

Results

The site scores are presented in Table 2, below:

Table 2. Bioassessment scores for sampling events at four stream locations near Heavenly ski resort (2001-11), calculated using the Eastern Sierra IBI (ESIBI) and the California Stream Condition Index (CSCI). (Blue cells indicate USFS samples with low BMI counts, yellow cells indicate SNARL samples.)

Sample Year	Sample Date	HVC-1 Heavenly Valley Cr "Sky Meadows"		HVC-2 Heavenly Valley Cr "Below Patsy's"		HVC-3 Heavenly Valley Cr "Property Line"		LHC-1 (Lower) Hidden Valley Cr (control)	
		ESIBI	CSCI	ESIBI	CSCI	ESIBI	CSCI	ESIBI	CSCI
2001 - USFS	Jul-01	35.6	0.56	49.4	0.74	53.9	0.77	75.2	0.92
2001 - SNARL	Jul-01	-	-	-	-	84.2	1.08	93	0.95
2002 - SNARL	Jul-02	-	-	-	-	75.3	0.87	96.8	1.15
2002 - USFS	Jul-02	37.9	0.69	53.9	0.91	51.1	0.72	75.2	1.08
2003	Jul-03	49.6	0.84	56.6	0.85	48.7	0.93	78.2	1.06
2006	Sep-06	55.3	0.92	52.2	0.95	69.1	1.02	80.6	1.15
2007	Aug-07	23.6	0.44	67	0.98	74.7	1.1	93.3	1.04
2010	Aug-10	36.8	0.74	55.2	0.99	80.7	0.9	94.6	1.08
2011	Aug-11	49.8	0.69	75	0.86	83.5	1.02	87.8	0.86
2011	Oct-11	-	-	-	-	-	-	87.8	0.99

The Eastern Sierra IBI was developed by Drs. David Herbst and Erik Silldorff of the University of California's Sierra Nevada Aquatic Research Laboratory (SNARL). The thresholds applicable to the Eastern Sierra IBI (ESIBI) are presented below in Table 3 (reprinted from Herbst and Silldorff 2009).

Table 3. Thresholds applicable to Eastern Sierra IBI (from Herbst and Silldorff 2009)

Supporting (Unimpaired)			Impaired	
Acceptable		Intermediate supporting but uncertain	Partially-supporting	Not supporting
>89.7	89.7–80.4	80.4 – 63.2	63.2 – 42.2	<42.2
A	B	C	D	F
Very good	Good	Fair	Poor	Very poor
Good		Fair	Poor	

The thresholds applicable to the CSCI are not yet published. Our interpretation of the CSCI results was guided by Drs. Andrew Rehn and Peter Ode of DFW-ABL, who are co-authors of the pending CSCI manuscript (*see* Table 4, from: Mazor and others, in preparation).

Table 4. Thresholds used to define condition classes for the CSCI. Pending publication of the CSCI, the values shown below were used for this assessment. (Values in parentheses reflect the probability that scores in the condition class are within the reference distribution.)

Index	Very likely intact (≥ 0.50)	Likely intact (0.30 to 0.50)	Possibly altered (0.10 to 0.30)	Likely altered (0.01 to 0.10)	Very likely altered (< 0.01)
CSCI	>1.00	1.00 – 0.92	0.91 – 0.79	0.78 – 0.63	0.62 – 0.00

Using the thresholds discussed above, biotic condition at site HVC-1 (“Sky Meadows”) is consistently poor according to the ESIBI, and mostly poor according to the CSCI. Biotic condition at site HVC-2 (“Patsy’s”) is generally poor according to the IBI, and generally good according to the CSCI. Biotic condition at site HVC-3 (“Property Line”) is variable (from poor to good, depending on the year) according to the ESIBI, and generally good according to the CSCI. Biotic condition at site LHC-1 (Hidden Valley Creek control site) is always good to very good according to both the IBI and the CSCI.

Discussion

There are several potentially confounding factors that make definitive interpretation of the current dataset difficult. Issues that we considered include: differences in field collection equipment (i.e., net mesh size), differences in area sampled, differences in collection methods (i.e., targeted-riffle methods vs. multi-habitat methods), and differences in field personnel that collected the samples (including poorly documented or undocumented expertise, training, and quality assurance procedures).

Based on prior bioassessment “methods comparison” studies (Rehn and others 2007, Gerth and Herlihy 2006, Herbst and Silldorff 2006 & 2004), we concluded that the effects of most of the methodological differences are relatively minor (e.g., targeted-riffle composite method vs. multi-habitat reachwide benthos method, area sampled, 250um mesh vs. 500um mesh), but three issues stand out:

1. Several USFS samples had very low benthic macroinvertebrate (BMI) counts, making them not good candidates for scoring with either the ESIBI or the CSCI. Both protocols expect at least 450- to 500-count samples, whereas these USFS data points had very low (i.e., < 200) counts. Since SNARL samples from these same sites collected in the same time frame had large BMI counts, and SNARL has both more experience and better QA documentation, it seems likely that this discrepancy may reflect problems with the USFS’s sample collection and/or processing techniques during that era. For these reasons, we recommend ignoring the data from three USFS samples with very low BMI counts (HVC-3 in 2001 and 2002, and LHC-1 in 2001).

2. The 2001 and 2002 SNARL samples stand out as having considerably higher scores than other data from the same sites in the 2001-2002 time period. Dr. Rehn observed that SNARL’s taxa lists frequently had a higher frequency of taxa identified to genus level, whereas USFS identifications were more often left at the family level for a number of groups. This may have contributed to the difference. But whatever the cause, because SNARL has both more experience and better QA documentation than the USFS crews of that era, we trust the SNARL results.
3. Even when the USFS samples for 2001-03 had sufficient BMI counts, differences between USFS’s and other crews’ scores persisted. (See LHC-1 in 2002-03.) For example, we cannot definitively explain why the USFS crews consistently obtained lower IBI scores at the control site (LHC-1) than the other three crews (SNARL, Heavenly’s consultants, and ABL).

Another key issue is that—given the variability in scores—there simply are not enough samples to permit a valid statistical comparison to demonstrate “improving trends over time” (as called for by the TMDLs). Even if we ignored the three issues above, statistical tests of early vs. later years would not demonstrate definitive trends because of the high variance in individual observations. While some (or all) of the HVC sites may be on an “upward” trend since the implementation of post-TMDL sediment control measures, we cannot conclude with a high degree of confidence whether any such trend is underway. At best, more data are needed to document any trend(s). At worst, the management measures installed to date may be insufficient to achieve the desired condition. Continued monitoring is needed to answer these questions.

If we exclude the questionable results, as discussed above, several generalizations about site condition can be made. Table 5, below, summarizes the results in narrative terms. The ESIBI and CSCI assessments generally agree for three of the four sites. We cannot explain why the assessments differ at the fourth site, HVC-2 (Heavenly Valley Creek below Patsy’s), where the ESIBI scores indicated generally poor biotic condition, and the CSCI scores indicated generally good condition. That difference may be due, in whole or in part, to methods, sampling error, and/or the low number of samples. Additional sampling may shed light on this question.

Table 5. Narrative summary of biological condition scores
(excluding questionable samples; see discussion)

Site	CSCI	ESIBI
HVC-1 Sky Meadows	Biological scores generally poor (except 2003 & 2006 were fair to good)	Biological scores always poor
HVC-2 Below Patsy’s	Biological scores generally good (except 2001 was fair)	Biological scores generally poor (except 2007 & 2011 were “fair”)
HVC-3 Property Line	Biological scores generally good	Biological scores mixed ➤ poor in 2003 ➤ fair in 2002, 2006-07 ➤ borderline fair-good in 2010 ➤ good in 2001, 2011
LHC-1 Lower Hidden	Biological scores always good to very good	Biological scores always good to very good

Conclusions & Recommendations

In the decade since TMDLs were adopted for Heavenly Valley Creek (i.e., from 2001-2011), bioassessment monitoring was conducted at three sites along the Creek, and at a nearby “control” site (Hidden Valley Creek). Taken as a whole, the results indicate that the instream biotic condition of site HVC-1 (“Sky Meadows”) is poor, and the biotic condition of sites HVC-2 (“Patsy’s”) and HVC-3 (“Property Line”) is generally fair to good (but not yet “*approaching conditions in Hidden Valley Creek*” as called for in the TMDLs).

