APPENDIX D NOISE DATA TECHNICAL APPENDIX

JUNE 2010

Figures

Alternative A: No Action

Alternative E: Alternating Seasonal Use

Tables

ALTERNATIVE A: CURRENT CONDITION

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NPS PREFERRED ALTERNATIVE

Introduction

The purpose of Appendix D is to provide further explanation of noise modeling assumptions and inputs, as well as present the figures and tables used in the Alternatives impact analysis discussed in Chapter 4, Environmental Consequences. This information will provide the reader with the technical basis used to assess potential impacts to resource categories including Soundscape, Wilderness Character, Ethnographic Resources, Visitor Use and Experience, Wildlife, Special Status Species, and Cumulative Impacts. Additional information regarding noise measurements, metrics, and ambient conditions may be found in Chapter 3, Soundscape and Chapter 4, Soundscape, Methodology.

Appendix D provides further explanation of assumptions and inputs used in the Federal Aviation Administration's (FAA) Integrated Noise Model, Version 6.2a, to perform the noise modeling to support Chapter 4, Environmental Consequences, Soundscape.

It also describes the model output and contains full-size versions of noise maps and tabular data used to support Chapter 4, Environmental Consequences, Soundscape.

Appendix D contains full-size version of cumulative impacts noise maps used to support the analysis of Cumulative Impacts in Chapter 4, Environmental Consequences, Soundscape.

Noise Modeling Assumptions and Input

In accordance with the NPS Management Policies and GCNP General Management Plan objectives for the natural Soundscape, the NPS is to protect the natural quiet and solitude of the park, and mitigate or eliminate impacts of activities causing excessive or unnecessary noise in, over, or adjacent to the park. In an April 9, 2008, Federal Register Notice (55130, Vol. 73, No. 186), NPS clarified that the definition of substantial restoration of natural quiet at GCNP will be achieved when the reduction of noise from aircraft operations below 18,000 feet mean sea level results in 50% or more of the park achieving the restoration of natural quiet (i.e., no aircraft audible) for 75 to 100% of the day, each and every day. The NPS also clarified that 50% of GCNP is a *minimum* in the restoration goal. Percent of the park achieving substantial restoration of natural quiet is represented in the following figures and tables as less than or equal to 25% Time Audible.

Definition of Day

Since commercial air-tour aircraft operate during daylight hours only at GCNP, noise analysis for this EIS is based on a 12-hour time period of 7 a.m. to 7 p.m. on the Peak Day. Specific to Grand Canyon, Peak Day is the day of the highest number of air-tour and air-tour-related operations in GCNP. Using Peak Day in the analysis is used to represent each and every "day." Based on a review of the most current annual data available at the time (2005, when noise modeling for this EIS began), the Peak Day occurred on August 8, 2005. This date represents the day with the highest total number of air-tour and air-tour-related operations in GCNP (635 operations); it does not necessarily contain typical operations for all the routes associated with these operations. Some routes were not used on August 8, 2005 either coincidentally or due to weather-related issues. Subsequent reviews of annual data for each year since 2005 through 2009 showed activity levels were generally below those in 2005, but that the 2005 Peak Day was still reasonable to use in the analysis.

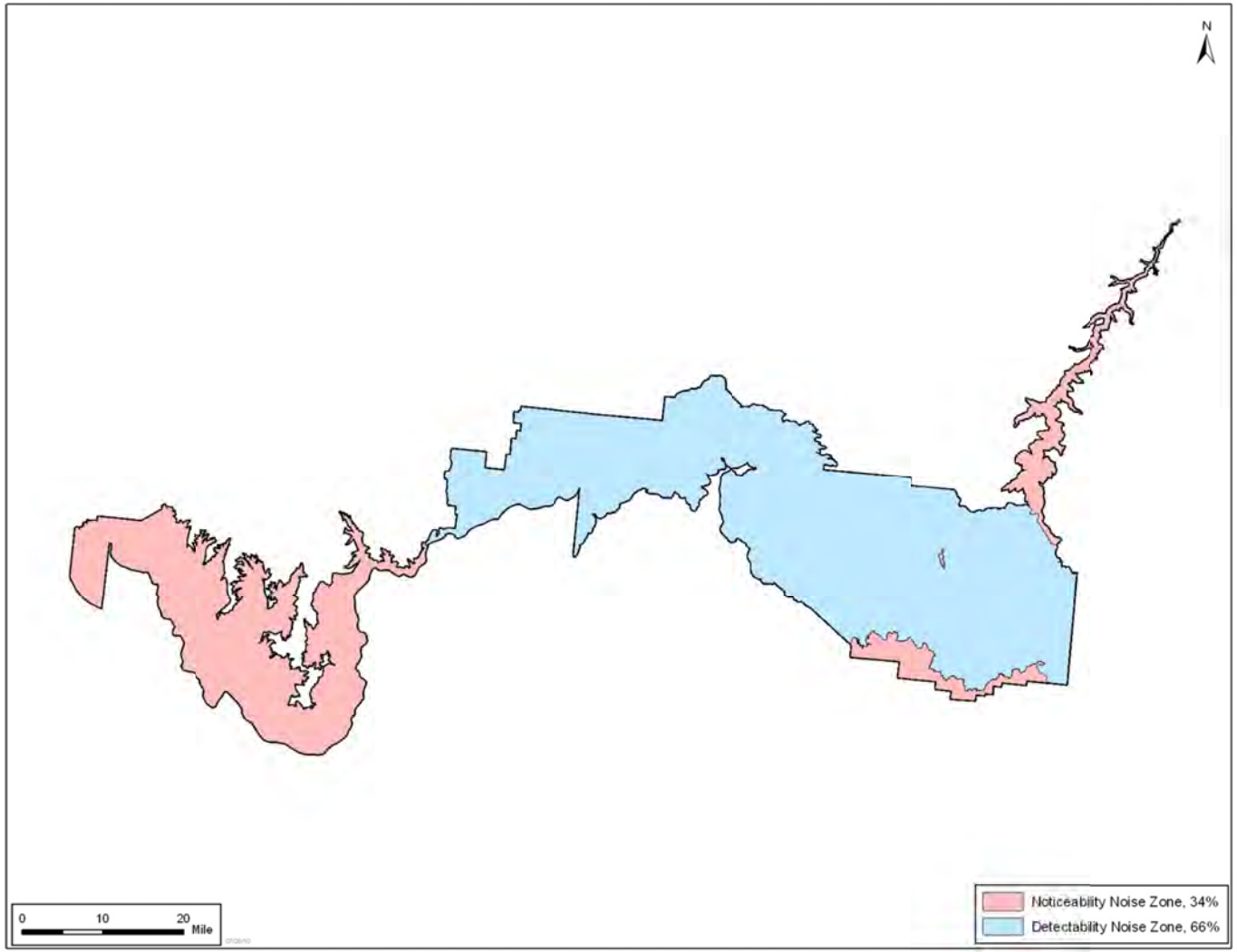
It should be noted that Peak Day occurs during Peak Season for park visitation. For those Alternatives that would impose seasonal use limitations on air-tour flights, the Peak Day during Off-Peak Season was determined based on an FAA-supplied activity report on air-tour and air-tour-related flight operations within the SFRA as of 2005. The specific 2005 day with highest operations during these specific Off-Peak Seasons for the Alternative was used. Alternative E would impose seasonal use limitations on air-tour flights in Zuni Point and Dragon Corridors.

Dual Zone Modeling of Percent Time Audible

In 1999, the National Park Service published in the Federal Register, Change in Noise Evaluation Methodology for Air-tour Operations Over Grand Canyon National Park, proposing a Dual Zone acoustic approach to evaluate achievement of Substantial Restoration of Natural Quiet (SRNQ). In modeling SRNQ, the Dual Zone system uses different sound levels for the onset of noise impacts (noticeability or audibility) depending on the Zone (Figure 1).

Specifically, for areas in the Detectability Zone (approximately 66% of GCNP), natural ambient sound levels[1] based on field measurements conducted by the NPS in 2005 were used directly in computing audibility. For areas in the Noticeability Zone (approximately 34% of GCNP), 10 decibels were added to natural ambient sound levels. Areas in the Noticeability Zone include Marble Canyon, South Rim developed areas, the North Rim developed area, and West End (Whitmore to Lake Mead including the Sanup region).

[1] Natural Ambient (as used in this document) is defined as the sound level of all natural sounds in a given area, excluding all mechanical, electrical, and other human-caused sounds. The natural ambient sound level is calculated as the sound level associated with an exceedence value by removing the percent time human-caused sounds are audible



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2 **FIGURE 1 GRAND CANYON NATIONAL PARK DUAL-NOISE ZONES**

3

Aircraft Data

Because the SFRA includes the airspace below an altitude of 18,000 feet MSL, aircraft operations were analyzed in the following three categories

- All Aircraft Operations Below 18,000 feet MSL and Within the SFRA;
- All Aircraft Operations Below 18,000 feet MSL and Outside the SFRA; and
- All Aircraft Operations 18,000 feet MSL and Above

The first category was analyzed to determine the extent of restoration of natural quiet and further assessed for potential direct and indirect impacts of the Alternatives. The latter two categories were analyzed as part of cumulative impact analyses.

Operational data for air-tour and air-tour-related flights were based on an FAA-supplied activity report on operations in the SFRA on the Peak Day for such operations in 2005 (August 8, 2005). The activity report contains data on every operation reported by air-tour operators, and is provided to the FAA on a quarterly basis in accordance with the Las Vegas Flight Standards District Office GCNP Special Flight Rules Area Procedures Manual, April 19, 2001. These data, presented by aircraft type, tail number, routes, and time of operation are the most accurate and current operational information available. Air-tour and air-tour-related operations were categorized as

- Commercial Air-tours The advertised air-tour flights and charter flights offered by GCNP commercial air-tour operators. This is the category of air-tour operation to which annual allocations and daily caps apply. These flights are coded CT in the activity report
- Grand Canyon West (Hualapai Exempt) Helicopter and fixed-wing flights to the Hualapai Reservation. Helicopter flights originate in the Las Vegas area and land either at Grand Canyon West Airport or descend to landing pads along the Hualapai side of the Colorado River. Most fixed-wing flights also originate in Las Vegas, but fly to Grand Canyon West Airport on the Reservation. These flights are coded GW in the activity report
- Transportation, Repositioning, Training, Maintenance An aggregate category of all flight operations in support of commercial air-tours. Transportation is typically the return leg of the Las Vegas/Grand Canyon fixed-wing commercial air tour, while repositioning refers to the movement of empty aircraft in support of these commercial air-tour operations. These flights are coded TR, RP, MF, or TP in the activity report
- Over the Edge (Elevator Flights) A helicopter descent from Grand Canyon West Airport to Hualapai Reservation pads along the Colorado River and return. These flights occur just outside the edge of the GCNP SFRA
- Brown routes (previously known as Bar 10) Helicopter and fixed-wing operations conducted to/from Bar Ten airstrip in support of river runners; also includes round-trip helicopter route to Supai Village from Grand Canyon National Park Airport in support of the Havasupai Tribe

Information for general aviation (GA), civil air transport (commercial), and military overflight activities was collected from FAA's Enhanced Traffic Management System (ETMS) and the Performance Data Analysis and Reporting System (PDARS). This included all operations within a rectangular block of airspace extending 20 nautical miles from the farthest edge of the GCNP boundary in each cardinal compass direction. The extent of this airspace was based on an estimate of the maximum distance aircraft might be audible in the park from outside the park's boundaries.

Table 1 presents the list of modeled scenarios and number of operations associated with each scenario. The first scenario, including all aircraft below 18,000 feet MSL and within the SFRA, is the basis for the calculation of whether SRNQ has been achieved in 50% or more of the park for 75 to 100% of the Peak Day.

Growth in Aircraft Operations

To forecast future airspace activity through the planning time frame (ten years), multiple years were analyzed (Base Year and Ten-Year Forecast) as part of all Alternatives[2]

- For commercial and general-aviation operations, an annual industry growth rate of 2.6% and 3.0% respectively, was applied to the number of operations in 2005 to forecast future activity through 2015. This rate was based on querying the FAA's Aviation Statistics Terminal Area Forecast (TAF) system for airports contributing 90% of the overflights (81 airports) that occurred in the Study Area on the Peak Day (August 8, 2005). [3] The 2015 fleet mix was then reviewed by the FAA's Office of Aviation Plans (APO), Statistics and Forecasting Branch (APO-110) to ensure aircraft types and numbers would be representative to the best of their knowledge
- For military operations, a no growth assumption was applied (i.e., 0%) as best available data based on discussions that took place during the Western-Pacific Region Airspace/Range Council Meeting held January 10-11, 2007[4]
- For air-tour and air-tour-related operations, an annual industry growth rate of 1.3% was applied to the number of operations in 2005 to forecast future activity through 2015. This rate was based on querying FAA's Terminal Area Forecast (TAF) system for the three primary airports serving GCNP [Grand Canyon (GCN), North Las Vegas (VGT), and Henderson (HND)][5]

Table 2 presents the list of modeled scenarios and number of operations associated with each scenario Ten-Year Forecast.

[2] The projections of industry growth rates shown below were developed based on data gathered for the year Peak Day is defined (2005) and considering historical trends. However they are more optimistic than would be calculated based on the late 2008 and 2009 economic recession

[3] Terminal Area Forecast (TAF) system, Washington, DC: Federal Aviation Administration, November 2006 http://www.apo.data.faa.gov/main/taf.asp

[4] Western-Pacific Region Airspace/Range Council Meeting, discussions between Vicki McCusker (Military Liaison for the NPS Natural Sounds Program) with Brigadier General Akey (Commander of the Massachusetts Air National Guard and Co-Chairman of the National Airspace/Range Executive Council), January 10-11, 2007

[5] Terminal Area Forecast (TAF) system, Washington, DC: Federal Aviation Administration, November 2006 http://www.apo.data.faa.gov/main/taf.asp

TABLE 1 LIST OF MODELED SCENARIOS FOR THE PEAK DAY OF THE BASE YEAR

Scenario	Aircraft (Daytime Operations 7 am to 7 pm)	Number of Operations for Each Alternative						
		A	E		F		NPS Preferred Alternative	
		Peak Season	Peak Season	Off-Peak Season	Peak Season	Off-Peak Season	Peak Season	Off-Peak Season
1[6]	All Aircraft below 18,000 feet MSL and within the SFRA • GA • Commercial • Military • All Air-tour and Air-tour Related	651	472	482	642	429	601	444
2	All Air-tour and Air-tour Related • Commercial Air-tours • GC West (a.k.a. "Hualapai Exempt") • Transportation, Repositioning, etc. • Over the Edge (a.k.a. "Elevator Flights") • Brown Routes	635	456	466	626	413	585	428
3	Commercial Air-tours	314	138	136	318	149	314	207
4	All Aircraft 18,000 feet MSL and Above • GA • Commercial • Military	For cumulative effects analysis: 978 (same for all alternatives)						
5	All Aircraft below 18,000 feet MSL and Outside the SFRA • GA • Commercial • Military	For cumulative effects analysis: 418 (same for all alternatives)						

[6] The first scenario, including all aircraft below 18,000 ft MSL and within the SFRA, is the basis for the calculation of whether SRNQ has been achieved in 50% or more of the park for 75% to 100% of the Peak Day. These totals include 16 aircraft which were flying between 14,500 ft and 17,999 ft within the SFRA.

TABLE 2 LIST OF MODELED SCENARIOS FOR THE PEAK DAY OF THE TEN-YEAR FORECAST

Scenario	Aircraft (Daytime Operations 7 am to 7 pm)	Number of Operations for Each Alternative						
		A	E		F		NPS Preferred Alternative	
		Peak Season	Peak Season	Off-Peak Season	Peak Season	Off-Peak Season	Peak Season	Off-Peak Season
1[7]	All Aircraft below 18,000 feet MSL and within the SFRA • GA • Commercial • Military • All Air-tour and Air-tour Related	741	469	475	639	425	619	468
2	All Air-tour and Air-tour Related • Commercial Air-tours • GC West (a.k.a. "Hualapai Exempt") • Transportation, Repositioning, etc. • Over the Edge (a.k.a. "Elevator Flights") • Brown Routes	722	450	456	620	406	600	449
3	Commercial Air-tours	358	137	130	311	144	336	233
4	All Aircraft 18,000 feet MSL and Above • GA • Commercial • Military	For cumulative effects analysis: 1263 (same for all alternatives)						
5	All Aircraft below 18,000 feet MSL and Outside the SFRA • GA • Commercial • Military	For cumulative effects analysis: 542 (same for all alternatives)						

[7] The first scenario, including all aircraft below 18,000 ft MSL and within the SFRA, is the basis for the calculation of whether SRNQ has been achieved in 50% or more of the park for 75% to 100% of the Peak Day. These totals include 19 aircraft flying between 14,500 ft. and 17,999 ft. within SFRA.

