

Appendix C

CUMULATIVE EFFECTS

Appendix C lists the cumulative accounts for allocations. TRPA Code Chapter 32.8.A (2) requires TRPA to report on the cumulative impacts on each threshold for projects approved after the effective date of the Regional Plan, and since the last threshold evaluation. The following sections evaluate the cumulative impacts on each threshold.

AIR QUALITY

This section addresses the cumulative effects of projects approved by TRPA on the Air Quality threshold indicators.

AQ-1: Carbon Monoxide (CO)

The TRPA monitors CO in the Stateline Nevada area at the Harvey's Casino. This site is currently managed by the Nevada Department of Environmental Protection and is used as the official measuring sites for the CO standards and the TRPA indicator. Based on the measurements at this site over the last five years, the Basin is currently out of attainment for the State 8-hr CO standard. The primary source of CO emissions in the Basin is vehicles. Although the emission levels of these vehicles have significantly improved over the last 15 years, due to their usage and close proximity to the monitored areas, ambient concentration levels remain above the standards.

AQ-2: Ozone

Between 2001 and 2004, there were no federal or Nevada state violations recorded at any of the four reporting monitoring locations. There were 29 1-hour violations of the more stringent TRPA's standard during this period. Because of the instability of the monitoring locations during this time, it is difficult to establish a reliable trend. However, the limited data could be interpreted that there has been a slight improvement during this evaluation period.

AQ-3: Particulate Matter (PM10)

Data collected by the Air Resources Board at the Sandy Way monitoring site between 2001 and 2005 indicated no exceedances of the national 24-hr standard and only six exceedances were estimated for the more stringent California's standard. In general, exceedances of the PM standards have reduced since 1987. These reductions can be attributed to the improvements associated with the BMP program, improvements in vehicle emissions, and the use of cleaner burning wood stoves and heaters.

AQ-4: Visibility

Since 1987 there have been significant improvements in both Sub-Regional (local urban areas) and Regional (Basin-wide) visibility standards. At the time of this writing, visibility data was available for the 2002 to 2005 time period. During this time, not only has the Basin achieved attainment status with all portions of visibility indicator, but the Basin has improved significantly from the previous evaluation. The primary pollutant associated with visibility in the Basin includes particulate matter. As discussed above, reductions in particulate matter can be attributed to the improvements associated with the BMP program, improvements in vehicle emissions, and the use of cleaner burning wood

stoves and heaters. Thus, improvement projects may have resulted in positive impacts to this indicator.

AQ-5: Traffic Volume

This indicator addresses traffic volumes along U.S. Highway 50 at the Park Avenue and US 50 intersection during the winter months. This indicator is measured on the Saturday of Presidents Day Holiday between 4:00 PM and 12:00 Midnight at a site immediately west of the intersection of Park Avenue in the City of South Lake Tahoe (SLT). Although TRPA evidence indicated this threshold is in attainment during the last evaluation, the actual counter was not operational and therefore the status was officially listed as unknown. For the 2006 evaluation, traffic volumes at the monitoring location were shown to be in attainment since 2003. The average traffic volume of 17,936 was recorded in 2006 and represents a 28.7 percent reduction from the 1981 levels. This is well above the 7 percent reduction required by the current standards. Because each project that generates additional vehicle trips is required to mitigate its traffic impacts and/or contribute to a regional air quality mitigation fund, it is likely that a decline in traffic volumes is due to improvements generated by projects in the Basin and demographic shifts in housing, employment and land-use strategies.

AQ-6: Wood Smoke

No measuring protocol has been developed to quantify the level of wood smoke in the Basin. For this reason, it is not possible to accurately evaluate this indicator. Although no conclusions can be reached regarding for this threshold, anecdotal evidence would suggest that wood smoke reduction programs have had positive impacts on wood smoke levels in the Basin.

AQ-7: Vehicle Miles Traveled (VMT)

In order to determine an annual VMT estimate (rather than developing a VMT estimate every five years) TRPA analyzed the annual percentage change resulting from 27 traffic count stations maintained by Caltrans and NDOT and applied this percentage change to the previous years modeling estimate. For reference, in 1987 the modeled VMT for the Basin was 1,813,748 miles (average peak summer day). When applying the annual percentage decrease of traffic volumes to the modeled 1981 estimate, VMT has been estimated to have decreased by 4.5 percent from 1981 values. Current data indicates that significant shifts in housing, gaming economies, employment and redevelopment strategies have assisted in significant reductions in traffic volumes and VMT with future trends in VMT being directly related to these demographic shifts.

AQ-8: Atmospheric Deposition

No protocol has been developed for measuring or quantifying the level of atmospheric nutrient loading in the Basin. For this reason, it is not possible to accurately evaluate this indicator. One of the primary in-Basin sources of atmospheric nutrient loading is the exhaust emissions and re-entrained road dust from automobiles. Both VMT and traffic volumes have decreased at the monitored locations within the Basin. Although no direct conclusions can be reached regarding for this threshold, anecdotal evidence would suggest that vehicle based reduction programs nutrients have had positive impacts on atmospheric deposition in the Basin.

WATER QUALITY

This section addresses the cumulative effects of projects approved by TRPA on Water Quality threshold indicators.

Appendix C lists the cumulative accounts for allocations and water quality projects implemented, in part, from Water Quality Mitigation Funds. According to Code Chapter 32.8.A(2), TRPA is required to report on the cumulative impacts on each threshold for projects approved after the effective date of the Regional Plan, and since the last threshold evaluation. While the required BMPs and water quality mitigation fees included on permits are intended to mitigate the onsite and offsite impacts of development, this section is intended to evaluate the cumulative impacts on the seven water quality threshold indicators.