While nascent signs of recovery may be emerging, there is insufficient data at this time to determine whether biotic condition is improving significantly at any of the sites since the TMDLs were adopted.

Given the above findings, bioassessment monitoring should be continued (using SWAMP’s Reachwide Benthos protocols and the existing 2-years-on, 2-years off schedule), at least until an improving trend can be definitively documented (i.e., conduct sampling in 2014-15, 2018-19, 2022-23, etc.).

References

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APPENDIX 3.1-C
BMP EFFECTIVENESS
MONITORING



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Memorandum

DATE: August 8, 2014

TO: Melanie Greene Armstrong, Hauge Brueck Associates
Chris Donley, CardnoENTRIX, Inc.
Andrew Strain, Heavenly Mountain Resort

FROM: Kristin Roaldson and Jill Sutherland

PROJECT: Heavenly Epic Discovery EIS/EIR/EIR

SUBJECT: BMP Monitoring Results 2006-2013

The following provides a discussion of the results from BMP Effectiveness Monitoring Program (Revised Environmental Monitoring Program, 2007) at Heavenly Mountain Resort (Heavenly), specifically for Permanent Best Management Practices (BMPs), for the period 2006 through 2013. In general, Permanent BMPs are BMPs used on a long-term basis to control erosion, reduce sediment transport, and prevent potential contaminant releases.

A description of the BMP monitoring protocol and data for the period 2006 through 2011 is found in the *Environmental Monitoring Program, Comprehensive Report, Heavenly Mountain Resort Water Years 2006 - 2011* (CardnoENTRIX, 2013). Per your request, this memo updates the evaluation with the monitoring results for 2012 and 2013 (BMP Effectiveness Monitoring annual reports, RCI, 2013, and RCI, 2014). Summaries for this period are presented below for the overall resort and, where feasible, on a watershed basis.

Resort Wide Evaluation

Permanent BMPs were routinely installed and monitored throughout the resort for both existing facilities and new projects during the monitoring period from 2006 to 2013. There were 346 separate permanent BMP evaluations completed at 117 separate sites. The number of inspections per year varied from 30 to 70 evaluations per year and averaged 43 per year. Variations are due to annual levels of activity at the Resort and the 3-year monitoring intervals. BMPS are monitored at 1, 3, 6, and 9-year intervals after they are installed, to evaluate both “implementation” and “effectiveness” over time.

Implementation

“Implementation” evaluates whether project design of BMPs are adequate for resource protection, and if BMP improvements are constructed according to the planning/management criteria. For 2006 through 2013, resort-wide Permanent BMP implementation ranged from 71 (2006) to 97 (2013) and 98 (2012) percent “fully implemented”. Evaluations averaged 47 per year with an average of only one (1) score of “not implemented” per year (Table 1). When design issues have been identified Heavenly has been responsive in correcting the situation. On the project level monitoring shows BMP implementation at Heavenly has been improving due to the following reasons.

- Completion of BMP retrofits at most existing facilities,
- Plans and specifications for BMPS for new construction projects have been prepared with increasing levels of detail during the eight year period, and
- Improved communication of BMP objectives, as well as training and experience of Heavenly's designated BMP field crews.

Table 1. Resort Wide Permanent BMP Implementation 2006 to 2013

Implementation Score	Average Number of Occurrences
Fully Implemented	42 per yr.
Minor Departure	3 per yr.
Not Implemented	1 per yr.
Total	47 per yr.

Overall Implementation is based on scores for two components: design and construction. To improve BMP design and construction at Heavenly, a review of the not "fully implemented" occurrences was made in the 5-year Comprehensive Reports (USDA Forest Service, 2003; CardnoENTRIX, 2006, CardnoENTRIX, 2013). For the eight year period (2006-2013), 19% of the small number of deviations from "fully implemented" were related to design or planning/management criteria and 81% were related to construction activities. The results are consistent with the comprehensive report for 2006 through 2011 (CardnoENTRIX, 2013). As technology and standards evolve, these results have been used by Heavenly to identify needs and adopt improved BMP design and construction techniques. In the last four years (2010 through 2013) no evaluations scored "not implemented".

Effectiveness

Resort-wide Permanent BMP effectiveness ranged from 84 to 98 percent on an annual basis from 2006 through 2013. The number of evaluations averaged 47 per year over the eight year period with an average of one (1) score of "not effective" and four scores of "at risk" per year (Table 2). The incidences of "at risk" scores decreased over the period, primarily related to implementation of new BMP techniques resulting in more effective long term soil stabilization.

Table 2. Permanent BMP Effectiveness Scores 2006 to 2013

Effectiveness Score	Average Number of Occurrences
Fully Effective	43 per yr.
At Risk	4 per yr.
Not Effective	1 per yr.
Total	47 per yr.

Overall "effectiveness" of permanent BMPs is evaluated using six criteria: Source Control/Soil Cover, Revegetation, Slope Protection, Drainage Systems/Infiltration, Ponding, and Hazardous Materials. The results for individual criteria help Heavenly to identify which types of BMPs are the most or least effective over an extended period of time (monitoring occurs at 1, 3, 6, and 9 years after installation). Of the six categories, Source Control/Soil Cover had more occurrences of not "fully effective". However, the transition to new revegetation techniques and soil amendments during 2006 through 2007 on many projects has resulted in improving effectiveness. Of the categories, Slope Protection had the second highest incidence of scores not "fully effective". This was primarily related to slope protection BMPs transitioning from erosion control fabrics to soil amendments or rock slope protection during the 2006

to 2013 period. As projects are monitored at 1, 3, 6 and 9 year intervals, results show whether BMP techniques are effective over the long term. If monitoring results identify BMPs that lose effectiveness over time, Heavenly has upgraded the BMPs with newer techniques.

Evaluation By Watershed

Heavenly Mountain Resort facilities are located in six different watersheds, as identified in the Master Plan. The two watersheds with majority of permanent BMP evaluations are the Heavenly Valley Creek watershed (46% of evaluations) in California and the Edgewood Creek watershed (18% of evaluations) in Nevada. Overall, 61% of evaluations were performed in California and 39% performed in Nevada. Monitoring varies with levels of activity in the various watersheds and the monitoring intervals specified in the protocol.

Monitoring results are summarized in Tables 3 and 4 for the following watersheds: Heavenly Valley Creek (CA-1), Edgewood Creek (NV-3), and South Fork Daggett Creek (NV-2+5). The Mott Canyon Creek (NV-1) and Tributary to Daggett Creek (NV-4) watersheds are not included since less than ten BMP evaluations were conducted within these watersheds, providing a limited data set for the 8-year period.

Implementation

Consistent with the overall “implementation” results for the resort (Table 1) and the 2011 comprehensive report (CardnoENTRIX 2013), departures from “fully implemented” on a watershed basis were infrequent (Table 3), and were more often construction then design concerns. If field monitoring identified design or construction concerns, Heavenly has been responsive in making corrections.

Table 3. Permanent BMP Implementation Results 2006 to 2013 For Watersheds

Average Number of Occurrences By Watershed	Heavenly Valley Creek Watershed (CA-1)	Edgewood Creek Watershed (NV-3)	South Fork of Daggett Creek Watershed (NV-2&5)
Fully Implemented	19 per yr.	7 per yr.	4 per yr.
Minor Departure	2 per yr.	0.88 per yr.	1.5 per yr.
Not Implemented	0.6 per yr.	0.13 per yr.	0.13 per yr.
Total	21 per yr.	8 per yr.	6 per yr.

