

TAHOE-BAIKAL INSTITUTE 2005

PROJECT REPORT

**COMPLETION OF 2004 TBI LAKE TAHOE STORMWATER BASIN
STUDY**

June 29th – July 15th - 2005

Participants

Zhargalma Alymbaeva (Russia)

Sarah Campbell (USA)

Sophia DeMaio (USA)

Jussi Laine (Finland)

Kirill Mutin (Russia)

Zoricto Sodboev (Russia)

Sponsors and Project Directors

Brent Wolfe

California Tahoe Conservancy (CTC)

Dr. Alan Heyvaert,

UCD Tahoe Research Group (TRG)

Woody Loftis

Natural Resources Conservation Service (NRCS)

Project Leader

Brent Wolfe

Project Support Staff

Raph Townsend (TRG)

Collin Strassenburgh (TRG)

Краткое описание проекта

Побережье озера Тахо стало активно застраиваться с начала 1970-х годов. Это привело к нарушению процессов фильтрации дождевых и талых вод в почву и необходимости отвода ливневых стоков. Вместе с ливневыми водами в озеро попадают питательные вещества, а также мелкодисперсные частицы, из-за которых прозрачность воды снижается на 1 фут каждый год.

Данный проект посвящен изучению прудов-отстойников (бассейнов) ливневых вод. Бассейны ливневых вод были построены для фильтрации стоков и задержки эродированных веществ, но с момента их постройки наблюдение за бассейнами и изучение эффективности их функционирования не проводилось.

В рамках данного проекта были определены морфометрические параметры бассейнов (длина, ширина, глубина, конфигурация) и оценены функциональные возможности бассейнов (количество входов и выходов бассейна, характеристика растительности).

При этом координаты каждого бассейна подтверждены с помощью GPS, все бассейны сфотографированы. Фотографии дополнили базы данных по бассейнам. В результате нашей работы местонахождения найденных и исследованных бассейнов были нанесены на карту, таким образом, отмечено 126 бассейнов, из которых 19 – новые точки. Мы уточнили информацию по ранее отмеченным точкам, добавили фотографии и морфометрические показатели. Полученная информация сведена в единую систему. Создание базы данных по бассейнам ливневых стоков – важный шаг при осуществлении контроля и предотвращения эрозионных процессов, происходящих на побережье оз. Тахо. База данных также может быть полезна в определении мест для строительства новых бассейнов в будущем.

Рекомендуем составить подобную карту бассейнов побережья Тахо со стороны Невады, а также соединить базы данных по двум штатам в единую систему. Также было бы полезно определить водосборные площади каждого бассейна и нанести их на карту. Так, например, бассейн, испытывающий большую нагрузку и поглощающий большой объем сточных вод, будет иметь вероятность быстрого изнашивания, засорения, уплотнения почвы и, следовательно, низкие показатели инфильтрации. Данная информация будет полезна для проведения ремонтных, восстановительных и очистных работ по бассейнам.

ABSTRACT

Stormwater basins are an important Best Management Practice (BMP) in that they are often relied on to capture the more difficult pollutants, fine sediment and nutrients. This project created a GIS map of stormwater treatment basins on the California side of the Lake Tahoe Basin. Attributes of the water quality basins were linked to the GIS layer and included length, width, depth, vegetation cover, inlet and outlet characteristics. Data and photographs for the TBI 2005 surveyed basins were added to the TBI 2004 database, which now includes a total of 116 basins. This map provides a basis for stormwater models and management. In the future it would be useful to finish the stormwater basin GIS layer by mapping the Nevada side of the Lake Tahoe Basin. Future work could be extended to include the location of other stormwater treatment facilities to improve management. Lake Tahoe could be used as a model for mapping stormwater treatment in other sensitive and quickly developing watersheds.

INTRODUCTION

Urbanization in the Tahoe Basin has disturbed natural watershed processes, with resulting changes in the sources of pollution and reduced treatment of stormwater runoff. Vegetative cover, infiltration rates and wetland functions have all been adversely affected by urban development and land use practices that increase impermeable surface area and alter drainage patterns. Detrimental impacts include higher runoff volumes and flow rates, which cause accelerated erosion of sediment and increased mobilization of nutrients. Preliminary studies suggest that current Best Management Practices (BMPs) do not provide adequate treatment for all stormwater discharges in the Lake Tahoe Basin based on standards set by the State of California Water Quality Control Board (Regenmorterer, Kayhanian, and Tsay, 2002). Available research indicates that phosphorous, nitrogen, and fine suspended sediment particles contribute most significantly to the loss of Lake Tahoe clarity. Consequently, pollutant reduction efforts have focused on these constituents (Heyvaert et al. 2004, unpublished). Stormwater basins are an important BMP used to capture more difficult pollutants to remove fine sediment and nutrients; they are often the last treatment opportunity prior to water being released to the lake. However, stormwater basins are one of the more expensive and land-limited BMPs

and one of several treatment options. It is important to develop efficient and effective projects in order to improve water quality at Lake Tahoe. Mapping helps determine basin need and effectiveness as well as illuminating other treatment options.

