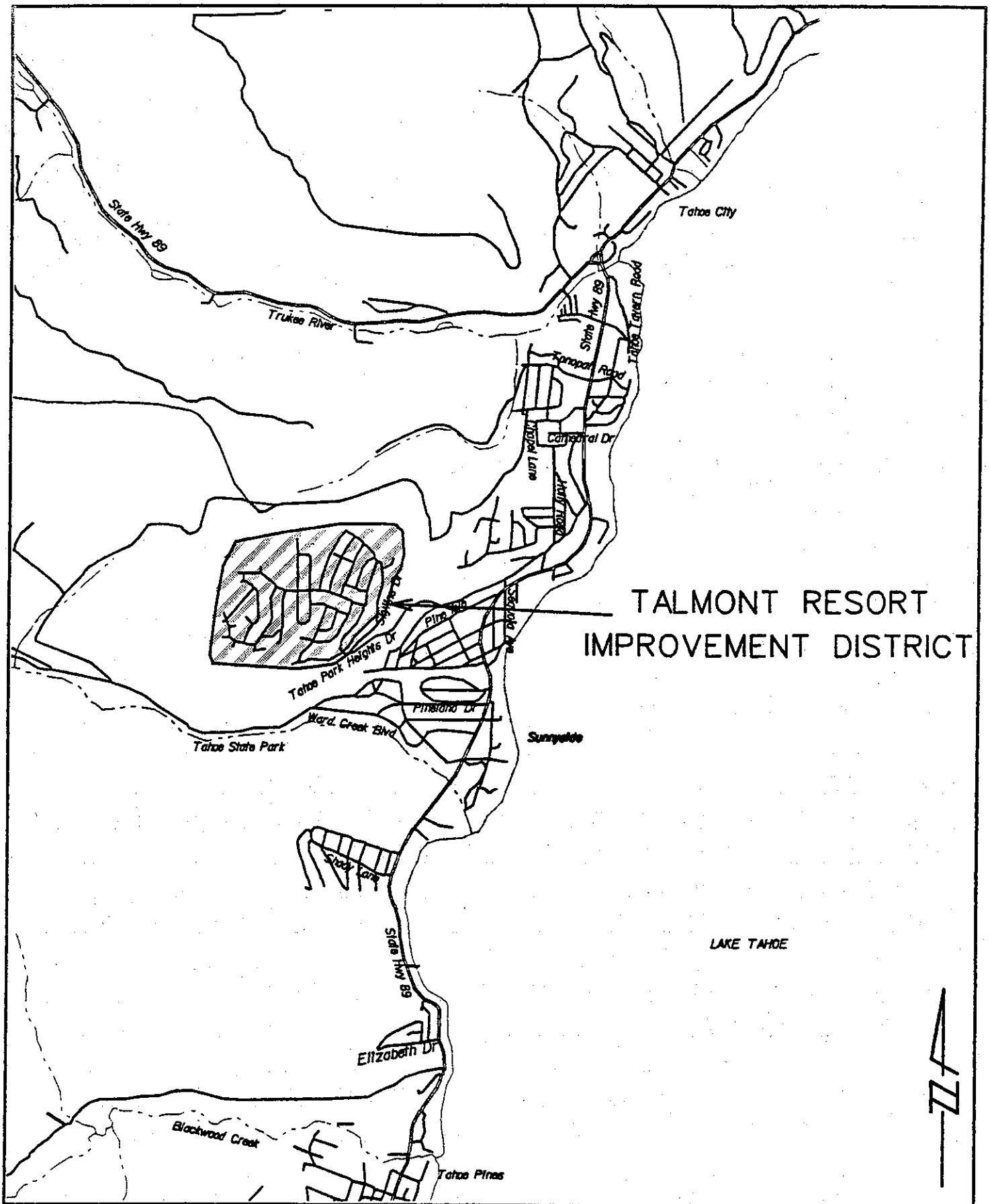
Source: THE DISTRICT IS SUPPLIED BY A WELL WHICH WAS CONSTRUCTED IN 1959. THE WELL HAS THE CAPACITY TO PROVIDE 250 GPM. A 2-INCH EMERGENCY INNERTIE ALSO EXISTS WITH TAHOE PARK WATER COMPANY.

Transmission: NINETY-FIVE PERCENT OF DISTRIBUTION MAINS ARE CONSTRUCTED OF ASBESTOS CEMENT PIPE. THE REMAINING FIVE PERCENT ARE 6 INCH CAST IRON. MOST MAINS RANGE FROM 6 - 8 INCH DIAMETER.

Treatment: WATER PRODUCED AND DISTRIBUTED BY THIS SYSTEM RECEIVES NO TREATMENT.

Storage: THE SYSTEM IS PROVIDED WITH A TOTAL STORAGE CAPACITY OF 381,000 GALLONS BETWEEN THREE STORAGE TANKS.

Capacity Limitations: THE DISTRICT EXPERIENCES NO SIGNIFICANT DIFFICULTIES OR LIMITATIONS, WHICH PROHIBIT SUPPLYING WATER OF ADEQUATE QUALITY AND QUANTITY.



TALMONT RESORT IMPROVEMENT DISTRICT

WARD WELL WATER COMPANY

District Overview: The Ward Well Water Company was granted a water supply permit in 1959 by the Placer County Health Department. Jurisdictional surveyance changed to State Department of Health Services in 1975. Ward Well Water Company is located in the Ward Valley area just off the west shore of Lake Tahoe.

Source Information: Ward Well water shed is the fourth largest in the Tahoe basin, inclusive of 1) Upper Truckee River, 2) Trout Creek, and 3) Blackwood Creek. The water shed covers an area of 31.0 square kilometers.

Ward Well Water Company consists of three well sources. Current production rates are as follows: Well 1 (55 gpm), Well 2 (90 gpm), and Well 3 (75 gpm). According to the California Code of Regulations, Title 22, (CCR) the minimum source capacity of 400 gpm is required for a this system. Current maximum production rate for all sources in this system is 220 gpm, thus yielding a 180 gpm deficit.

Primary Transmission and Distribution: The distribution system consists of a single pressure zone. Operating pressures range between 125-170 psi. System mains consists of 12 gage dipped and wrapped steel (42%), and galvanized steel pipe (58%). Pipe sizes range from 4 - 6 inches and 1 - 2.5 inches respectively. Most of the mains are reportedly in good condition.

Storage: The distribution system is equipped with a 55,000 gallon concrete tank which provides storage and system pressure. The tank is in fair condition.

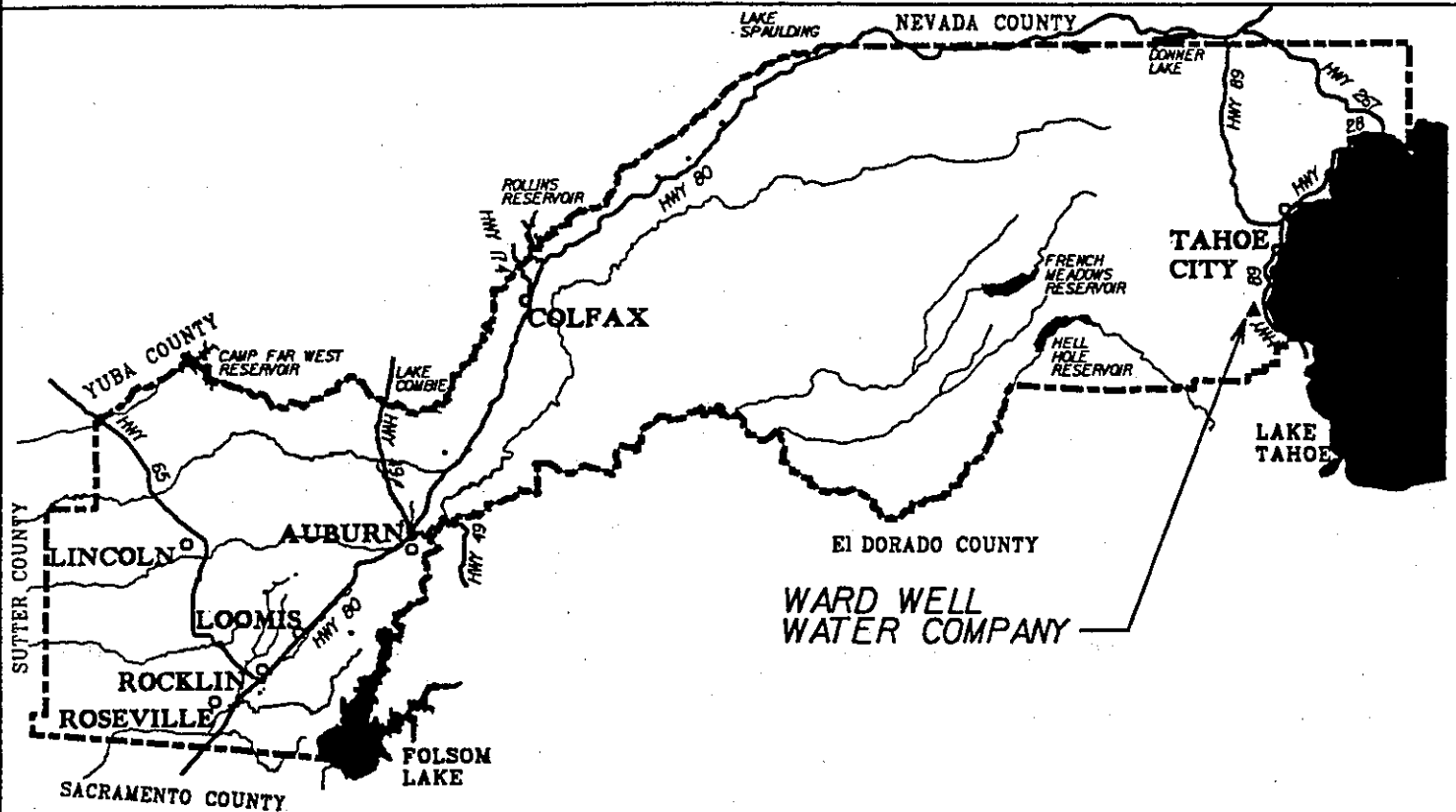
Treatment: No treatment is provided at any of the well sites.

1990 System Production: According to the 1991 annual report Ward Well Water Company provided service to 196 residential connections during 1990. Since there are no meters within the system production capacities are unknown.

Deficiencies and Limitations: The only real deficiencies with the system is the condition of the storage tank and the production deficit outlined by the CCR's.

System Appraisal: The Ward Well Water Company is able to provide good quality to its customers. Other than the above mentioned deficiencies mentioned, the water system is in good shape. Should continued development ever resume water supply will be a limiting factor as the system currently exists.

PLACER COUNTY WATER SYSTEMS



System Name: WARD WELL WATER COMPANY

Address: P.O. BOX 503, TAHOE CITY, CA 95730

Contact Name: STEVE McDONALD Phone: (916)-581-2231

Service Area Size: _____ No. Connect.: 197 Population Served: UNKNOWN

Services Provided: FLAT RATE RESIDENTIAL

Summary System Description

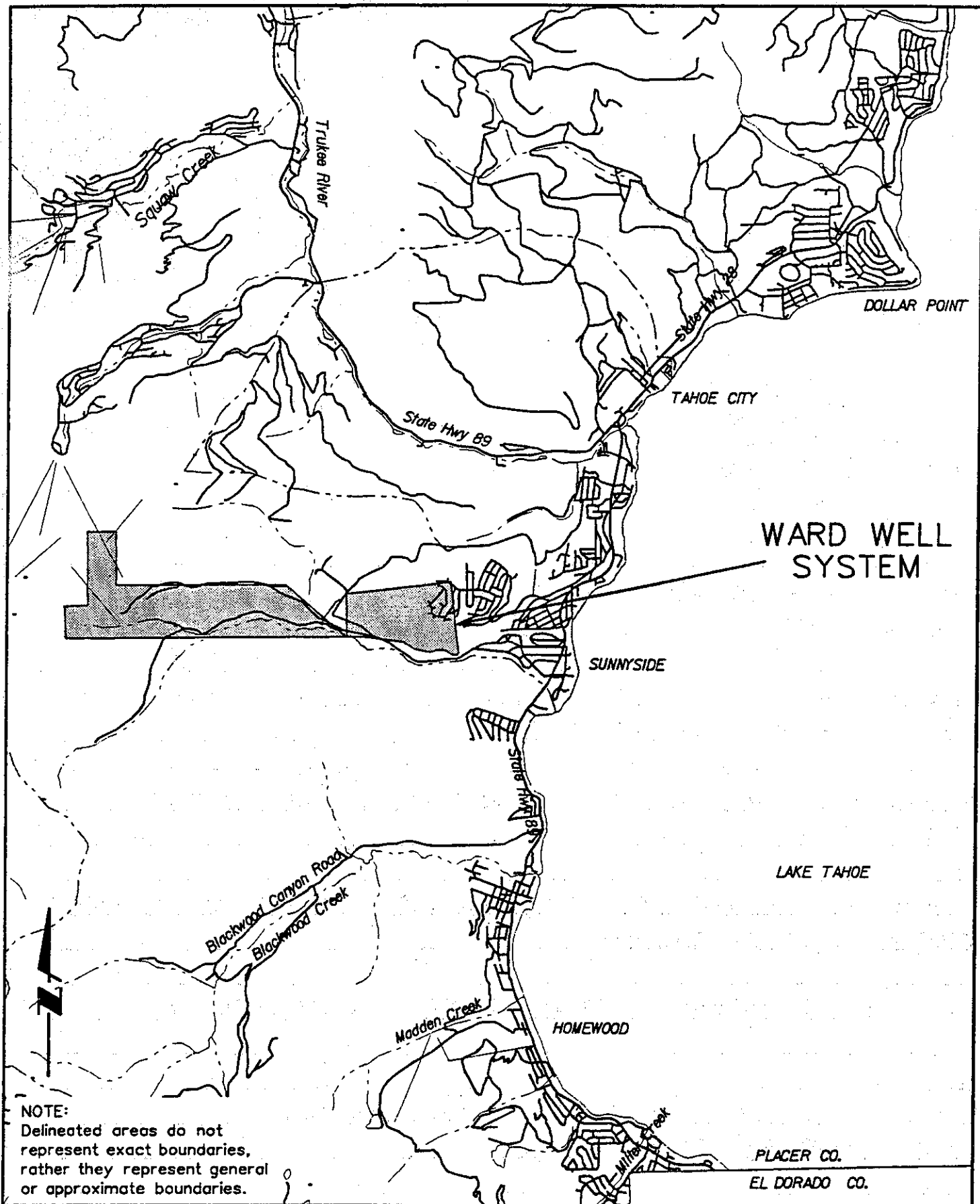
Source: THE SYSTEM CONSISTS OF THREE WELL SOURCES HAVING A COMBINED CAPACITY OF 220 GPM.

Transmission: THE DISTRIBUTION MAINS CONSIST OF 12 GUAGE DIPPED AND WRAPPED STEEL AND GALVANIZED STEEL PIPE.

Treatment: NO TREATMENT IS PROVIDED TO WATER PRODUCED BY THE SYSTEM.

Storage: THE SYSTEM IS EQUIPPED WITH A 55,000 GALLON CONCRETE TANK WHICH PROVEDES BOTH STORAGE AND PRESSURE.

Capacity Limitations: MANY OF THE ADMINISTRATIVE MONITORING DUTIES AND REPORTS NEED EITHER IMPLEMENTATION OR UPDATING.



WARD WELL WATER COMPANY Water Service Areas

WEIMAR WATER COMPANY

District Overview: Weimar is an unincorporated community located approximately 13 miles northeast of Auburn. Weimar Water Company, an investor owned company, serving three other water districts: Midway Heights, Timber Hills Mutual Water Company, and the Weimar Institute.

The company started in 1964 with construction of a 1 MGD water treatment plant and currently operates under a permit issued in 1987. The 1 MGD conventional water treatment plant draws water from PCWA's Boardman Canal.

Following is the rate schedule assessed during 1991:

Service Size	Metered
5/8"	\$8.20 per month service charge, 1st 300 ft ³ @ 1.14/100 ft ³ ; 1.49/over 300 ft ³
3/4"	\$9.00 per month service charge, 1st 300 ft ³ @ 1.14/100 ft ³ ; 1.49/over 300 ft ³
1"	\$12.20 per month service charge, 1st 300 ft ³ @ 1.14/100 ft ³ ; 1.49/over 300 ft ³
1.5"	\$16.25 per month service charge, 1st 300 ft ³ @ 1.14/100 ft ³ ; 1.49/over 300 ft ³
2"	\$22.00 per month service charge, 1st 300 ft ³ @ 1.14/100 ft ³ ; 1.49/over 300 ft ³

Source Information: Weimar Water Company purchases water from PCWA's Boardman Canal. Water is purchased by the Miners Inch (1/40 CFS or 11.25 gpm). A pump station located along the Boardman Canal pumps water to the conventional water treatment plant.

Primary Transmission and Distribution: Water is lifted from the canal by two pumps to a 460,000 gallon rectangular raw water basin. Full treatment is then provided using dual media gravity filters. The treated water is then boosted to fill (4) 60,000 gallon steel storage tanks, which gravity feed the system. Water mains throughout the system are composed of steel (approximately 77%) and PVC (approximately 23%). The steel mains range in size from 2 - 14 inches diameter and range in good to poor condition. The PVC lines range from 4 - 8 inch and are in good condition. Due to the amount and age of steel lines an aggressive corrosion control program is practiced.

Storage: Storage provided to the system consists of a 460,000 gallon raw water reservoir, and (4) 60,000 gallon steel storage tanks. The raw water reservoir is constructed of earth embankments. The steel storage tanks are reportedly in fair condition.

Treatment: Full complete conventional treatment is provided for water drawn from the Boardman Canal. Significant sanitary hazards are exposed to the canal, such as recreation, drainage from I-80, on-site sewers, and dead animals. Water is coagulated with alum, flocculated, settled, then filtered through dual media gravity filters followed by chlorination. The treatment plant capacity is 1 MGD. Turbidity fluctuations in Boardman Canal is an occasional problem after winter rainstorms.

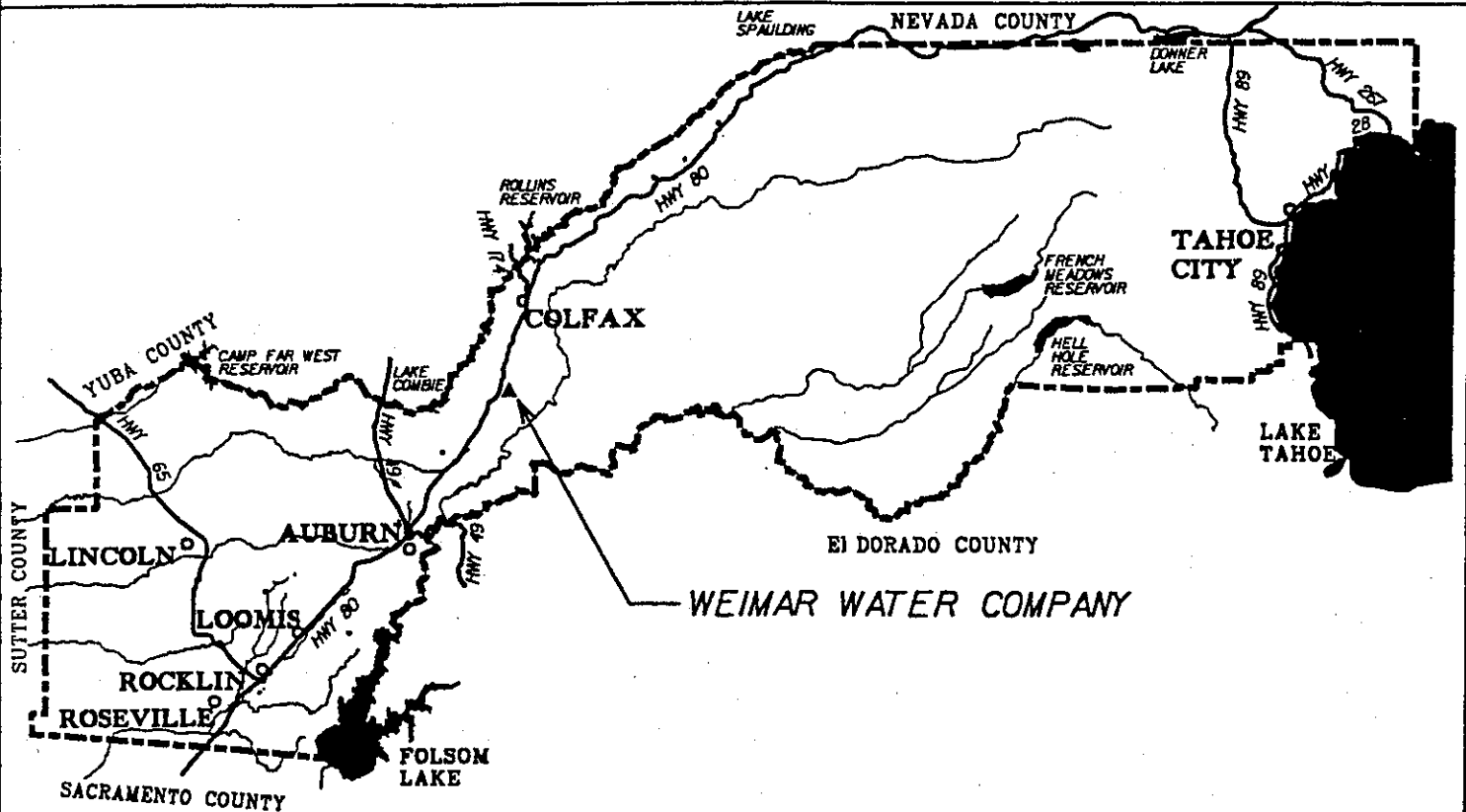
1990 System Production: According to the 1991 annual report 300 connections serve a permanent population of approximately 750. Three of these connections serve other water utilities. Maximum day production by the system was 0.45 million gallons, with the month of September experiencing the highest demands. Water is purchased by the miners inch from PCWA.

Deficiencies and Limitations: There exists no major deficiencies or limitations with the system

Existing Planned Improvements: Long range planning is directed at expanding the present service area to serve the entire Eden Valley from Weimar to (but not including) Colfax.

System Appraisal: The Weimar Water Company is in excellent condition for both treatment and source supply. It is also expected to conform with the Surface Water Treatment Regulations with only minor changes. The most serious problem facing the company would be drought effects on the Lake Spaulding Water Shed Area, which might require water rationing. Rationing has never been required in the past.

PLACER COUNTY WATER SYSTEMS



System Name: WEIMAR WATER COMPANY

Address: 2000 'O' ST., SUITE 200, SACRAMENTO CA 95814

Contact Name: FRED FAHLEN Phone: (916)-637-4441

Service Area Size: No. Connections: 300 Population Served: 750

Services Provided: SERVE RESIDENTIAL AND THREE OTHER WATER UTILITES.

Summary System Description

Source: THE COMPANY PURCHASES WATER FROM P.C.W.A.'S BOARDMAN CANAL BY THE MINERS INCH.

Transmission: WATER IS LIFTED FROM THE CANAL TO A 460,000 GALLON RAW WATER BASIN. THE DISTRIBUTION SYSTEM IS COMPOSED OF STEEL (77%) AND PVC (23%) MAINS.

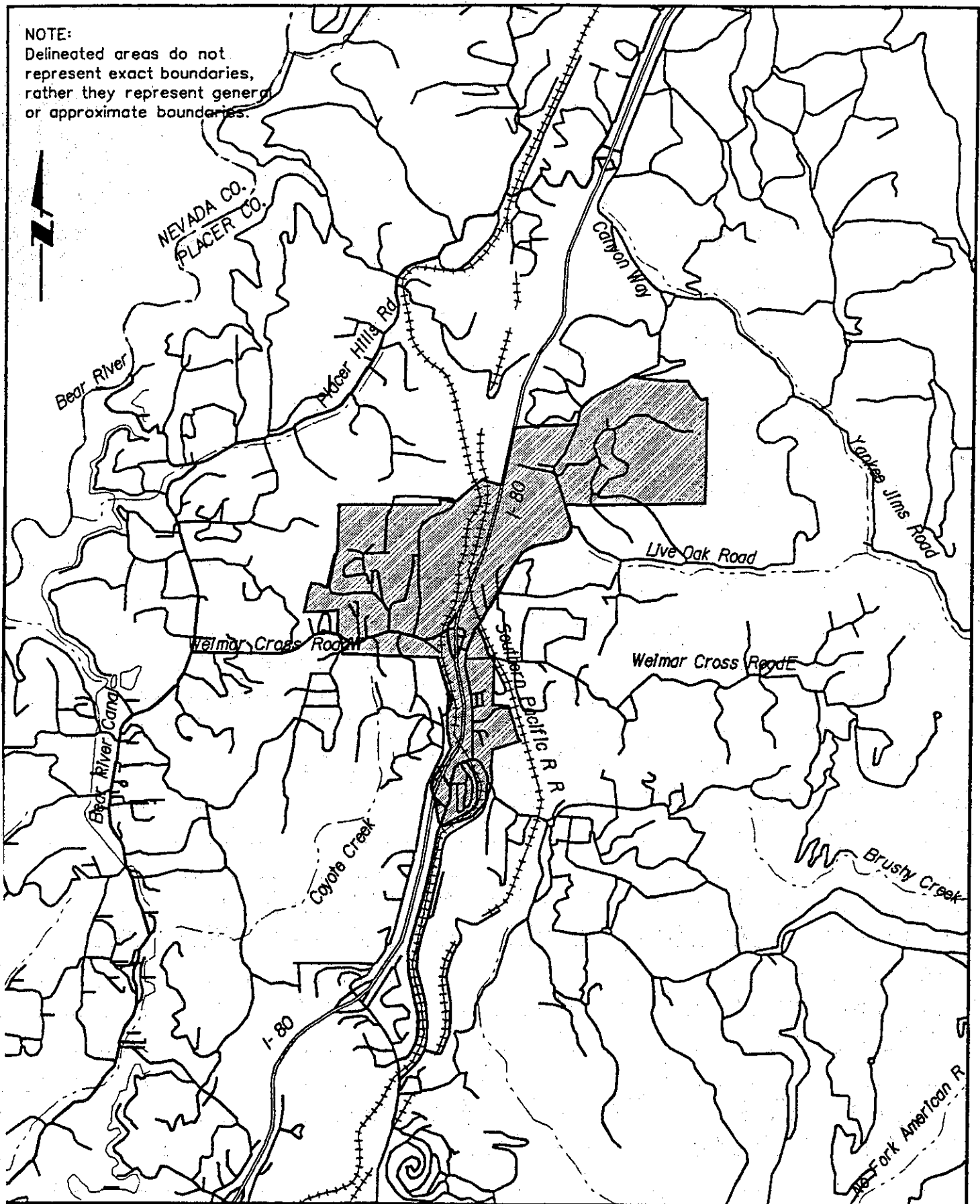
Treatment: FULL COMPLETE CONVENTIONAL TREATMENT IS PROVIDED BY A 1MGD TREATMENT PLANT.

Storage: STORAGE TO THE SYSTEM CONSISTS OF A 460,000 GALLON RAW WATER RESERVOIR AND (4) 60,000 GALLON STEEL TANKS.

Capacity Limitations: THERE ARE NO IDENTIFIED MAJOR DEFICIENCIES OR LIMITATIONS WITH THE SYSTEM.

NOTE:

Delineated areas do not
represent exact boundaries,
rather they represent general
or approximate boundaries.



WEIMAR WATER COMPANY
Water Service Area

Appendix B

Community Wastewater Systems

APPENDIX B

COMMUNITY WASTEWATER SYSTEMS

This appendix includes detailed summary information for each of the 37 community wastewater systems reviewed for Chapter 6 of the *Placer County General Plan Draft Background Report*. For each system, most, if not all, of the following information is summarized:

- General Information
- Wastewater Generation/Sources
- Collection System Description
- Wastewater Treatment and Disposal System Description
- System Deficiencies
- Proposed Improvements
- Financing
- System Appraisal

Following each of these detailed summaries is an "executive summary" sheet that includes a location map and a summary description of the individual system. Finally, for each individual system described, there is a service boundary map.

COMMUNITY WASTEWATER SYSTEMS REVIEWED

SYSTEM	PAGE
Alpineer Club, Inc.	B-3
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Tahoe City Public Utility District	B-69
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Alpine Springs County Water District	B-75
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ALPINEER CLUB, INC.

General Information: The Alpineer Club, Inc., lodge is located one mile east of Norden, off Highway 80, in the Tahoe National Forest (NE1/4 of Sec 20, T17N, R15E, MDB&M). Alpineer Club facilities are located on land leased from the U.S. Forest Service, Tahoe National Forest. Wastewater from the site is permitted by RWQCB Waste Discharge Requirement Order No. 85-293 which was adopted on October 25, 1985.

Surface drainage from the facilities flows to the South Fork Yuba River.

Wastewater Generation/Sources: Domestic wastewater only is generated by the lodge facilities. The Alpineer Club, Inc., lodge has a capacity of 40 guests with typical use of the facilities occurring on weekends during the skiing season.

Wastewater Treatment and Disposal System Description: A new septic tank and leachfield system was constructed by the members of the Alpineer Club in the summer of 1984 in response to RWQCB Cease and Desist Order No. 76-160. The new wastewater disposal facility is upslope from the lodge in an area which has a lower groundwater table than the old leachfield site and the new site soils are more conducive to percolation.

The new on-site sewage disposal system consists of three septic tanks which operate in series. Wastewater is pumped from the third septic tank upslope to the subsurface leachfield. The septic tank system has a total volume of 5,000 gallons (one-2,000 and two-1,500 gallon tanks) and the new leachfield occupies 3,300 square feet of surface area.

System Deficiencies: Chronic failures of the old septic-leachfield system were the result of a high seasonal groundwater table and an insufficient percolation rate. Effluent had surfaced and spilled into the South Yuba River initiating the RWQCB enforcement response. Alpineer Club members initiated attempts to repair the old system, which included cleaning the septic tank and leach lines, installing an additional 250 feet of leach line, and covering the leachfield area with a plastic tarp to slow snow melt infiltration. Unfortunately this repairs failed to appreciably fix the system and problems recurred until the new system was installed.

Since the installation of the new on-site sewage disposal system there have been no reported difficulties with wastewater disposal

Proposed Improvements: At this time, no known improvements are scheduled for the Alpineer Club, Inc., wastewater facilities. The regulatory agencies recommend that the Alpineer Club, Inc., wastewater system be connected to the Donner Summit Public Utilities District via a new lateral line which is located about 200 feet from the Lodge.

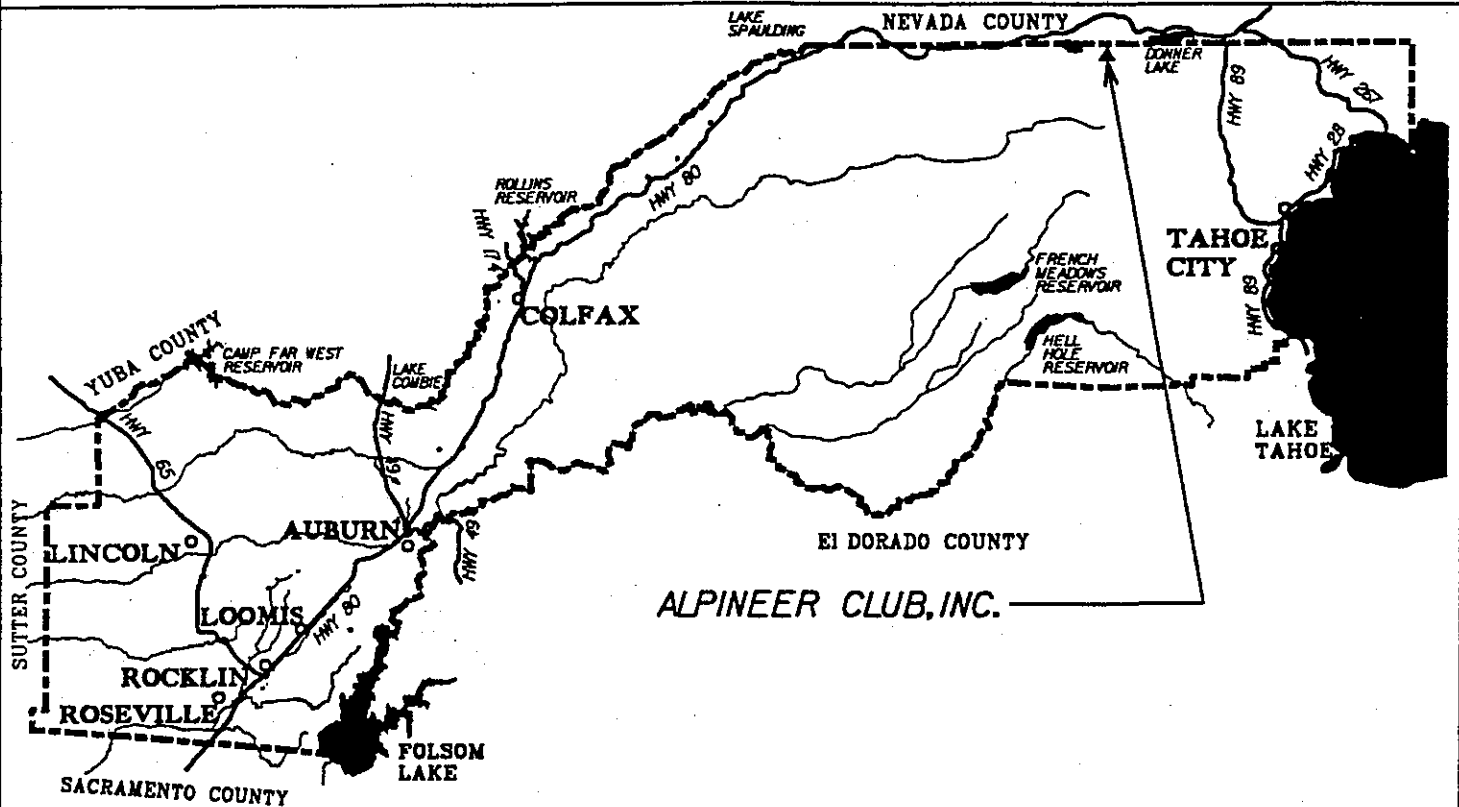
Financing: Financing for operations and maintenance of the Alpineer Club wastewater system is provided by club dues paid by each of the individual members. In cases where large improvements are necessary, an assessment of the total improvement costs is apportioned to the members.

System Appraisal: In the Summer of 1984 the Alpineer Club, Inc., constructed a new septic-leachfield system on additional Forest Service property which is located up-slope from the Lodge and exhibits soils and groundwater conditions more conducive to supporting an on-site wastewater disposal system. Inspections by RWQCB staff which have occurred since the new disposal facilities were constructed have

not found any evidence of septic or leachfield system failure.

Future connection of the Alpineer Club, Inc., wastewater flows to the Donner Summit PUD system is mandated by the regulatory agencies by 1993. Alpineer Club members are planning to hook-up to the Donner Summit PUD system by the compliance date. Future expansion of the Lodge, or additional wastewater generation, is not planned by the Alpineer Club, Inc., in the near-term.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: ALPINEER CLUB, INC.

Address: DONNER PASS ROAD, NORDEN, CA

Contact Name: MEL PEARCE Phone: (916)-453-6480

Service Area Size: 1 PARCEL No. Connect.: 1 Population Served: 40

Services Provided: WASTEWATER COLLECTION TREATMENT AND DISPOSAL FROM SEASONAL LODGE

Summary System Description

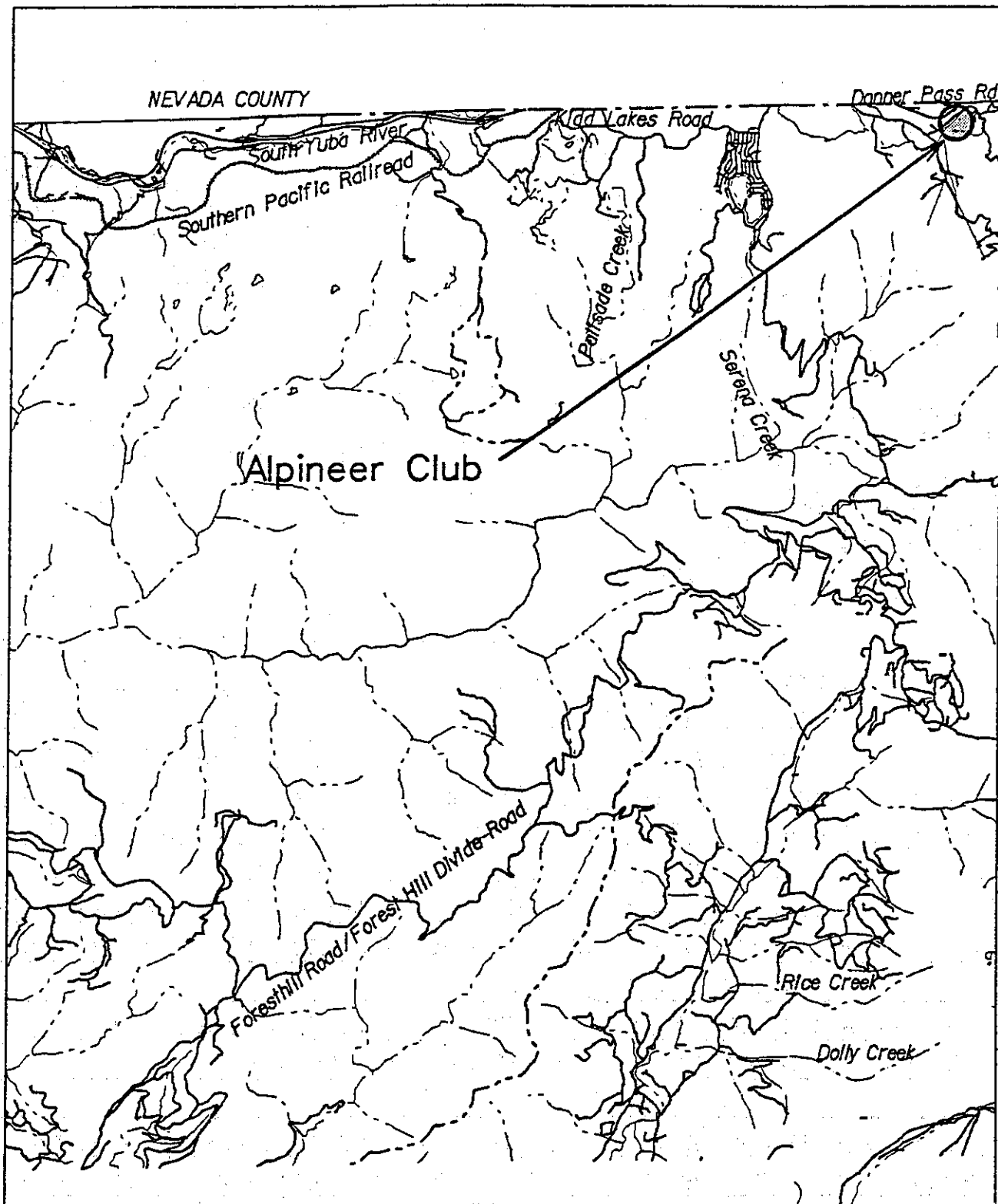
Service Area Characteristics: SIERRA MOUNTAINS REAR DONNER SUMMIT. TAHOE NATIONAL FOREST LAND, LEASED. GRANITE AND WELL FORESTED. SEASONAL USE MAINLY IN WINTER AS SKI LODGE. 40 PERSON CAPACITY.

Collection: WASTEWATER COLLECTED FROM LODGE RESTROOMS AND KITCHEN THEN CONVEYED THROUGH A 4 INCH LINE TO SEPTIC SYSTEM.

Treatment: PROVIDED BY ON-SITE SEPTIC SYSTEM. 5,000 GALLONS, 3 SEPTIC TANKS, PUMPED UPGRADIENT THROUGH A 2 1/2-INCH PVC PIPELINE TO A SUBSURFACE LEACHFIELD. NEW TANKS AND LEACHFIELD INSTALLED DUE TO OLD SYSTEM FAILURE.

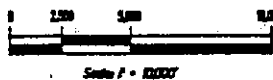
Disposal: NEW SUBSURFACE LEACHFIELD INSTALLED IN 1984 WITH PROVISIONS TO DIVERT SURFACE RUNOFF. APPROXIMATELY 3,300 SQUARE FOOT OF SURFACE AREA OCCUPIED BY FIELD.

Capacity Limitations: LIMITED SYSTEM CAPACITY DESIGNED FOR LODGE OCCUPANCY OF 40 PERSONS. NO PLANS FOR EXPANSION.



Placer County General Plan

Figure _____ Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Alpineer Club

- | | | | |
|--|-----------|--|-----------------------|
| | Streets | | County Line |
| | Waterways | | District Service Area |

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

AUBURN VALLEY SERVICES CORPORATION AND CASTLEWOOD CORPORATION

General Information: The Auburn Valley Services Corporation owns and operates the Auburn Valley Subdivision community wastewater treatment and disposal facility which is designed to serve 136 dwelling units and a golf clubhouse at full build-out. The wastewater facilities are located 1/4 mile west of the 18th tee on the Auburn Valley Country Club golf course on an easement of 200 acres of Castlewood, et al, property in Auburn.

At the request of the County of Placer, 3-1/2 years ago, the Auburn Valley Service Corporation and property owners formed a group to develop the system into County Service Area 28, Zone 91. Meetings are held once per month.

Discharge from the Auburn Valley Subdivision is permitted under RWQCB Waste Discharge Requirement Order No. 79-170 and Monitoring and Reporting Program Order No. 79-170. These documents were adopted on July 27, 1979.

Surface drainage from the area is to the Bear River.

Wastewater Generation/Sources: The Auburn Valley Subdivision and Country Club facilities were designed to accommodate an ADWF discharge of 43,000 gpd of domestic wastewater from 136 residences and a golf clubhouse. The wastewater is considered domestic in nature. Approximately 20,000 gpd (ADWF) of wastewater are currently being generated with a peak wet weather flow of 27,000 gpd.

Collection System Description: Currently there are only 43 residences and the golf course clubhouse connected to the system. Ultimate build-out is for 136 residences and the clubhouse. Flows from the clubhouse are estimated to be equivalent to 12 dwelling units. Of the unoccupied lots, approximately 10 are owned by individuals with the remainder owned by two land owners who have an approved plan to immediately build on 25 lots after the current building moratorium is lifted and one owner is working on developing 54 others.

Wastewater collection is via gravity sewers through 6-inch diameter asbestos cement (AC) lines and conveyed to the treatment facilities. The collection system is conventional in design with manholes provided about every 400 feet and an average sewer line depth of 4 feet. The original sewer system was constructed in 1976. There are no lift stations in the system.

Deficiencies: The collection system seems to have problems with inflow and infiltration. Inflow and infiltration contribution has been determined to be from the individual house laterals. Additional investigation of house laterals in the near term is being planned. A recent TV inspection verified that the sewer system mainlines were sound. There are not any other known deficiencies in the collection system.

Proposed Improvements: At this time planning is being considered to address the house lateral inflow and infiltration contribution. It is likely that the problem will be solved by mid-1993.

Wastewater Treatment and Disposal Systems Description: 200 acres within the subdivision are designated by easement for sewer use only. The treatment and disposal system is within this designated area. Wastewater is conveyed to five evaporative ponds for treatment and storage. The ponds comprise a total volume of 10.8 million gallons, approximately 4.1 acres and are operated in series. Designed for full build-out, only three of the ponds have been used to date with two of the five remaining empty.

The 1979 RWQCB WDR's stipulated that the design of the impoundments include the placement of an underlying clay layer for the ponds due to their planned location which is situated on areas of fractured rock. A clay layer with a minimum thickness of two feet thick and compacted to decrease permeability was to be incorporated into the design to assist in preventing percolation of wastewater containing potentially pathogenic organisms to the groundwater. This upgrade has to date not been carried out.

Deficiencies: Known deficiencies in the recent past include the discovery of potential leakage from the ponds which was documented in a RWQCB inspection report in 1988 and in a report prepared by the engineers retained by the homeowners. Auburn Valley Subdivision homeowners have expended a large effort to determine if indeed the leakage is from the ponds.

At this time there is some discussion over whether the ponds were adequately lined and several engineering/geotechnical firms were retained by the homeowners to determine if the ponds were leaking. Current thought is that there is a leak through a dike on pond C. The ponds are built in rock therefore expansion of the pond system is not thought to be cost effective.

Other known treatment system deficiencies include lack of a spray irrigation system.

Proposed Improvements: A predesign report submitted by Dewante & Stowell in October, 1989, recommended improvements to the wastewater management facility. Suggested alternatives included refinement of the existing treatment scheme by enlarging and lining the existing ponds and establishing the spray irrigation system. An additional alternative included conversion from the existing pond treatment process to a "packaged" treatment plant with surface discharge.

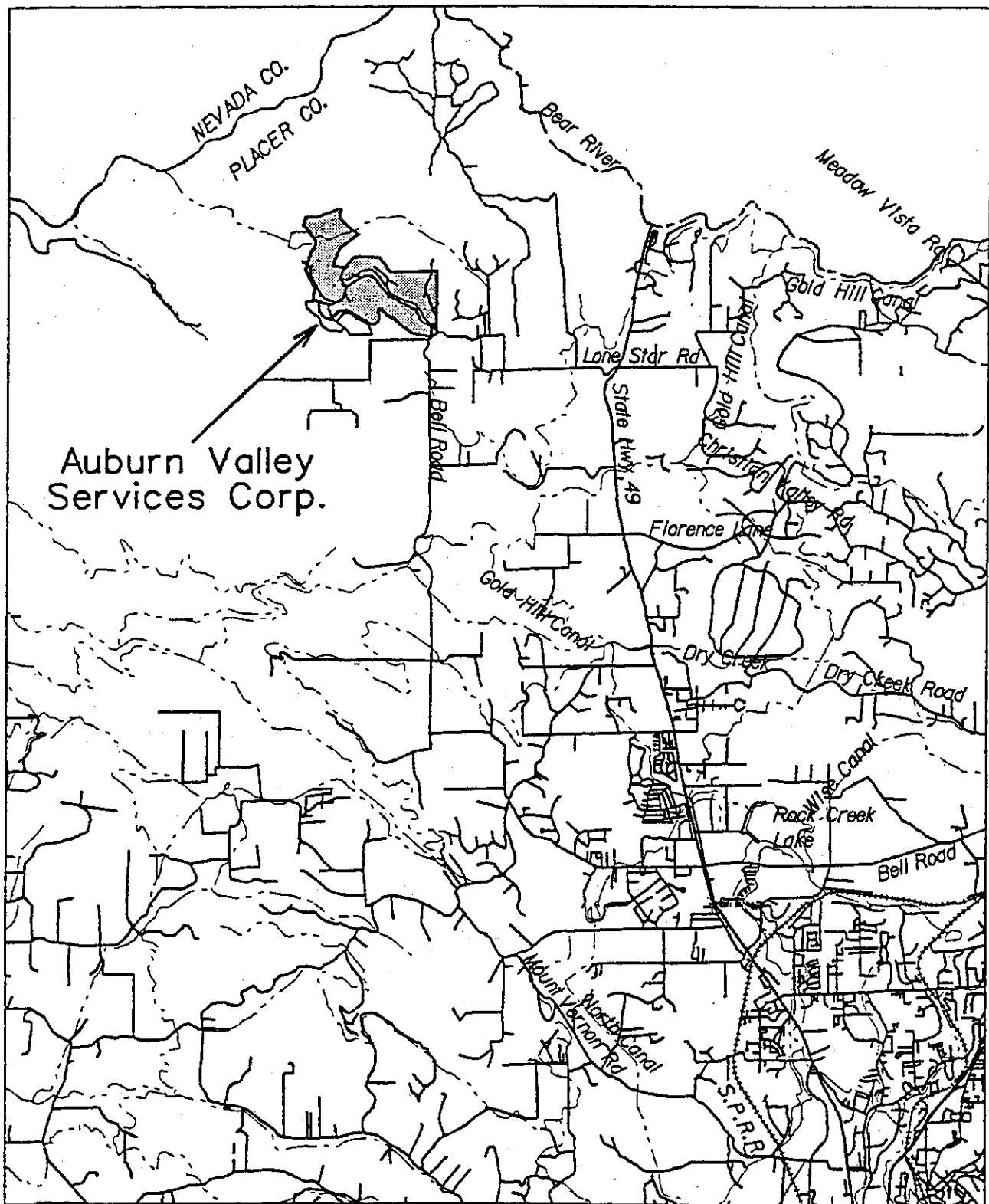
The packaged treatment plant process was determined as the best apparent alternative and construction of the improvements is scheduled to be initiated in 1992. These scheduled improvements will necessitate revisions of the discharge requirements by the RWQCB in the near-term.

Difficulties with the proposed plan for the treatment and disposal improvements include determining the methodology for disposal. RWQCB preference is not to allow treated effluent discharge to a lined pond disposal system. Current thought is to construct an outfall to the Bear River, approximately one mile away. A preliminary survey for the pipeline has been undertaken and the plan is being developed.

Financing: The Auburn Valley Subdivision (Auburn Valley Services Corporation wastewater collection, treatment and disposal facilities operations and maintenance costs are funded entirely by homeowner fees. Proposed treatment and disposal system improvements in the near-term will be funded by bond issues (through the County and repaid by assessment district fees).

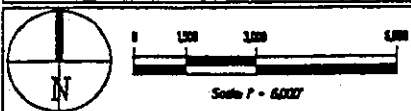
System Appraisal: Existing wastewater flow for the system is now at 20,000 gpd and remaining capacity is 23,000 gpd which should be adequate for the near-term. Existing Auburn Valley Subdivision wastewater facilities are not considered adequate by the regulatory agencies due to the reported leakage of the ponds.

Planned near-term refurbishment of the wastewater facilities should result in a significantly improved treatment and disposal system. The newly completed "packaged" plant treatment system will be designed to effectively treat and dispose of the anticipated wastewater quantities and should enable the subdivision to effectively treat its wastewater without substantially degrading the surrounding surface or groundwater. Design flows for the new wastewater treatment system are set for 40,000 gpd (ADWF).



Placer County General Plan

Figure _____
Wastewater Service Area



Date: 1/15/92
 Prepared by:
PSOMAS & ASSOCIATES

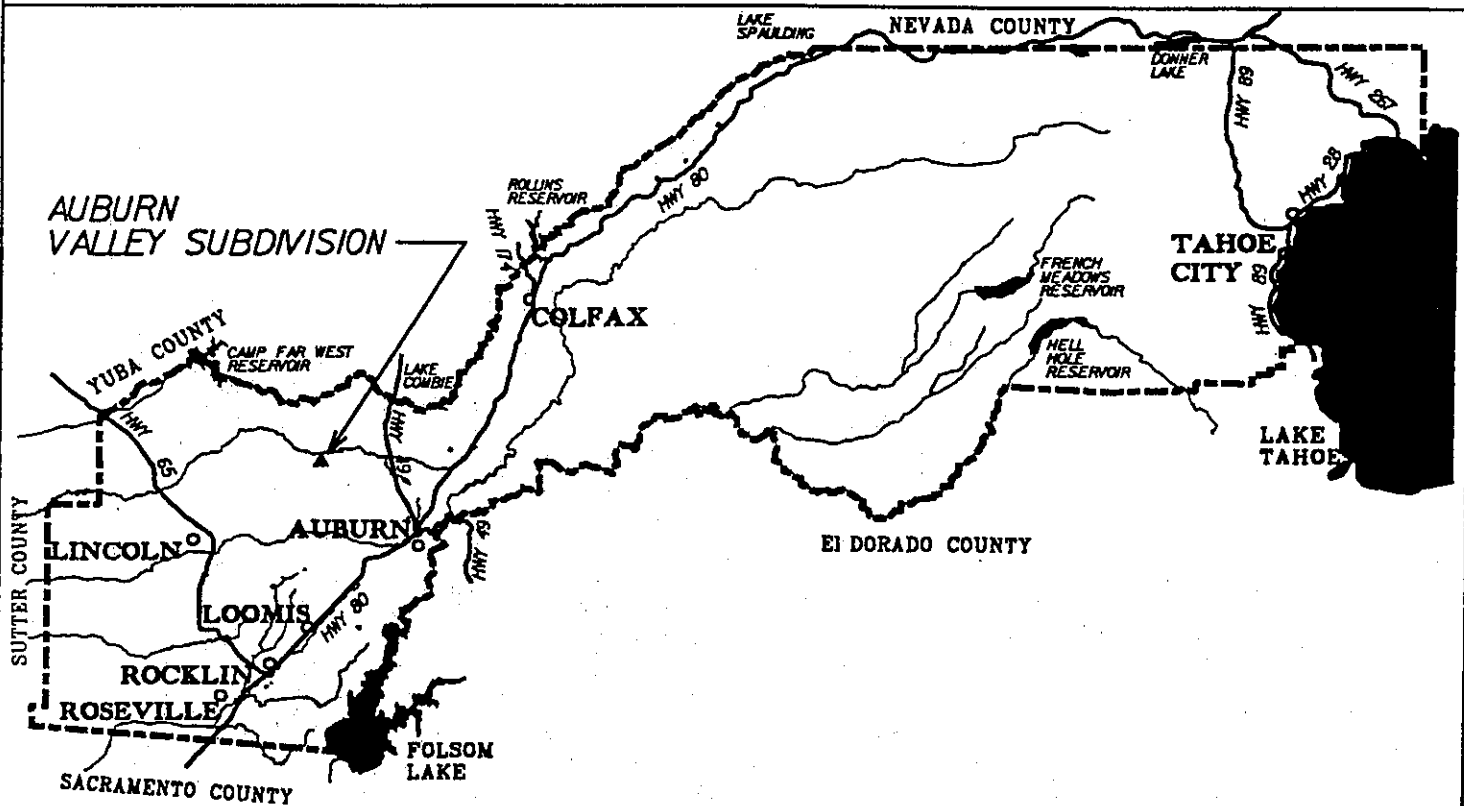
LEGEND

Auburn Valley Services Corp.

Streets	County Line
Waterways	District Service Area

NOTE:
 Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: AUBURN VALLEY SERVICES CORP. & CASTLEWOOD CORP. (AUBURN VALLEY SUBDIVISION)
 Address: 8800 AUBURN VALLEY ROAD, AUBURN CA (CLUB); P.O. BOX 5456, AUBURN CA 95604 (AVSC)
 Contact Name: LLOYD BISSING, PRESIDENT, HOMEOWNERS ASSOC. Phone: (916)-269-1810
 Service Area Size: _____ No. Connect.: 52 Population Served: 120
 Services Provided: WASTEWATER COLLECTION, TREATMENT AND DISPOSAL

Summary System Description

Service Area Characteristics: FOOTHILLS OF SIERRA NEVADA RANGE, ROLLING HILLS, OAKS AND GRASSLANDS.

Collection: 6 INCH SEWER LINES, GRAVITY SYSTEM, STD MANHOLES APPROXIMATELY ONE MILE OF COLLECTION LINE. 51 RESIDENTIAL AND 11 COUNTRY CLUB CONNECTIONS.

Treatment: CURRENTLY A POND SYSTEM. 5 PONDS IN SERIES. NEAR TERM IMPROVEMENT WILL BE A "PACKAGED" ACTIVATED SLUDGE PLANT WITH 30/30 TREATMENT LEVEL

Disposal: CURRENT PROVIDED BY EVAPORATION/PERCOLATION THROUGH THE POND SYSTEM. POSSIBLE NEW SYSTEM WILL INVOLVE A ONE-MILE PIPELINE WITH SURFACE DISCHARGE TO BEAR RIVER.

Capacity Limitations: 43,000 GPD DESIGN FLOW WITH EXISTING POND SYSTEM. DESIGN FLOW OF 40,000 PLANNED FOR PACKAGED PLANT SYSTEM.

CITY OF AUBURN

General Information: The City of Auburn Wastewater Treatment Plant is located west of the City between Ophir Road and Wise Road at 10441 Ophir Road in Auburn. The facility is operated by Sanitation and Operation Consultants, Inc., a private firm under contract to the City. Original wastewater facilities were constructed in 1976 with partial funding by State and Federal Clean Water Grant monies.

Wastewater discharge is regulated by RWQCB Waste Discharge Requirements Order No. 89-221, Federal USEPA NPDES Permit No. CA0077712, and RWQCB Monitoring and Reporting Program No. 89-221, effective since December 1989. The USEPA and the SWRCB have classified discharge from the City of Auburn facilities as a major discharge.

Surface runoff is to Auburn Ravine.

Wastewater Generation/Sources: City of Auburn wastewater collection, treatment and disposal facilities serve 3,170 residential and 345 commercial and industrial connections for a total of 3,515 connections. The wastewater is considered municipal in nature. The total population served is about 10,000.

Collection System Description: The oldest known pipeline in the collection system is dated to 1892 and some lines were also installed in the 1920's which are 5-inch diameter. A majority of the collection system improvements were installed in the 1960's, late 80's and early 90's. Wastewater is collected from an approximately 5 square mile service area through about 42 miles of sewer line. Pipe diameters range from 6 inch to 24 inch. Materials of construction include VCP, CIP and PVC. A majority of the collection system is gravity however, there are 9 lift stations and 12,000 feet of 6 and 8 inch pressure main.

Deficiencies: Severe infiltration and inflow problems within the collection system have caused hydraulic overloading at the treatment plant and the eventual release of partially treated wastewater to Auburn Ravine. These conditions warranted the issuance of Cease and Desist Order No. 77-223 on May 26, 1977. Collection system renovation and plant improvement activities were undertaken starting in 1983 with funding assistance provided by a Clean Water Grant. The Cease and Desist Order was rescinded on January 26, 1990 with RWQCB Order No. 90-025.

Television based inspections of the collection system in the recent past identified ten "hot spots" where improvements are warranted. The High Street project was identified as one of these ten remediation projects needed. Three of the identified projects have been completed to date. Starting in 1989, lining of manholes was initiated to reduce inflow. Manhole lining was an ongoing project up to 1991.

Other known collection system deficiencies are outlined in the SOCI memo to the City Public Works Department.

Proposed Improvements: In addition to the recently completed improvements to the collection system, lining or replacement of two pipelines in High Street is planned in the near-term. Also, the city is about three months from completion of a CAD map system for the entire collection system which is an extension of the County maps.

Wastewater Treatment System Description: The City of Auburn Wastewater Treatment Plant, situated on 70 acres, commenced operation in 1976. Wastewater is treated to secondary effluent quality levels. Wastewater treatment incorporates four equalization ponds, an aerated grit chamber, a comminutor and

bar screen, an extended aeration mode oxidation ditch, secondary clarifier, return sludge pumping system, chlorination and dechlorination processes, and sludge lagoons.

The design capacity of the existing secondary treatment facilities is 1.23 mgd. Current dry weather flows through the treatment plant average 1.0 mgd ADWF. Winter flows surpassing the hydraulic capacity of the facility are diverted to the equalization ponds for storage. Peak wet weather flows have been estimated to sometimes exceed 6.0 mgd. Emergency holding and bypass treatment ponds, which occupy 16 acres and have a usable volume of 30 million gallons, accommodate the excessive wet weather flows.

Deficiencies: Past treatment plant upsets were considered mainly due to excessive inflow and infiltration which caused hydraulic overloading at the plant. Another reason cited for plant upsets was an inability to operate the plant at its design wet weather flow rate due to inadequate sludge lagoon capacity and return sludge pumping capacity.

A Clean Water Grant partially funded improvements to the chlorination and dechlorination facilities, the addition of storage pond aerators, cleaning of storage pond No. 2, the addition of pond return flow capability, and side weir modifications. The City also installed mechanisms to allow increased dewatering of the sewage lagoons. With these recent improvements the treatment facilities are operating within the design capacity.

Remaining identified treatment plant deficiencies which were recently improved include replacement of the air lift return activated sludge pumps with screw lift pumps. A Somat system was installed for solids dewatering but has not been meeting the manufacturer's specifications. To alleviate this problem, the city plans to fund a belt press. A second clarifier is also being planned in the near-term.

In addition it is considered that a limiting plant capacity factor is the mixing capacity of the oxidation ditch.

Proposed Improvements: The December, 1989, RWQCB discharge requirements contained a time schedule for installation of adequate flow metering. The flowmeter improvements were completed in August of 1988. Metering improvements should expedite plant operations by optimizing drainage of wastewater from the storage ponds during off peak hours.

Additional planned treatment plant improvements include the diversion of existing direct flow from a subdivision which currently flows to pond #3 instead to a plug flow diversion box.

Disposal System Description: In accordance to existing permit conditions, plant effluent is discharged to Auburn Ravine Creek. During an emergency winter overflow crisis, partially treated wastewater from the pond No. 4 can be bypassed to the chlorine contact chamber and mixed with secondary effluent before discharge. Monitoring restrictions in such cases apply to the total coliform, suspended solids and BOD in the combined effluent.

Dried sewage sludge is hauled to a Class III sanitary landfill in Lincoln, CA.

Deficiencies: Identified disposal system deficiencies include the failure of the Somat system to remove solids.

Proposed Improvements: Reclamation of effluent for irrigation purposes is thought to be a viable disposal option. Beneficial reuse of sludge, such as agricultural soil amendment, is a desirable option for

future management. Near-term City plans include the funding of a two meter belt press for solids processing.

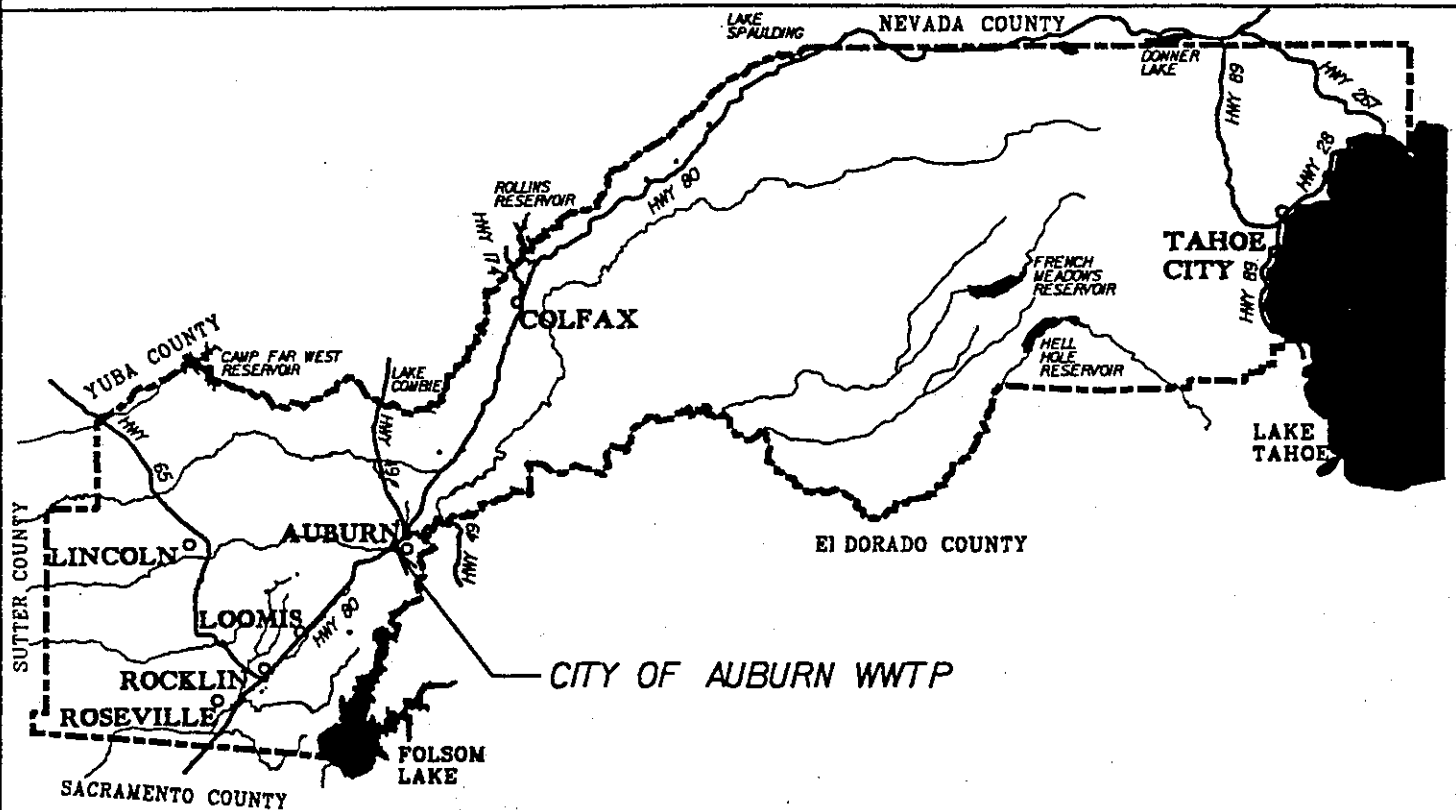
Financing: Original construction and subsequent improvement costs for the collection, treatment and disposal facilities were partially funded by the Clean Water Grant process. Local share costs for construction and improvements were funded by City funding processes.

Operations and maintenance costs are funded by the City operations budget of the Public Works Department.

System Appraisal: Treatment plant processes selected for design and construction were expected to provide secondary level discharge quality. Despite past sludge handling deficiencies, treatment plant performance and discharges were in general compliance with the permit conditions. Recent plant improvements will allow the facilities to maintain the requirements of its discharge requirements.

The existing plant site can accommodate an expansion of current treatment processes to handle an average flow of 2.5 to 3.0 mgd, equitable to a 25,000 service area population. Planned system expansions which include future upgrade of the treatment system to tertiary treatment level and elimination of sulfur dioxide and chlorine gases with the use of liquid hypochloride and sodium metabisulfite (NaHSO_3) as alternatives and planned for 1995 and will provide a total system capacity of 5.5 mgd ADWF. This is the maximum expansion threshold which will include tertiary treatment to meet the state discharge requirements.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: CITY OF AUBURN

Address: 1103 HIGH STREET, AUBURN

Contact Name: TERRY HOUGHTON, FACILITY SUPERVISOR Phone: (916)-823-1483

Service Area Size: No. Connect.: 3515 Population Served: 10,000

Services Provided: WASTEWATER COLLECTION TREATMENT AND DISPOSAL

Summary System Description

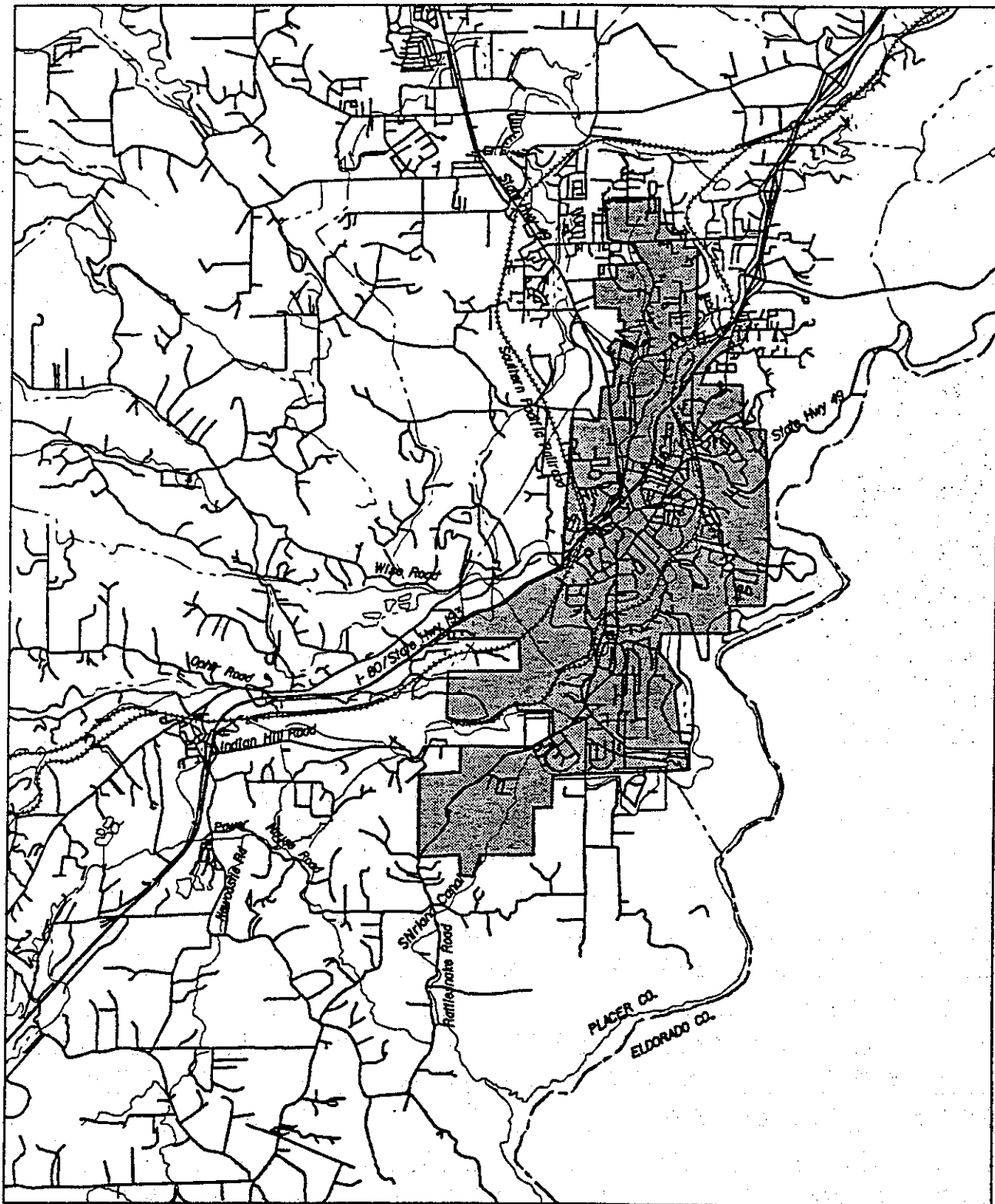
Service Area Characteristics: FOOTHILL LOCATION IN THE SIERRA NEVADA RANGE. ROLLING HILLS, OAK WOODLANDS, GRASSLANDS. FACILITIES SERVE THE CITY OF AUBURN AND OUTLYING AREAS.

Collection: FACILITIES SERVE A POPULATION OF 10,000. THERE ARE 3,170 RESIDENTIAL, AND 345 COMMERCIAL AND INDUSTRIAL CONNECTIONS. AVERAGE AGE OF COLLECTION SYSTEM IS 20 YEARS. LINE SIZES VARY FROM 6 INCH TO 24 INCH.

Treatment: SECONDARY TREATMENT LEVEL PROVIDED BY 4 EQUALIZATION BASINS, HEADWORKS, EXTENDED MODE OXIDATION DITCH, SECONDARY CLARIFIER, CHLORINATION AND DECHLORINATION.

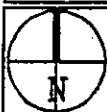
Disposal: SURFACE DISCHARGE IS TO AUBURN RAVINE CREEK. SOLIDS ARE DRIED AND TRANSPORTED TO LINCOLN CLASS III LANDFILL.

Capacity Limitations: DESIGN CAPACITY OF EXISTING PLANT IS 1.23 MGD. POTENTIAL FOR EXPANSION ON EXISTING SITE TO A CAPACITY OF 2.5 OR 3.0 MGD WHICH IS EQUITABLE TO A POPULATION OF ABOUT 25,000. EXPANSION TO 5.5 MGD MAX ULTIMATE.



Placer County General Plan

Figure _____
Wastewater Service Area



Date: 1/15/92

Prepared by

PSOMAS & ASSOCIATES

LEGEND

City of Auburn

- | | | | |
|--|-----------|--|-----------------------|
| | Streets | | County Line |
| | Waterways | | District Service Area |

NOTE:

Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

CALIFORNIA CONSERVATION CORPS PLACER ENERGY CENTER

General Information: The Placer Energy Center is a camp operated by the California Conservation Corps. The camp is located five miles north of the City of Auburn at 3710 Christian Valley Road. Wastewater is permitted under RWQCB Waste Discharge Requirement Order No. 86-135 which was adopted on June 27, 1986. The wastewater facility was constructed in the 1950's.

Wastewater Generation/Sources: The Placer Energy Center contains barracks, offices, and work areas. About 100 full and part-time residents occupy the camp. Wastewater generated by the facility is considered municipal in nature.

Collection System Description: The existing collection system is gravity flow and contains about 200 feet of clay main lines and ABS service laterals. There are six buildings currently connected to the collection system.

Deficiencies: Collection system infiltration and inflow is a minimal consideration.

Proposed Improvements: Line replacement is accomplished only when a break occurs.

Wastewater Treatment and Disposal System Description: Sewage treatment and disposal facilities at the camp consists of a 20,000 gallon concrete septic tank, two pumps and distribution unit, four evaporation/percolation ponds, and a spray irrigation field. Wastewater from the septic tank is pumped to the first two ponds for partial treatment and pumped again to the second set of ponds.

Whenever conditions allow, the second set ponds (#3 & #4) are emptied by means of the pump system to the spray irrigation field after a minimum settling time of 48 hours. Drainage from the spray pasture returns to the first two ponds, although the application rate of 10 gpm usually precludes significant runoff. The spray irrigation system typically operates about 11 hours per day in season.

A pit adjacent to the septic tank is designed to hold overflow which may occur in the event of a power or pipeline failure. Septage solids which accumulate in the tank are pumped about four times per year and hauled off-site by a contracted company to Rocklin. A grease trap which serves the kitchen is cleaned about once per year.

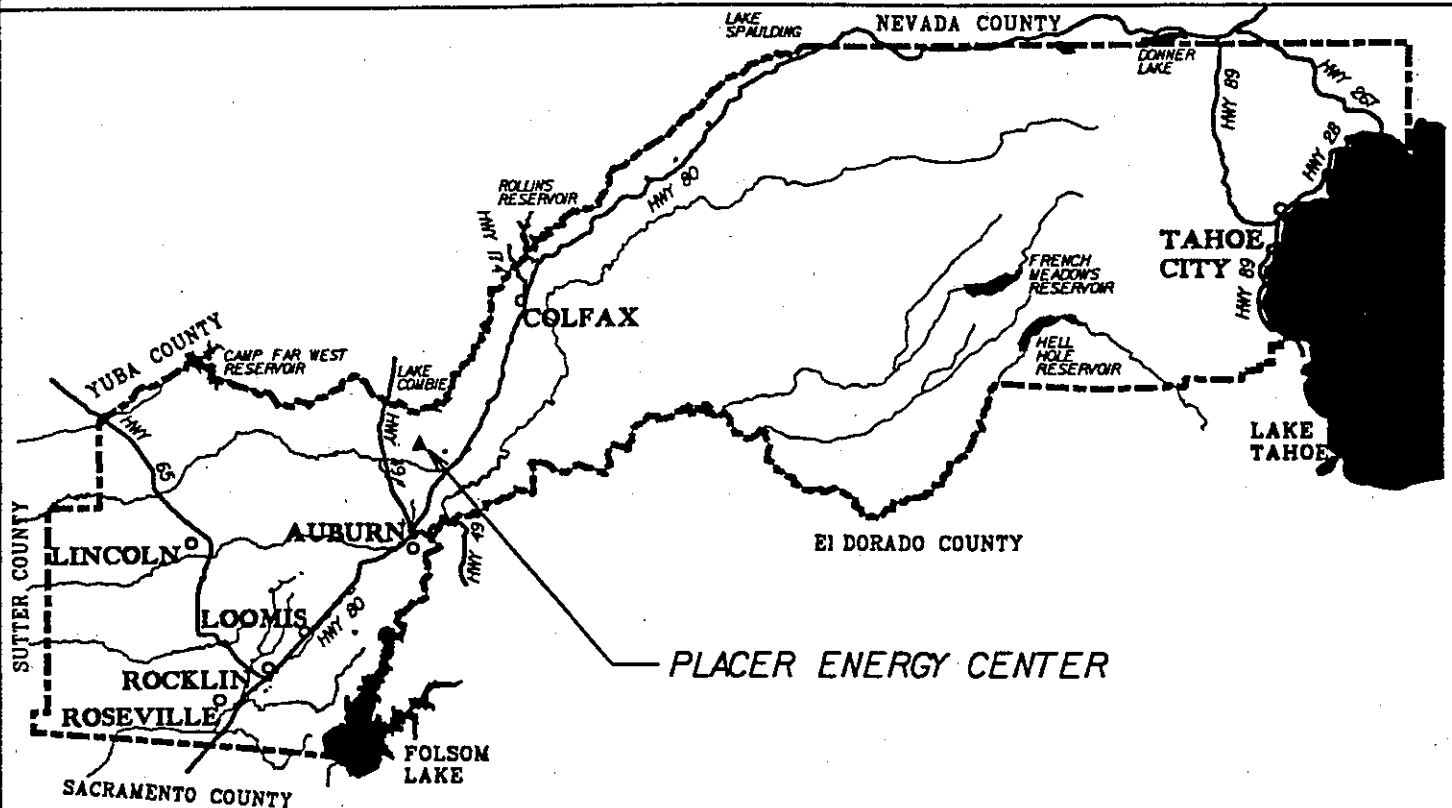
Deficiencies: The general condition of the treatment and disposal facilities is reportedly in good shape. No other known deficiencies exist at this time.

Proposed Improvements: The Placer Energy Center may eventually connect with the City of Auburn wastewater management facilities.

Financing: Funding for the Placer Energy Center is provided by the California Conservation Corps which is entirely funded by state funds.

System Appraisal: In general the Placer Energy Center wastewater collection, treatment and disposal facilities are considered in good condition and are providing adequate treatment and effluent quality for discharge to the spray field disposal system. Currently the Center does not anticipate any expansion. The Center would like to hook-up to the City of Auburn collection system and abandon its own on-site wastewater system. Currently there are not any plans to accomplish this proposed change in the near-term.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: CALIFORNIA CONSERVATION CORPS - PLACER ENERGY CENTER

Address: 3710 CHRISTIAN VALLEY ROAD, AUBURN, CA 95603

Contact Name: CLAUDIA RODGERS, MAINTENANCE MECHANIC Phone: (916)-823-4900

Service Area Size: 80 ac. No. Connect.: 6 Population Served: 100

Services Provided: RESIDENTIAL JOB TRAINING PROGRAM, WATER & WASTEWATER

Summary System Description

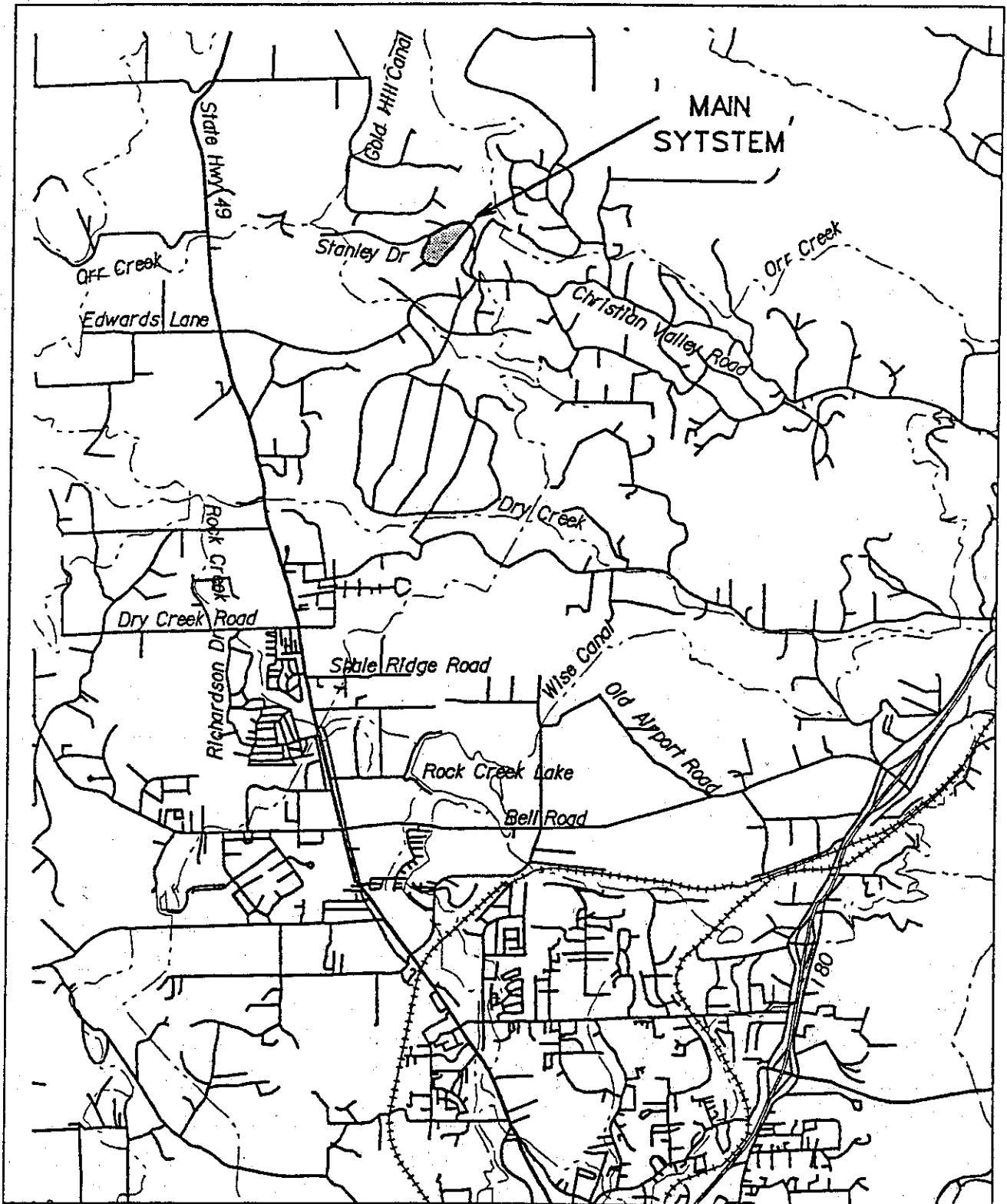
Service Area Characteristics: FACILITIES SERVE THE BARRACKS, OFFICES AND WORK AREAS. APPROXIMATELY 60 FULL AND PART TIME RESIDENTS OCCUPY THE CAMP. FOOTHILLS LOCATION OF THE SIERRA NEVADA RANGE. WOODED ROLLING HILLS.