Model Output Noise Maps And Data Tables

Based on review and recommendations of the Federal Interagency Committee on Aviation Noise (FICAN)[8,9], the NPS and FAA determined that Version 6.2a of the FAA's Integrated Noise Model (INM) was the appropriate best-practice noise model to analyze the sound environment and compute various noise metrics at GCNP for purposes of this EIS. FAA requirements for INM use are defined in FAA Order 1050.1E, Title 14 CFR Part 150, Airport Noise Compatibility Planning.[10] It should be noted however, that as with all models, INM 6.2a is not 100% accurate; FICAN reported the following qualifications regarding audibility modeling

> *Assessing accuracy was extremely difficult due to the complexity of the audibility metric. FICAN agreed that no model will ever be able to predict with absolute certainty the audibility of any particular aircraft event at any specific location. The problem lies in predicting with certainty all three key elements of audibility: ambient sound environment, source noise level, and detectability threshold of the observer (human or animal). Extensive long-term monitoring could substantially reduce uncertainty in the ambient sound levels. Even more extensive long-term measurement programs with detailed aircraft performance and position information may be able to substantially reduce uncertainty in predicted received aircraft sound levels. However, sound propagation over long distances through a complex atmosphere (wind, temperature, turbulence) will always be subject to considerable variability. Furthermore, observer reaction can never be predicted with absolute certainty. Uncertainty often exists to some degree in any type of modeling.* (FICAN 2005)

For each Alternative, a variety of user-supplied data are required to use the INM 6.2a. Physical characteristics including number of flights, altitude, routes, and operational flight procedures, contribute to characteristics of the sound generated by air-tours. All of these factors were taken into consideration in computer modeling of Alternatives.

Two types of analyses were performed using FAA's Integrated Noise Model, Version 6.2a, 1) contour analysis and 2) representative location point analysis.

Contour Analysis

Contour analyses were performed for two metrics

- Percent Time Audible (%TAUD) Percent of time during a 12-hour day aircraft sounds can be heard by the human ear. This metric was also used to assess restoration of GCNP's natural soundscape to natural quiet
- Equivalent (Average) Sound Level (L_{Aeq12}) The logarithmic average of aircraft sound levels in decibels (dBA) over the 12-hour day

Full-size versions of noise contour maps and tabular data used to support Chapter 4, Environmental Consequences, Soundscape are provided. The maps are organized by Alternative and then by metric. A noise contour is a color gradient plot that presents equal levels of noise exposure. The contour figures present flight tracks and key GCNP features. In the legend, each color in the contour represents a different range and what percentage of park area each range covers. For example, the *5 to < 10* range in a %TAUD contour indicates area of the park with audible events that occur at least 5%, but less than 10% of the time; in an L_{Aeq12} contour, this indicates area of the park where L_{Aeq12} is at least 5 dBA, but less than 10 dBA.[11]

[8] *FICAN Findings and Recommendations on Tools for Modeling Aircraft Noise in National Parks*, Washington, DC: Federal Interagency Committee on Aviation Noise, February 2005
https://www.faa.gov/about/office_org/headquarters_offices/arc/programs/grand_canyon_overflights/documentation/FICANRecommendationParksModelingFinal.pdf

[9] Fleming, Gregg G., Plotkin, Kenneth J., Roof, Christopher J., Ikelheimer, Bruce J., Senzig, David A., *FICAN Assessment of Tools for Modeling Aircraft Noise in the National Parks*, Cambridge, MA: John A. Volpe National Transportation Systems Center, Arlington, VA: Wyle Laboratories, Winchester, MA: Senzig Engineering, March 2005

[10] *Airport Noise Compatibility Planning*, Federal Aviation Regulations (FAR) Part 150, January 1985

[11] Blank areas in a contour indicate the noise exposure was not audible for %TAUD or below 0 dBA for L_{Aeq12} metrics. Thus, figure legends and tabular columns showing % park area do not always sum to 100%

Because limited ambient data were available outside GCNP, contours for %TAUD were computed only within GCNP boundaries; L_{Aeq12} contours were computed within the entire SFRA. Within GCNP boundaries, contours were further analyzed by three GCNP Management Zones: Developed, Non-Wilderness, and Wilderness. Zones and their definitions do not change by Alternative, although the impact assessment may differ between Zones.

Location Points Analysis

Following contour maps and supporting data are tables with results for location point analysis. As shown in Figure 2, a total of 127 individual Location Points were provided by the NPS for consideration in the analysis. Some locations represented noise sensitive areas within the Study Area. Locations GC008 through GC033 correspond to measurement sites where acoustic data have been collected by GCNP personnel. Locations GRID01 through GRID36 correspond to regularly spaced points (based on a ten-kilometer grid) added to the analysis for spatial coverage of the park.

Locations are presented in Table 3 and Figure 2 geographically grouped into four general areas[12]

- Marble Canyon
- East End
- Central
- West End

Location Point analysis were performed for the following metrics

- %TAUD
- L_{Aeq12}
- Time Above (TALA) The amount of time during a 12-hour day aircraft sounds are greater than a user-defined threshold. Five thresholds were modeled (35, 40, 45, 50, and 55 dBA).

Location Point results analyzed by geographical area are used in conjunction with contour results analyzed by Management Zone to gain a fuller insight into the nature of the noise and its potential impacts. Tables 4 to 7 present comparisons of median Location Point Data, Percent Time Audible, and Equivalent (Average) Sound Level for all Alternatives.

[12] In grouping the location points, consideration was given to where actions (flight operations) were located (i.e., points were clustered by routes, corridors, flight free zones, etc.), as well as analysis performed by the NPS Natural Sounds Program to identify areas of the park that share common noise exposure characteristics.

1 **TABLE 3 LOCATION POINTS MODELED**

Location #	Location ID	Location Point Name	Location Within GCNP?	Location Within SFRA?
Marble Canyon				
1	CLDWEL	Cliff Dwellers Lodge	No	Yes
2	GRID01	Grid Location Point 1	Yes	Yes
3	GRID02	Grid Location Point 2	No	Yes
4	GRID03	Grid Location Point 3	Yes	Yes
5	GRID04	Grid Location Point 4	No	Yes
6	GRID05	Grid Location Point 5	No	Yes
7	MARBDM	Marble Canyon Dam Site	Yes	Yes
8	NOCANY	North Canyon	Yes	Yes
9	SOCAN	South Canyon	Yes	Yes
East End				
10	96MILE	96 Mile Camp	Yes	Yes
11	BASCMP	Bass Camp	Yes	Yes
12	BASIN	The Basin	Yes	Yes
13	BRTANG	Bright Angel Point	Yes	Yes
14	CAPROY	Cape Royal	Yes	Yes
15	CEDRIG	Cedar Ridge	Yes	Yes
16	DSRTVW	Desert View	Yes	Yes
17	ELTOVR	El Tovar	Yes	Yes
18	GC008	Pasture Wash (piñon-juniper)	Yes	Yes
19	GC011	South Rim (ponderosa pine)	Yes	Yes
20	GC015	Rainbow Plateau (ponderosa pine)	Yes	Yes
21	GC031	Eremita Mesa	Yes	Yes
22	GC032	1.5 km SE of Moran Point	Yes	Yes
23	GRID06	Grid Location Point 6	Yes	Yes
24	GRID07	Grid Location Point 7	Yes	Yes
25	GRID10	Grid Location Point 10	Yes	Yes
26	GRID11	Grid Location Point 11	Yes	Yes
27	GRID12	Grid Location Point 12	Yes	Yes
28	GRID13	Grid Location Point 13	Yes	Yes
29	GRID14	Grid Location Point 14	Yes	Yes
30	GRID15	Grid Location Point 15	Yes	Yes
31	GRID16	Grid Location Point 16	Yes	Yes
32	GRID17	Grid Location Point 17	Yes	Yes
33	GRID18	Grid Location Point 18	Yes	Yes
34	GRID19	Grid Location Point 19	Yes	Yes
35	HBASIN	Hermit Basin	Yes	Yes
36	LIPAN	Lipan Point	Yes	Yes
37	LITCOL	Little Colorado	No	Yes
38	LTCORV	Little Colorado River	Yes	Yes
39	NANMES	Nankoweap Mesa	Yes	Yes
40	NANRIV	Nankoweap at River	Yes	Yes
41	NAVA1	Navajo 1	No	Yes
42	NAVA2	Navajo 2	No	Yes

Location #	Location ID	Location Point Name	Location Within GCNP?	Location Within SFRA?
43	PHANTM	Phantom Ranch	Yes	Yes
44	PTIMPR	Point Imperial	Yes	Yes

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TABLE 3 LOCATION POINTS MODELED IN INM (CONTINUED)

Location #	Location ID	Location Point Name	Location Within GCNP?	Location Within SFRA?
45	PTSUBL	Point Sublime	Yes	Yes
46	RANCH	The Ranch	No	Yes
47	TEMBUT	Temple Butte	Yes	Yes
48	TENMED	Ten X Meadow	No	Yes
49	TOWER	Tower of Ra	Yes	Yes
50	TUSAYN	Tusayan	Yes	Yes
51	ZUNALF	Zuni Alpha	No	Yes
52	ZUNCHR	Zuni Charlie	Yes	Yes
Central				
53	COYCAN	Coyote Canyon	No	Yes
54	DOME	The Dome	Yes	Yes
55	GC009	Tuweep (warm desert scrub)	Yes	Yes
56	GC010	Tuweep (cold desert scrub)	Yes	Yes
57	GC016	Hancock Knolls (piñon-juniper)	Yes	Yes
58	GC017	1 km W of Kanab Point (cold desert scrub)	Yes	Yes
59	GC033	Fossil Canyon	Yes	Yes
60	GRID08	Grid Location Point 8	Yes	Yes
61	GRID09	Grid Location Point 9	Yes	Yes
62	GRID20	Grid Location Point 20	Yes	Yes
63	GRID21	Grid Location Point 21	Yes	Yes
64	GRID22	Grid Location Point 22	Yes	Yes
65	GRID23	Grid Location Point 23	Yes	Yes
66	GRID24	Grid Location Point 24	Yes	Yes
67	GRID25	Grid Location Point 25	Yes	Yes
68	GRID26	Grid Location Point 26	Yes	Yes
69	GRID35	Grid Location Point 35	No	Yes
70	GRID36	Grid Location Point 36	No	Yes
71	HAVAPT	Havasu Point	Yes	Yes
72	HAVCAN	Havatagvitch Canyon	No	Yes
73	KANAPT	Kanab Point	Yes	Yes
74	MOHAWK	Mohawk Canyon	No	Yes
75	MOHCAN	Mohawk Canyon	No	Yes
76	MTSINY	Mt. Sinyala	Yes	Yes
77	NATCAN	National Canyon	No	Yes
78	PROCAN	Prospect Canyon	No	Yes
79	PRSPCT	Prospect Canyon	No	Yes
80	SOSUPC	South Supai Canyon	No	Yes
81	STONCK	Stone Creek	Yes	Yes
82	SUPVIL	Supai Village	No	Yes
83	SURPVA	Surprise Valley	Yes	Yes
84	TOROWP	Toroweap Overlook	Yes	Yes
85	TWPRS	Tuweep Ranger Station	Yes	Yes
86	UPDRCK	Upper Deer Creek	Yes	Yes

TABLE 3 LOCATION POINTS MODELED IN INM (CONTINUED)

Location #	Location ID	Location Point Name	Location Within GCNP?	Location Within SFRA?
		West End		
87	ADMIN	NPS Administration site	No	Yes
88	ANDRUS	Andrus Canyon	No	Yes
89	BATCAV	Bat Cave	No	Yes
90	BRNTSP	Burnt Springs Canyon	Yes	Yes
91	CASTLE	Castle Peak	No	Yes
92	DIACRK	Diamond Creek	Yes	Yes
93	GC018	Separation Canyon (warm desert scrub)	Yes	Yes
94	GCWEST	Grand Canyon West	No	Yes
95	GRAGOR	Granite Gorge	Yes	Yes
96	GRID27	Grid Location Point 27	No	Yes
97	GRID28	Grid Location Point 28	Yes	Yes
98	GRID29	Grid Location Point 29	Yes	Yes
99	GRID30	Grid Location Point 30	Yes	Yes
100	GRID31	Grid Location Point 31	No	Yes
101	GRID32	Grid Location Point 32	Yes	Yes
102	GRID33	Grid Location Point 33	Yes	Yes
103	GRID34	Grid Location Point 34	Yes	Yes
104	GRNTPK	Granite Peak	Yes	Yes
105	GUSPLT	Gus Plateau	No	Yes
106	HFCAN	Horse Flat Canyon	Yes	Yes
107	KELLPT	Kelly Point	Yes	Yes
108	MERIWH	Meriwhitca	No	Yes
109	MTDELL	Mt. Dellenbaugh	No	Yes
110	NONAME	Jackson Canyon	Yes	Yes
111	PARWAS	Parashant Wash	Yes	Yes
112	PMPKIN	Pumpkin Springs	Yes	Yes
113	PSCNNO	Peach Spring Canyon North	No	Yes
114	PSCNSO	Peach Spring Canyon South	No	No
115	QMPNT	Quartermaster Point	No	Yes
116	SADMTN	Saddle Mountain	Yes	Yes
117	SANUP	Sanup	Yes	Yes
118	SCCORV	Separation Canyon, 1km N of Colorado River	No	Yes
119	SCMCIG	Spencer/Meriwhitca Canyons	No	Yes
120	SEPARC	Separation Canyon at Colorado River	Yes	Yes
121	SHWZFC	Shivwits Fire Camp	No	Yes
122	SPENCA	Spencer Canyon	No	Yes
123	SUIPNT	Suicide Point	Yes	Yes
124	THRSPR	Three Springs	Yes	Yes
125	TWINPT	Twin Point	Yes	Yes
126	WESEND	West End	Yes	Yes
127	WHTRAP	Whitmore Rapids	Yes	Yes

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TABLE 4 MEDIAN OF 127 LOCATION POINTS ALL ALTERNATIVES PERCENT TIME AUDIBLE COMPARISON BASE YEAR

Location Point Grouping	Median Percent Time Audible by Alternative						
	A	E		F		NPS Preferred	
		Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
Marble Canyon	2	0	0	2	0	1	0
East End	64	17	1	64	28	60	36
Central	1	1	1	1	1	1	1
West End	19	5	5	17	15	19	19
All Location Points	9	1	2	4	5	9	7

TABLE 5 MEDIAN OF 127 LOCATION POINTS ALL ALTERNATIVES PERCENT TIME AUDIBLE COMPARISON TEN-YEAR FORECAST

Location Point Grouping	Median Percent Time Audible by Alternative						
	A	E		F		NPS Preferred	
		Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
Marble Canyon	2	0	0	2	0	1	0
East End	67	10	1	25	11	28	12
Central	1	1	1	1	1	1	1
West End	21	4	4	14	11	13	11
All Location Points	10	1	1	3	2	5	4

TABLE 6 MEDIAN OF 127 LOCATION POINTS ALL ALTERNATIVES EQUIVALENT SOUND LEVEL COMPARISON BASE YEAR

Location Point Grouping	Median Equivalent Sound Level (dBA) by Alternative						
	A	E		F		NPS Preferred	
		Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
Marble Canyon	14	0	0	14	0	7	0
East End	28	13	8	28	21	27	21
Central	10	7	8	8	7	10	9
West End	22	18	19	17	17	21	20
All Location Points	17	11	9	17	13	15	13

TABLE 7 MEDIAN OF 127 LOCATION POINTS ALL ALTERNATIVES EQUIVALENT SOUND LEVEL COMPARISON TEN-YEAR FORECAST

Location Point Grouping	Median Equivalent Sound Level (dBA) by Alternative						
	A	E		F		NPS Preferred	
		Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
Marble Canyon	16	0	0	15	0	8	0
East End	29	12	9	24	17	22	18
Central	10	8	8	9	9	10	9
West End	23	19	20	18	17	21	19
All Location Points	18	10	10	16	13	14	13

