

STATE OF NEVADA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES

Carson City



Incline Village area and Crystal Bay, Lake Tahoe, looking northeast from the Nevada-California State boundary.

WATER RESOURCES—INFORMATION SERIES

REPORT 23

**A RECONNAISSANCE OF STREAMFLOW AND FLUVIAL SEDIMENT TRANSPORT,
INCLINE VILLAGE AREA, LAKE TAHOE, NEVADA**

Third Progress Report, 1972 and 1973

**By
Patrick A. Glancy**

**Prepared cooperatively by the
Geological Survey, U.S. Department of the Interior**

1976



Oblique aerial view of eastern Incline Village area and Crystal Bay, Lake Tahoe.

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CONVERSION FACTORS

For those readers who may prefer to use metric units rather than English units, the conversion factors for terms in this report are listed below:

English unit	Metric unit	Multiplication factor to convert from English to metric quantity
Inches (in)	Millimetres (mm)	25.40
Feet (ft)	Metres (m)	.3048
Miles (mi)	Kilometres (km)	1.609
Acres	Square metres (m ²)	4,047
Square miles (mi ²)	Square kilometres (km ²)	2.590
Cubic feet per second (ft ³ /s)	Litres per second (l/s)	28.32
Do.	Cubic metres per second (m ³ /s)	.02832
Acre-feet	Cubic metres (m ³)	1,233
Acre-feet per square mile (acre-ft/mi ²)	Cubic metres per square kilometres (m ³ /km ²)	476.1
Tons (short)	Tonnes (t)	.9072

A RECONNAISSANCE OF STREAMFLOW AND FLUVIAL SEDIMENT TRANSPORT,
INCLINE VILLAGE AREA, LAKE TAHOE, NEVADA

By Patrick A. Glancy

ABSTRACT

Runoff of the five major streams in the Incline Village area was about 9,600 acre-feet during the 1972 water year and about 14,200 acre-feet during 1973. About four-fifths of the runoff during each year was from cumulative flows of Incline and Third Creeks. Sediment transported to Lake Tahoe by the five major streams was estimated to be about 1,500 tons in 1972 and 8,800 tons in 1973. The combined sediment delivery of Incline and Third Creeks was about 60 percent of the estimated total in 1972 and about 65 percent in 1973. About 90 percent of the sediment was delivered to the lake during the snowmelt runoff period in 1972 and about 96 percent in 1973. The annual sediment load was estimated to be about 73 percent sand and gravel (dominantly sand with some gravel, finer than 8 millimetres in particle-diameter size), 14 percent silt, and 13 percent clay in 1972. For 1973, the estimates are 83 percent sand and gravel (again dominantly sand with gravel particles less than 8 millimetres in diameter), 10 percent silt, and 7 percent clay.

Sediment transported by rainfall runoff generally contained greater percentages of silt and clay than that transported by snowmelt runoff. Estimated sediment yields for 1972 ranged from 3.2 to 76 tons per square mile from undeveloped areas, and 32 to 1,600 tons per square mile from developed areas. In 1973, the yields for undeveloped areas ranged from 19 to 420 tons per square mile, and yields from developed areas ranged from 700 to 5,000 tons per square mile. Estimates suggest that in both 1972 and 1973, about 80 percent of the sediment transported to Lake Tahoe came from developed areas and about 20 percent came from undeveloped areas. The resultant yield estimates (in tons per square mile) suggest that during both years, the estimated annual yields from developed areas were about 14 times those from undeveloped areas.

The highest measured concentrations of nitrate, ammonia, organic nitrogen, organic carbon, and phosphorous occurred when runoff originated mainly from rainfall or low-altitude snowmelt. Samples collected during rainfall and low-altitude snowmelt runoff also yielded the highest percentages of silt and clay in the sediment loads. Most phosphorous that moved to the lake during periods of heavy sediment transport appears to have traveled as a component of particulate matter, rather than in a dissolved state.

INTRODUCTION

Purpose and Scope

The U.S. Geological Survey, in cooperation with the Nevada Department of Conservation, started a 5-year reconnaissance of streamflow and sediment transport in the Incline Village area, Lake Tahoe, Nev., during the 1970 water year (a water year extends from October 1 to September 30). Five years is believed to be the shortest period that might represent the natural variability in annual runoff and sediment movement. The period is likewise believed to be the minimum time during which the hydrologic changes caused by urbanization within the area can be viewed in a reasonable perspective. However, this study was terminated at the close of the 1973 water year after 4 years of data collection because of a lack of funds. This is the third and final progress report designed to show results of the study. It includes summaries and preliminary analyses of the data collected during the third and fourth years--the 1972 and 1973 water years. This report, like the first two, is intentionally brief, because in-depth interpretations require data obtained during several consecutive years, as described above. A more detailed interpretive and summary report is in preparation.

A generalized sketch of the study area is shown in figure 1. Table 1 gives a breakdown of principal Incline Village drainages by area and altitude increments.

Major objectives of the study are to: (1) quantify runoff from the major drainage basins; (2) characterize the timing of runoff with respect to seasons and climate; (3) accumulate data for peak-flow and low-flow conditions; (4) quantify as accurately as possible, using reconnaissance techniques, fluvial-sediment transport with emphasis on (a) determining the annual sediment transport from the study area to Lake Tahoe, (b) evaluating the relative amounts of sediment derived from "urban" developed versus nondeveloped areas, and (c) characterizing sediment loads transported to Lake Tahoe with respect to particle-size distribution (proportionate amounts of gravel, sand, silt, and clay); and (5) providing preliminary data on several nutrients (nitrogen and phosphorous species, silica, and organic carbon) transported to the lake by the water-sediment mixture of streams, particularly during times of moderate to high rates of sediment transport.

Data Collection and Analysis

Streamflows of Incline and Third Creeks are monitored near their mouths by continuous recorders (fig. 1). Streamflow data for these creeks are presented in "Water Resources Data for Nevada - 1972," and "Water Resources Data for Nevada - 1973" (U.S. Geol. Survey, 1973 and 1974). Streamflows of Wood, Second, and First Creeks near their mouths were synthesized using instantaneous flow data collected on these streams, and correlating those data with the continuously recorded streamflows of Incline and Third Creeks.

Table 1.--Approximate natural drainage areas and
areal altitude distribution 1/

Drainage	Area (mi ²)	Approximate percentage of drainage area within various altitude zones				
		Below 7,000 feet	7,000-8,000 feet	8,000-9,000 feet	9,000-10,000 feet	Above 10,000 feet
Unnamed tributary west of First Creek <u>2/</u>	0.67	26	63	11	--	--
First Creek	a 1.09	17	35	40	8	--
Second Creek	b 1.81	32	30	23	15	--
Unnamed ephemeral tributaries <u>2/</u>	1.00	84	16	--	--	--
Wood Creek	2.03	19	33	34	14	--
Unnamed tributaries <u>2/</u>	0.28	100	--	--	--	--
Third Creek	6.03	17	13	35	34	1
Incline Creek	6.98	21	43	35	1	--
Mill Creek <u>2/</u>	2.02	42	42	16	--	--
Total (rounded)	21.9					

1. Hydrologic data in this report involve about 17.6 square miles, or approximately 80 percent of the total area.
2. These drainages are not represented in the data summary of this progress report; data collected and interpretations for the 1972 and 1973 water years in these areas require further analysis and will be included in the summary publication.
 - a. Natural drainage area is about 1.09 square miles, but the drainage area as modified by man since 1971 is about 1.20 square miles.
 - b. Drainage area above hydrologic measuring site is about 1.43 square miles.

About 1,180 sediment samples were collected during the 1972 and 1973 water years and analyzed according to standard U.S. Geological Survey methods (650 samples in 1972 and 530 in 1973). About 840 of the sediment samples were collected at the principal hydrologic data sites described above; the instantaneous sediment-transport data derived from these samples, as well as data for about 115 samples collected at the miscellaneous sites upstream on Third and Wood Creeks, are included in the appendix of this report. About 230 additional sediment samples were collected at numerous other sites in the study area and these data are on file with the U.S. Geological Survey, Water Resources Division, in Carson City, Nev.

The principal hydrologic data-collection sites are shown in figure 1. Some but not all of the supplementary sites are also shown in figure 1.

Sediment data were collected to obtain as broad a range of transport conditions as possible. A relatively small number of samples were collected to define the general sediment-transport characteristics during periods of low streamflow, but the most frequent and intensive sampling was done during periods of high streamflow when fluvial sediment transport was greatest.

Sediment discharges of Incline and Third Creeks near their mouths were computed on a daily basis according to standard U.S. Geological Survey methods. Daily sediment discharges for periods when no sediment data were collected were estimated by interpolating between days on which data were collected, with attention to streamflow and weather conditions as a means of improving interpolation accuracy. Sediment loads of Wood, Second, and First Creeks were estimated using several sediment-transport rating curves which were developed from available sample data, daily water discharges of the synthesized hydrographs, and personal observation of erosion and streamflow conditions. This method of estimating sediment loads is patterned after techniques described by Colby (1956).

Twenty-two samples were collected during the 2-year period for nutrient analysis (10 samples in 1972 and 12 in 1973). After collection, the samples were immediately chilled to temperatures lower than 4°C, portions of each sample were filtered as soon as practicable, and all sampled material was held at low temperature until analyzed. Most of these samples were collected during periods of snowmelt or rainfall runoff, near the mouths of Third and Incline Creeks. The sampling emphasized periods when rates of sediment transport were high, to characterize the movement of sediment-related nutrients.

Qualifications Regarding the Use of These Preliminary Data

Users of data summarized in this progress report are cautioned to bear in mind that these summaries represent only reconnaissance estimates of hydrogeologic conditions in the Incline Village area during the 1972 and 1973 water years.

The data summarized in this report may not be representative of past or future hydrogeologic conditions, because of their short-term nature and because of the dynamic developmental changes currently taking place in the area. Also, these data should not be extrapolated to other parts of the Tahoe basin, because hydrogeologic conditions throughout the basin probably varied greatly from place to place during the 1972 and 1973 water years. Hydrogeologic variability is to be expected, because of differences in natural hydrogeologic parameters as well as differences in man's activities throughout the Tahoe basin.

Acknowledgment

I am grateful for the assistance of T. L. Katzer, U.S. Geological Survey for the analysis of streamflow data, extensive checking of calculations, manuscript review, and help in the collection of field data.

