

CHAPTER 10

Noise

Noise, by definition, is “unwanted sound,” and is a subjective reaction to acoustical energy or sound levels. Due to the rural nature of the communities and the pristine natural areas in the Lake Tahoe Basin, sound levels that would go unnoticed in a highly urban or industrial environment outside the basin are likely to be considered noise, and have the potential to negatively impact human health, community ambiance, recreational experience, and wildlife (Francis and Barber 2013; Ware et al. 2015; Laurance 2015).

Based on data from previous research, primary drivers of noise levels in the basin have been attributed to anthropogenic activities and actions. Specifically, vehicular travel in transportation corridors and aircraft activity at the South Lake Tahoe Airport have been identified as the predominant noise sources in the basin. In an effort to address noise impacts to both wildlife and visitors, TRPA Resolution 82-11 established threshold standards for noise, characterized as numerical standards.

Table 10-1 summarizes the assessment criteria for current noise level conditions and trends relative to adopted threshold standards for the basin. The evaluation analyzes two indicator reporting categories for noise: single noise events generated by aircraft and motorized watercraft and cumulative noise events. The threshold standards for each indicator are based on numerical standards using the A-weighted decibel (dBA) as the unit of measure. A-weighting is commonly used for the measurement of environmental and industrial noise, and for assessing potential hearing damage and other noise-related health effects. One adopted policy statement directing the TRPA Governing Board to adopt noise standards for transportation corridors was also evaluated, and was determined to be implemented and in attainment with the threshold standard.

Table 10-1. TRPA adopted and recommended threshold standards for noise¹.

Indicator Reporting Category	Name of Standard	Standard Type	Adopted TRPA Threshold Standard for Noise and Recommended CNELs for Transportation Corridors ¹		Unit of Measure
Single Noise Events	Aircraft	Numerical	80 dBA (Between the hours of 8 AM and 8 PM)	Monitoring distance of 6,500 m – start of takeoff roll	Decibel Level (dBA)
				Monitoring distance of 2,000 m – runway threshold approach	
			77.1 dBA (Between the hours of 8 PM and 8 AM)	Monitoring distance of 6,500 m – start of takeoff roll	Decibel Level (dBA)
				Monitoring distance of 2,000 m – runway threshold approach	
	Watercraft (Pass-By Test)	Numerical	82 L _{max} ²	Monitoring distance of 50 ft. – engine at 3,000 rpm	Decibel Level (dBA)
	Watercraft (Shoreline Test)	Numerical	75 L _{max}	Monitoring distance of 5 ft. above water, 2 ft. above curve of shore, dock or platform. Watercraft in Lake, no minimum distance	Decibel Level (dBA)
	Watercraft (Stationary Test)	Numerical	88 dBA L _{max} for boats manufactured before January 1, 1993	Monitoring distance of 3.3 ft. from exhaust outlet – 5 ft. above water	Decibel Level (dBA)
			90 dBA L _{max} for boats manufactured after January 1, 1993		
	Motor Vehicles Less Than 6,000 GVW	Numerical	76 dBA - Less than 35 mph	Monitoring distance of 50 ft.	Decibel Level (dBA)
			82 dBA - Greater than 35 mph		
Motor Vehicles Greater Than 6,000 GVW	Numerical	82 dBA - Less than 35 mph	Monitoring distance of 50 ft.	Decibel Level (dBA)	
		86 dBA - Greater than 35 mph			
Motorcycles	Numerical	77 dBA - Less than 35 mph	Monitoring distance of 50 ft.	Decibel Level (dBA)	
		86 dBA - Greater than 35 mph			

¹ Consistent with the Policy Statement Standard in Resolution 82-11, Community Noise Equivalent Levels (CNEL) identified for Transportation Corridors have been adopted for Transportation Corridors in the Land Use Element of TRPA (1986) - Goals and Policies.

² Maximum sound level during a measurement period or a noise event



















	Off-Road Vehicles	Numerical	72 dBA - Less than 35 mph 86 dBA - Greater than 35 mph	Monitoring distance of 50 ft.	Decibel Level (dBA)
	Snowmobiles	Numerical	82 - Less than 35 mph	Monitoring distance of 50 ft.	Decibel Level (dBA)
Cumulative Noise Events	Critical Wildlife Habitat Areas	Numerical	Background noise shall not exceed a CNEL of 45		Decibel Level (dBA)
	Wilderness and Roadless Areas	Numerical	Background noise shall not exceed a CNEL of 45		Decibel Level (dBA)
	Low Density Residential Areas	Numerical	Background noise shall not exceed a CNEL of 50		Decibel Level (dBA)
	Rural Outdoor Recreation Areas	Numerical	Background noise shall not exceed a CNEL of 50		Decibel Level (dBA)
	High Density Residential Areas	Numerical	Background noise shall not exceed a CNEL of 55		Decibel Level (dBA)
	Commercial Areas	Numerical	Background noise shall not exceed a CNEL of 60		Decibel Level (dBA)
	Hotel/Motel Areas	Numerical	Background noise shall not exceed a CNEL of 60		Decibel Level (dBA)
	Industrial Areas	Numerical	Background noise shall not exceed a CNEL of 65		Decibel Level (dBA)
	State Routes 89, 207, 28, 267 and 431 (Transportation Corridors) ¹	Numerical	Background noise shall not exceed a CNEL of 55 (For this threshold evaluation, these CNEL standards are referred to as transportation corridor noise thresholds and this transportation corridor noise threshold overrides the land use CNEL thresholds and is limited to an area within 300 feet from the edge of the road).		Decibel Level (dBA)
	South Lake Tahoe Airport (Transportation Corridor) ¹	Numerical	Background noise shall not exceed a CNEL of 60 (This threshold applies to those areas impacted by the approved flight paths).		Decibel Level (dBA)
	U.S. Highway 50 ¹	Numerical	Background noise shall not exceed a CNEL of 65 (For this threshold evaluation, these CNEL standards are referred to as transportation corridor noise thresholds and this transportation corridor noise threshold overrides the land use CNEL thresholds and is limited to an area within 300 feet from the edge of the road).		Decibel Level (dBA)

Table 10-2 summarizes the results of the 2015 assessment. The table provides a summary of the status and trend of standards in the noise reporting categories for single noise events and cumulative noise events today as well as the results from the 2011 Threshold Evaluation Report for comparison. Figure 10-1 provides a key to the symbols used to communicate status, trends, and confidence, and a detailed description of each is provided in the methodology section. The following indicator sheets detail an assessment of the status and trend of each indicator and provide descriptions of the methods used and recommendations to modify the standards and the analytic approaches used to assess them.

The peer review from the 2011 Threshold Evaluation determined TRPA’s noise program is “too complex and resource intensive. There are too many indicators, land use categories, and numerical thresholds that need to be monitored to evaluate attainment” (TRPA 2012a). Based on this review, many of the noise monitoring thresholds, especially those related to single noise events, were not analyzed for this evaluation and therefore received a status of “unknown”.

Table 10-2: Noise status & trend summary

Standard	2011	2015
Single Noise Events		
Aircraft Departures/Arrivals		
Watercraft Shoreline Test		
Watercraft Pass-By Test		
Watercraft Stationary Test		
Motor Vehicles Less Than 6,000 GVW		
Motor Vehicles Greater Than 6,000 GVW		
Motorcycles		
Off-Road Vehicles		
Snowmobiles		

Standard	2011	2015
Cumulative Noise Events		
High-Density Residential Areas		
Low-Density Residential Areas		
Hotel/Motel Areas		
Commercial Areas		
Industrial Areas		
Urban Outdoor Recreation Areas		
Rural Outdoor Recreation Areas		
Wilderness and Roadless Areas		
Critical Wildlife Habitat Areas		
South Lake Tahoe Airport Transportation Corridor		
State Route 28 Transportation Corridor		
Highway 50 Transportation Corridor		
State Route 89 Transportation Corridor		
State Route 207 Transportation Corridor		

Standard	2011	2015
State Route 267 Transportation Corridor		
State Route 431 Transportation Corridor		
Policy Statement Assessment - Adopt noise standards for Transportation Corridors		

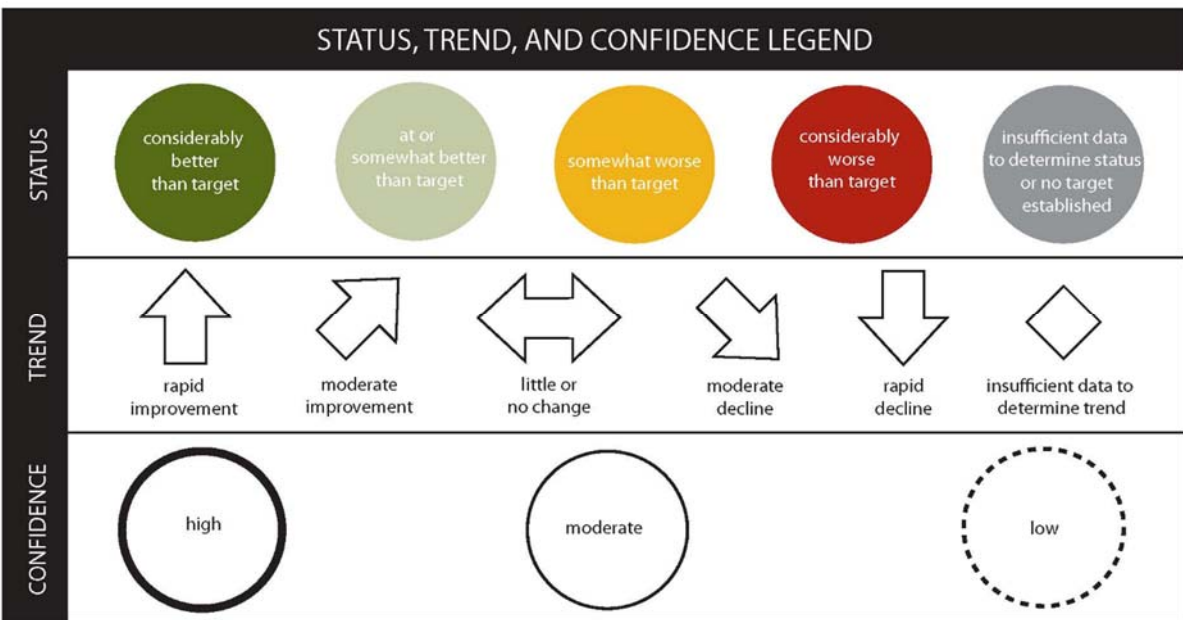





Figure 10-1: A key to the symbols used to assess status, trends, and confidence levels.

Table 10-3. Key to the reporting icon used to characterize the implementation status of management standards and policy statements.

Status Category	Description	Reporting Icon
Implemented	The management standard or policy statement has been integrated into the Regional Plan and is consistently applied to a project design or as a condition of project approval as a result of project review process. Examples of programs or actions can be identified to support the management standard’s implementation. Adopted programs or actions support all aspects of the management standard or policy statement’s implementation, or address all major threats to implementation.	
Partially Implemented	The management standard or policy statement has been integrated into the Regional Plan, but is not consistently applied during the project review process. No more than two examples of programs or actions can be identified to support the management standard’s implementation and/or adopted programs or actions support some aspects of the management standard or policy statement’s implementation, or address some major threats to implementation.	
Not Implemented	The management standard or policy statement has not been integrated into the Regional Plan and is not applied during the project review process. No examples of programs or actions can be identified to support implementation.	

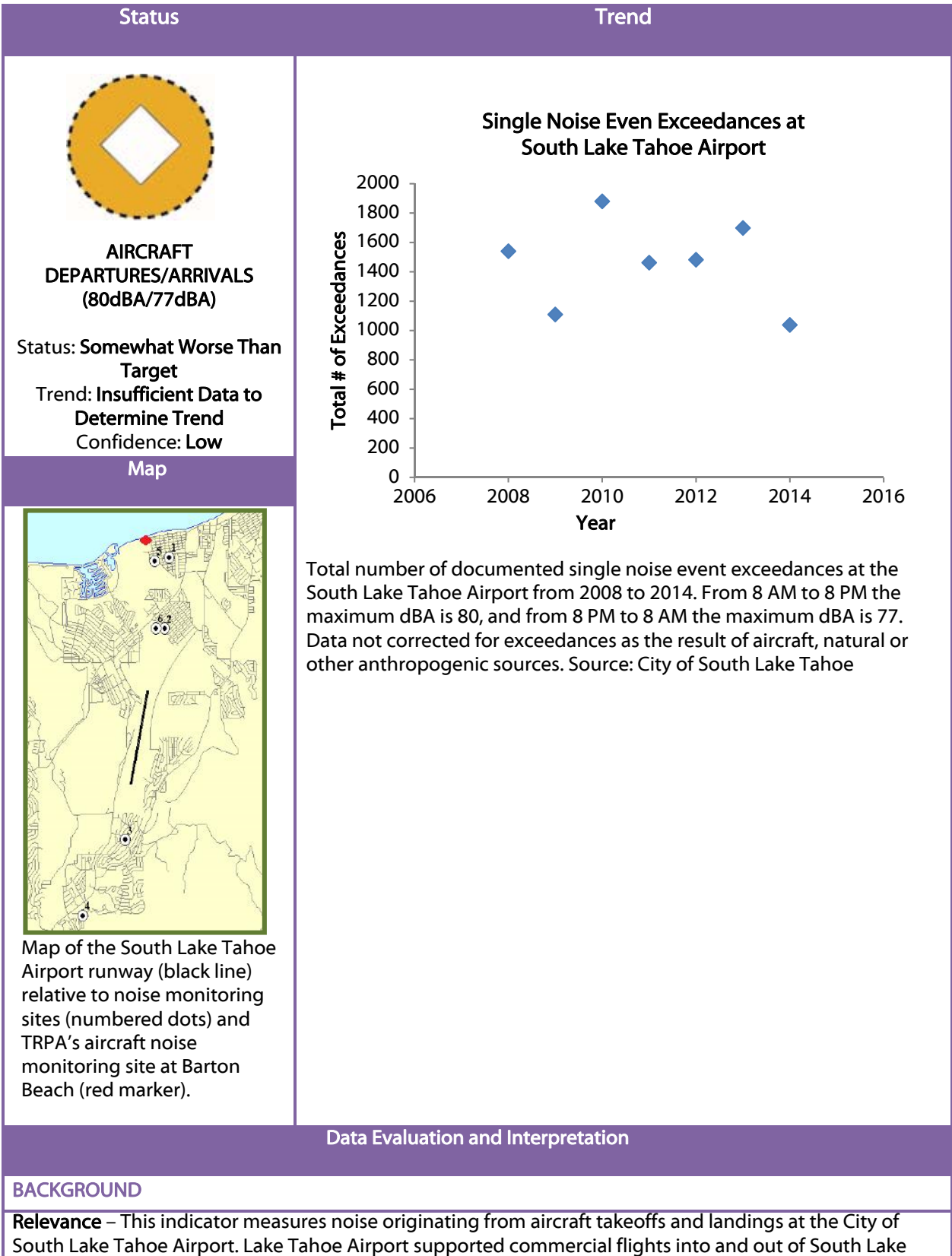
Single Noise Events

A noise event is defined by TRPA as “an unexpected increase in acoustics.” Single noise event threshold standards adopted by TRPA are based on the numerical value associated with the maximum measured level in acoustical energy during an event. This is referred to as the L_{max} of the event. TRPA adopted different single noise event threshold standards for different types of noise sources that were identified as creating the greatest amount of annoyance and/or sleep disruption. TRPA Resolution 82-11, adopting the threshold standards, identified single noise event threshold standards for aircraft, motorized watercraft, cars and trucks, motorcycles, off-road vehicles, and snowmobiles (Table 10-1).

This section reports on single noise events generated by aircraft and motorized watercraft. Other threshold standards have been adopted for this indicator reporting category including motor vehicles, motorcycles, off-road vehicles, and snowmobiles. However, due to insufficient data, these were not evaluated. Generally, TRPA noise threshold standards for these noise sources that represent noise levels from properly maintained and unmodified equipment. Primary factors influencing single noise event exceedances for these types of noise sources include modified exhaust systems, engine type, and user behavior.

The following section provides an evaluation of the status and trends of the shoreline test for motorized watercraft and the 80 dBA single noise event threshold standards for aircraft, measured between the hours of 8 AM and 8 PM. The “shoreline test” approach is one of three approaches related to motorized watercraft-generated single events. Evaluations of the other two watercraft monitoring approaches, the pass-by and stationary tests, are not included in this report due to insufficient data. The “80 dBA departures/arrivals” threshold standard is one of two threshold standards related to aircraft single events. An evaluation of the other threshold standard, “77 dBA departures/arrivals” is not included in this report due to insufficient data.

Single Noise Events: Aircraft Departures/Arrivals (80dBA/77dBA)



Tahoe from the early 1960s until 2001, when commercial service was ended. Since 2001, the airport has supported aircraft-related operations for one helicopter sightseeing business, occasional military training touch landing exercises, emergency services, and privately-owned general aviation flights only. Aircraft generated noise is most frequently recorded during summer months with most threshold exceedances occurring during the annual celebrity golf tournament and air show each July. TRPA adopted single noise event threshold standards to protect quality of life for residents and visitors and to reduce impacts to wildlife.

TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Single Noise Event, Aircraft

Adopted Standards – During the hours of 8 AM to 8 PM single noise events generated by aircraft shall not exceed 80 dBA L_{max} (maximum decibel level in a single event) for arrivals and departures. During the hours of 8 PM to 8 AM, the single event standard shall not exceed 77 dBA L_{max} for aircraft arrivals and departures.