Collection: WASTEWATER IS COLLECTED THROUGH APPROXIMATELY 200 FT. OF GRAVITY SEWER LINE AND CONVEYED TO THE TREATMENT PLANT. STANDARD CONSTRUCTION OF COLLECTION SYSTEM WITH 2 MANHOLES.

Treatment: PRIMARY TREATMENT IS ACCOMPLISHED BY A 20,000 GALLON SEPTIC TANK. TWO LIFT PUMPS AND A DISTRIBUTION UNIT CONVEY WASTEWATER FROM THE SEPTIC TANK TO 4 EVAPORATION/PERCOLATION PONDS.

Disposal: SEASONAL DRY WEATHER DISPOSAL TO A SPRAY IRRIGATION FIELD. APPLICATION RATE IS ABOUT 10 GPM AND OPERATION IS ABOUT 11 HOURS PER DAY, IN SEASON. RUNOFF FROM SPRAY FIELD IS CAPTURED AND RECYCLED.

Capacity Limitations: CURRENT FLOW FOR THE SYSTEM IS APPROXIMATELY 3,600 GPD. NO CURRENT PLANS FOR EXPANSION BEYOND EXISTING SERVICES.



Placer County General Plan

Figure — Wastewater Service Area

Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

Scale 1" = 4000'

LEGEND

Calif. Conservation Corps

Placer Energy Center

Streets	County Line
Waterways	District Service Area

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

CASTLE CITY MOBILE HOME PARK

General Information: The Castle City Mobile Home Park (Castle City MHP) is located one mile southwest of Newcastle at 1400 Newcastle Road. Wastewater is regulated by RWQCB Waste Discharge Requirement Order No. 75-169 and Monitoring and Reporting Program No. 75-169 which were adopted on July 25, 1975. Surface water runoff is to Secret Ravine. No surface discharge is permitted.

Wastewater Generation/Sources: The Castle City MHP encompasses 58 acres and provides services to about 200 mobile homes which represents a design population of approximately 400. An ultimate development of 295 units (design population of 540) is anticipated. In accordance to the RWQCB permit conditions the mean dry weather discharge from the facilities is not to exceed 22,000 gpd. The wastewater is considered domestic in nature.

Wastewater Collection, Treatment and Disposal System Description: The construction material of the Castle City Mobile Home Park collection system is Transite or ABS. The system has four manholes.

Wastewater flows from the collection system by gravity directly into pond No. 1 which in turn overflows into pond No. 2. There is no outflow structure at pond No. 2. The stabilization ponds, incorporating 6.3 acres, have an average depth of 6 feet and are fenced. An older single pond system which was constructed in 1964 served the MHP until the new two-pond system was constructed in 1971. At that time the old pond system was abandoned.

Two underdrain systems are installed to prevent natural spring water from entering the ponds. Each underdrain system consists of a 6-inch perforated pipe and a gravel bed. The gravel is covered by a plastic membrane and then by earth. Samples from the drain pipe are periodically collected by the Placer County Health Department. The RWQCB Monitoring and Reporting Program mandates weekly sampling in order to detect the presence of coliform organisms.

Deficiencies: There are no known system deficiencies.

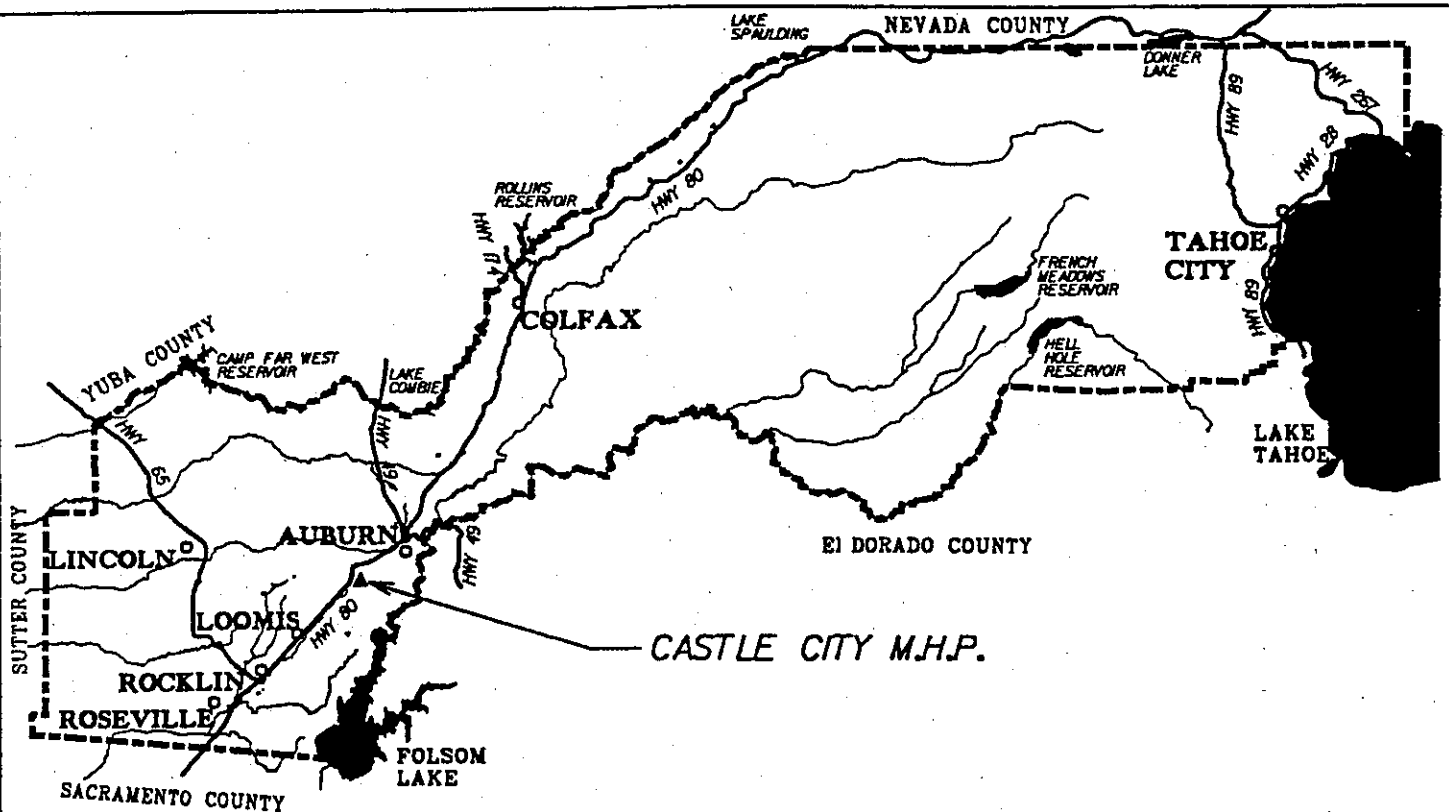
Proposed Improvements: At present, there are no planned improvements to the existing collection, treatment and disposal system.

In addition to the above-mentioned planned improvements, modifications to the existing system could provide additional capacity. A valve or siphon between pond No. 1 and pond No. 2 could help maintain wastewater in both ponds thus increasing the total evaporation rate. Sprinklers could be installed on the hillside above the ponds to achieve increased evaporation and transpiration. If necessary a third pond could be constructed to provide supplementary storage capacity.

Financing: Funding of improvements, operations and maintenance costs for the Castle City Mobile Home Park wastewater facilities come from rent of mobile home lots.

System Appraisal: In general the Castle City Mobile Home Park wastewater collection system is in good condition. Since the 1971 improvements to the treatment and disposal system were made the system reportedly has typically satisfied the requirements of the RWQCB waste discharge permit.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: CASTLE CITY MOBILE HOME PARK

Address: 1400 NEWCASTLE ROAD

Contact Name: RON COLEMAN, OPERATOR Phone: (916)-663-3544

Service Area Size: 58 ac. No. Connect.: 200 Population Served: 320

Services Provided: WASTEWATER COLLECTION, TREATMENT AND DISPOSAL

Summary System Description

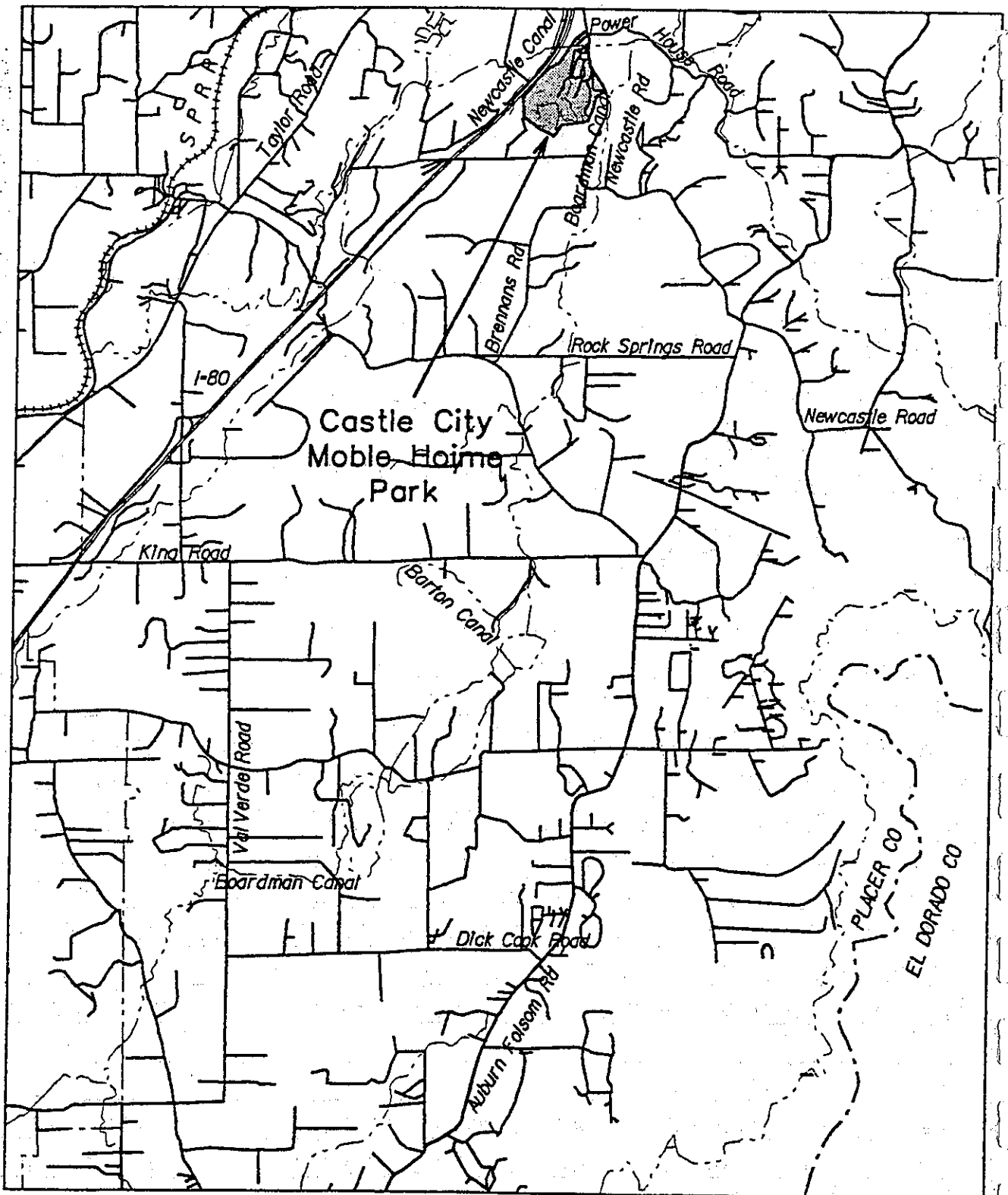
Service Area Characteristics: LOCATED ONE MILE SOUTHWEST OF NEWCASTLE. FOOTHILLS, OAK WOODLANDS AND GRASSLANDS. 58 ACRE MHP. FACILITIES CURRENTLY SERVE ABOUT 200 OF 259 UNITS.

Collection: WASTEWATER IS COLLECTED VIA A STANDARD GRAVITY TYPE SYSTEM.

Treatment: PROVIDED BY 2 STABILIZATION PONDS OPERATED IN SERIES. PONDS OCCUPY 6.3 ACRES WITH AN AVERAGE DEPTH OF 6 FEET. NEW POND SYSTEM WAS CONSTRUCTED IN 1971.

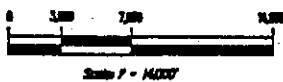
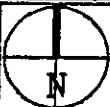
Disposal: EVAPORATION DISPOSAL FROM THE STABILIZATION PONDS DURING THE DRY SEASON.

Capacity Limitations: PERMITTED DISCHARGE TO PONDS IS NOT TO EXCEED 22,000 GPD.



Placer County General Plan

Figure — Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Castle City Mobile Home Park

- | | |
|-----------|-----------------------|
| Streets | County Line |
| Waterways | District Service Area |

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

CITY OF COLFAX

General Information: The City of Colfax Wastewater Treatment Plant (Colfax WWTP) is located about one mile southeast of downtown Colfax at Grand View Road. Discharge from the facility is permitted under RWQCB Waste Discharge Requirement Order No. 90-166, Federal EPA NPDES Permit No. CA0079529, and Monitoring and Reporting Program No. 90-166 effective June 22, 1990.

Wastewater Generation/Sources: Wastewater treated at the City of Colfax plant is considered of a municipal nature. The permitted average dry weather flow (ADWF) to the treatment facilities is 160,000 gpd. Current ADWF is about 140,000 gpd. Average annual discharge from the system is 250,000 gpd (including the wet weather contribution). The system serves 370 residential, 96 commercial and no industrial connections.

Collection System Description: Three major service areas combine to create the total collection service area to the Colfax system; the Downtown area, Illinois Town area and the West High School area. The Downtown area is considered the oldest and the average age of the collection network is about 50 years. The Illinois and West High School collection system areas are newer with an average age of 8 years.

The Downtown area was constructed in 1910 and is mainly 4-inch and 6-inch diameter clay gravity sewer lines. In 1989 the downtown collection area underwent some rehabilitation with 1,650 feet of old line replaced with new clay line.

The Illinois area collection system was mainly constructed in 1984 of PVC pipeline material and is about 10,000 lineal feet in overall length. Collection within the system is by gravity and typical manhole spacing is approximately every 300 feet. Constructed in 1987, the West High School area collection system is PVC pipeline material and is about 5,600 lineal feet in overall length.

Collection within the system is by gravity and typical manhole spacing is about every 300 feet. There are 6 lift stations and 146 manholes within the existing collection system. There are about 12 miles of total collection system pipelines which vary in size from 4, 6, 8, 10 and 15 inches in diameter. Some of the existing collection system lines are 75 years old.

Deficiencies: The City of Colfax collection system is considered in fair overall condition with the primary deficiency being inflow and infiltration.

Overall system capacity is 5 mgd and is considered adequate. Although some improvements were made the Downtown area, this portion of the collection system still does experience some inflow and infiltration problems. Inflow and infiltration is considered a problem in the aged sections of the collection system. Other identified collection system deficiencies include undersized collection areas and deteriorated or damaged pipelines.

Proposed Improvements: Planned, proposed or required collection system improvements include an infiltration and inflow study with associated work to follow. An RFP for the inflow and infiltration was circulated in October 1991.

Wastewater Treatment System Description: Construction of the new City of Colfax Wastewater Treatment Plant was completed in 1979. The treatment scheme consists of prechlorination for odor control, a comminutor and bar screen, two mechanically-aerated aerobic-anaerobic facultative treatment ponds in series, and an unlined storage pond.

The design capacity of the treatment plant is 1.5 mgd; however, the existing ADWF to the plant is about 140,000 gpd with a permitted maximum of 160,000 gpd ADWF. Considering infiltration and inflow, and rainfall on the ponds, the actual winter flow sometimes exceeds 300,000 gpd.

Deficiencies: The storage pond, which has a capacity of 69 million gallons, has experienced seepage problems since its construction in 1979. Seepage drains to a tributary of Smuthers Ravine, which is a tributary of Bunch Creek and the North Fork American River. This is a permitted discharge.

The RWQCB WDR's specify a time schedule for compliance with reduction of coliform levels in the WWTP effluent. Past effluent coliform levels have been detected in excess of 1,600 MPN/100 ml.

Proposed or Accomplished Improvements: The City has installed new chlorine contact facilities to rectify the high effluent coliform problem. The new chlorination disinfection facilities were brought on line in November 1991.

Additional planned, required or proposed improvements to the treatment facilities include pre-engineering planning for the next phase expansion of the treatment plant which is scheduled for 1992-93 or 1993-94. Also ongoing is a current application to amend the effluent permit (WDR) to allow 200,000 gpd discharge.

Disposal System Description: Effluent disposal from the Colfax WWTP is by two methods; spray irrigation in the summer and subsurface seepage disposal on a year-round basis. Seepage disposal in accordance to the discharge permit is limited to 130,000 gpd from 15 May to 15 October. Seepage disposal in the winter months sometimes exceeds 130,000 gpd with the average annual seepage disposal rate of 100,000 gpd. A sprinkler irrigation system covering 43 acres is used for evapotranspiration disposal. Spray disposal lowers the storage pond in the summer.

Sewage solids disposal have to date not been required.

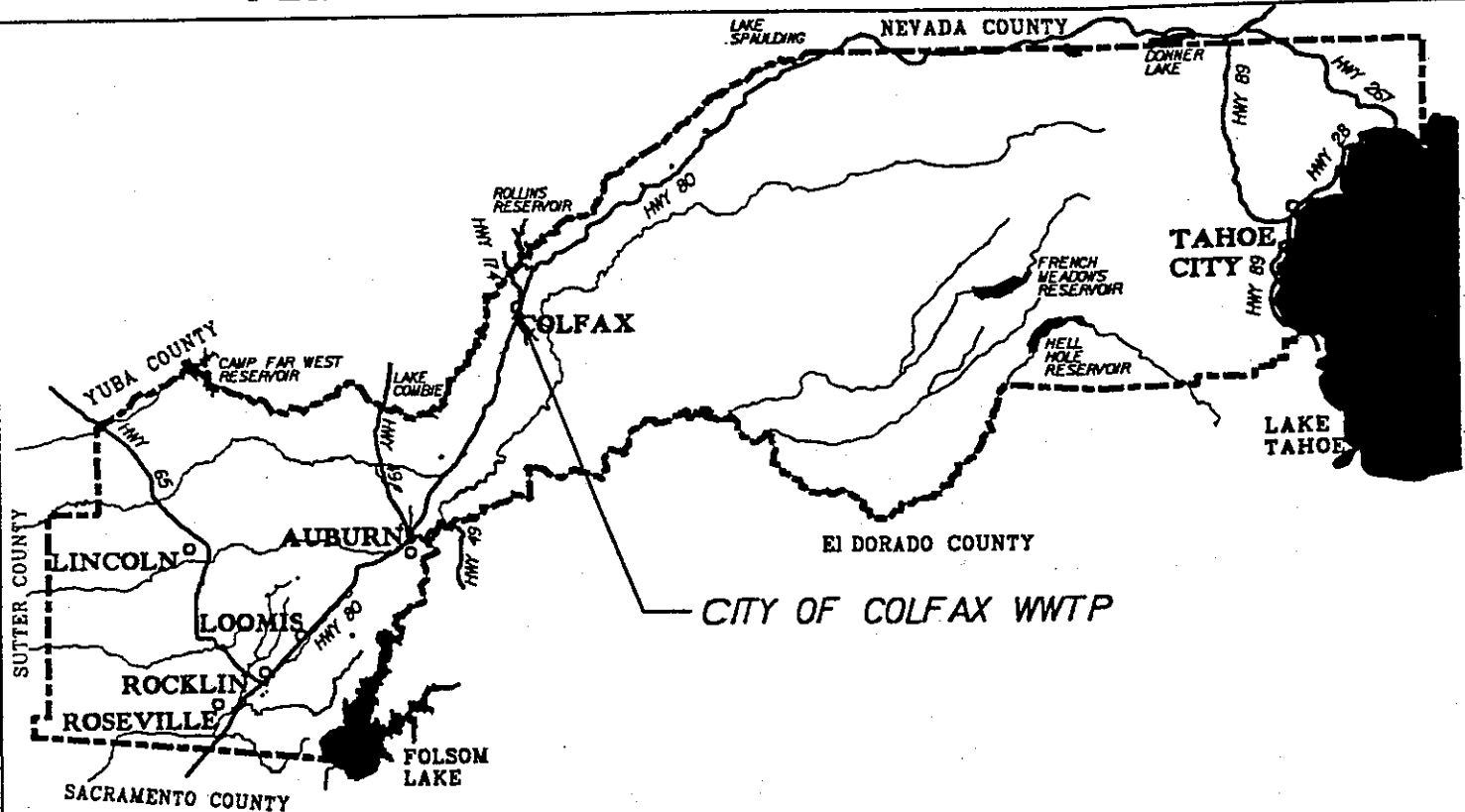
Deficiencies: Currently there are no identified deficiencies within the existing disposal system.

Proposed Improvements: There are currently no planned, required or proposed improvements to the disposal facilities.

Financing: Past wastewater collection, treatment and disposal system improvements have been partially funded by Clean Water Grant monies. Funding for planned future improvements is by means yet to be identified; however, local share costs will be funded by connection fee reserves. Local share of capital improvements, and operations and maintenance costs, is by service and connection fees.

System Appraisal: In general the City of Colfax wastewater collection, treatment and disposal facilities are considered adequate. Overall system capacity is presently permitted to an average dry weather flow of 160,000 gpd with an treatment plant expansion capability to 200,000 gpd. Plans to increase treatment plant capacity are underway at this time.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: CITY OF COLFAX

Address: GRANDVIEW ROAD, COLFAX 95713

Contact Name: WILLIAM ENOCH OR DAVE WOODFORD Phone: (916)-346-2313, 8640

Service Area Size: 1000 ac. No. Connect.: 466 Population Served: 1,450
APPROX.

Services Provided: WASTEWATER COLLECTION, TREATMENT AND DISPOSAL.

Summary System Description

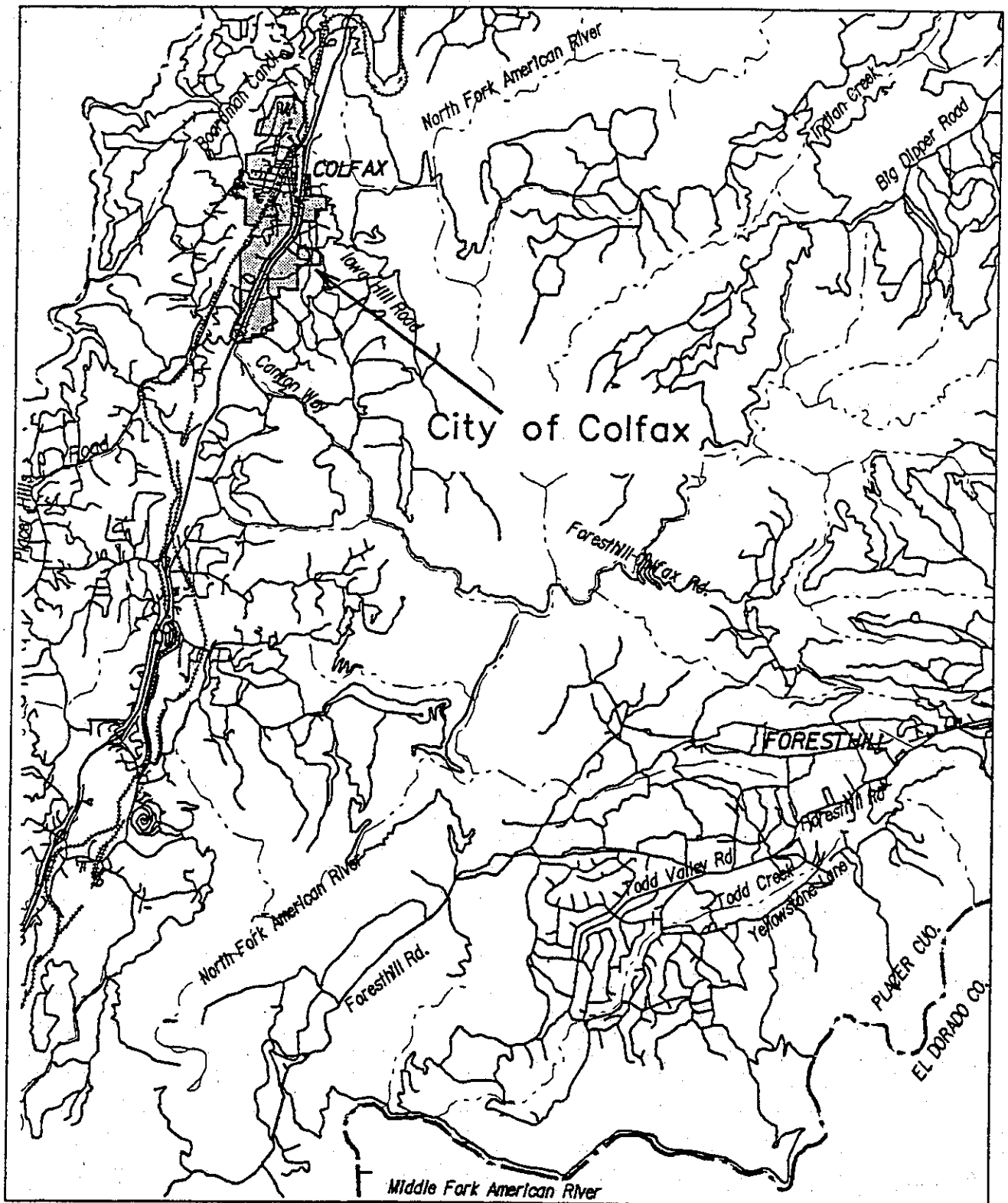
Service Area Characteristics: FACILITIES SERVE A 1,000 ACRE AREA WHICH INCLUDES 370 RESIDENTIAL AND 96 COMMERCIAL CONNECTIONS. LOCATED IN THE SIERRA NEVADA RANGE. FORESTED HILLY LAND.

Collection: WASTEWATER IS COLLECTED FROM 3 MAJOR SERVICE ZONES; DOWNTOWN, ILLINOIS TOWN AND WEST HIGH SCHOOL AREAS. GRAVITY SYSTEM INCLUDES 146 MANHOLES AND 6 LIFT STATIONS.

Treatment: TREATMENT PLANT CONSTRUCTED IN 1979. CONSISTS OF HEADWORKS, TWO AERATED FACULTATIVE LAGOONS AND AN UNLINED STORAGE POND. EXISTING ADWF IS ABOUT 140,000 GPD.

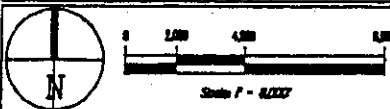
Disposal: SUBSURFACE SEEPAGE ON A YEAR-ROUND BASIS WITH SPRAY IRRIGATION IN THE SUMMER TO 43 ACRES OF SPRAY FIELD. 69 MG STORAGE POND IS USUALLY 65% EMPTIED BY END OF SUMMER USING IRRIGATION.

Capacity Limitations: PERMITTED MAXIMUM OF 160,000 GPD (ADWF). POTENTIAL TO EXPAND TO 200,000 GPD. APPLICATION FOR EXPANSION IN PROGRESS.



Placer County General Plan

Figure — Wastewater Service Area



Date: 1/15/92
Prepared by:
PSOMAS & ASSOCIATES

LEGEND

City of Colfax

- | | | | |
|--|-----------|--|-----------------------|
| | Streets | | County Line |
| | Waterways | | District Service Area |

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

DEPARTMENT OF TRANSPORTATION-GOLD RUN

General Information: The California Department of Transportation operates the Gold Run Roadside Rest Area on both sides of Highway 80, nine miles east of Colfax (SW 1/4, Sec 4, T15N, R10E, MDB&M). Discharge from the facility is regulated by RWQCB Waste Discharge Requirement Order No. 83-091 and Monitoring and Reporting Program No. 83-091, adopted by the RWQCB on August 12, 1983.

Wastewater Generation/Sources: Domestic wastewater is generated from restrooms and from recreational vehicle waste discharges. There are no unusual wastestream constituents evident from past monitoring results. There is a seasonal drop-off in wastestream quantity during the winter months.

Collection System Description: Wastewater is collected from both restroom facilities and recreational vehicle dumps on each side of the Highway and conveyed to the treatment and disposal facilities.

Deficiencies: There are currently no identified collection system deficiencies.

Proposed Improvements: There are currently no planned, required or proposed improvements to the collection system.

Wastewater Treatment and Disposal System Description: The Gold Run Sewage Treatment Facility utilizes septic tanks, a stabilization pond on the west side of the highway, a leachfield and a sprinkler irrigation system. The septic tank, pond and spray irrigation system is used to manage a maximum permitted summertime wastewater stream of 41,000 gpd. Gold Run handles a permitted maximum of 18,000 gpd of wastewater in the winter by disposing effluent from the septic tanks, through the stabilization pond and to a subsurface leachfield.

Pond effluent is chlorinated prior to disposal, nevertheless, contact with aerosol drifts from the sprayed effluent by the public is a serious concern. Mitigation measures to alleviate this issue include mitigation for stringent low effluent coliform levels and maintenance of trees as a partition between the spray field and highway. A collection basin at the base of the sprinkler field contains and returns runoff to the pond.

Septage solids are pumped from the tank and hauled to a permitted disposal site.

Deficiencies: There are currently no identified deficiencies in the treatment and disposal system.

Proposed Improvements: There are currently no planned, required or proposed improvements to the treatment and disposal system.

Financing: Funding for system improvements, operations and maintenance is provided through state funding methods.

System Appraisal: The facilities are considered adequate for the existing traffic flow presently being serviced. As traffic increases across Highway 80 and more patrons frequent the existing facilities, some additional expansion may be necessary.

DEPARTMENT OF TRANSPORTATION-WHITMORE MAINTENANCE STATION

General Information: The California Department of Transportation operates the Whitmore Maintenance Station on Highway 80, 3.5 miles east of Baxter. The wastewater generated from the maintenance station is regulated by RWQCB Waste Discharge Requirement Resolution No. 59-118, adopted March 19, 1959.

Wastewater Generation/Sources: It was estimated in March 1959 that 65 workers are quartered in a dormitory at the Whitmore Maintenance Station and discharge domestic wastes to the wastewater collection, treatment and disposal facilities.

Collection System Description: Wastewater is collected from restroom and kitchen facilities.

Deficiencies: There are currently no identified collection system deficiencies.

Proposed Improvements: There are currently no planned, required or proposed improvements to the collection system.

Wastewater Treatment and Disposal System Description: Wastewater treatment and disposal facilities consist of septic tank and leachfield. The WDR's give several water quality parameters to monitor and physical conditions to meet in the event of potential accidental discharge to Canyon Creek.

Septage solids are pumped from the tank and hauled to a permitted disposal site.

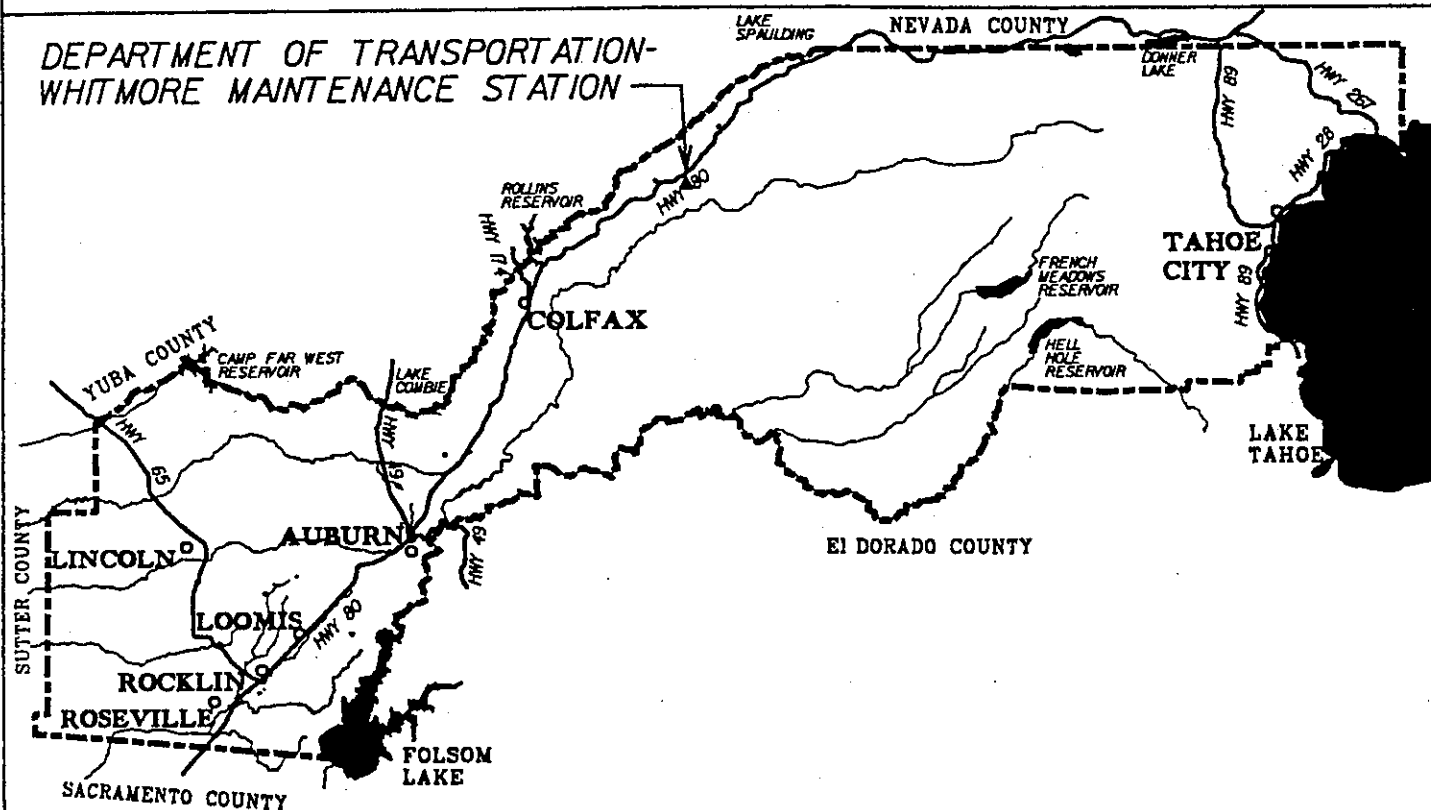
Deficiencies: There are currently no identified treatment and disposal system deficiencies.

Proposed Improvements: Currently there are no planned, required or proposed improvements to the treatment and disposal system.

Financing: Funding for system improvements, operations and maintenance is provided through State Department of Transportation processes.

System Appraisal: The existing facilities are considered adequate for the wastewater flow presently being serviced. The California Department of Transportation is not planning to expand the facility.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: DEPT.OF TRANSPORTATION-WHITMORE MAINTENANCE STATION

Address: 3.5 MILES EAST OF BAXTERON HWY 80

Contact Name: STEVE THOMPSON, REGIONAL MANAGER Phone: (916)-389-2883

Service Area Size: No. Connect.: 2 Population Served: 65

Services Provided: WASTEWATER COLLECTION, TREATMENT AND DISPOSAL

Summary System Description

Service Area Characteristics: CALTRANS. ROAD MAINTENANCE STATION WITH ABOUT 65 WORKERS QUARTERED IN A DORMITORY.

Collection: WASTEWATER IS COLLECTED FROM THE STATION RESTROOM AND KITCHEN FACILITIES AND CONVEYED BY GRAVITY TO AN ON-SITE SYSTEM.

Treatment: SEPTIC TANK AND LEACHFIELD SYSTEM.

Disposal: SUBSURFACE DISPOSAL THROUGH PERCOLATION FROM LEACHFIELD DISPOSAL SYSTEM.

Capacity Limitations: DESIGN CAPACITY OF THE SYSTEM IS 3,900 GPD.

DEPARTMENT OF PARKS & RECREATION - GRANITE BAY

General Information: The State Department of Parks & Recreation, American River District, owns and operates the Granite Bay State Park. Wastewater discharge is permitted by old RWQCB Sewage Discharge Requirements Resolution No. 69-205, which was adopted on March 14, 1969. An Application for Facility Permit/Waste Discharge was filed in December 1989 and the RWQCB is presently considering new waste discharge requirements and issuance of a new Order. The Granite Bay facilities are located in the Folsom Lake State Recreation Area, on the west side of the lake some four miles north of Folsom Dam.

Wastewater Generation/Sources: Visitors to Granite Bay State Park generate the wastestream collected and treated by the Granite Bay State Park wastewater facilities. Estimated wastewater flows in the spring and summer months are about 5,000 gpd whereas flows are approximately 500 gpd in the fall and winter months. The wastestream is considered domestic in nature.

Collection System Description: Constructed in 1968, the existing collection system is composed of 4-inch ABS or PVC sewer lines. The collection system is about 3,000 feet in overall length. Wastewater is collected from restroom facilities, a small park office, lifeguard building, food concession facility and one residence.

Deficiencies: There are currently no identified collection system deficiencies.

Proposed Improvements: Currently there are no planned, required or proposed improvements to the collection system.

Wastewater Treatment and Disposal System Description: The Granite Bay State Park wastewater treatment system is composed of six septic tanks of which the largest is 1,800 gallons and two leachfields. Leachfield No. 1 was refurbished with new materials in 1983. The size of leachfield No. 1 is 100 feet by 85 feet. Construction of leachfield No. 2, 125 feet by 100 feet in area, was completed in 1987.

Septage solids are pumped from the tank on a frequency of about every two or three years and hauled away for disposal. Tanks are inspected on an annual basis.

Deficiencies: Surfacing of wastewater commonly occurs during heavy park usage in the summer months due to leachfield inadequate capacity. The RWQCB affirmed in September 1985 that there exists a potential for water quality degradation and objectionable odors generation. The disposal areas have been surface bermed to preclude polluted runoff from the disposal areas.

There are currently no identified treatment and disposal system deficiencies.

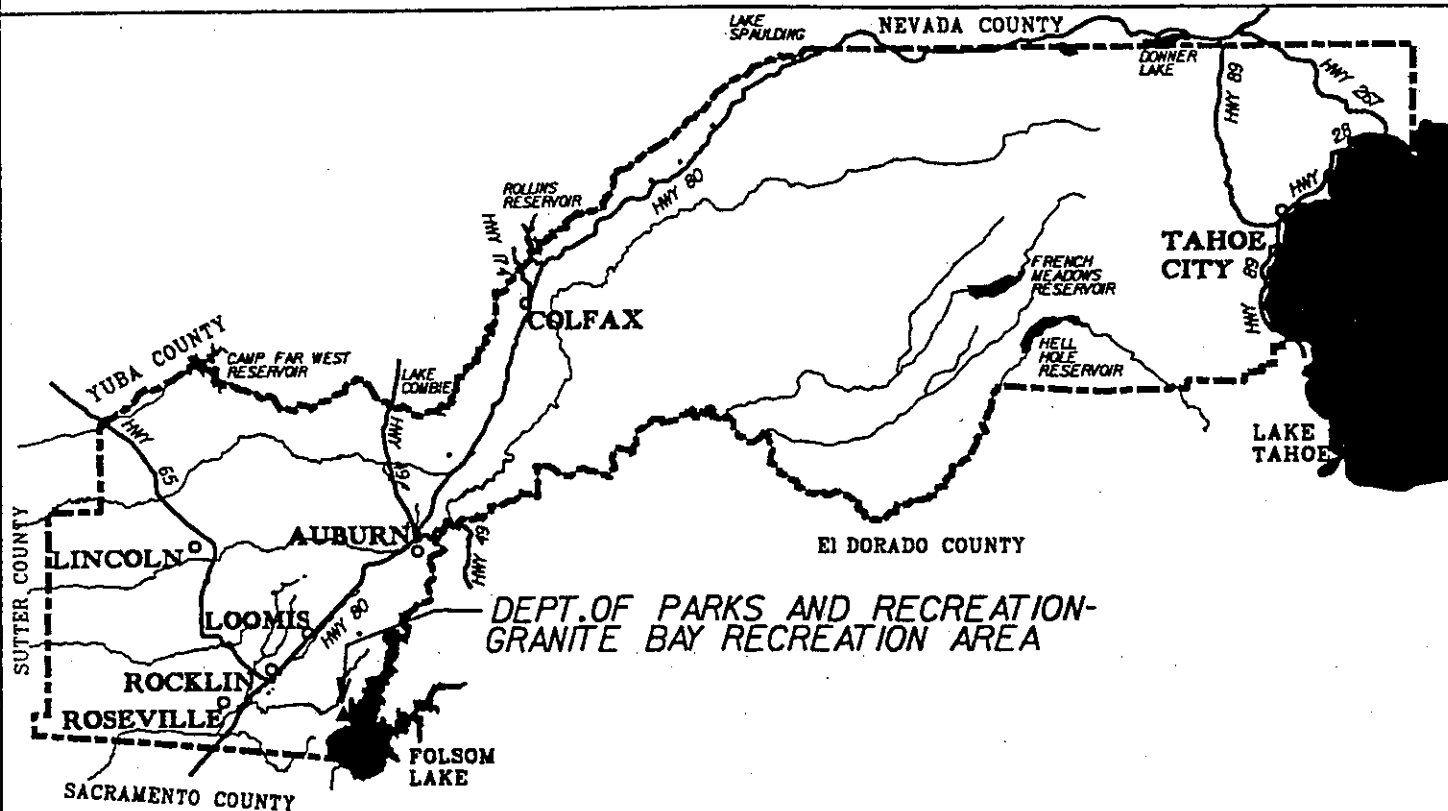
Proposed Improvements: Currently there are no planned, required or proposed improvements to the treatment and disposal system.

Connection to a sewer system and regional wastewater treatment plant is encouraged by the RWQCB.

Financing: Improvement capital and operations and maintenance costs are funded by capital outlay budgets and category I and II maintenance budgets. As of this writing, the State Park System is facing serious financial downsizing. Budgets are being slashed, positions cut and personnel laid off. Future budgets for operations and improvements are questionable.

System Appraisal: At this time the State Department of Parks and Recreation does not plan to expand the facility.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: DEPT.OF PARKS AND RECREATION-GRANITE BAY RECREATION AREA

Address: 7806 FOLSOM-AUBURN ROAD, FOLSOM, FOLSOM LAKE STATE REC.AREA

Contact Name: JOHN JONES Phone: (916)-988-0205

Service Area Size: No. Connect.: Population Served:

Services Provided: WASTEWATER COLLECTION, TREATMENT AND DISPOSAL.

Summary System Description

Service Area Characteristics: STATE RECREATIONAL AREA LOCATED ON THE WEST SIDE OF FOLSOM LAKE. ROLLING SIERRA NEVADA FOOTHILLS WITH OAK WOODLANDS AND GRASSLANDS.

Collection: WASTEWATER IS COLLECTED FROM THE PUBLIC AND DEPARTMENT RESTROOM FACILITIES USING A GRAVITY SEWER SYSTEM, AND 4 LIFT STATIONS.

Treatment: PROVIDED BY 6 SEPTIC TANKS, THE LARGEST OF WHICH IS 1,800 GALLONS, AND TWO LEACHFIELDS. ESTIMATED SUMMER FLOWS ARE ABOUT 5,000 GPD AND WINTER FLOWS ARE ESTIMATED AT ABOUT 500 GPD.

Disposal: SUBSURFACE SOIL DISPOSAL VIA LEACHFIELDS. TOTAL LEACHFIELD AREA IS 21,000 SQUARE FEET.

Capacity Limitations: DESIGN CAPACITY FOR THE ON-SITE SYSTEM IS NOT AVAILABLE.

HEATHER GLEN COMMUNITY SERVICES DISTRICT

General Information: The Heather Glen Community Services District oversees operation of a mobile home subdivision located a half mile northeast of Applegate at Applegate Road and Heather Glen Drive. Wastewater discharge from the Heather Glen Estates Mobile Home Subdivision is permitted by RWQCB Waste Discharge Requirements Order No. 90-268 and Monitoring and Reporting Program No. 90-268, adopted on February 28, 1990. Initial WDR's were adopted in 1963 for disposal to a stabilization pond. Surface runoff from Heather Glen Estates is to an un-named tributary to North Fork American River.

Wastewater Generation/Sources: Heather Glen Estates comprises build-out capability to 80 mobile home lots with a present occupancy of 75 lots. Present wastewater flowrate to the stabilization pond is about 10,000 gpd. The wastestream is considered domestic in nature.

Collection System Description: Constructed in 1963, the existing collection system is composed of 4, 6, and 10-inch non-techite type gravity sewer lines. The collection system is about 7,840 feet in overall length. Wastewater is collected from each of the mobile homes at the Park.

Deficiencies: The existing collection system does not experience excessive inflow and infiltration. There are currently no identified collection system deficiencies.

Proposed Improvements: There are currently no planned, required or proposed improvements to the collection system.

Wastewater Treatment and Disposal System Description: The Heather Glen Community Services District wastewater treatment and disposal system presently treats about 10,000 gpd ADWF. Collected wastewater is discharged to a fenced stabilization pond with overflow sprayed on an adjacent area. Existing daily flow is about 50 percent of the wastewater treatment and disposal design capacity of 20,000 gpd. System flows are currently approximately 10,000 gpd.

Accumulated solids in the stabilization pond have to date not required any disposal activity.

Deficiencies: Past treatment and disposal system problems include a few odor complaints, some septic conditions in the stabilization pond, and improper pond freeboard reporting to the RWQCB.

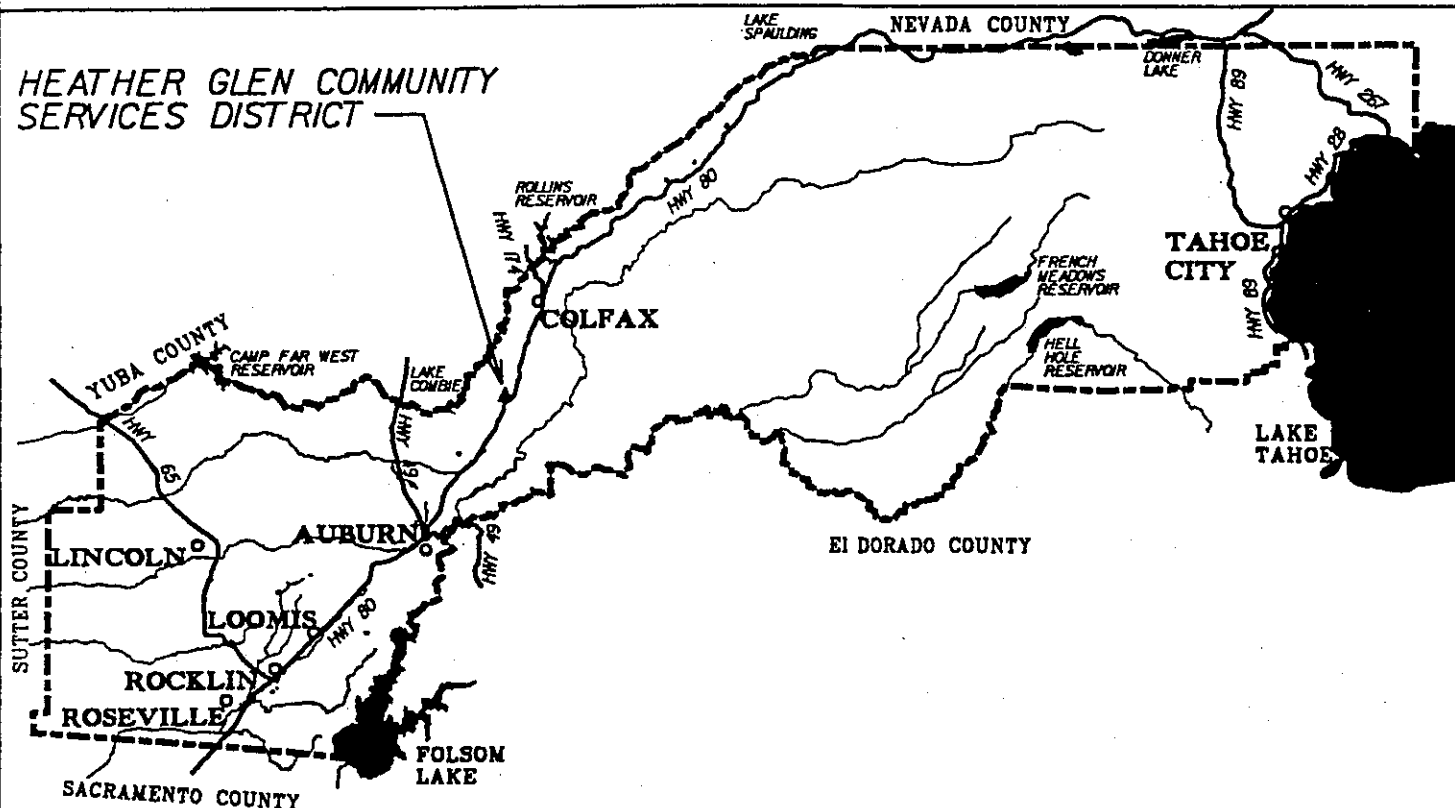
Other identified treatment and disposal system deficiencies include the reporting of pond levels nearing overflow height in 1991.

Proposed Improvements: Planned, required or proposed improvements to the treatment and disposal system are pending per the recommendation of the Heather Glen Community Services District consulting engineer in the near term.

Financing: Funding for the Heather Glen wastewater collection, treatment and disposal facilities is by Heather Glen CSD user and connection fees.

System Appraisal: Overall the existing Heather Glen Subdivision wastewater system reportedly is serving the present wastewater flows adequately. Although the subdivision is nearing full build-out, the wastewater system has additional capacity remaining to service the anticipated future flows. There currently are not any existing plans to expand the subdivision.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: HEATHER GLEN COMMUNITY SERVICES DISTRICT

Address: APPLEGATE ROAD AND HEATHER GLEN DRIVE, APPLEGATE, CA

Contact Name: JAY HUSSEY Phone: (916)-878-2513

Service Area Size: _____ No. Connect.: 78 Population Served: 114

Services Provided: WASTEWATER COLLECTION, TREATMENT AND DISPOSAL

Summary System Description

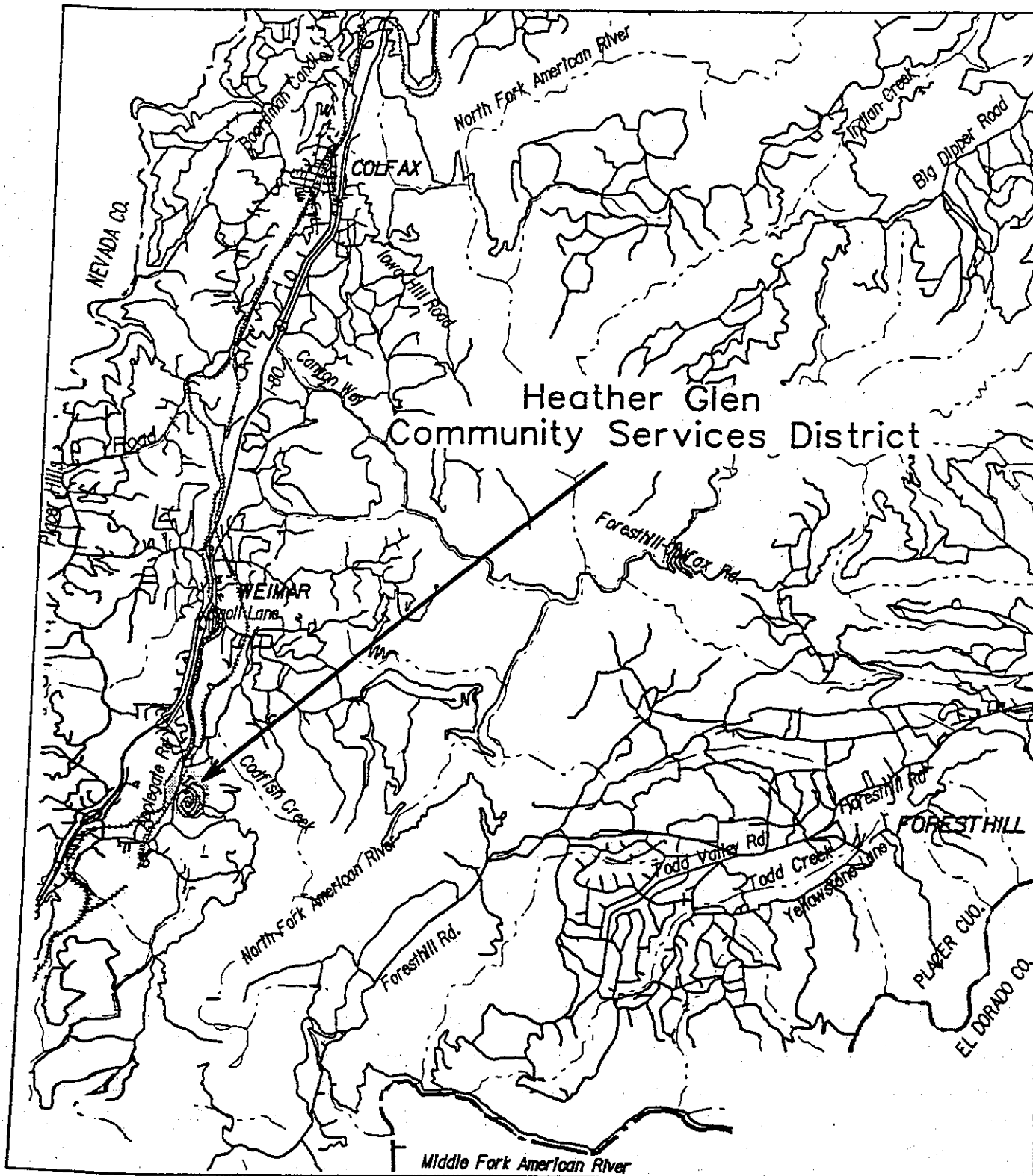
Service Area Characteristics: MOBILE HOME PARK LOTS ARE SERVED BY THE SYSTEM. TOPOGRAPHY OF AREA IS MOUNTAINOUS SIERRA NEVADA WOODED FOOTHILLS.

Collection: WASTEWATER GENERATED BY THE MOBILE HOME RESIDENCES IS CONVEYED BY 4, 6, & 10 INCH NON TECHITE TYPE GRAVITY SEWER LINES TO THE TREATMENT PLANT.

Treatment: PROVIDED BY A SINGLE, FENCED, STABILIZATION POND. EXISTING AVERAGE DAILY FLOW IS ABOUT 10,000 GPD (ADWF).

Disposal: PERCOLATION/EVAPORATION

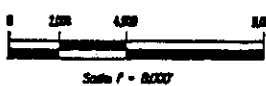
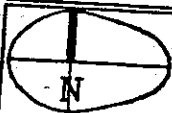
Capacity Limitations: ULTIMATE BUILD-OUT TO 80 MOBILE HOMES. DESIGN CAPACITY OF EXISTING FACILITIES IS 20,000 GPD.



Placer County General Plan

Figure _____

Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Heather Glen Community Services District

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| | |

NOTE:

Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

CITY OF LINCOLN

General Information: The City of Lincoln wastewater treatment plant facilities are located on Nicolaus Road in Lincoln (Sec 17, T12N, R6E, MDB&M). Discharge from the City of Lincoln wastewater treatment plant is permitted by RWQCB Waste Discharge Requirements Order No. 83-027 and Monitoring and Reporting Program No. 83-027, adopted on February 25, 1983.

Clean Water Grant monies helped fund system improvements including collection system up-grades to reduce inflow and infiltration and the purchase of 111 acres of land for spray irrigation disposal in 1975.

In 1987 a Phase III expansion plan was developed by the City which would improve the plant headworks, influent pumps, aerators, effluent lift station and initiate spray disposal to a nearby golf course and airport. This expansion would boost capacity to 1.4 mgd and proposed discharge to Markham Ravine along with spray disposal. Plans for the expansion were almost complete by June, 1988, however by August the RWQCB was questioning the need for expansion base on the existing flows and anticipated development.

The expansion proposal rested until 1989-90 when it was pushed again by the City. In February of 1990 the Federal Aviation Administration objected to the proposed reclamation spray field near the airport as posing a potential bird problem. In March of 1990 the financing (Clean Water Grant) was approved, the 1.4 mgd expansion project was ready to go out for bid and existing wastewater flows were at 75% of plant capacity and projected to reach capacity by the end of 1991-92. By November 1990 expansion construction was underway. Expansion improvements are complete with final grant close out efforts (preparation of O & M Manuals, etc.) now being completed.

Wastewater Generation/Sources: Wastewater treated at the City of Lincoln plant is considered of a municipal nature. The permitted average dry weather flow (ADWF) to the treatment facilities is 800,000 gpd.

Collection System Deficiencies: Repairs to the collection system were undertaken in 1975 to decrease infiltration and inflow. Since those repairs were made, the existing collection system experiences reduced inflow and infiltration.

Wastewater Treatment System Description: The existing treatment facilities and processes consist of headworks (comminutor), six surface-aerated facultative treatment lagoons, three storage ponds, and chlorination disinfection. Current permitted treatment plant capacity is 800,000 gpd.

Deficiencies: It was estimated in March 1990 that the plant is operating at 75 percent of design capacity and was projected to reach full capacity by 1991-92. Improvements to bring the plant capacity up to 1.4 mgd were undertaken in late 1990 and completed in December, 1991. Since the recent plant improvements were completed the treatment plant has adequate capacity to meet the anticipated near-term future growth.

Proposed Improvements: Planned, required or proposed improvements to the treatment system include new headworks (parshall flume and two comminutors), pumps, additional aerators, and an additional chlorinator for future use.

Disposal System Description: The City of Lincoln currently disposes of effluent to a 111 acre spray irrigation system located adjacent to the plant. The spray disposal field is bermed and has a runoff detention dam to inhibit surface runoff from the area. A recirculation pumping system collects spray field

runoff which may pool at the retention dam. Required improvements to the spray system included replacement of defective sprinkler heads, and reconfiguration of the sprinklers to comply with safety regulations.

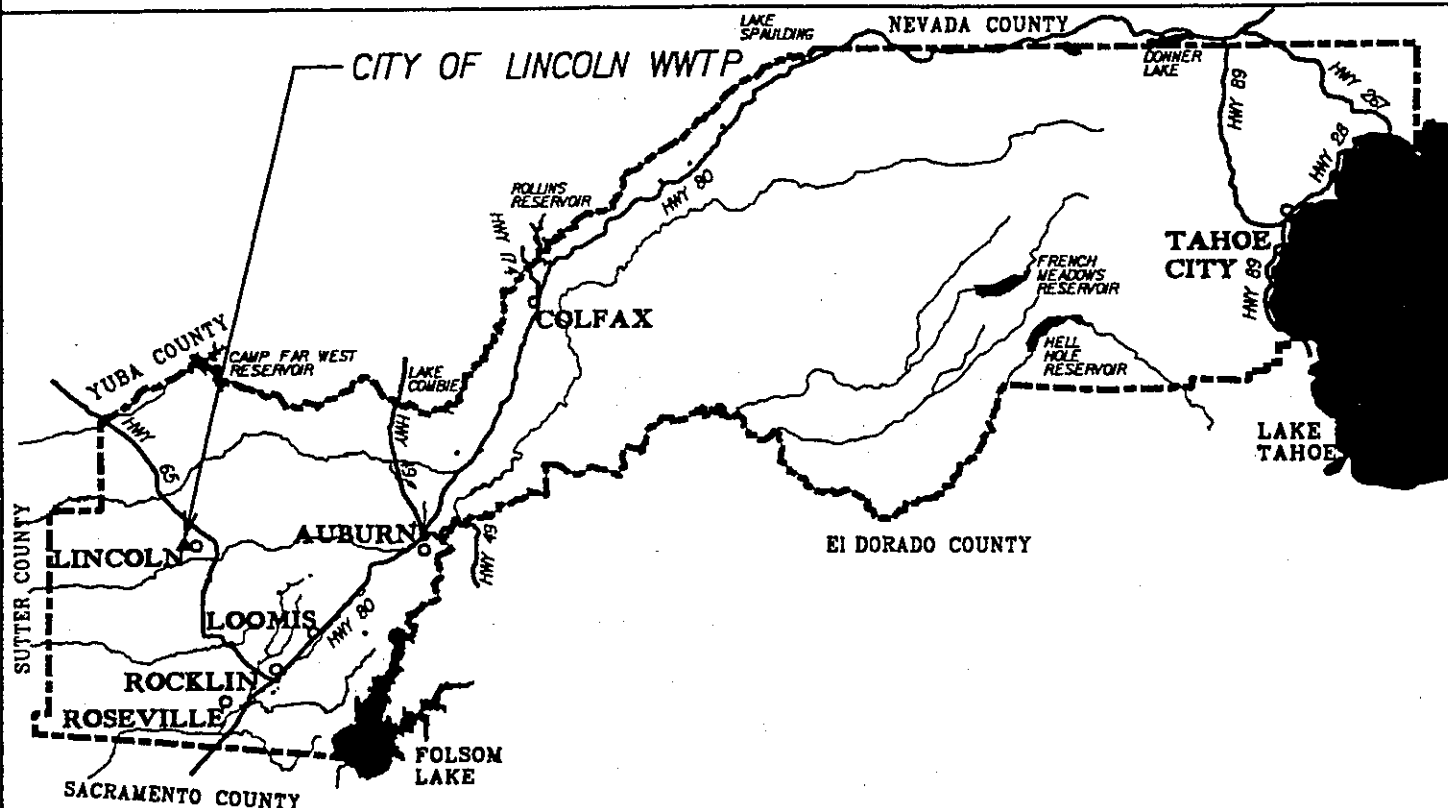
Proposed Improvements: An increase in the quantity of authorized land disposal to 800,000 gpd as part of the Phase III expansion was completed in 1991. The permit approval for additional disposal quantity was contingent on construction of two supplementary aerated facultative ponds, an additional storage pond, and restoration of the existing spray irrigation system.

Planned, proposed or required improvements on the disposal system which have been identified at this time include future effluent pump station to send effluent to the airport golf course storage lake and irrigation system.

Financing: Many of the improvements which have occurred since the initial construction of the City of Lincoln WWTP have been partially funded with Clean Water Grant monies. Local share portions of the improvement costs as well as operations and maintenance costs are funded through service fees, connection fees, and other funding.

System Appraisal: In general the City of Lincoln wastewater collection, treatment and disposal facilities are considered adequate to service the existing wastewater flows. Overall system capacity is presently permitted to an average dry weather flow of 800,000 gpd with an treatment plant expansion capability to 1,400,000 gpd.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: CITY OF LINCOLN - WWTP

Address: NICOLAUS ROAD, LINCOLN, CA

Contact Name: RALPH HITCHCOCK Phone: (916)-645-3314

Service Area Size: No. Connect.: Population Served:

Services Provided: WASTEWATER COLLECTION, TREATMENT AND DISPOSAL

Summary System Description

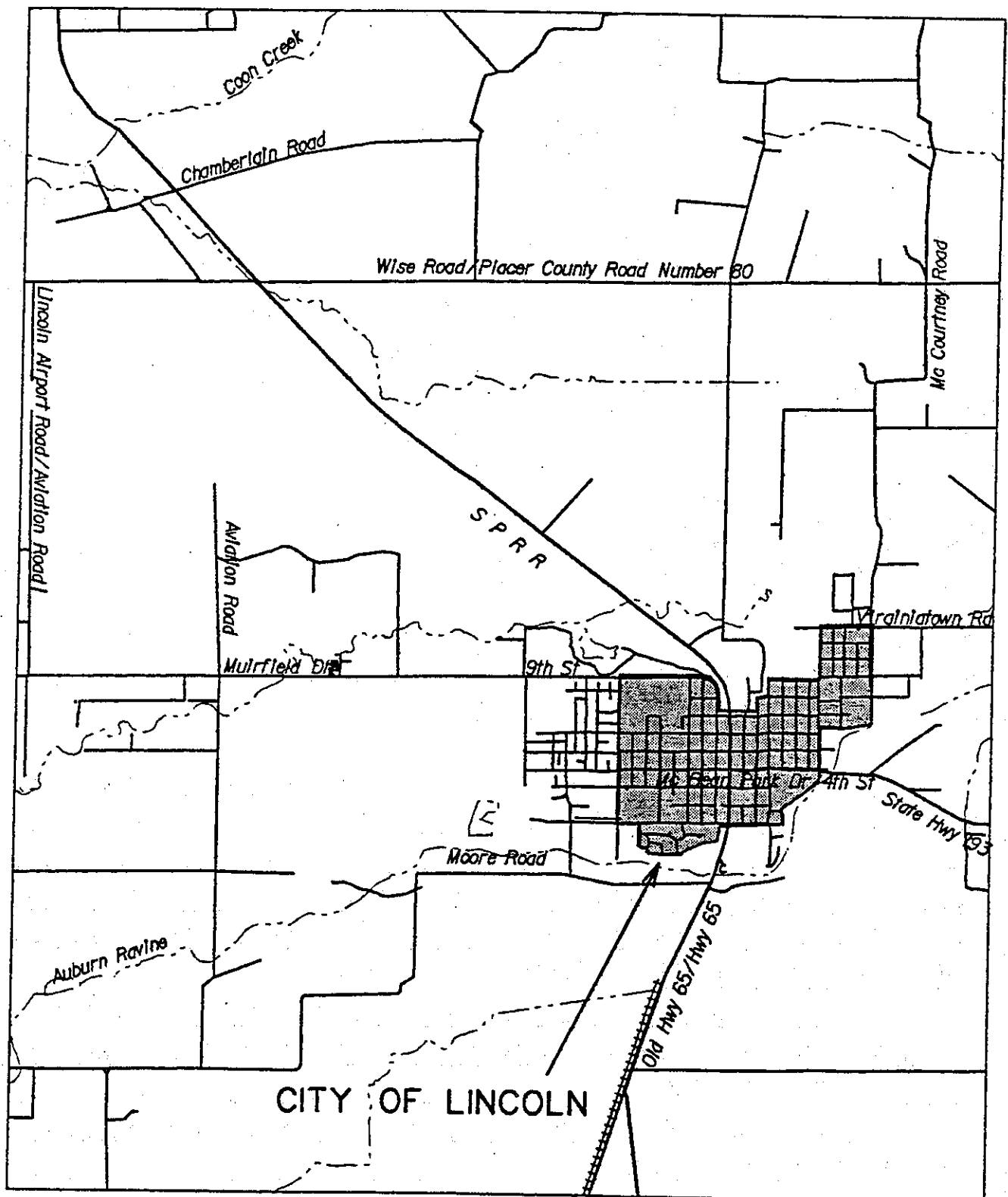
Service Area Characteristics: FACILITIES TREAT WASTEWATER GENERATED BY THE RESIDENCES AND COMMERCIAL ESTABLISHMENTS IN THE CITY AND SURROUNDING AREA. TOPOGRAPHY IS BASE OF FOOTHILLS, OAK WOODLANDS.

Collection: WASTEWATER IS COLLECTED FROM RESIDENCES, COMMERCIAL AND INDUSTRIAL CONNECTIONS AND CONVEYED THROUGH GRAVITY SEWER LINES TO THE TREATMENT PLANT.

Treatment: PROVIDED BY HEADWORKS, SIX SURFACE AERATED FACILITIES, LAGOONS, AND THREE STORAGE PONDS.

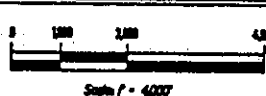
Disposal: SPRAY IRRIGATION DISPOSAL TO A 111-ACRE SPRAY FIELD. RUNOFF IS COLLECTED AND RECYCLED.

Capacity Limitations: CURRENT PERMITTED DISCHARGE IS 800,000 GPD. EXPANSION TO 1.4 MGD IS FEASIBLE.



Placer County General Plan

Figure _____ Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

City of Lincoln

- | | |
|-----------|-----------------------|
| Streets | County Line |
| Waterways | District Service Area |

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

NACO WEST-EMIGRANT GAP

General Information: Naco West, Inc., a Bellvue Washington firm, operates the Snowflower campground facility which is located near Highway 80, off the Yuba Gap Exit, at 41776 Yuba Gap Drive. The facilities are located on about 720 acres of Naco West owned property. Altitude at the campground is approximately 5,800 feet.

The campground was first opened in 1974. This operation provides year-round recreational services for camping as well as a small ski lift for wintertime activities. Due to the close proximity to the larger Tahoe Basin resorts the Snowflower Campground offers a wide variety of recreational latitude.

Wastewater discharge from the facility is permitted under RWQCB Waste Discharge Requirements Order No. 82-004 and Monitoring and Reporting Program No. 82-004 which were adopted on January 22, 1982.

Surface drainage from the area is to North Fork American River (Lake Snowflower).

Wastewater Generation/Sources: Wastewater is generated by campground facilities which include 11 restrooms with toilets, showers, and sinks and one recreational vehicle dump station. Wastewater generated is considered domestic in nature.

Collection System: Most of the existing collection system was constructed in 1974 using 2-inch to 4-inch PVC sewer lines. The system uses gravity collection with typical manhole spacing of 400 feet and 8 lift stations. Collection system capacity is 150 gpm (typical).

Deficiencies: The existing collection system does not have difficulties with inflow and infiltration. There are no currently identified deficiencies with the existing collection system.

Proposed Improvements: There are currently no planned, proposed or required collection system improvements.

Wastewater Treatment and Disposal System Description: Naco West's Snowflower Campground facility employs an on-site septic leachfield treatment/disposal system to handle the wastestream generated by the area. Construction of the wastewater system was finished in 1988, with initial start-up occurring in 1974. The design capacity of the individual septic system are 2,000 - 3,500 gpd. A 100% expansion capacity is available to the system by constructing the reserve leachfield systems.

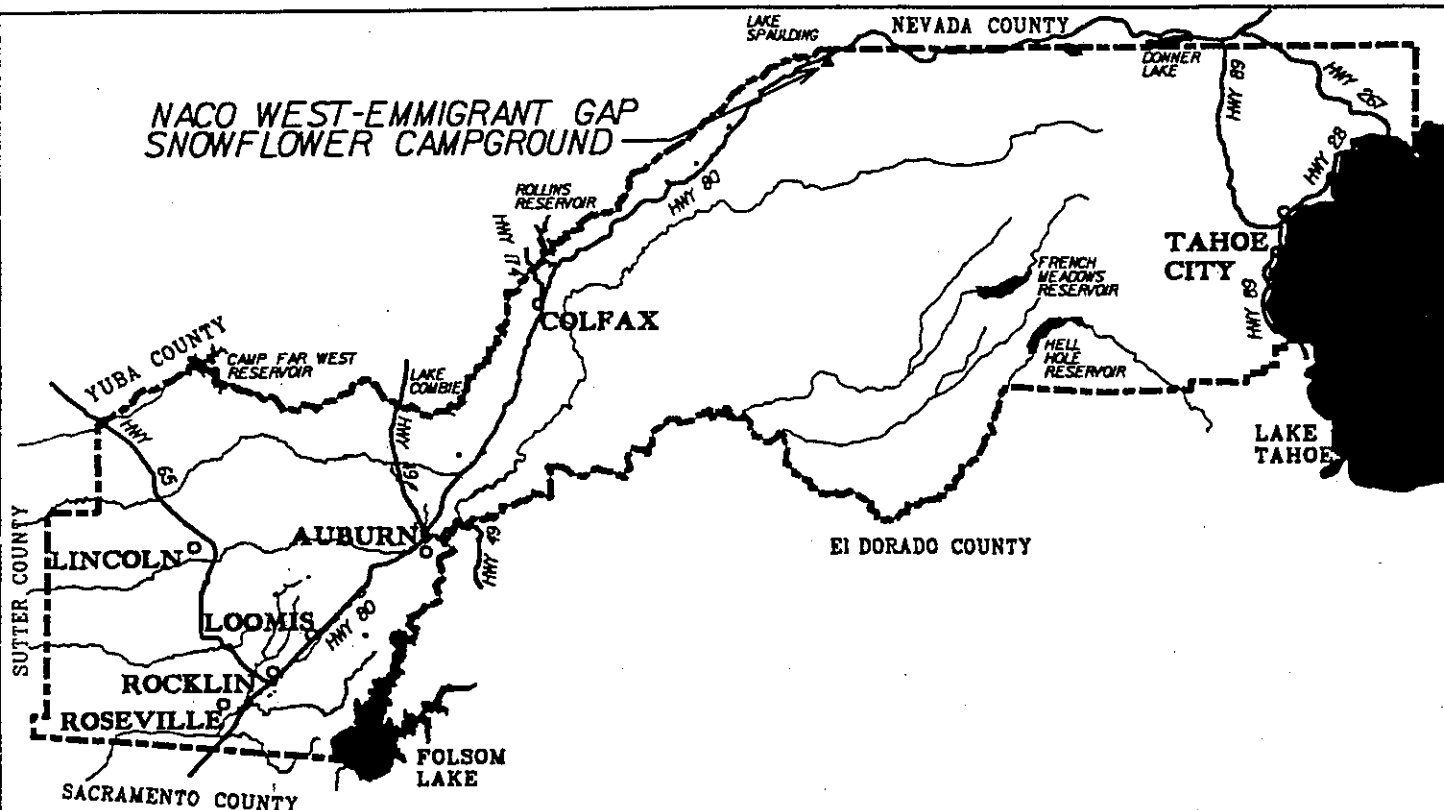
The wastewater treatment and disposal system uses numerous septic tanks and leachfields.

Deficiencies: Currently there are no identified disposal system deficiencies. There are currently no planned, proposed or required improvements to the treatment and disposal system.

Financing: Improvement, operations and maintenance costs for the Naco West Snowflower Campground sewage collection, treatment and disposal system are funded through Naco West corporate funds.

System Appraisal: In general the Naco West Snowflower system is considered to be in good shape overall. The existing design capacity of the system is 30,000 gpd with no plans for expansion in the near term.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: NACO WEST - EMIGRANT GAP (SNOWFLOWER CAMPGROUND)

Address: 41776 YUBA GAP DRIVE, EMIGRANT GAP CA

Contact Name: JIM JAEGER, PROJECT ENGINEER Phone: (206)-462-4497

Service Area Size: 720 ac. No. Connect.: 15 Population Served: 800 MAX.

Services Provided: WASTEWATER MANAGEMENT AT AN R.V. CAMPGROUND TRANSIENT

Summary System Description

Service Area Characteristics: FACILITIES SERVE THE ELEVEN CAMPGROUND RESTROOMS AND A RECREATIONAL VEHICLE DUMP STATION, ALONG WITH A LODGE, OFFICE, AND MANAGER RESIDENCE. ALL LOCALIZED SEPTIC SYSTEM FOR WASTEWATER.

Collection: LOCALIZED WITHIN THE IMMEDIATE AREA OF THE CAMPGROUND FACILITY. SEVERAL PUMP STATIONS ARE REQUIRED FOR WASTEWATER CONVEYANCE.

Treatment: PROVIDED BY SEVERAL SEPTIC TANK ON-SITE DISPOSAL SYSTEM.

Disposal: SEPTIC TANK EFFLUENT IS CONVEYED TO LEACHFIELDS FOR SUBSURFACE DISPOSAL. MANY OF THE INDIVIDUAL SEPTIC SYSTEMS USE PUMPS.

Capacity Limitations: DESIGN CAPACITY OF THE WASTEWATER SYSTEM IS VARIABLE FOR EACH OF THE SYSTEMS IN THE CAMPGROUND. CAPACITIES RANGE FROM 1500 TO 3500 GPD.

NEWCASTLE SANITARY DISTRICT

General Information: The Newcastle Sanitary District wastewater treatment plant is located west of Highway 80, between Newcastle and Penryn, on Taylor Road (NE 1/4, Sec 25, T12N, R7E, MDB&M) approximately one mile northwest of the Town of Newcastle. Discharge from the Newcastle Sanitary District WWTP is permitted under RWQCB Waste Discharge Requirement Order No. 78-226. This document was adopted on November 17, 1978.

Surface water drainage from the site is to Secret Ravine. No discharge to surface watercourses is allowed under the permit conditions.

Wastewater Generation/Sources: In 1991, Newcastle Sanitary District had 181 residential connections, 9 commercial connections, and 4 schools which generated a total of 45,000 gpd ADWF.

Wastewater generated by the City of Newcastle is considered municipal in nature.

Collection System Description: A total of 3.5 miles of clay pipes with concrete joints, reportedly about 80 years old, comprises the collection system. Construction of the collection system was likely to have been standard trench with native backfill of decomposed granite. Existing average dry weather daily flows of 48,300 gallons (peak 605,000 gpd in September 1991) and average wet weather daily flows of 122,000 gpd (March 1991).

Deficiencies: The existing collection system experiences particularly high wet weather flows due to infiltration and inflow problems. Inflow is considered to be the larger contributor of the two factors. In March 1989, the wet weather flow was reportedly 250,000 gpd with an estimated 4-hour peak exceeding 600,000 gpd. Unfortunately, an appeal to the SWRCB in April 1990, requesting a grant to study the collection system, was rejected based on the fact that study funds for collection systems were only available for unsewered areas. The SWRCB suggested the City apply for Small Community Grant monies to fund the study.

Other identified collection system deficiencies include manhole restoration services, house lateral improvements and low manhole covers.

Proposed Improvements: Currently there are plans to rehabilitate the collection system. These plans are on hold for the present. A planned program of collection system rehabilitation will be developed after the wastewater master plan is completed.

Wastewater Treatment System Description: The treatment plant, constructed in the early 1970's, consists of a headworks (diversion structure), one primary treatment aerated lagoon, a secondary treatment lagoon, two storage ponds, a chlorine disinfection system, and spray irrigation land disposal. The ponds operate in series. Design flow for the treatment plant is 70,000 gpd ADWF and limited by spray field capacity. High flow of 605,000 gpd was recorded during rain storms. Average dry weather flow in September 1991 was 48,300 gpd with average wet weather flow of 122,000 gpd in April 1991.

Deficiencies: The Newcastle Sanitary District treatment plant is susceptible to odors and, in October 1986, aerators were installed in the ponds to alleviate this problem.

Other identified treatment plant deficiencies include need for an interpond (pipe) system between treatment ponds #1 and #2, limitation on amounts of effluent to spray field (20,000 gpd) and chlorination facilities.

Storage in #3 and #4 storage ponds is not adequate for long periods of rainfall.

Proposed Improvements: Planned, proposed or required treatment plant improvements are to be determined after and as a result of the Wastewater Master Plan. If the present method of disposal is retained, spray system expansion would be required.

Disposal System Description: Disposal facilities for the Newcastle Treatment Plant consist of two storage ponds and a spray irrigation field. The spray irrigation field contains a 6-inch AC pipeline and 85 active spray heads over an area of 25 acres. The application rate is 450± gpm. Permitted disposal capacity is 70,000 gpd.

Deficiencies: Identified deficiencies in the existing disposal system include inadequate storage at present flows during long and heavy rainfall events. No alternate means of disposal are currently available.

Proposed Improvements: Planned, proposed or required improvements for the disposal system which have been identified at this time will be determined at the time the Wastewater Management Plan is completed and will depend upon the results of the Wastewater Management Plan.

Financing: Many of the improvements which have occurred since the initial construction of the City of Newcastle WWTP have been partially funded with grant monies. Local share portions of the improvement costs as well as operations and maintenance costs are funded through District connection fees and annual service charges.

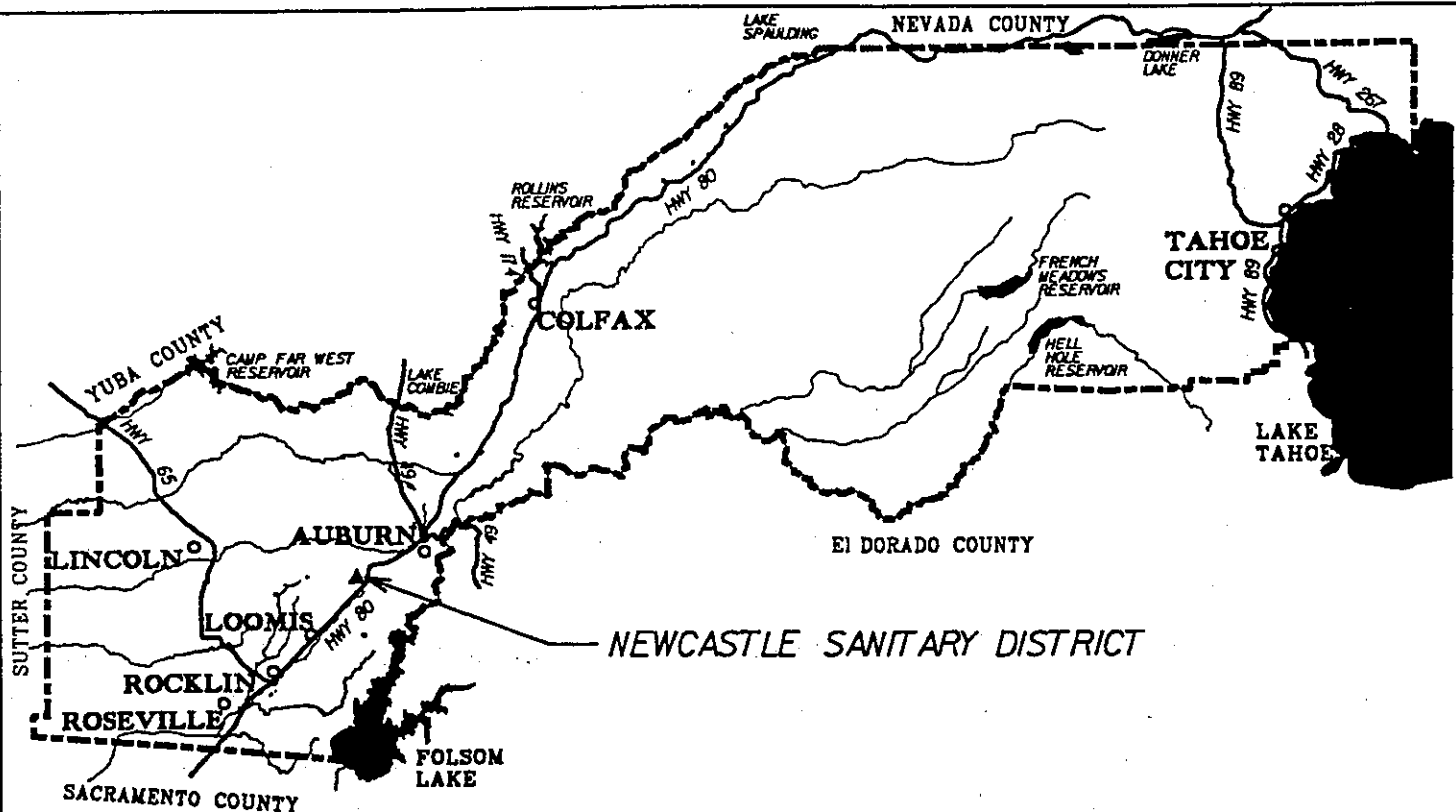
System Appraisal: In general the City of Newcastle wastewater collection, treatment and disposal facilities are considered to lack storage and be sending too much effluent for spray disposal daily (70,000 gpd). Overall system capacity is presently permitted to an average dry weather flow of 70,000 gpd. Plans to increase treatment plant capacity are needed and underway at this time.