RUNOFF

Runoff from the study area during the 1972 and 1973 water years is summarized in tables 2 and 3. During both years, about four-fifths of the total estimated runoff from the study area to Lake Tahoe was contributed by the combined flows of Incline and Third Creeks.

The nature of runoff during the 1972 water year is generalized chronologically as follows:

- a. Oct. 1, 2: Light rainfall runoff.
- b. Oct. 3-14: Seasonal low flows.
- c. Oct. 15-Nov. 10: Dominantly seasonal low flows with intermittent mild surges of increased runoff from sporadic light snowstorms.
- d. Nov. 11: Rainfall runoff.
- e. Nov. 12-25: A return to stable and moderate seasonal low flows caused by dominantly cool dry weather.
- f. Nov. 26: Rainfall runoff.
- g. Nov. 27-Mar. 1: Generally static streamflow dominated by base flow resulted from general snowpack accumulation caused by numerous storms of varying intensity, interspersed with short intervals of generally minor, very low-altitude melting.
- h. Mar. 2-21: Increased runoff caused by consistent low-altitude snowmelt.
- i. Mar. 22-Apr. 1: Retarded snowmelt runoff caused by a return of cold wintry weather.
- j. Apr. 2-13: Mostly retarded snowmelt runoff interrupted by short infrequent surges of renewed snowmelt runoff from low to middle altitudes, resulting from mostly cold weather with a few short warming periods.
- k. Apr. 14-May 9: Dominantly middle-altitude snowmelt runoff interrupted by short periods of cool and stormy weather.
- l. May 10-June 10: High-altitude snowmelt runoff caused by mainly clear and warm to hot weather.
- m. June 11-July 10: A gradual recession of high-altitude snowmelt runoff with a return to summer base level flow of all streams by July 10.
- n. July 11-Sept. 30: Summer low flows interrupted infrequently (Sept. 4-5 and Sept. 26-27) by light to moderately heavy rains.

The 1973 water year runoff is also summarized chronologically as follows:

- a. Oct. 1-18: Brief periods of seasonal low flow were interspersed with increased runoff pulses caused by several rainstorms and occasional snow showers.

Table 2.--Summary of runoff for 1972 water year
(Runoff in acre-feet)

	First Creek <u>1</u> /	Second Creek <u>1</u> /	Wood Creek <u>1</u> /	Third Creek <u>2</u> /	Incline Creek	Total (rounded)
October	29	44	83	228	332	720
November	28	38	60	210	314	650
December	28	44	65	222	239	600
January	30	47	59	218	224	580
February	36	47	43	204	262	590
March	58	130	100	419	582	1,290
April	47	94	82	373	438	1,030
May	71	160	130	1,040	544	1,940
June	60	67	61	618	363	1,170
July	25	50	24	129	209	440
August	19	33	15	73	144	280
September	26	38	24	100	156	340
Annual total (rounded)	460	790	750	3,830	3,810	9,600
	Annual runoff yield (acre-feet per square mile)	Maximum instantaneous discharge (cubic feet per second)	Minimum instantaneous discharge (cubic feet per second)			
First Creek	420	About 2 ft ³ /s in late May or early June	About 0.4 ft ³ /s in Sept.			
Second Creek	550	About 7 ft ³ /s, Mar. 3	About 0.45 ft ³ /s in Nov.			
Wood Creek	370	About 3½ ft ³ /s, in Mar. and May	About 0.2 ft ³ /s in Aug.			
Third Creek	640	34 ft ³ /s, May 29	0.65 ft ³ /s, Sept. 18			
Incline Creek	550	18 ft ³ /s, Mar. 3	1.5 ft ³ /s, Aug. 11-13			

1. Estimated on the basis of instantaneous flow data and hydrograph simulation.
2. Transbasin diversion shown in figure 1 was indirectly estimated by Rush (1967, p. 18) to average about 2,000 acre-feet per year. However, about 20 miscellaneous observations of diverted flow during the water year suggest 1972 diversion was about 900 acre-feet.

Table 3.--Summary of runoff for 1973 water year

(Runoff in acre-feet)

	First Creek <u>1/</u>	Second Creek <u>1/</u>	Wood Creek <u>1/</u>	Third Creek <u>2/</u>	Incline Creek	Total (rounded)
October	24	46	52	199	248	570
November	26	42	57	251	259	640
December	30	46	60	253	333	720
January	27	51	45	245	292	660
February	23	46	54	219	237	580
March	41	60	74	269	232	680
April	120	190	180	626	739	1,860
May	220	370	430	2,290	1,270	4,580
June	110	120	140	1,210	692	2,270
July	33	61	57	239	339	730
August	24	49	40	175	248	540
September	19	35	34	125	205	420
Annual total (rounded)	700	1,100	1,200	6,100	5,100	14,200
	Annual runoff yield (acre-feet per square mile)		Maximum instantaneous discharge (cubic feet per second)		Minimum instantaneous discharge (cubic feet per second)	
First Creek	640		About 6 ft ³ /s on May 14		About 0.3 ft ³ /s in Sept.	
Second Creek	770		About 11 ft ³ /s on May 16 and 18		About 0.4 ft ³ /s in Nov.	
Wood Creek	590		About 11 ft ³ /s on May 16		About 0.3 ft ³ /s in Dec.	
Third Creek	1,010		80 ft ³ /s, May 16		1.0 ft ³ /s, Sept. 13	
Incline Creek	730		40 ft ³ /s, May 31		1.7 ft ³ /s, Sept. 20	

1. Estimated on the basis of instantaneous flow data and hydrograph simulation:
2. Transbasin diversion shown in figure 1 was indirectly estimated by Rush (1967, p. 18) to average about 2,000 acre-feet per year. However, about a dozen miscellaneous observations of diverted flow during the water year suggest 1973 diversion was about 600 acre-feet.

- b. Oct. 19-Nov. 2: Seasonal low flows resulted from mostly clear weather occasionally interrupted by mild storm fronts which yielded only minor precipitation.
- c. Nov. 3 and 4: Low-altitude rainfall runoff with snowfall at higher altitudes.
- d. Nov. 5-Dec. 16: Seasonal low flows persisted during winter snowpack accumulation.
- e. Dec. 17-20: An intensive pulse of low-altitude runoff caused by rain on snowpack.
- f. Dec. 21-Jan. 10: A return to seasonal low flows and continued accumulation of winter snowpack.
- g. Jan. 11-13: A minor pulse of low-altitude runoff caused by rainfall on snowpack.
- h. Jan. 14-Mar. 14: A return to seasonal low flows and continued accumulation of winter snowpack. The accumulation resulted from numerous storms of varying intensity, interspersed with short intervals of generally minor, very low-altitude melting, all of which caused generally static streamflow conditions dominated by seasonal base flow.
- i. Mar. 15-22: Low-altitude spring snowmelt began, but runoff was retarded most of the time by recurring snowflurries and cold temperatures.
- j. Mar. 23-27: Increased runoff caused by low-altitude snowmelt.
- k. Mar. 28-Apr. 2: Low-altitude snowmelt runoff was sharply attenuated by renewed cold weather fronts and snowflurries.
- l. Apr. 3-12: Strong low-altitude snowmelt runoff.
- m. Apr. 13-19: Sharply retarded snowmelt runoff caused by recurring cold and stormy weather.
- n. Apr. 20-May 5: Low-altitude snowmelt resumed and evolved into dominantly middle-altitude snowmelt.
- o. May 6-11: Strong middle-altitude snowmelt runoff.
- p. May 12-19: Increasing high-altitude snowmelt runoff that peaked late during the period.
- q. May 20-June 13: High-altitude snowmelt runoff generally receded. Snowmelt runoff was sharply accelerated and supplemented by heavy rainfall on May 30-31.
- r. June 14-July 8: The waning high-altitude snowpack caused a gradual return to seasonal low flows.
- s. July 9-Sept. 30: Consistent seasonal low flows.

Cumulative runoff quantities from the several creeks of the study area during water years 1972 (9,600 acre-feet) and 1973 (14,200 acre-feet) were lower than those of the 1970 and 1971 water years (17,600 acre-feet each). Cumulative runoff in 1972 was only slightly greater than one-half that of 1970 and 1971. That of 1973 was about four-fifths of 1970 and 1971. Both 1972 and 1973 were characterized by generally early winter snowfall and snowpack accumulation rather than early winter rainfall runoff. Winter rains occurred twice during 1973 (mid-December and mid-January) but were either of relatively low intensity (December) or confined to lower altitudes (January); therefore, resultant runoff was only moderate. The relatively low cumulative runoff of 1972 was also gentle, and therefore, low peak flows were also characteristic of that year. These combined mild characteristics during 1972 strongly influenced sediment loads, which were much lower than average for the study period. The 1973 runoff year was intermediate in runoff characteristics compared to the previous 3 years. Peak flows of individual drainages were generally equal to or below those of 1971 on most creeks and lower than those of 1970, with the exception of Third Creek which peaked about 20 percent higher than in 1970.

The climax of spring snowmelt runoff in the streams of the study area during 1972 occurred as follows: First, Second, and Wood Creeks, early May; Incline Creek, mid-May; Third Creek, late May. However, strong surges of snowmelt runoff also occurred in Incline Creek and the smaller tributaries (First, Second, and Wood Creeks) during very early March. Stream-flow hydrographs for 1973 show the much more definitive spring snowmelt runoff climax that occurred during mid-May in Incline, First, Second, and Wood Creeks. Third Creek sustained heavy runoff from mid-May through early June.

SEDIMENT TRANSPORT

Estimated sediment transport to Lake Tahoe during the 1972 and 1973 water years by the major streams of the study area is summarized in tables 4 and 5. Sediment-load estimates represent the total sediment discharge (suspended load plus bedload). The tables indicate that about 60 percent of the 1,500 tons in 1972 and 65 percent of about 8,800 tons in 1973 reaching Lake Tahoe from the five study drainages came from Third and Incline Creeks. The tables also indicate that most of the annual sediment loads from each individual drainage (80-99 percent in 1972 and 90-98 percent in 1973) reached the lake during the snowmelt period. Likewise, the major part of the cumulative loads from all drainages (90 percent in 1972 and 96 percent in 1973) also reached the lake during the snowmelt period. The yields given in tables 4 and 5 are a means of expressing sediment-movement rates with regard to the size of the drainage area from which they were derived. They allow annual erosion- or transport-rate comparisons of the individual drainages, or drainage components, with each other, and with the composite rate of the total study area, irrespective of the sizes of the areas being compared. The expression of sediment transport as a yield rate is not intended to imply that erosion and sediment transport from a specific yield area were uniformly distributed throughout the area. In fact, in most of the study area, the bulk of the sediment seems to originate at numerous point sources.