Type of Standard – Numerical

Indicator (Unit of Measure) – A-weighted decibel (dBA) measurement used to evaluate the effects of environmental and industrial noise on human health.

Human & Environmental Drivers – The primary factors influencing single noise event exceedances caused by aircraft are aircraft type and frequency of flight (California Department of Transportation - California Aviation Planning 2007). A large percentage of the exceedances recorded by monitoring may be attributed to natural sources (e.g. wind, lightning, wildlife) and other anthropogenic sources other than aircraft. Additional factors influencing aircraft noise levels include wind, temperature, cloud cover, fog, topography, vegetation and man-made barriers such as homes and other buildings. Thermal inversions, a common occurrence in the Tahoe Basin (Tahoe Interagency Management System 2011), and cloud cover can cause noise levels to be perceived as louder than they are (California Department of Transportation - California Aviation Planning 2007).

MONITORING AND ANALYSIS

Monitoring Partners – City of South Lake Tahoe and TRPA. The California Tahoe Conservancy provided access to their lands for monitoring.

Monitoring Approach – Lake Tahoe Airport monitored noise at six sites in the vicinity of the airport (see map above) following an approved monitoring protocol. All exceedances logged by these monitors are documented and categorized in quarterly and annual noise reports sent to TRPA. While monitoring of exceedances has continued, the ability to differentiate between aircraft and non-aircraft exceedances was not possible, therefore data quality is low and only total exceedances (including aircraft, natural sources (e.g. wind, lightning, wildlife) and other anthropogenic sources) are reported and trend is not assessed. Past monitoring data shows that an average of 17 percent of exceedances were caused by aircraft, however the percent of exceedances per year caused by aircraft varies greatly year to year, making any judgement on how many of the total exceedances are caused by aircraft in any given year inestimable.

Analytic Approach – Simple linear regression is used to determine trend.

INDICATOR STATE

Status – Somewhat worse than target. For the current monitoring period where full year data is available, the total number of exceedances ranged from 1,038 to 1,698 (City of South Lake Tahoe 2015). Threshold attainment has historically been evaluated using a zero exceedance. Following that convention, the threshold is out of attainment. Due to the uncertainty regarding the number of exceedances caused by aircraft, the status has conservatively been determined to be “somewhat worse than target” consistent with the 2011 Threshold Evaluation.

Trend – Insufficient data to determine trend. The total number of exceedances shows a decreasing trend from 2008 to 2014. However, the trend is not statistically significant ($R^2 = 0.0347$, $P = 0.69$) and exceedances caused by aircraft cannot be differentiated from non-aircraft. The trend means little to understanding the performance of the threshold standard and is given a determination of “insufficient data to determine trend.”

Confidence –

Status – Low. Monitoring is conducted following widely accepted protocols, but due to the inability to differentiate between the sources of the exceedances, confidence is low.

Trend –Low. There is low confidence in the trend line of the total number of exceedances ($R^2 = 0.0347$, $P = 0.69$).

Overall – Low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – In the early 1990s, TRPA adopted aircraft type limitations for the Lake Tahoe Airport based on tested arrival and departure decibel levels. TRPA also established noise threshold standards for arrival and departures depending on time of day or night. The City of South Lake Tahoe has published noise abatement guidelines for all pilots located on the Lake Tahoe Airport website.

In 2013, the City initiated an Airport Master Plan Update in order to determine the current and future potential of the airport. Based on the update, the total number of operations are anticipated to increase from 23,540 recorded in 2013 to 29,645 in the year 2033, an overall increase of 17.9 percent over a 20-year period. Aircraft activity at the Lake Tahoe Airport has declined since a peak in 1978 of 63,881 annual operations. Although the existing 65 dB CNEL noise contour does not extend off airport property, proposed projects that could potentially alter aircraft operations, aircraft fleet mix, or change runway use would be subject to further review. The airport currently has an Airport Land Use Compatibility Plan (ALUCP) in place and will be updated after the master plan update and includes opportunities to maintain future noise monitoring of airport operations.

Effectiveness of Programs and Actions – Existing programs do not appear sufficiently effective at achieving adopted threshold standards based on the evaluation of available data.

Interim Target – Due to insufficient data, an interim target cannot be set.

Target Attainment Date – Due to insufficient data, a target attainment date cannot be set.

RECOMMENDATIONS

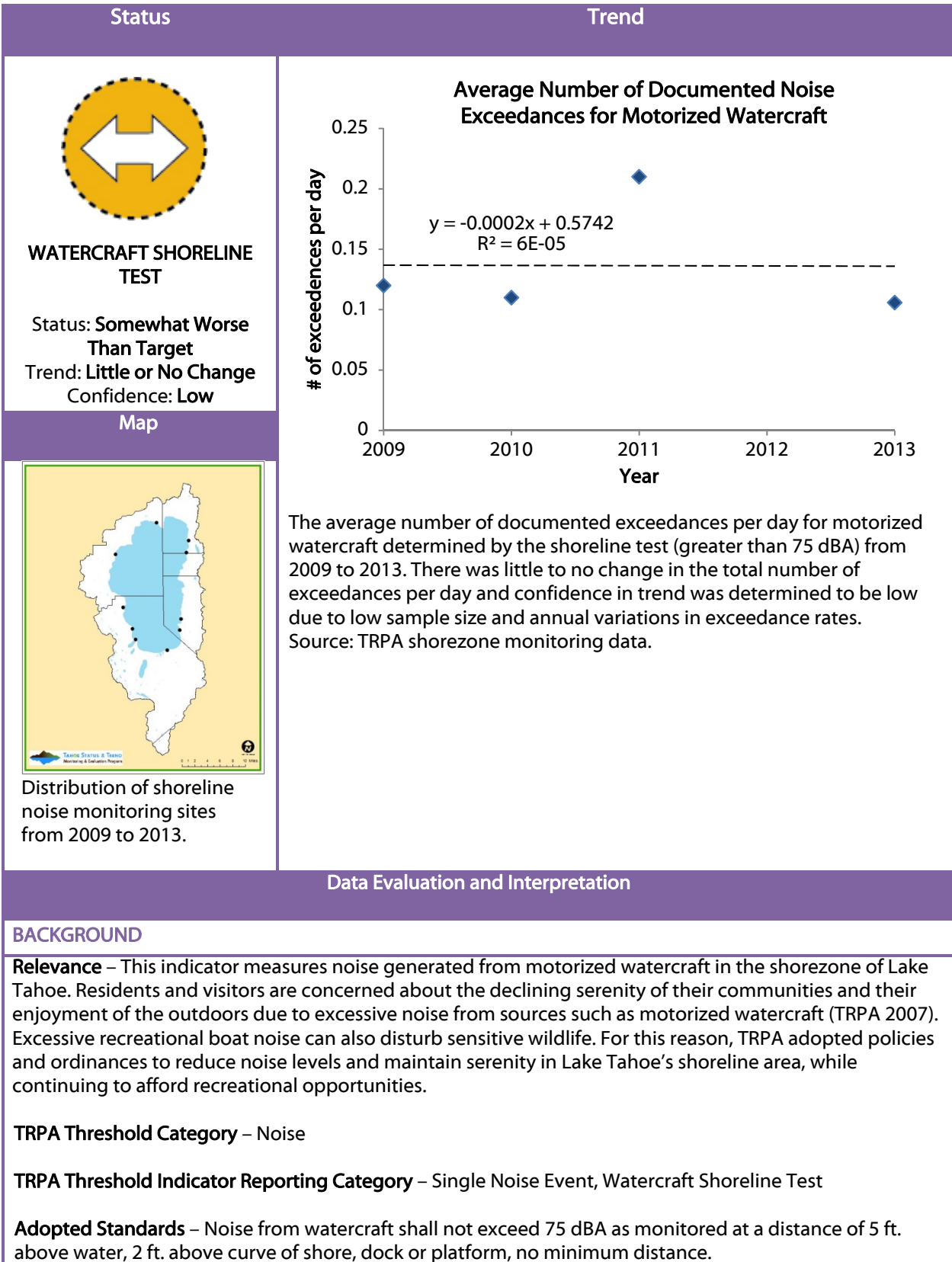
Analytic Approach – No changes recommended.

Monitoring Approach – Continue to explore options to cost effectively distinguish between natural and anthropogenic sources of noise exceedance events.

Modification of the Threshold Standard or Indicator – The standard should be assessed against best practice for the establishment of standards and indicators for M&E, and amended as necessary to ensure it reflects the latest science and provides information that is useful for management.

Attain or Maintain Threshold – Further measures may be necessary to achieve existing zero exceedance aircraft noise threshold standards. Alternatively, an investigation may be necessary to determine if existing threshold standards are achievable given today’s general aviation aircraft fleet and aircraft noise-reduction technologies. Although there is an established monitoring plan for single noise events for aircraft at the Lake Tahoe Airport, discrepancies of applicable threshold standards exist between the City of South Lake Tahoe and TRPA (i.e., 77 dBA L_{max} vs. 80 dBA L_{max}).

Single Noise Events: Watercraft Shoreline Test



Type of Standard – Numerical

Indicator (Unit of Measure) – Number of exceedances and exceedance rate (exceedances per day and per year) of the single noise event, watercraft shoreline test threshold standard measured in A-weighted decibel (dBA).

Human & Environmental Drivers – Watercraft-generated single-event noise exceedances are driven by the type of watercraft engine and exhaust system (Lanpheer 2000) and boater behavior (proximity to shore, operating speed, etc.). Shoreline topography, wave slap, and wind can also influence noise levels.

MONITORING AND ANALYSIS

Monitoring Partners – TRPA monitoring with land access granted by the California Tahoe Conservancy, U.S. Forest Service, California Department of Parks and Recreation, and Nevada Division of State Parks.

Monitoring Approach – Watercraft noise levels were measured annually from 2009 to 2013 at 10 shorezone locations for five to six sampling periods (ranging from four to 12 days) from May through September. Sampling periods are comprised of both weekends and weekdays, allowing for analysis of the differences in noise levels or exceedances between days in the week. The monitoring periods include low, medium, and high watercraft use times throughout the day (7 AM to 7 PM). All noise events are individually analyzed and categorized by a trained noise technician.

Analytic Approach – Simple linear regression is used to determine trend.

INDICATOR STATE

Status – Somewhat worse than target. TRPA’s maximum allowable noise level from any motorized watercraft in the shorezone is 75 dBA regardless of distance to shore. Measured noise levels in the shorezone from 2009 to 2013 (the last year of noise monitoring) put the Region in non-attainment with the zero-exceedance threshold standard, with watercraft responsible for:

- 47 recorded shorezone exceedances caused by watercraft in 2009 (0.12 exceedances/day, one exceedance every 8.2 days, n=386)
- 51 recorded shorezone exceedances caused by watercraft in 2010 (0.11 exceedances/day; one exceedance every 8.7 days, n=446)
- 91 recorded shorezone exceedances caused by watercraft in 2011 (0.21 exceedances/day; one exceedance every 4.7 days, n=428)
- 48 recorded shorezone exceedances caused by watercraft in 2012 (0.31 exceedances/day, one exceedance every 3.23 days, n=155)
- 12 recorded shorezone exceedances caused by watercraft in 2013 (0.097 exceedances/day; one exceedance every 10.3 days, n=123) (Bollard Acoustical Consultants 2014)

Data from boating surveys conducted in 2009, 2010, and 2011 indicate that 203,821; 188,047; and 193,540 boat trips occurred in those years, respectively. When placed in context of the total number of boat trips undertaken over the same time period, TRPA recorded noise exceedances from boats is 0.0002 percent to 0.0005 percent of the trips undertaken, or greater than 99.999 percent threshold standard compliance rate. Although the Region is not achieving the zero exceedance threshold standard, when viewed in context of the number of boat trips recorded over the same time period, it suggests that the Region is somewhat worse than target.

Trend – Little to no change. A simple linear regression model showed there is little to no change in the exceedance rate from 2009 to 2013.

Confidence –

Status – Moderate. There is a moderate degree of confidence in status because of noise monitoring protocol (SAE 1970), unit accuracy, data integrity, and spatial representativeness of monitoring sites. However, data has not been collected since 2013.

Trend – Low. The confidence in trend for all single event noise exceedances due to watercraft was determined to be low with an analysis of only five data points showing little statistical significance ($R^2=0.0938$, $P=0.616$).

Overall – Low. Overall confidence takes the lower of the two confidence determinations.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – TRPA’s Watercraft Team enforces a 600-foot no-wake zone for the shorezone to reduce shoreline noise levels.

Effectiveness of Programs and Actions – The existing program or action has not achieved total compliance (i.e., zero exceedances) with adopted threshold standards based on the status and trend evaluation of available data.

Interim Target – Due to a non-significant trend, an interim target cannot be set.

Target Attainment Date – Due to a non-significant trend, a target attainment date cannot be set.

RECOMMENDATIONS

Analytic Approach – No changes recommended.

Monitoring Approach – Re-engage shorezone noise monitoring once a new shorezone plan is implemented.

Modification of the Threshold Standard or Indicator – The standard should be assessed against best practice for the establishment of standards and indicators for M&E, and amended as necessary to ensure it reflects the latest science and provides information that is useful for management. Recommendation from the current Shoreline Initiative planning process to modify the threshold standard or comprehensive update of noise threshold standards to respond to recommendations of 2011 Threshold Evaluation Report peer review regarding noise standards.

Attain or Maintain Threshold – The conditions for this indicator could potentially improve with increased enforcement of the 600-foot no-wake zone regulation or re-enacting the prohibition on boats operating in the lake that have working, aftermarket exhaust bypass systems (invalidated by the 2010 shorezone litigation against TRPA).

Cumulative Noise Events

Cumulative noise or community noise equivalent level (CNEL) is a noise measurement based on a weighted average of all measured noise over a 24-hour period. The CNEL indicator applies a +4.77 dB (decibel) “penalty” or weight to noise levels during the evening period of 7 p.m. to 10 p.m. and a +10 dB penalty to noise levels during the night-time period of 10 PM to 7 AM to account for people’s increased sensitivity to night-time noise. TRPA adopted CNEL standards for different zones within the basin to account for expected levels of serenity. Zones included TRPA Plan Areas, land use categories and transportation corridors (Table 10-1).

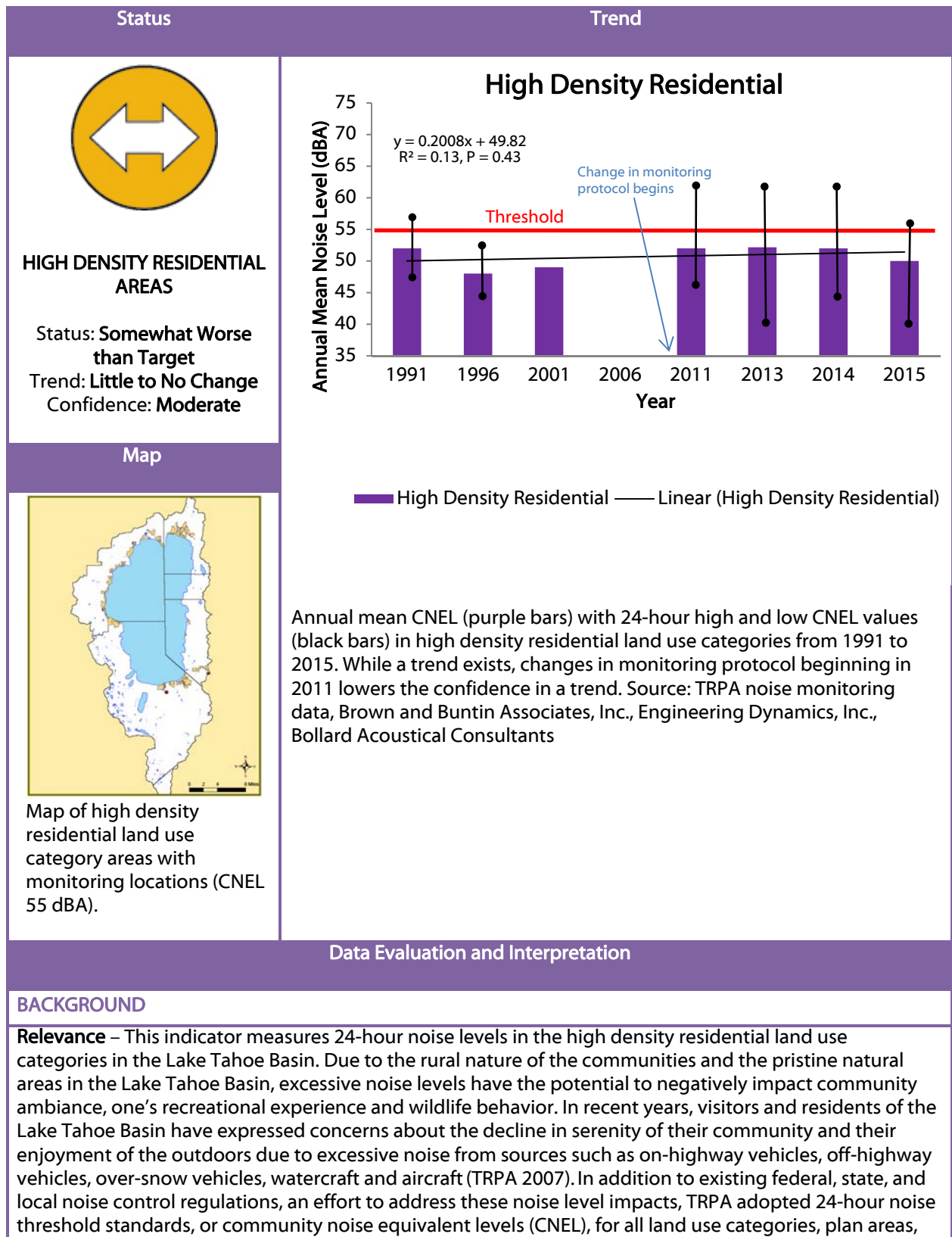
Adopted CNEL standards range from 45 dBA in critical wildlife habitat and wilderness areas to 65 dBA in highway corridors. The following comparisons provide a generalized practical indication of common sounds to which these standards can be compared:

- 40 dBA: residential area with soft radio music
- 50 dBA: open office area background level
- 60 dBA: normal conversational speech at 5-10 feet
- 70 dBA: small air compressor at 50 feet
- 80 dBA: sports car interior at 60 mph
- 90 dBA: industrial boiler room

In previous threshold evaluations, the number of land use types sampled to characterize Regional CNEL was limited, and the CNEL evaluation was typically based on a single 24-hour sampling effort. In 2011, the monitoring protocol was modified. Multiple plan areas within each individual land use category and transportation corridor were measured over at least seven 24-hour periods to determine attainment status by land use category. This monitoring approach was selected based on recommendations from previous CNEL noise studies and TRPA attempts to increase the statistical rigor and confidence in CNEL monitoring in the Region.