This existing collection system is in need of rehabilitation and the trunk sewer system is limited.

Presently the Newcastle Wastewater Treatment Plant system is in general compliance with the regulatory requirements except for effluent discharge to the disposal spray field.

Treatment and disposal capability will be required prior to any major increase in connections can be allowed. Improvements will be outlined in the pending Master Plan.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: NEWCASTLE SANITARY DISTRICT

Address: TAYLOR ROAD, NEWCASTLE, CA

Contact Name: LEONARD ORSOLINI Phone: (916)-663-3173, 3428

Service Area Size: _____ No. Connect.: 194 Population Served: 663

Services Provided: WASTEWATER MANAGEMENT

_____ Summary System Description _____

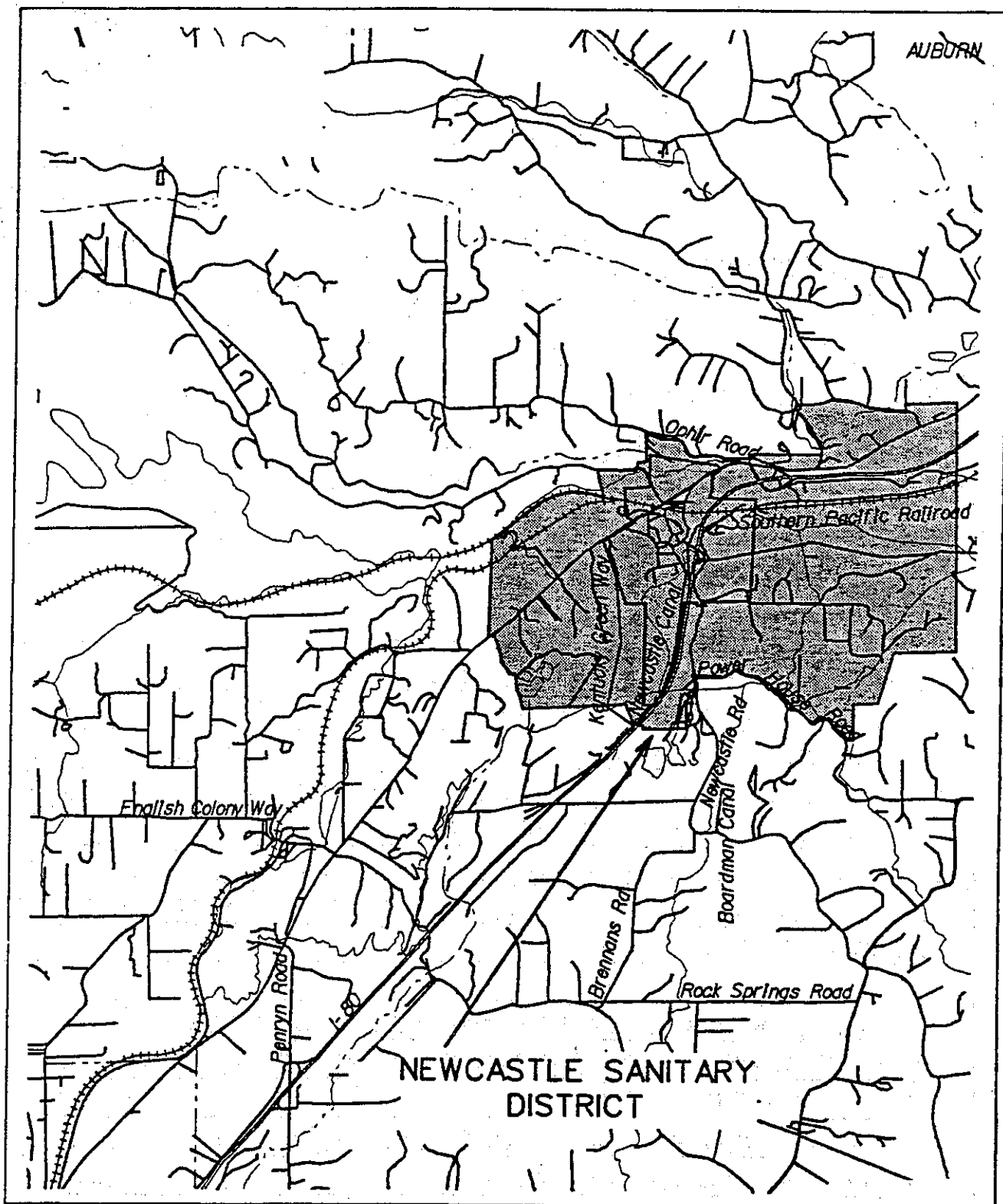
Service Area Characteristics: FACILITIES SERVE THE CITY OF NEWCASTLE AND SURROUNDING AREA.

Collection: A 3.5 MILE CLAY PIPE GRAVITY, COLLECTION SYSTEM SERVES 181 RESIDENTIAL AND 13 COMMERCIAL CONNECTIONS. HIGH INFLOW AND INFILTRATION DUE TO COLLECTION SYSTEM AGE.

Treatment: PROVIDED BY AN AERATED LAGOON SYSTEM CONSISTING OF HEADWORKS, TWO PRIMARY TREATMENT LAGOONS, TWO STORAGE PONDS AND CHLORINATION DISINFECTION SYSTEM.

Disposal: EFFLUENT FROM THE STORAGE POND IS DISTRIBUTED OVER A 25 ACRE SPRAY IRRIGATION FIELD.

Capacity Limitations: DESIGN FLOW FOR THE FACILITIES IS 70,000 GPD (ADWF).



Placer County General Plan

Figure _____

Wastewater Service Area

Date: 1/15/92

Prepared by: PSOMAS & ASSOCIATES

Scale 1" = 4000'

N

LEGEND

Newcastle Sanitary District

Streets County Line

Waterways District Service Area

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

OAKLAND SKI CLUB NORDEN

General Information: The Oakland Ski Club lodge is located one mile east of Norden, off Highway 49, in the Tahoe National Forest (NE 1/4, Sec 20, T17N, R15E, MDB&M). Land occupied by the Lodge is leased from the U.S. Forest Service. Wastewater from the lodge is permitted by RWQCB Waste Discharge Requirements Order No. 85-292 which was adopted on October 25, 1985.

Surface drainage from the area is to the South Fork Yuba River. No surface discharge is permitted in accordance with the RWQCB WDR's.

Wastewater Generation/Sources: Lodge facilities have a guest capacity of 40. Primary use of Oakland Ski Club lodge occurs on weekends during the skiing season.

Wastewater Collection, Treatment and Disposal System Description: The Oakland Ski Club lodge wastewater collection, treatment and disposal system consists of a septic tank/leachfield configuration which serves the restroom and kitchen facilities of the premises.

A new septic tank and leachfield system was constructed in the 1983 in response to RWQCB Cease and Desist Order No. 76-163. Chronic failures of the old system were the result of a high seasonal groundwater table and an insufficient soils percolation rate. Effluent from the old system surfaced and spilled into the South Yuba River drainage prompting the RWQCB enforcement action. Care was taken in construction of the new system to minimize surface runoff and snow-melt infiltration into the new leachfield.

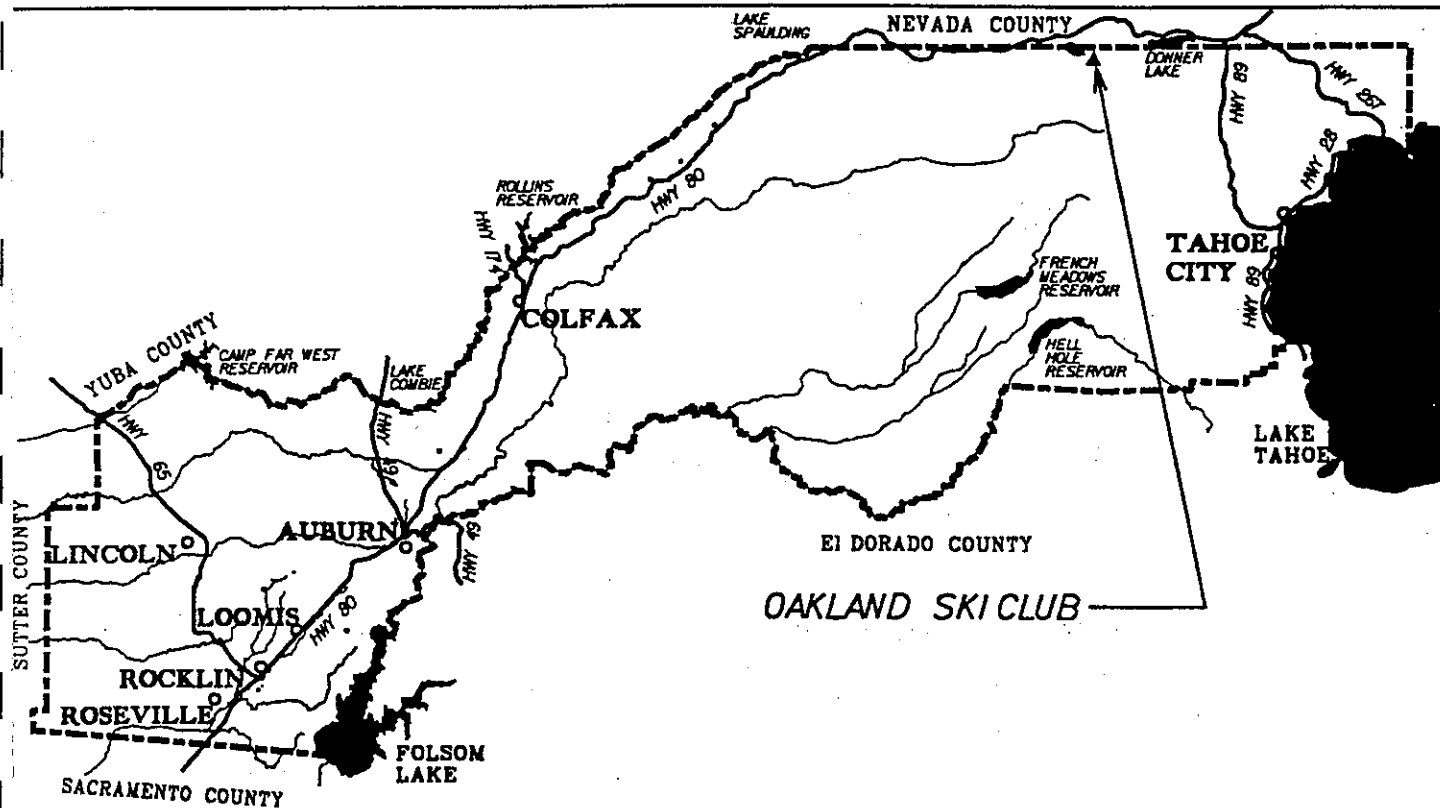
Deficiencies: Since the installation of the new septic tank and leachfield there have been no observed violations of the discharge permit conditions. There are no known deficiencies in the existing wastewater system.

Proposed Improvements: Connection to the Donner Summit Public Utility District WWTP is planned for implementation by October 1993.

Financing: Improvements and operations and maintenance costs on the Oakland Ski Club wastewater facilities are currently funded from fee assessments for members and volunteer labor. When hook-up to the Donner Summit PUD system occurs (planned for 1993), connection and service fees will be charged to the Oakland Ski Club.

System Appraisal: Since the Oakland Ski Club undertook septic tank and leachfield replacement and repair actions in 1983 the system has performed without reported difficulty. The system is designed for a 40 person flowrate and there are not plans to provide additional capacity or growth in the near-term. Hook-up to the Donner Summit PUD collection system is planned by October 1993.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: OAKLAND SKI CLUB

Address: 27731 MEDLAR DRIVE, HAYWARD CA 94544

Contact Name: MIKE CONTI

Phone: (510) 376-6145

Service Area Size: _____ No. Connect.: _____ Population Served: 40

Services Provided: WASTEWATER COLLECTION TREATMENT AND DISPOSAL

Summary System Description

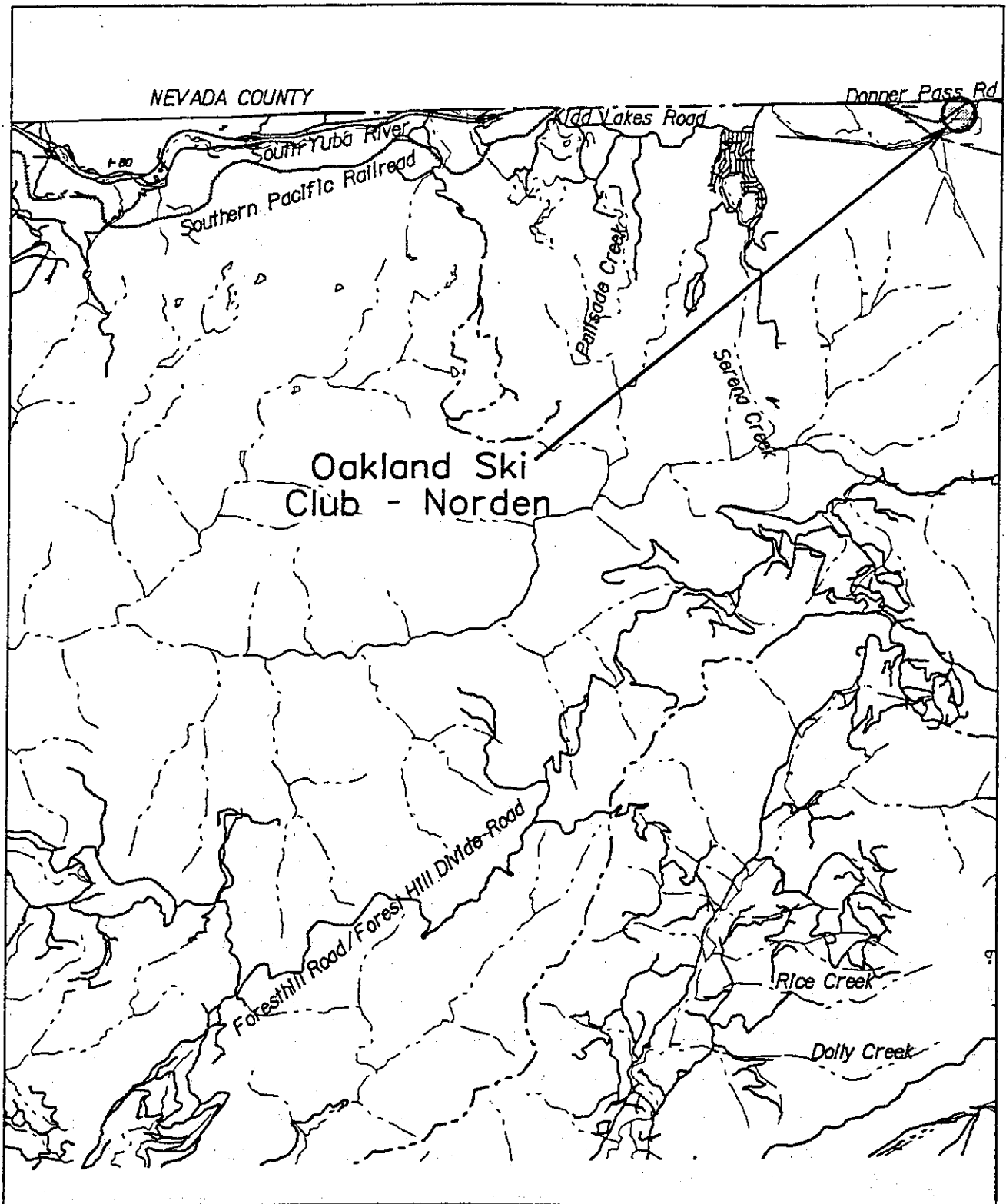
Service Area Characteristics: LOCATED IN THE SIERRA NEVADAS NEAR NORDEN ON TAHOE NATIONAL FOREST LAND. HEAVY FORESTED AND HIGHLY GRANITE. LAND LEASED FROM U.S. FOREST SERVICE.

Collection: ON-SITE DISPOSAL CONSISTING OF SEPTIC TANK AND LEACHFIELD. SYSTEM CONSTRUCTED IN 1983.

Treatment: STANDARD SEPTIC TANK TREATMENT SYSTEM, CONSISTING OF A GALLON TANK AND SUB-SURFACE LEACHFIELD.

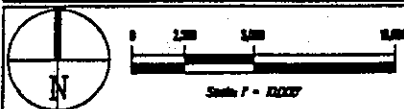
Disposal: SOLIDS ARE DISPOSED BY PUMPING SEPTIC TANK AND OFF-SITE HAULING TO PERMITTED DISPOSAL

Capacity Limitations: SINCE INSTALLATION OF SEPTIC TANK AND LEACHFIELD THERE HAVE BEEN NO OBSERVED DEFICIENCIES WITH THE SYSTEM. PLANNED HOOK-UP TO DONNER SUMMIT P.U.D. BY OCT. 1993.



Placer County General Plan

Figure 1 Wastewater Service Area



Date: 1/15/92

Prepared by
PSOMAS & ASSOCIATES

LEGEND

Oakland Ski Club-Norden

- | | |
|-----------|-----------------------|
| Streets | County Line |
| Waterways | District Service Area |

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

SHADY GLEN MOBILE HOME PARK

General Information: The Shady Glen Mobile Home Park is located at the intersection of Highway 174 and Rollins Reservoir about 1-1/2 mile north of Colfax (S 1/2, Section 27, T15N, R9E, MDB&M). Wastewater generated from the mobile home park is regulated by RWQCB Waste Discharge Requirement Order No. 86-187, adopted September 26, 1987.

Surface drainage from the treatment plant site is to an unnamed tributary of the Bear River whereas runoff from the disposal site is to Slaughter Ravine and thence to the North Fork American River.

Wastewater Generation/Source: The Shady Glen Mobile Home Park currently has 120 mobile home units, other rentals, and a restaurant. Currently the wastewater discharge flowrate is about 15,000 gpd ADWF of domestic wastewater.

Collection System Description: Constructed in 1972, the Shady Glen collection system is composed of 4, 6 and 8-inch transite and PVC lines. Collection throughout the system is by means of gravity flow. There are not any lift stations in the system. Total length of the collection system is about 2,500 lineal feet.

Deficiencies: The existing collection system does not suffer from significant inflow and infiltration. There are currently no other identified collection system deficiencies.

Proposed Improvements: There are currently no required, proposed or planned improvements to the collection system.

Wastewater Treatment and Disposal System Description: Shady Glen's original treatment and disposal system was constructed in 1963 and consisted of a single treatment lagoon and disposal to hillside irrigation. In 1973 a new "packaged" activated sludge type treatment plant was constructed to replace the old system.

Today the treatment facilities consist of an activated sludge plant located within the mobile home park property boundaries. After treatment through the activated sludge plant, the wastewater flows through two oxidation ponds operated in series and then to a 2.4 acre hillside spray irrigation system. Both the oxidation ponds and the spray disposal area are outside the mobile home park area.

Provision is made to bypass the activated sludge plant and divert raw wastewater directly into the ponds. Effluent from the second pond is used to irrigate the hillsides during the summer months. Irrigated runoff is returned to the second oxidation pond.

The treatment facilities, which were upgraded and expanded in 1973, accommodates an ultimate build-out mobile home park capacity of 120 units which represents an design flow of 24,000 gpd of wastewater.

Solids disposal is by drying.

Deficiencies: RWQCB inspection reports indicate a propensity for compliance with the Waste Discharge Requirement specifications, however, in April 1988 it was found that there was a lack of earthwork to prevent irrigation runoff from leaving the designated disposal area. Reconstruction of the runoff diversion channels to collect the effluent for return to the second pond was completed in 1990.

There are currently no identified treatment and disposal deficiencies.

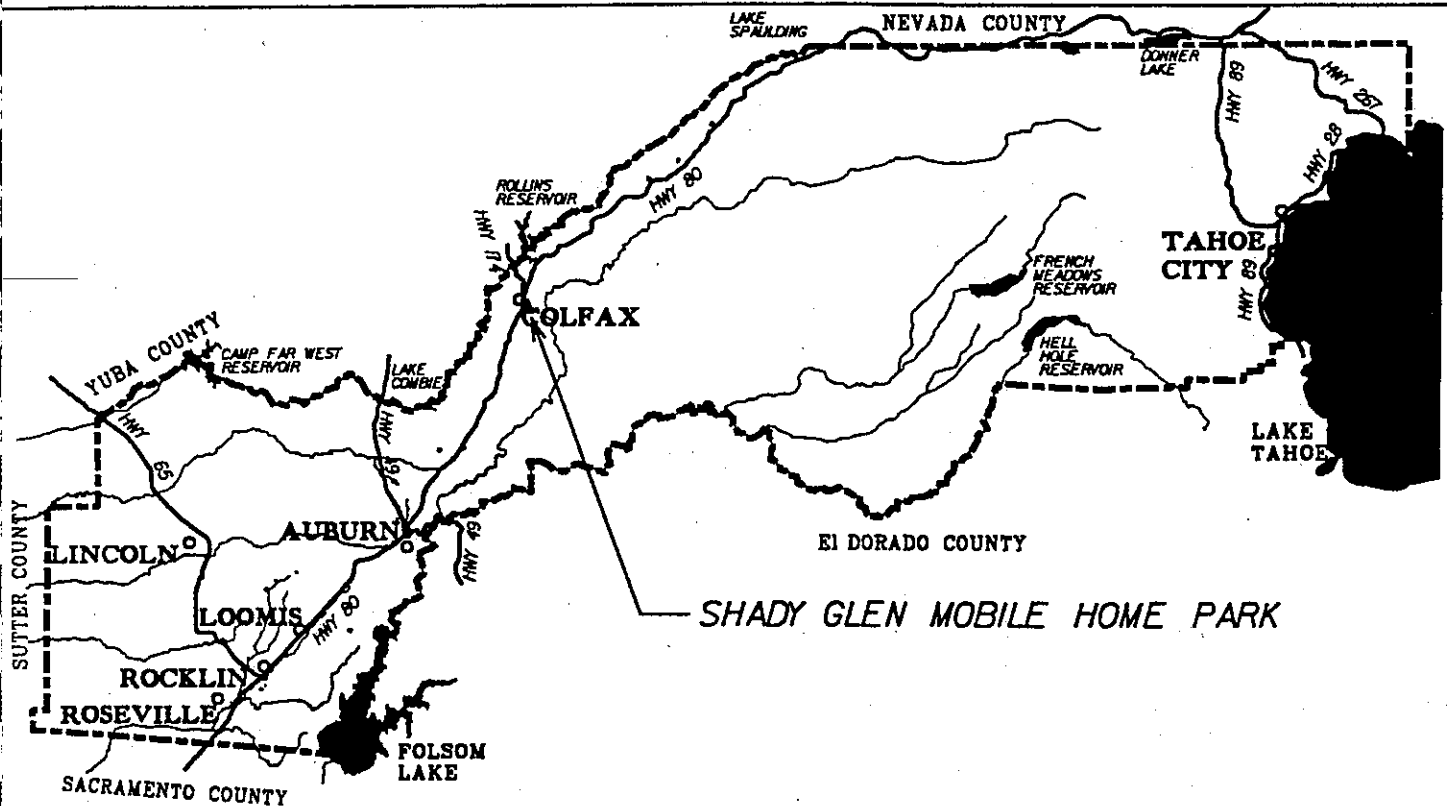
Proposed Improvements: Currently there are no planned, proposed or required treatment and disposal improvements.

Financing: Improvement, operations and maintenance cost are funded by the property owner.

System Appraisal: Recent inspections by the RWQCB have noted a well maintained system overall which is meeting the compliance goals in accordance with the permit conditions.

The existing collection, treatment and disposal system has sufficient capacity to meet the full build-out conditions of the Shady Glen Mobile Home Park which is 120 units. There are no plans to expand beyond that full build-out limit in the future. The existing system has a estimated remaining life of 50 years at which time it is expected that the system will undergo rehabilitation or hook-up to a regional treatment facility.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: SHADY GLEN MOBILE HOME PARK

Address: 450 GLADYCON ROAD *46, COLFAX, CA 95713

Contact Name: JOHN A. PANELLI/OWNER Phone: (916)-346-8228

Service Area Size: 0 30 ac. No. Connect.: 126 Population Served: VARIES

Services Provided: WASTEWATER COLLECTION TREATMENT AND DISPOSAL

Summary System Description

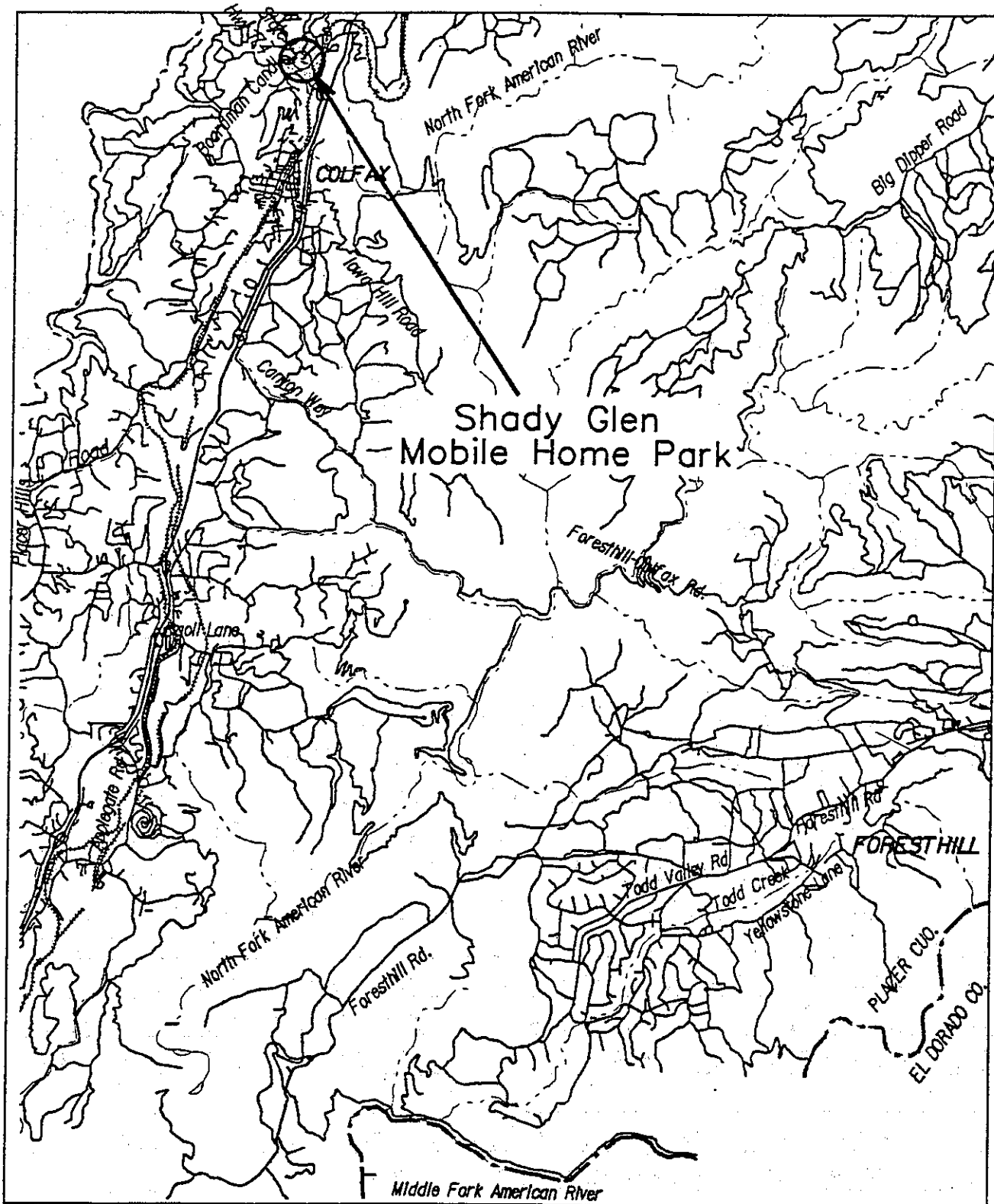
Service Area Characteristics: FACILITIES SERVE 126 UNITS AND A RESTAURANT HAVING 15,000 GPD DOMESTIC WASTEWATER. THE PARK BOUNDARIES INCLUDE A SLUDGE PLANT, TWO OXIDATION PONDS AND SPRAY IRRIGATION OF A 2.4 AC. HILLSIDE.

Collection: THE ACTIVATED SLUDGE PLANT DISCHARGES TO TWO OXIDATION PONDS. EFFLUENT FROM THE SECOND POND IS USED TO IRRIGATE HILLSIDES DURING SUMMER MONTHS.

Treatment: TREATMENT PRACTICED IS OXIDATION POND TREATMENT. HILLSIDE SPRAY IRRIGATION RUNOFF IS RETURNED TO THE SECOND POND.

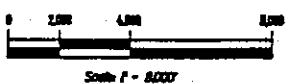
Disposal: SURFACE DISCHARGE IS NOT PERMITTED BY THE CURRENT WDR's. SOLIDS ARE DRIED AND TRANSPORTED TO LINCOLN CLASS III LANDFILL.

Capacity Limitations: CONTINUED MAINTENANCE MUST BE PRACTICED IN ORDER TO KEEP RUNOFF DISCHARGE FROM ESCAPING DESIGNATED DISPOSAL AREA.



Placer County General Plan

Figure — Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Shady Glen Mobile Home Park

- | | |
|-----------|-----------------------|
| Streets | County Line |
| Waterways | District Service Area |

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

PENRYN WASTE COLLECTION FACILITY

General Information: The community of Penryn is located ten miles southwest of the City of Auburn along Highway 80.

In the past, wastewater management for the Penryn community was accomplished by on-site septic/leachfield systems. On July 8, 1987, the County of Placer adopted Ordinance No. 3820-B declaring a moratorium on issuance of building permits and septic tank permits in the Penryn community area due to septic system failures. The Ordinance did not prohibit the issuance of a permit to reconstruct, repair, abandon, or operate an existing system, but required residents to connect to a new public sewer system when one became available.

In 1987 the County of Placer, with the assistance of Clean Water Grant funding, conducted a pollution study to determine the magnitude of the pollution problem. The study was completed in April and concluded that there was extensive septic tank system problems and bacteriological contamination within the community. Documentation included surfacing of sewage from leachfield areas, sewage odors and grey water found in community drainages.

In 1988 it was determined that the most cost effective solution was to construct a sewage collection system for the Penryn community and hook-up to the Roseville Regional WWTP through the Loomis/Rocklin collection system which is operated and maintained by the South Placer Municipal Utility District.

There are no RWQCB WDR's for the system, either for discharge or maintenance, since the system is hook-up to the South Placer MUD system.

Surface drainage from the area is to Dry Creek, thence Natomas East Canal, thence to the Sacramento River.

Wastewater Generation/Sources: The Penryn community contains 90 developed parcels, including a minor commercial center. The area of the parcels ranges from 0.1 acres to 5 acres, with an average size of about 0.6 acres. There are approximately 112 residential and 42 commercial connections to the Penryn collection system.

Wastewater Collection, Treatment and Disposal Description: Currently only septic/leachfield systems and the new sewage collection system are in use throughout the Penryn community. Septic/leachfield systems serving the existing developed properties are being abandoned as the properties connect to the collection system. Ultimately all septic systems will be abandoned and all parcels will be hooked up to the collection systems. The new collection system was constructed in 1988 to 1990 and consists of 19,000 feet of VCP line and has 80 sanitary manholes. Line sizes vary from 6-inches to 8-inches and materials of construction include VCP and DIP.

Treatment and disposal of the Penryn wastewater collected by the newly installed system occurs at the Roseville Regional WWTP.

Deficiencies: Septic system operations at the Penryn community have been a longstanding problem and a major public health concern. Shallow ground water, compounded with the proximity of the parcels and substandard septic systems, impedes proper wastewater percolation and treatment. The Wastewater Pollution Study for the Community of Penryn, completed in April 1987, documented significant bacteriological contamination of wells and roadside ditches caused by these failures. Surveys back to the

1960's indicate a history of septic system failures in this area.

Since the construction of the new collection system there have not been any reported deficiencies or major problems.

Proposed Improvements: Wastewater generated by the community of Penryn is currently managed on-site septic systems and the new collection system.

There are currently no additional planned, proposed or required collection system improvements.

Financing: Financing for the Penryn community wastewater system improvements, operations and maintenance was obtained from assessment district financing, grant funding, connection fees, and monthly service charges.

Current collection system connection and annual service fees are outlined in the following table.

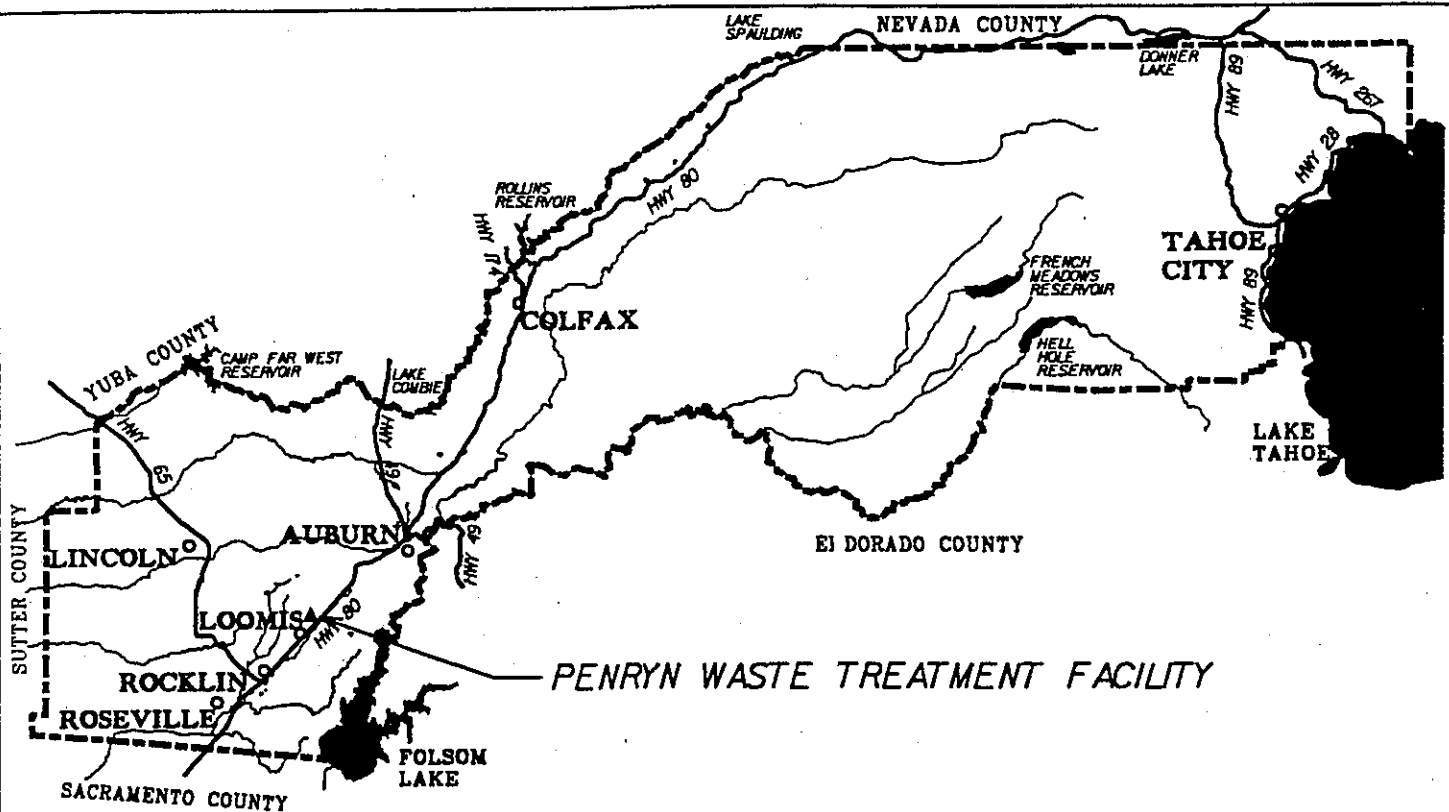
PENRYN COLLECTION SYSTEM FEE SCHEDULE

Participation Charge (Connection Fee)	\$3,550 per edu*
Monthly Service Charge	\$9 per edu
Penryn Sewer Main Line Extension	
Assessment District (Penryn Road) Reimbursement Fee	\$450 per edu

*\$50.00 per edu increase scheduled July 1, 1992.

System Appraisal: The Penryn community wastewater collection system was constructed in 1989 to 1990 and has a design capacity of 0.364 mgd. The system currently has a flow of about 0.213 mgd and no potential for expansion past the current 0.364 mgd. It is not anticipated that additional expansion of the system will occur in the near-term.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: PENRYN WASTE TREATMENT FACILITY

Address: SOUTH PLACER M.U.D., P.O. BOX 45, LOOMIS CA 95650

Contact Name: RICHARD R. STEIN, ENGINEERING ASSISTANT Phone: (916)-652-5877

Service Area Size: 220 ac. No. Connect.: 154 Population Served:

Services Provided: WASTEWATER COLLECTION AND MANAGEMENT

Summary System Description

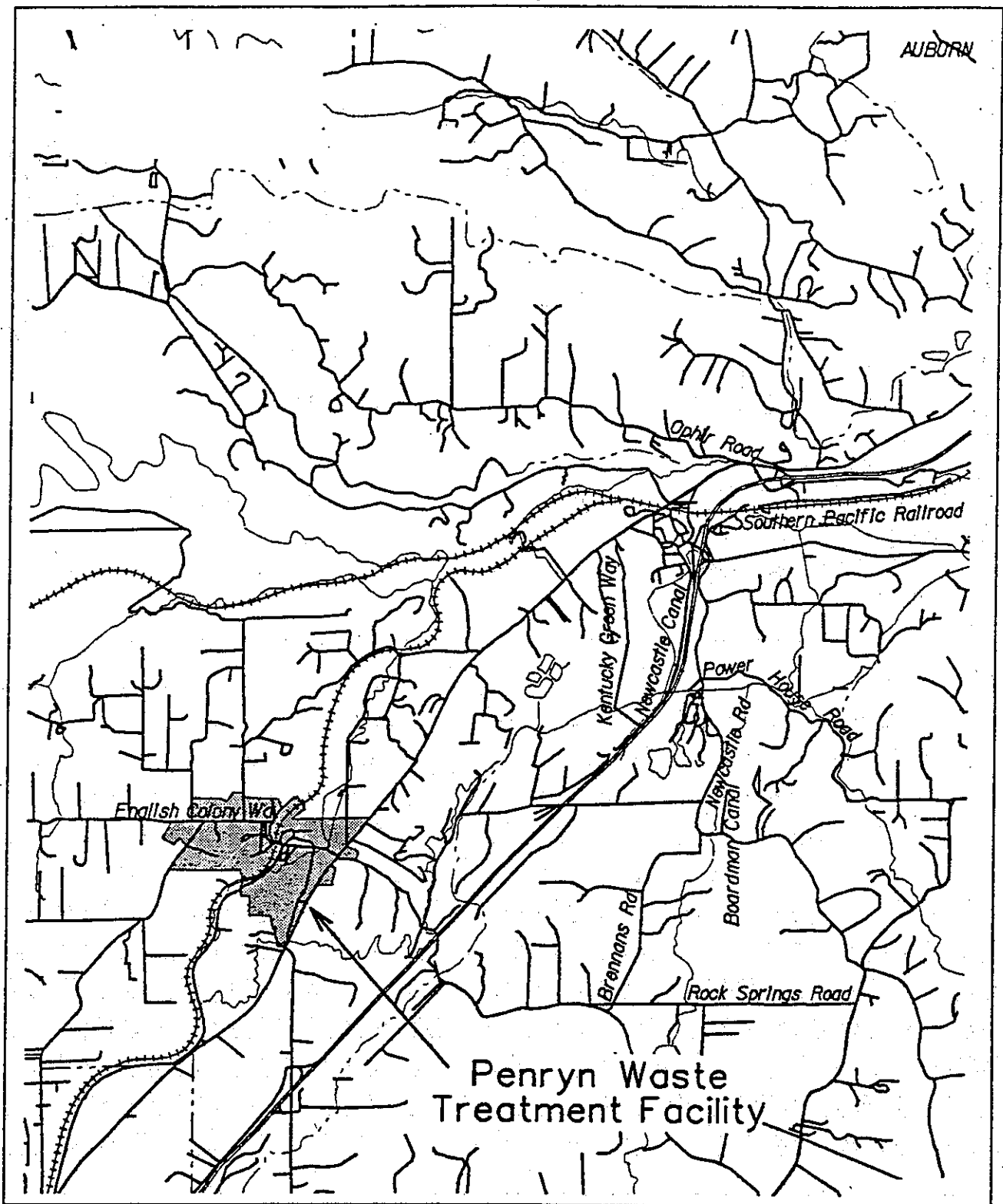
Service Area Characteristics: PENRYN IS LOCATED ABOUT 10 MILES SOUTHWEST OF AUBURN ALONG HWY 80. THE OAK WOODLANDS AND GRASSLANDS ARE SUBJECT TO SEASONAL HIGH GROUND WATER. THE COMMUNITY CONTAINS 90 DEVELOPED PARCELS AVERAGING 0.6 AC. IN SIZE.

Collection: WASTEWATER GENERATED BY THE COMMUNITY OF PENRYN IS COLLECTED THROUGH 3.5 MILES OF SEWER LINE AND CONVEYED TO THE SOUTH PLACER MUNICIPAL UTILITY DISTRICT SYSTEM. THE PENRYN SYSTEM WAS INSTALLED IN 1989 TO 1990.

Treatment: PENRYN WASTEWATERS ARE TREATED AT THE ROSEVILLE REGIONAL WWTP.

Disposal: DISPOSAL AT THE ROSEVILLE WWTP IS TO DRY CREEK AS PERMITTED SURFACE DISCHARGE.

Capacity Limitations: THE PENRYN COLLECTION SYSTEM HAS A DESIGN CAPACITY OF 0.364 MGD (253 EDU) CURRENT FLOWS ARE 0.213 MGD. (154 EDU).



Placer County General Plan

Figure — Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Penryn Waste Treatment Facility

- | | |
|-----------|-----------------------|
| Streets | County Line |
| Waterways | District Service Area |

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

PLACER COUNTY DEPARTMENT OF PUBLIC WORKS - SMD NO. 3

General Information: The Placer County Department of Public Works Sewer Maintenance District No. 3 wastewater management facility is located 5 miles east of Rocklin and 1.5 miles west of the Folsom Reservoir on the Auburn Folsom Road at Dick Cook Road. Discharge is governed by RWQCB Waste Discharge Requirements Order No. 90-040, Federal USEPA NPDES Permit No. CA0079367, and Monitoring and Reporting Program No. 90-040, adopted on February 23, 1990.

The treatment and disposal facilities are located in the Loomis Basin with surface drainage to Miners Ravine.

Wastewater Generation/Sources: The Placer County SMD No. 3 serves 300 residences and a minor commercial district (one mini mart). The RWQCB indicated in November 1989 that no industrial wastewater contributors are evident. The average domestic wastewater flow to the plant is currently 70,000 gpd ADWF. Full buildout of the area is estimated at 800 residences.

Collection System Description: The service area of the PCSMD No. 3 is located in the Loomis Basin. There are 300 residential and 1 commercial connections. Most of the collection system was constructed in 1962 using 6-inch to 15-inch clay sewer lines. The system is a gravity type and has about 130 manholes and 3 lift stations. The design capacity of the collection system is 3 mgd PWWF and recent flows suggest the system has seen 30% of the design capacity.

Deficiencies: The existing collection system does not have a significant problem with inflow and infiltration.

Proposed Improvements: There are currently no planned, proposed or required improvements for the collection system.

Wastewater Treatment System Description: Placer County SMD No. 3 wastewater treatment processes consist of screening, primary sedimentation, trickling filtration, secondary sedimentation, clariflocculator/sand filtration, chlorination disinfection and dechlorination. A pressure alarm was installed on the chlorine feed reclaim pump station in September 1990. Sludge processing facilities include anaerobic digestion and drying beds. The design capacity is 350,000 gpd. Currently only about 70,000 gpd, or 20% of the design flow, is seen through the plant. The current WDR's limit plant discharge to less than 300,000 gpd (30-day ADWF).

Solids from the drying beds are disposed of at the Western Regional landfill.

Deficiencies: The treatment plant is operating well below design flow and therefore system operations must be adjusted in accordance to the current flowrates. Historically the plant has had difficulties with recurring effluent pH violations. However, this past pH difficulty should be alleviated with ponding pH control equipment planned to be installed in 1992.

Currently identified treatment system deficiencies include the construction of a new chlorine contact chamber.

Proposed Improvements: Planned, proposed or required improvements to the treatment system include the construction of a new chlorine contact chamber.

Disposal System Description: Effluent is discharged to Miners Ravine and is subject to strict quality objectives during the recreational season.

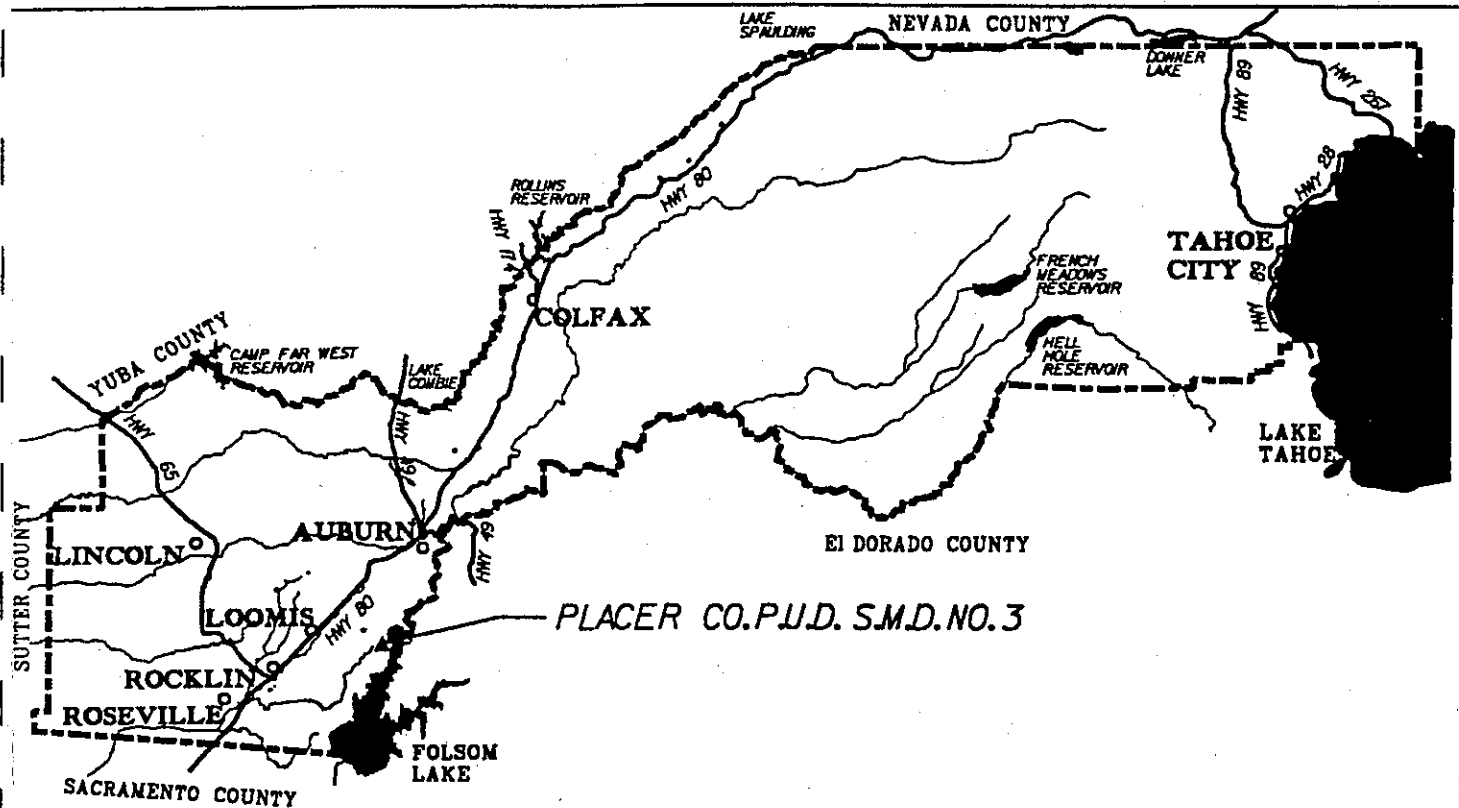
Deficiencies: There are currently no identified disposal system deficiencies.

Proposed Improvements: There are currently no planned, proposed or required improvements to the disposal system.

Financing: Improvement, operations and maintenance costs for the collection, treatment and disposal systems are funded by user fees and connection fees.

System Appraisal: Future growth is limited by the Loomis Basin General Plan recommendations and zoning. The current wastewater treatment plant discharge is limited by permit to 300,000 gpd (30-day ADWF). Plant design capacity is 350,000 gpd (ADWF).

PLACER COUNTY WASTEWATER SYSTEMS



System Name: PLACER COUNTY DEPT. OF PUBLIC WORKS - S.M.D. NO. 3

Address: 11144 B AVENUE, DEWITT CENTER, AUBURN, CA 95603

Contact Name: WARREN TELLEFSON Phone: (916)-889-7500

Service Area Size: No. Connect.: 300 Population Served:

Services Provided: COLL. TREATMENT AND DISPOSAL FOR RESIDENTIAL & COMMERCIAL DEVELOP.

Summary System Description

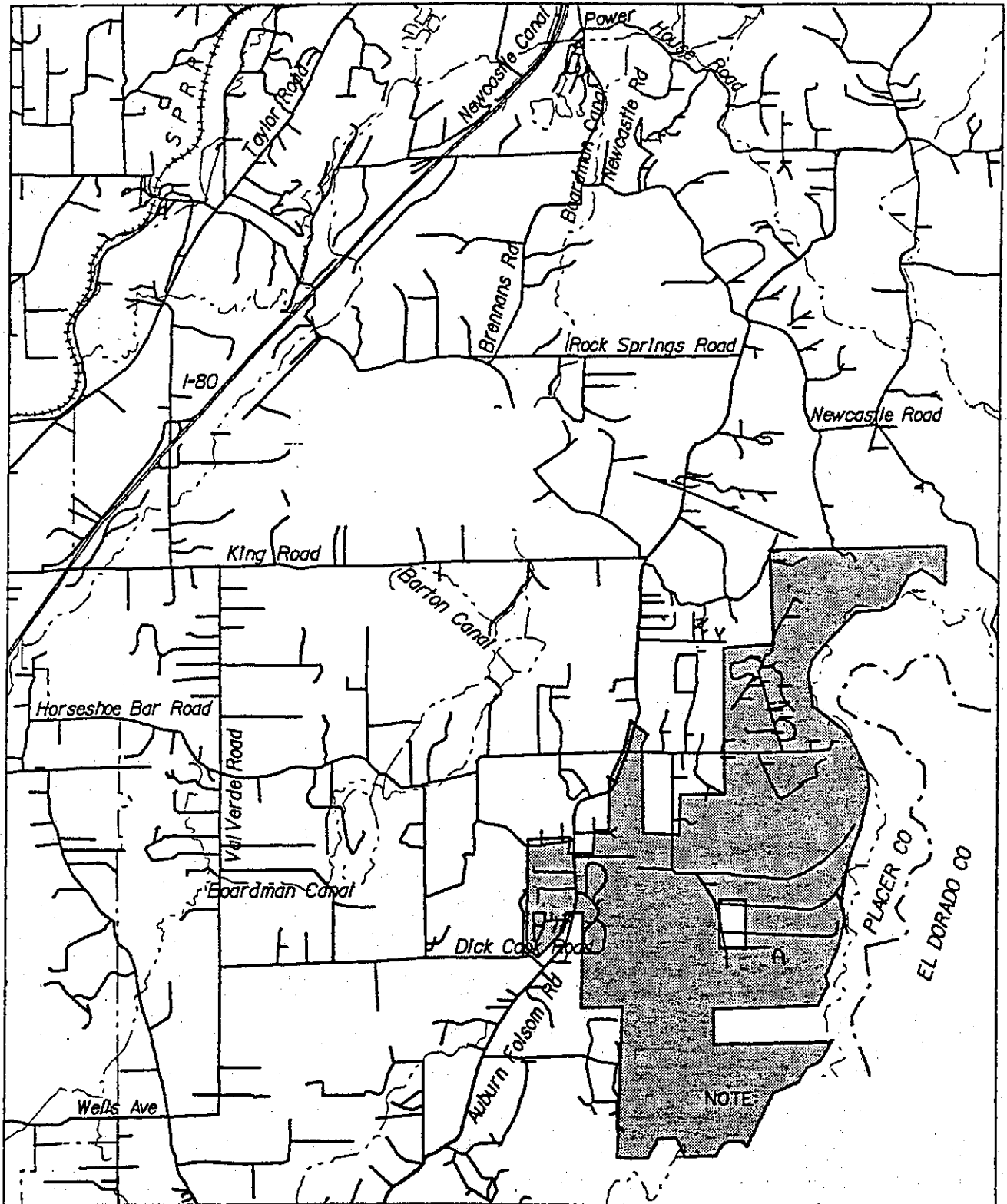
Service Area Characteristics: THE SERVICE AREA IS LOCATED IN LOOMIS BASIN CONSISTING OF LOWER FOOTHILLS OF THE SIERRA NEVADAS. TOPOGRAPHY CONSISTS OF OAK WOODLANDS AND GRASSLANDS, SOILS TYPICALLY HIGH IN CLAY AND WEATHERED GRANITE.

Collection: WASTEWATER GENERATION IS COLLECTED WITHIN 6 TO 15 INCH MAINS AND GRAVITY CONVEYED TO THE TREATMENT PLANT.

Treatment: A 0.35 MGD TREATMENT PLANT CURRENTLY OPERATED AT 20% CAPACITY. TREATMENT PROVIDED INCLUDES SCREENING PRIMARY SEDIMENTATION, TRICKLING FILTERATION, SECONDARY SEDIMENTATION, CLARIFLOCCULATOR/SAND FILTRATION, CHLORINATION AND

Disposal: EFFLUENT IS DISCHARGED TO MINERS RAVINE. SOLID WASTE DECHLORINATION. IS HAULED AWAY TO WESTERN REGIONAL LANDFILL.

Capacity Limitations: DESIGN CAPACITY IS CURRENTLY 0.35 MGD. THE PLANT IS CURRENTLY OPERATING AT ABOUT 20% CAPACITY.



<h1>Placer County General Plan</h1>		<h2>LEGEND</h2>	
<h3>Figure — Wastewater Service Area</h3>		<h3>Placer Co. Dept. of Public Works SMD No. 3</h3>	
	<p> Streets County Line </p> <p> Waterways District Service Area </p>		
	<p> Date: 1/15/92 Prepared by: PSOMAS & ASSOCIATES </p>		

NOTE: Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

PLACER COUNTY SERVICE AREA NO. 23--BLUE CANYON

General Information: Placer County Service Area No. 23 serves the community of Blue Canyon, located 36 miles northeast of Auburn (Sec 14, T16N, R11E, MDB&M). Discharge from the facility is permitted by RWQCB Waste Discharge Requirement Order No. 73-9 which was adopted on July 28, 1972.

Surface drainage is to Blue Canyon, a perennial stream, thence to the North Fork of the North Fork American River.

Wastewater Generation/Sources: Blue Canyon has a present transient recreational population occupying 26 residential and no commercial connections. The wastewater is considered domestic in nature.

Collection System Description: The collection system was originally constructed in 1973. Most of the collection system was constructed using 6-inch clay sewer line and is designed to flow by gravity. Manholes are sealed with rubber "O" rings and permit minimal infiltration and inflow. The mains are flushed out when necessary using a hydro-vacuum tank truck.

Deficiencies: There are currently no identified collection system deficiencies.

Proposed Improvements: There are no currently planned, proposed or required improvements to the existing collection system.

Wastewater Treatment and Disposal System Description: The wastewater management system at Blue Canyon was built in 1973. Wastewater flow is conveyed to a 16,000 gallon underground septic tank-leachfield system in the winter. The septic tank is designed to periodically alternate flow between two leach lines. Originally sewage was planned to be diverted to two evaporation/percolation ponds in the summer or when infiltration capacity was exceeded in winter; however, the pond system is not used to date. The design capacity of the system is 25,000 gpd or equivalent to 280 persons.

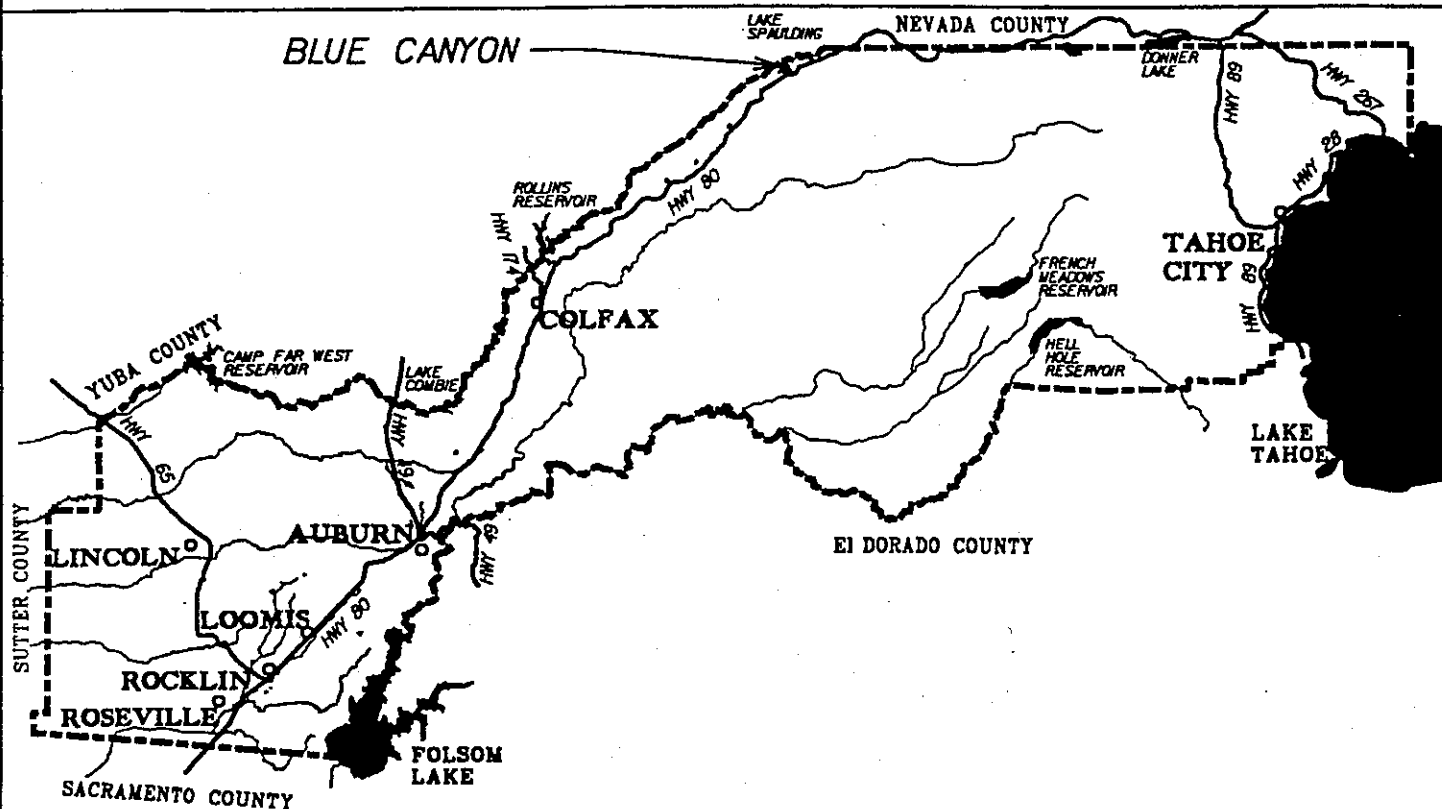
Deficiencies: Individual septic tank systems in the area are in various stages of malfunction. Currently there are no identified treatment and disposal deficiencies in the existing system.

Proposed Improvements: There are currently no planned, proposed or required improvements to the existing treatment/disposal system.

Financing: Improvements, operations and maintenance costs are funded by user and connection fees.

System Appraisal: In general, the overall condition of the Placer county Service Area No. 23 (Blue Canyon) collection, treatment and disposal system is considered good. It is anticipated that adequate capacity remains to meet future demands. Existing connections only number 26 residences and the design capacity of the system is estimated to be 280 persons.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: PLACER COUNTY SERVICE AREA NO.23 - BLUE CANYON

Address: 11144 B AVENUE, DEWITT CENTER, AUBURN, CA 95603

Contact Name: WARREN TELLEFSON Phone: (916)-889-7500

Service Area Size: _____ No. Connect.: 26 Population Served: _____

Services Provided: WASTEWATER COLLECTION AND MANAGEMENT

Summary System Description

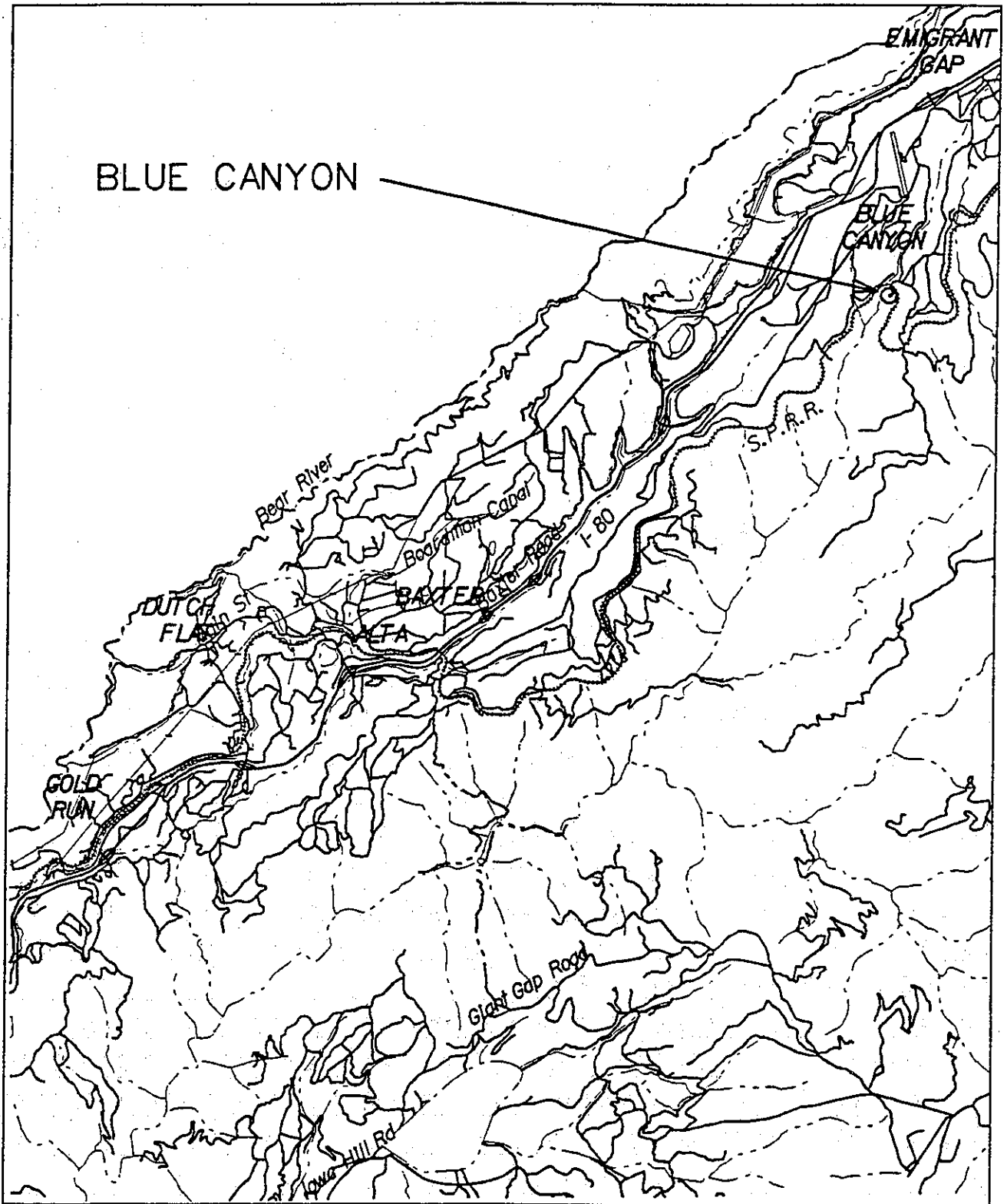
Service Area Characteristics: BLUE CANYON IS LOCATED 36 MILES NORTHEAST OF AUBURN ALONG HWY 80. THE AREA IS FORESTED WITH AN ABUNDANCE OF EXPOSED GRANITE IN THE SIERRA NEVADA RANGE.

Collection: THE COLLECTION SYSTEM WAS CONSTRUCTED IN 1973, COMPRISED PRIMARILY OF 6 INCH CLAY PIPE. THE SYSTEM GRAVITY FLOWS TO A 16,000 UNDERGROUND SEPTIC TANK - LEACHFIELD DISPOSAL SYSTEM. THERE ARE 26 RESIDENTIAL CONNECTIONS.

Treatment: STANDARD SEPTIC - LEACHFIELD TREATMENT IS PRACTICED. THE SEPTIC TANK IS DESIGNED TO ALTERNATE BETWEEN TWO LEACHFIELDS.

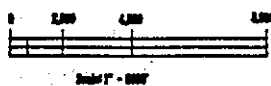
Disposal: EFFLUENT IS DISPOSED OF BY ONE OF THE AVAILABLE LEACHFIELDS. SOLIDS ARE PUMPED FROM THE SEPTIC TANK AND HAULED TO A PERMITTED FACILITY FOR DISPOSAL.

Capacity Limitations: MALFUNCTIONS AMONG AREA SEPTIC SYSTEMS NOT USING THE COMMON TANK ARE NUMEROUS. EXISTING FACILITIES HAVE ADEQUATE CAPACITY TO MEET FUTURE SERVICE NEEDS.



Placer County General Plan

Figure — Wastewater Service Area



Date: 1/15/92

Prepared by
PSOMAS & ASSOCIATES

LEGEND Placer County Service Area No. 23-Blue Canyon

- | | |
|-----------|-----------------------|
| Streets | County Line |
| Waterways | District Service Area |

NOTE:

Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

PLACER COUNTY SERVICE AREA NO. 24--APPLEGATE

General Information: Placer County Service Area No. 24 serves the town of Applegate, which is located north of Bowman on Highway 80 (Sec 4,5,8 & 9, T13N, R9E, MDB&M). Wastewater is regulated by RWQCB Waste Discharge Requirements Order No. 73-10 adopted on July 28, 1972.

Surface drainage is to an intermittent tributary of Clipper Creek thence the North Fork American River.

Wastewater Generation/Sources: Presently, the Applegate wastewater collection system consists of only 35 connections. There are 33 residential and 2 commercial connections. The remaining unconnected homes rely on septic tank-leachline systems. The wastewater flow to the treatment system rarely exceeds 10,000 gpd.

Collection System Description: The collection system consists of about 7,500 linear feet of 6-inch line and one lift station.

Deficiencies: Currently there are no identified collection system deficiencies.

Proposed Improvements: Currently there are no planned, proposed or required collection system improvements.

Wastewater Treatment and Disposal System Description: The Applegate Wastewater Treatment System, constructed in 1974, consists of a lift station and three oxidation ponds operated in series, each containing one acre. The treatment system is designed for a population of 100, or 10,000 gpd.

Provisions are made for overflow from pond No. 3 to an intermittent tributary of Clipper Creek which is tributary to the North Fork American River. Disposal of wastewater during ordinary conditions is by evaporation and percolation.

Deficiencies: In 1986, overflow of an undetermined amount of partially treated wastewater pond effluent occurred.

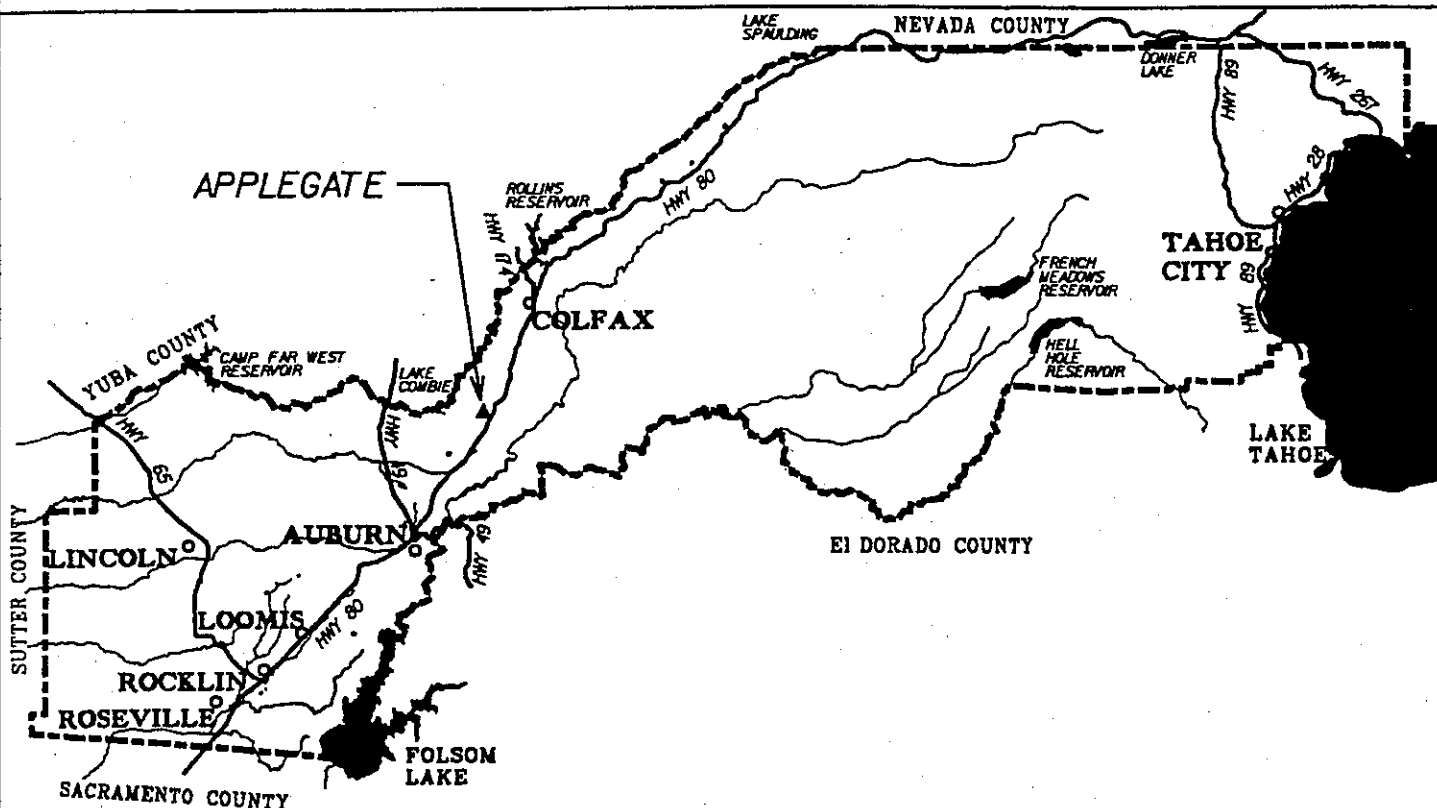
Identified current system deficiencies include lack of plant capacity to handle a 100-year precipitation event.

Proposed Improvements: There are currently no planned, proposed or required treatment or disposal system improvements.

Financing: Improvements, operations and maintenance costs are funded by user fees and connection fees.

System Appraisal: The treatment/disposal system is at capacity and the area has a self-imposed connection ban. Currently there are no plans for near term expansion or upgrades to the system.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: PLACER COUNTY SERVICE AREA NO.24 APPLEGATE

Address: 11144 B AVENUE, DEWITT CENTER, AUBURN, CA 95603

Contact Name: WARREN TELLEFSON Phone: (916)-889-7500

Service Area Size: _____ No. Connect.: 35 Population Served: _____

Services Provided: PROVIDE FOR COLLECTION AND DISPOSAL FOR RESIDENCES

Summary System Description

Service Area Characteristics: APPLEGATE IS LOCATED JUST NORTH OF BOWMAN ALONG HWY 80. THE AREA IS IN THE FORESTED SIERRA NEVADAS.

Collection: WASTE IS COLLECTED AND CONVEYED TO A LIFT STATION VIA 6 INCH PCP PIPE.

Treatment: EFFLUENT IS CONVEYED BY THE LIFT STATION TO THREE OXIDATION PONDS FOR TREATMENT AND DISPOSAL.

Disposal: EVAPORATION/PERCOLATION THROUGH THE THREE PONDS AT THE WWTP.

Capacity Limitations: THE SYSTEM IS DESIGNED TO HANDLE 10,000 GPD. CURRENTLY THERE IS A CONNECTION BAN SINCE THE SYSTEM IS AT CAPACITY.

PLACER COUNTY SERVICE AREA NO. 28--SHERIDAN

General Information: Placer County Service Area No. 28, Zone No. 6, located on 11th Street, Sheridan, CA, serves the community of Sheridan (Sec 13, T13N, R5E, MDB&M). Discharge is governed by RWQCB Waste Discharge Requirements Order No. 88-157, Federal EPA NPDES Permit No. CA0079341, and Monitoring and Reporting Program No. 88-157, adopted on September 23, 1988.

Surface runoff from the treatment plant area is to a drainage ditch, tributary to Yankee Slough, then to the Bear River. Seasonal surface discharge is permitted from 1 December to 31 March under certain conditions as outlined in the WDR's.

Wastewater Generation/Sources: The community of Sheridan contains 200 homes and businesses and discharges domestic wastewater. Placer County imposed a moratorium on new connections in 1985 in response to chronic hydraulic overloading at the treatment plant. In 1988 the treatment and disposal facilities were permitted by the RWQCB to mitigate the overloading and satisfy the regulatory mandates which now allow seasonal surface discharge. It was determined that the ponds were not big enough to handle winter flow conditions when no spray irrigation disposal is available. New WDR's were issued by the RWQCB to allow seasonal surface discharge of treated plant effluent after chlorination disinfection.

Collection System Description: Most of the existing collection system was constructed in 1974 using 6-inch to 8-inch PVC sewer lines. The system uses gravity collection with typical manhole spacing and one lift stations.

Deficiencies: Inflow and infiltration to the existing collection system has been a problem in the recent past. Excessive inflow problems are the principal cause for hydraulic capacity problems experienced at the Sheridan plant since 1982.

Proposed Improvements: Planned, proposed or required collection system improvements include maintenance to mitigate inflow and infiltration problems.

Wastewater Treatment System Description: The Sheridan wastewater treatment system consists of three oxidation ponds and a chlorination system. The plant has a design capacity of 40,000 gpd (ADWF) and the existing plant flow is at about 40,000 gpd (ADWF). The treatment plant site is about 20 acres and does not have much room for expansion of either ponds or irrigation systems. Additional property is not available for future expansion.

Deficiencies: Past compliance issues at the treatment plant include some operational violations such as elevated TSS levels and non-chlorinated plant effluent, freeboard in the ponds and a lift station overflow. Provisions were made in to correct these occurrences and operations planning has made adjustments to forestall additional occurrences.

Operational difficulties due to hydraulic overloading related to the collection system problems with inflow and infiltration also cause system upset.

There are no other currently identified deficiencies with the existing treatment plant.

Proposed Improvements: There are no currently planned, proposed, or required improvements to the treatment system other than the exception that a new system will be proposed prior to any new connections are allowed. A new treatment system may require development of a new treatment facility

with discharge to the Bear River watershed.

Disposal System Description: The existing disposal system consists of a 7 acre spray irrigation system for dry weather disposal and a seasonal surface discharge system for wet weather disposal to a drainage ditch which is tributary to Yankee Slough. Runoff from the spray field is returned to pond No. 1. Wet weather surface discharge is limited by the current WDR's to between 1 December and 31 March and only when the spray field is saturated and the freeboard in the ponds is less than 18 inches for the primary pond and less than 24 inches in the secondary and polishing ponds. Surface discharge must also be sufficiently oxidized and disinfected prior to release.

Deficiencies: The State Department of Health Services and the Placer County Health Department determined that the current level of wastewater treatment at Sheridan is adequate to preclude contamination to the receiving waters. Nevertheless, inadvertent discharge of unchlorinated effluent occurred in 1988 and pond freeboard violations were noted in May 1991.

Ineffective management practices are thought to have aggravated the capacity predicaments experienced at the spray irrigation disposal site.

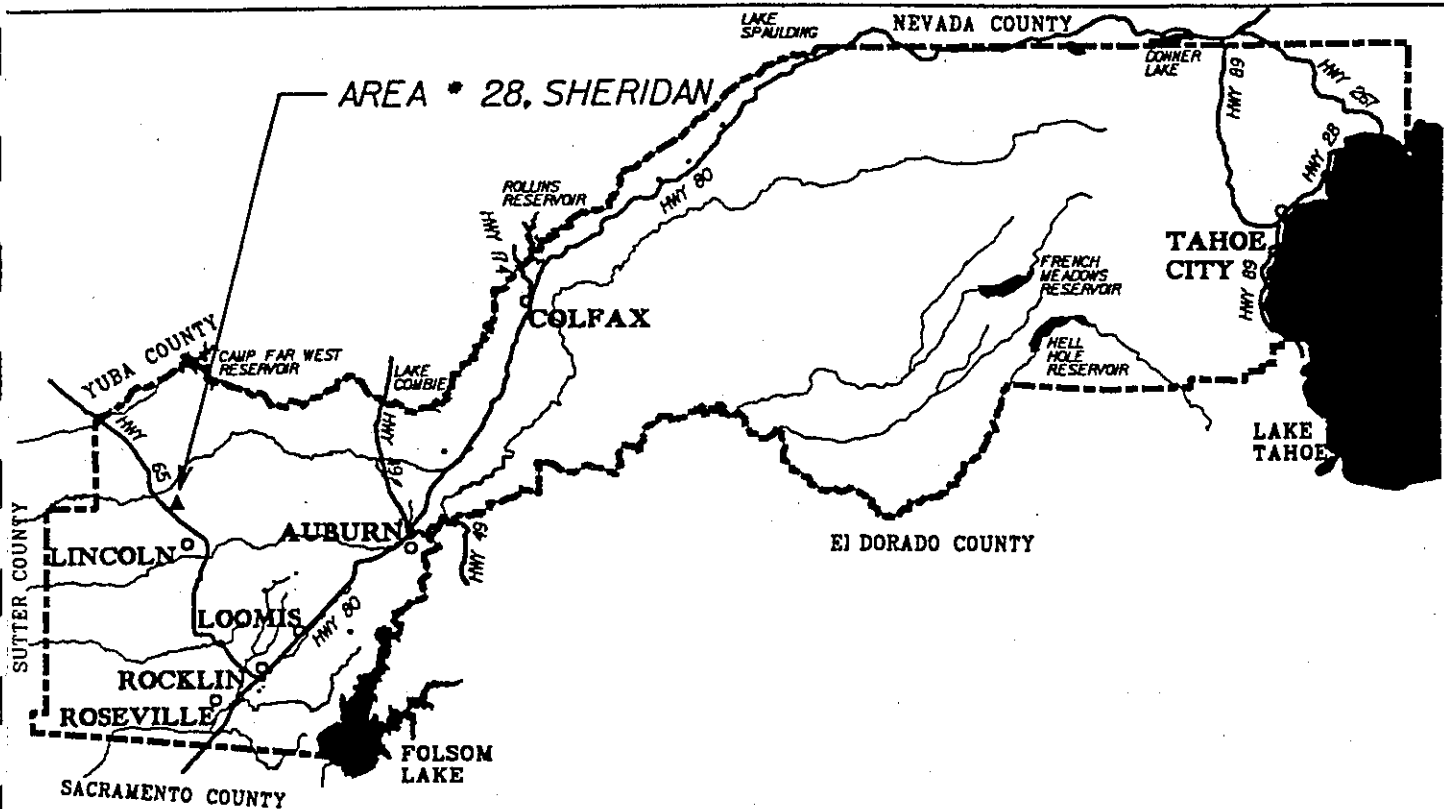
Currently identified disposal system deficiencies include lack of capacity for additional hook-ups.

Proposed Improvements: If new connections are planned or required in the future, facilities upgrade will be necessary.

Financing: Improvement, operations and maintenance costs for Placer County Service Area No. 28, Zone 6, Sheridan sewage collection, treatment and disposal system are funded through user fees and connection fees.

