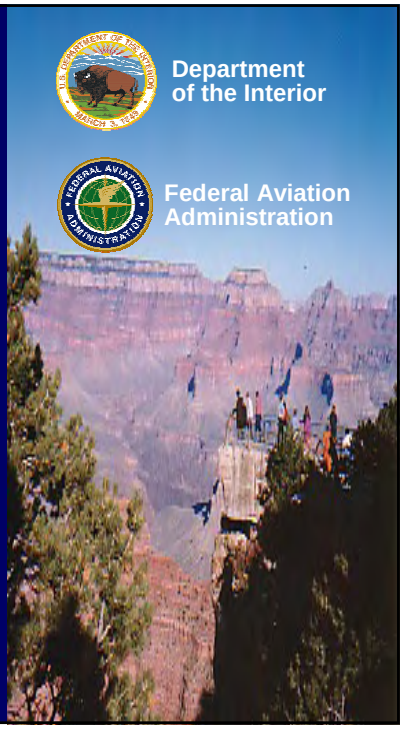
Modeling Working Group Presentation

Overview of Grand Canyon Noise Analysis Results

Department of the Interior

Federal Aviation Administration



Presented to: 10th Meeting of the Grand Canyon Working Group Of the National Parks Overflights Advisory Group

By: FAA/NPS Technical Working Group

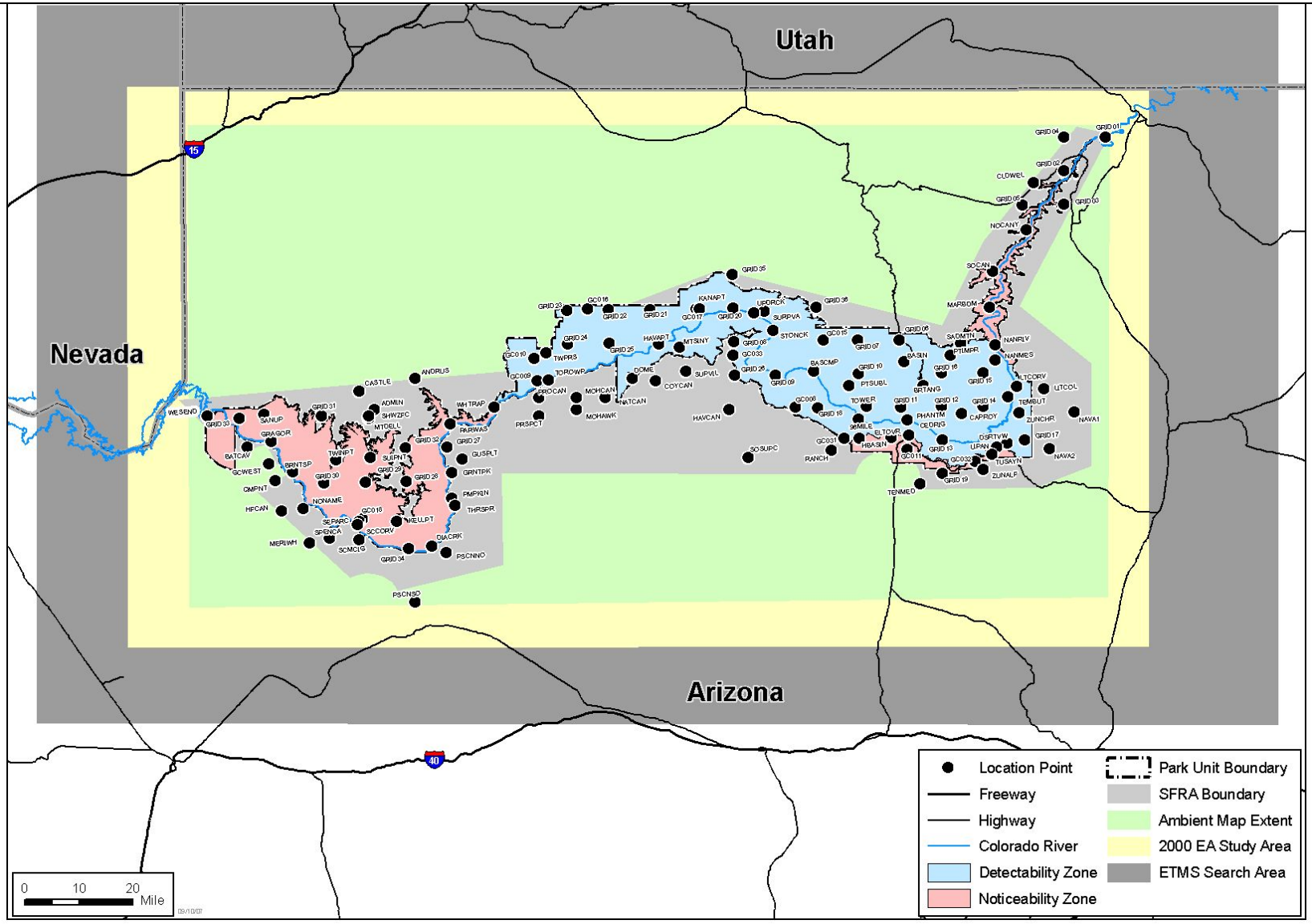
Date: September 20, 2007

Status of Modeling Tasks

- Modeling of Commercial, GA, and Military Operations
- Modeling of Alternatives A-F (peak season, base cases):
  - ✓ Contours: Time Audible
  - ➢ Contours: Equivalent Sound Level
  - ✓ Location Points: Time Audible, Equivalent Sound Level, Maximum Sound Level
- Modeling of Alternatives E-F (off-peak season, bases cases)
- Modeling of Alternatives A-F (forecast condition) are on hold pending possible industry fleet mix changes for commercial jet aircraft

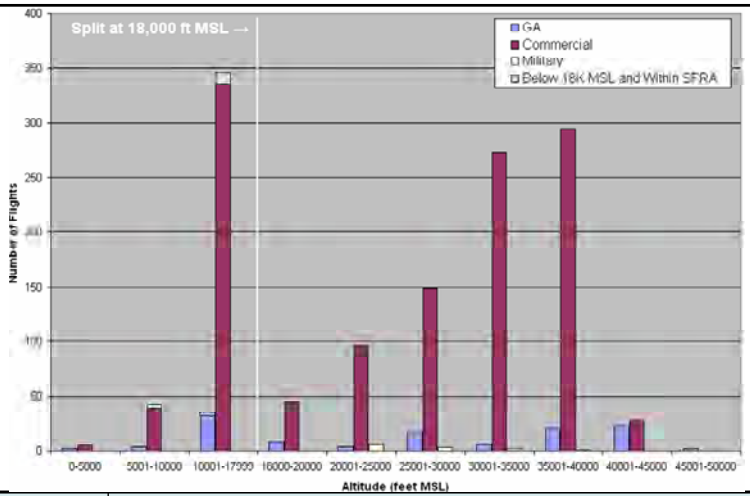
✓ Additional modeling analyses

Study Area for Grand Canyon Noise Analysis



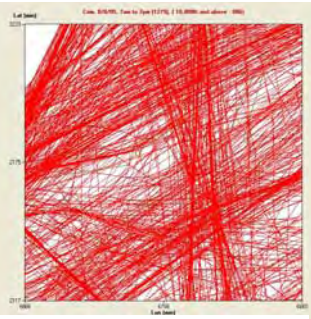
Commercial, GA, and Military Operations

- Because the dimensions of the SFRA controls the airspace up to an altitude of 17,999 feet MSL, all aircraft operations were analyzed in the following three categories:
  - ✓ **All Aircraft Operations 18,000 ft MSL and Above** (These operations are common to all alternatives and will be analyzed as part of cumulative impact analysis.)
  - ✓ **All Aircraft Operations Below 18,000 ft MSL and Outside the SFRA** (These operations are common to all alternatives and will be analyzed as part of cumulative impact analysis.)
  - ✓ **All Aircraft Operations Below 18,000 ft MSL and Within the SFRA** (These operations are common to all alternatives and will be analyzed to determine *the extent of restoration of natural quiet* and further assessed for potential impacts consistent with considerations of context and intensity as described in CEQ regulations, best available information, and reasonable scientific methods)

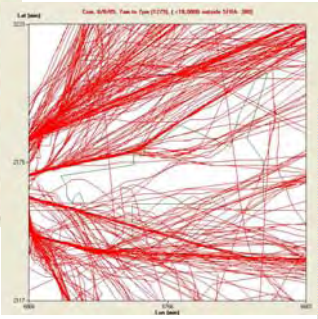


Aircraft Type	Number of Daytime Operations			
	Total*	18,000 ft MSL and Above	Below 18,000 ft MSL and Outside the SFRA	Below 18,000 ft MSL and Within the SFRA
Commercial	**1279**	886	380	13
General Aviation (GA)	**122**	81	38	3
Military	**11**	11	0	0

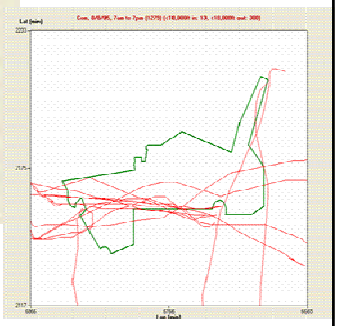
Commercial Operations (Daytime)



886 Operations 18,000 ft MSL and Above

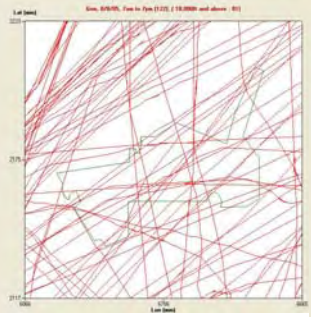


380 Operations Below 18,000 ft MSL and Outside the SFRA



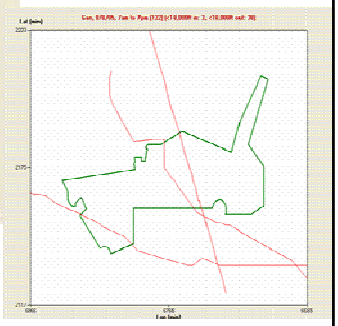
13 Operations Below 18,000 ft MSL and Within the SFRA

GA Operations (Daytime)



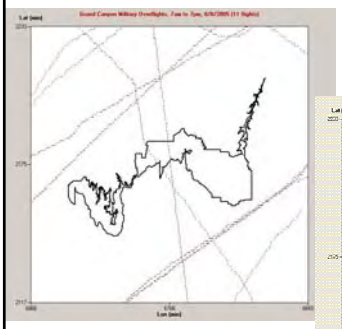
81 Operations 18,000 ft MSL and Above

38 Operations Below 18,000 ft MSL and Outside the SFRA

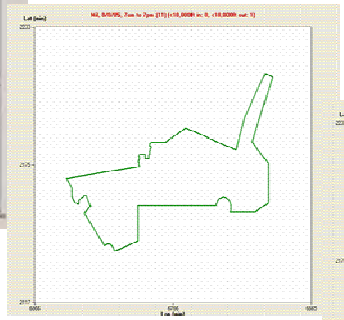


3 Operations Below 18,000 ft MSL and Within the SFRA

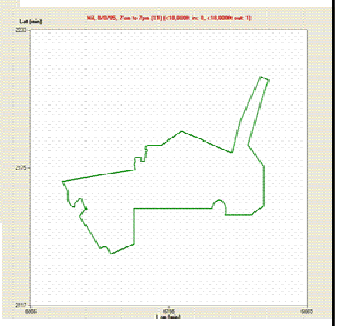
Military Operations (Daytime)



11 Operations 18,000 ft MSL and Above



0 Operations Below 18,000 ft MSL and Outside the SFRA



0 Operations Below 18,000 ft MSL and Within the SFRA

Noise Modeling Scenarios for All Alternatives

Aircraft Scenarios		#
(Common to all alternatives for cumulative effects analysis)	All Aircraft 18,000 ft MSL and Above	1
	All Aircraft below 18,000 feet MSL and Outside the SFRA	2
Alternatives A-F	**All Aircraft below 18,000 feet MSL and Within the SFRA**	3
	Total Commercial Air Tour and Air Tour Related	4
	Commercial Air Tours	5
	GC West	(These ops are part of *Total Commercial Air Tour and Air Tour Related* scenario and not modeled as separate scenarios)
	Transportation, Repositioning, etc.	
	Over the Edge	
	Brown Routes *	
Alternative A (with mitigation)	All Quiet Technology Commercial Air Tours (1:1 aircraft swap)	6
	All Quiet Technology Commercial Air Tours (1:1 passenger efficiency)	7

* **Brown Routes (previously known as Bar 10)** - refers to the helicopter and fixed-wing operations conducted to/from Grand Canyon Bar 10 airstrip in support of river runners; also includes the roundtrip helicopter route to Supai Village from Grand Canyon National Park Airport in support of the Havasupai Tribe.

Alternatives A-F: Operations Summary

Aircraft Scenario	# of Operations of Peak Season "Day" for Each Alternative/Scenario					
	A	B	C	D	E	F
All Aircraft 18,000 ft MSL and Above	978 (common to all alternatives for cumulative effects analysis)					
All Aircraft below 18,000 feet MSL and Outside the SFRA	418 (common to all alternatives for cumulative effects analysis)					
All Aircraft below 18,000 feet MSL and Within the SFRA	**651**	**624**	**493**	**453**	**472**	**642**
Total Commercial Air Tour and Air Tour Related	635	608	477	437	456	626
Commercial Air Tours	314	287	162	116	138	318

- **Alternative A Peak Day (August 8, 2005):** The FAA and NPS had agreed to define "day" as the peak day, i.e., the day of the highest number of Commercial Air Tour and Air Tour Related operations within GCNP in 2005 – i.e., 635 operations.
- **Alternatives B, C, D, and F:** The number of ops is based on the 8/8/05 peak day with expected increases and decreases in operations for route-use based on operator interviews is also reflected. Note: For **Alternative D**, the daily number of ops may be further modified based on a "noise budget" (to be defined).
- **Alternative E:** The daily number of ops is capped at 364 operations, excluding Hualapai "Exempt" flights from GC West.

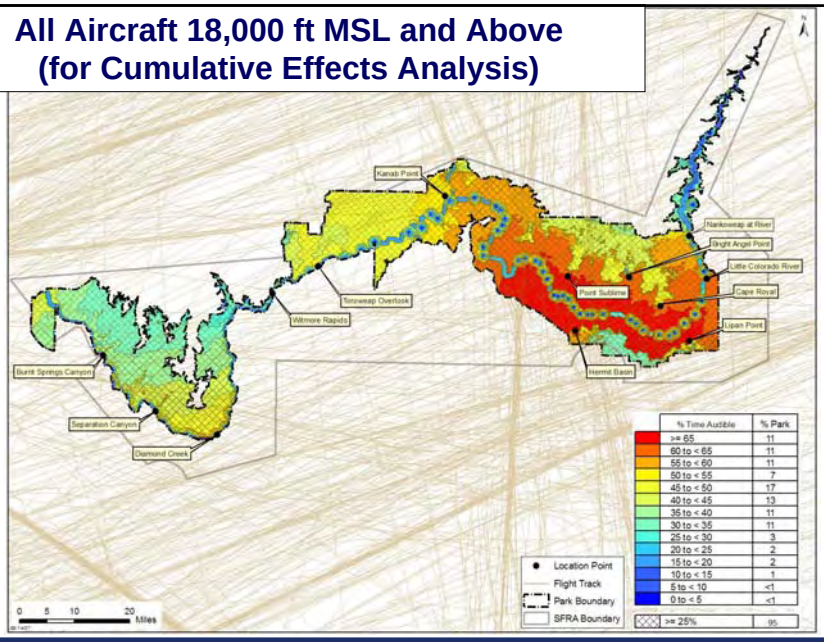
Alternatives A-F: Results Summary

The goal is to achieve restoration of natural quiet. Natural quiet is obtained when "50 percent or more of the park is experiencing natural quiet (i.e., no aircraft audible) 75 to 100 percent of the day," each and every day. [NPS Report to Congress (July 1995)]

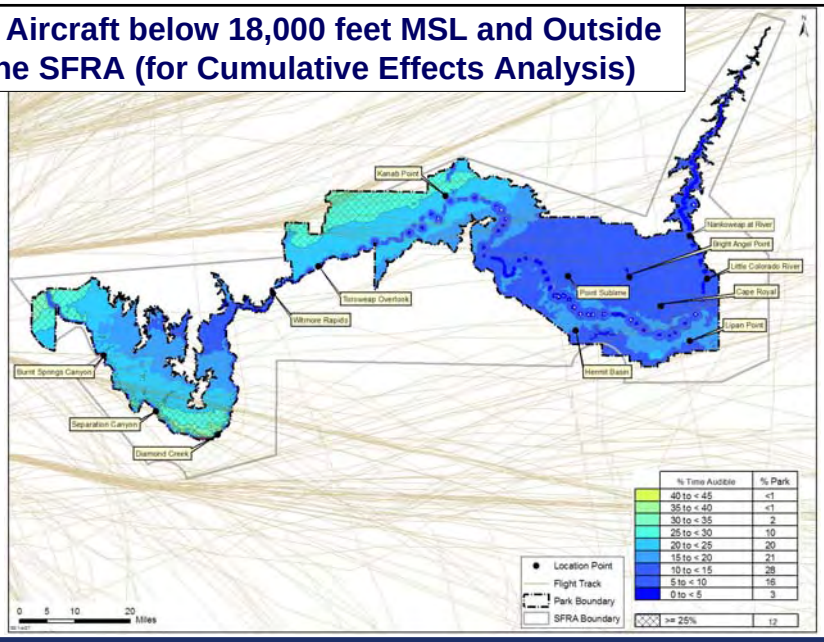
Aircraft Scenario	% of Park for aircraft audibility ≥ 25% for Each Alternative/Scenario (% of Park "Restored")					
	A	B	C	D	E	F
All Aircraft 18,000 ft MSL and Above (cumulative effects analysis)	94.5 (5.5)					
All Aircraft below 18,000 feet MSL and Outside the SFRA (cumulative effects analysis)	11.9 (88.1)					
All Aircraft below 18,000 feet MSL and Within the SFRA	45.5 **(54.5)**	45.7 **(54.3)**	39.1 **(60.9)**	21.8 **(78.2)**	24.8 **(75.2)**	48.8 **(51.2)**
Total Commercial Air Tour and Air Tour Related	44.8 (55.2)	45.0 (55.0)	38.3 (61.7)	21.2 (78.8)	24.4 (75.6)	48.3 (51.7)
Commercial Air Tours	36.1 (63.9)	37.0 (63.0)	29.0 (71.0)	15.0 (85.0)	16.1 (83.9)	36.7 (63.3)

Note: Notwithstanding the various scenarios modeled, the 1987 Overflights Act and the subsequent relevant court holdings require that the noise model account for noise from ***all aircraft*** to determine whether substantial restoration of natural quiet has been achieved. Moreover, NEPA requires that the agencies analyze the impacts of all noise sources cumulatively. Substantial restoration of natural quiet is achieved when the total percentage restored from ***all aircraft*** operations is 50% or more.