The following section provides an evaluation of the status and trends for the CNEL noise indicator. It includes an evaluation of the 16 adopted TRPA threshold standards for CNEL. Evaluations of these indicators were grouped by numerical standard or maximum allowable CNEL value for a specific area.

Cumulative Noise Events: High Density Residential Areas (CNEL 55 dBA)



and transportation corridors of the basin.

TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Cumulative Noise Events-CNEL of 55 dBA, High Density Residential land use categories.

Adopted Standards – For the high density residential land use categories, noise levels shall not exceed a CNEL of 55 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridors are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (Bollard Acoustical Consultants 2014). Other secondary anthropogenic noise influences include noise attributed to construction. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014).

MONITORING AND ANALYSIS

Monitoring Partners – TRPA monitoring with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample in various land use areas. Threshold standard attainment status was based on a single sample representing each land use type. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates 2004). The approach since 2011 monitors the same sites every year for at least seven days during the period of May 15 to October 1. This captures noise levels during the construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human's greater sensitivity to night-time noise.

Analytic Approach – Simple linear regression is used to determine trend. The average CNEL across all monitoring locations within a given land use category is averaged for the final "annual mean CNEL" result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – Somewhat worse than target. The maximum 24-hour CNEL for the most recent monitoring period,(2015) was 56.2 dBA recorded in the Tahoe Keys, which is approximately 102 percent of the standard (TRPA 2015). Therefore, a status of somewhat worse than target was determined.

Trend – Little to no change. The long term trend line shows a negligible increase in annual mean dBA per year in relation to the standard of 55 dBA (TRPA 2015). Therefore, a trend of little to no change was determined.

Confidence –

Status – High. Taking the recommendation of a reputable noise expert, 1) noise monitoring equipment was calibrated according to manufacturers' specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences

about the population of these land uses, and 3) a more robust sampling approach was deployed beginning in 2011. Therefore, confidence is high.

Trend – Low. $R^2 = 0.13$, $P = 0.43$. Due to changes in sampling protocol beginning in 2011, any confidence in trend significance is low.

Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under Code of Federal Regulations CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potential activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. The North Tahoe Public Utility District has a list of rules that prohibits activities that produce excessive noise levels during park hours. Other actions include motor vehicle exhaust system modification restrictions, which the California Highway Patrol (CHP) is required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).

TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on available status and trend information, it appears programs are mostly effective in reducing noise in rural outdoor recreation areas.

Interim Target – No interim target set.

Target Attainment Date – No target attainment date set.

RECOMMENDATIONS

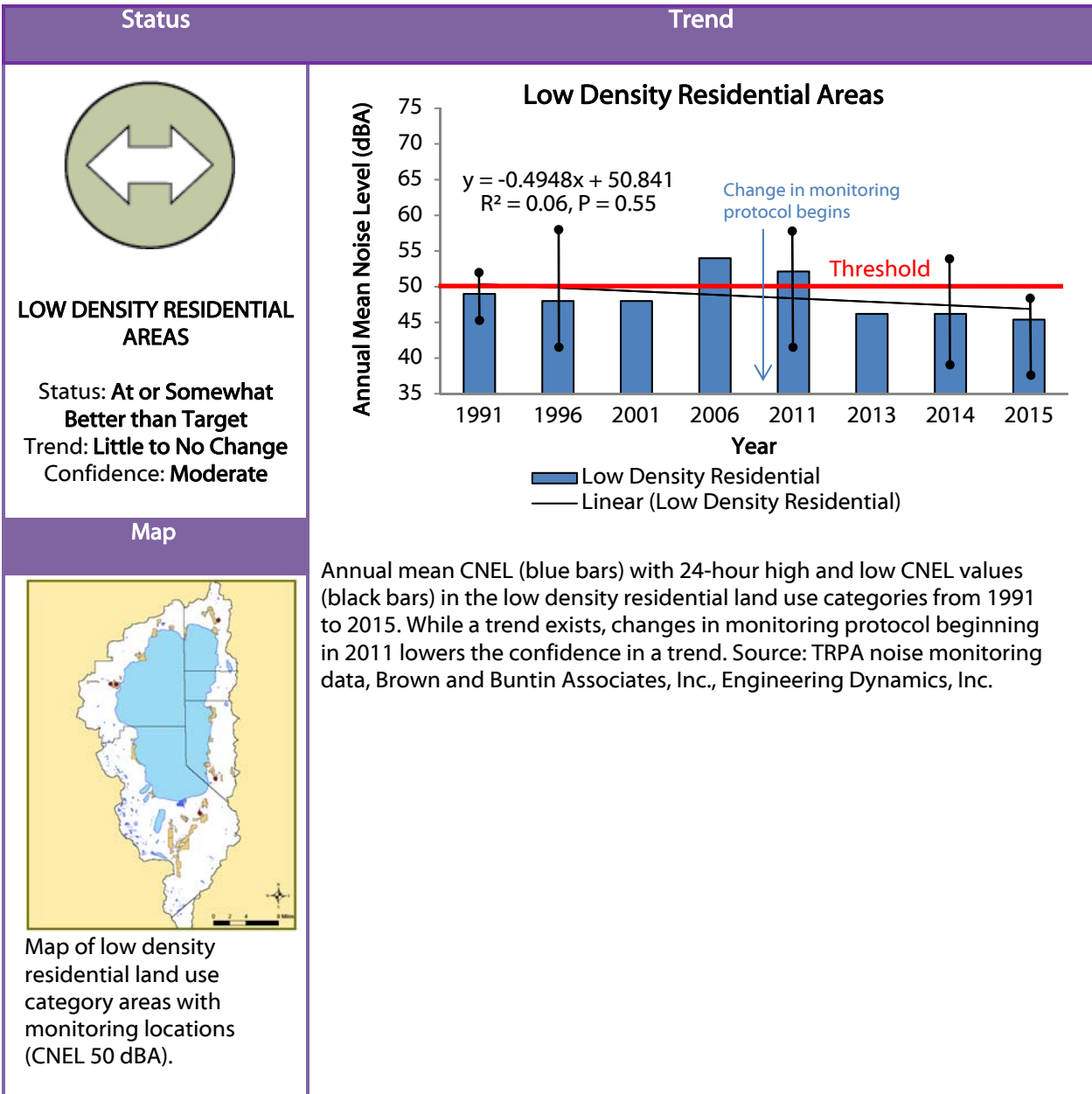
Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

Cumulative Noise Events: Low Density Residential Areas (CNEL 50 dBA)



Data Evaluation and Interpretation

BACKGROUND

Relevance – This indicator measures 24-hour noise levels in the low-density residential land use areas in the Lake Tahoe Basin. Due to the rural nature of the communities and the pristine natural areas in the Lake Tahoe Basin, excessive noise levels have the potential to negatively impact community ambiance, recreational experiences, and wildlife behavior. In the past, visitors and residents of the Lake Tahoe Basin have expressed concerns about the decline in serenity of their community, and their enjoyment of the outdoors due to excessive noise from sources such as on-highway vehicles, off-highway vehicles, over-snow vehicles, watercraft and aircraft (TRPA 2007). In addition to existing federal, state, and local noise control regulations, TRPA adopted 24-hour noise threshold standards, or community noise equivalent levels (CNEL), for all land use categories and plan areas of the basin.

TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Cumulative Noise Events-CNEL of 50 dBA, Low Density Residential areas

Adopted Standards – For the low density residential land use category noise levels shall not exceed a CNEL of 50 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridor are primarily generated from vehicles, roadway traffic, aircraft and recreational activity (Bollard Acoustical Consultants 2014). Other secondary anthropogenic noise influences include noise attributed to construction (Bollard Acoustical Consultants 2014). Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014).

MONITORING AND ANALYSIS

Monitoring Partners – TRPA monitoring with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample in various land use areas. Threshold standard attainment status was based on a single sample representing each land use type. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates 2004). The approach since 2011 monitors the same sites every year for at least seven days during the period of May 15 to October 1. This captures noise levels during the construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human’s greater sensitivity to night-time noise.

Analytic Approach – Simple linear regression is used to assess trend. The average CNEL across all monitoring locations within a given land use category is averaged for the final annual mean CNEL result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – Somewhat better than target. For the most recent year of monitoring (2015) the maximum 24-hour CNEL was 47.6 dBA recorded at Rubicon Estates which is 95 percent of the standard (TRPA 2015). Based on this, the status is determined to be at or somewhat better than target.

Trend – Little to no change. The long term trend line shows a decrease of 0.145 dBA/year, a 0.29 percent decrease per year in relation to the standard of 50 dBA (TRPA 2015). Therefore, a trend of little to no change was determined.

Confidence –

Status – High. Taking the recommendation of a reputable noise expert, 1) noise monitoring equipment was calibrated according to manufacturer specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences

about the population of these land uses, and 3) a more robust sampling approach was deployed beginning in 2011. Therefore, confidence is high.

Trend – Low. $R^2 = 0.06$, $P = 0.55$. Due to changes in sampling protocol beginning in 2011, any confidence in trend significance is low.

Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under Code of Federal Regulation CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potentially loud activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. Other actions include motor vehicle exhaust system modification restrictions, which the California Highway Patrol (CHP) are required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).

TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2014). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on available status and trend information, it appears programs are mostly effective in reducing noise in this land use category.

Interim Target – Threshold is in attainment.

Target Attainment Date – Threshold is in attainment.

RECOMMENDATIONS

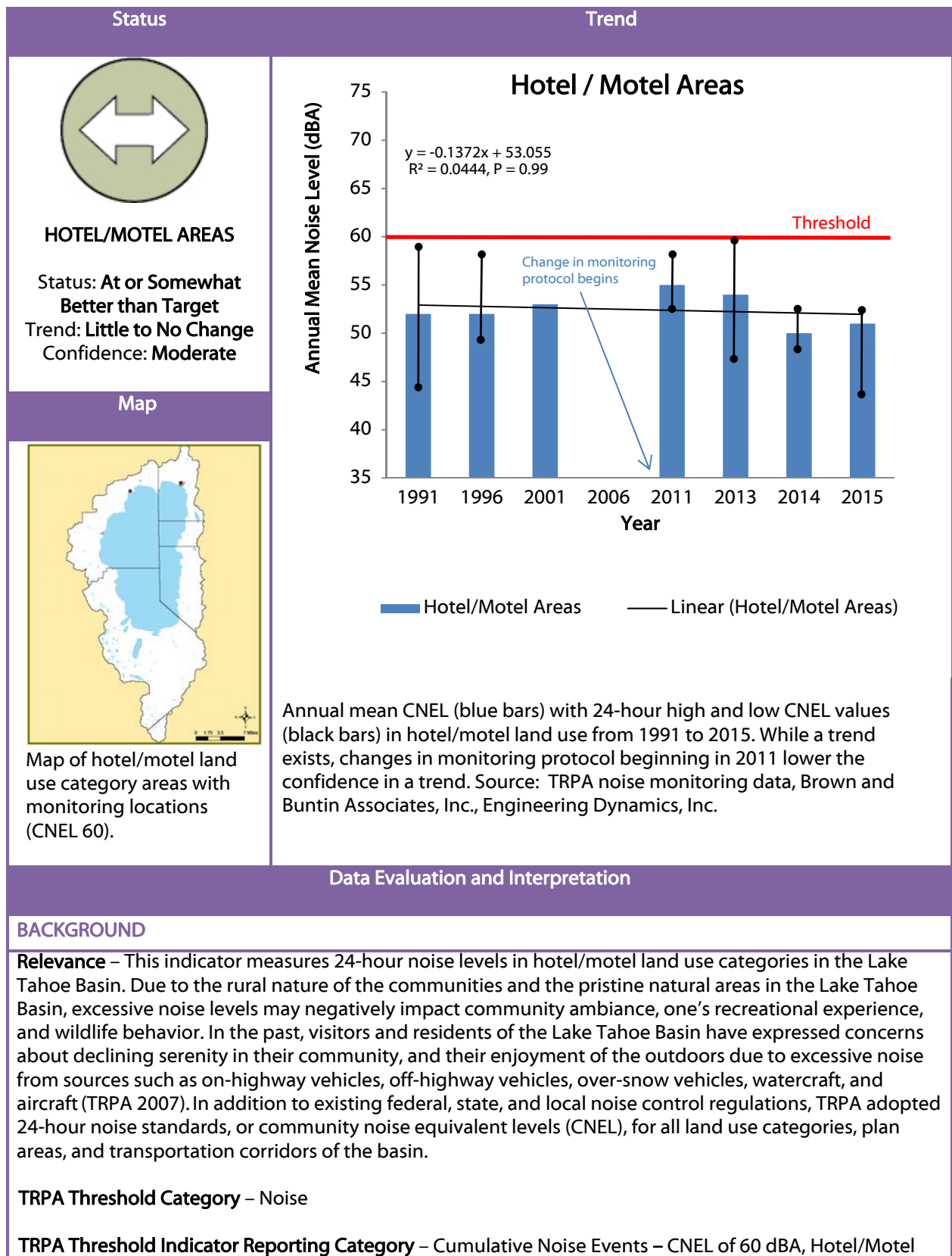
Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

Cumulative Noise Events: Hotel/Motel Areas (CNEL 60 dBA)



land use categories.

Adopted Standards – For the hotel/motel land use categories noise levels shall not exceed a CNEL of 60 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridors are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (Bollard Acoustical Consultants 2014). Other secondary anthropogenic noise influences include noise attributed to construction. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014).

MONITORING AND ANALYSIS

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample in various land use areas. Threshold standard attainment status was based on a single sample representing each land use type. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates 2004). The approach since 2011 monitors the same sites every year for at least seven days during the period of May 15 to October 1. This captures noise levels during the construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human's greater sensitivity to night-time noise.

Analytic Approach – Simple linear regression is used to determine trend. The average CNEL across all monitoring locations within a given land use category is averaged for the final "annual mean CNEL" result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – At or somewhat better than target. In the most recent monitoring period (2015) the maximum 24-hour CNEL was 52.2 dBA recorded in the Carnelian Bay tourist district, which is 88 percent of the standard (TRPA 2015). Therefore, a status of at or somewhat better than target was determined.

Trend – Little to no change. The long term trend line for the hotel/motel land use category shows a decrease of .04 dBA per year, a negligible percent decrease per year in relation to the standard of 60 dBA (TRPA 2015). Therefore, a trend of little to no change was determined.

Confidence –

Status – High. Taking the recommendation of a reputable noise expert, 1) noise monitoring equipment was calibrated according to manufacturers' specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences about the population of these land uses, and 3) a more robust sampling approach was deployed beginning in 2011. Therefore, confidence is high.

Trend – Low. $R^2 = 0.0444$, $P = 0.99$. Due to changes in sampling protocol beginning in 2011, any confidence in trend significance is low.

Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, Code of Federal Regulations CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potential activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. The North Tahoe Public Utility District has a list of rules that prohibits activities that produce excessive noise levels during park hours. Other actions include motor vehicle exhaust system modification restrictions, which the California Highway Patrol (CHP) is required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).

TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on available status and trend information, it appears current programs are mostly effective in reducing noise in hotel/motel areas.

Interim Target – Threshold is in attainment.

Target Attainment Date – Threshold is in attainment.