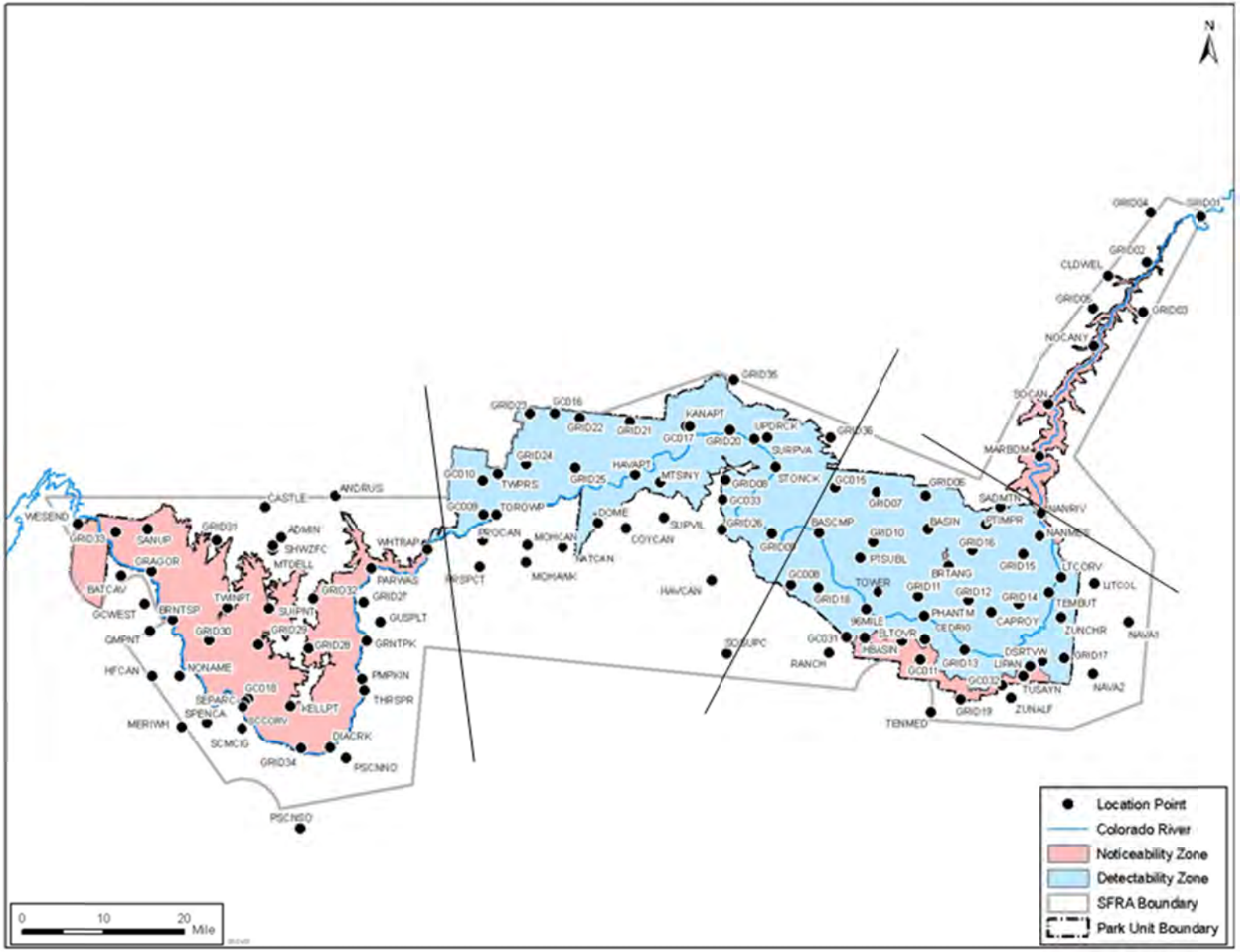

FIGURE 2 127 LOCATION POINTS MODELED IN INM FOR GCNP IN 4 GEOGRAPHICAL GROUPINGS

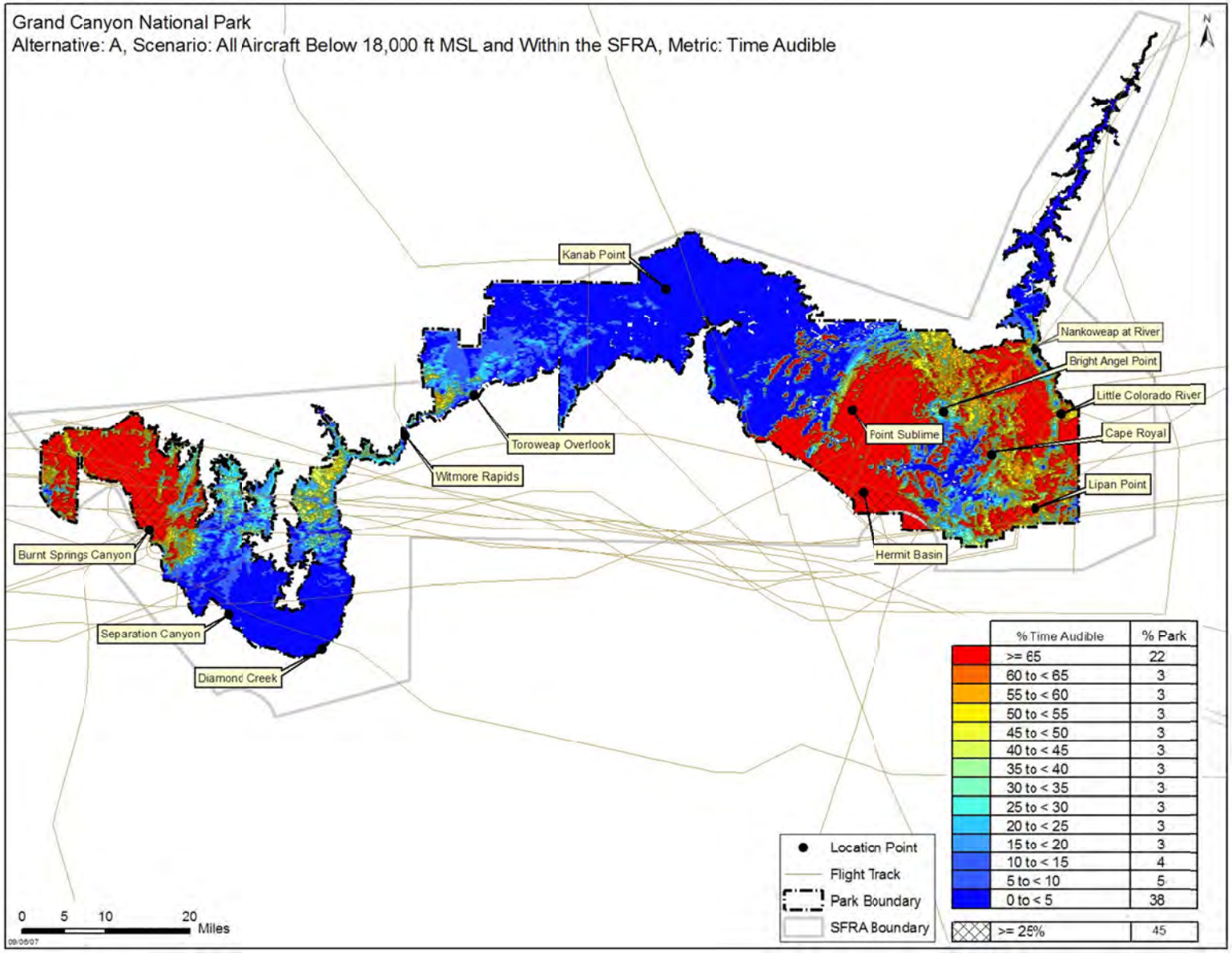

FIGURE 3 ALTERNATIVE A – %TAUD CONTOURS – ALL AIRCRAFT BELOW 18,000 FT MSL AND WITHIN THE SFRA

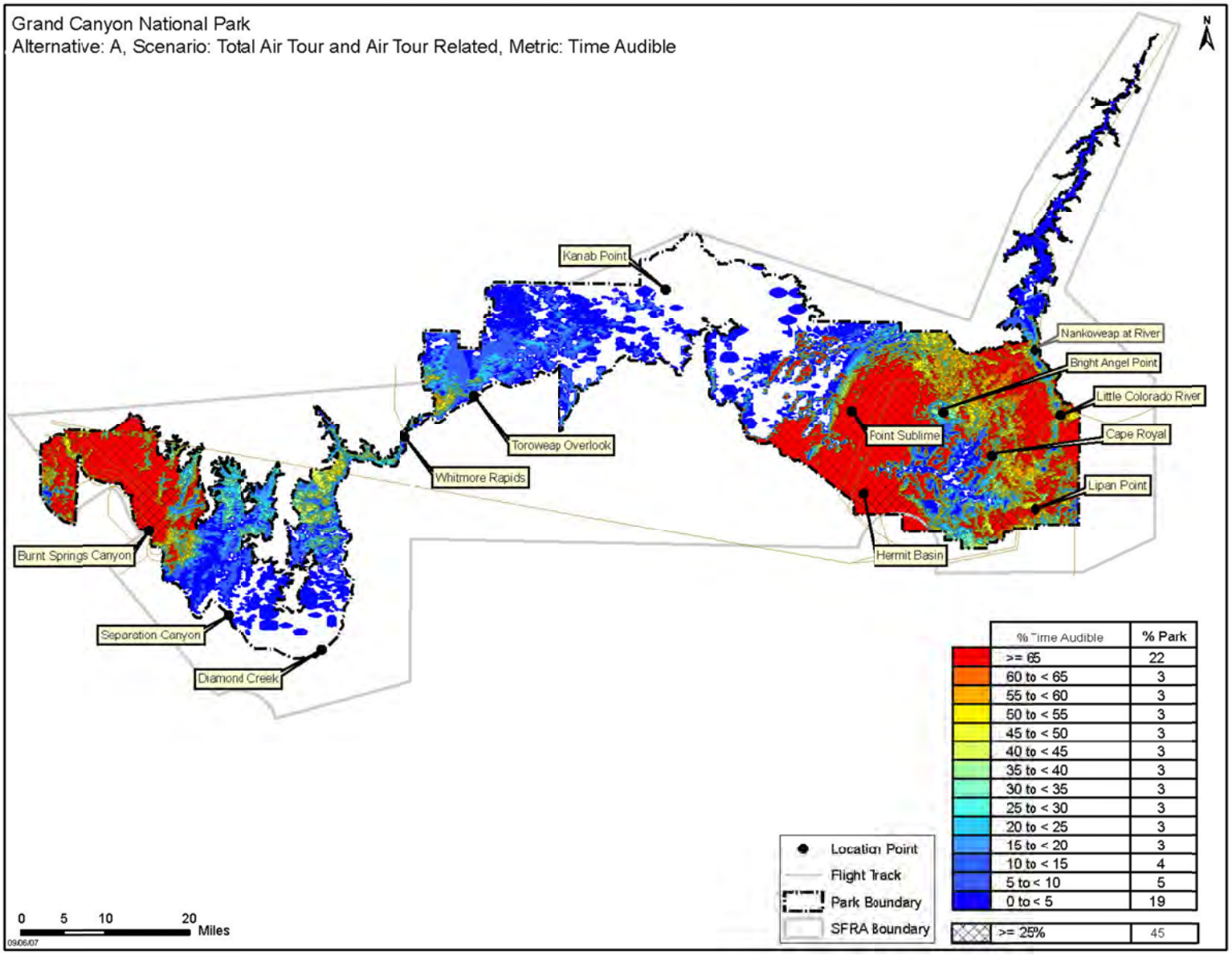

FIGURE 4 ALTERNATIVE A – %TAUD CONTOURS – AIR-TOUR AND AIR-TOUR RELATED

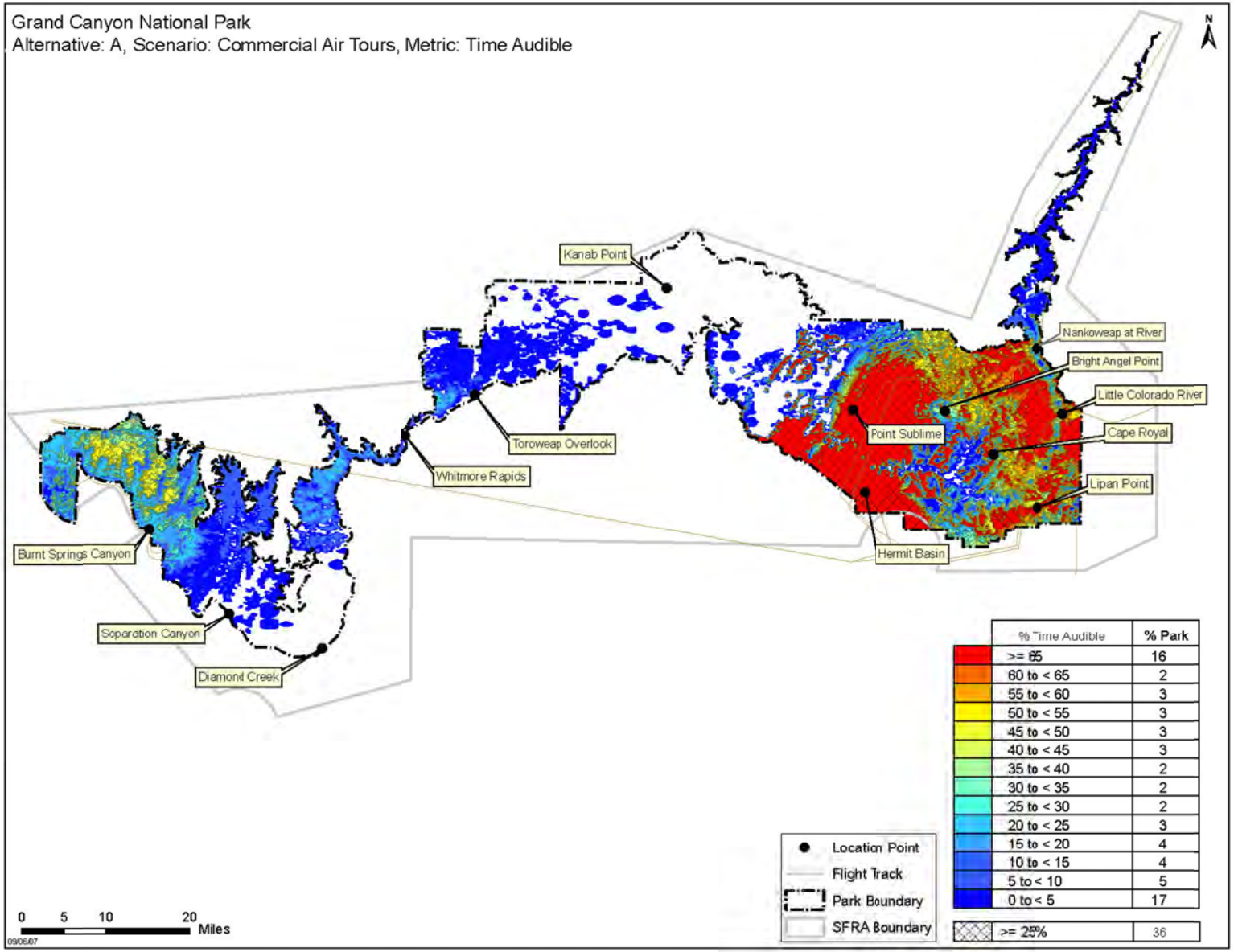

FIGURE 5 ALTERNATIVE A – %TAUD CONTOURS – COMMERCIAL AIR-TOURS

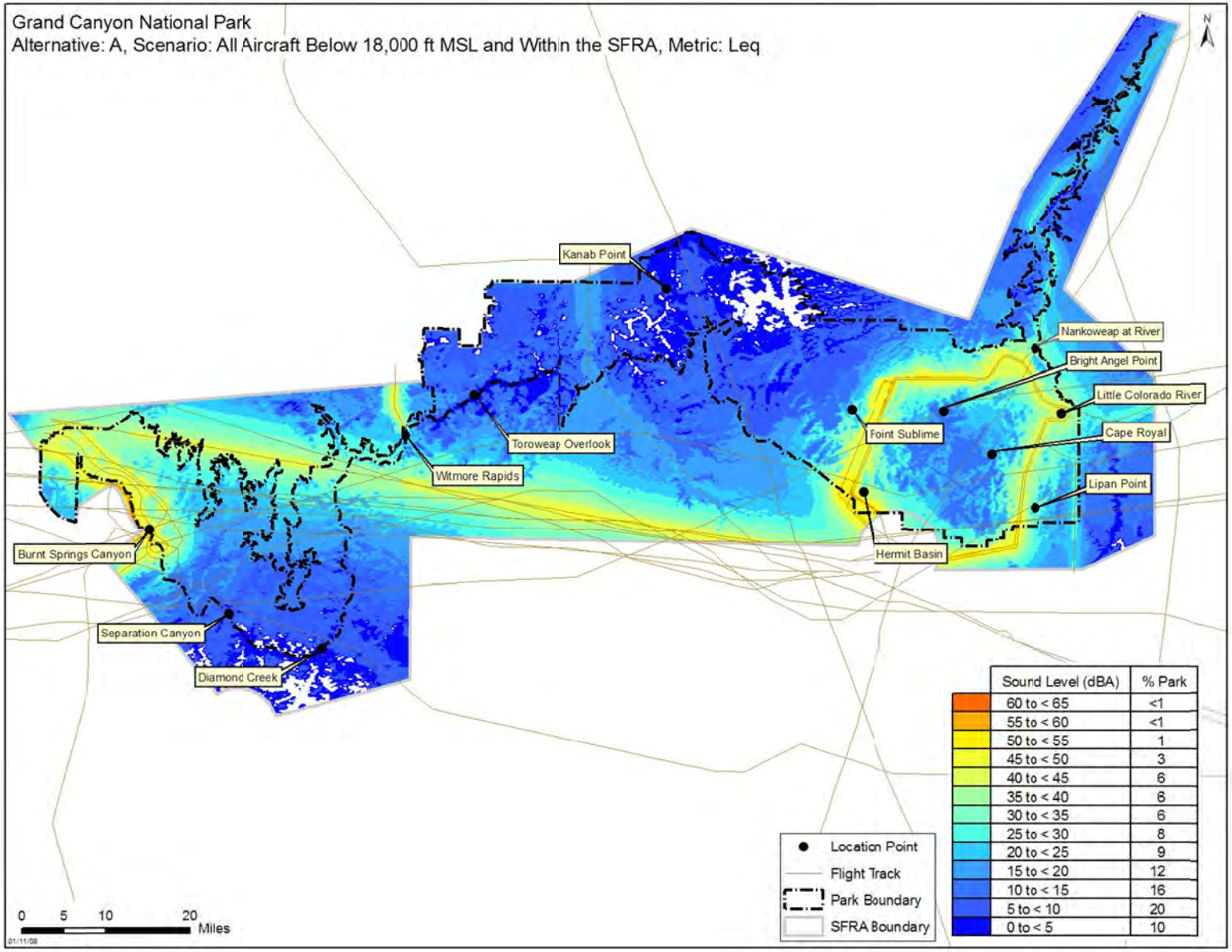

FIGURE 6 ALTERNATIVE A – L_{AEQ12} CONTOURS – ALL AIRCRAFT BELOW 18,000 FT MSL AND WITHIN THE SFRA

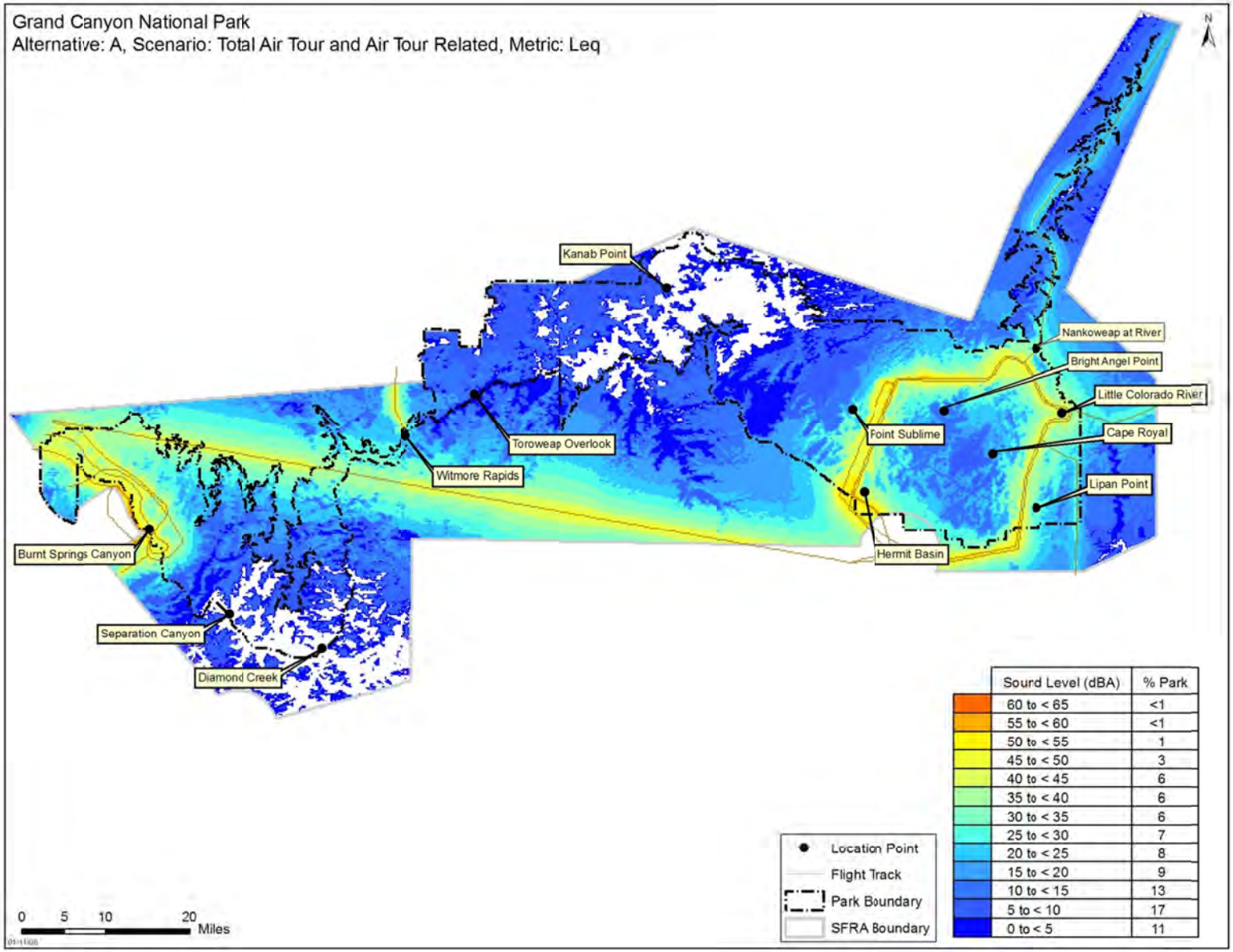

FIGURE 7 ALTERNATIVE A – L_{AEQ12} CONTOURS – AIR-TOUR AND AIR-TOUR RELATED

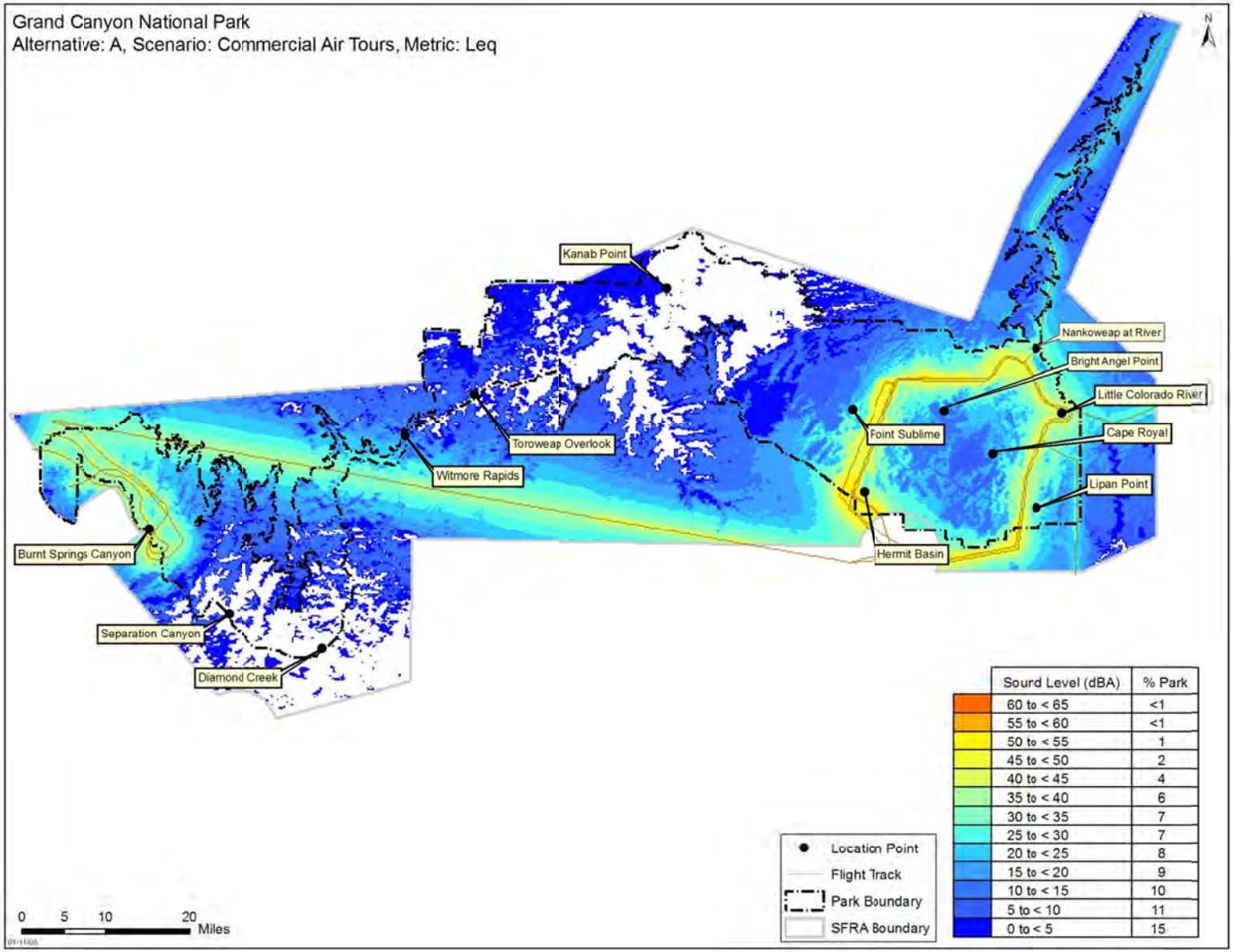

FIGURE 8 ALTERNATIVE A – L_{AEQ12} CONTOURS – COMMERCIAL AIR-TOURS

1 **TABLE 8 DETAILED CONTOUR ANALYSIS RESULTS WITHIN GCNP- ALTERNATIVE A**

Results Within GCNP		%TAUD			L_{Aeq12} (dBA)		
		All Aircraft Below 18,000 ft MSL and Within the SFRA	Air-tour and Air-tour Related	Commercial Air-tours	All Aircraft Below 18,000 ft MSL and Within the SFRA	Air-tour and Air-tour Related	Commercial Air-tours
Developed		% Of Management Zone					
	>= 65	49	49	49	0	0	0
	60 to < 65	8	8	8	0	0	0
	55 to < 60	5	5	5	0	0	0
	50 to < 55	4	4	4	2	2	2
	45 to < 50	3	3	3	2	2	2
	40 to < 45	6	6	6	2	2	2
	35 to < 40	4	4	5	5	5	4
	30 to < 35	5	5	5	15	14	14
	25 to < 30	4	4	4	40	39	38
	20 to < 25	4	4	4	27	27	28
	15 to < 20	2	2	2	6	7	7
	10 to < 15	1	1	1	2	2	1
	5 to < 10	1	1	1	1	1	1
	0 to < 5	5	4	5	0	0	1
Non-Wilderness		% Of Management Zone					
	>= 65	35	35	34	0	0	0
	60 to < 65	6	6	6	0	0	0
	55 to < 60	7	7	7	1	1	1
	50 to < 55	6	6	6	3	3	3
	45 to < 50	5	5	5	4	4	4
	40 to < 45	5	5	6	4	4	4
	35 to < 40	5	5	5	8	8	8
	30 to < 35	6	6	6	12	12	12
	25 to < 30	4	4	4	24	24	24
	20 to < 25	3	3	3	16	16	16
