**Final EA**

**Appendix L – Section 4(f) Analysis**

*Official with Jurisdiction Letter to The Navajo Nation*

**From:** ATMPTeam
**To:** president.buunygren@navajo-nsn.gov
**Cc:** tplatero@navajodot.org
**Subject:** Section 4(f) Consultation - Air Tours At Canyon de Chelly National Monument
**Date:** Tuesday, April 2, 2024 12:35:25 PM
**Attachments:** CACH_Se[redacted]Letter.pdf

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Dear President Nygren,

The Federal Aviation Administration (FAA), in cooperation with the National Park Service (NPS), is developing an Air Tour Management Plan (ATMP) for Canyon de Chelly National Monument (Park). The FAA is preparing documentation for the ATMP in accordance with the National Parks Air Tour Management Act (NPATMA) and other applicable laws, including Section 4(f) of the U.S. Department of Transportation Act (Section 4(f)). The purpose of the attached letter is to coordinate with you on FAA's preliminary findings related to the ATMP's potential impacts to Canyon de Chelly National Monument, which is a protected property under Section 4(f).

We request that you review the attached letter and respond with any concerns or need for further consultation on the FAA's proposed no substantial impairment finding within fourteen days of receiving this email.

Should you have any questions regarding any of the above, please contact Eric Elmore at 202-267-8335 or eric.elmore@faa.gov and copy the ATMP team at ATMPTeam@dot.gov.

Thank you.

U.S. Department
of Transportation
**Federal Aviation
Administration**

**United States Department of Transportation**
**FEDERAL AVIATION ADMINISTRATION**
Office of Policy, International Affairs & Environment
Office of Environment and Energy

**NATIONAL PARKS AIR TOUR MANAGEMENT PROGRAM**

April 2, 2024

Re: Consultation under Section 4(f) of the U.S. Department of Transportation Act (49 U.S.C. § 303) for the development of an Air Tour Management Plan for Canyon de Chelly National Monument

Dr. Buu Nygren, Navajo Nation President
Navajo Nation Office of the President
P.O. Box 7440
Window Rock, AZ 86515

Dear President Nygren:

The Federal Aviation Administration (FAA), in cooperation with the National Park Service (NPS) (collectively, the agencies) and the Navajo Nation, are developing an Air Tour Management Plan (ATMP) for Canyon de Chelly National Monument (Park). The FAA is preparing documentation for the ATMP in accordance with the National Parks Air Tour Management Act of 2000 (the Act) and other applicable laws, including Section 4(f) of the U.S. Department of Transportation (DOT) Act (Section 4(f)). The purpose of this letter is to coordinate with you on FAA's preliminary findings related to the ATMP's potential impacts to Canyon de Chelly National Monument which is a protected property under Section 4(f).

**Project Background and Purpose of the Action**

The Act (Public Law 106-181, codified at 49 U.S.C. § 40128), directs the agencies to develop ATMPs for commercial air tour operations over units of the National Park System. A commercial air tour operation is defined as "a flight conducted for compensation or hire in a powered aircraft where the purpose of the flight is sightseeing over a national park, within ½-mile outside the boundary of a national park or over Tribal lands, during which the aircraft flies below an altitude of 5,000 feet (ft.) above ground level (AGL) or less than 1 mile laterally from any geographic feature within the park (unless more than ½-mile outside the boundary)." When the Act was passed in 2000, existing air tour operators were permitted to continue air tour operations in parks until an ATMP was completed. To facilitate this continued use, FAA issued Interim Operating Authority (IOA) to existing air tour operators. IOA set an annual limit of the number of flights per operator for each park. In 2012, the Act was amended by Congress to, among other things, require operators to report the number of flights conducted on a quarterly interval each year. On February 14, 2019, Public Employees for Environmental Responsibility and the Hawai'i Coalition Malama Pono filed a petition in the United States Court of Appeals for the District of Columbia Circuit Court for the agencies to complete air tour management plans or voluntary agreements at seven specified parks, In re Public Employees for Environmental Responsibility, et al., Case No. 19-1044 (D.C. Cir.). On May 1, 2020, the Court granted the petition and ordered the agencies to submit a schedule to

bring 23 eligible parks, including Canyon de Chelly National Monument, into compliance with the Act within two years or to show specific, concrete reasons why doing so will take longer. Consistent with the Court's order, agencies submitted a proposed plan and schedule (Compliance Plan) on August 31, 2020. On June 21, 2022, the Court ordered the agencies to file a joint supplemental report and propose firm deadlines for bringing each of the parks included in the Compliance Plan into compliance with the Act. On July 21, 2022, the agencies filed their report and provided a deadline of December 31, 2024, to complete the ATMP for the Park.

Section 4(f) is applicable to historic sites and publicly owned parks, recreation areas, and wildlife and waterfowl refuges of national, State, or local significance that may be impacted by transportation programs or projects carried out by the DOT and its operating administrations, including the FAA. Section 4(f) of the DOT Act (codified at 49 U.S.C. § 303(c)), states that, subject to exceptions for *de minimis* impacts:

> "… the Secretary may approve a transportation program or project…requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, state, or local significance (as determined by the federal, state, or local officials having jurisdiction over the park, area, refuge, or site) only if –
>
> 1. There is no prudent and feasible alternative to using that land; and
> 2. The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use."

The term "use" refers to both physical and constructive impacts to Section 4(f) resources. A physical use involves the physical occupation or alteration of a Section 4(f) resource, while constructive use occurs when a proposed action results in substantial impairment of a resource to the degree that the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished. Under the ATMP, potential impacts to Section 4(f) resources from commercial air tours may include noise from aircraft within the acoustic environment, as well as visual impacts.

**Description of the Proposed Action**

In accordance with the Act, the agencies are developing an ATMP for the Park. Commercial air tours have been operating intermittently over the Park for over 20 years. Since 2005, these air tours have been conducted pursuant to IOA issued by FAA in accordance with the Act. IOA does not provide any operating conditions (e.g., routes, altitudes, time of day, etc.) for air tours other than a limit of 175 air tours per year. The ATMP will replace IOA for the Park and for Navajo Nation Tribal trust lands within ½ mile of the Park's boundary.

The agencies have documented the existing conditions for commercial air tour operations over the Park. The FAA and the NPS consider the existing operations for commercial air tours to be an annual number of 43 flights between 2017-2019. The agencies decided to use a three-year average because it reflects the most accurate and reliable air tour conditions based on available operator reporting, and accounts for variations across multiple years, excluding more recent years affected by the COVID-19 pandemic.

The proposed action is implementing the ATMP for the Park. The ATMP will prescribe operating parameters to mitigate impacts from commercial air tours on Park resources. The agencies considered two alternatives for the Park's ATMP: Alternative 1, which serves as the No Action Alternative, and

Alternative 2, which is identified as the Preferred Alternative and would prohibit air tours within the ATMP planning area.[1] In accordance with FAA Order 1050.1F, the FAA determined through an initial assessment if the proposed action and alternatives would result in use of any of the properties to which Section 4(f) applies. The No Action Alternative provides a basis for comparison but is not considered a selectable alternative because it does not meet the purpose and need for the ATMP. The FAA did not advance the No Action Alternative for Section 4(f) analysis as it is not a selectable alternative.

The following elements of the ATMP are included under the Preferred Alternative:

- Prohibits air tours within the ATMP planning area to protect the Park's cultural resources which necessarily include resources that are culturally and spiritually significant to the Navajo Nation because the Park is located entirely on Tribal trust lands. Air tours could continue to fly outside the ATMP planning area (i.e., at or above 5,000 ft. AGL or more than ½-mile outside of the Park's boundary), see **Attachment A**;
- There are no designated routes or altitudes prescribed in **Attachment A,** however, operators may continue to fly to points of interest in the area outside of the ATMP planning area where they already fly, fly around the ATMP planning area similar to existing flights, or above the ATMP planning area (at or above 5,000 ft. AGL); and
- The establishment of the ATMP would result in the termination of all IOA for the Park and Tribal lands within the ½-mile buffer.

The agencies are both responsible for monitoring and oversight of the ATMP.

**Section 4(f)**

The study area for considering Section 4(f) resources for the ATMP consists of the ATMP planning area. The Section 4(f) study area corresponds with the Area of Potential Effects used for compliance with Section 106 of the National Historic Preservation Act of 1966 (Section 106) for the Park. The only non-historic Section 4(f) resource identified in the study area is the Canyon de Chelly National Monument. Please see the Draft Environmental Assessment document (Section 3.5.1, Affected Environment for Cultural Resources, and Appendix G, *Cultural Resources Consultation and Summary*) for a list of historic resources that qualify under Section 4(f). There were no wildlife or waterfowl refuges identified in the Section 4(f) study area. Please refer to Figure 5 of the Environmental Assessment document for a map of the Section 4(f) resources analyzed within the Section 4(f) study area.

**Potential Use of Section 4(f) Resources**

Evaluating potential impacts to Section 4(f) resources focuses on changes in aircraft noise exposure and visual effects resulting from implementing the ATMP. A constructive use of a Section 4(f) resource would occur if there was a substantial impairment of the resource to the degree that the activities, features, or attributes of the site that contribute to its significance or enjoyment are substantially diminished. This could occur as a result of both visual and noise impacts. The FAA evaluated the Section 4(f) resources for potential noise (including vibration) and visual impacts to determine if there was substantial impairment to Section 4(f) resources due to the ATMP that might result in a constructive use.

[1] An ATMP regulates commercial air tours over a national park or within ½-mile outside the park's boundary during which the aircraft flies below 5,000 ft. AGL. This is referred to as the ATMP planning area.

**Noise Impacts Analysis**

The FAA's noise evaluation is based on day night average sound level ($L_{dn}$ or DNL), the cumulative noise energy exposure from aircraft. As part of the ATMP noise analysis, the NPS provided supplemental metrics to assess the impact of commercial air tours on visitor experience in quiet settings, including noise sensitive areas of Section 4(f) resources. The metrics and acoustical terminology considered for the Section 4(f) noise analysis are shown in the table below.

| **Metric** | **Relevance and citation** |
|---|---|
| Equivalent sound level, $L_{Aeq,\ 12\ hr}$ | The logarithmic average of commercial air tour sound levels, in decibels (dBA), over a 12-hour day. The selected 12-hour period is 7 AM to 7 PM to represent typical daytime commercial air tour operating hours. |
| Day-night average sound level, $L_{dn}$ (or DNL) | The logarithmic average of sound levels, in dBA, over a 24-hour day, DNL takes into account the increased sensitivity to noise at night by including a 10 dB penalty on noise events occurring between 10 PM and 7 AM local time.<br><br>Note: Both $L_{Aeq,\ 12hr}$ and DNL characterize:<br>• Increases in both the loudness and duration of noise events<br>• The number of noise events during specific time period (12 hours for $L_{Aeq,\ 12hr}$ and 24-hours for DNL)<br><br>If there are no nighttime events, then $L_{Aeq,\ 12hr}$ is arithmetically three dBA higher than DNL as the events are averaged over 24 hours instead of 12 hours.<br><br>The FAA's (2015, Exhibit 4-1) indicators of significant impacts are for an action that would increase noise by DNL 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the No Action Alternative (existing conditions) for the same timeframe. |
| Time audible natural ambient | The total time (in minutes) that aircraft noise levels are audible to an attentive listener with normal hearing under natural ambient conditions.<br><br>The natural ambient is the sound level exceeded 50 percent of the time $L_{50}$, determined from the natural sound conditions found in an ATMP planning area, including all sounds of nature (i.e., wind, streams, wildlife, etc.), and excluding all human and mechanical sounds. Time audible does not indicate how loud the event is, only if it might be heard. |
| Time above 35 dBA | The amount of time (in minutes) that aircraft sound levels are above a given threshold (i.e., 35 dBA).<br><br>In quiet settings, outdoor sound levels exceeding this level degrade experience in outdoor performance venues (American National Standards Institute (ANSI), |

| Metric | Relevance and citation |
|---|---|
| | 2007[2]); blood pressure increases in sleeping humans (Haralabidis et al., 2008[3]); maximum background noise level inside classrooms (ANSI/Acoustical Society of America S12.60/Part 1-2010[4]). |
| Time above 52 dBA | The amount of time (in minutes) that aircraft sound levels are above a given threshold (i.e., 52 dBA).<br><br>At this background sound level, normal voice communication at five meters (two people five meters apart), or a raised voice to an audience at ten meters would result in 95% sentence intelligibility (United States Environmental Protection Agency, Office of Noise Abatement and Control, 1974[5]). This metric represents the level at which one may reasonably expect interference with Park interpretive programs, activities that require communication from a distance and other general visitor communication. |
| Maximum sound level, $L_{max}$ | The loudest sound level, in dBA, generated by the loudest event; it is event-based and is independent of the number of operations. $L_{max}$ does not provide any context of frequency, duration, or timing of exposure. |

Under the Preferred Alternative, commercial air tours would not be conducted within the ATMP planning area which would reduce this source of noise originating from within the Section 4(f) study area. The acoustic impacts of the Preferred Alternative cannot be modeled because, although some speculation about air tour routes can be made, it is unknown where air tours would fly when outside the ATMP planning area, so data on the resultant DNL for this alternative are not available. The Preferred Alternative would provide 365 days per year without air tours within the ATMP planning area and would reduce noise at Section 4(f) resources.

[2] American National Standards Institute, Inc. (ANSI). (2007). Quantities and procedures for description and measurement of environmental sound — Part 5: Sound level descriptors for determination of compatible land use. *Acoustical Society of America*, ASA S12.9-2007/PART 5 (R2020), 1-20. https://www.techstreet.com/standards/asa-s12-9-2007-part-5-r2020?product_id=1534045

[3] Haralabidis A.S., Dimakopoulou, K., Vigna-Taglianti, F., Giampaolo, M., Borgini, A., Dudley, M., Pershagen, G., Bluhm, G., Houthuijs, D., Babisch, W. Velonakis, M., Katsouyanni, K. & Jarup, L. (2008). Acute effects of night-time noise exposure on blood pressure in populations living near airports. *European Heart Journal, 29*(5), 658-664. https://academic.oup.com/eurheartj/article/29/5/658/440015

[4] ANSI/Acoustical Society of America. (2010). Acoustical performance criteria, design requirements, and guidelines for schools, Part 1: Permanent schools. *Acoustical Society of America,* ANSI/ASA S12.60-2002/Part 1. https://webstore.ansi.org/preview-pages/ASA/preview_ANSI+ASA+S12.60+Part+1-2010+(R2020).pdf

[5] Environmental Protection Agency, Office of Noise Abatement and Control (1974). Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety. https://www.nrc.gov/docs/ML1224/ML12241A393.pdf

Since commercial air tour operations would be limited or prohibited within the ATMP planning area under the Preferred Alternative, this alternative could result in the displacement of tours outside of this area. The indirect effects analysis conducted for the Environmental Assessment indicates that it is highly unlikely that the air tours that are displaced to outside the ATMP planning area under the Preferred Alternative would generate a noise exposure level at or above DNL 65 dB in a single location in accordance with FAA Order 1050.1F, including those that overlap with Section 4(f) properties. Additionally, the FAA and the NPS are unable to predict with specificity if, where, and to what extent any displaced air tours would result in visual impacts in different and/or new areas, including Section 4(f) resources.

The FAA also considered the potential for vibrational effects on Section 4(f) resources under the Preferred Alternative. However, since the Preferred Alternative would not authorize commercial air tours to be conducted within the ATMP planning area, vibrational effects would not occur and there would be no constructive use from vibrational effects of Section 4(f) resources.

As a result, FAA concludes there would be no substantial impairment of Section 4(f) resources in the Section 4(f) study area from noise-related or vibrational effects caused by the implementation of the Preferred Alternative, which does not allow air tours in the ATMP planning area.

**Visual Impacts Analysis**

Recognizing that some types of Section 4(f) resources may be affected by visual effects of commercial air tours, the FAA and NPS considered the potential for the introduction of visual elements that could substantially diminish the significance or enjoyment of Section 4(f) resources in the ATMP planning area. Since the Preferred Alternative would not authorize air tours within the ATMP planning area, visual effects would not occur and there would be no constructive use of Section 4(f) resources due to visual effects.

The indirect effects analysis for Visual Effects (Section 3.8.2, Environmental Consequences for Visual Effects) identifies that some indirect visual impacts could occur if flights were displaced to outside the ATMP planning area. Section 4(f) resources are present in these areas and could experience visual effects if air tours were visible from those resources. However, the FAA and the NPS are unable to predict with specificity if, where, and to what extent any displaced air tours would result in visual impacts in different and/or new areas, including Section 4(f) resources. The air tour operator may choose to fly along existing flight paths but at or above 5,000 ft. AGL. It is unlikely that that operator would continue to conduct commercial air tours over the Park by flying along the perimeter of the ATMP planning area, further minimizing the potential for indirect effects. For air tours conducted at or above 5,000 ft. AGL, the increase in altitude would likely decrease impacts on ground level resources compared to current conditions.

**Preliminary Finding**

The FAA has preliminarily determined the Preferred Alternative would not substantially diminish the protected activities, features, or attributes of the Section 4(f) resources in the Section 4(f) study area. The Preferred Alternative would not result in substantial impairment of Section 4(f) resources; therefore, based on the analysis above, FAA intends to make a determination of no constructive use of Canyon de Chelly National Monument. We request that you review this information and respond with

any concerns or need for further consultation on the FAA's preliminary proposed no substantial impairment finding within fourteen days of receiving this letter.

Should you have any questions regarding any of the above, please contact Eric Elmore at 202-267-8335 or eric.elmore@faa.gov and copy the ATMP team at ATMPTeam@dot.gov.

Sincerely,

Eric Elmore
Senior Policy Advisor
Office of Environment and Energy
Federal Aviation Administration

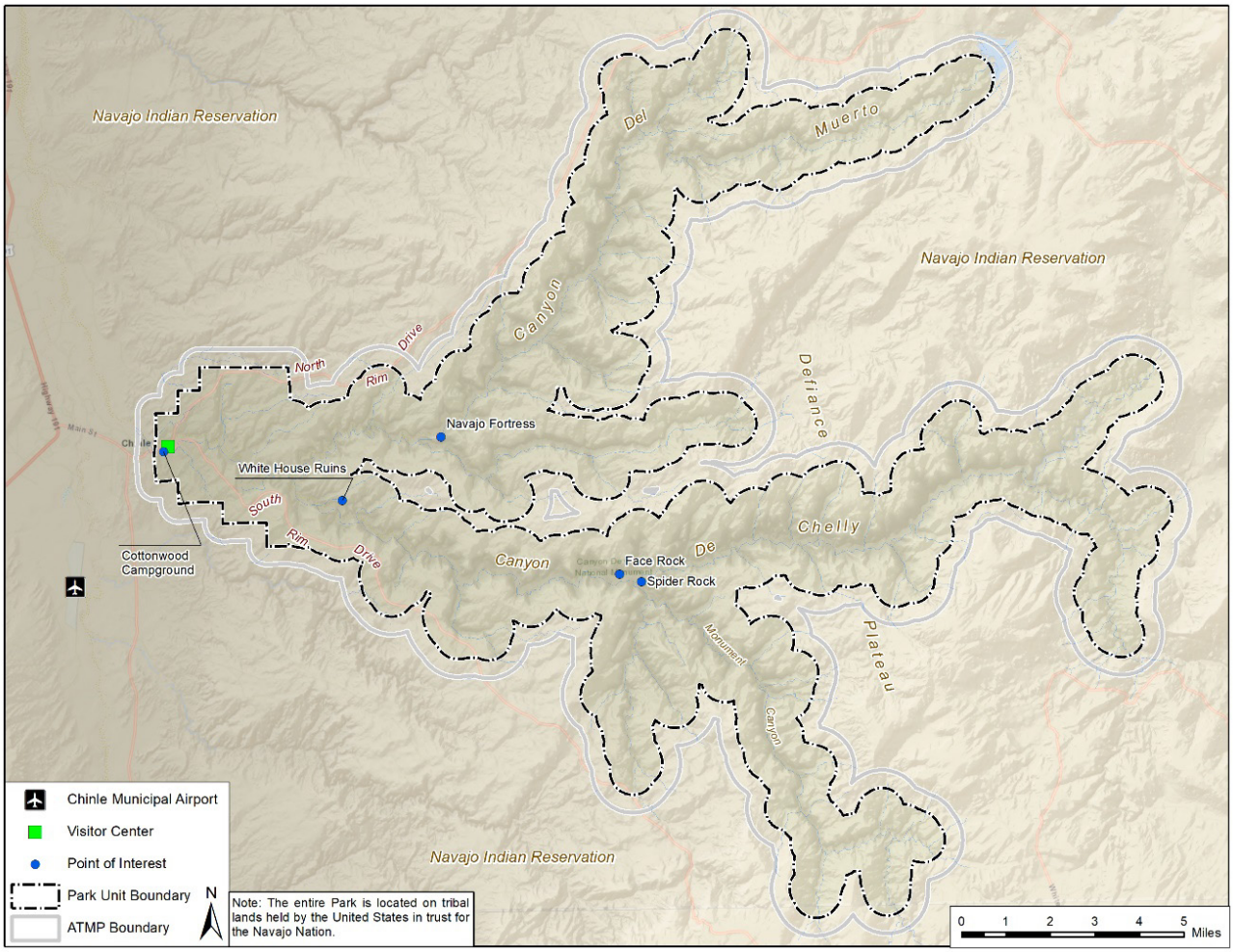
CC:
Tom Platero, Division Director
Navajo Department of Transportation, P.O. Box 4620, Window Rock, AZ 86515
tplatero@navajodot.org

Attachments

A. Map of ATMP planning area

**ATTACHMENT A**

**Map of the Area Subject to the ATMP for Canyon de Chelly National Monument**



**From:** ATMPTeam
**To:** ATMPTeam; president.buunygren@navajo-nsn.gov
**Cc:** tplatero@navajodot.org
**Subject:** RE: Section 4(f) Consultation - Air Tours At Canyon de Chelly National Monument
**Date:** Wednesday, April 10, 2024 11:36:06 AM

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Dear President Nygren,

This email serves as a reminder to please provide any feedback on the Federal Aviation Administration's preliminary findings in accordance with Section 4(f) of the U.S. Department of Transportation Act (Section 4(f)) related to potential impacts to Canyon de Chelly National Monument, which is a protected property under Section 4(f), by April 18th (see email below).

Should you have any questions regarding any of the above, please contact Eric Elmore at 202-267-8335 or eric.elmore@faa.gov and copy the ATMP team at ATMPTeam@dot.gov.

---

**From:** ATMPTeam <ATMPTeam@dot.gov>
**Sent:** Tuesday, April 2, 2024 2:35 PM
**To:** president.buunygren@navajo-nsn.gov
**Cc:** tplatero@navajodot.org
**Subject:** Section 4(f) Consultation - Air Tours At Canyon de Chelly National Monument

Dear President Nygren,

The Federal Aviation Administration (FAA), in cooperation with the National Park Service (NPS), is developing an Air Tour Management Plan (ATMP) for Canyon de Chelly National Monument (Park). The FAA is preparing documentation for the ATMP in accordance with the National Parks Air Tour Management Act (NPATMA) and other applicable laws, including Section 4(f) of the U.S. Department of Transportation Act (Section 4(f)). The purpose of the attached letter is to coordinate with you on FAA's preliminary findings related to the ATMP's potential impacts to Canyon de Chelly National Monument, which is a protected property under Section 4(f).

We request that you review the attached letter and respond with any concerns or need for further consultation on the FAA's proposed no substantial impairment finding within fourteen days of receiving this email.

Should you have any questions regarding any of the above, please contact Eric Elmore at 202-267-8335 or eric.elmore@faa.gov and copy the ATMP team at ATMPTeam@dot.gov.

Thank you.

**Final EA**

**Additional Materials Appendix M – National Parks Overflights Advisory Group Correspondence**

*Correspondence- 106 Public Comment Period*

*Correspondence - Public Comment Period*

## Canyon DeChelly ATMP Section 106 public comment period Nov. 2 - Dec. 4, 2023

Ward, Vicki L <Vicki_Ward@nps.gov>

Thu 11/2/2023 5:27 PM

To:Bob Randall <brandall@kaplankirsch.com>;dhingson_contact <dhingson@infowest.com>;Eric Lincoln <lincoln.eric2@gmail.com>;John Eastman <john@teton.com>;Les Blomberg <npc@nonoise.org>;Carl Slater <carl@cdcarl.com>;Huling, Murray <Murray.Huling@aopa.org>;james.viola@rotor.org <james.viola@rotor.org>;John Becker <john@papillon.com>
Cc:Beeco, Adam A <adam_beeco@nps.gov>;Trevino, Karen <Karen_Trevino@nps.gov>;Elmore, Eric (FAA) <eric.elmore@faa.gov>;Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>;Pearson, Georgina A <Gina_Pearson@nps.gov>;Pipkin, Ashley R <Ashley_Pipkin@nps.gov>

1 attachments (203 KB)

2023-24191.pdf;

Dear NPOAG,

We hope everyone is having a good fall so far and enjoying warmer weather after the recent cold snap that affected most of the mainland. FAA and NPS are diligently working to complete the remaining ATMPs and Environmental Assessments for Hawaii Volcanoes, Haleakala, Badlands, Mount Rushmore, Bandelier, and Canyon DeChelly and also on the voluntary agreement for Lake Mead.

Today, we wanted to let you know about the announcement for public comment related to the Na onal Historic Preservation Act Sec on 106 process for the Canyon DeChelly ATMP. This public comment period is distinct from the public comment period on the draft ATMP which will happen in 2024. The pdf of the Federal Register announcement is attached and a link to the announcement is below.

The FAA and NPS have initiated the Sec on 106 process with the Navajo Na on Tribal Historic Preservation Officer, Tribes, and other consul ng par es. The notice in the Nov. 2 Federal Register announces the opportunity for the public to comment on the results of the FAA's efforts to identify historic proper es, evaluate the proper es' significance, and assess the undertaking's effects on them. The agencies are seeking public input on the FAA's efforts to date in identifying consul ng par es, determining the area of potential effects, identifying historic proper es, and assessing the effects of the undertaking on historic proper es within the area of potential effects. Supporting documents that describe the historic proper es and instructions for submitting comments are on the NPS PEPC project site for the Canyon DeChelly ATMP (link below the FR notice). The public comment period closes on December 4, 2023.

Federal Register :: Notice of Availability of Consultation Documents for Public Comment Under Section 106 of the National Historic Preservation Act

FEDERAL REGISTER
The Daily Journal of the United States Government

### Notice of Availability of Consultation Documents for Public Comment Under Section 106 of the National Historic Preservation Act

The FAA, in cooperation with the National Park Service (NPS) (together the agencies), has initiated development of an Air Tour Management Plan (ATMP) for Canyon de

Chelly National Monument (the Park) pursuant to the National Parks Air Tour Management Act (NPATMA) of

www.federalregister.gov

ParkPlanning - Canyon de Chelly National Monument Air Tour Management Plan (nps.gov)

## ParkPlanning - Canyon de Chelly National Monument Air Tour Management Plan

National Park Service - PEPC - Canyon de Chelly National Monument Air Tour Management Plan

parkplanning.nps.gov

Regards,

Vicki L. Ward
Overflights Program Manager
Natural Sounds and Night Skies Division
Natural Resource Stewardship and Science Directorate
National Park Service
1201 Oakridge Dr., Suite 100
Fort Collins, CO 80525
vicki_ward@nps.gov
Teleworking/Mobile #: 970-631-5257
Fax: (970) 267-2109

"Listening to the silence is probably one of the most profound experiences we can have in our everyday life." Anne Wilson Schaef

contracting Scorecard and the governmentwide prime contracting scorecard by disregarding actions using Funding Office code 36135Y. This code refers to the Office of Integrated Veteran Care within the Veterans Health Administration, which reports the claims for payments under the CCN contracts for submission to FPDS.

**Larry Stubblefield,**

*Acting Associate Administrator, Office of Government Contracting and Business Development.*

[FR Doc. 2023–24206 Filed 11–1–23; 8:45 am]

**BILLING CODE 8026–09–P**

## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

### Notice of Availability of Consultation Documents for Public Comment Under Section 106 of the National Historic Preservation Act

**AGENCY:** Federal Aviation Administration (FAA), Department of Transportation (DOT).

**ACTION:** Notice of availability of consultation documents for public comment under section 106 of the National Historic Preservation Act.

**SUMMARY:** The FAA, in cooperation with the National Park Service (NPS) (together the agencies), has initiated development of an Air Tour Management Plan (ATMP) for Canyon de Chelly National Monument (the Park) pursuant to the National Parks Air Tour Management Act (NPATMA) of 2000 and its implementing regulations. The agencies determined that the development of an ATMP constitutes a Federal undertaking subject to compliance the National Historic Preservation Act of 1966, as amended (NHPA). The agencies have initiated the section 106 process with the Navajo Nation Tribal Historic Preservation Officer, Tribes, and other consulting parties. This notice announces the opportunity for the public to comment on the results of the FAA's efforts to identify historic properties, evaluate the properties' significance, and assess the undertaking's effects on them. The agencies are seeking public input on the FAA's efforts to date in identifying consulting parties, determining the area of potential effects, identifying historic properties, and assessing the effects of the undertaking on historic properties within the area of potential effects. The agencies are providing the description of the undertaking, the consulting party list, the delineation of the proposed Area of Potential Effects (APE), the results of the agencies' efforts to identify historic properties within the APE, the evaluation of their significance, and the agencies' approach to assessing the undertaking's effects upon the identified historic properties. Supporting documentation can be found at the following link: *https://parkplanning.nps.gov/CACHATMP.*

**DATES:** Any member of the public is encouraged to provide views on this project to the agencies. The agencies will accept and consider comments related to section 106. Comments must be received on or before December 1, 2023, by 11:59 MDT. Comments will be received on the PEPC website. The Park's website link is *https://parkplanning.nps.gov/CACHATMP.*

Before including your address, phone number, email address, or other personal identifying information in your comment, be advised that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

**ADDRESSES:** The public is encouraged to provide written comments regarding the section 106 documents provided in the PEPC website throughout the comment period.

*Contact:* Any request for reasonable accommodation related to providing comments on the Section 106 documents should be sent to the person listed on the Park's PEPC website. The U.S. Department of Transportation and U.S. Department of the Interior are committed to providing equal access to the meetings for all participants. If you need alternative formats or services because of a disability, such as sign language, interpretation, or other ancillary aids, please contact the person listed in the **FOR FURTHER INFORMATION CONTACT** section.

**FOR FURTHER INFORMATION CONTACT:** Sandra Fox, (202) 267–0928, *Sandra.Y.Fox@faa.gov.*

**SUPPLEMENTARY INFORMATION:**

*Description of the Undertaking.* The undertaking for purposes of section 106 is implementing an ATMP for the Park. Consistent with the NPATMA, the proposed ATMP would regulate commercial air tours over the Park or within ½ mile outside the boundary of the Park, including over tribal lands within or abutting the Park. A commercial air tour subject to the ATMP is any flight conducted for compensation or hire in a powered aircraft where a purpose of the flight is sightseeing over the Park, or within ½ mile of its boundary, during which the aircraft flies:

(1) Below 5,000 feet above ground level (except solely for the purposes of takeoff or landing, or necessary for safe operation of an aircraft as determined under the rules and regulations of the FAA requiring the pilot-in-command to take action to ensure the safe operation of the aircraft); or

(2) Less than one mile laterally from any geographic feature within the Park (unless more than ½ mile outside the Park boundary).

Overflights that do not meet the definition above of a commercial air tour are not subject to the NPATMA and are thus outside the scope of the ATMP.

The agencies have documented the existing conditions for commercial air tour operations over the Park. Although there are four air tour operators with IOA (Interim Operating Authority), only one commercial air tour operator currently conducts tours over the Park. The operator currently flies one route west to east over the southern portion of the park, two routes running east to west and back through the center of the Park, and two routes entering and exiting through the north portion of the Park and passing along the center of the Park east to west and back. Until the ATMP is in place the operators could change routes to fly over other areas of the Park without notice to the agencies. Existing routes are depicted in Attachment A in the supporting documentation. The agencies consider the existing operations for commercial air tours to be an average of 2017–2019 annual air tours flown, which is 43 air tours. Based on 2017–2019 data, there was only one instance in which flights exceeded 1 per day (2 flights on 3/19/19). A three-year average is used because it reflects the most accurate and reliable air tour conditions, and accounts for variations across multiple years. Under existing conditions, commercial air tours over the Park are conducted using fixed wing aircraft: Cessna 182 and Cessna T207A. Reported minimum altitudes range from 800 to 1,000 feet (ft.) above ground level (AGL) [1] depending on the route. The proposed undertaking would prohibit commercial air tour operations within the ATMP planning area. A summary of

[1] Altitude expressed in units above ground level is a measurement of the distance between the ground surface and the aircraft, whereas altitude expressed in median sea level (MSL) refers to the altitude of aircraft above sea level, regardless of the terrain below it. Aircraft flying at a constant MSL altitude would simultaneously fly at varying AGL altitudes, and vice versa, assuming uneven terrain is present below the aircraft.

the undertaking elements is shown in the table below:

SUMMARY OF ATMP ELEMENTS

| | |
|---|---|
| General Description and Objectives | Prohibits air tours within the ATMP planning area to maximize achievement of Park management objectives. Air tours could continue to fly outside the ATMP planning area (*i.e.,* at or above 5,000 feet AGL or more than ½-mile outside of the Park's boundary). |
| Annual/Daily Number of Flights | None in ATMP planning area. |
| Routes | None in ATMP planning area. |
| Minimum Altitudes | Flights over the Park at or above 5,000 feet AGL could occur as they are outside the ATMP planning area. Flights more than ½-mile outside the Park boundary could similarly still occur as they are also outside the ATMP planning area. |
| Time of Day | N/A. |
| Day of Week | N/A. |
| Seasonal | N/A. |
| Quiet Technology (QT) Incentives | N/A. |
| Annual Meeting, Operator Training and Education | N/A. |
| Restrictions for Particular Events | N/A. |
| Adaptive Management | N/A. |
| Initial Allocation, Aircraft Type, Competitive Bidding, and New Entrants | N/A. |
| Monitoring and Enforcement | Monitoring would occur to ensure operators are complying with the terms and conditions of the ATMP. |
| Interim Operating Authority [2] | Terminates 180 days from the establishment date of the ATMP. |

*Delineation of the Proposed APE and Historic Property Identification.* In establishing the proposed APE, the FAA sought to include areas where any historic property present could be affected by noise from or sight of commercial air tours that may take place under the undertaking, including those over the Park or adjacent tribal lands or those that are reasonably foreseeable. The FAA proposed an APE comprising the Park plus ½ mile outside the boundary of the Park. A map of the APE can be found on the Planning, Environment and Public Comment System (PEPC) website linked below.

To identify historic properties within the APE, the FAA coordinated with Park staff to identify known historic properties located within the APE. The FAA also coordinated with the Navajo Nation Heritage and Historic Preservation Department to collect data for previously identified properties that may be listed in or are eligible for listing in the National Register of Historic Places (National Register). The agencies performed an in-person records search at the Navajo Nation Heritage and Historic Preservation Department on September 13, 2023, which focused on identifying known Traditional Cultural Properties (TCPs) within the APE. The agencies have also consulted with other consulting parties, including Tribes that have an interest in the area, to identify any historic properties not previously identified in the APE or additional information on historic properties previously documented in the APE. A summary of the identified historic properties and whether they are listed or eligible to be listed on the National Register can be found on the PEPC website linked below.

*Assessment of Effects.* In assessing the effect of the undertaking on historic properties within the APE, the FAA will take into consideration that the undertaking does not include land acquisition, construction, or ground disturbance and will not result in physical effects to historic properties. The agencies will assess the effects of the undertaking on a historic property to determine if it alters the characteristics that qualify the property for eligibility for listing or inclusion in the National Register. Effects are considered adverse if they diminish the integrity of a property's elements that contribute to its significance. The agencies will focus the assessment of effects on the potential for adverse effects from the introduction of audible or visual elements that could diminish the integrity of the property's significant historic features. The FAA is also considering whether air tours could affect the use of TCPs associated with cultural practices, customs, or beliefs that continue to be held or practiced today.

The agencies request that you provide any comments you may have regarding the undertaking, the historic property identification efforts, your views regarding the significant characteristics of listed or eligible properties, and any information you might have that would help identify additional properties for which setting or feeling is a characteristic of significance. Your feedback on the potential of the undertaking to cause adverse effects to the historic properties is also welcomed.

This notice affords the public an opportunity to participate in section 106 activities for the development of an ATMP at Canyon de Chelly National Monument, including reviewing and providing comments on the section 106 process to date. The FAA and NPS encourage public participation and provide information on how to submit comments or feedback below. Supporting documentation can be found at the following link: *https://parkplanning.nps.gov/CACHATMP.*

The FAA and NPS are issuing this notice pursuant to section 800.2(d) of 36 CFR part 800, Protection of Historic Properties, and section 106 of 54 U.S.C. Subtitle III, National Historic Preservation Act. The section 106 implementing regulations at 36 CFR part 800 require FAA, as the lead Federal agency, to identify any properties within the project area that are listed in or eligible for listing in the National Register; to assess the effects the undertaking may have on historic properties; and to seek ways to avoid, minimize, or mitigate any adverse effects.

The FAA and the NPS are inviting comments from the public, Federal and State agencies, Tribes, and other interested parties on the section 106

[2] Commercial air tours over the Park are currently conducted under interim operating authority (IOA) that NPATMA required the FAA to grant air tour operators. Interim operating authority does not provide any operating parameters (routes, altitudes, etc.) for commercial air tours other than an annual limit. Under NPATMA, IOA for a park terminates by operation of law 180 days after an ATMP is established for that park.

process for Canyon de Chelly National Monument.

The FAA and the NPS have determined that the ATMP constitutes a Federal undertaking subject to compliance with section 106 of the NHPA and its implementing regulations at 36 CFR part 800. The FAA and the NPS have consulted with the Tribal Historic Preservation Officer, federally recognized Tribes, and other interested parties to identify historic properties and assess the potential effects of the ATMP on them.

The proposed APE for this undertaking (36 CFR 800.4(a)(1)) as defined at 36 CFR 800.16(d) is the geographic area or areas within which the undertaking may directly or indirectly cause alterations in the character or use of any historic properties, if any such properties exist. FAA and NPS approval of the ATMP does not require land acquisition, construction, or ground disturbance, and the FAA anticipates no physical effects to historic properties. The FAA is therefore focusing its assessment on the potential introduction of visual or audible elements that could diminish the integrity of any identified significant historic properties.

The historic property identification effort has focused on identifying properties for which setting and feeling are characteristics contributing to a property's National Register eligibility, as they are the type of historic property most sensitive to the effects of aircraft overflight. These may include isolated properties where a cultural landscape is part of the property's significance, rural historic districts, outdoor spaces designed for meditation or contemplation, and certain TCPs. The agencies have taken into consideration the views and input of consulting parties, past planning, research and studies, magnitude and nature of the undertaking, degree of Federal involvement, nature and extent of potential effects on historic properties, and the likely nature of historic properties within the APE in accordance with 36 CFR 800.4(b)(1). The historic property identification effort has focused on properties for which setting and feeling are characteristics contributing to the property's National Register eligibility.

In assessing the effects of the undertaking on historic properties in the APE, the FAA will consider the number and altitude of commercial air tours over historic properties to further assess the potential for visual effects and any incremental change in noise levels that may result in alteration of the characteristics of historic properties qualifying them for the National Register.

The comment period is open to the public. The FAA and the NPS request that comments be as specific as possible. All written comments become part of the official record. Written comments regarding the section 106 consultation documents can be submitted via PEPC or sent to the mailing addresses provided on the Park's PEPC site. Comments will not be accepted by fax, email, or any other way than those specified above.

Issued in Washington, DC, on October 30, 2023.

**Sandra Fox,**

*Environmental Protection Specialist, FAA Office of Environment & Energy.*

[FR Doc. 2023–24191 Filed 11–1–23; 8:45 am]

**BILLING CODE 4910–13–P**

## DEPARTMENT OF TRANSPORTATION

### Federal Railroad Administration

**[Docket No. FRA–2023–0002–N–22]**

### Proposed Agency Information Collection Activities; Comment Request

**AGENCY:** Federal Railroad Administration (FRA), Department of Transportation (DOT).

**ACTION:** Notice of information collection; request for comment.

**SUMMARY:** Under the Paperwork Reduction Act of 1995 (PRA) and its implementing regulations, this notice announces that FRA is forwarding the Information Collection Request (ICR) summarized below to the Office of Management and Budget (OMB) for review and comment. The ICR describes the information collection and its expected burden. On August 25, 2023, FRA published a notice providing a 60-day period for public comment on the ICR.

**DATES:** Interested persons are invited to submit comments on or before December 4, 2023.

**ADDRESSES:** Written comments and recommendations for the proposed ICR should be sent within 30 days of publication of this notice to *www.reginfo.gov/public/do/PRAMain.* Find the particular ICR by selecting ''Currently under Review—Open for Public Comments'' or by using the search function.

**FOR FURTHER INFORMATION CONTACT:** Ms. Arlette Mussington, Information Collection Clearance Officer, at email: *arlette.mussington@dot.gov* or telephone: (571) 609–1285 or Ms. Joanne Swafford, Information Collection Clearance Officer, at email: *joanne.swafford@dot.gov* or telephone: (757) 897–9908.

**SUPPLEMENTARY INFORMATION:** The PRA, 44 U.S.C. 3501–3520, and its implementing regulations, 5 CFR part 1320, require Federal agencies to issue two notices seeking public comment on information collection activities before OMB may approve paperwork packages. *See* 44 U.S.C. 3506, 3507; 5 CFR 1320.8 through 1320.12. On August 25, 2023, FRA published a 60-day notice in the **Federal Register** soliciting public comment on the ICR for which it is now seeking OMB approval. *See* 88 FR 58435. FRA has received no comments related to the proposed collection of information.

Before OMB decides whether to approve this proposed collection of information, it must provide 30-days' notice for public comment. Federal law requires OMB to approve or disapprove paperwork packages between 30 and 60 days after the 30-day notice is published. 44 U.S.C. 3507(b)–(c); 5 CFR 1320.12(d); *see also* 60 FR 44978, 44983, Aug. 29, 1995. OMB believes the 30-day notice informs the regulated community to file relevant comments and affords the agency adequate time to digest public comments before it renders a decision. 60 FR 44983, Aug. 29, 1995. Therefore, respondents should submit their respective comments to OMB within 30 days of publication to best ensure having their full effect.

Comments are invited on the following ICR regarding: (1) Whether the information collection activities are necessary for FRA to properly execute its functions, including whether the information will have practical utility; (2) the accuracy of FRA's estimates of the burden of the information collection activities, including the validity of the methodology and assumptions used to determine the estimates; (3) ways for FRA to enhance the quality, utility, and clarity of the information being collected; and (4) ways to minimize the burden of information collection activities on the public, including the use of automated collection techniques or other forms of information technology.

The summary below describes the ICR that FRA will submit for OMB clearance as the PRA requires:

*Title:* Critical Incident Stress Plans.

*OMB Control Number:* 2130–0602.

*Abstract:* Under 49 CFR part 272, Class I, intercity passenger, and commuter railroads are required to develop, and submit to FRA for approval, a critical incident stress plan

# [EXTERNAL] Public Comment Period: Canyon de Chelly National Monument

Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>

Thu 4/4/2024 9:50 AM

To:'Eric Lincoln' <lincoln.eric2@gmail.com>;'John Eastman' <john@teton.com>;'John Becker' <john@papillon.com>;'Les Blomberg' <npc@nonoise.org>;dhingson_contact <dhingson@infowest.com>;'james.viola@rotor.org' <james.viola@rotor.org>; 'Cade Clark' <cade.clark@rotor.com>;'carl' <carl@cdcarl.com>;'Bob Randall' <brandall@kaplankirsch.com>;'Huling, Murray' <Murray.Huling@aopa.org>
Cc:Elmore, Eric (FAA) <eric.elmore@faa.gov>;Trevino, Karen <Karen_Trevino@nps.gov>;Ward, Vicki L <Vicki_Ward@nps.gov>; Pipkin, Ashley R <Ashley_Pipkin@nps.gov>;Lares, Sheri (FAA) <sheri.lares@faa.gov>



Good morning –

The Draft ATMP and Draft EA for Canyon de Chelly National Monument is available for public comment for a 30-day period. The Federal Register no ce was published yesterday and can be found here: Federal Register :: Notice of Availability of Draft Air Tour Management Plan and Draft Environmental Assessment and Public Meeting. The draft documents and information on how to comment can be found directly at the NPS Planning, Environment, & Public Comment page for Canyon de Chelly: ParkPlanning - Canyon de Chelly National Monument Air Tour Management Plan (nps.gov). All comments must be received by 11:59 MDT May 3, 2024.

Thank you!

r/
**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

| | |
|---|---|
| **From:** | Fox, Sandra Y (FAA) |
| **To:** | "Bob Randall"; "Carl Slater"; "Dick Hingson"; "Eric Lincoln"; "Huling, Murray"; "James Viola"; "John Becker"; "John W Eastman"; "Noise Pollution Clearinghouse" |
| **Cc:** | "Ward, Vicki L"; Elmore, Eric (FAA); "Trevino, Karen"; Lares, Sheri (FAA); "Pipkin, Ashley R"; Deem, Patricia (FAA); "Porsia, Sara C" |
| **Subject:** | Corrected: NPOAG Consultation Request: Canyon de Chelly Draft ATMP |
| **Date:** | Monday, July 8, 2024 3:51:00 PM |
| **Attachments:** | NPOAG_CACH_Consult_Final_08Jul2024_sf_vw.pdf<br>CACH_Draft ATMP_508.pdf |

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Good afternoon NPOAG members,

Section 628 of the FAA Reauthorization Act of 2024 amends the National Parks Air Tour Management Act to require consultation with NPOAG when establishing an air tour management plan for a national park. Attached to this email are 1) a letter from the agencies requesting NPOAG consultation on the Canyon de Chelly Draft ATMP and 2) a copy of the Canyon de Chelly Draft ATMP.

Please refer to the attached letter for background information and further instructions. The deadline for receipt of the NPOAG consultation is **Aug 8, 2024** (date corrected from original email). As stated in the letter, the agencies will not accept comments from individual NPOAG members at this time.

Thank you very much for your attention to this matter,

r/

**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

United States Department of the Interior
NATIONAL PARK SERVICE

U.S. Department of Transportation
Federal Aviation Administration

United States Department of Transportation
FEDERAL AVIATION ADMINISTRATION

**NATIONAL PARKS AIR TOUR MANAGEMENT PROGRAM**

July 8, 2024

Via email

**Request for NPOAG consultation on the Canyon de Chelly Draft ATMP**

Dear NPOAG members,

President Biden signed the FAA Reauthorization Act of 2024 on May 16, 2024. Section 628 of the Reauthorization amends the National Parks Air Tour Management Act (Act) to require consultation with the National Parks Overflights Advisory Group (NPOAG).

> *Section 40128(b)(4) of title 49, United States Code, 21 is amended— (1) in subparagraph (C) by striking ''and'' at the end; (2) in subparagraph (D) by striking the period at the end and inserting ''; and''; and (3) by adding at the end the following: ''(E) consult with the advisory group established under section 805 of the National Parks Air Tour Management Act of 2000 (49 5 U.S.C. 40128 note) and consider all advice, information, and recommendations provided by the advisory group to the Administrator and the Director."*

The amended Act can be accessed at this link: http://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title49-section40128&num=0&edition=prelim.

Consistent with the recent amendment to the Act, the agencies are consulting with NPOAG regarding the draft ATMP for Canyon de Chelly National Monument. A copy of the draft ATMP is attached to this letter but can also be found on the NPS Planning, Environment & Public Comment website at this link: https://parkplanning.nps.gov/document.cfm?parkID=35&projectID=103419&documentID=135960

This consultation is separate from, and in addition to, the agencies' meetings throughout the ATMP planning process where the agencies generally discussed the process by which ATMPs were being developed. It is also separate from, and in addition to, the public comment period for the Canyon de Chelly Draft ATMP and Draft EA. In this consultation, the agencies are requesting a single submission from the NPOAG comprised of the NPOAG's consolidated consensus advice, information, and recommendations for the agencies' consideration. The agencies will not accept comments from individual NPOAG members at this time, as those

should have been submitted during the public comment period that closed on May 3, 2024. The agencies will consider all advice, information, and recommendations received.

This is a unique circumstance as we are mid-planning for the ATMP for Canyon de Chelly. Consultations with NPOAG regarding future ATMPs may be conducted differently and in a different place in the planning process. We look forward to future discussions with you about NPOAG consultations as directed in the amended Act.

All consensus advice, information, and recommendations from the NPOAG must be received no later than August 8, 2024, and may be provided via e-mail attachment to both sandra.y.fox@faa.gov and vicki_ward@nps.gov or mailed to:

Federal Aviation Administration
Office of Environment and Energy
800 Independence Ave SW, Suite 900W
ATTN: Sandi Fox
Washington, DC 20591

To facilitate NPOAG's collaboration, we will provide virtual meeting space via Zoom if requested. Please e-mail sandra.y.fox@faa.gov to schedule, or if you have any other questions.

SANDRA YI FOX

Digitally signed by SANDRA YI FOX
Date: 2024.07.08 14:38:34 -04'00'

Sandi Fox
Environmental Protection Specialist
Office of Environment & Energy
Federal Aviation Administration

VICKI WARD

Digitally signed by VICKI WARD
Date: 2024.07.08 12:53:28 -06'00'

Vicki Ward
Overflights Program Manager
Natural Sounds and Night Skies Division
National Park Service

## Fox, Sandra Y (FAA)

**From:** Fox, Sandra Y (FAA)
**Sent:** Tuesday, July 9, 2024 10:51 AM
**To:** John W Eastman; 'Bob Randall'; 'Carl Slater'; 'Dick Hingson'; 'Eric Lincoln'; 'Huling, Murray'; 'James Viola'; 'John Becker'; 'Noise Pollution Clearinghouse'
**Cc:** 'Ward, Vicki L'; Elmore, Eric (FAA); 'Trevino, Karen'; Lares, Sheri (FAA); 'Pipkin, Ashley R'; Deem, Patricia (FAA); 'Porsia, Sara C'
**Subject:** RE: Corrected: NPOAG Consultation Request: Canyon de Chelly Draft ATMP

Hi John,

Absolutely. In terms of scheduling options, I can set up a Zoom link for you all for whatever times/days work best for NPOAG to meet to develop and finalize consultation information and recommendations. I'm also happy to provide any assistance on using the features of Zoom if needed. For the meetings, I'll log in to start the meeting, but once everyone is online and set up, I will drop off so that NPOAG can meet independently. I'll remain available to log back in should you need any assistance w/ Zoom. And again, the link can be set up to be usable whenever it is convenient to NPOAG – you aren't limited to my normal office hours or anything like that.

As for the first meeting, I'm happy to coordinate schedules with NPS and FAA ATMP team members so that we can be available at the beginning of the meeting. I do think it'd be very helpful to watch the Canyon de Chelly public meeting that was held on Apr 17, 2024 if anyone was not able to attend. The recording of the live stream can be found on YouTube at this link: National Park Air Tour Management Plan: Canyon de Chelly, Arizona (youtube.com). The purpose of this meeting was to review the Draft ATMP with the public and provide an opportunity for Q&A.

The following link was provided in the letter to access the Draft ATMP electronically: ParkPlanning - Canyon de Chelly Draft ATMP, EA and FAQs (nps.gov). This website also has the Draft ATMP FAQ document provided as part of the public comment period which may be helpful to the group.

Hopefully this answers your questions, and if not I'm available to chat at your convenience!

Thanks!

r/
**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

---

**From:** John W Eastman <john@teton.com>
**Sent:** Tuesday, July 9, 2024 10:02 AM
**To:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>; 'Bob Randall' <brandall@kaplankirsch.com>; 'Carl Slater' <carl@cdcarl.com>; 'Dick Hingson' <dhingson@infowest.com>; 'Eric Lincoln' <lincoln.eric2@gmail.com>; 'Huling, Murray' <Murray.Huling@aopa.org>; 'James Viola' <james.viola@rotor.org>; 'John Becker' <John@papillon.com>; 'Noise Pollution Clearinghouse' <npc@nonoise.org>
**Cc:** 'Ward, Vicki L' <Vicki_Ward@nps.gov>; Elmore, Eric (FAA) <eric.elmore@faa.gov>; 'Trevino, Karen'

<Karen_Trevino@nps.gov>; Lares, Sheri (FAA) <sheri.lares@faa.gov>; 'Pipkin, Ashley R' <Ashley_Pipkin@nps.gov>; Deem, Patricia (FAA) <Patricia.Deem@faa.gov>; 'Porsia, Sara C' <sara.porsia@sol.doi.gov>
**Subject:** Re: Corrected: NPOAG Consultation Request: Canyon de Chelly Draft ATMP



Hi Sandra,

The attached letter of July 8 references an opportunity for a zoom call prior to the August deadline for NPOAG comments.