RECOMMENDATIONS

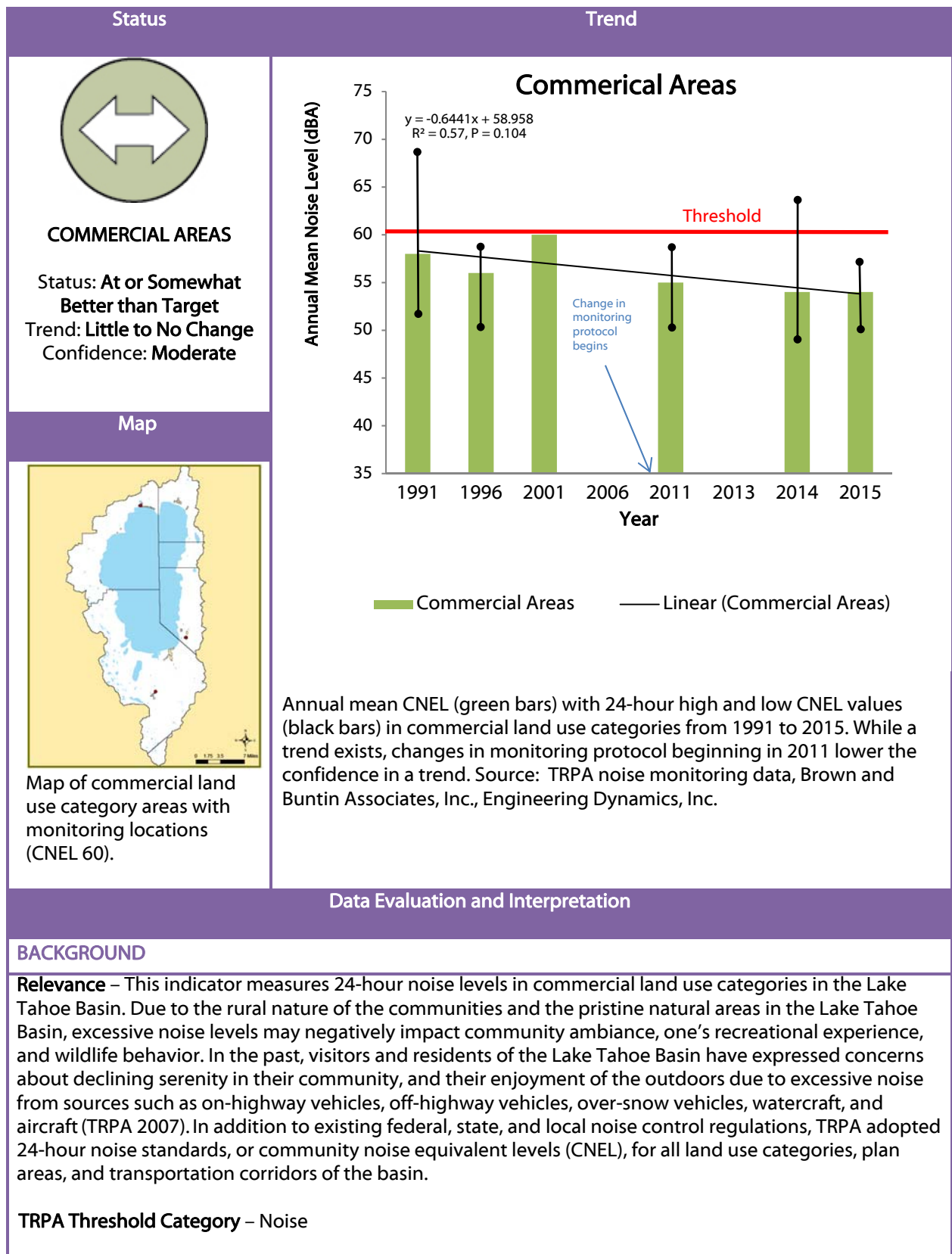
Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

Cumulative Noise Events: Commercial Areas (CNEL 60 dBA)



TRPA Threshold Indicator Reporting Category – Cumulative Noise Events – CNEL of 60 dBA, Commercial land use areas

Adopted Standards – For commercial land use categories noise levels shall not exceed a CNEL of 60 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted Decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (Bollard Acoustical Consultants 2014). Other secondary anthropogenic noise influences include noise attributed to construction. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014).

MONITORING AND ANALYSIS

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample in various land use areas. Threshold standard attainment status was based on a single sample representing each land use type. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates 2004). The approach since 2011 monitors the same sites every year for at least seven days during the period of May 15 to October 1. This captures noise levels during the construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human’s greater sensitivity to night-time noise.

Analytic Approach – Simple linear regression is used to determine trend. The average CNEL across all monitoring locations within a given land use category is averaged for the final “annual mean CNEL” result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – At or somewhat better than target. In the most recent monitoring period, 2015, the maximum 24-hour CNEL was 57.1 dBA recorded in the Kingsbury commercial area, which is 95 percent of the target (TRPA 2015). Therefore, a status of at or somewhat better than target was determined.

Trend – Little to no change. The long term trend for the commercial land use category shows a decrease of 0.18 dBA per year, a decrease of 0.3 percent per year in relation to the standard of 60 dBA (TRPA 2015). Therefore, a trend of little to no change was determined.

Confidence –

Status – High. Taking the recommendation of a reputable noise expert, 1) noise monitoring equipment was calibrated according to manufacturers’ specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences about the population of these land uses, and 3) a more robust sampling approach was deployed beginning in 2011. Consequently, confidence in the status was determined to be high because of the spatial and temporal characterization of CNEL across these land use types.

Trend – Low ($R^2 = 0.57$, $P = 0.104$). Due to changes in sampling protocol beginning in 2011, any confidence in trend significance is low.

Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under Code of Federal Regulations CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potentially loud activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. Other actions include motor vehicle exhaust system modification restrictions, which the California Highway Patrol (CHP) are required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).

TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on available status and trend information, it appears current programs are mostly effective in reducing noise in commercial areas.

Interim Target – Threshold is in attainment.

Target Attainment Date – Threshold is in attainment.

RECOMMENDATIONS

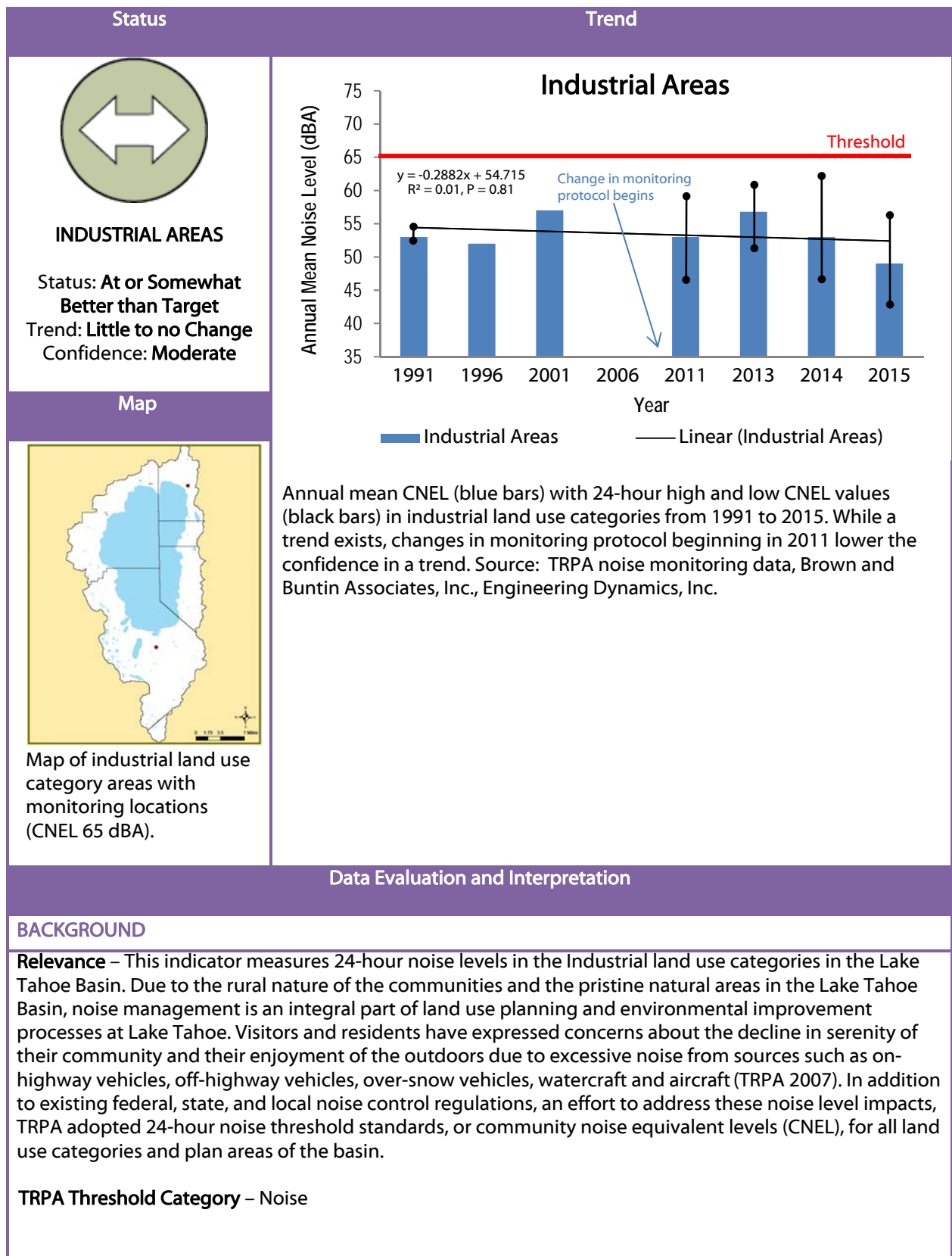
Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

Cumulative Noise Events: Industrial Areas (CNEL 65 dBA)



TRPA Threshold Indicator Reporting Category – Community Noise Equivalent Level - 65 dBA, Industrial Land Use Category

Adopted Standards – For the industrial land use category noise levels shall not exceed a CNEL of 65 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridor are primarily generated from vehicles, roadway traffic, aircraft and recreational activity (Bollard Acoustical Consultants 2014). Other secondary anthropogenic noise influences include noise attributed to construction. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014).

MONITORING AND ANALYSIS

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample in various land use areas. Threshold standard attainment status was based on a single sample representing each land use type. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates 2004). The approach since 2011 monitors the same sites every year for at least seven days during the period of May 15 to October 1. This captures noise levels during the construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human's greater sensitivity to night-time noise.

Analytic Approach – Simple linear regression is used to assess trend. The average CNEL across all monitoring locations within a given land use category is averaged for the final "annual mean CNEL" result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – At or somewhat better than target. In the most recent monitoring period (2015) the maximum 24-hour CNEL was 55.6 dBA recorded at the Industrial Tract in South Lake Tahoe, which is 86 percent of the target (TRPA 2015). Therefore, a status of at or somewhat better than target was determined.

Trend – Little to no change. The long term trend line shows a 0.08 dBA per year decrease, a 0.001 percent decrease in annual mean dBA per year in relation to the standard of 65 dBA (TRPA 2015). Therefore, a trend of little to no change was determined.

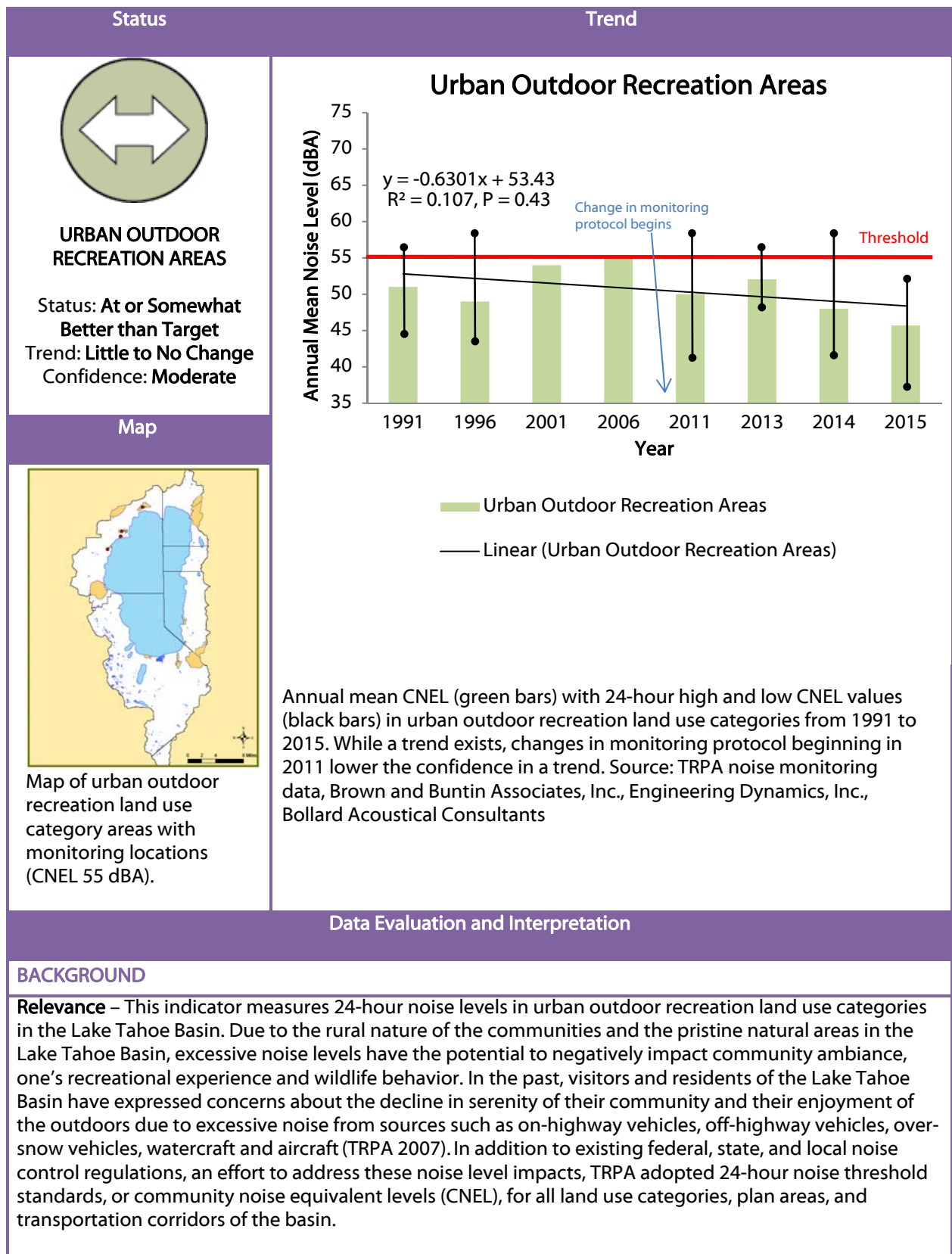
Confidence –

Status – High. Taking the recommendation of a reputable noise expert, 1) noise monitoring equipment was calibrated according to manufacturers' specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences about the population of these land uses, and 3) a more robust sampling approach was deployed beginning in 2011. Therefore, confidence is high.

Trend – Low. $R^2 = 0.01$, $P = 0.81$. Due to changes in sampling protocol beginning in 2011, any confidence in trend significance is low.

<p>Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.</p>
<p>IMPLEMENTATION AND EFFECTIVENESS</p>
<p>Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under Code of Federal Regulations CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potentially loud activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. Other restrictions, enforced by the California Highway Patrol (CHP) under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).</p> <p>TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.</p> <p>Effectiveness of Programs and Actions – Based on available status and trend information, it appears current programs are mostly effective in reducing noise in this land use category.</p> <p>Interim Target – Threshold is in attainment.</p> <p>Target Attainment Date – Threshold is in attainment.</p>
<p>RECOMMENDATIONS</p>
<p>Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.</p> <p>Monitoring Approach – No changes recommended.</p> <p>Modification of the Threshold Standard or Indicator – No changes recommended.</p> <p>Attain or Maintain Threshold – No changes recommended.</p>

Cumulative Noise Events: Urban Outdoor Recreation Areas (CNEL 55 dBA)



TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Cumulative Noise Events-CNEL of 55 dBA, Urban Outdoor Recreation land use categories

Adopted Standards – For urban outdoor recreation land use noise levels shall not exceed a CNEL of 55 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridors are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (Bollard Acoustical Consultants 2014). Other secondary anthropogenic noise influences include noise attributed to construction. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014).

MONITORING AND ANALYSIS

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample in various land use areas. Threshold standard attainment status was based on a single sample representing each land use type. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates 2004). The approach since 2011 monitors the same sites every year for at least seven days during the period of May 15 to October 1. This captures noise levels during the construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human’s greater sensitivity to night-time noise.

Analytic Approach – Simple linear regression is used to determine trend. The average CNEL across all monitoring locations within a given land use category is averaged for the final “annual mean CNEL” result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – At or somewhat better than target. The maximum 24-hour CNEL for the most recent monitoring period,(2015) was 50.1 dBA recorded at the old fish hatchery site in North Lake Tahoe, which is 91 percent of the standard (TRPA 2015). Therefore, a status of at or somewhat better than target was determined.

Trend – Little to no change. The long term trend line shows a decrease of 0.18 dBA/year, a 0.33 percent decrease per year in relation to the standard of 55 dBA (TRPA 2015). Therefore, a trend of little to no change was determined.

Confidence –

Status – High. Taking the recommendation of a reputable noise expert, 1) noise monitoring equipment was calibrated according to manufacturers’ specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences about the population of these land uses, and 3) a more robust sampling approach was deployed beginning in 2011. Therefore, confidence is high.

Trend – Low. $R^2 = 0.107$, $P = 0.43$. Due to changes in sampling protocol beginning in 2011, any confidence in trend is low.

Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under Code of Federal Regulation CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potential activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. The North Tahoe Public Utility District has a list of rules that prohibits activities that produce excessive noise levels during park hours. Other actions include motor vehicle exhaust system modification restrictions, which the California Highway Patrol (CHP) is required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).

TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on available status and trend information, it appears current programs are mostly effective in reducing noise in urban outdoor recreation areas.

Interim Target – Threshold is in attainment.

Target Attainment Date – Threshold is in attainment.