WQ-1: Turbidity, Shallow Waters of Lake Tahoe

Since 1987, all turbidity data taken has been less than the indicator standards of 1 Nephelometric Turbidity Units (NTU) or 3 NTU for stream discharge effected littoral zone. Since this threshold has been in attainment for the 1991, 1996, 2001, and the 2006 Threshold Evaluations, there appears to be no direct cumulative impact of projects since the 1987 Regional Plan based on the monitoring location at the 25 meter contour. Recent studies have indicated potential localized impacts in nearshore areas adjacent to urban development, but for the most part turbidity in these areas has been below the indicator standard. Further research on the higher turbidity nearshore areas occurred during 2002 and 2003 (Taylor *et al*, 2004), demonstrated source and nature of the turbidity in those areas was most effected by fine particulates (mainly inorganic sediment). This research also demonstrated the correlation between turbidity and the depth of transparency represented by the existing turbidity standards as being publicly unacceptable. Without specific localization of new development and projects in close proximity to the nearshore it is difficult to determine any effects on turbidity. The Lower Westside Restoration on the Upper Truckee should offer some improvement on turbidity from that tributary influence.

WQ-2: Clarity, Winter Pelagic Lake Tahoe (Secchi depth)

Since 1987, the Winter Average Secchi has continued to decline with considerable variation from year to year, although the trend appears to be slowing in recent years. Due to the decades long response time of the lake, it is difficult to determine if there has been cumulative effects of projects on this threshold indicator. Of the two major mitigation measures for this indicator, \$88.9 million has been spent on Erosion & Runoff Control projects since 1988. Many of these projects would include mitigation of offsite impacts of development. Since BMP requirements in these permits were intended to mitigate onsite (within design limits), there should be no cumulative impacts to that extent. If these project BMPs have not been maintained there could be impacts such as increased runoff, and sediment loading due to increased flows in right-of-ways (particularly those that have not had erosion and runoff treatment projects). The location of projects in the watershed would be related to their potential for direct impact on lake clarity.

WQ-3: Phytoplankton Primary Productivity (PPr)

Since 1987, Phytoplankton Primary Productivity has continued to increase in the deep waters of the lake. It is now known that PPr is predominantly Phosphorus limited most of the year, but there are times of co-limitation by nitrogen, or nitrogen limitation in the lake.

The increase in VMT, due to projects since 1987 and visitor trips may have contributed to Nitrogen loading of the lake, but additional VMT decreased in 2003 and 2005. The results of the Lake Tahoe Atmospheric Deposition Study have demonstrated that the most significant atmospheric loading is from in-basin sources. However, reductions in atmospheric nitrogen dioxide from improved emissions standards for engines may have decreased these impacts on a per vehicle basis since 1987. Direct impact of the projects since 1987 on Phosphorus loading to the lake would be difficult to determine in the absence of actual data on landscape maintenance and use of phosphorus fertilizers. The trends and focus for road sanding have been to reduce the use of road sand, but increased sanding or use of asphalt sealing in some areas with phosphorus containing abrasives or surfactants in slurry sealers may have resulted from projects implemented since 1987. Water quality and source control projects on road right-of-ways would be expected to reduce the amount of phosphorus loading to the lake. In addition road and SEZ restoration, and revegetation projects should have resulted in a net reduction of loading to the lake as well. Recent TMDL loading estimates, compared to those of 2000, suggest slightly less total nitrogen loading, but higher total phosphorus loading estimates for stream loading, groundwater, and overall.

WQ-4: Tributary Water Quality

Since 1987, tributary water quality annual averages for Nitrogen have exceeded standards for many years, and Phosphorus standards have been exceeded in most years with the exception of a few monitored tributaries. Iron standards are typically exceeded; however TRPA and the Lahontan Regional Water Quality Control Board have recognized that iron standards do not reflect natural background levels in these watersheds. Suspended sediment standards are exceeded less often and in fewer tributary watersheds than the nutrient standards. There is a general understanding that increased coverage from past projects (if concentrated in subwatersheds or entire watersheds) will tend to increase runoff and thus stream flows, which can lead to down cutting of those streams and bank erosion. There has not been analysis of impervious coverage impacts on a watershed basis for the Tahoe Basin. There is no direct evidence from tributary data on the monitored tributaries to indicate impact of projects since 1987 in decreasing tributary water quality. Recent and future projects on Blackwood Creek would be expected to improve water quality for that tributary, but it is too early to determine that from the data.

WQ-5: Stormwater Runoff Quality, Discharge to Surface Water

Between 1987 and 1996, monitoring of untreated stormwater runoff discharges to surface water had demonstrated that such runoff in most cases did not meet runoff standards. There has been a shift in emphasis since 1996 to focus monitoring efforts on treatment sites and projects built to treat stormwater runoff in order to meet those discharge standards. While all such sites are not monitored, the majority of sites that are monitored are meeting soluble Nitrogen, Phosphorus, and suspended sediment discharge standards. Areas that have had concentrated development since 1987, particularly those that have not had erosion and runoff control projects implemented on the right-of-ways would be likely to have impacted stormwater runoff water quality. Those impacts would be expected to be eliminated once the right-of-way water quality projects are implemented (now included in the Water Quality EIP). Monitoring of stormwater runoff has been largely focused on completed projects such as the Casino Core / Stateline project, Cattleman's Basin in the Pioneer Trail III project. There is still no systematic monitoring that might be useful in determining the impacts of new

development, but BMP required as part of these projects are expected to at least mitigate the 1 inch per hour design storm.

WQ-6: Stormwater Runoff Quality, Discharge or Infiltration to Groundwater

Since 1987, monitoring data of untreated stormwater runoff discharges to infiltration or treatment sites (particularly if no pretreatment such as sediment catch is involved) has been more limited than surface discharge data. Since 1996, there has been a shift in emphasis to focus monitoring efforts on treatment sites and the majority of those inlets to basins, etc., did meet total Nitrogen, Phosphorus, and Iron treatment standards. There was no turbidity data available for these sites, but older data suggests that discharges to such sites occasionally exceed discharge standards for turbidity. Since 1987, project BMP requirements would have included pretreatment for larger commercial projects that might be expected to exceed discharge standards to treatment areas. Data from limited residential BMP monitoring completed in 1996 suggested that infiltration standards for stormwater runoff were not being exceeded for total Nitrogen, or Phosphorus or likely turbidity (data was for suspended sediment but relatively low concentrations). In addition, limited groundwater impact studies have not demonstrated phosphorus breakthrough for infiltration basins. Thus projects built since 1987 with well maintained BMPs should not be impacting this threshold indicator onsite within the design standards. A recent study suggested that deeper dry wells or infiltration basins with high groundwater tables should be further investigated for impacts to groundwater.

