The area to the east of Taylor Creek and extending to Emerald Bay was not included in the model due to lack of data. The well in this area included only two groundwater level measurements. The gradients from these two measurements to the lake were 0.0018 and 0.018, averaging 0.0099. The land surface gradient in this area is similar to the average, 0.008. Using the range of gradients from 0.018 to 0.0018, a shoreline length of 1850 meters (6,070 feet), average depth of aquifer of 15 meters (50 ft) and a hydraulic conductivity of 15 m/day (50 ft/day), the discharge from this area ranges from $2.5x10^5$ to $2.7x10^6$ m^3/year (200 to 2,200 acre-feet/year). The discharge estimate using the average hydraulic gradient is $1.5x10^6$ m^3/year (1,200 acre-feet/year).

The California/Nevada border was the western boundary of the model therefore, the Stateline area discharge estimate was calculated. As the near shore topography is similar to that of South Lake Tahoe, an estimated hydraulic gradient of 0.0028 is reasonable. Using the gradient of 0.0028, a shoreline length of 2400 meters (7,874 ft), average depth of aquifer of 15 meters (50 ft) and a hydraulic conductivity ranging from 15 to 25 m/day (50 to 82 ft/day), the discharge from this area ranges from $4.9x10^5$ to $8.6x10^5$ m^3/year (400 to 700 acre-feet/year).

4.5 Nutrient Loading

The potential range of nutrient discharge via groundwater from the South Lake Tahoe/Stateline area to Lake Tahoe was calculated by multiplying the estimates of annual groundwater discharge for each subregion by concentrations of nutrients found in monitoring wells in the respective subregions. Details of the methodology used are described in Section 3.2.

4.5.1 Emerald Bay to Taylor Creek

This area only contains one well, 041, with analytical results for all nutrient forms of interest. Although this would normally be a constraint, the well is located in a significant location being close to the lake and within the predominant land use. For this reason, only one method of estimating loading was used, as it represents average, downgradient and land use weighted estimates. The average nutrient concentrations for well 041 are multiplied by the groundwater flux estimates calculated in Section 4.4. Table 4-12 summarizes the nutrient flux using this method.

The average concentrations, in conjunction with the discharge estimate using the average hydraulic gradient, $1.5x10^6$ m^3/year (1,200 acre-feet/year), are the best representation of the average nutrient loading from the Emerald Bay to Taylor Creek region to Lake Tahoe.

Table 4-12. South Lake Tahoe Average Annual Nutrient Loading, Emerald Bay to Taylor Creek

Constituent	Groundwater Flux (m^3/year)	Average Concentration Method: Average Concentration (mg/L)	Average Concentration Method: Nutrient Loading Estimate (kg/yr)
	2.7E+06		122
	1.5E+06		67
Ammonia + Organic	2.5E+05	0.045	11
	2.7E+06		138
	1.5E+06		75
Nitrate	2.5E+05	0.051	13
	2.7E+06		261
	1.5E+06		142
Total Nitrogen	2.5E+05	0.096	24
	2.7E+06		193
	1.5E+06		105
Orthophosphate	2.5E+05	0.071	18
	2.7E+06		231
	1.5E+06		126
Total Phosphorus	2.5E+05	0.085	21

Notes:
1. 1 m^3/year = 0.0008 acre-feet/year, 1 kg/yr = 2.2 lb/yr
2. Average nutrient concentrations derived from those included in Table 4-3.

4.5.2 Subregion 1

Both the average nutrient concentration and downgradient nutrient concentration methods were used for Subregion 1. The land use weighted method was not used as the wells in this region are located such that they represent the regional land use.

An average concentration for all nutrients of concern was determined for the subregion. The concentrations used to calculate the subregional averages are shown in Table 4-4. The average nutrient concentrations were multiplied by the groundwater flux estimates calculated in Section 4.4.

The wells in subregion 1 which best represent the downgradient concentrations are 043, 047, and 048. The average nutrient concentrations for these wells were multiplied by the groundwater discharge estimates calculated in Section 4.4. Table 4-13 summarizes the nutrient flux estimate using these methods.

The downgradient approach is the most reasonable estimate for the subregion. The downgradient wells represent the land uses of the region and would account for the accumulation or degradation of nutrients. The downgradient concentrations, in conjunction with the normal average year discharge rate, are the best representation of the average nutrient loading from subregion 1 to Lake Tahoe.

