

WHAT IS A NATURAL SOUNDSCAPE?

Nicholas P. Miller

Harris Miller Miller & Hanson Inc.

AGENDA

- **Background**
- **Existing Soundscapes**
- **Future Soundscapes**
- **Summary of Issues to Resolve**

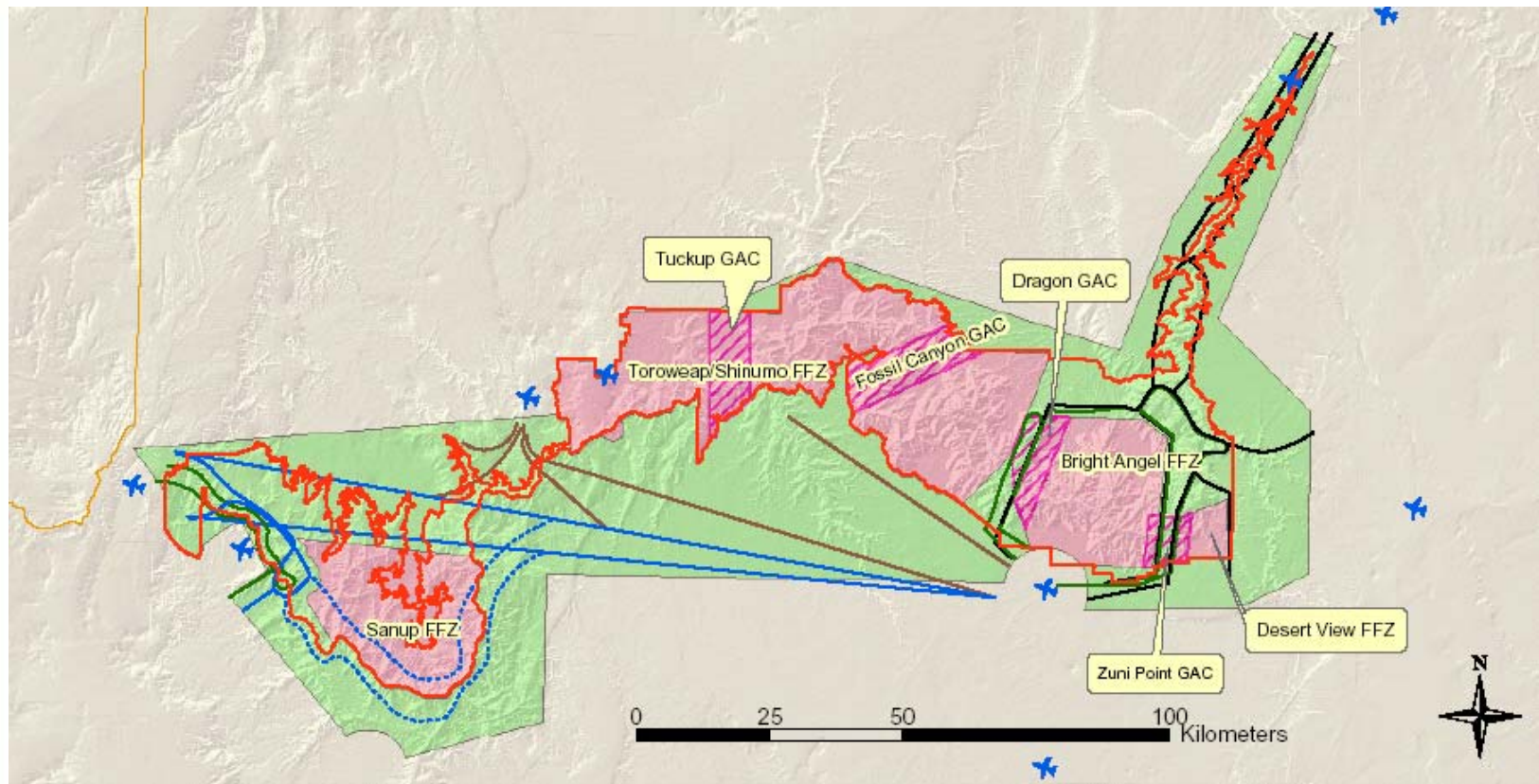
BACKGROUND

- **Mid-air collision, Grand Canyon, 1986**
- **Public Law 100-91- 1987**
- **FAA Restructures Grand Canyon Airspace**
- **NPS Developed Management Policy**
- **Public Law 106-181 – Air Tour Management Plans**