Can you please provide scheduling options for this call?

It would be helpful to have you & Vicky summarize the ATMP for CACH as part of this call.

Best

John Eastman

Get Outlook for iOS

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**From:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Sent:** Monday, July 8, 2024 1:51 PM
**To:** 'Bob Randall' <brandall@kaplankirsch.com>; 'Carl Slater' <carl@cdcarl.com>; 'Dick Hingson' <dhingson@infowest.com>; 'Eric Lincoln' <lincoln.eric2@gmail.com>; 'Huling, Murray' <Murray.Huling@aopa.org>; 'James Viola' <james.viola@rotor.org>; 'John Becker' <John@papillon.com>; John W Eastman <john@teton.com>; 'Noise Pollution Clearinghouse' <npc@nonoise.org>
**Cc:** 'Ward, Vicki L' <Vicki_Ward@nps.gov>; Elmore, Eric (FAA) <eric.elmore@faa.gov>; 'Trevino, Karen' <Karen_Trevino@nps.gov>; Lares, Sheri (FAA) <sheri.lares@faa.gov>; 'Pipkin, Ashley R' <Ashley_Pipkin@nps.gov>; Deem, Patricia (FAA) <Patricia.Deem@faa.gov>; 'Porsia, Sara C' <sara.porsia@sol.doi.gov>
**Subject:** Corrected: NPOAG Consultation Request: Canyon de Chelly Draft ATMP

Good afternoon NPOAG members,

Section 628 of the FAA Reauthorization Act of 2024 amends the National Parks Air Tour Management Act to require consultation with NPOAG when establishing an air tour management plan for a national park. Attached to this email are 1) a letter from the agencies requesting NPOAG consultation on the Canyon de Chelly Draft ATMP and 2) a copy of the Canyon de Chelly Draft ATMP.

Please refer to the attached letter for background information and further instructions. The deadline for receipt of the NPOAG consultation is **Aug 8, 2024** (date corrected from original email). As stated in the letter, the agencies will not accept comments from individual NPOAG members at this time.

Thank you very much for your attention to this matter,

r/
**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*

sandra.y.fox@faa.gov
(202) 267-0928

## Fox, Sandra Y (FAA)

**From:** Ward, Vicki L <Vicki_Ward@nps.gov>
**Sent:** Thursday, July 11, 2024 6:57 PM
**To:** dhingson_contact
**Cc:** Fox, Sandra Y (FAA)
**Subject:** Re: [EXTERNAL] Request for noise studies in re Canyon de Chelly
**Attachments:** CACH_BaselineAmbientReport_Apr2011.pdf



Hi Dick,

Attached is the 2011 ambient report that is in the list of references for the EA (Appendix A). You may notice what appears to be a different ambient report is referenced in Appendix F, Noise Analysis, dated 2016. It's the same report, FAA issued it under one of their report #s.

Cyndy Lee no longer works for Volpe.

Thanks,

Vicki L. Ward
Overflights Program Manager
Natural Sounds and Night Skies Division
Natural Resource Stewardship and Science Directorate
National Park Service
1201 Oakridge Dr., Suite 100
Fort Collins, CO 80525
vicki_ward@nps.gov
Teleworking/Mobile #: 970-631-5257
Fax: (970) 267-2109

"Listening to the silence is probably one of the most profound experiences we can have in our everyday life." Anne Wilson Schaef

---

**From:** Infowest <dhingson@infowest.com>
**Sent:** Thursday, July 11, 2024 8:11 AM
**To:** Ward, Vicki L <Vicki_Ward@nps.gov>
**Subject:** [EXTERNAL] Request for noise studies in re Canyon de Chelly



Vicki,
Could you provide or ufentify any aircraft noise studies (including in re Safari Southwest air tours and private flights, commercial jets, etc), just provide link(s)?

Both refs to noise modelling and  and actual acoustic- on-ground, measurements studies will be useful.

I asked Cyndi Lee at Volpe for any actual recent measurement-studies from on ground below, but have to date received no reply.

Naturally such studies ,  modeled or actual,  will be of particular interest; am also curious how any showing commercial jets a day overfly CACH, and in what “busy” periods. And especially in Lmaxes and time audible from direct (high) jet single flights.

Maybe this is basically what similar to some area studies, as at Grand Canyon, Zion or Bryce,  that you commonly now use as best, recent examples/prototypes?  (Even if you’ve no particular Canyon de Chelly study.)

NPOAG generally might benefit from accessing example research,  even ahead of setting meeting date.

Will hunt the online Record meanwhile, maybe there’s a study or two in there to point to,

Even better, at least for future engagement, field listening for NPOAG would be in very quiet Parks like CACH.

Nothing like hearing Dragon Corridor noise from say Rim and trailsnear Hermit’s Rest, or most any time from Point Sublime, especially in re QT,  supposedly 80+ per cent installed by now.

Also any specific credible Park complaint made re a specific CACH air tour would naturally interest someone at our e-meeting (noise? privacy invasion?) and add credibility , if so, (subtract credibility if not even one)

One would have thought this would come up in testimony from the on site meeting in mid/April ; At the Chapter House?

If so minutes or a recording of that *on site* CACH  meeting should go to NPOAG,  to further inform any conclusions NPOAG might reach.

I’m struck at the *relative* indifference to *specific* types, levels, frequencies, of  aircraft noise in  2016  CACH Park Foundation document, saw no citations to noise  studies. Though will look again if coached.

and then sudden attention concern about it , only the following year , that resulted in letter from NPS removing ATMP  exemption for even under 50 flights year?  .

There may be interesting historical agency  record , re that sudden , recent change?

Granted that I have no special claim to such , independent of NPOAG collectively but whatever is provided timely of this sort naturally is helpful collectively.

Thx
Dick Hingson
Flagstaff Az

Sent from my iPhone
Dick Hingson

U.S. Department of Transportation
Federal Aviation Administration
Western-Pacific Region
Los Angeles, CA 90009
FP-01 (ES228)

U.S. Department of the Interior
National Park Service
Natural Sounds and Night Skies
Division, Fort Collins, CO
VX-82 (JT022)

# BASELINE AMBIENT SOUND LEVELS IN CANYON DE CHELLY NATIONAL MONUMENT

Final Report
DOT-VNTSC-NPS-11-10
April 2011

**NOTICE**

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof. This report does not constitute a standard, specification, or regulation.

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# REPORT DOCUMENTATION PAGE

*Form Approved*
*OMB No. 0704-0188*



| 1. AGENCY USE ONLY (Leave blank) | 2. REPORT DATE | 3. REPORT TYPE AND DATES COVERED |
|---|---|---|
| | April 2011 | Final Report |

**4. TITLE AND SUBTITLE**
Baseline Ambient Sound Levels in Canyon de Chelly National Monument

**5. FUNDING NUMBERS**
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The Federal Aviation Administration (FAA), with the cooperation of the National Park Service (NPS) and assistance of the U.S. Department of Transportation, John A. Volpe National Transportation Systems Center (Volpe Center) is developing Air Tour Management Plans (ATMP) for all national parks with commercial air tours, with the exception of the Grand Canyon National Park (GCNP), tribal lands within or abutting the GCNP, air tour operations flying over or near the Lake Mead National Recreation Area solely as a transportation route to conduct an air tour over GCNP, Rocky Mountain National Park, and national park units located in Alaska. An important area of technical support is the determination of representative baseline ambient sound levels for the study parks. For approximately two weeks during the summer (September 2004) and one month during the winter (March 2010), the Volpe Center conducted baseline ambient sound level measurements in Canyon de Chelly National Monument. Acoustical and meteorological data were measured at five sites in the park. This document summarizes the results of the noise measurement study.

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# METRIC/ENGLISH CONVERSION FACTORS

## ENGLISH TO METRIC

### LENGTH (APPROXIMATE)

| | | |
|---|---|---|
| 1 inch (in) | = | 2.5 centimeters (cm) |
| 1 foot (ft) | = | 30 centimeters (cm) |
| 1 yard (yd) | = | 0.9 meter (m) |
| 1 mile (mi) | = | 1.6 kilometers (km) |

### AREA (APPROXIMATE)

| | | |
|---|---|---|
| 1 square inch (sq in, $in^2$) | = | 6.5 square centimeters ($cm^2$) |
| 1 square foot (sq ft, $ft^2$) | = | 0.09 square meter ($m^2$) |
| 1 square yard (sq yd, $yd^2$) | = | 0.8 square meter ($m^2$) |
| 1 square mile (sq mi, $mi^2$) | = | 2.6 square kilometers ($km^2$) |
| 1 acre = 0.4 hectare (he) | = | 4,000 square meters ($m^2$) |

### MASS - WEIGHT (APPROXIMATE)

| | | |
|---|---|---|
| 1 ounce (oz) | = | 28 grams (gm) |
| 1 pound (lb) | = | 0.45 kilogram (kg) |
| 1 short ton = 2,000 pounds (lb) | = | 0.9 tonne (t) |

### VOLUME (APPROXIMATE)

| | | |
|---|---|---|
| 1 teaspoon (tsp) | = | 5 milliliters (ml) |
| 1 tablespoon (tbsp) | = | 15 milliliters (ml) |
| 1 fluid ounce (fl oz) | = | 30 milliliters (ml) |
| 1 cup (c) | = | 0.24 liter (l) |
| 1 pint (pt) | = | 0.47 liter (l) |
| 1 quart (qt) | = | 0.96 liter (l) |
| 1 gallon (gal) | = | 3.8 liters (l) |
| 1 cubic foot (cu ft, $ft^3$) | = | 0.03 cubic meter ($m^3$) |
| 1 cubic yard (cu yd, $yd^3$) | = | 0.76 cubic meter ($m^3$) |

### TEMPERATURE (EXACT)

[(x-32)(5/9)] °F = y °C

## METRIC TO ENGLISH

### LENGTH (APPROXIMATE)

| | | |
|---|---|---|
| 1 millimeter (mm) | = | 0.04 inch (in) |
| 1 centimeter (cm) | = | 0.4 inch (in) |
| 1 meter (m) | = | 3.3 feet (ft) |
| 1 meter (m) | = | 1.1 yards (yd) |
| 1 kilometer (km) | = | 0.6 mile (mi) |

### AREA (APPROXIMATE)

| | | |
|---|---|---|
| 1 square centimeter ($cm^2$) | = | 0.16 square inch (sq in, $in^2$) |
| 1 square meter ($m^2$) | = | 1.2 square yards (sq yd, $yd^2$) |
| 1 square kilometer ($km^2$) | = | 0.4 square mile (sq mi, $mi^2$) |
| 10,000 square meters ($m^2$) | = | 1 hectare (ha) = 2.5 acres |

### MASS - WEIGHT (APPROXIMATE)

| | | |
|---|---|---|
| 1 gram (gm) | = | 0.036 ounce (oz) |
| 1 kilogram (kg) | = | 2.2 pounds (lb) |
| 1 tonne (t) | = | 1,000 kilograms (kg) = 1.1 short tons |

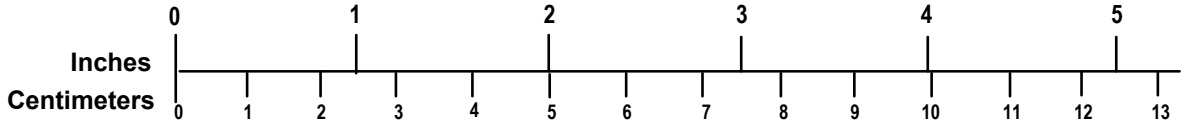
### VOLUME (APPROXIMATE)

| | | |
|---|---|---|
| 1 milliliter (ml) | = | 0.03 fluid ounce (fl oz) |
| 1 liter (l) | = | 2.1 pints (pt) |
| 1 liter (l) | = | 1.06 quarts (qt) |
| 1 liter (l) | = | 0.26 gallon (gal) |
| 1 cubic meter ($m^3$) | = | 36 cubic feet (cu ft, $ft^3$) |
| 1 cubic meter ($m^3$) | = | 1.3 cubic yards (cu yd, $yd^3$) |

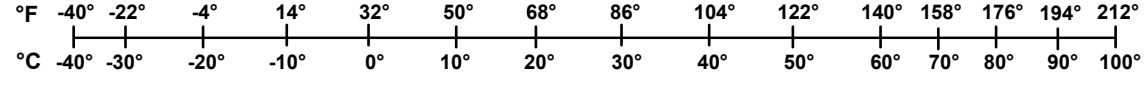
### TEMPERATURE (EXACT)

[(9/5) y + 32] °C = x °F

## QUICK INCH - CENTIMETER LENGTH CONVERSION




## QUICK FAHRENHEIT - CELSIUS TEMPERATURE CONVERSION




For more exact and or other conversion factors, see NIST Miscellaneous Publication 286, Units of Weights and Measures. Price $2.50 SD Catalog No. C13 10286

Updated 6/17/98

## ACKNOWLEDGEMENTS

The authors of this report wish to express their sincere gratitude to all who helped make this a successful study. The Federal Aviation Administration (FAA), Western-Pacific Regional Office, and National Park Service (NPS), Natural Sounds and Night Skies Division, proved invaluable coordination and support. We would also like to thank the Canyon de Chelly National Monument team, especially Scott Travis and Chris Blacksheep (summer 2004), Mick Castillo and Michelle Dela Cruz (winter 2010), for their expertise and assistance during site selection and deployment. Finally, thanks to Clay Reherman, Chris Scarpone and Noah Schulz (Volpe Center), and Bob Samiljan and Dick Horonjeff (Computer Services Corporation), who also participated in the field measurement effort.

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## EXECUTIVE SUMMARY

The Federal Aviation Administration (FAA), with the cooperation of the National Park Service (NPS) and assistance of the U.S. Department of Transportation, John A. Volpe National Transportation Systems Center (Volpe Center) is developing Air Tour Management Plans (ATMP) for all national parks with commercial air tours, with the exception of the Grand Canyon National Park (GCNP), tribal lands within or abutting the GCNP, air tour operations flying over or near the Lake Mead National Recreation Area solely as a transportation route to conduct an air tour over GCNP, Rocky Mountain National Park, and national park units located in Alaska.

An important area of technical support is the determination of representative baseline ambient sound levels for the study parks. The baseline ambient data will be used to establish a foundation from which potential noise impacts can be assessed. The collection of ambient sound level data also provides valuable information about a park's acoustic conditions for use in developing soundscape management plans.

This document summarizes the noise measurement study undertaken to provide data for the baseline ambient noise environment in Canyon de Chelly National Monument (Canyon de Chelly). As shown in Figure 1, Canyon de Chelly is located in the State of Arizona, northeast of Phoenix and within the Navajo Nation.

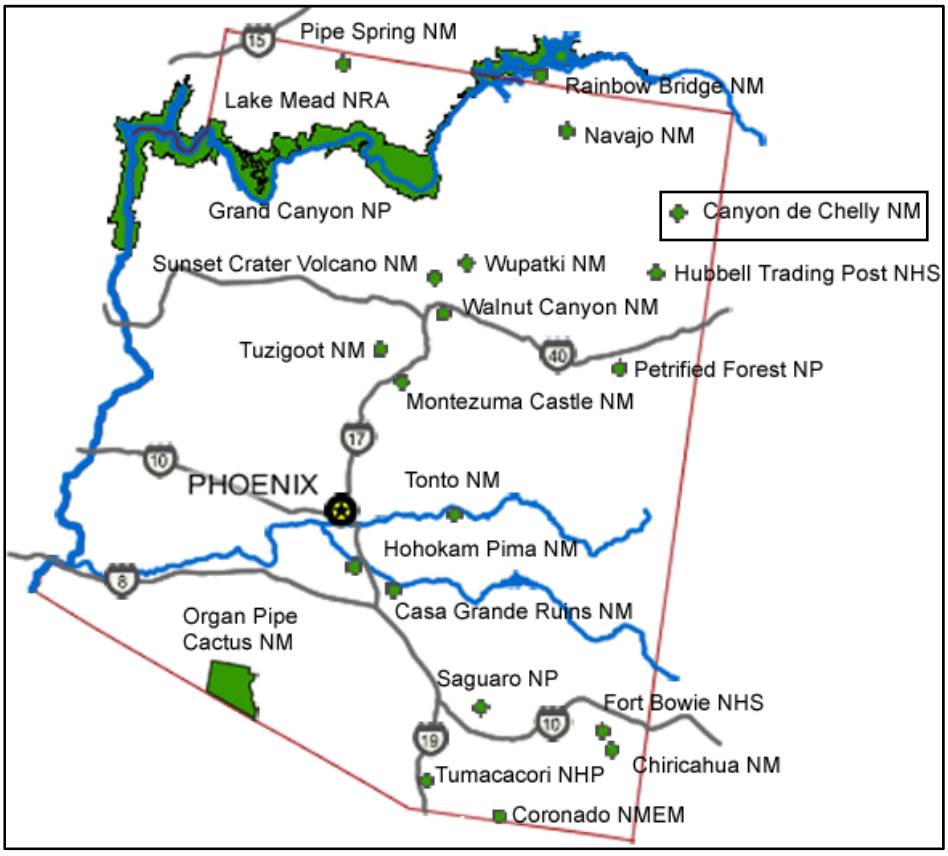


**Figure 1. Location of Canyon de Chelly National Monument.**[1]

For approximately two weeks during the summer (September 2004) and one month during the winter (March 2010), the Volpe Center conducted baseline ambient sound level measurements in Canyon de Chelly National Monument. Acoustical and meteorological data were measured at five sites in the park. These sites were selected during a meeting which took place at the park between Canyon de Chelly NPS and FAA Western-Pacific Region personnel, NPS Natural Sounds and Night Skies Division, and Volpe Center personnel. The primary goal of the site selection process was to identify the minimum number of field-measurement sites, which would allow for characterization of the baseline ambient sound levels throughout the entire park. This was accomplished by identifying acoustically representative regions for which data could be collected and stratified, i.e., "acoustic zones." These data could then be applied to other regions in the park possessing similar attributes, which will affect acoustics, such as land cover, wind conditions, and wildlife habitats.

Because the vegetative land cover within a park is one of the key attributes affecting the acoustics as land cover directly affects how sounds propagate from a source to a receiver, Geographic Information System (GIS) data for land cover were used in the development of the initial acoustic zones. Canyon de Chelly's forested areas cover 50 percent of the park (see Figure 2). The remaining two land cover types are primarily shrubland (40 percent) and grassland (10 percent). This establishes three initial acoustic zones.

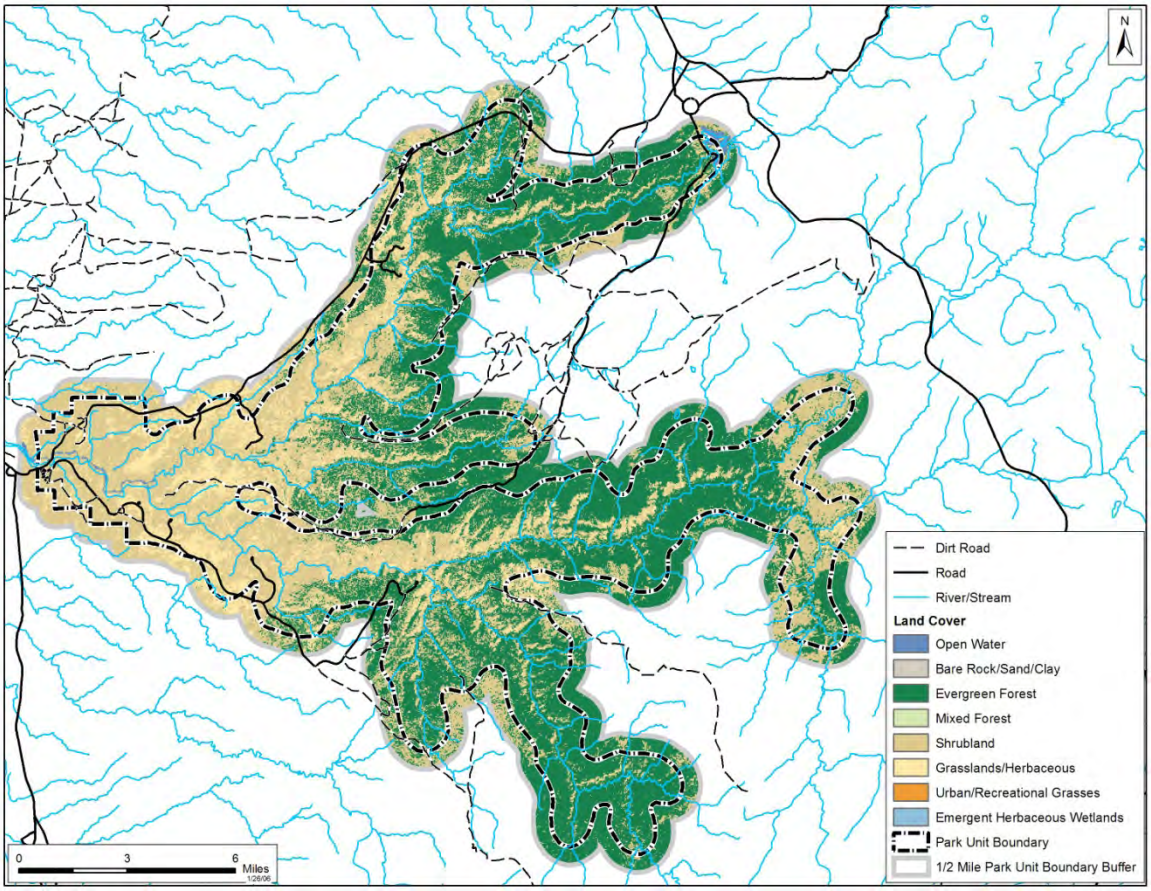


**Figure 2. National Land Cover Database (NLCD) land cover types for Canyon de Chelly.**

From the FAA/NPS meeting and taking into account land cover data, as well as how the park is managed, three final acoustic zones were developed:

- Frontcountry – Above the Rim (shrubland/grassland areas above the canyon rim with high visitor use)
- Frontcountry – Below the Rim (shrubland/grassland areas on the canyon bottom with moderate visitor use)
- Backcountry (shrubland/grassland and forested areas on the canyon bottom with limited visitor use)

With the goal of site selection to ensure at least one measurement location within each of the acoustic zones, Table 1 and Figure 3 display the locations of the final acoustic zones and measurement sites (see also additional discussion in Section 2).

**Table 1. Summary of measurement sites for Canyon de Chelly.**

| Site ID | Site Name | National Land Cover Database Classification | Acoustic Zone | Latitude (decimal degrees) | Longitude (decimal degrees) | Altitude (ft) | # Days of Data | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Summer | Winter |
| CC1 | First Ruin | Shrubland | Frontcountry – Below the Rim | 36.1425° | 109.4984° | 5,656 | 15 days | 31 days |
| CC2 | Antelope House Ruin | Shrubland | Backcountry | 36.1554° | 109.4456° | 5,739 | 16 days | 32 days |
| CC3 | White House Overlook | Shrubland | Frontcountry – Above the Rim | 36.1294° | 109.4781° | 6,181 | 2 days | 0 days* |
| CC4 | Antelope House Overlook | Shrubland | Frontcountry - Above the Rim | 36.1574° | 109.4427° | 6,344 | 1 day | 13 days |
| CC5 | Spider Rock Overlook | Shrubland | Frontcountry - Above the Rim | 36.1047° | 109.3555° | 6,872 | 1 day | 31 days |

* Based on the similarity of the data measured during the summer season, it was agreed that only two frontcountry (above the rim) sites would be needed for winter monitoring.

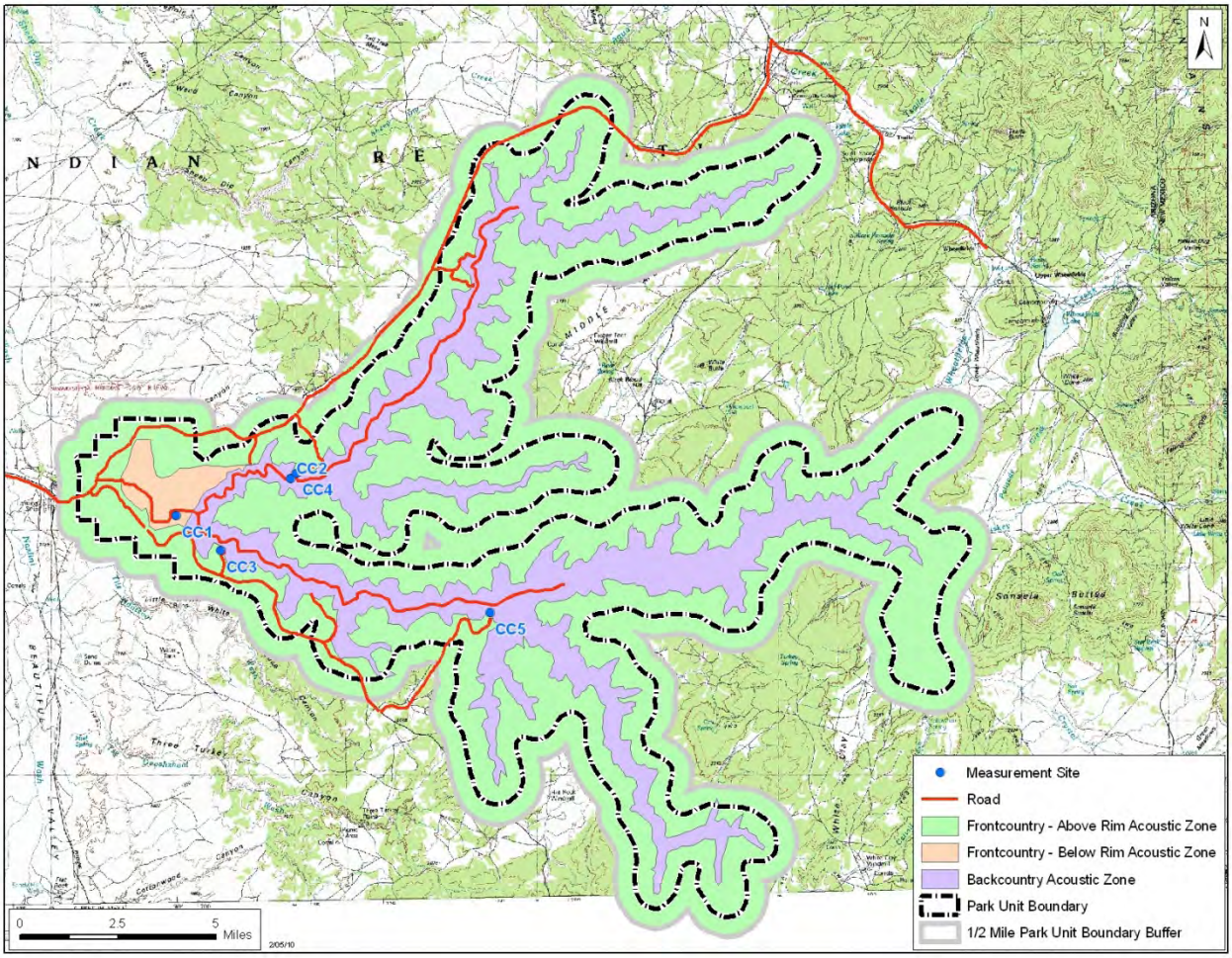


**Figure 3. Final acoustic zones and measurement sites for Canyon de Chelly.**

The following types of data were collected:

- *Acoustical*:
    - Continuous, one-second, A-weighted sound levels and their associated one-third octave-band un-weighted spectrum from 20 to 20,000 Hz;
    - Continuous digital audio recordings
- *Meteorological*: Continuous, one-second wind speed and direction data; and
- *Observer Logs*: During site visits, a field observer would perform short-term documentation of the acoustic environment at the site. Events audible within the acoustic environment were categorized into one of three primary acoustic states, based on the following hierarchal order: (1) Aircraft intrusions; (2) Human intrusions; and (3) Natural sounds. Aircraft intrusions include air tour, commercial, general aviation, military, and other aircraft sounds. Examples of non-aircraft (human) intrusions include hikers, campers, talking, motor vehicles, etc. The natural category was documented when no aircraft or other human-made sounds could be heard.

In addition, because for most parks, the majority of air tour operations occur during the day, the FAA and NPS have agreed that the impact assessment will be conducted using ambient sound levels during the time that the air tour operations occur. Accordingly, all ATMP analyses will be based on daytime ambient data. For Canyon de Chelly, only data measured during the time period of 7 am to 7 pm were used.

In general, all data analyses were performed in terms of three metrics:

- T*he A-weighted equivalent sound level ($L_{Aeq}$) and its associated one-third octave-band spectrum (unweighted)*: Ten times the base-10 logarithm of the time-mean-square, instantaneous A-weighted sound pressure, during a stated time interval, divided by the squared reference sound pressure of 20 μPa, the threshold of human hearing;
- *The 50-percentile exceeded sound level ($L_{50}$) and its associated one-third octave-band spectrum (unweighted)*: A statistical descriptor describing the sound level exceeded 50 percent of a specific time period. For example, from a fifty-sample measurement period with the samples sorted from highest sound level to lowest sound level, the twenty-fifth sound level is the 50-percentile exceeded sound level; and
- *The 90-percentile exceeded sound level ($L_{90}$) and its associated one-third octave-band spectrum (unweighted)*: A statistical descriptor describing the sound level exceeded 90 percent of a specific time period. For example, from a fifty-sample measurement period with the samples sorted from highest sound level to lowest sound level, the forty-fifth sound level is the 90-percentile exceeded sound level.

Using the data in the acoustic observer logs to group the individual, one-second, sound level values, four different types of ambient for each of the three above metrics can be computed from the data. The four primary types of "ambient" used in this document are defined as follows:

- *Existing Ambient*: The composite, all-inclusive sound associated with a given environment, excluding only the analysis system's electrical noise (i.e., aircraft-related sounds are included);

- *Existing Ambient Without Air Tours*: The composite, all-inclusive sound associated with a given environment, excluding the analysis system's electrical noise and the sound source of interest, in this case, commercial air tour aircraft;
- *Existing Ambient Without All Aircraft (for use in assessing cumulative impacts)*: The composite, all-inclusive sound associated with a given environment, excluding the analysis system's electrical noise and the sounds produced by the sound source of interest, in this case, all types of aircraft (e.g., commercial air tours, commercial jets, general aviation aircraft, military aircraft);[*] and
- *Natural Ambient*: The natural sound conditions found in a study area, including all sounds of nature (i.e., wind, streams, wildlife, etc.), and excluding all human and mechanical sounds.

Table 2 contains a summary of the ambient, sound level data measured at each measurement site. The table is arranged by acoustic zone, followed by measurement site number. The first four columns in the table are arranged as follows:

- *Acoustic Zone*: The acoustic and management zone in which the measurement site was located;
- *Site Name:* The name of the site;
- *Site ID*: The unique three-character ID representing the site "number"; and
- *Total # Days*: The total number of days measured.

The remaining columns define the ambient sound levels computed, as described in 5.7.[†] For the Existing Ambient, the $L_{Aeq}$, $L_{50}$, and $L_{90}$ metrics are computed taking into account the data from all days of measurements. For the remaining ambients (Existing Ambient Without Air Tours, the Existing Ambient Without All Aircraft, and Natural Ambient), only the $L_{50}$ metric is computed.

Table 3 contains a summary of the acoustic observer data logged at each measurement site. The first four columns in the table are arranged as follows:

- *Acoustic Zone*: The acoustic zone in which the measurement site was located;
- *Site Name:* The name of the site;
- *Site ID*: The unique three-character ID representing the site "number"; and
- *Level of Visitor-Use*: A designator indicating expected visitor use (with "high" indicating sites such as overlooks, "moderate" indicating short hikes, and "low" indicating minimal or no visitor use such as in the wilderness/backcountry) in the measurement site area.

The next four columns define the percentage of time that different noise sources were audible to

[*] The definition of Existing Ambient Without All Aircraft used in this report is consistent with FAA's historical approach for cumulative impact analysis.

[†] As noted previously, because for most parks, the majority of air tour operations occur during the day, the FAA and NPS have agreed that the impact assessment will be conducted using ambient sound levels during the time that the air tour operations occur. Accordingly, all ATMP analyses will be based on daytime ambient data. For Canyon de Chelly, only data measured during the time period of 7 am to 7 pm were used. This time period reflects typical operating hours for air tour operators conducting air tours in Canyon de Chelly according to Flight Standards District Office personnel.

the acoustic observer. The in-situ logging is performed during visits to the site itself; office listening is performed in the office using audio files that were collected at each site. Events audible within the acoustic environment were categorized into one of three primary acoustic states, based on the following hierarchal order: (1) Aircraft intrusions; (2) Human intrusions; and (3) Natural sounds. For aircraft intrusions, the acoustic observer would attempt to discern whether the aircraft was an air tour operation, or other operation (i.e., commercial, general aviation, or military) based on visual and auditory cues (e.g., type of aircraft and proximity to known air tour routes). Examples of non-aircraft (human) intrusions include hikers, campers, talking, motor vehicles, etc. The natural category was documented when no aircraft or other human-made sounds could be heard.

- *Fixed-Wing Aircraft and Helicopters*: The percentage of observer log time that fixed-wing aircraft and helicopters were audible;
- *Other Aircraft*: The percentage of observer log time that non-tour aircraft (e.g., general aviation, commercial jet, and military) were audible;
- *Human*: The percentage of observer log time that human noise sources (visitor- and mechanical-related) were audible; and
- *Natural*: The percentage of observer log time that natural noise sources were audible.

**Table 2. Summary of measured ambient sound level data for both summer and winter seasons.[*]**

| Acoustic Zone | Site Name | Site ID | Total # Days | Existing Ambient | | | | | | Existing Ambient Without Air Tours (Daytime Data Only 7 am to 7 pm) | Existing Ambient Without All Aircraft (Daytime Data Only 7 am to 7 pm) | Natural Ambient (Daytime Data Only 7 am to 7 pm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Daytime Data Only 7 am to 7 pm | | | Nighttime Data Only 7 pm to 7 am | | | | | |
| | | | | $L_{Aeq}$ (dBA) | $L_{50}$ (dBA) | $L_{90}$ (dBA) | $L_{Aeq}$ (dBA) | $L_{50}$ (dBA) | $L_{90}$ (dBA) | $L_{50}$ (dBA) | $L_{50}$ (dBA) | $L_{50}$ (dBA) |
| **Summer Season** | | | | | | | | | | | | |
| Frontcountry – Below the Rim | First Ruin | CC1 | 15 | 35.8 | 28.3 | 20.3 | 34.7 | 28.9 | 16.4 | 27.8 | 27.0 | 24.3 |
| Backcountry | Antelope House Ruin | CC2 | 16 | 42.4 | 33.2 | 20.2 | 36.1 | 32.4 | 20.6 | 33.0 | 32.3 | 29.8 |
| Frontcountry – Above the Rim | White House Overlook | CC3 | 2 | 34.0 | 26.2 | 19.4 | NA | NA | NA | 25.9 | 25.1 | 19.4 |
| Frontcountry – Above the Rim | Antelope House Overlook | CC4 | 1 | 41.5 | 35.8 | 25.5 | NA | NA | NA | 35.5 | 34.5 | 31.0 |
| Frontcountry – Above the Rim | Spider Rock Overlook | CC5 | 1 | 33.3 | 26.2 | 20.0 | NA | NA | NA | 25.9 | 24.6 | 20.0 |
| **Winter Season** | | | | | | | | | | | | |
| Frontcountry – Below the Rim | First Ruin | CC1 | 31 | 36.5 | 28.5 | 21.3 | 31.6 | 19.7 | 13.8 | 27.6 | 26.7 | 25.3 |
| Backcountry | Antelope House Ruin | CC2 | 32 | 39.2 | 32.2 | 18.3 | 33.3 | 28.0 | 12.4 | 32.1 | 31.5 | 29.2 |
| Frontcountry – Above the Rim | White House Overlook | CC3 | 0[†] | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Frontcountry – Above the Rim | Antelope House Overlook | CC4 | 13 | 36.7 | 23.8 | 14.3 | 32.7 | 15.7 | 7.7 | 22.9 | 21.4 | 20.4 |
| Frontcountry – Above the Rim | Spider Rock Overlook | CC5 | 31 | 37.2 | 24.2 | 16.1 | 29.2 | 17.6 | 13.8 | 24.0 | 21.7 | 19.1 |

[*] As stated earlier, two ambient maps were agreed upon for use in ATMP analyses: the Existing Ambient Without Air Tours ($L_{50}$) and the Natural Ambient ($L_{50}$).

[†] Based on the similarity of the data measured during the summer season, it was agreed that only two frontcountry (above the rim) sites would be needed for winter monitoring.

**Table 3. Summary of acoustic observer log data (in situ and office listening combined) for all sites for both summer and winter seasons.**

| Acoustic Zone | Site Name | Site ID | Level of Visitor-Use | % Time Audible | | | |
|---|---|---|---|---|---|---|---|
| | | | | Fixed-Wing Aircraft and Helicopters | Other Aircraft | Other Human | Natural (noise free) |
| **Summer Season** | | | | | | | |
| Frontcountry - Canyon | First Ruin | CC1 | Moderate | 6.0% | 7.1% | 30.4% | 56.5% |
| Backcountry - Canyon | Antelope House Ruin | CC2 | Moderate | 2.6% | 4.4% | 20.7% | 72.3% |
| Frontcountry - Rim | White House Overlook | CC3 | High | 5.0% | 8.9% | 65.3% | 20.8% |
| Frontcountry - Rim | Antelope House Overlook | CC4 | Moderate | 2.5% | 10.2% | 25.4% | 61.9% |
| Frontcountry - Rim | Spider Rock Overlook | CC5 | High | 7.9% | 16.3% | 62.4% | 13.4% |
| **Winter Season** | | | | | | | |
| Frontcountry - Canyon | First Ruin | CC1 | Moderate | 11.2% | 13.1% | 17.0% | 58.6% |
| Backcountry - Canyon | Antelope House Ruin | CC2 | Moderate | 2.8% | 5.9% | 23.7% | 67.7% |
| Frontcountry - Rim | White House Overlook | CC3* | High | NA | NA | NA | NA |
| Frontcountry - Rim | Antelope House Overlook | CC4 | Moderate | 5.0% | 13.0% | 7.5% | 74.5% |
| Frontcountry - Rim | Spider Rock Overlook | CC5 | High | 2.6% | 18.2% | 27.8% | 51.4% |

The measured ambient values presented in Table 2 are assigned to each acoustic zone. Then, because it is not feasible to carry out field data collection efforts in all areas of a park, the contributing effect of localized noise sources, such as waterfalls, river rapids, trains, and vehicles on roads, are typically modeled and combined with the measured sound levels to develop a composite, baseline, ambient "map" of a park. An ambient "map" is essentially a comprehensive grid of ambient sound levels throughout a study area. The composite, baseline, ambient map (along with representative one-third octave-band spectral data) is used as input to the INM to compute various noise-related descriptors and generate the sound-level contours that will be used in the assessment of potential noise impacts due to air tour operations.

* Based on the similarity of the data measured during the summer season, it was agreed that only two frontcountry (above the rim) sites would be needed for winter monitoring.

In the vicinity of and within Canyon de Chelly, there were a number of localized sound sources (e.g., roadways). Roadway sound sources were modeled using the Federal Highway Administration's Traffic Noise Model® (TNM).[2] Details of modeled roadway sound sources can be found in Section 7.2.

The two ambient maps agreed upon for use in ATMP analyses are:

- Existing Ambient Without Source of Interest; and
- Natural Ambient.

Figure 4 through Figure 7 present the two ambient maps, respectively, for the summer and winter seasons.

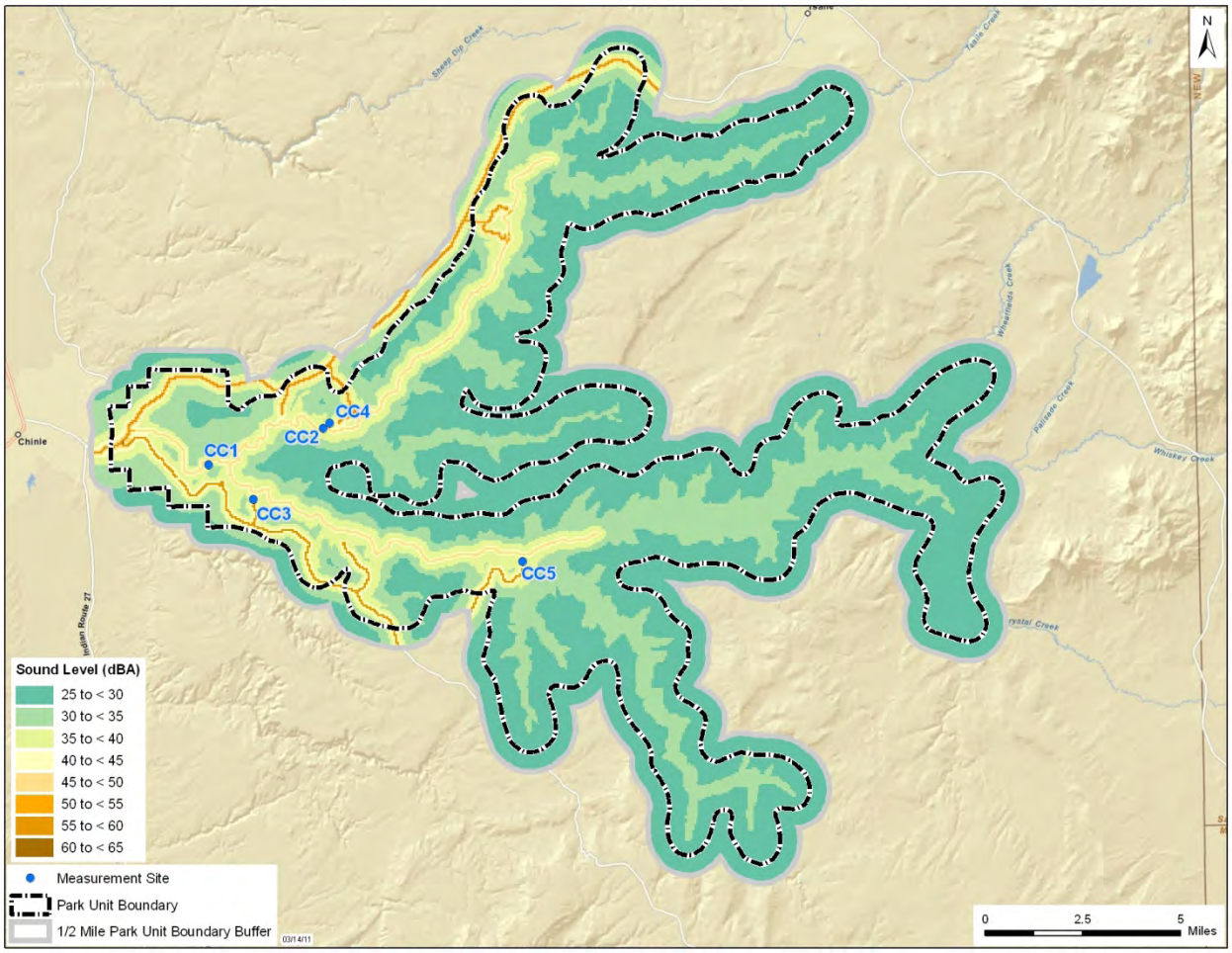


**Figure 4. Baseline ambient map: Existing Ambient Without Air Tours ($L_{50}$) for the summer season.**

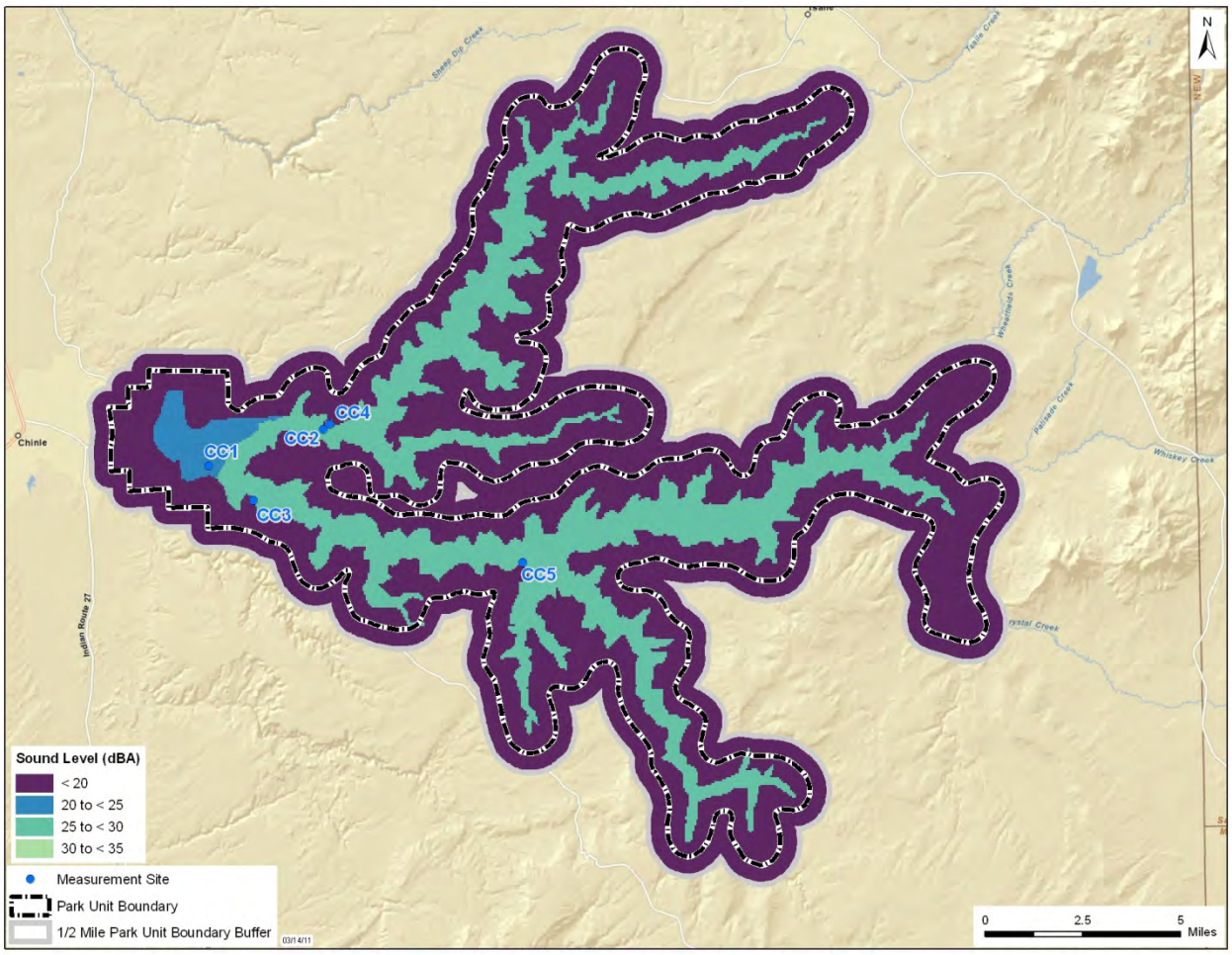


**Figure 5. Baseline ambient map : Natural Ambient ($L_{50}$) for the summer season.**

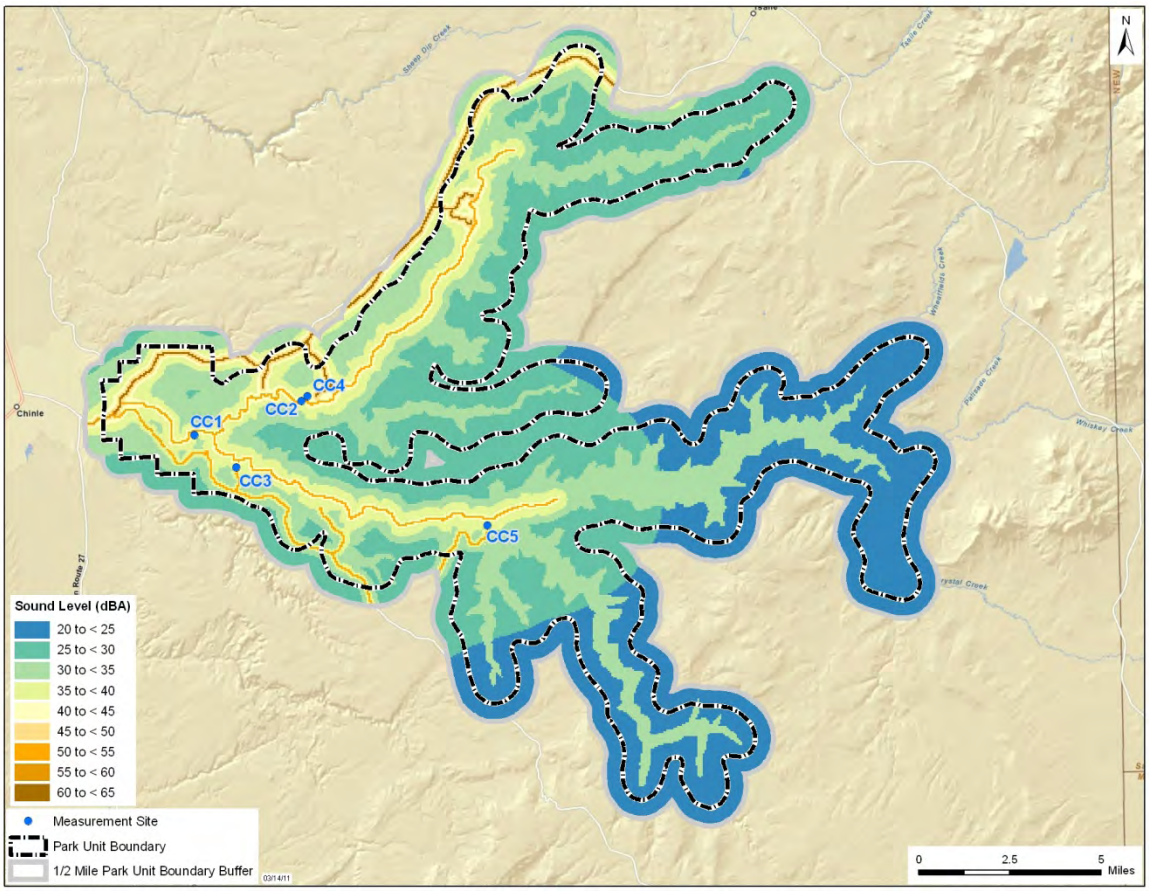


**Figure 6. Baseline ambient map: Existing Ambient Without Air Tours ($L_{50}$) for the winter season.**

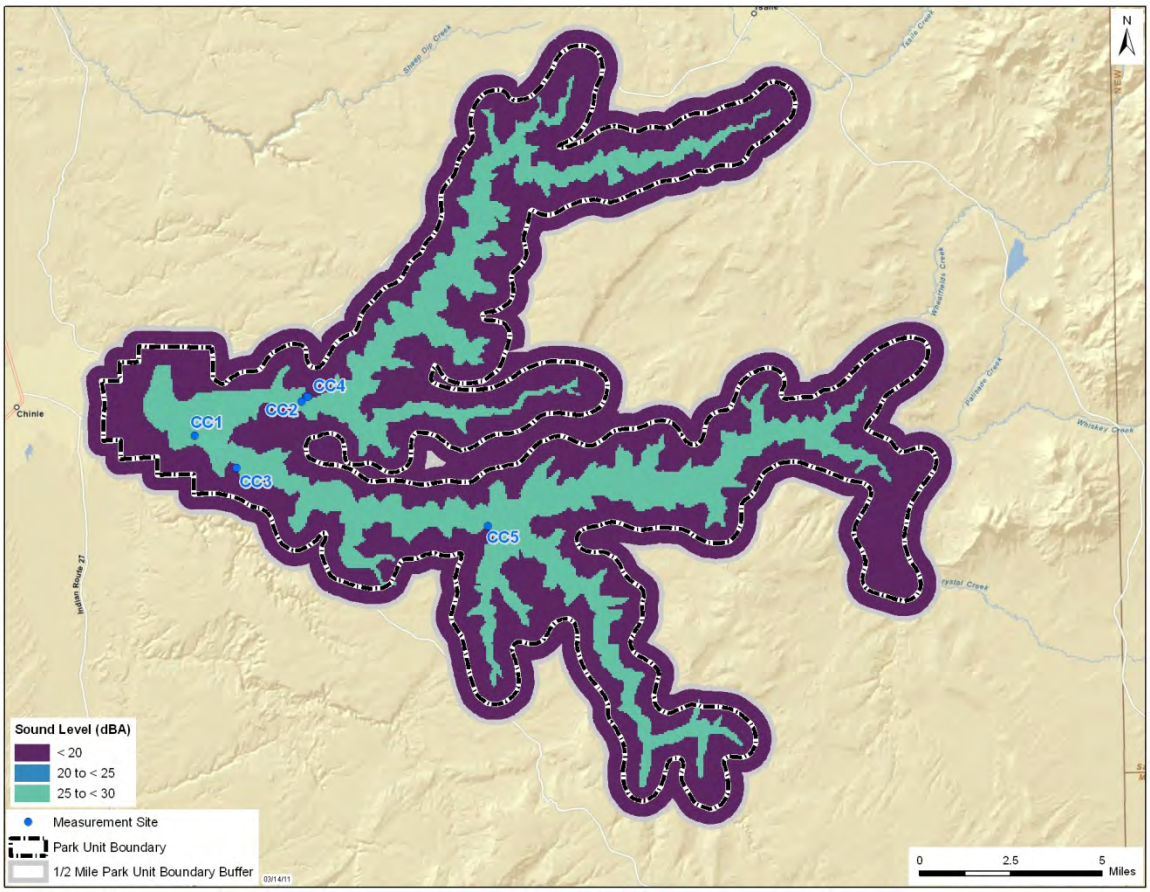


**Figure 7. Baseline ambient map : Natural Ambient ($L_{50}$) for the winter season.**

# 1. INTRODUCTION

Congress passed the National Parks Air Tour Management Act of 2000 (NPATMA) to regulate commercial air tour operations over units of the National Park System.[3] NPATMA directed the Federal Aviation Administration (FAA), with the cooperation of the National Park Service (NPS), to develop Air Tour Management Plans (ATMP) for all national parks with commercial air tours with the exception of the Grand Canyon National Park (GCNP), tribal lands within or abutting the GCNP, air tour operations flying over or near the Lake Mead National Recreation Area solely as a transportation route to conduct an air tour over GCNP, Rocky Mountain National Park, and national park units located in Alaska. The objective of the ATMPs is to develop acceptable and effective measures to mitigate or prevent significant adverse impacts, if any, from the air tours on the natural and cultural resources, visitor experiences, and tribal lands within the parks.