WQ-7: California-Nevada Other Lakes Water Quality

Since 1987, there have been few if any development projects that would impact other lakes water quality with the exception of Fallen Leaf Lake. While there have been rebuilds and some new development around Fallen Leaf lake in recent years, BMP requirements on these projects should have mitigated any impacts (with the possible exception of excess coverage removal on rebuilds if the original footprint was retained). Installation of BMPs where none existed previously should provide a net water quality benefit. Sampling and analysis of five of the other lakes was carried out during the 2002 and 2003 ice-free season (Lico, 2004). Echo Lakes did not appear to have had a significant change in their water quality since the 1990's sampling periods. While Fallen Leaf Lake has consistently not met the Secchi depth standard, there is no direct linkage to the amount of development around that Lake. Thus there is no evidence at this time that projects since 1987 have impacted the other lakes water quality threshold.

SOIL CONSERVATION/STREAM ENVIRONMENT ZONES (SEZ)

This section addresses the cumulative effects of projects approved by TRPA on Soil Conservation/Stream Environment Zone (SEZ) Threshold Indicators

Between 1987 and 2006, new residential and commercial development accounted for 438.15 acres of impervious coverage (based upon water quality fee receipts). This level of development represents 1.83% of the land area within the urban boundary and 0.21% of the total land area within the basin. The total amount of land coverage in the basin is now approximately 6953 acres, which amounts to only 3.44% of all lands.

While in the same timeframe 27.88 acres of impervious coverage has been removed (rehabilitated) and 15.8 miles of road decommissioned (hard coverage, too). Also, additional acres of potential coverage have been mitigated by fee. Since 1987, on average, about 21.9 acres of new coverage per year has been approved.

SC-1: Impervious Coverage

Since 1987 all TRPA-approved vacant land-to-developed projects have met the Bailey coefficients and are in attainment with the Soil Conservation threshold. Also, in 1987 TRPA adopted the Excess Land Coverage Mitigation Program (ELCMP), which strives to gradually bring all pre-1972 coverage into compliance with the Bailey Coefficients through the following options:

1. Reduce Coverage Onsite,
2. Reduce Coverage Offsite,
3. Coverage Mitigation Fee,
4. Parcel Consolidation or Parcel Line Adjustment

The program is functioning as intended, though more attention to the retirement of hard coverage is recommended, especially on low capability lands (1b, for example). Land banks in California and Nevada are receiving disbursements from TRPA and mostly retiring potential coverage and some hard coverage restoration, with fees from this program.

Overall, the cumulative effect of Regional Plan approved development in the Tahoe Basin on the Soil Conservation SC-1 Impervious Coverage threshold has been a net increase in impervious coverage. All of this coverage has been in accordance with TRPA regulations and is in compliance with Bailey coefficients and therefore in attainment with the SC-1 threshold.

SC-2: Naturally Functioning Stream Environment Zones

The Naturally Functioning SEZ Threshold has two main components: protection and restoration. Since 1987 no new disturbance in SEZ's has been allowed, except in circumstances where SEZ disturbance was unavoidable. In these cases, a 1.5-restored to 1-disturbed mitigation is required. The SEZ restoration portion of the threshold was set at restoring 1,100 acres of disturbed developed and subdivided SEZ by 2006. The restoration component of this threshold is in non-attainment and at the current rate of remedial activities will not be in attainment until after 2027. Since 1987, restoration efforts have not moved at a pace to allow attainment by 2006. The trend of acres of SEZ restored (per annum) has fluctuated both up and down. These fluctuations appear to be the result of periodic influx of large restoration projects that take three to five years to go from planning to implementation. For example, the period from 1992–1995 saw a 44% increase in acres restored as compared with the period between 1987-1991. Then, the period between 1996-2001 showed only a 16% increase compared to 1992-1995. Most recently, from 2001 to 2006, SEZ restoration increased only 6%, while significant acreages of SEZ are set for restoration in the 2007, 2008 and 2009 after several years of planning, design, public input and funding approval. Examples of the types of projects that have contributed to SEZ restoration since 1996 are listed in Table D-1.

With more effort being placed on integrating EIP projects into the SEZ threshold the trend of increasing acres restored per year should continue. Even though the threshold has not been met by 2006, the results of past SEZ restoration and the increasing trend of SEZ acres restored are encouraging. Overall, since 1987 the cumulative effect on SEZ's has been positive.

Table D-1. Complete SEZ Restoration Projects 1996-2006

Jurisdiction	Project and EIP #	Year Completed	Cost	Acres	Lead Agency
USFS	Blackwood Creek SEZ Headlands, # 27.6	2006	\$350,000	2	USFS
USFS	Blackwood Creek SEZ Fish Ladder, # 27.7	2006	1,423,181	1	USFS
Placer	Carnelian Bay Access Phase II & III, # 1018	2000	\$1,666,650	4	CTC
Placer	Snow Creek, # 25	2000	\$3,429,189	6	Placer County/ CTC
Placer	Tahoe Vista Beach	2000	\$20,000	1	NTPUD
Placer	Carnelian Creek – Phase III, # 1018	2000	\$2,458,490	8	CTC
Placer	Tahoe City Urban Improvements, # 1	2000	\$11,876,000	3	Placer County
Placer	Snow Creek Wildlife Habitat Restoration, # 25	2000	\$6,812,775	4.7	CTC
CSLT*	Trout Creek – Pioneer to Black Bart – Phase I & II & III, # 989	2001	\$2,175,808	99	CSLT
CSLT*	Wildwood (Between Ski Run and Pine Grove), # 318	1998	\$500,000	1	CSLT
CSLT*	Osgood Avenue, # 934	1998	\$150,000	0.5	CSLT
CSLT, Caltrans	South Y Industrial Tract SEZ Restoration Project, # 13	2001	324,000	5.8	CSLT, CTC, Caltrans
CSLT	Upper Truckee- Lower West Side, # 560.1	2003	10,500,000	12	CTC
CSLT	Nemetz-Twin Peaks SEZ project	2006	180,000	1.98	CTC
California State Parks	Washoe Meadows Phase IV Stream and Wetland Restoration Project	2003	\$300,000	23	CTC
El Dorado	Angora Creek, # 559	1997	\$350,000	10	C-Parks
El Dorado	Lonely Gulch, # 10128	2003	410,000	0.50	EDOT, USFS
El Dorado	Sky Meadows Stream Bank Stabilization, # 969	1998	\$25,000	0.15	USFS
El Dorado	Arapahoe	1996	\$27,468	.5	
El Dorado	Heavenly CWE Phase 2, # 961	1999	\$230,000	5.77	USFS
El Dorado	Heavenly CWE Phase 3, # 962	2000	\$205,000	5.24	USFS
El Dorado	Angora Creek SEZ Restoration , #985	2006	\$3,472,000	4.0	EDOT