System Appraisal: Perhaps the most prominent problem for the Sheridan wastewater system is the condition of the existing collection system which suffers from excessive inflow and infiltration. Design and permitted disposal capacity for the existing treatment and disposal system is 40,000 gpd (ADWF) and the existing discharge is about 40,000 gpd, or 100% of plant capacity.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: PLACER COUNTY SERVICE AREA NO.28, SHERIDAN

Address: 111444 B AVENUE/DEWITT CENTER, AUBURN CA 95603

Contact Name: WARREN TELLEFSON Phone: (916)-889-7500

Service Area Size: No. Connect.: 200 Population Served:

Services Provided: COLLECTION TREATMENT AND WASTEWATER DISPOSAL

Summary System Description

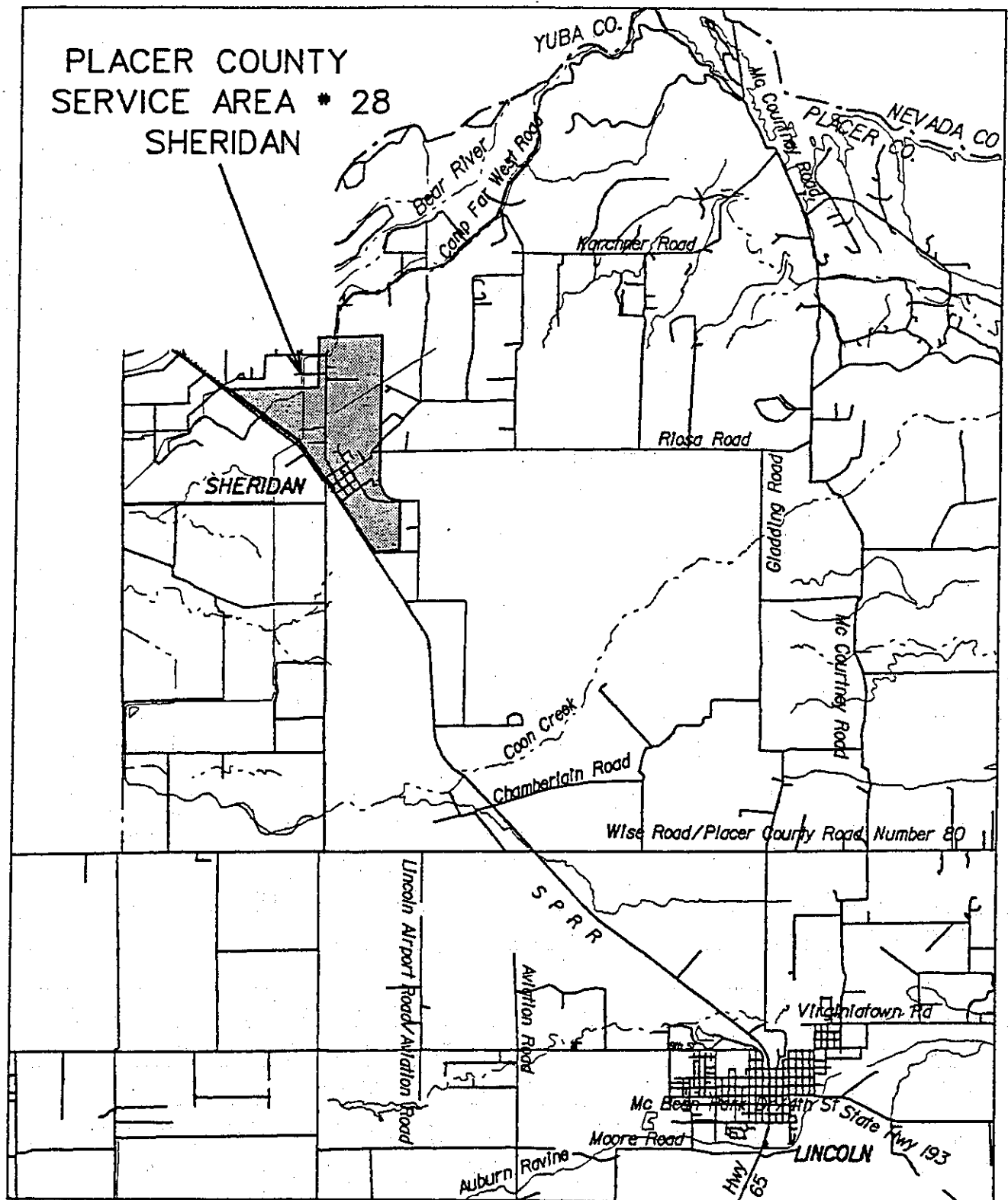
Service Area Characteristics: THE SHERIDAN COMMUNITY IS LOCATED JUST NORTH OF LINCOLN. THE AREA IS MOSTLY LOW-LYING FLAT LAND AND ROLLING HILLS WITH SOME OAKS.

Collection: HOMES AND BUSINESSES DISCHARGE TO A 6 & 8 INCH PVC MAIN CONVEYING SEWAGE TO THE TREATMENT PLANT. THE SYSTEM OPERATES ON GRAVITY. THERE IS ONE LIFT STATION IN THE COLLECTION SYSTEM.

Treatment: TREATMENT AND DISPOSAL FACILITIES WERE RETROFITTED IN 1988 THUS MITIGATING HISTORICAL OVERLOADING. THE TREATMENT SYSTEM CONSISTS OF THREE OXIDATION PONDS AND A CHLORINATION/DECHLORINATION SYSTEM.

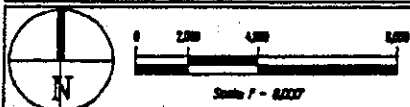
Disposal: THE DISPOSAL SYSTEM CONSISTS OF A 7 AC. SPRAY IRRIGATION SYSTEM FOR DRY WEATHER AND SEASONAL SURFACE DISCHARGE DURING WET WEATHER. SLUDGE IS HAULED AWAY TO A PERMITTED FACILITY.

Capacity Limitations: DUE TO LACK OF PLANT CAPACITY, THERE IS A SELF-IMPOSED CONNECTION BAN.



Placer County General Plan

Figure _____ Wastewater Service Area



Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Placer Co. Service Area
No. 28 - Sheridan

- | | |
|-----------|-----------------------|
| Streets | County Line |
| Waterways | District Service Area |

NOTE:

Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

PLACER COUNTY SEWER MAINTENANCE DISTRICT NO. 1

General Information: Placer County Sewer Maintenance District No. 1 wastewater treatment and disposal facilities are located on the northern end of Auburn just east of Highway 49 (Sec 20, T13N, R8E, MDB&M). The treatment plant is located at 11755 Jaeger Road. Wastewater is collected from the Bell Road area and the Dewitt Center as well as all of North Auburn outside the Auburn City limits.

Wastewater from Placer County Sewer Maintenance District No. 1 is permitted under RWQCB Waste Discharge Requirements Order No. 87-099, Federal USEPA NPDES Permit No. CA0079316, and RWQCB Monitoring and Reporting Program No. 87-099, adopted on June 26, 1987.

Discharge and surface drainage from the wastewater treatment plant site is to Rock Creek at tributary of Dry Creek and the Bear River.

Wastewater Generation/Sources: Modifications and expansion activities at the Placer County SMD No. 1 Wastewater Treatment Plant, funded by the Clean Water Grants Act, were completed in 1984. The improvements to the plant allowed connection in 1985 of the outmoded DeWitt Center Sewage Treatment Plant and service to the Bell Road area, which previously experienced chronic septic system failures. The treatment plant receives municipal wastewater. A wet weather flow of 6.34 mgd was recorded in March 1991.

Collection System Description: Most of the existing collection system was constructed in 1960's and 70's using 6-inch to 24-inch PVC, clay and ACP sewer lines. The system uses gravity collection with typical manhole spacing and 23 lift stations.

Deficiencies: Inflow and infiltration is a problem for the existing collection system. Plans for collection system remediation were undertaken in 1991 to correct collection system deficiencies.

Currently identified deficiencies with the existing collection system include inflow and infiltration problems due to deteriorated pipelines.

Proposed Improvements: Planned, proposed or required collection system improvements include correction of inflow and infiltration problems by continuous annual pipe replacement of approximately 8,000 feet of transite pipe over a 3 year schedule.

Wastewater Treatment System Description: The Placer County SMD No. 1 treatment plant consists of comminution, grit removal and a primary clarifier, rotating biological contactors (RBC's), intermediate clarification, dual media filters, chlorine contact chambers, sludge digestors, final clarifiers, dechlorination processes, sludge belt press, reclaimed water system, and 24,320 square feet of sewage sludge drying beds. Major modifications and improvements to the treatment plant were last completed in 1984 and in 1988. Planned future improvements are scheduled for 1993 and include expansion of the RBC's.

Recent major improvements (1984) to the plant included replacement of the biofilters with RBC's, and addition of dual media effluent filters, a second chlorine contact chamber, and a second sludge digester. In 1988, more filters, a third chlorine contact chamber, and a sludge press were added. The average dry weather flow capacity of the plant, expected to be adequate through 1993, is rated as 1.8 mgd (ADWF). Expansion to 2.3 mgd is planned for 1993.

Deficiencies: Currently there are no identified deficiencies with the existing treatment plant.

Proposed Improvements: An expansion currently planned for 1993, concurring with the present WDR's, will increase capacity to 2.3 mgd. A preliminary engineering report completed in 1988 by Harris & Associates estimated these improvement costs at \$1,965,000.

There are currently no other planned, proposed or required improvement to the treatment system.

Disposal System Description: Effluent from the Placer County SMD No. 1 wastewater treatment plant is discharged into Rock Creek, a tributary of Dry Creek and the Bear River.

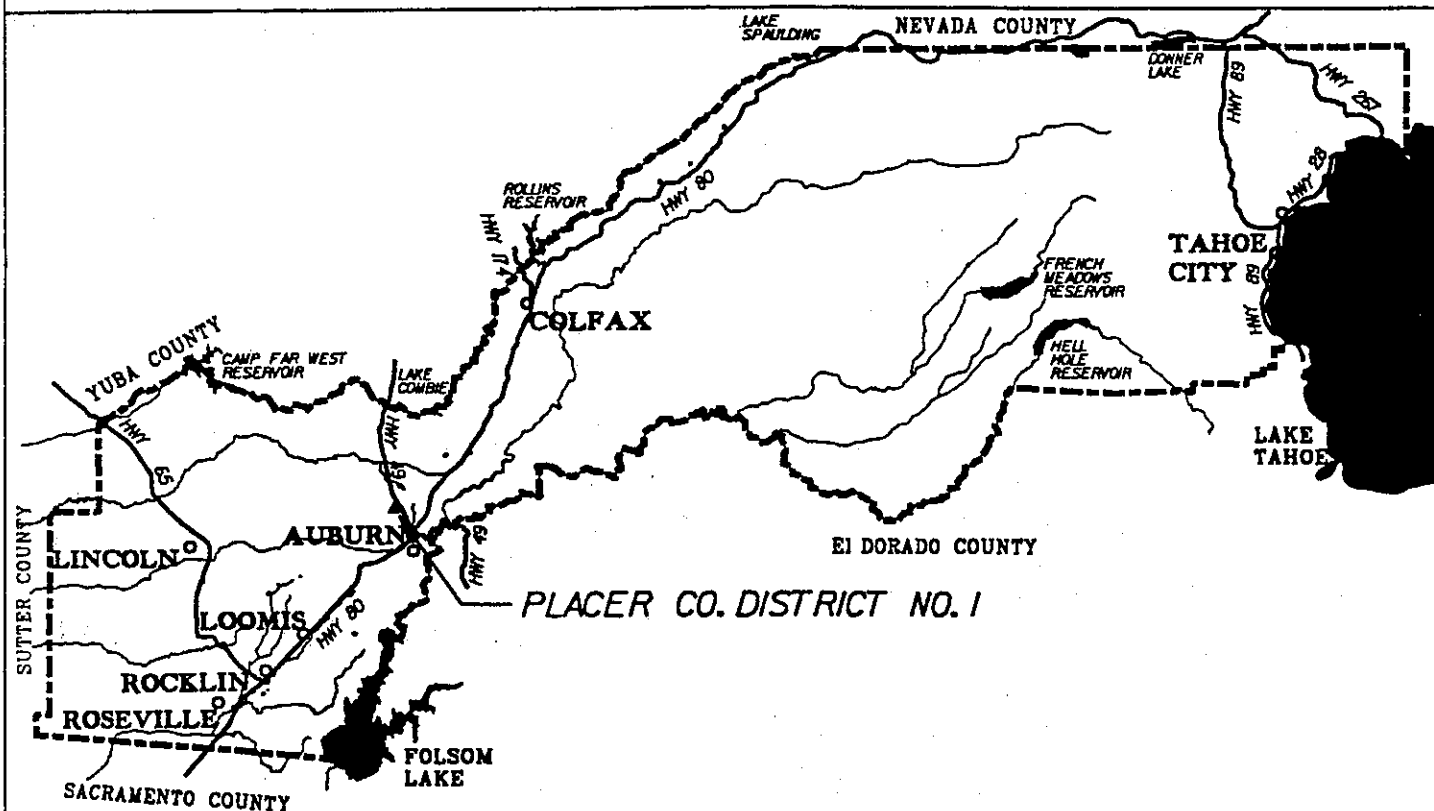
Deficiencies: Past compliance issues are considered minor. The system is well maintained and generally in good compliance with regulatory agency mandates. There are currently no identified deficiencies with the existing disposal system. Problems associated with past minor discharge violations have been corrected.

Proposed Improvements: There are currently no planned, proposed or required improvement to the disposal system.

Financing: Improvement, operations and maintenance costs for Placer County Sewer Maintenance District sewage collection, treatment and disposal system are funded through user fees and connection fees.

System Appraisal: The current discharge limitation is 1.8 mgd for the wastewater treatment plant with an additional capacity up to 2.3 mgd. Future expansion to 2.3 mgd is currently planned for 1993.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: PLACER COUNTY SEWER MAINTENANCE DISTRICT NO.1

Address: 11144 B AVENUE, DEWITT CENTER, AUBURN, CA 95603

Contact Name: WARREN TELLEFSON Phone: (916)-889-7500

Service Area Size: No. Connect.: 5,000 Population Served:

Services Provided: WASTEWATER MANAGEMENT

Summary System Description

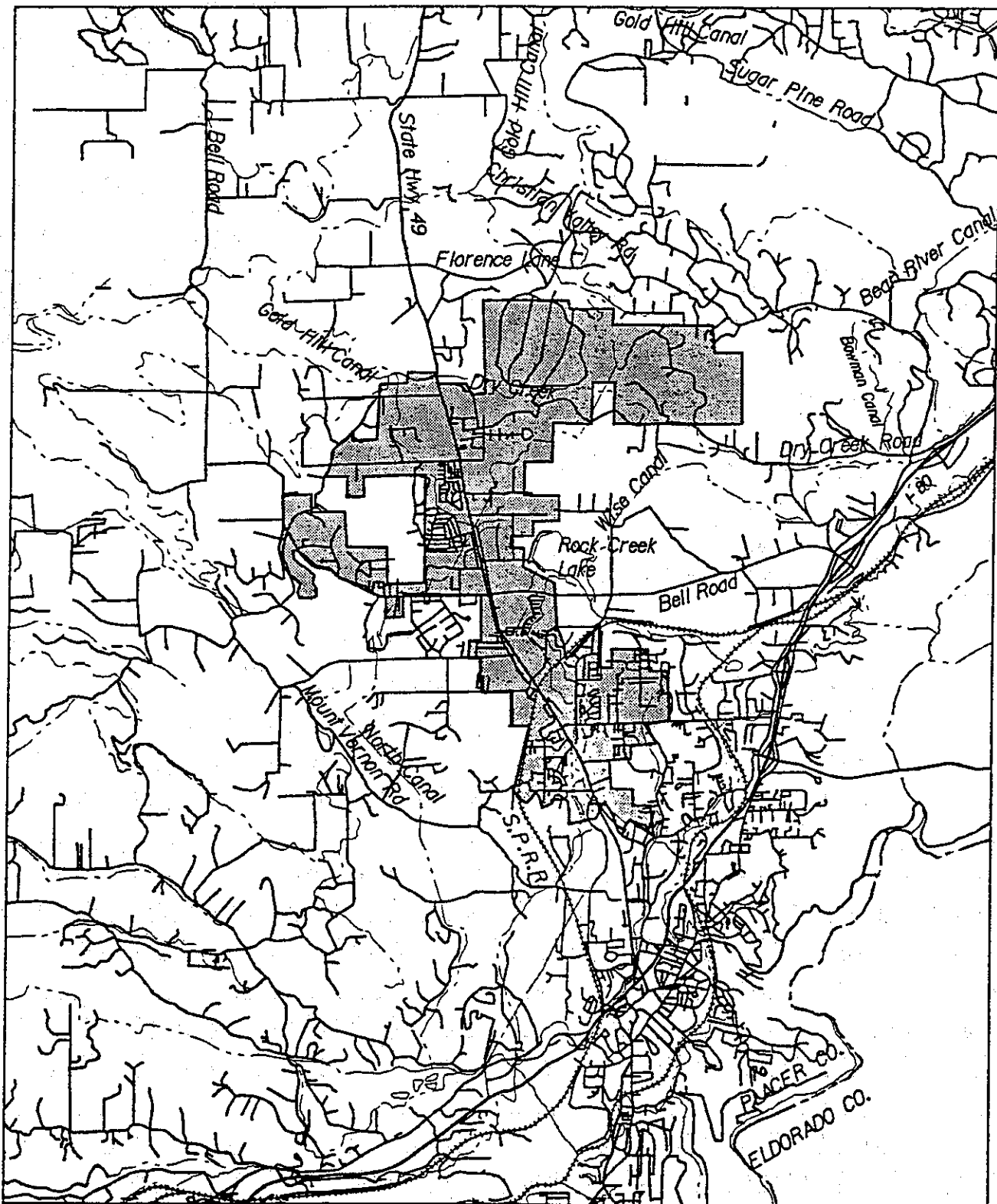
Service Area Characteristics: FACILITIES ARE LOCATED JUST NORTH OF AUBURN ALONG EAST SIDE OF HWY 49. THE AREA IS JUST BORDERING THE HIGHER OAK FOOTHILLS AND LOWER FORESTED SIERRA NEVADAS.

Collection: MOST OF THE COLLECTION SYSTEM WAS CONSTRUCTED IN 1960's & 1970's. THE SYSTEM FLOWS BY GRAVITY TO THE TREATMENT PLANT, BUT HAS 12 LIFT STATIONS IN OUTLYING AREAS.

Treatment: THE TREATMENT PLANT CONSISTS OF ROTATING BIOLOGICAL CONTACTORS, DUAL MEDIA FILTERS, CHLORINE CONTACT CHAMBERS, SLUDGE DIGESTORS, FINAL CLARIFIERS, DECHLORINATION PROCESSES, SLUDGE BELT PRESS, RECLAIM WATER SYSTEM, AND SLUDGE DRYING BEDS.

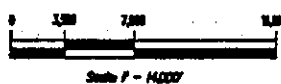
Disposal: EFFLUENT FROM THE WASTEWATER TREATMENT PLANT IS DISCHARGED INTO ROCK CREEK - A TRIBUTARY OF DRY CREEK AND THE BEAR RIVER. SOLIDS ARE HAULED AWAY TO A PERMITTED FACILITY.

Capacity Limitations: DESIGN CAPACITY OF WWTP IS 1.8 MGD WITH POTENTIAL FOR EXPANSION TO 2.3 MGD.



Placer County General Plan

Figure _____ Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

- | | |
|-----------|-----------------------|
| Streets | County Line |
| Waterways | District Service Area |

NOTE:

Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

Placer County Maintenance District No. 1

PLACER COUNTY SEWER MAINTENANCE DISTRICT NO. 2

General Information: Placer County Sewer Maintenance District No. 2 collection and conveyance facilities are located in the Granite Bay area between Folsom Lake and the limits of the City of Roseville. The treatment and disposal of the wastewater collected in the Placer County Sewer Maintenance District No. 2 collection system is conveyed to the Roseville Regional Wastewater Treatment Plant.

Surface drainage from the District area is to the American River.

Wastewater Generation/Sources: Initial collection system construction activities for the Placer County SMD No. 2 wastewater collection system were funded by Water Grants and local funding contributions and. The improvements to the area allowed connection to the City of Roseville Regional Sewage Treatment Plant which has alleviated previously experienced chronic septic system failures in the region.

The Placer County Sewer Maintenance District No. 2 system collects wastewater from approximately 4,000 residential and light commercial connections. Wastewater is considered municipal in nature. Average dry weather flows experienced by the system are about 1.3 mgd.

Collection System Description: Most of the existing collection system was constructed in the 1960's, 70's and 80's using 6-inch to 33-inch PVC, clay and ACP sewer lines. The system uses gravity collection with typical manhole spacing and six lift stations.

Deficiencies: Inflow and infiltration is a problem for the existing collection system. Plans for collection system remediation are ongoing with annual remediation work on the system performed on a pre-determined inspection and construction schedule to correct collection system deficiencies.

Currently identified deficiencies with the existing disposal system include identified inflow and infiltration problems in the existing collection system due to deteriorated lines.

Proposed Improvements: Planned, proposed or required collection system improvements include correction of inflow and infiltration problems with the remediation of the deficient lines.

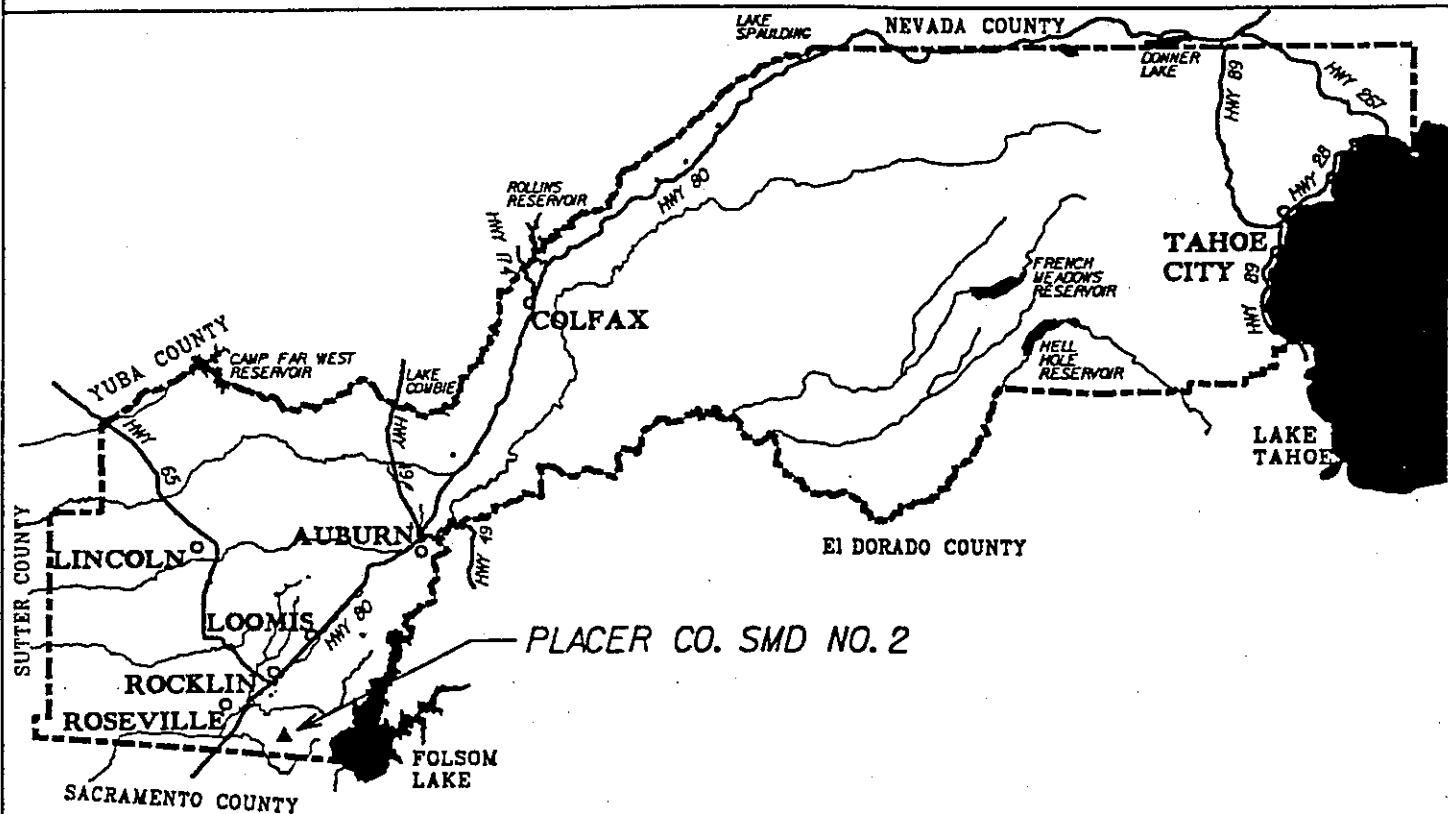
Wastewater Treatment and Disposal System Description: The Placer County SMD No. 2 collection system conveys wastewater collected to the City of Roseville Regional Wastewater Treatment Plant for treatment and ultimate disposal by surface discharge. Reference the City of Roseville section of this Report for additional information.

Financing: Improvement, operations and maintenance costs for Placer County Sewer Maintenance District sewage collection, treatment and disposal system are funded through user fees and collection fees.

System Appraisal: The current average dry weather flow experienced in the Placer County Sewer Maintenance District No. 2 wastewater collection system is approximately 1.3 mgd. In general the system is considered in adequate condition except for some inflow and infiltration problems which are being corrected through an annual remediation program.

Wastewater collected in the District is conveyed to the City of Roseville Regional Wastewater Treatment Plant for treatment and disposal.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: PLACER COUNTY SEWER MAINTENANCE DISTRICT NO.2

Address: 11144 B AVENUE, DEWITT CENTER, AUBURN, CA 95603

Contact Name: WARREN TELLEFSON Phone: (916)-889-7500

Service Area Size: _____ No. Connect.: 4,000 Population Served: _____

Services Provided: WASTEWATER COLLECTION AND CONVEYANCE

Summary System Description

Service Area Characteristics: THE SERVICE AREA IS LOCATED IN THE GRANITE BAY AREA. THE DISTRICT SERVES THE AREA FROM FOLSOM LAKE TO THE ROSEVILLE CITY LIMITS. TOPOGRAPHY CONSISTS OF VALLEY, FOOTHILLS, OAKS AND GRASSLANDS.

Collection: MOST OF THE COLLECTION SYSTEM WAS CONSTRUCTED IN 1960's & 1970's. THE SYSTEM FLOWS BY GRAVITY TO THE TREATMENT PLANT, BUT HAS 12 LIFT STATIONS IN OUTLYING AREAS.

Treatment: THE TREATMENT PLANT CONSISTS OF ROTATING BIOLOGICAL CONTACTORS, DUAL MEDIA FILTERS, CHLORINE CONTACT CHAMBERS, SLUDGE DIGESTORS, FINAL CLARIFIERS, DECHLORINATION PROCESSES, SLUDGE BELT PRESS, RECLAIM WATER SYSTEM, AND SLUDGE DRYING BEDS.

Disposal: DISPOSAL THROUGH THE ROSEVILLE FACILITIES WHICH DISCHARGE TO DRY CREEK.

Capacity Limitations: _____

PLACER COUNTY SERVICE AREA NO. 28--ZONE 11 - SABRE CITY

General Information: Placer County Service Area No. 28, Zone 11, Sabre City Wastewater Treatment Plant is owned by the County of Placer and operated by the Placer County Department of Public Works. The facility is situated north of PFE Road between Walerga Road and Cook Riolo Road near the Placer and Sacramento County line (SE 1/4, Sec 7, T10N, R6E, MDB&M).

Discharged wastewater is authorized under RWQCB Waste Discharge Requirements Order No. 91-149, Federal USEPA NPDES Permit No. CA0078786, and RWQCB Monitoring and Reporting Program No. 91-149, adopted on June 28, 1991.

Discharge and surface drainage is to Dry Creek, tributary to Natomas East Main Drainage Canal and thence to the American River or Sacramento River (depending on the flow conditions).

In 1981 Placer County took over the operations and maintenance of the facilities from Sacramento County.

Wastewater Generation/Sources: Monthly average wastewater flow is 45,000 gpd (ADWF) from 206 residential connections. There are no commercial or industrial connections. A new development of approximately 5,000 units is planned between Roseville and Watt Avenue which would be connected to the Roseville Regional WWTP. Currently there is a moratorium on additional connections to the Sable City WWTP.

Collection System Description: Most of the existing collection system was constructed in the 1960's using 6 to 10-inch VCP and ABS sewer lines. The system uses gravity collection with typical manhole spacing and there are no lift stations.

Deficiencies: Currently there are no identified deficiencies with the existing collection system.

Proposed Improvements: Currently there are no planned, proposed or required improvement to the collection system.

Wastewater Treatment System Description: The Sabre City treatment system was constructed in the early 1960's and consists of two surface aerated waste stabilization ponds with chlorination and dechlorination. Current monthly average flow is about 45,000 gpd and design flow is 45,000 gpd with no expansion capability.

Deficiencies: Currently identified deficiencies with the existing treatment plant include lack of capacity for new connections.

Proposed Improvements: The Placer County PUD is exploring funding and treatment alternatives in order to meet the RWQCB's permitting goals which specify a no-surface-discharge objective. The treatment alternative being considered as the best choice is connection to the Roseville Regional Wastewater Treatment Plant.

Currently planned, proposed or required improvement to the treatment system include abandonment of the plant and connection to Roseville when available.

Disposal System Description: Treated effluent is discharged to Dry Creek, a tributary to Natomas East Main Drainage Canal. Discharge must be limited to 45,000 gpd (ADWF, May to October).

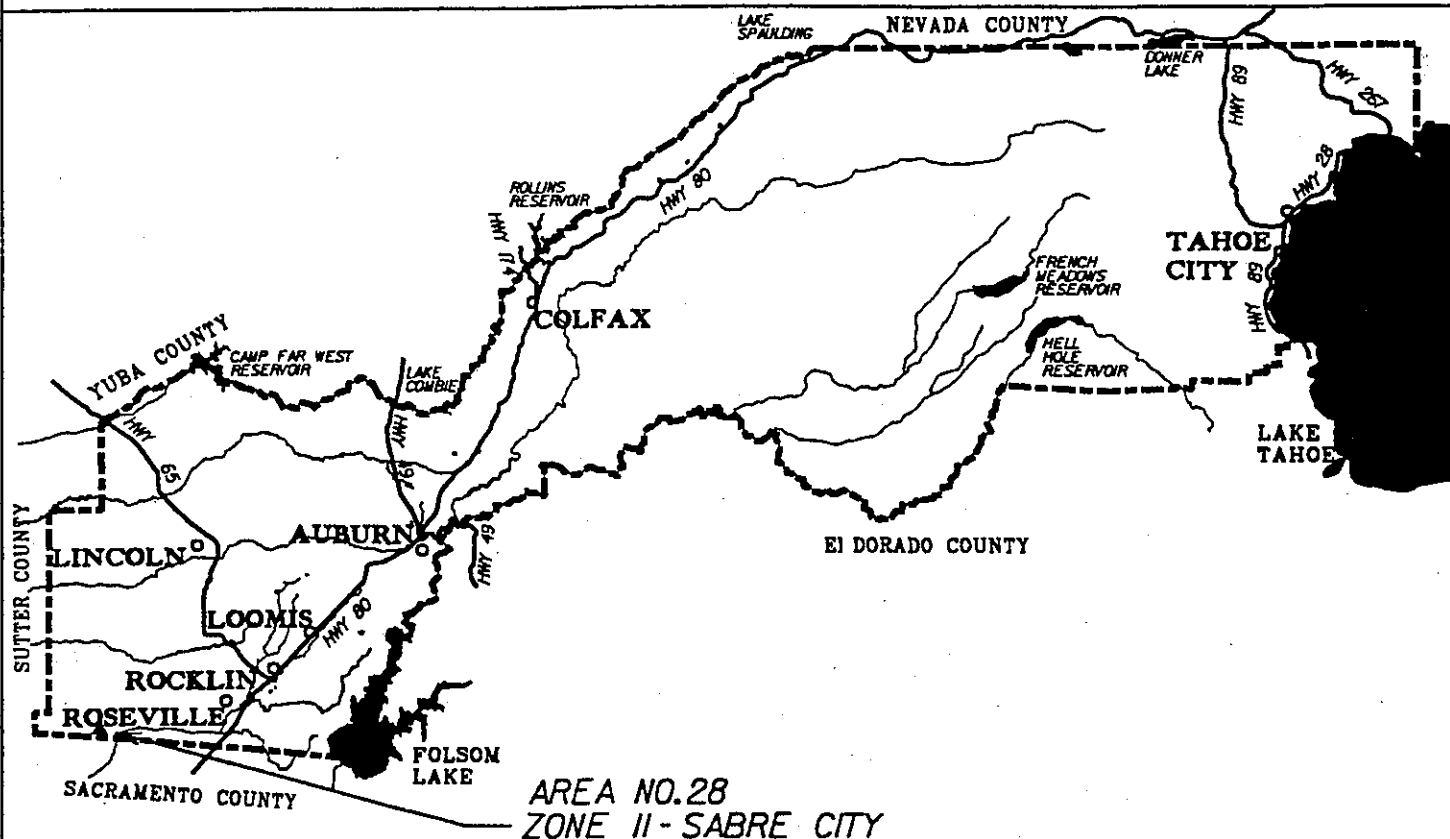
Deficiencies: Inspection reports confirm general compliance with the WDR's and the Monitoring and Reporting Program, however, concentrations of dissolved oxygen in the receiving waters have reportedly fallen below 5.0 mg/l and other minor discharge violations related to BOD, TSS, temp, coliform and pH have occurred.

Proposed Improvements: There are no currently planned, proposed or required improvement to the treatment system.

Financing: Improvement, operations and maintenance costs for Placer County Service Area No. 28, Zone 11, Sabre City sewage collection, treatment and disposal system are funded through user fees and connection fees.

System Appraisal: Current permitting limits discharge to 45,000 gpd (ADWF). Planning at this time indicates that abandonment of the existing treatment and disposal facilities and connection to the Roseville Regional Wastewater Treatment Plant by 1993-94. This will allow abandonment of the existing Sabre City discharge to Dry Creek. Current planning thought is that Sabre City wastewater will be connected to a 5000 unit development which is slated for the area between Roseville and Watt Avenue. This plan will be in conformance with the goals of the RWQCB WDR's.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: PLACER COUNTY SERVICE AREA NO.28 ZONE II-SABRE CITY

Address: 11144 B AVENUE, DEWITT CENTER, AUBURN, CA 95603

Contact Name: WARREN TELLEFSON Phone: (916)-889-7500

Service Area Size: No. Connect.: 206 Population Served:

Services Provided: WASTEWATER MANAGEMENT

Summary System Description

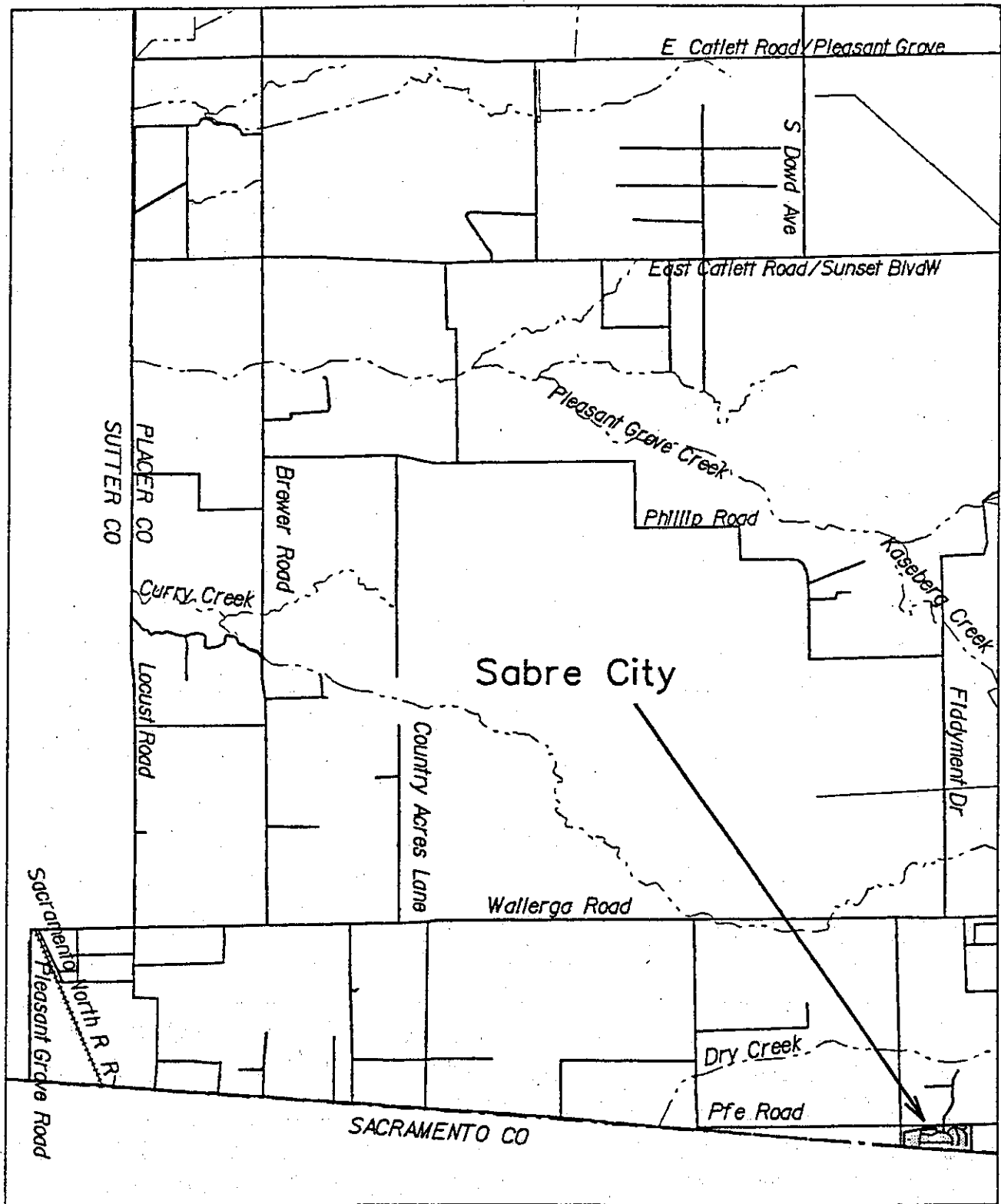
Service Area Characteristics: THE FACILITY IS LOCATED NORTH OF PFE ROAD
BETWEEN WALERGA ROAD AND COOK RIOLO ROAD.

Collection: MOST OF THE EXISTING COLLECTION SYSTEM WAS CONSTRUCTED IN THE
1960's. THE SYSTEM USES GRAVITY COLLECTION TRANSPORTING SEWAGE TO THE
TREATMENT AREA VIA A 10 INCH CLAY PIPE.

Treatment: THE TREATMENT SYSTEM CONSISTS OF TWO AERATED WASTE
STABILIZATION PONDS WITH CHLORINATION AND DECHLORINATION. DESIGN FROM
CAPACITY IS 45,000 GPD.

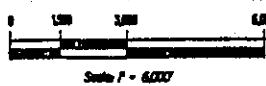
Disposal: DIRECT SURFACE DISCHARGE TO DRY CREEK.

Capacity Limitations: THE MOST SIGNIFICANT DEFICIENCY WITHIN THE SYSTEM IS
THE LACK OF CAPACITY FOR FUTURE CONNECTIONS.



Placer County General Plan

Figure _____ Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Placer Co. Dept. of Public
Works SA #28-Sabre City

Streets

Waterways

County Line

District Service Area

NOTE:

Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

RAINCO, INC. - CISCO GROVE

General Information: Cisco Grove Resort is operated by Rainco, Inc. and consists of one residence, a restaurant, one gas station and one motel unit. The resort is located approximately eight miles west of Soda Springs along Highway 80 (Sec 29, T17N, R13E, MDB&M).

Wastewater from the resort is regulated by RWQCB Waste Discharge Requirements Order No. 87-211 and Monitoring and Reporting Program No. 87-211 which were adopted on December 11, 1987.

Drainage from the resort area is to the South Yuba River.

Wastewater Generation/Sources: The Cisco Grove Resort consists of one gasoline station, one restaurant, one motel unit and one residential connections and generates approximately of 5,000 gpd of domestic wastewater. Ultimate design flow is 10,000 gpd. There is a minor potential for volatile organic contaminants in the wastestream from the gas station.

Collection System Description: Most of the existing collection system was constructed in 1963 using 4-inch to 6-inch clay sewer lines. The system uses gravity collection with typical manhole spacing and has no lift stations.

Deficiencies: There are currently no identified deficiencies with the existing collection system.

Proposed Improvements: There are currently no planned, proposed or required collection system improvements.

Wastewater Treatment and Disposal System Description: Domestic wastewater is treated in an extended aeration package treatment plant and settling tank. The design capacity of the package plant is 10,000 gpd. RWQCB Inspection Reports do not indicate any problems with the treatment system.

Effluent is discharged to three subsurface leachfields. A seasonal high ground water table and soil not particularly conducive to percolation caused the surfacing of wastewater in the recent past. The old leachfield was abandoned and two new leachfields were constructed in response to these limitations. This new disposal system has alleviated surfacing problems and allowed increased disposal flexibility. The RWQCB Monitoring and Reporting Program calls for testing of all leachfield system facilities, including pump stations, septic tanks, distribution lines, and effluent disposal areas on a weekly basis.

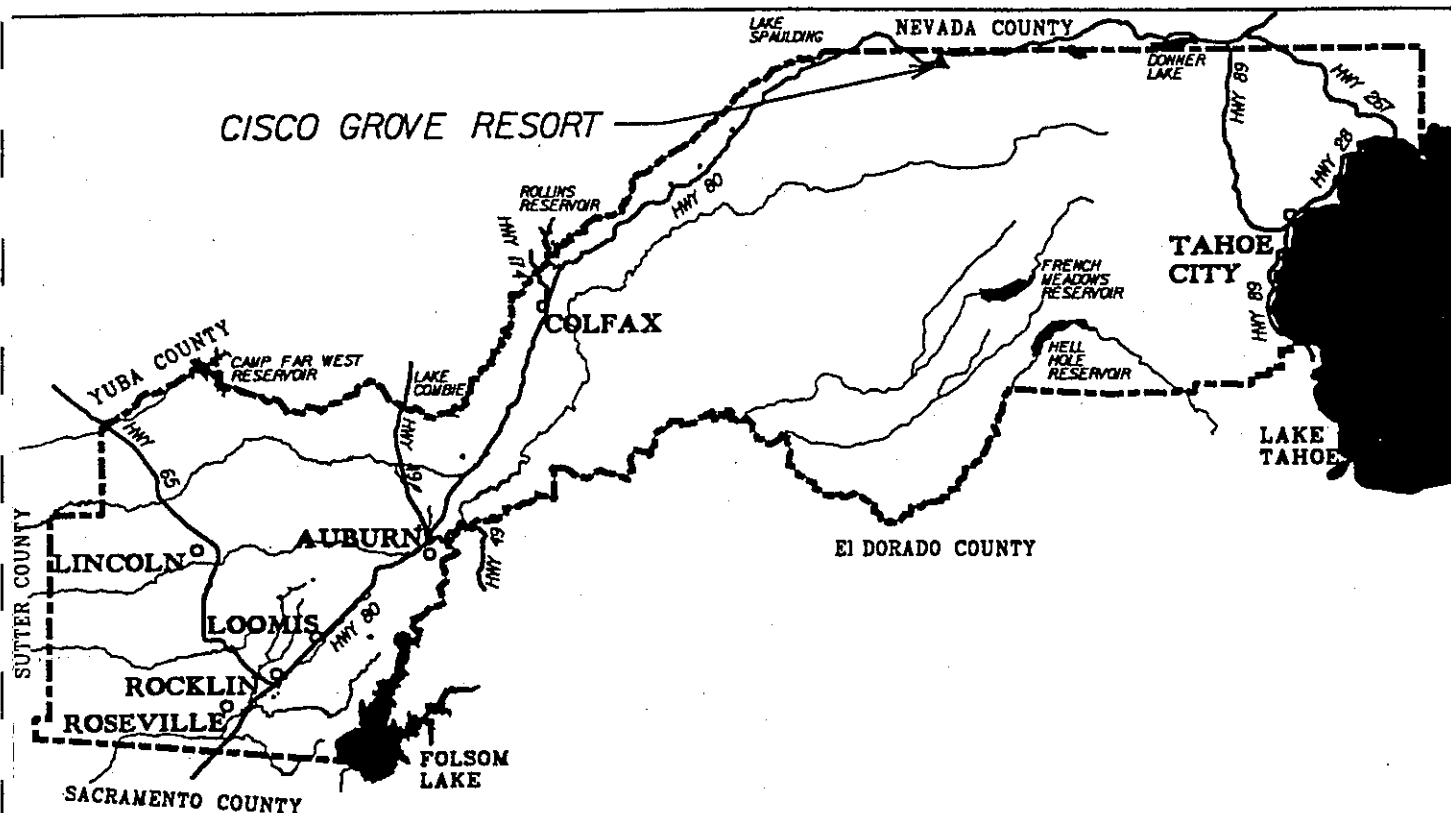
Deficiencies: Currently there are no identified deficiencies with the existing treatment plant and disposal system.

Proposed Improvements: There are currently no planned, proposed or required improvement to the treatment and disposal system.

Financing: Improvement, operations and maintenance costs for the Cisco Grove Resort sewage collection, treatment and disposal system are funded by resort funds.

System Appraisal: In general the Cisco Grove wastewater system is considered adequate to meet the existing and planned future flows. Existing flowrates to the plant are about 5,000 gpd average dry weather flow and 4,000 gpd peak wet weather flow. Design capacity for the system is 10,000 gpd. There are not any existing plans to expand the system or create additional system capacity in the near-term.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: RAINCO, INC. - CISCO GROVE RESORT

Address: P.O. BOX 760, SODA SPRINGS, CA 95728

Contact Name: KARL A. MIENER, PROPRIETOR Phone: (916) 426-3221

Service Area Size: _____ No. Connect.: 4 Population Served: VARIES

Services Provided: WASTEWATER MANAGEMENT

Summary System Description

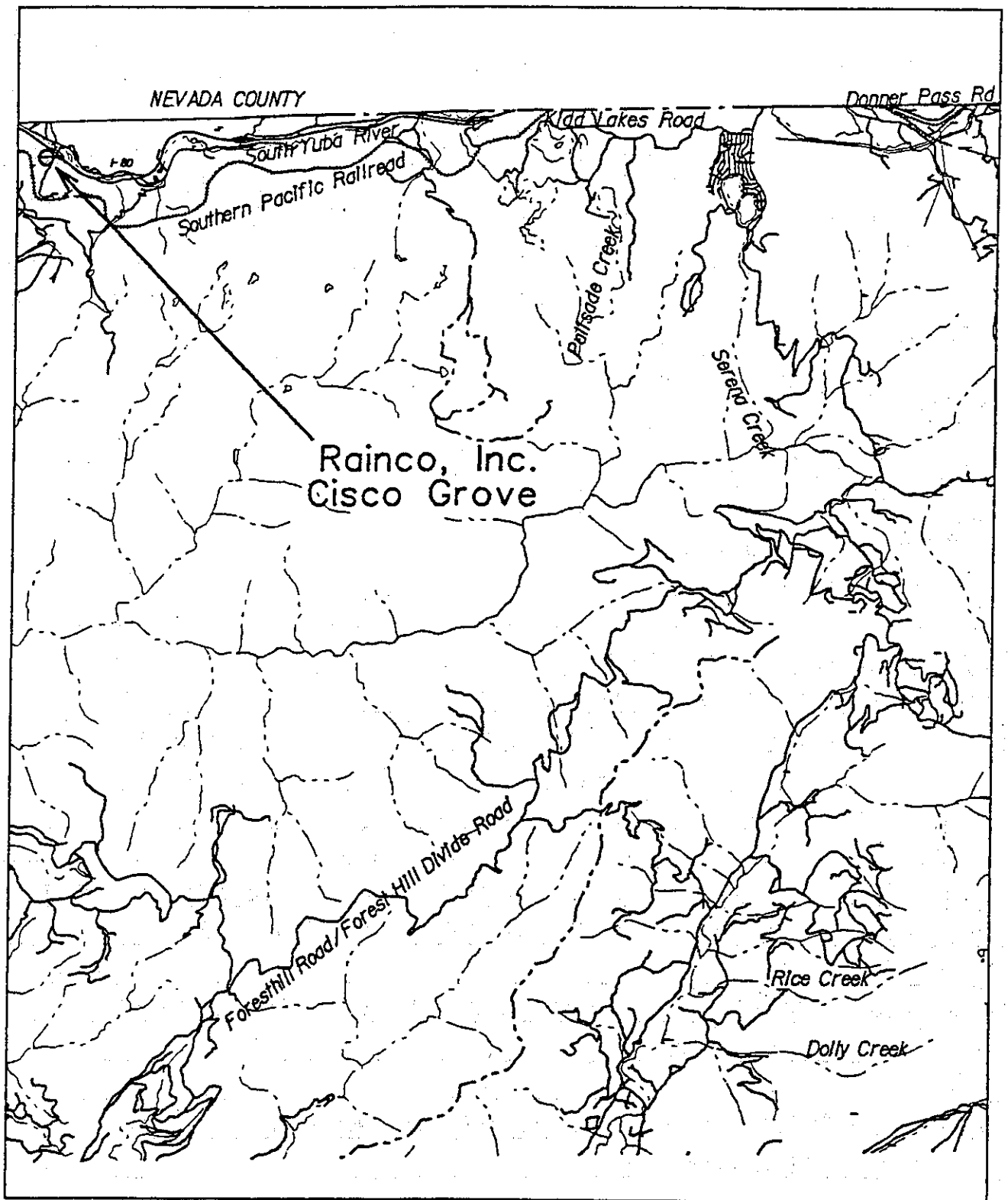
Service Area Characteristics: FACILITIES SERVE ONE GAS STATION, A RESTAURANT ONE MOTEL UNIT AND ONE RESIDENTIAL CONNECTION TO SATISFY WASTEWATER MANAGEMENT NEED.

Collection: A 300 FOOT TOTAL LENGTH CLAY TYPE GRAVITY SEWER SYSTEM SERVES THE RESORT AREA.

Treatment: PROVIDED BY AN EXTENDED AERATION PACKAGED TREATMENT PLANT AND SETTLING TANK.

Disposal: EFFLUENT IS DISCHARGED OT THREE SUBSURFACE LEACHFIELDS.

Capacity Limitations: DESIGN CAPACITY OF THE WASTEWATER PLANT IS 10,000 GPD.



Placer County General Plan

Figure — Wastewater Service Area

Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

Scale: 1" = 10,000'

LEGEND

**Rainco, Inc.
Cisco Grove**

Streets	County Line
Waterways	District Service Area

NOTE:
 Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

CITY OF ROSEVILLE REGIONAL WASTEWATER TREATMENT PLANT

General Information: The City of Roseville Regional Wastewater Treatment Plant is located southwest of the City of Roseville on Booth Road on the Dry Creek Drainage (Secs 9 & 10, T10N, R6E, MDB&M). Treatment and disposal facilities are located on City of Roseville Corporation Yard property.

Discharge from the City of Roseville Regional Wastewater Treatment Plant is permitted by RWQCB Waste Discharge Requirement Order No. 87-202, Federal USEPA NPDES Permit No. CA0079502, and RWQCB Monitoring and Reporting Program Order No. 87-202. These regulatory documents were adopted on December 11, 1987.

Surface drainage is to Dry Creek, tributary to Natomas East Main Drainage Canal, thence the Sacramento River.

Wastewater Generation/Sources: The Roseville Regional Wastewater Treatment Plant manages wastewater from the City of Roseville and, since 1986, Southeast Placer and Sunset Industrial Park. Such service area consolidation eliminated the use of four outmoded wastewater treatment facilities in the area which continually violated RWQCB discharge criteria.

Wastewater treated by the WWTP is considered municipal in nature, with significant commercial and minor industrial contribution.

Collection System Description: Materials of construction vary widely. Line sizes vary from 6-inch to over 42-inch. The system uses gravity collection with typical manhole spacing and lift stations were required for adverse grades.

Deficiencies: The collection system experiences some difficulty with inflow and infiltration. Peak design flow for the new treatment plant expansion is 45 mgd while the average dry weather flow is 18 mgd.

Proposed Improvements: Planned, proposed or required improvements to the collection system include a proposed gravity line, pump station and 20-inch force main serving new development north of the treatment plant has been designed with construction anticipated to begin in 1992.

Wastewater Treatment System Description: The design capacity of the Roseville Regional Wastewater Treatment Plant is 11.75 mgd average dry weather flow (ADWF) and peak wet weather flow of 21 mgd.

Wastewater treatment processes include activated sludge with contact stabilization, secondary clarification, and filtration. Chemical coagulation occurs upstream of the effluent filters.

A pretreatment program, approved by the EPA, regulates the discharge of industrial wastewater to the plant.

Deficiencies: A minimum of five industrial users, H.B. Fuller Company, Southern Pacific Transportation Co., Formica Corp., Hewlett Packard, and Reynolds Metals Company, were not in compliance with industrial pretreatment requirements in 1991. The City of Roseville issued a Cease and Desist Order to H.B. Fuller Company in January 1991 with interim mitigation measures and a time schedule for the completion of a pretreatment plant.

Identified current treatment plant deficiencies are being resolved with the treatment plant expansion

currently under construction.

Proposed Improvements: The current Roseville Regional Wastewater Treatment Plant improvement and expansion project is scheduled for completion in September 1993. The overhauled plant will have an ADWF capacity of 18 mgd with nitrogen removal capability.

Although the RWQCB and the Department of Fish and Game have concurred with more tolerant standards for pH and receiving water temperature, the current wastewater treatment plant expansion contains pH adjustment processes and a cooling tower.

Future improvements to the wastewater treatment system are currently under investigation to determine options for treatment and disposal of 60 to 80 mgd.

Disposal System Description: An average of 6 mgd of effluent is discharged to Dry Creek, a tributary of the Natomas East Main Drainage Canal and the Sacramento River. Strict discharge requirements as mandated by the RWQCB must be met prior to any release to Dry Creek. Sludge is dewatered by belt press and hauled offsite to the Western Regional Sanitary Landfill.

Deficiencies: The Roseville Regional Wastewater Treatment Plant has experienced TSS and receiving water turbidity violations. Strict enforcement of industrial pretreatment standards will most likely alleviate this concern. Excessive chlorine residuals detected in Dry Creek in 1990 can be suppressed with regular monitoring efforts and fine adjustment of plant operations.

There are presently no identified disposal system deficiencies.

Proposed Improvements: The renovated Roseville Regional Wastewater Treatment Plant will have Title 22 effluent quality.

A reclaimed water pump station will be installed in response to the RWQCB's aversion to increased surface water discharge to the Dry Creek Drainage. Utilization of this station and associated pipelines, designed to convey 6 mgd, will irrigate golf courses and City of Roseville parks and could transport effluent to the Pleasant Grove Basin in order to preserve Dry Creek water quality.

Planned, proposed or required disposal system improvements include

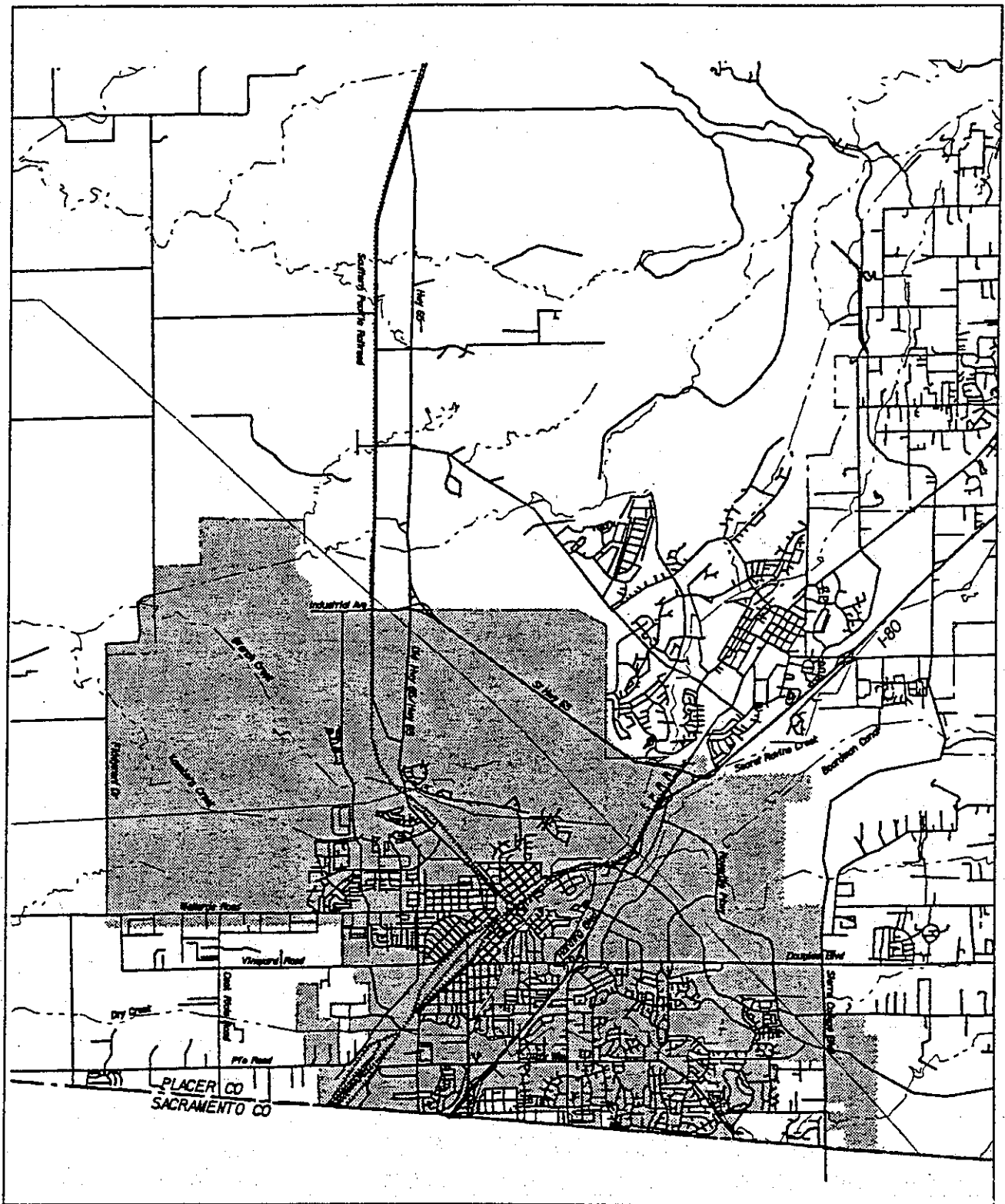
Financing: Funds of \$46,000,000 are secured for the current Roseville Regional Wastewater Treatment Plant improvement and expansion project. Operations and maintenance costs are funded by sewer user charges.

System Appraisal: Future options for wastewater treatment and disposal are uncertain, although the need for extreme and punctual planning is clear. The City of Roseville and the RWQCB estimated in January 1990 that the service area will eventually produce 60 to 80 mgd of wastewater. The current improvement and expansion project will only increase the capacity of the Roseville Regional Wastewater Treatment Plant from about 12 mgd to 18 mgd. The City of Roseville agreed to complete a study of wastewater management alternatives, which may involve construction of a new treatment plant on Pleasant Grove Creek. That study is underway.

The map illustrates the geographical context of the City of Roseville Regional Wastewater Treatment Plant (WWTP). Key features include:

- Counties:** Yuba County, Sutter County, El Dorado County, Nevada County, and Sacramento County.
- Highways:** Hwy 80, Hwy 99, Hwy 89, Hwy 28, Hwy 85, and Hwy 87.
- Lakes and Reservoirs:** Lake Spaulding, Lake Donner, Lake Tahoe, Lake Folsom, Lake Colby, Lake Combie, Lake Rollins, Lake French Meadows, and Lake Hell Hole.
- Cities and Towns:** Colfax, Auburn, Loomis, Rocklin, and Roseville.
- City of Roseville Regional WWTP:** Indicated by a line pointing to the Roseville area.

Capacity Limitations: CURRENT IMPROVEMENT AND EXPANSION PROJECT WILL INCREASE CAPACITY TO 18 MGD (ADWF). HOWEVER, SERVICE AREA WILL EVENTUALLY REQUIRE 60 TO 80 MGD.



<h1>Placer County General Plan</h1>		<h2>LEGEND</h2>	
<h3>City of Roseville</h3>			
<p>Figure _____</p> <h3>Wastewater Service Area</h3>		<p>Streets County Line</p> <p>Waterways District Service Area</p>	
	<p>Scale: 1" = 3,000'</p>	<p>Date: 1/15/92</p> <p>Prepared by: PSOMAS & ASSOCIATES</p>	
<p>NOTE: Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.</p>			

SIERRA LAKES COUNTY WATER DISTRICT

General Information: Sierra Lakes County Water District operates a water supply service and wastewater collection system. The wastewater facility is located north of Interstate 80 on Soda Springs and is operated by Donner Summit PUD.

The District's engineer recently completed the *Sierra Lakes County Water District Five Year Facilities Plan* (May 1990). An EIR assimilating the ecological effects of this facility was prepared by the Donner Summit Public Utilities District.

Surface drainage from the area is to Serena Creek which flows through the District and southerly to the American River.

Wastewater Generation/Sources: The *Sierra Lakes County Water District Five Year Facilities Plan* projects growth to 740 units by the year 2000, a 64% increase from the number of 1990 service connections.

Peak wet weather wastewater flow is estimated at 738 gpd/unit. Of this total, 69% of the flow is due to infiltration/inflow (I/I).

Collection System Description: The Sierra Lakes CWD wastewater collection and export system contains four internal pump stations. The pump stations are connected by force mains and operate in series. Pump station #4 discharges to station #3, station #3 discharges to station #2, and station #2 supports station #1.

Pump station #1 is the export pump station. All wastewater generated by Sierra Lakes CWD is transported to Donner Summit PUD through an 8-inch force main at a maximum rate of 1.05 mgd.

Most of the existing collection system was constructed in 1961 using 6-inch to 10-inch clay sewer lines. The system uses gravity collection with typical manhole spacing and 4 lift stations.

Deficiencies: The Sierra Lakes CWD wastewater collection system, particularly the pump station #2 system, experiences significant inflow and infiltration problems. Surcharging caused a manhole to overflow in January 1988 spilling approximately 100 gallons of raw sewage.

Other identified collection system deficiencies include old pumping stations. The wet pit, submersible pump stations were constructed in the early 1960's. Pumps and controls have been replaced as needed but the facilities are antiquated and will need upgrading at some point.

Proposed Improvements: According to the 1990 *Sierra Lakes County Water District Five Year Facilities Plan*, a study to identify specific inflow and infiltration problems and their solutions is budgeted for the first year of the plan. Additional construction money for collection system improvements is budgeted for each year thereafter.

Examination of the tracts available for development shows most of the future sewer connections will be served by pump station #4. Consequently, each of the pump stations will experience the effects of increased wastewater flow.

Analysis of the current 8-inch export force main confirms adequacy through the year 2000.

Wastewater Treatment and Disposal System Description: Sierra Lakes CWD contracts with Donner Summit PUD for treatment and disposal of wastewater. Treated effluent is disposed by land irrigation in summer with seasonal surface discharge to the South Yuba River.

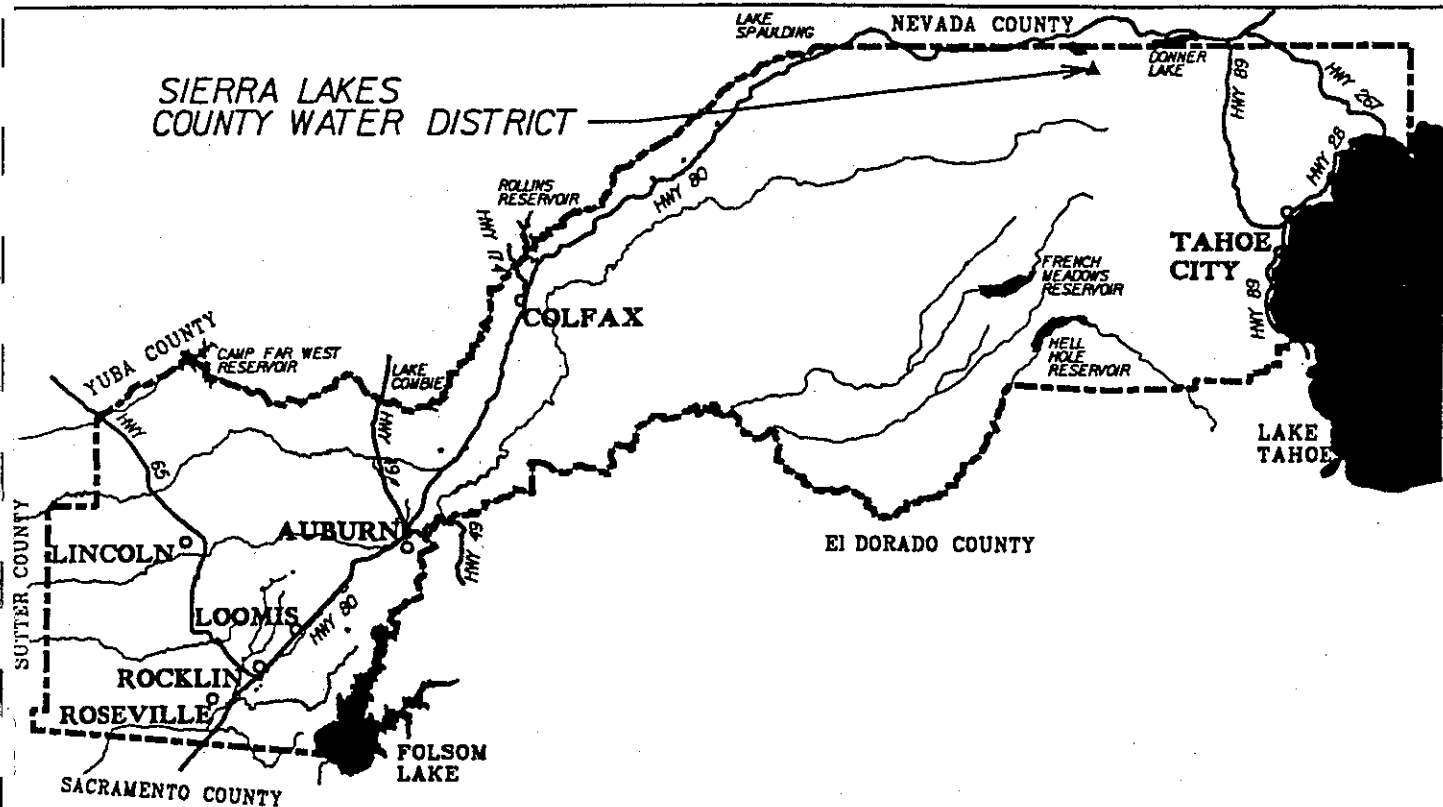
Deficiencies: The volume of wastewater exported to Donner Summit PUD has approached the limit of the contract.

Proposed Improvements: Sierra Lakes CWD is investigating options for future wastewater treatment and disposal. One alternative calls for construction of new facilities at Sierra Lakes CWD with potential for surface discharge to the South Yuba River or the American River. (The capacity of the old Sierra Lakes CWD wastewater treatment facility in February 1983 was 200,000 gpd.) Storage of raw sewage with pipeline transportation to an upgraded Donner Summit PUD Wastewater Treatment Plant is also being considered as an alternative.

Financing: The *Sierra Lakes County Water District Five Year Facilities Plan* discusses financing alternatives for facilities improvements. The total cost for wastewater management, water system, and operational upgrades is estimated at about \$3,000,000 for the planning period. Funding for wastewater facilities operations and maintenance comes from connection fees, service fees and taxes collected by the District.

System Appraisal: Sierra Lakes CWD is currently investigating options for future wastewater treatment and disposal. These include a study, design, and construction of a new Sierra Lakes CWD facility or transportation to an upgraded Donner Summit PUD Wastewater Treatment Plant. Existing system facilities have reached their safe capacity.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: SIERRA LAKES COUNTY WATER DISTRICT

Address: P.O. BOX 156, SODA SPRINGS, CA 95728

Contact Name: CHRIS SWANBERG, PRESIDENT Phone: (916)-482-1720

Service Area Size: _____ No. Connect.: _____ Population Served: _____

Services Provided: WASTEWATER COLLECTION AND EXPORT

Summary System Description

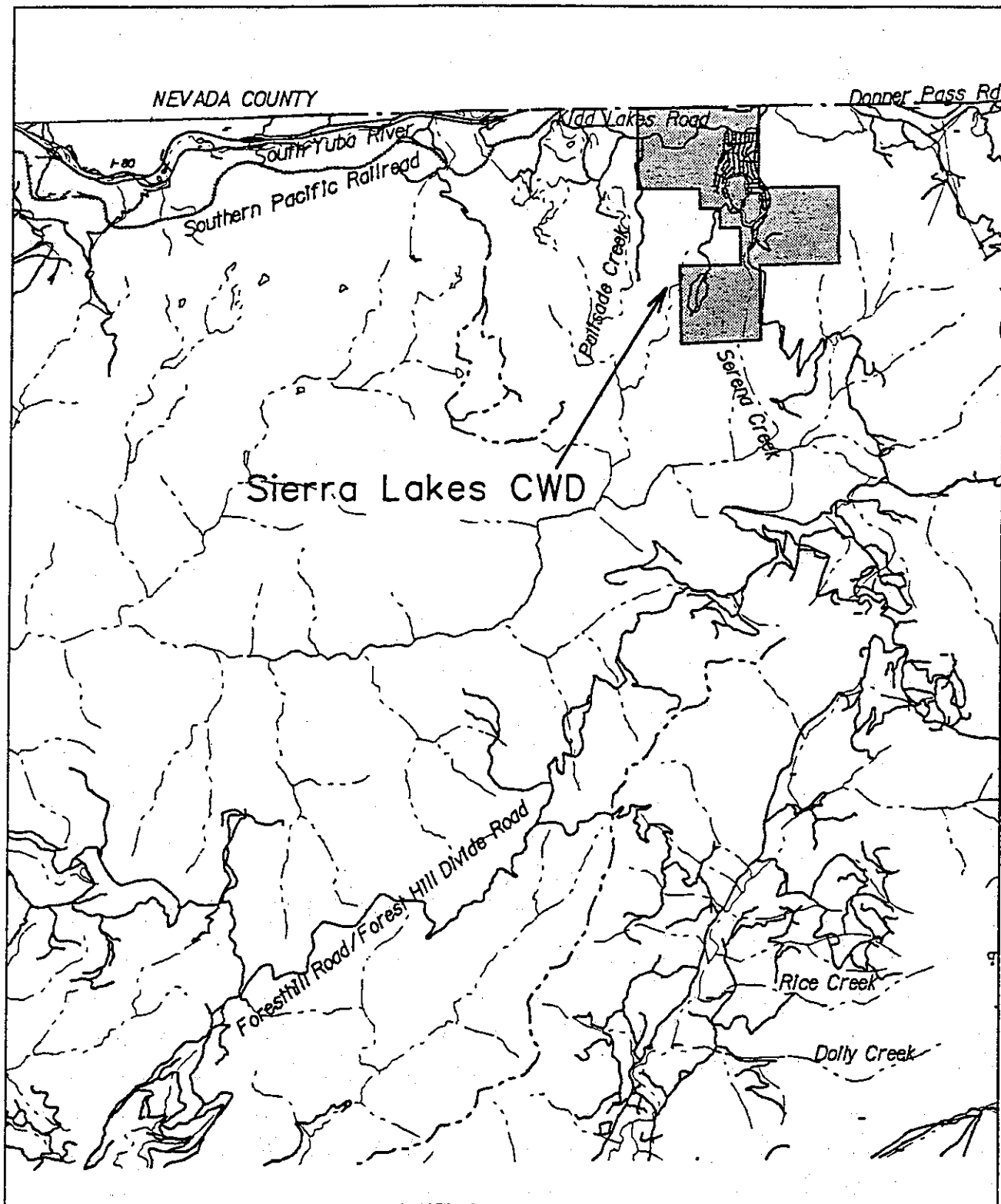
Service Area Characteristics: SIERRA NEVADA RANGE. MOUNTAINOUS LOCATION, WELL FORESTED. HILLY TERRAIN.

Collection: FOUR PUMP STATIONS OPERATE IN SERIES. 69% OF THE FLOW IS DUE TO I/I. MAXIMUM RATE THROUGH FORCE MAIN IS 1.05 MGD.

Treatment: CONTRACTS WITH DONNER SUMMIT PUD FOR TREATMENT AND DISPOSAL OF WASTEWATER.

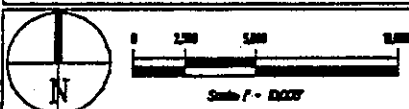
Disposal: TREATED EFFLUENT IS DISSPOSED BY LAND IRRIGATION IN SUMMER WITH SEASONAL SURFACE DISCHARGE TO THE SOUTH YUBA RIVER.

Capacity Limitations: PROJECTS GROWTH TO 740 UNITS BY YEAR 2000, A 64% INCREASE FROM THE NUMBER OF 1990 SERVICE CONNECTIONS. VOLUME OF WASTEWATER EXPORTED TO DONNER SUMMIT PUD HAS APPROACHED LIMIT OF CONTRACT.



Placer County General Plan

Figure _____ Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Sierra Lakes CWD

- | | |
|-----------|-----------------------|
| Streets | County Line |
| Waterways | District Service Area |

NOTE:

Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

SKY VIEW TERRACE MOBILE HOME PARK

General Information: Sky View Terrace Mobile Home Park is located in Todd Valley, 3.5 miles southwest of Foresthill on the Todd Valley Road. The mobile home park opened in 1963 and was formerly called Todd Valley Trailer Court. Wastewater generated from the park is permitted by RWQCB Waste Discharge Requirements Order No. 82-076, effective on June 25, 1982.

Surface drainage is to Middle Fork American River.

Wastewater Generation/Sources: The mobile home park currently has 130 trailer sites and, estimating an average of 290 gallons per site per day, generates approximately 37,500 gpd of domestic wastewater. The expected capacity of the park is an occupancy of 135 sites with an estimated flow of 39,000 gpd of wastewater (ADWF).

Collection System Description: Most of the existing collection system was constructed in 1970's and 80's using 3-inch to 4-inch ABS and some 6-inch transite sewer lines. The system uses gravity collection with one manhole and one lift station. Lift is from Pond #2 about 400 feet to manhole and then gravity flow to Pond #3.

Deficiencies: Currently there are no identified deficiencies with the existing collection system.

Proposed Improvements: Currently there are no planned, proposed or required collection system improvements.

Wastewater Treatment and Disposal System Description: The treatment facilities consist of three ponds acting as a sequential clarification process. Wastewater flows by gravity into the first and second ponds and is pumped into the third pond. Initial solids separation occurs in the first pond. Aerators were installed in ponds #1 and #2 to enhance treatment in 1982. Pond #3 was added in 1982 to provide final finish and added hydraulic capacity. The average dry weather flow to the treatment plant is currently estimated at no more than about 37,500 gpd. Design capacity for the plant is 39,000 gpd.

Surface drainage from ponds #1 and #2 is to Peachstone Gulch. Surface drainage from pond #3 is to Todd Creek. Both drainages converge downstream with Middle Fork American River. No surface water discharge or bypass is allowed under the current discharge requirements.

Deficiencies: Inspection reports confirm general compliance with the RWQCB Waste Discharge Requirements and the Monitoring and Reporting Program, however, ground water monitoring wells were neglected in a June 1982 report. There are two monitoring stations near pond #3 with 12 and 20 foot depths, each monitored monthly. In 1986 a drainage ditch overflowed into pond #1 and was permitted to be pumped to the river.

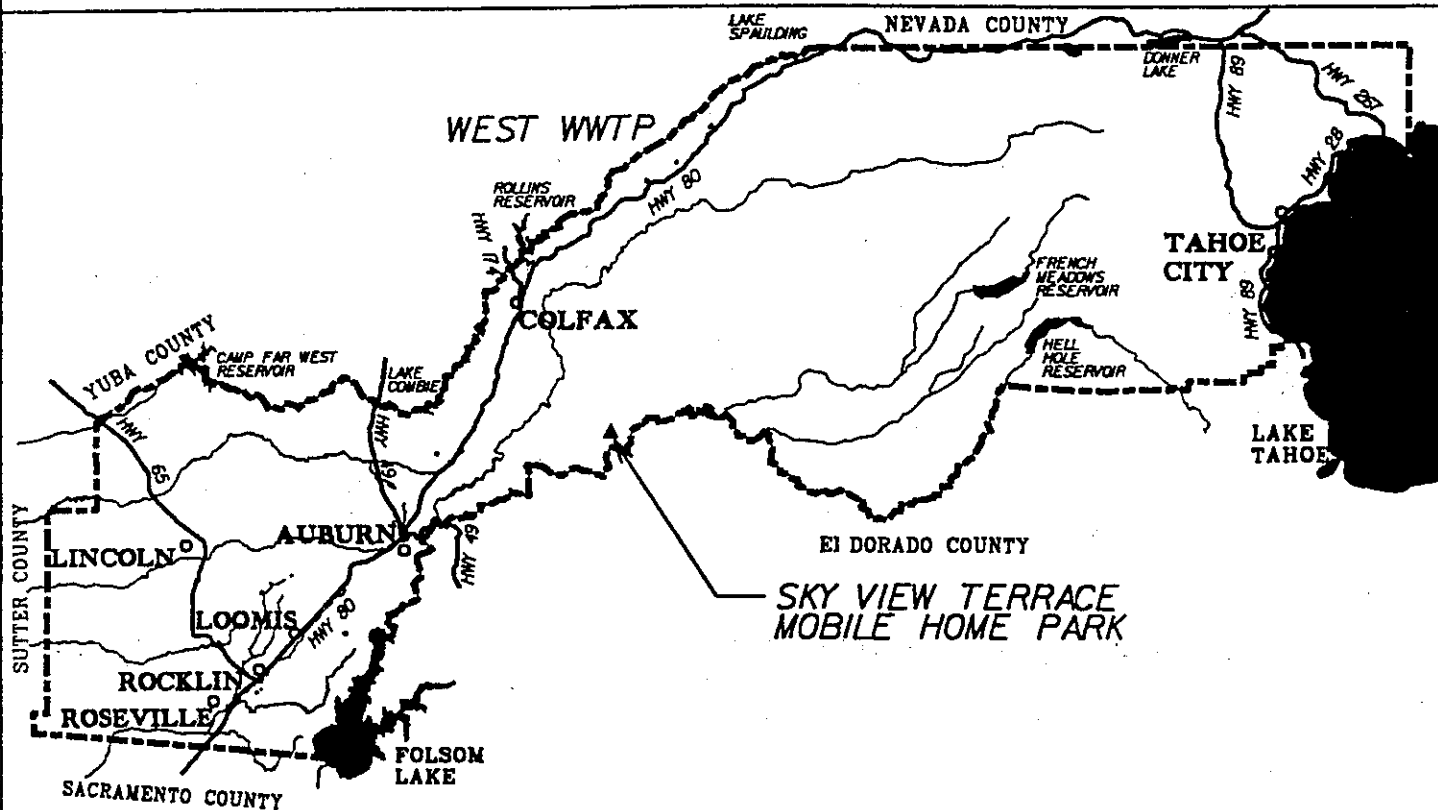
Proposed Improvements: At this time there are no planned, proposed or required improvement to the treatment and disposal system.

Financing: Improvement, operations and maintenance costs for the Sky View Mobile Home Park wastewater collection, treatment and disposal system are funded through Sky View Terrace trailer space rental fees or special financing for large improvements.

System Appraisal: Upon full buildout of the Sky View Terrace Mobile Home Park, mechanical aerators which were installed in the first and second ponds and the addition of the third pond have enhanced

treatment performance. Full build-out average dry weather flow will be 39,000 gpd and is expected to be reached in 1992. Plans for additional expansion beyond this level are not being considered at this time.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: SKY VIEW TERRACE MOBILE HOME PARK

Address: 21200 TODD VALLEY ROAD • 25, FORESTHILL, CA 95631

Contact Name: CAL LYONS, MANAGER Phone: (916)-367-2218

Service Area Size: 56 ac. No. Connect.: 135 Population Served: 400

Services Provided: WASTEWATER MANAGEMENT

Summary System Description

Service Area Characteristics: THE PARK CURRENTLY HAS 130 TRAILER SITES AND GENERATES ABOUT 37,500 GPD. EXPECTED CAPACITY OF PARK IS 135 SITES OR 39,000 GPD OF WASTEWATER.

Collection: THE EXISTING COLLECTION SYSTEM IS CONSTRUCTED OF A.B.S. AND TRANSITE PIPE.

Treatment: THREE PONDS ACT AS A SEQUENTIAL CLARIFICATION PROCESS. INITIAL SOLIDS SEPARATION OCCURS IN FIRST POND.

Disposal: EVAPORATION AND PERCOLATION.

Capacity Limitations: UPON FULL BUILDOUT OF PARK, MECHANICAL AERATORS INSTALLED IN FIRST AND SECOND PONDS WILL ENHANCE TREATMENT PERFORMANCE. ULTIMATE CAPACITY IS 39,000 GPD.

SOUTH SUTTER WATER DISTRICT--CAMP FAR WEST

General Information: The South Sutter Water District-Camp Far West Reservoir is located on the Bear River about fifteen miles southeast of Marysville (Sec 27, T14N, R6E, MDB&M). Wastewater from the facility is regulated by RWQCB Waste Discharge Requirements Order No. 87-210 and Monitoring and Reporting Program No. 87-210 which were adopted on December 11, 1987.

Surface drainage from the facilities is to the Camp Far West Reservoir and thence to the Bear River.

Wastewater Generation/Sources: The South Side Activity Area encompasses 67 camp sites and 37 day use facilities. The camp sites and day use facilities are supported by 2 fixed restrooms and several portable/chemical toilets.

Collection System Description: Wastewater from the two fixed bathrooms is conveyed by a gravity collection system to an oxidation/evaporation pond. The population served is variable mostly consisting of campers and recreational day users. The wastewater generated is considered domestic in nature.

Deficiencies: Currently there are no identified deficiencies with the existing collection system.

Proposed Improvements: Currently there are no planned, proposed or required collection system improvements.

Wastewater Treatment and Disposal System Description: Wastewater from the campsite facilities is conveyed to a single oxidation/evaporation pond. An emergency overflow pipe which was used for emergency overflows was removed.

Wastewater from the portable/chemical toilets is hauled offsite for disposal.

Deficiencies: A single oxidation/evaporation pond treats the wastewater flows. Although the system has never reportedly overflowed the potential for offsite migration of partially treated wastewater may exist.