Effectiveness

“Effectiveness” monitoring result by watershed shown in Table 4, show similar results to the overall resort evaluation (Table 2) and the majority of Permanent BMPs rated “fully effective”. Of BMPs found not fully effective, the Source Control/Soil Cover and Slope Stabilization criteria were again the most frequent in CA-1 and HV-3 watersheds, while Revegetation success criteria was more of a concern the NV 2&5 watershed.

Table 4. Permanent BMP Effectiveness Results 2006 to 2013 For Watersheds

Average Number of Occurrences By Watershed	Heavenly Valley Creek Watershed (CA-1)	Edgewood Creek Watershed (NV-3)	South Fork of Daggett Creek Watershed (NV-2&5)
Fully Effective	19 per yr.	7 per yr.	5 per yr.
At Risk	2 per yr.	0.50 per yr.	1.0 per yr.
Not Effective	0.5 per yr.	0.25 per yr.)	0.5 per yr.
Total	21 per yr.	8 per yr.	6 per yr.

APPENDIX 3.1-D
REVISED CUMULATIVE WATERSHED
EFFECTS (CWE) RESTORATION
PROGRAM

Table 4

Revised CWE Restoration Program (2006-2016 and On-going)

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
PHASE I								
CA-1								
1	R99	Powderbowl Access	Construct Runs G9 (Powderbowl Woods Built in 2007)	Post-project road maintenance treated annually; Access spur eliminated and second spur improved as part of Powderbowl lift replacement project; t 0.08 acres upgraded/0.07 acres decommissioned	2008	2008	RCI Photo Documentation	Yes
2	R141-R143	Lower California Trail	Construct I4 (Pinnacles 1 Implemented in 2007)	Revegetate, Mulch; Decommissioned Road segment R143 treated as part of log deck decommissioning	2007	2013	Heavenly Mountain Operations Staff	Yes
3	R141-R143	Lower California Trail	Construct I5 (Pinnacles 2 Implemented in 2007)	Revegetate, Mulch; Decommissioned Road segment R143 treated as part of log deck decommissioning	2008	2013	RCI Photo Documentation/ Heavenly Project Records	Yes
4	R166-R167	Roundabout Road	Construct Run 1A	Forest Service to advise as to need for Pre- and Post project maintenance; Road is treated annually as part of opening summer mountain access. Daily Summer dust abatement watering program	On-going	On-going	RCI Plan Sets	Future Capital Project
5	R263	Mid-station Road	Construct Gondola Hiking Trails	Forest Service to advise as to need for Pre- and Post project maintenance Road segments R261-R263 are treated annually as part of opening summer mountain access. Daily	2007	On-going	RCI Plan Set	Future Capital Project

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
				Summer dust abatement watering program.				
6	R1-4	Skyline	Skyline Trail Realignment (Implemented in 2008)	Decommission and revegetate abandoned road segments per design plans in MPA 07 EIR/EIS/EIS Appendix 2-J Skyline Trail was regraded with substantial slope stabilization, roadway width narrowing and erosion resistance treatment per approved design plans. Road is treated annually as part of opening summer mountain access. Daily Summer dust abatement watering program when open to public hiking.	2008	On-going	RCI Photo Documentation; BMP Effectiveness Monitoring Annual Report; Construction Season Summary; RCI Plan Set	Yes On-going Road Maintenance
7	Gondola Top Station	Site Clean Up/Landscaping	Construct Additional Tubing/Winter Park at Top of Gondola (Implemented in 2010 and 2013)	Remodel and Expand Vehicle and Lift Maintenance Shop at Top of Tram (Upper Shop) Gondola area clean up conducted and wood chip cover placed annually throughout top of gondola area. Revegetation seed mix planted in 2010, 2011, & 2013 in front of Tamarack Lodge. Daily Summer dust abatement watering program. Area receiving naturalized landscape seed and plantings as part of Summer Activities enhancements. Additional surface drainage improvements in flat areas where water accumulates to be implemented in 2014.	2007	Ongoing	RCI Photo Documentation; BMP Effectiveness Monitoring Annual Report; Construction Season Summary; RCI Plan Set; Heavenly Project Records	Yes
8	R250-R253	Von Schmidt to East Peak	Replace/Relocate Lifts S and T (Olympic Lift replaced in 2007/North Bowl Lift not Replaced)	Forest Service to advise as to need for Pre- and Post project maintenance Road is treated annually as part of opening summer mountain access.	2007	On-going	Heavenly Mountain Operations Staff	Yes Ongoing Road Maintenance

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
				Road corridor is roped annually and pine needles applied to road shoulders. Included in daily Summer dust abatement watering program. Segment 250 to be treated following construction of Big Easy zipline project.				
9	R155-R156	Groove/Upper Shop	Upper Shop SEZ Improvements (Implemented in 2006 and 2007)	<p>May require pre- and post project road work per review by Forest Service; rock-lined drainages are difficult to clean out due to the design implemented, but maintenance is necessary; maintenance of revegetation of cut and fill slopes; waterbar/rolling dip repairs</p> <p>Road improvements implemented per project design plans. Existing road is partially paved and maintained annually as part of summer road maintenance. Road base added to switch back corner (2013)</p>	2007	On-going	RCI Photo Documentation; BMP Effectiveness Monitoring Annual Report; Construction Season Summary; RCI Plan Set; Heavenly Project Records	<p>Yes</p> <p>On-going Road Maintenance</p>
10	R91-R95	Sky Meadows	Removal of Sky Meadows Deck and Meadow Restoration	<p>Forest Service to advise as to need for Pre- and Post project maintenance</p> <p>This Project would be implemented upon construction of Powerbowl Lodge, summer uses would be serviced by temporary structures that would be removed prior to the start of winter uses</p>	--	--		<p>Future Capital Project</p> <p>Ongoing Road Maintenance</p>

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
11	R47-R57	Lower Ridge Road	Construction of Powderbowl Lodge	Forest Service to advise as to need for Pre- and Post project maintenance Existing road maintained annually as part of summer road maintenance. Daily Summer dust abatement watering program on road segments up to Powderbowl Express lift station.	2007	On-going	RCI Photo Documentation; Heavenly Project Records	Future Capital Project Ongoing Road Maintenance
12	R58-R79	Maggie's Road	Construction of Powderbowl Lodge	General project maintenance; revegetation of cut and fill slopes, cleaning and repair of drainage ditches; repair of rolling dips; additional base rock may be required prior to use for Phase I projects; Forest Service to advise as to need for Pre- and Post project maintenance; Existing road maintained annually as part of summer road maintenance. Road has a road base surface from base of Patsy's chair to CA pumphouse. Daily summer dust abatement watering program	2007	On-going	RCI Photo Documentation; BMP Effectiveness Monitoring Annual Report; Construction Season Summary; RCI Plan Set; Heavenly Project Records	Future Capital Project Ongoing Road Maintenance
13 (Same as #5)	R263	Mid-station Road	Construct Gondola Hiking Trails	Forest Service to advise as to need for Pre- and Post project maintenance Road segments R261-R263 are treated annually as part of opening summer mountain access. Daily Summer dust abatement watering program.	2008	2011	RCI Plan Set	Future Capital Project Ongoing Road Maintenance
14 (Same as #9)	R155-R156	Upper Shop	Upper Shop BMP and SEZ Restoration Project- Phase I (Implemented in 2006 and 2007)	Road upgrades implemented per design plans in Appendix 3.2-A	2006	2008		Yes