Table D-1 Cont. Complete SEZ Restoration Projects 1996-2006

Jurisdiction	Project and EIP #	Year Completed	Cost	Acres	Lead Agency
Washoe	Incline Creek (Hyatt), # 123	2000	\$1,000,000	1.5	IVGID
Washoe	Lake Country Estates	1997	Not available	1.5	Private
Washoe	Rosewood Creek SEZ, # 562.1	2004	\$625,000	1.43	Washoe
Washoe	Village Blvd/Fairway) Mill Creek II, # 231.1	2003	\$1,715,370	.5	Washoe
Douglas	Lower Kingsbury Phase II, # 239	2004	1,875,128	0.32	NV State Lands
TOTAL (1996 to 2006)				205.39 Acres	
TOTAL (1981 to 1995)				321.15 Acres	
GRAND TOTAL (1981 to 2006)				526.54 Acres	

VEGETATION

This section addresses the cumulative effects of projects approved by TRPA on Vegetation Threshold Indicators.

While the vegetation conditions and patterns in the Lake Tahoe Region of today are a reflection of past and current human activities, there is a cumulative impact to the vegetation thresholds as a result of the allowed activity under the regional plan. The cumulative impacts that have occurred since the adoption 1987 of the regional plan are detailed below. These impacts are listed by threshold standard.

V-1: Common Vegetation

The resulting second growth forest that has grown in the past century has, until recently, received little active management, except fire suppression. As such, today's forest is even-aged and crowded, with many trees suppressed by the density of the surrounding forest. A drought, which started in the late 1980s, stressed the overstocked trees, making them susceptible to insects. In 1991 the United States Forest Service (USFS) estimated that 300 million board feet of timber were dying or dead (USDA 2000). This condition has increased the threat of large catastrophic fire and is indicative of a forest where many natural processes have been excluded. The increase in houses, residents and visitors increases the likelihood fire ignition, and the need to further suppress fires. This continues the overstocking problems and makes the forest susceptible future insect outbreak.

Housing, commercial and infrastructure construction have also influenced today's vegetation patterns. Not only have large and small trees been removed for these projects, forest structure and composition are also manipulated around the urban area as a defensible space for fire protection. In addition, road salts and soil compaction can stress remaining trees to the point where the tree is later removed as a hazard. The impacts of construction and hazard tree removal are not known; however, the impacts have not been evenly distributed within the watershed. Indeed, roughly 95 percent of the urban area is within the montane major vegetation zone (below 7,000 feet). Roughly 27

percent of the montane zone is urbanized and, if a large fuel defensible profile zone is included around the urban areas, roughly 55 percent of the montane zone forest is manipulated both in structure and composition. New impacts as a result of construction will continue in the montane zone as most of the remaining buildable lots in the Basin are within the montane zone. Lost urban trees are not replaced quickly, nor are there mechanisms to ensure lost trees are replaced. An average tree planted in an average location within the montane zone will only grow between 15-25 feet within 20 years. It is estimated that 60,000 trees have been removed since 1987 within the urban area as a result of allowed projects.

Since 1987 TRPA has approved 437 acres of new coverage. This new coverage is assumed to be mostly a conversion of vacant lands within the urban boundary. Within this same time, 301 acres of hard and soft coverage has been removed by public agencies within the conservation and recreation lands. This removal of coverage includes road closures and reduction of roads to trails. It is assumed that complete restoration of this land to a pre-disturbance condition has not occurred in terms of vegetation and wildlife needs, however the rehabilitation is effective for water quality and soil needs. In many regards it is not appropriate to equate the conversion of land and the rehabilitation of land for vegetation and wildlife on an acre for acre basis.

There has been a negative impact on the total amount of native vegetation by the creation of new structures within the urban areas (437 acres). Likewise, there is a positive impact by removing coverage within the conservation and recreation lands (301 acres).

V-2: Uncommon Plant Communities

All four of the uncommon plant communities are located within public land, and are therefore protected from planned and large-scale impacts. However, Grass Lake, Osgood Swamp, and Freel Peak are impacted by recreation activity. The total increase in residents and visitors, as a result of allowed development has increased the recreation impacts on these communities. Difficulty in quantifying the impacts makes it the significance of these impacts unclear. In addition, the indicator for this threshold standard makes the assessment of visitor impacts difficult.

V-3: Rare Plants

Most of the rare plants are located on public land, and are therefore protected from planned and large-scale impacts. However, Tahoe yellow cress is found on public and private lands along the shorezone of Tahoe. The total increase in residents' and visitors' use of beaches has increased the impacts to Tahoe yellow cress.

V-4: Late Seral/Old Growth Ecosystems

This threshold standard and associated change to the regional plan was adopted in 2001, and prior to this TRPA had only focused on late seral/old growth (LS/OG) since 1997.

There has been little additional increase in the total amount of late seral/old growth forest stands from 1987 or 1997. The time required for a stand of trees to develop old growth conditions is on the order of 160 to 250 years. The Comstock logging boom was during the 1880's and not enough time has passed for the development of late seral forests.