Table 4-13. South Lake Tahoe Average & Downgradient Annual Nutrient Loading, Subregion 1

			Average Concentration Method		Downgradient Concentration Method	
Constituent	Discharge Estimate Type	Groundwater Flux (m^3/year)	Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)	Downgradient Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)
Ammonia + Organic	Normal Average	4.7E+05		123		337
	Spring Average	6.7E+05		175		481
	Fall Average	2.3E+05	0.260	61	0.714	167
Nitrate	Normal Average	4.7E+05		15		27
	Spring Average	6.7E+05		21		38
	Fall Average	2.3E+05	0.031	7	0.057	13
Total Nitrogen	Normal Average	4.7E+05		137		364
	Spring Average	6.7E+05		195		519
	Fall Average	2.3E+05	0.289	68	0.771	181
Orthophosphate	Normal Average	4.7E+05		12		15
	Spring Average	6.7E+05		17		22
	Fall Average	2.3E+05	0.025	6	0.032	7
Total Phosphorus	Normal Average	4.7E+05		17		26
	Spring Average	6.7E+05		24		37
	Fall Average	2.3E+05	0.035	8	0.055	13

Notes:
1. 1 m^3/year = 0.0008 acre-feet/year, 1 kg/yr = 2.2 lb/yr
2. Average nutrient concentrations derived from those included in Table 4-4.

4.5.3 Subregion 2

All three methods of estimation are used in subregion 2. The wells are distributed throughout the area, so both the average and downgradient methods are applicable. The wells are not located in prime locations according to land use so the land use weighted method of estimation is also used. Table 4-14 shows the nutrient loading estimates for all methods.

The average nutrient concentrations were calculated for dissolved nitrate and total dissolved phosphorus using the average concentrations from the wells listed in Table 4-5. Only well 050 was monitored for ammonia + organic and orthophosphorus in this subregion. To establish a better estimate for these constituents as well as total dissolved nitrogen, the concentration for ammonia + organic was estimated using the nitrate concentrations as a basis. Nitrate represented 90% of the total nitrogen in well 050. Thodal (1997) estimated that the percentage of nitrate to total nitrogen was 85%. Orthophosphorus represented 61% of the total phosphorus in well 050. Thodal (1997) estimated that the percentage of orthophosphorus to total phosphorus was 55%. Thodal's estimates were based upon a larger data set and were used for the estimation in this subregion. There are several sources of error in using the average nutrient loading method. The majority of wells used in this estimation are located a considerable distance from the lake (Figure 4-10), and do not take into account cumulative effects downgradient. The wells are clustered together and do not represent the distribution of land uses in the area.

Well 050 is the most downgradient well in this subregion. The average concentrations for this well were used in the downgradient nutrient loading estimates. This method is not ideal as the downgradient well does not represent a majority of the land use. In addition, this well is deep (Table 4-5) and would not reveal the concentrations of nutrients in the shallow aquifer where they would be expected to be higher.

The land use weighted concentration method is more appropriate for this subregion. This method takes into account the major land uses of the area to estimate the average nutrient concentrations. The predominant land uses in this subregion are commercial and residential. They each account for approximately 50% of the land use in the region. A weighted average, using the values established in Section 2.3, was determined for each form of nitrogen and phosphorus. These weighted averages were used in conjunction with the discharge estimates to determine the estimated land use weighted nutrient loading for subregion 2.

The most reasonable estimate for this subregion uses the land use weighed concentrations and the normal average year discharge estimate. This method provides an estimation for subregion 2 which does not have an adequate monitoring network to evaluate the nutrients in the area.