RECOMMENDATIONS

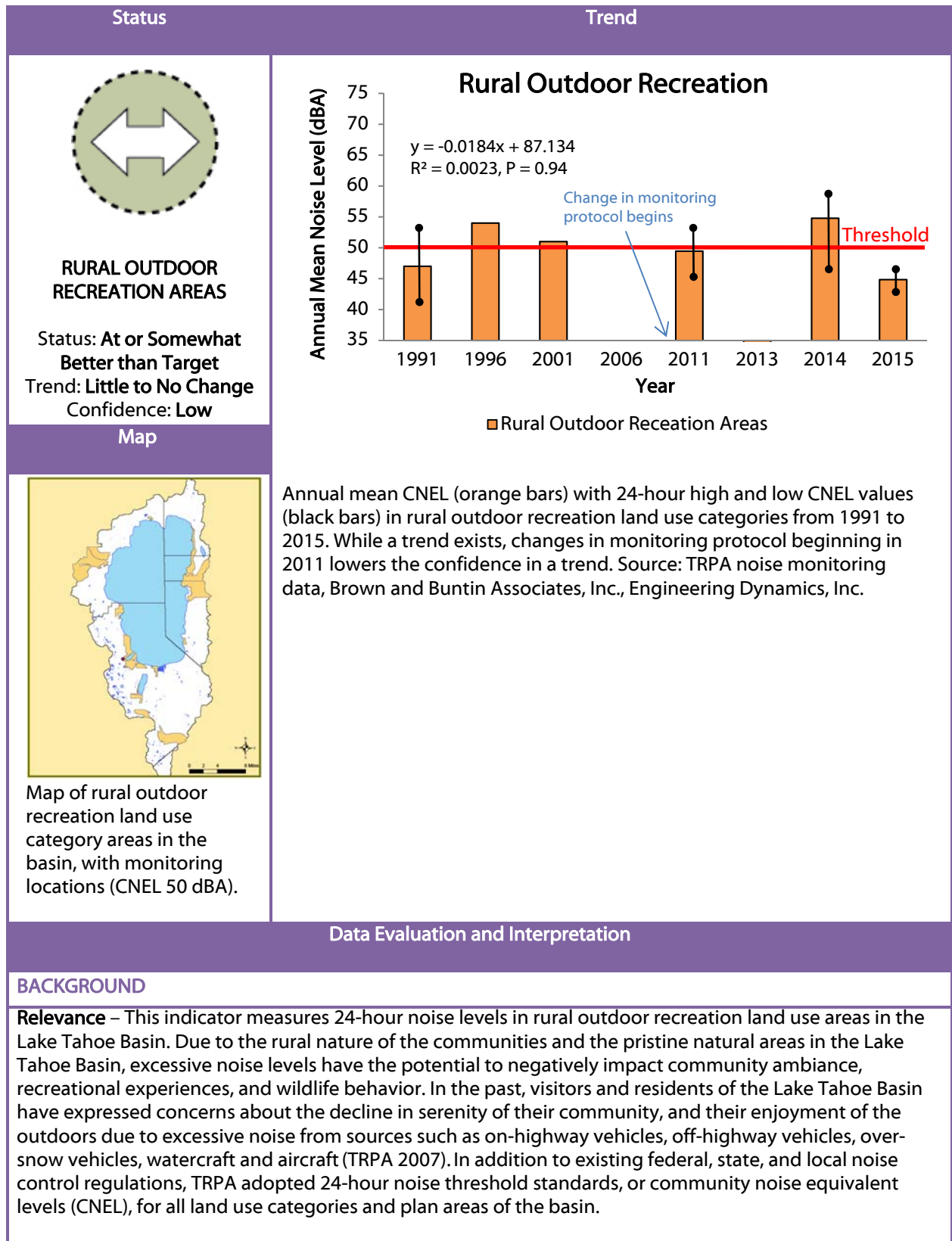
Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

Cumulative Noise Events: Rural Outdoor Recreation Areas (CNEL 50 dBA)



TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Cumulative Noise Events-CNEL of 50 dBA, Rural Outdoor Recreation Areas

Adopted Standards – For the rural outdoor recreation land use category noise levels shall not exceed a CNEL of 50 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (Bollard Acoustical Consultants 2014). Other secondary anthropogenic noise influences include noise attributed to construction. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014).

MONITORING AND ANALYSIS

Monitoring Partners –TRPA monitoring with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample in various land use areas. Threshold standard attainment status was based on a single sample representing each land use type. In contrast to historic monitoring efforts, a more comprehensive CNEL monitoring effort was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates 2004). The approach since 2011 monitors the same sites every year for at least seven days during the period of May 15 to October 1. This captures noise levels during the construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human's greater sensitivity to night-time noise.

Analytic Approach – Simple linear regression is used to determine trend. The average CNEL across all monitoring locations within a given land use category is averaged for the final annual mean CNEL result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – At or somewhat better than target. For the most recent reporting period (2015) the maximum 24-hour CNEL was 45.8 dBA recorded at the Eagle Falls parking lot, which is 92 percent of the target (TRPA 2015). Therefore, a status of at or somewhat better than target was determined.

Trend – Little to no change. The long term trend for the rural outdoor recreation land use category shows a negligible decrease in annual mean dBA per year in relation to the standard of 50 dBA (TRPA 2015). Therefore, a trend of little to no change is determined.

Confidence –

Status – Low. Taking the recommendation of a reputable noise expert, 1) noise monitoring equipment was calibrated according to manufacturers' specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences about the population of these land uses, and 3) a more robust sampling approach was deployed beginning in 2011. However, only one location was used to sample rural outdoor

recreation, thus confidence is low.

Trend – Low. $R^2 = 0.0023$, $P = 0.94$. Due to changes in sampling protocol beginning in 2011, any confidence in trend significance is low.

Overall - Low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under Code of Federal Regulation CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potentially loud activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. Other actions include motor vehicle exhaust system modification restrictions, which the California Highway Patrol (CHP) are required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).

TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on available status and trend information, it appears programs are mostly effective in reducing noise in rural outdoor recreation areas.

Interim Target – Standard is in attainment

Target Attainment Date – Standard is in attainment.

RECOMMENDATIONS

Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – Increase the number of monitoring sites to increase confidence in status.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

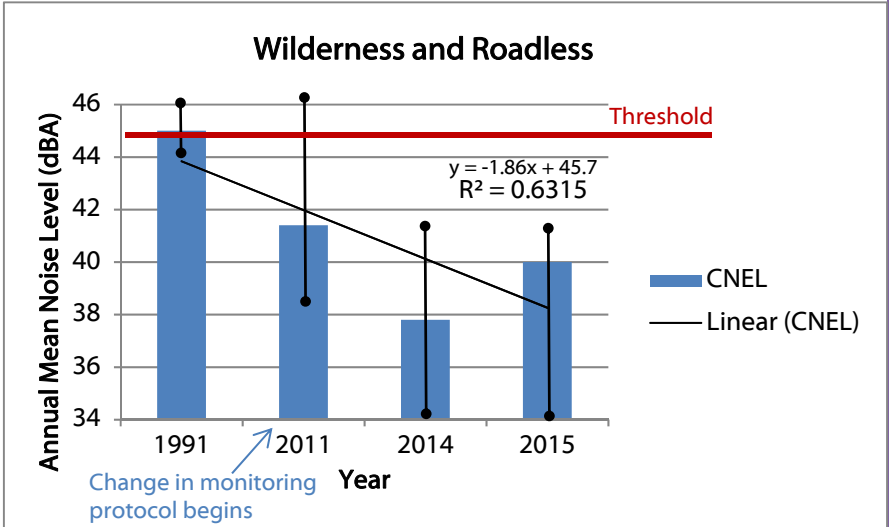
Cumulative Noise Events: Wilderness and Roadless Areas (CNEL 45 dBA)

Status Trend

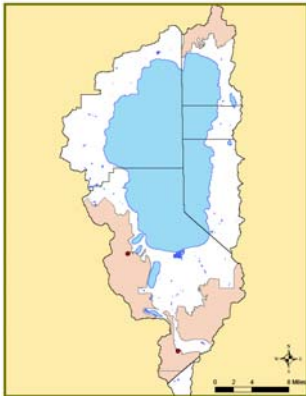


WILDERNESS AND ROADLESS AREAS

Status: **At or Somewhat Better than Target**
 Trend: **Moderate Improvement**
 Confidence: **Moderate**



Map



Map of wilderness and roadless land use category areas in the basin, relative to monitoring locations.

Annual mean CNEL (blue bars) with 24-hour high and low CNEL values (black bars) in the wilderness and roadless land use category from 1991 to 2015. While a trend exists, changes in monitoring protocol beginning in 2011 lower the confidence in a trend. Source: TRPA noise monitoring data, Engineering Dynamics, Inc.

Data Evaluation and Interpretation

BACKGROUND

Relevance – This indicator measures 24-hour noise levels in the wilderness and roadless land use category in the Lake Tahoe Basin. In recent years, visitors to and residents of the Lake Tahoe Basin have expressed concerns about the decline in serenity of their community and their enjoyment of the outdoors due to excessive noise from sources such as on-highway vehicles, off-highway vehicles, over-snow vehicles, watercraft and aircraft (TRPA 2007). Excessive noise levels, specifically in wilderness areas, can be especially disruptive. In addition to existing federal, state, and local noise control regulations to address impacts of

noise on both wildlife and people, TRPA adopted community noise equivalent levels (CNEL) for all land use categories in the basin.

TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Cumulative Noise Events–CNEL of 45 dBA, Wilderness and Roadless areas

Adopted Standards – For the wilderness/roadless land use category, noise levels shall not exceed a CNEL of 45 Dba

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridors are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (TRPA 2007). Other secondary anthropogenic noise influences include noise attributed to road construction and ambient basin noise (Bollard Acoustical Consultants 2014). Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014a).

MONITORING AND ANALYSIS

Monitoring Partners – TRPA monitoring with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample in various land use areas. Threshold standard attainment status was based on a single sample representing each land use type. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates 2004). The approach since 2011 monitors the same sites every year for at least seven days during the period of May 15 to October 1. This captures noise levels during the construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human's greater sensitivity to night-time noise.

Analytic Approach – Simple linear regression is used to determine trend. The average CNEL across all monitoring locations within a given land use category is averaged for the final "annual mean CNEL" result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – At or somewhat better than target. The wilderness and roadless land use category maximum 24-hour CNEL in the most recent monitoring period (2015) was 42.4 dBA recorded at the Dardanelles site, which is 92 percent of the standard (TRPA 2015). Therefore, a status of at or somewhat better than target was determined.

Trend – Moderate improvement. The long term trend line shows a decrease of 0.52 percent annual mean dBA per year in relation to the standard of 45 dBA (TRPA 2015). Therefore, a trend of moderate improvement was determined.

Confidence –

Status – High. Taking the recommendation of a reputable noise expert, 1) noise monitoring equipment was calibrated according to manufacturer specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences about the population of these land uses, and 3) a more robust sampling approach was deployed beginning in 2011. Therefore, confidence is high.

Trend – Low ($R^2 = 0.82$, $P = 0.09$). While there is a statistically significant long-term trend line, due to changes in sampling protocol beginning in 2011, any confidence in trend significance is low.

Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service prohibits the use of all motorized and mechanized vehicles within wilderness areas. Also, the U.S. Forest Service, under Code of Federal Regulation 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). In 2004, the Federal Aviation Administration (FAA) released an Advisory Circular (AC) that addressed flights over or near noise-sensitive areas. This document requested that pilots fly at altitudes higher than the minimum permitted by regulation, and on flight paths that will reduce aircraft noise in such area (U.S. Department of Transportation - Federal Aviation Administration 2004). Specifically, the document stated that pilots operating noise-producing aircraft over noise-sensitive areas should make every effort to fly not less than 2,000 feet above ground level, weather permitting (U.S. Department of Transportation - Federal Aviation Administration 2004). California State Parks restricts the use of off-highway motorized vehicles in the basin. TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on available status and trend information, it appears current programs are effective in minimizing noise in wilderness and roadless areas.

Interim Target – Threshold is in attainment.

Target Attainment Date – Threshold is in attainment.

RECOMMENDATIONS

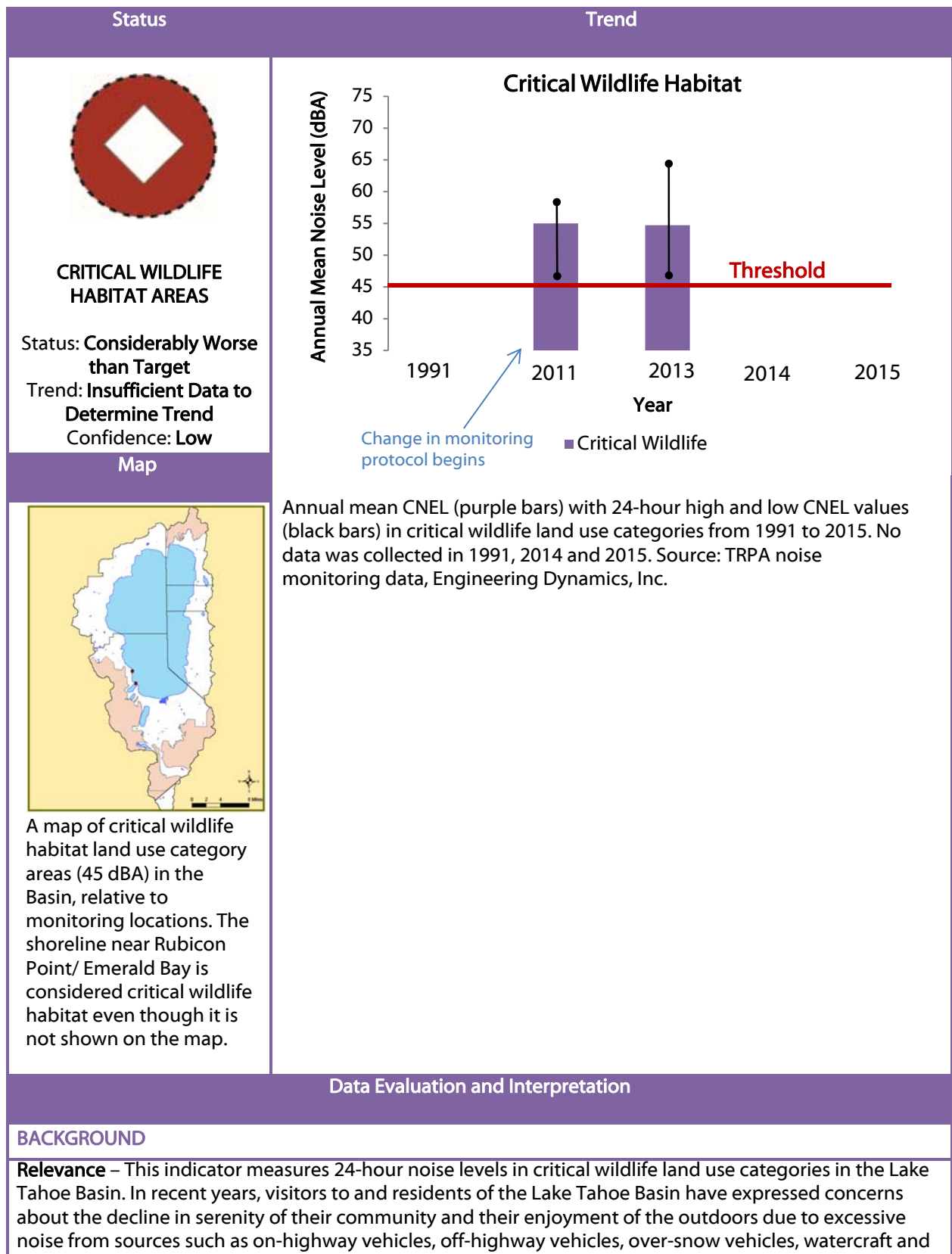
Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

Cumulative Noise Events: Critical Wildlife Habitat Areas (CNEL 45dBA)



aircraft (TRPA 2007). Excessive noise levels, specifically in critical wildlife habitat areas, can be especially disruptive. Agencies in the basin have adopted specific restrictions and threshold standards to protect sensitive wildlife habitat, and have identified this unique fauna on a special interest species list. In addition to existing federal, state, and local noise control regulations to address impacts of noise on both wildlife and people, TRPA adopted community noise equivalent levels (CNEL) for all land use categories in the basin.

TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Cumulative Noise Events-CNEL of 45 dBA for critical wildlife habitat areas

Adopted Standards – For the critical wildlife habitat land use category, noise levels shall not exceed a CNEL of 45 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Noise sources that affect critical wildlife areas in the Region include automobiles, motorized watercraft, aircraft and other recreational activity (Bollard Acoustical Consultants 2014). Natural events such as thunderstorms, wave slap, and wind can influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014).

MONITORING AND ANALYSIS

Monitoring Partners – TRPA monitoring with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample in various land use areas. Threshold standard attainment status was based on a single sample representing each land use type. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol was implemented in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates 2004). The approach since 2011 monitors the same sites every year for at least seven days during the period of May 15 to October 1. This captures noise levels during the construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human's greater sensitivity to night-time noise.

Analytic Approach – The average CNEL across all monitoring locations within a given land use category is averaged for the final "annual mean CNEL" result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – Considerably worse than target. Measurements for critical wildlife areas are available only for two years: 2011 and 2013. In those two years, the CNEL far exceeded the standard. In 2013, the most recent year of monitoring, the maximum 24-hour CNEL was 65.3 dBA recorded at Rubicon Point, which is 144 percent of the standard (Bollard Acoustical Consultants 2014a). Consequently, a determination of considerably worse than target was made.

Trend – Insufficient data to determine trend. Only data from 2011 and 2013 is available for critical wildlife areas. Limited data availability precludes an analysis of trends.

Confidence –

Status – Low. Taking the recommendation of a reputable noise expert, 1) noise monitoring equipment was calibrated according to manufacturer specifications, 2) sampled land use units and locations within each land use category were randomly selected to improve inferences about the population of these land uses, and 3) a more robust sampling approach was deployed in 2011. However, because only 2011 and 2013 data is available, confidence is low.