The U.S. Department of Transportation, Research and Special Programs Administration, John A. Volpe National Transportation Systems Center (Volpe Center) is supporting the FAA, Western-Pacific Region (AWP), and working cooperatively with the NPS, Natural Sounds Office, in the development of ATMPs. Approximately 85 park units will need ATMPs developed. A major component of establishing noise impacts is the determination of representative baseline sound levels, or ambient levels for each park. The collection of ambient sound level data provides valuable information about a park's acoustic conditions for use in developing soundscape management plans.

For approximately two weeks during the summer (September 2004) and one month during the winter (March 2010), the Volpe Center conducted baseline ambient sound level measurements in Canyon de Chelly National Monument (Canyon de Chelly). Acoustical and meteorological data were measured at five sites in the park. This document summarizes the results of the noise measurement study.

## 1.1 Objectives

The primary objective of this study is to quantify the baseline ambient sound levels within Canyon de Chelly to establish a foundation from which potential noise impacts can be assessed. Ambient sound level data collected in this study will be used for the primary purposes of:

- Establishing baseline ambient sound levels (both overall and frequency based) in key areas within a park;
- Establishing the different sound sources contributing to the baseline levels in key areas within a park;
- Modeling sound levels in other similar areas within a park for which resource constraints (or other issues) do not allow for direct measurements;
- Building a library of baseline ambient sound levels (both overall and frequency based), which may potentially be used in future ATMPs to generalize baseline ambient sound levels within similar types of parks, or park areas; and
- Provide input into the FAA's Integrated Noise Model (INM), which will be used to assess the complete acoustical environment within the entire park and aid in the assessment of a range of air tour alternatives. INM is a computer program used by over 700 organizations in over

50 countries to assess changes in noise impact. Requirements for INM use are defined in FAA Order 1050.1E, Environmental Impacts: Policies and Procedures, and Federal Aviation Regulations (FAR) Part 150, Airport Noise Compatibility Planning. In accordance with the results of the Federal Interagency Committee on Aviation Noise (FICAN) review ("Findings and Recommendations on Tools for Modeling Aircraft Noise in National Parks"), INM Version 6.2* is the best-practice modeling methodology currently available for evaluating aircraft noise in national parks and will be the model used for ATMP development.[4,5]

## 1.2 Report Organization

The presentation of this document, entitled "Baseline Ambient Sound Levels in Canyon de Chelly National Monument," begins with an executive summary. Section 1 presents an introduction and the objectives of this document. Section 2 overviews the process of measurement site selection with a brief description of the preliminary sites chosen. Section 3 discusses instrumentation. Section 4 presents the measurement procedures employed in the field. Section 5 discusses data reduction. Section 6 discusses the results of the study. Section 7 discusses the development of ambient maps. Appendix A presents detailed measurement site information. Appendix B contains the User's Guides for the continuous monitoring systems. Appendix C presents the instrumentation frequency response adjustments. Appendix D describes the development of instrumentation noise floor adjustments. A glossary and all related references are presented at the end of this document.

* INM Version 6.2 was the latest version of the INM at the time of this determination. Since then, INM Version 7.0b has been released.

## 2. STUDY AREA AND SITE SELECTION

As shown in Figure 8, Canyon de Chelly is located in the State of Arizona, northeast of Phoenix and within the Navajo Nation. Designated a National Monument in February of 1931 and encompasses 83,840 acres. Canyon de Chelly is one of the longest continuously inhabited areas in the United States that is of historical and spiritual significance to the Navajo people.[6] Over 800,000 people visit the park annually.[7] Figure 9 provides a general overview of the areas within Canyon de Chelly.

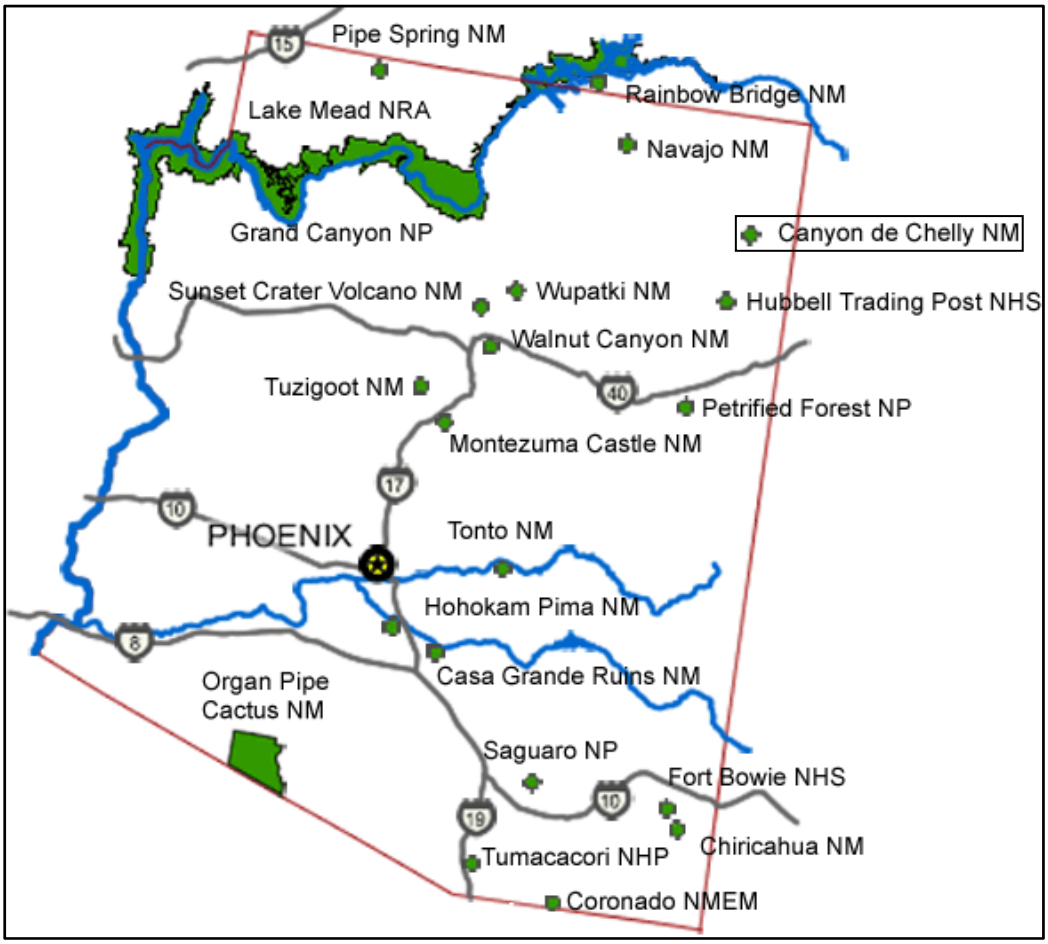


**Figure 8. Location of Canyon de Chelly National Monument.** [1]

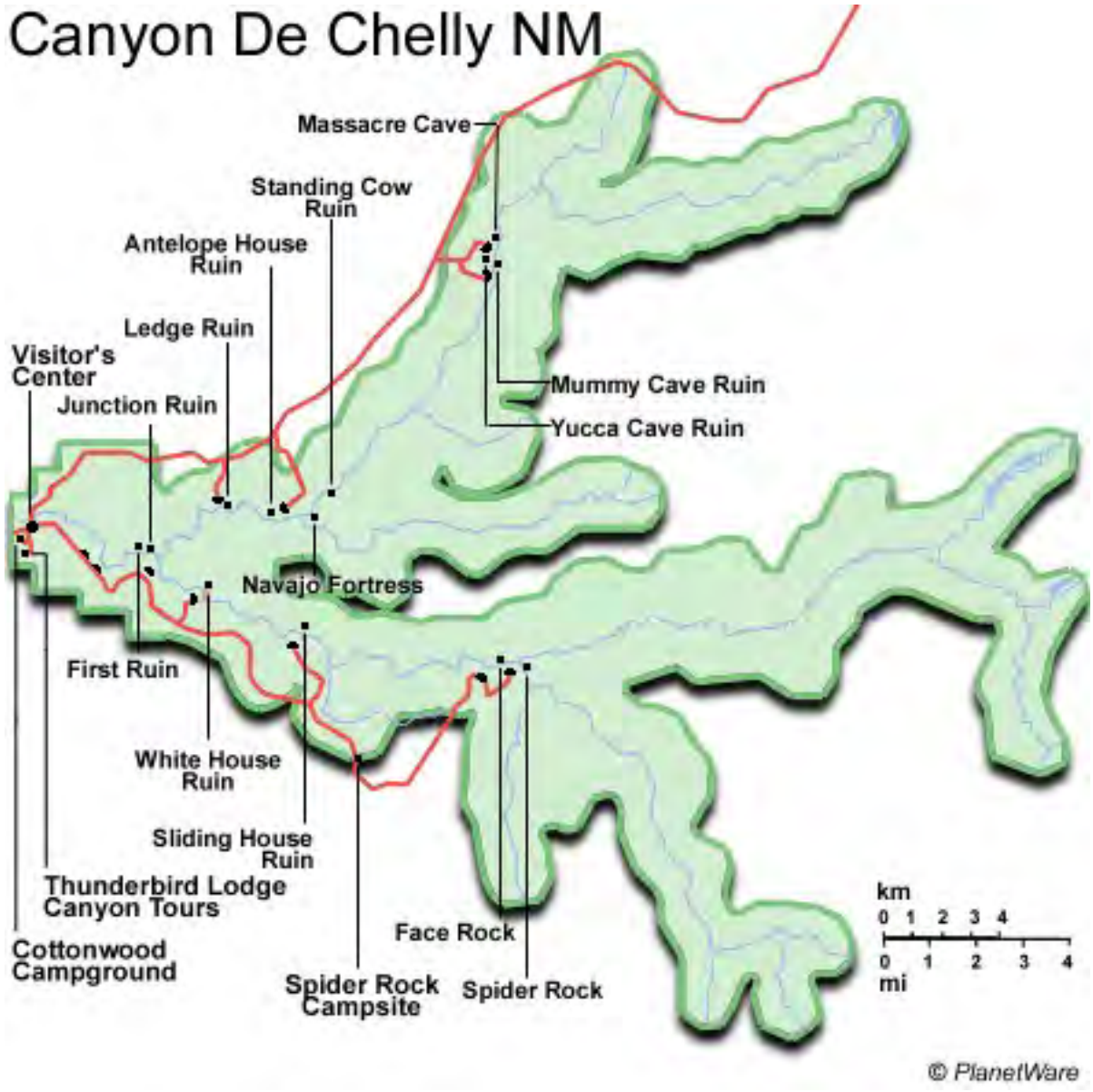


**Figure 9. Overview map of Canyon de Chelly.** [8]

## 2.1 Site Selection Criteria

The primary goal of the site selection process was to identify the minimum number of field-measurement sites, which would allow for characterization of the baseline ambient sound levels throughout the entire park. This was accomplished by identifying acoustically representative regions for which data could be collected and stratified, i.e., "acoustic zones." These data could then be applied to other regions possessing similar attributes, which will affect acoustics, such as land cover, wind conditions, and wildlife habitats. In the site selection process, the following primary criteria were used in the determination of acoustic zones:

- *Vegetation/Land Cover (see Section 2.2):* Sound propagates differently over different types of ground cover and through different types of vegetation. For example, sound propagates more freely over barren environments as compared with grasslands, and less freely through forest type environments. In addition, vegetation is typically dependent upon time-of-year, with foliage being sparser in the winter than other times in the year. Land cover can also affect wildlife activity. Previous studies in national parks have established a strong correlation between land cover, wind speed, and ambient sound level.[9,10,11,12]
- *Climate Conditions (see Section 2.3):* Climate conditions include: temperature, humidity, precipitation, wind speed, wind direction, etc.; all of which can affect ambient sound levels as shown in previously referenced studies. For example, higher elevation areas typically exhibit higher wind speeds resulting in higher ambient sound levels. Climate is also dependent upon daily and seasonal variations, which can affect ambient sound levels. For example, under conditions of a temperature inversion (temperature increasing with increasing height as in winter and at sundown), sound waves may be heard over larger distances; and winds tend to increase later in the day, and, as such, may be expected to contribute to higher ambient noise levels in the afternoon as compared with the morning. In addition, biological activity is also affected by climate and seasonality. Natural biological sounds fluctuate with season and might contribute to lower ambient sound levels in the winter. Finally, visitors contribute to a wide variety of sounds, including hikers talking and walking, tour buses and other vehicular noises, as well as air tours. The influence of weather on visitor-use patterns is also important. For example, moderate climate areas of a park are much more popular for backcountry hiking and camping. Areas with more extreme climates are visited less often, for shorter periods of time and more likely only during the day.

The above primary criteria were used to determine the acoustic zones in Canyon de Chelly, and then combined with the following secondary criteria to determine the final sites selected (see Section 2.6):

- *Park Resources/Management Zones (see Section 2.4):* As the objective of the ATMPs is to develop acceptable and effective measures to mitigate or prevent significant adverse impacts from the air tours on the natural and cultural resources, visitor experiences, and tribal lands within the parks, it is important to examine these resources and their locations/habitats during site selection. Park resources contribute, not only, to the multitude of sounds produced in certain areas of the park, but also to the serenity of other areas in the park. The way in which a park manages its resources can affect how potential impacts may be later assessed. It may also help identify where greater resource protection may be needed.
- *Commercial Air Tour Flight Routes (see Section 2.5):* Commercial air tours provide not only a unique experience for visitors of the National parks, but also a different way for visitors to enjoy certain areas of parks. However, these tours also have the potential to disrupt visitors' enjoyment of a park, its wilderness environment, and its native wildlife. As NPATMA directs the development of ATMPs to reduce or eliminate significant impacts, if any, caused by commercial air tours, the consideration of existing air tour routes during site selection is very important. Sites in the vicinity of air tour routes provide the unique opportunity to gather in-situ information during ambient data collection regarding the noise source of interest, i.e., air tour aircraft.

Overarching the above criteria, and in many cases the definitive criterion in the final-decision-making process, is site accessibility. As important as a given site is to satisfy any of the above criteria, if it is inaccessible, measurements cannot be conducted.

## 2.2 Vegetation/Land Cover

With the goal of potentially facilitating future data transferability between parks, all baseline acoustic data collected thus far have been organized/classified in accordance with the National Land Cover Database (NLCD). Developed by the U.S. Geological Survey (USGS), the NLCD is the only nationally consistent land cover data set in existence and is comprised of twenty-one NLCD subclass categories for the entire U.S.[13]

Figure 10 provides an overview of the general land cover in Canyon de Chelly. Canyon de Chelly's forest areas cover 50 percent of the park. The remaining two land cover types are primarily shrubland (40 percent) and grassland (10 percent). Measurement sites were selected to encompass as many of vegetative/topography types as possible.

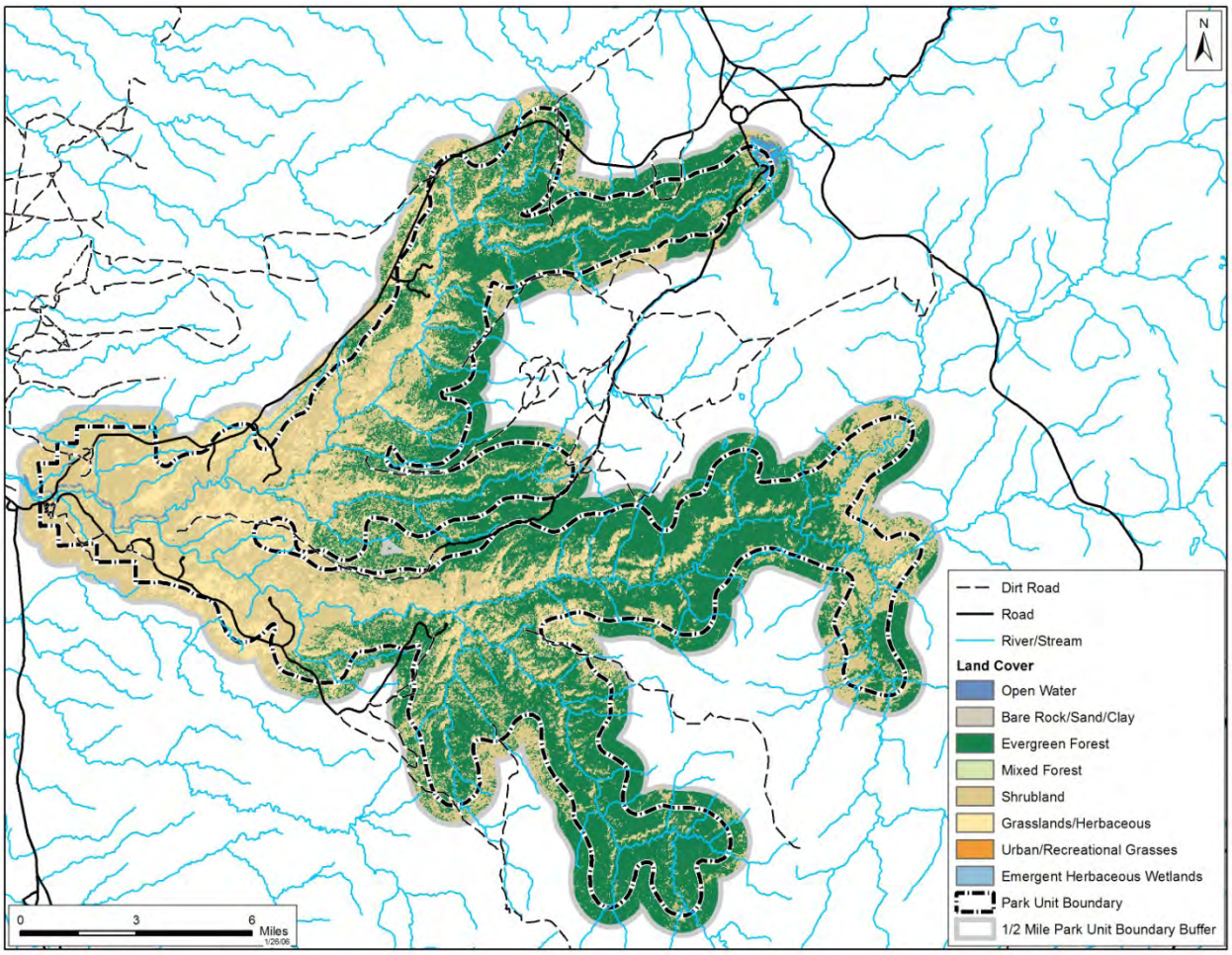


**Figure 10. National Land Cover Database (NLCD) land cover types in Canyon de Chelly.**

## 2.3 Climate Conditions

Climatology can also affect baseline ambient sound levels, as sound propagates differently in cold dry regions as opposed to warm humid regions; and substantial differences in wildlife activity can also be expected with varying climatology. With the goal of potentially facilitating future data transferability between parks, all baseline acoustic data collected thus far have been organized by ecological division.[14] This approach has been closely coordinated with NPS personnel.*

Table 4 provides the monthly climate summary (averaged from 1970 to 2010) recorded by meteorological stations nearest the park. It should be noted that it was agreed that data collection would take place during peak visitor season – summer. It is during this season that wildlife activity is more prevalent, visitor activity is increased, and air tours operate.

**Table 4. Monthly climate summary for Canyon de Chelly.[15]**

| Category | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Wind Speed (mph) | 4.4 | 5.5 | 6.4 | 8.4 | 7.7 | 7.2 | 5.3 | 4.4 | 4.9 | 4.7 | 4.6 | 4.1 |
| Prevailing Direction | WSW | SW | SW | SW | SW | WSW | S | S | S | S | SW | SSW |
| Average Max Temp (F) | 44.9 | 51.5 | 60.3 | 68.9 | 78.6 | 88.9 | 92.4 | 89.3 | 82.7 | 70.6 | 55.7 | 45.4 |
| Average Min Temp (F) | 19.5 | 23.6 | 29.5 | 35.4 | 43.6 | 51.6 | 59.4 | 58.3 | 49.5 | 37.6 | 27.1 | 18.8 |
| Average Total Precipitation (in) | 0.8 | 0.7 | 0.7 | 0.6 | 0.5 | 0.3 | 1.0 | 1.3 | 1.0 | 1.0 | 0.8 | 0.7 |
| Average Total Snow Fall (in) | 1.7 | 0.9 | 0.8 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 1.6 |
| Average Snow Depth (in.) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

## 2.4 Park Management and Visitor Use

Different park areas are designated for different management purposes and the protection of park resources. Visitors contribute a wide variety of sounds, from hikers talking and walking, to tour buses and other vehicular noises, to air tours, etc. Sites were chosen to cover three levels of visitor-use:

- *High Visitor-Use*: Any frontcountry location in a study area subject to substantial human activity, or destinations reached by automobile or bus, and generally traversable within thirty minutes (e.g., White House Overlook).
- *Moderate Visitor-Use*: Any frontcountry location in a study area subject to moderate to substantial human activity, or destinations generally reached within one hour of hiking (e.g., First Ruin).
- *Low Visitor-Use*: Any location in a study area subject to minimal human activity, such as designated wilderness areas or restricted, hiking and camping backcountry areas - these

* It should be noted that there is currently no standard vegetation classification system used by the NPS. However, several classification systems, including NLCD and NatureServe described in this document, are being reviewed by the NPS for use in grouping NPS park units by common vegetation, topography, and habitat.

destinations are generally located 1 hour or more from frontcountry locations (e.g., Mummy Cave Ruin).

## 2.5 Commercial Air Tour Flight Routes

According to the Interim Operating Authority applications received by the FAA, there are currently 7 existing commercial air tour operators approved to provide 186 tours over Canyon de Chelly annually. A map of typical air tour routes over Canyon de Chelly was not available at the time of measurement planning.

## 2.6 Canyon de Chelly Acoustic Zones

A meeting was held at the park between Canyon de Chelly NPS, FAA Western-Pacific Region, NPS Natural Sounds and Night Skies Division, and Volpe Center personnel to discuss the above site selection considerations. As stated earlier, it is anticipated that the use of acoustic zones as representative units, within which data can be collected and grouped (by vegetation, management zone, etc), may be extrapolated to similar areas in Canyon de Chelly. Based on the land cover data and the meeting discussion, three final acoustic zones were developed:

- Frontcountry – Above the Rim (shrubland/grassland areas above the canyon rim with high visitor use)
- Frontcountry – Below the Rim (shrubland/grassland areas on the canyon bottom with moderate visitor use)
- Backcountry (shrubland/grassland and forested areas on the canyon bottom with limited visitor use)

With the goal of site selection to ensure at least one measurement location within each of the acoustic zones, Table 5 and Figure 11 display the locations of the final acoustic zones and measurement sites. Appendix A contains individual descriptions and photographs of each measurement site location.

**Table 5. Summary of measurement sites selected for Canyon de Chelly.**

| Site ID | Site Name | National Land Cover Database Classification | Acoustic Zone | Latitude (decimal degrees) | Longitude (decimal degrees) | Altitude (ft) | # Days of Data | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Summer | Winter |
| CC1 | First Ruin | Shrubland | Frontcountry – Below the Rim | 36.1425° | 109.4984° | 5,656 | 15 days | 31 days |
| CC2 | Antelope House Ruin | Shrubland | Backcountry | 36.1554° | 109.4456° | 5,739 | 16 days | 32 days |
| CC3 | White House Overlook | Shrubland | Frontcountry – Above the Rim | 36.1294° | 109.4781° | 6,181 | 2 days | 0 days* |
| CC4 | Antelope House Overlook | Shrubland | Frontcountry - Above the Rim | 36.1574° | 109.4427° | 6,344 | 1 day | 13 days |
| CC5 | Spider Rock Overlook | Shrubland | Frontcountry - Above the Rim | 36.1047° | 109.3555° | 6,872 | 1 day | 31 days |

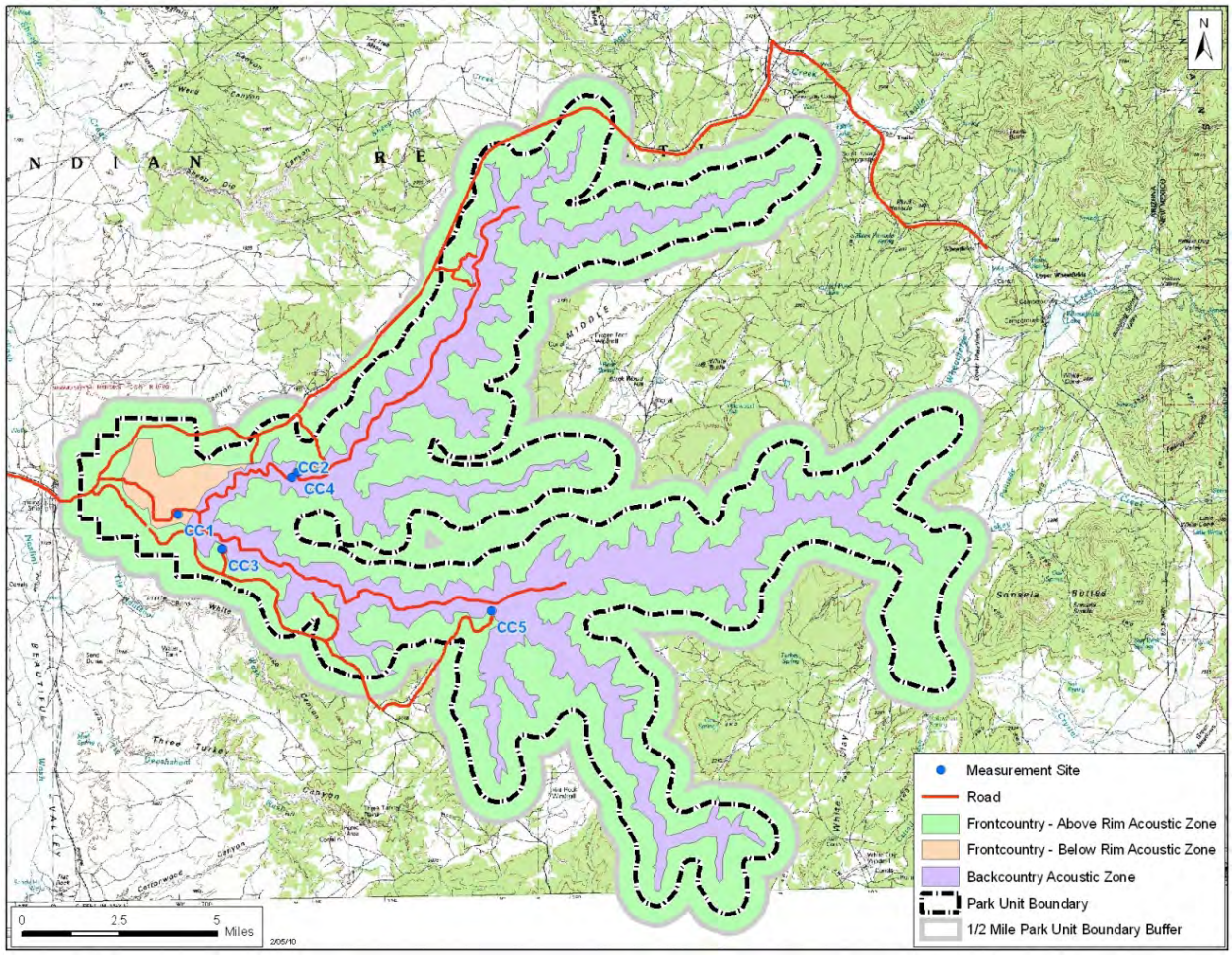


**Figure 11. Final acoustic zones and measurement sites for Canyon de Chelly.**

* Based on the similarity of the data measured during the summer season, it was agreed that only two frontcountry (above the rim) sites would be needed for winter monitoring.

## 2.7 Temporal Considerations (Seasonal, Daily, and Duration)

Measurement duration is a very difficult technical issue on which to reach consensus. It is likely that there will be substantial day-to-day, and for that matter, week-to-week, and possibly season-to-season variability, for many parks. For example, insect activity, which generally increases at night, may cause higher ambient sound levels than during the daytime. As another example, some wildlife activities (e.g., breeding) increase during certain months of the year, and, as such, may be expected to contribute to different ambient noise levels. However, it is typically not practical to measure at sites continuously for periods of many months, or several years. The choice of how long to measure must balance technical considerations and available resources. Measurements at a particular site should not only be of sufficient duration to ensure statistical confidence in the data, but also be reasonable in light of practical and other resource considerations.

### 2.7.1 Seasonal Considerations

Because the ultimate purpose of this data is to support impact assessment due to commercial air tours on park resources, acoustic data should be collected during the season (summer and/or winter) when air tours occur (not necessarily during the peak month of the activity, but during a month representative of the season when the activity occurs). Because air tours over Canyon de Chelly may be conducted during the summer and winter, ambient measurements during two seasons were agreed upon by FAA and NPS.

### 2.7.2 Time of Day Considerations

FAA and NPS have agreed that impact assessment will be conducted using ambient sound levels during the time that the air tour operations occur – that is, daytime hours. Daytime (as used in this report) will refer to the time period 7 am to 7 pm; nighttime will refer to the time period 7 pm to 7 am.

### 2.7.3 Measurement Duration

Based on long-term ambient data collected in Hawai`i Volcanoes National Park[16], as well as a joint review of acoustic literature and other relatively recent long-term NPS ambient studies in Bryce Canyon National Park and Arches National Park,[17] a 3-dB variability was achieved between 10, 25, and 40 days, depending on individual site variables/ characteristics. Since 2005, the FAA and NPS have jointly agreed that a minimum 25-day measurement period would be conducted for all future ATMP acoustic monitoring to limit measurement uncertainty to 3 decibels. An exception to the 25-day requirement would be for measurements in close proximity to localized sound sources, which generally don't vary substantially in level, such as waterfalls, river rapids, busy visitor centers. The measurement period for such situations will be situation dependent, but generally, for visitor centers and travel corridors, a 10-day measurement period will be adequate. Even shorter periods may be adequate for waterfalls or rivers with very little variability and for which only attenuation data is needed.

# 3. INSTRUMENTATION

Ambient sound levels measured in remote areas of the country under low wind conditions often approach the threshold of human hearing. As a result, specialized low-level instrumentation is required to accurately measure these sounds. This section discusses the specialized ambient measurement system used for this study.

The NoiseLogger™ Continuous Monitoring System can conduct unattended, long-term (30+ days), continuous ⅓-octave band noise measurements in outdoor environments. It is compact, light, rugged, and can run with external battery power, or solar panels, thus, enabling the system to store uninterrupted acoustic and wind data. Appendix B contains a more detailed description of system deployment, calibration, and dismantling.[18]

The system uses a large diameter windscreen and a ½-inch electret condenser microphone, interfaced with a sound level meter and a handheld personal computer for storing measured data using the NoiseLogger™ software. The system includes an ultrasonic anemometer to measure wind speed and direction. The output of the anemometer is also stored by the PDA via the NoiseLogger™ software.

## 3.1 Microphone System

The G.R.A.S. Model 40AQ and Model 40AE ½-inch, prepolarized microphones used in this study are electret condenser microphones. The random-incidence, frequency response of each microphone utilized in this study is shown in Appendix C. Being pre-polarized, the microphone functions as a closed system with regard to humidity, thus eliminating the potential for condensation in high humidity situations. Additionally, LD Model PRM902 preamplifiers were employed at each site. The cable to preamplifier connection is protected by plastic housing, which can contain desiccant cartridges to minimize humidity.

The microphone is protected from precipitation and birds with a Larson Davis Model EPS2108 special acoustic foam windscreen outfitted with birdspikes. The use of a windscreen also reduces the effects of wind-generated noise at the microphone diaphragm. Such reduction can effectively improve the signal-to-noise ratio of sound measurements. The attenuation of this windscreen is shown in Appendix C.

## 3.2 Sound Level Meter (SLM)

The microphone system was connected to a Larson Davis™ (LD) Model 824 sound level meter (SLM). The Model 824 SLM was set up with slow exponential time-weighting to continuously measure the overall A-weighted equivalent sound level for each 1-second sample, as well as the Z-weighted equivalent sound level in each ⅓-octave-band from 12.5 Hz to 20 kHz.

## 3.3 Handheld Personal Computer

The AC output of the LD Model 824 SLM was connected directly to the input of a Handheld Systems Husky™ Model Fex-21 handheld personal computer (H/PC) for data storage. With a 128-MB CompactFlash™ card, the Husky™ H/PC can provide approximately 2-weeks of continuous data storage.

## 3.4 MP3 Audio Recorder

The AC output of the LD 824 SLM was also connected directly to the input of an Edirol by Roland Model R-09 digital audio recorder. The audio recorder was set up to operate at a sample rate of 44.1 kHz recording MP3 files at 96 kbps. The use of an audio recorder allowed for later repeated playback and analysis, including the option for narrow-band analysis if deemed necessary.

## 3.5 Ultrasonic Anemometer

Wind speed and direction data were measured using an FT Technologies™ Model 702 ultrasonic anemometer. The FT 702 samples wind speed and direction at a rate of 5 samples per second and also provides a 1-second averaged output that was stored in the Husky™ H/PC. Due to the low ambient sound levels anticipated at many of the measurement sites, the use of these ultrasonic anemometers over a conventional wind cup/vane anemometer provides the advantages of: (1) the elimination of moving parts, which could potentially contaminate the acoustic data collected; and (2) a rugged, stainless steel construction, which means they are well suited for outdoor environments.

## 3.6 Solar Panel Array

Power to the instrumentation was provided by one of two means: (1) in areas with sun exposure during the day, a portable solar panel array was used; and (2) in areas with little or no sun exposure, marine batteries were used. Two marine batteries provided enough power to support collection of data for approximately two weeks; whereas systems using a solar panel array allowed for continuous data collection, as long as a modest amount of direct sunlight was available during daylight hours.

## 3.7 Source Identification/Acoustic Observer Log

In characterizing natural and non-natural acoustic conditions in a park, knowledge of the intensity, duration, and distribution of the sound sources is essential. Thus, during sound-level data collection, FAA and NPS have agreed that periods of observer logging "*in situ*" (i.e., on site and in real-time) and/or post measurements using high-quality digital recordings will be conducted in order to discern the type, timing, and duration of different sound sources.

*In situ* observer logging takes full advantage of human binaural hearing capabilities, allows identification of sound source origin, simultaneous sound sources, and directionality, and closely matches the experience of park visitors. In performing this activity, the acoustic environment was documented as a timed record of audible sounds using an automated spreadsheet programmed onto a Hewlett-Packard™ Model 200LX palmtop computer. Using pre-programmed macros, the spreadsheet allows the observer to place an immediate time stamp for an event and categorize that event into one of three primary acoustic states, based on the following hierarchal order: (1) Aircraft intrusions; (2) Human intrusions; and (3) Natural sounds. Aircraft intrusions include air tour, commercial, general aviation, military, and other aircraft sounds. Non-aircraft (human) intrusions may include hikers, campers, talking, motor vehicles,

etc. The natural category is documented when no aircraft or other human-made sounds can be heard. If more than one event within the same state category could be heard, the louder one (based on the observer's judgment) is logged with a notation of the other sounds that were present. An acoustic state would prevail until the current intrusion is no longer audible, or a new intrusion higher in the hierarchal order becomes audible to the observer.

Off-site audio playback observer logging allows for sampling periodically throughout the entire measurement period (e.g., 10 seconds every 2 minutes) and repeated playback of the recordings (e.g. when the sound is difficult to identify). Bose Quiet Comfort Noise Canceling headphones were used for off-site audio playback to minimize limitations imposed by the office acoustic environment.

## 3.8 Other Instrumentation

Three additional pieces of acoustic-support instrumentation are worthy of mentioning:

- *Sound level calibrator* - A B&K Model 4231 sound level calibrator was used in the field for establishing and checking the sensitivity of the entire acoustic instrumentation system (i.e., microphone, preamplifier, cables, and SLM). The Model 4231 produces a user-selectable 94-dB sound pressure level at a frequency of 1 kHz.
- *Microphone simulator* - A microphone simulator was used to establish the electronic noise floor of the entire electrical system absent of the microphone.
- *GPS unit* - A Garmin™ GPS Plus III unit was used to perform time synchronization of all pertinent instrumentation and documentation of the exact site location.

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# 4. FIELD MEASUREMENT PROCEDURES

This section presents the field measurement procedures utilized in the study. Sections 4.1 through 4.5 present a step-by-step description of the field measurement procedure, including deployment and dismantling.

## 4.1 System Deployment

**Figure 12. NoiseLogger™ system deployment: Site CC2.**

Following is a general step-by-step description of the system setup, which took place at all measurement sites:

1. The microphone, preamplifier, and windscreen were attached to a tripod, which was positioned in a location considered typical of the surrounding ambient environment. Care was taken to ensure that this location was not near any known localized noise sources and/or reflective surfaces. The tripod was adjusted to locate the microphone diaphragm at a height of 5 ft (1.5 m) above the local ground surface and oriented vertically (microphone grid facing the sky). To ensure physical stability, the tripod legs were secured using nylon rope with tension adjusters and/or sandbags.
2. The ultrasonic anemometer was attached to a second tripod, which was positioned at least 1 ft (0.3 m), but within 5 ft (1.5 m) of the microphone location. The tripod was adjusted to locate the anemometer sensor at a height of 5 ft (1.5 m) above the local ground surface and oriented north using a compass. To ensure physical stability, the tripod legs were secured using nylon rope with tension adjusters and/or sandbags.
3. The solar panel array was deployed facing due south to ensure maximum exposure to daytime sunlight. If adequate sun exposure was not available for sites located within forested areas, marine batteries were used in place of the solar panel arrays.

4. All connections in the SLM system case were checked and a new CompactFlash™ card, which was used to store measured data, was inserted into the Husky™ H/PC prior to turning on the H/PC.
5. The NoiseLogger™ program was retrieved from the CompactFlash™ card, and then invoked.
6. Per the program instructions, the following information/action was entered/performed:
7. *Site information:* The unique three-character ID representing the site "number" (e.g., CC2 for Site CC2[*]), and the site's name (e.g., Antelope House Ruin) were entered;
8. *Synchronization with the GPS unit:* Two minutes of one-second latitude and longitude data from the GPS unit were collected by the Husky™ H/PC;
9. *Equipment information:* System component model and serial numbers;
10. *System calibration:* Approximately 30 seconds of calibration signal are collected by the Husky™ H/PC;
11. *Sound Level Range:* The maximum sound level anticipated to be measured at the site. Given this user-selected "maximum," the NoiseLogger™ program automatically sets both a designated amount of gain and an absolute sound level limit ("ceiling") to LD Model 824 SLM. For example, for sites where a wide range of natural and mechanical sound sources were expected, this range was set to 90 dB. At this setting, the NoiseLogger™ program would apply 20 dB of gain to the LD Model 824 SLM, and the loudest sound level that could be measured would be 108 dB. For quieter sites, the "Sound Level Range" was set to lower levels, as appropriate.

Following calibration, the windscreen was replaced onto the microphone and all external system cables were "dressed" to allow for easy visual inspection, and to prevent disturbance by site activity.

## 4.2 Measurements

The following types of data were collected:

- *Acoustical*:
    - Continuous, one-second, A-weighted sound levels and their associated one-third octave-band un-weighted spectrum from 20 to 20,000 Hz;
    - Continuous digital audio recordings
- *Meteorological*: Continuous, one-second wind speed and direction data; and
- *Observer Logs*: During site visits, a field observer would perform short-term documentation of the acoustic environment at the site. Events audible within the acoustic environment were categorized into one of three primary acoustic states, based on the following hierarchal order: (1) Aircraft intrusions; (2) Human intrusions; and (3) Natural sounds. Aircraft intrusions include air tour, commercial, general aviation, military, and other aircraft sounds. Examples

[*] Although the NoiseLogger™ system only allows for a three-character ID, an NPS site-ID naming convention is used – specifically the four-letter park acronym followed by a three-digit number.

of non-aircraft (human) intrusions include hikers, campers, talking, motor vehicles, etc. The natural category was documented when no aircraft or other human-made sounds could be heard. If more than one sound within the same acoustic state category could be heard, the louder one (based on the observer's judgment) was logged with a notation of the other sounds that were present. An acoustic state would prevail until the current intrusion was no longer audible, or a new intrusion higher in the hierarchal order became audible to the observer. In addition to the three primary acoustic states, there were several sub-states as shown in Table 6.

The following is the step-by-step description of the field data collection procedure:

1. One field observer continuously documented the acoustic environment at the site, i.e., acoustic observer logging.
2. The other field observer periodically checked the equipment and took photographs of any visible aircraft for later determination of slant range. Detailed logs, including site, data, time, aircraft type, aircraft model, operator, tail number, and direction (when identifiable), were kept for later correlation with the recorded images. Note: Slant range data collection occurred only during the initial systems deployment, and not during remaining measurement period, when NPS personnel performed all site visits, acoustic observer logging, and system maintenance/relocation.
3. At the end of the site visit, all data were downloaded and transferred onto a central computer.
4. The NoiseLogger™ systems were then recalibrated and ambient sound level data collection re-initiated. If it were the end of the measurement trip, then the systems was dismantled and packed into backpacks for transport from the site.

**Table 6. Acoustic state identifiers.**

| Primary Acoustic States | | | | | |
|---|---|---|---|---|---|
| **Aircraft Intrusions** | | **Human Intrusions** | | **Natural Sounds** | |
| **Sub-State** | **Description** | **Sub-State** | **Description** | **Sub-State** | **Description** |
| Helicopter Aircraft | Designates noise produced by rotor-type aircraft | Human | Designates noise produced by park visitors, e.g., voices | Wildlife Animal | Designates noise produced by wildlife, e.g., birds |
| Propeller Aircraft | Designates noise produced by propeller-type aircraft | Vehicle | Designates noise produced by vehicles, e.g., automobiles | "Wind in the Foliage" | Designates noise produced the wind in foliage, e.g., trees |
| Jet Aircraft | Designates noise produced by jet-type aircraft | Domesticated Animal | Designates noise produced by pets, e.g., dog barking | "Wind in the Ear" | Designates noise produced the wind in the observer's ear, including silence |
| Unknown | Designates noise produced by unknown-type aircraft (invoked primarily for aircraft, which are heard, but not seen) | Other | Designates noise produced by other human-induced sources | Water | Designates noise produced the water sources, e.g., waterfall |
| Tour Operator | Designates tour operator | Measurement Team | Designates noise produced by the field measurement team (Note: All sound level data measured during acoustic states identified with "Human Intrusion - Measurement Team" designations are not included in the data analysis.) | Other | Designates noise produced by other natural sources |
| Commercial Operator | Designates commercial operator | | | | |
| General Aviation Operator | Designates general aviation operator | | | | |
| Military Operator | Designates military operator | | | | |
| Unknown Operator | Designates unknown operator (invoked primarily for aircraft, which are heard, but not seen) | | | | |
| High Altitude | Designates high altitude aircraft (typically greater than 2000 ft above ground level, or AGL) | | | | |
| Medium Altitude | Designates medium altitude aircraft (typically between 1000-2000 ft AGL) | | | | |
| Low Altitude | Designates low altitude aircraft (typically below 1000 ft AGL) | | | | |

# 5. DATA REDUCTION AND PROCESSING

This section summarizes the steps involved in the reduction and processing of the acoustic and meteorological data. These data were used by the Volpe Center as input to its data processing program, entitled NLcrunch (see Section 5.3). NLcrunch is a program developed by the Volpe Center to reduce, analyze and archive the large volume of data collected at the national parks in support of the ATMP Program.

## 5.1 NoiseLogger™ Acoustic and Meteorological Data Reduction

Raw NoiseLogger™ files contain both acoustic and meteorological data. The filename format of the files was as follows:

"TH13OB_Sxxx_YYYYMMDD.000,"

where "TH13OB_" is the default NoiseLogger™ header label, "Sxxx" is a unique four-character ID representing the site number (e.g., "SCC2" represents Site CC2), "YYYY" is the four-digit representation for the year, "MM" is the two-digit representation for the month, and "DD" is the two-digit representation for the day of the month. The ".000" extension identifies these files as binary formatted.

NoiseLogger™ files were then translated into ASCII text files by the NLcrunch program. Each line of the text file represented a 1-second data sample containing the date, time, equipment ID, battery voltage, internal temperature, and 1-second averaged wind speed, wind direction, Z-weighted (flat or no weighting) $L_{eq}$, C-weighted $L_{eq}$, A-weighted $L_{eq}$, and Z-weighted spectral data (12.5-20,000 Hz).

In addition to the binary files, the NoiseLogger™ system also recorded live audio samples. These files were used for later repeated playback during detailed analysis of distinct acoustic events.

## 5.2 Acoustic Observer Log Data Reduction

The acoustic observer log data files were checked by the actual field observer for accuracy, and edited as necessary to complete incomplete entries, clarify ambiguous comments, fix typographical errors, and remove blank rows. The files were then translated to Microsoft™ Excel format for input into NLcrunch.

## 5.3 Data Processing

As stated earlier, the acoustical, meteorological data, and observer log data were used as input to the data processing program, entitled NLcrunch, Version 4. The NLcrunch program applies several quality assurance filters and checks (Section 5.3.1), and then several adjustments (Section 5.3.4) to the acoustic data prior to detailed data analysis.

### 5.3.1 Data Filters

Several quality assurance filters and checks were applied to the acoustic data to ensure that any questionable data is identified and that only "good" data is used in the preparation of acoustic

results and conclusions. The list of filters used to identify "bad" or questionable data indicating system errors/problems:

- Data whose associated battery readings were less than 11.0 volts, the minimum voltage required to properly run the NoiseLogger™ system;
- Data whose associated internal temperature readings were greater than 122 degrees Fahrenheit, the LD Model 824 SLM's maximum operating temperature limit;
- Data whose associated 1-second average wind speeds were less than zero m/s, indicating an anemometer error;
- Data whose associated 1-second, unweighted sound levels exceeded the manufacturer's instrumentation noise "ceiling level" for the gain setting of the instrument, which indicate a system overload; and
- Data, which indicates a problem with the sound-level sample (e.g., data whose associated one-third octave-band data look flat-lined).

The following list of filters should be used to identify "bad" or questionable data that may bias the ambient sound level data:

- Data whose associated 1-second average wind speeds were greater than 11 mph (5 m/s). Note: Available data suggests that there is a high probability of microphone-induced distortion above this wind speed threshold; however, unless such wind conditions occur more than 50 percent of the hour, exceedence metrics (e.g., $L_{50}$, $L_{90}$) will not likely be influenced. If necessary, a portion of this data may be included in the final data set. This process is referred to as "backfilling" (see Section 5.4.3).
- Data that were contaminated by field personnel (e.g., data potentially contaminated by field personnel handling instrumentation during the calibration process) and/or other activities atypical for that area; and
- Data in any given hour, for which greater than 25 percent of the samples are lost due to the above and previously listed system error factors. This ensures hours with only a few samples cannot bias the analysis. See also Section 5.4.2 for guidance on pooled versus un-pooled data, and Section 5.4.3 for guidance to potentially recover hourly datasets with data loss due to high wind conditions (i.e., backfilling).

### 5.3.2 Data Pooling

There are two approaches to grouping data for analysis: pooled and unpooled. The pooled approach is to combine individual 1-second data from the entire sample period into a single dataset. Sound level descriptors, averages, variances, confidence levels, etc., are then computed for the set of statistical metrics for the pooled dataset. The unpooled approach is to analyze the data in discrete time periods, such as hourly. That is, sound level descriptors are computed for each individual hour; then the descriptors from individual hours across all days of the measurement period are determined.

The FAA and NPS have agreed that ambient analysis for ATMP parks will be performed using unpooled, hourly summary data. Although prior studies[19] have shown that results for pooled analyses are generally more conservative (i.e., lower) than results for an hourly analysis, analyzing ambient data by hour helps to ensure hour-to-hour and day-to-day variation is addressed. For hourly data analyses, hourly datasets are discarded for those hours that contain

less that 75 percent of "good" data. This ensures hours with only a few samples do not bias the analysis.

### 5.3.3 Data Recovery for High Wind

In previous ATMP data analyses, high-wind data [i.e., acoustic data measured whose associated 1-second average wind speeds were greater than 11 mph (5 m/s), the predetermined, acceptable, wind speed threshold] were removed from the dataset prior to data analyses. Removing this data has the clear potential to underestimate the median ($L_{50}$) ambient sound level estimates, because high winds may elevate the natural ambient sound levels. Discarding all the high-wind data would also limit the amount of useful data from high-wind sites, such as along a coastline or in alpine areas. Since the cost of field data collection is expensive and time consuming, it is desirable not only to recover hourly samples and use as much data as possible, but also to ensure that the ambient calculated at naturally-windy sites is accurately represented.

Based on recent Volpe analyses[20] of ambient data previously collected within ATMP parks, it was determined that up to 10% of any hourly measurement dataset can consist of high-wind data before a significant change to the statistical median ($L_{50}$) is observed. For the majority of measurement hours, this allowed for almost all of the measured data to be used in the hourly estimates (i.e., at the majority of sites measured for the ATMP project, high-wind data represented less than 10 percent of the dataset).

However, even with the addition of 10-percent high-wind data, there are still some occurrences where 45 minutes of data in each hour (i.e., 75 percent as discussed in Section 5.4.2) are not available for analyses, such as along a coastline or in alpine areas. In order to recover a portion of the hours that do not meet this criteria, a process was developed to recover as much data as possible from these sites by replacing, or "backfilling," data measured under high-wind conditions with data measured under high, but acceptable, wind conditions - specifically, data measured whose associated 1-second average wind speeds were between and 9 and 11 mph (4 and 5 m/s). Backfilling allows for the recovery of not only more hourly samples, but also ensures that the ambient calculated at naturally-windy sites is proportionally representative of windy conditions. Analysis showed that the effect to statistical descriptors, such as $L_{50}$ and $L_{90}$, is typically less than 1 dBA.