Table 4-14. South Lake Tahoe Average , Downgradient & Land Use Weighted Annual Nutrient Loading, Subregion 2

			Average Concentration Method		Downgradient Concentration Method		Land Use Weighted Method	
Constituent	Discharge Estimate Type	Groundwater Flux (m^3/year)	Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)	Downgradient Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)	Land Use Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)
Ammonia + Organic	Normal Average	1.2E+06		138		52		249
	Spring Average	1.6E+06		186		70		335
	Fall Average	7.1E+05	0.115	82	0.043	31	0.207	148
Nitrate	Normal Average	1.2E+06		816		451		530
	Spring Average	1.6E+06		1097		607		712
	Fall Average	7.1E+05	0.678	483	0.375	267	0.440	314
Total Nitrogen	Normal Average	1.2E+06		955		503		779
	Spring Average	1.6E+06		1283		676		1047
	Fall Average	7.1E+05	0.793	565	0.418	298	0.647	461
Orthophosphate	Normal Average	1.2E+06		26		22		104
	Spring Average	1.6E+06		36		29		139
	Fall Average	7.1E+05	0.022	16	0.018	13	0.086	61
Total Phosphorus	Normal Average	1.2E+06		47		35		143
	Spring Average	1.6E+06		63		47		193
	Fall Average	7.1E+05	0.039	28	0.029	21	0.119	85

Notes:

1. 1 m^3/year = 0.0008 acre-feet/year, 1 kg/yr = 2.2 lb/yr
2. Average nutrient concentrations derived from those included in Table 4-5.

4.5.4 Subregion 3

All three methods of estimation are used in Subregion 3. The wells are distributed throughout the area, so both the average and downgradient methods are applicable. The wells are not located in prime locations according to land use so this method of estimation is also used. Table 4-15 shows the nutrient loading estimates for all methods.

The average nutrient concentrations were calculated for dissolved nitrate and total dissolved phosphorus using the average concentrations from the wells listed in Table 4-6. Only wells 045 and 049 were monitored for ammonia + organic and orthophosphorus in this subregion. To establish a better estimate for these constituents as well as total dissolved nitrogen, the concentration for ammonia + organic was estimated using the nitrate concentrations as a basis. Again, Thodal's estimates of 85% nitrate and 55% orthophosphorus were used in this subregion based upon a larger data set. The average concentration approach is not suited for this area as most of the wells are screened within the deep aquifer. This method neglects those concentrations found in the shallow aquifer and bias the estimates to lower concentrations. The potential accumulation of nutrients downgradient is not accounted for in the averaging method.

Well 039 is the most downgradient well in this subregion with nutrient concentrations reported. The downgradient approach is not the best method to use in this subregion. The well is located approximately 450 meters (1,476 ft) from the shore and does not represent downgradient concentrations. These well is deep, neglecting the shallow aquifer.

The land use weighted method is the most appropriate for the region. This takes into account the primary land use and provides an estimation over a range of aquifer depths. The predominant land uses in this subregion are vegetated, residential and commercial representing approximately 50%, 33% and 17% of the land use in the region, respectively. A weighted average, using the values established in Section 2.3, was determined for each form of nitrogen and phosphorus. These weighted averages were used in conjunction with the discharge estimates to determine the estimated land use weighted nutrient loading for subregion 3.

The most reasonable estimate for this subregion uses the land use weighed concentrations and the normal average year discharge estimate. This method provides an estimation for subregion 3 which does not have an adequate monitoring network to evaluate the nutrients in the area.

Table 4-15. South Lake Tahoe Average, Downgradient & Land Use Weighted Annual Nutrient Loading, Subregion 3

			Average Concentration Method		Downgradient Concentration Method		Land Use Weighted Method	
Constituent	Discharge Estimate Type	Groundwater Flux (m^3/year)	Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)	Downgradient Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)	Land Use Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)
Ammonia + Organic	Normal Average	4.9E+04		5		5		14
	Spring Average	9.0E+04		9		9		26
	Fall Average	1.2E+03	0.099	0	0.097	0	0.292	0
Nitrate	Normal Average	4.9E+04		17		27		25
	Spring Average	9.0E+04		31		50		45
	Fall Average	1.2E+03	0.346	0	0.550	1	0.497	1
Total Nitrogen	Normal Average	4.9E+04		22		32		39
	Spring Average	9.0E+04		40		58		71
	Fall Average	1.2E+03	0.444	1	0.647	1	0.789	1
Orthophosphate	Normal Average	4.9E+04		1		1		4
	Spring Average	9.0E+04		2		2		8
	Fall Average	1.2E+03	0.021	0	0.021	0	0.091	0
Total Phosphorus	Normal Average	4.9E+04		2		2		6
	Spring Average	9.0E+04		3		4		11
	Fall Average	1.2E+03	0.033	0	0.039	0	0.124	0

Notes:
1. 1 m^3/year = 0.0008 acre-feet/year, 1 kg/yr = 2.2 lb/yr
2. Average nutrient concentrations derived from those included in Table 4-6.