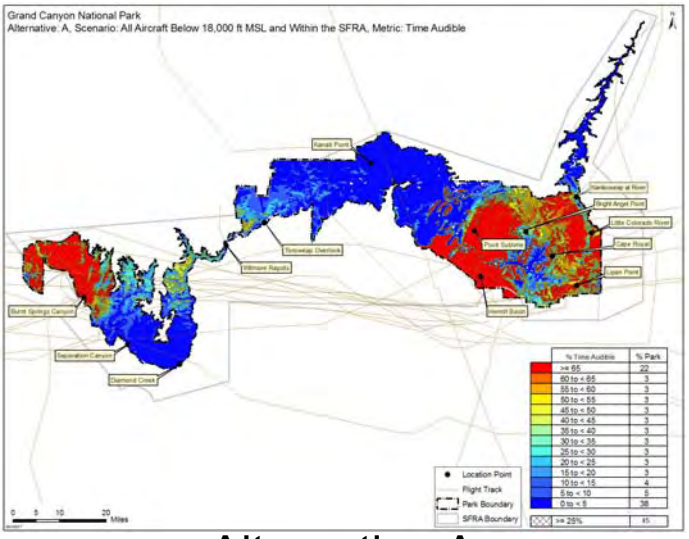
All Aircraft 18,000 ft MSL and Above (for Cumulative Effects Analysis)



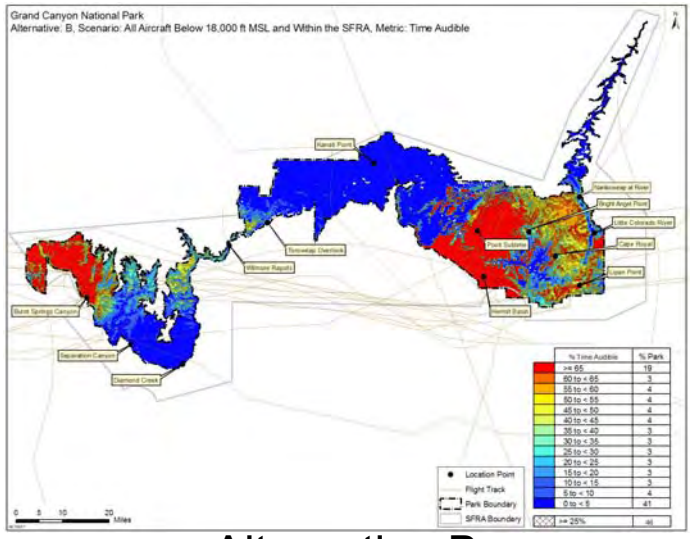
All Aircraft below 18,000 feet MSL and Outside the SFRA (for Cumulative Effects Analysis)



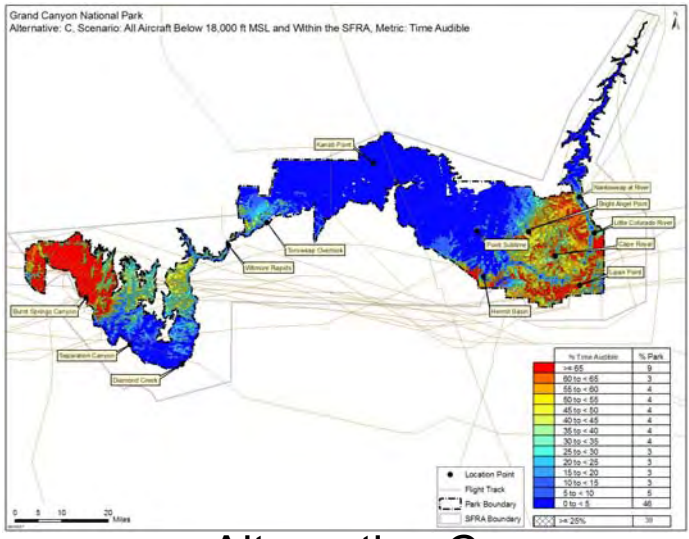
Alternatives A-F:
All Aircraft below 18,000 feet MSL and Within the SFRA



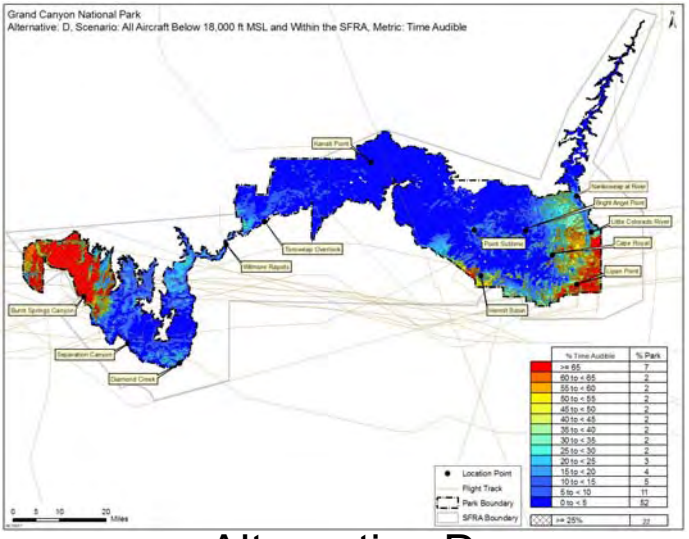
Alternative A



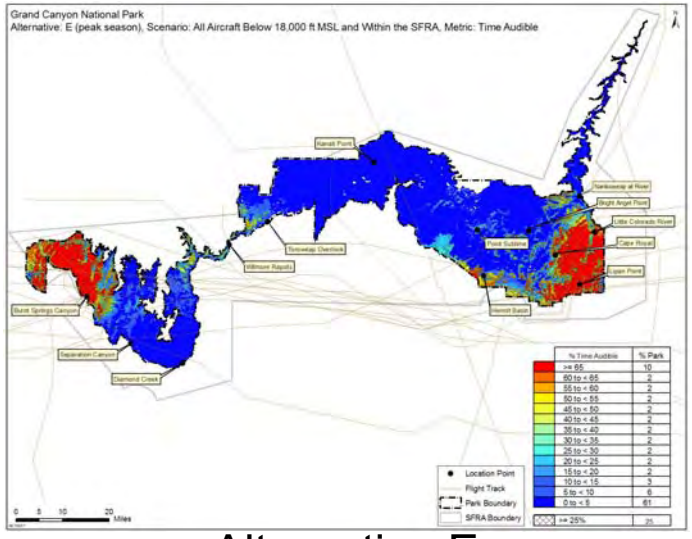
Alternative B



Alternative C



Alternative D



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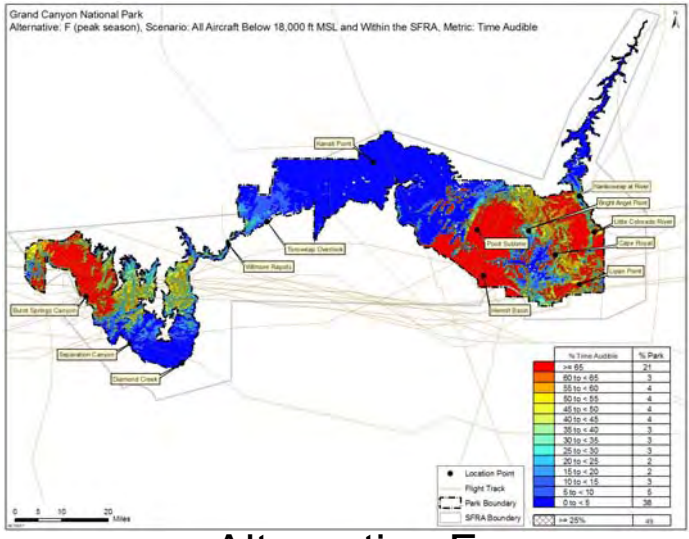
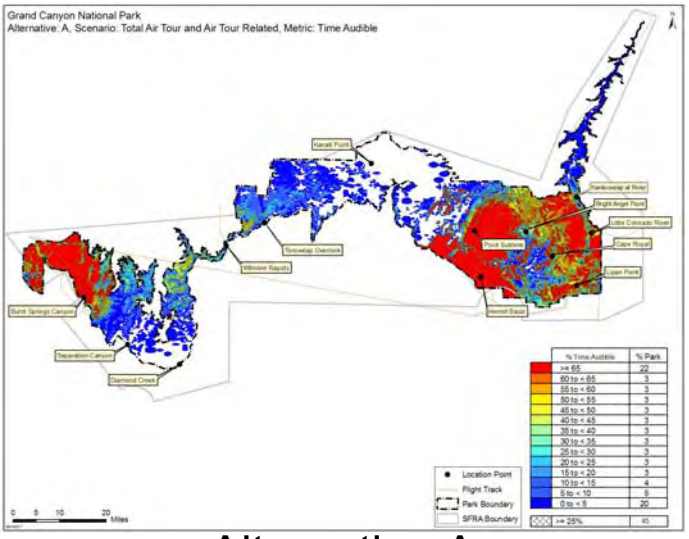
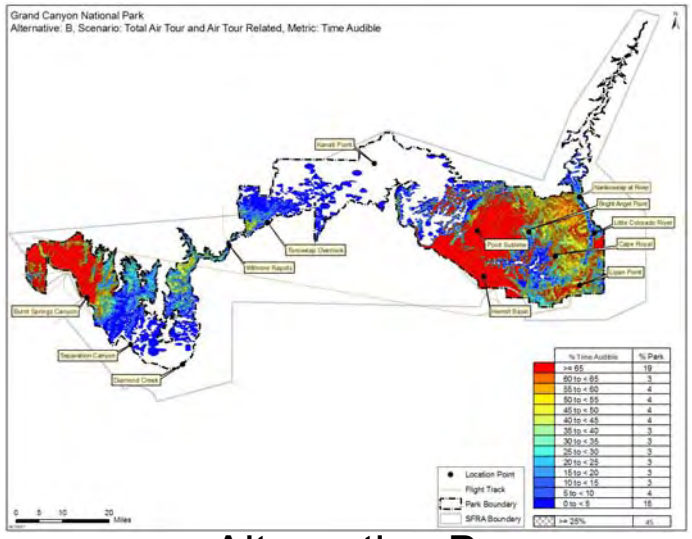


Alternative F

Alternatives A-F:
Total Commercial Air Tour and Air Tour Related



Alternative A



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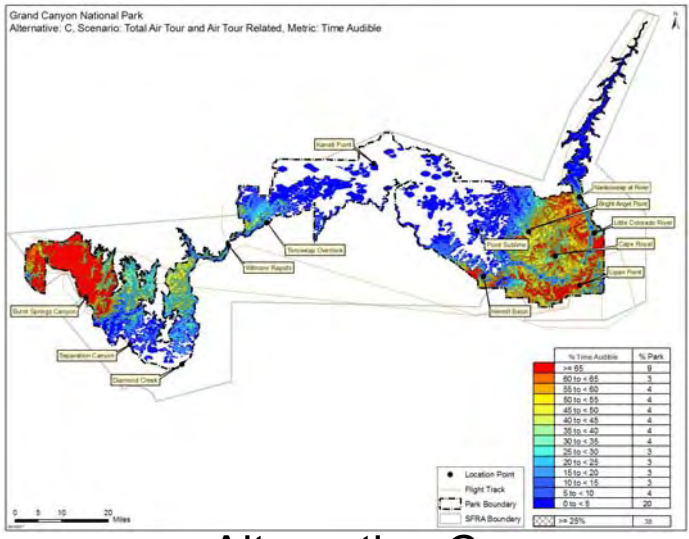

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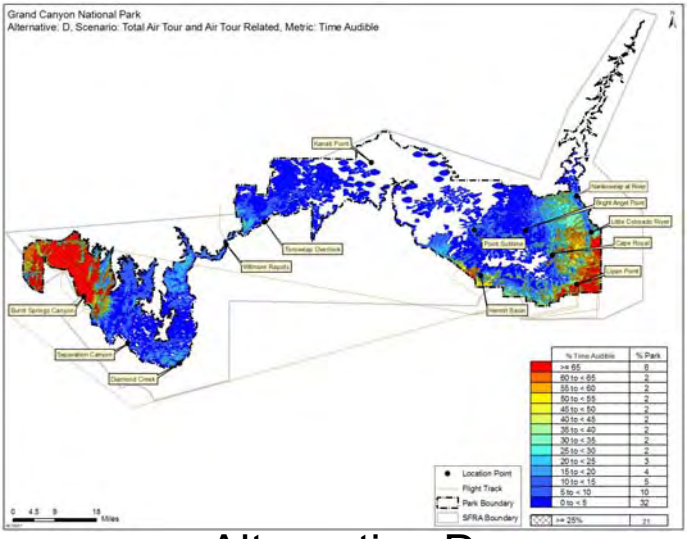

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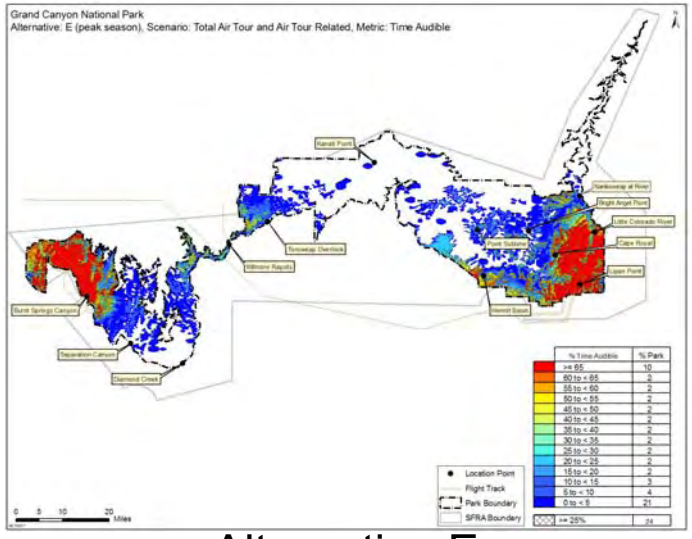

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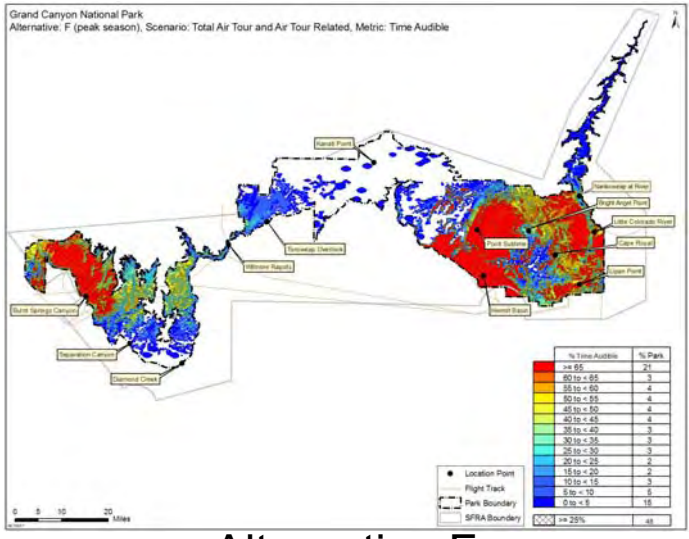
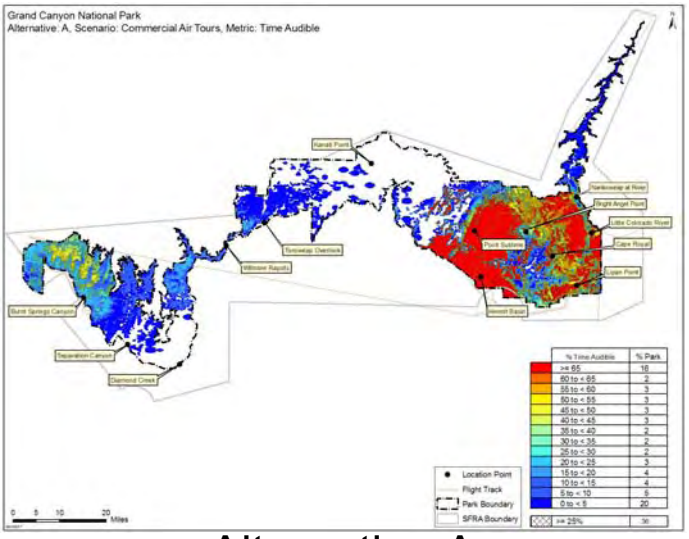
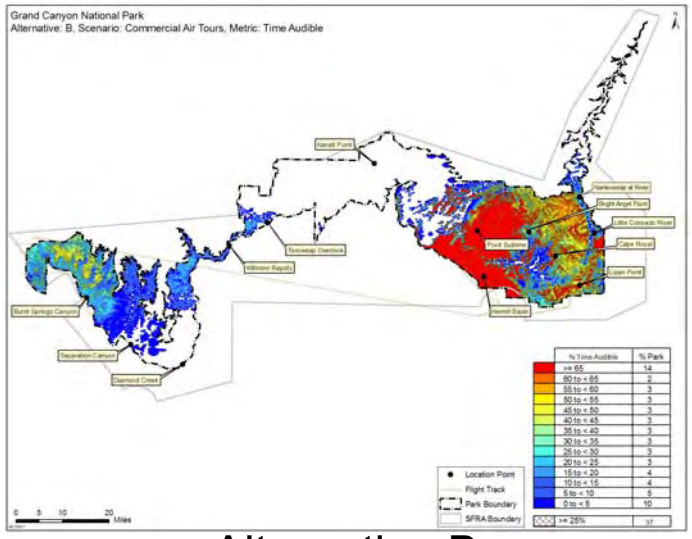