The methods and criteria recommended for backfilling sound level data measured during high-wind conditions are as follows:

- The hour must contain at least 30 minutes (50 percent) of good data;
- The goal for each hour is to have 75 percent of its samples (i.e., 45 minutes) used for analysis. Therefore, allow 10 percent, or 4.5 minutes, to be high-wind data (i.e., data measured when wind speeds were greater than 11 mph);
- Perform backfilling using data measured when wind speeds were high, but acceptable (between 9 and 11 mph) until the "75 percent good" criteria is met (i.e. 45 minutes of data for each candidate hour) - replacing data up to 100% of the hour would be adding unnecessary simulated data.

### 5.3.4 Data Adjustments

The following is the list of adjustments applied to the acoustic data by the NLcrunch program:

- Gain adjustments were applied, if necessary (Note: No gain adjustments were required for NoiseLogger™ data).
- Calibration adjustments were applied. These adjustments accounted for calibration drift as determined by measuring a calibration signal at the start and end of each data collection period.
- Microphone frequency response adjustments were applied. These adjustments accounted for frequency response biases of the microphone and were provided by a microphone calibration facility. Appendix C presents these adjustments in detail.
- Windscreen frequency response adjustments were applied. These adjustments accounted for frequency response effects of the windscreen. Appendix C presents these adjustments in detail.
- Noise floor adjustments were applied to NoiseLogger™ data, as appropriate. Note: Because ambient noise levels measured in remote areas of the country under low wind conditions (such as in national parks) often approach the threshold of human hearing, a process was developed to adjust the NoiseLogger™ data for contamination effects of the system noise floor. Application of these adjustments provide for more accurate estimation of the true ambient sound levels without being limited by the equipment's electrical noise floor. Appendix D discusses the method used to determine the noise floor of each NoiseLogger™ systems, as well as the final noise-floor adjustments used during data reduction.

## 5.4 Sound Level Descriptors

All sound-level data were analyzed in terms of the following metrics (also refer to the Terminology section for definitions):

- $L_{eq}$: The equivalent sound level determined by the logarithmic average of sound levels of a specific time period;
- $L_{50}$: A statistical descriptor describing the sound level exceeded 50 percent of a specific time period (i.e., the median); and
- $L_{90}$: A statistical descriptor describing the sound level exceeded 90 percent of a specific time period.

For each descriptor, both the broadband A-weighted sound level is determined and its associated ⅓-octave band un-weighted spectrum from 12.5 to 20,000 Hz. The process of computing the un-weighted one-third octave-band spectrum is virtually identical to the process for computing the broadband A-weighted sound level descriptors. The only difference is that the sound-level value is computed for un-weighted frequency-based sound levels rather than for broadband A-weighted sound levels. Specifically, the un-weighted sound level is computed individually for each ⅓-octave-band. The 33 un-weighted one-third octave-band sound levels (12.5 to 20,000 Hz) define the un-weighted sound level spectrum. This method of constructing the sound level spectrum means it is not an actual measured ⅓-octave band spectrum associated with a particular measurement sample, but a composite spectrum using the computed descriptor for each ⅓-octave-band.

## 5.5 Observer Log Descriptors

Periods of observer logging performed either in situ during sound-level data collection or later in the office or laboratory using high-quality digital recordings provides for an invaluable chronicle of the type, timing, and duration of the different sound sources that were audible during the observer log period (see also Section 4.2). These data not only provide a more complete characterization of the ambient environment, but also can be used to provide reasonableness checks with predicted audibility results from computer modeling efforts. Below are several commonly utilized metrics that can be determined from observer log data (the latter two are becoming more and more commonly found in NPS management plans):

- Time Audible is defined as the amount or percentage of time during a specified time period that the sound source of interest (e.g., aircraft) can be heard by the human ear.
- Number of Events per Hour (NEH) – The number of events of the sound source of interest (e.g., aircraft) that are audible within a specified time period.
- Noise-Free Interval (NFI) – The length of time that the sound source of interest (e.g., aircraft) is inaudible within a specified time period – essentially, the inverse of the Time Audible descriptor. For example, if aircraft sounds are audible 10 percent of the day, then the NFI is 90 percent.

## 5.6 Ambient Descriptors

The following four types of "ambient" characterizations are generally used and considered sufficient by the FAA and NPS in environmental analyses related to transportation noise: [19,21,22]

- *Existing Ambient:* The composite, all-inclusive sound associated with a given environment, excluding only the analysis system's electrical noise (i.e., aircraft-related sounds are included);
- *Existing Ambient Without Source of Interest:* The composite, all-inclusive sound associated with a given environment, excluding the analysis system's electrical noise and the sound source of interest, in this case, commercial air tour aircraft;
- *Existing Ambient Without All Aircraft* (for use in assessing cumulative impacts): The composite, all-inclusive sound associated with a given environment, excluding the analysis system's electrical noise and the sounds produced by the sound source of interest, in this case, all types of aircraft (i.e. commercial air tours, commercial jets, general aviation aircraft, military aircraft, and agricultural operations);* and
- *Natural Ambient:* The natural sound conditions found in a study area, including all sounds of nature (i.e., wind, streams, wildlife, etc.), and excluding all human and mechanical sounds.

If one considers the three sound level descriptors presented in Section 5.4 and the four types of ambient characterizations above, twelve ambient descriptors could potentially be computed as shown in Table 7.

* The definition of Existing Ambient Without All Aircraft used in this report is consistent with FAA's historical approach for cumulative impact analysis.

**Table 7. Matrix of twelve potential ambient descriptors.**

| Metric | Ambient Type | | | |
|---|---|---|---|---|
| | Existing | Existing Without Air Tours | Existing Without All Aircraft | Natural |
| $L_{Aeq}$ | 1 | 4 | 7 | 10 |
| $L_{50}$ | 2 | 5 | 8 | 11 |
| $L_{90}$ | 3 | 6 | 9 | 12 |

From the above twelve potential ambient descriptors, only the first three can be readily computed (see Section 5.7). The computation of ambient types other than Existing Ambient is more challenging because different sound sources often overlap in both frequency and amplitude; there is currently no practical method to separate out acoustic energy of different sound sources (i.e., human-caused sounds imbedded with natural sounds). The two ambient descriptors agreed upon for use in ATMP analyses are:

- Existing Ambient Without Source of Interest ($L_{Existw/oTours}$) – Descriptor 5 from the table above; and
- Natural Ambient ($L_{Nat}$)– Descriptor 11 from the table above.

## 5.7 Calculation of Ambients

Using the data in the acoustic observer logs, different characterizations of ambient can be *estimated* from the sound level data. This method was developed by performing a detailed data analyses conducted by the Volpe Center, working closely with the NPS, in comparing several approaches of estimating of the Natural Ambient and is comprised of the following steps:[23]

1. From the short-term in situ and off-site logging, determine the percent time human-caused sounds are audible.
2. Sort, high-to-low, the A-weighted level data, derived from the short-term, one-second, one-third octave-band data (regardless of acoustic state), and remove the loudest percentage (determined from the percent time audible of human-caused sounds in the short-term observer logs) of sound-level data. For example, if from Step 1 above, it is determined that at a particular site, the percent time audible of all human-caused sounds is 40 percent, then the loudest 40 percent of the A-weighted level data is removed. The $L_{50}$ computed from the remaining data is the estimated A-weighted natural ambient. This $L_{50}$, computed from the remaining data, can be mathematically expressed as an $L_x$ of the entire dataset as follows (%TA is the percent of time human-caused sounds are audible in the short-term observer logs):

$$L_x = \frac{100 - \%TA}{2} + \%TA$$

   For example, if non-natural sounds are audible for 40% of the time, L0 to L40 corresponds to the loudest (generally non-natural) sounds, and $L_{40}$ to $L_{100}$ corresponds to the quietest (generally natural) sounds. The median of $L_{40}$ to $L_{100}$ data is $L_{70}$. Therefore, the A-weighted

decibel value at $L_{70}$, the sound level exceeded 70 percent of the time, would be used for the entire dataset to characterize the natural ambient sound level.

3. The associated one-third octave-band un-weighted spectrum from 12.5 to 20,000 Hz is constructed similarly, except the $L_{50}$ is computed from the remaining data for each one-third octave-band. As with the Volpe method, it is not an actual measured one-third octave-band spectrum associated with a particular measurement sample, but rather a composite spectrum derived from the $L_x$ for each one-third octave-band.

This method for estimating the natural ambient is conceptually straightforward – as percent time audible approaches 0 percent, the Lx approaches $L_{50}$; as it approaches 100 percent, the $L_x$ approaches $L_{100}$. A concern with this approach is that loud natural sounds, such as thunder, could be removed from the data before calculating natural ambient sound levels, and the resulting calculated natural ambient sound levels could be an under-estimate of natural ambient sound levels. Although this is a valid concern, such events are rare relative to the entire measurement period (>25 days). Therefore, removing these data should not likely have a significant impact on calculations of natural ambient sound levels. This method also eliminates the possibility of having an estimated natural ambient level that exceeds the existing ambient level.

Based on the concept of the above method, the computation of the other ambient types (Existing Without Sound Source of Interest using the percentage of time sounds from the source of interest, e.g., air tour aircraft, are audible from short-term in situ and off-site observer logging, and Existing Ambient Without All Aircraft using the percentage of time all aircraft are audible from the observer logging) is a similar process.

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# 6. RESULTS

This section summarizes the results of the study. Included are an overall summary of the final, ambient sound levels for each measurement site (Section 6.1), temporal trends (Section 6.2), and the acoustic observer data logged at each measurement site (Section 6.3).

## 6.1 Summary Results

The following figures and tables are presented to show overall site-to-site comparisons:

- Figure 13 and Figure 14: A plot of the overall daytime* $L_{50}$ sound level computed for each site with all days included for the summer and winter seasons, respectively (a few points of interest outside the parks are also shown for comparison purposes only). The figure also shows a dark line above and below each plotting symbol, which indicate the 95% confidence interval on the results†;
- Table 8 contains a summary of the ambient, sound level data measured at each measurement site for both summer and winter seasons; and
- Table 9, Figure 15, and Figure 16 present the associated spectral data for the two ambient maps agreed upon for use in ATMP analyses: Existing Ambient Without Air Tours ($L_{50}$) and Natural Ambient ($L_{50}$).

* For most parks, the majority of air tour operations occur during the day, the NPS and FAA have agreed that the impact assessment will be conducted using ambient sound levels during the time that the air tour operations occur. Accordingly, all ATMP analyses are based on daytime ambient data. In general, daytime refers to the time period of 7 am to 7 pm unless otherwise specified by the NPS and FAA.

† The confidence interval is a measure of how certain one is of the value shown. The length of each of the dark lines indicate the day-to-day variability of the measurement for a particular site - the longer the line, the larger the day-to-day variability.

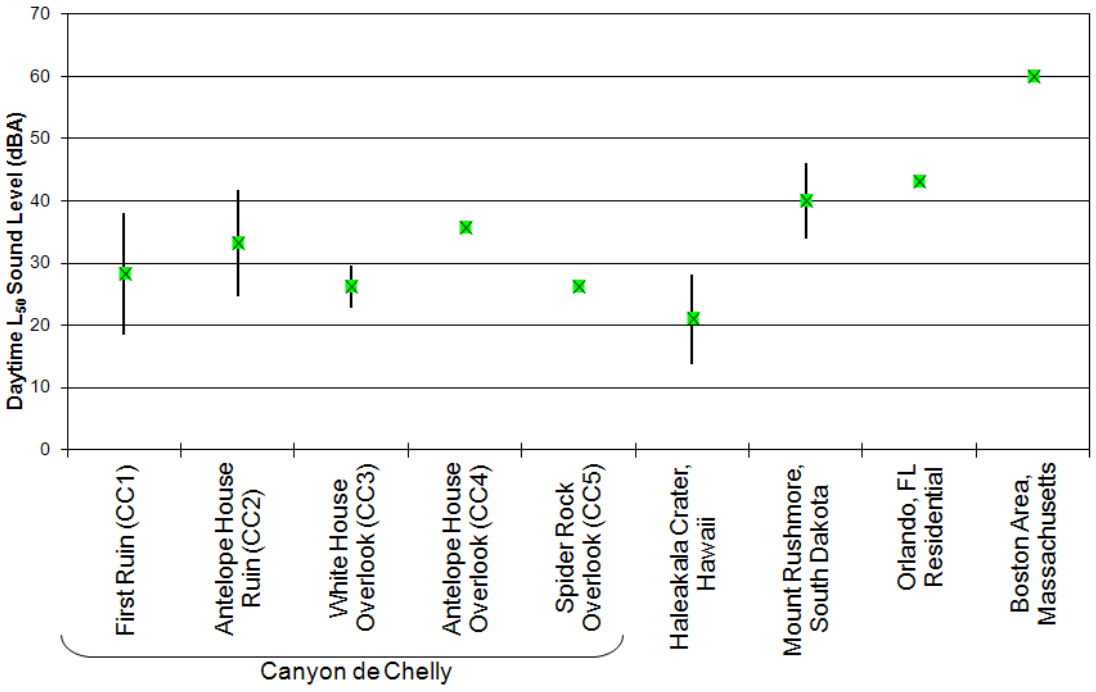


**Figure 13. Comparison of overall daytime $L_{50}$ sound levels for all sites for the summer season.***

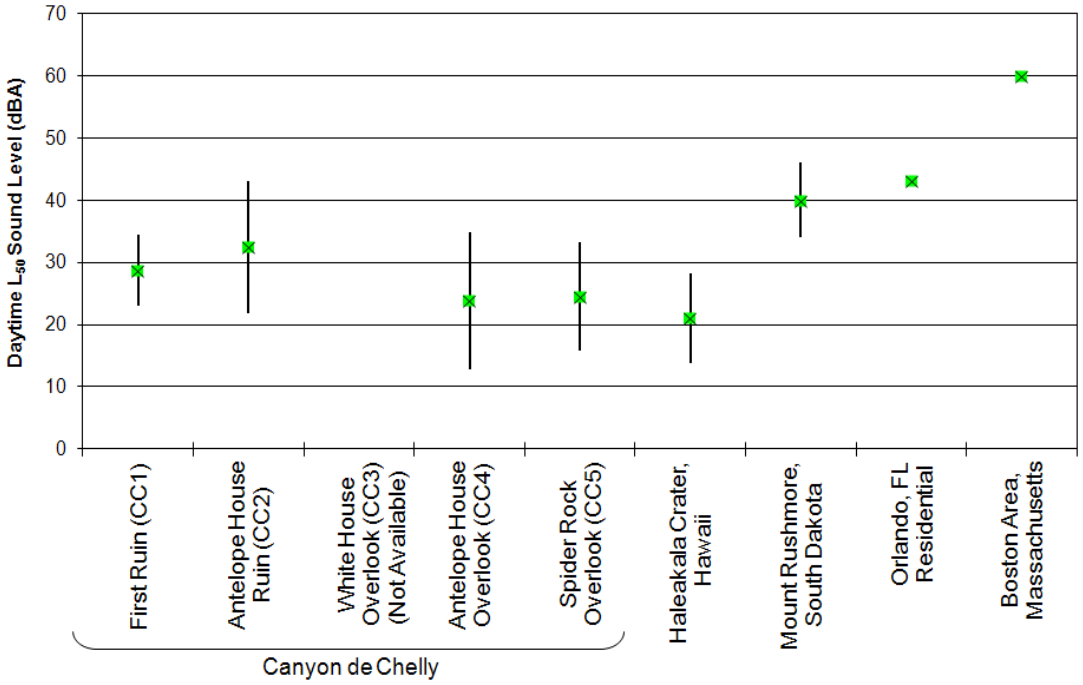


**Figure 14. Comparison of overall daytime $L_{50}$ sound levels for all sites for the winter season.***

* Confidence intervals for Orlando and Boston are not shown due to the limited amount of data represented (2 days and 1 week, respectively). Ambient data at ATMP parks, such as Canyon de Chelly, are typically measured for at least 15 days, however for the summer season less than two days of data are available for CC3 and less than one day of data was available for CC4, CC5, and for the winter only 13 days of data was available for CC4.

**Table 8. Summary of measured ambient sound level data for both summer and winter seasons.** [*]

| Acoustic Zone | Site Name | Site ID | Total # Days | Existing Ambient | | | | | | Existing Ambient Without Air Tours (Daytime Data Only 7 am to 7 pm) | Existing Ambient Without All Aircraft (Daytime Data Only 7 am to 7 pm) | Natural Ambient (Daytime Data Only 7 am to 7 pm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Daytime Data Only 7 am to 7 pm | | | Nighttime Data Only 7 pm to 7 am | | | | | |
| | | | | $L_{Aeq}$ (dBA) | $L_{50}$ (dBA) | $L_{90}$ (dBA) | $L_{Aeq}$ (dBA) | $L_{50}$ (dBA) | $L_{90}$ (dBA) | $L_{50}$ (dBA) | $L_{50}$ (dBA) | $L_{50}$ (dBA) |
| **Summer Season** | | | | | | | | | | | | |
| Frontcountry – Below the Rim | First Ruin | CC1 | 15 | 35.8 | 28.3 | 20.3 | 34.7 | 28.9 | 16.4 | 27.8 | 27.0 | 24.3 |
| Backcountry | Antelope House Ruin | CC2 | 16 | 42.4 | 33.2 | 20.2 | 36.1 | 32.4 | 20.6 | 33.0 | 32.3 | 29.8 |
| Frontcountry – Above the Rim | White House Overlook | CC3 | 2 | 34.0 | 26.2 | 19.4 | NA | NA | NA | 25.9 | 25.1 | 19.4 |
| Frontcountry – Above the Rim | Antelope House Overlook | CC4 | 1 | 41.5 | 35.8 | 25.5 | NA | NA | NA | 35.5 | 34.5 | 31.0 |
| Frontcountry – Above the Rim | Spider Rock Overlook | CC5 | 1 | 33.3 | 26.2 | 20.0 | NA | NA | NA | 25.9 | 24.6 | 20.0 |
| **Winter Season** | | | | | | | | | | | | |
| Frontcountry – Below the Rim | First Ruin | CC1 | 31 | 36.5 | 28.5 | 21.3 | 31.6 | 19.7 | 13.8 | 27.6 | 26.7 | 25.3 |
| Backcountry | Antelope House Ruin | CC2 | 32 | 39.2 | 32.2 | 18.3 | 33.3 | 28.0 | 12.4 | 32.1 | 31.5 | 29.2 |
| Frontcountry – Above the Rim | White House Overlook | CC3 | 0[†] | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Frontcountry – Above the Rim | Antelope House Overlook | CC4 | 13 | 36.7 | 23.8 | 14.3 | 32.7 | 15.7 | 7.7 | 22.9 | 21.4 | 20.4 |
| Frontcountry – Above the Rim | Spider Rock Overlook | CC5 | 31 | 37.2 | 24.2 | 16.1 | 29.2 | 17.6 | 13.8 | 24.0 | 21.7 | 19.1 |

[*] As stated earlier, two ambient maps were agreed upon for use in ATMP analyses: the Existing Ambient Without Air Tours ($L_{50}$) and the Natural Ambient ($L_{50}$).
[†] Based on the similarity of the data measured during the summer season, it was agreed that only two frontcountry (above the rim) sites would be needed for winter monitoring.

**Table 9. Summary of measured, daytime (7 am to 7 pm), ambient sound level spectral data for the summer season.***

| Frequency (Hz) | Existing Ambient Without Air Tours $L_{50}$ (dB) | | | | | Natural Ambient $L_{50}$ (dB) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CC1 | CC2 | CC3 | CC4 | CC5 | CC1 | CC2 | CC3 | CC4 | CC5 |
| **12.5** | 33.6 | 36.5 | 28.8 | 47.3 | 27.0 | 31.3 | 34.6 | 24.3 | 41.6 | 23.5 |
| **16** | 32.0 | 35.7 | 29.3 | 42.6 | 26.9 | 30.1 | 34.1 | 24.6 | 37.6 | 23.0 |
| **20** | 30.9 | 34.6 | 30.6 | 38.9 | 27.1 | 29.2 | 33.1 | 25.1 | 34.8 | 22.7 |
| **25** | 30.7 | 33.8 | 32.3 | 36.6 | 28.1 | 28.7 | 32.4 | 25.6 | 33.2 | 22.5 |
| **31** | 30.5 | 33.7 | 33.2 | 35.1 | 29.3 | 28.4 | 31.4 | 26.6 | 31.6 | 22.8 |
| **40** | 30.4 | 33.3 | 33.7 | 35.3 | 29.9 | 28.4 | 31.4 | 25.9 | 32.1 | 22.8 |
| **50** | 30.8 | 32.6 | 33.4 | 35.5 | 29.7 | 28.4 | 30.7 | 25.4 | 32.1 | 22.5 |
| **63** | 31.1 | 31.8 | 32.9 | 34.7 | 29.2 | 28.8 | 30.0 | 24.5 | 31.5 | 22.2 |
| **80** | 30.9 | 31.2 | 31.8 | 32.4 | 28.4 | 28.1 | 29.3 | 23.7 | 29.6 | 22.1 |
| **100** | 29.7 | 31.1 | 29.9 | 31.5 | 26.7 | 27.0 | 28.9 | 21.9 | 28.9 | 21.1 |
| **125** | 28.0 | 30.1 | 28.0 | 31.6 | 25.2 | 24.8 | 28.4 | 19.3 | 28.9 | 19.4 |
| **160** | 26.1 | 29.6 | 23.9 | 30.3 | 23.5 | 23.3 | 27.5 | 16.9 | 27.3 | 17.5 |
| **200** | 24.9 | 29.1 | 22.9 | 30.5 | 21.7 | 21.9 | 27.4 | 13.7 | 26.5 | 15.8 |
| **250** | 23.0 | 29.2 | 20.2 | 29.6 | 19.6 | 20.2 | 26.9 | 10.9 | 25.8 | 13.9 |
| **315** | 21.1 | 28.1 | 18.3 | 29.4 | 17.4 | 18.5 | 25.6 | 10.4 | 24.9 | 11.9 |
| **400** | 20.2 | 26.4 | 16.9 | 31.0 | 16.7 | 17.7 | 23.8 | 9.2 | 25.6 | 11.0 |
| **500** | 19.5 | 25.6 | 15.4 | 27.9 | 16.1 | 17.4 | 23.1 | 8.6 | 23.6 | 10.7 |
| **630** | 19.0 | 24.7 | 14.5 | 27.5 | 15.5 | 16.8 | 22.3 | 8.0 | 23.1 | 10.3 |
| **800** | 18.0 | 23.6 | 13.8 | 25.3 | 14.9 | 15.9 | 21.4 | 7.8 | 21.2 | 9.7 |
| **1000** | 16.6 | 21.9 | 12.3 | 24.0 | 13.4 | 14.9 | 20.1 | 7.1 | 19.1 | 9.0 |
| **1250** | 14.7 | 21.4 | 10.0 | 21.9 | 11.1 | 12.6 | 19.7 | 5.8 | 16.6 | 7.5 |
| **1600** | 13.2 | 21.3 | 7.6 | 20.5 | 9.3 | 11.1 | 20.1 | 4.7 | 15.0 | 6.0 |
| **2000** | 11.5 | 21.6 | 6.2 | 17.1 | 7.4 | 9.0 | 20.4 | 4.3 | 12.2 | 5.0 |
| **2500** | 9.5 | 21.4 | 5.5 | 14.2 | 6.3 | 7.7 | 19.9 | 4.4 | 10.0 | 4.9 |
| **3150** | 8.3 | 21.7 | 5.4 | 11.8 | 6.0 | 7.1 | 20.0 | 4.7 | 8.8 | 5.1 |
| **4000** | 7.2 | 19.8 | 5.7 | 9.3 | 6.2 | 6.7 | 18.4 | 5.3 | 7.4 | 5.6 |
| **5000** | 7.1 | 17.6 | 6.1 | 8.6 | 6.4 | 6.8 | 16.3 | 5.8 | 7.4 | 6.0 |
| **6300** | 7.4 | 15.1 | 6.0 | 8.1 | 6.4 | 6.9 | 13.3 | 5.7 | 7.4 | 6.0 |
| **8000** | 7.6 | 12.4 | 6.3 | 7.8 | 6.6 | 7.2 | 10.8 | 6.0 | 7.5 | 6.3 |
| **10000** | 8.4 | 10.7 | 6.4 | 8.1 | 6.9 | 7.9 | 9.4 | 6.2 | 7.9 | 6.6 |
| **12500** | 6.7 | 8.7 | 5.8 | 7.5 | 6.4 | 6.4 | 7.4 | 5.6 | 7.3 | 5.9 |
| **16000** | 6.5 | 9.2 | 5.6 | 7.5 | 6.3 | 6.3 | 7.8 | 5.4 | 7.2 | 5.8 |
| **20000** | 6.8 | 7.7 | 5.5 | 7.8 | 6.4 | 6.6 | 6.4 | 5.2 | 7.5 | 5.8 |

* As discussed in Section 5.7, the spectral data associated with the $L_{50}$ exceedence level is constructed by determining the $L_{50}$ from each one-third octave-band; therefore, it is not an actual measured one-third octave-band spectrum associated with a particular measurement sample.

**Table 10. Summary of measured, daytime (7 am to 7 pm), ambient sound level spectral data for the winter season.***

| Frequency (Hz) | Existing Ambient Without Air Tours $L_{50}$ (dB) | | | | | Natural Ambient $L_{50}$ (dB) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CC1 | CC2 | CC3 | CC4 | CC5 | CC1 | CC2 | CC3 | CC4 | CC5 |
| **12.5** | 45.0 | 47.9 | NA | 43.8 | 38.1 | 39.5 | 44.7 | NA | 40.8 | 34.5 |
| **16** | 41.5 | 44.7 | NA | 40.4 | 36.2 | 37.1 | 41.4 | NA | 37.9 | 33.6 |
| **20** | 38.3 | 41.8 | NA | 37.5 | 34.6 | 34.7 | 38.0 | NA | 35.5 | 32.0 |
| **25** | 35.9 | 39.6 | NA | 35.3 | 33.4 | 33.1 | 35.9 | NA | 33.5 | 31.0 |
| **31** | 34.2 | 36.8 | NA | 32.9 | 31.8 | 31.8 | 33.6 | NA | 31.6 | 28.8 |
| **40** | 33.0 | 35.2 | NA | 32.1 | 30.6 | 31.1 | 31.4 | NA | 31.1 | 27.6 |
| **50** | 31.9 | 32.8 | NA | 31.5 | 29.3 | 29.8 | 29.7 | NA | 30.0 | 26.2 |
| **63** | 31.2 | 30.6 | NA | 30.7 | 28.1 | 28.8 | 28.0 | NA | 29.4 | 25.2 |
| **80** | 30.2 | 29.0 | NA | 29.5 | 27.4 | 28.1 | 26.1 | NA | 28.1 | 24.1 |
| **100** | 28.9 | 27.5 | NA | 27.6 | 25.3 | 26.4 | 24.2 | NA | 26.1 | 22.4 |
| **125** | 25.8 | 26.2 | NA | 24.7 | 23.5 | 23.6 | 22.8 | NA | 23.3 | 19.7 |
| **160** | 22.5 | 24.6 | NA | 20.8 | 21.3 | 20.3 | 22.3 | NA | 19.6 | 16.9 |
| **200** | 19.8 | 23.7 | NA | 17.6 | 18.9 | 17.8 | 22.2 | NA | 16.4 | 15.0 |
| **250** | 18.3 | 24.2 | NA | 15.9 | 17.3 | 16.4 | 22.5 | NA | 14.2 | 13.3 |
| **315** | 17.6 | 24.2 | NA | 15.5 | 15.6 | 15.6 | 22.8 | NA | 13.7 | 12.2 |
| **400** | 17.9 | 23.8 | NA | 15.9 | 15.6 | 16.0 | 22.5 | NA | 14.4 | 11.9 |
| **500** | 17.7 | 23.1 | NA | 15.9 | 15.4 | 15.8 | 22.2 | NA | 14.3 | 12.0 |
| **630** | 17.2 | 23.0 | NA | 14.6 | 14.9 | 15.6 | 21.8 | NA | 13.8 | 11.7 |
| **800** | 16.7 | 22.4 | NA | 12.8 | 13.7 | 15.3 | 20.8 | NA | 11.8 | 10.4 |
| **1000** | 16.2 | 21.3 | NA | 10.2 | 13.0 | 14.3 | 19.8 | NA | 8.5 | 9.5 |
| **1250** | 14.9 | 20.2 | NA | 6.3 | 10.4 | 13.1 | 19.0 | NA | 4.6 | 6.9 |
| **1600** | 13.2 | 19.4 | NA | 2.5 | 7.3 | 11.7 | 17.9 | NA | 0.4 | 3.5 |
| **2000** | 13.3 | 19.1 | NA | -1.4 | 3.2 | 11.8 | 17.5 | NA | -2.5 | -0.1 |
| **2500** | 12.7 | 18.2 | NA | -4.2 | 1.0 | 10.8 | 16.7 | NA | -4.8 | -1.3 |
| **3150** | 11.0 | 18.1 | NA | -6.2 | 0.2 | 9.1 | 16.0 | NA | -8.3 | -1.0 |
| **4000** | 7.1 | 17.2 | NA | -8.8 | 0.9 | 4.6 | 14.7 | NA | -9.9 | 0.2 |
| **5000** | 3.7 | 16.2 | NA | -11.4 | 2.0 | 1.7 | 13.8 | NA | -12.5 | 1.7 |
| **6300** | 2.1 | 14.9 | NA | -13.9 | 3.4 | -0.2 | 12.8 | NA | -15.0 | 3.0 |
| **8000** | -1.1 | 13.8 | NA | -16.7 | 5.1 | 0.2 | 11.8 | NA | -17.5 | 4.7 |
| **10000** | -3.3 | 12.4 | NA | -18.9 | 6.6 | -2.2 | 10.5 | NA | -20.0 | 6.4 |
| **12500** | -4.3 | 9.9 | NA | -21.4 | 7.1 | -7.4 | 7.9 | NA | -22.5 | 6.8 |
| **16000** | -7.9 | 6.0 | NA | -23.9 | 6.0 | -10.8 | 5.1 | NA | -25.0 | 5.8 |
| **20000** | -10.2 | 8.0 | NA | -26.4 | 8.1 | -13.2 | 7.1 | NA | -27.5 | 7.8 |

* As discussed in Section 5.7, the spectral data associated with the $L_{50}$ exceedence level is constructed by determining the $L_{50}$ from each one-third octave-band; therefore, it is not an actual measured one-third octave-band spectrum associated with a particular measurement sample.

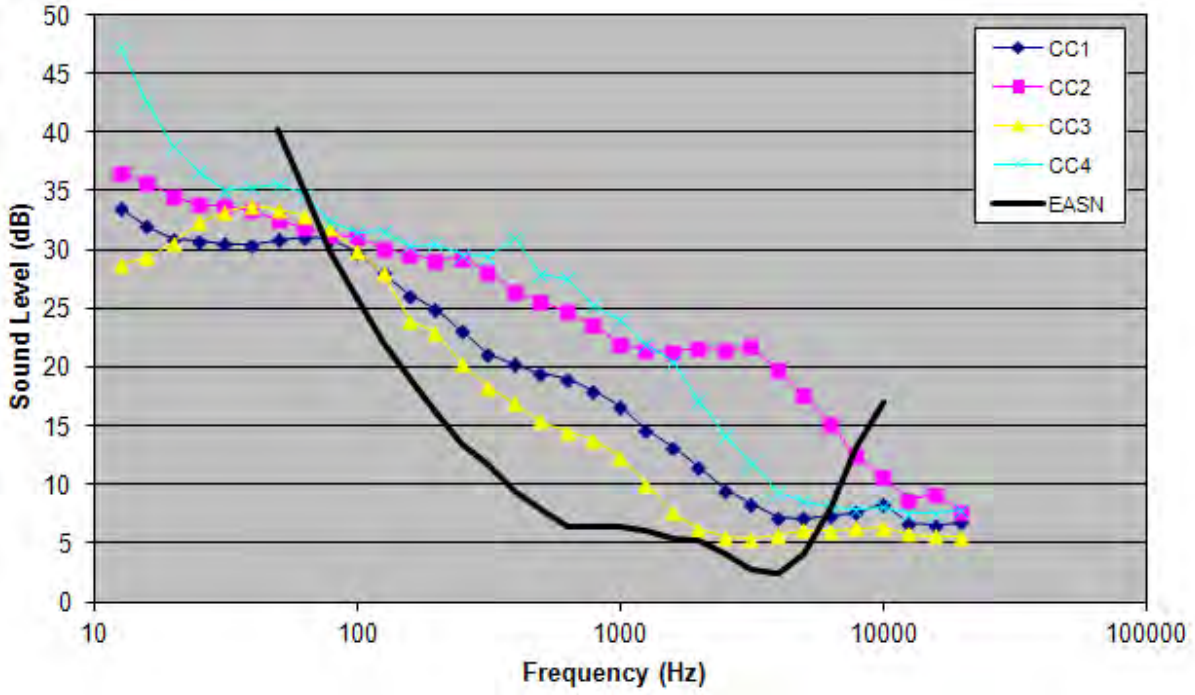


**Figure 15. Spectral data for the Existing Ambient Without Air Tours ($L_{50}$) for each site for the summer season.***

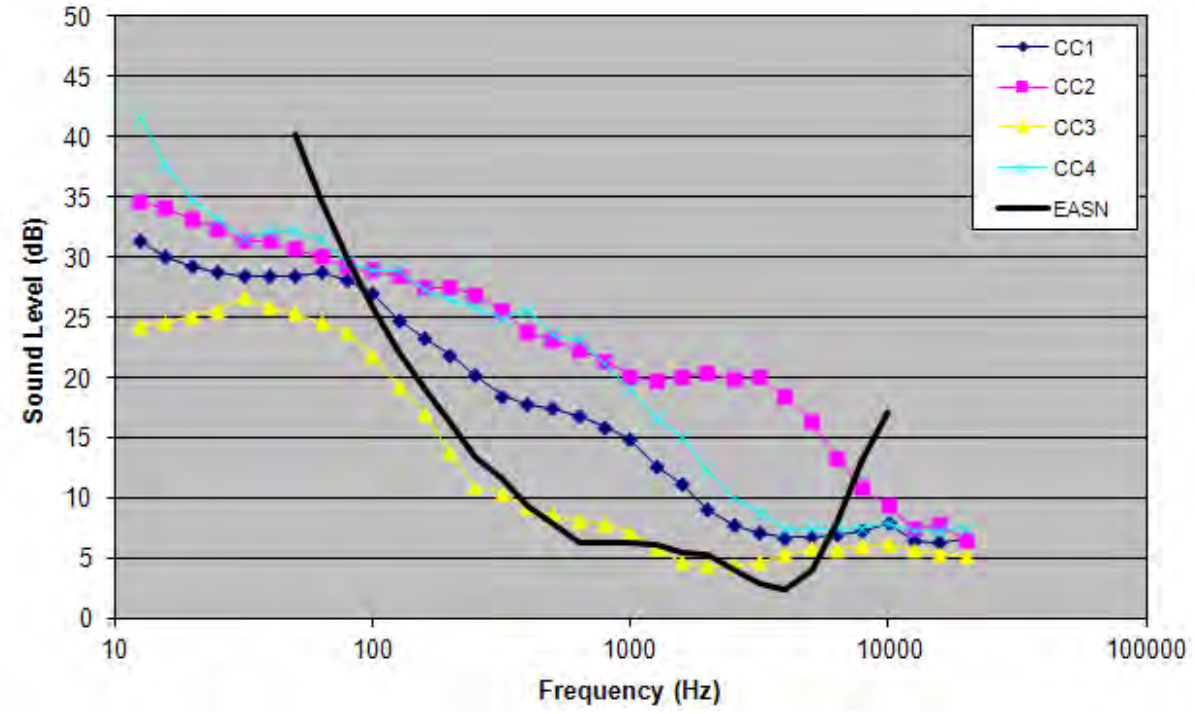


**Figure 16. Spectral data for the Natural Ambient ($L_{50}$) for each site for the summer season.***

* Also shown in each figure is the Equivalent Auditory System Noise (EASN), which represents the threshold of human hearing for use in modeling audibility using one-third octave-band data.

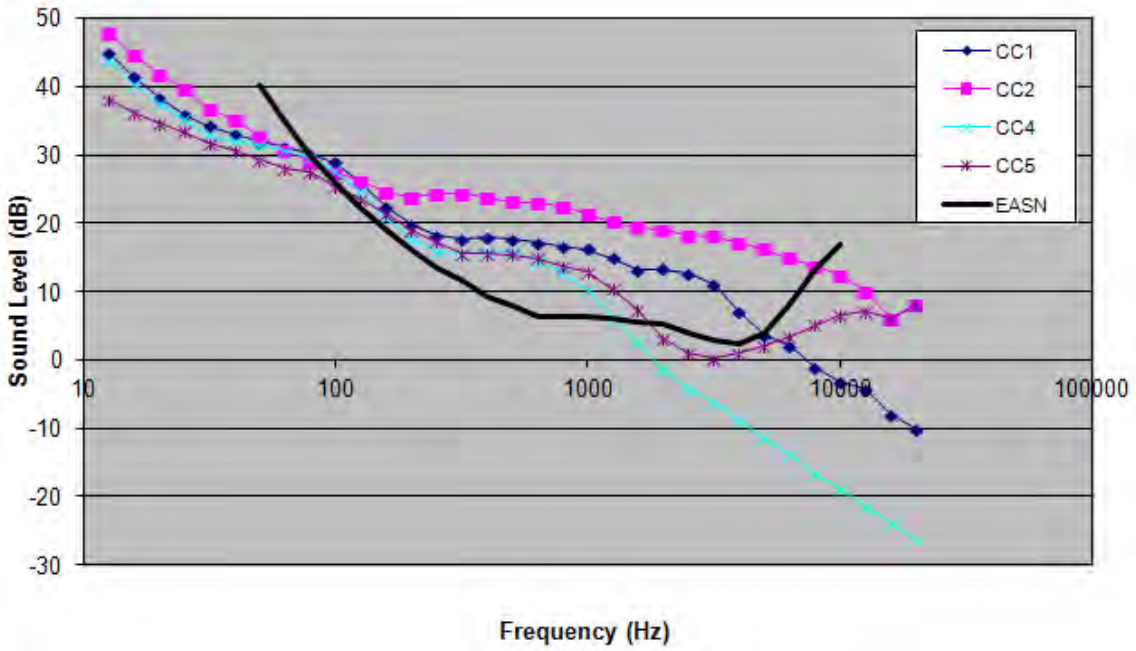


**Figure 17. Spectral data for the Existing Ambient Without Air Tours ($L_{50}$) for each site for the winter season.***

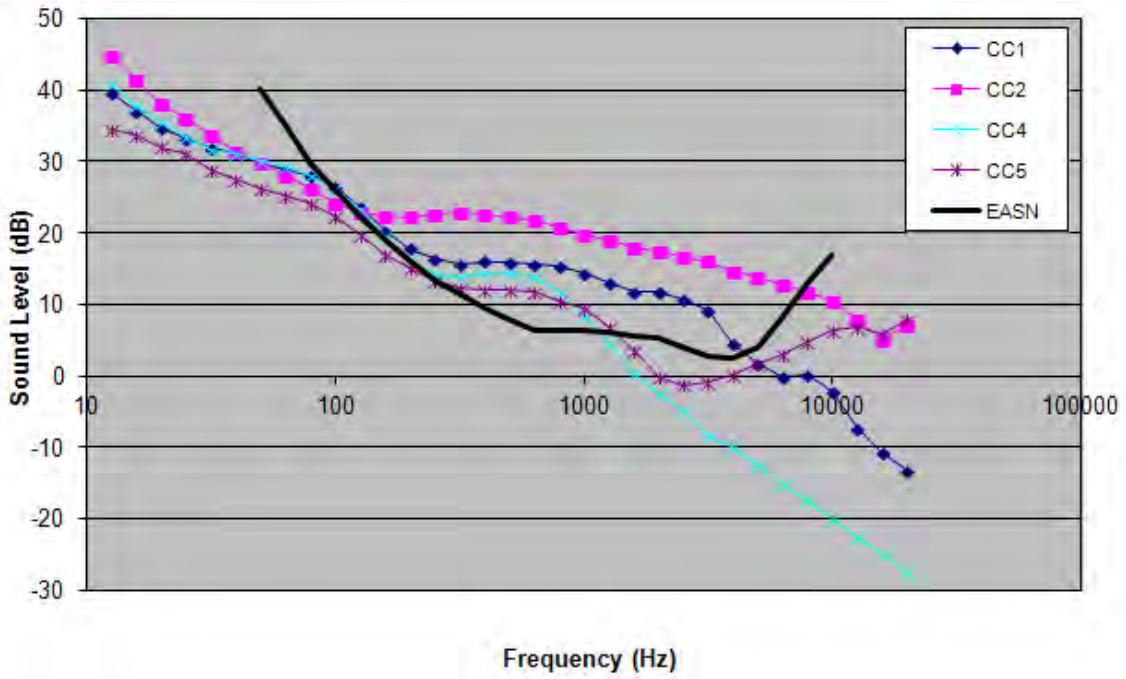


**Figure 18. Spectral data for the Natural Ambient ($L_{50}$) for each site for the winter season.***

* Also shown in each figure is the Equivalent Auditory System Noise (EASN), which represents the threshold of human hearing for use in modeling audibility using one-third octave-band data.

## 6.2 Temporal Trends

This section discusses the daily and diurnal trends of the data. Daily trends are shown on a 24-hour basis. Figure 19 and Figure 20 present the daily median Existing Ambient (i.e., the $L_{50}$ with all sounds included) for the summer and winter seasons, respectively. For the purpose of assessing daily trends in the data, sound level descriptors are computed for each individual hour; then the median from the 24 hours each day is determined. Dips and increases in daily sound levels are usually an indication of passing inclement weather and localized events. This data is useful in visually identifying potential anomalies in the data. Data anomalies would then be further examined from data recorded by the sound level meter and/or recorded audio samples.

Diurnal trends are shown on an hourly basis. Figure 20 presents the hourly median Existing Ambient (i.e., the $L_{50}$ with all sounds included) for the summer and winter seasons, respectively. Sites with a strong daytime diurnal pattern typically indicate the presence of human activity largely influencing the sound levels at those sites or a site that is subject to wind related sounds as wind increases throughout the daytime hours. Sites with a nighttime pattern typically indicate the presence of insect activity. Sites with little discernible pattern, e.g., somewhat constant across all hours, typically indicates a constant sound source. Examples of constant sound sources include nearby generators or shoreline surf. This data is also useful in visually identifying potential anomalies in the data.

Note: As stated earlier in Section 2.7.2, the FAA and NPS have agreed that impact assessment will be conducted using ambient sound levels during the time that the air tour operations occur – that is, daytime hours. Daytime (as used in this report) will refer to the time period 7 am to 7 pm; nighttime will refer to the time period 7 pm to 7 am.

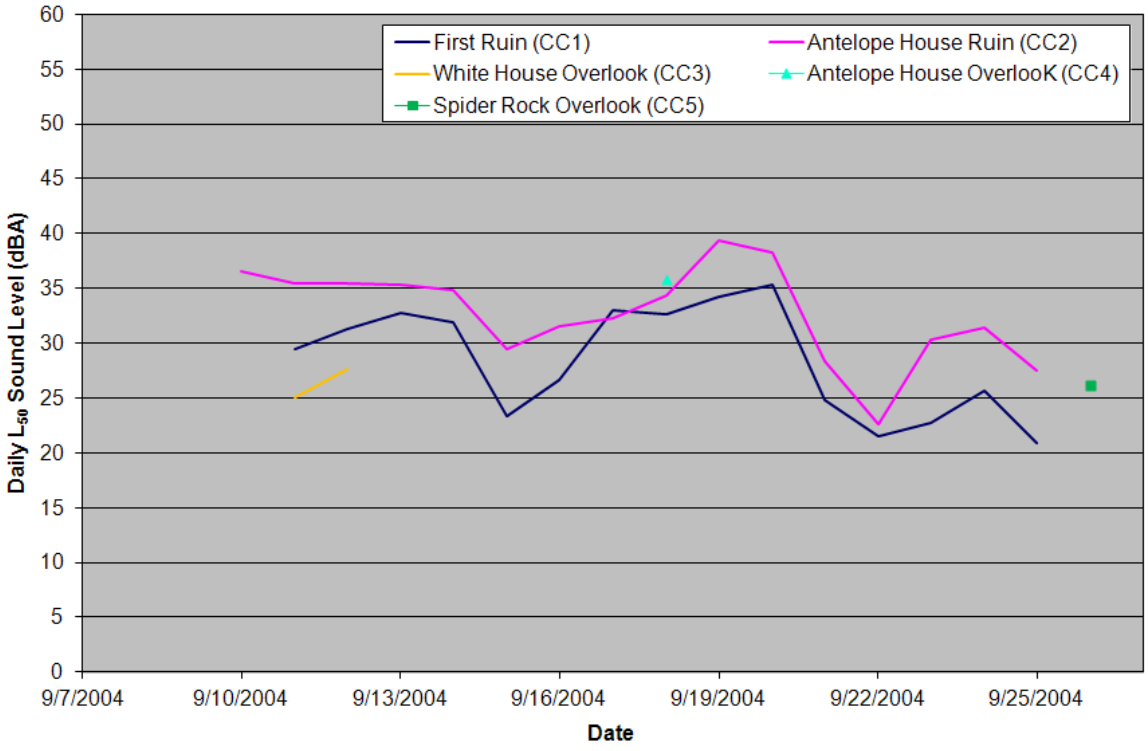


**Figure 19. Comparison of daily $L_{50}$ sound levels for all sites for the summer season.**

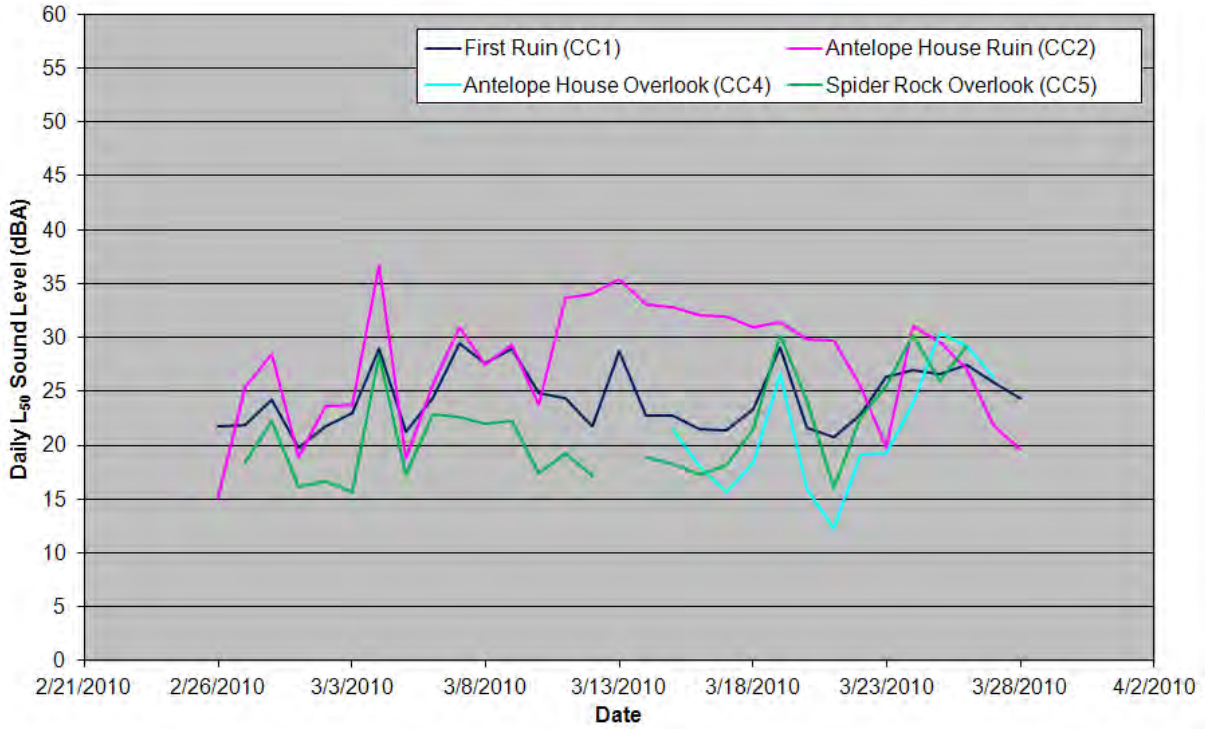


**Figure 20. Comparison of daily $L_{50}$ sound levels for all sites for the winter season.**

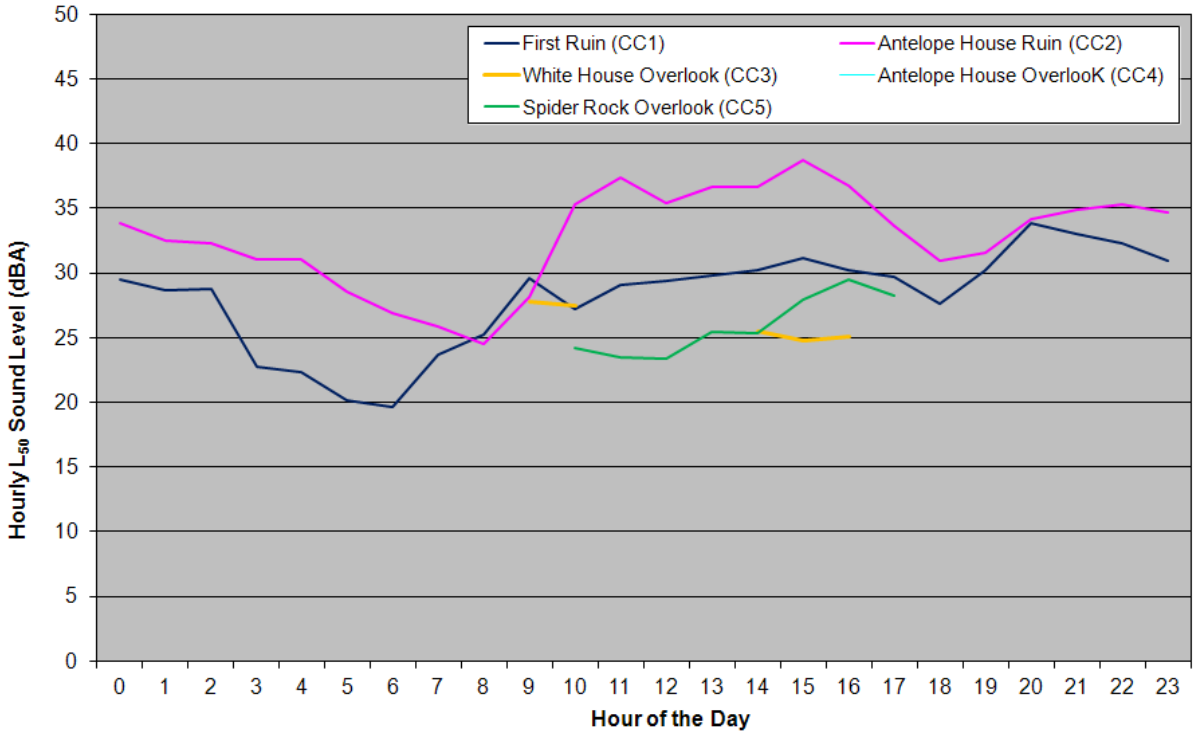


**Figure 21. Comparison of hourly $L_{50}$ sound levels for all sites for the summer season.**

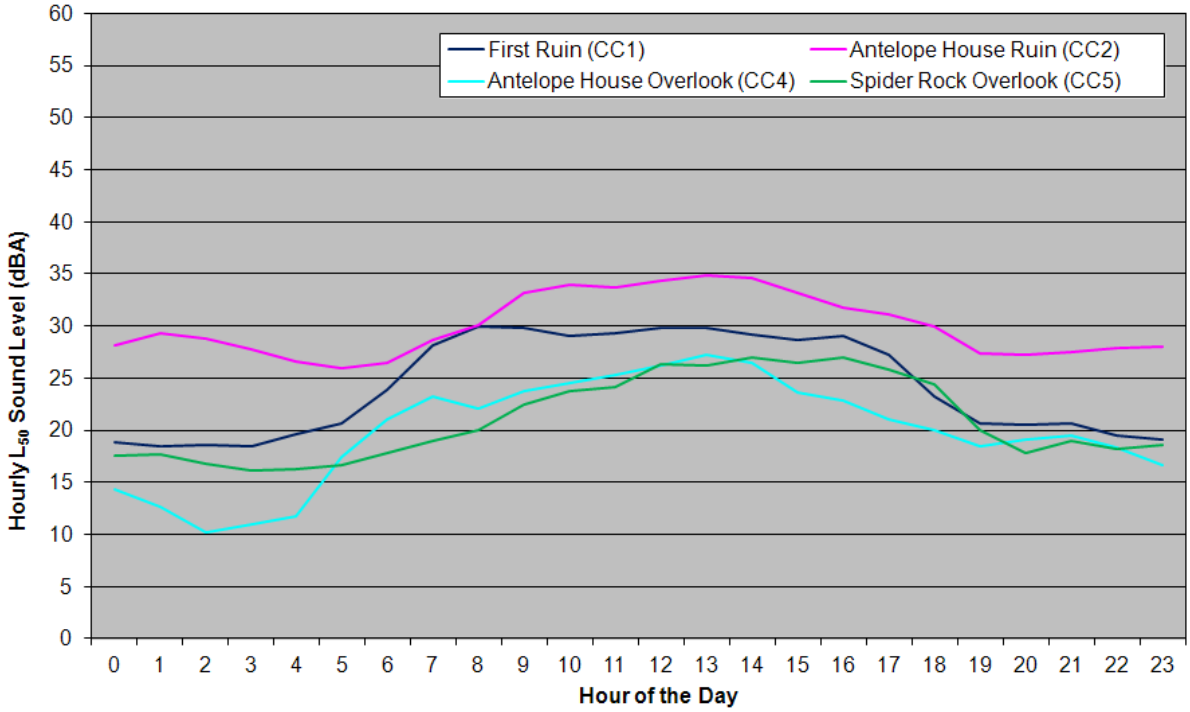


**Figure 22. Comparison of hourly $L_{50}$ sound levels for all sites for the winter season.**

## 6.3 Acoustic Observer Log Results

Table 11, Figure 23, and Figure 24 provide a summary of the acoustic observer data logged at each measurement site. This information gives an indication of the amount of time that certain sources are present at each site. Using the data in the acoustic observer logs, different characterizations of ambient can be *estimated* from the sound level data (as discussed in Section 5.7). The first four columns in the table are arranged as follows:

- *Acoustic Zone*: The acoustic and management zone in which the measurement site was located;
- *Site Name:* The name of the site;
- *Site ID*: The unique three-character ID representing the site "number";
- *Level of Visitor-Use*: A designator indicating expected visitor use (with "high" indicating sites such as overlooks, "moderate" indicating short hikes, and "low" indicating minimal or no visitor use such as in the wilderness/backcountry) in the measurement site area;

The next four columns define the percentage of time that different noise sources were audible to the acoustic observer. Events audible within the acoustic environment were categorized into one of three primary acoustic states, based on the following hierarchal order: (1) Aircraft intrusions; (2) Human intrusions; and (3) Natural sounds. For aircraft intrusions, the acoustic observer would attempt to discern whether the aircraft was an air tour operation, or other operation (i.e., commercial, general aviation, or military) based on visual and auditory cues (e.g., type of aircraft and proximity to known air tour routes). Examples of non-aircraft (human) intrusions include hikers, campers, talking, motor vehicles, etc. The natural category was documented when no aircraft or other human-made sounds could be heard.