4.5.5 Subregion 4

All three methods of estimation are used in Subregion 4. The wells are distributed throughout the area, so both the average and downgradient methods are applicable. The wells are not located in prime locations according to land use so this method of estimation is also used. Table 4-16 shows the nutrient loading estimates for all methods.

An average concentration for all nutrients of concern was determined for the subregion. The concentrations used to calculate the subregional averages are shown in Table 4-7. The average nutrient concentrations were multiplied by the groundwater flux estimates calculated in Section 4.4. Many of the sampling points in this region are chosen to monitor specific nutrient sources. This increases the concentration for the region, as much of the other land uses are not represented.

The wells in subregion 4 which best represent the downgradient concentrations are 024, and 031. The average nutrient concentrations for these wells were multiplied by the groundwater discharge estimates calculated in Section 4.4. Table 4-13 summarizes the nutrient flux estimate using these methods. The downgradient wells are again designed to monitor specific sources. This may introduce errors when using this as an estimation for the entire region.

The land use weighted option is the most appropriate for this region. This method considers the type of land use in the region to apply average concentrations. The predominant land uses in this subregion are residential, commercial and vegetated. Commercial and vegetated land uses represent approximately ¼ and $^{1}/_{8}{}^{th}$ of the land use in the region, respectively. The remaining area is predominantly residential. A weighted average, using the values established in Section 2.3, was determined for each form of nitrogen and phosphorus. These weighted averages were used in conjunction with the discharge estimates to determine the estimated land use weighted nutrient loading for subregion 4.

The most reasonable estimate for this subregion uses the land use weighed concentrations and the normal average year discharge estimate. This method provides an estimation for subregion 4 which does not have an adequate monitoring network to evaluate the nutrients in the area. The land use weighted average and normal average year discharge provide the best estimation of nutrient loading for this region.

Table 4-16. South Lake Tahoe Average, Downgradient and Land Use Weighted Annual Nutrient Loading, Subregion 4

			Average Concentration Method		Downgradient Concentration Method		Land Use Weighted Method	
Constituent	Discharge Estimate Type	Groundwater Flux (m^3/year)	Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)	Downgradient Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)	Land Use Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)
Ammonia + Organic	Normal Average	7.2E+05		385		259		176
	Spring Average	8.6E+05		461		310		211
	Fall Average	5.5E+05	0.535	295	0.359	198	0.245	135
Nitrate	Normal Average	7.2E+05		538		285		310
	Spring Average	8.6E+05		644		341		371
	Fall Average	5.5E+05	0.747	412	0.396	218	0.430	237
Total Nitrogen	Normal Average	7.2E+05		1086		544		486
	Spring Average	8.6E+05		1300		651		581
	Fall Average	5.5E+05	1.508	831	0.755	416	0.674	372
Orthophosphate	Normal Average	7.2E+05		86		48		61
	Spring Average	8.6E+05		103		57		73
	Fall Average	5.5E+05	0.119	66	0.066	36	0.085	47
Total Phosphorus	Normal Average	7.2E+05		37		86		86
	Spring Average	8.6E+05		45		103		103
	Fall Average	5.5E+05	0.052	29	0.119	66	0.119	66

Notes:
1. 1 m^3/year = 0.0008 acre-feet/year, 1 kg/yr = 2.2 lb/yr
2. Average nutrient concentrations derived from those included in Table 4-7.

4.5.6 Stateline

The Stateline area wells are dispersed throughout the area, providing a representative network. The wells are located in areas with a variety of land uses, and downgradient wells are present along the shoreline. For this reason, only the average and downgradient methods are applied. Table 4-17 shows the nutrient loading estimates for all methods.

An average concentration for all nutrients of concern was determined for the area. The concentrations used to calculate the subregional averages are shown in Table 4-8. The average nutrient concentrations were multiplied by the groundwater flux estimates calculated in Section 4.4.

The downgradient wells in this region are 003, 197, 199 and 200. The average nutrient concentrations for these wells were multiplied by the groundwater discharge estimates calculated in Section 4.4. The average nutrient concentrations for these wells was determined for use in estimating nutrient loading.