FISHERIES

This section addresses the cumulative effects of projects approved by TRPA on Fisheries Threshold Indicators.

F-1: Lake Habitat

According to the 1996 Threshold Evaluation, non-compliance with existing regulations by shorezone property owners that have manipulated lakebed habitat in order to improve sandy 'beach-like' conditions has hampered TRPA ability to achieve the Lake Habitat Threshold Standard. Within the last evaluation period several studies have been accomplished relevant to the degradation of littoral habitat. Metz and Herold (2004) used remote sensing data (IKONOS satellite imagery collected in 2002) to evaluate littoral habitat conditions.

In total, it was estimated in 2001 that 1,670 acres of lake habitat had been disturbed since the adoption of the 1987 Regional Plan. According to acreage calculations in the 2001 report, TRPA was 1,660 acres below a target of 5,948 acres of 'prime' fish habitat. Metz and Herold's (2004) results indicated that there are approximately 5,602 acres of "prime" fish habitat in Lake Tahoe's littoral zone, or about 357 acres less than identified as the threshold standard for lake habitat. Increased development had not impacted the structure of littoral fish habitat in large part to the mitigation of impacts to 'prime habitat' at 1.5 to 1.

F-2: Stream Habitat

Inappropriate stream crossing design at road intersections continue to render large sections of stream unavailable to migrating fish and hamper TRPA ability to achieve the threshold standard for Stream Habitat. However, impacts attributed to poor stream crossing design occurred **prior** to the adoption of the TRPA Regional Plan.

Stream habitat restoration projects approved will likely improve stream habitat conditions for fish. Some examples of progress made towards improving TRPA's ability to attain the Stream Habitat Threshold Standard since the last evaluation includes: The USFS-LTBMU Cookhouse Meadow Restoration Project and Blackwood Creek fish ladder removal, as well as The Washoe Meadows Phase IV Stream and Wetland Restoration Project implemented by the California Tahoe Conservancy.

F-3: Stream Flow:

The region is in attainment with this threshold standard.

F-4: Lahontan Cutthroat Trout Reintroduction

The region is in attainment with this threshold standard.

WILDLIFE

This section addresses cumulative effects of projects approved by TRPA on Wildlife threshold indicators.

This section is intended to evaluate the cumulative impacts on the two wildlife threshold standards and wildlife habitat in general. In addition to cumulative impacts, 'cumulative benefits' to wildlife thresholds and wildlife habitat in general are identified below.

TRPA does not currently have a monitoring system in place to determine, with quantitative certainty, the relationship of wildlife habitat quality and development. However, some conclusions may be drawn based amount of development in the basin and the preponderance of peer-reviewed literature assessing the effects of fragmentation on wildlife communities (summarized by Meffe and Carroll 1994). According to Meffe and Carroll (1994) and others, effects of urban development (i.e., habitat fragmentation) occur at many temporal (short- and long-term) and spatial scales (local to eco-region) and could include the following:

- 1) Increased predation rates and harassment from domestic pets,
- 2) Increased simplification of habitat structure,
- 3) Increased wildlife mortality rates associated with road kill,
- 4) Increased abundance of non-native nest parasites and predators, and invasive plants species.
- 5) Increased availability of non-native foods (e.g., garbage, bird seed)
- 6) Decreased habitat quality associated with human activity (increased noise, harassment, recreation, depredation, etc.).
- 7) Changes in species composition (insect, plant and wildlife) and abundance.
- 8) Changes in hydrologic conditions.
- 9) Decreased access to movement corridors.

In addition, the urbanization of forested landscapes necessitates the need to suppress and artificially manipulate natural forest processes, such as fire. Excessive fuel loading as a result of fire suppression could increase the probability of large-scale wildlife habitat loss through catastrophic wildfire.

In total, it was estimated that 6,526 acres (3.2% of land surface covered) of hard coverage existed in the basin prior to the adoption of the 1987 TRPA Regional Plan according to TRPA (1983). Since 1987, new development permitted by TRPA has additionally covered 437 (additional 0.2% of land surface covered) acres of land within the TRPA defined urban boundary (i.e., coverage attributed to residential and commercial development). These coverage values do not include 'soft' coverage development attributed to trails, dirt roads, parking pads (typical not permitted) and other man-modified areas such a ball fields. The USFS-LTBMU has estimated that a minimum additional 700 to 900 miles of 'soft' coverage (approximately 1,020 to 1,310 acres) exists in the form of roads and trails on lands they manage (G. Villanueva, USFS-LTBMU, pers. comm., 2001). Both hard and soft coverage creation represents potential cumulative degradation to the quality of wildlife habitats as some species are negatively affected by man-induced habitat fragmentation.

Since 2001 it is estimated that soft coverage has been reduced by 27.88 acres and 15.8 miles within Conservation and Recreation Plan Areas. The rehabilitated land includes road to trail conversions and road closures. It was assumed that complete restoration of this rehabilitated land has not entirely occurred to the extent that wildlife would benefit because disruptive human activities typically still occur at rehabilitated sites. However, the rehabilitation of these lands has likely been effective for mitigating water quality and soil impacts. Consequently, it was assumed that the land capability program does not always mitigate impacts to wildlife habitat quality and therefore new coverage cumulatively contributes to a decrease in the availability of potential wildlife habitat.

Based on 'hard' coverage calculations, a minimum of 30.9% of the land area within the urban boundary has been developed. Since 2001, 103 acres of new coverage was created within the urban boundary. If it is assumed that 180 trees of varying size class occur per acre (1 tree per 15 ft) within the urban boundary, than over the five years since the last threshold evaluation report 18,540 trees have been removed to accommodate new development. It should be assumed that a larger area of wildlife habitat has been affected by additional residential and commercial development due to human associated disturbance. Preliminary results from the Lake Tahoe Urban Biodiversity Project indicate that undeveloped urban parcels retain value to multiple wildlife species (Manley et al. 2006) TRPA has permitted projects and adopted actions that will likely improve conditions for wildlife and thus TRPA ability to achieve wildlife threshold standards.