- *Fixed-Wing Aircraft and Helicopters*: The percentage of observer log time that fixed-wing aircraft and helicopters were audible;
- *Other Aircraft*: The percentage of observer log time that air tour aircraft (e.g., commercial, military, general aviation, and agricultural) were audible;
- *Human*: The percentage of observer log time that human noise sources (visitor- and mechanical-related) were audible; and
- *Natural*: The percentage of observer log time that natural noise sources were audible.

**Table 11. Summary of acoustic observer log data (in situ and office listening combined) for all sites for both summer and winter seasons.**

| Acoustic Zone | Site Name | Site ID | Level of Visitor-Use | % Time Audible | | | |
|---|---|---|---|---|---|---|---|
| | | | | Fixed-Wing Aircraft and Helicopters | Other Aircraft | Other Human | Natural |
| **Summer Season** | | | | | | | |
| Frontcountry - Canyon | First Ruin | CC1 | Moderate | 6.0% | 7.1% | 30.4% | 56.5% |
| Backcountry - Canyon | Antelope House Ruin | CC2 | Moderate | 2.6% | 4.4% | 20.7% | 72.3% |
| Frontcountry - Rim | White House Overlook | CC3 | High | 5.0% | 8.9% | 65.3% | 20.8% |
| Frontcountry - Rim | Antelope House Overlook | CC4 | Moderate | 2.5% | 10.2% | 25.4% | 61.9% |
| Frontcountry - Rim | Spider Rock Overlook | CC5 | High | 7.9% | 16.3% | 62.4% | 13.4% |
| **Winter Season** | | | | | | | |
| Frontcountry - Canyon | First Ruin | CC1 | Low | 11.2% | 13.1% | 17.0% | 58.6% |
| Backcountry - Canyon | Antelope House Ruin | CC2 | Low | 2.8% | 5.9% | 23.7% | 67.7% |
| Frontcountry - Above Rim | White House Overlook | CC3 | Moderate | NA | NA | NA | NA |
| Frontcountry - Above Rim | Antelope House Overlook | CC4 | Moderate | 5.0% | 13.0% | 7.5% | 74.5% |
| Frontcountry - Above Rim | Spider Rock Overlook | CC5 | Moderate | 2.6% | 18.2% | 27.8% | 51.4% |

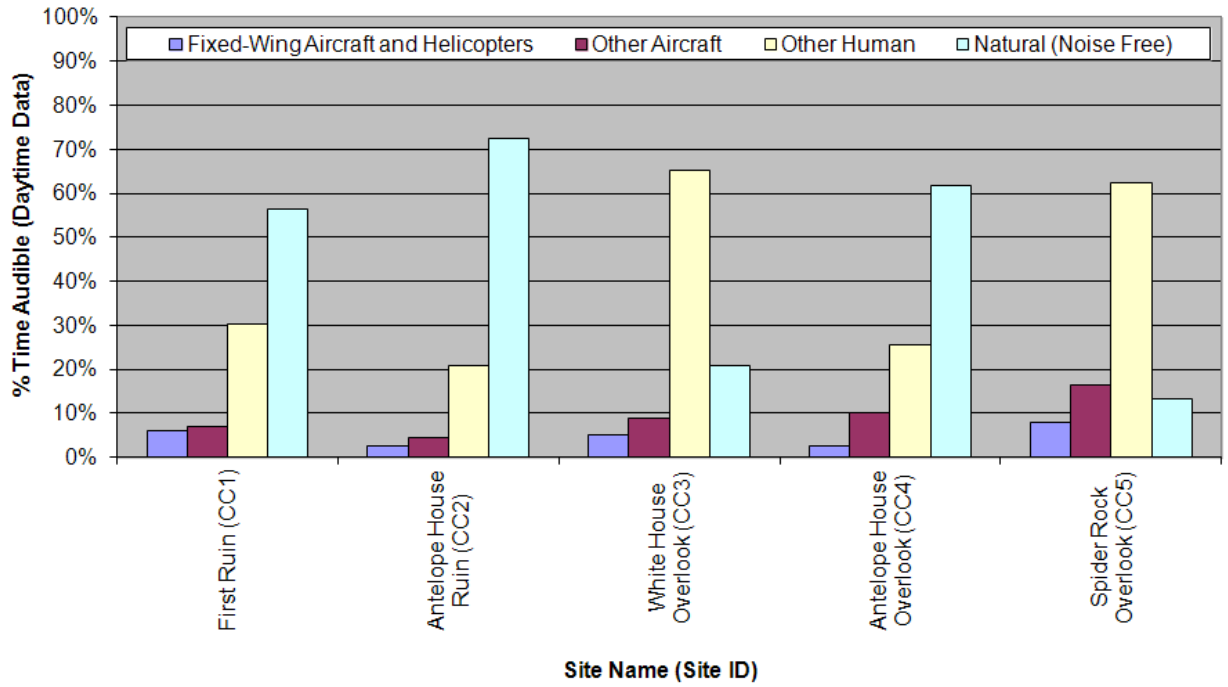


**Figure 23. Summary of acoustic observer log data (in situ and office listening combined) for all sites for the summer season.**

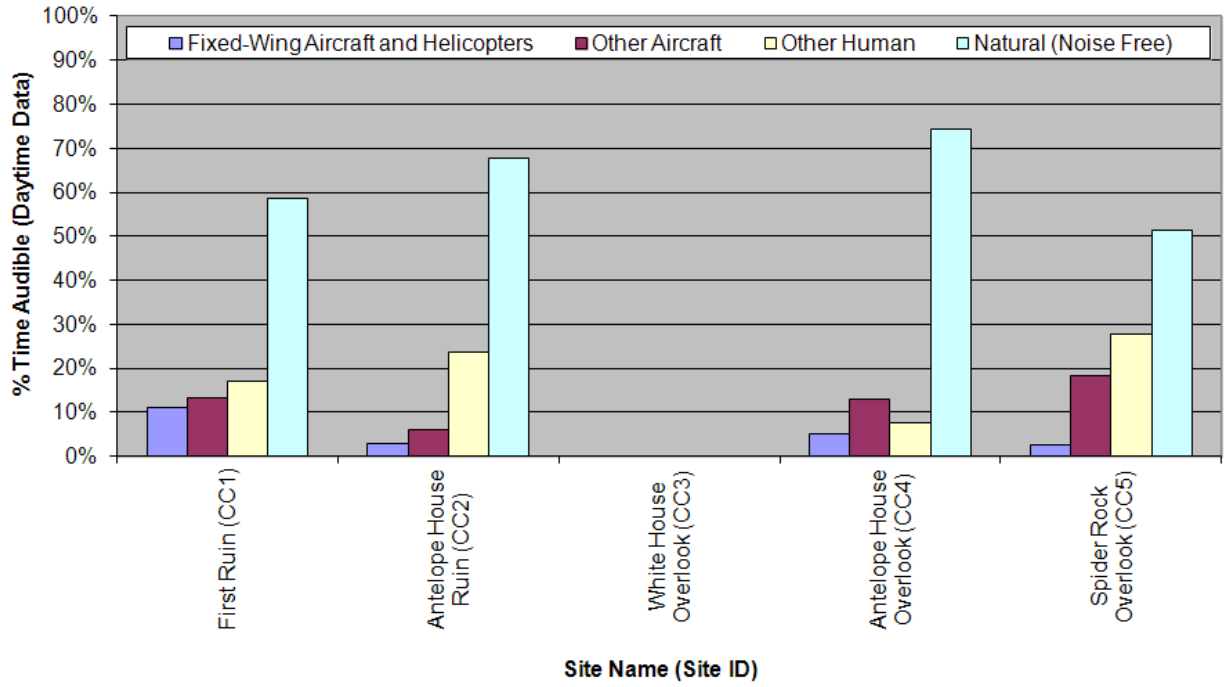


**Figure 24. Summary of acoustic observer log data (in situ and office listening combined) for all sites for the summer season.**

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# 7. AMBIENT MAPPING

As stated earlier, the primary objective of this study was to quantify the baseline ambient sound levels within the park to establish a foundation from which potential noise impacts due to air tour operations can be assessed. This was accomplished by developing a comprehensive grid of ambient sound levels (i.e., ambient maps) throughout the park.

The measured data provide the base layer for the map and are then combined with the contributing effect of roads and localized noise sources (see Section 7.2), such as waterfalls, and river rapids, to develop a final, composite, ambient map of the park. Ambient maps are useful to: (1) graphically characterize the ambient environment throughout an entire study area; and (2) to establish baseline, or background values in computer modeling from which various noise-related descriptors may be computed (e.g., percentage of time aircraft sounds are above the ambient). The descriptors could then be used in the assessment of potential noise impacts due to aircraft operations.

The development of ambient maps is accomplished using Geographic Information System (GIS). In GIS, the following actions are performed:

- Define the input "objects":
  - Define the park boundary in Universal Transverse Mercator (UTM)* coordinates to set the initial grid area boundary.†
  - Divide the park into a regular grid of points at a desired spacing using a Digital Elevation Model (DEM), which is a digital representation of a topographic surface typically used in GIS applications. Each point is assigned an elevation value and UTM coordinates from the DEM. Note: For Canyon de Chelly, a grid spacing of 500 ft (152.4 m) was used.
  - Define the acoustic zone boundaries in UTM coordinates.
  - Define the location of each measurement site.
- Assign a "measured" ambient sound level (and its associated one-third octave-band, unweighted spectrum), to each grid point within an acoustic zone based on the measurement site nearest to it (see Section 7.1).

For development of all ambient maps, except for Natural Ambient, three additional steps are performed:

- Define the location of localized noise sources, primarily vehicles on roads, but may also include trains, waterfalls, and river rapids. The closest distance to each source is calculated and assigned to each grid point.
- Assign an ambient sound level (and its associated one-third octave-band, unweighted spectrum) for each roadway to each grid point using the drop-off rates determined by computer modeling discussed in Section 7.2.
- Compute a combined measured and roadway ambient (and spectra). This is performed by using energy-addition, i.e., sound levels in decibels were converted to energy prior to addition.

The resultant ambient maps are presented in Section 7.3.

* The UTM system provides coordinates on a worldwide flat grid for easy manipulation in GIS applications.
† Because the ATMP Act applies to all commercial air tour operations within the ½-mile outside the boundary of a national park, the park boundary included a ½-mile buffer.

## 7.1 Assignment of Measured Ambient Data to Acoustic Zones

As discussed in Section 2.6, areas of like vegetation, topography, elevation, and climate were grouped into "acoustic zones," with the assumption that similar wildlife, physical processes, and other sources of natural sounds occur in similar areas with similar attributes. With the goal of site selection to ensure at least one measurement location within each of the acoustic zones, "measured" ambient sound level (and its associated one-third octave-band, unweighted spectrum) for each measurement site is assigned to an acoustic zone. Figure 25 presents the acoustic zones that were developed and the location of the measurement sites for Canyon de Chelly. Table 12 presents which measurement site data were applied to each acoustic zone.

**Table 12. Assignment of ambient data to acoustic zones.**

| Acoustic Zone | Site ID | Site Name |
|---|---|---|
| Frontcountry - Canyon | CC1 | First Ruin |
| Backcountry - Canyon | CC2 | Antelope House Ruin |
| Frontcountry - Rim | CC3<br>CC4<br>CC5 | White House Overlook<br>Antelope House Overlook<br>Spider Rock Overlook |

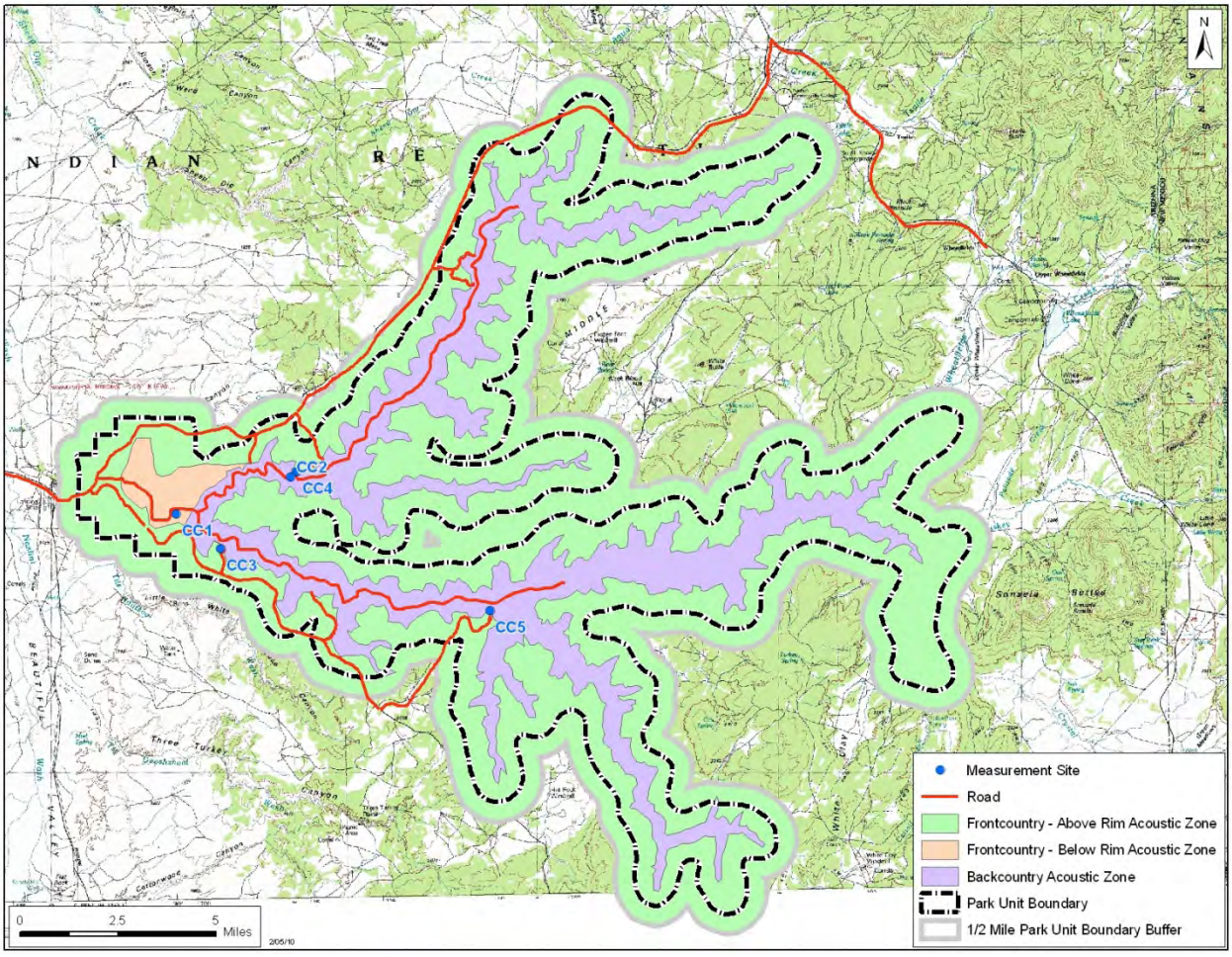


**Figure 25. Final acoustic zones and measurement sites for Canyon de Chelly.**

## 7.2 Ambient Mapping of Localized Sound Sources

The contributing effect of localized noise sources, primarily vehicles on roads, but may also include trains, waterfalls, and river rapids, are typically modeled and combined with the measured sound levels to develop a composite, baseline, ambient "map" of a park for all ambient maps, except natural ambient (see Table 13). The combined (measured plus roadway, for example) ambient are computed by using energy-addition, i.e., sound levels in decibels were converted to energy prior to addition. Roadway sound sources were modeled using the Federal Highway Administration's Traffic Noise Model® (TNM),[2] where the estimated drop-off rate, reflecting a continuous decrease in sound level as a function of increasing distance from each sound source, was computed. For a non-time-varying source, such as roadway noise, the TNM-computed $L_{Aeq}$ sound level parameters may be conservatively assumed to be equivalent to the $L_{50}$ and $L_{90}$ and, thus, used interchangeably as the "roadway" ambient.

**Table 13. Composite ambient maps.**

| Metric | Ambient Type | | | |
|---|---|---|---|---|
| | Existing | Existing Without Sound Source of Interest | Existing Without All Aircraft | Natural |
| $L_{50}$ | Measured + Localized Noise Source(s) | Measured + Localized Noise Source(s) | Measured + Localized Noise Source(s) | Measured |

In the vicinity of and within Canyon de Chelly, there were a number of roadways. The following general assumptions were made in the modeling:

- Roadway Traffic Volumes – Annual traffic volume on each roadway was determined using data collected by NPS and the Arizona Department of Transportation (AZDOT). The AZDOT (http://mpd.azdot.gov/mpd/data/aadt.asp). Where data are available for multiple years, the most current year was chosen. The traffic volume for an average day during the actual summer month (August) and the peak winter month (December) was obtained by using monthly visitation data obtained from the NPS Public Use Statistics Office website (http://www2.nature.nps.gov/stats/) to apportion the AZDOT annual traffic. Hourly volume is estimated by dividing the month's volume by the number of days in the month (31) and by 12 hours per day, which assumes the majority of traffic for Canyon de Chelly occurs between 7 am and 7 pm – typical commute hours.
- Roadway Traffic Mix and Speeds –The traffic mix and speeds on a given roadway were based on two sources: (1) The NPS Monthly Usage information (http://nature.nps.gov/stats/viewReport.cfm?selectedReport=ParkMonthlyReport.cfm; and (2) observations by field personnel during site visits. In some cases, a specific speed limit was determined using Google Maps using the "street view" to view an actual speed limit sign. When multiple speed limit signs showed varying speeds over a single road segment, an average. In some specific cases, notations from the Volpe field notes en route to measurement site locations were used to determine speed limits over various segments. An average speed of 35 mph was assumed as the default within the park when another more specific speed limit could not be determined.

- Ground Impedance – An effective flow resistivity of 1000 cgs/rayls was used for Canyon de Chelly.

**Table 14. Estimated hourly roadway traffic volume and speed for both summer and winter seasons.**

| Roadway | | | Estimated hourly volume | | | | |
|---|---|---|---|---|---|---|---|
| # | Name | Average Speed (mph) | Autos | Medium Trucks | Heavy Trucks | Buses | Motor -cycles |
| **Summer Season** | | | | | | | |
| 1 | Route 7 | 35 | 541 | 0 | 0 | 3 | 0 |
| 2 | North Rim Drive | 50 | 68 | 0 | 2 | 0 | 0 |
| 3 | South Rim Drive | 35 | 131 | 0 | 0 | 3 | 0 |
| 4 | Chinle Wash | 5 | 0 | 0 | 0 | 3 | 0 |
| **Winter Season** | | | | | | | |
| 1 | Route 7 | 35 | 486 | 0 | 0 | 0 | 0 |
| 2 | North Rim Drive | 50 | 141 | 0 | 4 | 0 | 0 |
| 3 | South Rim Drive | 35 | 59 | 0 | 0 | 0 | 0 |
| 4 | Chinle Wash | 5 | 0 | 0 | 0 | 7 | 0 |

## 7.3 Final Ambient Maps

The two ambient maps agreed upon for use in ATMP analyses are:

- Existing Ambient Without Air Tours (i.e., the Source of Interest); and
- Natural Ambient.

Figure 26 through Figure 29 present the four ambient maps for the summer and winter seasons, respectively.

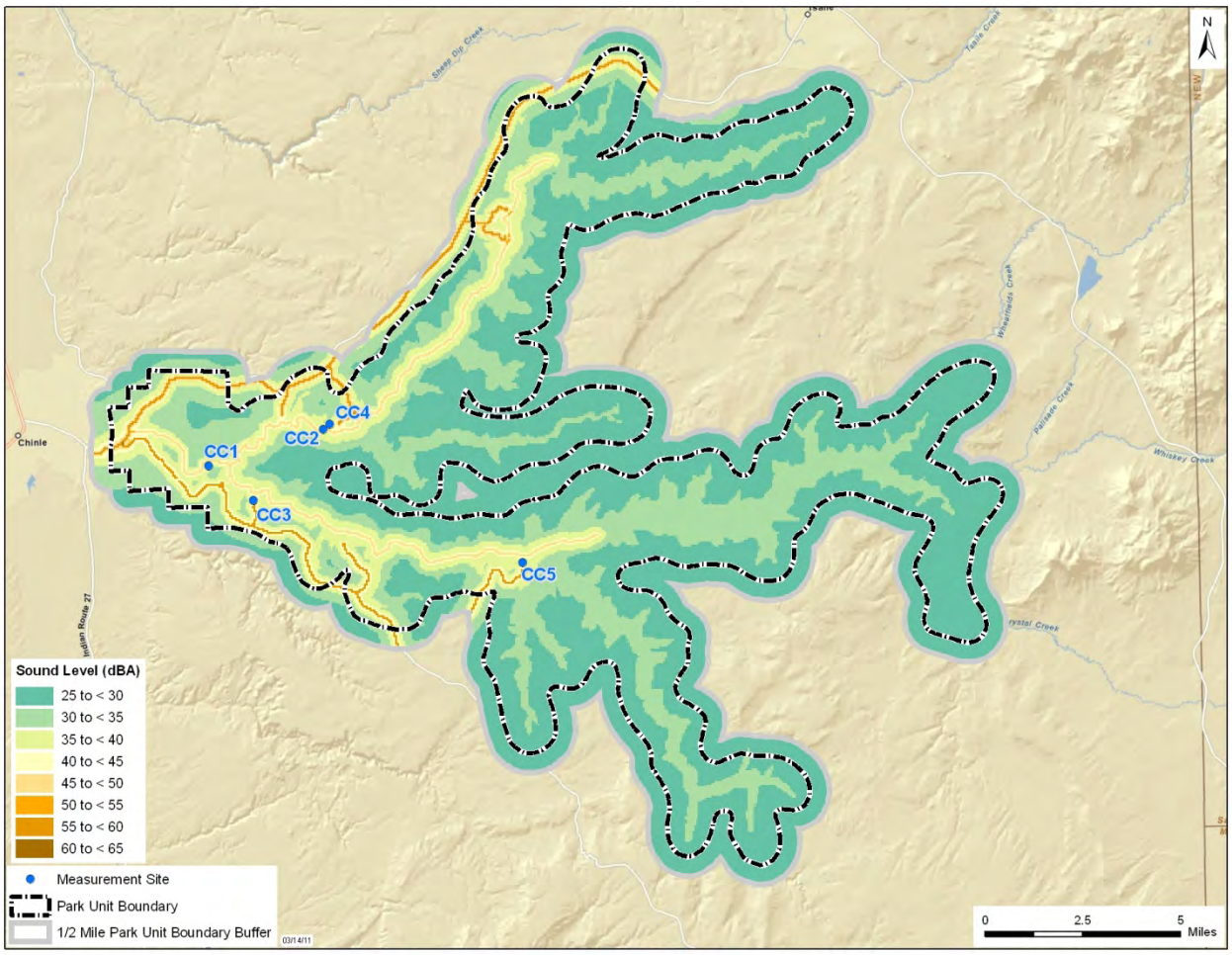


**Figure 26. Baseline ambient map: Existing Ambient Without Air Tours ($L_{50}$) for the summer season.**

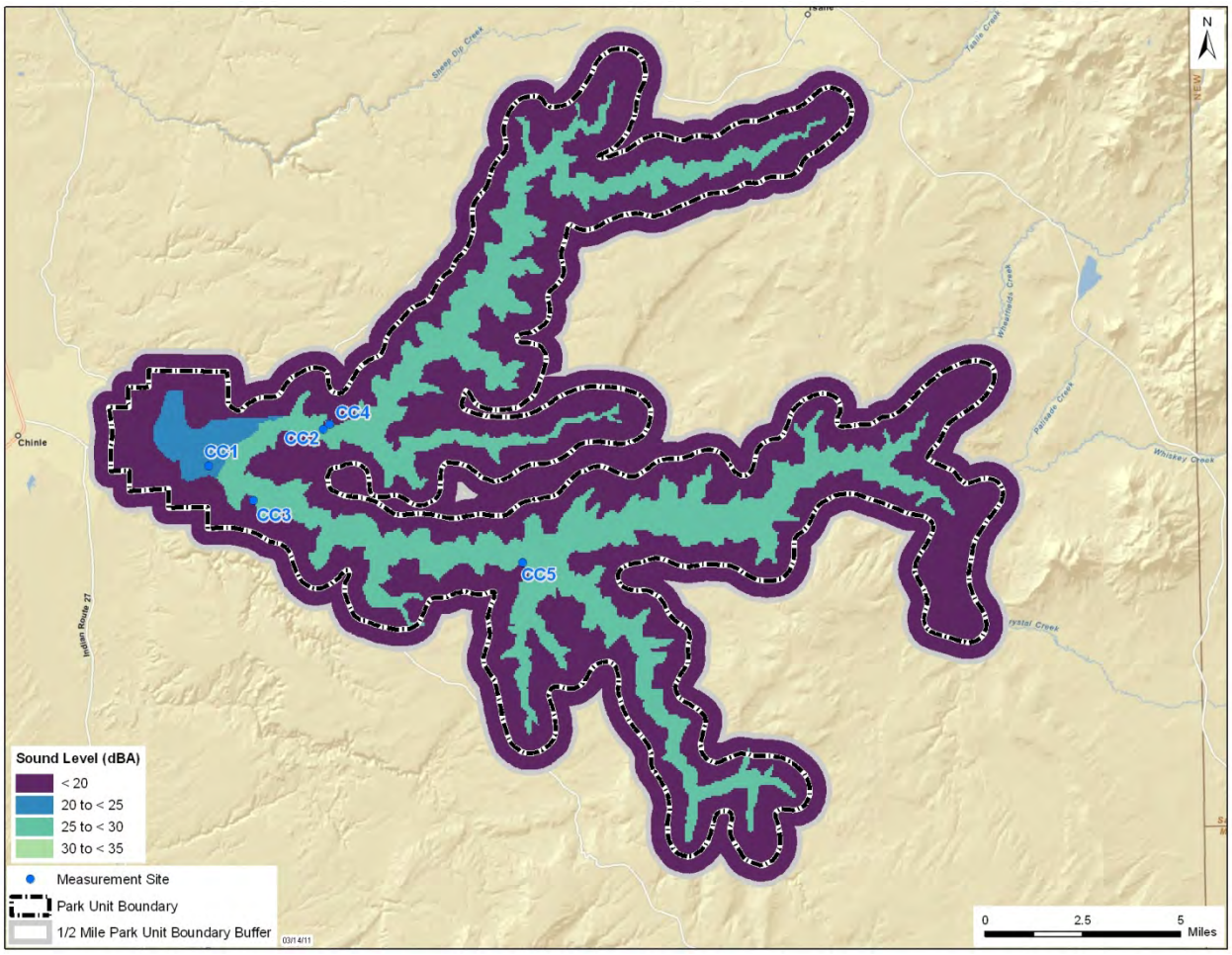


**Figure 27. Baseline ambient map : Natural Ambient ($L_{50}$) for the summer season.**

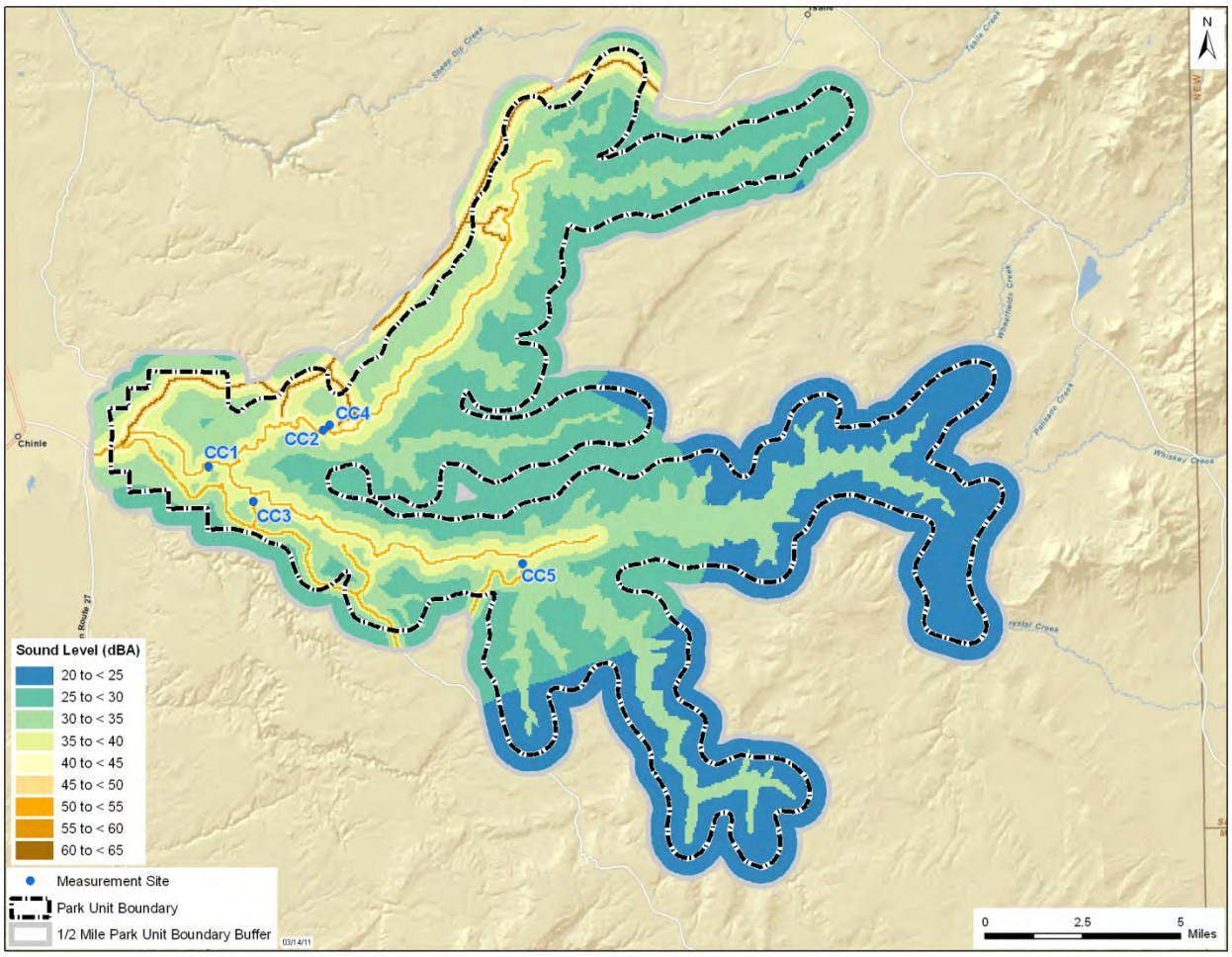


**Figure 28. Baseline ambient map: Existing Ambient Without Air Tours ($L_{50}$) for the winter season.**

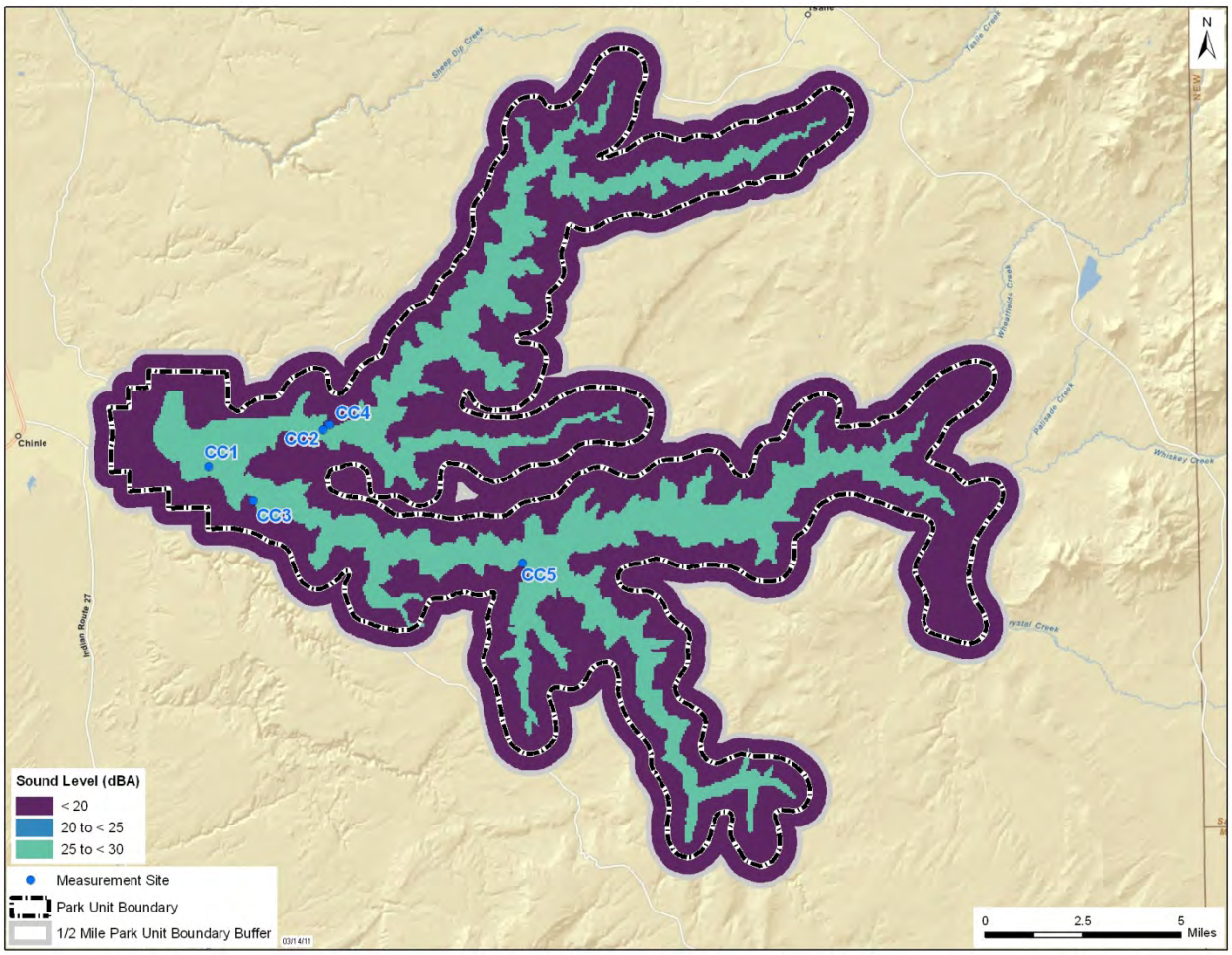


**Figure 29. Baseline ambient map : Natural Ambient ($L_{50}$) for the winter season.**

# APPENDIX A. MEASUREMENT SITE DETAILS

This section provides more detailed information for each individual site. For each site, the following are included:

- A photograph of the measurement site and a brief discussion of preliminary observations;
- A pie chart presenting a comparison of types of sound sources that were audible during observer logging;
- A graphic presenting distribution plots of the number of 1-second samples of each sound pressure level measured during daytime and nighttime hours, and daytime/nighttime combined;
- A graphic presenting the daily sound levels using three hourly A-weighted metrics ($L_{Aeq}$, $L_{50}$, and $L_{90}$ - refer to Terminology for definitions), as well as average daily wind speeds over the entire measurement period;
- A graphic presenting the hourly sound levels using three hourly A-weighted metrics ($L_{Aeq}$, $L_{50}$, and $L_{90}$ - refer to Terminology for definitions), as well as average hourly wind speeds over the entire measurement period

## A.1 Site CC1 – First Ruin

**Figure 30. Site CC1: Description and photograph.**

**Observations**

The CC1 site was located in the backcountry and accessible via the Chinle Wash, approximately 1.5 miles from the Visitor Center. The acoustic monitoring system was placed on a large rock structure about 30 feet above the canyon floor with a clear view of First Ruin. The ground was comprised of rock/gravel with some scrub vegetation. The canyon walls were sheer sandstone. Sound sources present at this location were primarily natural (wind-related and birds), but also included vehicles from ground tours moving through the canyon, as well as an occasional propeller and jet aircraft.

The summertime sound level distribution for this site indicates that the levels during the day have much different characteristics than at night. The daytime data has a normal distribution, while the nighttime distribution has two peaks, indicating two distinct sources or a combination of time periods with distinctly different sound environments, e.g., insect activity during some nighttime hours, but not all. The diurnal trend of wind related sounds throughout the day and insect activity at night is indicated in the hourly sound level results. In general, daytime sound levels ranged from approximately 20 to 40 dBA (the $L_{50}$ was 28.3 dBA); nighttime sound levels ranged from 15 to 38 dBA (the $L_{50}$ was 28.9 dBA). The twenty-four hour $L_{50}$ sound levels varied from 21 dBA to 35 dBA with very quiet conditions occurring during the early morning hours of 5 to 6 am.

The winter measurements showed similar overall sound level results as the summer (Summer $L_{50}$ 28.3 dBA; Winter $L_{50}$ 28.5 dBA), but with a more distinctive diurnal pattern in the winter. The hourly sound levels indicate a diurnal pattern that appears wind related and resulted in daytime sound levels to exceed night time levels by about 10 dBA. The twenty-four hour $L_{50}$ sound levels ranged from 17 dBA to 30 dBA. Specific louder days occurred on March 7, 2010 and March 20, 2010 due to rain and gusty winds causing elevated sound levels during those days.

On-site observations and off-site review of recorded audio data concluded that human-related sounds were audible at the First Ruin site 43.5% of daytime hours (7 am to 7 pm) during the summer season and 41.4% during the winter. Aircraft were audible 13.1% during the summer and 24.3% in the winter season. Sounds from vehicles in the canyon or on the canyon rim road were the second most prevalent Other human sound at this site. Natural sounds were primarily wind and bird vocalizations. Sounds from rain were more prevalent (5% of the daytime hours) during the winter season.

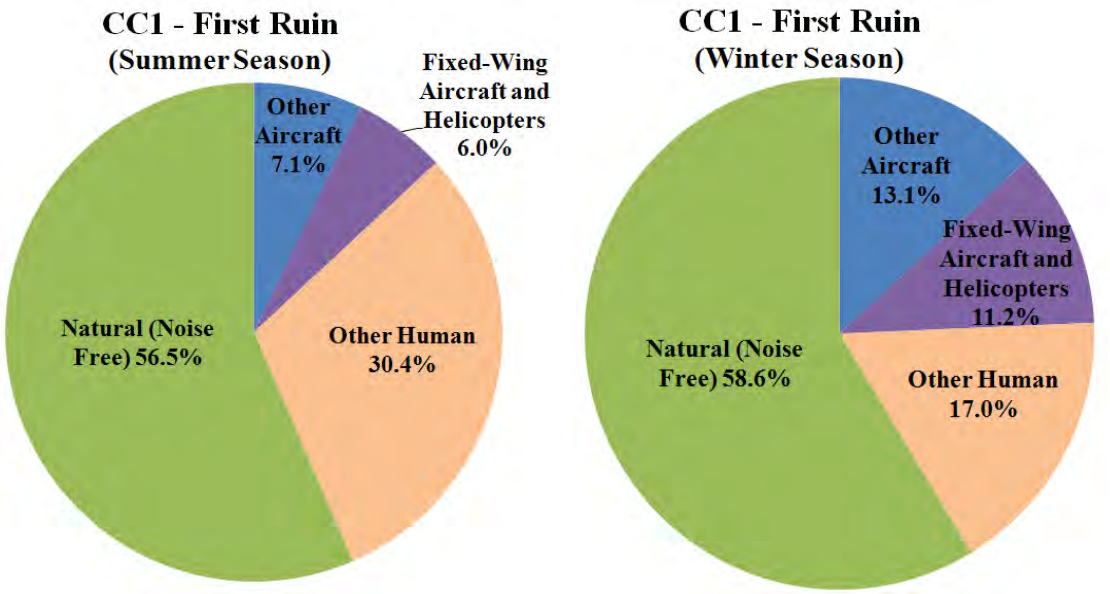


**Figure 31. Distribution of sound sources audible (in situ and office listening combined) for Site CC1 for the summer and winter season.**