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
15	Ski Run Segment Revegetation	CA-1 Ski Run segments	General maintenance of revegetation projects	<p>Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring</p> <p>The following ski runs were treated as part of 2011/2012 minor run widening project: Canyon 1 & 2, Ellie's Trail, Swing Trail, and Liz's'. Hot spots on Ridge Run are identified and treated. Blue Angel Chutes waterbars were rebuilt in 2010 and re-mulched in 2011. Water bar and road maintenance on Mombo Run in 2010. Pioneer Run (Ski Run N1) was treated with "Full Hogan prescription" in 2013. Ski School teaching area (Trail O1) is site of on-going experimental test plots by IERS. Irrigation annually on Ridge, Lower Cat Track, Creek Station, Maggie's Corner, Sky Meadows, Gondola Area and Pioneer Trail.</p> <p>Monitoring of effective soil cover and specification of erosion control treatments have evolved over the monitoring period, in consultation with the Forest Service and Lahontan. The initial focus on soil cover has been broadened to include infiltration potential, slope, and surface roughness. The 2011 CMR put forth this expanded approach, and implementation is under development with the relevant agencies.</p>	2010	2013	Heavenly Mountain Operations Staff	Yes On-going Ski Run Maintenance

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
CA-4								
16	R167-R176	Roundabout System	All Phase I projects on the California-side of the resort will utilize this road system (Implemented 2007-2013)	Forest Service to advise as to need for Pre- and Post project maintenance Road is treated annually as part of opening summer mountain access. Daily Summer dust abatement watering program	2007	On-going	RCI Photo Documentation; Heavenly Project Records	Yes
17	Ski Run Segment Revegetation	CA-4 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	X	On-going		No
CA-6 18	R177-R187	Roundabout System	All Phase I projects on the California-side of the resort will utilize this road system (Implemented 2007-2013)	Forest Service to advise as to need for Pre- and Post project maintenance Road is treated annually as part of opening summer mountain access, including placing road base in specific corners. Daily Annual Summer dust abatement watering program	2007	On-going	RCI Photo Documentation; Heavenly Project Records	Yes
19	Compliance Project	California Parking Lot	BMP Retrofit Project on the California Parking Lot (Implemented in 2006)	Compliance with Updated Discharge Permit Stormfilter-brand stormwater management system installed, barren slopes revegetated, snow removal and storage plan developed and implemented, Maintenance on the parking lot, surrounding areas and Stormfilter system is conducted annually. Filter cartridges in vaults are replaced as needed to remain effective.	2006 Phase 1	2007 Phase 2	RCI Photo Documentation, HMR BMP Effectiveness Monitoring Annual Report/ Construction Season Summary, RCI Plan Set, Heavenly Records and TRPA Project File Inspections	Yes

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
20	Ski Run Segment Revegetation	CA-6 Ski Run segments	General maintenance of revegetation projects	<p>Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring</p> <p>World Cup treated in 2010. Poma Run treated annually. Adult Ski School Area treated in 2008 as part of surface lift replacement project. Soil cover on East Bowl & Gunbarrel runs remains effective and do not need further treatment at this time Other erosion hot spots are field-identified and treated. Lower slopes are irrigated annually.</p> <p>Monitoring of effective soil cover and specification of erosion control treatments have evolved over the monitoring period, in consultation with the USFS and Lahontan. The initial focus on soil cover has been broadened to include infiltration potential, slope, and surface roughness. The 2011 CMR put forth this expanded approach, and implementation is under development with the relevant agencies.</p>	2007	On-going	RCI Photo Documentation, HMR BMP Effectiveness Monitoring Annual Report/ Construction Season Summary, Heavenly Project Records	Yes
CA-7								
21	R264-R267	Mid-station Road	Reconstruct Mid-station Access Road (Implemented in 2008)	<p>Phase I Project per design plans in Appendix 2-L</p> <p>Roadway was reconstructed per approved plans. Road is treated annually as part of opening summer mountain access. Daily Summer dust abatement watering program</p>	2008	On-going	RCI Photo Documentation, BMP Effectiveness Monitoring Annual Report/ Construction Season	Yes

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
							Summary	
NV-1								
22	Ski Run Segment Revegetation	NV-1 Ski Run segments	General maintenance of revegetation projects	<p>Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program Monitoring</p> <p>Erosion hot spots are field-identified and treated. Hot spots identified during 2014 field assessment will be addressed prior to additional capital development in NV-1; Areas include Orion's, Big Dipper and Aries Woods trails. Cross-slope waterbar maintenance needed on Orion's & Big Dipper runs. Road base added to corners in road segments 610-614 (Ski Run U1).</p> <p>Monitoring of effective soil cover and specification of erosion control treatments have evolved over the monitoring period, in consultation with the USFS and Lahontan. The initial focus on soil cover has been broadened to include infiltration potential, slope, and surface roughness. The 2011 CMR put forth this expanded approach, and implementation is under development with the relevant agencies.</p>	2007	On-going	RCI Photo Documentation, HMR BMP Effectiveness Monitoring Annual Report/ Construction Season Summary, Heavenly Project Records, Heavenly Mountain Operations Staff	Partial
NV-2+5								

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
23	R580-R581	Top of Comet Access Road	Construct W5	Cut slope stabilization; control surface runoff on to Aries run and new W5; maintenance of rolling dips	2007	2009		Future Capital Project Ongoing Road Maintenance
24	R500-R504 (Road segments R500, R501 and R504 are in NV-3; Road Segments R 502 and R503 are in NV-2+5)	Von Schmidt to East Peak	Replace/Relocate Lifts S and T (Olympic Lift replaced in 2007/North Bowl Lift not Replaced)	Forest Service to advise as to need for Pre- and Post project maintenance Road segment 504 was abandoned as part of Olympic lift replacement project. Other road segments were treated as part of lift replacement project. Road is treated annually as part of opening summer mountain access. Daily Summer dust abatement watering program when hiking trails are open. Road Segment 503 to be treated following completion of Big Easy zipline project	2007	On-going	Heavenly Mountain Operations Staff	Partial
25	Ski Run Segment Revegetation	NV-2+5 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program Monitoring Former ATV trail on upper Comet Run has been decommissioned; Comet Run and \$100 Saddle area are irrigated annually. Erosion hot spots are field-identified. New trails 14 and 15 utilized soil cover treatment prescription, which remains effective. Cross-slope waterbar maintenance needed on Comet and Jack's runs. Monitoring of effective soil cover and specification of erosion control treatments have evolved over the monitoring period, in consultation with the USFS and Lahontan. The initial	2011	On-going		Yes

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
				focus on soil cover has been broadened to include infiltration potential, slope, and surface roughness. The 2011 CMR put forth this expanded approach, and implementation is under development with the relevant agencies.				
NV-3								
26	R531-R540 (Road Segments R531-R540 are located in NV-2+5)	Upper Wayhome Road	Realign Run 6/ Road Segments R531-540	Now called Nevada Trail; Restore and revegetate abandoned road segments Existing road still in use and is treated annually as part of opening summer mountain access. Daily Summer dust abatement watering program	--	--	Heavenly Project Records	Future Capital Project Ongoing Road Maintenance t
27	R633	Base of North Bowl Chair	Replace/realign Lift S (Olympic Lift replaced in 2007/North Bowl Lift not Replaced)	Restore and revegetate abandoned road segment Road segment 633 was not relocated and remains in use. Road is treated annually as part of opening summer mountain access.	2007	On-going	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary	Future Capital Project Ongoing Road Maintenance
28	R630-R632	Base of North Bowl Chair	Replace/realign Lift S (Olympic Lift replaced in 2007/North Bowl Lift not Replaced)	Road segments to receive pre- and post project maintenance per design plans in Appendix G Road is treated annually as part of opening summer mountain access. Road segment 631 was moved further away from Edgewood Creek and was regraded and armored	2007	On-going	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary	Future Capital Project Ongoing Road Maintenance