Tables 6 and 7 show the load estimates prorated among areas of "urbanizing" development and undeveloped areas. Developed areas are those that contain homes, businesses, highways, recreational facilities, subdivision roads and construction, cleared utility rights of way, and roadways; therefore, they mainly encompass man's works and urbanizing efforts of the last several decades. These urbanizing efforts have been greatly accelerated during the last decade. The undeveloped areas make up the balance of the study area; however, undeveloped areas are not preserved in a naturally virgin state, because most of the so-called undeveloped areas were man-affected to some degree by the logging operations associated with the Comstock Lode mining operations during the last half of the 19th century, and by intermittent livestock grazing throughout the last hundred years.

The developed-area loads include loads derived as a result of the effects of development as well as those derived within the developed area because of natural erosion. No acceptable techniques are available to separate natural erosion from man-caused erosion within a given area, except in situations where adequate data were collected prior to the start of development. No known predevelopment hydrologic data are available for the Incline Village area. However, the differences in yields between developed and undeveloped areas, as shown in tables 6 and 7, are believed to provide a reasonable perspective regarding effects of development on sediment transport during the 1972 and 1973 water years. The estimated sediment loads in tables 6 and 7 suggest that about 80 percent of the sediment reaching Lake Tahoe during each of the 2 years came from the developed areas and about 20 percent came from the undeveloped areas. The data also suggest that average sediment yields (tons per square mile) from the developed areas to the lake during both 1972 and 1973 water years was about 14 times greater than those of the undeveloped areas.

Table 4.--Estimates of fluvial-sediment transport
(total load) into Lake Tahoe
during 1972 water year

Month	First Creek	Second Creek	Wood Creek	Third Creek	Incline Creek	Total (rounded)
Total-sediment loads (tons)						
October	--	--	--	1.8	3.5	--
November	--	--	--	2.8	8.0	--
December	--	--	--	3.0	4.3	--
January	--	--	--	2.9	2.5	--
February	--	--	--	6.2	9.5	--
March	--	--	--	62	40	--
April	--	--	--	50	15	--
May	--	--	--	490	29	--
June	--	--	--	120	20	--
July	--	--	--	0.9	3.0	--
August	--	--	--	0.4	1.0	--
September	--	--	--	4.4	9.5	--
Annual total (rounded)	83	490	20	740	150	1,500
Annual sediment yield, in tons per square mile (total drainage area includes sum of developed and unde- veloped areas)	69	340	9.9	120	21	85
Approximate distribution of annual loads according to main types of runoff (percent) <u>1/</u>						
Snowmelt period	80	85	75	99	85	90
Rainfall and low- flow period	20	15	25	1	15	10

1. Generally rounded to nearest 5 percent.

Table 5.--*Estimates of fluvial-sediment transport
(total load) into Lake Tahoe
during 1973 water year*

Month	First Creek	Second Creek	Wood Creek	Third Creek	Incline Creek	Total (rounded)
Total-sediment loads (tons)						
October	--	--	--	6.8	22	--
November	--	--	--	15	20	--
December	--	--	--	60	52	--
January	--	--	--	5.1	14	--
February	--	--	--	3.7	7.4	--
March	--	--	--	12	13	--
April	--	--	--	220	650	--
May	--	--	--	3,700	480	--
June	--	--	--	340	52	--
July	--	--	--	1.4	5.0	--
August	--	--	--	1.2	1.9	--
September	--	--	--	0.5	1.5	--
Annual total (rounded)	710	1,700	690	4,400	1,300	8,800
Annual sediment yield, in tons per square mile (total drainage area includes sum of developed and unde- veloped areas)	590	1,200	340	730	190	500
Approximate distribution of annual loads according to main types of runoff (percent)						
Snowmelt period	90	98	96	97	95	96
Rainfall and low- flow period	10	2	4	3	5	4

Table 6.--Estimates of total sediment loads and yields to Lake Tahoe from developed and undeveloped areas during 1972 water year

(All load estimates rounded to two significant figures)

	First Creek	Second Creek	Wood Creek	Third Creek	Incline Creek	Total (rounded)
Approximate total area (square miles) a	1.20	b 1.43	2.03	6.03	6.98	17.7
Approximate developed area						
Square miles	0.18	0.25	0.47	1.24	1.71	3.8
Approximate percentage of total area	15	17	23	21	24	21
Estimated sediment loads (tons)						
Developed area <u>1/</u>	73	400	15	550	130	1,200
Undeveloped area	10	90	5	190	20	300
Approximate yields (tons per square mile)						
Developed area <u>1/</u>	400	1,600	32	440	76	c 300
Undeveloped area	10	76	3	40	4	c 22

- a. Natural drainage area is about 1.09 square miles (table 1), but area in 1972 water year, as modified by man, was about 1.20 square miles.
- b. Total drainage area is about 1.81 square miles, but area draining to creek above hydrologic data site was about 1.43 square miles during 1972 water year.
- c. Areally weighted average.
1. Developed-area loads and yield rates include naturally eroded sediment (unaffected by man's activities) from within the developed areas.

Table 7.--*Estimates of total sediment loads and yields to Lake Tahoe from developed and undeveloped areas during 1973 water year*

(All load estimates rounded to two significant figures)

	First Creek	Second Creek	Wood Creek	Third Creek	Incline Creek	Total (rounded)
Approximate total area (square miles) a	1.20	b 1.43	2.03	6.03	6.98	17.7
Approximate developed area						
Square miles	0.18	0.25	0.47	1.24	1.71	3.8
Approximate percent- age of total area	15	17	23	21	24	21
Estimated sediment loads (tons)						
Developed area <u>1/</u>	630	1,200	620	3,400	1,200	7,000
Undeveloped area	80	500	70	1,000	100	1,800
Approximate yields (tons per square mile)						
Developed area <u>1/</u>	3,500	5,000	1,300	2,700	700	c 1,800
Undeveloped area	78	420	45	210	19	c 130

- a. Natural drainage area is about 1.09 square miles (table 1), but area in 1973 water year, as modified by man, was about 1.20 square miles.
- b. Total drainage area is about 1.81 square miles, but area draining to creek above hydrologic data site was about 1.43 square miles during 1973 water year.
- c. Areally weighted average.
1. Developed-area loads and yield rates include naturally eroded sediment (unaffected by man's activities) from within the developed areas.

The sediment-yield estimates from the undeveloped part of the Third Creek drainage are probably somewhat low, because an unknown amount of sediment was diverted from the upper part of the basin via the transbasin diversion route shown in figure 1. Miscellaneous sediment data collected at the point of transbasin diversion suggest that sediment diversion was probably less than 200 tons and very possibly less than 100 tons annually during 1972 and 1973. Estimated transbasin water diversions from Third Creek were about 23 percent and 10 percent, respectively, of the total flows into Lake Tahoe during 1972 and 1973 (tables 2 and 3). Also, diversions did not necessarily coincide with natural periods of high streamflow. Therefore, transbasin diversion presumably had only minor effects on sediment yields to the lake.

The sediment yield data for 1972 in table 6 show a greater variation between developed areas (up to 50 times, or from 32 to 1,600 tons per sq mi) than between undeveloped areas (up to 9 times, or from 3.2 to 76 tons per sq mi). In contrast, during 1973, variation between developed-area yields (up to 7 times, or from 700 to 5,000 tons per sq mi) was considerably less than that of undeveloped areas (up to 22 times, or 19 to 420 tons per sq mi), as shown in table 7. The relationships in 1973 are similar to conditions suggested by data of 1970 and 1971 (Glancy, 1971, p. 12, and 1973, p. 16). Therefore, the reverse situation of 1972 is anomalous to other years of the study period. The situation in 1972 may be related to the markedly lower total runoff and associated strikingly lower overall sediment loads in that year compared to those of 1970, 1971, and 1973.

During both 1972 and 1973, sediment yields from the undeveloped areas of Second and Third Creeks are markedly greater than those of First, Wood, and Incline Creeks. This characteristic was also noted in data for 1970 and 1971 (Glancy, 1971, p. 12, and 1973, p. 16), and probably is the result of continuing instability and nonequilibrium landscape conditions in the Second and Third Creek drainages caused by severe summer thunderstorm flooding of those drainages in 1967 and 1965, respectively (Glancy, 1969).

Maximum and minimum measured sediment concentrations and loads at the principal lake-inflow site for each stream during 1972 and 1973 are shown in tables 8 and 9. Great fluctuations occurred in the concentrations and loads, and, as might be expected, these fluctuations for any given stream generally were closely related to the magnitude of streamflow. Thus, the highest measured sediment concentrations and loads characteristically were associated with high streamflow; conversely, minimum sediment concentrations and loads were generally measured during low-flow periods.

The approximate particle-size distributions of estimated sediment loads reaching Lake Tahoe during 1972 and 1973 are listed in tables 10 and 11. These data were collected because the effects of fluvial-sediment transport on a stream's environment and on the lake environment are dependent on the character of the sediment as well as the quantity. For example, the concentration of suspended silt- and clay-size particles strongly affects the turbidity of the water, whereas sand-size particles, aside from forming

Table 8.--Maximum and minimum measured sediment transport during 1972 water year at sites of principal inflow to Lake Tahoe 1/

M A X I M U M				
Drainage	Concentration		Load	
	Date	mg/l	Date	tons/day
First Creek	Nov. 26	1,900	Apr. 14	5.6
Second Creek	Mar. 15	2,460	Mar. 3	20
Wood Creek	Mar. 4	207	Mar. 4	2.0
Third Creek	May 29	1,410	May 29	137
Incline Creek	Sept. 26	861	Sept. 26	23
M I N I M U M				
First Creek	Oct. 13	3	Oct. 13	0.003
Second Creek	Sept. 15	5	Sept. 15	.008
Wood Creek	several days	2	Feb. 8, 11	.003
Third Creek	Jul. 28, Sept. 4 and 15	2	Sept. 4 and 15	about .006
Incline Creek	May 13	3	Aug. 16	.02

1. These data describe the extreme instantaneous sediment-transport conditions measured during the year. Higher and lower concentrations and loads may have occurred at times when no measurements were made. However, these measured extremes are believed to generally depict the degree of variation in sediment-transport conditions that actually occurred, because sampling was intentionally scheduled to obtain data during periods of radically differing sediment movement. The periods of sediment-transport extremes do not necessarily coincide exactly with periods of water-discharge extremes, as shown by a comparison of tables 2 and 8.