METHODS

TBI participants worked with the CTC and UC Davis Tahoe Research Group (TRG) on this project. The project began with an overview of the Lake Tahoe Basin, with a specific focus on water quality. Participants learned about water quality issues in the Lake Tahoe Basin and about efforts to mitigate impacts of urbanization.

After this introduction, TBI 2005 participants located and verified basins throughout the California side of the Tahoe Basin, completing the Global Information System (GIS) map and database begun by TBI 2004 participants. Stormwater basins in Placer County, El Dorado County, and the City of South Lake Tahoe were located using old project maps as well as the 2004 GIS map. Coordinates were determined using a Global Positioning System (GPS) unit. Average length, width, and depth measurements were taken using a tape measure. The number of inlets and outlets and their specific characteristics were recorded. Dominant types of vegetation were also noted. Comments about site conditions including sedimentation, compaction, and presence of standing water were also noted. A Microsoft Excel file containing this data was completed and data was transferred to the GIS map begun by TBI 2004. Each basin was photographed with a digital camera and photographs were linked to the GIS file.

RESULTS

Data was collected for eighteen basins and recorded in a spreadsheet (see Appendix 1). The completion of this reconnaissance study produced a GIS database of CTC stormwater basins on the California side of the Lake Tahoe Basin. This GIS database is the first attempt to compile previous CTC erosion control projects into one repository. The database currently includes 116 stormwater treatment basins with information on location, size, vegetation, inlet and outlet structures, and digital photo documentation. This GIS database provides a user-friendly and accessible inventory (see Appendix 1) that can be updated over time to include more detailed

monitoring and maintenance information. The database, combined with an analysis of the basin storage, drainage area, and landuse types may be applicable for use with the Lake Tahoe Clarity Model and will assist in development of the Lake Tahoe TMDL.

DISCUSSION

Having completed the CTC basin mapping project begun by TBI 2004, the next step is to map stormwater basins on the Nevada portion of the Lake Tahoe watershed, and combine into one watershed map. TBI 2005's final product has been distributed to the Nevada Tahoe Conservation District for inclusion in the "Water Quality Project Inventory" currently in development by NTCDD. Detailed maps of basins comparable to those begun by the TBI 2004 group should be completed at several basins throughout the Tahoe watershed to better determine what makes an effective basin; this could be used as a model for planning future basins. Determining the effectiveness of the basins will help illuminate how much additional treatment is required to meet future regulatory standards. It has been indicated that suspended sediments, phosphorus, and nitrogen are the most harmful stormwater components affecting Lake Tahoe clarity. Therefore, holding capacity and soil types of each basin should be analyzed for their effectiveness at removing these pollutants to Lake Tahoe. Once runoff sources and basins are clearly depicted on a map, future treatment options (including, but not limited to, basins) can be explored. In this analysis we should continue to look for multi-use solutions, due to limited land and resources in the Lake Tahoe Basin. A possible example of multi-use treatment for stormwater is currently being explored at Bijou Meadow by TBI 2005. This project is analyzing the possibility of diverting stormwater through this meadow for filtration purposes. We believe that recreation and filtration can exist within a park-like environment. Signs can help to raise awareness of the water quality situation at Lake Tahoe and the role that multi-use stormwater filtration projects play in improving the local environment. The Tahoe Regional Planning Agency (TRPA), when permitting future commercial and residential development, should also consider the presence of stormwater treatment facilities. Lake Tahoe could be used as a model for mapping stormwater treatment in other sensitive and quickly developing watersheds. It is also a good example of cross-border cooperation around environmental issues.