Trend – Low. Insufficient data is available to make a trend determination.

Overall – Low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service restricts the use of all motorized and mechanized vehicles within wilderness areas. Also, the U.S. Forest Service, under Code of Federal Regulation CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). In 2004, the Federal Aviation Administration (FAA) released an Advisory Circular (AC) that addressed flights over or near noise-sensitive areas. The AC requested that pilots fly at altitudes higher than the minimum permitted by regulation, and on flight paths that will reduce aircraft noise in such areas (U.S. Department of Transportation - Federal Aviation Administration 2004). Specifically, the document stated that pilots operating noise-producing aircraft over noise-sensitive areas should make every effort to fly not less than 2,000 feet above ground level, weather permitting (U.S. Department of Transportation - Federal Aviation Administration 2004). In addition, the shorezone of Lake Tahoe has noise-related ordinances and regulations in TRPA code. These include a single event noise threshold of 75 dB, as well as a 600 ft. “no-wake zone” shorezone regulation. California State Parks restricts the use of off-highway motorized vehicles in the basin. TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – While there is limited data available for critical wildlife areas, the data available suggests that programs are not working to decrease noise in critical wildlife areas associated with offshore motorized watercraft.

Interim Target – No interim target set.

Target Attainment Date – Because limited data is available, it is not possible to set a target attainment date.

RECOMMENDATIONS

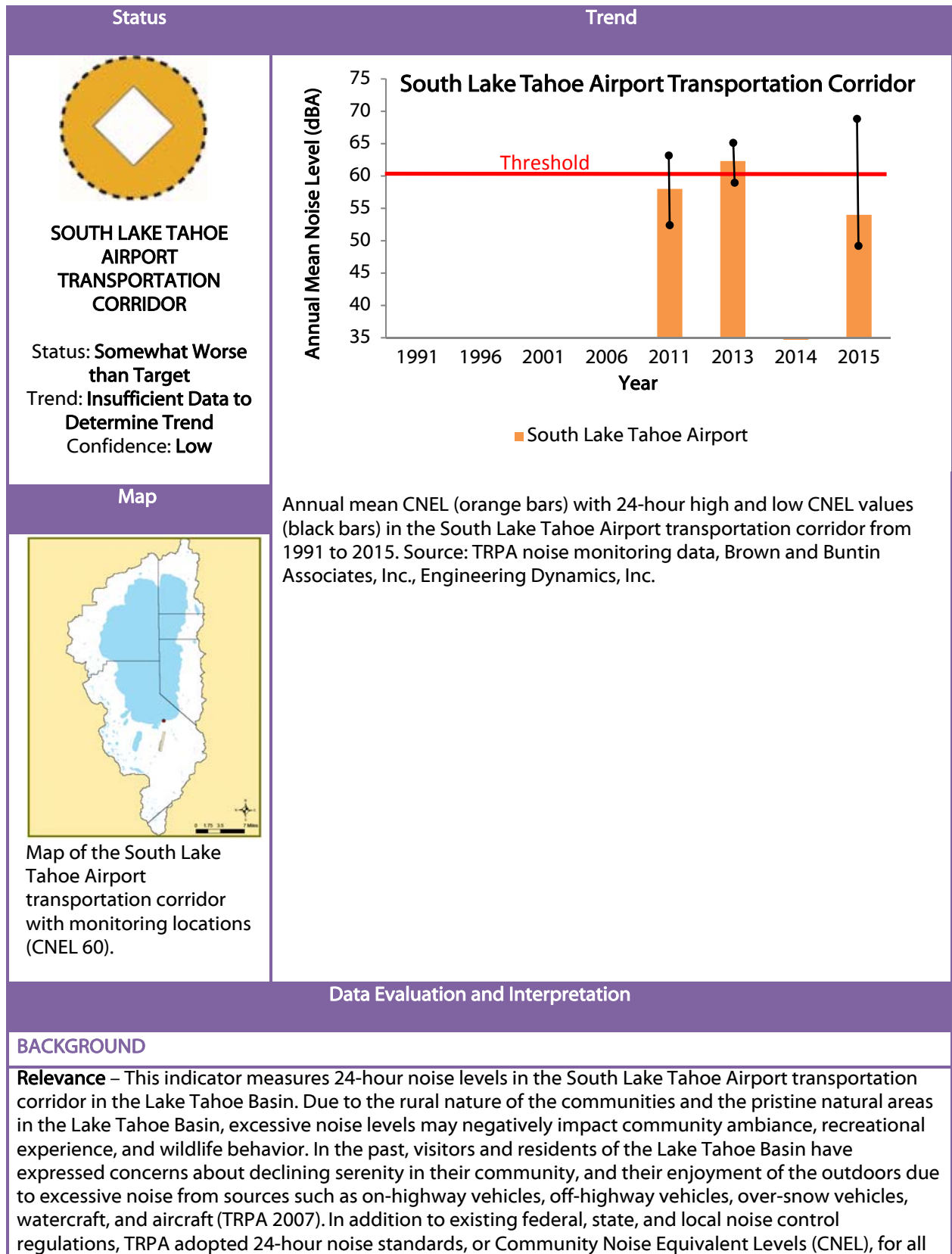
Analytic Approach – Noise experts have recommended that, status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – CNEL for the critical wildlife habitat land use category is out of attainment with the adopted threshold standard. Use management recommendations from the current Shoreline Initiative planning process to move the standard into attainment.

Cumulative Noise Events: South Lake Tahoe Airport Transportation Corridor (CNEL 60 dBA)



land use categories, plan areas, and transportation corridors of the basin.

TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Cumulative Noise Events – CNEL of 60 dBA, South Lake Tahoe Airport Transportation Corridor

Adopted Standards – For the South Lake Tahoe Airport transportation corridor noise levels shall not exceed a CNEL of 60 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridor are primarily generated from vehicles, roadway traffic, aircraft and recreational activity (Bollard Acoustical Consultants 2014). Other secondary anthropogenic noise influences include noise attributed to construction. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014).

MONITORING AND ANALYSIS

Monitoring Partners – Monitoring was conducted by TRPA and the City of South Lake Tahoe with land access granted by the California Tahoe Conservancy.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample per measured plan area. Threshold standard attainment status was based on a single sample representing a land use type. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol was implemented beginning in 2011. The 2011 monitoring approach was based on recommendations provided by a noise expert (Brown-Buntin Associates 2004). The approach since 2011 monitors the same sites every year for at least seven days during the period of May 15 to October 1. This captures noise levels during construction season and the busiest tourist seasons. Natural noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human’s greater sensitivity to night-time noise. In addition, CNEL values for the South Lake Tahoe Airport transportation corridor were gathered at the Barton Beach site (see indicator summary “Single Noise Event-Aircraft” for site specifics).

Analytic Approach – The highest recorded 24-hour CNEL is used for status analysis. Because only three years of data exists, trend analysis was not conducted.

INDICATOR STATE

Status – Somewhat worse than target. In 2015, the most recent monitoring period, the maximum 24-hour CNEL was 115 percent of the target (TRPA 2015). Therefore, a status of somewhat worse than target was determined.

Trend – Insufficient data to determine trend. While there has been a decrease in mean annual CNEL levels for the airport location since 2011, the limited amount of data results in a trend of insufficient data.

Confidence –

Status – Low. Monitoring is conducted following widely accepted protocols, but due to the inability to differentiate between the sources of the exceedances, confidence is low.

Trend – Low. Only three years of data exists.

Overall – Low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The City of South Lake Tahoe has published noise abatement guidelines on the South Lake Tahoe Airport website for all pilots. These guidelines pertain to aircraft flight paths and for low altitude departures and approaches over environmentally sensitive and residential areas.

Effectiveness of Programs and Actions – Based on available trend information and the lack of program-specific effectiveness monitoring, it is not possible to characterize the effectiveness of existing regulations and programs with certainty.

Interim Target – No interim target set.

Target Attainment Date – Because there is no established trend, a target attainment data is not possible to estimate.

RECOMMENDATIONS

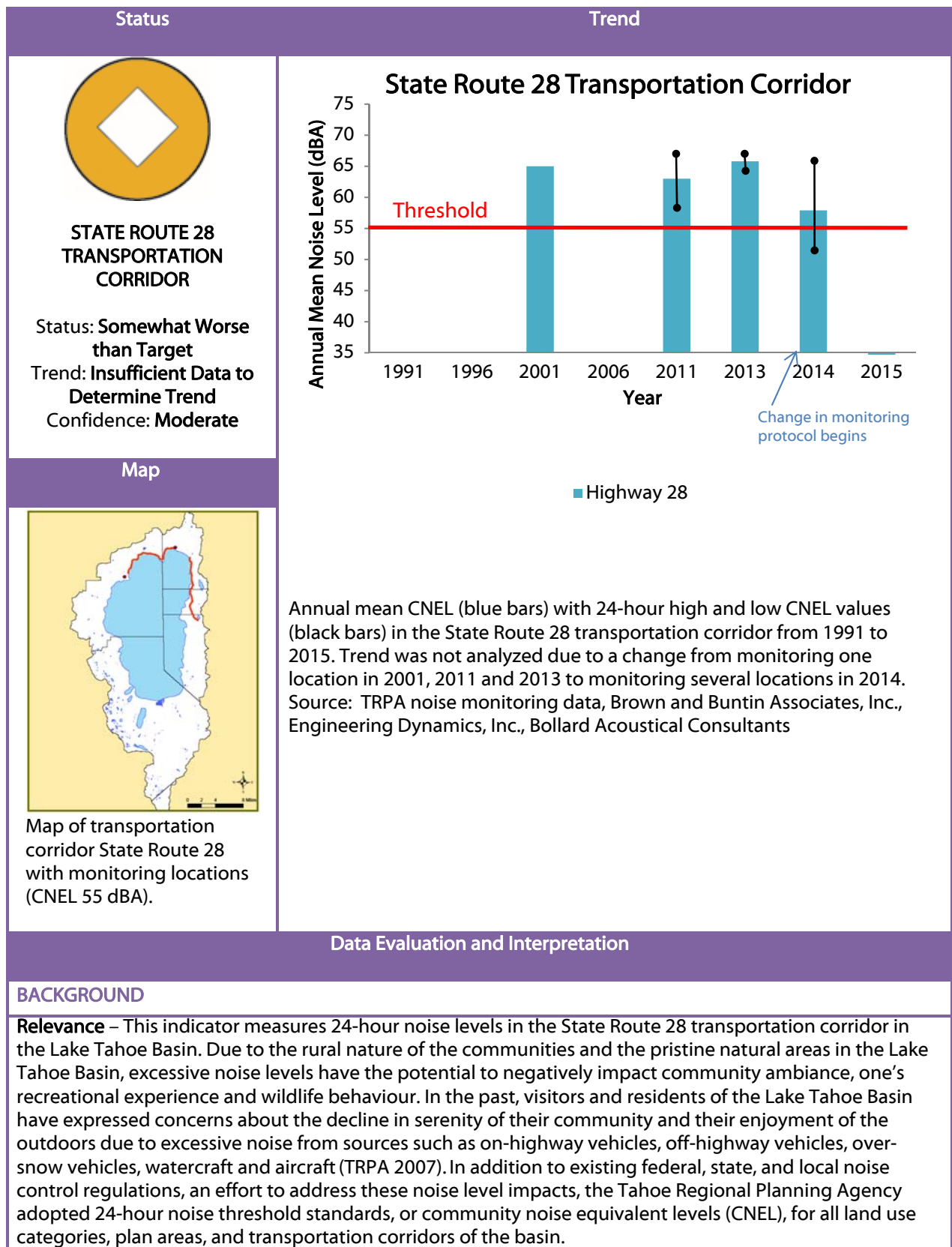
Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should be based on annual mean CNEL, instead of the current practice of using the maximum 24 hour CNEL.

Monitoring Approach – Development of a cost-effective monitoring and evaluation methodology for CNEL in the South Lake Tahoe Airport Corridor.

Modification of the Threshold Standard or Indicator – The standard should be assessed against best practice for the establishment of standards and indicators for M&E, and amended as necessary to ensure it reflects the latest science and provides information that is useful for management. Clarification is needed on whether the threshold will be analysed based on the most current years' data only (current approach) or using a four-year or other periodic average.

Attain or Maintain Threshold –The feasibility of meeting currently adopted CNEL (or single event) noise threshold standards for the Airport is uncertain and should be evaluated. Based on the evaluation, threshold standards should be considered for adjustment consistent with FAA, TRPA, and airport permit requirements. Modified threshold standards, if any, should be addressed and incorporated in updates to the Airport Master Plan.

Cumulative Noise Events: State Route 28 Transportation Corridor (CNEL 55 dBA)



TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Cumulative Noise Events-CNEL of 55 dBA, State Route 28 Transportation Corridor

Adopted Standards – For the State Route 28 transportation corridor, noise levels shall not exceed a CNEL of 55 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridors are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (Bollard Acoustical Consultants 2014a). Other secondary anthropogenic noise influences include noise attributed to construction. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014a).

MONITORING AND ANALYSIS

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample at each transportation corridor. Threshold standard attainment status was based on a single sample representing a transportation corridor. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol for transportation corridors was conducted in 2014. The 2014 monitoring approach was based on recommendations provided by a noise expert (Bollard Acoustical Consultants 2014b). The 2014 approach monitored several sites along each transportation corridor for multiple weeks during the period of May 15 to October 1. This captures noise levels during the construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human’s greater sensitivity to night-time noise.

Analytic Approach – Because data is not comparable across years due to changes in monitoring approach, trend was not analyzed. The average CNEL across all monitoring locations within a given land use category is averaged for the final “annual mean CNEL” result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – Somewhat worse than target. The maximum 24-hour CNEL from 2014, the most current year of data, was 65.2 dBA which is 115 percent of the target (Bollard Acoustical Consultants 2014b). Therefore, a status of somewhat worse than target was determined. Additionally, the 24-hour CNEL was above the standard on 88 percent of sampling days.

Trend – Insufficient data to determine trend. The 2014 monitoring cannot be compared to previous years due to changes in sampling protocol. Therefore, trend analysis was not completed.

Confidence –

Status – High. Based on the recommendations of noise experts a more robust sampling approach was initiated in 2014, including additional instrument calibration and monitoring at several locations within each transportation corridor.

Trend – Low. Due to the significant change in monitoring approach (one location vs. several locations), trend cannot be analyzed.
Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under Code of Federal Regulations CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potential activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. The North Tahoe Public Utility District has a list of rules that prohibits activities that produce excessive noise levels during park hours. Other actions include motor vehicle exhaust system modification restrictions, which the California Highway Patrol (CHP) is required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).

TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on the fact that State Route 28 has been out of attainment every year it was monitored, and there is no significant trend, it appears current programs and actions are not effective in reducing noise levels on State Route 28.

Interim Target – No interim target set.

Target Attainment Date – Because trend data is not available, it is not possible to set a target attainment date.

RECOMMENDATIONS

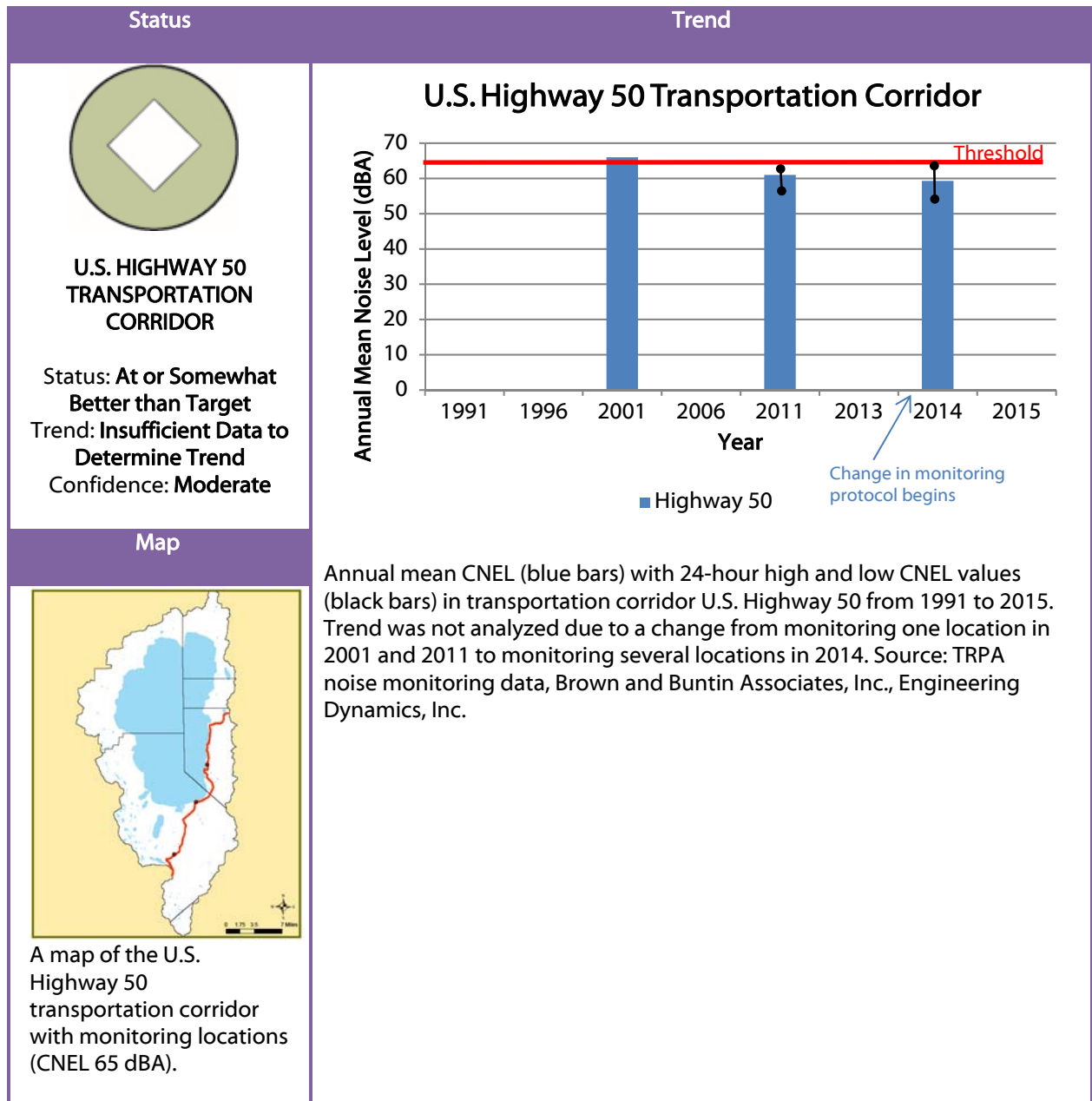
Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

Cumulative Noise Events: U.S. Highway 50 Transportation Corridor (CNEL 65 dBA)



Data Evaluation and Interpretation

BACKGROUND

Relevance – This indicator measures 24-hour noise levels in the U.S. Highway 50 transportation corridor in the Lake Tahoe Basin. Due to the rural nature of the communities and the pristine natural areas in the Lake Tahoe Basin, noise management is an integral part of land use planning and environmental improvement processes at Lake Tahoe. Visitors and residents have expressed concerns about the decline in serenity of their community and their enjoyment of the outdoors due to excessive noise from sources such as on-highway vehicles, off-highway vehicles, over-snow vehicles, watercraft and aircraft (TRPA 2007). In addition to existing federal, state, and local noise control regulations, an effort to address these noise level impacts, TRPA adopted 24-hour noise threshold standards, or Community Noise Equivalent Levels (CNEL), for all land use categories and plan areas of the basin.

TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Community Noise Equivalent Level - 65 dBA, U.S. Highway 50 Transportation Corridor

Adopted Standards – For the U.S. Highway 50 transportation corridor noise levels shall not exceed a CNEL of 65 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridor are primarily generated from vehicles, roadway traffic, aircraft and recreational activity (Bollard Acoustical Consultants 2014a). Other secondary anthropogenic noise influences include noise attributed to road construction and ambient basin noise. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014a).

MONITORING AND ANALYSIS

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample at each transportation corridor. Threshold standard attainment status was based on a single sample representing a transportation corridor. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol for transportation corridors was conducted in 2014. The 2014 monitoring approach was based on recommendations provided by a noise expert (Bollard Acoustical Consultants 2014b). The 2014 approach monitored several sites along each transportation corridor for multiple weeks during the period of May 15 to October 1. This captures noise levels during construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human’s greater sensitivity to night-time noise.

Analytic Approach – Because data is not comparable across years due to changes in monitoring approach, trend was not analyzed. The average CNEL across all monitoring locations within a given land use category is averaged for the final “annual mean CNEL” result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – At or somewhat better than target. The maximum 24-hour CNEL for the most recent monitoring period, 2014, was 63.9 dBA, which is approximately 99 percent of the target (Bollard Acoustical Consultants 2014b). Therefore, a status of at or somewhat better than target was determined. In 2014, Bollard Acoustical Consultants were hired to do a comprehensive study of these transportation corridors. This study took data over multiple weeks and at multiple segments. While it does tell us much about the current status, the data is not comparable to previous year’s data where data was collected at only one point. For this corridor in 2014, the 24-hour CNEL was never exceeded.

Trend – Insufficient data to determine trend. The 2014 monitoring cannot be compared to previous years due to changes in the sampling protocol. Because only two comparable points exist, a trend of insufficient data to determine trend is given.

Confidence –

Status – High. Based on the recommendations of noise experts a more robust sampling approach was initiated in 2014, including additional instrument calibration and monitoring at several locations within each transportation corridor.

Trend – Low. Due to significant changes in monitoring approach (one location vs. several locations), trend cannot be analyzed.

Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under Code of Federal Regulation CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potentially loud activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. Other restrictions, enforced by the California Highway Patrol (CHP) under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).

TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on available status and trend information, it appears programs are mostly effective in reducing noise in this transportation corridor.

Interim Target – Threshold is in attainment.

Target Attainment Date – Threshold is in attainment.

RECOMMENDATIONS

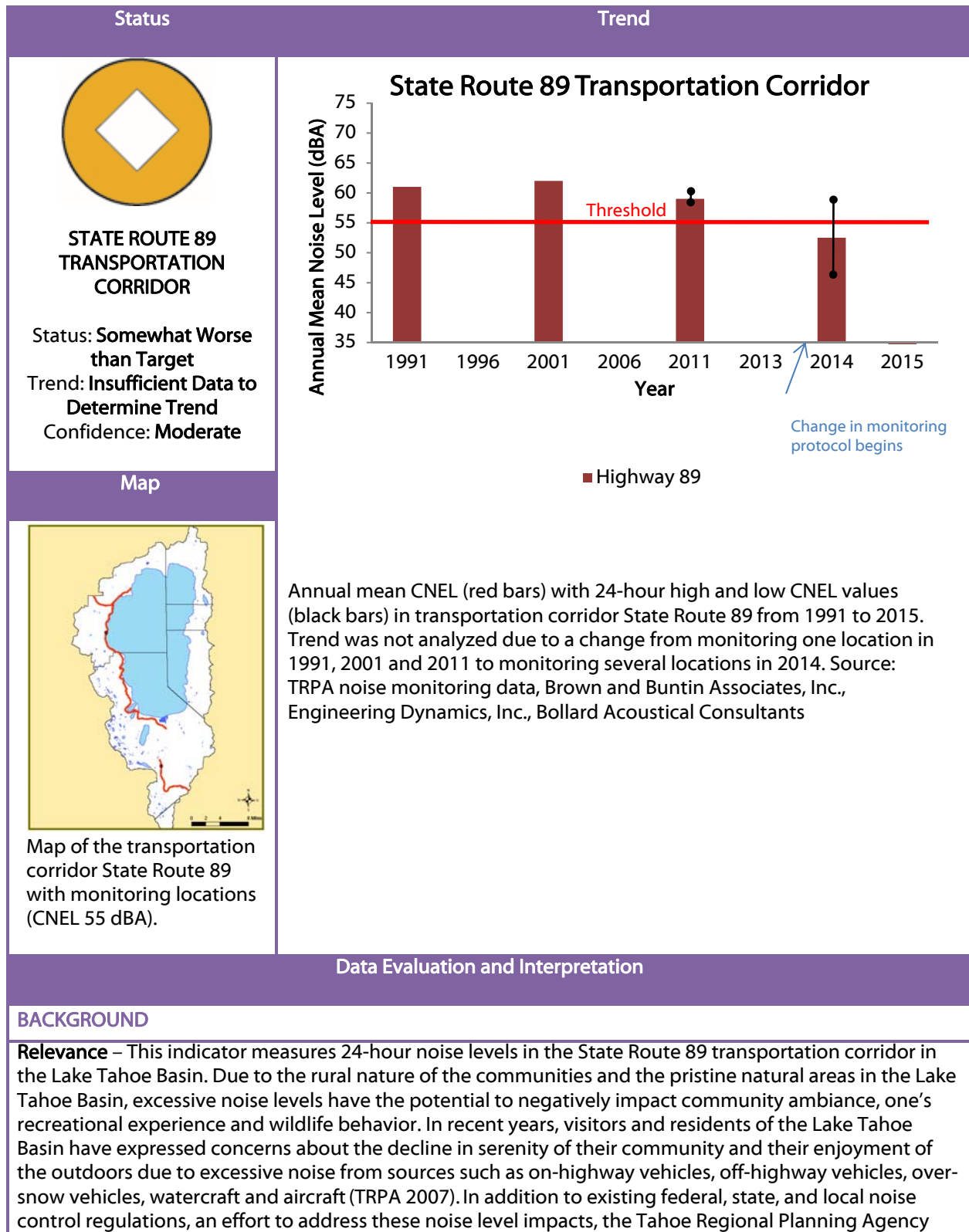
Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

Cumulative Noise Events: State Route 89 Transportation Corridor (CNEL 55 dBA)



adopted 24-hour noise threshold standards, or community noise equivalent levels (CNEL), for all land use categories, plan areas, and transportation corridors of the basin.

TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Cumulative Noise Events-CNEL of 55 dBA, State Route 89 Transportation Corridor

Adopted Standards – For the State Route 89 transportation corridor, noise levels shall not exceed a CNEL of 55 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridors are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (Bollard Acoustical Consultants 2014a). Other secondary anthropogenic noise influences include noise attributed to construction. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014a).

MONITORING AND ANALYSIS

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample at each transportation corridor. Threshold standard attainment status was based on a single sample representing a transportation corridor. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol for transportation corridors was conducted in 2014. The 2014 monitoring approach was based on recommendations provided by a noise expert (Bollard Acoustical Consultants 2014b). The 2014 approach monitored several sites along each transportation corridor for multiple weeks during the period of May 15 to October 1. This captures noise levels during construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human's greater sensitivity to night-time noise.

Analytic Approach – Because data is not comparable across years due to changes in monitoring approach, trend was not analyzed. The average CNEL across all monitoring locations within a given land use category is averaged for the final "annual mean CNEL" result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – Somewhat worse than target. The maximum 24-hour CNEL recorded in 2014, the most recent year data is available, was 59.4 dBA, which is 107 percent of the target. Therefore, a status of somewhat worse than target was determined (Bollard Acoustical Consultants 2014b). Sampling in 2014 was done at multiple segments as opposed to at one location in prior evaluations, therefore data is not comparable. For this corridor in 2014, the 24-hour CNEL was above the standard on 28 percent of sampling days.

Trend – Insufficient data to determine trend. The 2014 monitoring cannot be compared to previous years due to changes in sampling protocol. Therefore, trend analysis was not completed.

Confidence –

Status – High. Based on the recommendations of noise experts a more robust sampling approach was initiated in 2014, including additional instrument calibration and monitoring at several locations within each transportation corridor.

Trend – Low. Due to significant changes in monitoring approach (one location vs. several locations), trend cannot be analyzed.

Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under Code of Federal Regulation CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potential activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. The North Tahoe Public Utility District has a list of rules that prohibits activities that produce excessive noise levels during park hours. Other actions include motor vehicle exhaust system modification restrictions, which the California Highway Patrol (CHP) is required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).

TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on the fact that State Route 89 has been out of attainment every year it was monitored, and there is no significant trend, it appears current programs and actions are not effective in reducing noise levels on State Route 89.

Interim Target – No interim target set.

Target Attainment Date – Because trend data is not available, it is not possible to set a target attainment date.

RECOMMENDATIONS

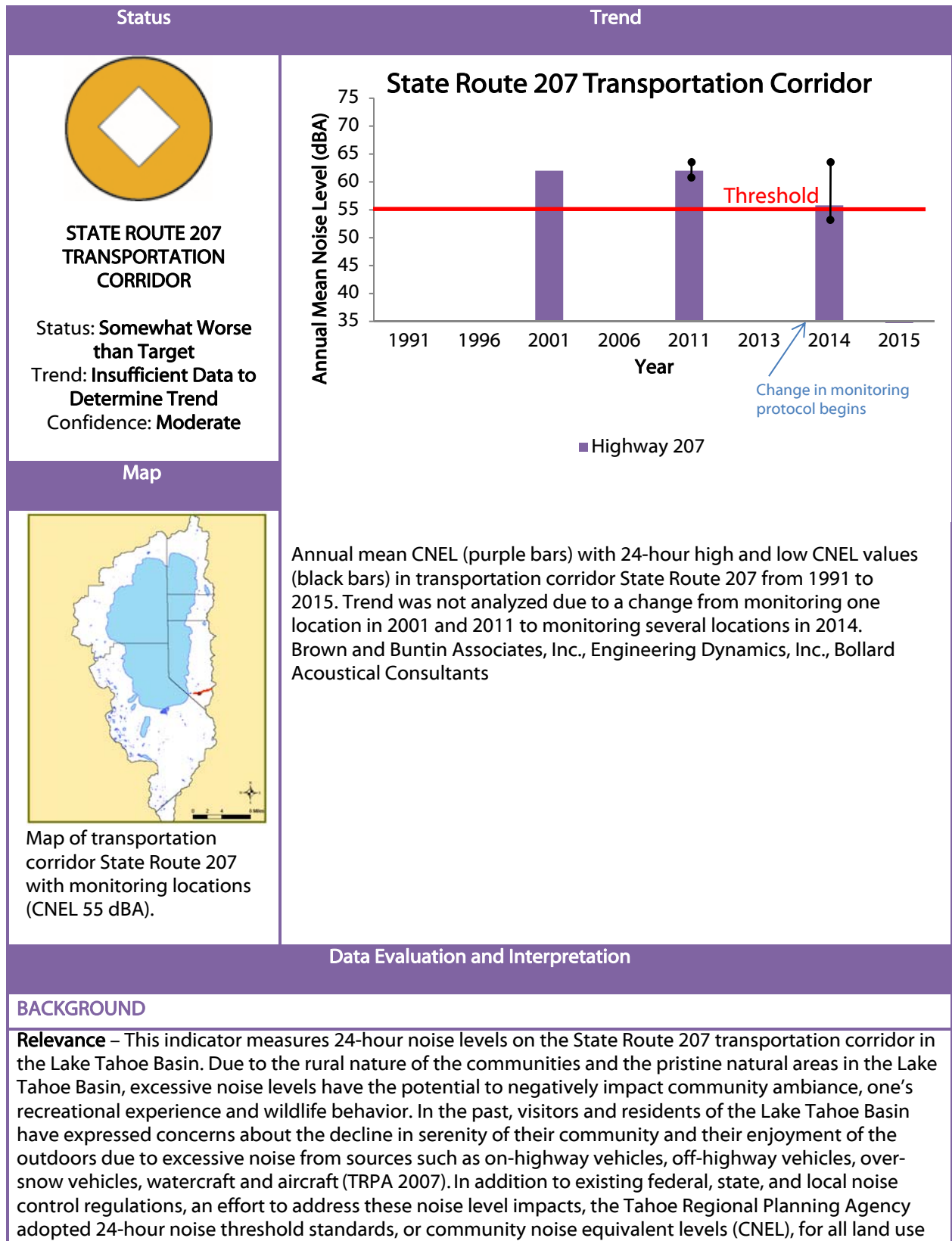
Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

Cumulative Noise Events: State Route 207 Transportation Corridor (CNEL 55 dBA)



categories, plan areas, and transportation corridors of the basin.

TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Cumulative Noise Events-CNEL of 55 dBA, State Route 207 Transportation Corridor

Adopted Standards – For the State Route 207 transportation corridor, noise levels shall not exceed a CNEL of 55 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridors are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (Bollard Acoustical Consultants 2014a). Other secondary anthropogenic noise influences include noise attributed to construction. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014a).

MONITORING AND ANALYSIS

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample at each transportation corridor. Threshold standard attainment status was based on a single sample representing a transportation corridor. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol for transportation corridors was conducted in 2014. The 2014 monitoring approach was based on recommendations provided by a noise expert (Bollard Acoustical Consultants 2014b). The 2014 approach monitored several sites along each transportation corridor for multiple weeks during the period of May 15 to October 1. This captures noise levels during construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human’s greater sensitivity to night-time noise.

Analytic Approach – Because data is not comparable across years due to changes in monitoring approach, trend was not analyzed. The average CNEL across all monitoring locations within a given land use category is averaged for the final “annual mean CNEL” result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – Somewhat worse than target. The maximum 24-hour CNEL in the most recent monitoring period, 2014, was 61.5 dBA, which is 112 percent of the target (Bollard Acoustical Consultants 2014b). Therefore, it received a status of somewhat worse than target. In 2014, Bollard Acoustical Consultants were hired to do a comprehensive study of these transportation corridors. This study took data over multiple weeks and at multiple segments. Therefore, while it does tell us much about the current status, the data is not comparable to previous year’s data where data was collected at only one point. For this corridor, the 24-hour CNEL was above the standard on 67 percent of sampling days in 2014.

Trend – Insufficient data to determine trend. The 2014 monitoring cannot be compared to previous years due to changes in the sampling protocol. Therefore, trend analysis was not completed.

Confidence –

Status – High. Based on the recommendations of noise experts a more robust sampling approach was initiated in 2014, including additional instrument calibration and monitoring at several locations within each transportation corridor.

Trend – Low. Due to significant changes in monitoring approach (one location vs. several locations), trend cannot be analyzed.

Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under Code of Federal Regulations CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potential activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. The North Tahoe Public Utility District has a list of rules that prohibits activities that produce excessive noise levels during park hours. Other actions include motor vehicle exhaust system modification restrictions, which the California Highway Patrol (CHP) is required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).

TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on the fact that State Route 207 has been out of attainment every year it was monitored, and there is no significant trend, it appears current programs and actions are not effectively reducing noise levels on State Route 207.

Interim Target – No interim target set.

Target Attainment Date – Because trend data is not available, a target attainment date cannot be established.