Table 9.--Maximum and minimum measured sediment transport during 1973 water year at sites of principal inflow to Lake Tahoe 1/

M A X I M U M				
Drainage	Concentration		Load	
	Date	mg/1	Date	tons/day
First Creek	Nov. 4	6,780	Apr. 10	26
Second Creek	May 15	4,440	May 18	126
Wood Creek	May 12	2,080	May 15	55
Third Creek	May 25	5,630	May 25	912
Incline Creek	Apr. 25	2,320	May 31	169
M I N I M U M				
First Creek	Aug. 7	2	Aug. 7	about 0.002
Second Creek	Aug. 7	1	Aug. 7	about 0.002
Wood Creek	July 12 and Aug. 7	2	Dec. 5 and Aug. 7	about 0.004
Third Creek	Sept. 14	2	Sept. 14	.01
Incline Creek	Aug. 7 and Sept. 14	5	Sept. 14	.05

1. These data describe the extreme instantaneous sediment-transport conditions measured during the year. Higher and lower concentrations and loads may have occurred at times when no measurements were made. However, these measured extremes are believed to generally depict the degree of variation in sediment-transport conditions that actually occurred, because sampling was intentionally scheduled to obtain data during periods of radically differing sediment movement. The periods of sediment-transport extremes do not necessarily coincide exactly with periods of water-discharge extremes, as shown by a comparison of tables 3 and 9.

Table 10.--*Estimates of particle-size distribution of sediment loads reaching Lake Tahoe during 1972 water year*

(All tonnages rounded to not more than two significant figures 1/)

Drainage	ANNUAL TOTAL					
	Sand and gravel		Silt		Clay	
	Tons	Percentage	Tons	Percentage	Tons	Percentage
First Creek	51	61	18	22	14	17
Second Creek	370	76	65	13	55	11
Wood Creek	13	65	4	20	3	15
Third Creek	570	77	95	13	75	10
Incline Creek	70	46	40	27	40	27
Total	1,100	73	220	14	190	13
Drainage	SNOWMELT RUNOFF PERIOD					
	Sand and gravel		Silt		Clay	
	Tons	Percentage	Tons	Percentage	Tons	Percentage
First Creek	45	67	14	21	8	12
Second Creek	330	81	42	10	35	9
Wood Creek	10	67	3	20	2	13
Third Creek	560	77	95	13	75	10
Incline Creek	57	46	35	28	32	26
Total	1,000	75	190	14	150	11
Drainage	RAINFALL AND LOW-FLOW RUNOFF PERIODS					
	Sand and gravel		Silt		Clay	
	Tons	Percentage	Tons	Percentage	Tons	Percentage
First Creek	6	38	4	25	6	37
Second Creek	40	48	23	28	20	24
Wood Creek	3	60	1	20	1	20
Third Creek	3.7	37	3.4	34	2.9	29
Incline Creek	12	46	7	27	7	27
Total	65	47	38	27	37	26

1. Lateral and vertical summation of tonnages in this table may not precisely agree because of rounding. Likewise, cumulative tonnages for individual creeks and study area totals may not precisely agree with table 4.

Table 11.--Estimates of particle-size distribution of sediment loads reaching Lake Tahoe during 1973 water year

(All tonnages rounded to not more than two significant figures 1/)

Drainage	A N N U A L T O T A L					
	Sand and gravel		Silt		Clay	
	Tons	Percentage	Tons	Percentage	Tons	Percentage
First Creek	550	77	100	14	60	9
Second Creek	1,300	78	180	11	180	11
Wood Creek	520	75	95	14	80	11
Third Creek	3,900	89	320	7	150	4
Incline Creek	1,000	78	180	14	110	8
Total	7,300	83	880	10	580	7
S N O W M E L T R U N O F F P E R I O D						
First Creek	510	80	83	13	43	7
Second Creek	1,300	80	170	10	170	10
Wood Creek	500	76	88	13	73	11
Third Creek	3,800	90	300	7	140	3
Incline Creek	990	80	160	13	90	7
Total	7,100	84	800	10	520	6
R A I N F A L L A N D L O W - F L O W R U N O F F P E R I O D S						
First Creek	44	56	17	22	17	22
Second Creek	20	50	10	25	10	25
Wood Creek	11	45	6.9	28	6.7	27
Third Creek	83	75	15	14	12	11
Incline Creek	46	53	23	26	18	21
Total	200	60	72	21	64	19

1. Lateral and vertical summation of tonnages in this table may not precisely agree because of rounding. Likewise, cumulative tonnages for individual creeks and study area totals may not precisely agree with table 5.

good beaches, commonly clog streambed gravels and, therefore, generally affect the stream biota adversely. The particle-size characteristics of the sediment also influence the chemistry of the water-sediment mixtures. Tables 10 and 11 indicate that sediment loads derived during rainfall-runoff conditions generally contain much greater percentages of fine-grained material than those associated with the snowmelt runoff. However, the total annual five-stream composite loads reaching the lake were dominated by coarse-grained sediment--that is, sand and gravel (about 73 percent and 83 percent of the total loads in 1972 and 1973, respectively).

The data in tables 10 and 11 do not differentiate between gravel and sand. Original laboratory analyses show that the size of all sediment particles sampled was finer than 8 millimeters in diameter. These data, plus the knowledge that particle-size data are representative of the bulk of sediment movement suggest that virtually all transported gravel was of the granule or small pebble size. Reference to particle-size data in the appendix suggests gravel transport during the 1972 and 1973 water years was as follows: (1) gravel never made up more than 34 percent of the combined gravel-sand mixture at times of particle-size sampling; (2) gravel transport to the lake during the 1972 water year was probably negligible for First, Wood, and Incline Creeks; (3) gravel transport to the lake during the 1972 water year was probably less than 10 percent of the total loads of Second and Third Creeks; and (4) during the 1973 water year, gravel transport to the lake was probably less than 25 percent of total load for Third Creek, less than 20 percent for First and Second Creeks, and less than 15 percent for Wood and Incline Creeks.



NUTRIENTS

The Incline Village investigation also involves a preliminary effort to assess the magnitude of nutrients (nitrogen and phosphorous species, silica, and organic carbon) transported into Lake Tahoe by streamflow. This effort represents an attempt to relate nutrient transport to the quantitative aspects of streamflow and sediment transport. Nutrient transport to the lake is reportedly being accelerated because of erosion caused by man's development activities (Goldman, 1974, p. 13; U.S. Environmental Protection Agency, 1974, p. 52 and 53).

The interrelationships of water-sediment mixtures with regard to the derivation, transport, and ultimate disposition of nutrients are not often well understood. This complex problem was summarized by Lee (1970). Because of the complexity, this preliminary investigation was designed to merely identify the magnitude of the problem in the Incline Village area. It is hoped that this preliminary reconnaissance will provide the necessary information to help design a more intensive study.

Table 12 gives the results of reconnaissance nutrient sampling during the 1972 and 1973 water years. Sediment and water-discharge data collected concurrently with the nutrient data are also included in the table to depict runoff and sediment-transport conditions. Nutrient data collection generally followed the scheme used in 1971 (Glancy, 1973, table 7) in that samples were collected only at the mouths of Incline and Third Creeks. Five samples were collected during water year 1972 and 21 were collected the following year.

Several nutrient-transport trends are suggested by the 1972-73 data. During periods of runoff from rainfall and (or) low-altitude snowmelt, concentrations of the following substances are generally higher than during middle- to high-altitude snowmelt runoff: nitrate, ammonia, organic nitrogen, total organic carbon, and total phosphorous. Highest percentages of fine-grained sediment (silt and clay) are also in transport during the periods of runoff from rainfall and low-altitude snowmelt. Concentrations of nitrite, dissolved phosphorous, and dissolved orthophosphate are generally very low for all types of sampled runoff conditions. The considerably higher concentrations of total phosphorous compared to dissolved phosphorous and dissolved orthophosphate reaffirms the generally held belief that most phosphorous moving into the lake is a component of the organic and inorganic sediment particles.

The total quantity of any substance in transport is the product of its concentration and the magnitude of water discharge. Concentrations alone are not necessarily indicative of the amount of any substance moving into the lake. Therefore, any evaluation of nutrient input to the lake must also consider the magnitude of water discharge at the time of sampling.

Table 12.--Summary of nutrient and concurrent streamflow and sediment-transport data for 1972 and 1973 water years