Appendix 1: Stormwater Basin Study

Data Collection – TBI 2004/2005

Appendix 1: Stormwater Basin Study Data Collection TBI 2004/2005

Project Name	GPS Label	Nearest Street(s)	Average in Feet			Dominant Vegetation	# Inlets	#Outlets	Inlet Comments	Outlet Comments	General Comments
			Depth	Width	Length						
Agate Road	AGA	Agate Rd.	4.5	45	130	grass	1	1			
Al Tahoe-Pioneer Trail Bijou Creek	APB1	Pioneer Trail, Ralph	2.5	25	40	cattails; healthy vegetation around basin (meadow-like)	3	2			standing water; small basin; ~1-2ft water in basin; inlet 2 channelized groundwater seep?; inlet 3 storm drain from house
Al Tahoe-Pioneer Trail Bijou Creek	APB2	Pioneer Trail, Edna	3.5	45	59	tall, thick grasses; willows surrounded by pines (healthy looking)	1	1			inlet = 2-3 ft metal pipe (standing water and deposition of detritus); outlet = raised 1-2ft, diameter 3-4ft
Al Tahoe-Pioneer Trail Bijou Creek	APB3	Glenwood between Andy/Jo Circle	-1	11	12	where not underwater, thick grasses and wild rose	1	0			1 ft standing water; inlet = 3ft metal pipe with standing water; water spreads over meadow;
Al Tahoe-Pioneer Trail Bijou Creek	APB4	Pioneer Trail, Bode	-3	27	57	tall grasses; willows; clover; some daisies; surrounded by pine	1	1			standing water near inlet and some near outlet; inlet looks good (no sedimentation)
Angora	ANG1	Angora Creek Rd, Lake Tahoe blwd	1'	24'	145'	very healthy marshy grasses, high grasses, aquatic vegetation	2	1	1. Pipe - half-full of water, lots of sediment - coarse and fine	overflow pipe grate	2 feet of standing water; footpaths
Angora	ANG2	Elk Point	1	20	30	sparse vegetation; shrubs and willows	2	1	1. Runoff from road with gravel; 2. Rocky roadside drainage stream	overflow pipe slightly raised	coarse deposition
Angora	ANG3	Other side of ANG2	3	25	95	marshy meadow grasses	1	1	Pipe from ANG2	outlet raised	Large sediment deposit approximately 15'x6'x6" - may have been dumped there?
Angora	ANG4	Lake Tahoe Blvd. and Coyote Ridge	2.5	50	67	marshy meadow grasses	1	1	sediment from road	rocky overflow into small creek	woodchips and pine debris present
Apache	APA1	NW side of Celio and Blackfoot	3'	32'	92'	sparse vegetation in main basin, pine debris and rock in 1st basin	1	1	1 quarter-full with sediment and pine detritus, channel to basin~40' unarmored, although vegetation covers it well	overflow	lots of sediment and erosion, netting visible of basin floor
Apache	APA10	Seminole Curve, W side and Yakima Court	1'	5'	10'	vegetation good on banks, some netting still visible	1	0	1.5' pipe, clean	overflows into woods?	tiny basin at the end of 60' long rocky channel; sediment: detritus and some fine sediment
Apache	APA11	N side of Apache (btw. Seminole and Ottawa)	1.5'	15'	18'	nothing on bottom (rocks), woody plants on sides	2	1	1. 2.5' pipe, has some sediment (little) 2. 2' pipe	unarmed drainage ditch to golf course behind, shaded and moist	some coarse and fine sediment collected; some rocks raised in front of exit
Apache	APA12	Apache and Ottawa (NE)	3'	18'	22'	sparse pine-wood vegetation on sides	2	1			sedimentation on bottom - mostly gravel, some pine and fine sediment; two rocky streams converge in a small basin, there is a third rocky stream