The downgradient approach is the most accurate in this region. The wells are positioned to monitor a variety of land uses and are close enough to the lake to show representative concentrations of nutrients that could be entering the lake. The downgradient nutrient concentrations and groundwater discharge rate of 8.6 x 10^5 m^3/year (700 acre-feet/year) are considered the most reasonable estimation of nutrient loading to Lake Tahoe from this area.

Table 4-17. Stateline Average & Downgradient Annual Nutrient Loading

	Average Concentration Method		Downgradient Concentration Method	
Groundwater Flux (m^3/year)	Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)	Downgradient Average Concentration (mg/L)	Nutrient Loading Estimate (kg/yr)
4.9E+05		180		317
8.6E+05	0.365	315	0.642	554
4.9E+05		480		54
8.6E+05	0.972	839	0.110	95
4.9E+05		660		371
8.6E+05	1.337	1154	0.752	649
4.9E+05		7		10
8.6E+05	0.015	13	0.020	17
4.9E+05		11		17
8.6E+05	0.023	20	0.034	29

Notes:

1. 1 m^3/year = 0.0008 acre-feet/year, 1 kg/yr = 2.2 lb/yr
2. Average nutrient concentrations derived from those included in Table 4-8.

4.6 Ambient Nutrient Loading

Ambient loading was calculated from the basin-wide data set for wells located in a forested land use. The ambient nutrient loading is calculated to estimate the amount of nutrients that would discharge into Lake Tahoe regardless of anthropogenic sources. The discharge rates which were determined to be the most reasonable estimates of groundwater discharge were used in calculating the ambient nutrient loading. Based on these estimates, the total dissolved nitrogen concentrations that may be entering the lake from natural processes is 867 kg/year (1,911 lbs/yr). The estimated ambient total dissolved phosphorus concentration entering the lake is 326 kg/year (719 lbs/yr). Table 4-18 summarizes the loading estimates.

Table 4-18. South Lake Tahoe/Stateline Ambient Nutrient Loading Estimate

Subregion	Groundwater Discharge (m^3/year)	Ambient Total Dissolved Nitrogen (mg/L)	Ambient Total Dissolved Phosphorus (mg/L)	Ambient Nitrogen Nutrient Loading (kg/year)	Ambient Phosphorus Nutrient Loading (kg/year)
Emerald Bay to Taylor Creek	1.48E+06			268	101
Subregion 1	4.72E+05			86	32
Subregion 2	1.20E+06	0.181	0.068	218	82
Subregion 3	4.93E+04			9	3
Subregion 4	7.20E+05			130	49
Stateline	8.63E+05			156	59
Total				867	326

Notes:

1. 1 m^3/year = 0.0008 acre-feet/year, 1 kg/yr = 2.2 lb/yr
2. Average nutrient concentrations derived from those included in Section 3.2.

4.7 Summary & Conclusions

The South Lake Tahoe/Stateline area has the largest monitoring network in the basin. This provides the best dataset available to calculate nutrient loading to Lake Tahoe. For this reason, a groundwater flow model was developed. The model encompassed all of this area except Taylor Creek to Emerald Bay and Stateline. The groundwater discharge estimates for the areas not modeled are computed in a similar manner as the rest of the basin.

The groundwater discharge estimates for the subregions ranged from 1.2 x 10^3 m^3/year to 2.7 x 10^6 m^3/year (1 acre-ft/year to 2,200 acre-ft/year). The broad range of values is due to municipal drinking water supply well pumping in subregion 3 and no pumping and a steeper gradient in the Emerald Bay to Taylor Creek area. A number of methods were used to provide a range of nutrient loading estimates for each region. The most reasonable estimate for each region is included in Table 4-19.

Table 4-19. South Lake Tahoe/Stateline Total Dissolved Nitrogen and Total Dissolved Phosphorus Loading Estimate Summary by Subregion

Constituent	Nutrient Loading Estimate (kg/year)						
	Emerald Bay to Taylor Creek	Subregion 1	Subregion 2	Subregion 3	Subregion 4	Stateline	Total
Total Nitrogen	142	364	779	39	486	649	2,459
Total Phosphorus	126	26	143	6	86	29	416

Comparing the total groundwater nutrient loading (Table 4-19) to the ambient nutrient loading (Table 4-18), natural processes may make up to 35% of the nitrogen and 78% of the total dissolved phosphorus loading to the lake.