	15 to < 20	2	2	2	12	11	11
	10 to < 15	2	2	2	9	8	7
	5 to < 10	3	2	2	4	6	4
	0 to < 5	11	8	7	1	1	3

Results Within GCNP		%TAUD			L_{Aeq12} (dBA)		
		All Aircraft Below 18,000 ft MSL and Within the SFRA	Air-tour and Air-tour Related	Commercial Air-tours	All Aircraft Below 18,000 ft MSL and Within the SFRA	Air-tour and Air-tour Related	Commercial Air-tours
Proposed Wilderness		**% Of Management Zone**					
	>= 65	21	21	15	0	0	0
	60 to < 65	3	3	2	0	0	0
	55 to < 60	3	3	2	0	0	0
	50 to < 55	3	3	3	1	1	1
	45 to < 50	3	3	3	3	3	2
	40 to < 45	3	3	2	6	6	4
	35 to < 40	2	2	2	6	6	6
	30 to < 35	2	2	2	6	6	7
	25 to < 30	3	2	2	7	6	6
	20 to < 25	3	3	3	9	8	7
	15 to < 20	3	3	4	13	9	9
	10 to < 15	4	4	4	17	13	10
	5 to < 10	6	5	5	21	17	12
	0 to < 5	40	20	20	10	12	16
Entire Park		**% Of GCNP**					
	>= 65	22	22	16	0	0	0
	60 to < 65	3	3	2	0	0	0
	55 to < 60	3	3	3	0	0	0
	50 to < 55	3	3	3	1	1	1
	45 to < 50	3	3	3	3	3	2
	40 to < 45	3	3	3	6	6	4
	35 to < 40	3	3	2	6	6	6
	30 to < 35	3	3	2	6	6	7
	25 to < 30	3	3	2	8	7	7
	20 to < 25	3	3	3	9	8	8
	15 to < 20	3	3	4	13	9	9
	10 to < 15	4	4	4	16	13	10
	5 to < 10	5	5	5	20	17	11
	0 to < 5	38	19	17	10	11	15

1

TABLE 9 DETAILED CONTOUR ANALYSIS RESULTS WITHIN THE SFRA - ALTERNATIVE A

Results Within the SFRA	%TAUD			L_{Aeq12} (dBA)		
	All Aircraft Below 18,000 ft MSL and Within the SFRA	Air-tour and Air-tour Related	Commercial Air-tours	All Aircraft Below 18,000 ft MSL and Within the SFRA	Air-tour and Air-tour Related	Commercial Air-tours
>= 65	N/A	N/A	N/A	0	0	0
60 to < 65	N/A	N/A	N/A	0	0	0
55 to < 60	N/A	N/A	N/A	0	0	0
50 to < 55	N/A	N/A	N/A	1	1	1
45 to < 50	N/A	N/A	N/A	2	2	1
40 to < 45	N/A	N/A	N/A	5	5	2
35 to < 40	N/A	N/A	N/A	7	7	5
30 to < 35	N/A	N/A	N/A	7	7	7
25 to < 30	N/A	N/A	N/A	8	8	8
20 to < 25	N/A	N/A	N/A	11	10	10
15 to < 20	N/A	N/A	N/A	16	12	12
10 to < 15	N/A	N/A	N/A	16	14	14
5 to < 10	N/A	N/A	N/A	16	14	12
0 to < 5	N/A	N/A	N/A	9	10	12