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Apache	APA13	1337 Ottawa Court	1'	3'	5' basin	rock-lined, bottom covered by pine debris, woody dense surrounding	2	0	unarmed street inflow	overflows into woods	looks good - collects fine sediment and some coarse, moist marshy grasses in inlet stream, meadow grasses in inlet (maybe accidental)
Apache	APA14	S side of Ottawa St. (1237)	3'	28'	42'	rock-lined bottom, a few grass mounds, somewhat barren woody, small tree in the middle	4	1	3 natural inflows from woods - eroded and 1 pipe	overflow drain ~2' raised	Some soil erosion, coarse sedimentation
Apache	APA2	NW of Celio and Blackfoot, across from APA1	4'	38'	44'	vegetated OK,	1	1	2' pipe clean	rocky stream dead ends, field behind 50' rock or dirt stream, some evidence of small streams meandering down slope, dry	rock bottom with sediment, foot path around S edge, rock-lined bottom, several inches sediment throughout basin; little erosion, stable
Apache	APA3	N side of Mohican and Apache	3'	18'	48'	rock bottom with pine detritus, vegetation good on sides, some erosion of steep north slope	1	1	cemented runoff from street, has some detritus and gravel (fine sediment collected on it ~1-2")	raised overflow	Eroded footpath on western steep slope, metal marker present
Apache	APA4	S side of Mohican	4'	20'	62'	S side - mature willows, N side - sparse vegetation, covered in pine needles	1	1	2' pipe	rocky outflow, 53 m, meandering, with a couple of small pools, ends in wooded area	Rock bottom, netting visible on steep sides, erosion, pine detritus in O stream, dry
Apache	APA5	Heides and Apache	3'	10'	12'	woody cool area, no plants in rocky channel, nice high grass in basin, some willows on side	2	1	2' pipes	rocky overflow	6" standing water at inlets, heavy deposition of pine needles, fine and coarse gravel, erosion on S side
Apache	APA6	N side sitka and Apache	1.5'	30'	60'	W side of bank somewhat vegetated, E side well vegetated	1	1	2' pipe, half-filled with fine moist sediment, lots of fine sediment where there is no water	rocky outflow, ~10', ends in a heavy vegetation meadow	Rocky bottom, ~6" standing water in basin, inflow dry, lots of deposition in a meadow-heavy vegetation, erosion on W and N side of bank
Apache	APA7	Mohican and Apache (SE)	3'	21'	36'	no vegetation, rocks, banks covered with pine-needle layer,	1	0	some sediment at inflow - fine and wet,	possibly overflows into wooded area (pines)	some erosion, netting, all rock, barren banks, metal pole and a concrete square in the middle
Apache	APA8	N side of Apache	1'	8'	12'	timble berry and fireweed, wood floor, pine needles	1	0	1' pipe, clean, elevated	unarmored stream flows in to the woods - lots of erosion in stream	tiny, wet in wooded area lots of pine debris and coarse sediment

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Apache	APA9	S side of Apache, Seminole, across from APA8	1.5'	12'	at stream)	rocky basin, banks with wood vegetation and pine needles	2	1	1. Cemented runoff from road, 2. 1' pipe	raised outflow grate, goes to APA8	fine and coarse sediment from road inlet; not much from pipe
Beaver Project	BEA1	Salmon, Chipmunk	2.5	26	41	lush grass and clover	1	2		outlet riser	
Beecher-Lodi	BEL1	Beecher and Alma	1	15	20	grass	1	1	large pipe	overflows into Truckee	6 inches of standing water; outflows almost directly to Truckee River
Beecher-Lodi	BEL2	Beecher	9	84	90	grass	2	2	1.land runoff 2. pipe w=~2'	1.rocky overflow 2.elevated overflow pipe h=~4'	overflow goes to BEL3; steep undervegetated slopes; some standing water @ Inlet
Bijou Creek	BCK1	El Tahoe, Bijou Community Park	2	141	186	lupine, sage and sparse grass	1	0	rock buildup in culvert		dry basin
Bijou Wildwood 2	BWW2		4	205	244	high, mature grasses; trees; cattails, willows	1	1			some sediment throughout grassland; appears to be working well; cement forebay is clean; could have been recently cleaned out (track marks along forebay visible); some water in channel; garbage present
Black Bart	BBT1	Barbara and Sierra Blvd.	3.5	31	41	pine duff; sparse grasses; pretty dry	2	0	1.gravel run-off (no stones)=erosion; 2.pipe =~2' from street		site within 5 to 10 feet of road; only deposition is gravel and sand presumably from road. Retention basin?
Black Bart	BBT10	NE corner of clear creek and Chiquapin	3	30	60	mature grass, good coverage; lupin along banks	1	1	~2' pipe	long, armored + pine duff; flows to creek	detritus and some sediment in Inflow pipe
Black Bart	BBT11	Muir and Chiquapin	2.5	35	50	heavily vegetated by meadow grass; lupin and wild rose on banks	2	1	1. pipe 2. unestablished sheetflow from road		erosion at Inflow; sedimentation visible under grass
Black Bart	BBT12	Muir and Chiquapin, East of BBT11	3	30	60	mature grass, lupin along banks	1	1	~2 pipe	long & armored; pine duff flows to creek	
Black Bart	BBT13	Corner of Chiquapin & Genoa (NW)	3.5	50	60	thick heavy vegetation; willow trees	1	1	pipe	armored; heavily vegetated	Big sediment deposits in front of inlet covered by vegetation; big sediment at outflow; outflow heavily vegetated; sediment deposits are vegetated
Black Bart	BBT14	Chiquapin dead end	1	10	84	very little vegetation; pine detritus	1	0	pipe - sedimented	no established outflow; spreads out	2 storm drains next to I, probably connect to sewer pipe; Slopes look eroded (not stabilized) rocks covered with deposition. Rock apron at end, filled with 8" of pine detritus.
Black Bart	BBT15	Black Bart and Ornsby Dr.	4	45	100	pine needles and meadow flowers	3	1	inlet pipe heavily sedimented	overflow 1' high	unestablished inflows from road-slight, gully erosion on 1 side
Black Bart	BBT16	Hank Monk	2	55	65	some grasses	1	1	2' pipe	overflow, flows to I of BBT14	erosion on NW side (steep), dry, some sediment at inflow
Black Bart	BBT17	Black Bart Circle	1	10	12	no vegetation; debris	1	0	2' pipe	meadow	needs maintenance, filled with sediment and pine debris, long rocklined ditch ~150'
Black Bart	BBT19	Black Bart Court	3.5	12	90	sparse to moderate vegetation	1	1	2' pipe, fine sediment at inflow 10"	1.5' pipe, raised 2'	Outflow goes to other side of st. (see picture) to meadow to creek