The South Lake Tahoe/Stateline Area has an extensive monitoring network, however the placement of many of the wells are not representative of the nutrient concentrations that may be entering the lake through groundwater. Subregion 2 and subregion 4 are prime candidates for a better placed monitoring network, as the wells currently are not placed to properly evaluate all the potential sources. While subregion 3 does not have an adequate monitoring network, the lack of significant discharge (Fenske 2003) to the lake in this area reduces the amount of loading originating from the region. The evaluation shows that subregion 2 and the Emerald Bay to Taylor Creek area potentially discharge the highest concentrations of nitrogen and phosphorus for the region, respectively. These estimates would place the two subregions as top priorities for future investigation or mitigation in South Lake Tahoe/Stateline.

Additional downgradient monitoring points would be beneficial in the Tahoe Keys area. The wells in this region are located approximately 2,800 meters (9,186 ft) from the lake. There are no wells that are sufficient to characterize groundwater near the lake. A cluster of wells installed to define the nutrient concentrations with depth would provide better information on the distribution of nutrients with depth.

The area between wells 024 and 013 in subregion 4, near the lake shore, would be a good addition to the monitoring network. Again, many of the wells are located too far from shore to provide a good estimation of nutrients near the lake.

Although well placement is acceptable in the Emerald Bay to Taylor Creek area, the groundwater level measurements and geology are not clearly defined. This region should be targeted for additional groundwater level measurements to better define the gradient for the region. The geology should be further investigated in this area, as well as the remainder of the region.

Bergsohn has conducted a study to determine depth to bedrock, but the intervening zones require additional investigation. An understanding of the stratigraphy of South Lake Tahoe is critical for evaluating contaminant and nutrient transport towards Lake Tahoe and their redistribution within the basin. Current models are based mainly on deep production wells drilled for STPUD and geophysically logged. Although this is a valuable dataset, each log represents a point measurement showing vertical changes in material types. Then, the data must be extrapolated between wells. To reduce potential for interpreter error, surface geophysical investigations should be run along key transects, both parallel and transverse to the shoreline. These data can be used to better define lateral continuity of major reflecting surfaces. Select, continuously cored test pilot holes should then be drilled to validate material types to ground truth the surface geophysics. Such geophysical surveys should include seismic reflection surveys to define general stratigraphic patterns and the basement geometry. Where shallow stratigraphic information is required, ground-penetrating radar surveys should be conducted to acquire high-resolution information for the upper 18 m to 40 m (60 to 100 ft).

Because of the multitude of land uses in the region, it is difficult to determine the contribution of nutrients from various sources. Specific land use types should be targeted for additional monitoring to better understand each as a contributor. Examples of land uses that require additional investigation are residential areas that are fertilized vs. those that prefer natural vegetation. Ball fields and urban parks should be targeted for additional information. South Lake Tahoe also contains numerous dry wells. The effects from these and other infiltration basins and trenches are unknown. Studies are underway or planned to monitor the effects from infiltration basins.

Additional data gaps for this area can be found in Appendix B.

The results of the South Lake Tahoe/Stateline area nutrient loading estimate are compared to those presented in The U.S. Forest Service Watershed Assessment (Murphy et al. 2000). Comparing these values, the South Lake Tahoe/Stateline area represents only 4.1% of the nitrogen and 10.4% of the phosphorus nutrient loading from groundwater to Lake Tahoe.

Table 4-20. South Lake Tahoe/Stateline Area Groundwater Nutrient Loading Comparison to Basin Wide Loading Estimates from U.S. Forest Service Watershed Assessment (Murphy et al. 2000)

	Nitrogen	Phosphorus	Dissolved Phosphorus
U.S. Forest Service Watershed Assessment Results, Basin-Wide			
Estimated annual nutrient loading from all sources (kg)	418,100	45,700	17,000
Estimated annual nutrient loading from groundwater (kg)	60,000	4,000	4,000
Corps Groundwater Evaluation Results, South Lake Tahoe/Stateline Area			
Estimated annual nutrient loading from groundwater (kg)	2,459	416	416
Estimated percent of annual nutrient loading from all sources	0.59%	0.91%	2.4%
Estimated percent of annual nutrient loading from groundwater	4.1%	10.4%	10.4%