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
29	R521-R523	Top of North Bowl Chair Access Road/Pepi's	Replace/realign Lift S (Olympic Lift replaced in 2007/North Bowl Lift not Replaced)	Road segments to received maintenance upon replacement/realignment of Lift S per design plans in Appendix 2-G Road is treated annually as part of opening summer mountain access. Daily Summer dust abatement watering program. Rock slope protection added to cut slope above road along Road segment 522 in 2014	2007	On-going	Heavenly Mountain Operations Staff	Yes On-going Road Maintenance
30	R571-R573A	Olympic Base to Tower 18	Remove Lift T (Olympic Lift replaced in 2007)	Decommission road segments upon removal/relocation of lift Road to base of Olympic lift treated as part of lift replacement project. Road Segments 573 and 573A were decommissioned as part of project. Road decommissioning included soil loosening, amendments, seed, mulch	2007	2009	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary	Yes On-going Road Maintenance
31	R506-R513	Alternate Route to East Peak	Construct Runs S8 (Implemented in 2007)	These segment are decommissioned; maintenance and revegetation	X	On-going		No
32	Olympic1-5	Run S1	Construct S9 (Implemented in 2007)	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring Run segments adjacent to lift terminals were treated as part of Olympic Express lift replacement project. Run S1 is irrigated annually to maintain soil cover.	2009	On-going	RCI Photo documentation, Heavenly Mountain Operations Staff	Yes On-going Ski Run Maintenance

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
				Monitoring of effective soil cover and specification of erosion control treatments have evolved over the monitoring period, in consultation with the USFS and Lahontan. The initial focus on soil cover has been broadened to include infiltration potential, slope, and surface roughness. The 2011 CMR put forth this expanded approach, and implementation is under development with the relevant agencies.				
33	N/LNBOWL1-4	Run S3	Construct S10 (Implemented in 2007)	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring Edgewood Creek SEZ restoration project completed in 2006. Effective soil cover in non-SEZ sections of ski run remains effective	2006	2007	RCI Photo Documentation	Yes
34	Ski Run Segment Revegetation	NV-3 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring Run Q1 revegetated as part of SEZ restoration project in Edgewood Bowl. Trail X1 revegetated with "Full Hogan prescription" as part of Boulder Magic Carpet removal. Olympic Run is irrigated annually. Monitoring of effective soil cover and	2006	2010	RCI Photo Documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary, Heavenly Mountain Operations Staff	Yes

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
				specification of erosion control treatments have evolved over the monitoring period, in consultation with the USFS and Lahontan. The initial focus on soil cover has been broadened to include infiltration potential, slope, and surface roughness. The 2011 CMR put forth this expanded approach, and implementation is under development with the relevant agencies. Ski run segment known as the Olympic Downhill Traverse needs maintenance.				
NV-4								
35	BMP Retrofit Project		Stagecoach Parking Lot	Full BMPs are needed at this facility to decrease the ERA of NV-4 to below the allowable TOC	--	--		Future Capital Project
36	Ski Run Segment Revegetation	NV-4 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program Monitoring The Tahoe Rim Trail was relocated and the existing trail segment was decommissioned by the Tahoe Rim Trail Association (TRTA). TRTA has agreed to re-decommission it in 2014 due to continued use by hikers. Lower Stagecoach Trail has a small number of specific areas lacking effective cover to be retreated. It is the only ski trail in the watershed.	2012	On-going	Heavenly Mountain Operations Staff	Partial

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
NV-4A 37	R557-R562 (Road Segments R557-R562 are located in NV-4 and NV-5)	Nevada Trail (was Wayhome)	Phase I Projects will utilize these road segments	Forest Service to advise as to need for Pre- and Post project maintenance Road is treated annually as part of opening summer mountain access. Daily Summer dust abatement watering program	2007	On-going	Heavenly Project Records	Yes On-going Road Maintenance
38	Ski Run Segment Revegetation	NV-4a Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program Monitoring Perimeter Run treated with wood chips in 2011 as part of implementing Trail U3	2011	2011	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary, Heavenly Mountain Operations Staff	Yes
NV-5								
39	R545-R550	Nevada Trail (was Wayhome)	Phase I Projects will utilize these road segments (Not Implemented)	Forest Service to advise as to need for Pre- and Post project maintenance Existing road still in use and is treated annually as part of opening summer mountain access. Daily Summer dust abatement watering program	2007	On-going		Yes
40	Ski Run Segment Revegetation	NV-5 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program Monitoring Upper Stagecoach Trail is extremely well-vegetated with effective cover. Additional maintenance or treatment is	2008	2009	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary,	Yes

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
				<p>not necessary. Revegetation and wood chips using the "Full Hogan" prescription were added to several segments of the existing Stagecoach trail as part of a snowmaking improvements project resulting in effective cover.</p> <p>Monitoring of effective soil cover and specification of erosion control treatments have evolved over the monitoring period, in consultation with the USFS and Lahontan. The initial focus on soil cover has been broadened to include infiltration potential, slope, and surface roughness. The 2011 CMR put forth this expanded approach, and implementation is under development with the relevant agencies</p>			Heavenly Mountain Operations Staff	
PHASE II								
CA-1								
41	Patsy1-6	Run E1	Replace Lift E	<p>Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring</p> <p>General run maintenance last completed in 2006</p>	2006	2006	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary, Heavenly Mountain Operations Staff	Future Capital Project

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
42	R148-149	Groove/Upper Shop Road	Remove Lift F	Forest Service to advise as to need for Pre- and Post project maintenance General road maintenance completed in 2008	2008	2008	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary, Heavenly Mountain Operations Staff	Future Capital Project
43	R528-R530 (Road Segments R228-R530 located in NV- 2+5)	Lift HH	Construct Lift HH (Lift at Von Schmits – Built 2009)	Forest Service to advise as to need for Pre- and Post project maintenance (road in summer, transport lift in winter) Road is treated annually as part of opening summer mountain access. Daily Summer dust abatement watering program	2009	On-going	RCI Photo Documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary, Heavenly Mountain Operations Staff	Yes On-going Road Maintenance
44	Bettys6-9	Run H6	Construct Run H12/Snowmaking	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
45	Ridge1-5	Run 3	Construct Run H13/Snowmaking	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
46	Groove1-5	Run E2	E2 Snowmaking	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
47	Watrfall1	Run G4	G4 Snowmaking	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
48	PwdrbIRn1-7	Run G8	G8 Snowmaking	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
49	PowdrBwl1-4	Run G8	G9 Snowmaking	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
50	Bettys1-5	Run H5	H5 Snowmaking (below ground)	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
51	ElleSwng1-3	Run I2	I2 Snowmaking	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
--	No Project	No Project	GG2 Snowmaking		--	--		No Project required
52	FORTY9ER1-4	Run GG5	GG5 Snowmaking	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
53	In-ground Halfpipe	Run H11	Construct along Run H11	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
--	No Project	No Project	HH2 Snowmaking		--	--		No Project required
--	No Project	No Project	HH3 Snowmaking		--	--		No Project required
54 (Same as #9)	R155-R156	Vehicle Maintenance Shop at Top of Tram	Remodel and Expand Facility (Implemented 2006-2008)	May require pre- and post project road work per review by Forest Service; rock-lined drainages are difficult to clean out due to the design implemented, but maintenance is	2007	On-going	RCI Photo Documentation; BMP Effectiveness Monitoring	Yes On-going Road Maintenance

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
				necessary; maintenance of revegetation of cut and fill slopes; waterbar/rolling dip repairs Road improvements implemented per project design plans. Existing road is partially paved and maintained annually as part of summer road maintenance. Road base added to switch back corner (2013)			Annual Report; Construction Season Summary; RCI Plan Set; Heavenly Project Records	
55	R250-R256	Von Schmidt Road/Run	10 Snowmaking	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
56	General Revegetation/L andscaping	General Revegetation/ Landscaping	Construct Top of Gondola Lodge (Implemented 2010/Tamarack Lodge)	Landscaping Plan	2007	On-going	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary, Heavenly Mountain Operations Staff	Yes
57	R127-R136	California Breakover/Hel lwinkle's	Construct Top of Gondola Lodge (Implemented 2010/Tamarack Lodge)	Forest Service to advise as to need for Pre- and Post project maintenance In 2010, RCI designed and we implemented a road drainage improvement project for the upper road section near the top of Cal Trail Breakover.. Road base to nearly the entire length of roadway most recently in 2013	2010	2013	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary, Heavenly Mountain Operations Staff	Yes