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Black Bart	BBT2	Barbara Street - east side	3	37	80	very sparse vegetation.	1	1	gravel-lined rim stormwater drain; rock-lined at end.	gravel overflow eroding. Outflow is possibly inflow or both?	side walls lack protection; rock-lined outflow with deposition; very dry
Black Bart	BBT3	Barbara Street - west side	3	40	75	very sparse vegetation.	1	1	gravel-lined rim stormwater drain.	unarmored overflow	unarmored overflow; side walls lack protection; very dry
Black Bart	BBT4	Martin and Barbara	3	78	166	grass; one willow; some young pines; wildflowers; rushes in deposition zones	1	1	armored, long & rocky	armored, overflows into creek.	little deposition under bridge; deposition on 1/5 of basin
Black Bart	BBT5	Black Bart (east side) and Martin	3	30	70	tall wetland grasses; young willows	2	1	inflows from road (not visible)	overflow raised ~2'	standing water; healthy vegetation; east slope covered with large boulders
Black Bart	BBT6	West side of Black Bart, opposite BBT5	2	10	15	wetland/meadow grasses; willows on perimeter	1	0	~3' pipe from road	spreads through meadow	Roadside gravel (from snow cleaning) deposition ~5" in inflow pipe; ~6" standing water @ Inflow
Black Bart	BBT7	N side of Martin st.	1.5	5	5	healthy meadow grasses, willows	1	0		drains to meadow	lots of roadside gravel deposited around the basin
Black Bart	BBT8	N side of Chiquapin st and Meadow Crest	2.5	32	55	meadow grasses, small shrubs; pine needles	2	1	1. from road - wood chips & rock	rocklined outflow goes to creek	rocky Inlets stretch for 30'
Black Bart	BBT9	across from 1334 Chinquapin st	1.5	20	40	marsh vegetation; couple young willows	1	1		armored outflow into creek	fine sediment in Inflow and on water path over rock; 3-6" of sediment deposited; 8" in basin - functioning well
Cascade	CAS1	Sugar Pine Rd.	4	100	50	grass	2	1			good condition; no sediment deposition
Cascade	CAS2	Sugar Pine Rd.	3.75	25	55	grass	1	1			basin shores are strengthened with straw mat
Cascade	CAS3	Cascade St.	5.5	20	40	none	2	0			lined with rock
Clement	CLE1	End of Clement	6	40	150	grass	1	2		riser and overflow weir	
Fern Street	FER1	Hwy 28 and Fern Street	2	15	49	sparse grass	1	1	sediment at inlet	outlet riser	
Gardner Mountain	GMT1	Gardner and Sand Harbor	4	15	75	tall grasses	1	1			Well vegetated with steeply constructed rock walls
Gardner Mountain	GMT2	Gardner and Wentworth	2	50	100	grass	2	2			
Gardner Mountain	GMT3	Garner and Panther	3	15	40	grass	1	1			vegetation only the bottom of the basin
Gardner Mountain	GMT4	Panther - across the street from CMT3	2	40	100	cedar, grass, willows	1	2			overgrown
Gardner Mountain	GMT5	Gardner @ back entrance to high school	4	10	150	duff	1	1			U-shaped basin
Glorene and 8th	GLO1	Highway 89	3.5	60	215	Just planted	1	2	under construction	under construction	under construction
Glorene and 8th	GLO2	North of Highway 89	2	45	130	native grass replanted in basin	1	1	under construction	under construction	under construction
Glorene and 8th	GLO3	North of Highway 89, Tenth	2	165	188	small trees and bushes, mule's ear	1	1	floor bay		erosion control blanket
Glorene and 8th	GLO4	Clement	2.5	26	43	sparse grass	1	0	large rocks at mouth of inlet		