Alternative F

Alternatives A-F:
Commercial Air Tours



Alternative A



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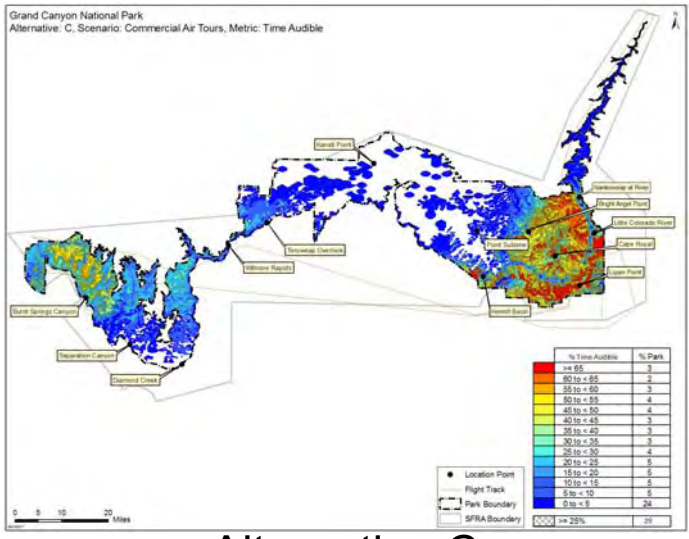

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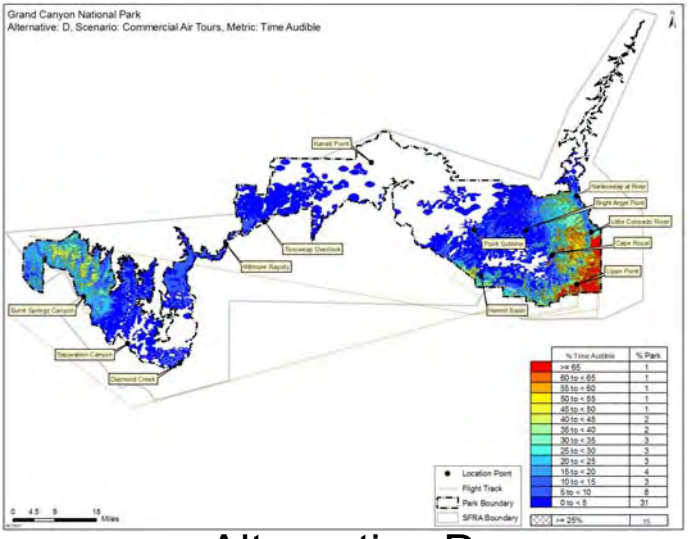

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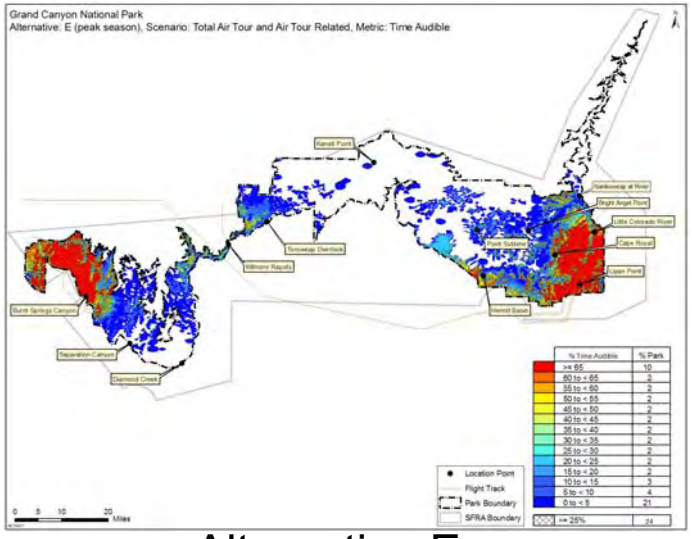

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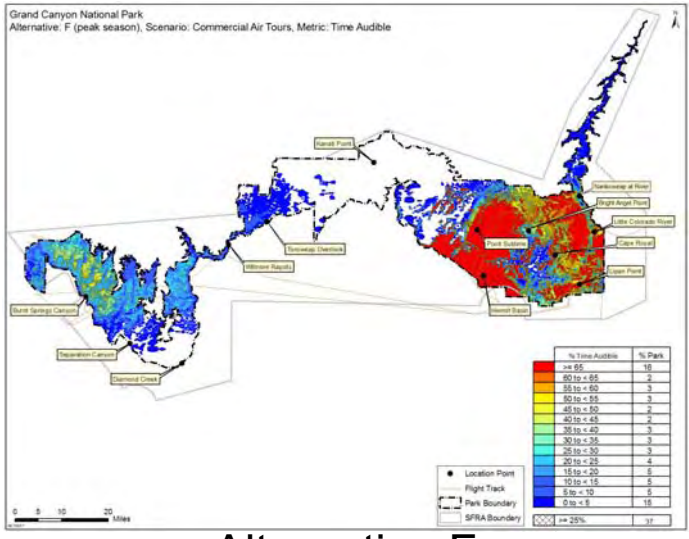
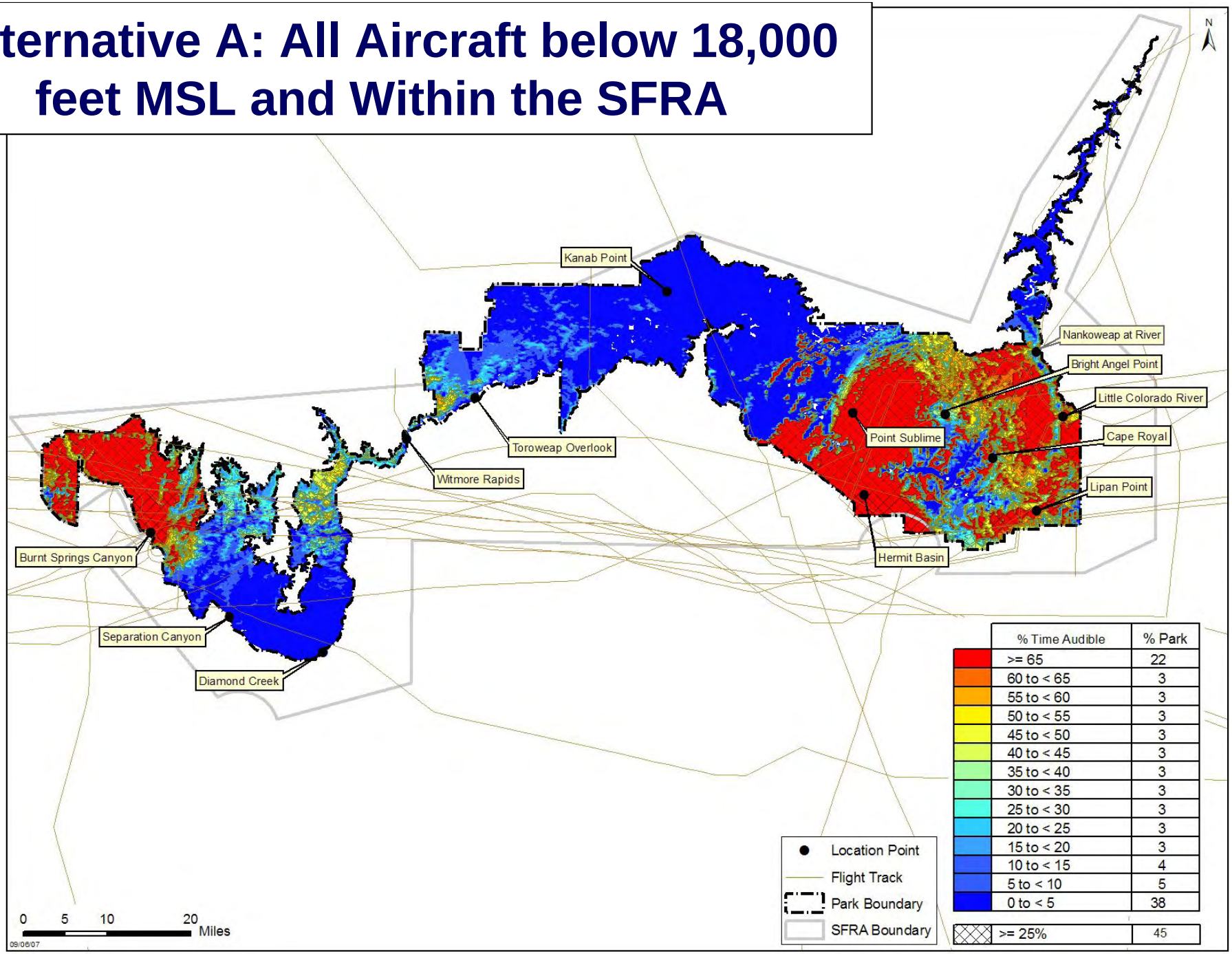
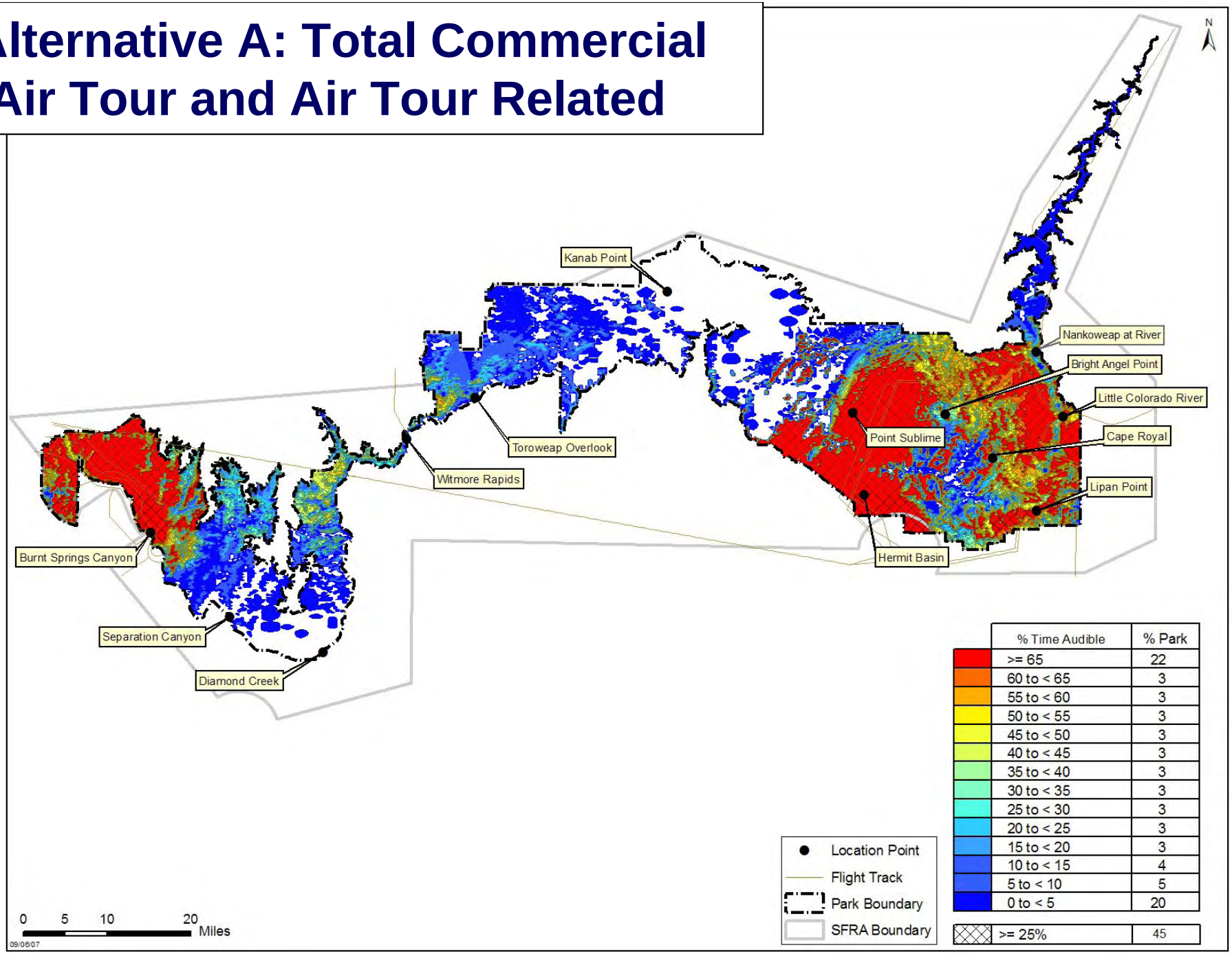


Alternative F

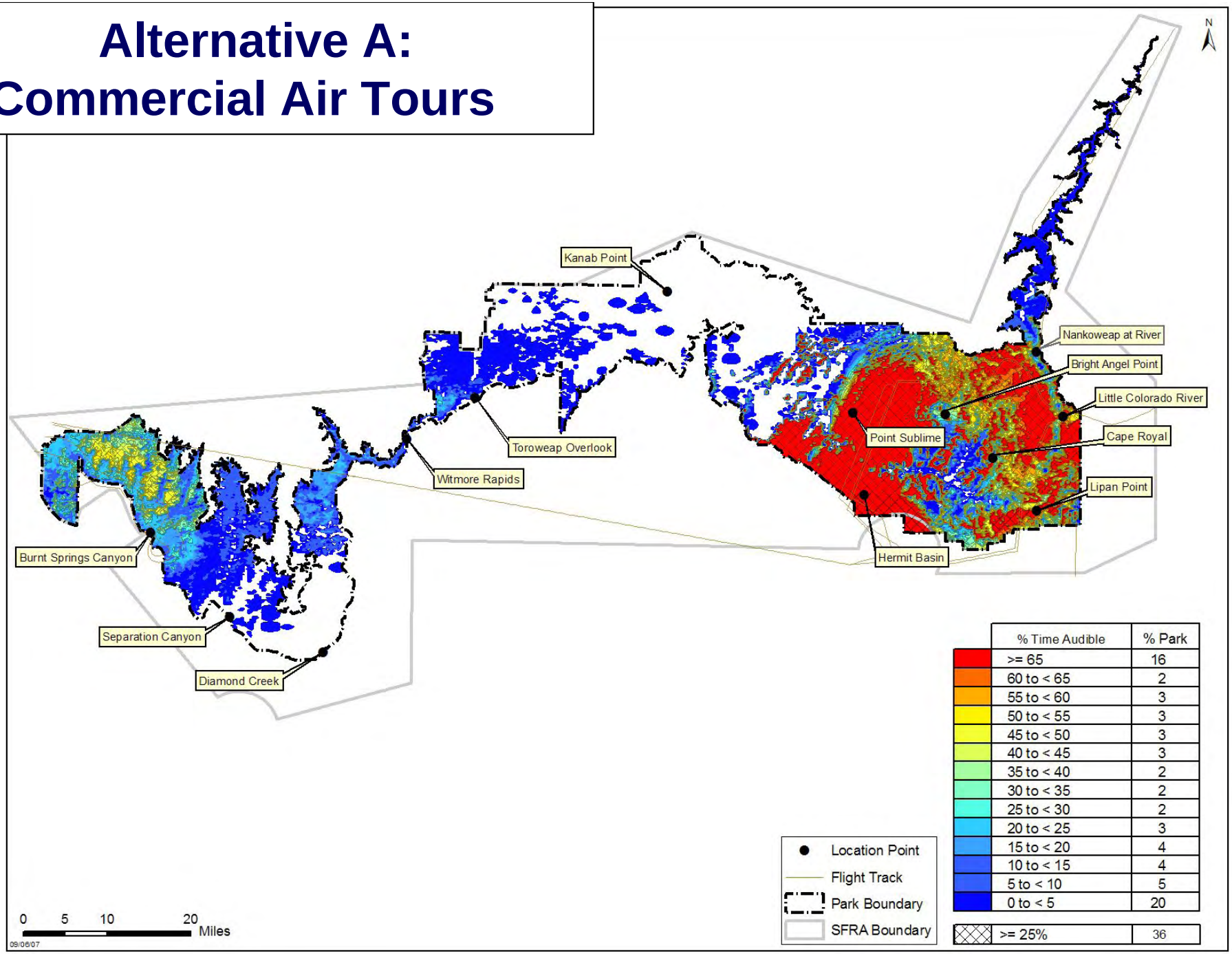
Alternative A: All Aircraft below 18,000 feet MSL and Within the SFRA