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
58	General Revegetation/L andscaping	General Revegetation/ Landscaping	Expand Tubing at Top of Gondola (Implemented in 2009)	Landscaping Plan	2007	On-going	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary, Heavenly Mountain Operations Staff	Yes
59	Ski Run Segment Revegetation	CA-1 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary, Heavenly Mountain Operations Staff	Yes On-going Ski Run Maintenance
CA-4								
60	Communication site Access Road	Communicatio n site Access Road	Angel's Roost (Implemented in 2011)	Forest Service to advise as to need for Pre- and Post project maintenance Access road decommissioned (soil loosening, amendments, seed, mulch)	2012	2012	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary	Yes

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
61	Ski Run Segment Revegetation	CA-4 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary, Heavenly Mountain Operations Staff	On-going Ski Run Maintenance
CA-6								
62	Ski Run Segment Revegetation	CA-6 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		On-going Ski Run Maintenance
63	Site Clean up		Relocate Lower Shop off-site		--	--		Future Capital Project
CA-7	No Project				--	--		No Project required
NV-1								
64	BIGDIP1-4	Run V4	Construct V11 (Implemented 2011)	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program	X	X		No

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
65	Ski Run Segment Revegetation	NV-1 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		On-going Ski Run Maintenance
NV-2+5								
66	R620A	R620A	Replace Lift U	Maintenance of BMPs (waterbars) and Run Revegetation	--	--		Future Capital Project
67	R531-R539	Upper Wayhome (Ski Run 6)	Phase I Project to realign Ski Run 6	Now called Nevada Trail; Phase I project to realign this road/ski run segment; abandoned road segment will be decommission and revegetated in accordance with Forest Service standards and guidelines for decommissioned roads;	--	--		Future Capital Project
--	No Project	No Project	Construct Run U4/Snowmaking		2011	2011		No Project Required
68	ORIONS 9-11	Run V9	Construct Run V12/Snowmaking (Implemented in 2007)	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	X	X		No
--	No Project	No Project	Construct Run 14/Snowmaking (Implemented in 2010)		--	--		No Project Required
	No Project	No Project	Construct Run 15/Snowmaking (Implemented in 2010)		--	--		No Project Required

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
69	PERIMIR5-9	Run U1	Snowmaking U1	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
70	R649-R655	Lower Galaxy/Stump Piles	Snowmaking U2	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
71	R584-R585	Knob Trail	Snowmaking V3	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
72	R609	Lower Dipper Return	Snowmaking V5	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
73	Jack1-3	Run W2	Snowmaking W2	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
74	Ski Run Segment Revegetation	NV-2+5 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		Future Capital Project
NV-3								
75	R631-R632 and NB Access Road	Base of North Bowl/Boulder and NB Access Road	Replace Lift Q	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
76	OLYMPIC4-9	Run S1	Snowmaking S1	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
--	No Project	No Project	Snowmaking S2	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		No Project Required
--	No Project	No Project	Snowmaking S3	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		No Project Required
77	R519-R522	Pepi's	Snowmaking S4	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
78	R599-606A	Old NV Fuel Island	Snowmaking S6	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
79	R599-606A	Old NV Fuel Island	Snowmaking S7	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Capital Project not implemented/CW E Restoration Project not triggered
80	Ski Run Segment Revegetation	NV-3 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area	On-going	On-going		On-going Ski Run Maintenance

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
				Monitoring				
NV-4								
81	R560-R563	Middle Wayhome/Ne vada Trail	R2 Snowmaking	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Capital Project not implemented/CW E Restoration Project not triggered
82	BMP Retrofit Project	BMP Retrofit Project	Stagecoach Deck and Parking Lot	BMP Parking Lot and Revegetate Areas Disturbed by Deck Expansion	--	--		Future Capital Project
83	Ski Run Segment Revegetation	NV-4 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		On-going Ski Run Maintenance
NV-4A								
84	PERIMTR5-9	Run U1	Construct Run U3/Snowmaking (Implemented in 2010)	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	X	X		No
85	Ski Run Segment Revegetation	NV-4A Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		On-going Ski Run Maintenance

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
NV-5								
86	R566-R570	Access to Olympic Downhill	Construct Run R3	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
87	R662-R664	George's	Construct Run R4	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
88	R545-R548	Lower Wayhome/Ne vada Trail	Construct Run 16	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
--	No Project	No Project	Construct Run 18		--	--		No Project Required
89	UPRSTG1-4	Run R1	R1 Snowmaking	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program Monitoring Snowmaking corridor treated in 2008 and 2009 and remains effective. The remaining area of Upper Stagecoach Trail is well-vegetated with effective cover. Additional maintenance or treatment is not necessary.	2008	2009	RCI Photo documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary	Yes
90	Ski Run Segment Revegetation	NV-5 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		On-going Ski Run Maintenance
PHASE III								

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
CA-1								
91	Upmombo1-2; MOMBOMED1- 5	Mombo (Run G6) and Mombo Meadows (Run G5)	Extend Lift A	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
92	R268	J Lift Access Road	Construct Lift J	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
93	R159, R159A, R160; PIONRPMA1-2	Pioneer Water Tank Road/Pioneer Poma	Replace Lift N (Implemented in 2008)	Road Maintenance; Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring Lift replaced in 2008. Road to old water tank was decommissioned and fully recontoured in 2011. Also, ski run along Pioneer Poma got full restoration treatment in 2013 (all water bars removed).	2018	2013	RCI Photo Documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary	Yes
94	R76-R80	Creek Station	Patsy's Hut/Snow Beach Expansion (Implemented in 2010)	Road Maintenance; Maintenance of BMPs (waterbars and sediment basins) and Revegetation of lift areas; Forest Service to advise as to need for Pre- and Post project maintenance Road is treated annually as part of opening summer mountain access Daily Summer dust abatement watering program. Umbrella Bar was relocated in 2010. Road segments 76-80 were treated in 2010 and 2011.	2010	On-going	RCI Photo Documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary	Yes

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
95	R90-R94/15-4-6	Sky Meadows East/Run I1	Replace Lift I	Road Maintenance; Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
96	Ski Run Segment Revegetation	CA-1 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		On-going Ski Run Maintenance
CA-4								
97	Ski Run Segment Revegetation	CA-4 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		On-going Ski Run Maintenance
CA-6 --	No Project		Relocate Snowmaking Building		--	--		No Project Required
98	LrGnbrl1-3	Run B2	Replace California Lodge	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
99	Ebol1-5	Run B1	Replace Lift A	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
100	CA Parking Lot		Kid's Camp at CA Base (Implemented 2008)	Maintenance of Parking Lot BMPs	On-going	On-going		Yes
101	WbolPom1-5	Runs K1 and K2	Replace Lift K	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
102	WbolPom1-5	Runs K1 and K2	Replace Lift L	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
103	WbolPom1-5	Runs K1 and K2	Replace Lift M	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	--	--		Future Capital Project
104	Ski Run Segment Revegetation	CA-6 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		On-going Ski Run Maintenance

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
CA-7								
105	R264-R267	Analyze effects of change in use from emergency to transport	Construct Mid-station Restaurant	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
NV-1								
106	R272-275	Sand Dunes Access Road	Construct Sand Dunes Restaurant/Lodge/Access Road	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
107	R594-R596	Orion's Road	Construction Sand Dunes Restaurant Lodge/Access Road	Segments to be decommissioned upon completion of Sand Dunes Access Road	--	--		Future Capital Project
108	R622-R627	Mott Canyon Base	Replace/Relocate Lift DD	Pre-project creek crossing enhancement/Post-project road maintenance; Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
109	R616-617	Mott Canyon Top	Replace/Relocate Lift DD	Decommission road segments upon removal/relocation of lift	--	--		Future Capital Project
110	Ski Run Segment Revegetation	NV-1 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		On-going Ski Run Maintenance
NV-2+5								