W-1: Special Interest Species

Multiple actions have improved conditions for Special Interests Species since the last threshold evaluation. The USFS-LTBMU has decommissioned nearly 20% of Forest Service road network an effort that began prior to 2001 and continues today. The fraction of the USFS road decommissioning that has completely restored the road prism, will presumable improve wildlife habitat connectivity through reduce human impacts. In addition, the USFS-LTBMU has restored aspen stands in Blackwood Canyon, the Cathedral Lake area and Burke Creek which have improved Goshawk habitat.

TRPA permitted, or approved through MOU's, several projects since the last threshold evaluation that have potentially impacted the ability to achieve Special Interest Species Threshold Standards. In 2006, USFS contracted fuels reduction in the area of Tahoe City may have directly contributed to the failure of a Northern Goshawk nest. A single juvenile was found dead within the treatment area, the precise cause of death was not determined. Also, a Goshawk nest was abandoned in the Watson Creek area during the 2003 nesting season, most likely due to heavy equipment operating within 30 meters of the nest tree. The equipment was operating in support of USFS fuels treatment operations.

W-2: Habitat of Special Significance

Projects that TRPA permitted since the last threshold evaluation that have likely improved the ability to achieve the Habitat of Special Significance Threshold Standards. On example is the USFS-LTBMU's Cookhouse Meadow Restoration Project which improved riparian habitat along Big meadow Creek. Although TRPA has not kept pace with restoration goals for SEZ, TRPA has been successful at not permitting further degradation to SEZ.

SCENIC RESOURCES

This section addresses cumulative effects of projects approved by TRPA on the Scenic Resources threshold indicators.

Although the single impact of one allocation on scenic resource indicators is not possible to assess, overall trend analysis can be used to analyze these impacts. For the four scenic resource threshold indicators, the cumulative impacts of approved allocations are discussed below.

SR-1: Travel Route Ratings

Since 1987, extensive fieldwork have been completed for threshold evaluations, along with that completed during the Shorezone and Shoreland Ordinance development and assessment process identified several clear trends related to scenic threshold issues. The following paragraphs discuss trends important for the travel route and scenic quality rating systems.

Improvements in Commercial Districts

Beginning with the adoption of the 1987 Regional Plan, substantial public and private investment in the community plan areas of the region has occurred. Almost without exception, this investment has improved the scenic quality of the associated roadway units. Twelve roadway units with improved scores fall partially or wholly within community plan areas; improvement in the six units in community plan areas has resulted in threshold attainment. The most dramatic of these improvements is the South Lake Tahoe Redevelopment Area, Tahoe City Urban Improvements, and North Stateline, and Lower Kingsbury/Meadow. Removal of degraded structures, improvement in architectural quality of new and remodeled structures, increased landscaping and landscaped open space, decreases in highway curb cuts, and improved signage have all contributed to a remarkable transformation. This improvement affects both travel route and scenic quality ratings. Current plans for continued improvement in this unit are expected to produce further threshold attainment.

While the redevelopment area of South Lake Tahoe produces the improvement with the highest visibility, upgrades in many other areas have also occurred. Since 1996, major improvements in Douglas County around the US 50/Kahle Drive intersection, Tahoe City, and Carnelian Bay have resulted in bringing three roadway units into travel route rating threshold attainment. In Washoe County, implementation of the North Stateline Beautification Project has resulted in improvements to the built environment and enhances scenic quality in the area. In most of these areas, publicly funded projects that produce scenic improvement occurred and were matched by privately funded upgrades to existing development. In the last five years throughout the region, publicly and privately funded projects improved roadway travel route ratings by approximately 67.5 points; public investment since 1991 has created approximately 19.5 points improvement. Private property upgrade that followed these projects occurred in Tahoe City, Kings Beach, Kingsbury Grade, South Lake Tahoe, and Meyers. This confirms a fundamental principle of community redevelopment and provides encouragement for continued public leadership in planning and funding improvement projects.

Shoreline Views

The release of allocations since 1987 has resulted in impacts to scenic quality to the basin, and increases in visibility of residential structures along the threshold travel

routes. However, based on previous evaluations and reconfirmed in the 2001 Evaluation, it is important to note that the majority of impacts are the direct result of the redevelopment process that does not require an allocation. First noted in 1991 and raised as a serious concern in 1996, this redevelopment is adversely affecting both shoreline and roadway units. It is particularly noteworthy that the continued drop in both travel route and scenic quality scores is occurring as a result of new projects approved by TRPA in apparent compliance with regulations intended to prevent this drop. This reduction in scenic quality, concentrated outside of the urban roadways, is occurring at a time that the developed commercial centers are improving as discussed above, and appears to be accelerating in recent years. Although the release of allocations in conjunction with a project has been shown to impact scenic quality when they are visible from threshold travel routes, the majority of allocations have resulted in infill development within residential plan areas that do not directly impact the travel route rating threshold.

There has been a recent and dramatic increase in the scale and mass of residential structures. As land values increase, property owners are proposing residential structures very much larger than existing on-site structures. While staying within maximum coverage and height allowances, new projects very often replace several small, one- or two-story cabins with large two-, three-, or four-story houses. These structures often block lake views from the roadway and are rarely adequately screened or sited to reduce visual dominance as seen from the lake.

As a result of the continued decline in shoreline scenic quality, TRPA adopted in 2002 the Shoreland Ordinance which regulated the amount of visible structure permitted as viewed from the Lake. The adopted system regulated the visibility of structure based on design criteria and permitted more visible structure provided that the structure implemented design measures to reduce the overall contrast of the structure. The trend in shoreline units is starting to show positive trends at the parcel level as a result of the adoption of the Shoreland Ordinances following the 2001 Threshold Evaluation. However, a critical mass of projects has not been realized in individual shoreline units to directly result in scenic quality rating increases at the unit level. As a result of a few number of vacant parcels left in the shoreland and the perceived cumulative improvements being realized basin wide in the shoreline travel units, additional allocation is not expected to result in scenic quality impacts in the shoreline units.