Date	Time	Discharge (ft ³ /s)	Water temperature (°C)	Milligrams per litre												
				Dissolved nitrate as N	Dissolved nitrite as N	Total ammonium as N	Dissolved ammonium as N	Total organic nitrogen as N	Dissolved organic nitrogen as N	Total nitrogen as N l/	Dissolved nitrogen as N	Total phosphorus as P	Dissolved phosphorus as P	Dissolved orthophosphate as P	Dissolved silicon as SiO ₂	Total organic carbon as C
<u>10336698 THIRD CREEK NEAR CRYSTAL BAY, NEVADA</u>																
<u>1972</u>																
Mar. 3	1745	10	5.0	0.23	0.00	0.23	0.16	0.78	0.22	1.2	0.61	0.46	--	0.07	16	6.5
Apr. 5	1120	7.9	3.5	.04	.00	.14	.13	.62	.05	.80	.22	.19	--	.00	17	11
May 29	1930	36	10.5	.03	.00	.13	.05	.29	.02	.45	.10	.27	--	.01	13	5.0
Nov. 4	0040	11	4.0	.09	.02	.21	.17	1.2	.41	1.5	.69	.33	0.10	.06	12	17
<u>1973</u>																
Mar. 25	1550	8.2	6.5	.11	.00	--	.09	.69	.26	.89	.46	.36	.03	.05	16	12
Apr. 4	1615	9.0	6.5	0.11		.07	.08	--	.42	--	.61	--	.06	--	--	--
Apr. 22	1700	11	9.5	.04	.01	.09	.03	.29	.02	.43	.10	.13	.03	.02	17	--
May 1	1745	16	8.5	.04	.00	--	.00	--	.27	--	.32	.05	.03	.01	16	4.0
May 18	1800	65	6.0	.06	.00	.04	.02	.30	.07	.40	.15	.12	.01	.01	11	5.0
May 28	1915	68	9.0	.03	.00	.03	.03	.46	.08	.52	.14	.17	.01	.01	13	6.0
May 29	1130	36	11.0	.03	.00	.03	.01	.17	.09	.21	.12	.05	.01	.01	15	2.5
May 31	1530	76	8.5	.01	.00	.07	.07	1.0	.25	1.1	.33	.47	.01	.01	12	16
June 22	1900	7.4	11.5	.01	.00	.00	.01	.11	.09	.12	.11	.04	.02	.01	18	1.5
Sept. 4	1215	2.0	13.5	.00	.01	.01	.01	.06	.04	.08	.06	.04	.04	.04	18	1.0
<u>10336700 INCLINE CREEK NEAR CRYSTAL BAY, NEVADA</u>																
<u>1972</u>																
Mar. 2	1715	11	4.5	0.15	0.00	--	0.41	0.53	0.21	1.1	0.77	0.31	--	0.04	23	7.0
Apr. 5	1100	8.0	3.5	.09	.00	--	.08	.27	.11	.44	.28	.13	--	.01	20	10
Nov. 4	0015	12	4.5	.00	.05	0.39	.34	1.6	.20	2.0	.59	.83	0.05	.05	13	27
<u>1973</u>																
Mar. 25	1615	9.8	5.0	.12	.00	--	.12	.81	.39	1.0	.63	.31	.04	.06	19	20
Apr. 4	1600	9.4	7.0	.09		.12	.06	--	.44	--	.59	--	.05	--	--	--
Apr. 22	1630	16	8.0	.10	.00	.06	.02	.42	.13	.58	.25	.18	.02	.02	20	--
May 1	1820	22	7.0	.10	.00	.05	.03	.32	.13	.47	.26	.11	.03	.01	19	6.5
May 18	1730	28	8.5	.07	.00	.08	.03	.35	.06	.50	.16	.07	.02	.01	17	6.0
May 28	1900	18	11.5	.02	.00	.01	.01	.20	.17	.26	.23	.04	.01	.01	18	3.0
May 31	1500	36	9.5	.02	.00	.05	--	1.6	.30	1.7	.35 ^e	.53	.03	.02	16	18
June 22	1845	9.4	11.0	.01	.00	.02	.00	.12	.12	.15	.13	.05	.01	.01	22	2.0
Sept. 14	1200	3.7	13.0	.15	.00	.09	.01	.05	.00	.29	.16	.07	.07	.07	24	2.0

1. Assumes that total nitrate and nitrite approximately equal the dissolved concentrations.

e. Estimated.

Specific conductance (micromhos per cm at 25°C)	Total sediment concentration (mg/l)	Total sediment load (tons per day)	Approximate particle-size distribution of sediment load				Runoff character
			Gravel	Sand	Silt	Clay	
<u>10336698 THIRD CREEK NEAR CRYSTAL BAY, NEVADA</u>							
65	302	8.2	0	25	43	32	Low-altitude snowmelt
65	322	6.9	0	38	31	31	Low-altitude rainfall
27	1,170	114	19	66	10	5	High-altitude snowmelt
60	752	22	7	59	17	17	Rainfall
95	265	5.9	0	41	35	24	Low-altitude snowmelt
83	313	7.6	0	65	20	15	Low-altitude snowmelt
73	444	13	0	87	9	4	Middle-altitude snowmelt
54	150	6.5	0	87	13		Middle-altitude snowmelt
27	3,000	527	21	75	3	1	High-altitude snowmelt
28	1,970	362	30	66	3	1	High-altitude snowmelt
31	404	39	0	97	3		High-altitude snowmelt
30	3,190	656	31	60	7	2	High-altitude snowmelt plus low-altitude rainfall
49	5	.10	--	--	--	--	Seasonal low flow
71	2	.01	--	--	--	--	Seasonal low flow
<u>10336700 INCLINE CREEK NEAR CRYSTAL BAY, NEVADA</u>							
76	247	7.3	0	9	38	53	Low-altitude snowmelt
62	208	4.5	0	11	48	41	Low-altitude rainfall
57	962	31	11	23	26	40	Rainfall
101	344	9.1	0	50	30	20	Low-altitude snowmelt
82	384	9.7	0	58	24	18	Low-altitude snowmelt
64	1,140	49	7	82	8	3	Middle-altitude snowmelt
55	544	32	11	81	6	2	Middle-altitude snowmelt
42	149	11	0	82	18		High-altitude snowmelt
43	180	8.7	0	94	6		High-altitude snowmelt
57	665	65	0	57	26	17	Receding high-altitude snowmelt plus low-altitude rainfall
54	10	.25	--	--	--	--	Seasonal low flow
67	5	.50	--	--	--	--	Seasonal low flow

REFERENCES CITED

- Colby, B. R., 1956, Relationship of sediment discharge to streamflow: U.S. Geol. Survey open-file report, 170 p.
- Environmental Protection Agency, 1974, The Lake Tahoe Study: Environmental Protection Agency Report, 137 p.
- Glancy, P. A., 1969, A mudflow in the Second Creek drainage, Lake Tahoe basin, Nevada, and its relation to sedimentation and urbanization: U.S. Geol. Survey Prof. Paper 650-C, p. C195-C200.
- _____, 1971, A reconnaissance of streamflow and fluvial sediment transport, Incline Village area, Lake Tahoe, Nevada, First progress report, 1970: Nevada Div. Water Resources, Water Resources Info. Ser. Rept. 8, 28 p.
- _____, 1973, A reconnaissance of streamflow and fluvial sediment transport, Incline Village area, Lake Tahoe, Nevada, Second progress report, 1971: Nevada Div. Water Resources, Water Resources Info. Ser. Rept. 19, 37 p.
- Goldman, C. R., 1974, Eutrophication of Lake Tahoe emphasizing water quality: Davis, California Univ. Inst. of Ecology, Environmental Protection Agency Report EPA-660/3-74-034, 408 p.
- Lee, G. F., 1970, Factors affecting the transfer of materials between water and sediments: Wisconsin Univ., Water Resources Center, Literature Review no. 1, 50 p.
- Rush, F. E., 1967, Water-resources appraisal of Washoe Valley, Nevada: Nevada Dept. Conserv. and Nat. Resources, Water Resources-Reconn. Ser. Rept. 41, 38 p.
- U.S. Geological Survey, 1973, Water resources data for Nevada, 1972: Carson City, Nev., U.S. Geol. Survey, Water Resources Div., 250 p.
- _____, 1974, Water resources data for Nevada, 1973: Carson City, Nev., U.S. Geol. Survey, Water Resources Div., 258 p.

APPENDIX

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS--Continued

Date	Time (24-hour)	Water temperature		Water discharge (ft ³ /s)	Specific conductance (umhos/cm at 25°C)	Total sediment concentration (mg/l)	Total sediment discharge (tons/day)	Total sediment particle size										Method of analysis		
		°F	°C					Percent finer than the size (in millimetres) indicated												
								.002	.004	.008	.016	.031	.062	.125	.250	.500	1.00	2.00		
10336690 SECOND CREEK NEAR CRYSTAL BAY, NEV. (LAT 39°15'10", LONG 119°58'35")--Continued																				
May 13, 1972	2045	45	7.0	3.2	48	1,700	15													
May 19	0905	40	4.5	2.1	59	103	.58													
May 23	1740			1.8	55	514	2.5													
May 25	1915	51	10.5	2.1	53	243	1.4													
May 26	1700	60	15.5	2.1	51	209	1.2													
May 27	1630	62	16.5	2.2	49	398	2.4													
May 27	1950	52	11.0	2.0	50	175	.94													
May 27	2245	48	9.0	2.0	49	220	1.2													
May 28	1240	62	16.5	1.8	54	184	.89													
May 29	1805	56	13.5	2.0	52	328	1.8													
June 2	1700	61	16.0	1.6	55	155	.67													
June 7	1930	53	11.5	1.4	75	380	1.4													
June 9	1345	52	11.0	1.3	71	60	.21													
June 13	1800	59	15.0	1.1	62	38	.11													
July 3	1430	70	21.0	.89	65	18	.04													
July 13	1010	50	10.0	.86	69	8	.02													
July 28	1455	72	22.0	.83	81	15	.03													
Aug. 16	0950	42	5.5	2.1	74	6	.03													
Sep. 4	1735	56	13.5	.89	75	15	.04													
Sep. 15	0955	46	7.5	.57	75	5	.008													
Sep. 20	1045	43	6.0	.57	75	25	.04													
Sep. 26	0840	45	7.0	.80	67	84	.18													
Sep. 27	1005	45	7.0	.83	62	598	1.3													
1973 Water Year																				
Oct. 11, 1972	1310	47	8.5	.52	78	8	.01													
Oct. 17	1015	40	4.5	.80	78	39	.08													
Nov. 4	0125	38	3.5	2.4	37	3,540	23	4	6	8	10	12	14	15	20	30	49	97		SPWC
Nov. 4	1050	36	2.0	1.6	49	558	2.4													
Nov. 4	1530	41	5.0	1.6	58	1,660	7.2													
Nov. 6	1215	32	0.0	.38	71	91	.09													
Nov. 24	1550	36	2.0	.52	68	392	.55													
Dec. 5	1055	33	.5	.38	75	37	.04													
Dec. 17	1620	32	0.0	2.2	72	777	4.6													
Dec. 22	1620	37	3.0	1.2	72	65	.21													
Jan. 8, 1973	1455	34	1.0	.74	84	244	.49													
Jan. 12	1700	34	1.0	1.2	136	477	1.5													
Jan. 13	1125	36	2.0	.66	86	196	.35													
Feb. 9	1200	36	2.5	.80	80	16	.03													
Feb. 23	1725	36	2.0	1.0	85	132	.36													
Mar. 1	1600	37	3.0	1.0	78	68	.18													
Mar. 7	1510	37	3.0	.80	76	45	.10													
Mar. 15	1500	40	4.5	.80	71	243	.52													
Mar. 23	1525	40	4.5	1.0	70	178	.48													
Mar. 25	1430	41	5.0	1.4	65	512	1.9					37								S
Mar. 25	1650	39	4.0	1.6	65	566	2.4													
Mar. 27	1505	37	3.0	1.2	70	198	.64													
Apr. 4	1500	43	6.0	1.5	64	638	2.6					31								S
Apr. 4	1745	39	4.0	1.6	64	643	2.8													
Apr. 5	0655	34	1.0	1.2	72	290	.94													
Apr. 5	1735	40	4.5	2.5	67	1,540	10													
Apr. 10	1010	39	4.0	2.5	61	416	2.8													
Apr. 10	1505	45	7.0	4.6	50	3,040	38					30								S
Apr. 10	1820	40	4.5	4.6	51	3,500	43													
Apr. 11	0645	36	2.0	3.0	61	1,200	9.7													
Apr. 11	1620	42	5.5	5.3	47	4,240	61													
Apr. 17	1500	42	5.5	2.7	63	1,640	12													
Apr. 22	1510	47	8.5	3.7	53	4,190	42	2	3	5	7	10	13	18	29	43	57	86		SBWC
Apr. 22	1735	41	5.0	4.3	56	2,360	27													
Apr. 24	1645	43	6.0	6.6	46	3,360	60													
Apr. 25	0700	36	2.0	4.0	57	1,190	13													
Apr. 25	1900	39	4.0	7.0	47	2,350	44													
Apr. 26	0745	39	4.0	4.3	55	1,240	15													
May 1	1630	46	8.0	5.7	49	1,600	25													
May 6	1605	48	9.0	3.0	71	2,570	21													
May 7	1620	48	9.0	4.4	50	1,080	13													
May 9	1730	46	8.0	5.5	43	1,500	22	3	4	5	7	9	12	18	29	45	62	78		SBWC
May 9	1910	43	6.0	5.3	42	1,300	19													
May 10	0650	39	4.0	3.4	53	821	7.5													
May 12	1525	54	12.0	7.9	40	3,320	71	5	8	12	18	24	31	44	62	75	84	92		SPWC
May 12	1915	45	7.0	7.9	39	2,160	46													
May 14	1725	45	7.0	7.6	35	2,190	45													
May 15	1735	45	7.0	9.9	34	4,440	119													
May 16	1725	48	9.0	11	39	2,390	71													
May 17	0710	42	5.5	7.0	40	2,520	48													
May 18	1930	45	7.0	11	35	4,240	126													
May 21	1755	47	8.5	8.1	35	2,820	62													
May 22	0900	43	6.0	5.3	40	536	7.7													
May 25	1705	45	7.0	4.8	42	169	2.2													
May 28	1740	55	13.0	5.3	38	316	4.5													
May 30	1710	51	10.0	4.3	40	750	8.7													
May 31	1350	47	8.5	9.0	36	1,280	31													
May 31	1620	46	7.5	5.7	38	243	3.7													
June 1	1535	53	11.5	4.0</																