Public Law 100-91

- Nature and scope of overflight problem
- Injurious effects on natural, historical, cultural resources
- **Grand Canyon airspace to “substantially restore natural quiet in the park”**
- Impairment of visitor enjoyment
- Impacts of aircraft noise on safety of park users
- Values associated with aircraft flights

FAA Restructures Grand Canyon Airspace



SFAR 50-2

NPS Developed Management Policy

- **Treat natural sounds as a resource to preserve**
- **Determine baseline sound environment**
- **Determine “appropriate” sounds**
- **Seek to restore / preserve natural sounds**

Public Law 106-181- Title VIII

National Parks Air Tour Management Act

- **Commercial air tours may operate only if ATMP prescribes permitted tour operations**
- **ATMP developed through FAA and NPS cooperation**
- **FAA to determine what constitutes “quiet technology”**
- **ATMP provide incentives for quiet technology aircraft**

Characterizing the Existing Soundscape

- To preserve it, what is it?
- National Parks can be large
- Each park is, by definition, unique
- Parks have many different areas, uses, purposes
- Can the “soundscape” be quantified?

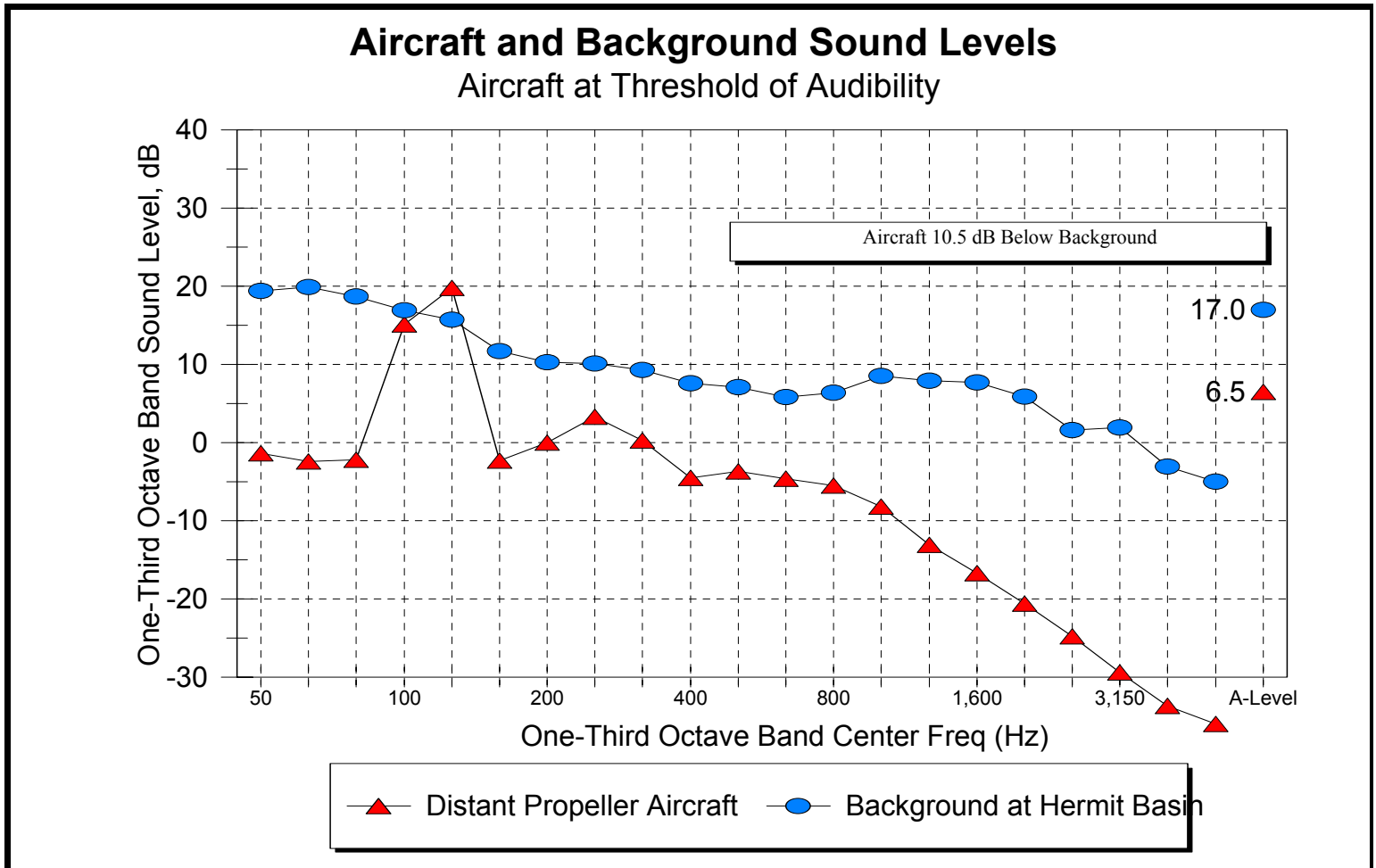
Characterizing the Existing Soundscape

- Grand Canyon required to **“substantially restore natural quiet”** and defined it as:
 - “...substantial restoration requires that 50% or more of the park achieve “natural quiet” (**i.e., no aircraft audible**) for 75 – 100 percent of the day.”
- Operational – How much of the park lies within a zone where aircraft can be heard 25% or more of the time?

Characterizing the Existing Soundscape

- Definition of “substantially restore natural quiet” established two major issues:
 - **Audibility became associated with defining soundscape**
 - **Computer modeling became necessary**
- Determining what is audible when and where became a significant part of characterizing the soundscape

What is Audibility?



Quantifying Audibility

- Need to define and determine “background”
 - **Where to measure?**
- Need to quantify sources of sound
- Need to measure
 - **Frequency Content**
 - **Time variation**