Incremental Loss of Lake Views

Roadway units along the north and west shores are experiencing incremental loss of lake views. Very often this loss results from residential rebuilds that increase the scale of lakeside residences. This loss also occurs, however, through construction of accessory structures such as solid fences or two story garages. The loss of small lake views can be hard to define as a significant impact when considering any individual project, yet the cumulative effect is important. Brief glimpses of lake views, interspersed with more open and dramatic longer lake views, define the notable character of most of the scenic corridor along the north and west shores. Loss of these brief lake views creates stretches of highway that are undistinguished from many other forested roadways. This has negative implications for both travel route and scenic quality thresholds.

Increasing Visual Impact of Shorezone Structures

Due to the prohibition on new pier development in prime fish habitat, this trend has not yet caused widespread visual impacts; however, it is clear from recent applications, pier

improvements that have been permitted, and discussion with representatives of littoral property owners, substantial visual change in the shorezone is likely. Without careful management of the unique shoreline landscape, the cumulative effect of new and larger piers, boat lifts, and associated structures could dramatically affect the scenic character of the Lake.

SR-2: Scenic Quality Ratings

Trends affecting the scenic quality rating indicator are the same as those described above for the travel route rating indicator.

SR-3: Public Recreation and Bicycle Trails

Public Investment in Maintenance and Upgrade Produces Widespread Improvements

Since threshold adoption in 1993, important improvements to recreation areas and bike trails have been funded, resulting in upgraded and new facilities available to the general public. Nearly all the recreation areas assessed displayed good or improving maintenance conditions, and several areas offered dramatically improved facilities. The lake access projects funded by the California Tahoe Conservancy offer the best example of use of public funds to both create and improve the scenic quality of public recreation areas. Redeveloped beach parcels in Kings Beach and Carnelian Bay restore important landscape characteristics and offer built features completely in harmony with the natural landscape and high expectations of the recreational visitor. The City of South Lake Tahoe (El Dorado Beach), Nevada State Parks (Memorial Point), California State Parks (Vikingsholm parking area), and the Incline Village General Improvement District (Incline Beach) are other examples of organizations making improvements.

As with other redevelopment projects noted throughout this report, some new recreation facilities produce both positive and negative change. At Burnt Cedar Beach and Sand Harbor in the festival area, new facilities offer improved visitor services and display pleasing design characteristics, yet are too large for their settings and include design elements out of character with the natural environment.

Impacts of Changing Off Site Conditions

The primary concern related to recreation areas and bike trails are changing scenic conditions occurring off site. The primary off site feature creating concern is shoreline and littoral parcel development. Trends related to construction of large shoreline residences are discussed in detail above. Increased length of piers and spread of use of boat lifts also decrease view of the natural landscape and increase shoreline clutter. In fact, shorezone development (i.e. piers, buoys and boatlifts) impacts views from the recreation areas as much or more than views from any other rated resource or travel route.

Changes in the forest backdrop are visible from many recreation areas, although scores for the affected views rarely decline. View of the new gondola cut for Heavenly Valley, of the new Embassy Suites structure at Ski Run Blvd., and increased view of residential development above Incline Village are examples. While these changes are distinct, often from many viewpoints, they are usually part of a large panorama and do not alter the score for the entire view.

SR-4: Community Design

Increased Use of Regionally Appropriate Architectural Elements and Other Design Changes

Allocation of Commercial Floor Area (CFA) has and is occurring in the Lake Tahoe Region since 1987, and has resulted in substantial public and private investment in redevelopment. Almost without exception, new projects introduce high quality materials and involve superior design elements. Both commercial and residential redeveloped properties often include design characteristics commonly called “Tahoe rustic” or “Old Tahoe” or “National Park”. This includes use of peeled logs, natural wood and stone exterior siding, and steeply pitched roofs with dormer windows. Many projects also include paned glass for windows and richly detailed garden areas. These design elements often create regionally appropriate architectural improvements compared to the structures they replace.

Public/Private Projects Making Substantial Improvements

Throughout the region, public and joint public/private investments have produced substantial improvements to community character. These projects include several sidewalk/landscaping projects, erosion control and water quality improvement projects, land buy-out by public agencies that involves removal of decrepit structures, and the numerous projects involved in the South Lake Tahoe redevelopment area. Without exception, investment made in these projects has resulted in improving the sense of place and the functionality of core community areas. As noted in other sections of this chapter, public leadership in these projects has often encouraged private investment on nearby properties, expanding the benefits beyond the public project area boundaries.

Another benefit of these public projects is the degree of public involvement in their planning and design. Even in communities that lack strong statements of desired community character, the public nature of the design process often, though not always, produced projects that reflect such character. For example, design of the amenity package for the sidewalk project in Tahoe City was the result of years of community meetings and community fundraising to produce a specific desired result. On the other hand, community interest in the design for the pedestrian connection between Kingsbury Grade and the South Stateline Casino Core failed to secure a design that reflected a specific desired character.

Development Patterns

Throughout the evaluation report, the negative scenic effects of removing small structures and replacing them with very much larger structures have been identified. Another feature of that development trend is the loss of historical structures and historical development patterns. Together these resources create community and landscape characters distinct in different parts of the region, but also unique to Tahoe. Structures constructed at different times in the region’s history display changing technologies, resident and visitor interests, and environmental values. Changing economic and social trends over time brought about development patterns, including size of parcel, structure setbacks, and landscape treatment, which create the story of the built environment in Tahoe. This story includes transition from summer estate retreats, to small summer cabin tracts, and to the modern year-round mixed community we have today. The resulting landscape constitutes a scenic tourist draw and provides continuity with the past and a strong emotional attachment to repeat visitors. However, it should be noted that redevelopment of existing structures generally do not require an allocation

unless it is an expansion of a commercial or tourist accommodations use. Existing residential structures have vested rights and do not require an allocation from TRPA.

As noted previously, not all past development practices or “old” structures produce

Improvement to the region’s signage has been considered a key feature in creating desirable commercial districts and attaining threshold standards. Since adoption of the TRPA sign ordinance (Chapter 26) in 1989, the quality, size and placement of signs has steadily improved. However, this evaluation concludes that signage continues to contribute to scenic problems. Specifically, signage continues to produce levels of clutter that is inconsistent with appreciation of the area’s natural values. This includes signs that are too large, too close to the road, too high, and with colors and materials that compete to such an extent as to cause confusion.