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS--Continued

Date	Time (24-hour)	Water temperature °F	Water temperature °C	Water discharge (ft ³ /s)	Specific conductance (umhos/cm at 25°C)	Total sediment concentration (mg/l)	Total sediment discharge (tons/day)	Total sediment particle size										Method of analysis	
								Percent finer than the size (in millimetres) indicated											
								.002	.004	.008	.016	.031	.062	.125	.250	.500	1.00	2.00	
10336693 WOOD CREEK NEAR CRYSTAL BAY, NEV. (LAT 39°15'40", LONG 119°57'25")--Continued																			
May 6, 1972	1820	47	8.5	3.4	49	32	.29	--	--	--	--	--	--	--	--	--	--	--	--
May 10	1500	52	11	2.4	52	13	.08	--	--	--	--	--	--	--	--	--	--	--	--
May 12	1820	52	11.0	2.9	51	20	.16	--	--	--	--	--	--	--	--	--	--	--	--
June 9	1425	50	10	2.4	52	6	.04	--	--	--	--	--	--	--	--	--	--	--	--
Sep. 27	1020	43	6.0	1.6	59	219	.95	--	--	--	--	--	--	--	--	--	--	--	--
1973 Water Year																			
Oct. 11, 1972	1505	46	7.5	.8	65	15	.03	--	--	--	--	--	--	--	--	--	--	--	--
Dec. 5	1115	33	.5	1.2	62	10	.03	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 10	1035	38	3.5	2.4	54	46	.30	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 24	1715	40	4.5	3.6	38	2,380	23	--	--	--	--	--	--	--	--	--	--	--	--
May 15	1645	44	6.5	11	35	1,120	33	--	--	--	--	--	--	--	--	--	--	--	--
May 16	1715	48	9.0	17	35	598	27	--	--	--	--	--	--	--	--	--	--	--	--
June 12	1550	59	15	3.6	46	3	.10	--	--	--	--	--	--	--	--	--	--	--	--
Aug. 7	1250	57	14	1.6	59	10	.01	--	--	--	--	--	--	--	--	--	--	--	--
10336694 WOOD CREEK AT MOUTH, NEAR CRYSTAL BAY, NEV. (LAT 39°14'35", LONG 119°57'30")																			
1972 Water Year																			
Oct. 13, 1971	1345	53	11.5	1.0	67	6	.02	--	--	--	--	--	--	--	--	--	--	--	--
Oct. 18	1445	42	5.5	1.3	64	9	.04	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 5	1520	41	5.0	.92	80	6	.01	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 11	0900	40	4.5	1.3	70	8	.03	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 11	1515	42	5.5	2.5	67	132	.89	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 12	0905	36	2.0	1.2	65	5	.02	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 26	1445	39	4.0	1.5	70	35	.14	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 27	1130	38	3.5	1.0	70	2	.01	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 29	1620	36	2.0	1.2	66	6	.02	--	--	--	--	--	--	--	--	--	--	--	--
Dec. 5	1410	36	2.0	1.2	74	19	.06	--	--	--	--	--	--	--	--	--	--	--	--
Dec. 14	1325	33	0.5	1.2	65	4	.01	--	--	--	--	--	--	--	--	--	--	--	--
Dec. 22	1430	34	1.0	1.4	66	13	.05	--	--	--	--	--	--	--	--	--	--	--	--
Jan. 8, 1972	1535	35	1.5	1.3	87	2	.007	--	--	--	--	--	--	--	--	--	--	--	--
Jan. 12	1157	36	2.0	1.2	66	2	.006	--	--	--	--	--	--	--	--	--	--	--	--
Jan. 13	1550	38	3.5	1.5	76	6	.02	--	--	--	--	--	--	--	--	--	--	--	--
Jan. 20	1555	37	3.0	.84	76	10	.02	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 8	1530	36	2.0	.55	86	2	.003	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 11	1200	36	2.0	.55	63	2	.003	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 13	1615	38	3.5	.68	65	5	.009	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 16	1635	40	4.5	.68	64	10	.02	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 27	1635	42	5.5	1.3	60	48	.17	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 28	1445	39	4.0	1.4	65	56	.21	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 28	2155	37	3.0	1.7	71	93	.43	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 29	1000	36	2.0	1.2	61	5	.02	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 2	1605	42	5.5	1.8	59	22	.11	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 3	1505	45	7.0	3.4	56	183	1.7	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 3	1800	40	4.5	3.4	53	90	.83	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 4	0730	38	3.5	1.7	67	8	.04	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 4	1625	45	7.0	3.6	52	207	2.0	23	38	54	73	84	88	92	97	99	100	--	SPWC
Mar. 6	0715	36	2.0	1.5	74	5	.02	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 6	1730	43	6.0	2.5	58	24	.16	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 7	1142	40	6.5	1.4	81	13	.05	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 15	1530	47	8.5	2.1	64	9	.05	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 16	0700	36	2.0	1.8	59	4	.02	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 20	1520	49	9.5	2.3	55	14	.09	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 22	0940	37	3.0	1.7	55	7	.03	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 23	1600	41	5.0	1.7	55	6	.03	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 4	1500	44	6.5	1.2	57	4	.01	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 5	0945	39	4.0	1.4	58	18	.07	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 5	1135	37	3.0	1.7	58	169	.78	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 10	1225	41	5.0	1.0	60	2	.01	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 14	1415	44	6.5	1.8	55	166	.81	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 14	1800	37	3.0	1.5	53	104	.42	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 15	0655	33	0.5	.92	60	9	.02	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 15	1705	46	8.0	1.8	44	44	.21	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 20	1600	47	8.5	1.3	59	20	.07	--	--	--	--	--	--	--	--	--	--	--	--
May 2	1700	55	13.0	3.0	54	63	.51	--	--	--	--	--	--	--	--	--	--	--	--
May 2	1900	52	11.0	3.4	54	84	.77	--	--	--	--	--	--	--	--	--	--	--	--
May 3	0650	36	1.5	2.1	54	13	.07	--	--	--	--	--	--	--	--	--	--	--	--
May 4	1830	53	11.5	3.4	52	53	.49	--	--	--	--	--	--	--	--	--	--	--	--
May 6	1735	52	11.0	3.0	51	39	.32	--	--	--	--	--	--	--	--	--	--	--	--
May 7	0945	40	4.5	2.3	52	24	.15	--	--	--	--	--	--	--	--	--	--	--	--
May 9	1355	51	10.5	2.3	52	13	.08	--	--	--	--	--	--	--	--	--	--	--	--
May 10	1315	50	10	2.1	52	10	.06	--	--	--	--	--	--	--	--	--	--	--	--
May 12	1750	55	13.0	2.1	52	35	.20	--	--	--	--	--	--	--	--	--	--	--	--
May 13	1400	59	15.0	2.0	51	11	.06	--	--	--	--	--	--	--	--	--	--	--	--
May 13	1850	56	13.5	2.7	52	40	.29	--	--	--	--	--	--	--	--	--	--	--	--
May 19	0900	41	5.0	2.1	51	23	.13	--	--	--	--	--	--	--	--	--	--	--	--
May 23	1730	--	--	1.7	53	12	.06	--	--	--	--	--	--	--	--	--	--	--	--
May 25	1905	56	13.5	1.5	53	19	.08	--	--	--	--	--	--	--	--	--	--	--	--
May 27	1645	62	16.5	1.6	53	22	.09	--	--	--	--	--	--	--	--	--	--	--	--
May 29	1820	60	15.5	2.5	52	21	.14	--	--	--	--	--	--	--	--	--	--	--	--
June 2	1650	63	17.0	1.7	49	14	.06	--	--	--	--	--	--	--	--	--	--	--	--
June 7	1915	55	13.0	1.7	72	30	.14	--	--	--	--	--	--	--	--	--	--	--	--
June 9	1225	40	9.0	1.4	54	9	.03	--	--	--	--	--	--	--	--	--	--	--	--
June 13	1750	61	16.0	1.0	59	13	.04	--	--										