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
111	Ski Run Segment Revegetation	NV-2+5 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		On-going Ski Run Maintenance
NV-3								
112	R250-R250A; R500-R504	Von Schmidt's To East Peak	Expand East Peak Maintenance	Forest Service to advise as to need for Pre- and Post project maintenance	--	--		Future Capital Project
113	Edgewood Bowl Maintenance	Edgewood Bowl Maintenance	Construct Boulder Base Area and Skiers Services Building	Maintenance of SEZ Project	2011	2011		Future Capital Project
114	Edgewood Bowl Maintenance	Edgewood Bowl Maintenance	Expand Deck at Existing Lodge	Maintenance of SEZ Project	2012	2012		Future Capital Project
115	Ski Run Segment Revegetation	NV-3 Ski Run segments	General maintenance of revegetation projects - No Records Kept	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		On-going Ski Run Maintenance
NV-4								
116	Ski Run Segment Revegetation	NV-4 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		On-going Ski Run Maintenance
NV-4A								

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
117	U3	Ski Run U3	Construct U3/Snowmaking (Implemented in 2010)	Adapted and Approved ESRHRP Prescriptions Ski Run U3 (Outlaw Trail) implemented without snowmaking	2010	2011	RCI Photo Documentation, BMP Effectiveness Monitoring Annual Report, Construction Season Summary	Yes
118	U4	Ski Run U4	Construct U4/Snowmaking	Adapted and Approved ESRHRP Prescriptions	--	--		Future Capital Project
NV-5								
119	Z1-1,2,3	Run Z1	Construct Z1/Snowmaking	Adapted and Approved ESRHRP Prescriptions	--	--		Future Capital Project
120	Z2-1,2,3	Run Z2	Construct Z2/Snowmaking	Adapted and Approved ESRHRP Prescriptions	--	--		Future Capital Project
121	Z3-1,2,3	Run Z3	Construct Z3/Snowmaking	Adapted and Approved ESRHRP Prescriptions	--	--		Future Capital Project
122	Z4-1,2,3,4	Run Z4	Construct Z4/Snowmaking	Adapted and Approved ESRHRP Prescriptions	--	--		Future Capital Project
123	Z5-1	Run Z5	Construct Z5/Snowmaking	Adapted and Approved ESRHRP Prescriptions	--	--		Future Capital Project
124	Z7-1,2,3	Run Z7	Construct Z7/Snowmaking	Adapted and Approved ESRHRP Prescriptions	--	--		Future Capital Project

PHASE I, II and III Restoration					Project Recordkeeping			
Watershed/ Project Number	Sediment Source (CWE Model)	Road/Run/ Facility Name	2007 Master Plan Capital Project Linkage	CWE Restoration Project Description	Project Start Date	Project Completion Date	Data Source	CWE Program Implementatio n Credit
125	Ski Run Segment Revegetation	NV-5 Ski Run segments	General maintenance of revegetation projects	Maintenance of Ski Run BMPs (waterbars and sediment basins) and Revegetation; Determined annually as part of the revised Environmental Monitoring Program and Updated Discharge Permit General Ski Area Monitoring	On-going	On-going		On-going Ski Run Maintenance

APPENDIX 3.1-E
CUMULATIVE WATERSHED
EFFECTS (CWE) MODELING

Summary of USFS %ERA analyses for Heavenly Ski Resort.

Basin	Area (ac)	MUSLE 2013 %ERA ¹	2013 %ERA ²	MPA-07 %ERA ³	MPA-07 + Epic/Disc. %ERA ⁴
CA-1	1564	2.27	3.99	4.29	4.49
CA-4	139	4.57	2.44	2.44	2.44
CA-6	417	4.46	7.38	7.37	7.41
CA-7	305	0.23	0.71	1.09	1.19
NV-1	643	12.22	3.37	3.80	4.24
NV-1 w/o Mott Cyn	593	ND ⁵	2.38	2.86	2.86
Edge-1	479	ND	0.53	ND	0.61
Edge-2	825	ND	4.72	ND	4.77
NV-2	652	3.16	4.04	4.79	4.79
NV-3	408	2.37	5.48	5.57	5.61
NV-4	79	9.52	9.43	9.86	9.86
NV-4A	237	0.23	0.96	1.11	1.11
NV-5	177	2.42	3.70	7.18	7.19
NV-2+5	829	3.06	3.92	5.30	5.70

¹ MUSLE program, or sediment-yield based estimate of %ERA for existing conditions (2013).

² Simple coefficient method for estimating %ERA for existing conditions in 2013.

³ Simple coefficient method for estimating %ERA for the 2007 MPA anticipated buildout.

⁴ Simple coefficient method for estimating %ERA for the 2007 MPA anticipated buildout including the EPIC/Discovery Park.

⁵ Not determined.

ERA Coefficients	
Skiruns	0.15
Roads/parking	1.0
General Impervious	0.8

EPIC Trail development summary of impacts for ERA analysis												
										ERA Coeff.		
Mtn Bike Trails - total coverage per watershed										Beg/Int	1.0	likely more traffic and steady use
										Advanced	0.8	less traffic, more narrow trail
Basin	Beg/Int (sq ft)	Advanced (sq ft)	Beg/Int (ac)	Advanced (ac)	ERA							
CA-1	16176	0	0.37	0.00	0.37							
NV-1	85686	31776	1.97	0.73	2.55							
NvV-2+5	118362	488	2.72	0.01	2.73							
										ERA Coeff.		
Hiking Trails - total coverage per watershed (6' width)										Foot paths	0.8	Moderate traffic on mild slopes
Basin	Trails (sq ft)	Trails (ac)		ERA								
CA-1	43434	1.00		0.80								
CA-7	1666	0.04		0.03								
NvV-2+5	17442	0.40		0.32								
										ERA Coeff.		
										Parking	1.0	Standard assumption
Structures, Hiking & Biking Trails impact ERA summary										Structures	0.8	Like commercial area, condos, horse areas etc at Kirkwood
										Total Additional		
Basin	Trails	Panorama	Structures	Parking/Rds	ERA							
CA-1	2.52	0.30	0.12	0.19	3.14							
CA-6		0.18			0.18							
CA-7	0.03	0.26			0.29							
Edgewood	CA-7/NV-3	4021		0	0.06	0.42						
		4022		36.375	2.49	0.44						
	NV-1	2.55	0.23			2.78						
	NV-3		0.17			0.17						
	NV-4A		0.00			0.00						
	NV-2+5	3.05	0.33			3.37						
	NV-5		0.03			0.03						
										ERA Coefficients		
										Skiruns	0.15	Ranges from 0.1-0.2 depending on grading, stump cut etc, mixed runs so used midpt
2013 Existing Conditions										Roads/parking	1.0	
										Impervious	0.6-1.0	depends on type & BMP - see ERA summary
Basin	Area (ac)	SkiRuns	Roads	Undevelop	Imperv. Surface	ERA sum	MSL%ERA	2013 + EPIC+Panorama				
CA-1	1564	34.78	25.86	0	0.46	61.10	2.27	3.91%	4.11%	0.20		
CA-4	139	0.00	3.38	0	0	3.38	4.57	2.43%	2.43%	0.00		
CA-6	417	11.25	6.98	0	3.14	21.37	4.46	5.13%	5.17%	0.04		
CA-7	305	0.75	0.93	0	0.12	1.80	0.23	0.59%	0.68%	0.09		
Edge-1	479	2.46	0.06	0	0	2.52	NA	0.53%	0.61%	0.09		
Edge-2	825	0.075	2.49	0	36.375	38.94	NA	4.72%	4.77%	0.05		
NV-1	643	16.24	5.31	0	0.02	21.57	12.22	3.35%	3.79%	0.43		
NV-2	652	13.53	12.29	0	0.12	25.94	3.16	3.98%				
NV-3	408	12.31	5.03	0	1.25	18.59	2.37	4.56%	4.60%	0.04		
NV-4	79	1.10	2.84	0	4.29	8.23	9.52	10.42%	10.42%	0.00		
NV-4A	237	2.27	0.00	0	0	2.27	0.23	0.96%	0.96%	0.00		
NV-5	177	4.68	1.87	0	0	6.55	2.42	3.70%	3.72%	0.02		
NV-2+5	829	18.2145	14.16	0	0.12	32.49		3.92%	4.33%	0.41		