1 **TABLE 10 RESULTS FOR 127 POINT LOCATIONS - ALTERNATIVE A - ALL AIRCRAFT BELOW 18,000 FT MSL AND WITHIN THE SFRA**

#	Location ID	Location Point Name	Base Year					Ten-Year Forecast				
			TAUD (%)	L_{Aeq12} (dBA)	TALA35 dBA (%)	TALA45 dBA (%)	TALA55 dBA (%)	TAUD (%)	L_{Aeq12} (dBA)	TALA35 dBA (%)	TALA45 dBA (%)	TALA55 dBA (%)
Marble Canyon												
1	CLDWEL	Cliff Dwellers Lodge	1	6	0	0	0	1	10	0	0	0
2	GRID01	Grid Location Point 1	0	15	0	0	0	0	17	0	0	0
3	GRID02	Grid Location Point 2	2	16	0	0	0	3	19	0	0	0
4	GRID03	Grid Location Point 3	3	14	0	0	0	3	16	0	0	0
5	GRID04	Grid Location Point 4	0	0	0	0	0	0	2	0	0	0
6	GRID05	Grid Location Point 5	2	8	0	0	0	2	12	0	0	0
7	MARBDM	Marble Canyon Dam Site	0	3	0	0	0	0	4	0	0	0
8	NOCANY	North Canyon	3	24	1	0	0	3	25	2	0	0
9	SOCAN	South Canyon	2	21	1	0	0	3	23	1	0	0
East End												
10	96MILE	96 Mile Camp	72	45	89	27	0	74	45	99	28	0
11	BASCMP	Bass Camp	0	7	0	0	0	0	7	0	0	0
12	BASIN	The Basin	73	48	31	13	4	75	48	35	14	4
13	BRTANG	Bright Angel Point	47	24	0	0	0	48	24	0	0	0
14	CAPROY	Cape Royal	59	25	1	0	0	61	26	1	0	0
15	CEDRIG	Cedar Ridge	81	19	0	0	0	82	19	0	0	0
16	DSRTVW	Desert View	76	29	5	0	0	79	30	6	0	0
17	ELTOVR	El Tovar	95	19	0	0	0	96	20	0	0	0
18	GC008	Pasture Wash (pinyon-juniper)	98	20	0	0	0	98	21	0	0	0
19	GC011	South Rim (ponderosa pine)	49	26	0	0	0	54	26	0	0	0
20	GC015	Rainbow Plateau (ponderosa pine)	0	6	0	0	0	0	7	0	0	0
21	GC031	Eremita Mesa	100	49	100	51	5	100	49	100	57	5
22	GC032	1.5 km SE of Moran Point	64	41	36	9	0	68	41	41	10	0
23	GRID06	Grid Location Point 6	52	19	0	0	0	56	20	0	0	0

#	Location ID	Location Point Name	Base Year					Ten-Year Forecast				
			TAUD (%)	L_{Aeq12} (dBA)	TALA35 dBA (%)	TALA45 dBA (%)	TALA55 dBA (%)	TAUD (%)	L_{Aeq12} (dBA)	TALA35 dBA (%)	TALA45 dBA (%)	TALA55 dBA (%)
24	GRID07	Grid Location Point 7	1	7	0	0	0	1	8	0	0	0
25	GRID10	Grid Location Point 10	92	25	0	0	0	92	25	0	0	0
26	GRID11	Grid Location Point 11	55	18	0	0	0	56	18	0	0	0
27	GRID12	Grid Location Point 12	1	13	0	0	0	1	14	0	0	0
28	GRID13	Grid Location Point 13	1	12	0	0	0	1	13	0	0	0
29	GRID14	Grid Location Point 14	70	34	17	0	0	74	34	19	0	0
30	GRID15	Grid Location Point 15	65	28	5	0	0	69	29	6	0	0
31	GRID16	Grid Location Point 16	80	33	9	2	0	84	34	10	2	0
32	GRID17	Grid Location Point 17	70	25	1	0	0	72	25	1	0	0
33	GRID18	Grid Location Point 18	60	16	0	0	0	60	17	0	0	0
34	GRID19	Grid Location Point 19	41	40	27	9	0	44	41	31	10	0
35	HBASIN	Hermit Basin	99	42	74	12	0	100	42	81	12	0
36	LIPAN	Lipan Point	74	34	17	1	0	77	35	18	1	0
37	LITCOL	Little Colorado	1	25	1	0	0	1	25	1	0	0
38	LTCORV	Little Colorado River	34	43	59	18	0	37	43	66	19	0
39	NANMES	Nankoweap Mesa	87	43	34	12	1	90	43	40	13	1
40	NANRIV	Nankoweap at River	7	34	15	3	0	8	35	16	3	0
41	NAVA1	Navajo 1	2	14	0	0	0	2	15	0	0	0
42	NAVA2	Navajo 2	4	13	0	0	0	4	13	0	0	0
43	PHANTM	Phantom Ranch	3	12	0	0	0	4	12	0	0	0
44	PTIMPR	Point Imperial	66	38	22	6	0	68	39	24	7	0
45	PTSUBL	Point Sublime	100	35	23	0	0	100	35	23	0	0
46	RANCH	The Ranch	99	33	17	0	0	99	35	17	0	0
47	TEMBUT	Temple Butte	62	37	28	4	0	66	38	31	4	0
48	TENMED	Ten X Meadow	64	49	31	13	5	68	49	36	15	5
49	TOWER	Tower of Ra	97	44	51	17	2	98	45	57	18	2
50	TUSAYN	Tusayan	64	35	16	3	0	67	36	18	3	0
51	ZUNALF	Zuni Alpha	43	46	34	14	3	46	46	40	16	3
52	ZUNCHR	Zuni Charlie	55	28	5	0	0	59	29	6	0	0
Central												
53	COYCAN	Coyote Canyon	0	16	0	0	0	0	16	0	0	0

#	Location ID	Location Point Name	Base Year					Ten-Year Forecast				
			TAUD (%)	L_{Aeq12} (dBA)	TALA35 dBA (%)	TALA45 dBA (%)	TALA55 dBA (%)	TAUD (%)	L_{Aeq12} (dBA)	TALA35 dBA (%)	TALA45 dBA (%)	TALA55 dBA (%)
54	DOME	The Dome	1	16	0	0	0	1	16	0	0	0
55	GC009	Tuweep (warm desert scrub)	12	15	0	0	0	14	16	0	0	0
56	GC010	Tuweep (cold desert scrub)	15	11	0	0	0	17	11	0	0	0
57	GC016	Hancock Knolls (pinyon-juniper)	2	10	0	0	0	2	10	0	0	0
58	GC017	1 km W of Kanab Point (cold desert scrub)	2	9	0	0	0	2	9	0	0	0
59	GC033	Fossil Canyon	2	12	0	0	0	2	12	0	0	0
60	GRID08	Grid Location Point 8	3	10	0	0	0	3	10	0	0	0
61	GRID09	Grid Location Point 9	1	5	0	0	0	1	5	0	0	0
62	GRID20	Grid Location Point 20	0	4	0	0	0	0	4	0	0	0
63	GRID21	Grid Location Point 21	2	14	0	0	0	2	14	0	0	0
64	GRID22	Grid Location Point 22	18	12	0	0	0	21	13	0	0	0
65	GRID23	Grid Location Point 23	2	10	0	0	0	2	10	0	0	0
66	GRID24	Grid Location Point 24	3	8	0	0	0	4	8	0	0	0
67	GRID25	Grid Location Point 25	11	9	0	0	0	12	10	0	0	0
68	GRID26	Grid Location Point 26	1	12	0	0	0	2	13	0	0	0
69	GRID35	Grid Location Point 35	0	3	0	0	0	0	3	0	0	0
70	GRID36	Grid Location Point 36	0	1	0	0	0	0	1	0	0	0
71	HAVAPT	Havasu Point	0	0	0	0	0	0	0	0	0	0
72	HAVCAN	Havatagvitch Canyon	1	7	0	0	0	1	8	0	0	0
73	KANAPT	Kanab Point	1	6	0	0	0	1	7	0	0	0
74	MOHAWK	Mohawk Canyon	1	11	0	0	0	1	12	0	0	0
75	MOHCAN	Mohawk Canyon	2	11	0	0	0	2	12	0	0	0
76	MTSINY	Mt. Sinyala	1	0	0	0	0	1	0	0	0	0
77	NATCAN	National Canyon	3	13	0	0	0	4	14	0	0	0
78	PROCAN	Prospect Canyon	4	14	0	0	0	5	14	0	0	0
79	PRSPCT	Prospect Canyon	22	22	0	0	0	25	22	0	0	0
80	SOSUPC	South Supai Canyon	6	27	4	0	0	7	27	5	0	0

#	Location ID	Location Point Name	Base Year					Ten-Year Forecast				
			TAUD (%)	L_{Aeq12} (dBA)	TALA35 dBA (%)	TALA45 dBA (%)	TALA55 dBA (%)	TAUD (%)	L_{Aeq12} (dBA)	TALA35 dBA (%)	TALA45 dBA (%)	TALA55 dBA (%)
81	STONCK	Stone Creek	0	0	0	0	0	0	0	0	0	0
82	SUPVIL	Supai Village	0	5	0	0	0	0	13	0	0	0
83	SURPVA	Surprise Valley	1	0	0	0	0	1	0	0	0	0
84	TOROWP	Toroweap Overlook	0	13	0	0	0	0	14	0	0	0
85	TWPRS	Tuweep Ranger Station	1	3	0	0	0	1	4	0	0	0
86	UPDRCK	Upper Deer Creek	1	1	0	0	0	1	1	0	0	0
West End												
87	ADMIN	NPS Administration site	44	31	10	1	0	49	32	12	1	0
88	ANDRUS	Andrus Canyon	22	17	0	0	0	24	17	0	0	0
89	BATCAV	Bat Cave	93	47	71	29	4	95	48	81	33	5
90	BRNTSP	Burnt Springs Canyon	70	46	64	22	3	75	47	73	25	3
91	CASTLE	Castle Peak	27	18	0	0	0	30	19	0	0	0
92	DIACRK	Diamond Creek	0	0	0	0	0	0	0	0	0	0
93	GC018	Separation Canyon (warm desert scrub)	0	9	0	0	0	1	9	0	0	0
94	GCWEST	Grand Canyon West	92	35	22	0	0	95	36	25	0	0
95	GRAGOR	Granite Gorge	58	34	9	2	0	63	35	10	2	0
96	GRID27	Grid Location Point 27	20	26	2	0	0	23	27	2	0	0
97	GRID28	Grid Location Point 28	14	17	0	0	0	16	18	0	0	0
98	GRID29	Grid Location Point 29	7	12	0	0	0	8	13	0	0	0
99	GRID30	Grid Location Point 30	39	28	2	0	0	42	28	2	0	0
100	GRID31	Grid Location Point 31	37	42	25	9	1	41	43	29	10	1
101	GRID32	Grid Location Point 32	44	27	2	0	0	49	28	2	0	0
102	GRID33	Grid Location Point 33	87	42	36	9	0	90	43	41	10	1
103	GRID34	Grid Location Point 34	0	1	0	0	0	0	1	0	0	0
104	GRNTPK	Granite Peak	2	17	0	0	0	2	18	0	0	0
105	GUSPLT	Gus Plateau	41	25	1	0	0	46	26	1	0	0
106	HFCAN	Horse Flat Canyon	3	13	0	0	0	4	13	0	0	0
107	KELLPT	Kelly Point	1	10	0	0	0	1	10	0	0	0
108	MERIWH	Meriwhitca	0	7	0	0	0	1	8	0	0	0
109	MTDELL	Mt. Dellenbaugh	29	41	23	8	1	32	42	26	9	1

#	Location ID	Location Point Name	Base Year					Ten-Year Forecast				
			TAUD (%)	L_{Aeq12} (dBA)	TALA35 dBA (%)	TALA45 dBA (%)	TALA55 dBA (%)	TAUD (%)	L_{Aeq12} (dBA)	TALA35 dBA (%)	TALA45 dBA (%)	TALA55 dBA (%)
110	NONAME	Jackson Canyon	18	24	1	0	0	20	25	2	0	0
111	PARWAS	Parashant Wash	12	33	13	1	0	14	33	15	1	0
112	PMPKIN	Pumpkin Springs	0	7	0	0	0	0	8	0	0	0
113	PSCNNO	Peach Spring Canyon North	0	4	0	0	0	0	4	0	0	0
114	PSCNSO	Peach Spring Canyon South	NA	0	0	0	0	NA	0	0	0	0
115	QMPNT	Quartermaster Point	72	45	50	19	1	76	46	57	22	1
116	SADMTN	Saddle Mountain	51	37	16	5	0	53	37	18	5	0
117	SANUP	Sanup	79	38	25	3	0	83	38	28	4	0
118	SCCORV	Separation Canyon, 1km N of Colorado River	1	8	0	0	0	1	8	0	0	0
119	SCMCIG	Spencer/Meriwhitca Canyons	0	4	0	0	0	0	4	0	0	0
120	SEPARC	Separation Canyon at Colorado River	0	7	0	0	0	0	7	0	0	0
121	SHWZFC	Shivwitz Fire Camp	35	38	23	4	0	39	38	26	4	0
122	SPENCA	Spencer Canyon	0	6	0	0	0	0	7	0	0	0
123	SUIPNT	Suicide Point	15	22	1	0	0	17	23	1	0	0
124	THRSPR	Three Springs	1	8	0	0	0	2	9	0	0	0
125	TWINPT	Twin Point	19	23	1	0	0	22	23	1	0	0
126	WESEND	West End	58	39	39	8	0	63	40	45	9	0
127	WHTRAP	Whitmore Rapids	12	21	0	0	0	13	21	0	0	0

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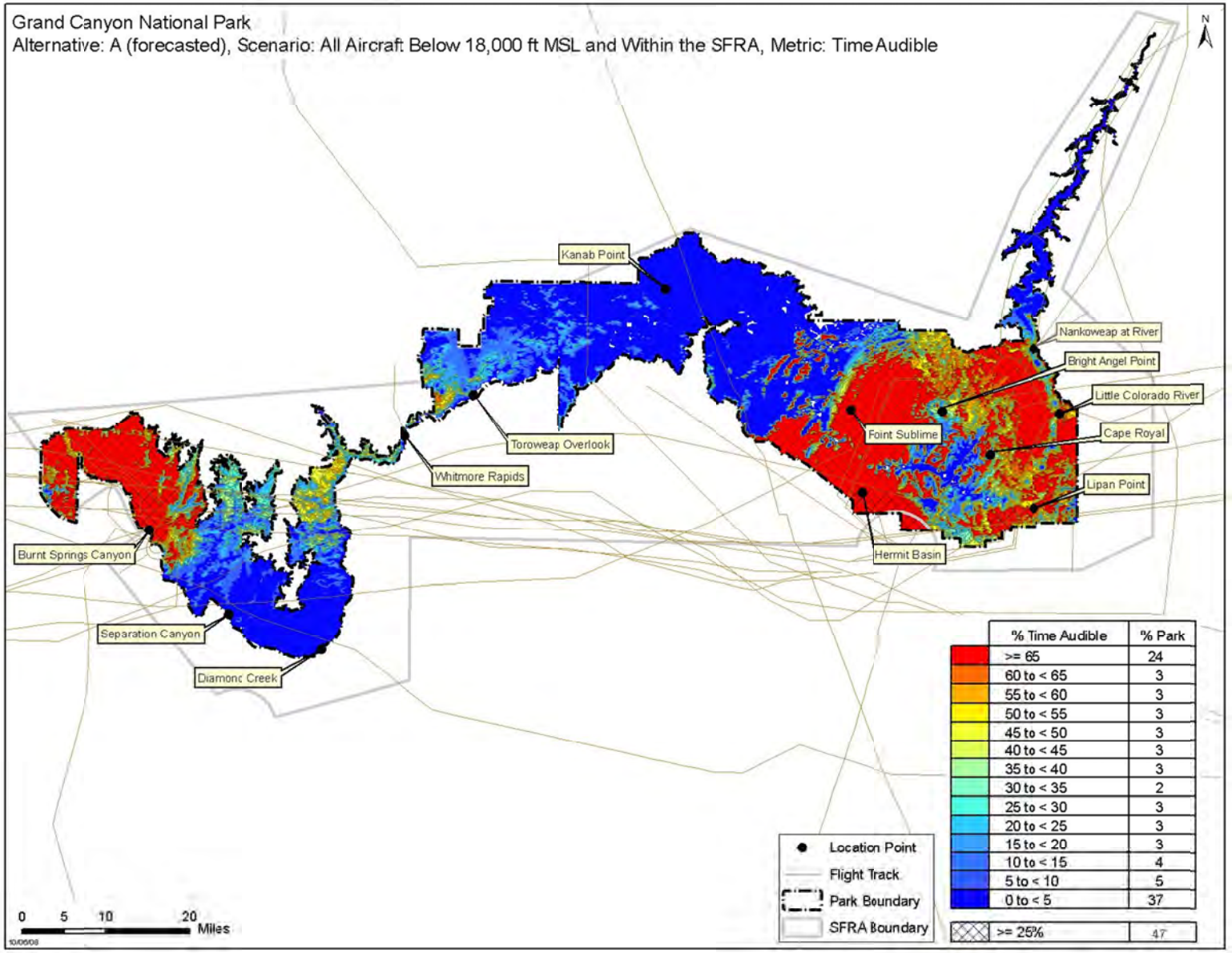