NOISE

This section addresses the cumulative effects of projects approved by TRPA on the Noise threshold indicators.

N-1: Single Event Noise- South Lake Tahoe Airport

From 1987 to 2001, only a few exceedances of Airport noise standards had occurred relative to the total number of operations; however, without the airport noise monitoring system functioning in the last five years it is difficult to confirm this trend. Based on complaints, permitted projects and lack of commercial service does not appear to have significantly impacted (positively or negatively) achievement of the noise standards set for the airport.

N-2: Single Event Noise- Other

The unit of sound level measurements is the decibel (dB), sometimes expressed as dBA. Since decibel levels are expressed in a logarithmic relationship, sound levels can not be added or subtracted. The doubling of a noise source will result in about a 3 dBA increase, which is barely perceptible to the human ear. A 10-fold increase in noise will result in about a 10 dBA increase, which is like a doubling of loudness.

Since 1987, TRPA has continued to receive a significant number of noise complaints regarding the operation of jet skis and water craft on Lake Tahoe; however, this is being addressed in the new TRPA shorezone regulation package for which the final EIS has determined to be mitigated to a less to significant level (Lake Tahoe Shorezone Ordinance Amendments Final EIS, November 2006).

There still is a challenge with the operation of off-highway vehicles, particularly motorcycles in regards to noise. However, monitoring for single events has been extremely limited, and therefore the actual impacts associated with permitted projects are unknown. Although the data which are available have not indicated significant impacts on noise resulting from the projects permitted over the past 15 years, it is expected that noise generated from single events has been and will likely continue to increase as the populations of Lake Tahoe have increased, and will continue to do so.

N-3: Community Noise Equivalent Level (CNEL)

Unlike single event noise levels, CNELs are averaged noise levels found in a given area. CNELs are the noise level measurements of the “average” noise levels over a 24-hour

day, with adjustments for potential annoyance or intrusion being added for noise that occurs during evening and night-time hours. Since 1987, comprehensive threshold CNEL measurements have been taken only three times; however there have been numerous studies related to major projects requiring environmental documents.

Therefore, the impacts of permitted projects on Basin noise levels are known to meet the CNEL standards. Within the limited data set of threshold monitoring, measurements indicate that in 1991, approximately 15% of the Plan Areas measured exceeded the CNEL. In 1996, approximately 18% of monitoring Plan Areas were above the standard. In 2000, 19% of CNEL measurements exceeded the applicable standard. However, most exceedances were caused or contributed to by local construction activities (which are exempt from noise standards during certain hours) and traffic. Aside from the construction and traffic generated noise, it would likely require a significant increase in residential development to generate a significant increase in the CNEL values for each Plan Area (since a doubling of the source results in only a 3 dBA increase). Since TRPA has and will continue to limit development, impacts to the CNEL generated by local activities (excluding construction) will likely remain minimal, especially since the CNEL values are the average noise levels over a 24 hour period (with weighting to account for evening and nighttime hours) and not for single events. It is safe to assume that as the population of Lake Tahoe increase, (though local population growth is limited by TRPA), noise events will also increase but not to any significant level.

RECREATION

This section addresses the cumulative effects of projects approved by TRPA on the Recreation threshold indicators.

All projects approved by the Agency are found to be consistent with the threshold standards, or the project possesses elements of mitigation that render potential negative impacts to a less-than-significant level.

R1: High Quality Experience/Additional Access

The development of residential, commercial and tourist projects overall has not hindered the ability of TRPA to meet the threshold standards as measured by the interim targets established in the 2001 Threshold Evaluation with regard to quality experience (user surveys, targeted miles of bike trails and multi-use trails, development of the regional recreation plan). Concerning additional access to the shorezone and natural areas (measured by preservation of existing ROWs and easements and miles of public shoreline acquisition) not all urbanizing activities have resulted in a loss of public access. However, changes in the use of lakefront property, especially if a commercial, tourist accommodation or marina use is changed to a residential use, have resulted in the loss of public access to the shoreline of Lake Tahoe. Conversely, public acquisitions have twice made formerly residential parcels available to the public for use and enjoyment.

The utilization and consumption of resources do not directly effect the attainment of the threshold standards, unless the utilization leads to environmental degradation, a circumstance that should not occur given the findings necessary for project approval.

The programs in place for the restoration and mitigation of past development activities contribute positively toward the attainment of the recreation threshold standards in circumstances where it is not Tahoe-dependent recreation facilities being eliminated as part of the restoration. Even in the latter experience, if public access is still provided for

as part of the restoration, such as at the Lower Westside Project, recreation use types may shift, but not be eliminated. As was described in past User Preference Surveys, some of the leading attributes that contribute to a high-quality experience are the same attributes of a healthy environment: clean air, clear water, scenic beauty, and green vegetation. Cumulatively, these programs and the resulting projects have contributed positively toward the attainment of the recreation threshold standards.

The cumulative effect of projects has lead to the attainment of the R1 threshold standards.

R2: Fair Share of Resource Capacity Available to the General Public

No specific interim targets exist for the R2 standard, since this threshold was in compliance in 2001. Disposition of PAOTs, approval of non-PAOT projects and public land acquisitions are the traditional units of measure for threshold compliance.

The resources of concern for the “fair share” recreation threshold standards are linked to capacities such as transportation and consumptive resources such as potable water and available sewer treatment capacity. These capacities have not proven to be the limiting factor to recreation facility development for the recreation purveyors. Smaller water companies with service limitations are not located where future major recreation facilities would be anticipated. Thus, residential, commercial and tourist development projects, even in the jurisdictions where service capacities are more limited, have not necessarily “competed” with recreation projects for such resources.

The programs in place for the restoration and mitigation of past development activities generally are not long-term consumers of resources; therefore, cumulatively these projects can be positive contributors to threshold attainment by returning capacity to the servicing utility systems that may be used for recreation or other types of development.

The cumulative effects of projects have contributed to the attainment of the R2 threshold standard.

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