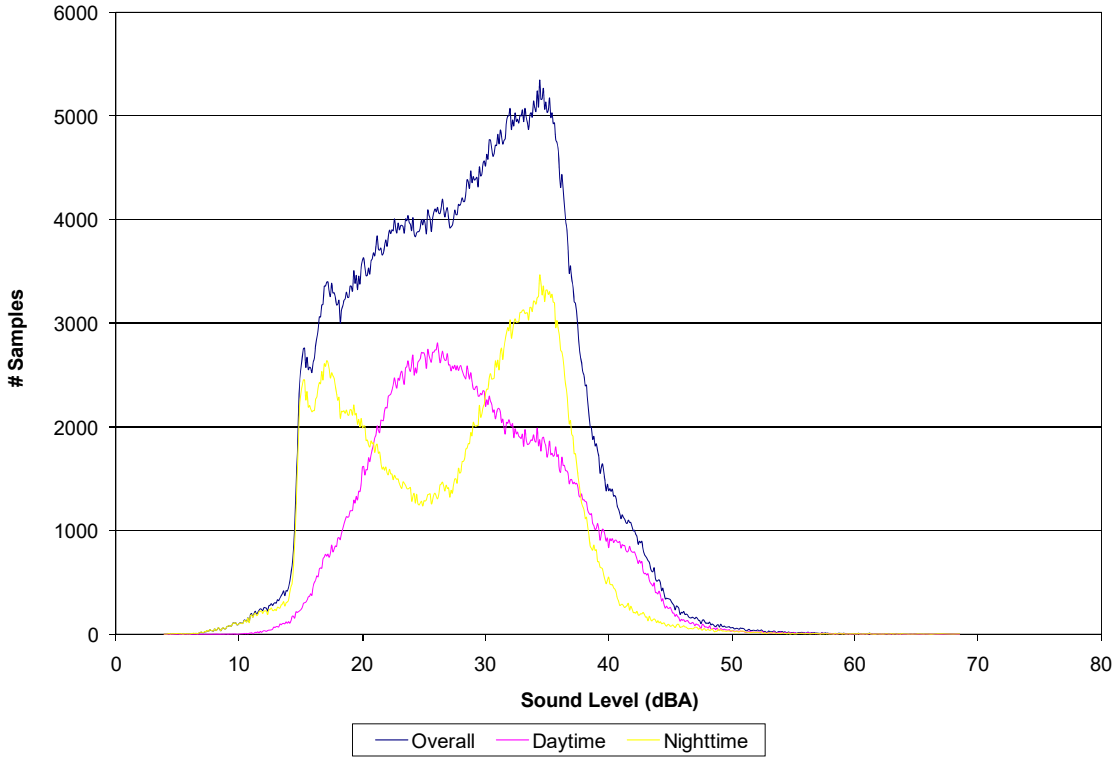


**Figure 32. Distribution of data for Site CC1 for the summer season.**

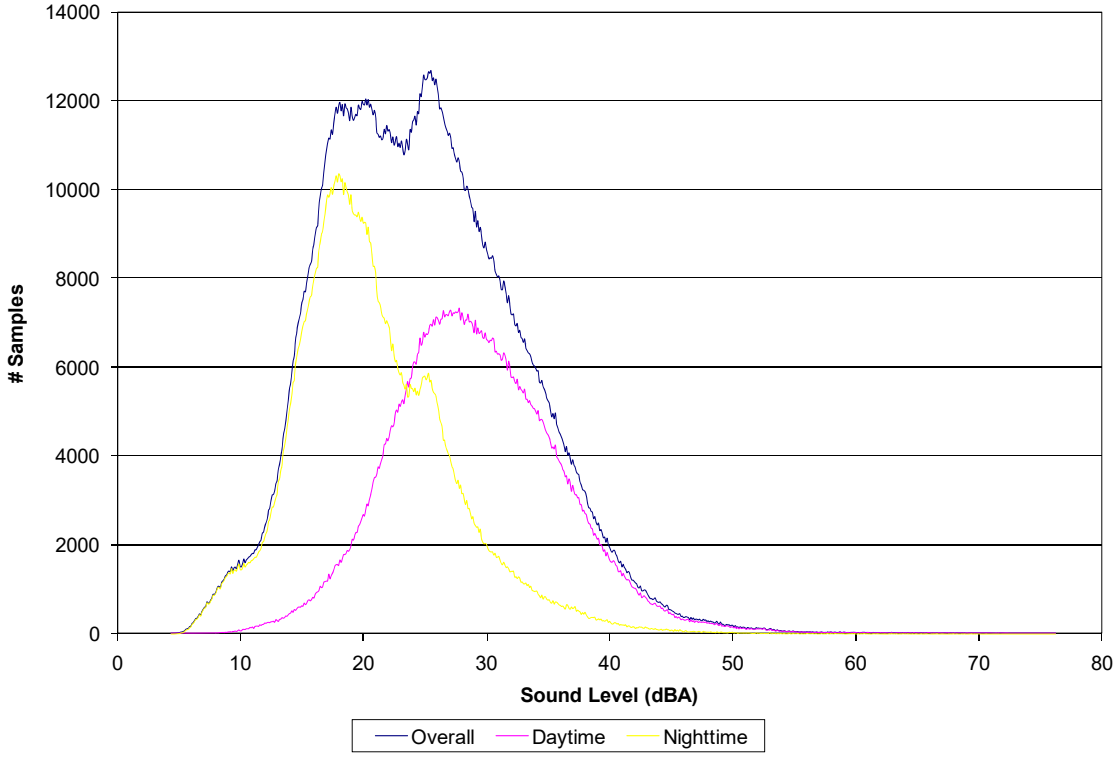


**Figure 33. Distribution of data for Site CC1 for the winter season.**

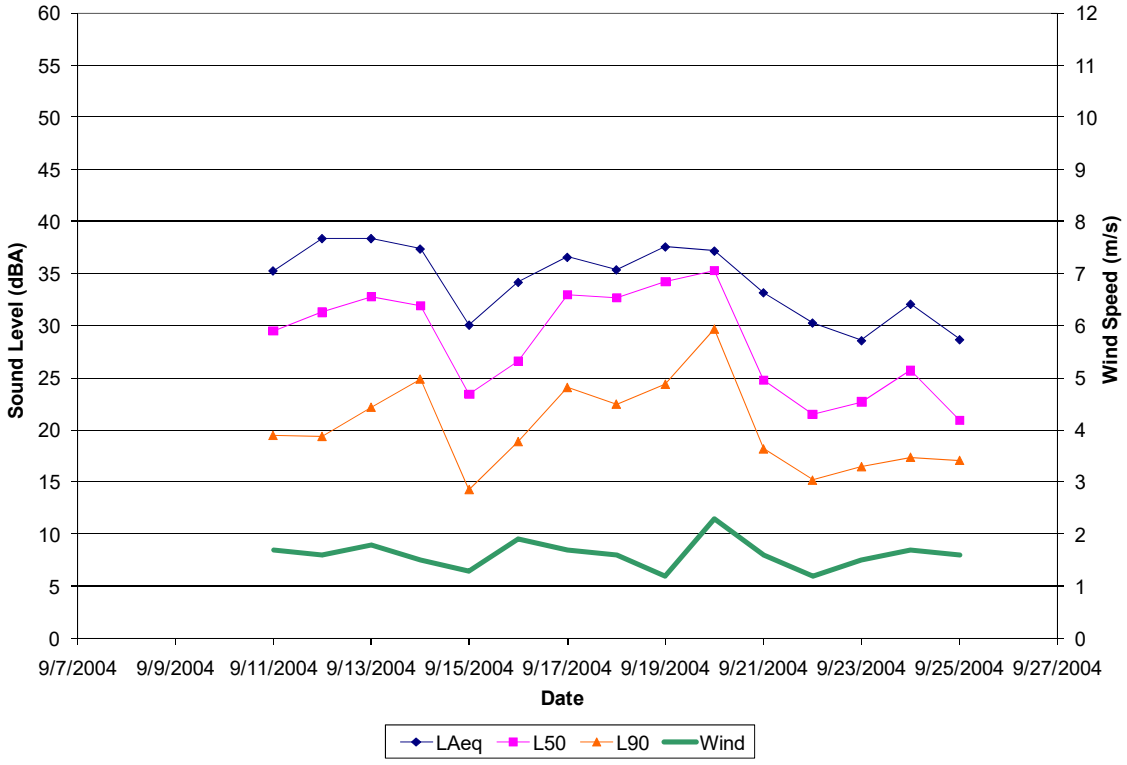


**Figure 34. Daily sound levels and wind speeds for Site CC1 for the summer season.**

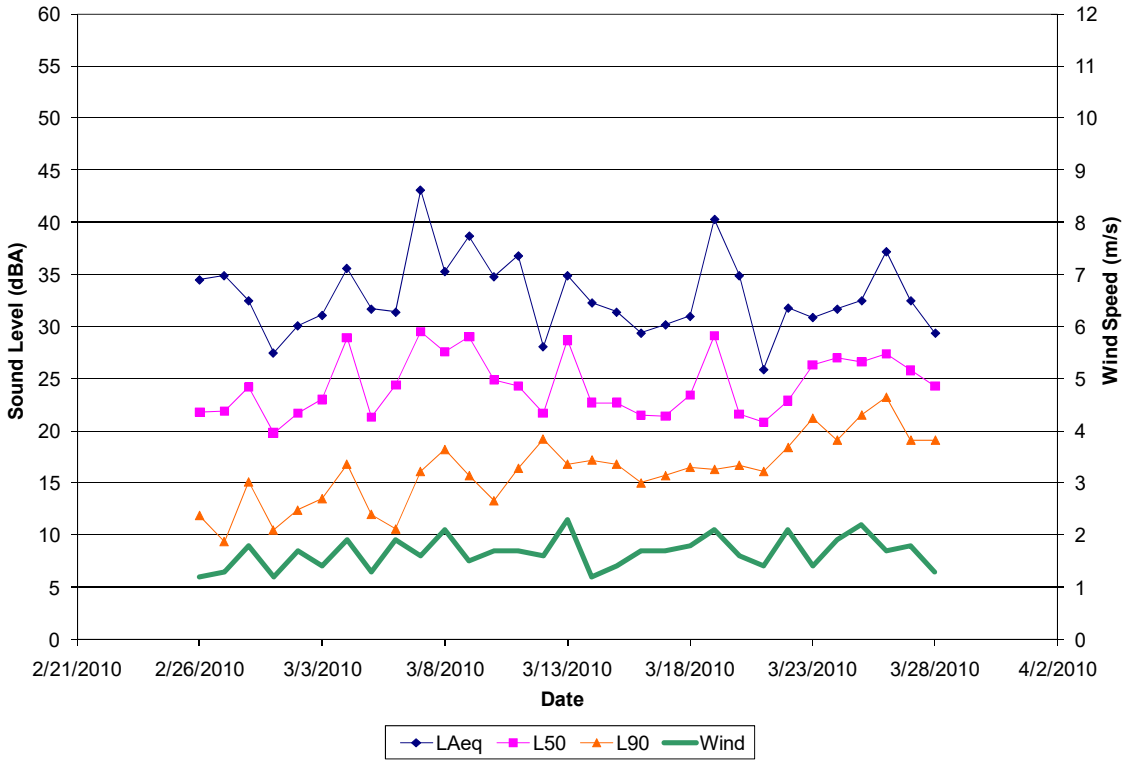


**Figure 35. Daily sound levels and wind speeds for Site CC1 for the winter season.**

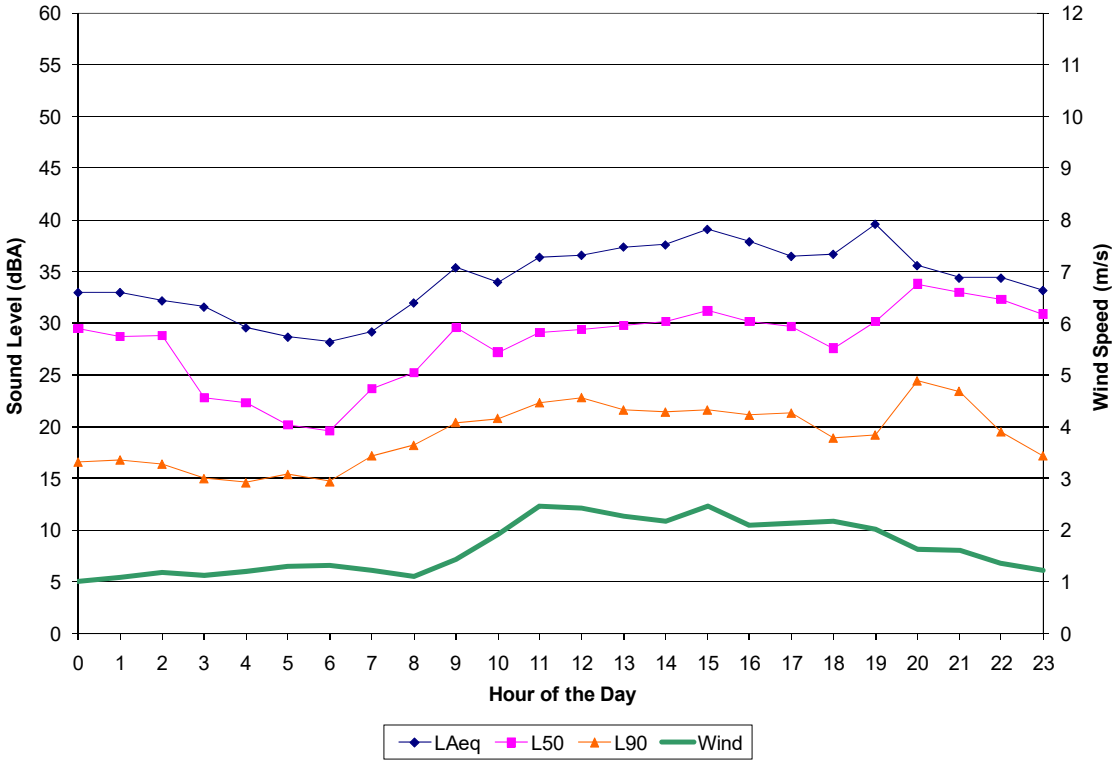


**Figure 36. Hourly sound levels and wind speeds for Site CC1 for summer season.**

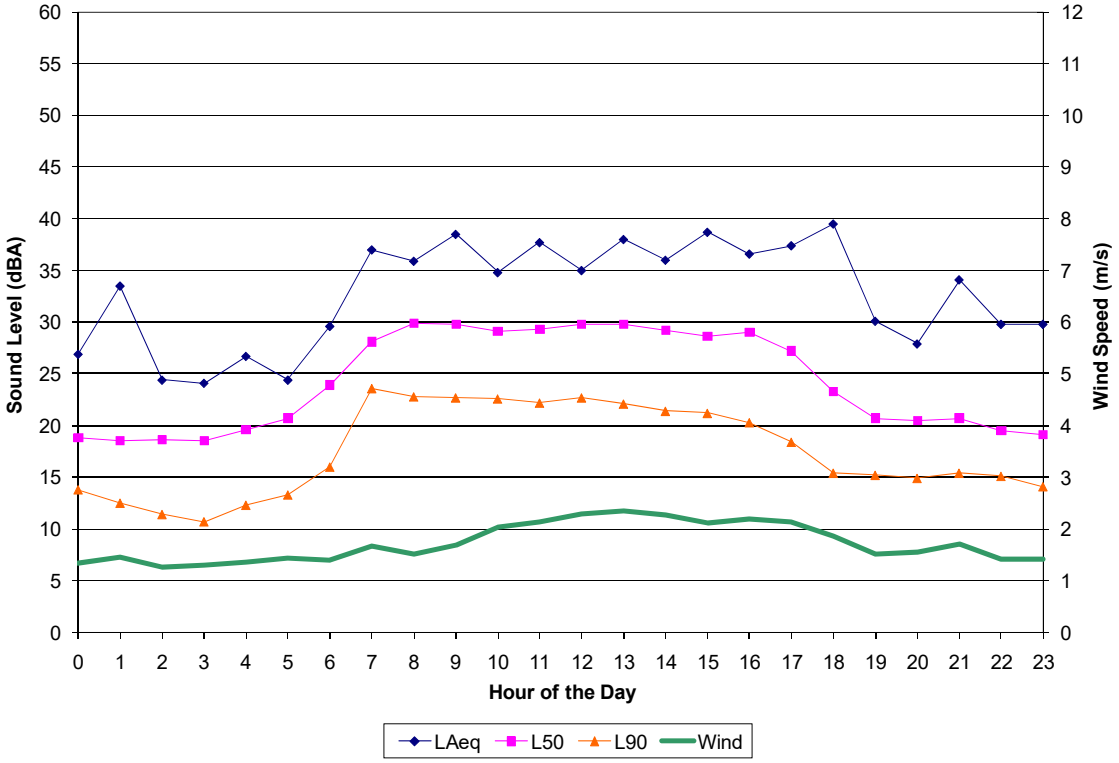


**Figure 37. Hourly sound levels and wind speeds for Site CC1 for winter season.**

## A.2 Site CC2 – Antelope House Ruin

**Figure 38. Site CC2: Description and photograph.**

**Observations**

The CC2 site was located in the backcountry near the Antelope House Ruin – a popular destination for visitors. The acoustic monitoring system was placed in the middle of a sandy pasture and within visual distance of the Antelope House Ruin. Sound sources present at this location were primarily natural (wind-related and birds), but also included visitors and vehicles from ground tours stopping at the ruin, a small generator, and occasional propeller and jet aircraft. Several times a day, a flute is played at the ruin to entertain and attract visitor attention.

The data distribution of summer daytime and nighttime sound levels is similar. There is a slight diurnal trend of wind related sounds and visitor-use during daytime hours is shown in the hourly sound level results. In general, daytime sound levels ranged from approximately 16 to 56 dBA (the $L_{50}$ was 33.2 dBA); nighttime sound levels ranged from 16 to 52 dBA (the $L_{50}$ was 32.4 dBA). The twenty-four hour summer sound levels varied from 23 dBA to 39 dBA with indication of louder events occurring near the midday time period.

The winter measurements showed similar overall sound level results as the summer (Summer $L_{50}$ 33.2 dBA; Winter $L_{50}$ 32.2 dBA) with the winter levels slightly lower than summer. A loud day occurred on March 4, 2010 and this was due to inclement weather that included rain and gusting winds.

On-site observations and off-site review of recorded audio data concluded that human-related sounds were audible at the CC2 location for 27.7% of the daytime hours in the summer season and 32.3% during the winter season. Aircraft sounds were audible for 7% of the daytime hours

in the summer and accounted for 8.6% of the human sounds in the winter season. Other human sounds in the canyon included vehicle traffic, sounds from visitors talking and other vehicle-related sounds. Natural sounds at CC2 were primarily wind, water-related sounds, and bird vocalizations.

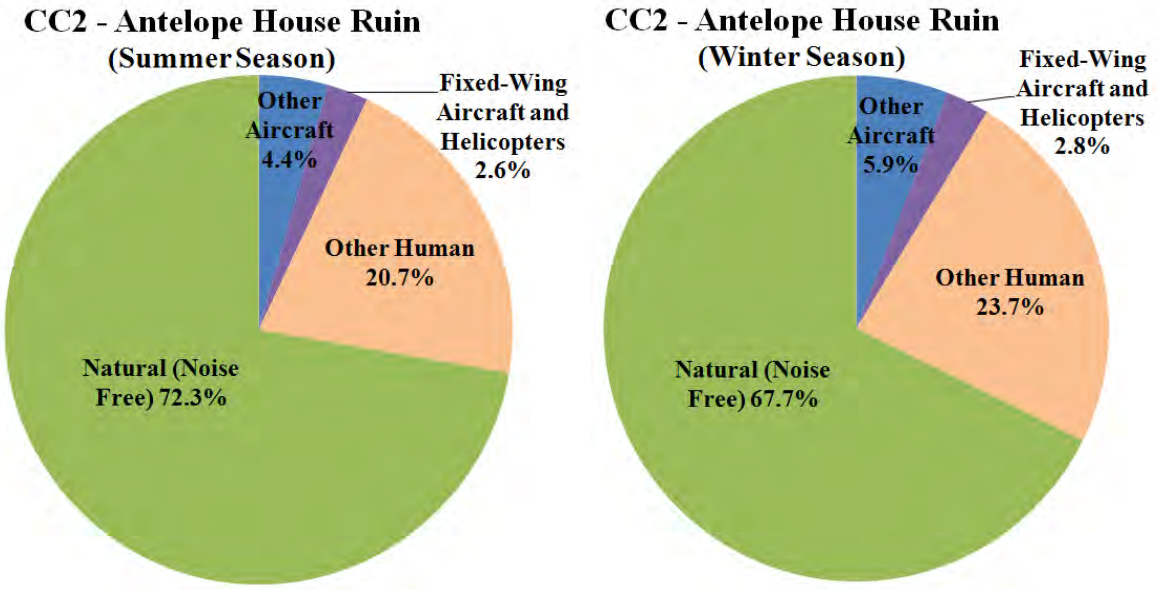


**Figure 39. Distribution of sound sources audible (in situ and office listening combined) for Site CC2 for the summer and winter seasons.**

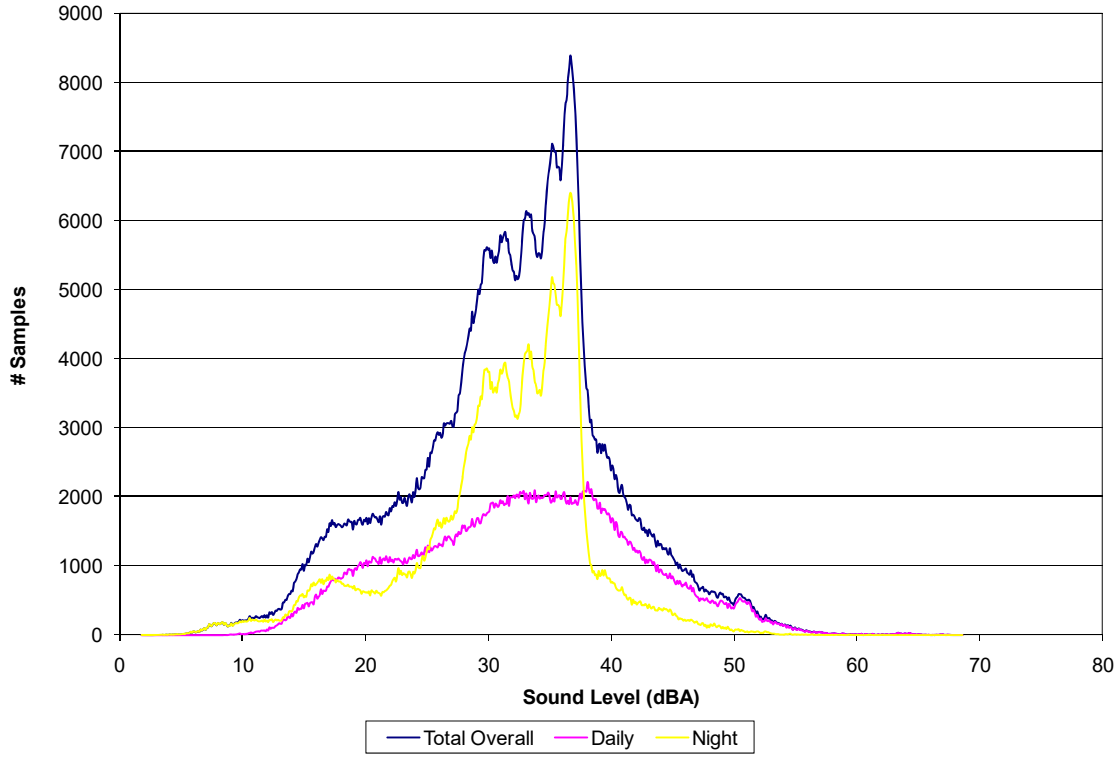


**Figure 40. Distribution of data for Site CC2 for the summer season.**

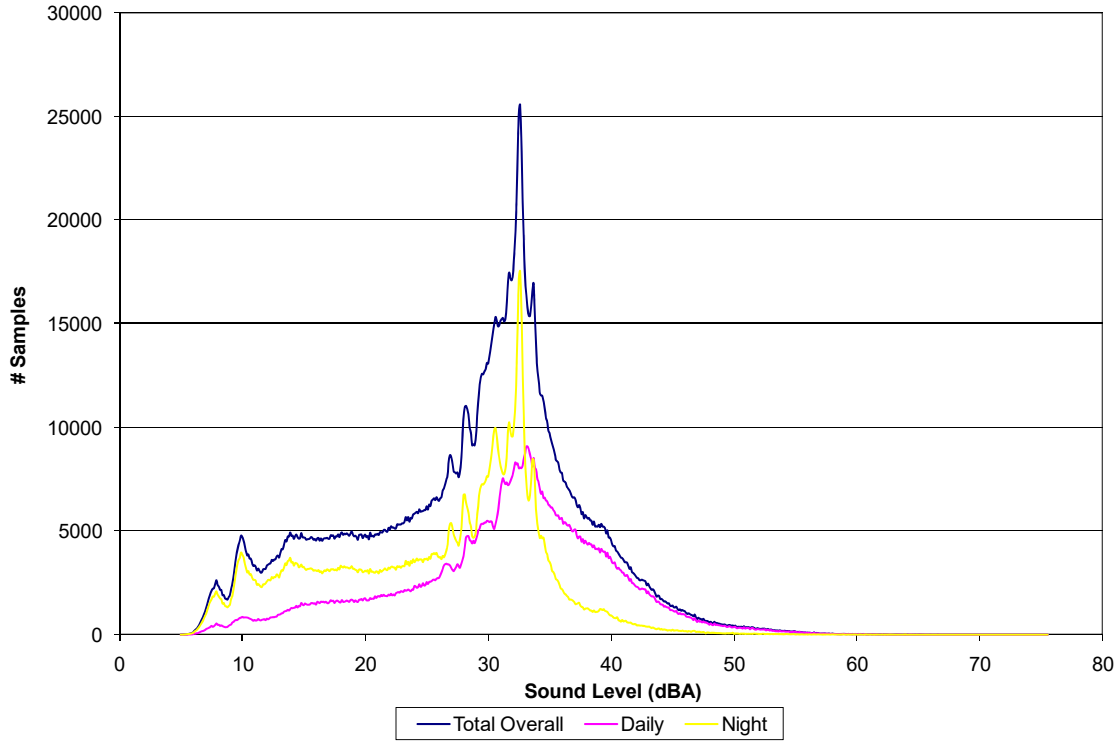


**Figure 41. Distribution of data for Site CC2 for the winter season.**

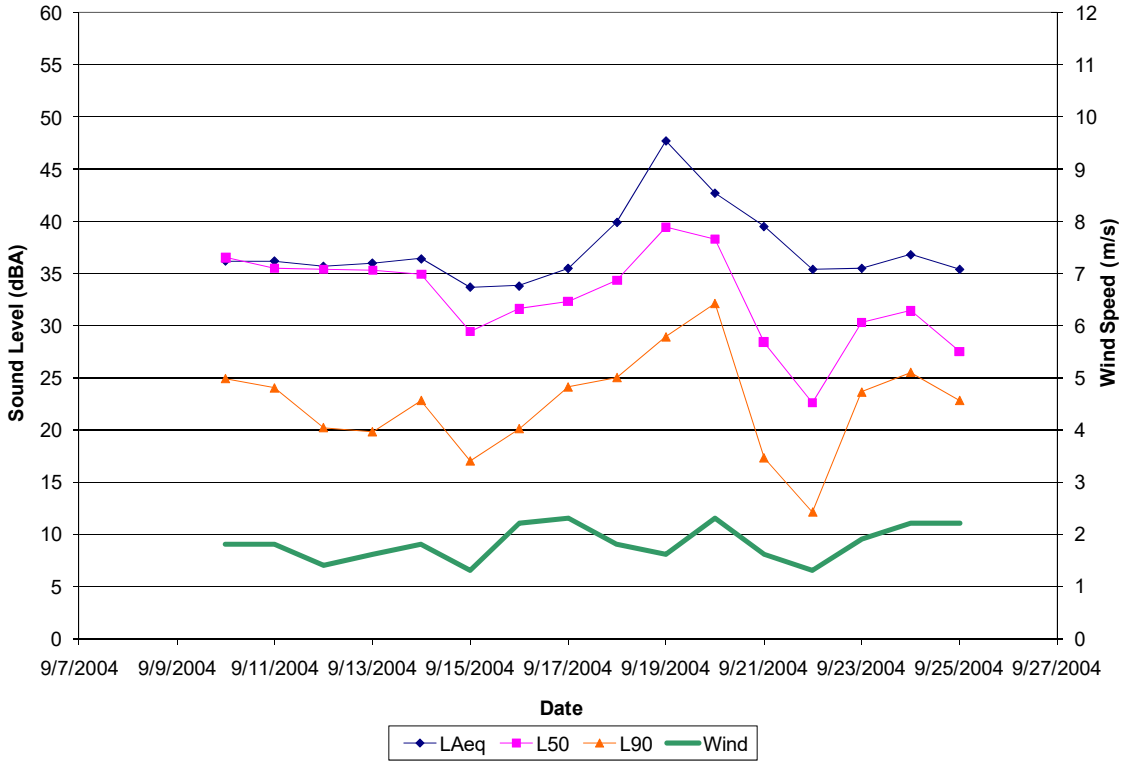


**Figure 42. Daily sound levels and wind speeds for Site CC2 for the summer season.**

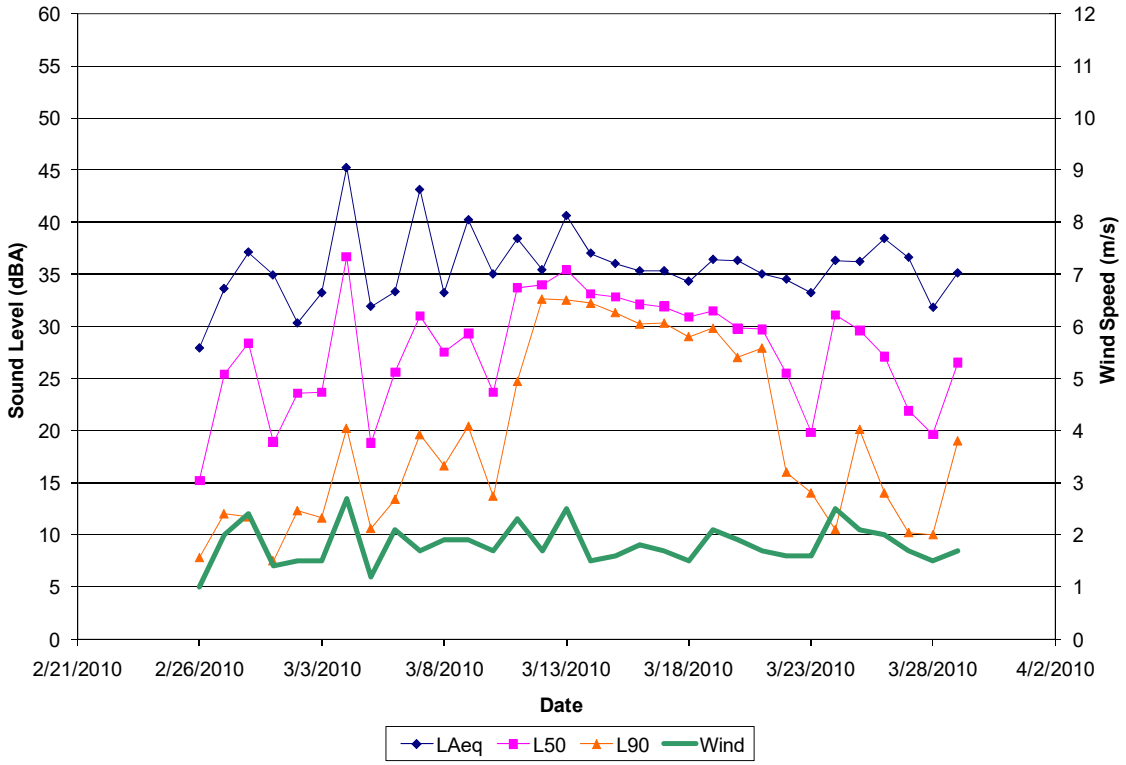


**Figure 43. Daily sound levels and wind speeds for Site CC2 for the winter season.**

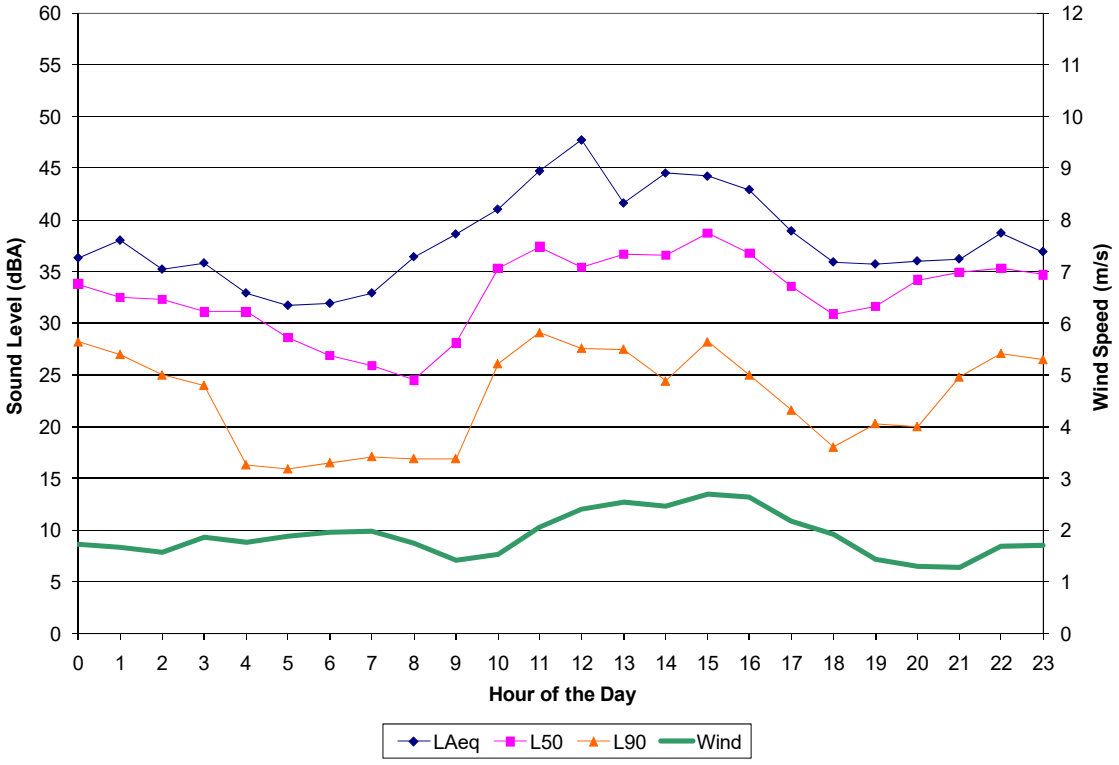


**Figure 44. Hourly sound levels and wind speeds for Site CC2 for the summer season.**

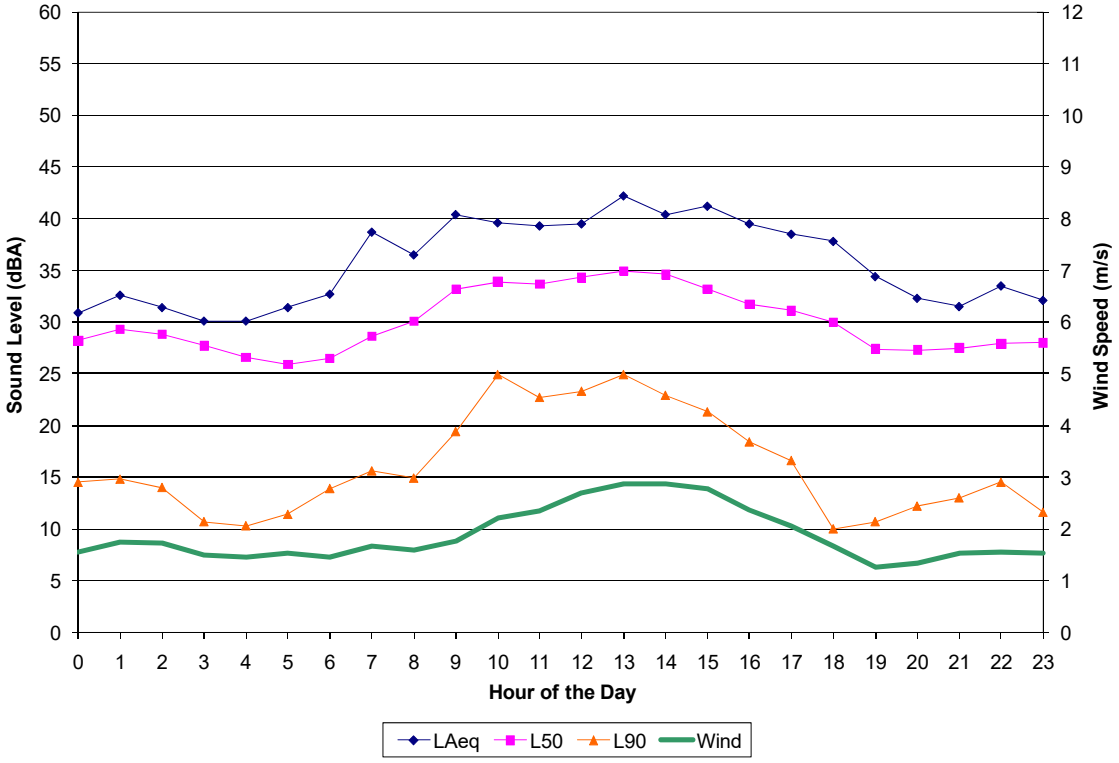


**Figure 45. Hourly sound levels and wind speeds for Site CC2 for the winter season.**

## A.3 Site CC3 – White House Overlook

**Figure 46. Site CC3: Description and photograph.**

**Observations**

The CC3 measurement location is a frontcountry site located along South Rim Drive and not far from the parking lot at the overlook pull-out for White House Ruin. The ground was comprised of rock/sand with some scrub vegetation. Two days of data were collected at this measurement location during the summer season due to lack of a secure location to leave the monitoring equipment. As such, summer nighttime data for this site are not available. Based on the similarity of the data measured during the summer season (sites CC3, CC4, and CC5), it was agreed that only two frontcountry (above the rim) sites (CC4 and CC5) would be needed for winter monitoring.

As with most overlook sites, automobile noise and visitor noise were prevalent. Sound sources present at this location also included wind-related sounds and bird vocalizations, as well as occasional fixed-wing and jet aircraft. The measured sound levels at the CC3 location were relatively quiet for an overlook site with heavy visitor-use. In general, daytime summer sound levels ranged from approximately 18 to 57 dBA (the $L_{50}$ was 26.2 dBA). The twenty-four hour $L_{50}$ sound levels were between 25 dBA and 27 dBA, as were the hourly $L_{50}$ sound levels.

On-site observations concluded that human-related sounds were audible at the CC3 location for 79.2% of the daytime hours in the summer season. Aircraft was audible at this location for 14% of the observed daytime hours, of this propeller and helicopter aircraft accounted for 5% and commercial jet aircraft accounted for 8.9% of the aircraft sounds. Visitor related noise and vehicle noise accounted for the majority of other human related sounds at CC3.

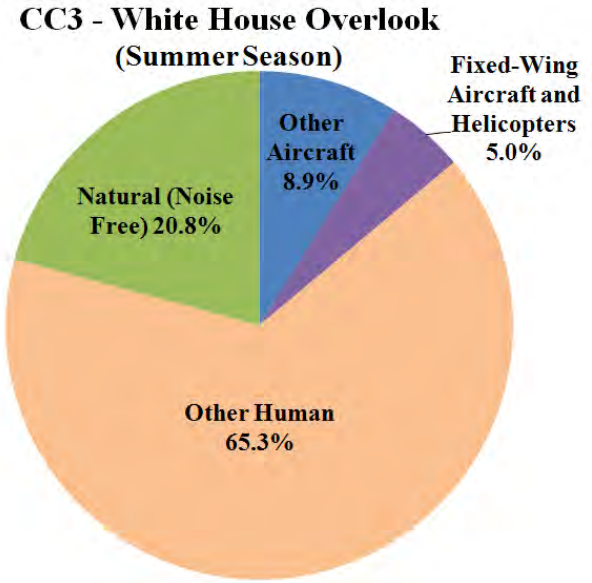


**Figure 47. Distribution of sound sources audible (in situ and office listening combined) for Site CC3 for the summer season.**

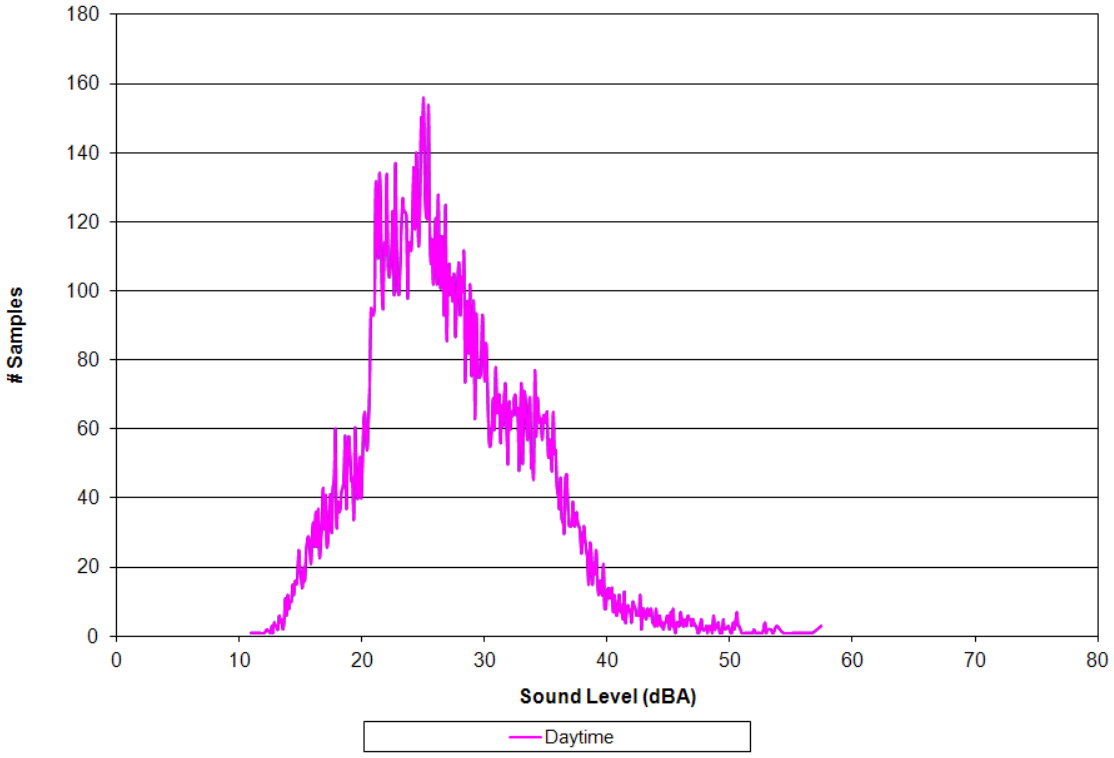


**Figure 48. Distribution of data for Site CC3 for summer season.**

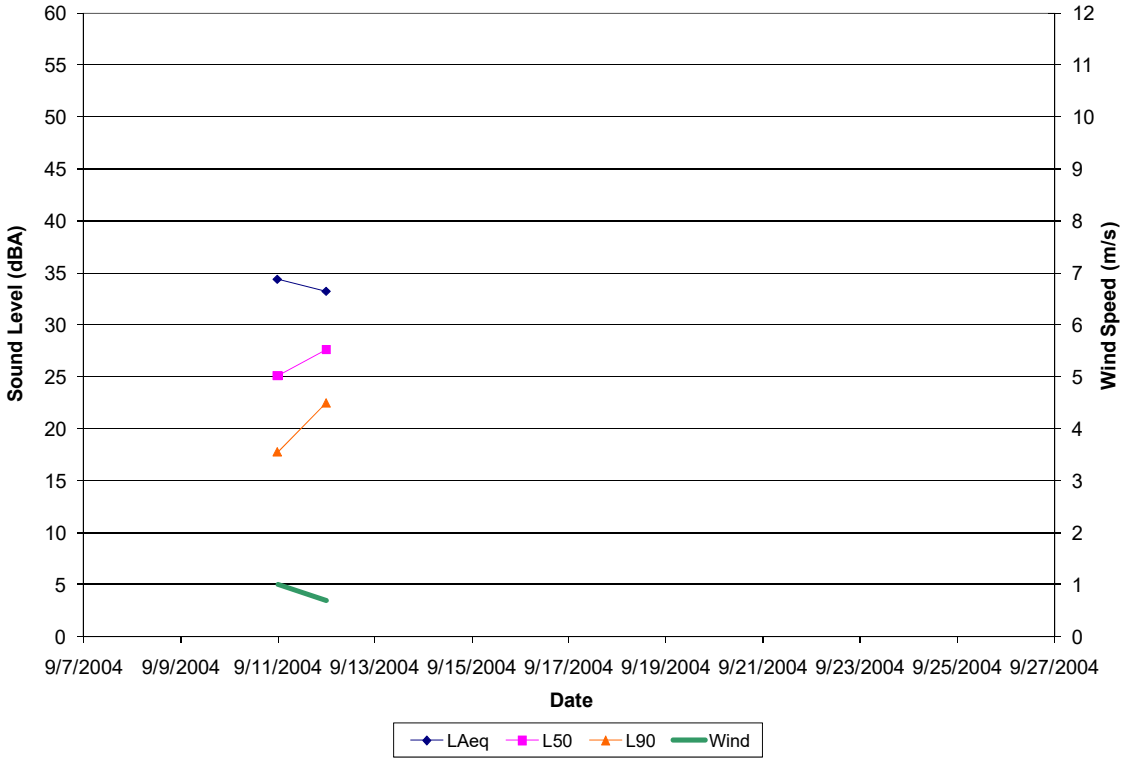


**Figure 49. Daily sound levels and wind speeds for Site CC3 for summer season.**

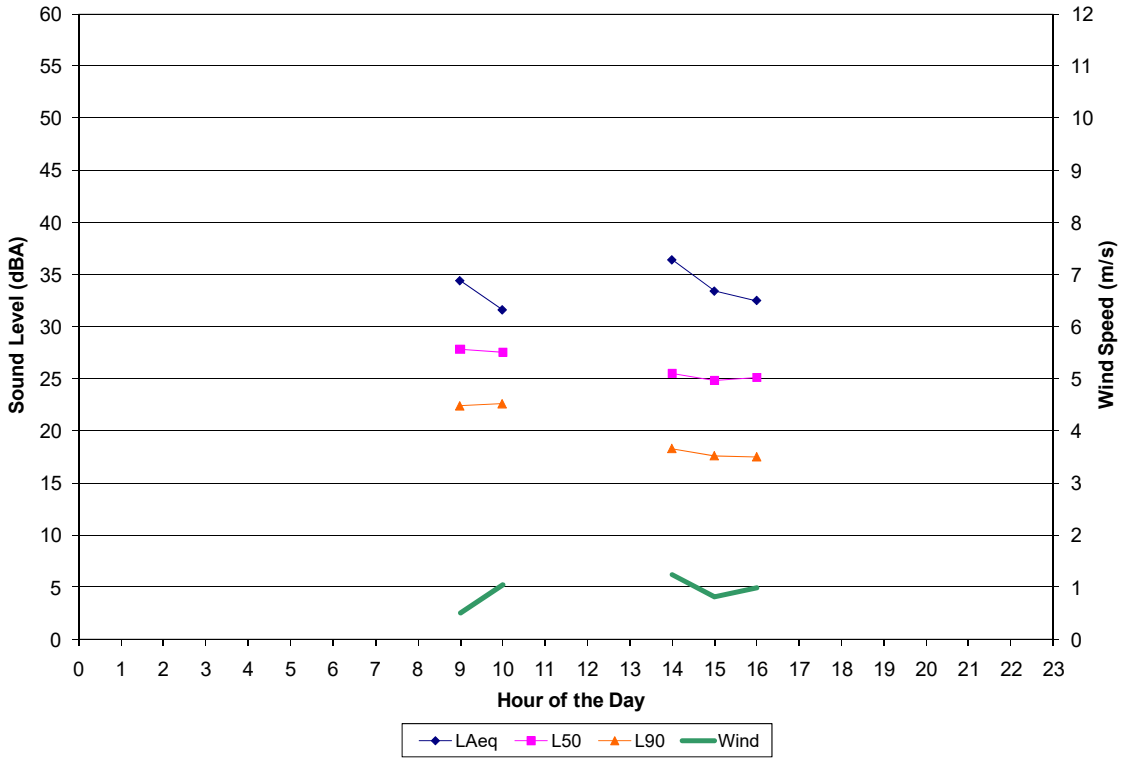


**Figure 50. Hourly sound levels and wind speeds for Site CC3 for summer season.**

## A.4 Site CC4 – Antelope House Overlook

**Figure 51. Site CC4: Description and photograph.**

**Observations**

The CC4 measurement location is a frontcountry site located along North Rim Drive and was approximately 100 yards from the parking area. The ground was comprised of rock/sand with some scrub vegetation. Only one day of data were collected at this measurement location during the summer season due to lack of a secure location to leave the monitoring equipment. As such, summer nighttime data for this site are not available. During the winter season, the site was less frequented by visitors, so it was possible to leave the equipment unmanned and collect nearly two weeks of continuous data at this overlook location.

Automobile noise and visitor noise were prevalent at this location during the summer season. Sound sources present at this location in the summer also included sounds from wind and bird vocalizations, as well as occasional propeller and jet aircraft. The summer overall $L_{50}$ sound level at CC4 was louder than the other frontcountry locations at White House Ruin (CC3) and Spider Rock (CC5). In general, summer daytime sound levels ranged from approximately 21 to 50 dBA (the $L_{50}$ was 35.8 dBA). The summertime daytime $L_{50}$ values were approximately 36 dBA as were the hourly $L_{50}$ levels.

The winter season longer-term sound level results were quite different from the summer short-term data. The winter overall $L_{50}$ was 23.8 dBA while the summer $L_{50}$ was 35.8 dBA, a difference of 12 dBA from the single day of summer sound level data. The winter twenty-four $L_{50}$ levels varied from 13 dBA to 31 dBA with very quiet conditions during the night hours. The hourly $L_{50}$ sound levels exhibited a diurnal pattern and appear to increase throughout the day as the wind increases. Loud days were noted on March 19, 25 and 26, 2010. All three of these

dates were days in which gusty winds occurred in this area and resulted in elevated sound levels recordings.

On-site observations concluded that human-related sounds were audible at the CC4 location for 38.1% of the daytime hours in the summer season. Aircraft were audible during the summer for 12.7% of the daytime hours. Other human sounds were vehicle and visitor related. During the winter season, human sounds were audible for 25.5% of the daytime hours. Aircraft were audible during the winter for 18% of the daytime hours. Natural sounds included wind and wind related sounds, birds and some rain.

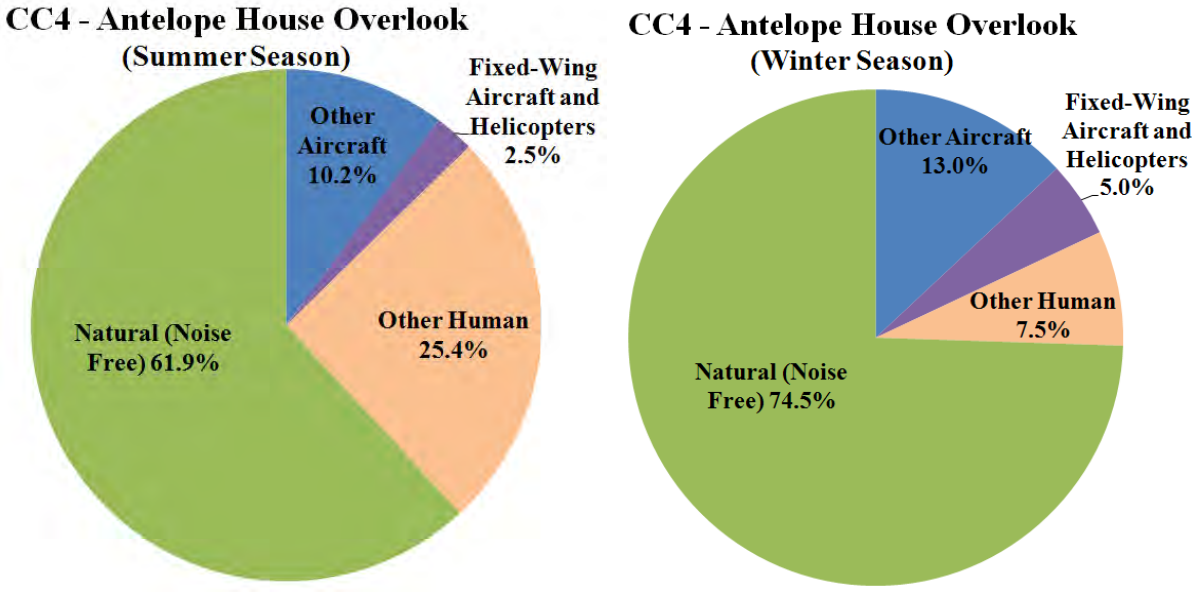


**Figure 52. Distribution of sound sources audible (in situ and office listening combined) for Site CC4 for the summer and winter seasons.**