WHERE TO MEASURE

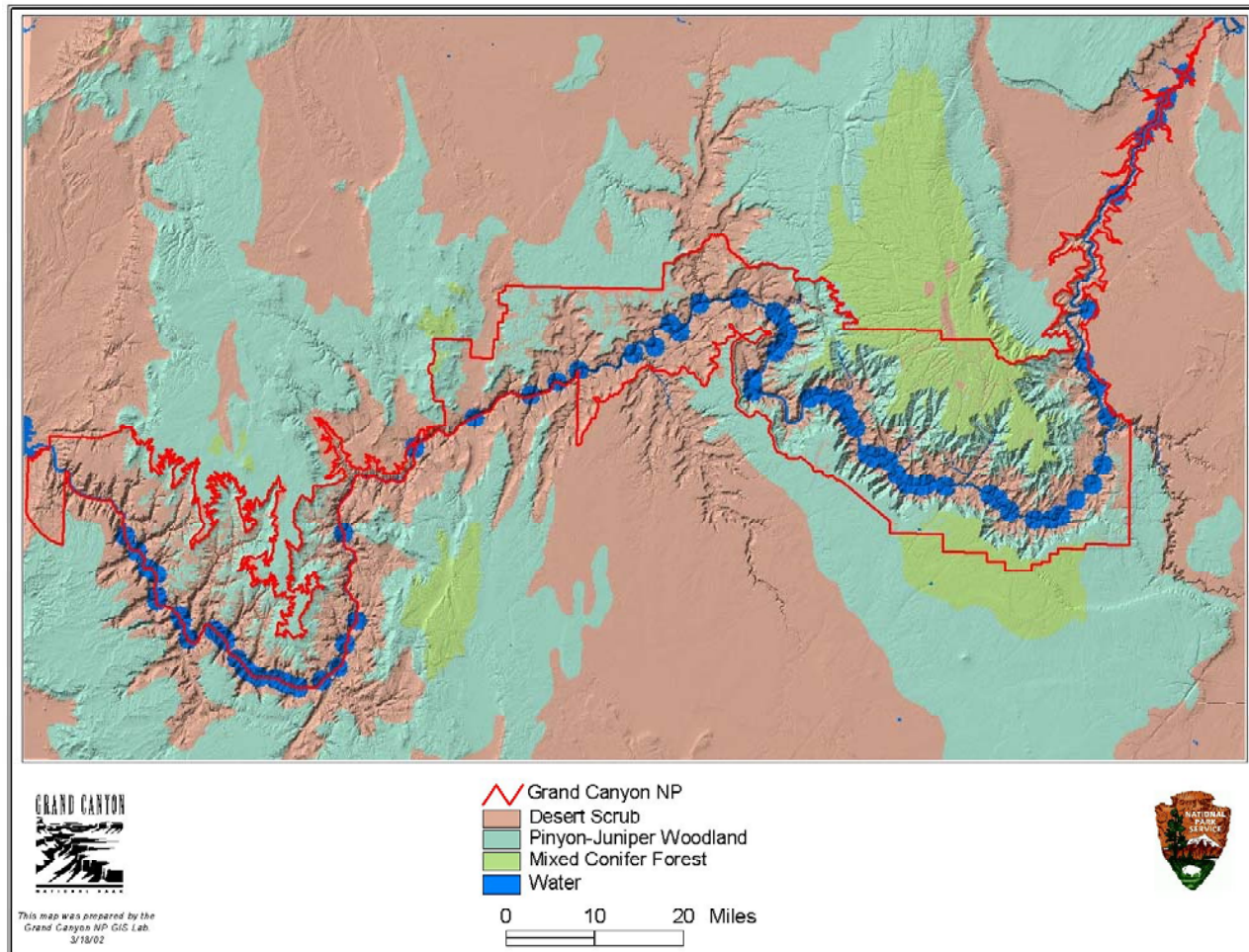
- **Need to consider**
 - **Noise generators**
 - **“Natural Acoustic Zones”**
 - **Vegetation**
 - » **Foliage**
 - » **Wildlife**
 - **Water**
 - **Wind conditions**
 - **Human-produced – traffic, aircraft, etc.**
 - **Accessibility**



Existing Soundscape Natural Acoustic Zones

<http://www.hmmh.com/>

VEGETATION / WATER - GRCA



Modeling

- Existing - Can not measure everywhere
- Future – Way to project effects of actions
- Model Validation Study
 - Audibility never modeled before in outdoor environment
 - Tested four models
 - Compared measurements with model predictions

Measurements

- Length of time to measure
- Identifying audible sources
- Type of Instrumentation
 - Expense
 - Durability
 - Spectra or WAV files



Modeling

- **Which model works “best”**
 - **(How to define and determine “best”)**
- **Special input requirements**
 - **Spectra**
 - **Directivity**
 - **Track and Speed**
- **Public availability**
- **Support**