FIGURE 9 ALTERNATIVE A (TEN-YEAR FORECASTED) – %TAUD CONTOURS – ALL AIRCRAFT BELOW 18,000 FT MSL AND WITHIN THE SFRA

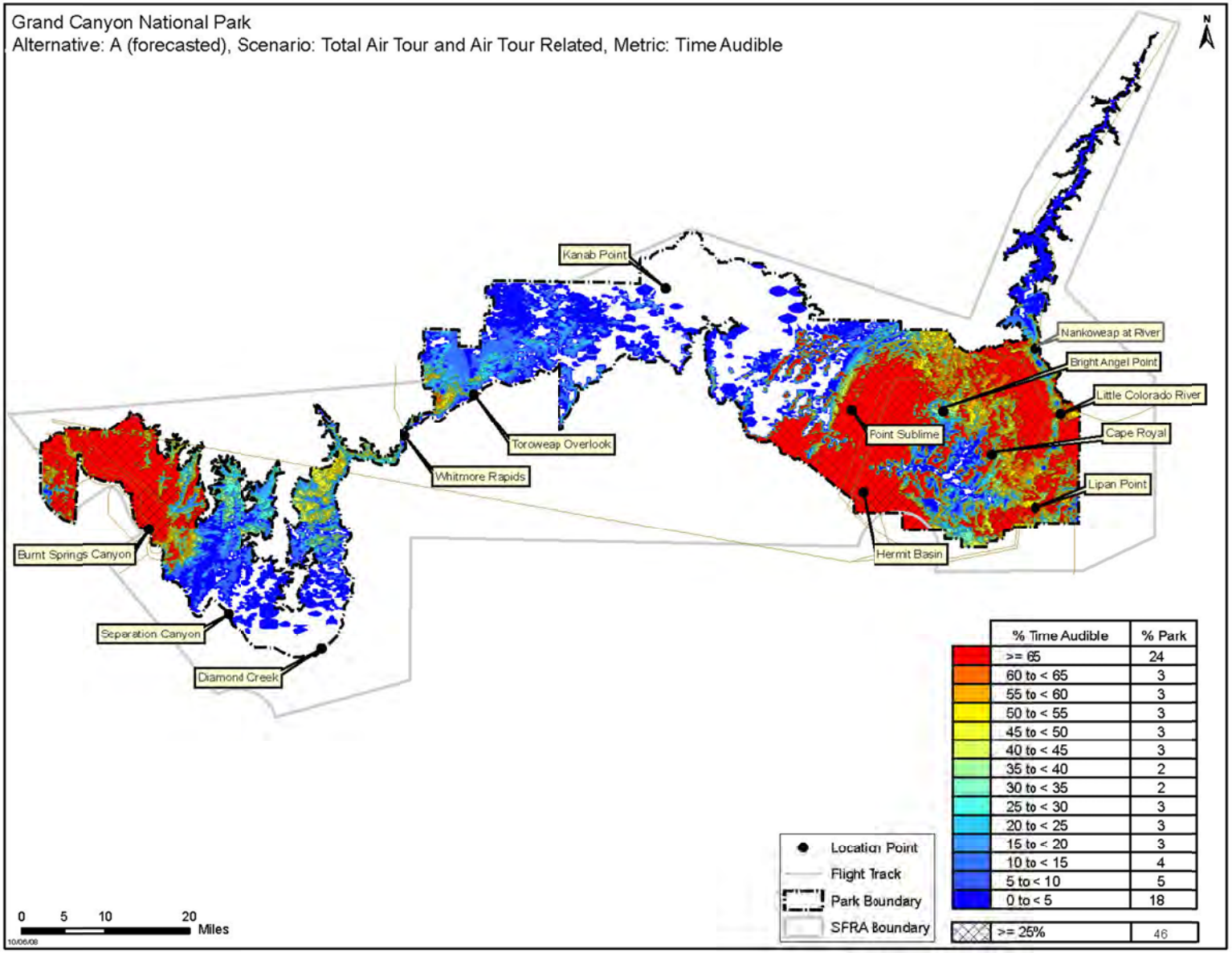

FIGURE 10 ALTERNATIVE A (TEN-YEAR FORECASTED) – %TAUD CONTOURS – AIR-TOUR AND AIR-TOUR RELATED

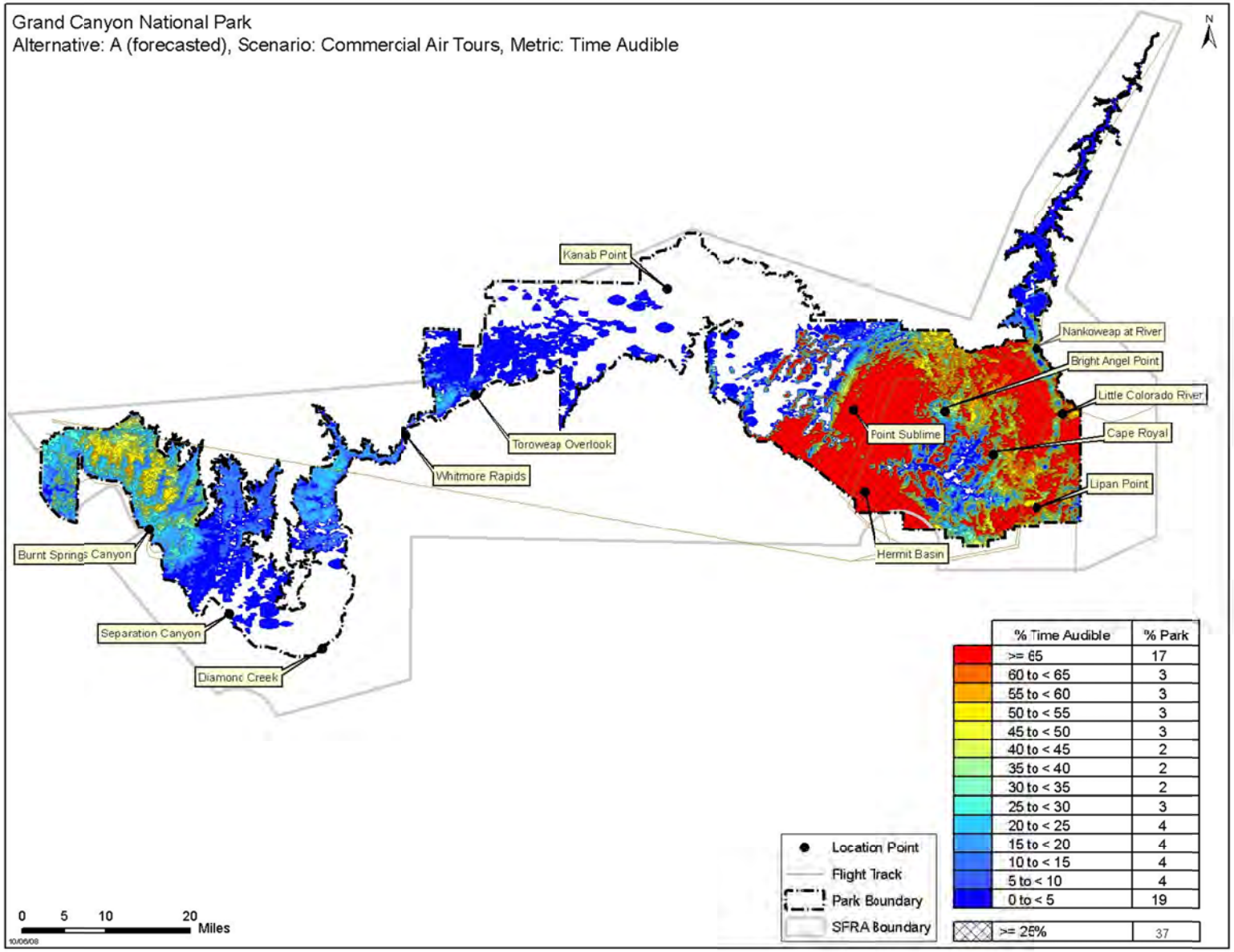

FIGURE 11 ALTERNATIVE A (TEN-YEAR FORECASTED) – %TAUD CONTOURS – COMMERCIAL AIR-TOURS

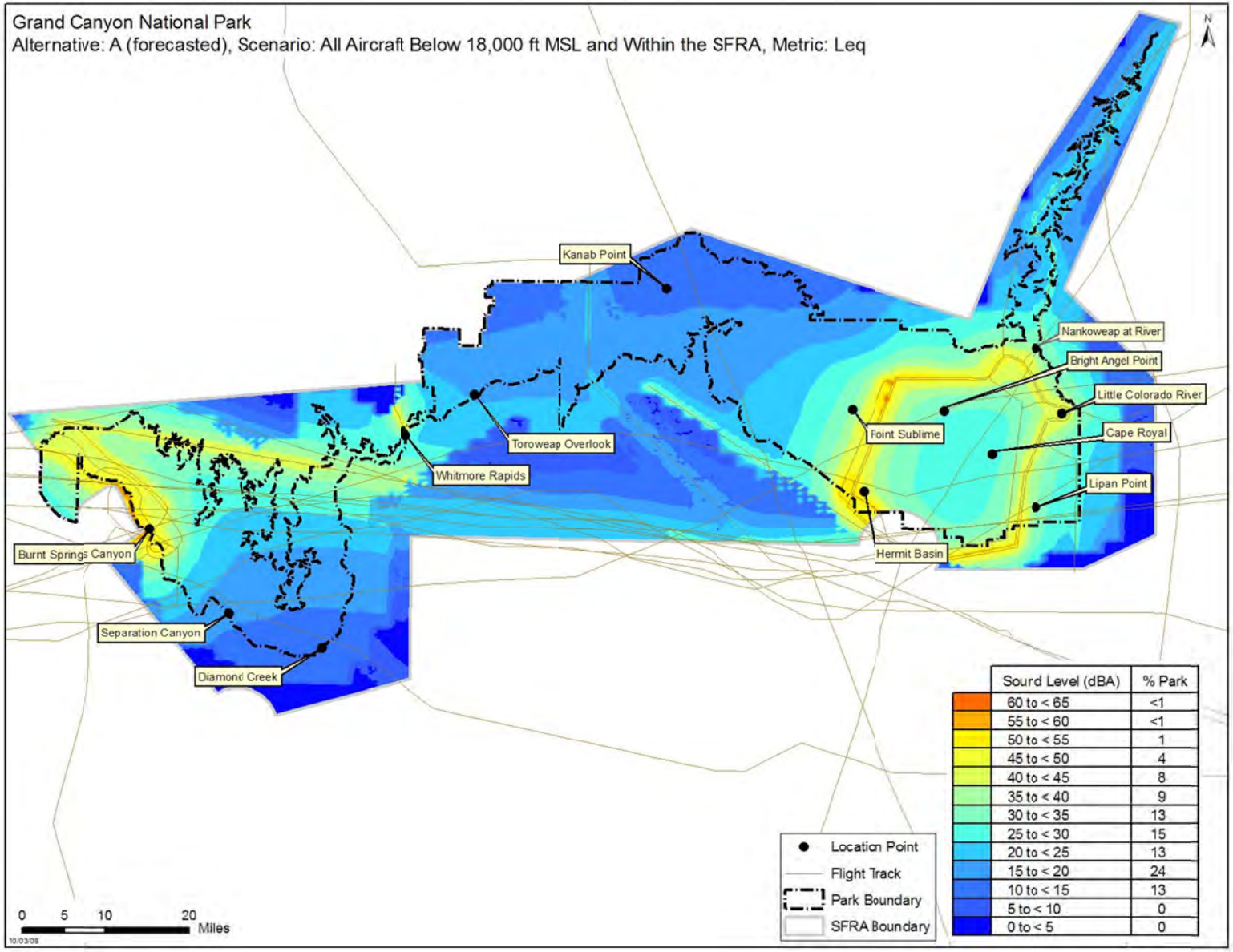

FIGURE 12 ALTERNATIVE A (TEN-YEAR FORECASTED) – L_{AEQ12} CONTOURS – ALL AIRCRAFT BELOW 18,000 FT MSL AND WITHIN THE SFRA