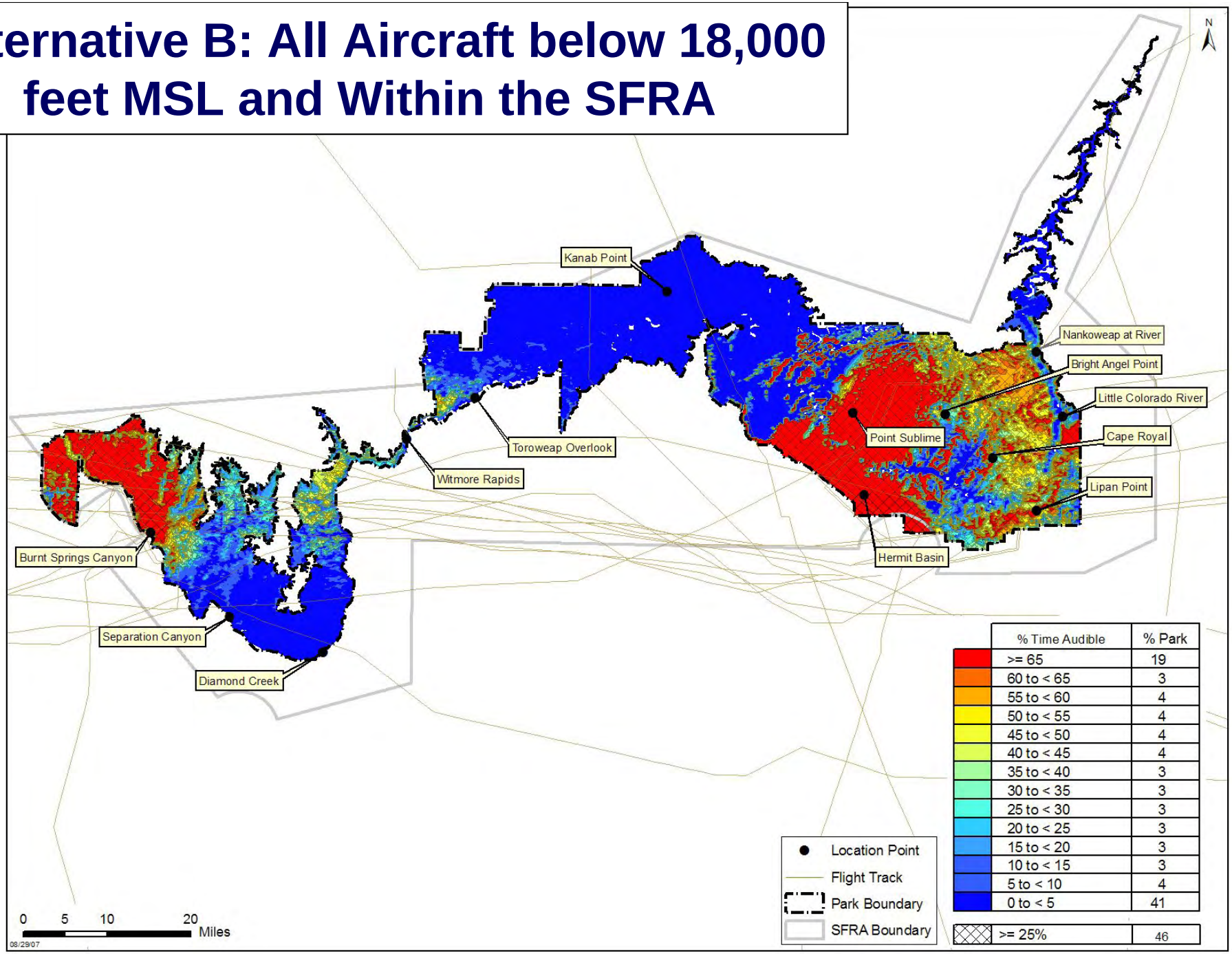
Alternative A: Total Commercial Air Tour and Air Tour Related



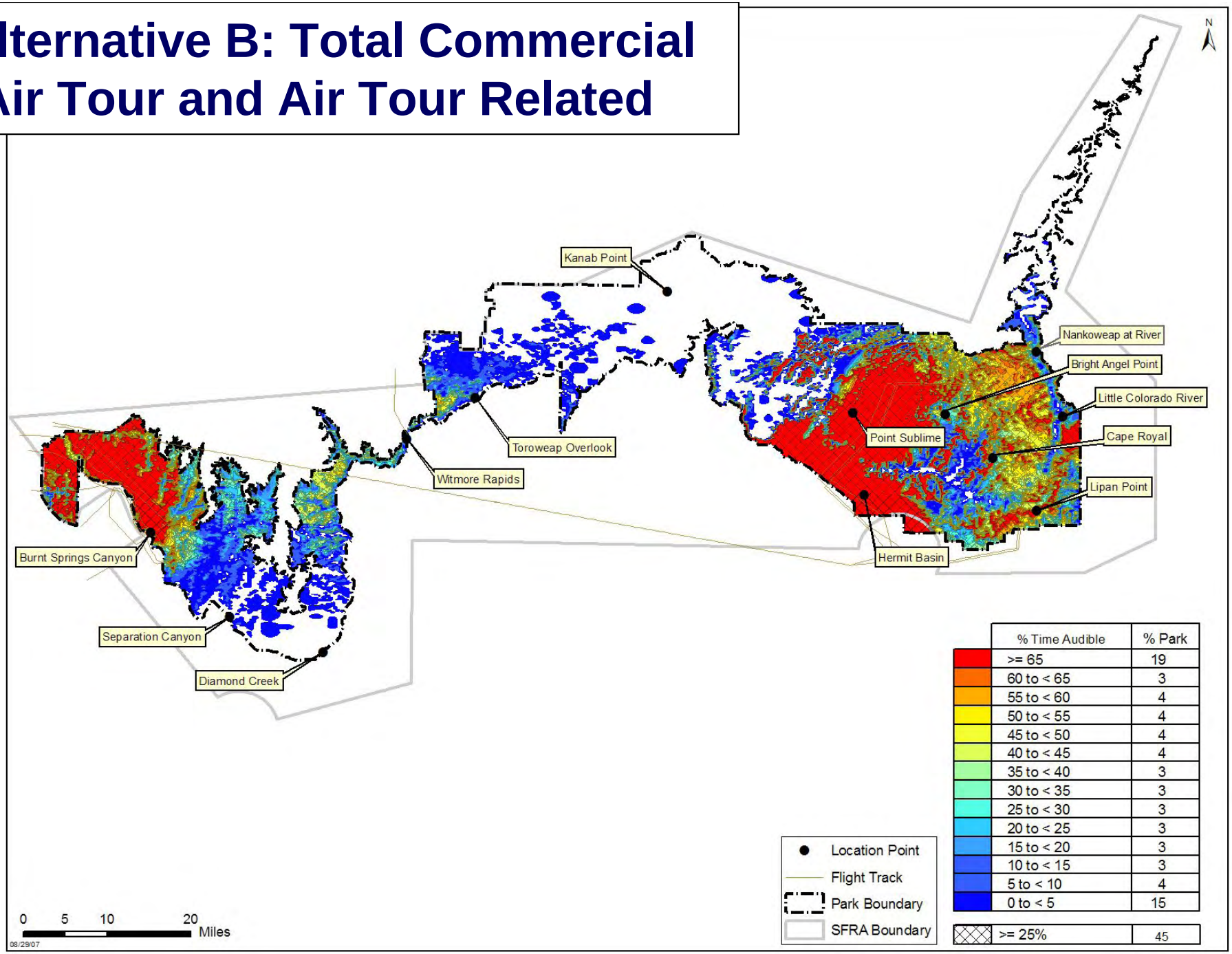
Alternative A: Commercial Air Tours



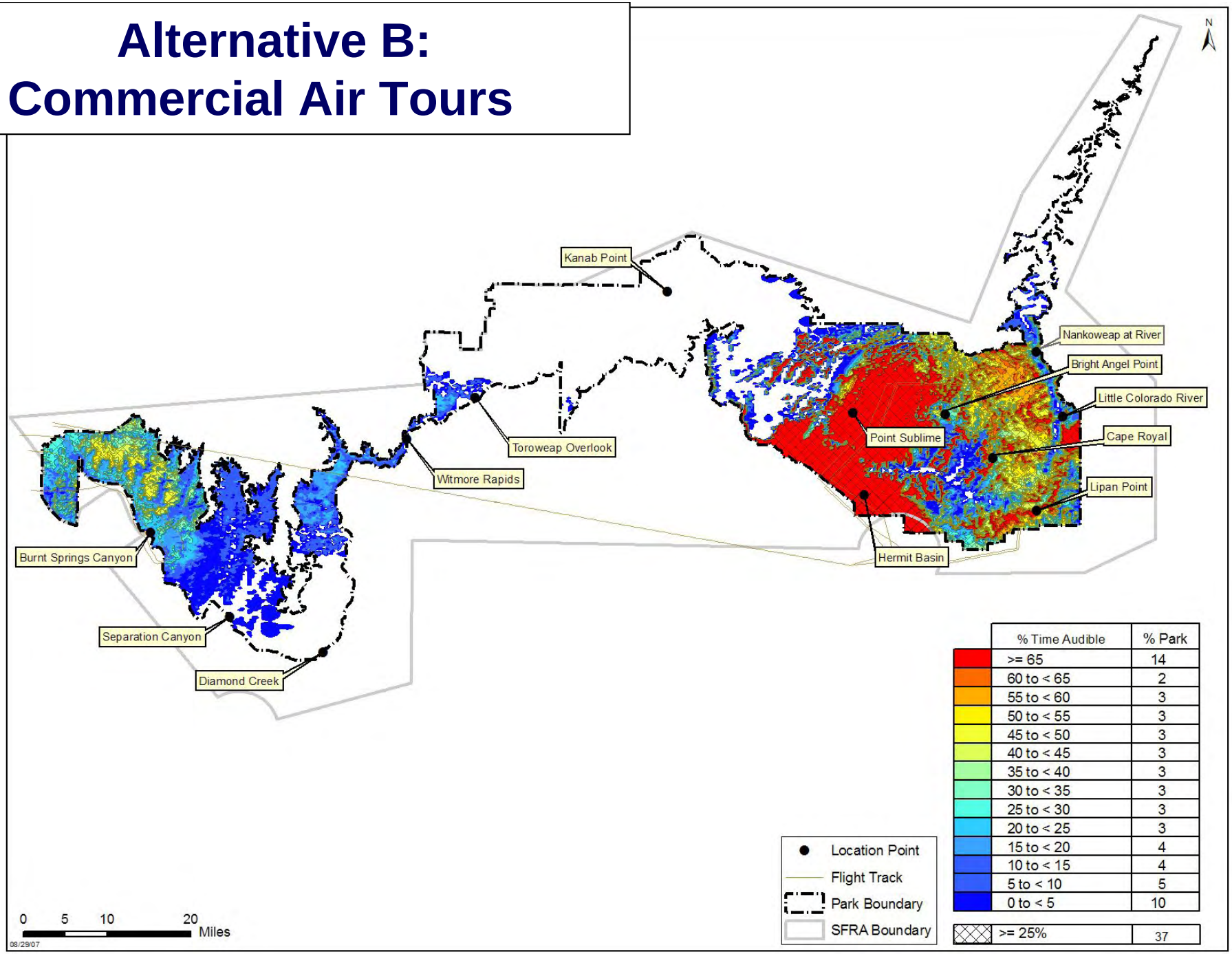
Alternative B: All Aircraft below 18,000 feet MSL and Within the SFRA



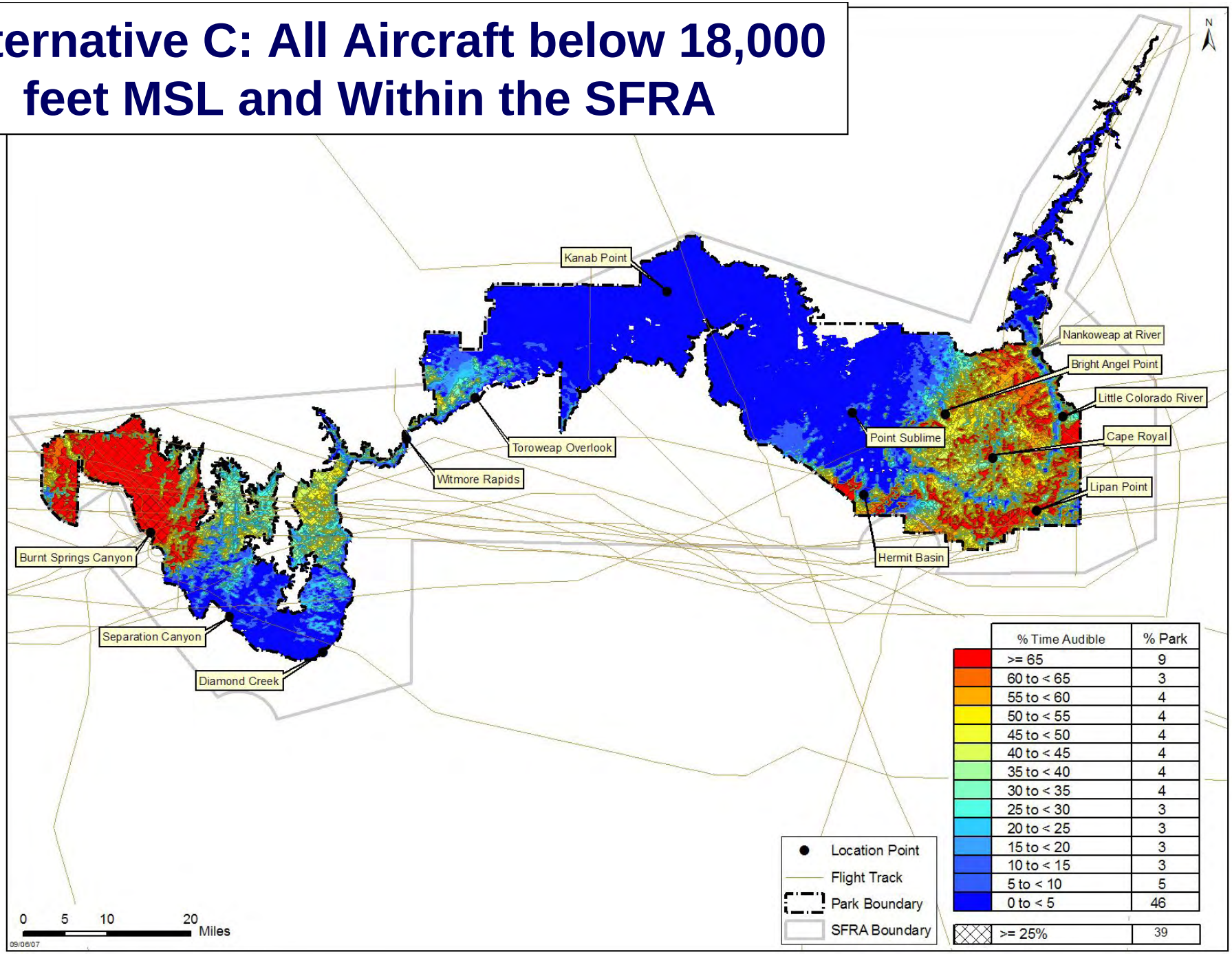
Alternative B: Total Commercial Air Tour and Air Tour Related