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Glorene and 8th	GLO5	Clement	2	15	19	no vegetation	1	1	large rocks at mouth of inlet		
Glorene and 8th	GLO6	Tata	3	14	14	no vegetation	1	0			small rock-lined circular basin
Glorene and 8th	GLO7	Tata	1.5	25	34	sparse grass	1	1		outlet riser	
Griff Creek	GFC1	Hwy 28	1	55	85	grass and bushes	1	1			flowing water
Hekpa	HEK1	East of Powerline Bike Path	5	80	110	sparse to medium vegetation, low grasses,	1	1	2' pipe, rock around	rocky overflow	some matting still visible; dry pine detritus on rock, some bank erosion
Hekpa	HEK2	West of HEK1 behind housing	4	72	117	Natural vegetation - bitter brush and sage	1	1	1.5 pipe	rock outflow	deposition on rocks of 1 - sparse, some DG, A bit dry
Kayak Café	KCF1	Hwy 28	2	19	113	lush sedge and grasses	2	1			
Kayak Café	KCF2	Hwy 28	3	55	370	sedge and grasses	3	1			
Kayak Café	KCF3	Hwy 28	2	40	80	sedge, grass, wildflowers	1	0			Hwy 28 runoff, standing water
Kings Beach 1	KGB1	Beaver St., Steelhead St.	4	70	100	grass has been recently cut; trees on perimeter	2	2			good working condition; public access prohibited
Kings Beach 2	KGB2	Trout St., Brook St.	4	93	155	80% high grass; shrubs	1	2			good working condition; surrounded by a fence; public access prohibited
Kings Beach 3	KGB3	Salmon Ave., Fox St.	2	78	105	grass; trees on perimeter	2	1			project grass covers 30% and has been recently cut; fenced area; discharge regulated at inlets
Mountain Drive	MTN	Mountain Dr., Hwy 89	9	42	57	some shrubs	2	1			rocks; stone-lined; some shrubs on perimeter; deposition; some standing water in middle; culvert that run under Hwy 89 and leads to rock-lined ditch
N. Shore Beaches 1	NSB1	Hwy 28, Moon Dunes Beach, Agatam Rd.	1.5	8	17	some grass on perimeter; no vegetation in basin	1	0			very small and unlikely to be functional; unknown outlet, run-off from Hwy and very small parking area
N. Shore Beaches 2	NTL	Hwy 28, National Ave.		133	386	little grass; trees	3	3			area covered with some gravel and mulch; basin seems neglected; considerable erosion at outlets; no filtration; run-off from Hwy and parking lot
National Ave. Erosion Control Project	NEP	National Ave., Hwy 28	4.5	50	63	grass; trees on perimeter	2	1			excellent working condition; partially lined with rocks; split wood fence with access driveway
Nile Road	NIL1	Ophir Rd., Agate Rd.	5	74	80	grass; mulch at the bottom	1	2			straw mat
Nile Road	NIL2	Nile Rd., Agate Rd.	2.5	85	90	grass	1	2			no deposition
North Upper Truckee	NUT1	Highway 50, N. Upper Truckee	4'	34'	40'	some short meadow grasses on bottom, W bank barren, E bank vegetated, netting visible	2	1	1. runoff from Highway (lower half paved) 2. asphalt road into basin	rock and cement overflow into woods	lots of coarse sediment, including lots of cinder. Very and dry
North Upper Truckee	NUT2	W San Bernardino, N Upper Truckee	4'	37'	38'	sparse vegetation on bottom and sides	1	2	pipe, ~30' unarmad stream, netting on stream	1. overflow pipe, 1' raised. 4' wide 2. rock-lined overflow - unarmad stream into woods	some bank erosion (sandy), fine and lots of coarse/sand sediment, no netting on banks