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS--Continued

Date	Time (24-hour)	Water temperature °F °C	Water discharge (ft ³ /s)	Specific conductance (umhos/cm at 25°C)	Total sediment concentration (mg/l)	Total sediment discharge (tons/day)	Total sediment particle size											Method of analysis		
							Percent finer than the size (in millimetres) indicated													
							.002	.004	.008	.016	.031	.062	.125	.250	.500	1.00	2.00			
10336698 THIRD CREEK NEAR CRYSTAL BAY, NEV. (LAT 39°14'26", LONG 119°56'44")--Continued																				
Apr. 25, 1973	0635	36	2.0	12	66	453	15													
Apr. 25	1930	30	4.0	17	56	638	29													
Apr. 26	0730	39	4.0	14	61	214	8.1													
May 1	1600	51	10.5	14	54	98	3.7													
May 1	1745	47	8.5	16	54	150	6.5					13	19	36	61	86	100	S		
May 6	1540	51	10.5	13	57	72	2.5													
May 6	1705	48	9.0	14	55	37	1.4													
May 7	1730	48	9.0	18	49	100	4.9													
May 9	1650	50	10.0	21	45	313	18													
May 9	1810	47	8.5	25	41	470	32													
May 9	1940	43	6.0	28	38	734	55	4	5	8	11	15	18	27	40	57	68	83	SBWC	
May 10	0730	38	3.5	20	53	92	5.0													
May 12	1450	54	12.0	35	36	809	76													
May 12	1815	44	6.5	40	30	1,480	160	2	3	5	6	8	10	16	27	48	70	92	SBWC	
May 14	0940	42	5.5	33	34	608	54													
May 14	1835	45	7.0	48	44	3,270	424													
May 15	1815	41	5.0	51	27	1,750	241													
May 16	1800	46	8.0	41	26	1,580	175													
May 17	0640	40	4.5	51	30	2,770	381													
May 18	1800	43	6.0	65	27	3,000	527	1	1	1	2	3	4	6	14	32	55	79	SBWC	
May 18	2000	41	5.0	52	26	3,120	438													
May 21	1715	49	9.5	50	31	1,020	138													
May 21	1910	45	7.0	55	29	1,000	148													
May 22	0835	41	5.0	39	30	345	36													
May 25	1630	46	8.0	60	30	5,630	912													
May 25	1830	44	6.5	60	30	2,520	408	0	0	1	2	3	4	6	12	29	53	76	SBWC	
May 28	1715	44	6.5	69	47	2,740	510													
May 28	1915	48	9.0	68	28	1,970	362	1	1	1	2	3	4	7	14	29	51	70	SBWC	
May 29	1130	52	11.0	36	31	404	39							3	6	13	26	49	100	S
May 30	1415	53	11.5	39	30	424	45													
May 30	1530	51	10.5	46	30	765	95													
May 31	1325	45	7.0	46	35	657	82													
May 31	1590	47	8.5	76	30	3,200	656	1	2	4	5	7	9	14	24	35	53	69	SPWC	
May 31	1655	42	5.5	68	27	1,610	296													
June 1	1505	53	11.5	35	35	320	30													
June 4	1715	56	13.5	39	31	252	27													
June 8	1830	59	15.0	47	27	564	72													
June 8	1945	54	12.0	47	28	389	49													
June 12	0710	44	6.5	24	34	76	4.9													
June 12	0855	46	7.5	23	33	12	.75													
June 12	1900	55	13.0	32	30	175	15													
June 22	1900	53	11.5	7.4	49	5	.10													
July 12	1540	20	6.5	3.5	62	4	.04													
Aug. 7	0920	52	11	3.3	71	6	.05													
Sep. 12	1255	60	15.5	2.0	73	3	.02													
Sep. 14	1215	56	13.5	2.0	71	2	.01													
10336700 INCLINE CREEK NEAR CRYSTAL BAY, NEV. (LAT 39°14'25", LONG 119°56'40")																				
1972 Water Year																				
Oct. 13, 1971	1550	52	11.0	4.3	66	6	.07													
Oct. 18	1420	42	5.5	6.6	65	13	0.23													
Nov. 5	1430	42	5.5	4.6	66	6	.07													
Nov. 11	0850	39	4	6.2	76	30	.50													
Nov. 11	1100	41	5.0	7.3	90	81	1.6													
Nov. 11	1445	42	5.5	9.8	86	405	11													
Nov. 11	1545	42	5.5	9.0	72	182	4.4													
Nov. 12	0850	38	3.5	5.9	70	25	.40													
Nov. 26	1430	41	5.0	6.2	88	158	2.6													
Nov. 26	1610	40	4.5	8.7	84	184	4.3													
Nov. 27	1115	38	3.5	4.6	72	12	.15													
Nov. 29	1605	37	3.0	5.2	70	13	.18													
Dec. 5	1400	38	3.5	5.2	91	174	2.4													
Dec. 5	1530	36	2.0	5.6	116	96	1.5													
Dec. 14	0820	32	0.0	11	68	14	.42													
Dec. 22	1415	34	1.0	5.2	130	34	.48													
Jan. 8, 1972	1515	36	2.0	5.6	72	5	.08													
Jan. 12	1000	36	2.0	3.0	95	5	.04													
Jan. 13	1530	39	4.0	4.6	284	18	.22													
Jan. 20	1540	38	3.5	4.6	98	12	.15													
Feb. 8	1515	38	3.5	4.9	91	14	.19													
Feb. 11	0940	35	1.5	4.0	70	8	.09													
Feb. 13	1600	40	4.5	5.9	75	20	.32													
Feb. 16	1620	40	4.5	6.2	75	51	.85													
Feb. 27	1620	42	5.5	8.0	80	179	3.9													
Feb. 27	1750	40	4.5	8.8	79	111	2.6													
Feb. 28	1510	41	5.0	8.4	73	178	4.0													
Feb. 28	2140	37	3.0	11	79	136	4.0													
Feb. 29	0945	36	2.0	7.3	79	20	.39													
Mar. 2	1545	43	6.0	9.4	82	142	3.6													
Mar. 2	1715	40	4.5	11	76	247	7.3	38	53	68	82	90	91	93	95	97	100		SBWC	
Mar. 3	1450	10	5.0	16	87	519	22													
Mar. 3	1730	40	4.5	20	58	396	21							70					S	
Mar. 4	0715	38	3.5	11	73	72	2.1													
Mar. 4	1600	44	6.5	17	66	210	9.6													
Mar. 4	1805	40	4.5	18	62	168	8.2													
Mar. 6	0700	37	3.0	9.0	75	36	.87													
Mar. 6	1740	42	5.5	14	68	77	2.9													
Mar. 7	0957	37	3.0	8.0	75	13	.28													
Mar. 15	1515	47	8.5	11	70	52	1.5													
Mar. 15	1625	46	8.0	1																