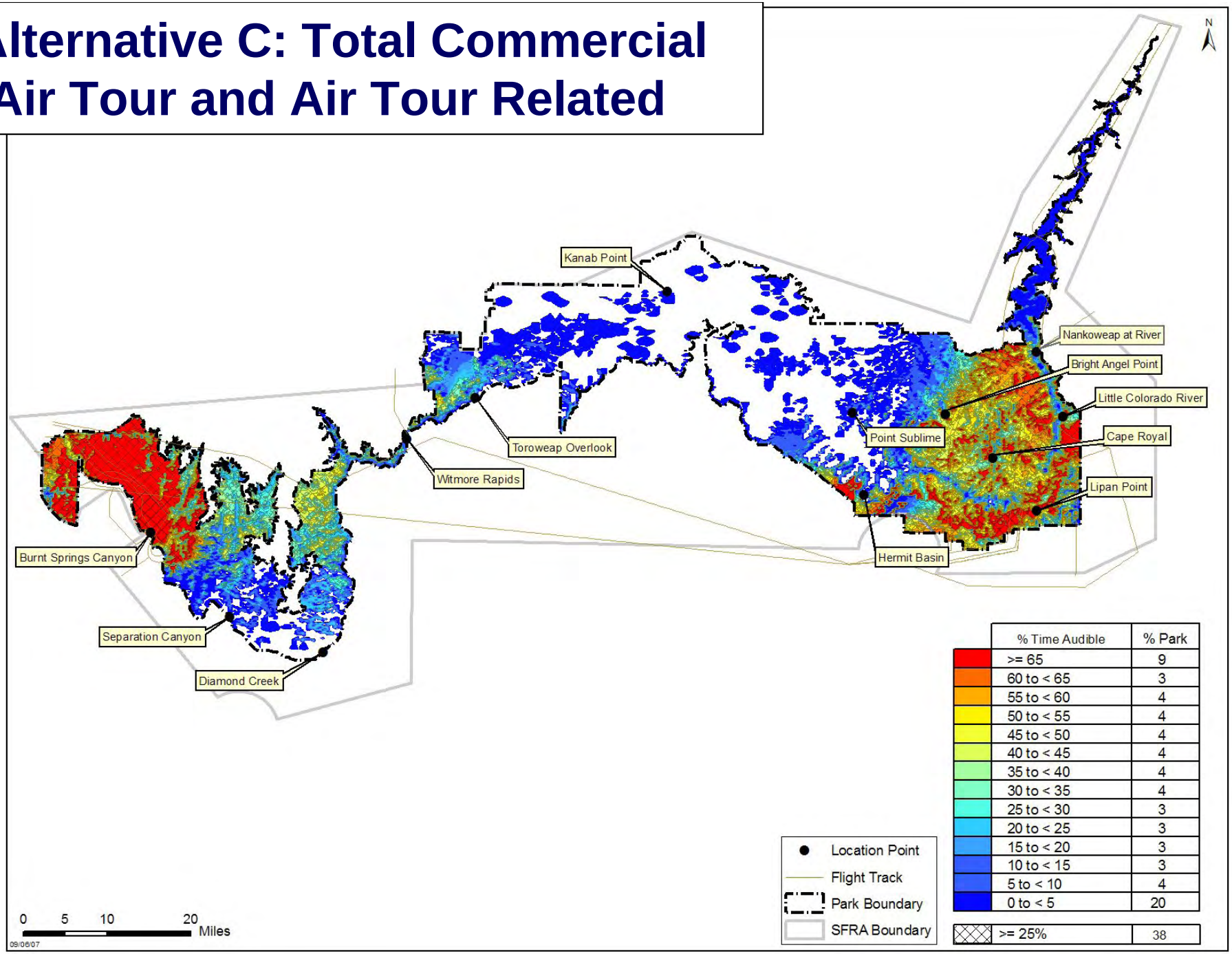
Alternative B: Commercial Air Tours



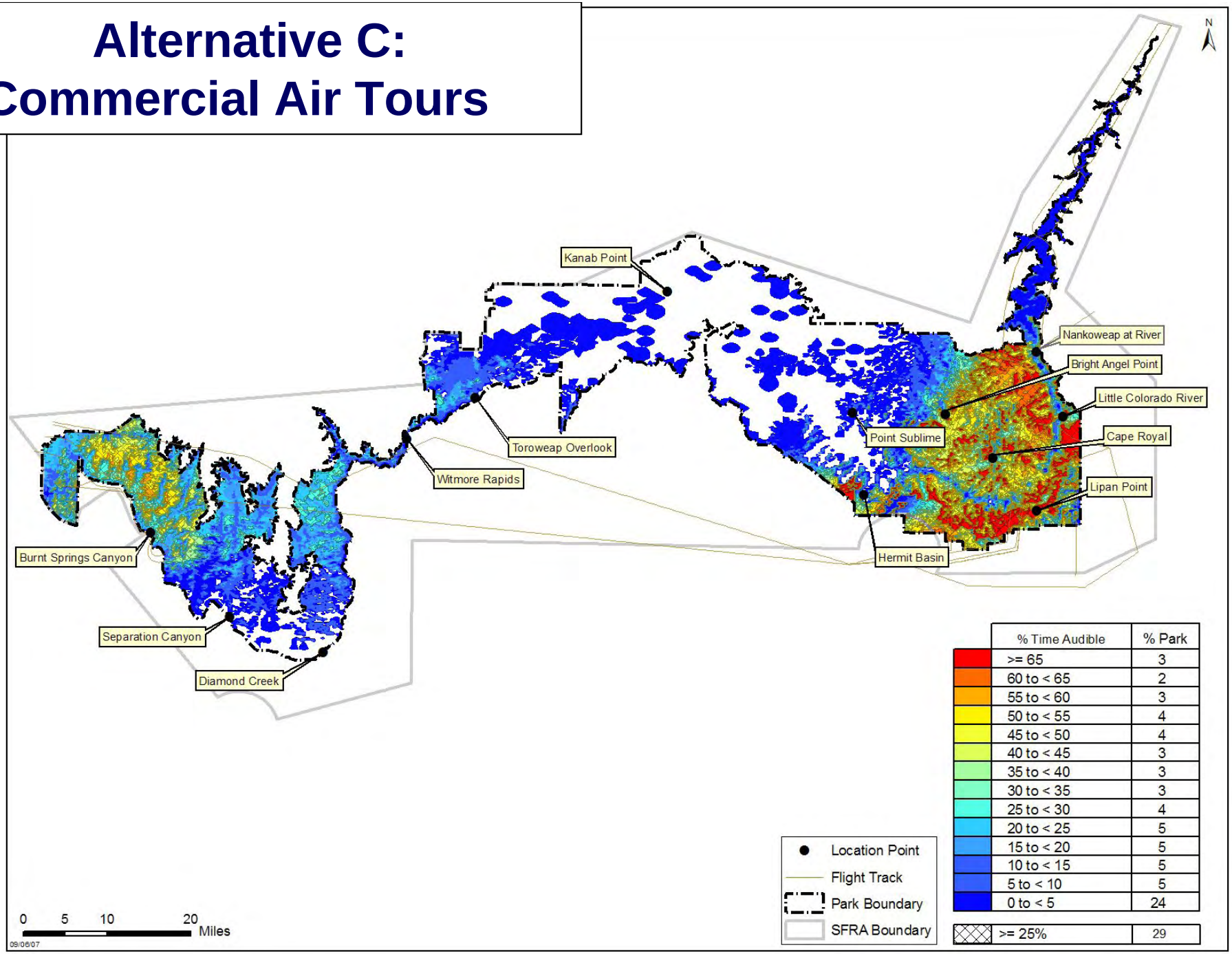
Alternative C: All Aircraft below 18,000 feet MSL and Within the SFRA



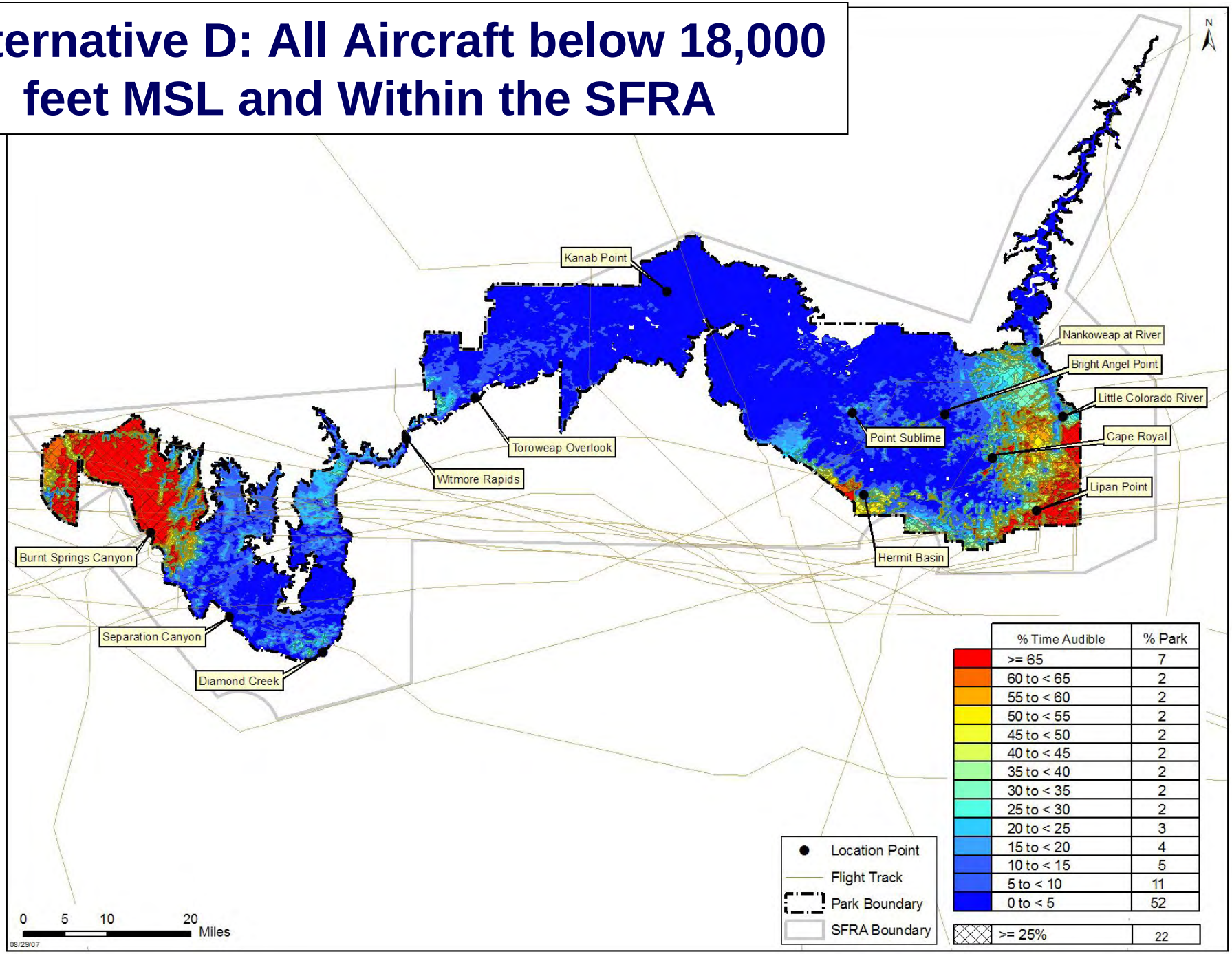
Alternative C: Total Commercial Air Tour and Air Tour Related



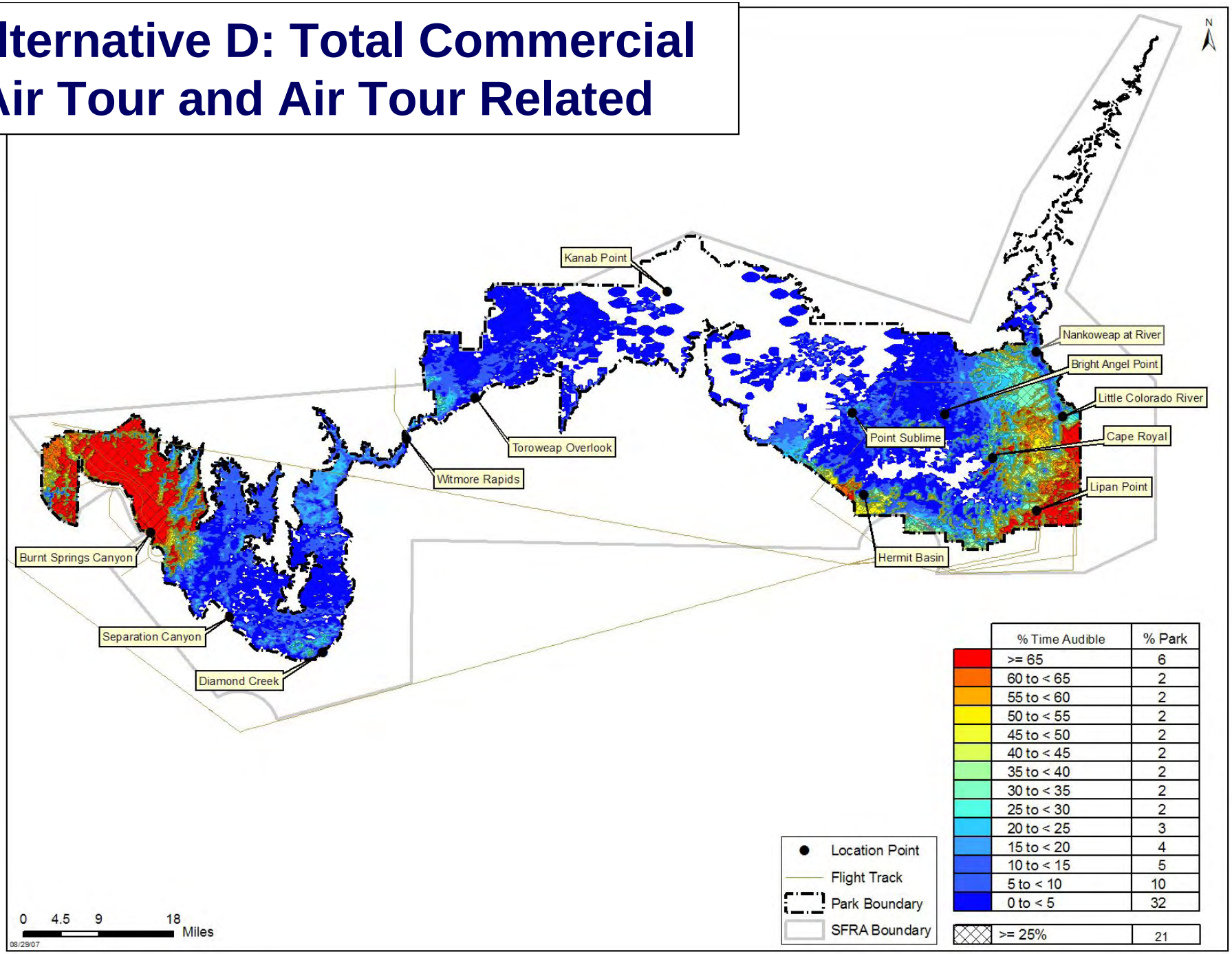
Alternative C: Commercial Air Tours



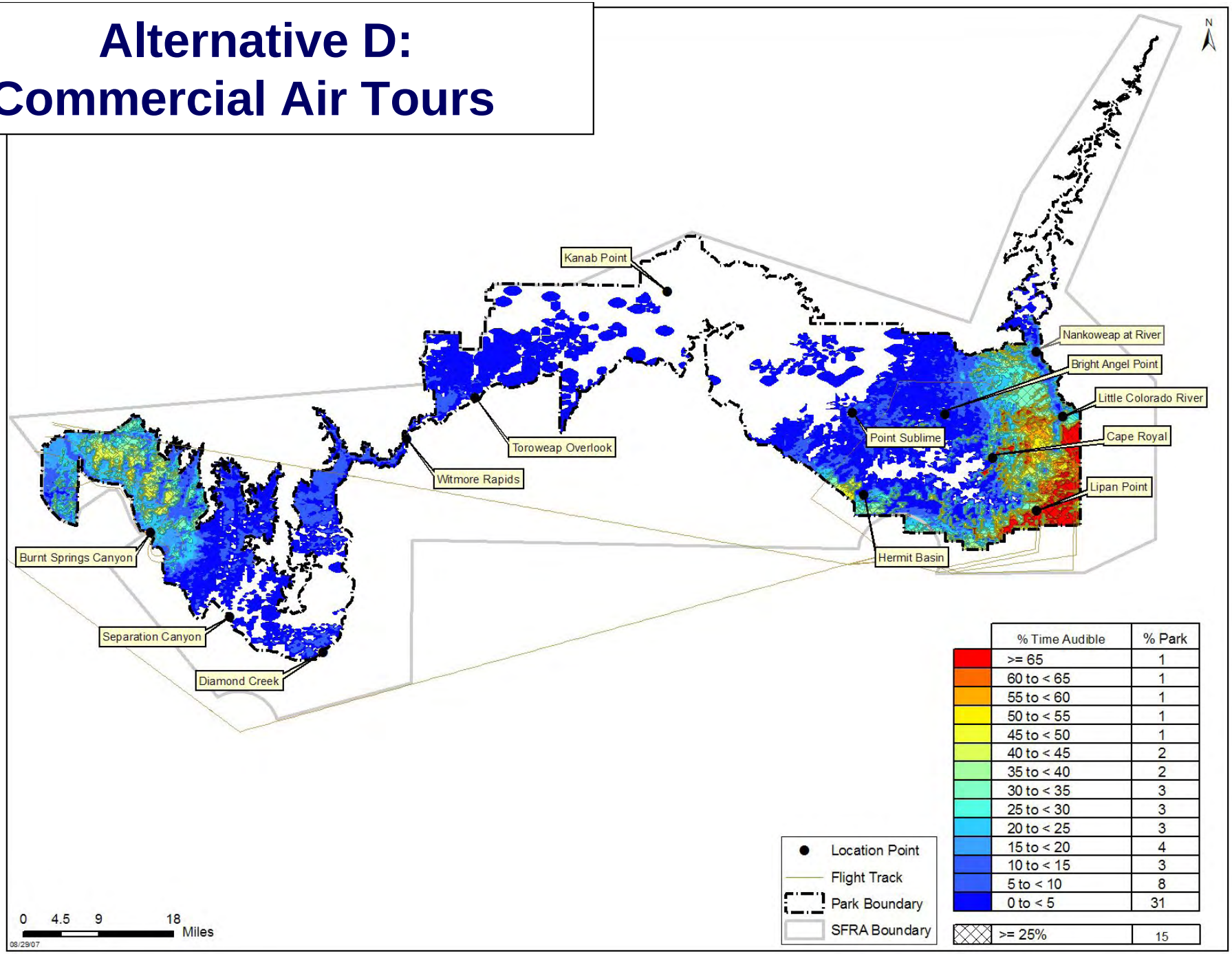
Alternative D: All Aircraft below 18,000 feet MSL and Within the SFRA



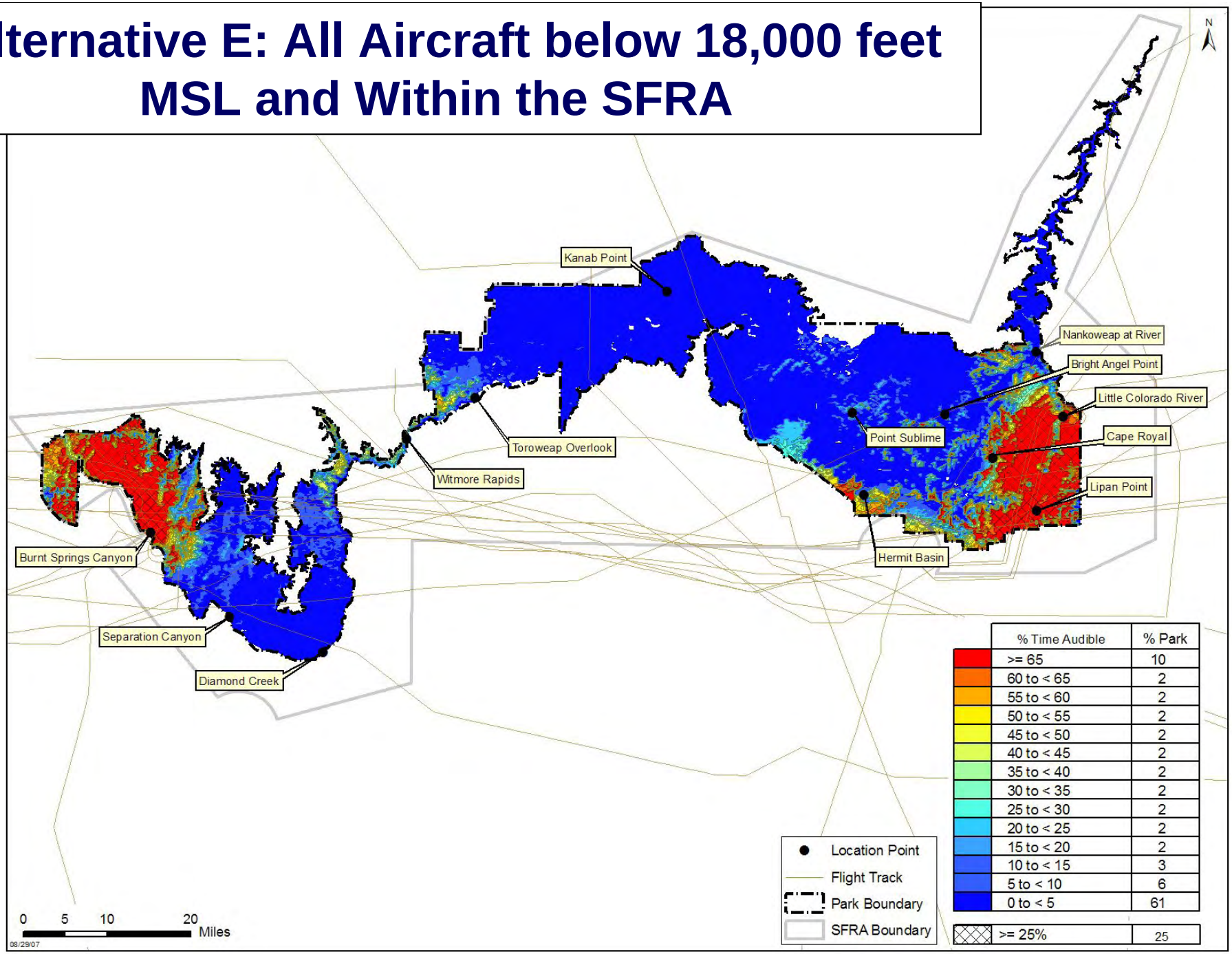
Alternative D: Total Commercial Air Tour and Air Tour Related