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Project Name	GPS Label	Nearest Street(s)	Average in Feet			Dominant Vegetation	# Inlets	#Outlets	Inlet Comments	Outlet Comments	General Comments
			Depth	Width	Length						
North Upper Truckee	NUT3	W side of Upper Truckee, Poewin st.	7'	40'	75'	woody pine, dry area, shrubs on E side	3	1	2 inflows are 3' pipes and 1 is a natural stream from woods	6.5' tall outflow pipe	rocks put in to stop natural off-road erosion?, lots of sediment: sand, gravel, cinder; w bank barren, eroding, E bank somewhat vegetated, steep - some erosion, moist, fine sediment close to outlet
North Upper Truckee	NUT4	Grizzly Mtn Dr., N Upper Truckee	5'	22'	31'	wood plants and some shrubs, willows	3	1	1. Natural? Road runoff 2. Cemented road runoff 3. 2.5' pipe	low-placed pipe	check-dam in the middle (rocks), inlet-almost all coarse sediment, fine rock, sand, cinder
North Upper Truckee	NUT5	North Upper Truckee	2	31	41	sparse grass	1	2		outlet riser	dry wit bottom deposition, boulders in basin
North Upper Truckee	NUT6	Delaware	1.5	27	34	sparse grass	1	1			clayey basin, standing water
North Upper Truckee	NUT7	N. Upper Truckee Rd., Otomites	2.5'	30'	36'	pretty unvegetated area, some grasses, pine trees (mature)	2	1	1. inlet from road - rock-lined channel, lots of pine needles, cinder and fine sediment 2. Pipe 1.5 ft 1/3 full of sediment, detritus (coarse and fine, detritus), water paths eroded	grated overflow, pipe 3.5', raised 2'	Basin itself not constructed, more of a natural low point, undefined borders, flows into low woods (barren soil),
Pioneer I	PIO1	Pioneer trail, Southern Pine	2'	10'	10'	heavily sedimented, some tiny grasses	1	1	4' pipe, heavily sedimented, mostly gravel from road, some fine sedimentation, 3-5' sediment, possibly more	stone overflow, goes into a marsh	
Pioneer III	PPP1	Dead end of Cattleman's Trail	4.5	110	200	some marsh grass (mostly rushes); young willows; lots of plants on bottom mixed in	1?	1			outlet is rocky stream; heavy deposition throughout; straw mat still visible
Pioneer III	PPP3	Kokanee and Pioneer	5.5	72	400	Dense at I1 and I2, moderate on bottom of basin, top of bank (esp. N side) is sparsely vegetated	2	1		rocky stream/pool	
Rocky Point/Park Ave.	RPT1	Park Ave., Pine Blvd.	4	130	313	newly vegetated (lupin, yarrow, bunch grasses, some new trees)	3	1			outlet 1 (elevated rock base 3 ft); inlets have rocks in front of them; aesthetically it looks good
Rocky Point/Park Ave.	RPT2		3.5	162	180	aquatic vegetation	3	2			wildlife seen (birds); lots of standing water; inlet 1 is big with concrete 3 ft diameter pipe; inlet 2 swale, rock-lined 8 ft across from trailer park; inlet 3 underwater, 1ft diameter; outlet 1 elevated 2 ft; outlet 2 elevated 3 ft