RECOMMENDATIONS

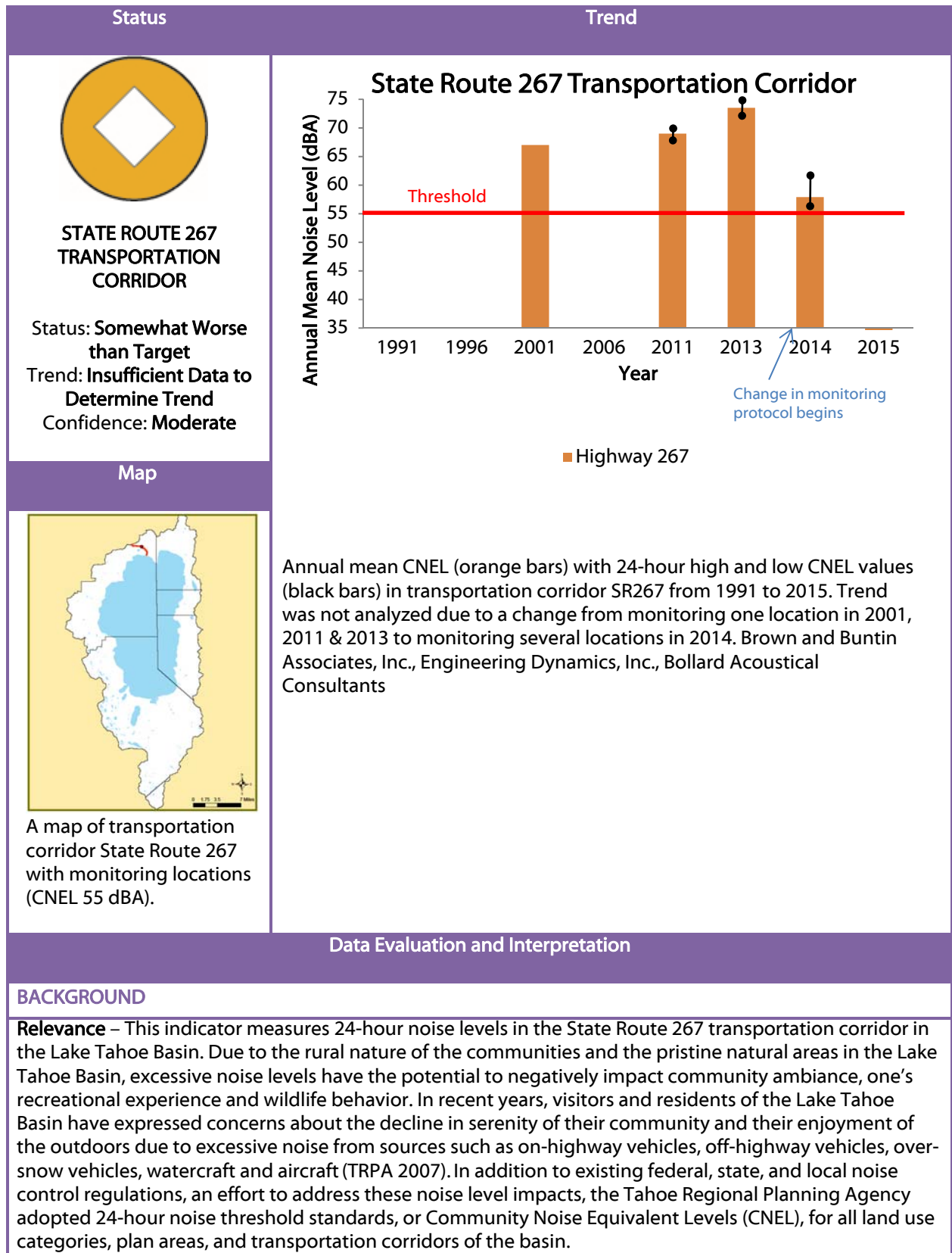
Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

Cumulative Noise Events: State Route 267 Transportation Corridor (CNEL 55 dBA)



TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Cumulative Noise Events-CNEL of 55 dBA, State Route 267 Transportation Corridor

Adopted Standards – For the State Route 267 transportation corridor, noise levels shall not exceed a CNEL of 55 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridors are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (Bollard Acoustical Consultants 2014a). Other secondary anthropogenic noise influences include noise attributed to construction. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014a).

MONITORING AND ANALYSIS

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample at each transportation corridor. Threshold Standard attainment status was based on a single sample representing a transportation corridor. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol for transportation corridors was conducted in 2014. The 2014 monitoring approach was based on recommendations provided by a noise expert (Bollard Acoustical Consultants 2014b). The 2014 approach monitored several sites along each transportation corridor for multiple weeks during the period of May 15 to October 1. This captures noise levels during construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human’s greater sensitivity to night-time noise.

Analytic Approach – Because data is not comparable across years due to changes in monitoring approach, trend was not analyzed. The average CNEL across all monitoring locations within a given land use category is averaged for the final “annual mean CNEL” result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – Somewhat worse than target. The maximum 24-hour CNEL for the most recent monitoring period, 2014, was 61.1 dBA which is 111 percent of the target (Bollard Acoustical Consultants 2014b). Therefore, a determination of somewhat worse than target was made. In 2014, Bollard Acoustical Consultants were hired to do a comprehensive study of these transportation corridors. This study took data over multiple weeks and at multiple segments. While it does tell us much about the current status, the data is not comparable to previous year’s data where data was collected at only one point. For this corridor, the 24-hour CNEL was above the standard on 100 percent of sampling days in 2014.

Trend – Insufficient data to determine trend. The 2014 monitoring effort cannot be compared to previous year’s efforts. Therefore, trend analysis was not completed.

Confidence –

Status – High. Based on the recommendations of noise experts a more robust sampling approach was initiated in 2014, including additional instrument calibration and monitoring at several locations within each transportation corridor.

Trend – Low. Due to significant changes in monitoring approach (one location vs. several locations), trend cannot be analyzed.

Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under Code of Federal Regulations CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potential activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. The North Tahoe Public Utility District has a list of rules that prohibits activities that produce excessive noise levels during park hours. Other actions include motor vehicle exhaust system modification restrictions, which the California Highway Patrol (CHP) is required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).

TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on the fact that State Route 267 has been out of attainment every year it was monitored, and there is no significant trend, it appears current programs and actions are not effective in reducing noise levels on State Route 267.

Interim Target – No interim target set.

Target Attainment Date – Because trend data is not available, a target attainment date cannot be established.

RECOMMENDATIONS

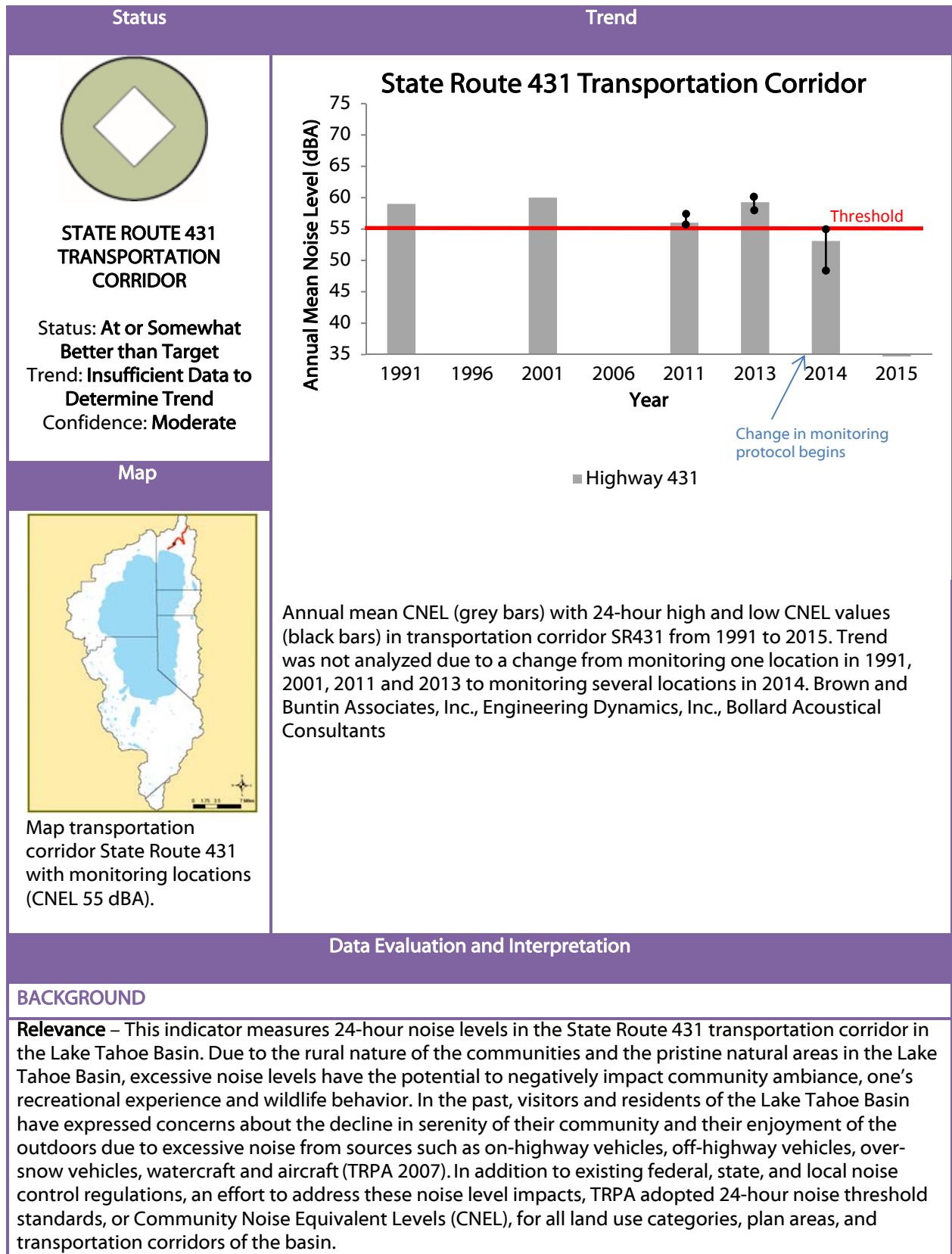
Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

Cumulative Noise Events: State Route 431 Transportation Corridor (CNEL 55 dBA)



TRPA Threshold Category – Noise

TRPA Threshold Indicator Reporting Category – Cumulative Noise Events-CNEL of 55 dBA, State Route 431 Transportation Corridor

Adopted Standards – For the State Route 431 transportation corridor noise levels shall not exceed a CNEL of 55 dBA.

Type of Standard – Numerical

Indicator (Unit of Measure) – The maximum 24-hour CNEL A-weighted decibel (dBA) is used to assess status. The annual mean CNEL is used to assess trend. The A-weighted decibel measurement is used in evaluating the effects of environmental and industrial noise effects on human health.

Human & Environmental Drivers – Anthropogenic noise levels affecting these land use categories and transportation corridors are primarily generated from vehicles, roadway traffic, aircraft, and recreational activity (Bollard Acoustical Consultants 2014a). Other secondary anthropogenic noise influences include noise attributed to construction. Natural events such as thunderstorms and wind influence noise levels as environmental drivers (Bollard Acoustical Consultants 2014a).

MONITORING AND ANALYSIS

Monitoring Partners – Monitoring was conducted by TRPA with land access granted by the U.S. Forest Service, California State Parks, the California Tahoe Conservancy, and several private property owners.

Monitoring Approach – Historical monitoring consisted of gathering a single 24-hour sample at each transportation corridor. Threshold standard attainment status was based on a single sample representing a transportation corridor. In contrast to single-sample historic monitoring, a more comprehensive CNEL monitoring protocol for transportation corridors was conducted in 2014. The 2014 monitoring approach was based on recommendations provided by a noise expert (Bollard Acoustical Consultants 2014b). The 2014 approach monitored several sites along each transportation corridor for multiple weeks during the period of May 15 to October 1. This captures noise levels during construction season and the busiest tourist seasons. Unusual noise such as lightning strikes and animal sounds are discarded from the data. The mean 24-hour dBA from each day is averaged for the final CNEL at each monitoring location. Decibel levels at night are weighted more heavily to account for human’s greater sensitivity to night-time noise.

Analytic Approach – Because data is not comparable across years due to changes in monitoring approach, trend was not analyzed. The average CNEL across all monitoring locations within a given land use category is averaged for the final “annual mean CNEL” result and is used for trend analysis. The highest recorded 24-hour CNEL across all monitoring locations within a given land use or transportation category is used for status analysis.

INDICATOR STATE

Status – At or somewhat better than target. In the most recent monitoring period (2014) the maximum 24-hour CNEL was 55.2 dBA, which is 100.2 percent of the target (Bollard Acoustical Consultants 2014b). Therefore, a status of “at or somewhat better than target” was determined. In 2014, Bollard Acoustical Consultants were hired to do a comprehensive study of these transportation corridors. This study took data over multiple weeks and at multiple segments. While it does tell us much about the current status, the data is not comparable to previous year’s data where data was collected at only one point. For this corridor, the 24-hour CNEL was above the standard on 25 percent of sampling days in 2014.

Trend – Insufficient data to determine trend. The 2014 monitoring cannot be compared to previous years due to changes in the sampling protocol. Therefore, trend analysis was not completed.

Confidence –

Status – High. Based on the recommendations of noise experts a more robust sampling approach was initiated in 2014, including additional instrument calibration and monitoring at several locations within each transportation corridor.

Trend – Low. Due to significant changes in monitoring approach (one location vs. several locations), trend cannot be analyzed.

Overall – Moderate. Overall confidence takes the middle of the two confidence determinations when high and low.

IMPLEMENTATION AND EFFECTIVENESS

Programs and Actions Implemented to Improve Conditions – The U.S. Forest Service, under Code of Federal Regulations CFR 261.4(d), prohibits causing public inconvenience, annoyance, or alarm by making unreasonably loud noise (USDA 2016). Although this can include a wide range of potential activities, the U.S. Forest Service also has specific regulations for decibel levels generated from motorized vehicles on applicable forest lands. The North Tahoe Public Utility District has a list of rules that prohibits activities that produce excessive noise levels during park hours. Other actions include motor vehicle exhaust system modification restrictions, which the California Highway Patrol (CHP) is required to enforce. These restrictions, under Vehicle Code Section 27151, prohibit the modification of the exhaust system to amplify or increase the noise emitted by the vehicle, making the vehicle noncompliant with Section 27150VC (California Highway Patrol 2006).

TRPA and local jurisdictions review proposed public and private projects to determine if the project would result in increases in existing CNEL that would exceed applicable standards (TRPA 2012b). Projects that would exceed applicable CNEL standards are required to mitigate project-related noise.

Effectiveness of Programs and Actions – Based on available status and trend information, it appears current programs are mostly effective in reducing noise in this transportation corridor.

Interim Target – Threshold is in attainment.

Target Attainment Date – Threshold is in attainment.

RECOMMENDATIONS

Analytic Approach – Noise experts have recommended that status determination for cumulative noise events should either 1) be based on annual mean CNEL at all monitoring locations within a given land use category, instead of the current practice of using the maximum 24 hour CNEL at all monitoring locations within a given land use category, or 2) attainment of CNEL should be based on the percentage of events that exceed the threshold rather than being based on a single exceedance and that TRPA should report on the number of locations that exceed the CNEL standard rather than the magnitude of the exceedance.

Monitoring Approach – No changes recommended.

Modification of the Threshold Standard or Indicator – No changes recommended.

Attain or Maintain Threshold – No changes recommended.

Chapter 10 Noise References

- Bollard Acoustical Consultants. 2014a. "2013 Shorezone Noise Monitoring Report."
———. 2014b. "Lake Tahoe Basin Corridor Segments Noise Study." Traffic noise assessment.
- Brown-Buntin Associates. 2004. "Tahoe Regional Planning Agency Noise Thresholds Update Report."
- California Department of Transportation - California Aviation Planning. 2007. "Aircraft Noise." <http://www.dot.ca.gov/hq/planning/aeronaut/landcomp4.html>.
- California Highway Patrol. 2006. "CHP Information Bulletin No. 98-100. In Excessive Noise Enforcement Passenger Vehicles, Light Trucks and Motorcycles."
- City of South Lake Tahoe. 2015. "South Lake Tahoe Airport Noise."
- Francis, Clinton D, and Jesse R Barber. 2013. "A Framework for Understanding Noise Impacts on Wildlife: An Urgent Conservation Priority." *Frontiers in Ecology and the Environment* 11 (6): 305–13. doi:10.1890/120183.
- Lanpheer, R.A. 2000. "Pleasure Motorboat Model Noise Act, Executive Summary."
- Laurance, William F. 2015. "Wildlife Struggle in an Increasingly Noisy World." *Proceedings of the National Academy of Sciences* 112 (39): 11995–96. doi:10.1073/pnas.1516050112.
- Tahoe Interagency Management System. 2011. "Weather in the Lake Tahoe Basin Airshed."
- TRPA. 2007. "2006 Threshold Evaluation Report." Stateline, NV: Tahoe Regional Planning Agency.
———. 2012a. "2011 Threshold Evaluation." Stateline, NV: Tahoe Regional Planning Agency.
———. 2012b. "Code of Ordinances." Stateline, NV: Tahoe Regional Planning Agency.
———. 2015. "TRPA CNEL Noise Monitoring Data 1991-2015."
- U.S. Department of Transportation - Federal Aviation Administration. 2004. "In Visual Flight Rules Flight Near Noise-Sensitive Areas." U.S. Department of Transportation - Federal Aviation Administration.
- USDA. 2016. "Code of Federal Regulations."
- Ware, Heidi E., Christopher J. W. McClure, Jay D. Carlisle, and Jesse R. Barber. 2015. "A Phantom Road Experiment Reveals Traffic Noise Is an Invisible Source of Habitat Degradation." *Proceedings of the National Academy of Sciences* 112 (39): 12105–9. doi:10.1073/pnas.1504710112.