Regulatory agency compliance issues in the past have mainly focused on delinquent monitoring report submittals.

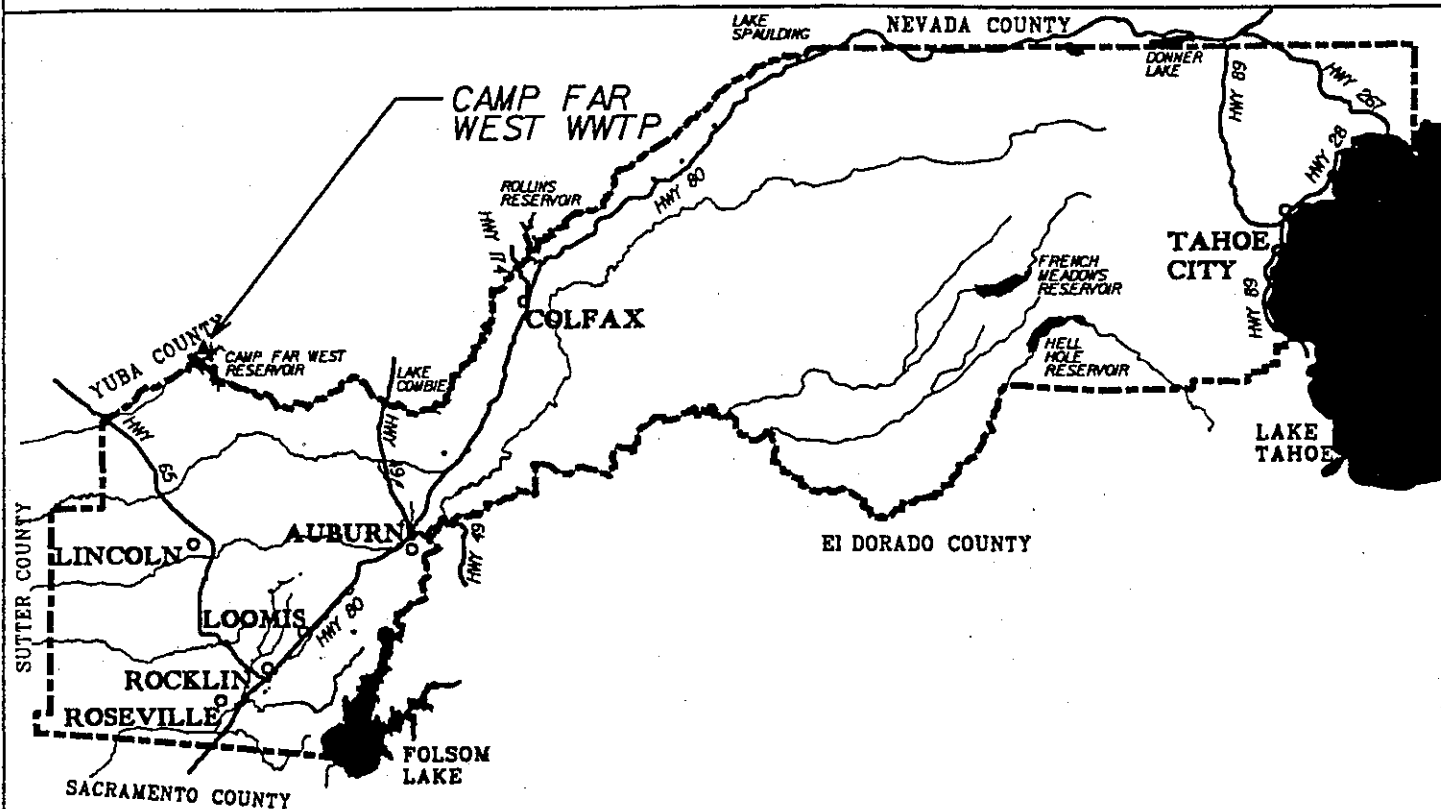
Currently there are no identified deficiencies with the existing treatment and disposal facilities.

Proposed Improvements: There are no near term planned, proposed or required improvements to the treatment and disposal system.

Financing: Improvement, operations and maintenance costs for the sewage collection, treatment and disposal system are funded through South Sutter Water District funding and campsite use fees.

System Appraisal: The Camp Far West wastewater collection, treatment and disposal system is designed for a peak wet weather flow of 53,000 gpd. The system is currently at about 80% of its design capacity. Plans for additional capacity are not being considered at this time.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: SOUTH SUTTER WATER DISTRICT - CAMP FAR WEST

Address: FIFTEEN MILES SOUTHEAST OF MARYSVILLE ON BEAR RIVER

Contact Name: ROBERT MELTON, GENERAL MANAGER Phone: (916)-656-2242

Service Area Size: 67 SITES No. Connect.: 2 Population Served: VARIABLE

Services Provided: WASTEWATER MANAGEMENT

Summary System Description

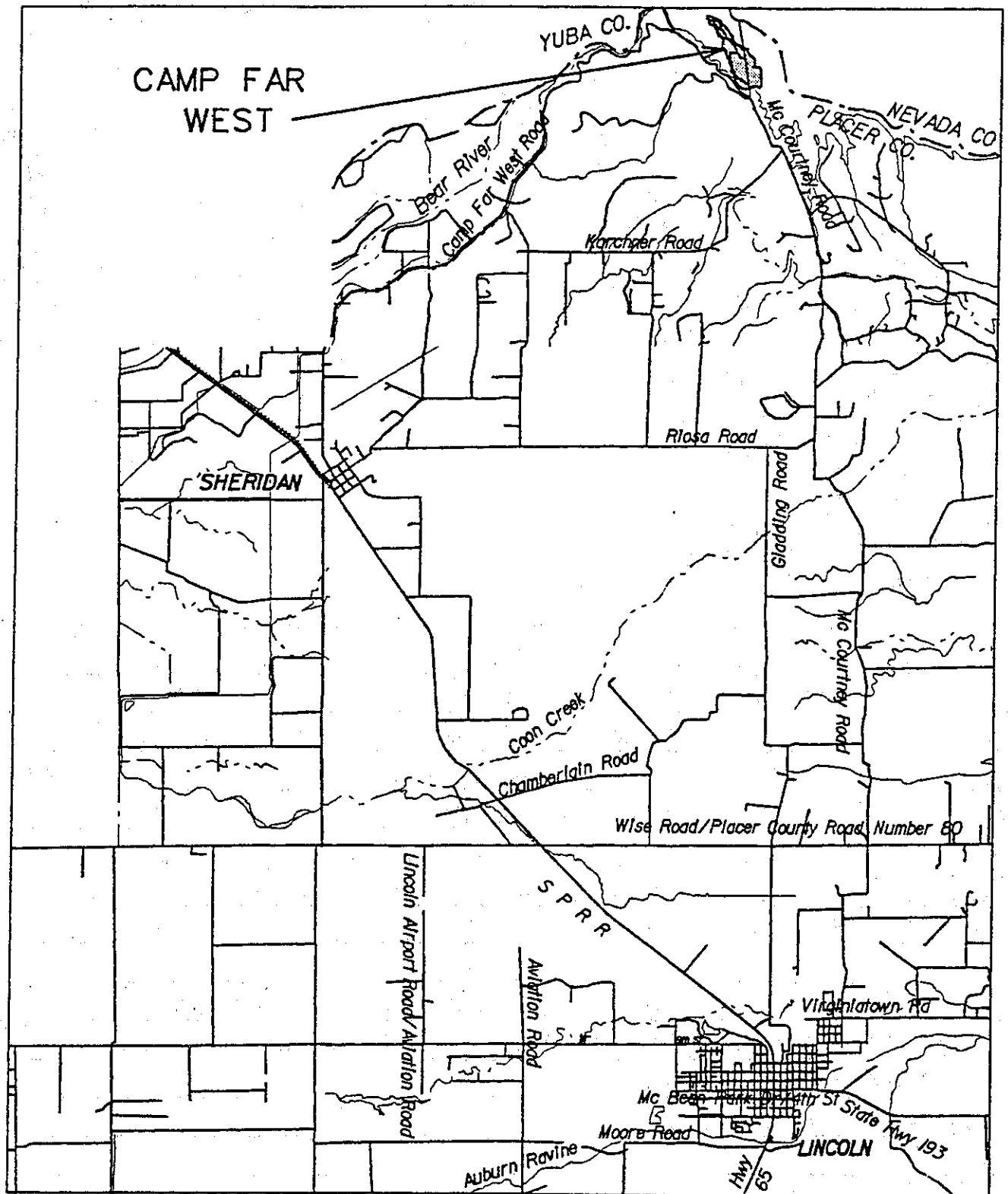
Service Area Characteristics: SOUTH SIDE ACTIVITY AREA ENCOMPASSES 67 CAMPSITES AND DAY USE FACILITIES.

Collection: NO CAMP SITES ARE CONNECTED TO SEWAGE HOOKUPS. HOWEVER THE CAMP SITES AND DAY USE FACILITIES ARE SUPPORTED BY FIXED RESTROOMS AND PORTABLE/CHEMICAL TOILETS.

Treatment: OXIDATION POND.

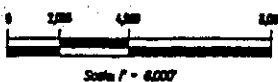
Disposal: EVAPORATION. WASTEWATER FROM PORTABLE/CHEMICAL TOILETS IS HAULED OFFSITE.

Capacity Limitations: DESIGN CAPACITY OF THE FACILITIES IS 53,000 GPD.



Placer County General Plan

Figure — Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

South Sutter Water District-Camp Far West

- Streets
- County Line
- Waterways
- District Service Area

NOTE:

Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

U. S. FOREST SERVICE FRENCH MEADOWS

General Information: Waste discharge requirements were rescinded by the RWQCB for the U.S. Forest Service, French Meadows System on November 22, 1991 by RWQCB Order No. 91-236. this system is now under the regulatory and enforcement requirements of the Placer County Department of Health and Medical Services, Division of Environmental Health.

WEIMAR INSTITUTE

The Weimar Institute is located ten miles northeast of the City of Auburn, west of U.S. Highway 80, between Auburn and Colfax, at 20601 West Paoli Lane (Sec 28, T14N, R9E, MDB&M). Wastewater from the facility is permitted under RWQCB Waste Discharge Requirements Order No. 88-082, Federal USEPA NPDES Permit No. CA0077925, and RWQCB Monitoring and Reporting Program No. 88-025. The WDR's and the Monitoring and Reporting Program were adopted on May 20, 1988.

Surface drainage is to Coyote Creek, thence Wooley Creek and Lake Combie.

Wastewater Generation/Sources: The Weimar Institute operates a wastewater treatment plant to treat domestic wastewater from a school, health center, staff houses, and dormitories. A total population of 550 (1977 estimate) is served by the wastewater system. Average dry weather discharge is 11,000 gpd. Wastewater generated is considered domestic in nature.

Collection System Deficiencies: There are currently no identified deficiencies with the existing collection system.

Proposed Improvements: Currently there are no planned, proposed or required collection system improvements.

Wastewater Treatment System Description: The Weimar Institute Sewage Treatment Facility consists of an Imhoff tank, trickling filter, and three oxidation ponds.

The Weimar Institute undertook a planned rehabilitation of the treatment and disposal system to sufficiently treat discharge of 27,000 gpd. Approval of technical information demonstrating adequate performance of the leachfield is the premise for RWQCB discharge permitting for this expansion.

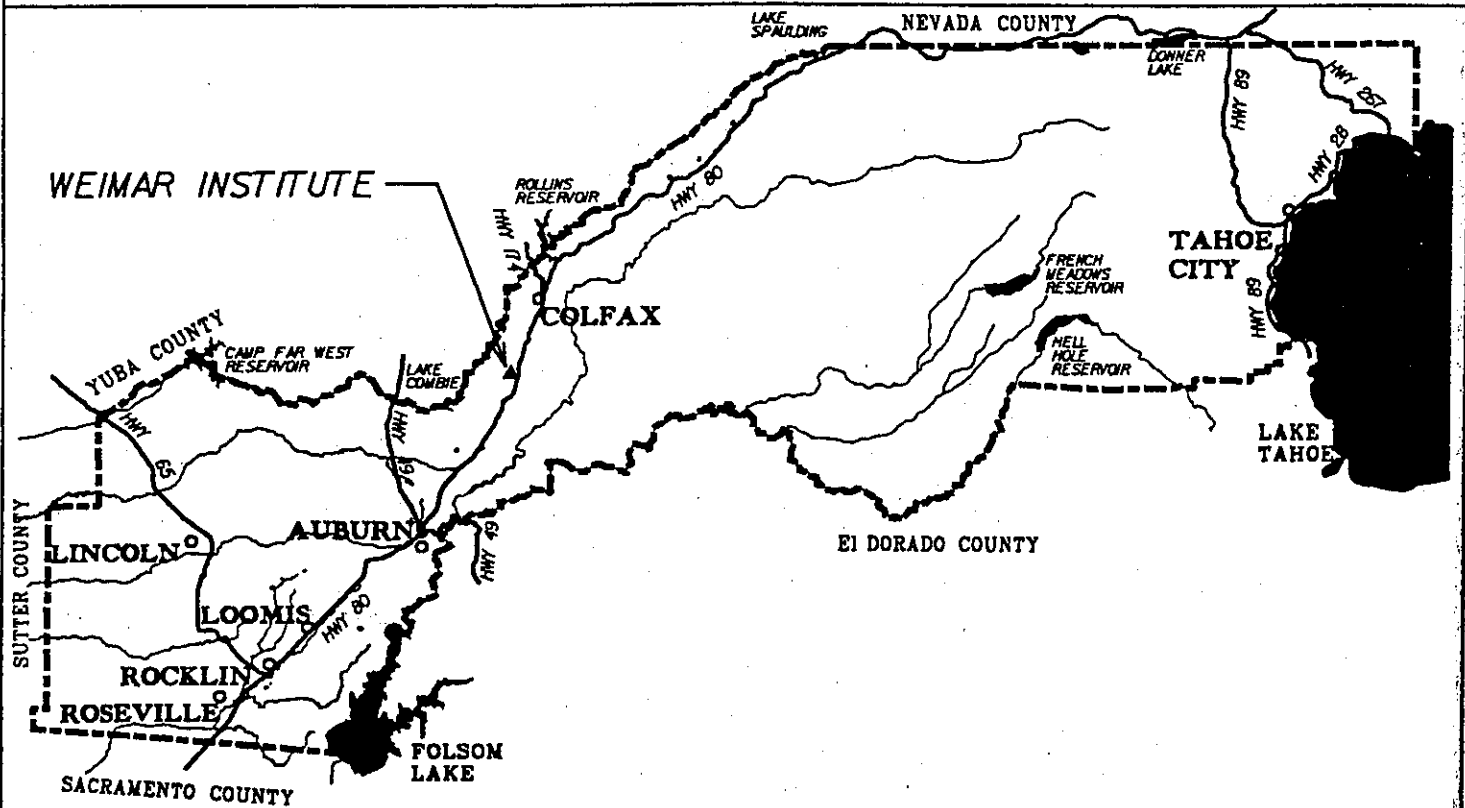
These recent improvements have increased the hydraulic capacity of the treatment facilities. Reconstruction of the oxidation ponds negated spring activity and increased capacity. Also, surface runoff controls were constructed and the levees, subject to seepage, were replaced. These improvements were made in response to Cleanup and Abatement Order of January 18, 1982, Cease and Desist Order No. 76-169, and an Administrative Civil Liability Order.

Disposal System Description: Effluent from the wastewater treatment plant is discharged into a subsurface leachfield.

Deficiencies: Direct discharge of wastes to surface waters or surface water drainage courses is prohibited. An overflow to Coyote Creek of 10,000 gallons which occurred in June 1989, presumably the work of vandals. In 1985, a spill of 69,000 gallons of wastewater warranted the issuance of a fine from the RWQCB. The Monitoring and Reporting Program designates two locations for taking samples from Coyote Creek.

Financing: Improvement, operations and maintenance costs for the sewage collection, treatment and disposal system are funded through Weimar Institute funds.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: WEIMAR INSTITUTE

Address: 20601 WEST PAOLI LANE, WEIMAR, CA 95736

Contact Name: KAREN A.WADE, EXECUTIVE VICE PRES. Phone: (916)-637-4111

Service Area Size: _____ No. Connect.: _____ Population Served: _____

Services Provided: WASTEWATER MANAGEMENT

Summary System Description

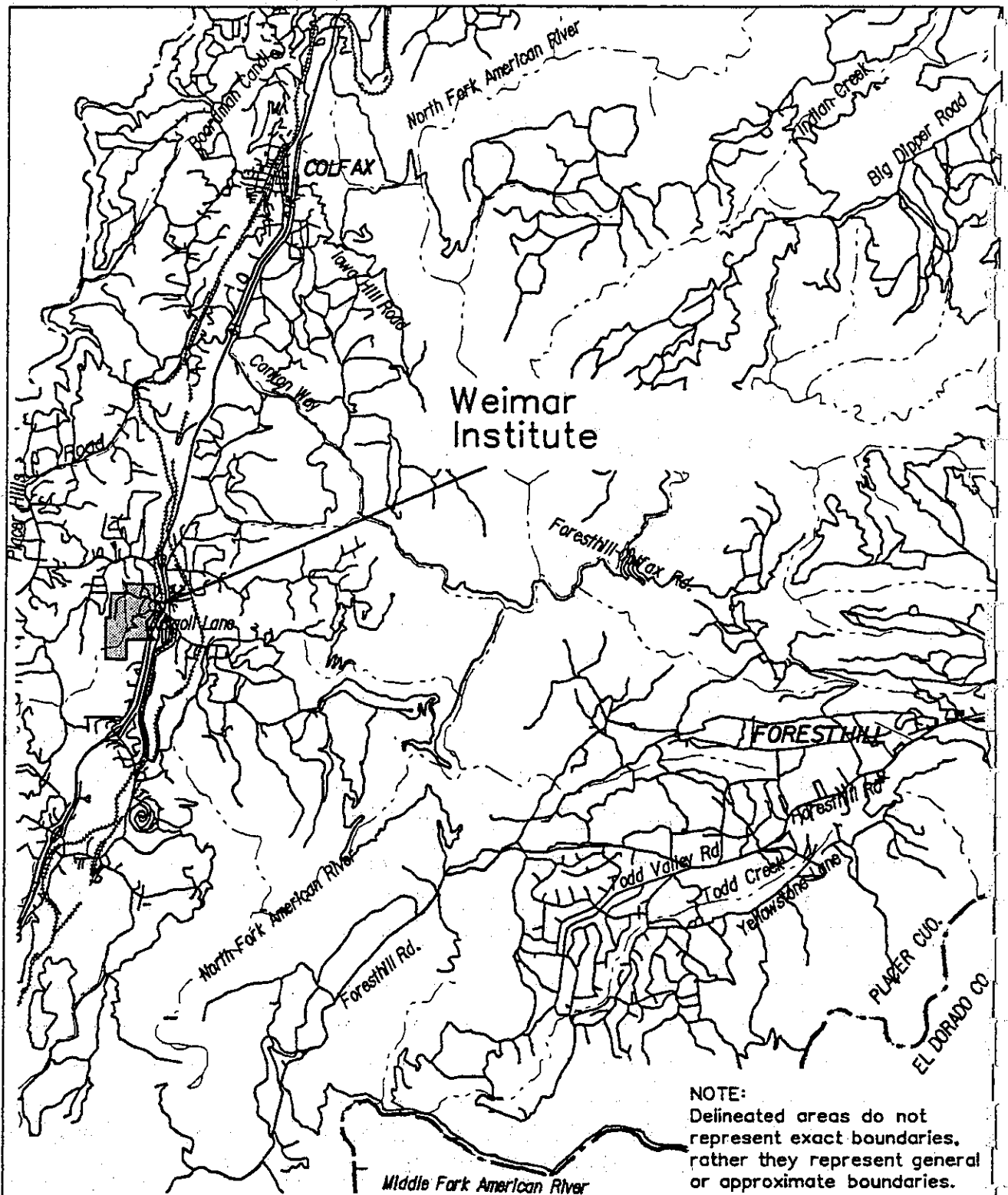
Service Area Characteristics: LOCATED 10 MILES NORTHEAST OF THE CITY OF AUBURN. WEIMAR INSTITUTE CONSISTS OF A SCHOOL, HEALTH CENTER, STAFF HOUSES, AND DORMITORIES.

Collection: _____

Treatment: WASTEWATER TREATMENT CONSISTS OF AN IMHOFF TANK, TRICKLING FILTER, AND THREE OXIDATION PONDS. ADWF OF 11,000 GPD.

Disposal: EFFLUENT DISCHARGED TO A LEACHFIELD.

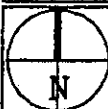
Capacity Limitations: APPROVAL OF TECHNICAL INFORMATION DEMONSTRATING ADEQUATE PERFORMANCE OF THE LEACHFIELD IS THE PREMISE FOR EXPANSION TO 27,000 GPD (ADWF).



NOTE:
Delineated areas do not
represent exact boundaries,
rather they represent general
or approximate boundaries.

Placer County General Plan

Figure — Waste Water Service Area



Date: 1/10/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

- | | | | |
|--|-----------|--|-----------------------|
| | Streets | | County Line |
| | Waterways | | District Service Area |

NOTE:
Delineated areas do not represent exact boundaries, rather they represent
general or approximate boundaries.

Weimar Institute

NORTH TAHOE PUBLIC UTILITY DISTRICT

General Information: The North Tahoe Public Utility District (North Tahoe PUD) operates a wastewater collection and exportation system. The North Tahoe PUD was formed in 1948 to address the problem of septic tank system failures which were threatening the water quality of Lake Tahoe. Originally the Kings Beach, Brockway and Tahoe Vista areas were included in the North Tahoe PUD; however, in 1970 a new joint wastewater treatment plant was constructed in Tahoe City allocating an expansion of the district to include all developed lands in the area.

In 1978 a regionalization of the northern and western portions of the Lake Tahoe area occurred and all wastewater collected was conveyed to a new treatment facility constructed in the Martis Valley (see Tahoe-Truckee Sanitation Agency).

Any discharge of liquid or material resulting from operations by the North Tahoe PUD is regulated by Revised Waste Discharge Requirements Order No. 6-83-51, effective on December 15, 1983. No monitoring and reporting program is currently proposed.

Wastewater Generation/Sources: Wastewater is generated by residents and businesses from the Kings Beach, Brockway, Kingswood, Tahoe Estates, Agate Bay Subdivisions, Camelian Bay, Camelian Woods, Ridgewood, Ceder Flat, Lake Forest, Fulton Acres, Camelian Heights, Chinquapin, Dollar Cove, Dollar Point Unit 8 and Tahoe Vista communities located along the north and northwest shores of Lake Tahoe.

There are 4,656 residential and 194 commercial connections in the system (Total 4,850). The service area is 4,158 acres with an estimated resident population of 8,000 and an estimated seasonal population of over 20,000.

The 1991 dry weather wastewater flow is nearly 0.89 mgd which correlates to about 73 gallons/capita/day. According to the 1991 *North Tahoe Public Utility District Master Sewer Plan*, the anticipated dry weather wastewater flow in the year 2003 is 1.04 mgd.

Before issuing new sewer connection permits, North Tahoe PUD, a member entity of the Tahoe-Truckee Sanitation Agency, must be provided evidence of development approved by the Tahoe Region Planning Agency (TRPA), which will determine if the proposed development is consistent with the Lake Tahoe Basin Water Quality Plan. The TRPA is a compact formed by California and Nevada to perpetuate Lake Tahoe water quality.

Collection System Description: The North Tahoe PUD maintains 94 miles of gravity sewer, 6.25 miles of force mains, and 4 primary and 14 satellite pumping stations. There are 1,598 manholes. Sewer line sizes vary from 4-inch to 36-inch and the materials of construction include clay, asbestos cement, cast iron and PVC pipe materials.

Collection system components were installed during three major timeframes. Shortly after the formation of the district in 1948, about 37,000 feet of sewer lines were heavily constructed in 1952. Then in 1960 another major effort to install about 67,000 feet of lines was undertaken. Finally during the period between 1967 and 1973 approximately 322,000 feet of line was installed. The average age of the collection system is therefore about 31 years old.

Deficiencies: Minimal information is available on the condition of 45% of the sewer system due to construction and easement constraints which limit access.

The western section of downtown Kings Beach, the Cedar Flat tract, Tahoe Marina/Tahoe Estates, the eastern region of Kings Beach and Brockway, and the Kingswood Estates are areas of the North Tahoe PUD collection system that have been documented with excessive infiltration/inflow (I/I) in comparison to current goals and standards.

Funding limitations prevent a desirable frequency of maintenance.

Other currently identified deficiencies with the existing collection system include establishing and maintaining access to easement areas, funding, facility replacements, establishing adequate reserve levels, and cost accounting to ensure optimum efficiency.

Proposed Improvements: North Tahoe PUD has identified twenty sewer line replacement projects. It is recommended in the *North Tahoe Public Utility District Sewer Master Plan*, that required repairs and replacements are made over a seven year period, beginning in 1990. During the final six years of the program an average of 1,700 linear feet of sewer line will be replaced annually.

North Tahoe PUD is in the process of implementing an information management system to optimize maintenance operations.

Additional planned, proposed or required collection system improvements include pump station modifications for emergency power, replacement of underground storage tanks, provide system mapping for field operations. Replacement of the Dollar Hill force main and replacement of pump station variable speed controllers for efficiency.

Wastewater Treatment and Disposal System: Wastewater from North Tahoe PUD is conveyed to the Tahoe-Truckee Sanitation Agency (T-TSA) Regional Wastewater Treatment Plant in Martis Valley. The various pump stations in the North Tahoe PUD system transport the wastewater to the Dollar Main Pump Station from which it is pumped over dollar hill through a 0.6 mile 20-inch lined steel main to a group interceptor that carries the flow through the TCPUD service area to the T-TSA interceptor.

Financing: North Tahoe PUD, in accordance to the financial strategy introduced in the *North Tahoe Public Utility District Sewer Master Plan*, plans to raise the connection fee to \$2,000 and gradually increase monthly sewer rates, from \$13.86 in 1991 to \$22.47 in the year 2000.

A Certificate of Participation issue is needed to fund capital improvements from 1990 to 1993. General obligation bond proceeds are proposed to support subsequent improvements. The *North Tahoe Public Utility District Sewer Master Plan* advocates that \$450,000 is spent each year on collection system repairs and replacement and another \$30,000 to \$60,000 is budgeted for emergency uses.

Operations and maintenance costs for the sewage collection, treatment and disposal system are funded through a combination of service fees and Ad Valorem tax revenue. The system has a vehicle fleet of 46 and personnel consisting of 2 mechanics and 4.3 administrative staff. Administration costs were budgeted for \$475,000 for fiscal year 1991-92 with an annual operations cost budgeted for \$850,000 and annual non-operating cost budgeted at \$168,000 and direct capital outlay of \$138,000.

The current fee schedule for the system is outlined in the following table.

NORTH TAHOE PUD SYSTEM FEE SCHEDULE

Type of Connection	Code	Units	Charge Per Unit	
			Monthly	Annually
Residential	R	Living Unit	14.86	178.32
Residential (non-taxed)	D	Living Unit	17.86	214.32
Motel w/o Kitchen/Guest Facilities	M	Living Unit	3.72	44.64
Motel with Kitchen	N	Living Unit	4.85	58.20
Motel Res/Stock Coop/Studio	A	Living Unit	9.86	118.32
Campsite with Sewer Connection	K	No. of Sites	7.44	89.28
Campsite w/o Sewer Connection	Q	No. of Sites	6.52	78.12
Restaurants and Bars	F	No. Seats Inside	1.14	13.68
		No. Seats Outside**	0.38	4.56
Snack Bars	J	No. Plumbing Fixture Units	1.13	13.68
Laundries	L	No. 10 lb Machines	6.10	73.20
Theaters	T	No. of Seats	0.14	1.68
Service Stations	P	No. Service Bays	19.91	238.92
Barber Shops	H	No. Service Chairs	3.91	46.92
Markets	G	No. Plumbing Fixture Units	2.60	31.20
Churches	C	No. of Seats	0.14	1.68
Beauty Shops	V	No. Service Chairs	6.51	78.12
Marina Boat Pumping Facility	X	Each	13.96	167.52
Other Business	B	No. Plumbing Fixture Units	1.48	17.76
Schools	U	No. of Seats	0.0167	0.20
Other Business (non-taxed)	E	No. Plumbing Fixture Units	AS MAY BE DETERMINED	
Animal Shelter	O		40.81	489.72
Swimming Pools	Y	Per Pool	2.96	35.52
Special Charges				
Inspections Per Visit:			\$ 25.00	
Service Lateral Cleaning and Testing,				
Inspection of New Services and				
Existing Services				
Inspection Fee (more than 2 inspections)			\$ 50.00	
Administrative Fee, Connection Charge Refunds			\$250.00	
Delinquency Charges				
Penalty			10%	
Monthly Charge			1%	
Tapping Charge, Sewer Stub			\$150.00	
Reconnection Charge, Sewer Service			\$100.00	
After Normal Working Hours Service Call			\$ 35.00	
minimum or actual time				
and materials				
Returned Check Charge			\$ 10.00	
Wastewater disposal Fees			\$ 6.00 per 1,000 gallons	

System Appraisal: The North Tahoe PUD operates a wastewater collection and conveyance system. The 1991 North Tahoe Public Utility District Sewer Master Plan identifies operating and facility needs and develops a rational financing program.

Collection system design daily flow is 11 mgd with a current average daily flow of 0.95 mgd and a peak daily flow of 3.8 mgd. Anticipated dry weather flow in the year 2003 is 1.04 mgd with a capability to collect and transport in excess of 6 mgd. Near-term planning includes the connection of additional service areas.

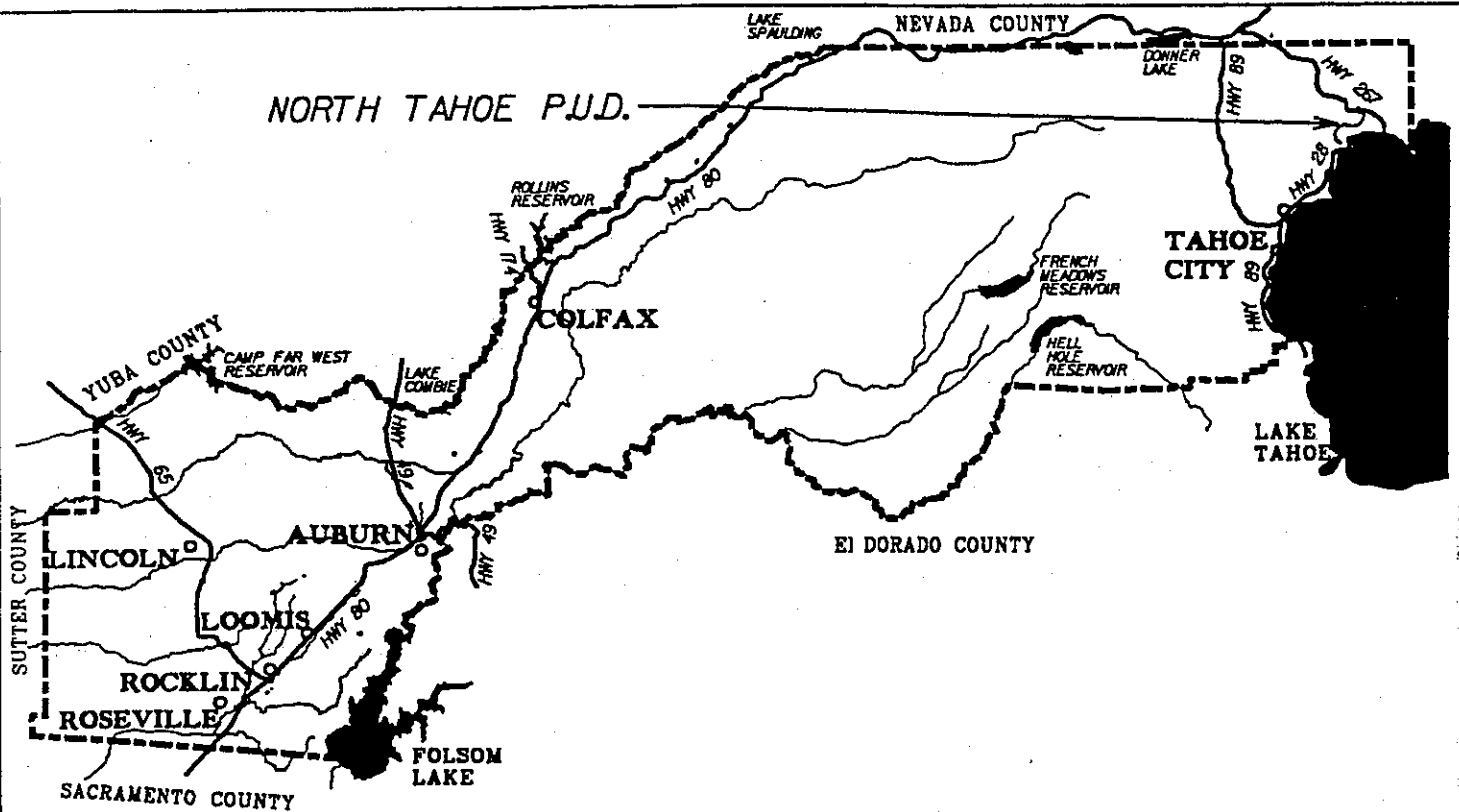
Identified apparent problems include:

- Funding constraints and associated limitations
- An inability to cost account by task
- Moderate to high inflow and infiltration in some areas
- Lack of redundant force main lines
- Inadequate access to lines in easement areas
- Old age of some portions of the collection system
- Lack of back-up power for satellite pump stations
- Enforcement of a grease control ordinance

The system has a good record for sustained operational continuity even through inclement weather conditions. The number of overflows or spills from the system averages less than one per year and there are currently no outstanding regulatory enforcement actions. The system is considered to have a high level of operational readiness and adequate level for emergencies.

In general the North Tahoe PUD wastewater collection and conveyance system is considered in adequate overall condition.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: NORTH TAHOE P.U.D.

Address: 875 NATIONAL AVENUE, TAHOE VISTA, CA 96148

Contact Name: LEON C. SCHEGG, CHIEF ENGINEER Phone: (916) 546-4212

Service Area Size: 4,158 ac. No. Connect.: 4,850 Population Served: 8,000

Services Provided: WASTEWATER COLLECTION AND TRANSPORT

Summary System Description

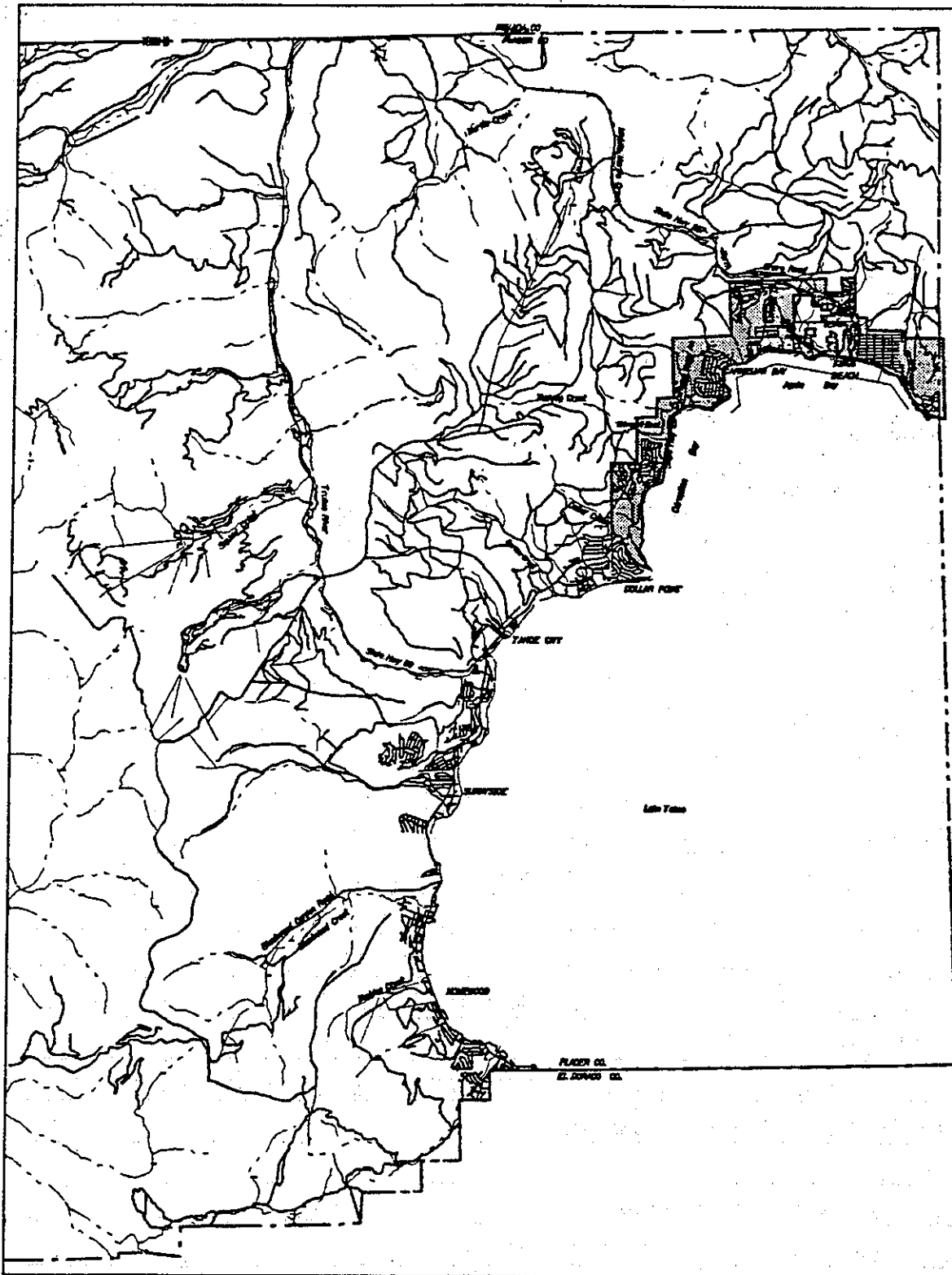
Service Area Characteristics: KINGS BEACH, BROCKWAY, TAHOE VISTA, CARNELIAN BAY, CEDAR FLAT, AND DOLLAR COVE COMMUNITIES LOCATED ALONG THE NORTH SHORE OF LAKE TAHOE.

Collection: 94 MILES OF GRAVITY SEWER, 6.25 MILES OF FORCE MAINS, AND 18 PRIMARY AND SATELLITE PUMPING STATIONS.

Treatment: WASTEWATER TRANSPORTED TO TAHOE-TRUCKEE SANITATION AGENCY MARTIS VALLEY WASTEWATER TREATMENT PLANT.

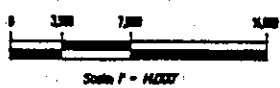
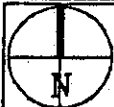
Disposal: TTSA EFFLUENT DISCHARGED BY GROUND INJECTION WITH SEASONAL DISPOSAL TO SPRAY IRRIGATION FIELD.

Capacity Limitations: DEVELOPMENT MUST GAIN CONSENT OF TAHOE REGION PLANNING AGENCY BEFORE DISTRICT ISSUES NEW SEWER CONNECTION PERMITS. CURRENT SYSTEM DESIGN CAPACITY IS 11.0 MGD. THIS CAPACITY IS IN EXCESS OF ALL GROWTH SCENARIOS.



Placer County General Plan

Figure — Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

North Tahoe PUD

- | | |
|-----------|-----------------------|
| Streets | County Line |
| Waterways | District Service Area |

NOTE:

Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

TAHOE CITY PUBLIC UTILITY DISTRICT

General Information: The Tahoe City Public Utilities District provides water, sewer collection, and recreational services to the north and west shores of Lake Tahoe.

Wastewater discharged from Tahoe City PUD is not permitted under RWQCB WDR's since the collection system is connected to the Tahoe-Truckee Sanitation Agency (T-TSA) regional wastewater treatment plant. Maintenance projects are however regulated by Revised Waste Discharge Requirements Order No. 6-83-50, adopted on December 15, 1983. No monitoring of wastewater management processes is currently required.

Wastewater Generation/Sources

Tahoe City PUD extends services to most developments from Emerald Bay to Dollar Point. The collection system can be divided into 25 flowsheds. Most flowsheds are served by one or more lift stations which deliver wastewater to the T-TSA interceptor. There are approximately 6,600 residential connections and 200 commercial connections in the system. The wastestream is considered municipal in nature.

Peak dry weather flow occurs in July and August with a six year average of 1.37 mgd. Winter season wastewater flows are usually less than summertime flows, however, average flows in February through April 1986 exceeded 1.5 mgd under the influence of infiltration/inflow (I/I). Daily flows averaged almost 2.2 mgd in March 1986.

Average daily flow over the six year period beginning in 1985 was 1.08 mgd; however, the six year ADWF was estimated to be 1.26 mgd.

Before issuing new sewer connection permits, Tahoe City PUD, a member entity of the Tahoe-Truckee Sanitation Agency, must gain the consent of the Tahoe Region Planning Agency (TRPA), which will determine if the proposed development is consistent with the Lake Tahoe Basin Water Quality Plan. The TRPA is a compact formed by California and Nevada to perpetuate Lake Tahoe water quality.

Collection System Description: The sewer service area is divided into 25 flow sheds, each facilitated by one or more pump stations which convey wastewater to the Tahoe-Truckee Sanitation Agency (T-TSA) Truckee River Interceptor which flows to the T-TSA Regional Wastewater Treatment Plant. Tahoe City PUD pipelines and pump stations were generally designed to serve a much greater population than currently inhabits, or is likely to inhabit the area in the future.

Tahoe City PUD staff has established and sustained an excellent maintenance program.

A majority of the collection system was installed in 1970 and the average system age is 22 years. Line sizes range from 6 inches to 42 inches and the materials of construction include PVC, ACP, VCP, and RCP. There are 20 lift stations in the system with pumping capacities ranging from 0.002 to 2.4 mgd.

Deficiencies: Collection system capacity limitations have only been recorded under extreme conditions produced by excessive I/I.

In response to increasing wastewater flows, Tahoe-Truckee Sanitation Agency conducted an *Intensive Flow Evaluation* (prepared by CH2M Hill) on the wastewater collection systems of each member agency in

1984. The study disclosed collection systems with groundwater infiltration exceeding 500 gallons/day/inch/mile. The Tahoe City PUD collection system experienced the most extreme groundwater infiltration at 754 gallons/day/inch/mile. A gravity sewer line replacement schedule outlines replacement to the year 2001 which involves approximately 13,000 feet of pipeline at an estimated cost of 1.5 million dollars.

Proposed Improvements: Tahoe City PUD proposes to undertake a flow monitoring program. This program includes upgrading of flow monitoring equipment in the pumping stations and introduction of digital recorders. In addition, fifteen satellite flow monitoring stations, each consisting of a flume, level recording instrument, and a SCADS transmitter, are planned for installation.

The *Public Review Draft of the Tahoe City Public Utility District Sewer Master Plan* identifies \$10,400,000 in replacement costs over the next decade and \$637,000 in new capital additions. All capital improvements, including costs associated with replacement, repair, or upgrade of collection system components and development of a flow monitoring program, are summarized in the Capital Improvement Plan.

Wastewater Treatment and Disposal System: Wastewater from Tahoe City PUD is conveyed to the Tahoe-Truckee Sanitation Agency Regional Wastewater Treatment Plant in Martis Valley.

Financing: The Capital Assets Management Program represents a method for funding the future replacement of Tahoe City PUD's sewer utility capital assets.

The impact of the recommended Capital Improvement Plan and the Capital Assets Management Program on sewer rates was evaluated under a number of funding scenarios in the *Public Review Draft of the Tahoe City Public Utility District Sewer Master Plan*. All of the alternatives are based on the assumption that \$400,000 in property tax revenues will be available annually to fund some capital improvements.

Improvement, operations and maintenance costs for the sewage collection, treatment and disposal system are funded through connection fees and annual service fees. The current fee schedule for the system is outlined in the following table.

TAHOE CITY PUD SYSTEM FEE SCHEDULE

Connection			Charges	Annual Charge
Code	Type of Connection	Unit Description		
A	Residential	Dwelling Unit	\$131.00	\$1,000.00
B	Motel without Kitchen	Each	53.32	395.00
C	Motel with Kitchen	Each	56.88	435.00
D	Campsite with Sewer Connection	Each	66.08	490.00
E	Campsite w/o Sewer Connection	Each	56.88	435.00
F	Restaurants	Per Seat	7.24	50.00
G	Bars	Per Seat	7.24	50.00
H	Snack Bars	Each	197.00	1,475.00
I	Laundries	Per Machine	26.68	200.00
J	Theater	Each	393.92	2,945.00
K	Service Station	Each	197.00	1,475.00
L	Barber Shop/Beauty Salon	Each	131.08	980.00
M	Hotel Room w/o Bath	Each	33.64	250.00
N	Hotel Room with Bath	Each	53.32	395.00
O	Marina Boat Pumping Facility	Each	197.00	1,475.00
P	Commercial or Professional Building Not Otherwise Listed and Churches	Floor space up to 1,000 sq.ft.	131.08	1,000.00
		Plus for each additional 1,000 sq.ft. or fraction	66.08	500.00
		Plus for each 1/2 to 1 sewer unit*	131.08	1,000.00
		Plus for less than 1/2 sewer unit*	66.08	500.00
R	Swimming Pool Wastes	Per year	66.08	440.00
S	Temporary Discharges	\$.59 per 1,000 gallons, plus \$.59 per 1,000 gallons per lift	None	
T	Non-Taxable Properties	Two times applicable rate for proper category	As Determined	131.08
U	Unclassified		As determined	As Determined

Note: Minimum Annual Charge for any use of the sewage works is \$131.08.

Bond Required for Property Owner Doing Own Work	500.00
Reconnection Fee (Section XV F)	95.00

*One sewer unit is equal to 20 plumbing fixture units (see TCPUD Ordinance for plumbing fixture units explanation).

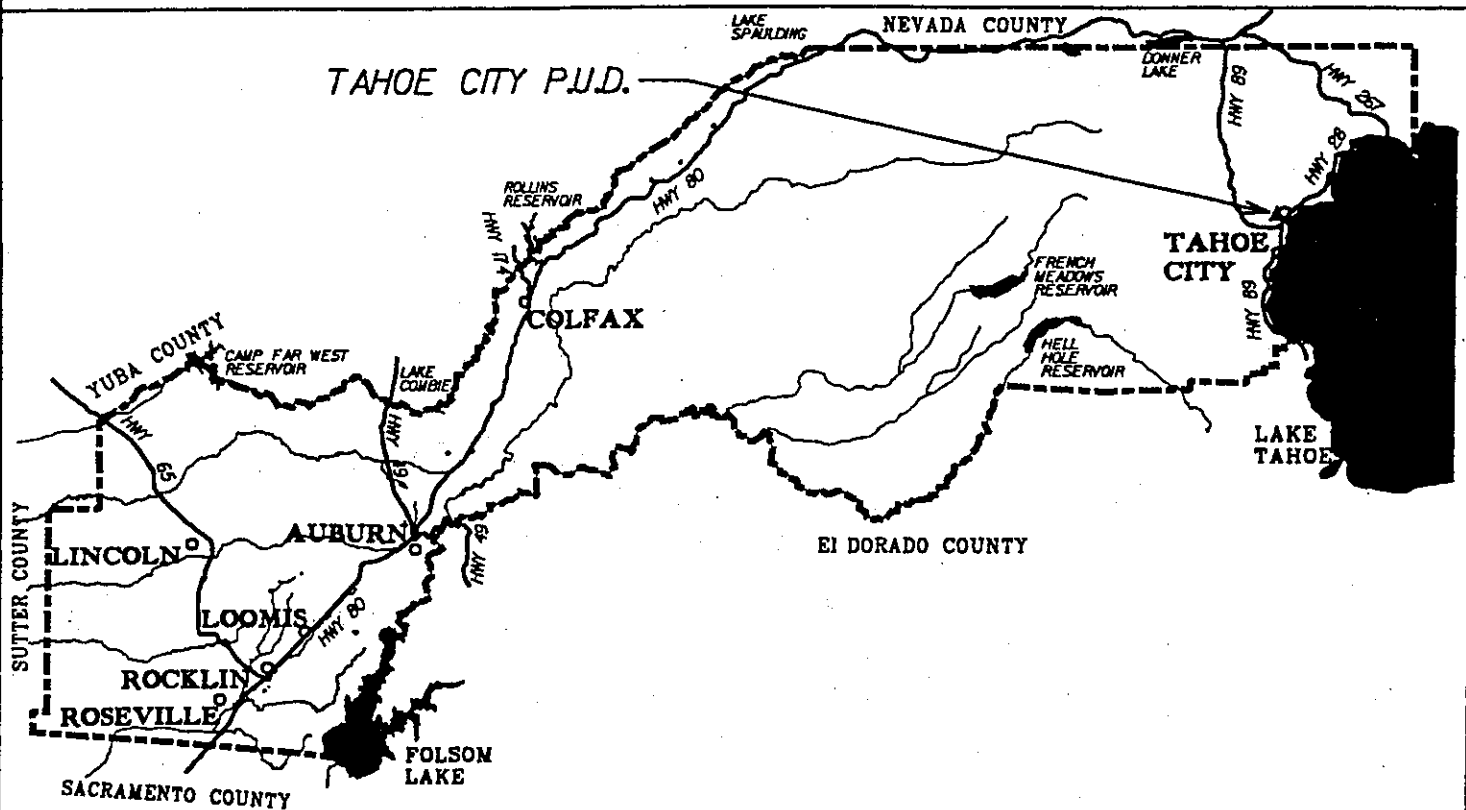
Source: Tahoe City PUD, Ordinance 195, effective January 1, 1991.

System Appraisal: Tahoe City PUD provides a wastewater collection service. Wastewater is transported to the Tahoe-Truckee Sanitation Agency Regional Wastewater Treatment Plant.

The 1991 *Public Review Draft of the Tahoe City Public Utility District Sewer Master Plan* defines the capital improvements necessary to maintain effective wastewater collection and develops financing mechanisms to fund these improvements.

In general the Tahoe City PUD wastewater collection and conveyance system is considered in good overall condition. Collection system design capacity is 3 to 6 mgd with a current flow of nearly 1.08 mgd and a potential maximum expansion to 7.0 mgd. Due to building regulations in the Tahoe Basin, there will be only minimal growth in future years.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: TAHOE CITY PUBLIC UTILITY DISTRICT

Address: P.O. BOX 33, TAHOE CITY, CA 95730

Contact Name: DAVID ANTONUCCI, GEN. MANAGER/CHIEF ENGR. Phone: (916)-583-3796

Service Area Size: _____ No. Connect.: 6,800 Population Served: _____

Services Provided: WATER, WASTEWATER COLLECTION AND RECREATIONAL SERVICES

Summary System Description

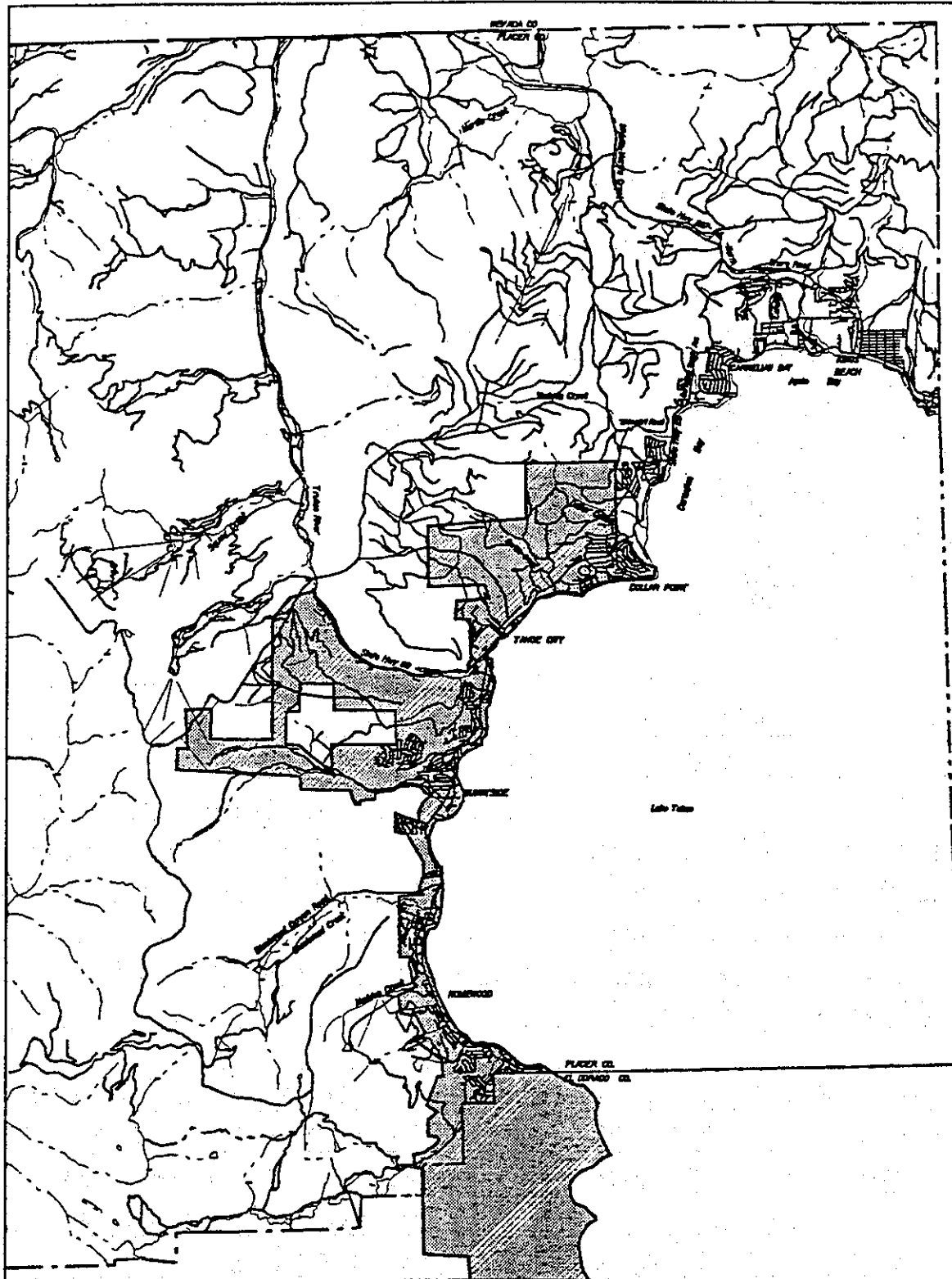
Service Area Characteristics: NORTH AND WEST SHORES OF LAKE TAHOE.
HILLY TERRAIN, WELL FORESTED.

Collection: THE WASTEWATER COLLECTION SYSTEM SERVES MANY DEVELOPMENTS FROM EMERALD BAY TO DOLLAR POINT. WASTEWATER IS CONVEYED TO THE T-TSA TRUCKEE RIVER INTERCEPTOR FOR EXPORT TO THE T-TSA TREATMENT PLANT.

Treatment: PROVIDED BY THE T-TSA REGIONAL WASTEWATER TREATMENT FACILITIES IN THE MARTIS VALLEY. TERTIARY LEVEL TREATMENT IS PROVIDED AT THE T-TSA FACILITY.

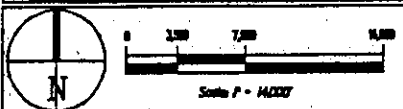
Disposal: EFFLUENT FROM THE T-TSA FACILITIES IS DISCHARGED TO SUBSURFACE TRENCHES AND SEASONALLY DISCHARGED TO SPRAY IRRIGATION FIELDS.

Capacity Limitations: CURRENT FLOWS ARE 1.08 MGD (6-YR. ADWF, 1985-90). DESIGN CAPACITY FOR THE T.C.P.U.D. SYSTEM IS 3 TO 6 MGD WITH A POTENTIAL FOR EXPANSION TO 7.0 MGD. CAPACITY EXCEEDS EXPECTED FUTURE USE.



Placer County General Plan

Figure _____ Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Tahoe City PUD

- | | | | |
|--|-----------|--|-----------------------|
| | Streets | | County Line |
| | Waterways | | District Service Area |

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

SQUAW VALLEY COUNTY WATER DISTRICT

General Information: Squaw Valley County Water District, located in Olympic Valley, provides water supply, sewer collection, and fire protection services. It was organized under the provisions of Division 12 of the Water Code and incorporated in 1964.

Wastewater Generation/Sources: Squaw Valley CWD covers fifteen square miles and provides sewer collection service to approximately 750 permanent residents through 861 sewer connections. There are 821 residential and 40 commercial connections.

The 1991 population within Squaw Valley CWD is estimated to be about 750 on a continual basis. Olympic Valley has a transient seasonal population which culminates at 20,000 to 25,000 during the winter holidays.

In 1990, 68.3 million gallons of wastewater was generated by Squaw Valley CWD, a decrease of 9.1 million gallons from the previous year.

Collection System Description: The Squaw Valley CWD wastewater collection system consists of 84,610 linear feet, or sixteen miles, of sewer main (45,820 linear feet of 6-inch diameter pipe, 15,539 feet of 8-inch pipe, 9,960 feet of 10-inch pipe, 2,853 feet of 12-inch pipe, 128 feet of 14-inch pipe, and 10,310 feet of 15-inch pipe) and 355 standard sanitary manholes. The Resort at Squaw Creek installed an additional 1.7 miles of sewer main in 1990.

Several collection system improvements were made in 1990. Squaw Valley CWD replaced about 320 feet of pipeline on an easement between Tiger Tail and Forest Glen Roads to the tune of \$43,355. Earth stabilization work to protect an interceptor line was accomplished with funds contributed by Tahoe-Truckee Sanitation Agency.

Deficiencies: Currently identified deficiencies with the existing collection system include determining sources of inflow and infiltration.

Proposed Improvements

Squaw Valley CWD proposes to complete a water and sewer master plan, comprehensive as-built maps, and installation of a computerized maintenance program before 1994. Planned, proposed or required collection system improvements include implementation of a District T.U. program to identify inflow and infiltration sources.

Wastewater Treatment and Disposal System: Wastewater from Squaw Valley CWD is conveyed to the Tahoe-Truckee Sanitation Agency (T-TSA) Regional Wastewater Treatment Plant in Martis Valley through the T-TSA gravity interceptor main.

Financing: The minimum connection fee per new single family dwelling unit is \$1,125 and a tapping fee based on the actual district cost. Fixture units added to existing dwellings are \$20/equivalent fixture unit. New connections for commercial customers may include additional charges depending on the size of the project and availability of the system.

Squaw Valley CWD annual service charge for residences is \$103.20. Commercial and industrial wastewater service charges are delineated in Chapter 2, Schedule B of the 1990 *Squaw Valley County*

Water District Code.

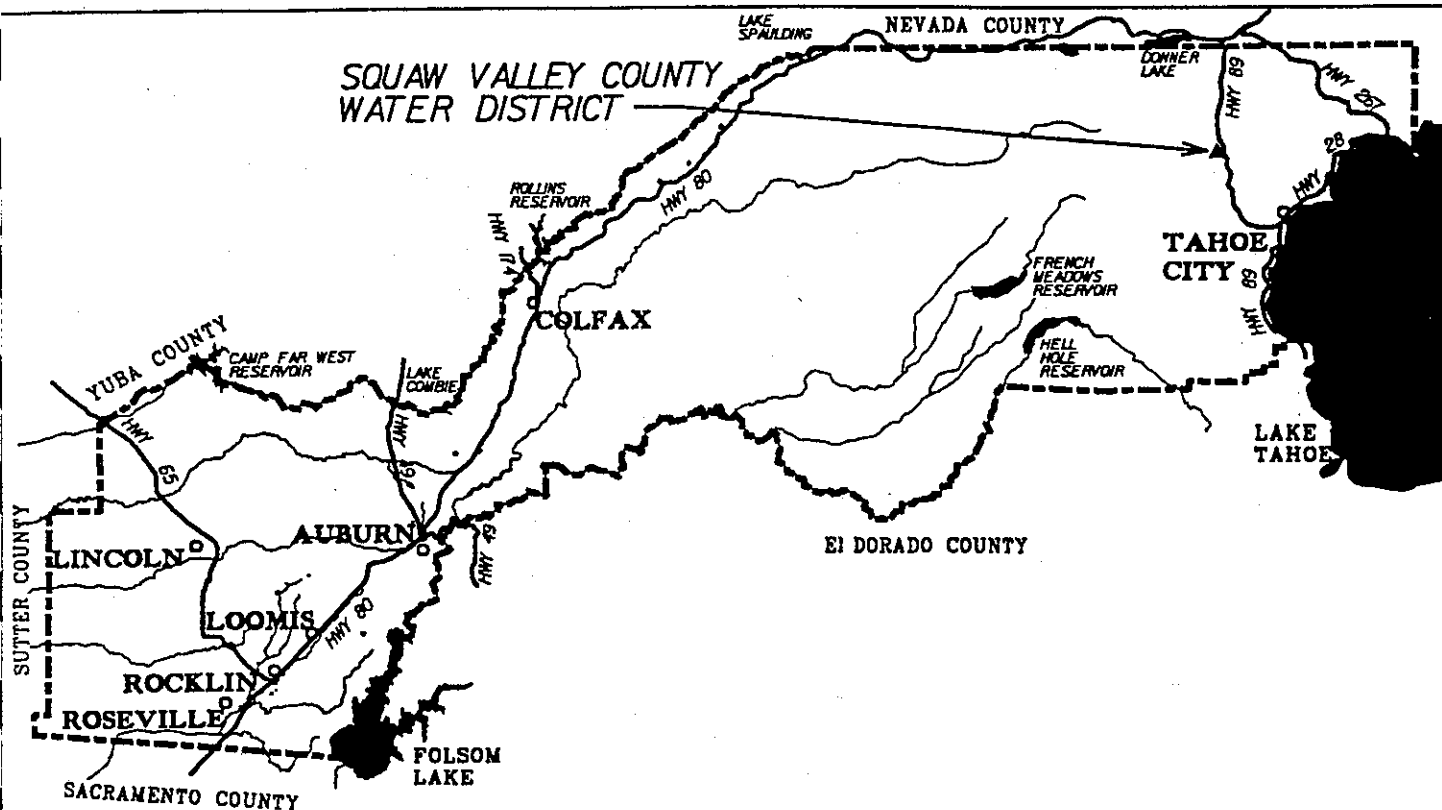
Operations and maintenance costs for the sewage collection system are funded through taxes and annual service fees. Improvements are funded through capital reserve funds obtained from connection fees.

The operations budget for fiscal year 1990-91 was \$66,325 and the administration budget was \$138,156.

System Appraisal: Squaw Valley County Water District provides a wastewater collection service for the Olympic Valley area. Wastewater is transported to the Tahoe-Truckee Sanitation Agency Regional Wastewater Treatment Plant.

In general the Squaw Valley County Water District wastewater collection and conveyance system is considered in good overall condition. Collection system design capacity is 1.0 mgd with a current flow of nearly 0.3 mgd. Anticipated flow in the year 2000 is 0.5 mgd with a potential maximum to expand to 1.0 mgd. Near-term planning does not include the connection of additional service areas.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: SQUAW VALLEY COUNTY WATER DISTRICT

Address: P.O. BOX 2026, OLYMPIC VALLEY, CA 96146

Contact Name: RICHARD L. LIERMAN, GENERAL MANAGER Phone: (916) 583-4692

Service Area Size: 15 sq. mi. No. Connect.: 861 Population Served: 750

Services Provided: WATER SUPPLY, WASTEWATER COLLECTION, FIRE PROTECTION

Summary System Description

Service Area Characteristics: SERVES RESIDENTS IN OLYMPIC VALLEY. TRANSIENT SEASONAL POPULATION CULMINATES AT 20,000 TO 25,000 DURING WINTER HOLIDAYS.

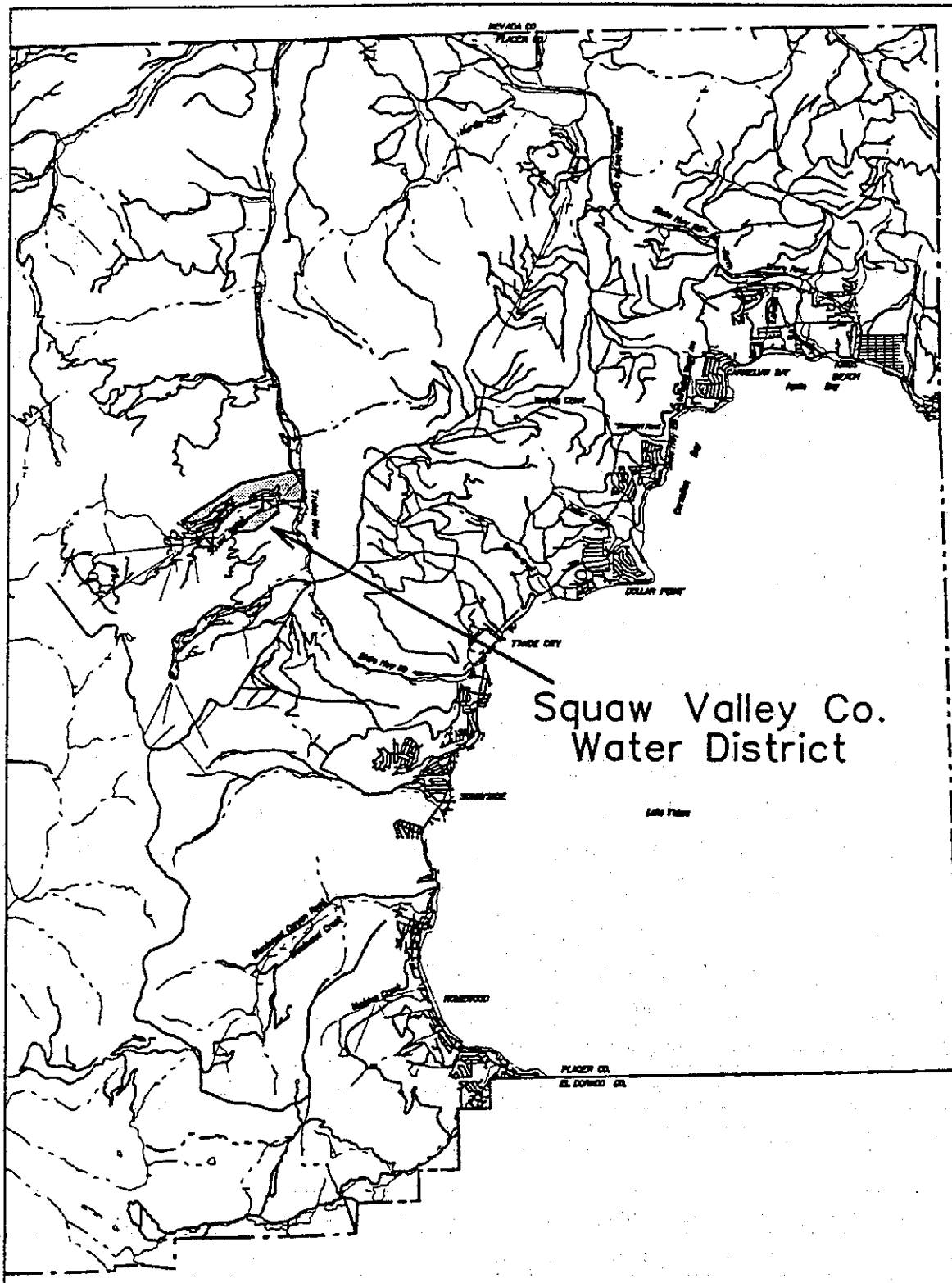
68.3 MILLION GALLONS WASTEWATER GENERATED IN 1990.

Collection: SYSTEM CONSISTS OF 16 MILES OF SEWER MAIN. THE RESORT AT SQUAW CREEK INSTALLED ADDITIONAL 1.7 MILES IN 1990.

Treatment: WASTEWATER TRANSPORTED TO TAHOE-TRUCKEE SANITATION AGENCY MARTIS VALLEY WASTEWATER TREATMENT PLANT.

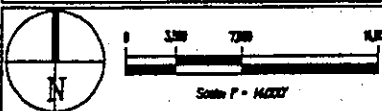
Disposal: T-TSA EFFLUENT DISCHARGED TO SUBSURFACE TRENCHES WITH SEASONAL DISPOSAL TO SPRAY IRRIGATION FIELD.

Capacity Limitations: CURRENT PERMITTED WASTEWATER FLOW IS 0.3 MGD. SYSTEM DESIGN CAPACITY IS 1.0 MGD WITH NO POTENTIAL FOR EXPANSION ABOVE 1 MGD.



Placer County General Plan

Figure — Wastewater Service Area



Date: 1/15/92
Prepared by:
PSOMAS & ASSOCIATES

LEGEND Squaw Valley County Water District

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NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

ALPINE SPRINGS COUNTY WATER DISTRICT

General Information: Alpine Springs County Water District wastewater collection system serves the community of Alpine Meadows in the Powder Bowl and Alpine Meadows Ski Areas of the Tahoe Basin. The Alpine Springs County Water District mailing address is P.O. Drawer E, Tahoe City, CA 95730.

The community wastewater treatment and disposal system was abandoned by Alpine Springs CWD and the collection system was hooked up to the Tahoe-Truckee Sanitation Agency facilities. At that time the RWQCB issued Board Order No. 6-87-46 rescinding the WDR's (No.6-76-7) which prescribed the discharge requirements for the old Alpine Springs CWD wastewater treatment facilities.

Wastewater Generation/Sources: Wastewater discharged to the collection system is generated by 520+ residential and 3 commercial connections. The average dry weather flow for the existing collection system is 0.03 mgd and the design capacity of the system is 0.5 mgd. Severe storms in February 1986 resulted in wastewater flows exceeding 200,000 gpd.

Collection System Description: The Alpine Springs CWD wastewater collection system consists of 61,700 linear feet, or about twelve miles, of sewer main (47,000 linear feet of 6-inch diameter pipe, 5,700 feet of 8-inch pipe, 9,000 feet of 10-inch pipe). Except for the River Run Project which has PVC pipe, most of the sewer is made of asbestos cement pipe.

The 1987 *Report on Sewer & Water Systems* indicates that Alpine Springs CWD does not experience excessive infiltration/inflow (I/I) problems and has relatively few manholes and pipelines requiring repairs. In any case, Alpine Springs CWD has an active and effective maintenance program.

Deficiencies: Currently identified deficiencies with the existing collection system include some main line sections which have reverse fall or sagging areas.

Proposed Improvements: A sewer maintenance program is proposed for 1990 through 1996 for the purposes of determining pipeline condition and setting priorities for repairs and replacement. The projected cost of this maintenance program exceeds \$30,000. Significant capital improvements to the Alpine Springs CWD wastewater collection system are not anticipated in the next five to ten years.

Additional planned, proposed or required collection system improvements include general line and/or manhole replacement line replacements as identified by the sewer maintenance program and television inspection of the main trunk line.

Wastewater Treatment and Disposal System: Wastewater from Alpine Springs CWD is conveyed to the Tahoe-Truckee Sanitation Agency Regional Wastewater Treatment Plant in Martis Valley through the T-TSA interceptor main. Demolition of the abandoned wastewater treatment plant was accomplished in 1991 at a cost of \$30,000.

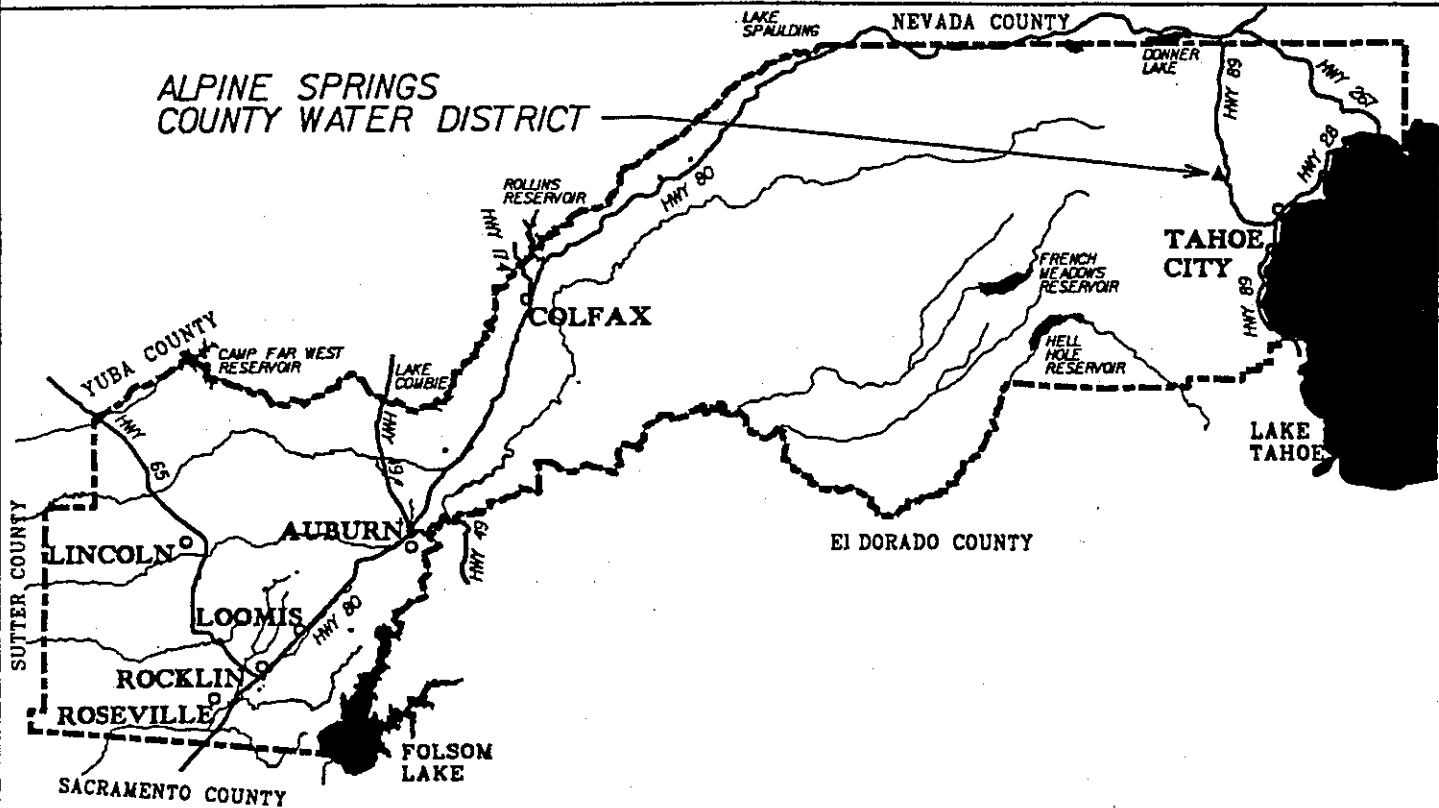
Financing: Primary sources of revenue for improvements, operations and maintenance for the Alpine Springs CWD wastewater collection include property tax, sewer service fees, and interest income. The current fee schedule for the system is outlined in the following table.

ALPINE SPRINGS CWD SYSTEM FEE SCHEDULE

Annual Service Fee	\$ 75.00
Sewer Connection Fee (2 bedroom house)	\$875.00
(includes connection fee of \$525.00 and an inflow and infiltration surcharge of \$350.00)	

System Appraisal: Alpine Springs County Water District provides a wastewater collection service. Wastewater is transported to the Tahoe-Truckee Sanitation Agency Regional Wastewater Treatment Plant. In general the Alpine Springs CWD wastewater collection and conveyance system is considered in adequate overall condition. Collection system design capacity is 0.5 mgd (peak) with a current flow of nearly 0.05 mgd. Anticipated flow in the year 1992 is 0.05 mgd. Near-term planning does include the connection of additional service areas. Proposed areas for additional connection may include the Phase II expansion of the River run Condos (24 units) and the White Wolf Lodge (54 rooms).

PLACER COUNTY WASTEWATER SYSTEMS



System Name: ALPINE SPRINGS COUNTY WATER DISTRICT

Address: P.O. BOX E, TAHOE CITY, CA 96145

Contact Name: THOMAS G. SKJELSTAD, GENERAL MANAGER Phone: (916)-583-2342

Service Area Size: 4.5 sq. mi. No. Connect.: 535 Population Served:

Services Provided: WASTEWATER COLLECTION AND EXPORT

Summary System Description

Service Area Characteristics: SIERRA NEVADA MOUNTAIN LOCATION, WELL FORESTED. THE ALPINE SPRINGS C.W.D. COLLECTION SYSTEM PROVIDES SERVICE TO ALPINE MEADOWS ESTATES,

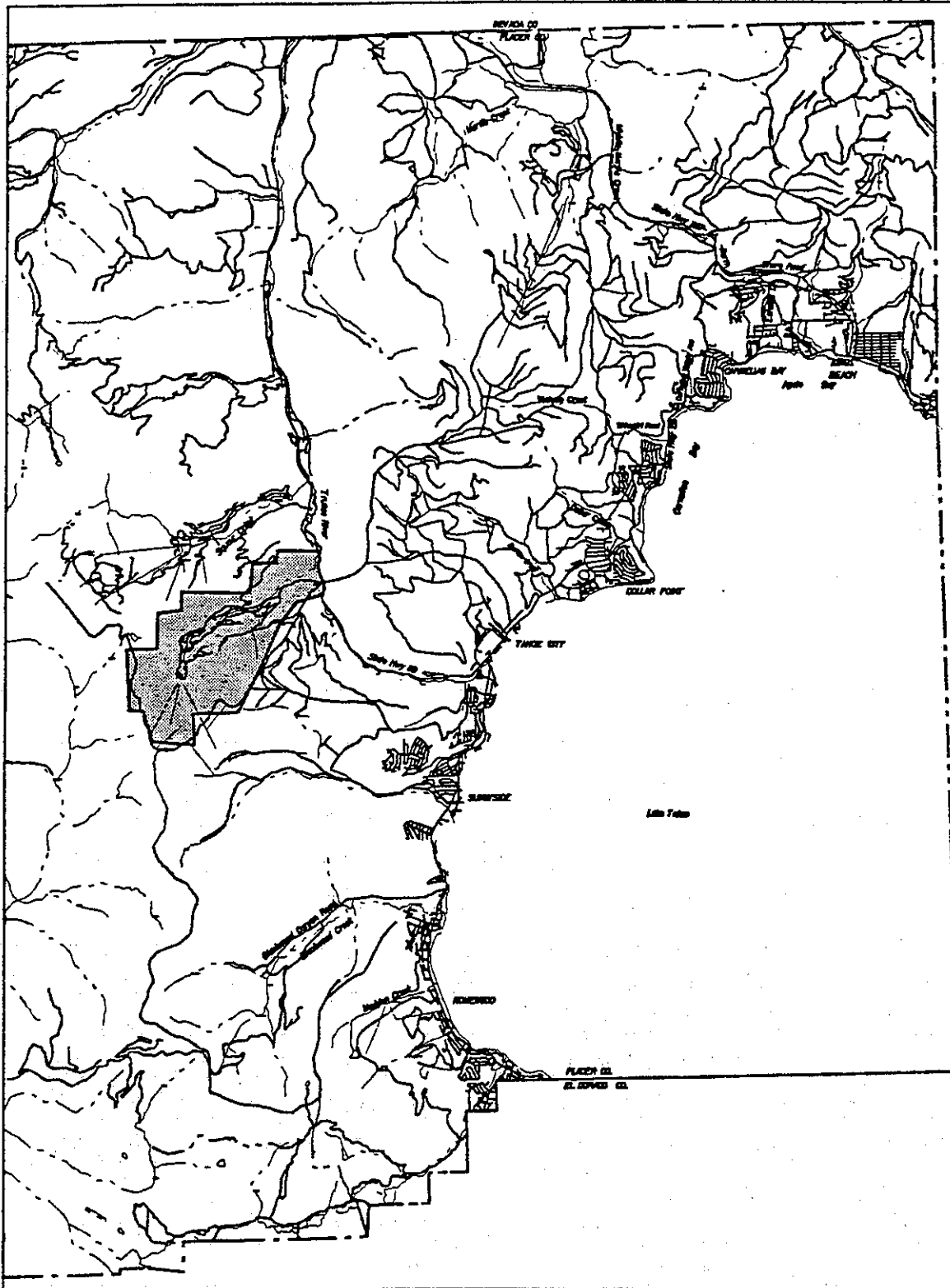
BEAR CREEK ASSOCIATION, ALPINE CENTER, ALPINE MANOR, RIVER RUN, ALPINE PLACE AND ALPINE

Collection: THE EXISTING COLLECTION SYSTEM IS STRICTLY GRAVITY MEADOWS SKI LODGE. FLOW. NO FORCE MAINS OR PUMP STATIONS ARE USED. TOTAL COLLECTION SYSTEM LINE LENGTH IS ABOUT 12 MILES.

Treatment: WASTEWATER IS TRANSPORTED TO THE TAHOE - TRUCKEE SANITATION AGENCY MARTIS VALLEY WASTEWATER TREATMENT PLANT.

Disposal: ALPINE STRINGS W D WASTEWATER IS TREATED AT THE T-TSA FACILITIES AND T-TSA EFFLUENT IS DISCHARGED TO SUBSURFACE TRENCHES WITH SEASONAL DISPOSAL TO A SPRAY IRRIGATION FIELD.

Capacity Limitations: CURRENTLY PERMITTED DISPOSAL TO THE T-TSA SYSTEM IS 0.05 MGD. A.S.C.W.D. COLLECTION SYSTEM DESIGN CAPACITY IS 0.5 MGD.



Placer County General Plan

Figure _____ Wastewater Service Area



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Alpine Springs Co. Water District

Streets

Waterways

County Line

District Service Area

NOTE:

Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

NORTHSTAR COMMUNITY SERVICES DISTRICT

General Information: The Northstar Community Services District was formerly operated by the Placer County Department of Public Works as Placer County Service Area No. 21. Recently the Northstar CSD was formed and formally took command over the wastewater collection system.

Wastewater Generation/Sources: Wastewater is generated by the Northstar subdivision which houses a permanent population of 1,135 and a seasonal population which approaches 9,000. There are 1,136 residential and 17 commercial connections in the system. Wastewater is considered domestic in nature.