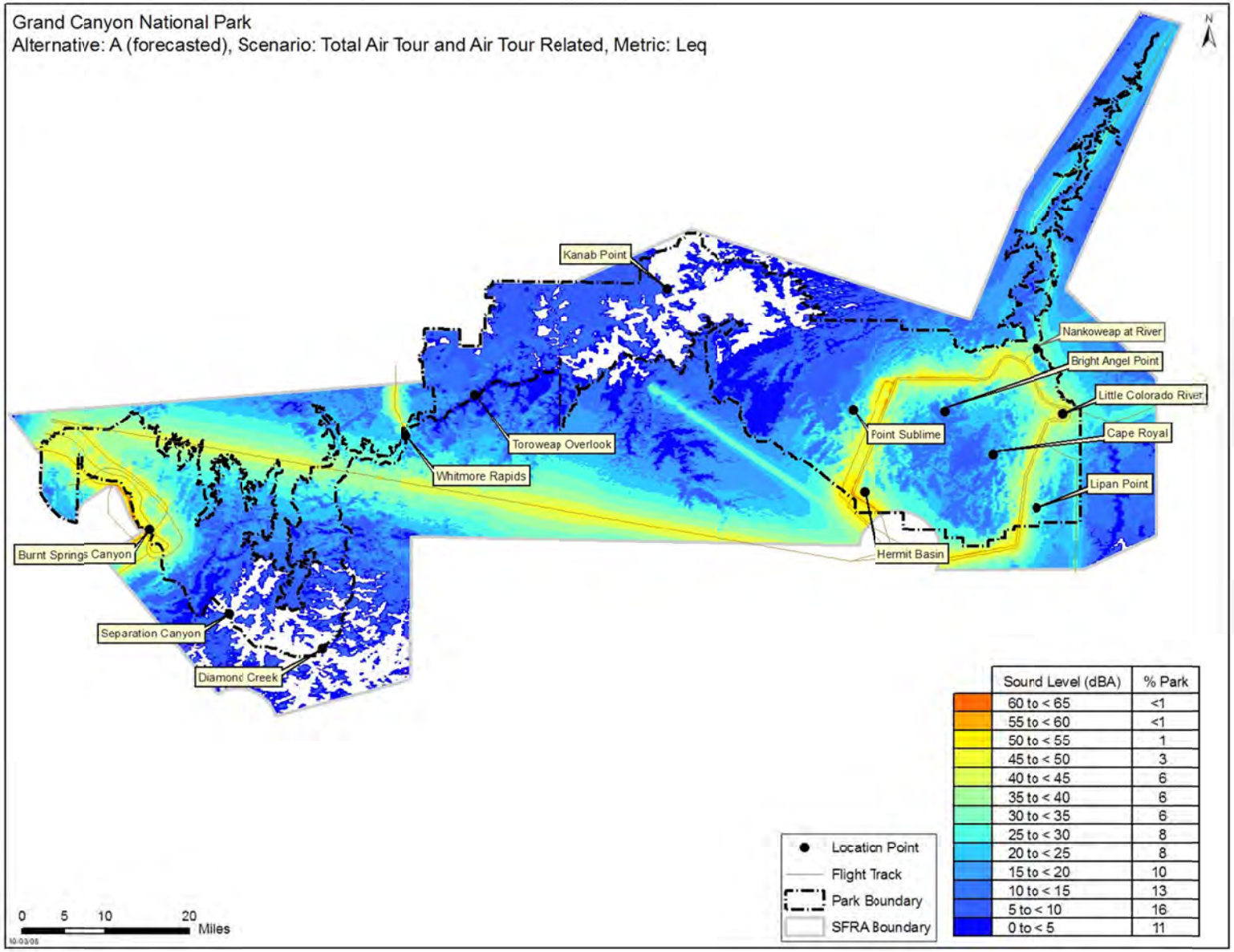

FIGURE 13 ALTERNATIVE A (TEN-YEAR FORECASTED) – L_{AEQ12} CONTOURS – AIR-TOUR AND AIR-TOUR RELATED

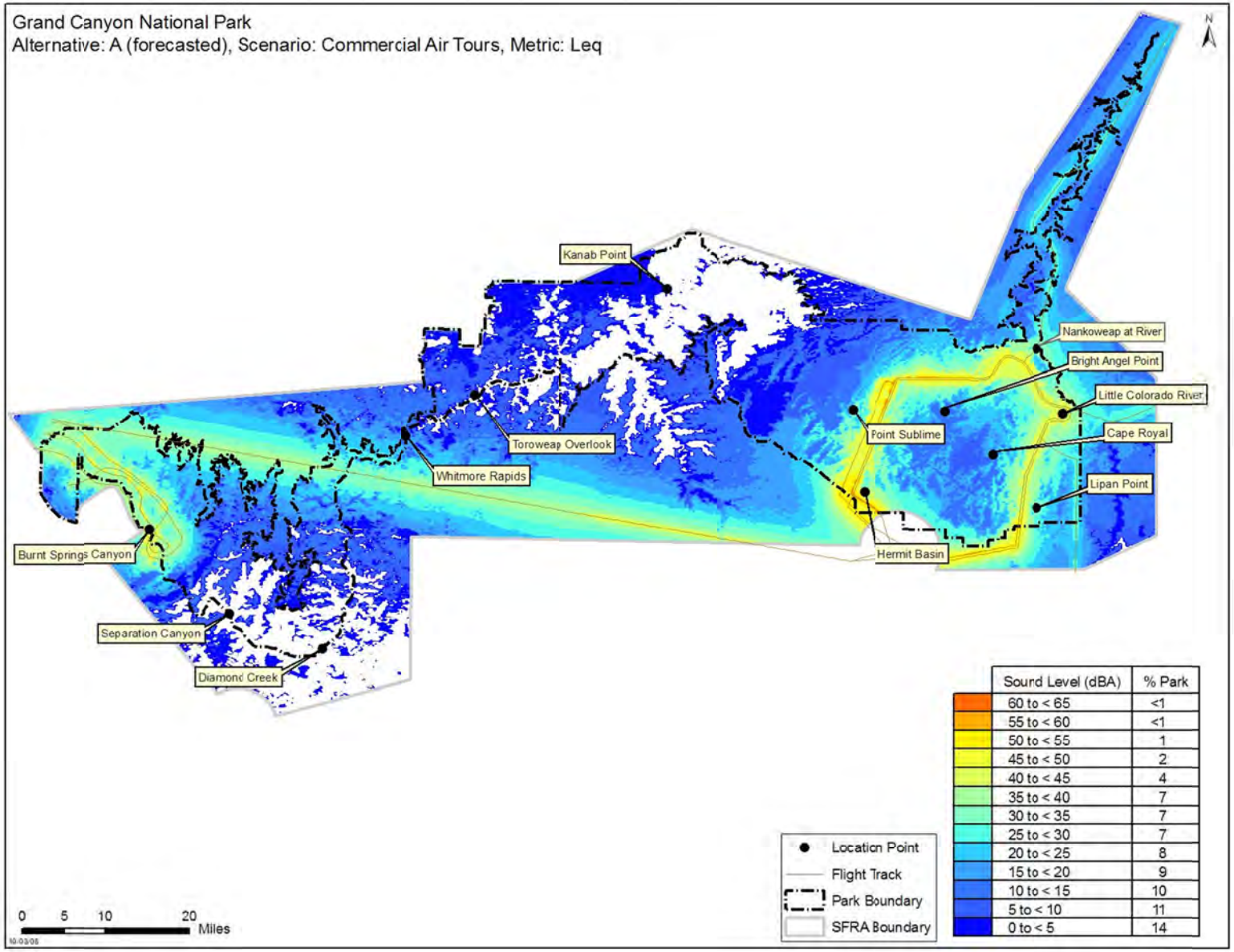

FIGURE 14 ALTERNATIVE A (TEN-YEAR FORECASTED) – L_{AEQ12} CONTOURS – COMMERCIAL AIR-TOURS

TABLE 11 DETAILED CONTOUR ANALYSIS RESULTS WITHIN GCNP- ALTERNATIVE A FOR TEN-YEAR FORECAST

Results Within GCNP		%TAUD			L_{Aeq12} (dBA)		
		All Aircraft Below 18,000 ft MSL and Within the SFRA	Air-tour and Air-tour Related	Commercial Air-tours	All Aircraft Below 18,000 ft MSL and Within the SFRA	Air-tour and Air-tour Related	Commercial Air-tours
Developed		% Of Management Zone					
	>= 65	54	54	54	0	0	0
	60 to < 65	6	6	6	0	0	0
	55 to < 60	4	4	5	0	0	0
	50 to < 55	3	3	3	1	2	2
	45 to < 50	4	4	4	2	1	1
	40 to < 45	6	6	6	5	2	2
	35 to < 40	4	4	4	16	5	5
	30 to < 35	4	4	4	52	15	15
	25 to < 30	4	4	4	23	42	42
	20 to < 25	3	3	3	0	24	25
	15 to < 20	1	1	1	2	6	6
	10 to < 15	1	1	1	0	2	1
	5 to < 10	1	1	0	0	1	1
	0 to < 5	4	4	5	0	0	1
Non-Wilderness							
	>= 65	39	38	38	0	0	0
	60 to < 65	7	6	6	0	0	0
	55 to < 60	6	6	6	0	1	1
	50 to < 55	5	5	5	4	3	3
	45 to < 50	5	5	5	5	4	4
	40 to < 45	5	5	5	8	5	5
	35 to < 40	5	4	4	15	9	9
	30 to < 35	6	6	6	31	12	12
	25 to < 30	4	4	4	27	25	25
	20 to < 25	3	3	3	1	16	16
	15 to < 20	2	2	2	8	11	11
	10 to < 15	2	2	2	1	8	7
	5 to < 10	2	2	2	0	5	4
	0 to < 5	11	8	6	0	1	3

Results Within GCNP		%TAUD			L_{Aeq12} (dBA)		
		All Aircraft Below 18,000 ft MSL and Within the SFRA	Air-tour and Air-tour Related	Commercial Air-tours	All Aircraft Below 18,000 ft MSL and Within the SFRA	Air-tour and Air-tour Related	Commercial Air-tours
Proposed Wilderness				**% Of Management Zone**			
	>= 65	23	23	16	0	0	0
	60 to < 65	3	3	2	0	0	0
	55 to < 60	3	3	2	0	0	0
	50 to < 55	3	3	3	1	1	1
	45 to < 50	3	3	2	4	3	2
	40 to < 45	2	3	2	8	6	4
	35 to < 40	2	2	2	9	6	6
	30 to < 35	2	2	2	12	6	7
	25 to < 30	2	2	3	15	6	6
	20 to < 25	3	3	4	14	8	8
	15 to < 20	3	3	4	25	10	9
	10 to < 15	4	4	4	13	14	10
	5 to < 10	5	5	4	0	16	12
	0 to < 5	39	19	20	0	12	15
Entire Park				**% Of GCNP**			
	>= 65	24	24	17	0	0	0
	60 to < 65	3	3	3	0	0	0
	55 to < 60	3	3	3	0	0	0
	50 to < 55	3	3	3	1	1	1
	45 to < 50	3	3	3	4	3	2
	40 to < 45	3	3	2	8	6	4
	35 to < 40	3	2	2	9	6	7
	30 to < 35	3	2	2	13	6	7
	25 to < 30	2	3	3	15	8	7
	20 to < 25	3	3	4	13	8	8
	15 to < 20	3	3	4	24	10	9
	10 to < 15	4	4	4	13	13	10
	5 to < 10	5	5	4	0	16	11
	0 to < 5	37	18	16	0	11	14

1 **TABLE 12 DETAILED CONTOUR ANALYSIS RESULTS WITHIN THE SFRA - ALTERNATIVE A FOR TEN-YEAR FORECAST**

Results Within the SFRA	%TAUD			L_{Aeq12} (dBA)		
	All Aircraft Below 18,000 ft MSL and Within the SFRA	Air-tour and Air-tour Related	Commercial Air-tours	All Aircraft Below 18,000 ft MSL and Within the SFRA	Air-tour and Air-tour Related	Commercial Air-tours
>= 65	N/A	N/A	N/A	0	0	0
60 to < 65	N/A	N/A	N/A	0	0	0
55 to < 60	N/A	N/A	N/A	0	0	0
50 to < 55	N/A	N/A	N/A	1	1	1
45 to < 50	N/A	N/A	N/A	2	2	1
40 to < 45	N/A	N/A	N/A	5	5	3
35 to < 40	N/A	N/A	N/A	6	7	6
30 to < 35	N/A	N/A	N/A	8	7	7
25 to < 30	N/A	N/A	N/A	12	9	8
20 to < 25	N/A	N/A	N/A	18	11	10
15 to < 20	N/A	N/A	N/A	22	13	13
10 to < 15	N/A	N/A	N/A	16	14	14
5 to < 10	N/A	N/A	N/A	5	13	11
0 to < 5	N/A	N/A	N/A	3	9	11