Heavenly Mountain Resort					
Epic Discovery Activities Proposed Mountain Bike Trails by Watershed					
13-May-14					
Trail Segment	Segment Length (lineal feet)	Length in CA1	Length in NV1	Length in NV2+5	Trail Width
Beginner Trails					
B1-1	992		877	115	6
B1-2	3,146		3146		6
B1-3	822		822		6
B1-4	3,311		3311		6
B1-5	1,529		1074	455	6
B1-6	1,930			1930	6
B1-7	1,502			1502	6
B1-8	3,326			3326	6
B2	1,419		348	1071	6
B3-1	900	900			6
B3-2	1,624	1624			6
B4-1	2,172	172		2000	6
B4-2	1,543			1543	6
B4-3	2,783			2783	6
B4-4	1,094			1094	6
Subtotal	28,093	2,696	9,578	15,819	
Intermediate Trails					
I1-1	2,364		2364		6
I1-2	912		912		6
I1-3	1,684		798	886	6
I2	629		629		6
I3	934			934	6
I4	2,088			2088	6
Subtotal	8,611	0	4,703	3,908	
Advanced Trails					
A1-1	1,589		1589		3
A1-2	1,929		1929		4
A1-3	3,585		3585		3
A1-4	963		841	122	4
Subtotal	8,066		7,944	122	

Adventure Peak Epic Discoveries

Trail Designation on Plans	Activity	Length	Length in CA1	Area in CA-1	Length in East Watershed	Length in CA7	Area in CA-7	Trail Width
P8	Alpine Coaster	60	60	360			0	6
P9	Alpine Coaster	75	75	450			0	6
P10	Mid Station Canopy Tour	787		0		787	1574	2
M11	Mid Station Canopy Tour	1196		0	1,150	46	92	2
M12	Mid Station Canopy Tour	163		0	163		0	2
M13	Mid Station Canopy Tour	387		0	387		0	2
M14	Mid Station Canopy Tour	547		0	547		0	2
M15	Mid Station Canopy Tour	194		0	194		0	2
M16	Mid Station Canopy Tour	755		0	755		0	2
M17	Mid Station Canopy Tour	221		0	221		0	2
M18	Mid Station Canopy Tour	298	194	388	104		0	2
P19	Mid Station Canopy Tour	75	34	68	41		0	2
P20	Mid Station Canopy Tour	617	617	2468			0	4
P21	Sky Cycle Canopy Tour	686	686	2744			0	4
M22	Sky Cycle Canopy Tour	3952	3331	6662	621		0	2
M23	Sky Cycle Canopy Tour	839		0	839		0	2
M24	Sky Cycle Canopy Tour	125	43	86	82		0	2
P25	Kiddie Zipline	34	34	136			0	4
P26	Kiddie Zipline	33	33	132			0	4
P27	Disc Golf	1835	1835	3670			0	2
Path Coverage Total		12,879	6,942	17,164	5,104	833	1,666	

East Peak Lake Basin Epic Discoveries

Trail Designation on Plans	Activity	Length (ft)	Length in CA1	Area in CA-1	Length in NV 2+5	Area in NV-2+5	Trail Width
P28	East Peak Lodge Hiking Trail	605	605	1210		0	2
P29	East Peak Lodge Hiking Trail	2078		0	2,078	4156	2
P30	East Peak Lodge Hiking Trail	661		0	661	1322	2
P31	East Peak Lodge Hiking Trail	2650		0	2,650	5,300	2
P32	East Peak Canopy Tour	669		0	669	2676	4
P33	East Peak Canopy Tour	21		0	21	84	4
M34	East Peak Canopy Tour	529		0	529	1058	2
M35	East Peak Canopy Tour	371		0	371	742	2
P36	East Peak Canopy Tour	786		0	786	1572	2
P37	East Peak Water Activities	133		0	133	532	4
Path Coverage Total		8,503	605	1,210	7,898	17,442	

Sky Meadows Basin Epic Discoveries

Trail Designation on Plans	Activity	Length (ft)	Length in CA1	Area in CA-1	Out of Basin	Trail Width
P1	Sky Basin Zip Tour	2301	2301	4602		2
M2	Sky Basin Zip Tour	2440	2440	4880		2
M3	Sky Basin Zip Tour	6402	6402	12804		2
P4	Sky Basin Zip Tour	450	450	1800		4
P5	Sky Meadows Challenge Course	150	150	600		4
P6	Sky Meadows Challenge Course	71	71	142		2
P7	Ridge Run Lookout Tower	164	58	232	106	4
Path Coverage Total		11,978	11,872	25,060	106	

Heavenly TRPA In-Basin Land Coverage Summary
 Estimated New Land Coverage for Proposed Action and Alternatives

New Coverage		Proposed 1a	Proposed 1b
Adventure Peak Epic Discoveries			
Alpine Coaster Forest Flyer	Buildings (Terminal, bull wheels, attendant's shed)	3,170	
	Coaster	1,256	
	Trails	810	
	Parking	432	
Sky Cycle	Structures	1,511	
	Trails and Queuing Areas	13,339	
	Maintenance Road	4,898	
Mid Station Canopy Tour	Trails and Queuing Areas	11,538	
	Structures	80	
In-fill Activities	Trails	3,938	
	Mountain Bike Skills Park	15,182	
	Concrete Pad for Bike Rental Area	2,000	
Total Adventure Peak Epic Discoveries		58,154	
East Peak Basin Epic Discoveries			
East Peak Lodge Hiking Trail (in Basin Segments)	Trails	1,210	
Mountain Bike Park (in Basin Trail Segments B3-1 and B3-2)		15,144	
Total East Peak Basin Epic Discoveries		16,354	
Sky Meadows Basin Epic Discoveries			
Sky Basin Coaster		6656	370
Sky Basin Zip Line			
	Trails and Queuing Areas	24,150	168
Sky Meadows Challenge Course	Trails	138	604
Mountain Excursion Tour			
	Parking/Pullouts	440	
Ridge Run Lookout Tower			
	Sky Express Deck Expansion	1,000	
	Structures	992	
	Parking/Pullouts	440	
	Trails	656	
Total Sky Meadows Basin Epic Discoveries		27,816	
Total New Land Coverage		102,324	772

CA-1

Basin	Sq. Ft			
CA-1	Trails	Parking/Rds	Structures	
		73,725	8,210	6,753

Basin	Acres			
CA-1	Trails	Parking/Rds	Structures	
		1.69	0.19	0.16

CA-1

already included from Mtn bike tab

CA-1

Panorama Trails	Length (ft)	Area (sq ft)
CA-1	5467	16401
CA-6/7	3208	9624
CA-7	4634	13902
Un-named between CA-7 & NV-3	15619	46857
NV-1	4139	12417
NV-3	3042	9126
NV-2+5	5917	17751
NV-4a	28	84
NV-5	576	1728

APPENDIX 3.1-F
SKY BASIN (WATERSHED CA-1)
EROSION ASSESSMENT



SKY BASIN (UPPER CA-1 WATERSHED) EROSION ASSESSMENT



Prepared by

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August 2014

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