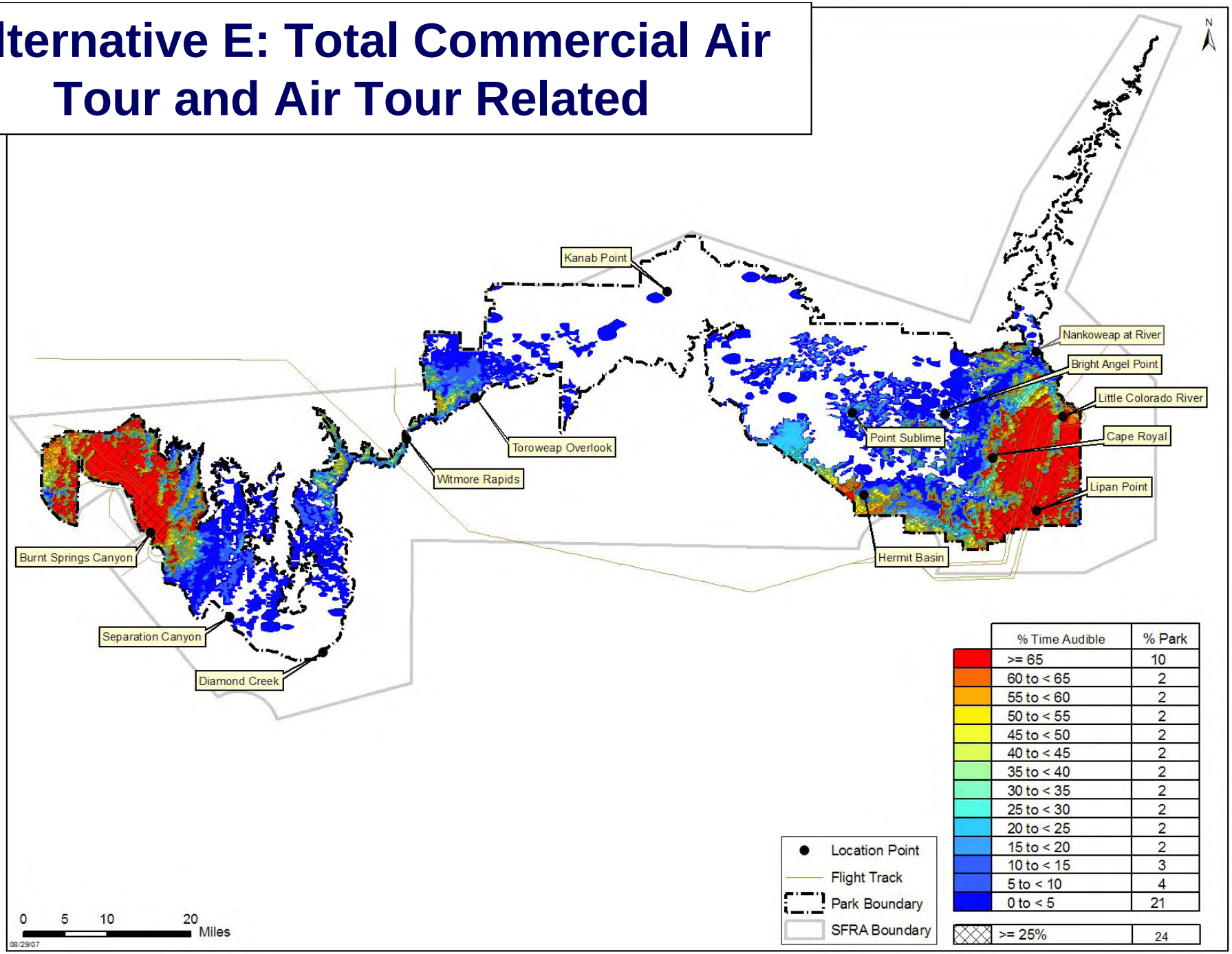
Alternative D: Commercial Air Tours



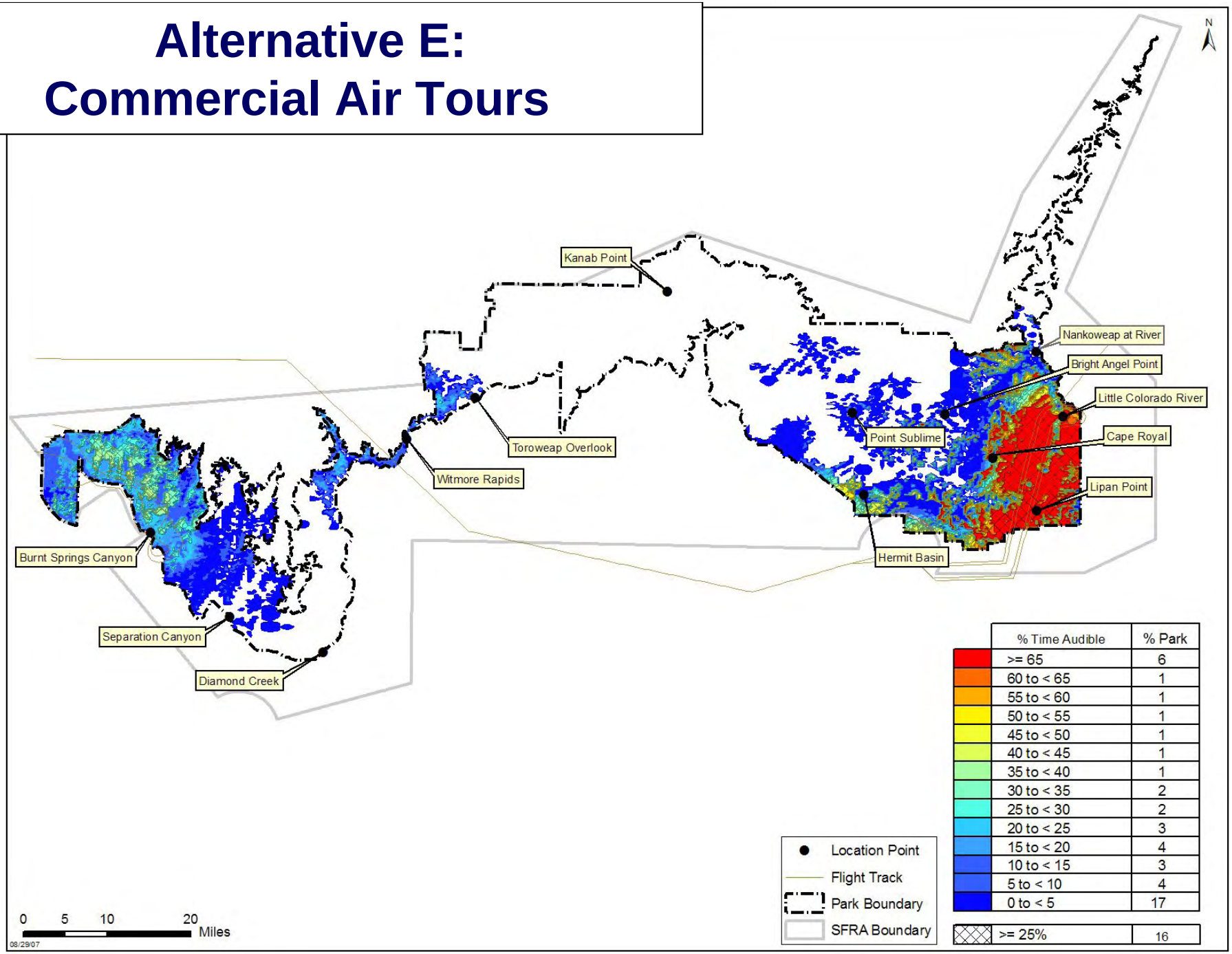
Alternative E: All Aircraft below 18,000 feet MSL and Within the SFRA



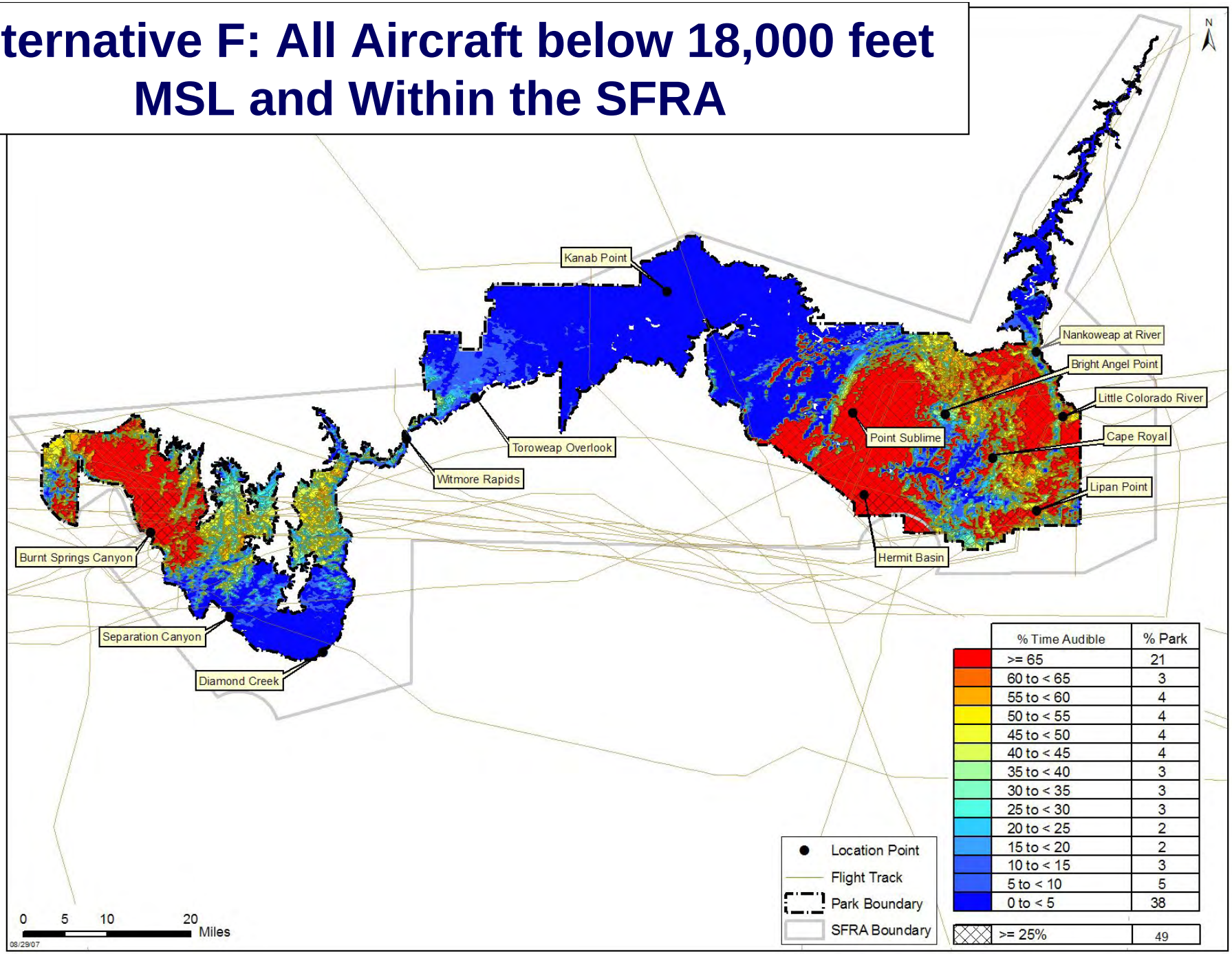
Alternative E: Total Commercial Air Tour and Air Tour Related



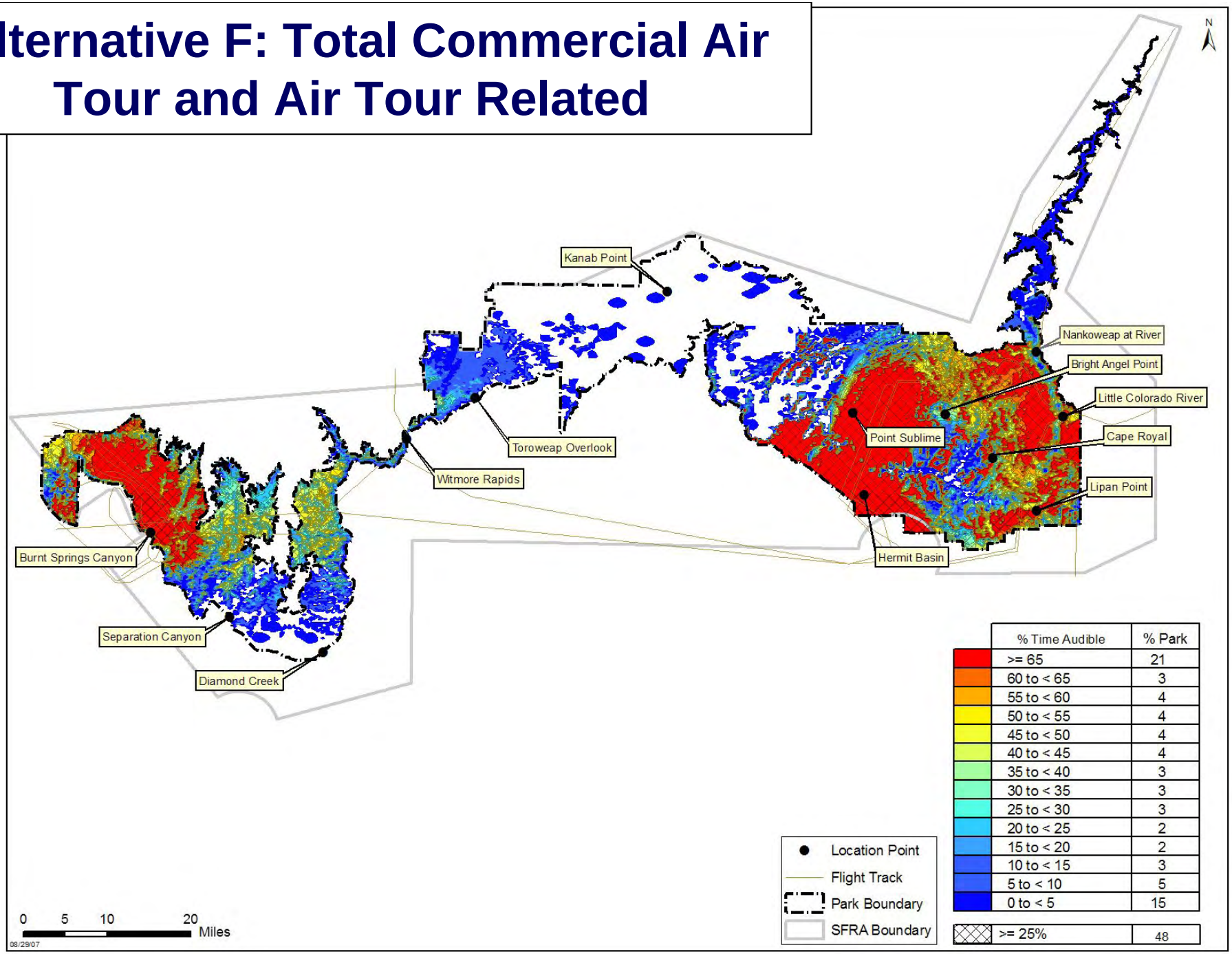
Alternative E: Commercial Air Tours



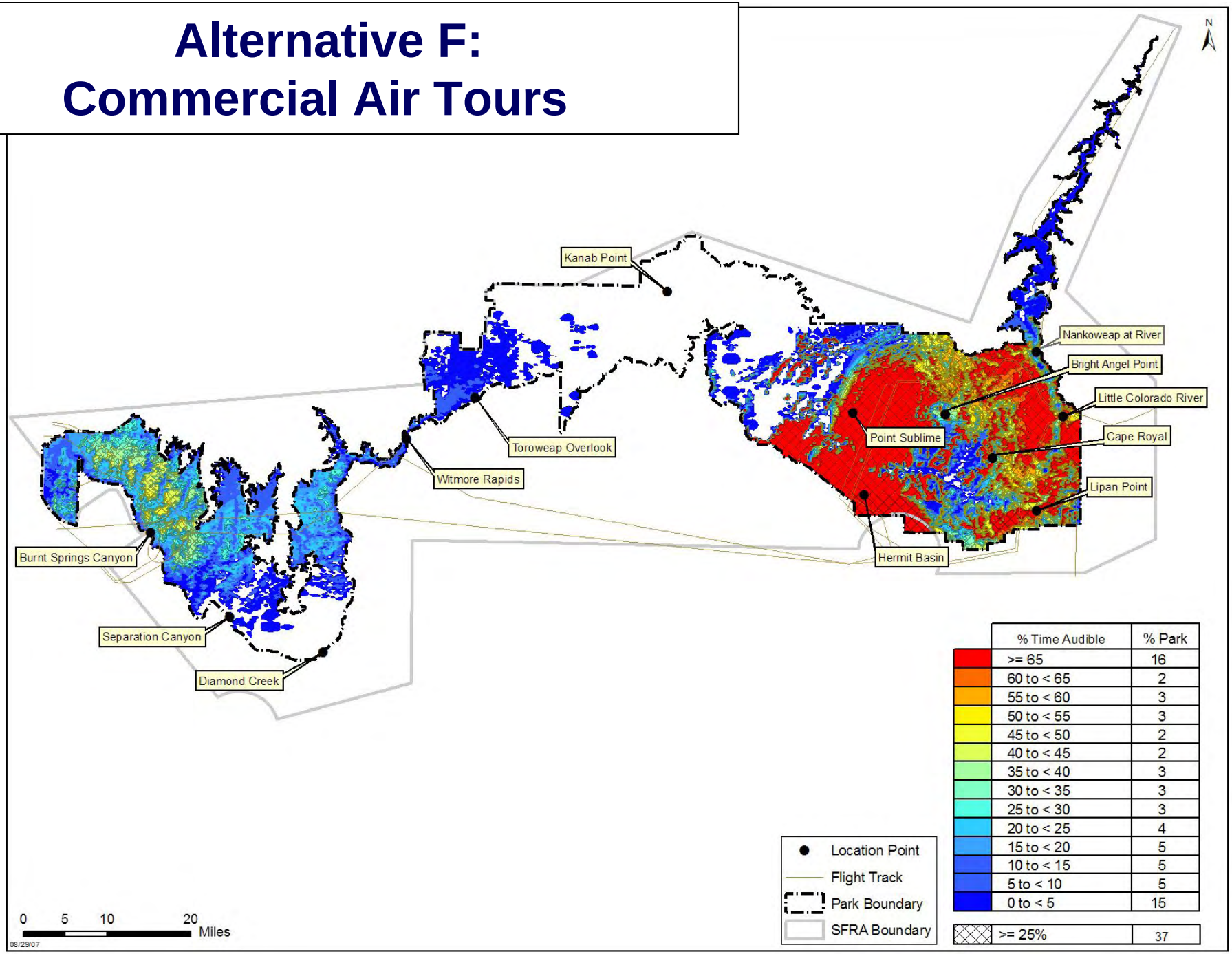
Alternative F: All Aircraft below 18,000 feet MSL and Within the SFRA