Collection System Description: Most of the existing collection system was constructed in 1972 using 6-inch to 8-inch PBVC and ABS sewer lines. The system uses gravity collection with typical manhole and two lift stations.

Deficiencies: Currently there are no identified deficiencies with the existing collection system.

Proposed Improvements: There are currently no planned, proposed or required collection system improvements.

Wastewater Treatment and Disposal System: Wastewater from Northstar CSD is conveyed to the Tahoe-Truckee Sanitation Agency Regional Wastewater Treatment Plant in Martis Valley and to the Tahoe Sanitary District facilities for treatment.

Financing: Improvement, operations and maintenance costs for the sewage collection, treatment and disposal system are funded through user fees and connection fees.

The current fee schedule for the system is outlined in the following table.

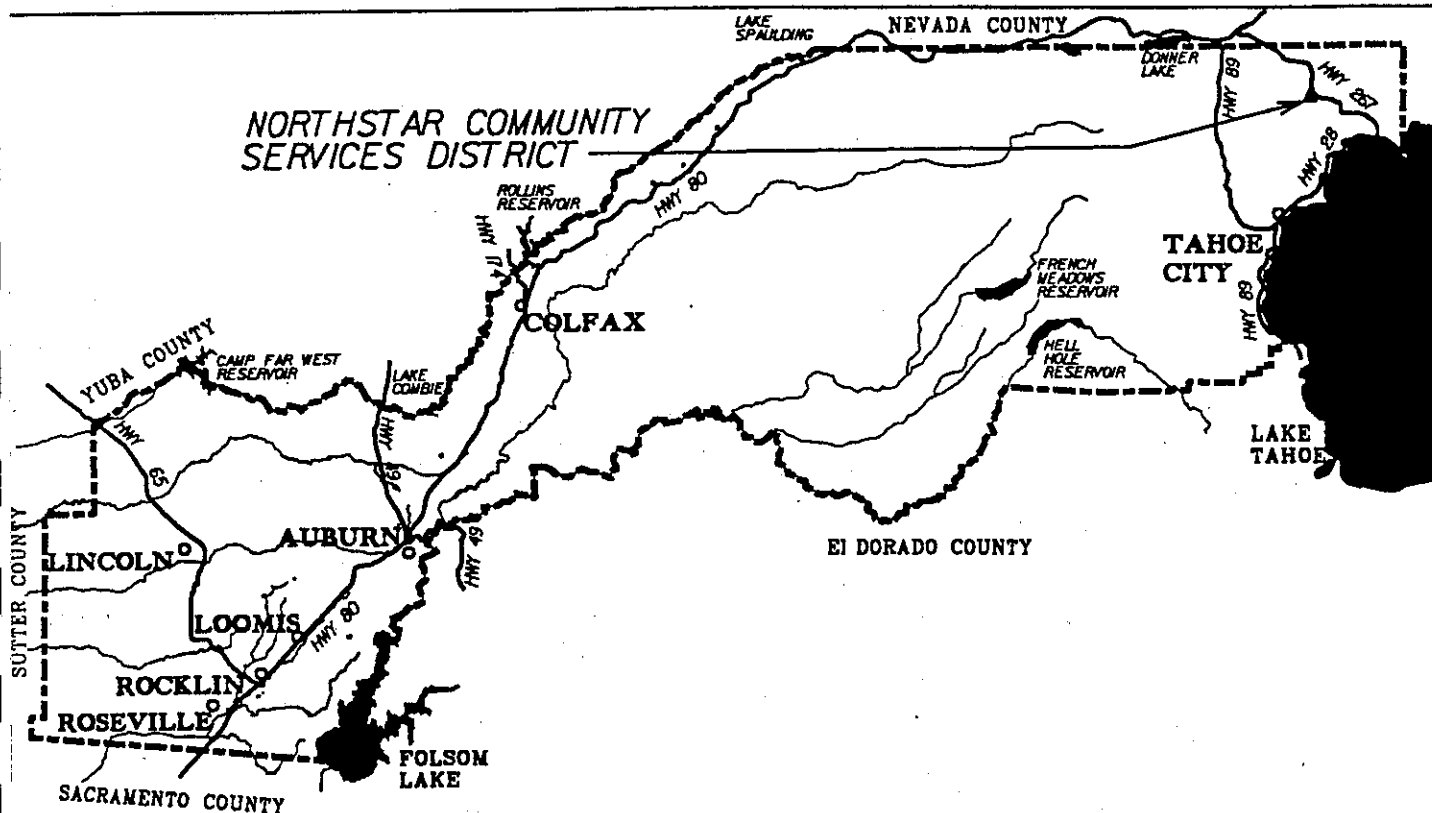
NORTHSTAR CSD SYSTEM FEE SCHEDULE

Connection Type	
User Fees	
	Fee
Residential (condos and houses)	\$328.80/year
Commercial	
Type B (other businesses)	\$3.03/fixture unit
Type F (restaurants)	\$2.20/seat
Type Z (theaters)	\$0.79/seat
Connection Fee	\$250.00 (minimum)

System Appraisal: Northstar CSD provides water supply and wastewater collection services. Wastewater is transported to the Tahoe-Truckee Sanitation Agency Regional Wastewater Treatment Plant.

In general the Northstar CSD wastewater collection and conveyance system is considered in good overall condition. Collection system design capacity is 2.2 mgd.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: NORTHSTAR COMMUNITY SERVICES DISTRICT

Address: 51 TRIMONT LANE, TRUCKEE CA 96161

Contact Name: JAMES H. LOCHRIDGE, UTILITIES MANAGER Phone: (916)-562-0669

Service Area Size: _____ No. Connect.: 1153 Population Served: 3K-9K

Services Provided: WASTEWATER COLLECTION AND EXPORT

Summary System Description

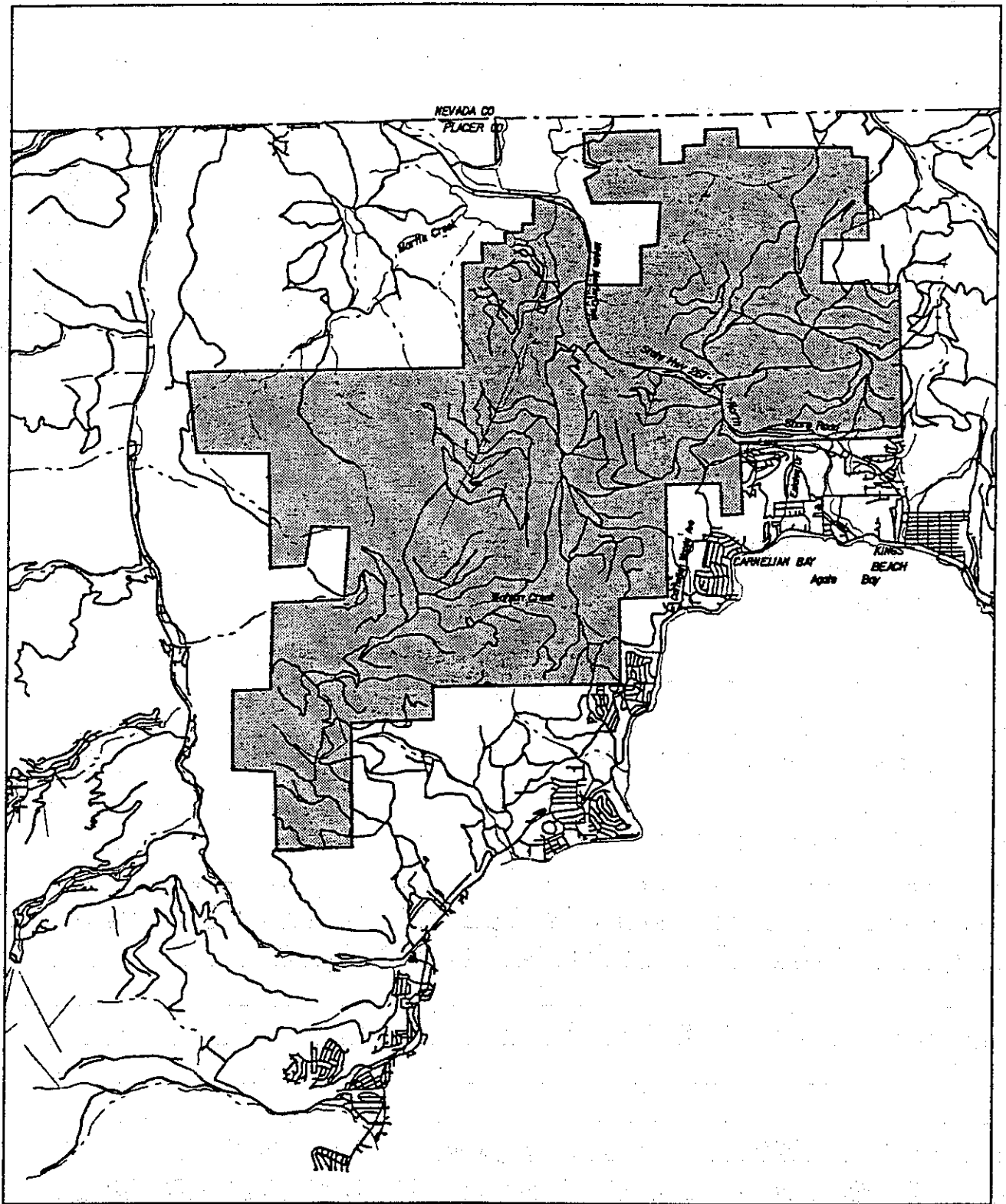
Service Area Characteristics: SIERRA NEVADA MOUNTAIN LOCATION, WELL FORESTED.
WASTEWATER IS COLLECTED FROM THE NORTHSTAR SUBDIVISION.

Collection: THE SYSTEM USES 6 & 8 INCH GRAVITY LINE. THERE ARE 2 LIFT STATIONS.

Treatment: WASTEWATER IS TRANSPORTED MAINLY TO THE TAHOE - TRUCKEE SANITATION AGENCY MARTIS VALLEY WASTEWATER TREATMENT PLANT WITH SOME FLOWS ALSO CONVEYED TO TAHOE SANITARY DISTRICT.

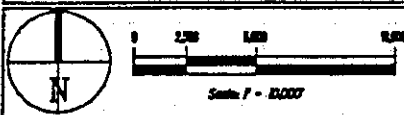
Disposal: T-TSA EFFLUENT IS DISCHARGED TO SUBSURFACE TRENCHES WITH SEASONAL DISPOSAL TO A SPRAY IRRIGATION FIELD.

Capacity Limitations: CURRENT MAXIMUM FLOWS ARE LIMITED BY LINE SIZES AND ARE BETWEEN 1.75 AND 2.2 MGD WITH 335,000 GPD OF THE FLOW GOING TO TAHOE SANITARY DISTRICT AND THE REMAINDER TO T-TSA.



Placer County General Plan

Figure — **Wastewater Service Area**



Date: 1/15/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Placer Co. Service
Dist. No. 21 - Northstar

- | | |
|-----------|-----------------------|
| Streets | County Line |
| Waterways | District Service Area |

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

TRUCKEE SANITARY DISTRICT

General Information: The Truckee Sanitary District (Truckee SD) owns and operates a wastewater collection system responsible for collecting wastewaters from the community of Truckee, Tahoe Donner area, Glenshire/Devonshire Subdivision and the areas surrounding this general region. The Truckee SD was formed in 1906 and began operations in 1908.

Wastewater from the Truckee SD is not regulated by permit from the RWQCB since the system is exporting sewage to the Tahoe-Truckee Sanitation Agency wastewater treatment plant. Maintenance projects for the Truckee Sanitary District are however regulated by Waste Discharge Requirements Order No. 6-85-130 adopted November 14, 1985 and Monitoring and Reporting Program No. 85-130 adopted November 19, 1985.

Wastewater Generation/Sources: Wastewater collected by the Truckee SD system is generated by 6,462 residential and 371 commercial connections. The service area is about 35 square miles and the resident population is 10,000 with a seasonal peak population of approximately 21,000 persons. The wastestream is considered municipal in nature.

Collection System Description: Most of the existing collection system was constructed in 1970 using 6 inch to 21 inch AC, PVC and clay sewer liens. The system uses 1,500,000 feet of gravity lines with a typical manhole spacing of 400 feet and has 31 lift stations.

Deficiencies: Currently there are no identified deficiencies with the existing collection system.

Proposed Improvements: There are no currently planned, proposed or required collection system improvements.

Wastewater Treatment & Disposal System: Wastewater from Truckee SD is conveyed to the Tahoe-Truckee Sanitation Agency Regional Wastewater Treatment Plant in Martis Valley through the T-TSA interceptor main.

Financing: Improvement costs are funded through connection fees whereas operations and maintenance costs are funded through user fees. The annual operations budget for the system is currently \$2,230,000 with an administration budget of \$760,000. There are 25 staff members.

The current fee schedule for the system is outlined in the following table.

TRUCKEE SD SYSTEM FEE SCHEDULE

Connection Type	Connection Code	Units	Monthly User	
			Fee Per Unit	Charge Per Unit
Residential	R	Living Units	\$750.00	\$14.50
Residential (non-taxed)*	D	Living Units	\$750.00	\$19.00
Motel Without Kitchen	M	Living Units	\$202.00	\$3.92
Motel With Kitchen	N	Living Units	\$262.00	\$5.08
Campsite With Sewer	K	# of Sites	\$187.00	\$3.63
Campsite Without Sewer	Q	# of Sites	\$142.00	\$2.76
Other Businesses	B	# of PFU's	\$60.00	\$8.87
Other Businesses (non-taxed)*	E	# of PFU's	\$60.00	\$11.14
Markets	G	# of PFU's	\$60.00	\$0.87
Laundries	L	# of 10# Mach.	\$240.00	\$7.69
Restaurants & Bars	F	# of Seats	\$60.00	\$1.45
Restaurants & Bars (non-taxed)*	J	# of Seats	\$60.00	\$1.90
Outside Restaurant Seats	Z	# of Seats	\$30.00	\$0.72
Theaters	T	# of Seats	\$10.00	\$0.29
Churches	C	# of Seats	\$10.00	\$0.29
Barber Shops	H	# of Chairs	\$210.00	\$4.06
Beauty Shops	A	# of Chairs	\$405.00	\$7.83
Service Stations	P	# of Serv. Bays	\$1,072.50	\$20.74
Car Wash	CW	# of Bays	\$750.00	\$14.50
Car Wash (non-recycle)	NR	# of Bays	\$ 2,250.00	\$43.50
Other	S			

Determined by Gen. Manager

Additional deposits, inspection charges, inspection fees and charges may be assessed (see appendix A-1 of TSD Ordinance).
Minimum Connection fee is \$250.00

Refer to Appendix A-3 of the TSD Ordinance for Fixture Unit Equivalents.

* Refers to customers from whom the TSD receives no property tax monies. (Federal, State, local governments and districts).

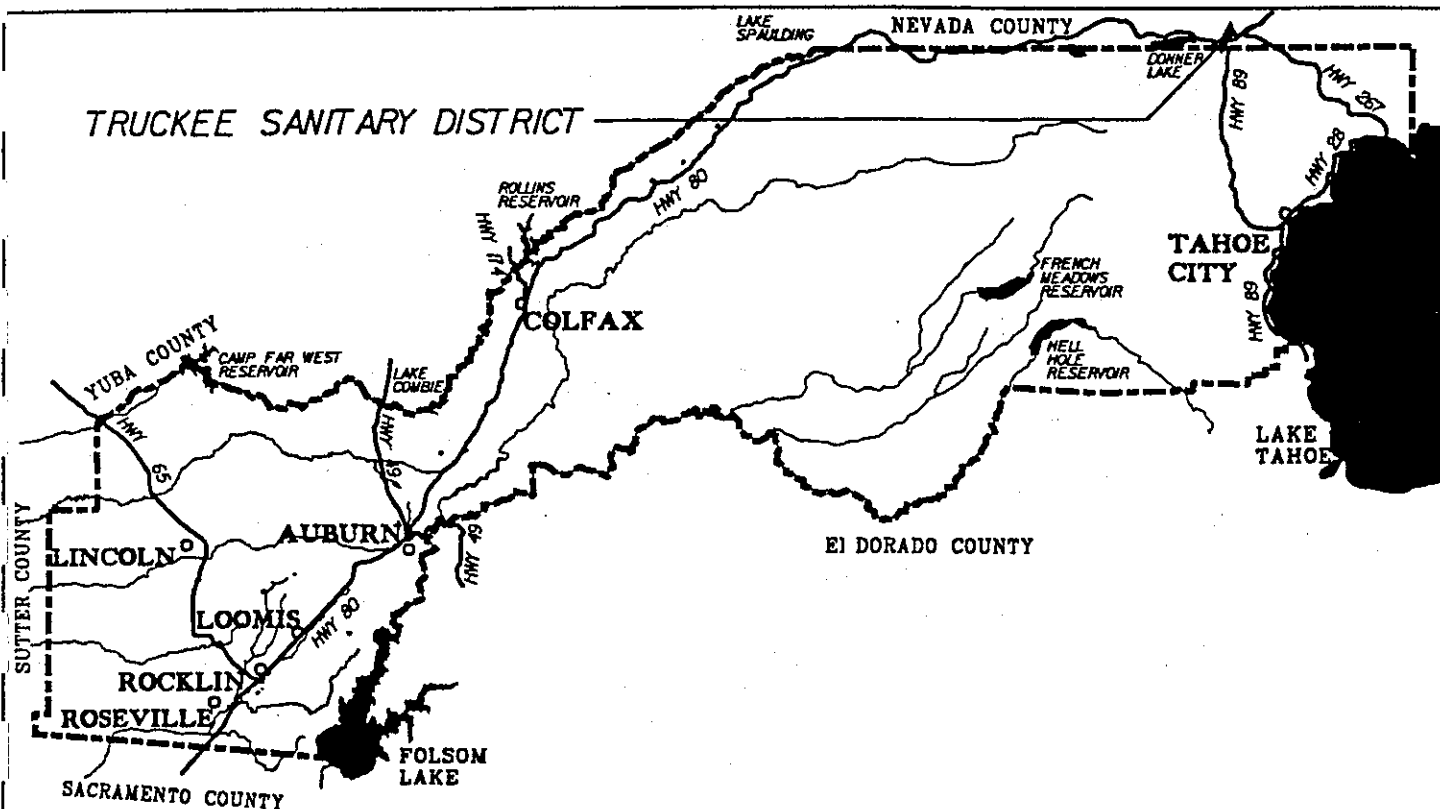
PFU's = Plumbing Fixture Units (see Ordinance for listings).

Source: Truckee Sanitary District Ordinance 2-91, effective July 1, 1991.

System Appraisal: Truckee SD provides a wastewater collection service for the community of Truckee, Tahoe Donner area, Glenshire/Devonshire Subdivision and the areas surrounding this general region. Wastewater is conveyed to the Tahoe-Truckee Sanitation Agency Regional Wastewater Treatment Plant.

In general the Truckee SD wastewater collection and conveyance system is considered in good overall condition. Collection system design capacity is 10.1 mgd with a current flow of nearly 1.5 mgd. Anticipated flow in the year 1992 is 1.5 mgd. Near-term planning does include the connection of additional service areas.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: TRUCKEE SANITARY DISTRICT

Address: P.O. BOX 2628, TRUCKEE, CA 96160

Contact Name: OSSIAN BUTTERFIELD Phone: (916)-587-3804

Service Area Size: 35 sq.mi. No. Connect.: 6833 Population Served: 10,000

Services Provided: WASTEWATER COLLECTION AND EXPORT

Summary System Description

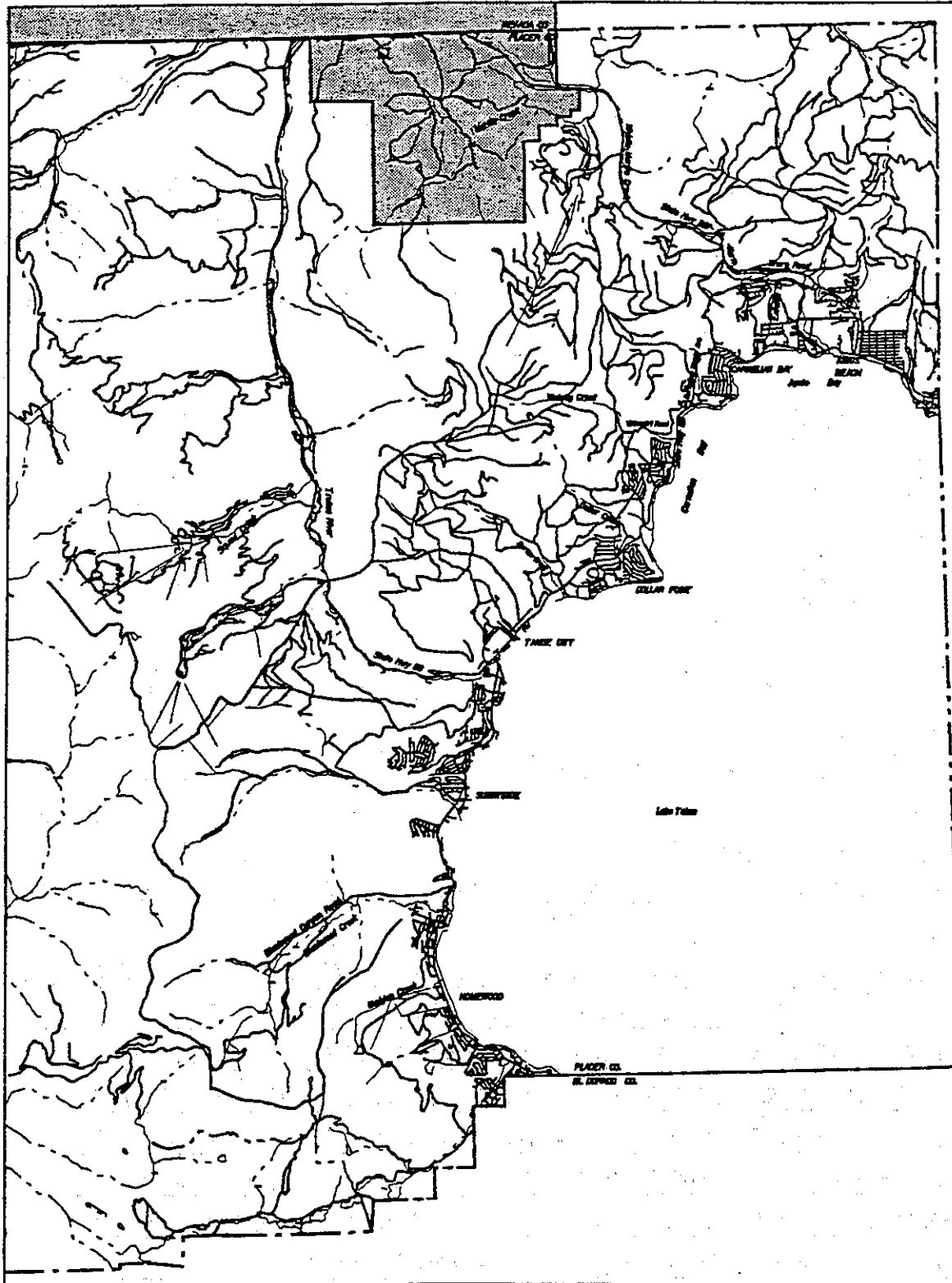
Service Area Characteristics: SIERRA NEVADA MOUNTAIN RANGE, WELL FORESTED. WASTEWATER COLLECTED FROM THE COMMUNITY OF TRUCKEE, TAHOE DONNER AREA, GLENSHIRE/DEVONSHIRE SUBDIVISION AND OTHER SURROUNDING AREAS.

Collection: THE COLLECTION SYSTEM CONSISTS OF 275 MILES OF GRAVITY LINE AND 8.2 MILES OF PRESSURE LINE, 2284 MANHOLES AND 31 LIFTSTATIONS. THE COLLECTION SYSTEM DESIGN CAPACITY IS 101 MGD. (ACTUAL MAX FLOW CAPACITY)

Treatment: WASTEWATER IS TRANSPORTED TO THE TAHOE - TRUCKEE SANITATION AGENCY (T-TSA) MARTIS VALLEY WASTEWATER TREATMENT PLANT.

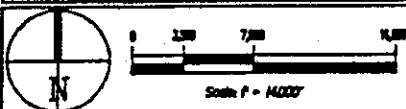
Disposal: DISPOSAL OF THE TRUCKEE SANITARY DISTRICT WASTEWATER FOLLOWS TREATMENT AT T-TSA. T-TSA EFFLUENT IS DISCHARGED TO SUBSURFACE TRENCHES WITH SEASONAL DISPOSAL TO A SPRAY IRRIGATION FIELD.

Capacity Limitations: CURRENTLY THERE IS NO LIMIT ON PERMITTED DISCHARGE. DESIGN CAPACITY IS 101 MGD.



Placer County General Plan

Figure — Wastewater Service Area



Date: 1/15/92
Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Truckee Sanitary District

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NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

TAHOE-TRUCKEE SANITATION AGENCY

General Information: The Tahoe-Truckee Sanitation Agency (T-TSA) is located at 13720 Joerger Drive, and the mailing address is P.O. Drawer B, Truckee, CA 96160.

Wastewater from T-TSA Martis Valley Wastewater Treatment Plant is regulated by Updated RWQCB Waste Discharge Requirements Order No. 6-90-27 and Monitoring and Reporting Program No. 90-27, effective April 11, 1990.

Wastewater Generation/Sources: The Tahoe-Truckee Sanitation Agency (TTSA) is designated as the regional entity to provide management of wastewater from North Tahoe PUD, Tahoe City PUD, Alpine Springs County Water District, Squaw Valley County Water District, Truckee Sanitary District, and Northstar Community Services District. The wastestream is considered municipal in nature.

In August 1978 average flows to the T-TSA wastewater treatment plant were nearly 3.8 mgd. During February 1986 total wastewater flow reached an estimated 18.5 mgd. TTSA currently handles an average wastewater flow of 3.64 mgd.

Before serving new sewer connection permits in the Tahoe Basin, the property must comply with the regulations of the TRPA, which will determine if the proposed development is consistent with the Lake Tahoe Basin Water Quality Plan. The TRPA is a compact formed by California and Nevada to perpetuate Lake Tahoe water quality.

Collection System Description: The Truckee River Interceptor conveys wastewater from Lake Tahoe Basin Public Utility District to Truckee. The interceptor conveyance system is constructed of CRP and DIP with line sizes varying from 20 inch to 36 inch diameter and a total length of 17 miles.

Deficiencies: TTSA does not have the authority to implore rules or regulations on member entities.

Proposed Improvements: Planned, proposed or required collection system improvements include continued inflow and infiltration monitoring of the existing collection system.

Wastewater Treatment System Description: The T-TSA Regional Wastewater Treatment Plant, located in the Martis Valley near Truckee, Nevada County, provides tertiary level treatment. Treatment processes include comminution, grit removal, primary sedimentation, pure oxygen activated sludge, chemical addition, mixed-media filtration, phosphorus and ammonia removal, and final chlorination. Organic sludge is anaerobically digested and dewatered. The T-TSA Regional Wastewater Treatment Plant was constructed in 1976-77 and began operation in 1978.

The seven day average capacity of the T-TSA treatment facility and its associated collection and disposal systems is 7.4 mgd during the summer period. The instantaneous wastewater flow is not permitted to exceed 13.0 mgd.

TTSA is equipped with 39 million gallons of emergency storage capability, including a 15 million gallon retention basin. A small portion of the 15 MG basin is used to equalize flows.

Deficiencies: Currently there are no identified deficiencies with the existing treatment plant.

Proposed Improvements: TTSA has a sewage overflow preventive maintenance and spill response

program pursuant to RWQCB Waste Discharge Requirements.

Additional planned improvement to the treatment system include increasing wastewater treatment capacity and associated upgrades as outlined in the January 1981 Final EIR and subsequent documents.

Disposal System Description: TTSA effluent is discharged to subsurface leach fields with seasonal disposal to a 10.5 acre spray irrigation field (pilot project status only). Treated and dewatered sludge is transported to the Eastern Regional Sanitary Landfill in Placer County.

Deficiencies: The TTSA disposal site is located within the Truckee River Hydrological Unit. Several investigations, including a study completed in October 1991 by the TTSA, indicate that TTSA effluent discharged to the subsurface disposal system flows toward the Truckee River and Martis Creek, a tributary of the Truckee River.

The TTSA effluent contains elevated phosphorous concentrations. The TTSA report revealed that 42,000 kilograms of phosphorous was applied to the effluent disposal field since 1978 and between 80 to 90 percent of the phosphorous was estimated to reside in the soil through 1990. Nevertheless, it was found that projected phosphorous concentrations will not exceed the 0.3 mg/l groundwater regulatory limit for 37 years while maintaining the current degree of treatment.

Proposed Improvements: Effluent disposal by spray irrigation is considered an experimental project at this time. Evaluation of the results after November 1991 will determine if this method of disposal is discontinued or expanded in the future.

Financing: Tahoe-Truckee Sanitation Agency semi-annual service charges are \$54 per residential living unit. The connection fee is \$2,750 for new residences. These fees vary according to the level of service, typically measured by the number of plumbing fixture units (PFU's). Regulations pertaining to the use, rates and charges for the T-TSA system are outlined in the 1990 T-TSA Ordinance and its addenda. The following table provides an outline of the current connection and use fee schedule.

TAHOE-TRUCKEE S.A. FEE SCHEDULE

Connection Type	Connection Code	Units	Fee Per Unit	Semi-annual User Charge Per Unit
Residential	R	Living Units	\$2,750	\$54.00
Residential (non-taxed)	D	Living Units	\$2,750	\$55.80
Guest House	M	Living Units	\$825	\$14.70
Motel Without Kitchen	M	Living Units	\$825	\$14.70
Motel With Kitchen	M	Living Units	\$1,965	\$18.96
Campsite With Sewer	K	# of Sites	\$1,375	\$28.92
Campsite Without Sewer	Q	# of Sites	\$1,022	\$24.42
Restaurants & Bars	F	# of Seats	\$275	\$5.22
Outside Restaurant Seats	Z	# of Seats	\$100	\$1.86
Ski Clubs	B	# of PFU's	\$275	\$6.90
Snack Bars	B	# of PFU's	\$275	\$6.90
Laundries	L	# of 10# Machines	\$1,375	\$28.74
		20# to 50# Machines	\$2,750	\$57.42
Theaters	T	# of Seats	\$28	\$0.36
Service Stations	P	# of Service Bays	\$2,800	\$76.02
Barber Shops	H	# of Service Chairs	\$825	\$14.70
Markets	G	# of PFU's	\$415	\$10.62
Churches	C	# of Seats	\$28	\$0.36
Beauty Shops	A	# of Service Chairs	\$1,375	\$24.42
Other Businesses	B	# of PFU's	\$275	\$6.90
Other Business (non-taxed)	E	# of PFU's	\$275	\$7.14
Septage	I	As May Be Determined		\$1.02
Other	S	As May Be Determined		\$1.02

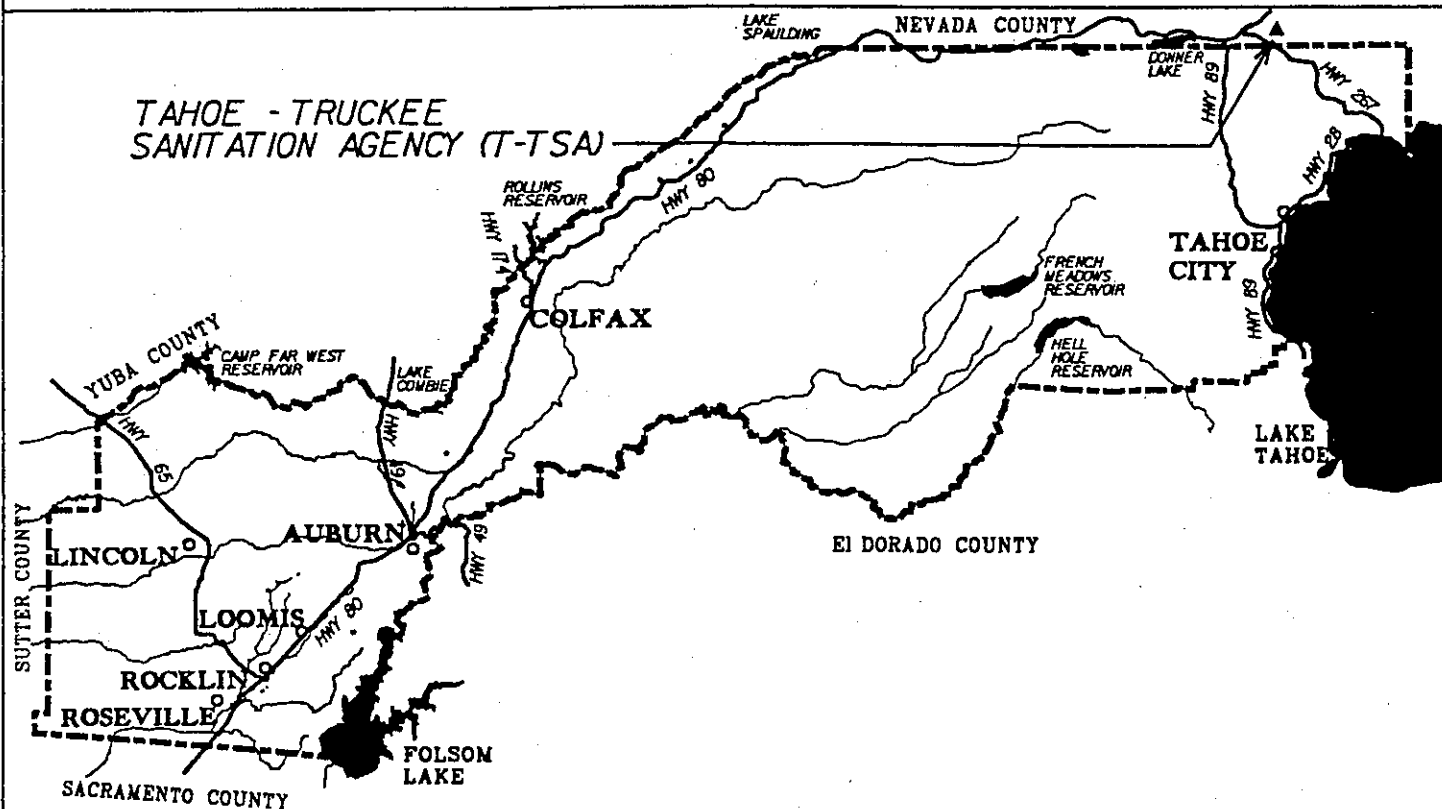
Source: T-TSA Ordinance 2-91

Notes: PFU's = Plumbing Fixture Units (See Ordinance for listings)

System Appraisal: The Tahoe-Truckee Sanitation Agency is designated as a regional entity to provide wastewater management. TTSA operates a tertiary level wastewater treatment facility discharging to subsurface leach fields and a spray irrigation field, both of which are in hydrologic continuity with the Truckee River and Martis Creek.

In general the T-TSA Martis Valley Wastewater Treatment Plant facilities is considered in excellent overall condition. Treatment/Disposal system design capacity is 7.4 mgd with a current flow of 3.5 mgd. Anticipated flow in the year 2008 is 7.4 mgd with a potential maximum to expand to 10.0 mgd. Near-term planning does not include the connection of additional service areas.

PLACER COUNTY WASTEWATER SYSTEMS



System Name: TAHOE - TRUCKEE SANITATION AGENCY (T-TSA)

Address: 13720 JOERGER DRNE, TRUCKEE, CA 96160

Contact Name: CRAIG WOODS, GENERAL MANAGER Phone: (916)-587-2525

Service Area Size: _____ No. Connect.: 17,400 Population Served: _____

Services Provided: DESIGNATED AS REGIONAL ENTITY TO PROVIDE WASTEWATER MANAGEMENT.

Summary System Description

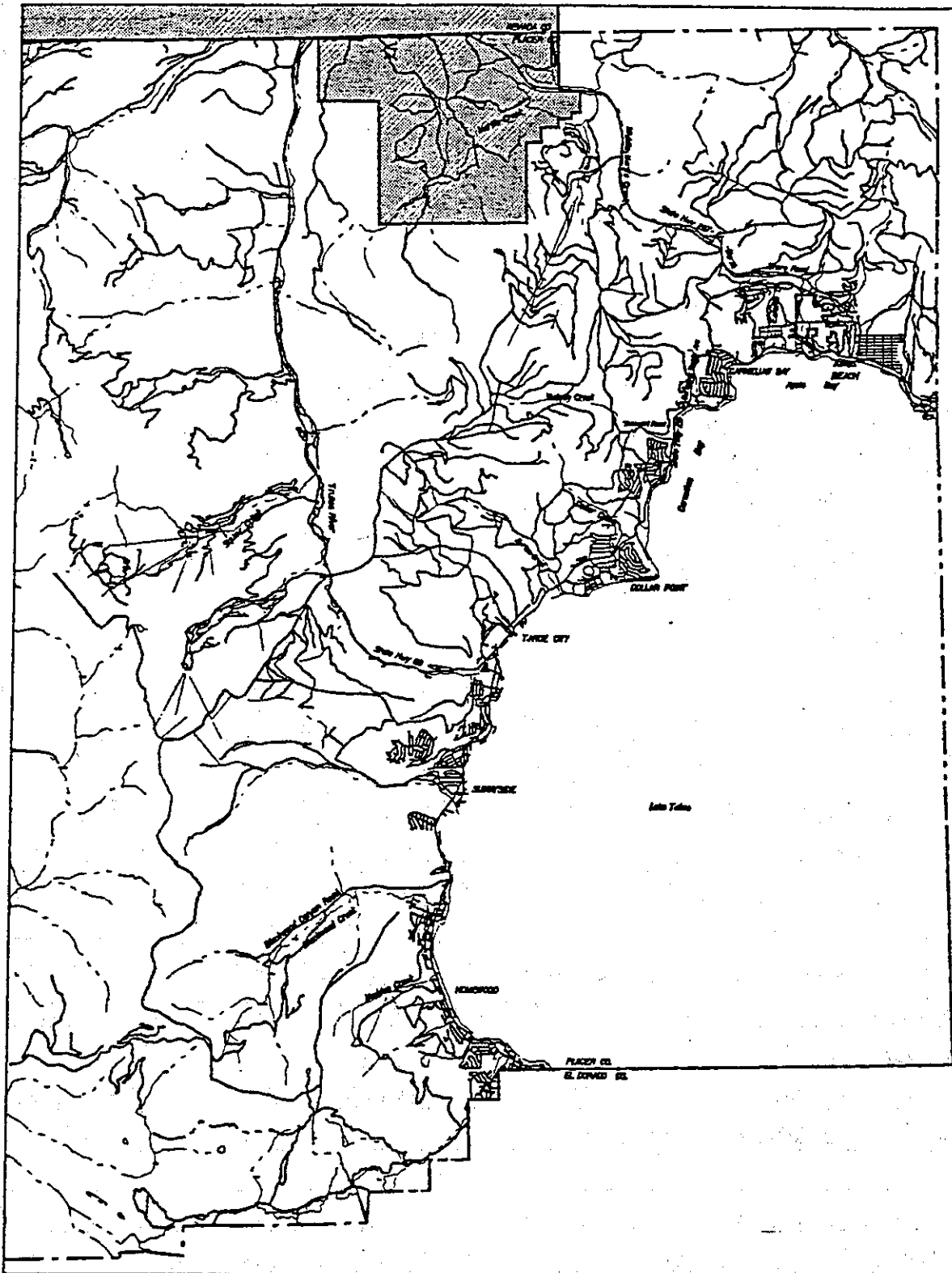
Service Area Characteristics: MANAGES WASTEWATER FROM NORTH TAHOE P.U.D.,
TAHOE CITY P.U.D., ALPINE SPRINGS C.W.D., SQUAW VALLEY C.W.D., TRUCKEE S.D.,
AND NORTHSTAR C.S.D.

Collection: TRUCKEE RIVER INTERCEPTOR CONVEYS WASTEWATER FROM LAKE
TAHOE DEVELOPMENTS TO TRUCKEE.

Treatment: TERTIARY LEVEL TREATMENT INCLUDES SEDIMENTATION, PURE
OXYGEN ACTIVATED SLUDGE, AND PHOSPHOROUS AND AMMONIA REMOVAL.
39 MILLION GALLONS STORAGE CAPABILITY. MAXIMUM FLOW OF 13.0 MGD.

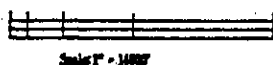
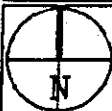
Disposal: EFFLUENT DISCHARGED TO SUBSURFACE LEACHFIELD WITH SEASONAL
DISPOSAL TO SPRAY IRRIGATION FIELD.

Capacity Limitations: 7.4 MGD SEVEN DAY AVERAGE DURING SUMMER PERIOD.
NEW CONNECTIONS MUST MEET FEDERAL, STATE, AND LOCAL REGULATIONS.



Placer County General Plan

Figure — Waste Water Service Area



Scale 1" = 1000'

Date: 1/10/92

Prepared by:
PSOMAS & ASSOCIATES

LEGEND

Streets
Waterways

Tahoe Truckee Sanitation Agency

County Line
District Service Area

NOTE:
Delineated areas do not represent exact boundaries, rather they represent general or approximate boundaries.

Appendix C
Wildlife Habitat Relationships
Community Descriptions

APPENDIX C

WILDLIFE HABITAT RELATIONSHIPS COMMUNITY DESCRIPTIONS

Chapter 9 of the *Draft General Plan Background Report* provides an overview of the vegetation and wildlife resources in Placer County. The summary descriptions of biological communities presented in Chapter 9 are based on the Wildlife Habitat Relationships (WHR) descriptions contained in *A Guide to Wildlife Habitats of California*, which was published by the California Department of Forestry and Fire Protection in October of 1988. This appendix contains reproductions of the detailed WHR community descriptions contained in the original report.

WHR COMMUNITIES DESCRIBED

WHR COMMUNITY	PAGE
Perennial Grassland	C-3
Annual Grassland	C-5
Chamise-Redshank Chaparral	C-7
Mixed Chaparral	C-9
Montane Chaparral	C-11
Alpine Dwarf-Shrub	C-13
Valley Oak Woodland	C-15
Blue Oak Woodland	C-17
Blue Oak-Digger Pine	C-19
Montane Hardwood	C-21
Montane Hardwood-Conifer	C-23
Aspen	C-25
Ponderosa Pine	C-27
Sierran Mixed Conifer	C-29
White Fir	C-31
Lodgepole Pine	C-33
Red Fir	C-35
Subalpine Conifer	C-37
Jeffrey Pine	C-39
Eastside Pine	C-41
Valley Foothill Riparian	C-43
Montane Riparian	C-45

Perennial Grassland

John G. Kie



Vegetation

Structure.—Perennial Grassland habitats, as defined here, occur in two forms in California: coastal prairie, found in areas of northern California under maritime influence, and relics in the valley grasslands now dominated by annual grasses and forbs. The coastal prairie form is described here. Relic perennial grasslands are discussed in the chapter on Annual Grassland habitats (AGS). Species of perennial grasses are also common in Wet Meadow (WTM) and other habitats.

Structure in Perennial Grassland habitat is dependent upon the mix of plant species at any particular site. For example, sites with western bracken fern exhibit a taller (to 1.5 m (5 ft)), more vertically diverse structure than those dominated by shorter grasses such as silver hairgrass (10-30 cm (0.3-1.0 ft)). Grazing by domestic livestock or wild herbivores such as Roosevelt elk can substantially alter habitat structure through reduction in plant height and removal of biomass. Average herbaceous production on nine soil series in Humboldt County was estimated to be 1700-13,000 kg/ha (1500-11,500 lb/ac) (Cooper and Heady 1964).

Composition.—Perennial Grassland habitats are dominated by perennial grass species such as California oatgrass, Pacific hairgrass, and sweet vernalgrass. On northern sites near the ocean in Del Norte and Humboldt Counties, common species include California oatgrass, American dunegrass, goldfields, Kentucky bluegrass, and western bracken fern (Heady et al. 1977). Further inland, common species include redbud, silver hairgrass, sweet vernalgrass, English daisy, soft chess, coast carex, orchardgrass, California oatgrass, Idaho fescue, red fescue, Douglas iris, western bracken fern and red clover (Heady et al. 1977). To the south, at Point Lobos State Reserve in Monterey County, dominant species include silver hairgrass, coronaria brodiaea, soft chess, California oatgrass, Pacific hairgrass, snakeroot, gumweed, toad rush, poverty rush, common wood-rush, squawroot, and fiddle dock (Heady et al. 1977).

Other Classifications.—Other classifications of Perennial Grassland are Coastal Prairie (Munz and Keck 1959, Cheatham and Haller 1975), Coastal Prairie-Scrub Mosaic (Küchler 1977), and *Festuca-Danthonia* grassland (Heady et al. 1977). Further, CALVEG (Parker and Matyas 1981) describes perennial grass in the North Interior, South Sierran and Southern Interior Ecological provinces. Perennial grass in each of these regions are more associated with the Wet Meadow (WTM) and Fresh Emergent Wetland (FEW) habitats in the North Interior; WTM, FEW, Lodgepole Pine (LPN), Eastside Pine (EPN), and Jeffrey Pine (JPN) in the South Sierran, and Joshua Tree (JST) and Desert Scrub (DSC) in the South Interior. If perennial grass is encountered in any of these regions of the State, refer to the appropriate habitat description.

Habitat Stages

Vegetation Changes 1-2S-D.—Historically, factors that have affected Perennial Grassland habitats on the north coast include the introduction of non-native annual plant species, increased grazing pressure, elimination of frequent fires, and cultivation

(Heady et al. 1977). Vegetation changes influenced by increased grazing, such as the spread of introduced annuals, were slower to occur on the north coast than in the central valley. Spanish missions did not extend north of Sonoma County, and the Russian settlements at Fort Ross and elsewhere on the north coast maintained few cattle and sheep. However, heavy grazing by Roosevelt elk and frequent use of fire by local Indian tribes may have influenced the successional stages of many Perennial Grassland habitats (Heady et al. 1977).

Duration of Stages.—Heavily grazed Perennial Grassland habitat dominated by annual plant species returns to perennial species under reduction in grazing pressure. Heady et al. (1977) suggest a successional sequence of annual forbs, followed by annual grasses and perennial forbs, then by perennial grasses such as hairy oatgrass and common velvetgrass, and ending in a climax community dominated by sweet vernalgrass and Pacific oatgrass. On some sites, Perennial Grassland habitat may give way to Coastal Scrub habitat (CSC) dominated by coyotebush and lupine (Heady et al. 1977).

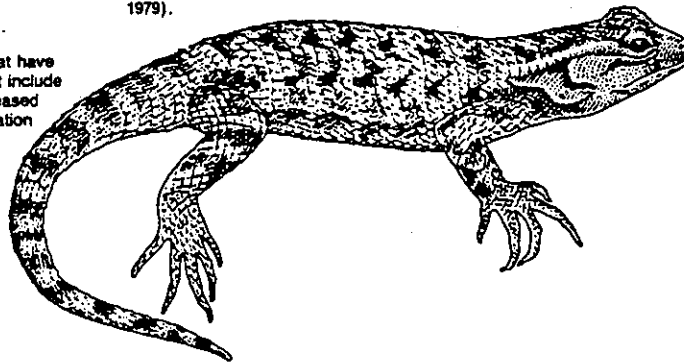
Where Perennial Grassland habitat occurs on sites formerly supporting Douglas-fir (DFR), the establishment of perennial grasses may in some cases prevent succession back to the original forest cover (Gordon Huntington, pers. comm.).

Biological Setting

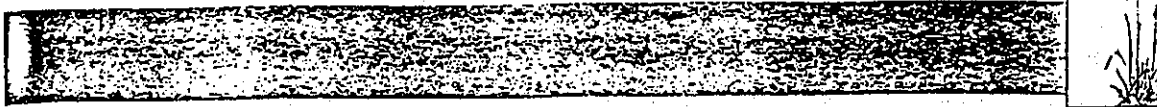
Habitat.—Perennial Grassland habitat in the coastal prairie can be found adjacent to Douglas-fir (DFR), Redwood (RDW), Coastal Oak Woodland (COW), Closed Cone-Pine Cypress (CPC), Coastal Scrub (CSC), Saline Emergent Wetland (SEW), Estuarine (EST), Marine (MAR), Fresh Emergent Wetland (FEW), Valley-Foothill Riparian (VRI), Cropland (CRP), Pasture (PAS), and Orchard-Vineyard (OVN) habitats.

Wildlife Considerations.—Perennial Grassland provides optimum habitat for many species, including the common garter snake, western terrestrial garter snake (Houck 1979), northern harrier, barn owl, burrowing owl, western kingbird, Say's phoebe, barn swallow, western meadowlark, savannah sparrow, grasshopper sparrow (Harris and Harris 1979), Townsend mole, coast mole, Botta's pocket gopher, western harvest mouse, California vole, long-tailed vole, and Oregon vole (Mossman 1979).

In addition, Perennial Grassland often serves as feeding habitat for the turkey vulture, red-tailed hawk, American kestrel, peregrine falcon, western bluebird (Harris and Harris 1979), fringe-tailed bat, big brown bat, striped skunk, coyote, black-tailed jackrabbit, brush rabbit, Roosevelt elk, and black-tailed deer (Mossman 1979).



Western Fence Lizard (*Sceloporus occidentalis*)



PGS
Perennial Grassland habitat, Solano
County, California (photo by Jim Barry)

Physical Setting

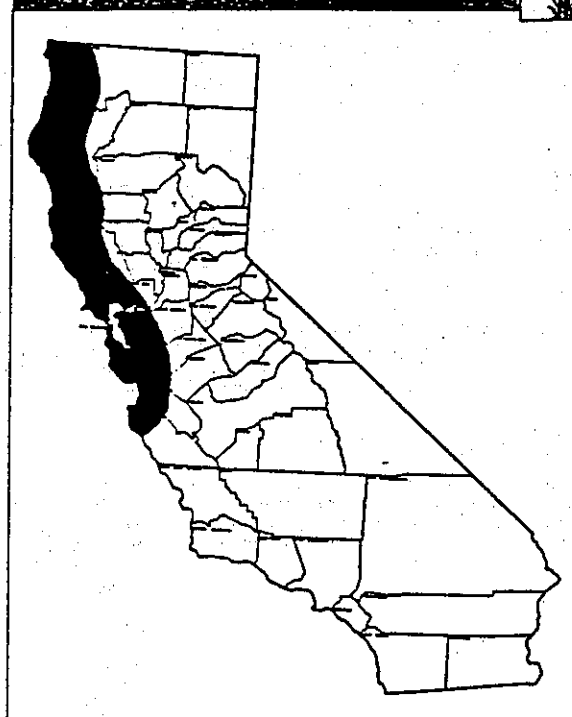
Perennial Grassland habitat typically occurs on ridges and south-facing slopes, alternating with forest and scrub in the valleys and on north-facing slopes (Heady et al. 1977). Perennial Grassland habitats are most often found on Mollisols. These soils may grade into Inceptisols to the north, with higher precipitation allowing for leaching of the mollic horizon, and into Alfisols to the south, under drier conditions. On the north coast, Perennial Grassland habitat may occasionally be found on Ultisols which formerly supported Douglas-fir (DFR) habitats, but which have been cleared by man (Gordon Huntington, pers. comm.).

Climatic conditions are under strong maritime influence. Crescent City in Del Norte County has one of the wettest, coolest, most vegetatively productive climates in California (Major 1977). On the north coast, the length of the frost-free season in adjacent Douglas-fir (DFR) habitat is about 200 days (14 fortnights) (Garrison et al. 1977). Annual precipitation is highest in the north (Crescent City 1777 mm (70 in)), and lower to the south (Point Reyes, 497 mm (20 in); Monterey, 465 mm (18 in)) and inland (Davis, 418 mm (16 in)) (Major 1977). Fog, which is common, reduces evapotranspiration, and greatly influences potential natural vegetation.

Distribution

Perennial Grassland habitat occurs along the California coast from Monterey County northward (Küchler 1977). It is found below 1000 m (3280 ft) in elevation and seldom more than 100 km (62 mi) from the coast (Heady et al. 1977).

Perennial Grassland



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Annual Grassland

John G. Kie



Vegetation

Structure.—Annual Grassland habitats are open grasslands composed primarily of annual plant species. Many of these species also occur as understory plants in Valley Oak Woodland (VOW) and other habitats. Structure in Annual Grassland depends largely on weather patterns and livestock grazing. Dramatic differences in physiognomy, both between seasons and between years, are characteristic of this habitat. Fall rains cause germination of annual plant seeds. Plants grow slowly during the cool winter months, remaining low in stature until spring, when temperatures increase and stimulate more rapid growth. Large amounts of standing dead plant material can be found during summer in years of abundant rainfall and light to moderate grazing pressure. Heavy spring grazing favors the growth of summer-annual forbs, such as tarweed and turkey mullein, and reduces the amount of standing dead material. On good sites, herbage yield may be as high as 4900 kg/ha (4400 lb/ac) (Garrison et al. 1977).

Composition.—Introduced annual grasses are the dominant plant species in this habitat. These include wild oats, soft chess, ripgut brome, red brome, wild barley, and foxtail fescue. Common forbs include broadleaf filaree, redstem filaree, turkey mullein, true clovers, bur clover, popcorn flower, and many others. California poppy, the State flower, is found in this habitat. Perennial grasses, found in moist, lightly grazed, or relic prairie areas, include purple needlegrass and Idaho fescue. Vernal pools, found in small depressions with a hardpan soil layer, support downywood, meadowfoam, and other species (Parker and Matyas 1981).

Species composition is also related to precipitation (Bartolome et al. 1980). Perennial grasses are more common on northern sites with mean annual rainfall greater than 150 cm (60 in). Soft chess and broadleaf filaree are common in areas with 65–100 cm (25–40 in) of rainfall, and red brome and redstem filaree are common on southern sites with less than 25 cm (10 in) of precipitation (Bartolome et al. 1980).

Other Classifications.—Annual Grassland habitat has been described as Valley Grassland (Munz and Keck 1959, Heady 1977), Valley and Foothill Grassland (Cheatham and Haller 1975), California Prairie (Küchler 1977), Annual Grasslands Ecosystem (Garrison et al. 1977), Bromegrass, Fescue, Needlegrass, and Wild Oats series (Paysen et al. 1980), and Annual Grass-Forb series (Parker and Matyas 1981).

Habitat Stages

Vegetation Changes 1-2S-D.—Annual Grassland habitats occupy what was once a pristine native grassland. The native grassland likely consisted of climax stands of perennial bunchgrasses, such as purple needlegrass, on wetter sites (Bartolome 1981, Bartolome and Gemmill 1981), with annual species existing as climax communities on drier alluvial plains (Webster 1981). Today, plant succession in the classical sense does not occur in Annual Grassland habitats. However, species composition is greatly influenced by seasonal and annual fluctuations in weather patterns. Annual plants germinate with the first fall rains that exceed about 15 mm (0.6 in), growing slowly during winter and more rapidly in spring (Heady 1977). Botanical composition changes throughout the growing season because of differences in plant phenology (Heady 1958). Most annuals mature between April and June (Heady 1977), although some species, such as tarweed and turkey mullein, continue to grow into summer. Fall rains that encourage germination, followed by an extended dry period, favor the growth of deep-rooted forbs (Duncan and Woodmansee 1975), but continuing rainfall favors rapidly growing grasses (Pitt and Heady 1978). Livestock grazing favors the growth of low-stature, spring-maturing forbs, such as filaree (Freckman et al. 1979), and summer annuals, such as turkey

mulein (Duncan 1976). Because these are important food plants for many wildlife species, proper levels of livestock grazing are generally beneficial in this habitat. In the absence of livestock, Annual Grassland habitats are often dominated by tall, dense stands of grasses such as ripgut brome (Freckman et al. 1979) and wild oats.

Duration of Stages.—Although Annual Grassland habitats consist largely of non-native annuals, these effectively prevent the reestablishment of native perennials over large areas and how comprise climax communities (Heady 1977). Introduced annuals should be considered naturalized plant species and so managed, rather than as invading species characteristic of poor range sites.

Biological Setting

Habitat.—Annual Grassland habitat is found just above or surrounding Valley Foothill Riparian (VRI), Alkali Scrub (ASC), Fresh Emergent Wetland (FEW), Cropland (CRP), Orchard-Vineyard (OVN), and Pasture (PAS) habitat types, and below Valley Oak Woodland (VOW), Blue Oak Woodland (BOW), Blue Oak-Digger Pine (BOP), Chamise-Redshank (CRC), and Mixed Chaparral (MCH) habitats. Annual Grassland habitat also borders Coast Oak Woodland (COW), Closed Cone-Pine-Cypress (CPC), Coastal Scrub (CSC), and Eucalyptus (EUC) habitats.

Wildlife Considerations.—Many wildlife species use Annual Grasslands for foraging, but some require special habitat features such as cliffs, caves, ponds, or habitats with woody plants for breeding, resting, and escape cover. Characteristic reptiles that breed in Annual Grassland habitats include the western fence lizard, common garter snake, and western rattlesnake (Basey and Sinclair 1980). Mammals typically found in this habitat include the black-tailed jackrabbit, California ground squirrel, Bott's pocket gopher, western harvest mouse, California vole, badger, and coyote (White et al. 1980). The endangered San Joaquin kit fox is also found in and adjacent to this habitat (U.S. Fish and Wildlife Service 1983). Common birds known to breed in Annual Grasslands include the burrowing owl, short-eared owl, horned lark, and western meadowlark (Verner et al. 1980). This habitat also provides important foraging habitat for the turkey vulture, northern harrier, American kestrel, black-shouldered kite, and prairie falcon.

Physical Setting

Annual Grassland habitat occurs mostly on flat plains to gently rolling foothills. Common soil orders include Entisols and Alfisols (Garrison et al. 1977). Entisols are often found at lower elevations on flood plains and swales that receive periodic deposits of alluvium (U.S. Soil Conservation Service 1975), and are characterized by little or no pedogenic horizon development. Alfisols occur at higher elevations above the valley floor (Garrison et al. 1977). Some Annual Grassland habitats can be found in the drier portion of the southern San Joaquin Valley on Aridisols (Garrison et al. 1977). Climatic conditions are typically Mediterranean, with cool, wet winters and dry, hot summers. The length of the frost-free season averages 250 to 300 days (18 to 21 fortnights) (Garrison et al. 1977). Annual precipitation is highest in the north (Redding, 960 mm (38 in)) and north coast (Ukiah, 909 mm (36 in)), decreasing to the south (Sacramento, 430 mm (17 in); Stockton, 339 mm (13 in); Fresno, 259 mm (10 in)), and reaching a minimum in the southern San Joaquin Valley (Bakersfield, 150 mm (6 in)) (Major 1977).

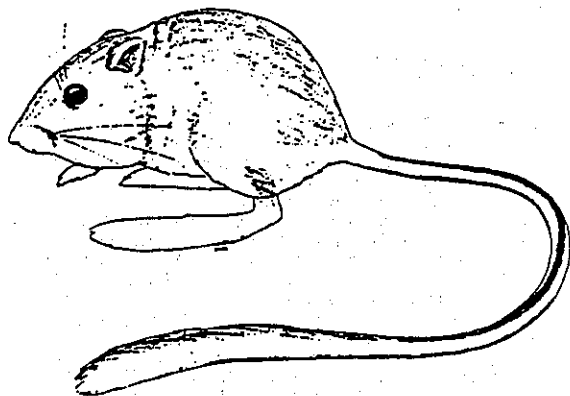
Distribution

Annual Grassland habitat occurs throughout the central valley of California, in the coastal mountain ranges as far north as Men-

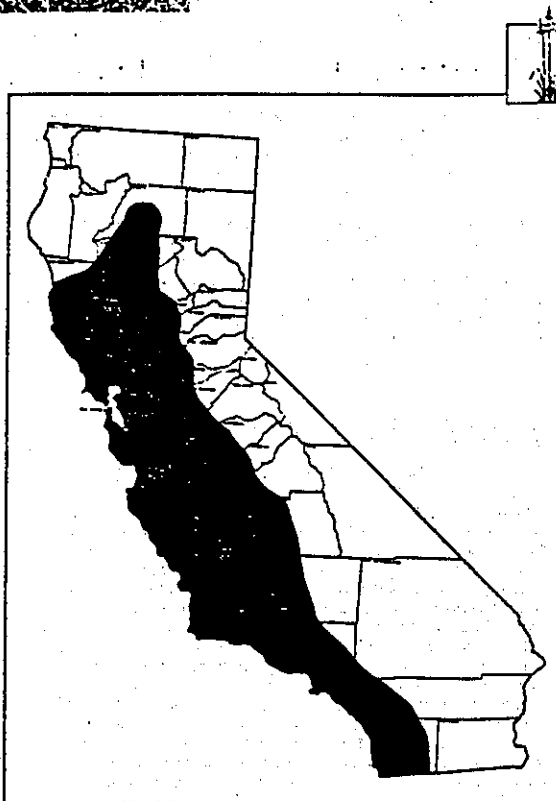


AGS
Annual Grassland habitat, Chino Hills, San Bernardino County, California (photo by Gary O. Fregien)

docino County, and in scattered locations in southern California. It occurs from sea level to about 1200 m (3900 ft) in elevation (Heady 1977). Relics of the pristine California prairie can be found throughout this habitat, including sites at Jepson Prairie (Solano County), and at the University of California's Hopland Field Station (Mendocino County) and Hasting's Natural History Reservation (Monterey County). However, these relics are limited in size and may not constitute a separate habitat.



Giant Kangaroo Rat (*Dipodomys ingens*)



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Chamise-Redshank Chaparral



Vegetation

Structure.—Fire occurs regularly in Chamise-Redshank Chaparral and influences habitat structure. Mature Chamise-Redshank Chaparral is single layered, generally lacking well-developed herbaceous ground cover and overstory trees. Shrub canopies frequently overlap, producing a nearly impenetrable canopy of interwoven branches. Chamise-dominated stands average 1 to 2 m (3.3 to 6.6 ft) in height, but can reach 3 m (9.8 ft) (Horton 1960, Cheatham and Haller 1975, Hanes 1977). Total shrub cover frequently exceeds 80 percent, but may be considerably lower on extremely xeric sites with poor soils (Minnich 1976, Vogl 1976, Hanes 1977). Redshank stands are slightly taller, averaging 2 to 4 m (6.6 to 13.1 ft) but occasionally reaching 6 m (19.7 ft) (Hanes 1965, 1977, Cheatham and Haller 1975). Mature redshank frequently is more open than chamise and can have sparse herbaceous cover between shrubs (Hanes 1965, 1977, Paysen et al. 1980).

Composition.—Chamise-Redshank Chaparral may consist of nearly pure stands of chamise or redshank, a mixture of both, or with other shrubs. The purest stands of chamise occur on xeric, south-facing slopes (Hanes 1976). Toyon, sugar sumac, poison-oak, redberry, and California buckthorn are commonly found in drainage channels and on other relatively mesic sites (Vogl 1976). At upper elevations or on more mesic exposures, chamise mixes with ceanothus, manzanita, scrub oak, and laurel sumac (Horton 1960, Hanes 1976, Parker and Matyas 1981). Ceanothus and sugar sumac are common associates of redshank (Hanes 1965, 1977). In southern California, white sage, black sage, and California buckwheat are common at lower elevations and on recently disturbed sites (Hanes 1965, 1977).

Distinguishing Chamise-Redshank Chaparral from Mixed Chaparral (MCH) and Coastal Scrub (CSC) is a subjective interpretation based on percent cover by chamise and redshank and time since last burn. Paysen et al. (1980) classify chaparral as chamise or redshank if either species is "dominant". Hanes (1977) considers a stand to be chamise if it comprises 50 to 100 percent of total cover and redshank if it comprises 20 to 50 percent of total cover. For purposes of this description and the WHR model (Salwasser and Laudenslayer 1982), a more complex definition is needed which reflects changes in species composition that occur during post-fire recovery and aging. A stand of brush is classified as Chamise-Redshank Chaparral, as opposed to Mixed Chaparral, if any of the following criteria are fulfilled.

1. Any stand with greater than 60 percent relative shrub cover by chamise and redshank.
2. Young stands recovering from fire with greater than 20 percent absolute shrub cover by chamise and redshank, and greater than 75 percent relative shrub cover by these species and relatively short-lived subshrubs such as yerba-santa.
3. Any stand with at least 50 percent relative shrub cover by chamise and redshank and greater than 75 percent relative shrub cover by these species and shrubs of intermediate lifespan such as several species of ceanothus.

Other Classifications.—Most plant ecologists treat stands dominated by chamise and redshank as distinct types (Cheatham and Haller 1975, Thorne 1976, Hanes 1977, Paysen et al. 1980, Parker and Matyas 1981). Horton (1960) further divides chamise into "pure chamise" and "chamise-ceanothus" to reflect the frequent occurrence of mixtures of these shrubs. The Californian mixed chaparral of Cheatham and Haller (1975) includes many stands of Chamise-Redshank Chaparral that also support a significant component of ceanothus and other shrubs.

Habitat Stages

Vegetation Changes 1:2-4:5-D.—Fire is the primary disturbance initiating secondary succession in Chamise-Redshank Chaparral. Annuals, perennial herbs, and subshrubs are abundant for

several years after a fire. Shrubs begin to appear either as seedlings or root-crown sprouts beginning the first growing season after burning (Hanes 1971). As the habitat matures, shrub cover and height increase and herbaceous cover declines (Hanes 1971). Relatively short-lived shrubs and subshrubs, such as California buckwheat, common deerweed, and most species of ceanothus, may be absent or rare in older stands (Horton and Kraebel 1955, Hanes 1977). After each fire, populations of these species and post-fire herbs regenerate quickly from the seed bank in the soil (Sweeney 1956). In old unburned stands, species diversity is low, growth rates are slow, long-lived shrubs accumulate dead material, and some shrubs may die (Hanes 1971, Rundel and Parsons 1979).

Duration of Stages.—The general schedule of post-fire recovery in chaparral is described by Menke and Villaseñor (1977) and Zedler (1977). Herbaceous cover is dominant for 1 to 3 years. Long- and short-lived shrubs increase in height and cover but canopies generally do not overlap for 3 to 15 years after fire. From 10 to 30+ years, short-lived shrubs die, shrub cover increases, the canopy closes, and dead material begins to accumulate. Rundel and Parsons (1979) found that, in the Sierra Nevada, chamise growth rates declined and accumulation of dead material began after 16 years. Time to senescence is dependent on local site characteristics. In southern California, Hanes (1977) considers chamise older than 60 years to be senescent, but this may occur in 20 to 25 years in northern California (Sampson 1944). Horton (1960) states that pure chamise in the San Bernardino Mountains reaches 25 percent cover in 10 years, 50 percent in 40 years, and 70 percent in 55 years. However, recovery rates and peak cover vary with soil type, climatic regime, and slope. For example, most mesic sites supporting chamise and ceanothus reach 50 percent cover in 10 years and 90 percent cover in 25 years. Some sites may reach 90 percent cover in 10 years (T. E. Paysen, pers. comm.). At 50 years, shrub cover in mixed stands of chamise and ceanothus may decline to 80 percent total shrub cover as ceanothus dies (Hanes 1977).

Biological Setting

Habitat.—Chamise-Redshank Chaparral generally occurs below and grades into Mixed Chaparral (MCH). On some sites, Chamise-Redshank Chaparral may form an ecotone with Ponderosa Pine (PPN), Coastal Oak Woodland (COW), or mixed conifer types. In northern California, the lower boundary is with Annual Grassland (AGS) and Blue Oak-Digger Pine (BOP). In southern California, Coastal Scrub (CSC) may form a broad mosaic with Chamise-Redshank Chaparral. Location of the boundary can depend on fire frequency (Hanes 1971). On desert exposures, redshank stands may occur above either Mixed Chaparral (MPC) or Desert Succulent Scrub (DSC) and either above or below Pinon-Juniper (PJN).

Wildlife Considerations.—Wildlife species found in this habitat type also are found in either Mixed Chaparral (MCH), Montane Chaparral (MCP), Coastal Scrub (CSC) or Sagebrush (SGB) and in shrubs beneath several woodland and forest types. The primary land management consideration is selection of alternative fire management treatments. Long-term fire suppression can lead to stand senescence (Vogl 1977) and declines in deer (Biswell et al. 1952), small mammals (Quinn 1979), birds (Wirtz 1979), and reptiles (Simovich 1979). Most animal populations reach peak densities in the first two or three decades, frequently 1 to 15 years, after a fire. Repeated fires at short intervals could favor crown-sprouting shrubs over obligate seed sprouters (Vogl 1977). Either management extreme could have long-term impacts on wildlife through changes in nutrient availability, soil quality or vegetation composition, structure, and recovery time. Prescribed burning can be an effective management tool, but the effects vary with season of burn (Rundel 1982). Post-fire herbs may be important in immobilizing nitrogen within the chaparral system (Rundel and Parsons 1980). Protecting these herbs from grazing

A. Sidney England

CRC
Chamise-Redshank Chaparral habitat,
Grindstone Project, Glenn County,
California (photo by A. Sidney
England)

may be important for effective long-term habitat maintenance (Rundel 1982). Populations of most small vertebrates decline sharply or are eliminated when chaparral is converted to grassland (Lillywhite 1977). Active and passive chaparral management programs must tailor management prescriptions to specific site characteristics and project goals.

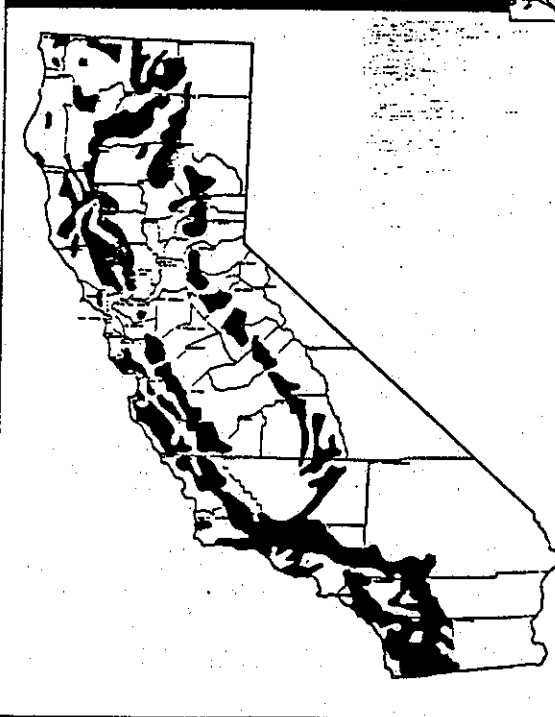
Physical Setting

Chamise-dominated stands are most common on south- and west-facing slopes; redshank is found on all aspects (Hanes 1965, 1977, Cheatham and Haller 1975). Soils usually are thin with little accumulation of organic material (Cheatham and Haller 1975). Chamise may be a dominant shrub on some serpentine sites (Parker and Matyas 1981). Chamise-Redshank Chaparral is found in a mediterranean climate; rainfall is 38 to 63 cm (15 to 25 in), less than 20 percent of total precipitation falls in summer, and winters are mild (Ornduff 1974). The predominant land forms are steep slopes and ridges (Thorne 1976).

Distribution

Hanes (1977) provides a good description of "chamise" and "redshank" chaparral distributions in California. This habitat is usually found below 1200 m (4000 ft) on mountain ranges outside the deserts (Cheatham and Haller 1975, Vogl 1976, Minnich 1976, Hanes 1977, Parker and Matyas 1981). Large nearly pure areas of redshank-dominated chaparral occur in the interior valleys of the peninsular mountain ranges of Riverside and San Diego counties; isolated stands are found in the Santa Monica Mountains and in northern Santa Barbara and San Luis Obispo counties (Cheatham and Haller 1975, Hanes 1977). Chamise is the dominant shrub of this habitat type throughout the rest of the state. Nearly pure stands of chamise cover large areas in the peninsular and transverse ranges and Tehachapi Mountains of southern California. To the north, chamise more frequently mixes with other shrubs, especially several species of ceanothus. This type of vegetation covers large areas in the central coast ranges and on the eastern exposures of the north coast ranges; as isolated stands in the Cascade and Klamath ranges and the Siskiyou Mountains; and in a broken band on the western slope of the Sierra Nevada (Hanes 1977, Parker and Matyas 1981).

Chamise-Redshank Chaparral



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Mixed Chaparral

A. Sidney England



Vegetation

Structure.—Mixed Chaparral (MCH) is a structurally homogeneous brushland type dominated by shrubs with thick, stiff, heavily cutinized evergreen leaves. Shrub height and crown cover vary considerably with age since last burn, precipitation regime (cismontane vs. transmontane), aspect, and soil type (Hanes 1977). At maturity, cismontane Mixed Chaparral typically is a dense, nearly impenetrable thicket with greater than 80 percent absolute shrub cover. Canopy height ranges from 1 to 4 m (3.3 to 13.1 ft), occasionally to 6 m (19.6 ft) (Horton 1960, Cheatham and Haller 1975, Hanes 1977). On poor sites, serpentine soils or transmontane slopes, shrub cover may be only 30 to 60 percent and shrubs may be shorter, 0.5 to 3.0 m (1.6 to 9.8 ft) (Cheatham and Haller 1975, Hanes 1976, 1977). Considerable leaf litter and standing dead material may accumulate in stands that have not burned for several decades.

Composition.—Mixed Chaparral is a floristically rich type that supports approximately 240 species of woody plants (Ornduff 1974). Composition changes between northern and southern California and with precipitation regime, aspect, and soil type. Dominant species in cismontane Mixed Chaparral include scrub oak, chaparral oak, and several species of ceanothus and manzanita. Individual sites may support pure stands of these shrubs or diverse mixtures of several species. Commonly associated shrubs include chamise, birchleaf mountain mahogany, silk-tassel, toyon, yerba-santa, California buckeye, poison-oak, sumac, California buckthorn, hollyleaf cherry, Montana chaparral-pea, and California fremontia. Some of these species may be locally dominant.

Leather oak and interior silk-tassel are widely distributed on cismontane serpentine soils, and chamise and toyon may be abundant on these soils. Shrubs such as Jepson, coyote, and dwarf ceanothus and serpentine manzanita are local serpentine endemics (Cheatham and Haller 1975, Thorne 1976, Hanes 1977). Incense-cedar, knobcone pine, Coulter pine, and Digger pine frequently are found in Mixed Chaparral on serpentine soils (Thorne 1976).

Shrub live oak, desert ceanothus, and desert bitterbrush are examples of shrubs found in Mixed Chaparral only on transmontane slopes (Cheatham and Haller 1975, Thorne 1976, Hanes 1977, and Zabriskie 1979). However, many species found in cismontane stands are also common on desert-facing slopes. Examples include bigberry manzanita, chamise, birchleaf mountain mahogany, California fremontia, and several species of ceanothus.

Other Classifications.—Most authors divide Mixed Chaparral into several types based on the dominant floristic component, soil type or location. Cheatham and Haller (1975) recognize Californian mixed, south coastal, semi-desert, and serpentine chaparrals. Thorne (1976) identifies mixed chaparral but separates serpentine and desert transition chaparral as distinct types. Payson et al. (1980) subdivide this type into 7 series (ceanothus, mountain mahogany, scrub oak, prunus, sumac, manzanita, and toyon) based on the dominant or codominant shrub components. Hanes (1977) gives a good review and description of 6 Mixed Chaparral types (ceanothus, scrub oak, manzanita, serpentine, desert, and woodland).

Habitat Stages

Vegetation Changes 1:2-4:S-D.—Post-fire recovery of Mixed Chaparral begins with a cover of subshrubs, annuals, and perennial herbs. However, shrubs that will be dominant in mature chaparral are present as seedlings and root-crown sprouts. As shrub cover and height increase with age, herbaceous cover declines. Long-lived seeds remaining in the soil produce the herbaceous cover following the next fire (Sweeney 1956). Shrub species composition also may change as the stand ages. Yerba-santa,

common deerweed, and many ceanothus are examples of relatively short-lived (<40 years) shrubs and subshrubs that disappear from stands that have not been burned for decades (Horton and Kraebel 1955, Hanes 1971, 1977). Long-lived shrubs in very old stands become senescent, accumulating standing dead material, and some individual may die.

Some authors (e.g., Thorne 1976) have suggested that Mixed Chaparral might succeed to an oak woodland if protected from fire for extremely long periods. Others (e.g., Minnich 1976) have failed to find evidence to support this notion. Hanes (1977) suggests that confusion may result from inadequate distinction among vegetation types with different species compositions, soil qualities, slopes, aspects, and precipitation regimes.

Duration of Stages.—Menke and Villaseñor (1977) and Zedler (1977) give good descriptions of the chaparral post-fire recovery schedule. For the first 1 to 3 years, cover is dominated by short-lived herbs and subshrubs; shrubs are present as seedlings and root-crown sprouts. From 3 to 15 years, herbaceous species disappear as shrubs and subshrubs enlarge, but shrub canopies generally do not touch. From approximately 10 to 30+ years after a burn, shrub cover increases, canopies begin to overlap, relatively short-lived shrubs begin to die, and dead material accumulates. Stands more than 25 to 35 years old eventually can become senescent. The post-fire recovery schedule varies with species composition, slope, aspect, elevation, and soil type. Shrub regeneration is quicker on more mesic sites. In southern California, stands dominated by manzanita, ceanothus, and scrub oak reach 50 to 60 percent cover in 10 years and 80+ percent cover in 25 to 30 years (Horton 1960, Vogt 1976, Puse 1982b). Recovery time usually is shorter in northern California. Stands of Chamise-Redshank Chaparral (CRC) can become extremely senescent in 60 to 90 years; some Mixed Chaparral types may take 2 to 3 times longer (Hanes 1982).

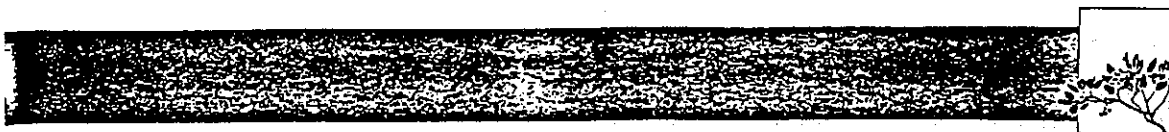
Biological Setting

Habitat.—Mixed and Chamise-Redshank Chaparral (CRC) occur as a mosaic on low to middle elevation slopes below several woodland and forest types. Compared to Chamise-Redshank Chaparral, Mixed Chaparral generally occupies more mesic sites at higher elevations or on north-facing slopes. In southern California, Coastal Scrub (CSC) may form the lower chaparral boundary (Hanes 1977). In northern California, Mixed Chaparral merges with Annual Grassland (AGS) and Blue Oak-Digger Pine (BOP) at lower elevations. Chaparral shrubs form the understory of many Blue Oak-Digger Pine stands. At upper elevations, Mixed Chaparral grades into Coastal Oak Woodland (COW), Ponderosa Pine (PPN) or mixed conifer types and frequently forms the understory of these habitats. On desert exposures, Desert Scrub (DSC), Desert Succulent Scrub (DSS) or Joshua Tree (JST) may be found below Mixed Chaparral. Jeffrey Pine (JPN), Pinon-Juniper (PJN) or Juniper (JUN) habitats occur above Mixed Chaparral.

Wildlife Considerations.—No wildlife species are restricted to Mixed Chaparral. Most species are found in other shrub-dominated types including Chamise-Redshank Chaparral (CRC), Montane Chaparral (MCP), Coastal Scrub (CSC), and Sagebrush (SGB), or the shrubs beneath several woodland and forest types. Wildlife management considerations usually focus on selecting alternative fire management treatments. Potential impacts of management actions in Mixed Chaparral generally are similar to Chamise-Redshank Chaparral.

Physical Setting

Mixed Chaparral occurs on all aspects, but at lower elevations, it generally is found on north-facing slopes. This pattern is espe-



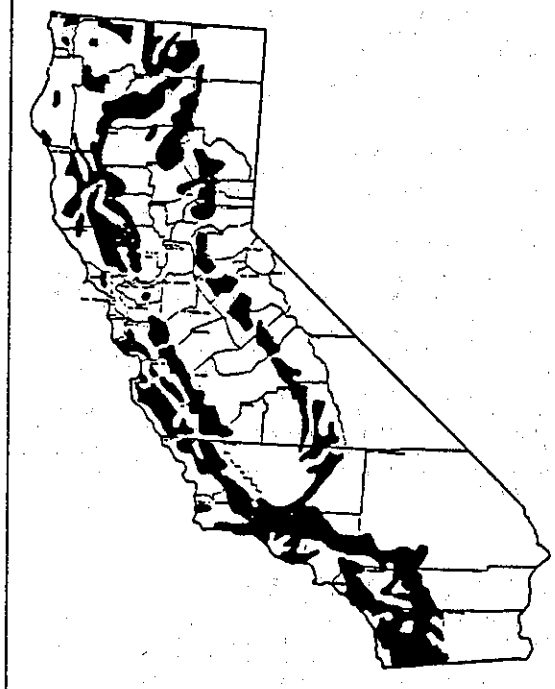
MCH
Mixed Chaparral habitat, Fouts Spring,
Colusa County, California (photo by A.
Sidney England)

cially true in southern California. Generally, it occurs on steep slopes and ridges with relatively thin, well-drained soils (Ornduff 1974, Cheatham and Haller 1975). Soils can be rocky, sandy, gravelly or heavy (Cheatham and Haller 1975, Thorne 1976). Mixed Chaparral occurs on sites with deeper and more mesic soils than Chamise-Redshank Chaparral (Cheatham and Haller 1975). Serpentine soils are high in several potentially toxic substances, such as iron and magnesium, and low in required nutrients, including calcium (Whittaker 1975). The mediterranean climate is characterized by cool, wet winters and hot, dry summers. Total rainfall is 38 to 63 cm (15 to 25 in) with less than 20 percent falling during the summer (Ornduff 1974).

Distribution

Mixed Chaparral generally occurs below 1520 m (5000 ft) on mountain ranges throughout California except in the deserts (Cheatham and Haller 1975, Parker and Matyas 1981). Upper and lower elevational limits vary considerably with precipitation regime, aspect, and soil type. Mixed Chaparral occurs throughout the transverse, peninsular, and central coast ranges and the Tehachapi Mountains. In the Sierra Nevada, this type is a broken band along middle and lower elevations of the western slope. It also occupies large areas in the north coast ranges, especially on interior slopes, and is found as large discontinuous patches in the Siskiyou Mountains and Cascade and Klamath Ranges (Cheatham and Haller 1975, Hanes 1977).