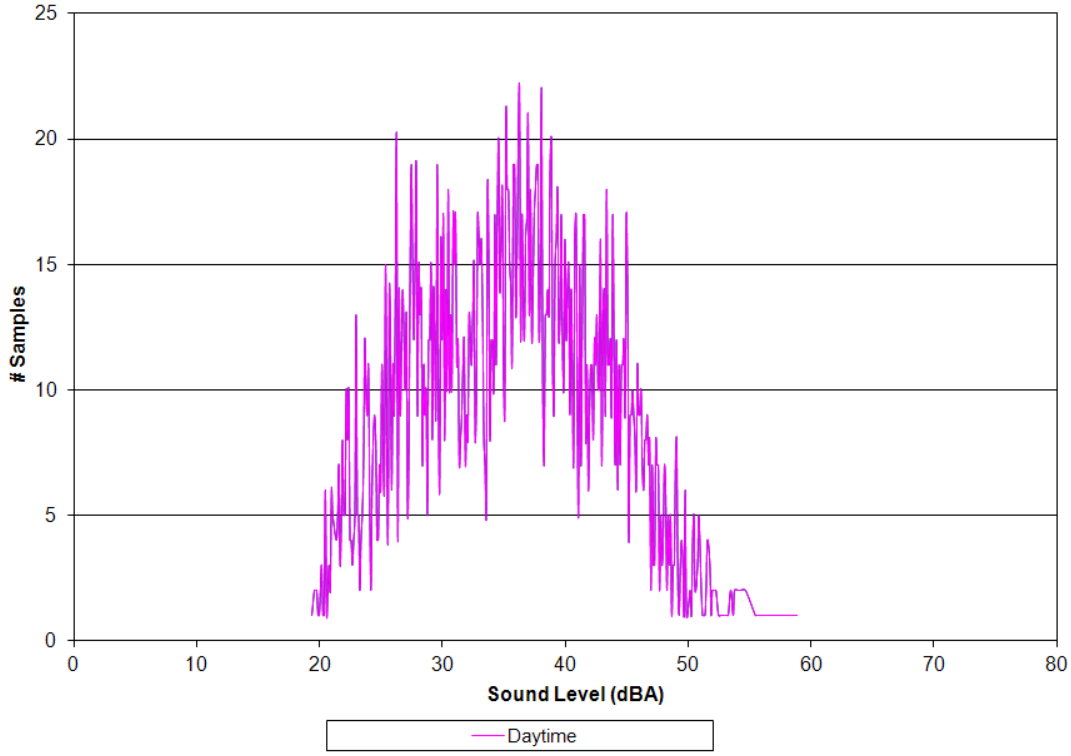


**Figure 53. Distribution of data for Site CC4 for the summer season.**

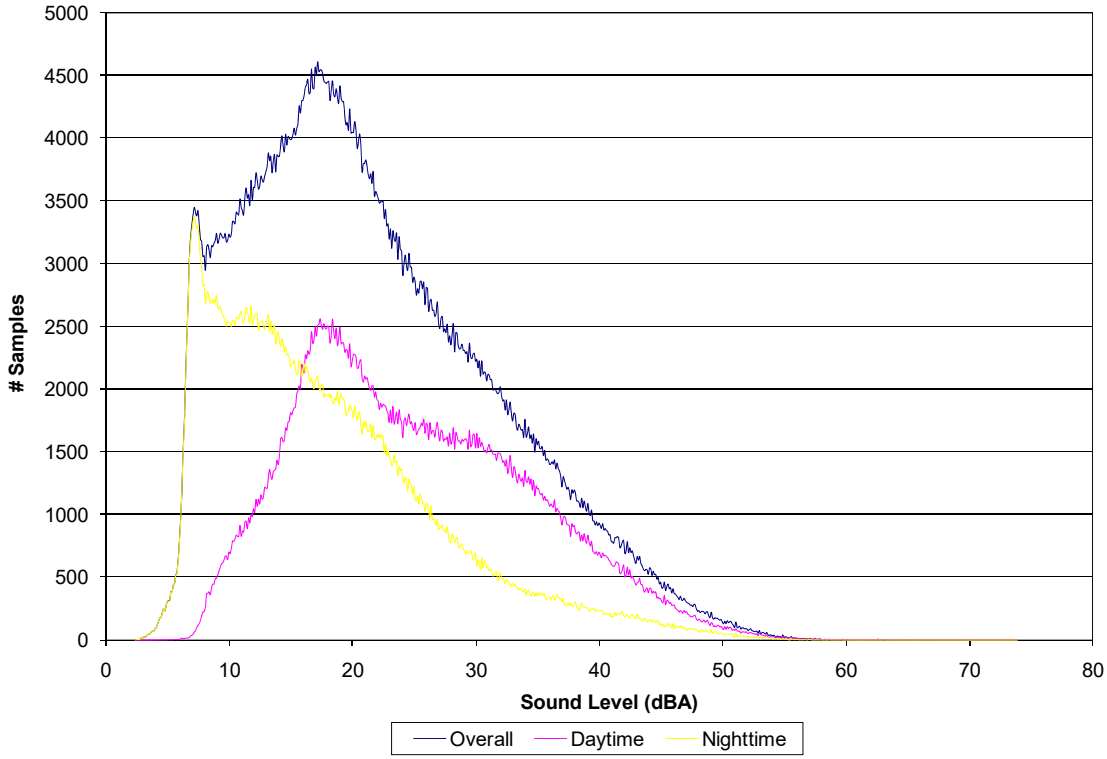


**Figure 54. Distribution of data for Site CC4 for the winter season.**

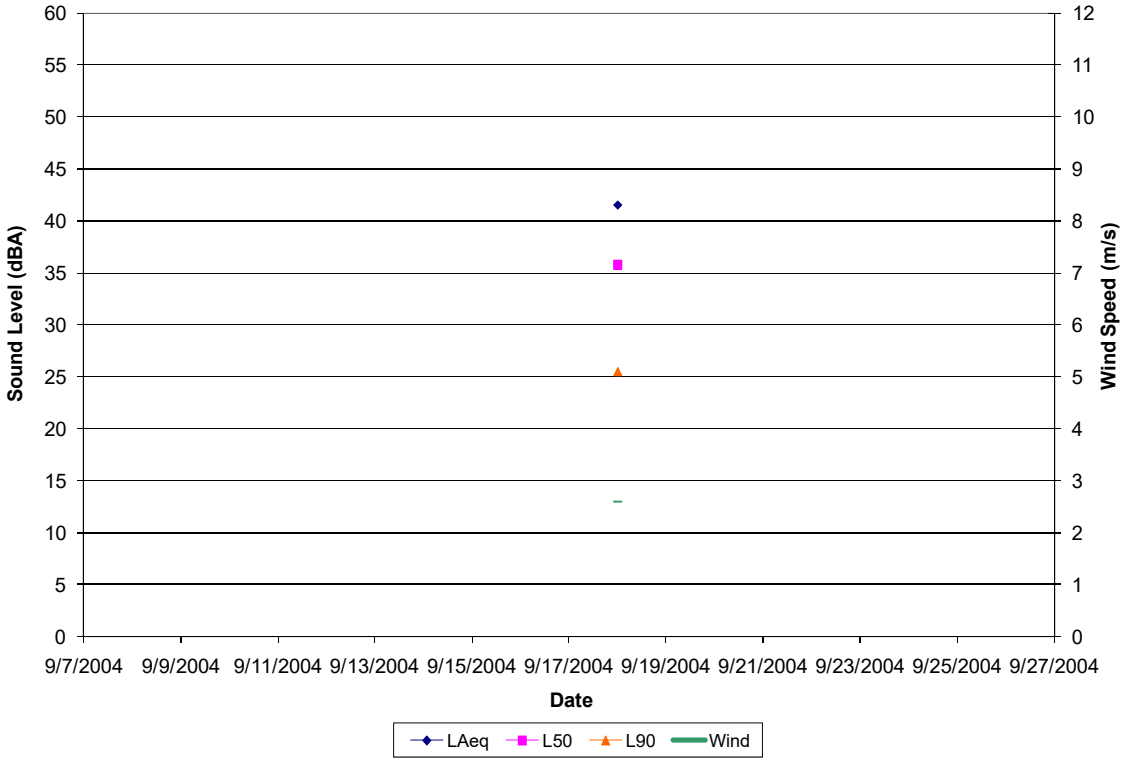


**Figure 55. Daily sound levels and wind speeds for Site CC4 for the summer season.**

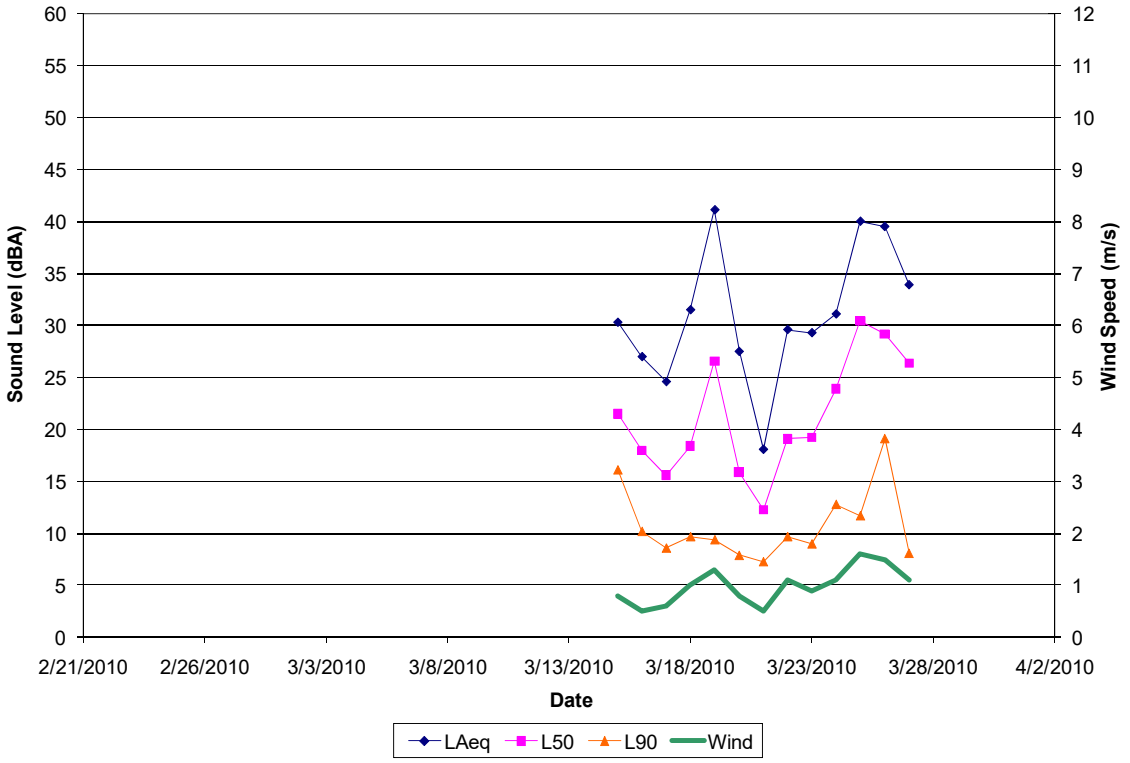


**Figure 56. Daily sound levels and wind speeds for Site CC4 for the winter season.**

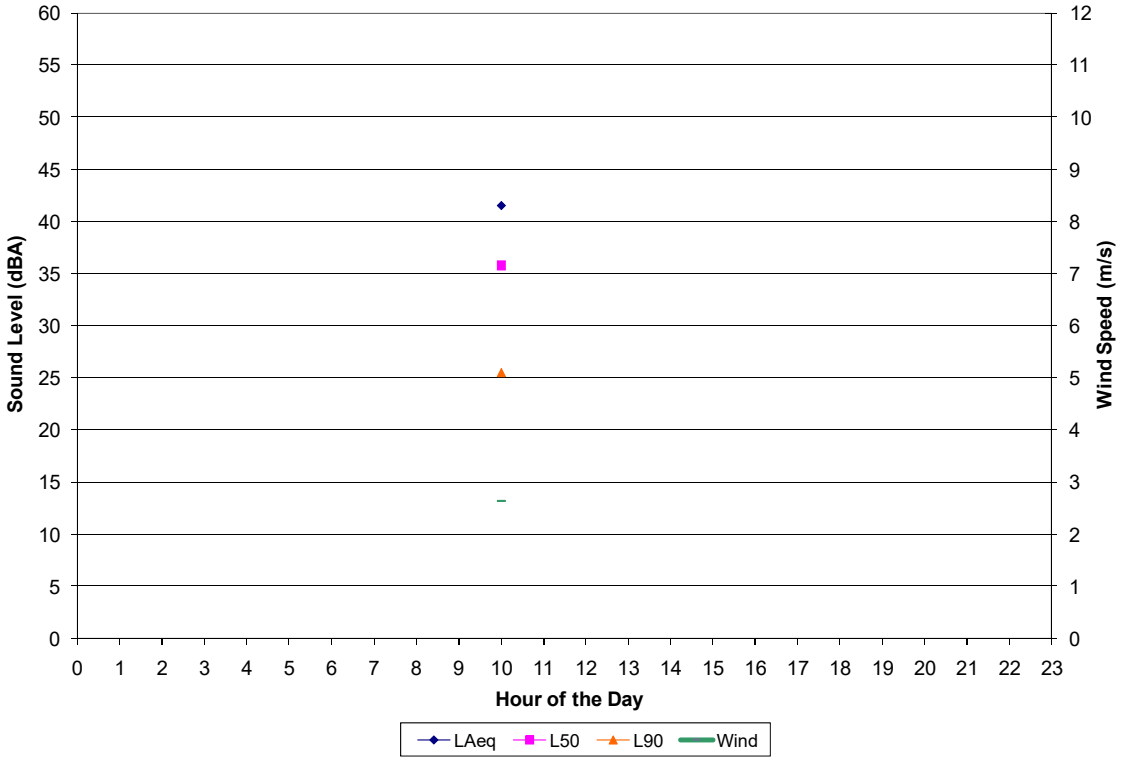


**Figure 57. Hourly sound levels and wind speeds for Site CC4 for the summer season.**

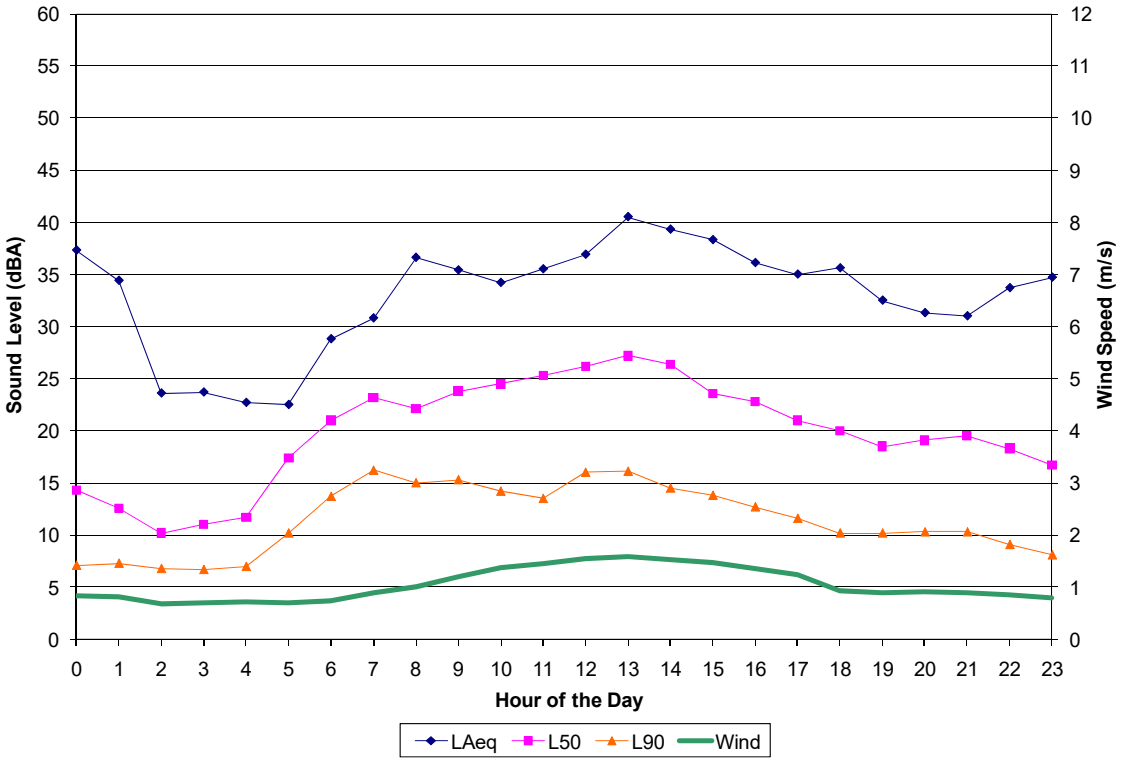


**Figure 58. Hourly sound levels and wind speeds for Site CC4 for the winter season.**

## A.5 Site CC5 – Spider Rock Overlook

**Figure 59. Site CC5: Description and photograph.**

**Observations**

The CC5 measurement site is a frontcountry site located along the South Rim Drive in a clearing near the main paved trail that led to the Spider Rock Overlook. The ground was comprised of rock/sand with nearby some scrub vegetation. Only one day of data were collected at this measurement location during the summer season due to lack of a secure location to leave the monitoring equipment. As such, summer nighttime data for this site are not available. During the winter season, the site was less frequented by visitors, so it was possible to leave the equipment unmanned and collect one month of continuous data at this overlook location.

Vehicle noise and visitor related sounds were prevalent at this location during the summer season. Other sound sources included wind-related sounds and bird vocalizations, as well as occasional propeller and commercial jet aircraft. Summer sound levels were relatively quiet for an overlook site with heavy visitor-use. In general, daily summer sound levels ranged from approximately 18 to 41 dBA (the $L_{50}$ was 26.2 dBA). The overall winter $L_{50}$ sound level was two decibels quieter than the summer $L_{50}$ level (the $L_{50}$ was 24.2 dBA). The twenty-four hour $L_{50}$ sound levels in the winter varied from 16 dBA to 27 dBA and sound levels were very quiet during the night hours.

The winter hourly $L_{50}$ levels have a diurnal trend with sound levels increasing during the daytime hours and decreasing in the evening. The hourly data indicates that this diurnal trend is related to wind conditions at the Spider Rock site, but the audibility data also showed that human activity contributed as well. Several loud days occurred during the winter season on March 5, 2010 and March 22, 2010. The day of March 5$^{th}$ experienced higher aircraft and jet audibility than a

typical day at this location and the March 22nd date experienced windy conditions which led to elevated sound levels.

Human related sounds were audible 86.6% during daytime hours in the summer season and 48.6% in the winter season. Aircraft audibility was similar for both seasons (24% during the summer and 21% during the winter). Other human sounds present at this site included automobile noise, visitor voices and parking lot related noise. The dominant natural sounds at this site were wind and birds (and also rain during the winter season).

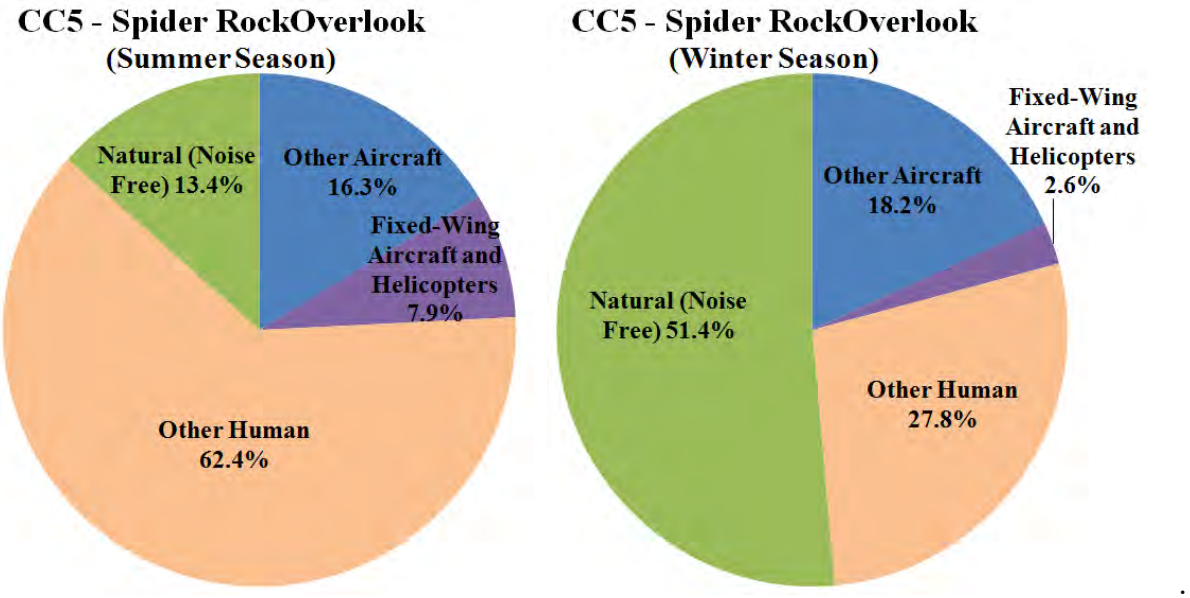


**Figure 60. Distribution of sound sources audible (in situ and office listening combined) for Site CC5 for the summer and winter seasons.**

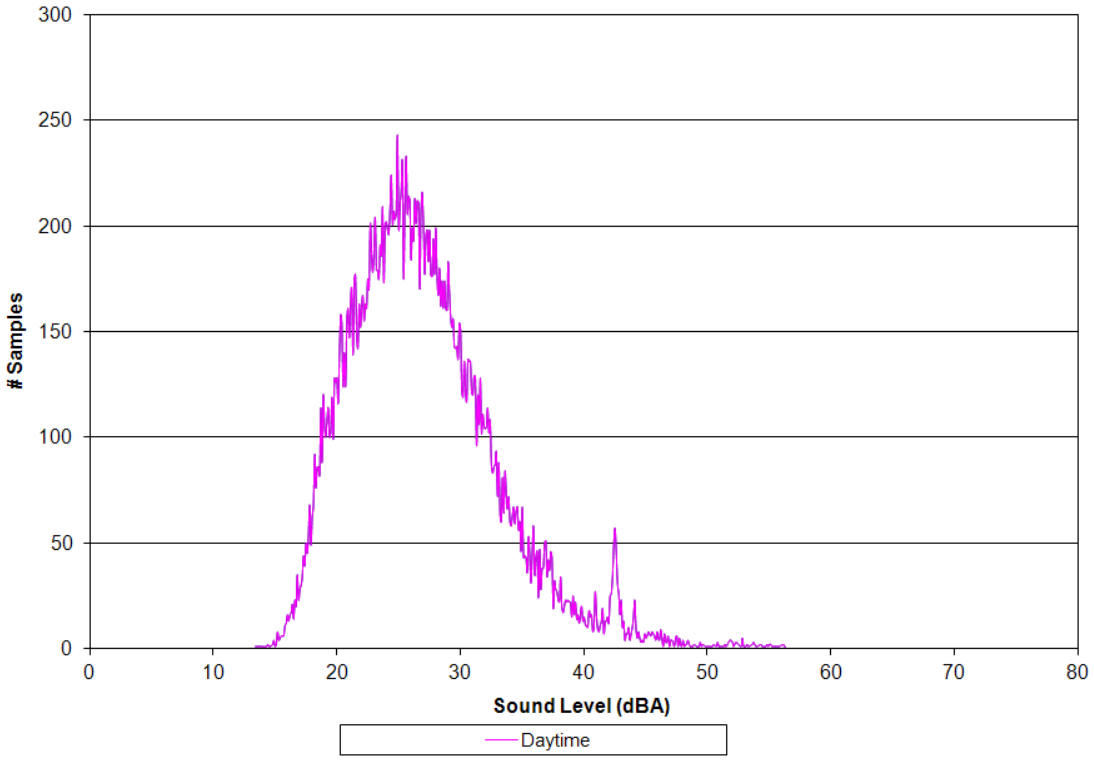


**Figure 61. Distribution of data for Site CC5 for the summer season.**

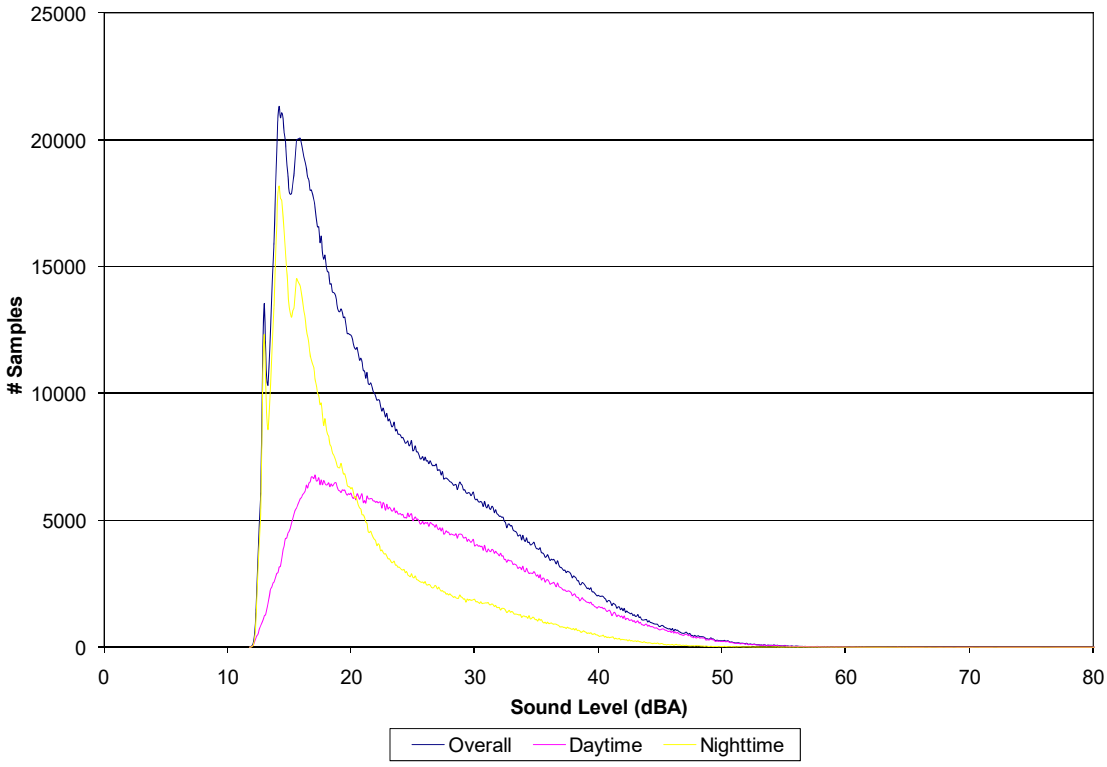


**Figure 62. Distribution of data for Site CC5 for the winter season.**

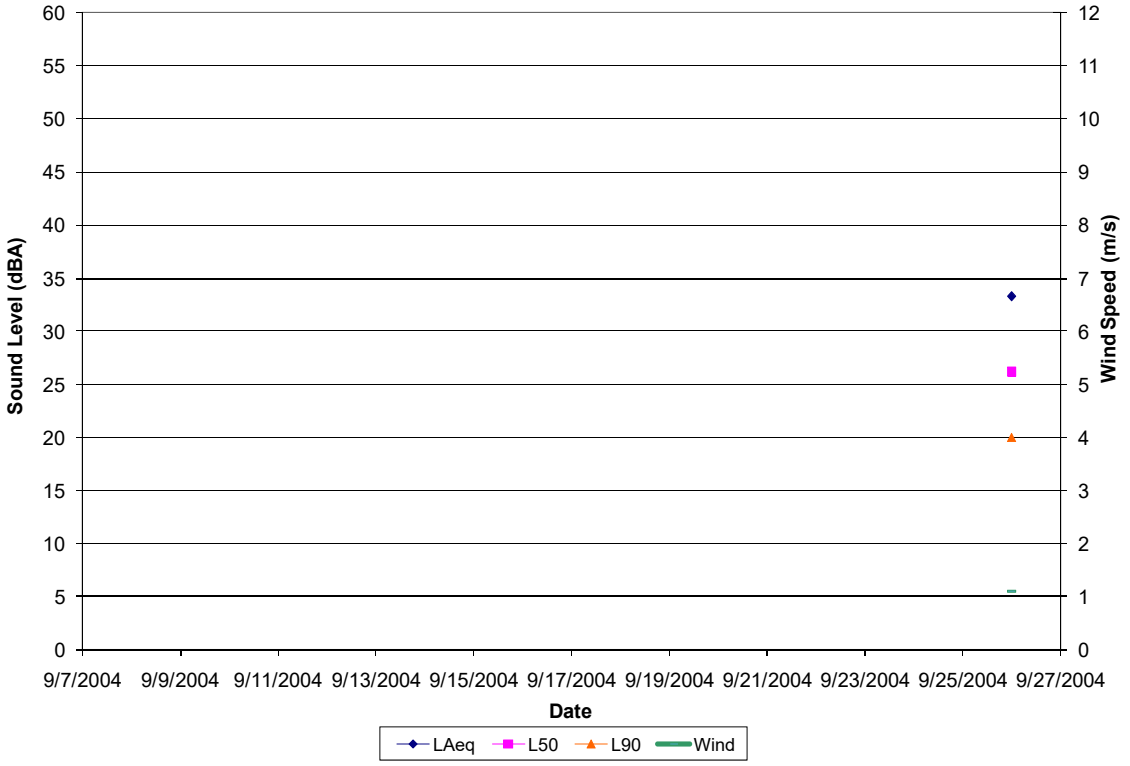


**Figure 63. Daily sound levels and wind speeds for Site CC5 for the summer season.**

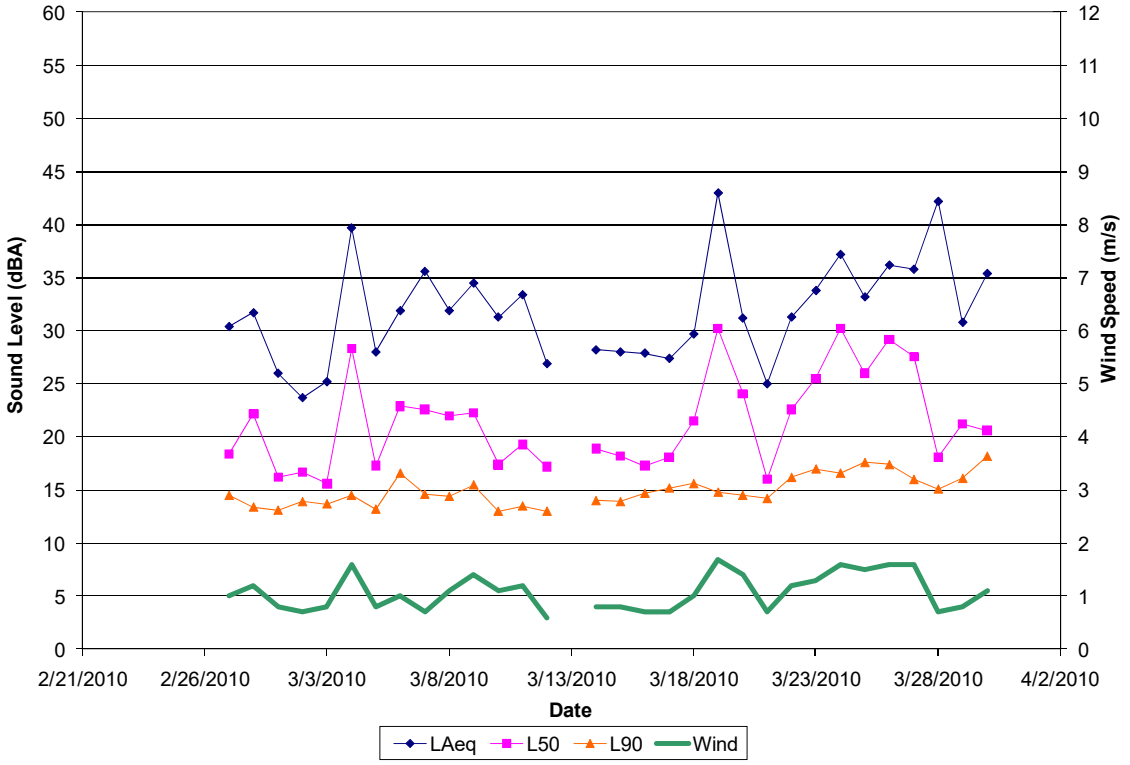


**Figure 64. Daily sound levels and wind speeds for Site CC5 for the winter season.**

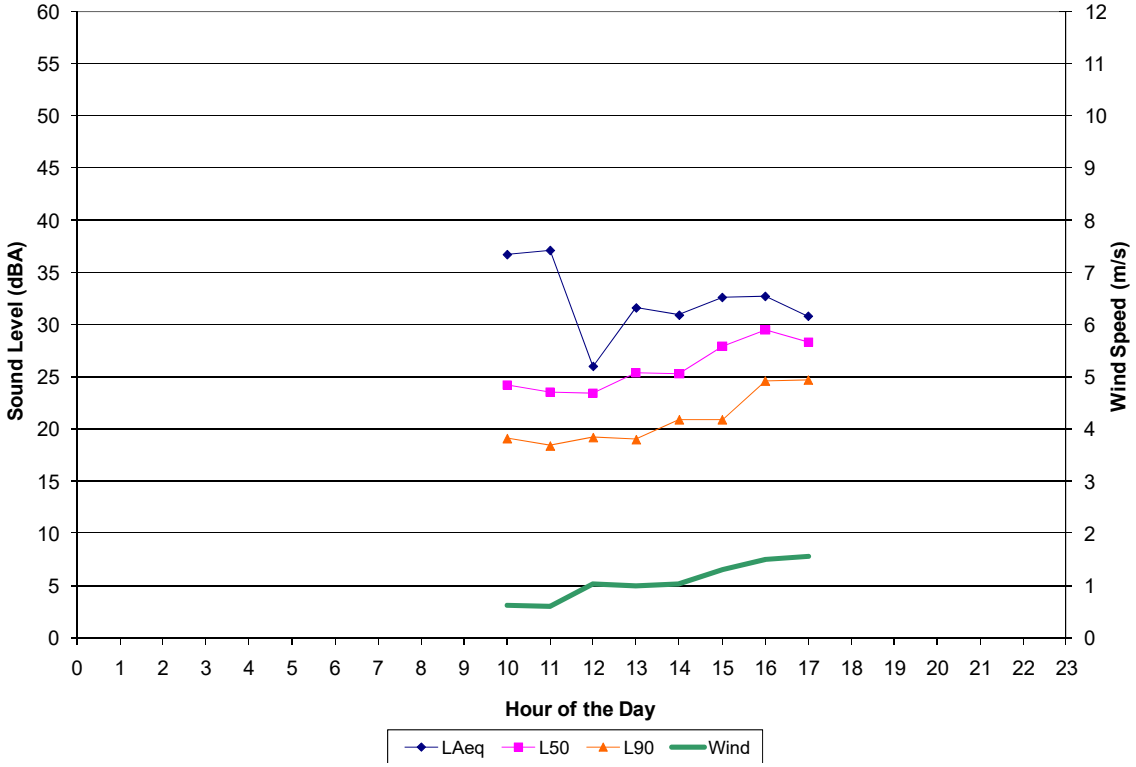


**Figure 65. Hourly sound levels and wind speeds for Site CC5 for the summer season.**

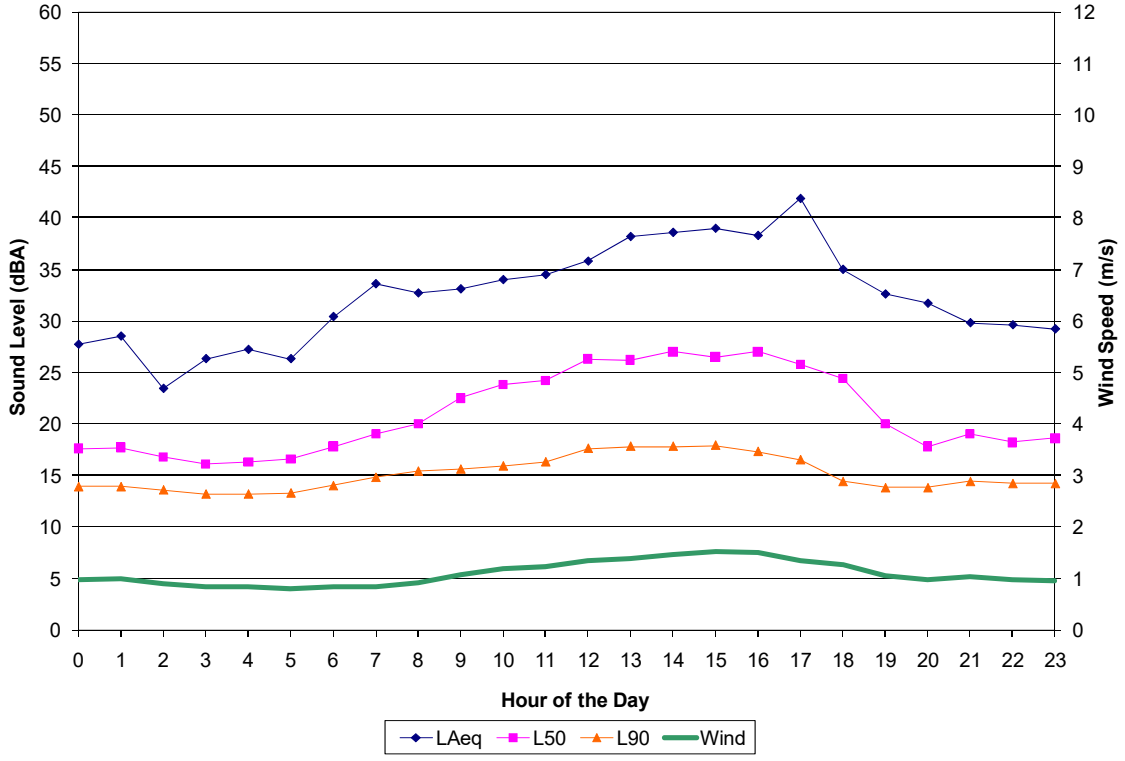


**Figure 66. Hourly sound levels and wind speeds for Site CC5 for the winter season.**

# APPENDIX B. NOISELOGGER™ CONTINUOUS SYSTEM REFERENCE

This appendix presents the step-by-step procedures for the deployment, setup, and dismantling of the NoiseLogger™ system. Section 3 discusses the systems' component instrumentation in more detail.

## B.1 Deployment

Locate an approximate 5x5 ft area that is both relatively flat and at least 50 ft (15 m) from reflective objects.

Carefully unpack the system backpacks.

### B.1.1 Wind Sensor System

1. Extend tripod so that the legs are flat on the ground.
2. The FT702 anemometer is stored in the SLM acoustics case. Remove mount from anemometer. Screw the mount onto the tripod. Connect one end of anemometer cable to the base of the anemometer THRU the mount. Secure anemometer to mount using hex key and screws. Attach anemometer (see Figure 67) to tripod.
3. Adjust tripod height such that top of the anemometer sensor is 5 ft (1.5 m) above the ground.
4. Orient the anemometer properly toward North direction (look for the "N" marked on the anemometer). A compass can be found in the calibration kit.


**Figure 67. FT702 anemometer.**

5. Carefully wrap the anemometer cable around the tripod or tie with zip-ties, so that it will not hit the tripod in the wind. Connect other end of cable to the SLM case external connector.
6. Anchor the tripod to the ground or a nearby stationary object using the rope, stakes, and sandbags, as necessary, so that it will not sway in the wind.

### B.1.2 Microphone System

1. Extend tripod so that the legs are flat on the ground. Attach the microphone aluminum collar to top of tripod.
2. Attach the microphone to the preamp. Connect the mic/preamp to the microphone cable (red cable, black connector, 7-pin connector with twist locking collar) and carefully slide mic/preamp/cable into the aluminum collar from the top (see Figure 68).
3. Adjust tripod height such that top of the microphone is 5 ft (1.5 m) above the ground and oriented vertically.
4. Carefully slide the large foam windscreen over the top of the mic/preamp until the windscreen mount reaches the black line on the microphone collar. Finger-tighten the plastic set screw to the collar (not the preamp).

5. Carefully wrap the microphone cable around the tripod or tie with zip-ties, so that it will not hit the tripod in the wind. Connect one end of microphone cable to the SLM case external connector.
6. Anchor the tripod to the ground or a nearby stationary object using the rope, stakes, and sandbags, as necessary, so that it will not sway in the wind.

**Figure 68. Microphone/preamp assembly.**

### B.1.3 Power System

1. Unfold the metal panel and carefully remove solar panels. Align panels one though four from left to right (see Figure 69). Remove the two smooth rods and 4 panel rods from the array accessories bag.
2. Insert the two smooth rods into the metal "panel plate" and black corner blocks on the base plate to prop up "panel plate" at about 60-degree angle.

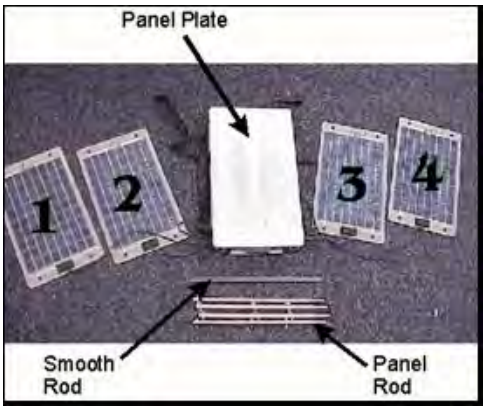


**Figure 69. Unpack solar array.**

3. Place left inner orange loop on the right upper panel plate tube; place right inner orange loop on the left upper panel plate tube (see Figure 70).
4. Place a panel rod into each side of the upper panel plate tube. Rotate panel rod so that the connection points are facing away from the panel plate.
5. Place the outer left loop of the orange line to the outer end of the left panel rod. Place the outer right loop of the orange line to the outer end of the right panel rod. The inner orange lines should now form an "X" pattern behind the "panel plate."

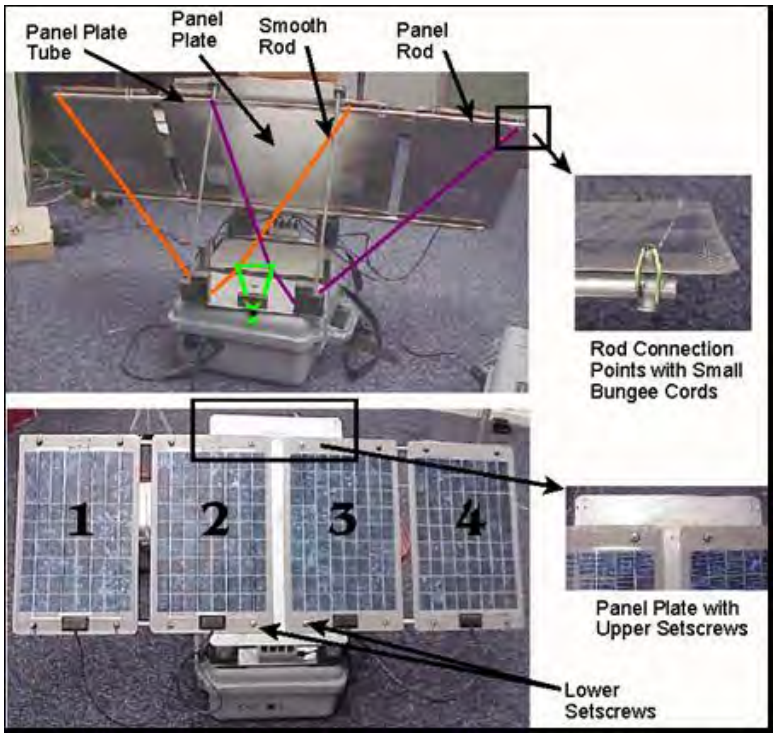


**Figure 70. Solar panel array setup.**

6. Tighten the "X" pattern by pulling the small string loop at the base of the "X" and raising the tension knob (see Figure 71).
7. Insert the two lower panel rods into the tubes at the bottom of the "panel plate."
8. First attach panel #2 to the left inner position and panel #3 to the right inner position and secure with the four thumbscrews, which can be found in a small plastic bag within the array accessories bag. Make sure that the black cables are at the bottom of the plate and not between the lower panel rods and the panel.

**Figure 71. Close-in view of string tensioner.**

9. Attach the outer panel #1 to the left outer position, and panel #4 to the right outer position.
10. Attach the small bungee cords (found in small plastic) bag to the rod connection points on the faces of the solar panels and to the back of the rod.
11. Connect the solar panel power cable to the power case (3-pin connector with twist locking collar).
12. Verify that the green "charging" LED is lit on the Sun Saver 6 input block.
13. Verify that the vent knob on the front of the power case is removed and placed inside the case.
14. Close the power case.
15. Place solar panel array on top of the power case. Secure the array to the power case with the black straps.
16. Orient the entire solar panel array in the desired position for the specific site location

(typically in a southerly direction).
17. Connect the system power cable (2-pin connector with twist locking collar) to the SLM case external connector and to the power case external connector.

## B.2 Operation:

### B.2.1 NoiseLogger™ Startup

1. Open SLM acoustics case. Remove top foam piece.
2. Verify connections as shown in Figure 72, specifically verify that the silver connector/red cable is connected to right Husky™ com port and the black Husky™ adapter/beige serial cable is connected to the left com port, also that the small black cable is connected to the side of the black Husky™ adapter. Verify also that the cable from the "Mic In" connector to the top of the LD824 is connected.
3. Open the plastic back plate to the Husky™ by squeezing the two clips on the back of the Husky™ and check to ensure a 128-MB CompactFlash™ card (Storage Card) is in one of the two card slots. Restore the back plate.
4. Power up the Husky™ by pressing the red center button below the screen. Note: If the Husky™ hasn't been turned on for a long time, the unit may display several screens to calibrate the touch screen and perform time zone setup on the unit.

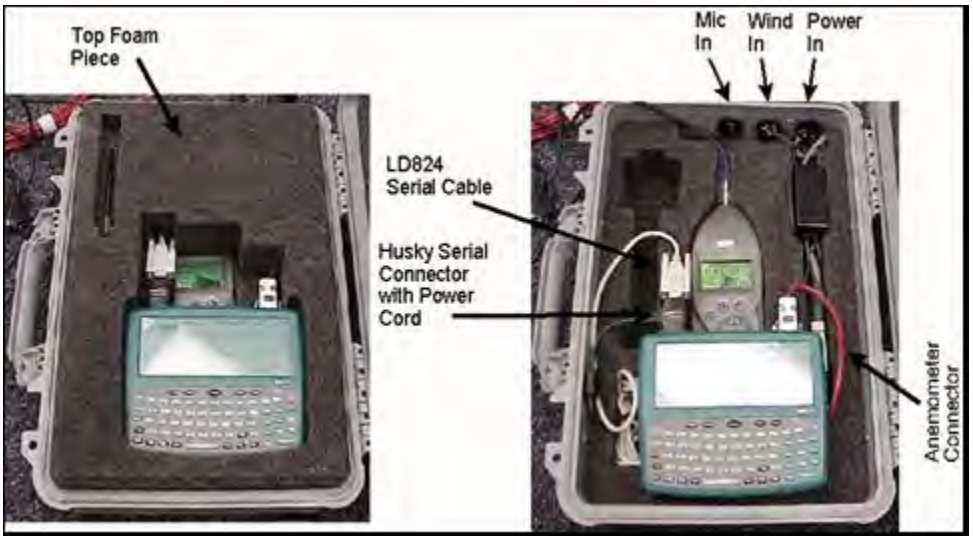


**Figure 72. SLM acoustics case.**

5. Power up the LD824 by pressing the lighted green (left-most) button on the front panel Note: The LD824 may power up automatically when the Husky™ is started.
6. Reset/reboot the Husky™ by pressing both the contrast and brightness buttons on either side of the power button.
7. Using the red tip of the stylus, select "My Handheld PC" icon on the desktop.
8. A Windows browser is displayed. Select the "Storage Card" directory to access the 128-MB CompactFlash™ card. Select the "NoiseLogger™ ver 2.1.0.0" folder and then run the NoiseLogger.exe program by double clicking the filename with the stylus.
9. An "About NoiseLogger" dialog is displayed. Select OK.

10. Per the program instructions, enter a unique three-character ID representing the site "number" (e.g., CC2 for Site CC2), and the site's name (e.g., Antelope House Ruin).*
11. Select "Equipment Info" and proceed to the GPS Synchronization (Section B.2.3).

### B.2.3 GPS Synchronization

1. A GPS unit and cable can be found in the calibration kit. Connect the serial end of the GPS cable to the Husky™ right-side com port. If the anemometer cable is already connected to this com port, disconnect the silver connector with red cable, and then connect the black GPS cable.
2. Connect the other end of the GPS cable to the back of the GPS unit.
3. Turn on the GPS unit by pressing the red light-bulb button. When the unit has adequate satellite communication, the unit will display "3-D Navigation," which may take several minutes. Use the "PGDN" button to display latitude, longitude, and elevation information. Write this information onto the site log sheet.
4. Select the [Sync with GPS] button on the computer screen. Date, time, and satellite information will begin to scroll for approximately 2 minutes. Note: If you are unable to sync with GPS, manually update the date and time and select the "Update" button.
5. Disconnect the GPS unit and cable from the computer when data stops scrolling and a message is displayed on the computer screen that says "Please disconnect GPS…"
6. Turn off the GPS unit by pressing the light-bulb button on its front panel.
7. Reconnect the anemometer cable.
8. Select the [Close] button on the screen and proceed to Section B.2.4.

### B.2.4 Equipment Information

1. Verify that the wind sensor (anemometer) cable is connected properly to the computer.
2. Select the type of anemometer being used in the pull-down menu in the "Equipment Info" dialog. Note: This must be performed even if the anemometer is the default type. Select [Continue].
3. If an anemometer error occurs or a com port error message is displayed, check the connection, then press [Continue] and select [Equipment Info] again. If the problem persists continue on to the [Calibrate SLM] procedure (Section B.3.4).
4. Enter the sound level meter type and serial number. Refer to the equipment info sheet taped to the inside cover of the case). Note: The info sheet should be checked as some equipment may have been switched out in the field.
5. Enter the anemometer type and serial number.
6. Select the desired calibration level. If a level other than 94 or 114 dB is selected, enter the level in the field to the right. Verify that the "Frequency" field shows 1000.
7. Enter the calibrator type and serial number. A calibrator can be found in the calibration kit.
8. Select the [Continue] button.
9. Enter the microphone type and serial number.
10. Enter the preamp type and serial number.
11. Enter the GPS unit type and serial number.
12. Enter the computer type and serial number.

* Although the NoiseLogger™ system only allows for a three-character ID, an NPS site-ID naming convention is used – specifically the four-letter park acronym followed by a three-digit number.

13. Enter operator name and comments.
14. Select the [Finish] button. If prompted to "Sync with GPS" again, select the [Cancel] button. Proceed to Section B.2.5

### B.2.5 Calibration

1. The NoiseLogger™ program sends commands to the LD824 to control it during calibration and data logging. There is no need to handle the LD824 other than ensuring the preamp cable connection, serial data connection and power connection.
2. Carefully remove the large foam windscreen and apply the calibrator to microphone (see Figure 73). A calibrator can be found in one of the calibration kits. Note: To ensure the calibrator is seated properly, gently rotate it clockwise ¼ turn.
3. Carefully apply power to calibrator by pressing the left button on the calibrator (94-dB setting).
4. Select the [Calibrate SLM] button on the computer screen.
5. Verify information in the resultant calibrator info dialog. Select [Calibrate] button.

**Figure 73. System calibration.**

6. Verify that the LD824 is responding to the calibration process (a sound level of approximately 94 dBA at 1000 Hz should be displayed. When calibration is complete, a message is displayed on the computer screen with the calibration offset (typically between –45 and –50 dB). Write this offset level on the site log sheet. Note: During strong wind conditions, it may be difficult to observe a steady calibration signal. In such instances, cover the calibrator and mic/preamp assembly with a bag (such as the solar array accessories bag) and select the [Calibrate] button to redo calibration, taking care not to disturb the microphone and calibrator during this process.
7. After system calibration is completed, record approximately 30 seconds of the calibrator tone by selecting the [Collect Data] button. Verify that the anemometer cable is securely connected to the computer and select [Yes].
8. Verify that the sound level being reporting on the computer screen is approximately 94 dB for A, C, and flat weighting.
9. After about 30 seconds, stop data collection by selecting the [Stop Collection] button. Select [Yes] to verify.
10. Carefully de-activate the calibrator and remove it from the microphone.
11. After recording the calibration signal, carefully de-activate the calibrator and remove it from the microphone. Carefully replace the large foam windscreen.

### B.2.6 System Integrity Check

1. System integrity is checked prior to the start of data collection to ensure that there is no outside signal influence on the system. This is performed by recording the sound level with a dummy microphone.
2. Carefully remove the large foam windscreen. Carefully replace the microphone on the preamp with a microphone simulator. Place the microphone back in its holder during this exercise for safekeeping.
3. In the "Sound Level Range" (located in the upper right corner of the computer screen) pull-

down menu, change the sound level range to 60.
4. Select the [Collect Data] button. Verify that the anemometer cable is securely connected to the computer and select [Yes].
5. Verify that the sound level being reporting is low, approximately 10-15 decibels for A, C, and flat weighting.
6. After about 20 seconds, stop data collection by selecting the [Stop Collection] button. Select [Yes] to verify.
7. Replace the microphone simulator on the preamp with the microphone.
8. Carefully replace the large foam windscreen over the top of the mic/preamp until the windscreen mount reaches the black line on the microphone collar. Finger-tighten the plastic set screw to the collar (not the preamp).

## B.3 Data Collection

1. Carefully slide the large foam windscreen over the top of the mic/preamp until the windscreen mount reaches the black line on the microphone collar. Finger-tighten the plastic set screw to the collar (not the preamp).
2. In the "Sound Level Range" (located in the upper right corner of the computer screen) pull-down menu, select the desired sound level range (90 dB is the default). Note: This level is the anticipated maximum sound level to be measured at the site. Given this user-selected "maximum," the NoiseLogger™ program automatically sets both a designated amount of gain and an absolute sound level limit ("ceiling") to LD824 (see Table 15 below). For example, for sites where a wide range of natural and mechanical sound sources was expected, this range should be set to 90 dB. At this setting, 20 dB of gain is automatically applied to the LD824, and the loudest sound level that could be measured is 108 dB. For quieter sites, the "Sound Level Range" should be set to lower levels, as appropriate.

**Table 15. LD Model 824 SLM sound level range and associated gain setting and ceiling level.**

| Sound Level Range (dB) | LD824 Gain Setting (dB) | Ceiling Level (dB) |
|---|---|---|
| 110 | 0 | 128 |
| 100 | +10 | 118 |
| 90 | +20 | 108 |
| 80 | +30 | 98 |
| 70 | +40 | 88 |
| 60 | +50 | 78 |

3. Select the [Collect Data] button. Verify that the anemometer cable is securely connected to the computer and select [Yes].
4. Verify that data is being collected: "Samples saved" is incrementing, and wind and sound level data are being read.
5. Replace top foam piece carefully over the computer. Verify that data appears reasonable and that "Samples saved" is incrementing. Also verify a battery reading above 11.0. Note: The

system will not run properly if the battery reading is below 11.0. A fully charged system would display approximately 12.5.
6. Close the SLM case and secure the site.

## B.4 Data Download

1. Stop data collection by selecting the [Stop Collection] button. Select [Yes] to verify.
2. Perform an end-calibration by recording the sound level with a calibrator applied.
3. Carefully remove the large foam windscreen. Apply the calibrator to microphone. A calibrator can be found in one of the calibration kits. Note: To ensure the calibrator is seated properly, gently rotate it clockwise ¼ turn.
4. Carefully apply power to calibrator by pressing the left button on the calibrator (94-dB setting).
5. Select the [Collect Data] button. Verify that the anemometer cable is connected to the Husky™ and select [Yes].
6. Verify that the sound level being reporting on the computer screen is approximately 94 dB for A, C, and flat weighting. Note: During strong wind conditions, it may be difficult to observe a steady calibration signal. In such instances, cover the calibrator and mic/preamp assembly with a bag (such as the solar array accessories bag), taking care not to disturb the microphone and calibrator during this process.
7. After about 30 seconds, stop data collection by selecting the [Stop Collection] button. Select [Yes] to verify.
8. To download the data from the computer, press the power button below the computer screen to power down the computer. Carefully remove the plastic back plate by squeezing the two clips on the back of the Husky™. Remove the plastic back plate and push the lever with green handle (do not pull it) like a plunger to pop out the 128-MB CompactFlash™ card. Make sure the flashcard is properly labeled with site info, date and other pertinent information. A wax pen can be found in one of the calibration kits. Also write this information, including the card number, on the site log sheet. If this is the end of the measurement period for this site, proceed to Section B.6 for instructions on dismantling the system. If measurements are to continue, install new flashcard, reinstall the plastic back plate, reconnect black Husky™ adapter ensuring that the Husky™ power cord is attached to the adapter, and power up the computer. Note the new card number on the site log sheet.
9. Perform calibration (see Section B.2.5).
10. Start data collection (see Section B.3).

## B.5 System Dismantling

### B.5.1 SLM Acoustics Case

1. Verify that the computer is powered down by disconnecting the power cable from the side of the Husky™ adapter on the left com port. Press the red center button above the keyboard of the Husky™ keypad to power down the computer.
2. Power down the LD824 if it has not already shut down by pressing and holding down the lighted green (left-most) button on the LD824.
3. Disconnect main power cable from SLM case and Power case.
4. Disconnect mic/preamp cable and anemometer cable from SLM case.

5. Store the stylus, hex key, and small screwdriver, replace top foam piece on the Husky, and close SLM acoustics case.

### B.5.2 Wind Sensor System

1. Remove the anemometer from its mount by using the hex key to remove the screws. Disconnect the anemometer cable from the base of the anemometer THRU the mount. Unscrew the mount from the tripod. Replace the anemometer onto the mount with the screws. Place the anemometer/mount assembly in the SLM acoustics case.
2. Collapse the anemometer tripod.
3. Roll up the anemometer cable.

### B.5.3 Microphone System

1. Remove large foam windscreen.
2. Remove mic/preamp/cable assembly from aluminum collar.
3. Carefully remove the microphone from the preamp and place it in its protective case.
4. Disconnect preamp from cable, replace the protective red cap on preamp (microphone end) and insert preamp into plastic tube (connector end first, not red cap).
5. Remove aluminum collar from tripod. Place collar and preamp tube in the SLM acoustics case.
6. Roll up the microphone cable
7. Collapse the microphone tripod.

### B.5.4 Power System

1. Disconnect power cable from solar array to the power case.
2. Remove small bungee cords from the solar panels, place in plastic bag, and then place in solar-array accessories bag.
3. Remove the outer two panels and carefully place on the ground, panel facing up.
4. Remove the four setscrews holding the two inner panels, place set screws in bag with bungee cords.
5. Remove the two inner panels and place on ground facing up.
6. Disconnect orange loop from ends of upper panel rods.
7. Remove all four panel rods and place in solar-array accessories bag.
8. Remove smooth rods and place in solar-array accessories bag.
9. With the panel plate upright, place panel #4 on base plate with panel facing up.
10. Place panel #3 facing down on top of panel #4, making sure that panel #4 and #3 power cable connection blocks are on opposite sides of each other.
11. Loop power cables in between panel faces.
12. Place panel #2, metal to metal on top of panel #3, so that the panel is facing up.
13. Place panel #1 facing down on top of panel #2, making sure that panel #1 and #2 power cable connection blocks are on opposite sides of each other.
14. Loop power cables in between panel faces.
15. Route main power cable over the top of panel #1 so the connector is actually beyond the panel slightly and won't crush either the connector or the top panel when the panel plate is closed (see Figure 74).
16. Close panel plate over the top of the stack of panels and secure with black straps.

**Figure 74. Packing the solar panel array.**

Note: Once the system is fully dismantled, place the components into their appropriate backpack. Perform a visual inspection of the site to ensure nothing was left behind.

## APPENDIX C. INSTRUMENTATION FREQUENCY RESPONSE ADJUSTMENTS

All NoiseLogger™ acoustic data were adjusted prior to data analysis to account for microphone and windscreen frequency response biases – that is, the diffraction and interference effects that occur at the microphone diaphragm when it is placed in a diffuse sound field (Section C.1) and the acoustic effects, i.e., insertion losses, that occur when using a microphone windscreen (Section C.2). These adjustments were either measured or determined from the instrument's calibration certificate.* This appendix presents a description of these adjustments.