Alternative F: Total Commercial Air Tour and Air Tour Related



Alternative F:
Commercial Air Tours

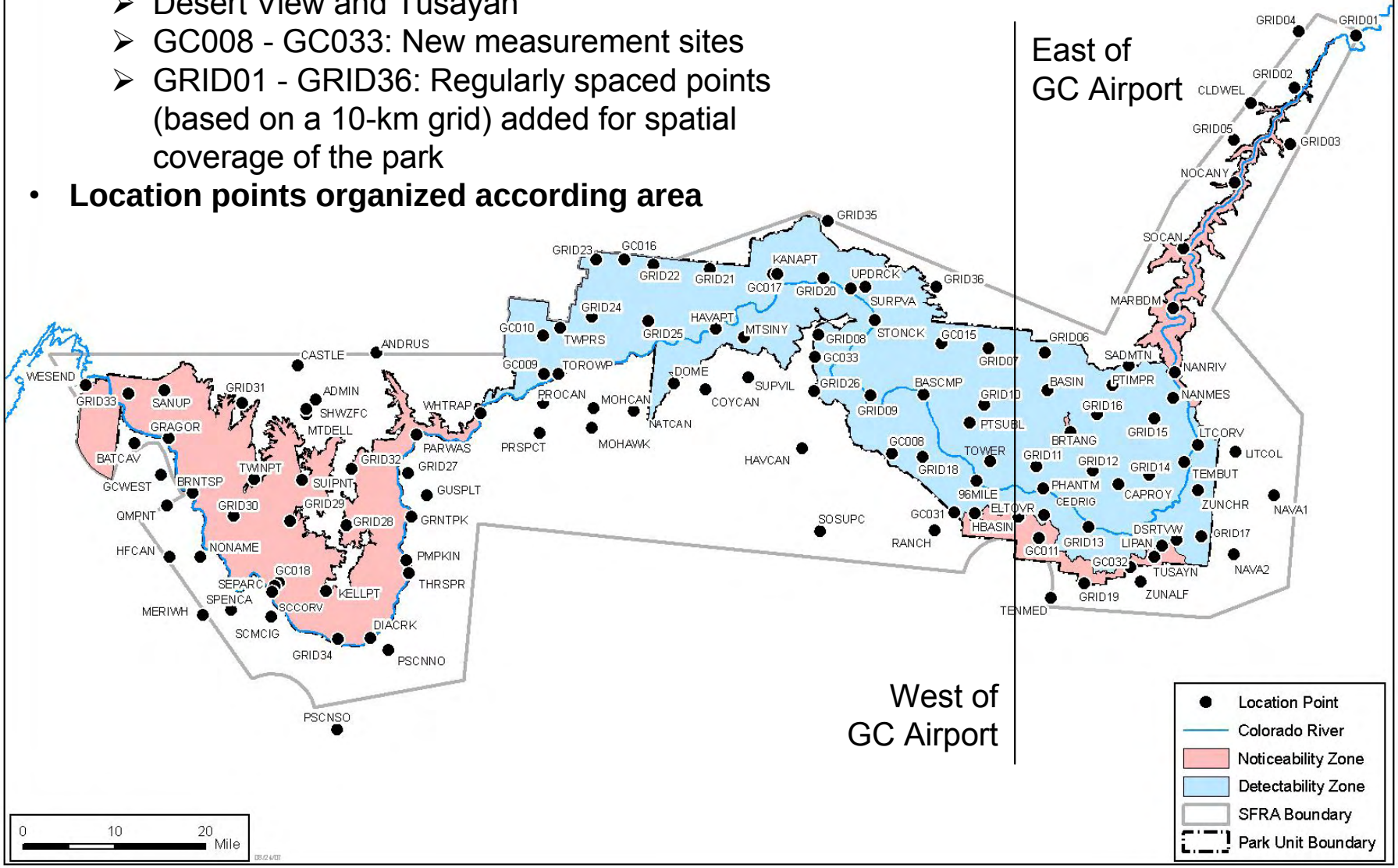


Location Points Analysis

- **76 existing location points**
- **51 new location points**
  - Desert View and Tusayan
  - GC008 - GC033: New measurement sites
  - GRID01 - GRID36: Regularly spaced points (based on a 10-km grid) added for spatial coverage of the park
- **Location points organized according area**

North of Colorado River

South of Colorado River



Time Audible Results Summary for Location Points

(refer to handout pages 1-2 for results at each location point)

Location Points		% Time Audible (12-Hour Day)							
		All Aircraft 18,000 ft MSL and Above	All Aircraft below 18,000 feet MSL and Outside the SFRA	All Aircraft below 18,000 feet MSL and Within the SFRA					
				A	B	C	D	E	F
All 127 Location Points*	Max	**70.8**	**30.8**	**99.8**	**99.8**	**94.5**	**92.7**	**92.2**	**99.8**
	Median	**36.0**	**12.4**	**8.9**	**4.2**	**6.7**	**4.8**	**1.5**	**4.2**
	Min	**1.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
North of Colorado River, West of Grand Canyon Airport	Max	**66.7**	**30.8**	**99.8**	**99.8**	**94.4**	**92.7**	92.2	**99.8**
	Median	**38.0**	**17.1**	**8.8**	**1.9**	**2.3**	**5.0**	1.5	**1.8**
	Min	**1.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	0.0	**0.0**
South of Colorado River, West of Grand Canyon Airport	Max	70.8	27.5	99.8	99.8	94.5	92.2	91.8	**99.8**
	Median	26.4	10.2	2.6	1.7	3.2	2.1	1.1	**3.5**
	Min	15.4	3.7	0.0	0.0	0.0	0.0	0.0	0.0
North of Colorado River, East of Grand Canyon Airport	Max	69.1	22.8	87.0	78.1	76.8	61.6	81.4	87.0
	Median	49.6	11.5	48.7	39.9	28.8	3.6	1.0	48.7
	Min	15.5	2.8	0.0	0.0	0.0	0.0	0.0	0.0
South of Colorado River, East of Grand Canyon Airport	Max	68.7	16.7	95.1	94.0	78.4	73.9	87.9	95.4
	Median	46.9	8.5	48.8	48.8	42.3	45.6	40.1	52.4
	Min	1.8	0.1	0.5	0.0	0.0	0.0	0.0	0.0

* Note: Peach Spring Canyon South (PSCNSO) was not modeled for Time Audible, as it is located too far outside park boundaries for ambient data coverage.

L_{eq} Results Summary for Location Points

(refer to handouts pages 3-4 for results at each location point)

Location Points		Equivalent Sound Level (dBA) (12-Hour Day)							
		All Aircraft 18,000 ft MSL and Above	All Aircraft below 18,000 feet MSL and Outside the SFRA	All Aircraft below 18,000 feet MSL and Within the SFRA					
				A	B	C	D	E	F
All 127 Location Points	Max	**31.6**	**31.8**	**49.2**	**49.2**	**47.5**	**51.0**	**52.7**	**49.2**
	Median	**26.6**	**20.9**	**16.6**	**13.6**	**14.7**	**14.0**	**11.2**	**16.5**
	Min	**22.7**	**15.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
North of Colorado River, West of Grand Canyon Airport	Max	31.6	30.1	47.3	48.0	47.5	47.3	47.2	**47.5**
	Median	26.5	20.7	12.1	10.9	10.5	10.4	9.1	**10.2**
	Min	23.0	15.8	0.0	0.0	0.0	0.0	0.0	0.0
South of Colorado River, West of Grand Canyon Airport	Max	29.3	31.8	49.2	49.2	46.8	45.0	44.9	49.2
	Median	26.4	21.2	13.5	12.8	13.0	14.7	9.1	13.8
	Min	24.8	15.2	0.0	0.0	0.0	0.0	0.0	0.0
North of Colorado River, East of Grand Canyon Airport	Max	31.4	23.6	47.5	42.1	46.5	42.0	38.9	47.5
	Median	26.6	19.1	22.1	16.0	23.3	12.4	9.6	22.2
	Min	22.7	15.3	0.0	0.0	0.0	0.0	0.0	0.0
South of Colorado River, East of Grand Canyon Airport	Max	29.8	23.3	48.9	46.8	45.9	51.0	52.7	48.9
	Median	28.8	21.4	28.3	23.4	27.8	29.4	21.1	28.3
	Min	24.1	15.3	12.0	3.3	5.0	6.7	6.5	12.1

L_{max} Results Summary for Location Points

(refer to handout pages 5-6 for results at each location point)

Location Points		Maximum Sound Level (dBA)							
		All Aircraft 18,000 ft MSL and Above	All Aircraft below 18,000 feet MSL and Outside the SFRA	All Aircraft below 18,000 feet MSL and Within the SFRA					
				A	B	C	D	E	F
All 127 Location Points	Max	**65.9**	**59.8**	**70.5**	**68.9**	**69.8**	**69.9**	**71.9**	**70.5**
	Median	**48.6**	**46.7**	**40.0**	**38.4**	**39.2**	**38.4**	**37.6**	**40.0**
	Min	**43.3**	**33.9**	**9.9**	**9.9**	**9.9**	**13.8**	**9.9**	**9.9**
North of Colorado River, West of Grand Canyon Airport	Max	65.8	59.8	64.5	64.5	63.4	64.5	**63.4**	**66.0**
	Median	49.1	44.7	37.4	37.4	36.4	36.4	**36.9**	**36.9**
	Min	44.7	33.9	15.4	15.4	**14.5**	**14.5**	**14.5**	**15.4**
South of Colorado River, West of Grand Canyon Airport	Max	55.5	56.1	57.3	58.3	68.5	57.0	57.0	64.9
	Median	48.3	48.6	38.3	38.3	37.5	37.8	37.5	38.3
	Min	45.3	38.0	9.9	9.9	9.9	23.8	9.9	9.9
North of Colorado River, East of Grand Canyon Airport	Max	65.9	51.4	65.0	61.1	65.8	64.9	59.8	65.0
	Median	48.5	45.6	46.2	41.1	48.7	40.6	35.8	46.2
	Min	43.3	39.5	14.0	14.1	24.0	13.8	13.8	14.0
South of Colorado River, East of Grand Canyon Airport	Max	54.0	50.9	70.5	68.9	69.8	69.9	71.9	70.5
	Median	48.7	45.7	47.8	39.6	46.3	46.4	45.8	47.8
	Min	46.1	41.7	25.8	24.9	24.9	24.9	25.8	25.8

Additional Modeling Analyses

- Additional modeling analyses
  - ✓ Alternative A with mitigation (QT conversion for all Commercial Air Tours)
  - ✓ East-end curfew analysis
  - ✓ Detailed Location Points: Time Above 52 dBA, Maximum Sound Level
  - ✓ Preliminary GA corridor analysis
  - • Additional GA corridor analysis
  - • Flight-free zones analysis
  - • Single aircraft operation sensitivity analysis for Commercial Air Tour and Air Tour Related for select aircraft on select routes

Alternative A With Mitigation: Operations Summary

Aircraft Scenario	# of Commercial Air Tour Operations of Peak Season "Day" for Each Alternative/Scenario							
	A	A (QT 1:1 Aircraft)	A (QT 1:1 Passenger)	B	C	D	E	F
All Aircraft 18,000 ft MSL and Above (for Cumulative Effects Analysis)	978 (common to all alternatives)							
All Aircraft below 18,000 feet MSL and Outside the SFRA (for Cumulative Effects Analysis)	418 (common to all alternatives)							
All Aircraft below 18,000 feet MSL and Within the SFRA	**651**	**651**	**598**	**624**	**493**	**453**	**472**	**642**
Total Commercial Air Tour and Air Tour Related	635	635	582	608	477	437	456	626
Commercial Air Tours*	314	314	261	287	162	116	138	318

*** Alternative A with Mitigation: Convert all Commercial Air Tours to QT by**

- **1:1 Aircraft:** Commercial Air Tour aircraft will be converted to QT on a 1:1 aircraft basis
- **1:1 Passenger Efficiency:** Commercial Air Tour aircraft will be converted to QT on a 1:1 passenger basis, i.e., larger aircraft with more passenger seats will result in fewer flights

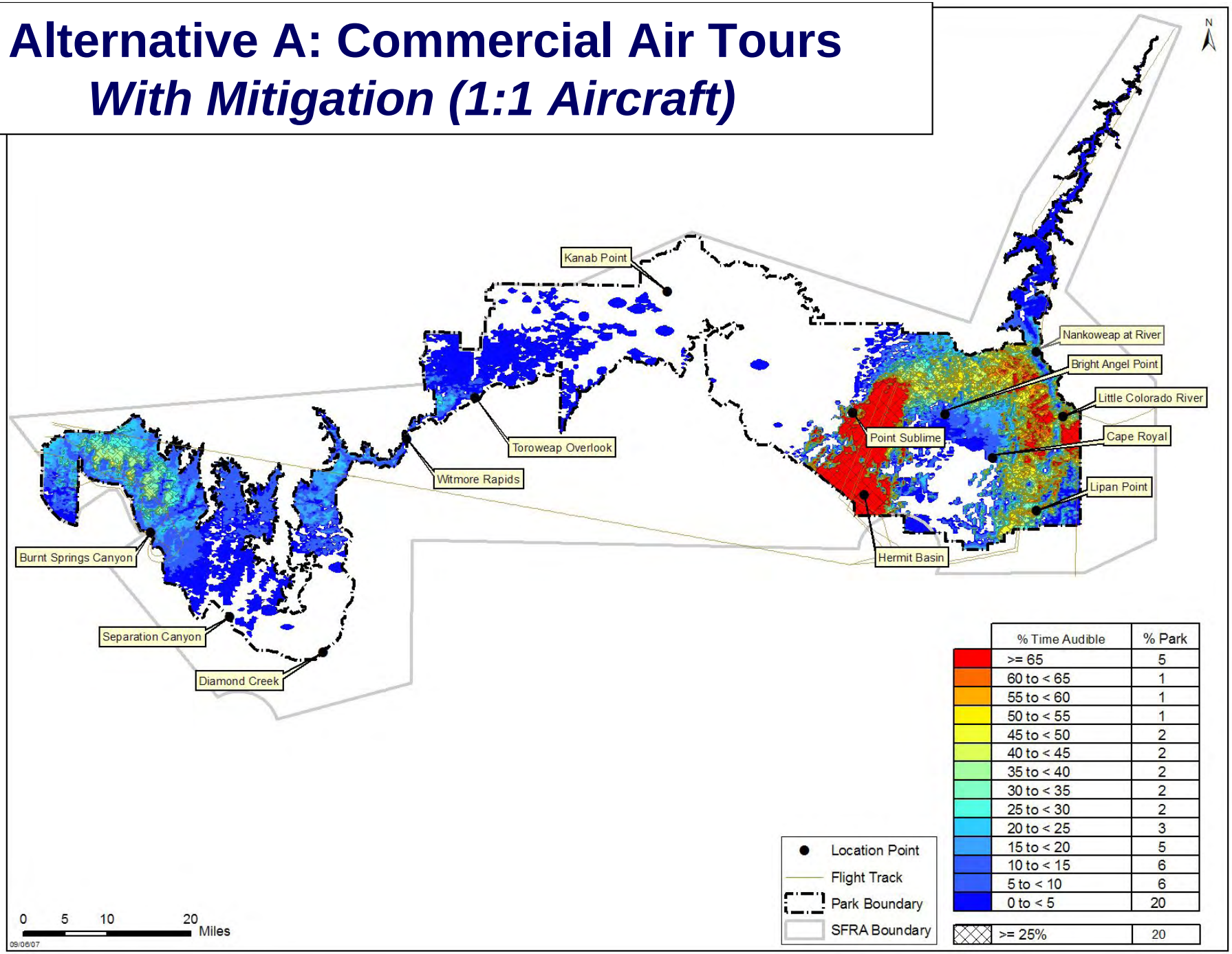
Alternative A With Mitigation: Results Summary

The goal is to achieve restoration of natural quiet. Natural quiet is obtained when "50 percent or more of the park is experiencing natural quiet (i.e., no aircraft audible) 75 to 100 percent of the day," each and every day. [NPS Report to Congress (July 1995)]