Appendix 1: Stormwater Basin Study Data Collection TBI 2004/2005

Project Name	GPS Label	Nearest Street(s)	Average in Feet			Dominant Vegetation	# Inlets	#Outlets	Inlet Comments	Outlet Comments	General Comments
			Depth	Width	Length						
Rocky Point/Park Ave.	RPT3	Pioneer Trail, Hwy 50	7	109	122	planted willow staked and grasses	4	1			inlets 1,2,3, and 4 = 2 ft pipe; outlet square and 4ft wide, raised ~3ft; inlet 4 has deposition; straw mats visible; still under construction
Rocky Point/Park Ave.	RPT3B	Pioneer Trail, Hwy 50	7	103	189	planted willow staked and grasses	3	1			still under construction; no deposition; inlet 6 = grate, sloped; outlet square and 4ft wide, raised ~3 ft
Rocky Point/Park Ave.	RPT4	Rocky Point Rd.	-6	110	120	none	0	1			still under construction; fenced off; should flow to RPT6?
Rocky Point/Park Ave.	RPT5	Rocky Point Rd.	-7	72	116	none					still under construction; workers onsite; worker said this basin should flow to RPT4
Rocky Point/Park Ave.	RPT6	Rocky Point Rd.	1.5	25	152	meadow	0	4			overflow weir = 20ft; meadow with artificial banks and small drainage area on edge; no compacted soils in basin but compacted on perimeter; natural inlet; outlets ~4-5 ft deep with some standing water on bottom
Ski Run	SKI1	Secline St., Rainbow Ave.	2	6	200	no vegetation in ditch; some grass and shrubs on sides	2	1			stone-lined ditch
Ski Run	SKI2	Osgood, Wildwood	4.5	199	249	well-growing grasses; rushes; sedges; willows	1	2			healthy looking like Ski Run Erosion Control Project; inlet 2 has evidence of standing water (dried algae remains); sedimentation throughout; bike path/foot traffic
Ski Run	SKI3		4	118	697	somewhat barren; yellow cattails are growing well	7	3			outlet drains from McDonald's parking lot; north side of bank is well-eroded; bike paths (dirt and paved); little vegetation remains; outlets 2/3 likely drain to storm sewers; not much sedimentation; not looking healthy
Ski Run	SKI4	Hwy 50	3	68	489	short grasses (mostly dry; steeper north side more barren and eroding)	1	1			some sedimentation; channel meanders through; water may not ever flow through; inlet ~3ft; outlet 2ft and flows to marina (better vegetation in front)
Stateline	STL1	Pine and Park Ave.	4	200	300	grass, and some cattails					Large three-tier linear basin
Stateline	STL2	Stateline, Pine	5	18	223	sparse vegetation, trees and shrubs around inlets	3	1	trees and shrubs around inlets		compacted soil
Stateline	STL3	Stateline, Pine	3	18	450	grass and small willows	2	0			linear basin
Stateline	STL4	Stateline, Pine	4	18	250	lush grass and bushes	2	0			linear basin on Pine, cement-blocked culvert
Tahoe City Wetlands	TDP	Hwy 89, Hwy 28									
Tahoe Tahoma Cedars	TTC1	1st Ave., Fir St.	-5.5	30		grass; shrubs					surrounded by a wire fence; no access; 3 celled basin with weirs
Tahoe Tahoma Cedars	TTC2	6th Ave., Elm St.	-6	~20	~70	grass; shrubs; some trees on the perimeter	1	1			surrounded by a wire fence; lots of deposition; no vegetation at bottom center; grass and shrubs on perimeter
Tahoe Tahoma Cedars	TTC3	Gray Ave., Hwy 89	-6	~150	~250	grass; shrubs	2	2			surrounded by chain link fence; locked

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			Depth	Width	Length						
Tahoe Valley	TVL1	Tucker and 89	3	115	147	wetland grasses including rushes	1	2	pipe	1. Outlet pipe near surface berm on westside 2. Rocky overflow onto street	Footpath along perimeter; outlet has fine and coarse sediment deposited
Tahoe Valley	TVL2	Fifth and Eloise	4.5	150	200	marsh plants, willows	1	2			Large amounts of sedimentation; some standing water
Tamarack	TAM	Sierra Dr., Hwy 89	4.5	33	100	30% grass	1	2			access road to the basin
Twelve and Thirteenth Streets	TAT1	12th and Patricia	3	40	100	grass	1	1			fenced
Twelve and Thirteenth Streets	TAT2	12th and Patricia	2	40	80	grass	1	1		adjustable flash board outlet	fenced
Twelve and Thirteenth Streets	TAT3	12th and Patricia	3	30	90	grass	1	2		outlet pipe and overflow weir	fenced
Upper Cutthroat	UPP1	Upper Cutthroat	2	21	40	sparse grass	1	2	bubble-up inlet with infiltration pipes	outlet riser	
Valley View	VAL	Valley View Dr., Lake View Dr.	3.5	42	50	grass; shrubs	2	1			
Valley View	VAL2	Valley View Dr., Lake View Dr.	3	32	45	little vegetation; 2 shrubs	1	1			strengthened with plastic fishnet
West Sierra Tract	WST1	Sierra Blvd., Chris Rd.	4	80	170	tall grasses on basin; pines and tall shrubs on sides	2	1			lots of standing water in outlet channel; lots of sedimentation; 1.5 ft deep at inlets; some shallow standing water in basin; minimal litter; well-functioning