Mixed Chaparral



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Montane Chaparral

Roland J. Risser and Michael E. Fry



Vegetation

Structure.—The growth form of montane chaparral species can vary from tree-like (up to 3 meters) to prostrate. When mature, it is often impenetrable to large mammals. Its structure is affected by site quality, history of disturbance (e.g., fire, erosion, logging) and the influence of browsing animals. For example, on shallow granitic soils in the Sierra Nevada, low dense growths of pinemat manzanita and huckleberry oak characterize an edaphic climax community, associated with scattered conifers and much exposed granite. Following fire in the mixed conifer forest habitat type, whitethorn ceanothus-dominated chaparral may persist as a subclimax community for many years.

Montane chaparral is characterized by evergreen species; however, deciduous or partially deciduous species may also be present. Understory vegetation in the mature chaparral is largely absent. Conifer and oak trees may occur in sparse stands or as scattered individuals within the chaparral type.

Composition.—Montane chaparral varies markedly throughout California. Species composition changes with elevational and geographical range, soil type, and aspect. One or more of the following species usually characterize montane chaparral communities: whitethorn ceanothus, snowbrush ceanothus, greenleaf manzanita, pinemat manzanita, hoary manzanita, bitter cherry, huckleberry oak, sierra chinkapin, juneberry, fremont silktassel, Greene goldenweed, mountain mahogany, toyon, sumac and California buckthorn. As one or more of these species become dominant under various environmental regimes, further subclassification of the montane chaparral series is possible (Krebs 1972, McNaughton 1968).

Other Classifications.—Montane chaparral has been broadly described as chaparral (Munz and Keck 1973, (Küchler 1977) or mountain shrub (USDA 1977). Subclassifications based upon predominant species composition have also been described as montane mixed shrub series, huckleberry oak/pinemat manzanita series, bush chinquapin series, greenleaf manzanita series, tobacco brush series, mountain whitethorn series (Parker and Matayas 1981); upper montane chaparral, lower montane chaparral (Cheatham and Haller 1975).

Habitat Stages

Vegetation Changes 1:2-4:5-D.—Montane chaparral in California occurs in gradations between two characteristic successional sequences:

The first sequence is associated with poorer, typically shallow soils (in early stages of development), often overlying fractured bedrock. Here, chaparral species may predominate to form an edaphic climax community.

In the second sequence, chaparral is a secondary succession following disturbance on deeper forest soils. After disturbance (logging, fire, erosion) chaparral proliferates and may exclude conifers and other vegetation for many years. However, chaparral may facilitate the germination of red fir seedlings (Barbour 1984) and other shade tolerant conifers by providing a protective cover, moderating microclimate, and improving soil conditions. Chaparral shrubs may be an essential link in forest succession by building up soil nutrient levels, especially nitrogen, to the point where trees can survive (Zavitovski and Newton 1968). In mature timber stands, chaparral species may senesce due to insufficient light through the canopy and are only present as a sparse understory. Thus, silvicultural practices have a strong influence on the structure of montane chaparral.

Most montane chaparral species are fire adapted. Mature plants sprout back from the root crown. Some species require scarification of the seed for germination and may produce numer-

ous seedlings after a fire (Gratkowski 1961). However, if fires are too frequent, these species may be eliminated (Biswell 1969) changing the subsequent structure of the community. Deer and livestock foraging on sprouting chaparral may also have a significant effect on its rate of development, structure, and ultimate species composition (Biswell and Gilman 1961, Davis 1967). The forage yields of most sprouting shrubs are reduced for the first few years after a fire, but rapidly regain their original status. Burned areas commonly produce new shrub growth high in protein and are a preferred food source for herbivores (Einarsen 1946, Swank 1956).

Duration of Stages.—Following fire, herbaceous plants may dominate for up to 5 years. Usually within 7 to 9 years the brush overstory is fully developed (Sweeney 1956, Sampson 1944). Chaparral may persist for up to 50 years or longer before conifer development begins to significantly reduce the shrub growth through shading (Lyon 1969, Sweeney 1968). Where chaparral types occur as an edaphic climax (i.e., on poor, rocky soils, fractured bedrock or lava caps), growth rates may be rather slow, growth form is usually small and stunted, and individuals may be quite old.

Development of montane chaparral at high elevations is often slowed by cold temperatures, snow cover and a short growing season (Barbour and Major 1977). However, at lower elevations, burned or logged areas may sprout new growth by the next growing season.

Biological Setting

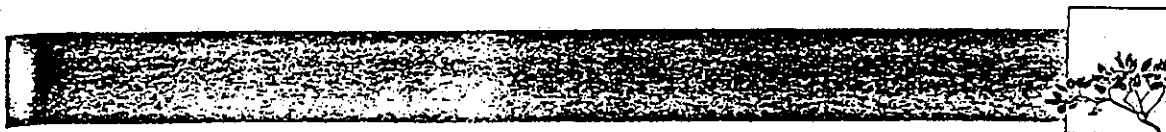
Habitat.—Montane chaparral adjoins a variety of other wildlife habitats, including montane riparian (MRI), mixed chaparral (MCH), and perennial grassland (PGS). It becomes established in disturbed coniferous habitats such as ponderosa pine (PPN), mixed conifer (SMC), Jeffrey pine (JPN), red fir (RFR) and lodgepole pine (LPN). At high elevations in the southern Sierra, it may occur with a sparse juniper overstory. At the lower extent of its elevational range, montane chaparral may intergrade with mixed chaparral, a very similar habitat type.

Wildlife Considerations.—Montane chaparral provides habitat for a wide variety of wildlife. Numerous rodents inhabit chaparral (Wertz 1974). Deer and other herbivores often make extensive use of chaparral. Throughout the west slope of the Sierra and south through the Transverse Range, deer are strongly associated with chaparral communities. Montane chaparral provides critical summer range foraging areas, escape cover and fawning habitat. In the Sierra, fawning areas are frequently found where the chaparral lies adjacent to or contains an interspersed of perennial grass or meadow-riparian habitat (Ashcraft 1975, Desmann, 1971, Ashcraft 1976, Pacific Gas and Electric 1981). Some small herbivores use chaparral species in fall and winter when grasses are not in abundance. Rabbits and hares eat twigs, evergreen leaves and bark from chaparral. Shrubs are important to many mammals as shade during hot weather, and moderate temperature and wind velocity in the winter (Loveless 1967).

Many birds find a variety of habitat needs in the montane chaparral. It provides seeds, fruits, insects, protection from predators and climate, as well as singing, roosting and nesting sites (Verner and Boss 1980), Storer and Usinger 1970).

Physical Setting

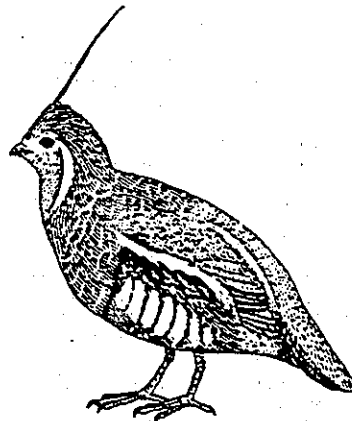
Montane chaparral can be found on shallow to deep soils, on all exposures, and from gentle to relatively steep slopes. It may dominate on more xeric sites, but occurs locally throughout the coniferous forest zone. Generally, climate is like that associated with the coniferous forest zone—cold winter temperatures with substantial precipitation. Summers are typically hot and dry (Bar-



bour and Major 1977). In the northern portion of the state, montane chaparral is found between 914 to 2743 m (3000-9000 ft). In southern California this type occurs above 2134 m (7000 ft).

Distribution

Montane chaparral is associated with mountainous terrain from mid to high elevation at 914 to 3047 m (3000-10,000 ft). It occurs in southern California above 2134 m (7000 ft) in the Transverse Range of Los Angeles, and in San Bernardino, Riverside and San Diego counties; from Siskiyou to Kern counties in the Cascade and Sierra Nevada mountains; as a minor type from Tehama to Lake counties; and in Del Norte, Siskiyou, Trinity, and Shasta counties in the North Coast Ranges and Klamath mountains (Barbour and Major 1977). As a successional stage following disturbance, its distribution coincides with the ponderosa pine and mixed coniferous forest habitat types (Barbour and Major 1977).

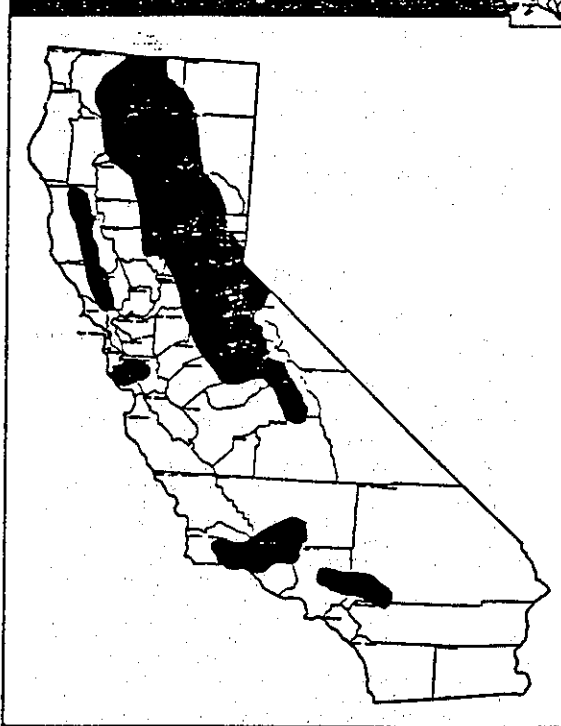


Mountain Quail (*Oreortyx pictus*)



MCP
Montane Chaparral habitat, Sierra Nevada, California (photo by Roland J. Risser)

Montane Chaparral



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Alpine Dwarf-Shrub

Gary L. Benson



Vegetation

Structure.—Alpine Dwarf-Shrub habitats typically are low gram-inoid and forb communities with an admixture of dwarf-shrubs (often cushion plants) (Küchler 1977). The perennial herbs or dwarf shrubs comprising these communities are usually less than 0.5 m (18 in) tall (Cheatham and Haller 1975). Coverage may reach 100 percent at lower elevations but becomes increasingly open as elevation increases. On mesic sites, a continuous turf contrasts with patches of bunchgrasses and cushion plants on drier sites (Küchler 1977).

Composition.—Species composition varies considerably throughout California. The most common shrubs occurring are creambush oceanspray, Greene goldenweed and mountain white heather. These shrubs occur primarily in northern California and the Sierra Nevada. Creambush oceanspray also occurs commonly in the southern California mountains. The most common alpine shrub in the White Mountains is timberline sagebrush (Parker and Matyas 1981, Cheatham and Haller 1975).

Nonshrub species that commonly occur in the alpine areas of northern California and the Sierra Nevada include Eschscholtz buttercup, primrose, prostrate sabbaldia, sedge, bluegrass, buckwheat, squirelltail, rock-cress, mountain sorrel, pussypaws, Indian paintbrush, Payson's draba, and Sitka romanzoffia (Parker and Matyas 1981, Cheatham and Haller 1975).

The following nonshrub species dominate the high Sierra: columbine, heart willowweed, Davidson's penstemon, Jacobs-ladder, and Coville's phlox (Parker and Matyas 1981, Cheatham and Haller 1975).

The scattered alpine areas of the San Bernardino, San Gabriel and San Jacinto mountains are dominated by draba, Panish's alumroot, creambush oceanspray, silver railardella, alpine Eschscholtz buttercup, wild onion, rock-cress, mariposa lily, and several species of buckwheat (Parker and Matyas 1981, Cheatham and Haller 1975).

The dominant nonshrub species in alpine areas of the White Mountains include timberline sagebrush, Scribner's wheatgrass, several species of phlox, and Jacobs-ladder (Cheatham and Haller 1975).

Other Classifications.—Other names for Alpine Dwarf-Shrub habitat include Dwarf Scrub (Alpine) Series (Parker and Matyas 1981), Alpine Community (Küchler 1977), Alpine fell-field (Munz and Keck 1959) and Alpine fell-field cushion type (Thorne 1976). This habitat is included in Cheatham and Haller's Alpine Fell-fields major subdivision under their Alpine Boulder and Rock Field habitat type. Cheatham and Haller (1975) further subdivide Alpine Fell-fields into 1) Klamath-Cascade, 2) Sierra Nevada, 3) Southern California, and 4) White Mountains Fell-fields.

Habitat Stages

Vegetation Changes 1:2-4;S-M.—Following disturbance, Alpine Dwarf-Shrub habitats follow a slow successional process to any of the structural classes 1:2-4;S-M. There is limited information about the changes that occur in the plant communities comprising this habitat. Only limited autecological studies have been conducted (Mooney 1966, Billings and Mooney 1968, Billings 1975, Chabot and Billings 1972, Schultze et al. 1967, Johnson and Caldwell 1975, Ehleringer and Miller 1975), but insufficient comprehensive synecological work has been conducted to effectively describe the various successional stages and associated species in this habitat. Major and Taylor (1977) present an excellent review of the work on floristics and autecology of alpine communities.

Duration of Stages.—Development of communities in this habitat proceeds quite slowly and does not attain great stature or complicated structure due to the harsh environmental conditions. The time required to proceed through the few successional

stages is not known, but is dependent on the severity of the local environmental and soil conditions. Presumably, the structure and composition of the climax communities do not change substantially over time. Severe changes in weather patterns — extended drought, for example — or other environmental conditions — landslide, mass-wasting, and destructive activities of animals or man — usually result in the communities of this habitat reverting to earlier successional stages.

Biological Setting

Habitat.—The Alpine Dwarf-Shrub habitat is restricted to the highest elevations generally above timberline. At the lower elevational extent of this habitat, it normally interfaces with 1) Subalpine Conifer (SCN) and closed cone pine/cypress (CPC) habitats, 2) Subalpine Forest or Foxtail Pine Forest in the north, 3) Sierran Mixed Subalpine Forest in the Sierra Nevada, 4) Southern California Subalpine Forest and 5) Bristlecone Pine Forest in the White Mountains. The Alpine Dwarf-Shrub habitat vegetation may sometimes constitute part of the Bristlecone Pine Forest where they intergrade. The Alpine Dwarf-Shrub habitat often intergrades with Alpine Talus and Scree Slopes in the summit regions of southern California mountains. This habitat also intergrades quite broadly with Subalpine Sagebrush in the White Mountains (Cheatham and Haller 1975).

Wildlife Considerations.—Birds common in this habitat (or adjacent alpine meadows) include blue grouse, rufous hummingbird, mountain bluebird and gray-crowned rosy finch. Mammals in this habitat include the Mount Lyell shrew, broad-footed mole, pika, white-tailed jackrabbit, yellow-bellied marmot, Belding's ground squirrel, northern pocket gopher or mountain pocket gopher, and mountain sheep (Storer and Usinger 1963).

Physical Setting

Generally, the Alpine Dwarf-Shrub habitat is found above timberline on all aspects, slopes, and ridgelines, so the physical environment tends to be cold, dry, and windy. In the northern portion of California, this habitat is cold with a brief summer growing season. This habitat is subject to intense solar radiation and freezing nights in summer. It is subject to severe winds and very low temperatures in winter on windward slopes, which are often blown clear of snow. Protected slopes often have persistent snowdrifts until midsummer or later. The substrate is quite rocky with little soil formation and excellent drainage. Plants in this habitat are subject to desiccation by midsummer after meltwater disappears.

In northern California, this habitat is cold with a brief summer growing season and is somewhat drier and cooler in the Sierra Nevada. In southern California, the habitat is less cold and accumulates less snow than the Sierra Nevada so it tends to be drier. It is also subject to severe winds from fall through spring. In the White Mountains, this habitat has much less snow, so it is significantly drier and colder than in the Sierra Nevada (Cheatham and Haller 1975).

The growing season occurs July and August in northern California and along the Sierra Nevada. Here, the growing season is often delayed until the beginning of August because of heavy snow accumulation. The growing season can also be limited by drought. The growing season in southern California normally begins in June (Cheatham and Haller 1975).

This habitat is found only in the highest elevations in California (see map). Toward the north, it is found on the highest peaks of the Klamath Range, usually above 2270 m (7500 ft). It is also



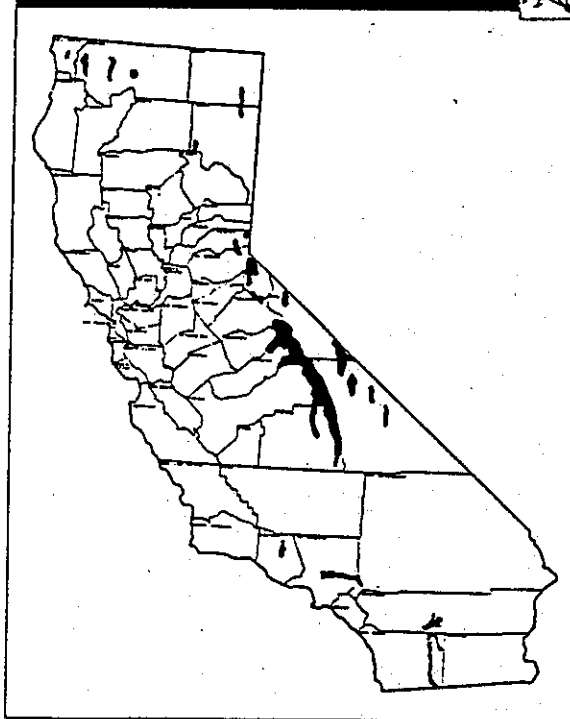
ADS
Alpine Dwarf-Shrub habitat, Lake Tahoe
Basin, California (photo by Gary Benson)

found on Mt. Shasta and Mt. Lassen from 2580 to 3180 m (8500 to 10,500 ft) and occasionally higher (Cheatham and Haller 1975). In the Sierra Nevada, it is confined to the highest peaks, from Lake Tahoe to Yosemite, usually above 2575 m (8500 ft). From that point southward, it is almost continuous along the Sierra Nevada crest to Olancha Peak (Tulare-Inyo county line). Toward the southerly extent along the Sierra Nevada, this habitat is found above 3480 m (11,500 ft). In southern California, it is confined to the summit region and adjoining ridgelines above 3030 m (10,000 ft) in the San Bernardino, San Gabriel, and San Jacinto mountains. Alpine Dwarf-Shrub is almost continuous along the main ridge of the White Mountains above 3480 m (11,500 ft) (Cheatham and Haller 1975).



Pika (*Ochotona princeps*)

Alpine Dwarf-Shrub



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Valley Oak Woodland

Lyman V. Ritter



Vegetation

Structure.—This habitat varies from savanna-like to forest-like stands with partially closed canopies, comprised mostly of winter-deciduous, broad-leaved species. Denser stands typically grow in valley soils along natural drainages. Tree density decreases with the transition from lowlands to the less fertile soils of drier uplands. Exceptions to this pattern are known, especially in the central coastal counties (N. H. Pillsbury, pers. comm.). Similarly, the shrub layer is best developed along natural drainages, becoming insignificant in the uplands with more open stands of oaks. Valley oak stands with little or no grazing tend to develop a partial shrub layer of bird-disseminated species, such as poison-oak, toyon, and coffeeberry (J. R. Griffin, pers. comm.). Ground cover consists of a well-developed carpet of annual grasses and forbs. Mature valley oaks with well-developed crowns range in height from 15 to 35 m (49 to 115 ft) (Cheatham and Haller 1975, Conard et al. 1977).

Composition.—Canopies of these woodlands are dominated almost exclusively by valley oaks (Conard et al. 1977). Tree associates in the Central Valley include California sycamore, Hinds black walnut, interior live oak, boxelder, and blue oak. The shrub understory consists of poison-oak, blue elder, California wild grape, toyon, California coffeeberry, and California blackberry. Various sorts of wild oats, brome, barley, ryegrass, and needlegrass dominate the ground cover.

Digger pine and coast live oak are associated with VOWs along the Coast Range (Parker and Matyas 1979). Griffin (1976) reported that Coulter pine and canyon live oak are found in a montane savanna of valley oak in the Santa Lucia Range, Monterey County.

Other Classifications.—This type is referred to as the Foothill Woodland by Murz and Keck (1959), Valley Oak Savanna (33) by Küchler (1977), the Valley Oak Phase of the Foothill Woodland by Griffin (1977), Valley Oak Series by Paysen et al. (1980), and Valley Oak Community by Parker and Matyas (1979). Conard et al. (1977) and others include VOWs in the Central Valley riparian zone, a vegetative division in the physiographic gradient extending from river edges to higher terraces. Cheatham and Haller (1975) included part of the VOW habitat in their Central Valley Bottomland Woodland (6.11), and Küchler (1977) included parts in his Riparian Forest (28) designation.

Habitat Stages

Vegetation Change 1:2-5:5-D.—In most remaining VOW, little recruitment of young oaks occurs to replace the veteran oaks dying of natural causes or being destroyed by urban and agricultural development (White 1966, Griffin 1973, 1976, 1977). The lack of oak recruitment seems to be related to animal damage of acorns and seedlings (Griffin 1980a, b). The successful combination of circumstances for valley oak establishment is speculative. The future of this habitat in valley locations seems to be fewer valley oaks and more open grassland (Griffin 1976). However, Griffin (1976) found that the current absence of ground fire encourages the invasion of evergreen oaks, Coulter pine, or both, in upland sites in the Santa Lucia Mountains.

Presently, most valley oak stands are in mature stages 5:5-D, but structural classes 1:5:5-D are presumably possible. Canopy development and plant density are variable. Only a few localized studies give quantitative data on the structure of VOW (see Griffin 1976, Conard et al. 1977).

Duration of Stages.—Secondary succession of VOWs under natural conditions has not been studied and little opportunity exists for its study. Most surviving stands appear to be between 100 and 300 years old, and individual valley oaks may live as long as 400 years (Stem 1977). Valley oaks seem to be tolerant of flood-

ing (Harris et al. 1980), and young trees will sprout when fire damaged (Griffin 1976). Given natural perturbations such as fire and flooding, and assuming successful regeneration of valley oaks, VOW would probably remain the climax community.

Biological Setting

Habitat.—VOWs in the Great Valley usually merge with Annual Grasslands or border agricultural land. Where these woodlands extend to the foothills surrounding the valley, they intergrade with Blue Oak Woodlands or Blue Oak-Digger Pine habitats. Near major stream courses this community intergrades with Valley-Foothill Riparian vegetation. West of the Coast Range, VOWs sometimes associate with Coastal Oak Woodlands and, to a limited extent, Montane Hardwood and Coastal Scrub.

Wildlife Considerations.—These woodlands provide food and cover for many species of wildlife. Oaks have long been considered important to some birds and mammals as a food resource (i.e., acorns and browse). Verner (1980) reported that 30 bird species known to use oak habitats in California include acorns in their diet. An average of 24 species of breeding birds were recorded on a study plot at Ancil Hoffman Park, near Carmichael, in Sacramento County from 1971 to 1973 (Gaines 1977). The study plot was dominated by valley oaks but included some cottonwood in the canopy. Probably the most significant breeding bird species recorded was red-shouldered hawk. In decreasing order, the most common species were European starling, California quail, plain titmouse, scrub jay, rufous-sided towhee, Bewick's wren, bushtit, and acorn woodpecker. Barrett (1980) indicates that the ranges of about 80 species of mammals in California show substantial overlap with the distribution of valley oaks, and several, such as fox and western gray squirrels and mule deer, have been documented using valley oaks for food and shelter.

Physical Setting

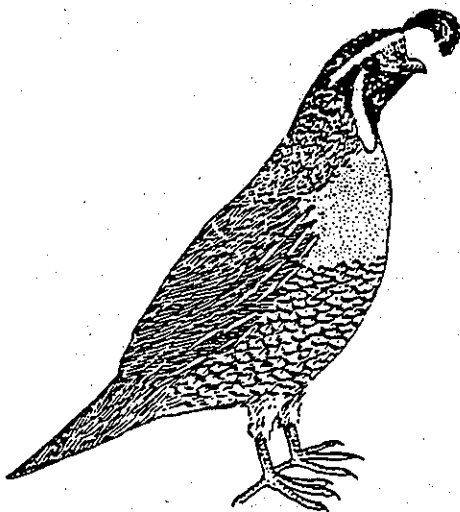
This habitat occurs in a wide range of physiographic settings but is best developed on deep, well-drained alluvial soils, usually in valley bottoms. Most large, healthy valley oaks are probably rooted down to permanent water supplies (Griffin 1973). Stands of valley oaks are found in deep sills on broad ridgetops in the southern Coast Range. Where this type occurs near the coast, it is usually found away from the main fog zone (Griffin 1978). The climate is Mediterranean, with mild, wet winters and hot, dry summers.

Distribution

Remnant patches of this habitat are found in the Sacramento Valley from Redding south, in the San Joaquin Valley to the Sierra Nevada foothills, in the Tehachapi Mountains, and in valleys of the Coast Range from Lake County to western Los Angeles County. Usually it occurs below 610 m (2000 ft), although Griffin (1976) reported a ridgetop stand at 1525 m (5000 ft) in the Santa Lucia Mountains.

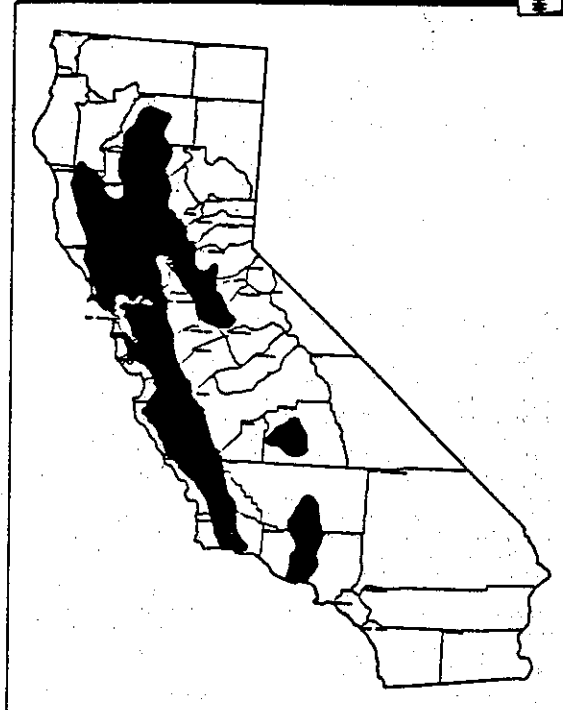


VOW
Valley Oak Woodland habitat, San
Joaquin Valley, California (photo by
Stan W. Eiams)



California Quail (*Callipepla californica*)

Valley Oak Woodland



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Blue Oak Woodland

Lyman V. Ritter



Vegetation

Structure.—Generally these woodlands have an overstory of scattered trees, although the canopy can be nearly closed on better quality sites (Pillsbury and De Lasaux 1983). The density of blue oaks on slopes with shallow soils is directly related to water stress (Griffin 1973). The canopy is dominated by broad-leaved trees 5 to 15 m (16 to 50 ft) tall, commonly forming open savanna-like stands on dry ridges and gentle slopes. Blue oaks may reach 25 m (82 ft) in height (McDonald 1985); the tallest tree, found in Alameda County, measured 28.7 m (94 ft) high and had a crown spread of 14.6 m (48 ft) (Pardo 1978). Shrubs are often present but rarely extensive, often occurring on rock outcrops. Typical understory is composed of an extension of Annual Grassland vegetation.

Composition.—Blue oak is the dominant species, comprising 85 to 100 percent of the trees present. Common associates in the canopy are coast live oak in the Coast Range, interior live oak in the Sierra Nevada, valley oak where deep soil has formed, and western juniper in the Cascade Range. In the Tehachapi and Palute Ranges in Kern County, this habitat mixes with species from east of the mountains—California juniper and single-leaf pinyon. In interior sections of the southern Coast Range, as in San Luis Obispo County, it mixes with California juniper (V. L. Holland, pers. comm.). Associated shrub species include poison-oak, California coffeeberry, buckbrush, redberry, California buckeye, and manzanita spp. The ground cover is comprised mainly of annuals, such as brome grass, wild oats, foxtail, needlegrass, filaree, fiddleneck, and others. Comprehensive descriptions of different BOW's can be found in White (1966), Griffin (1977), Baker et al. (1981), and Pillsbury and De Lasaux (1983).

Other Classifications.—The habitat is referred to as Foothill Woodland by Munz and Keck (1959), Blue Oak Phase of the Foothill Woodlands by Griffin (1977), Blue Oak Series by Paysen et al. (1980), Blue Oak Savanna by Verner and Boss (1980), and Blue Oak Community by Parker and Matyas (1981). BOW's and Blue Oak-Digger Pine Woodlands are considered a single habitat in Küchler's (1977) Blue Oak-Digger Pine Forest (25) and in the Blue Oak-Digger Pine (250) type of the Society of American Foresters (Eyre 1980).

Habitat Stages

Vegetation Changes 1:2:5:5-D.—Details of successional trends in this habitat type are poorly known. Succession presumably proceeds directly from annual grasslands to tree stages. Most stands of BOW exist as medium or large tree stages with few or no young blue oaks present (White 1966, Holland 1976, Griffin 1977, Baker et al. 1981). Therefore, only structural classes 3:5:5-D are likely to be found. Few areas can be found in California where successful recruitment of blue oaks has occurred since the turn of the century (Holland 1976). This may be due to changes in land use; increased consumption or damage of acorns and seedlings by insects, livestock, and native animals; competition between seedlings and introduced annuals for available soil nutrients and moisture; and the absence of appropriate climatic conditions. Where germination of acorns occurs, survival and growth of the seedlings typically fail. Probably in the drier savanna-like stands, the grassland openings will simply become larger as older trees die. Griffin (1977) suggests that live oaks may replace deciduous oaks in some areas, because their seedlings are more browse resistant. Many authorities question whether conditions will ever again support the recruitment of blue oaks needed to maintain these important woodlands.

Duration of Stages.—Valid generalizations about the duration of various successional stages leading to mature stands of BOW are not possible, because adequate quantitative studies have

never been done. The successional sequence probably takes at least 50 years, even on good sites. Age studies in the Coast Range (White 1966, Pillsbury and De Lasaux 1983) and the southern Sierra Nevada (Brooks 1969) indicate that most blue oak stands are currently 80 to 120 years in age. Blue oaks are relatively slow-growing, long-lived trees. Large blue oaks range in age from 153 to 390 years (White 1966). Estimation of tree age based on dbh measurements is risky, however, because the dbh relationship varies tremendously depending on site quality. Moreover, height growth is extremely slow or even ceases after trees reach 65 cm (26 in) in dbh (McDonald 1985).

Biological Setting

Habitat.—This type usually intergrades with Annual Grasslands or Valley Oak Woodlands at lower elevations and Blue Oak-Digger Pine woodlands at higher elevations.

Wildlife Considerations.—The importance of oak habitats to wildlife in California has recently been reviewed by Barrett (1980) and Verner (1980), but they give few details relevant specifically to BOW's. Verner and Boss (1980) give data on wildlife use in blue oak savannas of the western Sierra Nevada. They indicate that 29 species of amphibians and reptiles, 57 species of birds, and 10 species of mammals find mature stages of this type suitable or optimum for breeding, assuming that other special habitat requirements are met. Griffin (1971) concluded that acorns buried by scrub jays, yellow-billed magpies, western gray squirrels and California ground squirrels are more likely to germinate because they root better and are less likely to be eaten. Although many wildlife species benefit from the use of oaks and even enhance oak germination, additional information is needed on many aspects of oak-wildlife relationships before this habitat can be properly managed.

Physical Setting

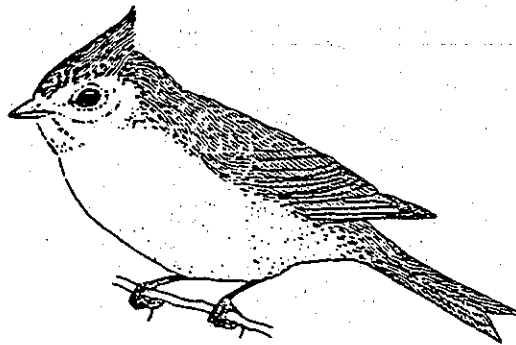
BOW's are usually associated with shallow, rocky, infertile, well-drained soils from a variety of parent materials (McDonald 1985). Blue oaks are well adapted to dry, hilly terrain where the water table is usually unavailable (Griffin 1973). The climate is Mediterranean, with mild wet winters and hot dry summers. Climatic extremes are relatively great in these woodlands, because they have a considerable geographic and elevational range. Average annual precipitation varies from 51 to 102 cm (20 to 40 in) over most of the blue oak's range, although extremes are noted from 25 cm (10 in) in Kern County to 152 cm (60 in) in Shasta County (McDonald 1985). Blue oaks have an unusual tolerance of severe drought, even shedding their leaves during periods of extreme moisture stress. This survival trait contributes to its pattern of distribution, as it competes most successfully with other tree species on drier sites (McDonald 1985). Mean maximum temperatures are from 24 to 36°C (75 to 96°F) in summer, and minima are from -2 to 6°C (29 to 42°F) in winter. The growing season ranges from 6 months in the north to the entire year in the south, with 175 to 365 frost-free days (Burcham 1975).

Distribution

BOW's occur along the western foothills of the Sierra Nevada-Cascade Ranges, the Tehachapi Mountains, and in the eastern foothills of the Coast Range, forming a nearly continuous ring around the Central Valley. The habitat is discontinuous in the valleys and on lower slopes of the interior and western foothills of the Coast Range from Mendocino County to Ventura County. It is generally found at elevations from 152 to 610 m (500 to 2000 ft) at the northern end of its range and on the western slopes of the Sierra Nevada, from 76 to 915 m (250 to 3000 ft) in the central Coast Range, and from 168 to 1370 m (550 to 4500 ft) in the Transverse and Peninsular Ranges (Sudworth (1908).

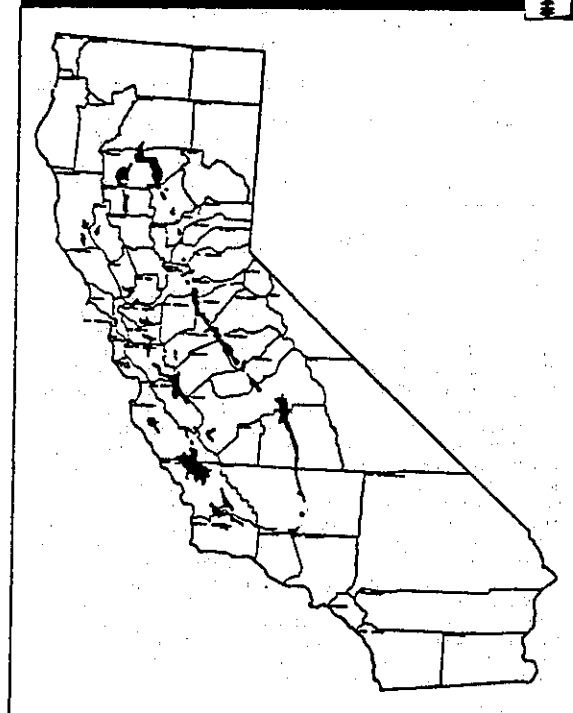


BOW
Blue Oak Woodland habitat, San Joaquin Experimental Range, California
(photo by Jared Verner)



Plain Titmouse (*Parus inornatus*)

Blue Oak Woodland



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Blue Oak—Digger Pine

Jared Verner



Vegetation

Structure.—This habitat is typically diverse in structure both vertically and horizontally, with a mix of hardwoods, conifers, and shrubs. The shrub component is typically composed of several species that tend to be clumped, with interspersed patches of Annual Grassland. Woodlands of this type generally have small accumulations of dead and downed woody material and relatively few snags, compared with other tree habitats in California. Most existing stands of this type are in mature stages, with canopy cover ranging from 10 to 59 percent, and dbh ranging from 2.5 to 30 cm (1 to 12 in). Size class 6 depends on a sparse overstory of digger pine above a lower canopy of oaks, as canopies of blue oak seldom exceed 15 m (50 ft) in height. Individual trees seldom exceed 125 cm (49 in) dbh, and exceptionally may reach 30 m (100 ft) in height.

Composition.—Blue oak and digger pine typically comprise the overstory of this habitat, with blue oak usually most abundant. Stands dominated by digger pine tend to lose their blue oak, which is intolerant of shade (P. M. McDonald, pers. comm.). In the foothills of the Sierra Nevada, tree species typically associated with this habitat are interior live oak and California buckeye. In the Coast Range, associated species are the coast live oak, valley oak, and California buckeye (Griffin 1977). Interior live oak sometimes dominates the overstory, especially in rocky areas and on north-facing slopes at higher elevations (Neal 1980).

At lower elevations, where blue oaks make up most of the canopy, the understory tends to be primarily annual grasses and forbs. At higher elevations where digger pines and even interior live oaks sometimes comprise the canopy, the understory usually includes patches of shrubs in addition to the annual grasses and forbs. Shrub species include *Ceanothus* spp., manzanita, whiteleaf manzanita, Parry manzanita, redberry, California coffeeberry, poison-oak, silver lupine, blue elder, California yerbana, rock gooseberry, and California redbud.

Other Classifications.—This type is referred to as Blue Oak-Digger Pine by the Society of American Foresters (Eyre 1980) and Parker and Matyas (1981), and as Blue Oak-Digger Pine Forest by Küchler (1977). Neal (1980) gives an excellent, short description of the type, and a more complete description can be gleaned from Griffin (1977) in his discussion of California's oak woodlands.

Habitat Stages

Vegetation Changes 1-2-5-5-D-6.—Succession presumably proceeds from annual grasslands directly to tree stages at lower elevations, where a shrub layer is usually sparse or absent. At higher elevations, shrubs and trees regenerate together.

Duration of Stages.—Secondary succession beginning with disturbed soil is rapid during early stages, with annual grasslands giving way to shrubs within 2 to 5 years. However, stands of mature shrubs adequate to provide habitat for those wildlife species requiring them take longer to develop—approximately 10 to 15 years. The conifers grow more rapidly than the hardwoods, maturing into relatively large trees even within 30 to 40 years, judging from the photo series taken at the San Joaquin Experimental Range in Madera County (Woolfolk and Reppert 1963). Most of the meager information on growth rates of blue oaks comes from sites in northern and central California. They generally grow slowly at all ages. Blue oaks in Nevada, Shasta, and Placer Counties showed little or no growth in height after they reached 65 cm (26 in) dbh (McDonald 1985). The age at which they normally begin producing acorn crops is unknown (M. McClaran, pers. comm.), but it likely takes several decades.

Concern has been expressed for the long-term existence of

this habitat (Holland 1976), because "little regeneration has occurred since the late 1800s, as livestock, deer, birds, insects, and rodents consume nearly the entire acorn crop each year. Of the few seedlings that become established a large proportion are eaten by deer" (Neal 1980:126). Furthermore, the absence of grazing livestock does not generally result in regeneration (White 1966), because many other animals eat acorns and seedling oaks. Moreover, introduced grasses are subject to burning, may compete directly with seedling oaks for light and nutrients, and may be allelopathic to the oaks.

The general absence of secondary successional stages of these woodlands has precluded detailed study of their composition or rates of change.

Biological Setting

Habitat.—As Griffin (1977:386) points out, "oak woodland seldom forms a continuous cover over large areas. It is a major item in a mosaic including valley grassland...and chaparral...with strips of riparian forest." This mosaic is reflected in the character of the understory in stands of BOP woodlands. At lower elevations, these woodlands merge with Annual Grasslands, Blue Oak Woodlands, and Valley Oak Woodlands. The Annual Grasslands actually extend into the woodlands as a ground cover where not shaded by shrubs. The Blue Oak Woodlands differ from the BOP type in lacking a conifer component and usually in lacking a shrub component.

At upper elevations, BOP habitats merge with extensive stands of Mixed Chaparral in most localities, although in some places the Ponderosa Pine type grows at an elevation low enough to form a mixed ecotone with Mixed Chaparral and BOP.

Wildlife Considerations.—BOP woodlands provide breeding habitats for a large variety of wildlife species, although no species is totally dependent on them for breeding, feeding, or cover. In the western Sierra Nevada, for example, 29 species of amphibians and reptiles, 79 species of birds, and 22 species of mammals find mature stages of this type suitable or optimum for breeding, assuming that other special habitat requirements are met (Verner and Boss 1980).

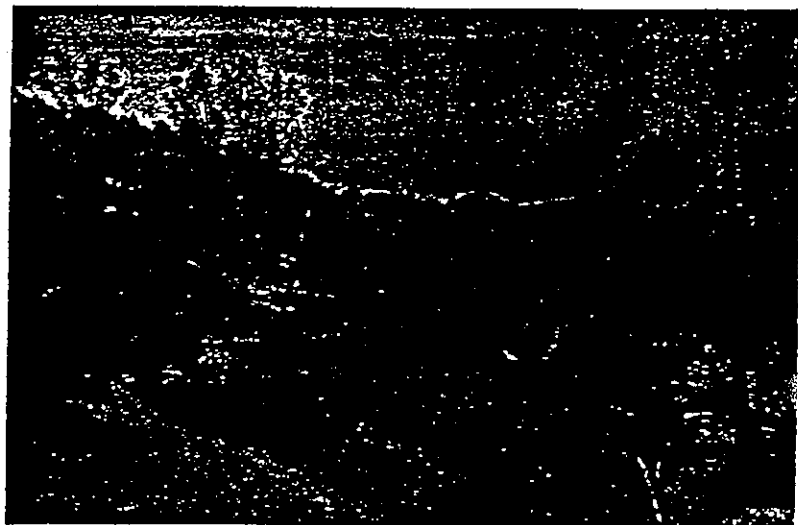
Most species breed during late winter and early spring—a factor to consider when planning management activities. Snags are less common, and hence less critical to wildlife, in this than in other forest types. Most species of cavity-nesting birds, for example, use living oaks. The cavities are often in scars where limbs have broken from the trunk or a main branch and have developed a level of decay that makes them more easily excavated by primary cavity nesters.

According to Olson (1974), blue oaks produce an abundant seed crop every 2 to 3 years and bumper crops every 5 to 8 years; however, McClaran (pers. comm.) questions that such a clear cycle of acorn production has been confirmed. In any case, acorns are an important food resource for many species of birds (Verner 1980) and mammals (Barrett 1980).

Physical Setting

The habitat occurs in a typically Mediterranean climate—hot, dry summers and cool, wet winters. Most precipitation falls as rain from November through April, averaging from 51 to 102 cm (20 to 40 in) within the primary range of blue oak (McDonald 1985). The frost-free growing season ranges from 150 to 300 days, with January minima averaging -1°C (30°F) and July maxima averaging 32°C (90°F) (McDonald 1985).

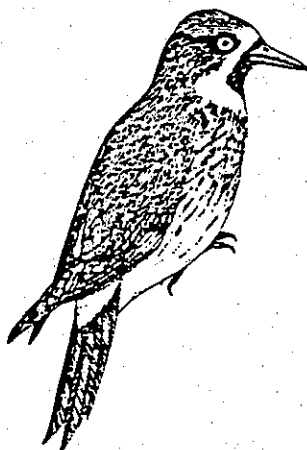
Soils are from a variety of generally well-drained parent materials, ranging from gravelly loam through stony clay loam. Soils rich in rock fragments are typical (McDonald 1985).



BOP
Blue Oak-Digger Pine habitat, western
slope Sierra Nevada, California (photo
by Jared Verner)

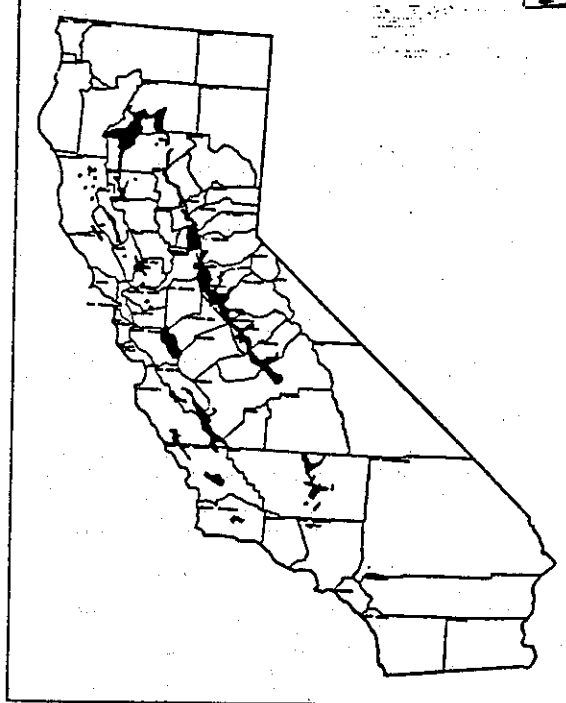
Distribution

The range of this habitat (well described by Neal, 1980) generally rings the foothills of the Central Valley, between 150 and 915 m (500 and 3000 ft) in elevation. The Pit River drainage in the Cascade Range and the foothills of the Klamath Mountains mark the approximate northern limit. The habitat is nearly continuous in the western foothills of the Sierra Nevada, except for a gap of 96 km (60 mi) between the Kings and Kern Rivers, where digger pine is missing. The distribution extends south into the Liebre Mountains of northern Los Angeles County and the drainages of Piru Creek and Santa Clara River in Ventura County. It is discontinuous in the Coast Range west of the Central Valley from Ventura to Mendocino Counties. And it extends westward to within 16 km (10 mi) of the coast in a few places (Griffin 1977, Neal 1980).



Acorn Woodpecker (*Melanerpes formicivorus*)

Blue Oak—Digger Pine



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Montane Hardwood

Philip M. McDonald



Vegetation

Structure.—A typical montane hardwood habitat is composed of a pronounced hardwood tree layer, with an infrequent and poorly developed shrub stratum, and a sparse herbaceous layer. On better sites, individual trees or clumps of trees may be only 3 to 4 m (10 to 13 ft) apart. On poorer sites, spacing increases to 10 m (26 to 33 ft). Where trees are closely spaced, crowns may close but seldom overlap. Living crowns on mature canyon live oaks occupy about 60 percent of the bole on typical sites and up to 80 percent on poor sites. Tree heights tend to be uniform at most ages in mature stands where hardwoods occur, but subordinate to conifers. Mature oaks on better sites and in canyons range between 17 and 30 m (56 and 98 ft) tall and up to 150 cm (59 in) dbh. On poorer sites, mature trees typically are 10 to 15 m (33 to 49 ft) tall with boles up to 65 cm (26 in) in dbh, with dome-shaped crowns almost as wide as the trees are tall. On rocky summits, canyon live oak is a shrub of small diameter, usually less than 4 m (13 ft) in height. Snags and downed woody material generally are sparse throughout the montane hardwood habitat.

Composition.—In the Coast Range and Klamath Mountains, canyon live oak often forms pure stands on steep canyon slopes and rocky ridgetops. It is replaced at higher elevations by huckleberry oak (Parker and Matyas 1980). At higher elevations, it is scattered in the overstory among ponderosa pine, Coulter pine, California white fir, and Jeffrey pine, the latter on serpentine and peridotite outcrops. Middle elevation associates are Douglas-fir, tanoak, Pacific madrone, California-laurel, California black oak, and bristlecone fir. Knobcone pine, Digger pine, Oregon white oak, and coast live oak are abundant at lower elevations. Understory vegetation is mostly scattered woody shrubs (manzanita, mountain-mahogany, poison-oak) and a few forbs.

In the Transverse and Peninsular ranges of southern California, overstory associates at middle and higher elevations are Jeffrey pine, ponderosa pine, sugar pine, incense-cedar, California white fir, bigcone Douglas-fir, California black oak, and Coulter pine. At lower elevations, associates are white alder, coast live oak, bigleaf maple, California-laurel, bigcone Douglas-fir, and occasionally valley oak, Digger pine, and blue oak (Cheatham and Haller 1975, McDonald and Littrell 1976). Understory shrub species are manzanita, poison-oak, coffeeberry, currant, and ceanothus.

In the southern Cascade and Sierra Nevada ranges, steep, rocky south slopes of major river canyons often are clothed extensively by canyon live oak and scattered old-growth Douglas-fir. Elsewhere, higher elevation overstory associates are typical mixed conifer and California black oak; lower elevation associates are Digger pine, knobcone pine, tanoak, Pacific madrone, and scrubby California-laurel. Associated understory vegetation includes Oregon-grape, currant, wood rose, snowberry, manzanita, poison-oak, and a few forbs and grasses.

Other Classifications.—In southwest Oregon, the species is part of the mixed evergreen (*Pseudotsuga-sclerophyll*) zone and to a lesser extent the conifer forest zone on drier areas (Franklin and Dyrness 1969). These classifications are pertinent to California as well. In California, canyon live oak occurs in 12 of the 17 forest communities described by Munz and Keck (1968), in 8 dominance types in the Sierra Nevada (Myatt 1980), and in 6 ecological provinces (Parker and Matyas 1980). Cheatham and Haller (1975) place canyon live oak in 8 minor subdivisions of 2 habitat types. Canyon live oak is recognized as a forest cover type by the Society of American Foresters and is an associate species in eight other types (Eyre 1980).

Habitat Stages

Vegetation Changes 12-SS-D.—Initial establishment of canyon live oak is by acorns, most of which do not move far from beneath tree crowns. Wider dissemination of acorns and seeds of

associate species is by birds and mammals. After establishment, canyon live oak sprouts vigorously from the root crown. Most hardwood associates also sprout prolifically. Rapid sprout growth enables the hardwoods to capture most of the favorable microsites, forcing the conifers to invade harsher sites, or those made harsh by hardwood roots below ground and hardwood shade above. Delayed establishment, slow growth, and sparse or clumpy distribution of conifers often results.

In most instances, succession is slow. Seldom is canyon live oak a pioneer species, but occasionally it invades and becomes established on alluvial soils (Heady and Zinke 1978). Canyon live oak has loose, dead, flaky bark that catches fire readily and burns intensely (Plumb 1980). Occasional fire often changes a stand of canyon live oak to live oak chaparral, but without fire for sufficient time, trees again develop. Where fire is frequent, this oak becomes scarce or even drops out of the montane hardwood community.

Duration of Stages.—A type more stable than Montane Hardwood is difficult to envision. The large number of species in the type, both conifer and hardwood, allow it to occupy and persist in a wide range of environments. Good soils and poor, steep slopes and slight, frequently disturbed and pristine—all are at least adequate habitats for one or more species. Longevity (at least 300 years for some species), and large size help to ensure dominance. Seed and sprout reproductive modes assure both widespread and stationary reproduction, and consequently several age and size classes usually are present in most areas. Growth of most hardwoods, especially canyon live oak, generally is slow and depends on depth and rockiness of soil, slope, and possibly length of time for roots to reach groundwater (Myatt 1980).

Biological Setting

Habitat.—At lower elevations, neighboring habitats are Valley-foothill Hardwood-conifer (VHC) and, to a lesser extent, Closed-cone Pine Cypress (CPC). At low and middle elevations, Mixed Chaparral (MCH) interfaces with Montane Hardwood. Wildlife habitats at middle elevations, often overlapping above and below, are Montane Hardwood-conifer (MHC), Mixed Conifer (MCN), Douglas-fir (DFR) and, to a lesser degree, Pine-juniper (PJN). At higher elevations, Montane Hardwood is neighbor to Eastside Pine (EPN), Jeffrey Pine (JPN), and Montane Chaparral (MCP).

Wildlife Considerations.—Bird and animal species characteristic of the Montane Hardwood habitat include disseminators of acorns (scrub and Steller's jays, acorn woodpecker, and western gray squirrel) plus those that utilize acorns as a major food source—wild turkey, mountain quail, band-tailed pigeon, California ground squirrel, dusky-footed woodrat, black bear, and mule deer. Deer also use the foliage of several hardwoods to a moderate extent. Many amphibians and reptiles are found on the forest floor in the Montane Hardwood habitat. Among them are Mount Lyell salamander, ensatina, relict slender salamander, western fence lizard, and sagebrush lizard. Snakes include rubber boa, western rattlesnake, California mountain kingsnake, and sharp-tailed snake.

Physical Setting

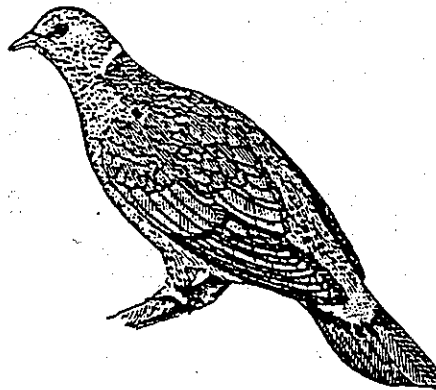
Canyon live oak and associates are found on a wide range of slopes, especially those that are moderate to steep. Soils are for the most part rocky, alluvial, coarse textured, poorly developed, and well drained. Soil depth classes range from shallow to deep. Canyon live oak, incense-cedar, and a few other associates are also found on ultrabasic soils. Mean summer temperatures in the Montane Hardwood habitat vary between 20° and 25°C (68° and 77°F) and mean winter temperatures between 3° and 7°C (37° and 45°F). Frost-free days range from 160 to 230 (Thornburgh 1986).



Annual precipitation varies from 2794 mm (110 in) in the northern Coast Range to 914 mm (36 in) in the mountains of southern California.

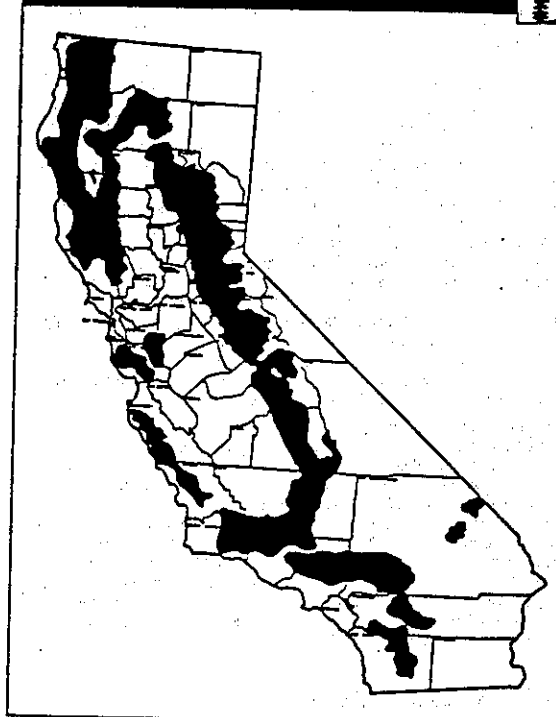
Distribution

The Montane Hardwood habitat ranges throughout California mostly west of the Cascade-Sierra Nevada crest. East of the crest, it is found in localized areas of Placer, El Dorado, Alpine, and San Bernardino Counties. Elevations range from 100 m (300 ft) near the Pacific Ocean to 2745 m (9000 ft) in southern California.

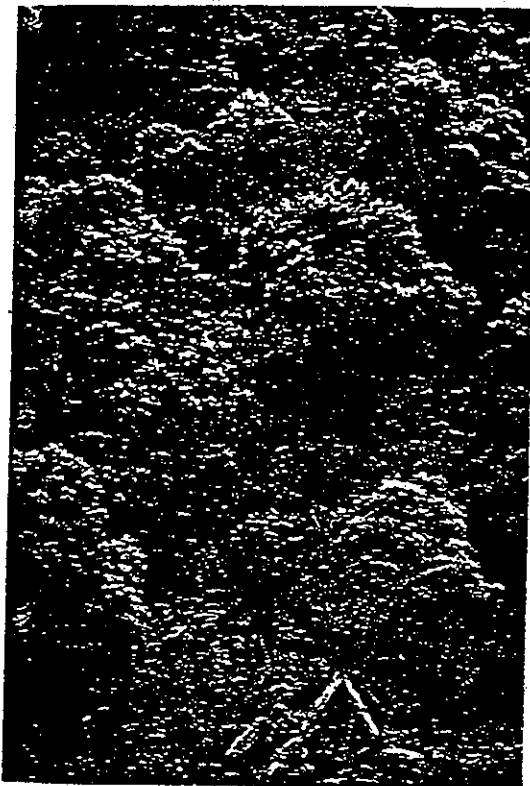


Band-tailed Pigeon (*Columba fasciata*)

Montane Hardwood



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.



MHW
Montane Hardwood habitat, Trinity County, California (photo by Philip McDonald)

Montane Hardwood-Conifer



Vegetation

Structure.—Montane Hardwood-Conifer (MHC) habitat includes both conifers and hardwoods (Anderson et al. 1976), often as a closed forest. To be considered MHC, at least one-third of the trees must be conifer and at least one-third must be broadleaf (Anderson et al. 1976). The habitat often occurs in a mosaic-like pattern with small pure stands of conifers interspersed with small stands of broad-leaved trees (Sawyer 1980). This diverse habitat consists of a broad spectrum of mixed, vigorously growing conifer and hardwood species. Typically, conifers to 65 m (200 ft) in height form the upper canopy and broad-leaved trees 10 to 30 m (30 to 100 ft) in height comprise the lower canopy (Proctor et al. 1980, Sawyer 1980). Most of the broad-leaved trees are sclerophyllous evergreen, but winter-deciduous species also occur (Cheatham and Haller 1975).

Relatively little understory occurs under the dense, bilayered canopy of MHC. However, considerable ground and shrub cover can occur in ecotones or following disturbance such as fire or logging. Steeper slopes are normally devoid of litter; however, gentle slopes often contain considerable accumulations of leaf and branch litter (Cheatham and Haller 1975).

Composition.—Common associates in MHC are ponderosa pine, Douglas-fir, incense-cedar, California black oak, tanoak, Pacific madrone, Oregon white oak, and other localized species. Species composition varies substantially among different geographic areas.

In the north coast, California black oak, Oregon white oak, golden chinquapin, and canyon live oak are commonly found with white fir, Douglas-fir, and ponderosa pine (Parker and Matyas 1981). In the Klamath Mountains and north coast from the Oregon border to Marin County, Oregon white oak, tanoak, Pacific madrone, red alder, Douglas-fir, western red cedar, western hemlock, ponderosa pine, sugar pine, and knobcone pine are common (Küchler 1977, McDonald 1980, Parker and Matyas 1981). In the northern interior, California black oak, bigleaf maple, Pacific madrone, and tanoak are common with ponderosa pine, white fir, incense-cedar, Douglas-fir, and sugar pine forming the overstory. In the northern Sierra Nevada, common associates include California black oak, bigleaf maple, white alder, dogwood, Douglas-fir, incense-cedar and ponderosa pine. In the southern Sierra Nevada, common associates include California black oak, black cottonwood, canyon live oak, Jeffrey pine, Douglas-fir, ponderosa pine, sugar pine, incense-cedar, and localized areas of giant sequoia (Küchler 1977, Parker and Matyas 1981). In the central coast, common associates include coast live oak, big leaf maple, Pacific madrone, tanoak, canyon live oak, Coulter pine, coastal redwood and, to a lesser extent, California black oak and ponderosa pine. In the northern central coast, Douglas-fir is found; while in the southern areas, bigcone Douglas-fir occurs. In the Tehachapi, transverse and peninsular ranges of Southern California, common associates include canyon live oak, Pacific madrone, coast live oak and, to a lesser extent, California black oak, ponderosa pine, sugar pine, and incense-cedar (Thorne 1976, Küchler 1977, Parker and Matyas 1981).

Other Classifications.—Montane Hardwood-Conifer is very diverse and has been given a variety of names in the literature including: Mixed Evergreen Forest (Munz and Keck 1973); Mixed Evergreen Zone - Second Growth Forest (Broadleaf 1.1.1H) (Mixed 1.2.31) (Proctor et al. 1980); Mixed Evergreen Forest with Chinquapin, Mixed Hardwood Forest, Mixed Hardwood and Redwood Forest, Oregon Oak Forest, Coulter Pine Forest (Küchler 1977); Mixed Evergreen Forest, Coast Range Mixed Conifer Forest, Santa Lucia Fir Forest, Coast Range Ponderosa Pine Forest, Coulter Pine Forest (Cheatham and Haller 1975); Santa Lucia Fir Series, Bigcone Douglas-fir Series, Madrone Series and Black Oak Series (Paysen 1980); Oregon White Oak (Stein 1980); Cali-

fornia Black Oak (McDonald 1980); Douglas-fir-Tanoak-Pacific Madrone (Sawyer, 1980); Black Oak Series, Maple-Alder-Dogwood Series, Mixed Conifer-Pine Series, Madrone-Tanoak Series (Parker and Matyas 1981).

Habitat Stages

Vegetation Changes 1:2-5:5-D;6.—This habitat is climax in most cases; however, it can occur as a seral stage of mixed conifer forests. Vegetation response following disturbance, such as fire or logging, begins with a dense shrubby stage dominated by taller broad-leaved species. The stand gradually increases in height, simultaneously developing into two canopy strata with faster growing conifers above and broad-leaved species below. On mesic sites the conifer component overtakes the hardwood component more rapidly than on xeric sites, where the hardwood component is dominant longer (McDonald 1980).

Duration of Stages.—Secondary succession following disturbance is vigorous, with shrubs and trees regenerating together. The conifer component develops into relatively large, mature trees within 30 to 50 years. The broad-leaved component normally requires 60-90 years. Eventually the conifer component overtakes the broad-leaved component. Successional sequence and timing varies geographically and differs depending on species and environmental factors such as climate, water, and soil.

Biological Setting

Habitat.—Geographically and biologically, Montane Hardwood-Conifer is transitional between dense coniferous forests and montane hardwood, mixed chaparral, or open woodlands and savannahs. MHC merges with many other habitats at its upper and lower ecotones. These habitats include Valley-Foothill Hardwood (VFH), Valley-Foothill Hardwood-Conifer (VHC), Valley-Foothill Riparian (VRI), Closed-Cone Pine-Cypress (CPC), Montane Hardwood (MHW), Mixed Conifer (MCN), Douglas-fir (DFR), Redwood (RDW), Montane Riparian (MRI), Montane Chaparral (MCP), and Mixed Chaparral (MCH). The habitat is an area of vegetational and floristic diversity with large numbers of endemic species (Proctor et al. 1980).

Wildlife Considerations.—Montane Hardwood-Conifer provides habitat for a variety of wildlife species. Mature forests are valuable to cavity nesting birds. Moreover, mast crops are an important food source for many birds as well as mammals. Canopy cover and understory vegetation are variable which makes the habitat suitable for numerous species. In mesic areas, many amphibians are found in the detrital layer. Due to geographic variation in components of Montane Hardwood-Conifer, caution must be exercised when predicting wildlife species use.

Physical Setting

Montane Hardwood-Conifer generally occurs on coarse, well-drained mesic soils, in mountainous terrain with narrow valleys. Slopes average approximately 57 percent with all aspects encountered. Winters are cool and wet; summers are hot and dry. Northern California Montane Hardwood-Conifer sites have less rainfall and fog than Redwood (RDW) or Mixed Conifer (MCN) habitats. In southern California, this habitat is found at higher elevations, and in moist canyons. Average rainfall is 60 to 170 mm (25 to 65 in), with some fog. The growing season is 7 to 11 months, with 200 to 300 frost-free days. Mean summer maximum temperatures are 25 to 36°C (75 to 95°F). Mean winter minima are -2 to 4°C (29 to 30°F) (Munz and Keck 1970).

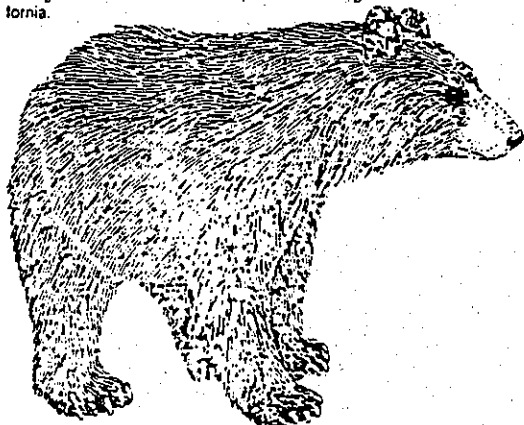
Richard Anderson



MHC
Montane Hardwood-Conifer habitat,
Sierra Nevada, California (photo by
Richard L. Anderson)

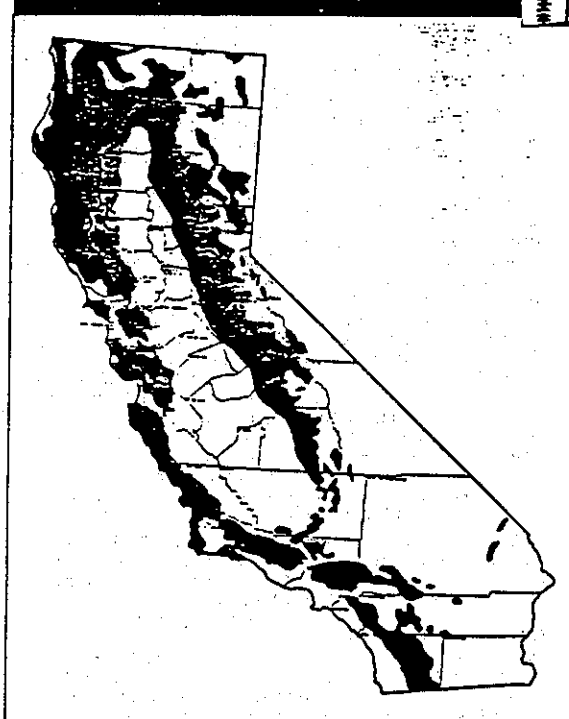
Distribution

Montane Hardwood-Conifer occurs throughout California and is somewhat continuous from Santa Cruz County northward through the outer coast range into Oregon, usually some distance inland from the coast (Cheatham and Haller 1975). The habitat typically follows the upper and/or inland margins of the coastal redwood (RDW) or Douglas fir (DFR) habitats. It can also be found on northfacing slopes of the inner north coast ranges, the Santa Lucia Mountains, as well as small patches extending to Santa Barbara County (Cheatham and Haller 1975). Montane Hardwood-Conifer also occurs somewhat continuously down the Sierra Nevada to the transverse ranges. Elevations range from 300 to 1210 m (1000 to 4000 ft) in the north to 605 to 1760 m (2000 to 5800 ft) in the south. Isolated patches of MHC can be found throughout the transverse and peninsular ranges of southern California.



Black Bear (*Ursus americanus*)

Montane Hardwood-Conifer



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Aspen

Jared Verner



Vegetation

Structure.—Mature stands of quaking aspen usually have relatively open canopies, often shared with other deciduous trees and a few conifer species, typically pines. Average canopy closures of stands in eastern California range from 60 to 100 percent in young and intermediate-aged stands and from 25 to 60 percent in mature stands (E. L. McGraw, pers. comm.). Quaking aspens often attain a height of 18 m (60 ft) and a diameter of 0.6 m (2 ft) (Brockman et al. 1968). Extraordinary trees may reach a height of 30 m (100 ft) and a diameter of about 1 m (3 ft) (Strothmann and Zasada 1957). The open nature of the stands results in substantial light penetration to the ground. Therefore all stands have an herbaceous understory with about half maintaining a tall shrub layer (DeByle and Zasada 1980).

Composition.—Aspen stands are typically composed of clones representing one or more genetic lines. They vary from a few stems on less than 1 ha (2.5 acres) to thousands of stems on 20 ha (50 acres) or more (Barnes 1975). Associated subdominant tree species may include willows, alders, black cottonwood, lodgepole pine, Jeffrey pine, ponderosa pine, red fir, white fir, Douglas-fir, and Engelmann spruce (Thorne 1977, DeByle and Zasada 1980, Parker and Matyas 1981). In communities near climax, however, quaking aspen is conspicuously the dominant species in the canopy.

Important understory shrubs include sagebrush, roses, snowberry, western chokecherry, and western serviceberry. Forbs are usually more abundant than grasses and sedges, and the herbaceous component is typically so rich and diverse as to defy description (DeByle and Zasada 1980).

Other Classifications.—This cover type is referred to as Aspen Woodland by Thorne (1977), Quaking Aspen by Parker and Matyas (1981), and the Aspen Series by Payson et al. (1980). DeByle and Zasada (1980) describe the type over its entire distribution in the United States and Canada.

Habitat Stages

Vegetation Changes 1:2-5:5-D:6.—Following disturbance, succession proceeds rapidly from an herbaceous layer to shrubs and trees, which invade together. The successional status of aspen stands is unsettled. Most authorities regard it as an early seral stage that invades after fire or other disturbances (Strothmann and Zasada 1957). Consequently, successful, long-term suppression of fires or excessive grazing and browsing by ungulates may result in the eventual disappearance of quaking aspen from an area (Gruell and Loope 1974).

All stands spread by root suckering, resulting in stands comprised of a mosaic of clones of different ages, ranging in size from less than 1 ha (2.5 acres) to more than 20 ha (50 acres) (DeByle and Zasada 1980). Quaking aspens, intolerant of shade, are gradually replaced by more shade-tolerant conifers. "Owing sometimes to the paucity of coniferous seed trees and perhaps also to increasing aridity, the rate of coniferous invasion is so slow that a virtually permanent (climax) type has developed on some sites. On these, aspen vegetatively reproduces repeatedly and develops into all-aged stands" (DeByle and Zasada 1980:96).

Duration of Stages.—The rate of succession in aspen stands varies considerably, even within the same physiographic province (Bartos 1973). Therefore, it is difficult to generalize about the rates. Typically, however, early successional stages are of short duration. The herbaceous stage gives way to a shrub-seedling stage within 5 years. The shrub-seedling stage develops into a pole-sized stand usually within 10 to 15 years, with trees maturing within 30 years. Although quaking aspens are relatively short-lived trees, and subject to significant heart rot, DeByle and Zasada (1980) report intact stands 200 years of age.

Biological Setting

Habitat.—Aspen stands in California occur primarily at higher elevations near seeps, streams, and meadows on the eastern slopes of the Sierra Nevada and Cascade Ranges. Zonally they are found within the Red Fir, Mixed-conifer, and Lodgepole Pine habitats (Thorne 1977, Parker and Matyas 1981). Aspens commonly occur adjacent to Sagebrush habitats and other montane shrub types, where they are often the only tree species present. They are also found along streams adjoining Jeffrey Pine habitats. At higher elevations they occur with whitebark pine, where they grow in a shrubby, wind-pruned form (Parker and Matyas 1981).

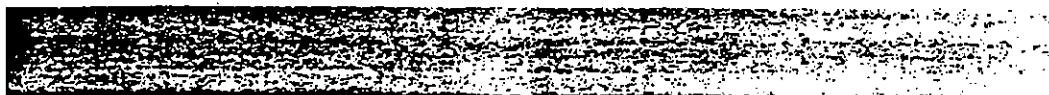
Wildlife Considerations.—Although no wildlife species is totally dependent on habitats dominated by aspen, this cover type adds significantly to the richness of the wildlife in areas where it occurs. The habitat typically has a shrubby ecotone with adjacent meadows. This and the shrub understory within stands provide nesting cover for several species that might otherwise be scarce or absent. The mesic sites that permit aspen to establish also result in higher insect production compared to adjacent forests or shrublands. Such insect production, together with a high rate of fungal infection of trees, is thought to account for the greater variety and abundance of birds in ASP habitats than in adjacent forests and shrublands (Wintemitz 1980). Aspen stands are habitats favored by a variety of cavity-nesting birds, such as bluebirds, sapsuckers, downy woodpeckers, and chickadees. Snags are important to cavity nesters in these stands, but live aspens are easily and therefore commonly drilled by excavating species. On the eastern slopes of the Sierra Nevada, aspen stands adjoining sagebrush and other shrub habitats apart from forested sites often provide nesting cover for northern goshawks. (E. L. McGraw pers. comm.).

Physical Setting

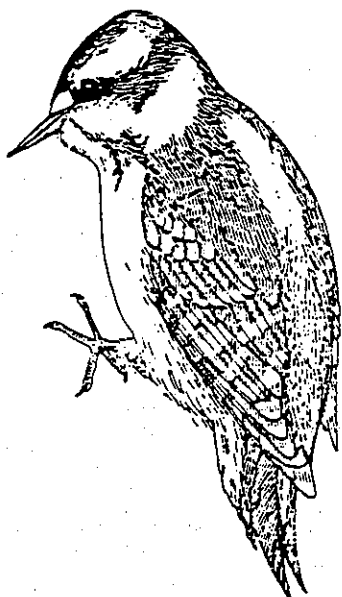
Aspen stands occur at high elevations on a variety of sites and soils. A high water table during the early part of the growing season is required. Therefore, these stands are good indicators of moist conditions (Parker and Matyas 1981). Sites with permanent high water tables are occupied by willows (Thorne 1977), with which aspens may form ecotones. Soils range "from shallow stony soils and loamy sands to heavy clays. Best development occurs on well-drained sandy to silt loam soils" (DeByle and Zasada 1980). The climate is rigorous—long winters with heavy snows and very cold temperatures, hence a short growing season.

Distribution

Most ASP habitats in California are found within 80 km (50 mi) of the Nevada border from Mono County to Plumas County. Small stands are scattered generally north and westward from there into northern Trinity and western Siskiyou Counties (Griffin and Critchfield 1972). Disjunct populations occur in the White and San Bernardino Mountains (Lloyd and Mitchell 1966, Payson et al. 1980). Elevational limits generally range from 2000 to 3000 m (6550 to 9850 ft), although quaking aspen occurs as low as 915 m (3000 ft) at McArthur-Burney Falls State Park, Shasta County (Griffin and Critchfield 1982). Aspen stands do not extend to the upper tree line in any locality (DeByle and Zasada 1980).

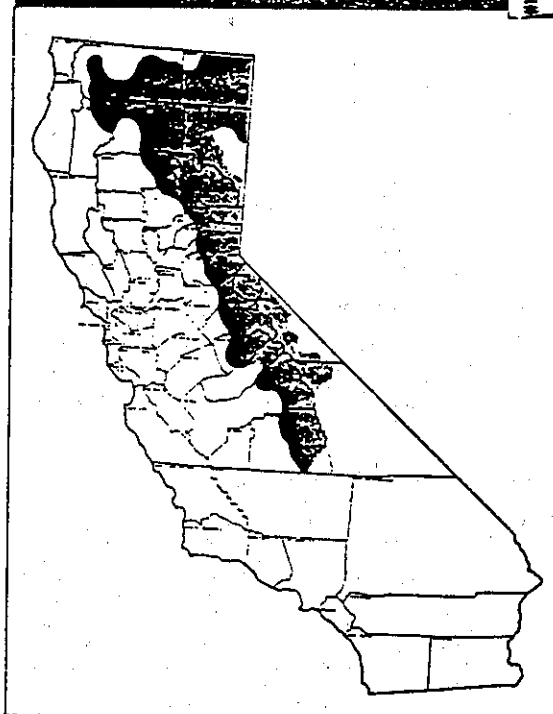


ASP
Aspen habitat, Tuolumne County, California (photo by William F. Laudenslayer, Jr.)



Downy Woodpecker (*Picoides pubescens*)

Aspen



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Ponderosa Pine

E. Lee Fitzhugh



Vegetation

Structure.—Tree spacing in ponderosa pine stands varies from open patchy to extremely close. On high quality sites, virgin stands may be 46-55 m (150-180 ft) high, with diameters from 0.9-1.2 m (3-4 ft) (Harlow and Harar 1950). Typical overstory coverage of all layers may exceed 100% (Vankat 1970). Other conifers, when present, provide denser crowns than do the pine, thus creating habitat diversity. Grasses, shrubs, and deciduous trees may be present or absent. Typical coverage of shrubs is 10-30% and of grasses and forbs is 5-10% (Barbour 1986).

Composition.—The ponderosa pine habitat includes pure stands of ponderosa pine as well as stands of mixed species in which at least 50% of the canopy area is ponderosa pine. Associated species vary depending on location in the state and site conditions. Typical tree associates include white fir, incense-cedar, Coulter pine, Jeffrey pine, sugar pine, Douglas-fir, bigcone Douglas-fir, canyon live oak, California black oak, Oregon white oak, Pacific madrone and tanoak.

Associated shrubs include manzanita, ceanothus, mountain-misery, Pacific dogwood, hairy yerba-santa, yellowleaf silktassel, bitter cherry, California buckthorn, poison-oak, Sierra gooseberry.

Grasses and forbs include slimleaf brome, Orcutt brome, carex, smallflower melicgrass, bluegrass, bottlebrush squirreltail, bed-straw, brackenfern, bush morning-glory, rhomboid clarkia, Child's blue-eyed mary, shrubby eriostem, splendid gilia, Sierra iris, whisker-brush, lryo bush lupine, summer lupine, purple nightshade, streptanthus, goosefoot violet, and wildiris.

Other Classifications.—The ponderosa pine habitat, as defined here, forms a part of the yellow pine forest of Munz and Keck (1959) and Thorne (1977), the montane forest of Griffin and Critchfield (1976), the ponderosa/Jeffrey pine series of Payson, *et al.* (1980) and the mid-montane conifer forest of Barbour (1986). More restrictive types which include only a part of the ponderosa pine habitat are Pacific ponderosa pine (245) (Eyre 1980), ponderosa pine (Parker and Matyas 1979 and Barbour and Major 1977), western Sierra ponderosa pine forest (Barry unpublished, cited in Cheatham and Haller 1975), ponderosa pine series of the Sierra montane conifer forest (Pase 1982a), Coast Range ponderosa pine forest and "westside" ponderosa pine forest (Cheatham and Haller 1975), and Sierran yellow pine forest (Küchler 1977). In addition, on those sites where ponderosa pine is dominant, portions of other montane forests (Küchler 1977), and Pacific ponderosa pine-Douglas-fir (Barbour 1986), and mixed conifer (244, 243), (Eyre 1980) are included in ponderosa pine habitat.

Habitat Stages

Vegetation Changes 1:2-5:SD.—Most ponderosa pine stands that include other coniferous trees probably are maintained by periodic ground fires. In many of these stands, crown fires result in dense montane chaparral communities (Cheatham and Haller, 1975). Young, dense stands, as in plantations, exclude most undergrowth once trees attain a closed canopy. Prior to that, dense brush is typical, but an herbaceous layer may develop on some sites.

Duration of Stages.—On sites or areas that are dry or of low quality, significant pine regeneration may depend on concurrent disturbance of chaparral and a good pine seed crop with favorable weather. Thus, it may require 50-100 years for significant pine regeneration in the absence of intervention. Clearcuts with minimal brush control develop a dense stand of pole-size trees in 20-30 years, twice the time required when brush is completely removed. Dense brush is typical in young stands and an herbaceous layer may develop on some sites. On drier sites, there is less tendency for succession toward shade-adapted species.

Sites disturbed by fire or logging sometimes are converted to dense montane chaparral or mixed chaparral. Moist chaparral areas of higher site quality tend to develop directly into mixed conifer stands.

As young, dense stands age and attain a closed canopy, they exclude most undergrowth. When other adapted conifers occur in moist ponderosa pine stands of medium to high site quality, they may form a significant understory in about 20 years in the absence of fire. If allowed to continue, such succession may change the structure and composition of the stand within 40 years sufficiently to favor wildlife adapted to mixed conifer habitats. Most ponderosa pine stands that include other coniferous trees probably are maintained by periodic ground fires (Cheatham and Haller 1975).

Biological Setting

Habitat.—In Northern California, ponderosa pine stands occur above coastal oak woodland, valley oak woodland, blue oak woodland, blue oak-digger pine and below mixed conifer. Montane hardwood stands may be below or interspersed with ponderosa pine. Jeffrey pine stands often occur above ponderosa pine, but may be found on serpentine soils or on harsh sites at lower elevations in the ponderosa pine zone. Farther south, coastal scrub, chamise-redshank, mixed chaparral, or woodland oaks are typical at the lower boundary of the ponderosa pine habitat, with bigcone Douglas-fir or true firs at the upper edge. Dry, rocky sites within the habitat may support montane chaparral, mixed hardwood-conifer or closed-cone pine-cypress. Isolated, small patches of bigcone Douglas-fir may occur in mesic canyons or on north-facing slopes within ponderosa pine stands.

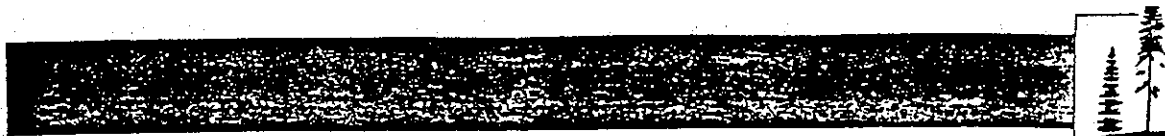
Wildlife Considerations.—Ponderosa pine sometimes is a transitional or migratory habitat for deer and can be extremely important to deer nutrition in migration holding areas. A mixture of early and late successional stages closely interspersed probably will provide good general wildlife habitat, but riparian zones, deer migratory routes and holding areas require special consideration during management planning. The California condor uses the ponderosa pine habitat from Madera and Santa Clara Counties southward. Moreover, the Sierra Nevada red fox, Siskiyou mountain salamander and Shasta salamander also are found in the habitat.

Physical Setting

The lower elevational limit of the habitat may correspond to a mean annual temperature less than 13°C (55°F) and precipitation greater than 350 mm (33 in) except in southern California (Barbour 1986). Brown (1982) reported a minimum precipitation level of 635 mm (25 in) annually in the Peninsular Ranges. Ponderosa pine is found on all aspects, depending on soils and location within the local elevational range. Less than one-third of the precipitation is snowfall (Barbour 1986).