Other

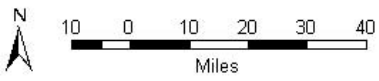
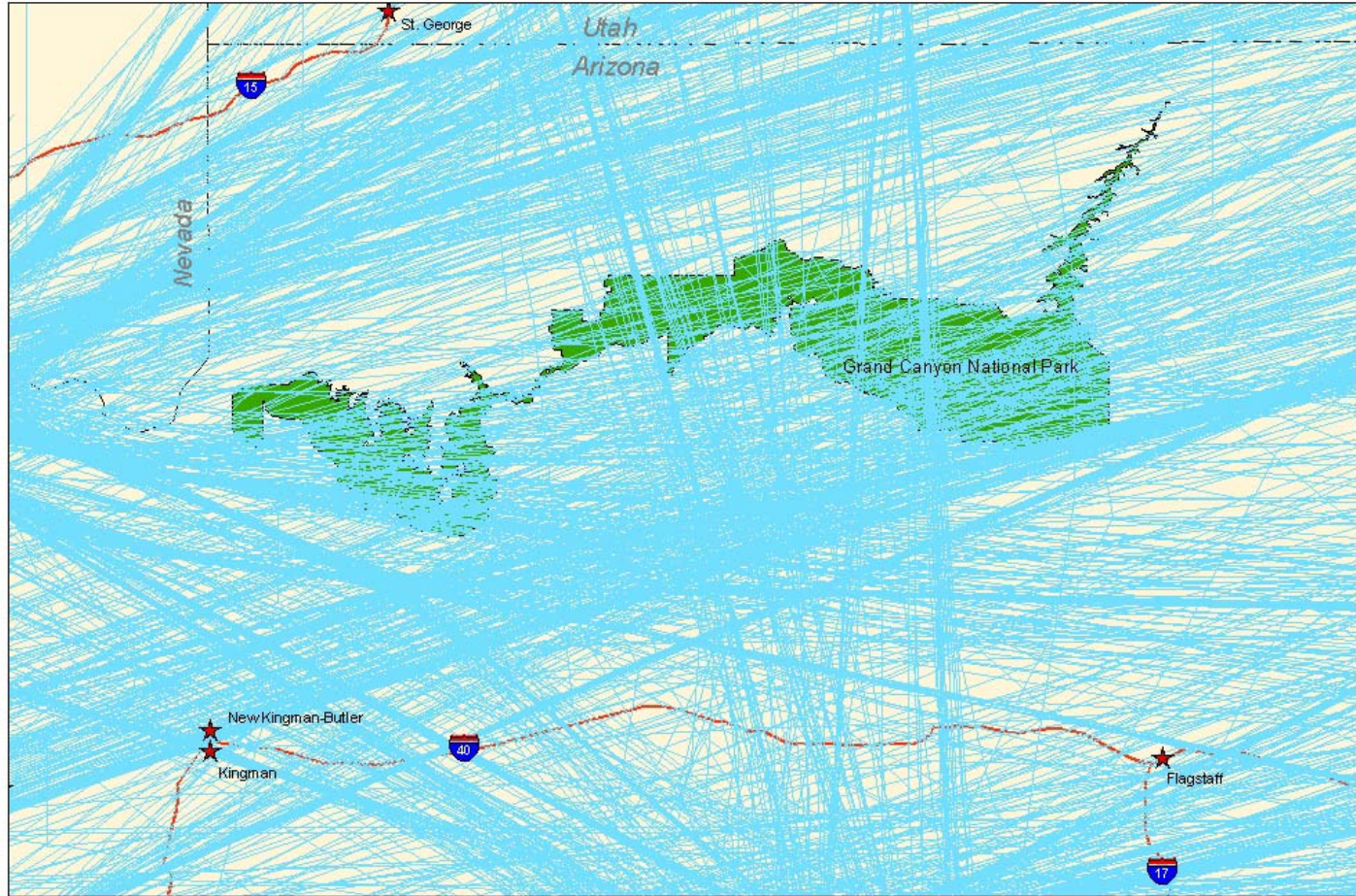
- **Metrics**
 - **Percent time audible**
 - **Percent time “noticeable”**
 - **Noise-free intervals**
- **Determining Impacts**
 - **Appropriate / inappropriate**
 - **Amount of mitigation / abatement**

Other

- **What is the best way to determine Quiet Technology**
- **What benefits accrue to owners of Quiet Technology**
- **What to do, if anything, about high altitude commercial jet operations**

Issues to Resolve

7:00 AM to 10:00 PM Jet Departures over Grand Canyon National Park, Arizona
October 17, 2000



Issues to Resolve

2:00 PM to 4:00 PM Jet Departures over Grand Canyon National Park, Arizona
October 17, 2000