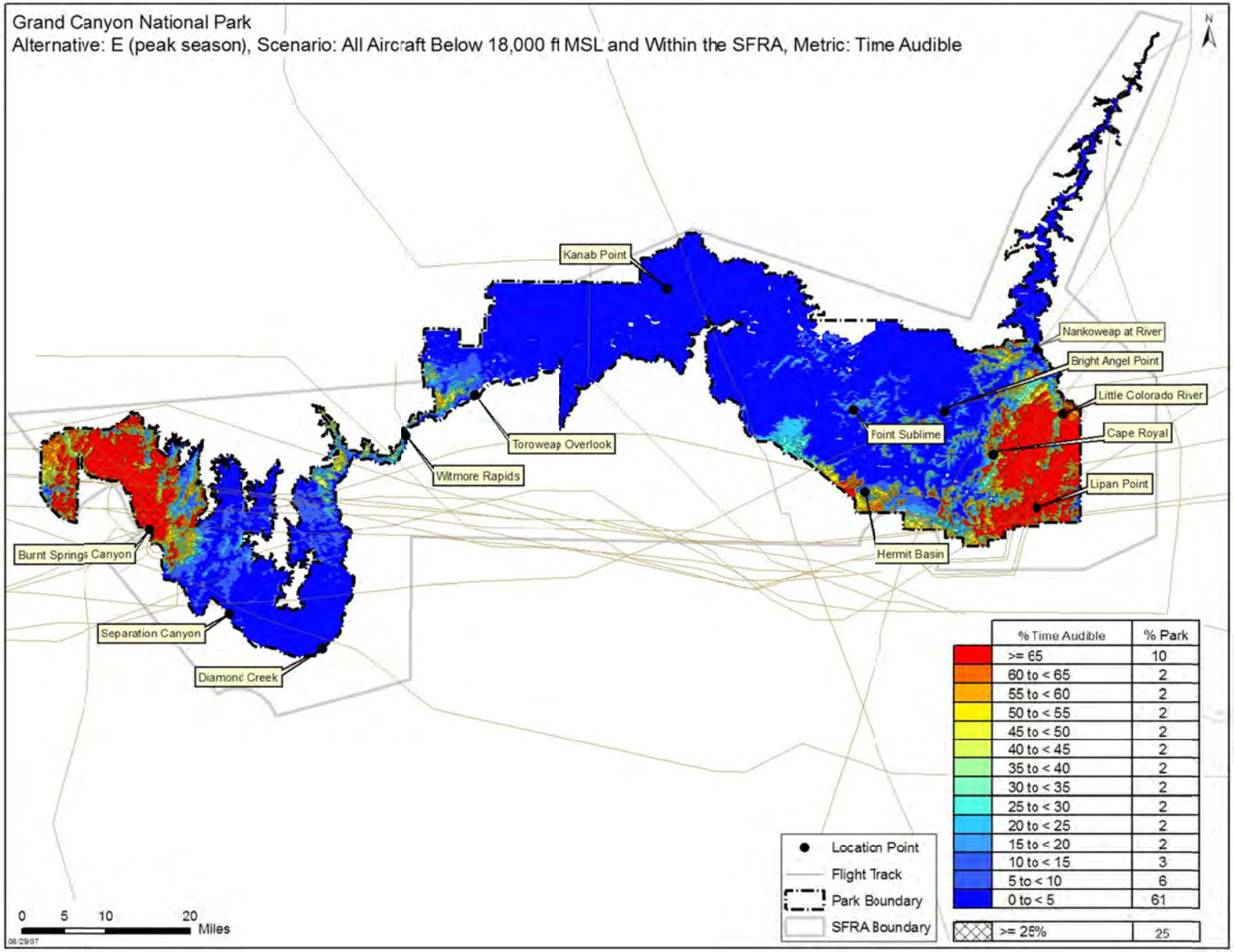

FIGURE 15 ALTERNATIVE E (PEAK SEASON) – %TAUD CONTOURS – ALL AIRCRAFT BELOW 18,000 FT MSL AND WITHIN THE SFRA

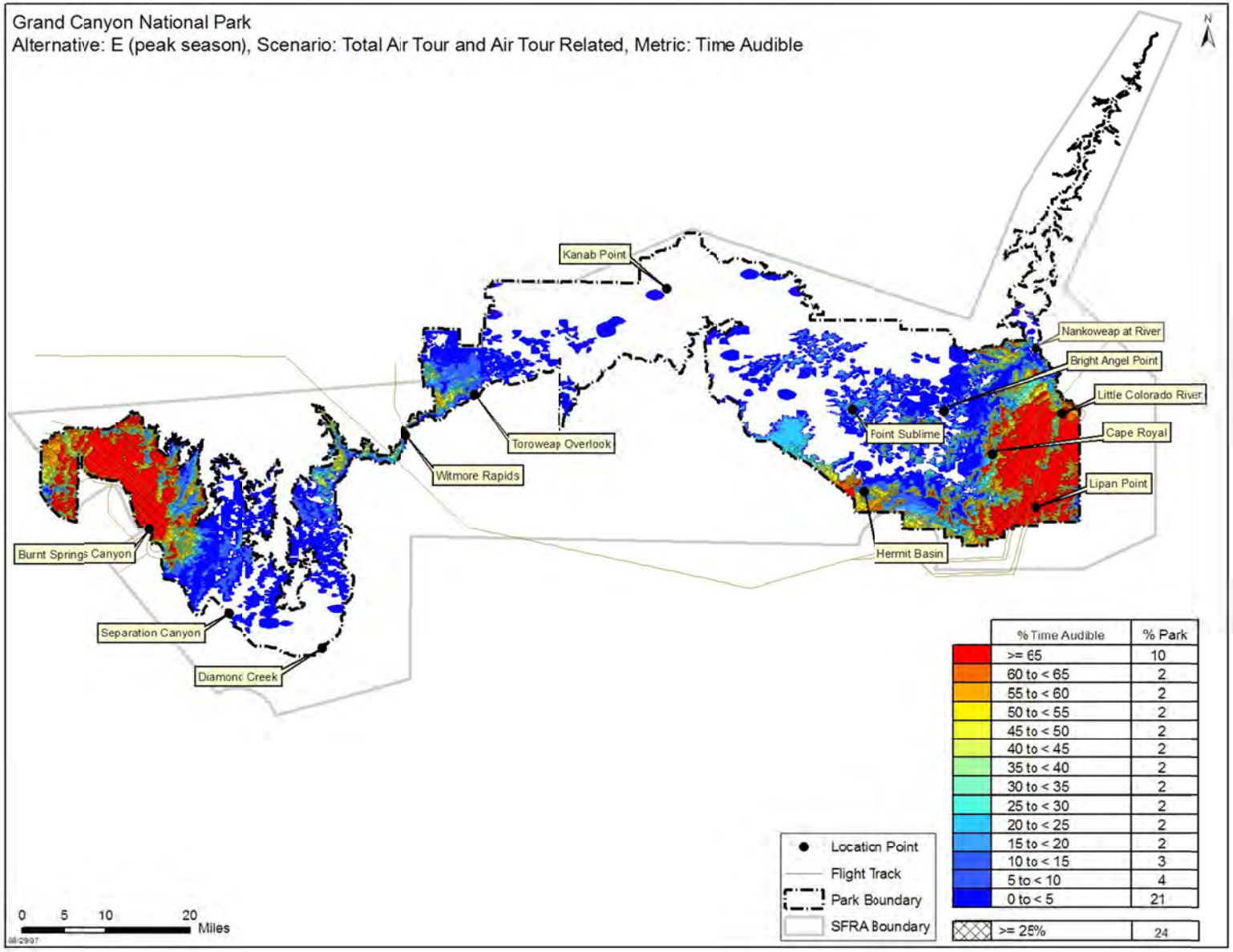

FIGURE 16 ALTERNATIVE E (PEAK SEASON) – %TAUD CONTOURS – AIR-TOUR AND AIR-TOUR RELATED

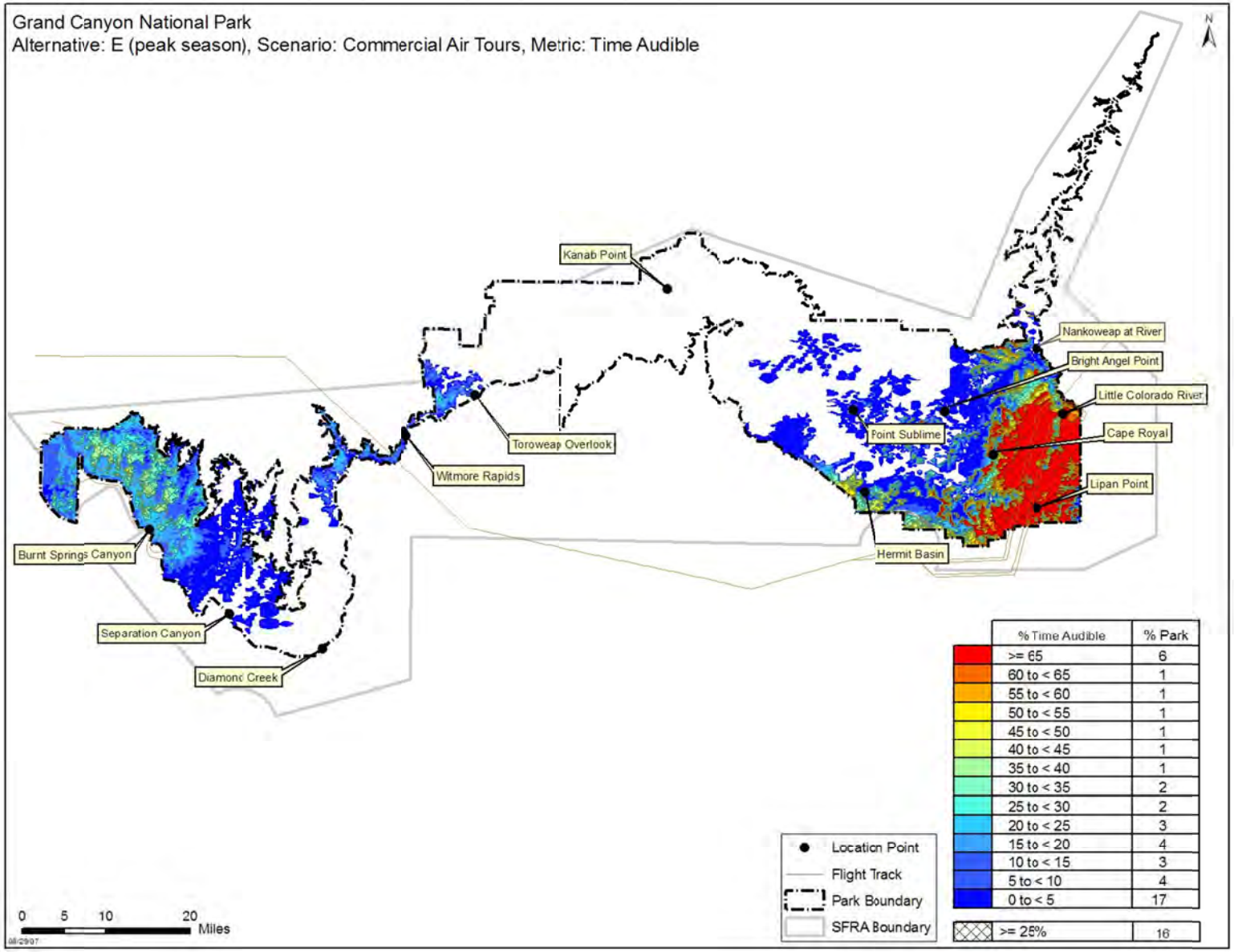

FIGURE 17 ALTERNATIVE E (PEAK SEASON) – %TAUD CONTOURS – COMMERCIAL AIR-TOURS

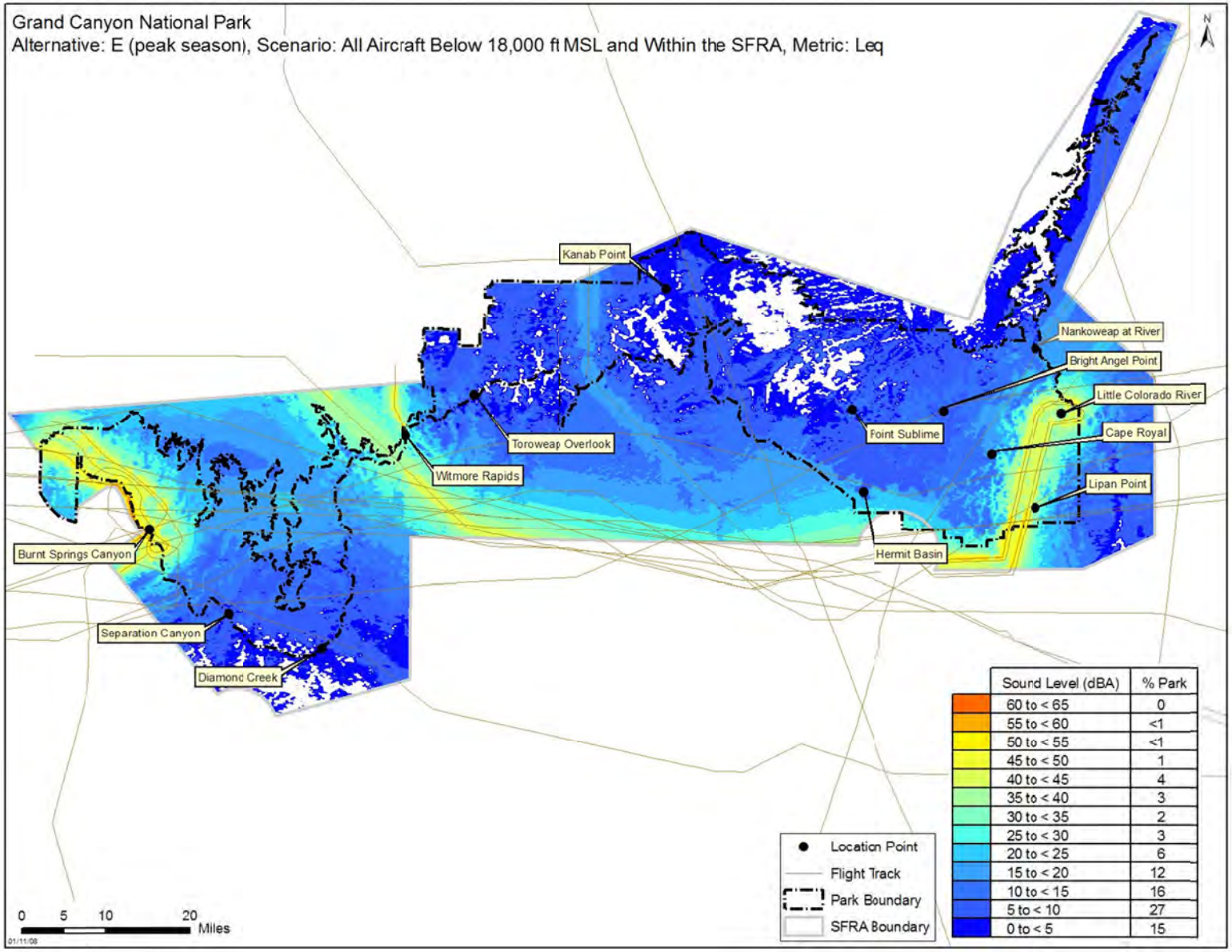

FIGURE 18 ALTERNATIVE E (PEAK SEASON) – L_{AEQ12} CONTOURS – ALL AIRCRAFT BELOW 18,000 FT MSL AND WITHIN THE SFRA

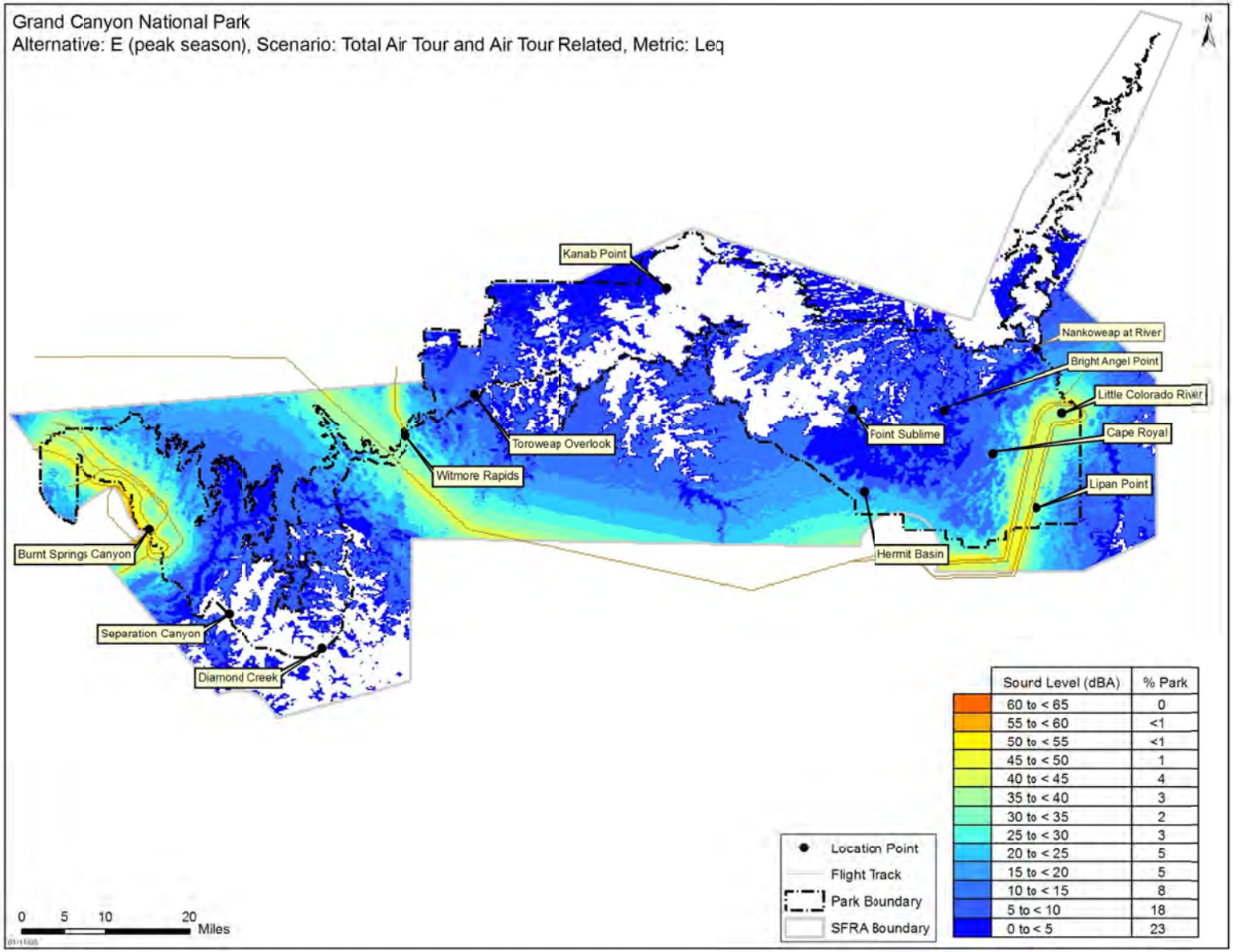

FIGURE 19 ALTERNATIVE E (PEAK SEASON) – L_{AEQ12} CONTOURS – AIR-TOUR AND AIR-TOUR RELATED

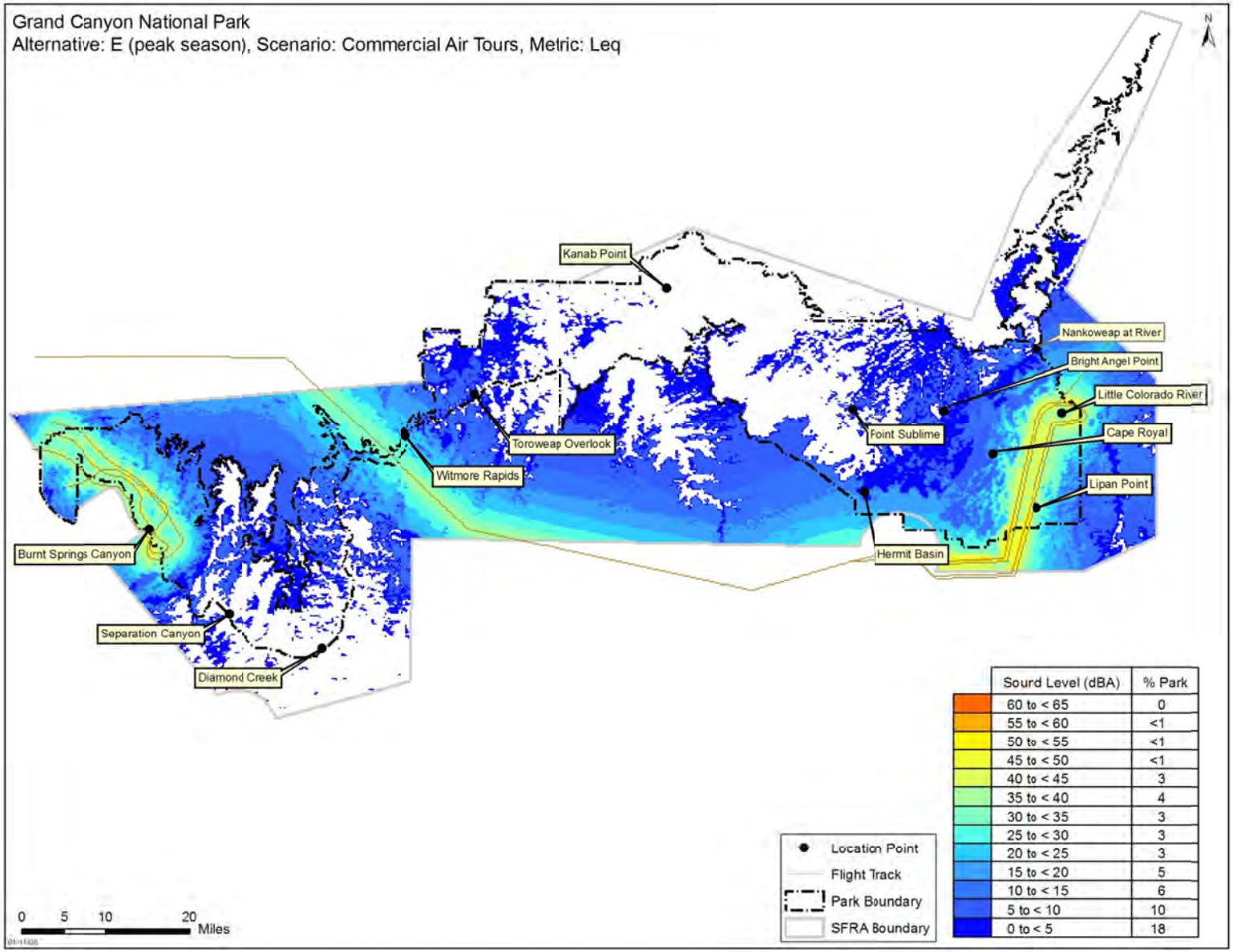

FIGURE 20 ALTERNATIVE E (PEAK SEASON) – L_{AEQ12} CONTOURS – COMMERCIAL AIR-TOURS