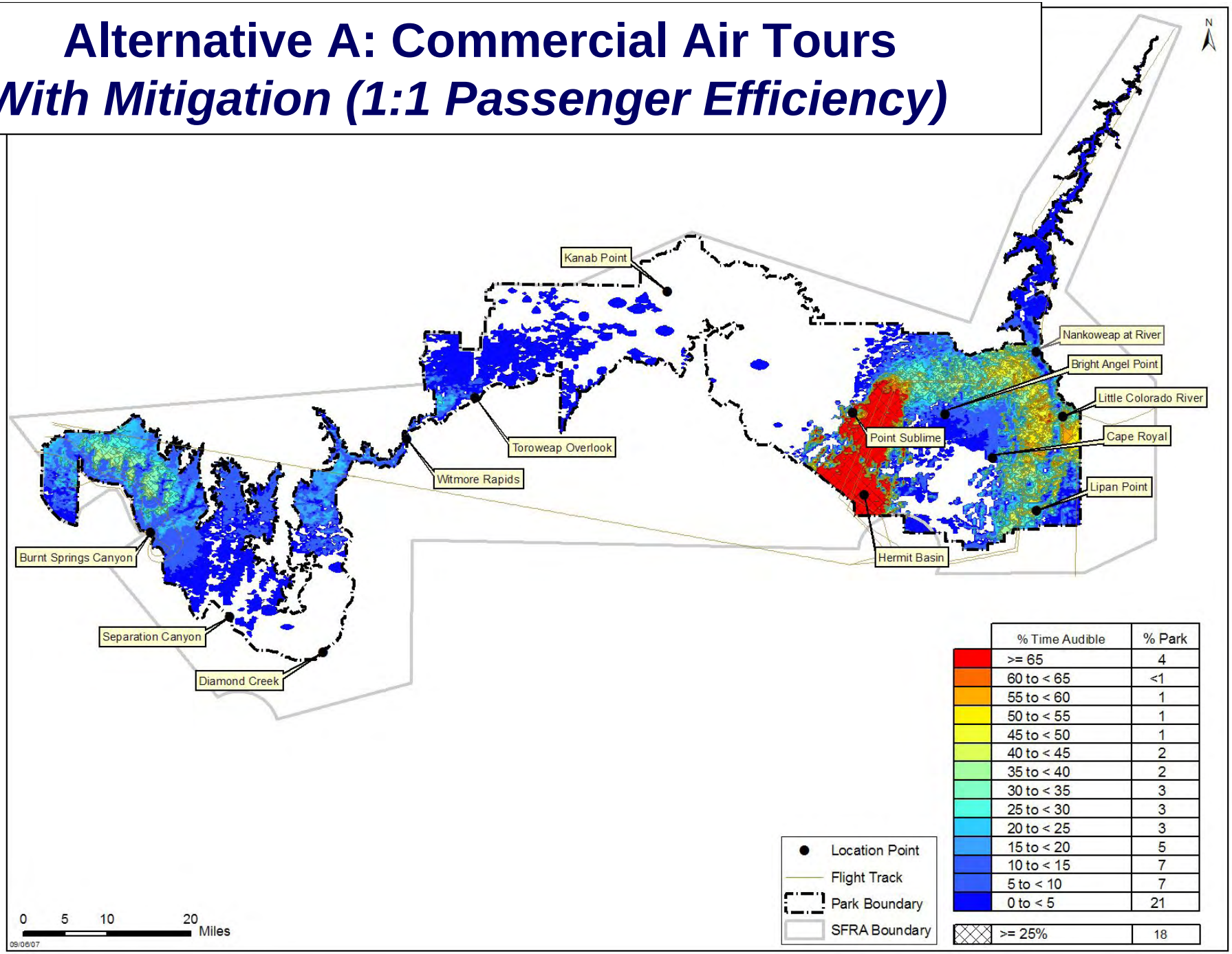
Aircraft Scenario	% of Park for aircraft audibility ≥ 25% for Each Alternative/Scenario (% of Park "Restored")							
	A	A (QT 1:1 Aircraft)	A (QT 1:1 Passenger)	B	C	D	E	F
All Aircraft 18,000 ft MSL and Above (for Cumulative Effects Analysis)	5.5							
All Aircraft below 18,000 feet MSL and Outside the SFRA (for Cumulative Effects Analysis)	88.1							
All Aircraft below 18,000 feet MSL and Within the SFRA	45.5 **(54.5)**	31.8 **(68.2)**	29.3 **(70.7)**	45.7 **(54.3)**	39.1 **(60.9)**	21.8 **(78.2)**	24.8 **(75.2)**	48.8 **(51.2)**
Total Commercial Air Tour and Air Tour Related	44.8 (55.2)	31.1 (68.9)	28.6 (71.4)	45.0 (55.0)	38.3 (61.7)	21.2 (78.8)	24.4 (75.6)	48.3 (51.7)
Commercial Air Tours	36.1 (63.9)	20.2 (79.8)	17.5 (82.5)	37.0 (63.0)	29.0 (71.0)	15.0 (85.0)	16.1 (83.9)	36.7 (63.3)

Note: Notwithstanding the various scenarios modeled, the 1987 Overflights Act and the subsequent relevant court holdings require that the noise model account for noise from ***all aircraft*** to determine whether substantial restoration of natural quiet has been achieved. Moreover, NEPA requires that the agencies analyze the impacts of all noise sources cumulatively. Substantial restoration of natural quiet is achieved when the total percentage restored from ***all aircraft*** operations is 50% or more.

Alternative A: Commercial Air Tours
With Mitigation (1:1 Aircraft)



Alternative A: Commercial Air Tours
With Mitigation (1:1 Passenger Efficiency)



Time Audible Results Summary for Location Points

(refer to handout pages 1-2 for results at each location point)

Location Points		% Time Audible (12-Hour Day)		
		Commercial Air Tours Only		
		A	A (with Mitigation) QT by 1:1 Aircraft	A (with Mitigation) QT by Passenger Efficiency
All 127 Location Points*	Max	99.6	96.5	94.0
	Median	2.3	1.7	1.6
	Min	0.0	0.0	0.0
North of Colorado River, West of Grand Canyon Airport	Max	99.6	93.8	89.4
	Median	0.6	0.1	0.1
	Min	0.0	0.0	0.0
South of Colorado River, West of Grand Canyon Airport	Max	99.6	96.5	94.0
	Median	0.2	0.0	0.0
	Min	0.0	0.0	0.0
North of Colorado River, East of Grand Canyon Airport	Max	86.7	74.9	62.9
	Median	48.3	10.5	6.4
	Min	0.0	0.0	0.0
South of Colorado River, East of Grand Canyon Airport	Max	94.9	58.3	44.8
	Median	48.0	26.5	19.7
	Min	0.0	0.0	0.0

* Note: Peach Spring Canyon South (PSCNSO) was not modeled for Time Audible, as it is located too far outside park boundaries for ambient data coverage.

L_{eq} Results Summary for Location Points

(refer to handout pages 3-4 for results at each location point)

Location Points		Equivalent Sound Level (dBA) (12-Hour Day)		
		Commercial Air Tours Only		
		A	A (with Mitigation) QT by 1:1 Aircraft	A (with Mitigation) QT by Passenger Efficiency
All 127 Location Points*	Max	49.2	46.3	45.7
	Median	13.5	11.9	11.0
	Min	0.0	0.0	0.0
North of Colorado River, West of Grand Canyon Airport	Max	44.1	41.1	40.2
	Median	6.4	5.1	5.0
	Min	0.0	0.0	0.0
South of Colorado River, West of Grand Canyon Airport	Max	49.2	46.3	45.7
	Median	8.7	5.6	5.3
	Min	0.0	0.0	0.0
North of Colorado River, East of Grand Canyon Airport	Max	47.5	45.1	44.5
	Median	22.0	19.0	17.2
	Min	0.0	0.0	0.0
South of Colorado River, East of Grand Canyon Airport	Max	48.9	45.8	44.4
	Median	28.3	22.3	20.7
	Min	10.4	2.4	0.8

L_{max} Results Summary for Location Points

(refer to handout pages 5-6 for results at each location point)

Location Points		Maximum Sound Level (dBA)		
		Commercial Air Tours Only		
		A	A (with Mitigation) QT by 1:1 Aircraft	A (with Mitigation) QT by Passenger Efficiency
All 127 Location Points*	Max	**70.5**	**62.7**	**62.7**
	Median	**27.8**	**23.0**	**23.0**
	Min	**0.0**	**0.0**	**0.0**
North of Colorado River, West of Grand Canyon Airport	Max	63.4	**54.7**	**54.7**
	Median	18.1	**16.7**	**16.7**
	Min	0.0	**0.0**	**0.0**
South of Colorado River, West of Grand Canyon Airport	Max	57.3	53.1	53.1
	Median	23.5	21.1	21.1
	Min	0.0	0.0	0.0
North of Colorado River, East of Grand Canyon Airport	Max	65.0	62.7	62.7
	Median	39.4	35.8	35.8
	Min	13.8	8.6	8.6
South of Colorado River, East of Grand Canyon Airport	Max	70.5	59.9	59.9
	Median	47.8	38.1	38.1
	Min	18.5	7.0	7.0

East-End Curfew Analysis

- ✓Alternative A: May - September: 8 am – 6 pm (10 hours)
- ✓Alternative B: Same as Alternative A (10 hours)
- ✓Alternative C: April - October: 8 am – 7 pm (11 hours)
- ✓Alternative D: June - August: 9 am - 6 pm (9 hours)
- ✓Alternative E: 2.5 Hrs After Sunrise + 1.5 Hrs Before Sunset for Non-QT (8 hours for non-QT, 12 hours for QT)
- ✓Alternative F: Same as Alternative A (10 hours)

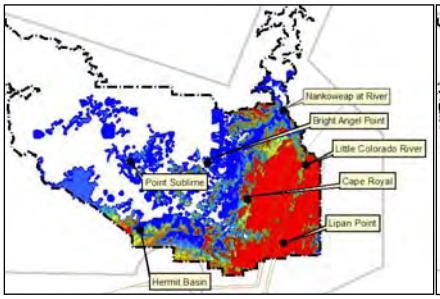
East-End Curfew Analysis Summary

Aircraft Scenario	% of Park ≥ 25% Time Audible for Each Alternative for Commercial Air Tours on East-End							
	A (10-Hr Curfew)	A (QT 1:1 Aircraft) (10-Hr Curfew)	A (QT 1:1 Passenger) (10-Hr Curfew)	B (10-Hr Curfew)	C (11-Hr Curfew)	D (9-Hr Curfew)	E (8-Hr, 4-Hr QT Curfew)	F (10-Hr Curfew)
Commercial Air Tours	32	19	17	33	22	13	15 (8-Hr) 16 (4-Hr)	33

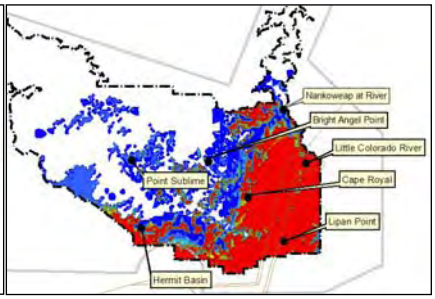
Aircraft Scenario	% of Park ≥ 25% Time Audible for Each Alternative for Commercial Air Tours on East-End							
	A (12-Hr Day)	A (QT 1:1 Aircraft) (12-Hr Day)	A (QT 1:1 Passenger) (12-Hr Day)	B (12-Hr Day)	C (12-Hr Day)	D (12-Hr Day)	E (12-Hr Day)	F (12-Hr Day)
Commercial Air Tours	32	19	17	33	22	13	13	33

Alternative E: Commercial Air Tours

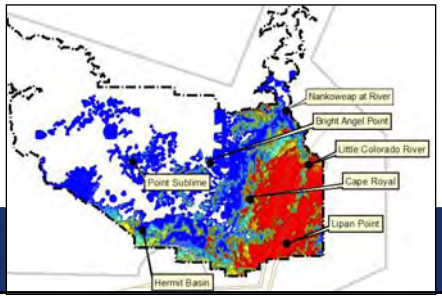
(July 1 - September 15: 2.5 Hrs After Sunrise + 1.5 Hrs Before Sunset for Non-QT)



8-Hr for Non-QT and QT
≥ 25% TA in 15% of park



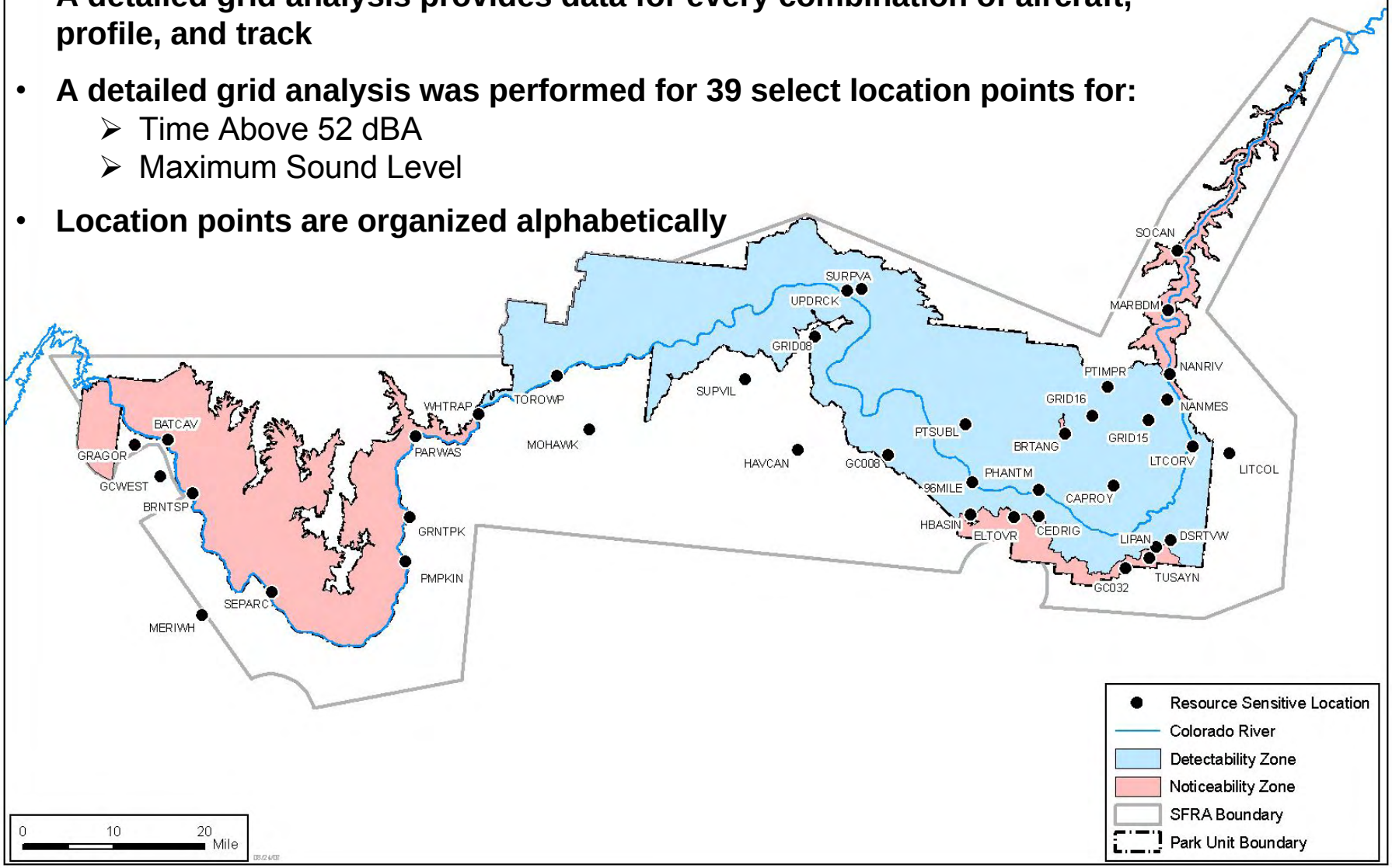
4-Hr for QT Only
≥ 25% TA in 16% of park



12-Hr Day With Curfew
≥ 25% TA in 13% of park

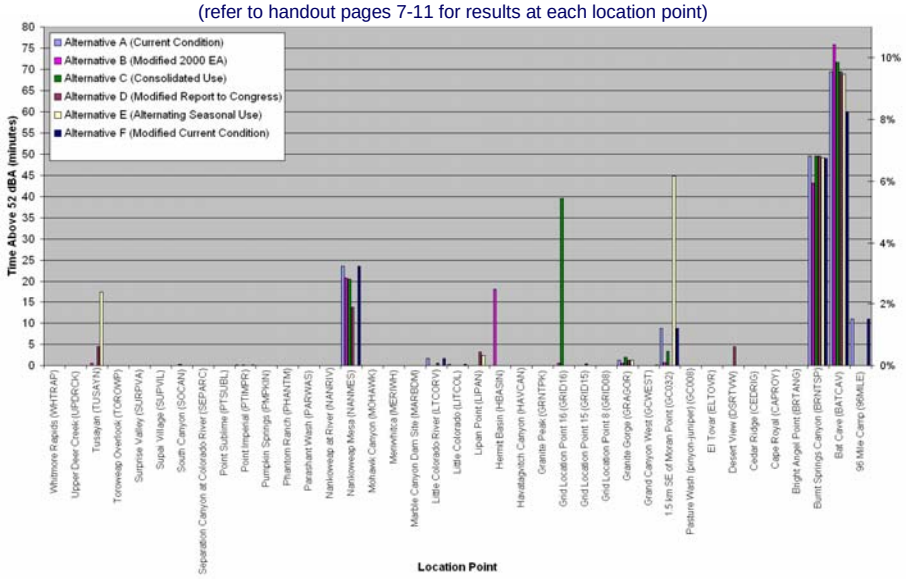
Detailed Location Points Analysis

- **Modeled for "All Aircraft below 18,000 ft MSL and within SFRA" scenario for all alternatives**
- **A detailed grid analysis provides data for every combination of aircraft, profile, and track**
- **A detailed grid analysis was performed for 39 select location points for:**
  - Time Above 52 dBA
  - Maximum Sound Level
- **Location points are organized alphabetically**



Detailed Time Above 52 dBA Results

(refer to handout pages 7-11 for results at each location point)



Detailed L_{max} Results for Location Points

(refer to handout pages 13-18 for results at each location point)