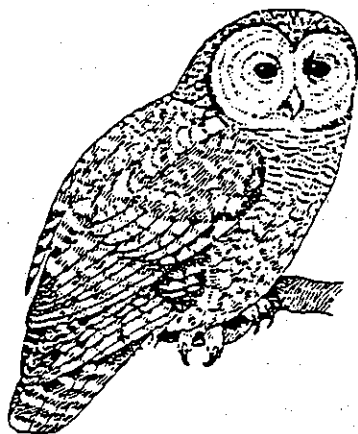
Distribution

Ponderosa pine habitat is found on suitable mountain and foothill sites throughout California except in the immediate area of San Francisco Bay, in the north coast area, south of Kern County in the Sierra Nevada and east of the Sierra Nevada Crest. Elevational ranges include 240-180 m (800-5000 ft) in the northern Sierra Nevada and Cascades, 1200-2100 m (3937-6890 ft) in the central and southern Sierra Nevada and 1300-2140 m (4265-7021 ft) in the Transverse and Peninsular Ranges, although it may be



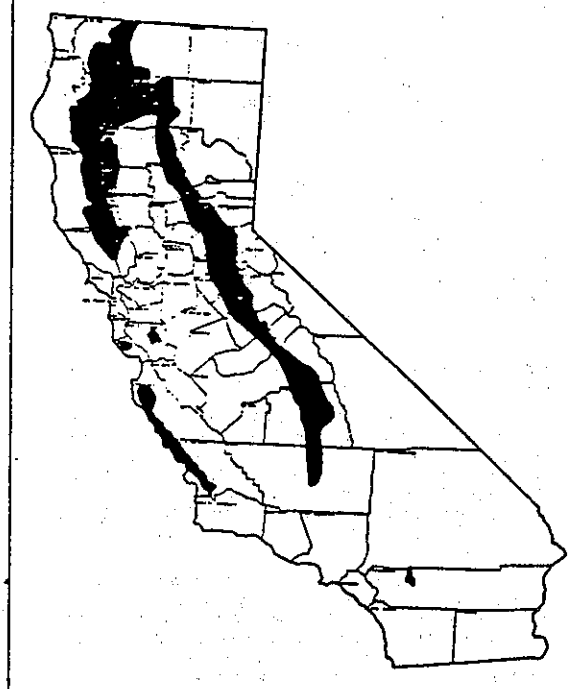
PPN
Ponderosa Pine habitat, Trinity County,
California (photo by E. Lee Fitzhugh)

found as low as 105 m (3445 ft) in moist south-coastal sites (Rundel *et al.* 1977, Thorne 1977, Brown 1982 and Cheatham and Haller 1975). The ponderosa pine habitat is replaced by Jeffrey pine on the Mojave Desert slopes of the Transverse Range and often on the eastern side of the Peninsular and Coast Ranges.



Spotted Owl (*Strix occidentalis*)

Ponderosa Pine



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Sierran Mixed Conifer

Barbara H. Allen



Vegetation

Structure.—The Sierran mixed conifer habitat is an assemblage of conifer and hardwood species that forms a multilayered forest. Historically, burning and logging have caused wide variability in stand structure, resulting in both even-aged and uneven-aged stands (Rundel et al. 1977). Virgin old-growth stands where fire has been excluded are often two-storied, with the overstory comprised of mixed conifer and the understory white fir and incense-cedar (Tappeiner 1980).

Forested stands form closed, multilayered canopies with nearly 100 percent overlapping cover (Rundel et al. 1977). When openings occur, shrubs are common in the understory (Kosco 1980). Closed canopy stand distribution is both extensive and patchy depending on scale, site, slope, soils, microclimate, and history.

At maturity, the dominant conifers range from 30 to 60 m (100 to 200 ft) tall with a highly variable basal area of about 17 to 26 sq m (180 - 280 sq ft). Diameter breast height at maturity for pines and Douglas-fir is commonly greater than 1 m (40 in); white fir greater than 0.9 m (35 in) is common (Laake and Fiske 1983b). Fuel loading in stands heavy with pine may reach 27,000 kg/ha (70 to 80 t/ac) in natural stands; whereas fuel loading in stands heavy with fir may reach 16,000 kg/ha (40 to 50 t/ac).

Composition.—Five conifers and one hardwood typify the mixed conifer forest — white fir, Douglas-fir, ponderosa pine, sugar pine, incense-cedar, and California black oak. White fir tends to be the most ubiquitous species (though most often a minor overstory component) because it tolerates shade and has the ability to survive long periods of suppression in brush fields. Douglas-fir dominates the species mix in the north, but is absent south of the Merced River (Tappeiner 1980). Ponderosa pine dominates at lower elevations and on south slopes. Jeffrey pine commonly replaces ponderosa pine at high elevations, on cold sites, or on ultramafic soils (Rundel et al. 1977). Red fir is a minor associate at the highest elevations. Sugar pine is found throughout the mixed conifer type. Black oak is a minor, but widespread, component in mixed conifer stands. Though black oak does best on open sites, it is maintained under adverse conditions such as shade, ridgetops, and south slopes where conifers may regenerate in its shade (Tappeiner 1980). In the central and particularly southern Sierra Nevada, giant sequoia is a striking associate of the mixed conifer type (Rundel et al. 1977). White fir, incense-cedar and sugar pine are associated with the mesic giant sequoia sites (Tappeiner 1980).

Deerbrush, manzanita, chinquapin, tan oak, bitter cherry, squawcarpet, mountain whitethorn, gooseberry, rose, and mountain misery are common shrub species in the mixed conifer understory (Kosco and Bartolome 1983). Grasses and forbs associated with this type include mountain brome, *Carex*, bull thistle, iris, *Juncus*, and needlegrass. In all, over 100 species of grasses, forbs and shrubs contribute to the flora of the mixed conifer habitat (Tappeiner 1980).

Other Classifications.—Other names for the Sierran mixed conifer habitat include yellow pine forest (Munz 1973). Parker and Matyas (1981) divide Sierran mixed conifer into five series: mixed conifer-fir, mixed conifer-pine, ponderosa pine, white fir and Jeffrey pine. Rundel et al. (1977) describes the mixed conifer as part of a White fir-mixed conifer forest and Cheatham and Haller (1975) call this habitat Sierran coniferous forest (8.42), a major subdivision of the lower montane coniferous forest habitat (8.4). Sierran mixed conifer is SAF type 243 (Tappeiner 1980). Where ponderosa pine or Douglas-fir predominates without significant amounts of white fir or incense-cedar, the forest is typed as Pacific ponderosa pine or Pacific ponderosa pine-Douglas-fir (SAF types 245 and 244, respectively) (McDonald 1980).

Habitat Stages

Vegetation Changes 1;2-5;S-D;6.—After logging or burning, succession proceeds from an ephemeral herb to perennial grass-herb, through a shrub-perennial grass stage, to conifers (Burham 1964). In many areas, however, shrubs appear in the first year after disturbance (Kosco 1980). The habitat stages are stage 1, grass-forb, with bedstraw, plantain, mountain brome, and needlegrass as common early succession species; stage 2, shrub-seedling-sapling, characterized by manzanita, *Ceanothus*, cherry, gooseberry, and mountain misery. In the seedling tree stage through the sapling tree, pole tree, small tree, and medium/large tree stages, the five conifers gain dominance of the site.

Duration of Stages.—Stage duration has been described by Verner (1980). The grass-forb stage, generally is short-lived (less than 2 years). The shrub-seedling-sapling stage is usually evident by yr 2 and lasts 10 to 40 yr; this stage is a mixture of shrubs and saplings up to 6 m (20 ft) tall depending on the site, degree, and type of disturbance. If tall shrubs capture the site, it may take 10 to 15 plus yr for trees to dominate the site. The pole-medium tree stage supports trees up to 15 m (50 ft) tall and may last from 15 to 90 yr on poor sites. The mature and overmature stages include stands greater than about 30 m (100 ft) in height.

Biological Setting

Habitat.—The type adjoins the Pacific ponderosa pine-Douglas-fir type (SAF 244) in the Klamath Mountains and Cascade Range, the Pacific ponderosa pine (SAF 245) and interior ponderosa pine (SAF 237), (PPN) at lower elevations and drier slopes, and the white fir (SAF 211), (WFR) and red fir (SAF 207), (RFR) types at higher elevations. Montane meadows and riparian deciduous woodlands are found within the Sierran mixed conifer type. Digger-pine oak, blue oak savannah and chaparral types may adjoin this type at drier, and lower elevations.

Wildlife Considerations.—The mixed conifer forest supports some 355 species of animals (Verner and Boss 1980). Sensitive species inhabiting mixed conifer include spotted owl, fisher and pine marten. Endangered species include bald eagle and peregrin falcon (Verner and Boss 1980). Variety in plant species composition provides diversity in food and cover. Black oak acorns, berries from a variety of shrubs (e.g., deerbrush), and a great number of grasses and forbs provide the forage resource essential for wildlife (Kosco and Bartolome 1983).

Physical Setting

Soils supporting the Sierran mixed conifer habitat are varied, derived primarily from Mesozoic granitic, Paleozoic sedimentary and volcanic rocks; and Cenozoic volcanic rocks. Serpentine soils, found primarily in the northern mixed conifer zone, support a number of endemic plants. Soils are deep to shallow. Fissures and cracks in granitic parent material often support forest growth, even where soil development is shallow. Temperatures range from 24 to 58°C (40 to 96°F) in summer and 4 to 36°C (-10 to 60°F) in winter and decrease with elevation (Major 1977). The growing season ranges between 90 and 330 days in the north with 40 to 200 frost-free days, and 180 to 365 days in the south with 180 frost-free days. Precipitation ranges from 76 to 229 cm (30 to 90 in) per year, from October to May, with increasing snowfall as elevation increases.



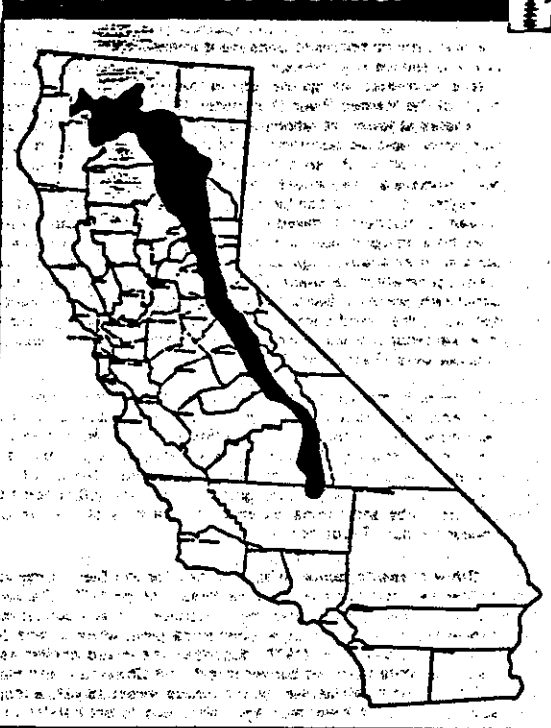
Distribution

The Sierran mixed conifer habitat generally forms a vegetation band ranging 770 to 1230 m (2500 to 4000 ft) in the north to 1230 to 3076 m (4000 to 10,000 ft) in the southern Sierra Nevada (Griffin and Critchfield 1972). The Sierra Nevada mixed conifer forest occupies between 1.8 to 3.2 million ha (4.5 to 7.8 million ac) in southern Oregon and California, dominating western middle elevation slopes of the Sierra Nevada. Disjunct populations of mixed conifer are found in the Peninsular, Transverse, and Coast ranges of California.

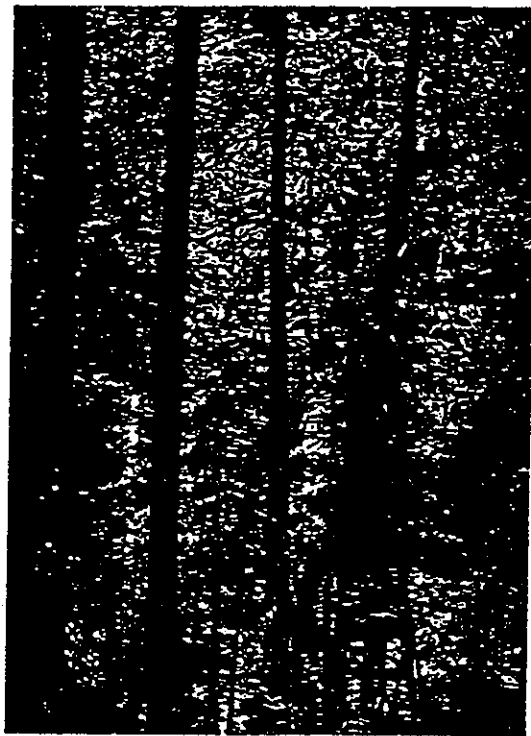
The Pileated Woodpecker (*Dryocopus pileatus*) is a large woodpecker with a black cap and white face. It is found in the Sierra Nevada mixed conifer forest, where it feeds on insects in the bark of trees. The Pileated Woodpecker is a common species in this habitat, and its presence is often a good indicator of the health of the forest.

Pileated Woodpecker (*Dryocopus pileatus*)

Sierran Mixed Conifer



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist. It is not intended to represent actual distribution, but rather to show the potential range of the habitat.



SMC Sierran Mixed Conifer habitat, Rubicon River, Placer County, California (photo by Robert F. Holland)

White Fir

Karen Shimamoto



Vegetation

Structure.—The White Fir (WFR) habitat is characterized by nearly monotypic even-aged overstory (Cheatham and Haller 1975, Paysen et al. 1980, Riegel 1982, Rundel et al. 1977). Overlapping crowns that cast deep shade are characteristic, although open stands are common (Cheatham and Haller 1975, Eyre 1980, Riegel 1982). Northern California specimens grow to about 70 m (230 ft) in height. Southern California specimens grow to about 30 m (100 ft) (Cheatham and Haller 1975). The understory may consist of sparsely scattered grasses, forbs, and shrubs, or white fir seedlings and saplings (Cheatham and Haller 1975, Eyre 1980, Paysen et al. 1980). However, on moist swales or drainage bottoms, herbaceous cover may approach 100 percent (Rundel et al. 1977). Downed material usually consists of logs, branches and needle litter (Cheatham and Haller 1975). Fire influences the white fir habitat by causing a mosaic of even-aged stands in different successional stages.

Composition.—Mature white fir stands, normally monotypic, with more than 80 percent occurring as white fir, are found throughout California; from the Klamath Mountains along the north coast to the south coast mountain ranges, and in interior ranges from the Warner Mountains in the Great Basin to the Clark, Kingston, and New York mountain ranges in interior southern California (Rundel et al. 1977, Parker and Matyas 1981).

Shade and downed woody material tend to inhibit understory species (Parker and Matyas 1981). In the Klamath Mountains, for example, canyon live oak and chinquapin are the predominant understory species and open stands usually include squawcarrapet and barberry. Dense stands, however, have herbaceous species such as wake robin, vetch, and pipissisewa. Jeffrey pine is an associate in the Cascades and Warner mountain ranges, with greenleaf manzanita and currant as understory shrubs. Tree associates change in the southern Sierra Nevada, where sugar pine, incense-cedar, and red fir are found. Pipissisewa, wintergreen, currant, and snowplant are in the understory (Cheatham and Haller 1975). In the south coast range and south interior range, sugar pine and single-leaf pinyon occur as associates of white fir, most commonly on cool, north- and east-facing slopes, respectively. Rundel et al. (1977) describes white fir vegetative composition over elevational and moisture differences in the Sierra Nevada.

Other Classifications.—Historically, the white fir habitat has been described as part of the mixed conifer habitat (white fir phase) (Griffin 1967) or as ecotonal between mixed conifer and red fir. Munz and Keck (1959) simply included it in yellow pine forest. White fir habitat is now named White Fir (Parker and Matyas 1981); White Fir (211) (Eyre 1980); White Fir Series (Paysen et al. 1980); White Fir Zone (Franklin and Dymess 1973); Sierran White Fir (8.424) and Southern California White Fir (8.532) (Cheatham and Haller 1975); White Fir-Sugar Pine Forest (Thorne 1977).

Habitat Stages

Vegetation Changes 1-2-5-S-D-6.—Following disturbance, white fir proceeds through the seral stages (Gordon 1970, 1973b, Eyre 1980, Conard 1980, Conard and Radosevich 1982, Hopkins 1982, Laacke and Fiske 1983).

In the grass/torb stage, bare mineral soil provides the best seedbed for white fir. If the site has been burned, brush seedlings such as manzanita, snowbrush, ceanothus, mountain whitethorn, deerbrush, willow, bittercherry, huckleberry oak, currant, gooseberry and chinquapin also become established.

In the shrub/sapling stage, large brushfields comprise 75 percent of the vegetative cover and persist for 30-50 years. Varying density of white fir seedlings (1000-10,000 stems per ha) establish

within 10 to 20 years, growing under and eventually overtopping the brush. In managed situations, brush is removed and white fir growth increases by as much as 200 percent in height.

In the pole/medium tree stage, white fir overtops the shrubs which for the most part are shaded out and die. Sometimes an understory of white fir establishes by the time the overstory reaches pole height. This multilayered condition persists into later stages.

In the large tree stage, a characteristic understory develops including whitevein shinleaf, little prince's pine, brackenfern, striped coralroot, and milk keltoggia—primarily root parasites and semiparasitic species.

Duration of Stages.—The duration of the grass/torb stage is dependent on the availability of a white fir seed source and a good seed crop every 3-9 years (Schopmeyer 1974, Gordon 1978). Reforestation activities would limit the duration of this seral stage to less than 5 years. In the shrub/sapling stage, white fir seedlings and saplings can persist for 30 to 50 years under a brush overstory. The average age in the large tree stage is 250 to 300 years with 70 to 90 cm (28-35 in) dbh (Hopkins 1979a, 1979b).

Biological Setting

Habitat.—In the Klamath Mountains, the Cascades, and the Sierra Nevada, white fir habitat occurs between mixed conifer and red fir habitats (Eyre 1980, Parker and Matyas 1981). In the south coast Transverse and Peninsular ranges, and in the mountain ranges of interior southern California, white fir intergrades at lower elevations with mixed conifer and is replaced at higher elevations by lodgepole pine (Cheatham and Haller 1975, Parker and Matyas 1981).

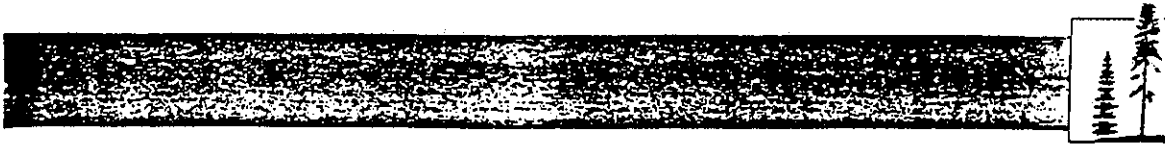
Wildlife Considerations.—White fir habitat is probably the coolest, moistest, nonriparian habitat within the lower to mid-elevation forests in northern California. In southern California this habitat is colder and drier, probably equivalent to the red fir habitat elsewhere, but with drier conditions (Cheatham and Haller 1975).

As stands mature, a high percentage of defective trees are found, the result of windthrow and heart rot fungus (Gordon 1973, Hopkins 1982). Excellent habitat is provided for snag and cavity dependent wildlife species, particularly when breaks occur between 15-30 m (50-100 ft). The additional benefit of heart rot is the cylindrically stable snag created as a result of the rot moving from the inside of the tree to the outer diameter.

White fir is the preferred tree species for insect-gleaning yellow-rumped warblers and western tanagers, and is also commonly used by other insect-gleaning birds, such as mountain chickadee, chestnut-backed chickadee, golden-crowned kinglet, and black-headed grosbeak (Airola and Barrett 1965).

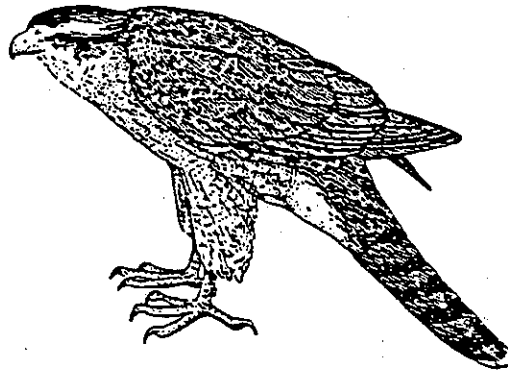
Physical Setting

White fir habitats are found on a variety of soils developed from different parent material, including volcanic and igneous rocks, granitics, various metamorphics, and sedimentary material (Franklin and Dymess 1973, Powells 1965, Hopkins 1982). Soils are coarse textured, well-drained, have poorly developed profiles, are often rocky, and are cold, with mean annual temperatures from 0 to 10°C (32-50°F) (Cheatham and Haller 1975, Riegel 1982, Laacke and Fiske 1983). Cooler north- and east-facing slopes are the most common sites throughout the state, however, Riegel (1982) noted the presence of unusually xeric white fir stands in the Warner Mountains. Precipitation is between 76-178 cm (30-70 in) mostly in the form of snow. Almost all precipitation falls between October and May (Laacke and Fiske 1983).

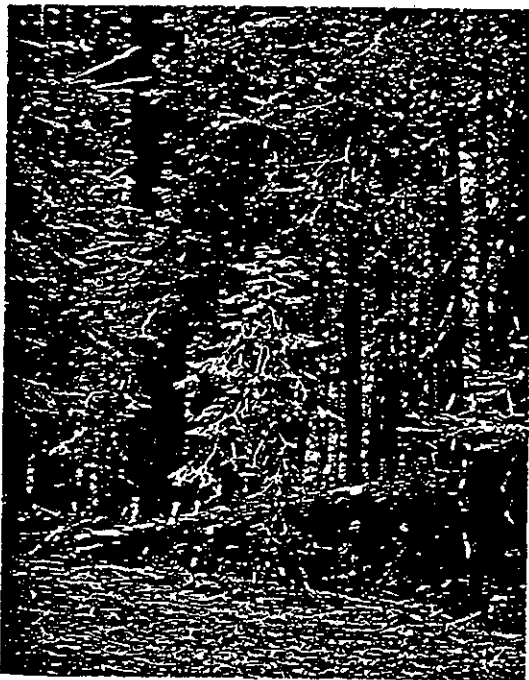


Distribution

Elevation of white fir habitat varies with latitude. In the Klamath Mountains of Trinity and Siskiyou Counties, white fir is found from 1370 to 1680 m (4500-5500 ft); from 1520 to 1830 m (5000-6000 ft) in the Cascade and Warner Mountains; at about 1675 m (5500 ft) in the Southern Sierra Nevada; above 1800 m (6000 ft) throughout the Transverse and Peninsular Ranges; and between 1600 to 2135 m (6000-7000 ft) in the southern interior ranges (Cheatham and Haller 1975, Parker and Matyas 1981). Small relict stands are also found at 2300 to 2880 m (7500-9500 ft) in the Clark, Kingston, and New York Mountains in the Mojave Desert (Thorne 1977, Paysen et al. 1980).

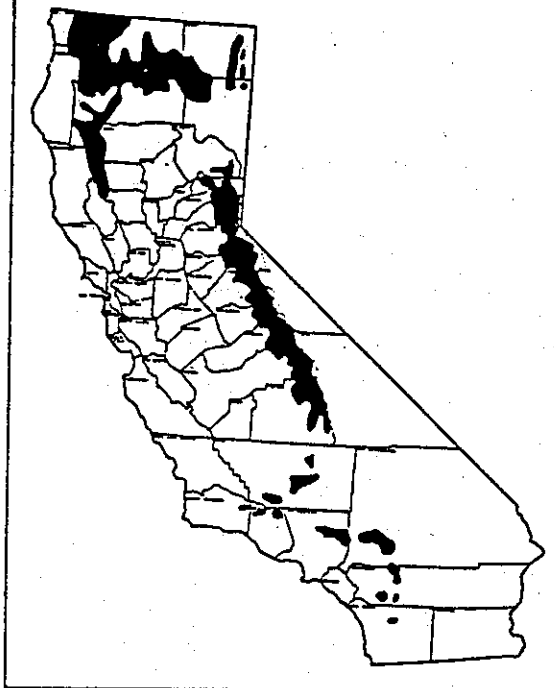


Northern Goshawk (*Accipiter gentilis*)



WFR
White Fir habitat, Lassen Volcanic National Park, California
(photo by Mary Ann Showers)

White Fir



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Lodgepole Pine

James W. Bartolome



Vegetation

Structure.—Lodgepole pine typically forms open stands of similarly sized specimens in association with few other species and with a sparse understory (Rundel et al. 1977). On fertile sites, trees can reach a height of 40 m (130 ft), but typically a stand consists of groups averaging 15 to 20 m (40 to 65 ft) in height. Nine stands in Sequoia National Park (Van Kat and Major 1978, cited in Rundel et al. 1977) averaged 56 percent crown cover, 3390 trees per ha (1370 per ac), and 58 sq m (625 sq ft) of basal area per ha (2.5 ac). Mature Sierran stands often contain significant seedlings and saplings, in contrast to the even aged character of stands in the northern Cascades and Rocky Mountains (Critchfield 1980).

Composition.—Lodgepole pine overwhelmingly dominates the habitat. Occasional associates include aspen and mountain hemlock. The amount of understory is weakly correlated with overstory density (Bartolome 1983). The understory may be virtually absent, consisting of scattered shrubs and herbs, or a rich herbaceous layer at meadow margins. Many lodgepole stands are associated with meadow edges and streams, where the understory consists of grasses, forbs, and sedges. In the southern Sierra and mountains of southern California, understory shrubs such as huckleberry and mountain heather may be common (Cheatham and Haller 1975).

Other Classifications.—Lodgepole Pine habitats form an easily distinguishable subdivision of the mixed conifer forest. Other classifications are Lodgepole Pine (U.S. Forest Service 1961) and Lodgepole Forest (Munz and Keck 1949). Classifications based on potential vegetation may not include a lodgepole pine type, considering it successional to other forest types.

Habitat Stages

Vegetation Changes 1:2-5:5-D.—Three major disturbances affect lodgepole pine in California: fire, insects, and logging. These disturbances create openings of various sizes that lodgepole pines rapidly recolonize (Lotan and Perry 1983). The stages of vegetation change are primarily the result of increased tree density, canopy cover, and size.

A short period of herbaceous productivity precedes closure of the tree canopy on productive sites. The prolific seed output, establishment, and seedling growth of lodgepole pine makes the period of herbaceous production short.

Continued recruitment into stands produces overstocking and slow growth of the overcrowded trees. This overcrowding may make them susceptible to insects (Lotan and Perry 1983), although others have argued that the more vigorously growing trees are more likely to be attacked. Beetle infestation creates large quantities of fuel that increase the probability of wildfire.

Many Sierran meadows have been invaded over the last few centuries by lodgepole pine (Benedict 1982); creating new dense stands. Although the understory persists, productivity is lowered (Bartolome 1983). The causes of this invasion remain poorly understood. Repeated episodes of tree invasion and subsequent reestablishment of meadows have occurred since the most recent glaciation.

Duration of Stages.—Young pines establish very rapidly and become reproductive; five year-old lodgepole pines are capable of producing cones (Critchfield 1980). Within 20 years, the canopy closes and understory productivity becomes negligible (Basilie 1975). Duration of the type thus depends on subsequent longevity of the trees. Stand persistence appears inversely related to site productivity (Lotan and Perry 1983); highly productive sites in Washington and Idaho were reported to start losing trees at 80 to 100 years. The upper limit of tree age seems about 400 years, although Critchfield (cited in Rundel et al. 1977) estimated one tree in the Sierra to be at least 600 years old.

Biological Setting

Habitat.—Typically the lodgepole pine zone is found above red fir and below the other subalpine conifer habitats (Rundel et al. 1977). Although the boundaries between lodgepole pine and meadow are dynamic, they are easily differentiated in classification of the existing landscape. Lodgepole pine most closely associates with the red fir habitat of lower elevations. Although lodgepole pine is widespread, it is generally a minor forest element in other habitats. At the upper elevation limits of lodgepole pine in southern California, the trees may adjoin alpine habitats.

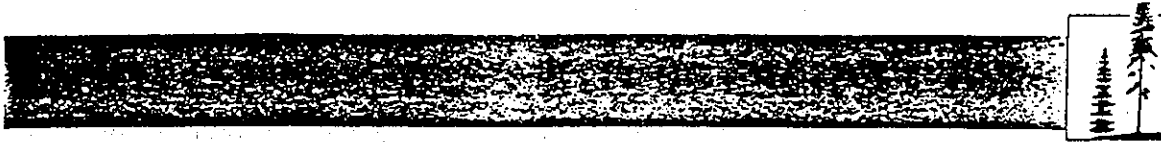
Wildlife Considerations.—Lodgepole pine stands have low structural diversity and are relatively low in animal species. Many species found in lodgepole pine stands are associated with the meadow edge. The Lodgepole habitat provides suitable habitat for 6 reptiles and amphibians, 49 birds, 35 mammals (Verner and Boss 1980). These species include wolverine (rare), goshawk (sensitive), bald eagle (endangered), and prairie falcon (sensitive).

Physical Setting

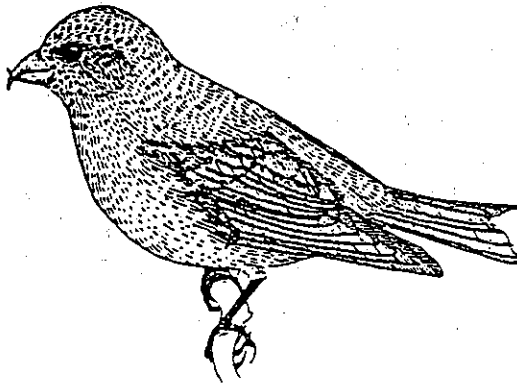
Lodgepole pine occupies an array of landscape units within its zone of adaptation. Areas of lodgepole pine in the red fir habitats are characterized by poor drainage and often a cooler microsite. Lodgepole pine is commonly associated with meadows (Rundel et al. 1977). Although lodgepole pine has well developed water regulation mechanisms, it typically occupies areas with at least seasonally wet soils. Annual precipitation in the lodgepole pine zone averages from 750 to 1000 mm (30 to 40 in) annually, mostly as snow. The growing season is short, averaging 2 to 3 months (Rundel et al. 1977).

Distribution

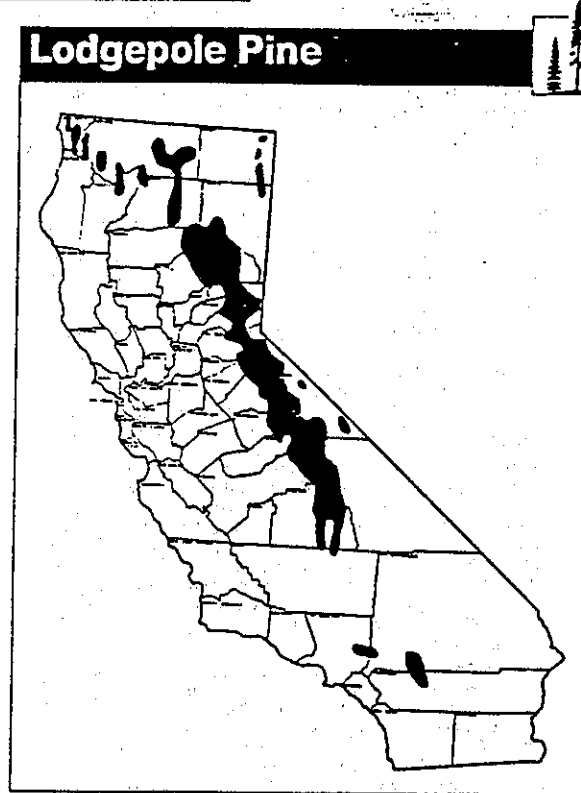
Lodgepole Pine habitats are scattered throughout the state, but concentrated in the Sierra Nevada and southern Cascades. Significant stands, however, occur in the higher mountains of southern California (Griffin and Critchfield 1972). Well developed lodgepole pine habitats are found above 1800 m (5900 ft) elevation in the northern Sierra and above 2400 (7900 ft) in the south.



LPN
Lodgepole Pine habitat, Tuolumne
Meadows, California (photo by Robert
F. Holland)



Red Crossbill (*Loxia curvirostra*)



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Red Fir

Reginald H. Barrett



Vegetation

Structure.—Stand structure is typified by even-aged (established within 20-year span) groups of trees that cover several to thousands of square meters. The cause of this pattern is probably a history of recurrent lightning fires, windthrows, and insect outbreaks acting to kill groups of trees (Oosting and Billings 1943, Vankat 1970, Kilgore 1971, 1973, Gordon 1973a, Rundel et al. 1977, Pitcher 1981). Natural regeneration occurs on the disturbed site following the next good cone crop. Young seedling stands are thinned by competition for soil moisture during summer (Gordon 1970, Ustin et al. 1984). Logging is becoming a more common source of disturbance, creating larger openings on average than historic disturbances (Chapel et al. 1983).

Composition.—Mature red fir stands normally are monotypic, with very few other plant species in any layer. Heavy shade and a thick layer of duff tends to inhibit understory vegetation, especially in dense stands (Oosting and Billings 1943). To the north, in the Klamath Mountains, red fir gives way to noble fir (Griffin and Critchfield 1972).

Other Classifications.—Because of its distinctiveness, references to the red fir type are unambiguous (Jensen 1947, Storer and Usinger 1963, Munz and Keck 1970, Cheatham and Haller 1975, Küchler 1977, Matyas and Parker 1979, Eyre 1980, Holstein 1980).

Habitat Stages

Vegetation Changes 12-S-S-D.—After disturbance — typically logging or fire — red fir vegetation on a site proceeds through 4 seral stages: grass/forb, shrub/sapling, pole/medium tree, and large tree (Oosting and Billings 1943, Vankat 1970, Gordon 1979, Rundel et al. 1977, Zieroth 1978, Pitcher 1981). The grass/forb stage occurs when red fir seedlings become established on mineral soil or shallow litter and require about 5 years to reach a height of 15 cm (6 in). Herbs are often sparse due to competition for soil moisture on light soils. In the shrub/sapling stage, large brushfields may develop after hot wildfires and are dominated by *Ceanothus* or other shrub species for many years. The pole/medium tree stage produces dense stands of young red fir that grow slowly with little mortality for many years. In the large tree stage, subdominant trees die and add to a growing layer of duff and downed woody material, and dominant trees continue to grow for several hundred years to heights of 40 m (130 ft). Old-growth stands on poor sites in the Sagehen Creek drainage of Nevada County average about 400 years old. The understory of mature stands is limited to less than 5 percent cover of shade tolerant forbs (e.g., *Chimaphila menziesii*, *Phylla picta*).

Duration of Stages.—Seral patterns are defined here for both good and poor sites (Schumacher 1928; Dunning and Reineke 1933; Oosting and Billings 1943, Gordon 1970, 1973b, Rundel et al. 1977, Barrett and Salwasser 1982). The seral pattern on good sites includes 10 years in the grass/forb stage, 20 years in the shrub/seedling stage, 80 years in the pole/medium tree stage and 110 years in the large tree stage. The pattern on poor sites includes 20 years in the shrub/seedling stage, 100 years in the pole/medium tree stage and 250 years in the large tree stage. Hence the cumulative year totals are 200 from the good site and 400 from the poor site.

Biological Setting

Habitat.—Red fir habitats occur on frigid soils of the higher mountains of northern California. At lower elevations red fir habitats intergrade with white fir-dominated mixed conifer stands on drier sites and with lodgepole pine-mountain meadow stands on moist sites. Small pockets of lodgepole pine also occur in wet

sites scattered throughout large tracts of red fir. Similar inclusions of aspen may be found along riparian zones. Mountain meadows of various sizes, sometimes associated with small lakes, are also typical of red fir habitats. At higher elevations, red fir habitats include increasing numbers of mountain hemlock, western white pine, whitebark pine, and to a lesser extent, foxtail pine and limber pine. Noble fir is associated with red fir in the northwestern region of the State (Rundel et al. 1977).

Wildlife Considerations.—Red fir habitats throughout California provide food or cover for at least one season to a total of 169 wildlife species (8 amphibians, 4 reptiles, 104 birds including 15 waterbirds, and 53 mammals). Red fir habitats can be considered very important for 28 birds and 26 mammals. Of special note are goshawk (sensitive species); blue grouse (game species); great gray owl, red fox, pine marten, and wolverine (rare species). Several rare or endangered raptors use red fir habitats to a minor extent (Grinnell and Storer 1924, Sumner and Dixon 1953, Shelford 1963, Storer and Usinger 1963, Johnston 1970, Verner and Boss 1980).

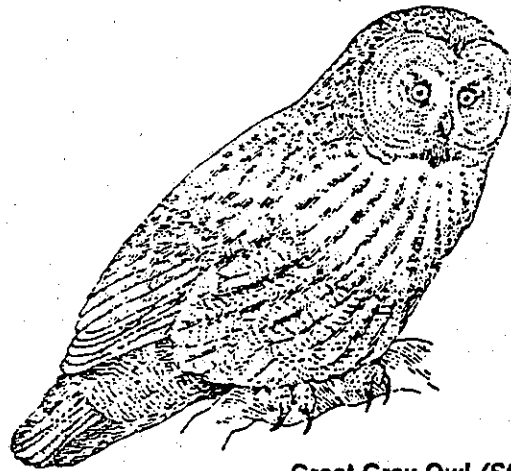
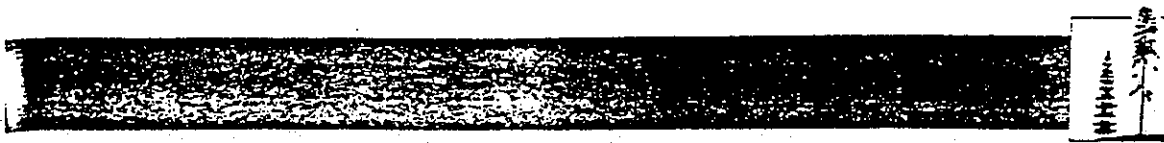
Physical Setting

Red fir habitats are found on frigid soils over a wide range of topography exclusive of very wet sites. Annual precipitation ranges from 1000 to 3000 mm (40 to 50 in) per year, primarily as snow that forms packs up to 5 m (15 ft) in winter. Summers are dry, limiting tree growth to seasonally available soil moisture (Rundel et al. 1977).

Distribution

Red fir is distributed in an elevational band from about 1800 to 2750 m (6000 to 9000 ft). It extends from northern Lake County northward through the North Coast Ranges and from Kern County northward through the Sierra Nevada into the Cascade Range of southwestern Oregon (Griffin and Critchfield 1972). Large expanses of nearly monotypic stands of red fir are common throughout its range. Logging of red fir is accelerating, consequently the amount of low seral stages will increase considerably in the future.

Marten (*Martes americana*)

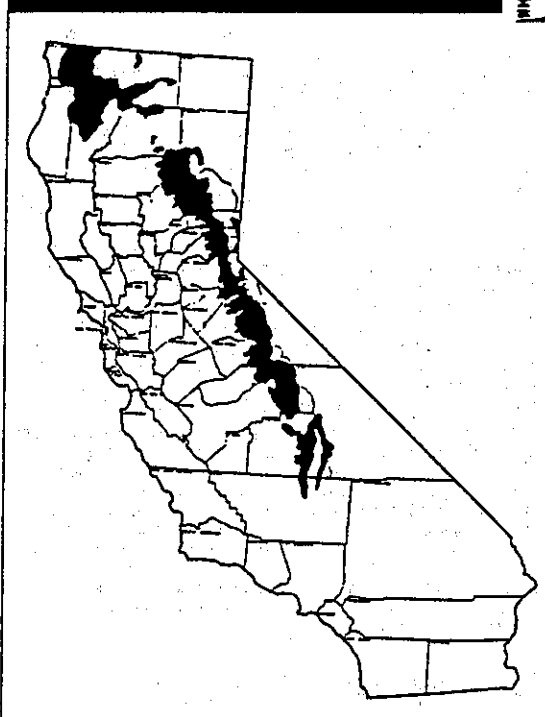


Great Gray Owl (*Strix nebulosa*)



RFR
Red fir habitat, Sierra Nevada, California (photo by Joe R. McBride)

Red Fir



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Subalpine Conifer

Jared Verner and Kathryn L. Purcell



Vegetation

Structure.—Typical SCN habitats are open forests with needle-leaved evergreen trees of low to medium stature. Stand density and tree height are typically greater at lower limits of its elevational range (Küchler 1977). In protected sites at lower elevations, tree height may exceed 30 m (100 ft), but trees on exposed sites and windy ridges near tree line are shaped into krummholz—stunted, mat-like forms often only about 1 m (3 ft) tall. Shrubby vegetation and herbaceous ground cover are generally sparse or lacking. Litter accumulation is typically scanty, but fallen woody material persists for long periods in the cold climate.

Composition.—Several species dominate canopies of this type in different localities, either singly or in mixtures of two or more species (Parsons 1980). These include Engelmann spruce, subalpine fir, mountain hemlock, western white pine, lodgepole pine, whitebark pine, foxtail pine, bristlecone pine, and limber pine.

Although typically of minor importance, a shrub understory may include Pinyon manzanita, squaw currant, purple mountain heather, oceanspray, and big sagebrush. Willows, western huckleberry, California huckleberry, Sierra bilberry, and alpine laurel occur on moist sites. Western wheatgrass, California brome, several species of lupines, and a variety of flowering annuals are common in the sparse ground cover (Rundel et al. 1977, Parsons 1980).

Other Classifications.—SCN combines several types described by other authors. It includes the Engelmann Spruce-Alpine Fir, Mountain Hemlock, Whitebark Pine, Foxtail Pine, Western White Pine, Limber Pine, and Bristlecone Pine of Parker and Matyas (1979) and the Society of American Foresters (SAF) (Eyre 1980), as well as California Mixed Subalpine (256) of the SAF, Subalpine Coniferous Forests (8.6) of Cheatham and Haller (1975) include approximately the same range of dominants. Bristlecone Pine, Foxtail Pine, and Limber Pine of Payson et al. (1980) are included, as are the Subalpine Forest (17) and Bristlecone Pine Forest (18) of Munz and Keck (1959). Finally Upper Montane-Subalpine Forest (17), Southern Montane-Subalpine Forest (18), and Great Basin Subalpine Forest (19) of Küchler (1977) overlap with SCN as described here.

Habitat Stages

Vegetation Changes 12-ES-D.—Most high-elevation forests in California have been little disturbed by human influence, but fire, wind, and other natural disturbances offer chances to study successional changes in these forests. Owing to their lack of economic importance, however, few such studies have been carried out in SCN habitat. Parsons (1980:90) observed that the infrequent fire pattern at high elevations in the Sierra Nevada leads to "a specific vegetational mosaic...characteristic of the high country." No details are available. Most of the canopy dominants are pioneers and probably also climax species, at least in harsher environments. For example, whitebark and limber pine, though less shade tolerant than subalpine fir, Engelmann spruce, and mountain hemlock, can regenerate without wildfire or logging due to their longevity and ability to survive extremely cold climates. Furthermore, the short growing seasons, as well as the typically open nature of the stands at higher elevations help ensure regeneration (Pfister et al. 1977).

Duration of Stages.—Little information is available, although Parsons (1980:90) notes that "the slow growth and longevity of most of the subalpine species lead to long timespans between stages." Many tree species that dominate stands of this type are well known for their longevity and slow growth. A whitebark pine 43 cm (17 in.) in dbh was 800 years old (Arno 1967), foxtail pine has been aged at nearly 2000 years (Mastrogiovanni 1972), and bristlecone pine has been aged at over 4600 years in the White Mountains of eastern California and over 4900 years on Wheeler Peak in eastern Nevada (Hawksworth and Bailey 1980).

Biological Setting

Habitat.—SCN intergrades with Lodgepole Pine, Jeffrey Pine, and Red Fir habitats at lower elevations. The shrub understory and ground cover are better developed where SCN habitats adjoin moist sites, as along riparian corridors or montane meadows.

Wildlife Considerations.—Coniferous forests at high elevations in California typically support fewer species of amphibians, reptiles, birds, and mammals than any other major forest type in the State. The reasons, though, not clearly established, probably involve some combination of climate, short growing season, lower primary productivity, moisture stress, and lower production of insects and other invertebrates that provide food resources for many vertebrates. Excluding species dependent on ponds, lakes, streams, or cliffs, Laudenslayer (1980) shows no amphibians and only one reptile that find conditions suitable for breeding in these high-elevation forests. He lists only 17 species of birds and 15 of mammals that find conditions optimum, and 14 birds and 22 mammals that find conditions suitable for breeding in such forests. Several species that find optimum or suitable conditions at these high elevations have special significance for land managers. These include the great gray owl, pileated woodpecker, marten, and wolverine.

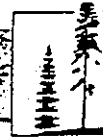
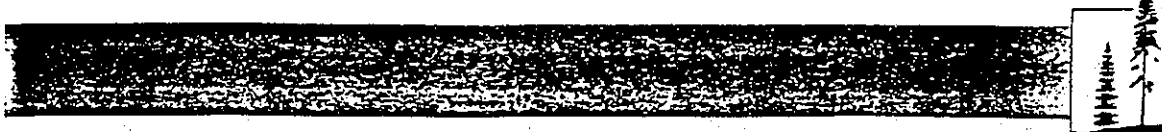
Burney (1980:99) writes that "birds and small mammals consume so much limber pine seed that little is left for natural regeneration. However, small mammals that transport and bury seed aid dissemination into new areas, and germination of forgotten seed caches undoubtedly accounts for dense groups of stems occasionally found." Such groups of stems are better known to grow from caches left by Clark's nutcrackers, which are probably the primary agents of seed dispersal for limber and perhaps whitebark pines (Tomback and Kramer 1980, Tomback 1982).

Physical Setting

These forests typically occupy extremely harsh environments. Soils are generally thin and of low quality—coarse sand, gravel, volcanic debris, and rocks derived from decomposing parent material. Although subalpine fir and Engelmann spruce occur together on rocky, moist moraines and are considered to be indicators of high soil moisture (Parker and Matyas 1979), most stands of SCN are on dry, well-drained soils. The climate is especially challenging. For example, in the Subalpine Forest type described by Munz and Keck (1959), precipitation averages only 76 to 127 cm (30 to 50 in) and may be as low as 38 cm (15 in) east of the crest of the Sierra Nevada. Heavy snow cover is usual. Mean summer high temperatures probably do not exceed 18°C (65°F), and killing frosts are possible during all months. The growing season lasts only 7 to 9 weeks. Similarly, in bristlecone pine forests, measured precipitation over a 3-year period averaged 38 cm (15 in), much of it as snowfall. Mean summer maximum temperatures ranged from 12 to 19°C (54 to 66°F), and winter minima ranged from -16 to -6°C (3 to 21°F) (Munz and Keck 1959). Intense winds are characteristic of these habitats.

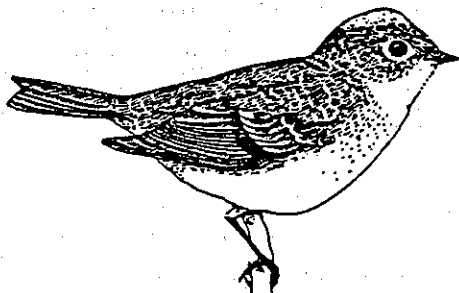
Distribution

SCN is generally distributed at high elevations in all significant mountain ranges of the State. It is well represented in the north, with an elevational range from about 2100 to 2900 m (7000 to 9500 ft); and in the Sierra Nevada, ranging from 2700 to 3350 m (9000 to 11,000 ft). "It is poorly represented in southern California" (Parsons 1980:90), typically within an elevational range of 2880 to 3400 m (9500 to 11,200 ft) (Cheatham and Haller 1975). Engelmann spruce-subalpine fir stands are poorly represented in California, occurring together only near Russian Peak in southwestern Siskiyou County (Griffin and Critchfield 1972, Parker and



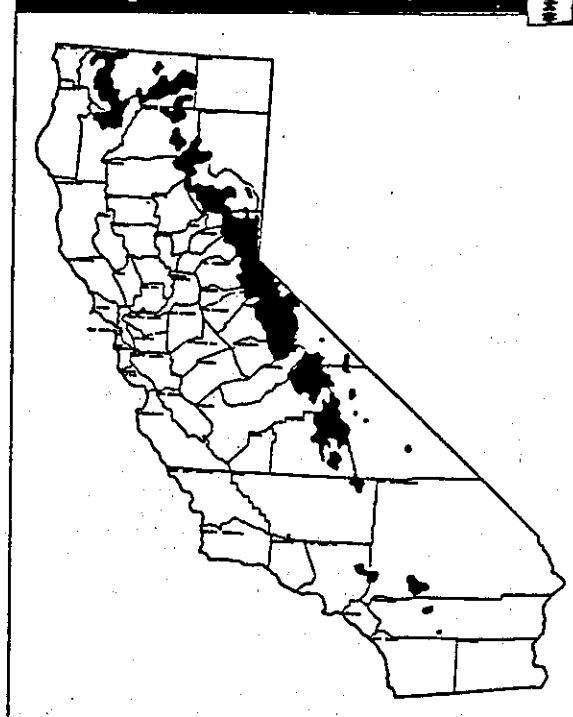
SCN
Subalpine Conifer habitat, Vista Point,
Kaiser Pass California (photo by Jared
Verner)

Matyas 1979). "Mountain hemlock, lodgepole pine, western white pine, and California red fir are common in mixed stands above the red fir forest in the north" (Parsons 1980:90). Mountain hemlock is the usual dominant in the northern Sierra Nevada, gradually disappearing to the south (Rundel et al. 1977). The southernmost stand occurs in Tulare County (Parsons 1972). In the Warner Mountains and from about Lake Tahoe southward in the Sierra Nevada, whitebark and lodgepole pine dominate stands of SCN to about the headwaters of the Kern River, where foxtail pine becomes the usual dominant species (Cheatham and Haller 1975). Whitebark pine tends to be the dominant conifer near tree line in the central Sierra Nevada (Cheatham and Haller 1975, Rundel et al. 1977). Limber pine occupies similar sites on the east side of the Sierra Nevada in Inyo and Mono Counties (Arno 1967, Griffin and Critchfield 1972), and together with lodgepole pine it comprises the dominant type in stands of SCN in southern California (Cheatham and Haller 1975). Bristlecone pine stands occur from about 2900 to 3500 m (9500 to 11,500 ft) elevation in the White and Inyo Mountains and the Last Chance and Panamint Ranges, east of the southern Sierra Nevada (Parker and Matyas 1979).



Ruby-crowned Kinglet (*Regulus calendula*)

Subalpine Conifer



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Jeffrey Pine

Joe R. McBride



Vegetation

Structure.—The structure of the Jeffrey pine forest varies over its distribution. A single tree layer is characteristic of Jeffrey pine stands on moderately dry sites, giving an impression of openness, limited leaf area, light, and heat. On moist and mesic sites a second tree layer exists which is composed of deciduous hardwood species, whereas on dry sites evergreen hardwood species form the second tree layer. Conifer species provide the second tree layer on xeric sites. The single (or upper) tree layer ranges from 30 to 50 m (98 to 164 ft) in height, but in some stands this layer may exceed 65 m (213 ft) (Fowells 1965). The second tree layer, where it exists, varies from 5 to 10 m (16 to 33 ft) in height. Complete (100 percent) crown cover is seldom encountered in Jeffrey pine habitats. Most stands have typically between 40 and 70 percent crown cover in the uppermost tree layer and usually less than 50 percent crown cover in the second layer, except on moist sites where Aspen cover may approach 100 percent. In southern California a krummholz form, where trees are only a few meters tall, is found at higher elevations near timberline.

A sclerophyllous shrub layer is common to most Jeffrey pine stands except on serpentine soils, extremely xeric sites where the shrub layer is absent (Jenkinson 1980), and where the krummholz form exists. Height and crown cover of the shrub layer varies with site characteristics. For example, taller shrub layers up to 2 m (6 ft) with significant crown (> 70 percent) are common on more mesic sites.

Composition.—Jeffrey pine is the dominant species found in the upper tree layer. It usually forms pure stands but may have as its associates ponderosa pine, Coulter pine, sugar pine, lodgepole pine, timber pine, white fir, red fir, incense-cedar, and black cottonwood. Jenkinson (1980) suggests that any stand in which Jeffrey pine makes up the majority of the stocking should be recognized as Jeffrey pine. Dominant species composition of the second tree layer consists of aspen on moist sites, California black oak on mesic sites, and pinyon pine and western juniper on dry sites. Shrub species composition varies between geographical regions. In the Klamath Mountains, huckleberry, scrub oak, manzanita, Fremont siltkassel and coffeeberry dominate the shrub layer. Shrubs common to the Jeffrey pine type on the western slope of the Sierra Nevada include huckleberry oak, manzanita, and mountain misery. East of the Sierra-Cascade crest, the dominant shrub layer species include squaw currant, snowbush, and green-leaf manzanita at higher elevations, and antelope bitterbrush, rabbitbrush, and sagebrush at lower elevations. The shrub layer of Jeffrey pine stands in southern California is dominated by scrub oak, ceanothus, Sierra chinquapin, manzanita, Parish snowberry, and cherry.

Herbaceous species common to the Jeffrey pine type in southern California include rockcress, birdbeak, buckwheat, fritillary, groundsmoke, ivesia, lupine, rock melic, Bridge's penstemon, penstemon and needlegrass (Thorne 1977). Species common to Jeffrey pine stands along the east slope of the Sierra Nevada include squirreltail, blue wildrye, slender hairgrass, western needlegrass, woolly wyethia, and pennyroyal.

Other Classifications.—Jeffrey pine has been included in the broad yellow pine forest type of Munz and Keck (1949-50); pine-Douglas-fir, pine-fir, and pine-Douglas-fir-fir of Jensen (1947); Jeffrey pine of Parker and Matyas (1981), SAF (Eyre 1980), and Cheatham and Haller (1975); the upper montane mixed conifer forest of Cheatham and Haller (1975); and type 42 - evergreen forest land of Anderson et al. (1976). Jeffrey pine is divided into two classes - northern Jeffrey pine forest and southern Jeffrey pine forest - by Küchler (1977). Payson et al. (1980) includes Jeffrey pine in the Ponderosa/Jeffrey Pine Series of the Conifer Forest Subformation. Horton (1960) divides it between the pine forest type and the sugar pine-white fir forest type, while Thorne (1975) includes it in the yellow pine forest.

Habitat Stages

Vegetation Changes 1,2-5:5-D.—Old-growth Jeffrey pine stands exhibit an uneven-aged structure. Analysis of fire scars and age structure suggests that prehistoric fires played an important role in regeneration without destroying the overstory (McBride and Laven 1976); however, in southern California fires have recently eliminated large areas of Jeffrey pine forest overstory because of accumulated surface fuels. The successional pattern following these fires involves an initial fireweed stage, followed by a shrub stage dominated by ceanothus and manzanita. Where canyon live oak is present in the second tree layer, an oak stage develops instead of the more common shrub stage (Minnick 1976). In time, Jeffrey pine succeeds the shrub or oak stage to restore the original vegetation.

Duration of Stages.—Jeffrey pine stands are self-perpetuating under a regime of periodic surface fires. Typical old-growth stands in southern California support trees up to 450 years old. The age structure of these stands suggests that regeneration has occurred about every 40 to 60 years (Laven 1982). Where crown fires have created openings, the fireweed stage lasts for 2 to 3 years, followed by the shrub stage which persists for 15 to 20 years. Extensive areas of ceanothus and manzanita (i.e., montane chaparral) and canyon live oak woodland, resulting from large crown fires occurring in the last 70 years in the San Bernardino Mountains, show no evidence of reestablishment of Jeffrey pine, and further succession of these areas to Jeffrey pine is problematical. Forest harvesting using selective cutting and sanitation-salvage methods has converted Jeffrey pine stands to oak woodlands or montane chaparral in the San Bernardino Mountains (Minnick 1976). Where clearcutting or group selection cutting was followed by planting Jeffrey pine, the type has been successfully maintained.

Biological Setting

Habitat.—The Jeffrey pine habitat is associated with Douglas-fir at its lower elevations and subalpine conifer at its higher elevations in the Klamath Mountains. East of the Sierra-Cascade crest it occurs between subalpine conifer at higher elevations and pinyon-juniper or sagebrush at lower elevations. On the west side of the Sierra Nevada, Jeffrey pine is generally found above Sierra Nevada mixed conifer and below the subalpine conifer or alpine dwarf shrub. On ultramafic soils at mid-elevations, Jeffrey pine is surrounded by mixed conifer (Sierra Nevada and Klamath-enched). In southern California, Jeffrey pine is situated above ponderosa pine or blue oak-digger pine on the southern side of the Transverse and the southwestern side of the Peninsular Ranges. At higher elevations in these mountains it gives way to subalpine conifer. At lower elevations on the northern side of the Transverse Range it adjoins pinyon-juniper. On the northeastern side of the Peninsular Range, it is adjacent to the desert scrub or pinyon-juniper. Areas of Jeffrey pine forest in the Peninsular Range east of San Diego are surrounded by chamise (redshank) or are adjacent to pinyon-juniper type.

Wildlife Considerations.—Jeffrey pine is intermediate in species richness between warmer forests at lower elevations and colder forests at higher elevations in the Klamath Mountains and on the west side of the Sierra Nevada. Its species richness exceeds that of the adjacent upper elevation forests and lower elevation woodland and scrub types in both the Transverse and Peninsular Ranges.

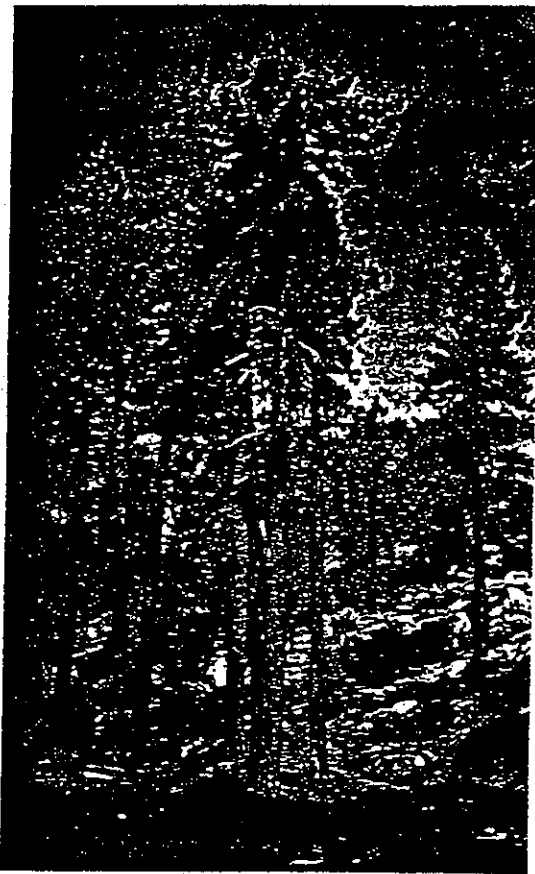
The value of the Jeffrey pine forest type as a habitat for wildlife is due in large part to the food value of the Jeffrey pine seeds. Pine seeds are included in the diet of more wildlife species than any other genus except oak (Light 1973). The bark and foliage also serve as important food sources for squirrels and mule deer. Jeffrey pine provides vital nesting cover for several species such as nuthatch, brown creeper, woodpecker, and northern flying



squirrel. The southern rubber tree, a species listed as rare by the State of California and sensitive by the U.S. Forest Service, is reported to occur in the Jeffrey pine forest type in southern California (Cunningham 1962).

Physical Setting

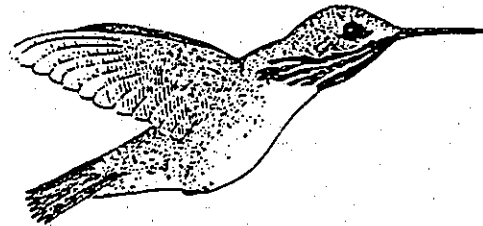
Jeffrey pine occurs in a variety of physical settings throughout its extensive range. The tolerance of its dominant species to low temperatures allows the type to occupy the borders of topographic frost pockets and high cold ridges (Haller 1959). It is commonly found on soils developed from granite and lava flows, but can also develop as a type on ultramafic soils (Walker 1954). Its distribution in northern California west of the Sierra-Cascade crest is limited to such soils (Jenkinson 1980). Jeffrey pine is not restricted by aspect or slope.



JPN
Jeffrey Pine habitat, Sierra Nevada, California (photo by Joe R. McBride)

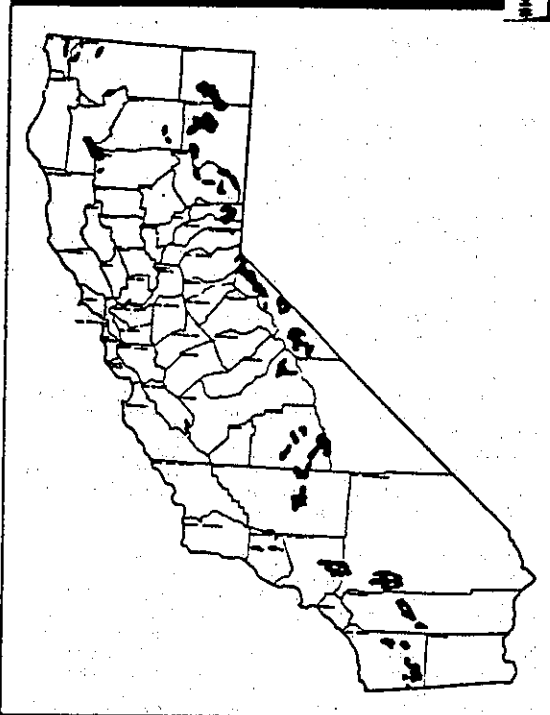
Distribution

Jeffrey pine ranges from 150 to 2900 m (500 to 9500 ft), the actual range depending upon latitude. The habitat covers extensive areas in the Klamath Mountains, North Coast Range, Cascade Range, Modoc Plateau, Sierra Nevada, Transverse Range, and the Peninsular Range in California. It also occurs in Oregon, Nevada, and Baja California.



Calliope Hummingbird (*Stellula calliope*)

Jeffrey Pine



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Eastside Pine

E. Lee Fitzhugh



Vegetation

Structure.—The eastside pine habitat is characterized by short to moderate height, 20-35 m (65-115 ft tall) pine trees at maturity. Without disturbance, except for naturally occurring fire, a mosaic of even-aged patches develops, with open spaces and dense sapling stands. Oaks or junipers may form an understory, but pure stands of pine also are found. An open stand of low shrubs, less than 2 m (6.5 ft) and a grassy herb layer are typical. Crowns of pines are open, allowing light, wind and rain to penetrate, whereas other associated trees provide more dense foliage.

Composition.—Ponderosa pine is the dominant tree with less representation by Jeffrey pine, lodgepole pine, white fir, incense-cedar, Douglas fir, California black oak and western juniper. Stands of Washoe pine mixed with white fir, white pine and lodgepole pine at higher elevations in the Warner Mountains are included in this habitat. Undergrowth varies depending on site conditions, but typically may include one or more of the following shrubs: big sagebrush, antelope bitterbrush, manzanita, ceanothus, rubber rabbitbrush, mountain mahogany, creambush, oceanspray and mountain snowberry. Prominent herbaceous plants include mule ears, arrowleaf balsamroot, Idaho fescue, pinegrass, bluebunch wheatgrass and bottlebrush squirreltail.

Other Classifications.—The eastside pine habitat is equivalent to interior ponderosa pine (Eyre 1980), the yellow pine-shrub forest (*Pinus-Purshia*) (Küchler 1977) and "eastside" ponderosa pine forest (Cheatham and Haller 1975). It is a subdivision of the ponderosa/Jeffrey pine series (Payson et al. 1980), ponderosa pine (Rundel et al. 1977, Parker and Matyas 1979) and yellow pine forest (Munz and Keck 1959, Thorne 1977).

Habitat Stages

Vegetation Changes 1:2-5:5-D.—Logging, bark beetles, root diseases and fire are the major disturbances in the eastside pine type. The understory typical of the specific site increases following disturbance, depending on the nature of the disturbance, season in which it occurred and weather patterns. In general, disturbance favors brush, particularly manzanita and ceanothus. But some kinds of disturbance may eliminate antelope bitterbrush, a desirable deer forage plant that may not be as robust a competitor with trees as are some other shrubs. Open tree stands generally support more vigorous brush or grass understories which may prevent additional tree regeneration for many years. Fire tends to maintain pine stands on sites that will support other conifers. The following understory dominants may be used to identify different eastside pine communities: western juniper, manzanita, several species of ceanothus, big sagebrush, antelope bitterbrush, grass dominance and forb dominance.

Duration of Stages.—Eastside pine is moderately slow growing and long-lived. The time required for succession varies greatly depending on site, competition and seed source. The more severe sites within the type impose problems of reproduction and competition, so that stands may not necessarily reproduce themselves after disturbance, being replaced instead by forbs, grasses, brush or junipers.

Biological Setting

Habitat.—Eastside pine is bounded at the lower edge by low and big sagebrush, bitterbrush, perennial grassland or pinyon-juniper woodland habitat which often are found on finer textured soils and at the upper edge by mixed conifer, lodgepole pine, and red fir. Eastside pine occupies an intermediate, less harsh environment than Jeffrey pine, which occurs above and intermingled with eastside pine.

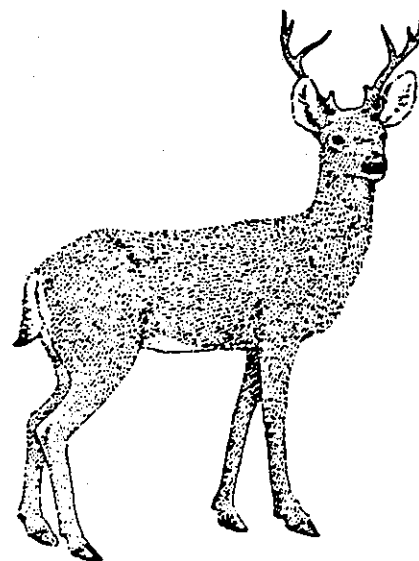
Wildlife Considerations.—Pine types with shrubby understories have a high degree of vertical diversity, especially when other conifers are present. Large pine branches form good nesting substrates for large raptors. Sites supporting the larger shrub species—manzanita and some ceanothus species—may become so densely vegetated in the absence of fire that livestock and big game cannot use the areas. Eastside pine stands often form important migratory and winter range for deer. Higher elevation stands with grassy understories near water may be extremely important deer lawning areas and migratory holding areas. Important wildlife species in the eastside pine habitat include the bald eagle and American peregrine falcon (both on federal and state endangered species lists) and the Sierra Nevada red fox, and the California bighorn sheep.

Physical Setting

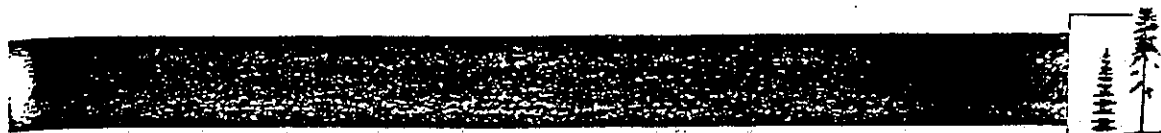
Eastside pine habitat is found on coarse, well-drained basaltic soils, in a drier, colder setting than the Ponderosa pine (PPN) habitat. All exposures are represented depending on elevation. Fine-textured soils favor pinyon-juniper habitats.

Distribution

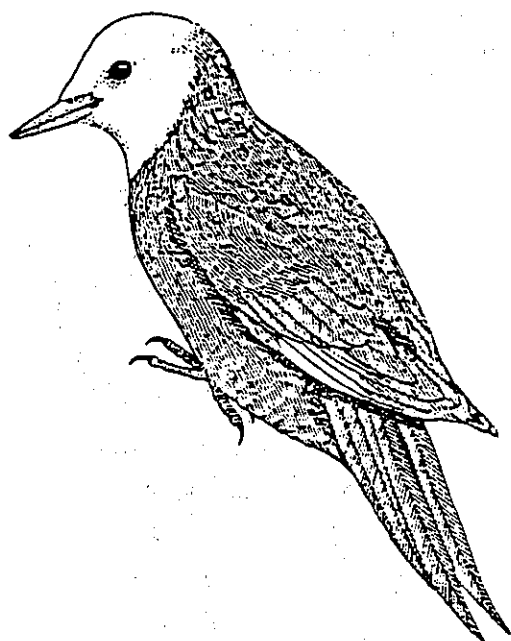
Eastside pine habitat occurs from about 1200-1980 m (400-6500 ft) elevation, approximately east of a line drawn from Lake Tahoe to Hill, a small town on Interstate 5 where it crosses the California-Oregon border (McDonald 1983). Eastside pine habitat extends into Oregon. Small scattered stands occur south of Lake Tahoe through the northern half of Inyo County.



Mule Deer (*Odocoileus hemionus*)

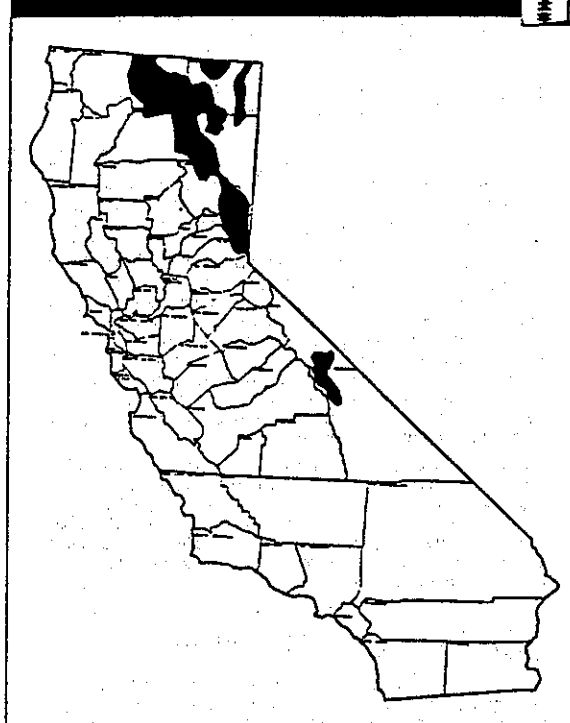


EPN
Eastside Pine habitat, Black Mountain
Experimental Forest, Lassen County, Cali-
fornia (photo by Sydney Smith)



White-headed Woodpecker
(*Picoides albolarvatus*)

Eastside Pine



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Valley Foothill Riparian

William E. Grenfell Jr.



Vegetation

Structure.—Canopy height is approximately 30 m (98 ft) in a mature riparian forest, with a canopy cover of 20 to 80 percent. Most trees are winter deciduous. There is a subcanopy tree layer and an understory shrub layer. Lianas (usually wild grape) frequently provide 30 to 50 percent of the ground cover and festoon trees to heights of 20 to 30 m (65 to 98 ft). Herbaceous vegetation constitutes about one percent of the cover, except in openings where tall forbs and shade-tolerant grasses occur (Conard et al. 1977). Generally, the understory is impenetrable and includes fallen limbs and other debris.

Composition.—Dominant species in the canopy layer are cottonwood, California sycamore and valley oak. Subcanopy trees are white alder, boxelder and Oregon ash. Typical understory shrub layer plants include wild grape, wild rose, California blackberry, blue elderberry, poison oak, buttonbrush, and willows. The herbaceous layer consists of sedges, rushes, grasses, miner's lettuce, Douglas sagewort, poison-hemlock, and hoary nettle.

Other Classifications.—Other classification schemes that describe VRI habitats are Cottonwood and California Sycamore (Parker and Matyas 1981), Central Valley Bottomland Woodland - 6.11, Southern Alluvial Woodland - 6.31 (Cheatham and Haller 1975), Wild Rose, Alder, Cottonwood, Sycamore, Willow (Paysen et al. 1980), Riparian Forest - 28 (Küchler 1977) and Forested Wetland - 61 (Anderson et al. 1976).

Habitat Stages

Vegetation Changes 1;2-5;S-D.—Cottonwoods grow rapidly and can reach WHR size/age class 5 in about 20 to 25 years. One specimen measuring 92 cm (36 in) (inside the bark) showed an age of 29 years (Sudworth 1908). This secondary succession to climax could occur as rapidly as 25 to 30 years in VRI habitats dominated by cottonwood. One valley oak tree 54 cm (21 in) in diameter (WHR size/age class 4) showed an age of 57 years. Valley oak dominated riparian systems would probably take 75+ years to reach climax/maturity. Some VRI types consisting of only a shrub layer (VRI 1;2: S-D) (willows, wild rose, blackberry) may persist indefinitely.

Duration of Stages.—Shrubby riparian willow thickets may last 15-20 years before being overtopped and shaded out by cottonwoods. Cottonwood or willow tree habitats close to river channels that receive a good silt infusion, without major disruptive flows, tend to be self-perpetuating (R. Holland pers. comm.).

Biological Setting

Habitat.—Transition to adjacent nonriparian vegetation is usually abrupt, especially near agriculture (Cheatham and Haller 1975). The Valley-Foothill Riparian habitat is found in association with Riverine (RIV), Grassland (AGS, PGS), Oak Woodland (VFH) and Agriculture (PAS, CRP). It may intergrade upstream with Montane Riparian.

Wildlife Considerations.—Valley-foothill riparian habitats provide food, water, migration and dispersal corridors, and escape, nesting, and thermal cover for an abundance of wildlife. At least 50 amphibians and reptiles occur in lowland riparian systems. Many are permanent residents, others are transient or temporal visitors (Brode and Bury 1985). In one study conducted on the Sacramento River, 147 bird species were recorded as nesters or winter visitants (Laymon 1985). Additionally, 55 species of mammals are known to use California's Central Valley riparian communities (Trapp et al. 1985).

Physical Setting

Valley-foothill riparian habitats are found in valleys bordered by sloping alluvial fans, slightly dissected terraces, lower foothills, and coastal plains. They are generally associated with low velocity flows, flood plains, and gentle topography. Valleys provide deep alluvial soils and a high water table. The substrate is coarse, gravelly or rocky soils more or less permanently moist, but probably well aerated (Cheatham and Haller 1975). Average precipitation ranges from 15 to 76 cm (6-30 in), with little or no snow. The growing season is 7 to 11 months. Frost and short periods of freezing occur in winter (200 to 350 frost-free days). Mean summer maximum temperatures are 24 to 39°C (75 to 102°F), mean winter minima are -2 to 7°C (29 to 44°F) (Munz and Keck 1973). VRI habitats are characterized by hot, dry summers, mild and wet winters. Coastal areas have a more moderate climate than the interior and receive some summer moisture from fog (Bailey 1980). Potential evaporation during the warmest months is often greater than precipitation. Low rainfall and streamflow result in water scarcity in many parts of the area.

Distribution

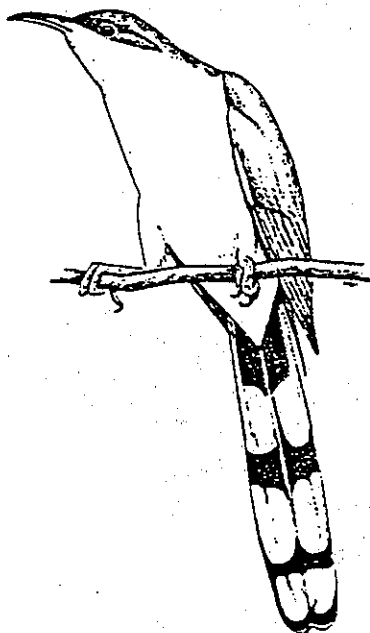
Valley-foothill riparian habitats occur in the Central Valley and the lower foothills of the Cascade, Sierra Nevada and Coast ranges. They are also found in lower slopes at the bases of the Peninsular and Transverse ranges. A few lower elevation locations are on the desert side of the southern California mountains. VRI habitats range from sea level to 1000 m (3000 ft), fingering upward to 1550 m (5000 ft) on south-facing slopes.



Ringtail (*Bassariscus astutus*)

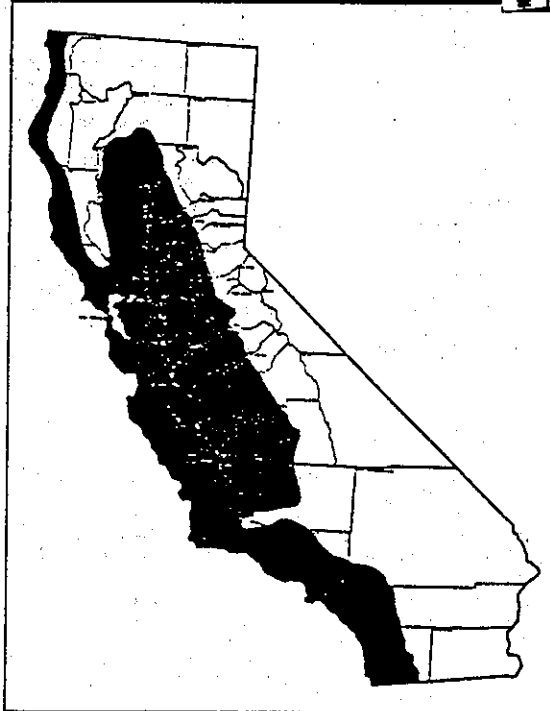


VRI
Valley Foothill Riparian habitat, Sacramento River, California (photo by Robert F. Holland)



Western Yellow-billed Cuckoo
(*Coccyzus americanus*)

Valley Foothill Riparian



The map depicts general habitat distribution. Green represents an area of the state that the habitat can be found when the proper environmental conditions exist.

Montane Riparian

William E. Grenfell Jr.



Vegetation

Structure.—The vegetation of montane riparian (MRI) zones is quite variable and often structurally diverse (Marcot 1979). Usually, the montane riparian zone occurs as a narrow, often dense grove of broadleaved, winter deciduous trees up to 30 m (98 ft) tall with a sparse understory. At high mountain elevations, MRI is usually less than 15 m (49 ft) high with more shrubs in the understory. At high elevations, MRI may not be well developed or may occur in the shrub stage only.

Composition.—In northwest California along streams west of the Klamath Mountains, black cottonwood is a dominant hardwood. In some areas, it is codominant with bigleaf maple. In either case, black cottonwood can occur in association with dogwood and boxelder. At high elevations, black cottonwood occurs with quaking aspen and white alder (Parker and Matyas 1979).

In northeastern California, black cottonwood, white alder and thinleaf alder dominate the montane riparian zone. Oregon ash, willow and a high diversity of forbs are common associates.

In the Sierra Nevada, characteristic species include thinleaf alder, aspen, black cottonwood, dogwood, wild azalea, willow and water birch (southern Sierra east of the crest), white alder and dogwood (north Sierra).

In the southern Coast Range as well as Transverse and Peninsular ranges, bigleaf maple and California bay are typical dominants of montane riparian habitat. Fremont cottonwood is the most important cottonwood in the Sierra below 1524 m (5000 ft), much of the Coast Ranges and the Transverse and Peninsular ranges.

MRI habitats can occur as alder or willow stringers along streams of seeps. In other situations an overstory of Fremont cottonwood, black cottonwood and/or white alder may be present.

Other Classifications.—Montane riparian habitats are also described as riparian (Laudenslayer 1982), riparian deciduous (Verner and Boss 1980, Marcot 1979), bigleaf maple, alder, maple-alder-dogwood, white alder, willow and alder-willow series (Parker and Matyas 1979), mixed riparian woodland - 6.21, willow thickets - 6.24 and red alder groves - 6.22 (Cheatham and Haller 1975).

Habitat Stages

Vegetation Changes 1:2-5:5-D:6.—Definite successional stages are not described in the literature. Many montane riparian stages may prevail indefinitely, climax or subclimax. Shrub-type stages should be evaluated as size/age class 1 or 2. Overstory trees such as cottonwood, maple and alder may range up to size/age class 6.

Duration of Stages.—Montane riparian habitats within given watersheds tend to maintain the same mosaic of stages. However, the location of these stages may vary as a result of periodic torrential flows. Riparian Systems can be damaged by debris, sedimentation, or uprooting of entire plants which are redeposited further downstream (Campbell and Green 1968).

Biological Setting

Habitat.—The transition between MRI and adjacent nonriparian vegetation is often abrupt, especially where the topography is steep. This habitat intergrades with montane chaparral, montane hardwood, montane hardwood/conifer, lodgepole pine, red fir and wet meadow habitats.

Wildlife Considerations.—All riparian habitats have an exceptionally high value for many wildlife species (Thomas 1979, Marcot 1979, Sands 1977). Such areas provide water, thermal cover, migration corridors and diverse nesting and feeding opportunities.

The shape of many riparian zones, particularly the linear nature of streams, maximizes the development of edge which is so highly productive for wildlife (Thomas 1979).

The range of wildlife that uses the MRI habitat for food, cover and reproduction include amphibians, reptiles, birds and mammals.

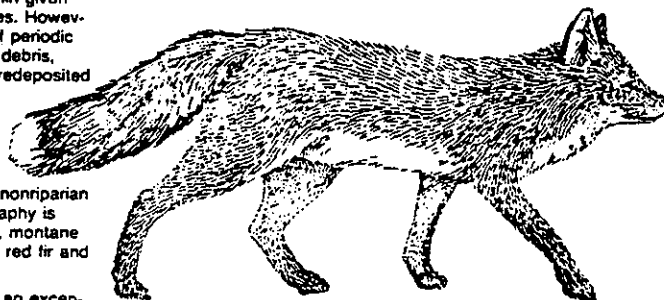
The southern rubber boa and Sierra Nevada red fox are among the rare, threatened or endangered wildlife that use MRI habitats during their life cycles.

Physical Setting

Riparian areas are found associated with montane lakes, ponds, seeps, bogs and meadows as well as rivers, streams and springs. Water may be permanent or ephemeral (Marcot 1979). The growing season extends from spring until late fall, becoming shorter at higher elevations. Most tree species flower in early spring before leafing out.

Distribution

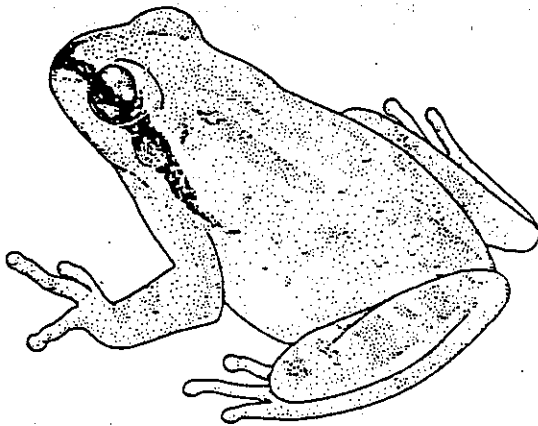
Montane riparian habitats are found in the Klamath, Coast and Cascade ranges and in the Sierra Nevada south to about Kern and northern Santa Barbara Counties, usually below 2440 m (8000 ft). The Peninsular and transverse ranges of southern California from about southern Santa Barbara to San Diego Counties also include MRI habitat. MRI subtype, consisting mostly of red alder, is found from northern San Luis Obispo to Del Norte Counties along the immediate coast (Cheatham and Haller 1975).



Sierra Nevada Red Fox (*Vulpes vulpes necator*)



MRI
Montane Riparian habitat, Alder Creek,
Sierra County, California (photo by Wil-
liam F. Laudenslayer, Jr.)



Pacific Treefrog (*Hyla regilla*)

Montane Riparian



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