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS--Continued

Date	Time (24-hour)	Water temperature °F	Water temperature °C	Water discharge (ft ³ /s)	Specific conductance (umhos/cm at 25°C)	Total sediment concentration (mg/l)	Total sediment discharge (tons/day)	Total sediment particle size										Method of analysis	
								Percent finer than the size (in millimetres) indicated											
								.002	.004	.008	.016	.031	.062	.125	.250	.500	1.00	2.00	
10336700 INCLINE CREEK NEAR CRYSTAL BAY, NEV. (LAT 39°14'25", LONG 119°56'40")--Continued																			
Apr. 15, 1972	1650	45	7.0	11	70	162	4.8	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 20	1545	50	10.0	7.0	88	24	.45	--	--	--	--	--	--	--	--	--	--	--	--
May 2	1645	54	12.0	8.0	62	22	.48	--	--	--	--	--	--	--	--	--	--	--	--
May 2	1845	50	10.0	11	47	86	2.6	--	--	--	--	--	--	--	--	--	--	--	--
May 3	0630	37	3.0	8.7	55	21	.49	--	--	--	--	--	--	--	--	--	--	--	--
May 4	1815	52	11.0	11	48	77	2.3	--	--	--	--	--	--	--	--	--	--	--	--
May 4	1930	49	9.5	12	60	59	1.9	--	--	--	--	--	--	--	--	--	--	--	--
May 6	1715	51	10.5	10	48	36	.97	--	--	--	--	--	--	--	--	--	--	--	--
May 6	1850	48	9.0	12	46	56	1.8	--	--	--	--	--	--	--	--	--	--	--	--
May 6	2030	45	7.0	11	45	34	1.0	--	--	--	--	--	--	--	--	--	--	--	--
May 7	0930	40	4.5	9.0	67	28	.68	--	--	--	--	--	--	--	--	--	--	--	--
May 9	1345	50	10.0	9.0	49	18	.44	--	--	--	--	--	--	--	--	--	--	--	--
May 10	0845	40	4.5	8.4	59	14	.32	--	--	--	--	--	--	--	--	--	--	--	--
May 12	1730	54	12.0	8.0	49	44	.95	--	--	--	--	--	--	--	--	--	--	--	--
May 12	1855	52	11.0	9.8	46	40	1.1	--	--	--	--	--	--	--	--	--	--	--	--
May 12	2015	49	9.5	9.8	47	44	1.2	--	--	--	--	--	--	--	--	--	--	--	--
May 13	1340	55	13.0	8.7	49	3	.07	--	--	--	--	--	--	--	--	--	--	--	--
May 13	1835	54	12.0	10	46	57	1.5	--	--	--	--	--	--	--	--	--	--	--	--
May 13	2100	49	9.5	10	45	39	1.1	--	--	--	--	--	--	--	--	--	--	--	--
May 19	0845	41	5.0	7.6	51	30	.62	--	--	--	--	--	--	--	--	--	--	--	--
May 23	1715	--	--	8.0	53	26	.56	--	--	--	--	--	--	--	--	--	--	--	--
May 25	1850	56	13.5	8.7	51	54	1.3	--	--	--	--	--	--	--	--	--	--	--	--
May 26	1730	60	15.5	8.0	59	84	1.8	--	--	--	--	--	--	--	--	--	--	--	--
May 27	1650	61	16.0	8.0	49	130	2.8	--	--	--	--	--	--	--	--	--	--	--	--
May 29	2110	54	12.0	8.0	49	96	2.1	--	--	--	--	--	--	--	--	--	--	--	--
June 2	1645	62	16.5	7.3	57	28	.55	--	--	--	--	--	--	--	--	--	--	--	--
June 7	1830	55	13.0	8.0	51	76	1.6	--	--	--	--	--	--	--	--	--	--	--	--
June 9	1000	48	9.0	8.0	53	22	.48	--	--	--	--	--	--	--	--	--	--	--	--
June 13	1730	62	16.5	6.2	52	52	.87	--	--	--	--	--	--	--	--	--	--	--	--
July 3	1400	66	19.0	4.0	59	9	.10	--	--	--	--	--	--	--	--	--	--	--	--
July 13	1300	64	18	3.2	63	12	.10	--	--	--	--	--	--	--	--	--	--	--	--
July 28	1420	68	20	3.2	67	10	.09	--	--	--	--	--	--	--	--	--	--	--	--
Aug. 16	1430	60	15.5	2.1	81	4	.02	--	--	--	--	--	--	--	--	--	--	--	--
Sep. 4	1715	56	13.5	3.0	70	8	.06	--	--	--	--	--	--	--	--	--	--	--	--
Sep. 15	0900	46	7.5	2.5	69	7	.05	--	--	--	--	--	--	--	--	--	--	--	--
Sep. 20	1610	54	12.5	2.1	67	8	.05	--	--	--	--	--	--	--	--	--	--	--	--
Sep. 26	0800	45	7.0	7.3	72	712	14	--	--	--	--	--	--	--	--	--	--	--	--
Sep. 26	1100	46	7.5	10	65	861	23	--	--	--	--	--	--	--	--	--	--	--	--
Sep. 27	0930	45	7.0	10	59	547	15	--	--	--	--	--	--	--	--	--	--	--	--
Sep. 27	1250	48	9.0	6.2	61	164	2.7	--	--	--	--	--	--	--	--	--	--	--	--
1973 Water Year																			
Oct. 1, 1972	1630	48	9.0	4.0	64	72	0.78	--	--	--	--	--	--	--	--	--	--	--	--
Oct. 2	0720	46	8.0	4.9	66	84	1.1	--	--	--	--	--	--	--	--	--	--	--	--
Oct. 11	0925	45	7.0	3.7	71	12	.12	--	--	--	--	--	--	--	--	--	--	--	--
Oct. 17	0930	40	4.5	4.6	70	36	.45	--	--	--	--	--	--	--	--	--	--	--	--
Oct. 18	0205	37	3.0	4.6	61	138	1.7	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 4	0015	40	4.5	12	57	962	31	27	40	52	60	65	66	67	69	71	76	89	SPWC
Nov. 4	0245	39	4.0	15	51	624	25	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 4	1015	38	3.5	7.0	66	45	.85	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 4	1455	40	4.5	11	64	216	6.4	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 4	1620	40	4.5	9.4	63	108	2.7	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 6	1520	38	3.5	5.2	90	18	.25	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 24	1515	37	3.0	4.0	80	33	.36	--	--	--	--	--	--	--	--	--	--	--	--
Dec. 5	1135	32	0.0	4.0	71	52	.56	--	--	--	--	--	--	--	--	--	--	--	--
Dec. 17	1530	32	0.0	30	85	1,180	96	--	--	--	--	--	--	--	--	--	--	--	--
Dec. 22	1545	32	3.0	9.0	125	54	1.3	--	--	--	--	--	--	--	--	--	--	--	--
Jan. 8, 1973	1120	32	0.0	4.2	72	20	.23	--	--	--	--	--	--	--	--	--	--	--	--
Jan. 12	1720	34	1.0	10	113	298	8.0	--	--	--	--	--	--	--	--	--	--	--	--
Jan. 13	1050	36	2.0	7.0	120	74	1.4	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 9	1305	37	3.0	4.0	88	22	.24	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 23	1650	38	3.5	5.2	87	55	.77	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 1	1640	38	3.5	6.6	93	34	.61	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 7	1110	37	3.0	4.6	122	17	.21	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 15	1420	43	6.0	4.6	90	119	1.5	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 15	1615	40	4.5	5.2	87	103	1.4	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 23	1450	44	6.5	4.9	101	68	.90	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 23	1635	41	5.0	5.9	86	93	1.5	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 25	1340	46	8.0	6.2	94	70	1.2	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 25	1615	41	5.0	9.8	101	344	9.1	13	20	28	37	45	50	55	59	64	92	100	VPWC
Mar. 25	1745	40	4.5	9.0	82	226	5.5	--	--	--	--	--	--	--	--	--	--	--	--
Mar. 27	1445	40	4.5	6.2	94	30	.50	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 4	1425	48	9.0	8.0	96	109	2.4	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 4	1600	45	7.0	9.4	82	384	9.7	12	18	24	32	37	42	42	44	55	87	100	VBWC
Apr. 4	1815	40	4.5	9.8	82	228	6.0	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 5	0630	34	1.0	6.6	107	36	.61	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 5	1700	43	6.0	14	95	491	19	15	21	29	38	46	51	56	64	71	80	100	VBWC
Apr. 5	1830	40	4.5	14	76	469	18	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 6	0815	36	2.0	6.6	91	170	3.0	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 10	1430	48	9.0	14	78	453	17	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 10	1640	44	6.5	18	71	578	28	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 10	1850	40	4.5	19	67	427	22	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 11	0620	36	2.0	12	83	290	9.4	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 11	1715	42	5.5	22	63	1,180	70	--	--	--	--	17	--	--	--	--	--	--	S
Apr. 17	1550	41	5.0	11	77	108	3.2	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 22	1430	50	10.0	12	72	426	14	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 22	1630	46	8.0	16	64	1,140	49	2	3	4	7	9	11	15	23	33	54	93	SBWC
Apr. 22	1800	43	6.0	19	66	663	34	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 24	1600	47	8.5	20	61	1,170	63	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 24	1750	43	6.0	22	56	1,200	71	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 25	0720	37	3.0	13	73	1,040	37	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 25	1940	39	4.0	23	60	2,320	144	--	--	--	--	--	--	--	--	--	--	--	--
Apr. 26	0720	40	4.5	14	68	1,140	43	--	--	--	--	--	--	--	--	--	--	--	--
May 1	1545	50	10.0	18	58	1,080	52	--											

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS--Continued

Date	Time (24-hour)	Water temperature		Water discharge (ft ³ /s)	Specific conductance (umhos/cm at 25°C)	Total sediment concentration (mg/l)	Total sediment discharge (tons/day)	Total sediment particle size										Method of analysis		
		°F	°C					Percent finer than the size (in millimetres) indicated												
								.002	.004	.008	.016	.031	.062	.125	.250	.500	1.00	2.00		
10336700 INCLINE CREEK NEAR CRYSTAL BAY, NEV. (LAT 39°14'25", LONG 119°56'40")--Continued																				
May 14, 1973	0905	44	6.5	22	49	520	31	--	--	--	--	--	--	--	--	--	--	--	--	
May 14	1820	50	10.0	31	39	786	66	--	--	--	--	--	--	--	--	--	--	--	--	
May 15	1835	47	8.5	30	39	291	24	--	--	--	--	--	--	--	--	--	--	--	--	
May 16	1815	52	11.0	30	39	756	61	--	--	--	--	--	--	--	--	--	--	--	--	
May 17	0630	42	5.5	24	45	519	34	--	--	--	--	--	--	--	--	--	--	--	--	
May 18	1730	47	8.5	28	42	149	11	--	--	--	--	--	18	26	45	67	84	100		S
May 18	2015	46	8.0	28	41	128	9.7	--	--	--	--	--	--	--	--	--	--	--	--	
May 21	1700	53	11.5	24	40	276	18	--	--	--	--	--	--	--	--	--	--	--	--	
May 21	1920	50	10.0	25	40	272	18	--	--	--	--	--	--	--	--	--	--	--	--	
May 22	0825	44	6.5	22	43	260	15	--	--	--	--	--	--	--	--	--	--	--	--	
May 25	1645	50	10.0	20	42	49	2.6	--	--	--	--	--	--	--	--	--	--	--	--	
May 28	1705	59	15.0	18	44	126	6.1	--	--	--	--	--	--	--	--	--	--	--	--	
May 28	1900	53	11.5	18	43	180	8.7	--	--	--	--	--	6	9	20	42	61	100		S
May 30	1630	52	11.0	18	48	191	9.3	--	--	--	--	--	--	--	--	--	--	--	--	
May 31	1315	48	9.0	32	50	1,960	169	--	--	--	--	--	--	--	--	--	--	--	--	
May 31	1435	47	8.5	37	52	1,350	135	--	--	--	--	--	--	--	--	--	--	--	--	
May 31	1500	49	9.5	36	57	665	65	11	17	23	31	37	43	54	73	82	97	100		VPWC
May 31	1705	47	8.5	25	44	474	32	--	--	--	--	--	--	--	--	--	--	--	--	
June 1	1500	54	12.0	18	46	176	8.6	--	--	--	--	--	--	--	--	--	--	--	--	
June 4	1605	57	14.0	16	46	125	5.4	--	--	--	--	--	--	--	--	--	--	--	--	
June 8	1830	61	16.0	14	47	40	1.5	--	--	--	--	--	--	--	--	--	--	--	--	
June 12	1030	48	9.0	12	50	17	.55	--	--	--	--	--	--	--	--	--	--	--	--	
June 12	1845	56	13.5	13	50	21	.74	--	--	--	--	--	--	--	--	--	--	--	--	
June 22	1845	52	11	9.4	54	10	.25	--	--	--	--	--	--	--	--	--	--	--	--	
July 12	1545	64	18	4.9	62	10	.13	--	--	--	--	--	--	--	--	--	--	--	--	
Aug. 7	0750	49	9.5	5.2	65	5	.07	--	--	--	--	--	--	--	--	--	--	--	--	
Sep. 12	1415	66	19.0	3.7	65	48	.48	--	--	--	--	--	--	--	--	--	--	--	--	
Sep. 14	1200	55	13.0	3.7	67	5	.05	--	--	--	--	--	--	--	--	--	--	--	--	