Table 16 and Table 17 provide a summary each system's equipment information used for the summer and winter seasons, respectively:

**Table 16. Summary of NoiseLogger™ system equipment information used for the summer season.**

| Site ID | Site Name | LD824 Serial # | Microphone Type and Serial # | Preamplifier Serial # | Anemometer Type and Serial # | Windscreen # |
|---|---|---|---|---|---|---|
| CC1 | First Ruin | A0842R | 40AQ #25836 | 1243 | FT702 #2080-77 | NPS |
| CC2 | Antelope House Ruin | A0845U | 40AQ #38116 | 1282 | FT702 #2080-68 | NPS |
| CC3 | White House Overlook | A1148R | 40AE #31802 | 1643 | FT702 #2080-86 | V1 |
| CC4 | Antelope House Overlook | A1148R | 40AE #31802 | 1643 | FT702 #2080-86 | V1 |
| CC5 | Spider Rock Overlook | A1148R | 40AE #31802 | 1643 | FT702 #2080-86 | V1 |

**Table 17. Summary of NoiseLogger™ system equipment information used for the winter season.**

| Site ID | Site Name | LD824 Serial # | Microphone Type and Serial # | Preamplifier Serial # | Anemometer Type and Serial # | Windscreen # |
|---|---|---|---|---|---|---|
| CC1 | First Ruin | A1149S | 40AE #83643 | 1647 | FT702 #2080-87 | 9 |
| CC2 | Antelope House Ruin | A0842R | 40AQ #38114 | 1243 | FT702 #2080-77 | 5 |
| CC3 | White House Overlook | NA | NA | NA | NA | NA |
| CC4 | Antelope House Overlook | A0843S | 40AQ #38119 | 1276 | FT702 #2360-33 | 11 |
| CC5 | Spider Rock Overlook | A1151L | 40AQ #83642 | 1650 | FT702 #2080-58 | 11 |

### C.1 Microphone Frequency Response Adjustments

The frequency response of a microphone varies with the angle of incidence between the sound waves and the microphone diaphragm. In measuring ambient noise, the locations of the sound sources are somewhat arbitrary, i.e., randomly occurring. As a result, the random-incidence,

* Note: All acoustic instrumentation, including microphones, preamplifiers, sound level meters, and sound-level calibrators are calibrated annually by their manufacturer or other certified laboratory to verify accuracy. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

frequency response of each microphone was determined from its annual calibration certificate and used to adjust the acoustic data prior to data analysis (see Table 18, Table 19, Figure 75, and Figure 76).

**Table 18. Microphone frequency responses for the summer season.**

| Frequency (Hz) | Frequency Band | Site ID | | | | |
|---|---|---|---|---|---|---|
| | | CC1 | CC2 | CC3 | CC4 | CC5 |
| 12.5 | 11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 16 | 12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 13 | 0.00 | 0.00 | -0.13 | -0.13 | -0.13 |
| 25 | 14 | 0.00 | 0.00 | -0.05 | -0.05 | -0.05 |
| 31 | 15 | 0.00 | 0.00 | -0.10 | -0.10 | -0.10 |
| 40 | 16 | 0.00 | 0.00 | -0.09 | -0.09 | -0.09 |
| 50 | 17 | 0.00 | 0.00 | -0.05 | -0.05 | -0.05 |
| 63 | 18 | 0.00 | 0.00 | -0.11 | -0.11 | -0.11 |
| 80 | 19 | 0.00 | 0.00 | -0.08 | -0.08 | -0.08 |
| 100 | 20 | 0.00 | 0.00 | -0.03 | -0.03 | -0.03 |
| 125 | 21 | 0.00 | 0.00 | -0.05 | -0.05 | -0.05 |
| 160 | 22 | 0.00 | 0.00 | -0.04 | -0.04 | -0.04 |
| 200 | 23 | 0.00 | 0.00 | -0.04 | -0.04 | -0.04 |
| 250 | 24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 315 | 25 | 0.00 | 0.00 | -0.06 | -0.06 | -0.06 |
| 400 | 26 | 0.00 | 0.00 | -0.04 | -0.04 | -0.04 |
| 500 | 27 | 0.00 | 0.00 | -0.04 | -0.04 | -0.04 |
| 630 | 28 | 0.02 | 0.02 | -0.05 | -0.05 | -0.05 |
| 800 | 29 | 0.02 | 0.02 | -0.07 | -0.07 | -0.07 |
| 1000 | 30 | 0.00 | 0.05 | -0.06 | -0.06 | -0.06 |
| 1250 | 31 | 0.01 | 0.02 | -0.05 | -0.05 | -0.05 |
| 1600 | 32 | 0.01 | 0.03 | -0.05 | -0.05 | -0.05 |
| 2000 | 33 | 0.03 | 0.07 | -0.16 | -0.16 | -0.16 |
| 2500 | 34 | 0.07 | 0.11 | -0.21 | -0.21 | -0.21 |
| 3150 | 35 | 0.16 | 0.20 | -0.32 | -0.32 | -0.32 |
| 4000 | 36 | 0.13 | 0.14 | -0.59 | -0.59 | -0.59 |
| 5000 | 37 | 0.12 | 0.08 | -0.95 | -0.95 | -0.95 |
| 6300 | 38 | 0.37 | 0.25 | -1.27 | -1.27 | -1.27 |
| 8000 | 39 | 0.77 | 0.46 | -1.58 | -1.58 | -1.58 |
| 10000 | 40 | 0.69 | 0.54 | -2.28 | -2.28 | -2.28 |
| 12500 | 41 | -0.36 | 0.09 | -3.10 | -3.10 | -3.10 |
| 16000 | 42 | -3.69 | -1.48 | -4.50 | -4.50 | -4.50 |
| 20000 | 43 | -8.56 | -4.49 | -8.81 | -8.81 | -8.81 |

**Table 19. Microphone frequency responses for the winter season.**

| Frequency (Hz) | Frequency Band | Site ID | | | | |
|---|---|---|---|---|---|---|
| | | CC1 | CC2 | CC3 | CC4 | CC5 |
| 12.5 | 11 | 0.00 | 0.00 | NA | 0.00 | 0.00 |
| 16 | 12 | 0.00 | 0.00 | NA | 0.00 | 0.00 |
| 20 | 13 | 0.00 | 0.07 | NA | 0.06 | -0.09 |
| 25 | 14 | -0.07 | 0.04 | NA | 0.05 | -0.09 |
| 31 | 15 | 0.02 | 0.04 | NA | 0.08 | -0.06 |
| 40 | 16 | 0.00 | 0.00 | NA | 0.08 | -0.03 |
| 50 | 17 | 0.01 | 0.03 | NA | 0.10 | 0.00 |
| 63 | 18 | 0.01 | 0.00 | NA | 0.02 | 0.01 |
| 80 | 19 | 0.02 | 0.02 | NA | 0.01 | 0.03 |
| 100 | 20 | 0.01 | -0.01 | NA | 0.02 | -0.03 |
| 125 | 21 | 0.01 | 0.01 | NA | 0.01 | 0.00 |
| 160 | 22 | -0.01 | 0.01 | NA | 0.01 | 0.04 |
| 200 | 23 | -0.01 | -0.01 | NA | 0.01 | 0.00 |
| 250 | 24 | 0.00 | 0.00 | NA | 0.00 | 0.00 |
| 315 | 25 | 0.00 | 0.00 | NA | -0.03 | -0.03 |
| 400 | 26 | -0.03 | -0.01 | NA | -0.02 | -0.01 |
| 500 | 27 | -0.02 | 0.01 | NA | -0.01 | -0.02 |
| 630 | 28 | -0.01 | -0.01 | NA | -0.02 | -0.02 |
| 800 | 29 | -0.02 | 0.00 | NA | -0.02 | -0.02 |
| 1000 | 30 | 0.02 | 0.02 | NA | -0.03 | 0.02 |
| 1250 | 31 | 0.08 | 0.05 | NA | 0.07 | 0.04 |
| 1600 | 32 | 0.09 | 0.07 | NA | 0.11 | 0.04 |
| 2000 | 33 | 0.14 | 0.09 | NA | 0.14 | 0.04 |
| 2500 | 34 | 0.15 | 0.13 | NA | 0.18 | -0.02 |
| 3150 | 35 | 0.25 | 0.20 | NA | 0.27 | 0.01 |
| 4000 | 36 | 0.25 | 0.12 | NA | 0.27 | -0.04 |
| 5000 | 37 | 0.32 | 0.09 | NA | 0.30 | -0.15 |
| 6300 | 38 | 0.34 | 0.15 | NA | 0.42 | -0.16 |
| 8000 | 39 | 0.50 | 0.32 | NA | 0.59 | 0.00 |
| 10000 | 40 | 0.26 | 0.12 | NA | 0.14 | -0.13 |
| 12500 | 41 | -1.13 | -1.45 | NA | -1.58 | -1.34 |
| 16000 | 42 | -2.18 | -2.35 | NA | -2.98 | -1.95 |
| 20000 | 43 | -5.93 | -5.45 | NA | -6.63 | -5.48 |

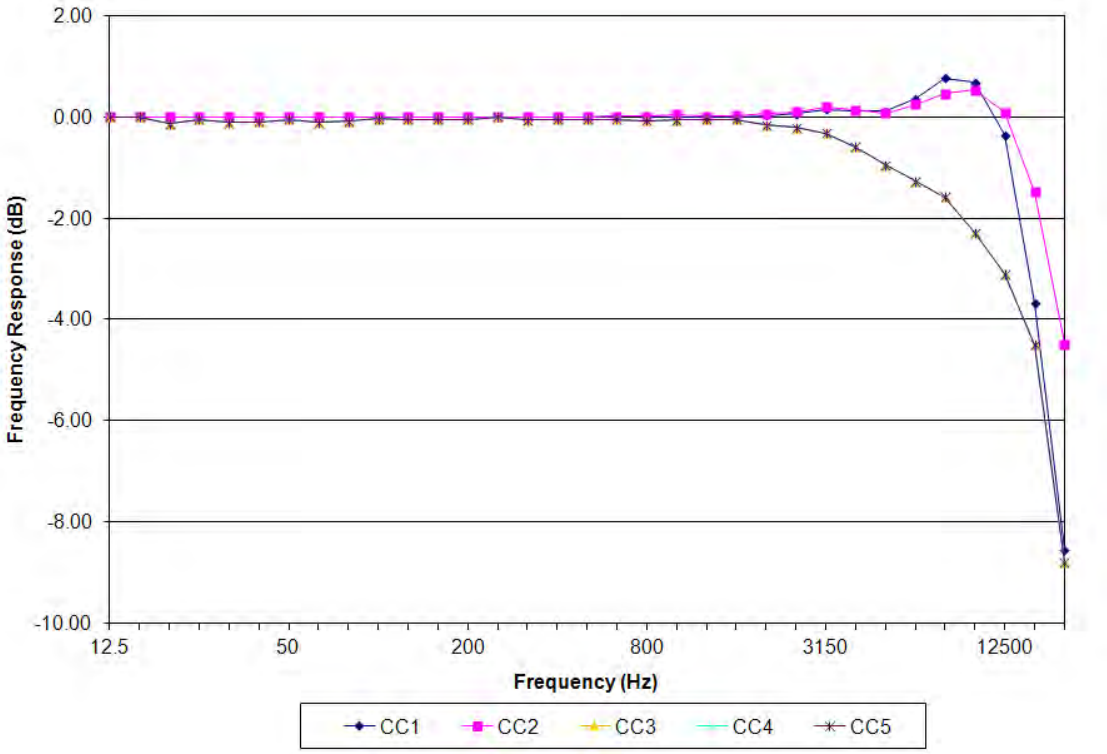


**Figure 75. Microphone frequency responses for the summer season.**

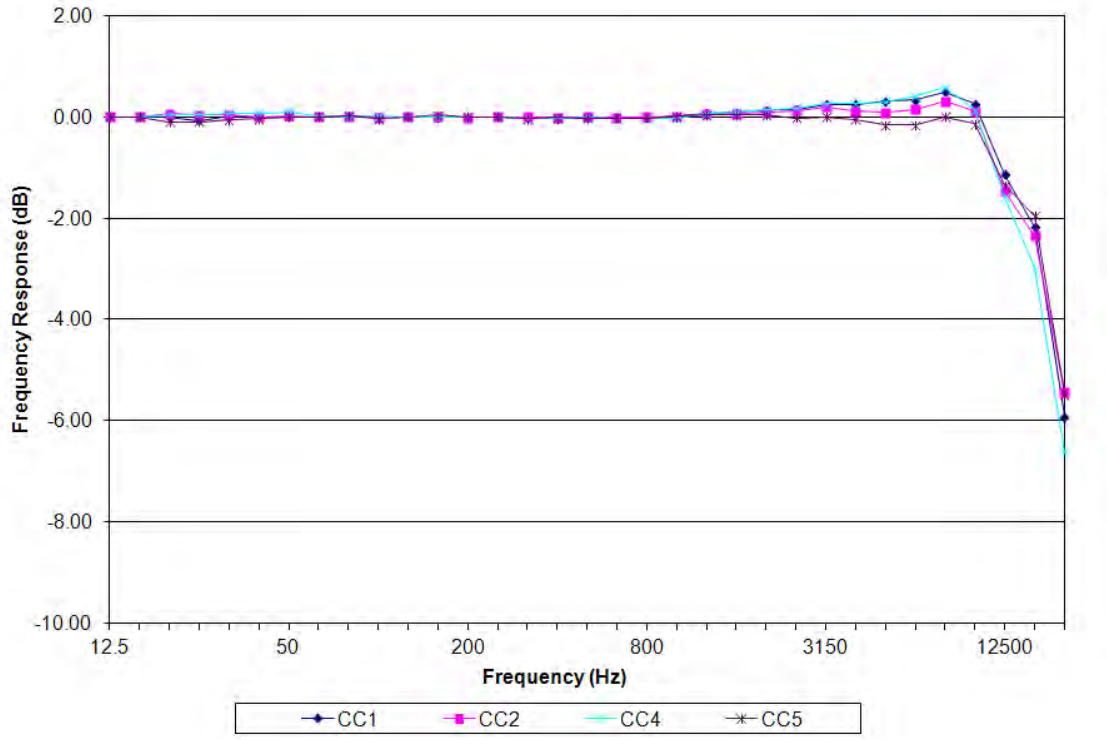


**Figure 76. Microphone frequency responses for the winter season.**

## C.2 Windscreen Frequency Response Adjustments

As discussed in Section 3.1, the use of a windscreen reduces the effects of wind-generated noise at the microphone diaphragm. The attenuation shown as a function of frequency is provided in Table 20 and Figure 77.[24]

**Table 20. Windscreen frequency responses for both summer and winter seasons.**

| Frequency (Hz) | Frequency Band | All Sites |
|---|---|---|
| 12.5 | 11 | 0.00 |
| 16 | 12 | 0.00 |
| 20 | 13 | 0.00 |
| 25 | 14 | 0.00 |
| 31 | 15 | 0.00 |
| 40 | 16 | 0.00 |
| 50 | 17 | 0.00 |
| 63 | 18 | 0.00 |
| 80 | 19 | 0.00 |
| 100 | 20 | 0.00 |
| 125 | 21 | 0.00 |
| 160 | 22 | 0.00 |
| 200 | 23 | 0.00 |
| 250 | 24 | 0.00 |
| 315 | 25 | 0.07 |
| 400 | 26 | 0.00 |
| 500 | 27 | 0.10 |
| 630 | 28 | 0.13 |
| 800 | 29 | 0.13 |
| 1000 | 30 | 0.20 |
| 1250 | 31 | 0.20 |
| 1600 | 32 | 0.20 |
| 2000 | 33 | 0.20 |
| 2500 | 34 | 0.23 |
| 3150 | 35 | 0.00 |
| 4000 | 36 | 0.00 |
| 5000 | 37 | -0.60 |
| 6300 | 38 | -1.07 |
| 8000 | 39 | -1.73 |
| 10000 | 40 | -2.40 |
| 12500 | 41 | -2.60 |
| 16000 | 42 | -2.03 |
| 20000 | 43 | -3.40 |

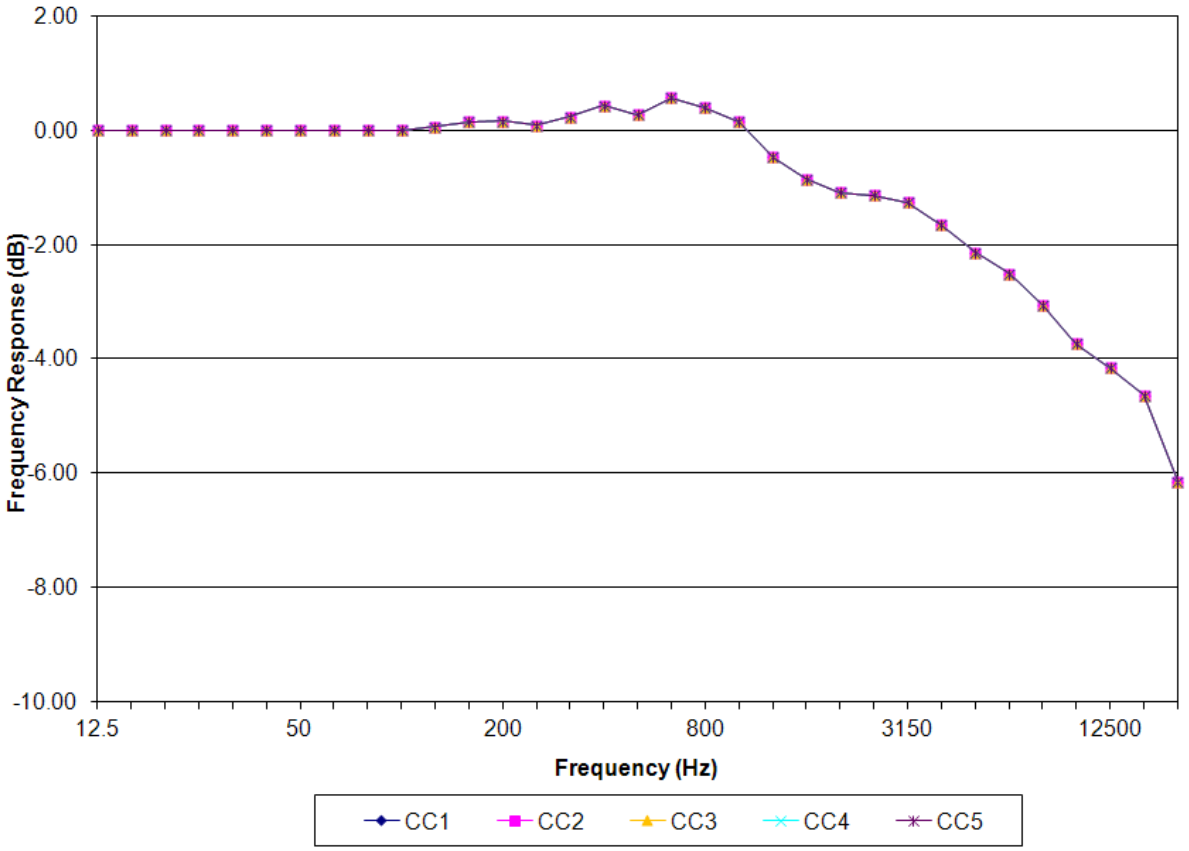


**Figure 77. Windscreen frequency responses for both summer and winter seasons.**

# APPENDIX D. INSTRUMENTATION NOISE FLOOR ADJUSTMENTS

Documented ambient noise levels measured in remote areas of the country under low wind conditions (such as in national parks) often approach the threshold of human hearing. The NoiseLogger™ system has the capability of measuring sound levels down to approximately 15 to 20 dBA. A process was developed, to estimate and adjust the NoiseLogger™ data for contamination effects of the system noise floor. The process used for noise floor adjustments combines several elements of the method presented by HMMH in Reference 25, as well as other additional criteria developed by the Volpe Center.[16] Application of these adjustments provide for more accurate estimation of the true ambient sound levels without limitations of the equipment's electrical noise floor.

## D.1 Resultant Noise Floors

Table 21, Table 22, Figure 78, and Figure 79 show the resultant noise floor levels used for each site.

**Table 21. Derived noise floors for the summer season.**

| Frequency (Hz) | Frequency Band | Site ID | | | | |
|---|---|---|---|---|---|---|
| | | CC1 | CC2 | CC3 | CC4 | CC5 |
| 12.5 | 11 | 18.00 | 18.20 | 15.75 | 15.75 | 15.75 |
| 16 | 12 | 16.60 | 16.30 | 14.75 | 14.75 | 14.75 |
| 20 | 13 | 15.70 | 14.00 | 13.70 | 13.70 | 13.70 |
| 25 | 14 | 14.50 | 11.90 | 12.40 | 12.40 | 12.40 |
| 31 | 15 | 13.10 | 9.20 | 11.00 | 11.00 | 11.00 |
| 40 | 16 | 11.50 | 6.10 | 9.55 | 9.55 | 9.55 |
| 50 | 17 | 10.00 | 4.00 | 7.55 | 7.55 | 7.55 |
| 63 | 18 | 8.60 | 2.00 | 5.75 | 5.75 | 5.75 |
| 80 | 19 | 7.10 | 0.70 | 4.10 | 4.10 | 4.10 |
| 100 | 20 | 5.60 | -0.20 | 2.15 | 2.15 | 2.15 |
| 125 | 21 | 4.10 | -0.50 | 0.95 | 0.95 | 0.95 |
| 160 | 22 | 2.70 | -0.60 | 0.10 | 0.10 | 0.10 |
| 200 | 23 | 1.50 | -0.70 | -0.55 | -0.55 | -0.55 |
| 250 | 24 | 0.70 | -0.80 | -0.85 | -0.85 | -0.85 |
| 315 | 25 | 0.20 | -0.80 | -0.90 | -0.90 | -0.90 |
| 400 | 26 | 0.00 | -0.70 | -0.85 | -0.85 | -0.85 |
| 500 | 27 | 0.10 | -0.60 | -0.55 | -0.55 | -0.55 |
| 630 | 28 | 0.30 | -0.50 | -0.15 | -0.15 | -0.15 |
| 800 | 29 | 0.50 | -0.20 | 0.40 | 0.40 | 0.40 |
| 1000 | 30 | 0.70 | 0.60 | 1.00 | 1.00 | 1.00 |
| 1250 | 31 | 0.90 | 1.70 | 1.60 | 1.60 | 1.60 |
| 1600 | 32 | 1.40 | 2.70 | 2.00 | 2.00 | 2.00 |
| 2000 | 33 | 2.00 | 3.50 | 2.50 | 2.50 | 2.50 |
| 2500 | 34 | 2.80 | 4.00 | 4.10 | 4.10 | 4.10 |
| 3150 | 35 | 3.60 | 4.50 | 4.50 | 4.50 | 4.50 |

| Frequency (Hz) | Frequency Band | Site ID | | | | |
|---|---|---|---|---|---|---|
| | | CC1 | CC2 | CC3 | CC4 | CC5 |
| 4000 | 36 | 4.30 | 5.30 | 4.80 | 4.80 | 4.80 |
| 5000 | 37 | 4.70 | 6.00 | 4.90 | 4.90 | 4.90 |
| 6300 | 38 | 5.10 | 6.70 | 4.90 | 4.90 | 4.90 |
| 8000 | 39 | 5.20 | 7.00 | 5.20 | 5.20 | 5.20 |
| 10000 | 40 | 5.20 | 7.20 | 5.20 | 5.20 | 5.20 |
| 12500 | 41 | 4.90 | 7.40 | 4.70 | 4.70 | 4.70 |
| 16000 | 42 | 4.20 | 7.30 | 4.60 | 4.60 | 4.60 |
| 20000 | 43 | 3.50 | 6.70 | 4.40 | 4.40 | 4.40 |

**Table 22. Derived noise floors for the winter season.**

| Frequency (Hz) | Frequency Band | Site ID | | | | |
|---|---|---|---|---|---|---|
| | | CC1 | CC2 | CC3 | CC4 | CC5 |
| 12.5 | 11 | 17.45 | 18.00 | NA | 18.80 | 12.10 |
| 16 | 12 | 16.45 | 16.60 | NA | 18.20 | 10.50 |
| 20 | 13 | 15.35 | 15.70 | NA | 17.00 | 9.10 |
| 25 | 14 | 13.85 | 14.50 | NA | 15.30 | 7.90 |
| 31 | 15 | 11.80 | 13.10 | NA | 13.30 | 6.60 |
| 40 | 16 | 10.05 | 11.50 | NA | 11.30 | 5.20 |
| 50 | 17 | 8.05 | 10.00 | NA | 9.20 | 3.80 |
| 63 | 18 | 6.00 | 8.20 | NA | 7.50 | 2.50 |
| 80 | 19 | 4.00 | 6.50 | NA | 5.70 | 1.40 |
| 100 | 20 | 2.10 | 4.90 | NA | 3.80 | 0.50 |
| 125 | 21 | 0.60 | 3.80 | NA | 2.20 | -0.60 |
| 160 | 22 | -0.20 | 2.70 | NA | 0.80 | -1.60 |
| 200 | 23 | -0.50 | 1.50 | NA | 0.10 | -2.00 |
| 250 | 24 | -1.05 | 0.70 | NA | -0.20 | -2.40 |
| 315 | 25 | -1.00 | 0.20 | NA | -0.10 | -2.50 |
| 400 | 26 | -0.85 | 0.00 | NA | 0.20 | -2.60 |
| 500 | 27 | -0.65 | 0.10 | NA | 0.40 | -2.50 |
| 630 | 28 | -0.25 | 0.30 | NA | 0.70 | -2.40 |
| 800 | 29 | 0.25 | 0.50 | NA | 1.00 | -1.90 |
| 1000 | 30 | 2.10 | 0.80 | NA | 1.20 | -1.30 |
| 1250 | 31 | 2.50 | 1.40 | NA | 1.60 | -0.40 |
| 1600 | 32 | 3.20 | 2.20 | NA | 2.00 | 0.40 |
| 2000 | 33 | 3.90 | 2.80 | NA | 2.60 | 1.10 |
| 2500 | 34 | 4.80 | 3.40 | NA | 3.30 | 1.70 |
| 3150 | 35 | 5.20 | 4.00 | NA | 3.90 | 2.10 |
| 4000 | 36 | 6.00 | 4.70 | NA | 4.80 | 2.40 |
| 5000 | 37 | 6.30 | 5.40 | NA | 5.50 | 2.90 |

| Frequency (Hz) | Frequency Band | Site ID | | | | |
|---|---|---|---|---|---|---|
| | | CC1 | CC2 | CC3 | CC4 | CC5 |
| 6300 | 38 | 6.60 | 5.70 | NA | 6.20 | 3.10 |
| 8000 | 39 | 6.50 | 6.00 | NA | 6.90 | 3.30 |
| 10000 | 40 | 6.50 | 5.80 | NA | 7.30 | 3.20 |
| 12500 | 41 | 6.40 | 5.65 | NA | 7.50 | 3.10 |
| 16000 | 42 | 6.20 | 5.20 | NA | 7.50 | 3.00 |
| 20000 | 43 | 6.10 | 4.80 | NA | 7.30 | 2.90 |

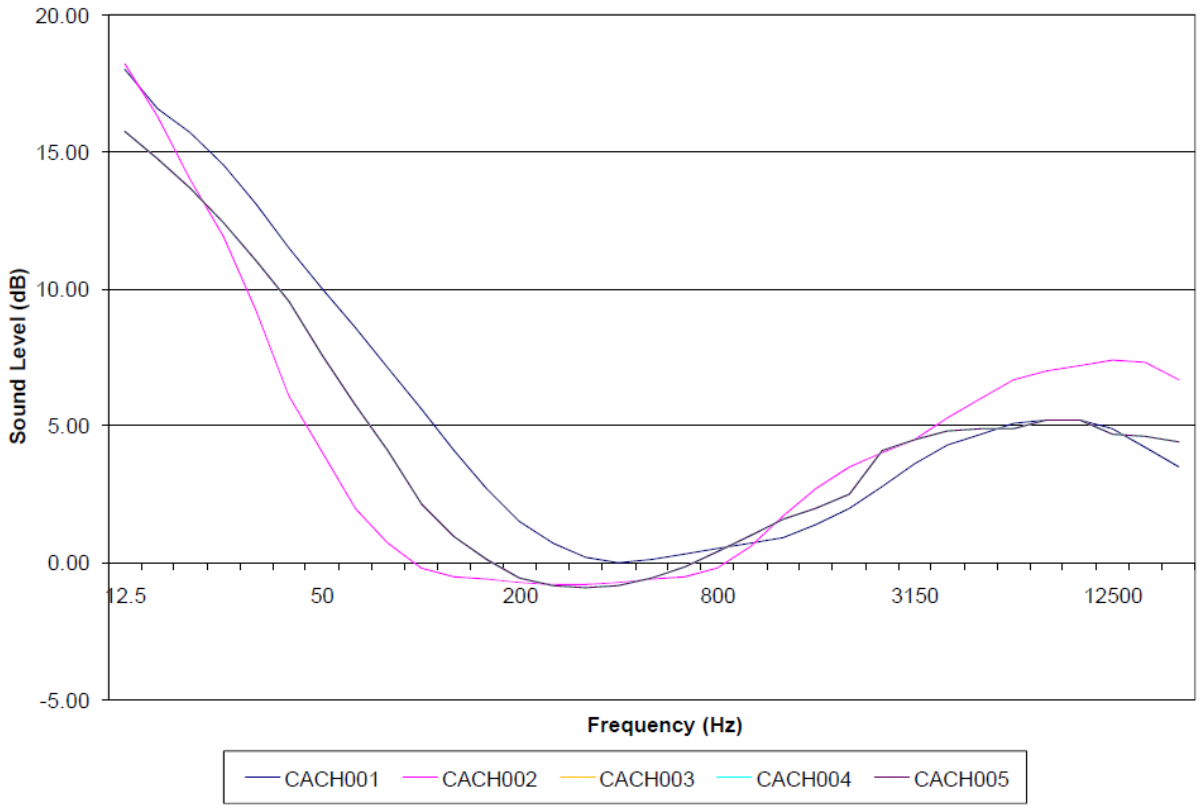


**Figure 78. Derived noise floors for each site for the summer season.**

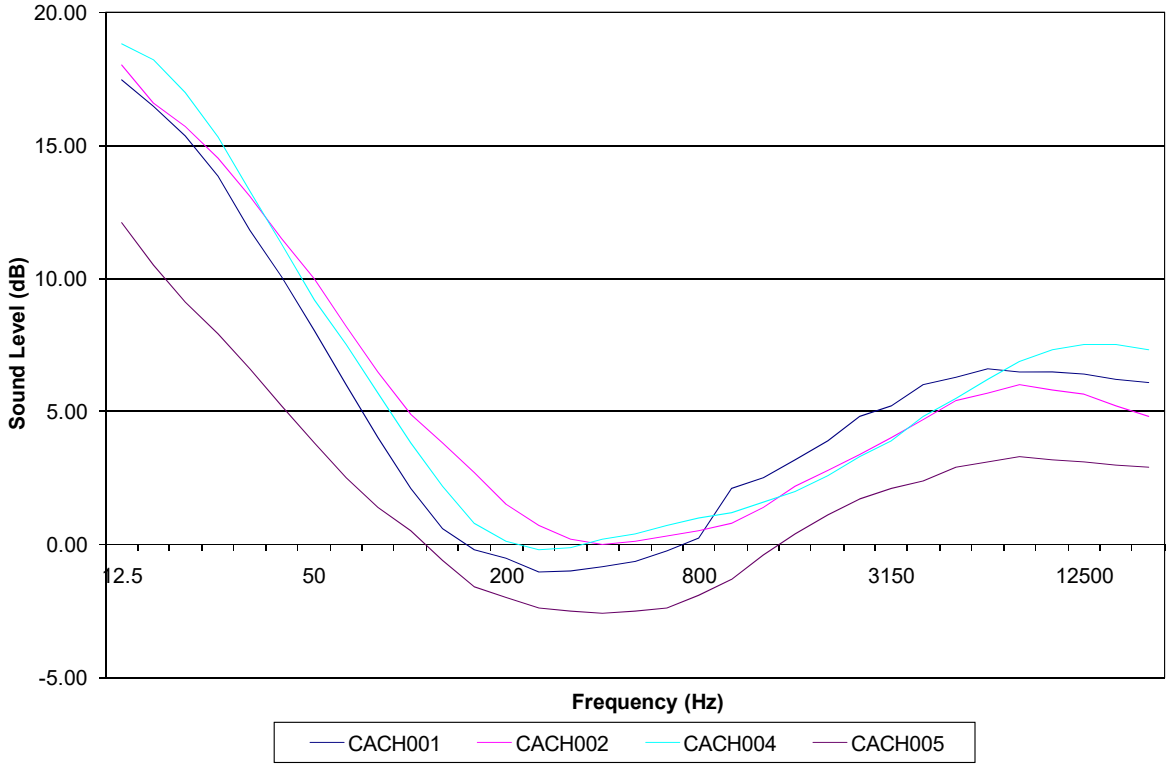


**Figure 79. Derived noise floors for each site for the winter season.**

## D.2 Applying Noise Floor Adjustments

The algorithm used in applying noise floor adjustments is based on HMMH's work as presented at the Inter-Noise Conference in August 2002.[24] The method applies the noise floor adjustments as an energy subtraction from the sound levels in each frequency band, whenever the measured-band sound level is within 1 dB of the noise floor of the system. At the ⅓-octave frequency band where the subtraction criterion is no longer met, the remainder of the spectrum (out to ⅓-octave frequency band 43, or 20 kHz) is extrapolated downward using a constant slope. The overall A-weighted sound level is then computed using the reconstructed spectrum.

## TERMINOLOGY

This section presents pertinent terminology used throughout the document. Note: Definitions are generally consistent with those of the American National Standards Institute (ANSI) and References 26 through 30.

**A-WEIGHTING** - A frequency-based methodology used to account for changes in human hearing sensitivity as a function of frequency. The A-weighting network de-emphasizes the high (6.3 kHz and above) and low (below 1 kHz) frequencies, and emphasizes the frequencies between 1 kHz and 6.3 kHz, in an effort to simulate the relative response of human hearing.

**ACOUSTIC ENERGY** - Commonly referred to as the mean-square sound-pressure ratio, sound energy, or just plain energy, acoustic energy is the squared sound pressure (often frequency weighted), divided by the squared reference sound pressure of 20 μPa, the threshold of human hearing. It is arithmetically equivalent to $10^{LEV/10}$, where LEV is the sound level, expressed in decibels.

**AMBIENT** - The composite, all-inclusive sound associated with a given environment, excluding the analysis system's electrical noise and the sound source of interest. Several definitions of ambient noise have been adopted by different organizations depending on their application. *Existing Ambient*: The composite, all-inclusive sound associated with a given environment, excluding only the analysis system's electrical noise (i.e., aircraft-related sounds are included);

- *Existing Ambient Without Air Tours*: The composite, all-inclusive sound associated with a given environment, excluding the analysis system's electrical noise and the sound source of interest, in this case, commercial air tour aircraft;
- *Existing Ambient Without All Aircraft* (for use in assessing cumulative impacts): The composite, all-inclusive sound associated with a given environment, excluding the analysis system's electrical noise and the sounds produced by the sound source of interest, in this case, all types of aircraft (i.e. commercial air tours, commercial jets, general aviation aircraft, military aircraft, and agricultural operations); and
- *Natural Ambient*: The natural sound conditions found in a study area, including all sounds of nature (i.e., wind, streams, wildlife, etc.), and excluding all human and mechanical sounds.

**ANNOYANCE** - Any bothersome or irritating occurrence.

**BACKCOUNTRY** - Any location in a study area subject to minimal human activity, such as designated wilderness areas or restricted, hiking and camping areas (destinations generally located 1 hour or more from frontcountry locations).

**C-WEIGHTING** - A frequency-based methodology that is linear over the mid frequency range from 200 Hz to 1.6 kHz, and de-emphasizes the low (below 200 Hz) and high (above 1.6 kHz) frequencies.

**DAY-NIGHT AVERAGE SOUND LEVEL (DNL, denoted by the symbol $L_{dn}$)** - A 24-hour time-averaged sound exposure level (see definition below), adjusted for average-day sound

source operations. In the case of aircraft noise, a single operation is equivalent to a single aircraft operation. The adjustment includes a 10-dB penalty for operations occurring between 2200 and 0700 hours, local time.

**DECIBEL** - (symbol dB) A unit of measure for defining a noise level or a noise exposure level. The number of decibels is calculated as ten times the base-10 logarithm of the squared sound pressure (often frequency weighted), divided by the squared reference sound pressure of 20 μPa, the threshold of human hearing.

**EQUIVALENT SOUND LEVEL (TEQ, denoted by the symbol $L_{AeqT}$)** - Ten times the base-10 logarithm of the time-mean-square, instantaneous A-weighted sound pressure, during a stated time interval, T (where $T=t_2-t_1$, in seconds), divided by the squared reference sound pressure of 20 μPa, the threshold of human hearing. $L_{AeqT}$ is related to $L_{AE}$ by the following equation:

$$L_{AeqT} = L_{AE} - 10Lg(t_2-t_1) \quad \text{(dB)}$$

Where $L_{AE}$ = Sound exposure level (see definition below).

The $L_{Aeq}$ for a specific time interval, T1 (expressed in seconds), can be normalized to a longer time interval, T2, via the following equation:

$$L_{AeqT2} = L_{AeqT1} - 10Lg(T2/T1) \quad \text{(dB)}$$

**FRONTCOUNTRY** - Any location in a study area subject to substantial human activity, such as scenic overlooks, visitor centers, recreation areas, or destinations reached by short hikes (1 hour or less).

**FREQUENCY** – For a function periodic in time, the reciprocal of the period (the smallest increment of an independent variable for which a function repeats itself).

**HARD GROUND** - Any highly reflective surface in which the phase of the sound energy is essentially preserved upon reflection; examples include water, asphalt and concrete.

**HERTZ** - (abbreviation Hz) Unit of frequency, the number of times a phenomenon repeats itself in a unit of time.

**$L_{50}$** - A statistical descriptor describing the sound level exceeded 50 percent of a specific time period. For example, from a fifty-sample measurement period with the samples sorted from highest sound level to lowest sound level, the twenty-fifth sound level is the 50-percentile exceeded sound level.

**$L_{90}$** - A statistical descriptor describing the sound level exceeded 90 percent of a specific time period. For example, from a fifty-sample measurement period with the samples sorted from highest sound level to lowest sound level, the forty-fifth sound level is the 90-percentile exceeded sound level.

**$L_{AE}$** (see Sound Exposure Level)

**$L_{Aeq}$** (see Equivalent Sound Level)

**$L_{ASmx}$** (see Maximum Sound Level)

**$L_{dn}$** (see Day-Night Average Sound Level)

**$L_x$** - A statistical descriptor describing the sound level exceeded "x" percent of a specific time period, e.g., $L_{50}$ and $L_{90}$.

**LINE SOURCE -** Multiple point sources moving in one direction, radiating sound cylindrically. Note: Sound levels measured from a line source decrease at a rate of 3 dB per doubling of distance.

**LOW-LEVEL NOISE ENVIRONMENT** - An outdoor sound environment typical of a remote suburban setting, or a rural or public lands setting. Characteristic day-night average sound levels (DNL, represented by the symbol, $L_{dn}$) would generally be less than 45 dB, and the everyday sounds of nature, e.g., wind blowing in trees and birds chirping would be a prominent contributor to the DNL.

**MAXIMUM SOUND LEVEL** - The maximum, A-weighted sound level associated with a given event (see figure with definition of sound exposure level). Fast exponential response ($L_{AFmx}$) and Slow exponential response ($L_{ASmx}$) characteristics effectively damp a signal as if it were to pass through a low-pass filter with a time constant ($\tau$) of 125 and 1000 milliseconds, respectively.

**NATURAL AMBIENT** (see Ambient)

**NATURAL QUIET** - The natural sound conditions found in a study area. Natural quiet is a subset of ambient noise. Traditionally, it is characterized by the total absence of human or mechanical sounds, but includes all sounds of nature, such as wind, streams, and wildlife. In a park environment, the National Park Service (NPS) on Page 74 of its Report to Congress[30] defines natural quiet as the absence of mechanical noise, but containing the sounds of nature, such as wind, streams, and wildlife, as well as human-generated "self-noise" (e.g., talking, the tread of hiking boots on the trail, a creaking packframe, the rattle of pots or pans).

**NATURAL SOUNDSCAPE** - In accordance with National Park Service's Director's Order #47, the natural soundscape is the Natural Ambient sound level of a park. It is comprised of the natural sound conditions in a park, which exist in the absence of any human-produced noises. [31]

**NOISE** - Any unwanted sound. "Noise" and "sound" are used interchangeably in this document.

**NOISE DOSE** - A measure of the noise exposure to which a person is subjected.

**NOISE-POWER DISTANCE (NPD) DATA** – A set of noise levels representing a particular aircraft/engine combination in the FAA's INM, expressed as a function of: (1) engine power, usually the corrected net thrust per engine; and (2) source-to-receptor distance.

**OVERLOOK** - Any frontcountry location in a study area subject to substantial human activity, or destinations reached by automobile or bus, and generally traversable within thirty minutes.

**PERCENT TIME-ABOVE** – The percentage of time that a time-varying sound level is above a given sound level threshold.

**POINT SOURCE -** Source that radiates sound spherically. Note: Sound levels measured from a point source decrease at a rate of 6 dB per doubling of distance.

**SHORT HIKE** - Any frontcountry location in a study area subject to moderate to substantial human activity, or destinations generally reached within one hour of hiking.

**SOFT GROUND** - Any highly absorptive surface in which the phase of the sound energy is changed upon reflection; examples include terrain covered with dense vegetation or freshly fallen snow. (Note: At grazing angles greater than 20 degrees, which can commonly occur at short ranges, or in the case of elevated sources, soft ground becomes a good reflector and can be considered hard ground).

**SOUND** – Auditory sensation evoked by the oscillation in pressure, stress, particle displacement, particle velocity, etc., in a medium with internal forces (e.g., elastic or viscous), or the superposition of such propagated oscillations.

**SOUND EXPOSURE LEVEL (SEL, denoted by the symbol $L_{AE}$)** – Over a stated time interval, T (where $T=t_2-t_1$, in seconds), ten times the base-10 logarithm of a given time integral of squared instantaneous A-weighted sound pressure, divided by the product of the squared reference sound pressure of 20 µPa, the threshold of human hearing, and the reference duration of 1 sec. The time interval, T, must be long enough to include a majority of the sound source's acoustic energy. As a minimum, this interval should encompass the 10-dB down points (see Figure 80).

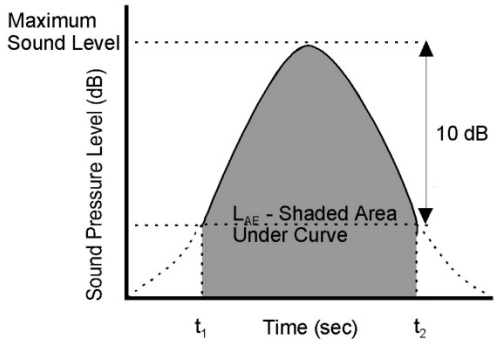


**Figure 80. Graphical representation of $L_{AE}$.**

The $L_{AE}$ can be developed from 1-second, A-weighted sound levels ($L_{Ak}$) by the following equation:

$$L_{AE} = 10Lg\left[\sum_{k=t_1}^{t_s} 10^{L_{AK}/10}\right] \quad \text{(dB)}$$

In addition, $L_{AE}$ is related to $L_{AeqT}$ by the following equation:

$$L_{AE} = L_{AeqT} + 10Lg(t_2-t_1) \quad \text{(dB)}$$

Where $L_{AeqT}$ = Equivalent sound level in dB (see definition above).

**SOUND PRESSURE LEVEL (SPL)** - Ten times the base-10 logarithm of the time-mean-square sound pressure, in a stated frequency band (often frequency-weighted), divided by the squared reference sound pressure of 20 µPa, the threshold of human hearing.

$$SPL = 10Lg[p^2/ p_{ref}^2]$$

Where $p^2$ = time-mean-square sound pressure; and $p_{ref}^2$ = squared reference sound pressure of 20 µPa.

**SOUNDSCAPE** - In accordance with National Park Service's Director's Order #47 (http://www.nps.gov/policy/DOrders/DOrder47.html), soundscape is defined as "the total ambient acoustic environment associated with a given environment in an area such as a national park. In a national park setting, this soundscape is usually composed of both Natural Ambient sounds and a variety of human-made sounds."

**SPECTRUM** – A set of sound pressure levels in component frequency bands, usually one-third octave-bands.

**TIME-ABOVE** – The duration that a time-varying sound level is above a given sound level threshold in a given area during a given time period.

**TIME-AUDIBLE** – The percentage of time that a time-varying sound level can be heard by a receiver in a given area during a given time period.

**Z-WEIGHTING** – Indicates no frequency-based methodology was used (also referred to as flat or no weighting).

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| | |
|---|---|
| **From:** | Ward, Vicki L |
| **To:** | dhingson_contact |
| **Cc:** | Fox, Sandra Y (FAA) |
| **Subject:** | Re: [EXTERNAL] Request for semi-annual Canyon de Chelly NM (CACH) air tour operations data (updated) : 2020-2023 |
| **Date:** | Thursday, July 11, 2024 7:03:15 PM |



Hi Dick,

The 2020 air tour report is available at National Parks Air Tour Management Program - Natural Sounds (U.S. National Park Service) (nps.gov). 2021 - 2023 air tour reporting results are unofficial and unpublished and aren't ready for release yet.

Thanks,

Vicki L. Ward
Overflights Program Manager
Natural Sounds and Night Skies Division
Natural Resource Stewardship and Science Directorate
National Park Service
1201 Oakridge Dr., Suite 100
Fort Collins, CO 80525
vicki_ward@nps.gov
Teleworking/Mobile #: 970-631-5257
Fax: (970) 267-2109

"Listening to the silence is probably one of the most profound experiences we can have in our everyday life." Anne Wilson Schaef

---

**From:** Infowest <dhingson@infowest.com>
**Sent:** Wednesday, July 10, 2024 11:31 AM
**To:** Ward, Vicki L <Vicki_Ward@nps.gov>
**Subject:** [EXTERNAL] Request for semi-annual Canyon de Chelly NM (CACH) air tour operations data (updated) : 2020-2023



Vicki,

(As I need to report the CACH ATMP matter , this Saturday morning, with my quarterly meeting of Sierra Club's Conservation Committee )

So my request,

1) please provide in reply the number of air tours reported by *all CACH operators combined* (principally Safari Southwest specifically , (if possible to share a specific operator's numbers, am not sure the rule on that)

For first and last halves of 2020, 2021, 2022, and 2023;

Also please provide preliminary , even if not yet officially audited, *rough estimate* (by or during first week of August) for the number of tours reported from them for first half of 2024; and also cite any reporting delinquency , particularly if from the principal operator? as these reports are all due to FAA from each one, by the 31st of the month. January and July.

Since by far the main operator and contending one, is Safari Southwest, we are naturally focused on his reported numbers; so for purposes of my Saturday report to Chapter, now on Agenda, and upcoming consideration by NPOAG , please respond as possible , even if certain very small operators reports still not completely received/available …

An assumption is (given massive participation in this ATMP process) , and *commendable* attention to detail,
that Safari Southwest has been assiduously prompt, in providing timely half-year reports , long required by law, and now , given newly mandated consult- circumstances involving NPOAG , ie required participation in ATMP planning; can be shared with us , internally. Even if confidentially.

Sent from my iPhone

Dick Hingson
Member of NPOAG,
air tours specialist of Sierra Club Grand Canyon Chapter (AZ), (myself based in Flagstaff Az)

Don't hesitate to call if needed or best: 928-699-8366;

I'll be glad to consult by phone with you and/or FAA, by phone, anytime , if that's also or instead desirable .

**From:** Fox, Sandra Y (FAA)
**To:** Infowest
**Cc:** Vicki Ward Ward
**Subject:** RE: Corrected: NPOAG Consultation Request: Canyon de Chelly Draft ATMP -my response
**Date:** Monday, July 15, 2024 12:05:00 PM

---

Hi Dick –

Thanks so much, I just want to summarize and make sure I'm getting the requests correct:

1. Regarding the in-person meeting in Chinle:
    a. Number of people that attended the in-person meeting
    b. Number of people that spoke and/or submitted comments
2. # of Air Tours from 2020 forward and timeliness of submission

Is that correct?

Thanks so much!

r/
**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

---

**From:** Infowest <dhingson@infowest.com>
**Sent:** Friday, July 12, 2024 2:52 PM
**To:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Cc:** Vicki Ward Ward <vicki_ward@nps.gov>
**Subject:** Re: Corrected: NPOAG Consultation Request: Canyon de Chelly Draft ATMP -my response



Sandra, thx for re-send (as delays even "missed" messages, in emails possible this (short, odd)scrambled Holiday Week , such are notable ,including re my own, re even US Mail Delivery!

Hadn't caught up with the Eastman-generated dialogue, as messaged,

So, thx!

I have CACh air tour matter on my own Sierra Club quarterly chapter conservation agenda-report, tomorrow ; incl, the impressive 2011 NPS soundscape "natural ambient"measurements, study link

Even looked into lengthy NPS Administrative History of the Park, online, which shows SST overflights as major aircraft 1960's -1970's concern! (And which should be noted -as conceivably *resurgent* concern).

Question (just curious): how many attended the April 16th Navajo Chapter House meeting (I didn't, as was still back East post/NPOAG until April 20th, have gotten no update from any source as to its tenor , numbers of participants, any written testimony submitted there.

Key Point:
At least some brief reference to the April 16th Chapter House meeting, at least to degree of attendance/interest, if any,

be soon provided the NPOAG;

Q. How many attended there April 16th , in Chinle Chapter House? (Rough estimate is fine.) his many prepared testimonies submitted?

How many testified there? Even for a minute,

also : as to recent air tour reported operations #'s there (ie, from required semi-annual , required operator reports) :

(please update, even if rough estimates still) including whether original periodic, air tour operator-data was at all timely provided?
or explicitly not,
or, if never submitted at all?
Or if just plain "lost" in some maelstrom , and can't be re requested for some reason? or for what specific reason?
(since 2020) .

If we have an online, group NPOAG meeting , in coming weeks, in fact they'd expect to hear something on that!

I'll review ATMP in my Sierra Club "Grand Canyon Chapter" (AZ) Conservation Committee , in our tomorrow am's virtual, online long-scheduled quarterly meeting.

Ask, As to how they would want/expect NPOAG to now proceed.

Along with any other issues input received on this matter—today or overnight—from any source.

Of course will next re-watch the NPOAG public April public meeting for anything I "missed" ….!

Do you envision a possible series of NPOAG meetings on this , given consensus from such a group is very hard at 11th hour, to reach on an actual ATMP especially on a ban !!

Sent from my iPhone
Dick Hingson

> On Jul 9, 2024, at 7:51 AM, Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov> wrote:
>
> Hi John,
>
> Absolutely. In terms of scheduling options, I can set up a Zoom link for you all for whatever times/days work best for NPOAG to meet to develop and finalize consultation information and recommendations. I'm also happy to provide any assistance on using the features of Zoom if needed. For the meetings, I'll log in to start the meeting, but once everyone is online and set up, I will drop off so that NPOAG can meet independently. I'll remain available to log back in should you need any assistance w/ Zoom. And again, the link can be set up to be usable whenever it is convenient to NPOAG – you aren't limited to my normal office hours or anything like that.
>
> As for the first meeting, I'm happy to coordinate schedules with NPS and FAA ATMP team members so that we can be available at the beginning of the meeting. I do think it'd be very helpful to watch the Canyon de Chelly public meeting that was held on Apr 17, 2024 if anyone was not able to attend. The recording of the live stream can be found on YouTube at this link: National Park Air Tour Management Plan: Canyon de Chelly, Arizona (youtube.com). The purpose of this meeting was to review the Draft ATMP with the public and provide an opportunity for Q&A.
>
> The following link was provided in the letter to access the Draft ATMP electronically: ParkPlanning - Canyon de Chelly Draft ATMP, EA and FAQs (nps.gov). This website also has the Draft ATMP FAQ document provided as part of the public comment period which may be helpful to the group.
>
> Hopefully this answers your questions, and if not I'm available to chat at your convenience!
>
> Thanks!
> r/
> **Sandi Fox**
> Environmental Protection Specialist
> *Environmental Policy Division*
> *Office of Environment & Energy*
> *Federal Aviation Administration*
> sandra.y.fox@faa.gov

(202) 267-0928

---

**From:** John W Eastman <john@teton.com>
**Sent:** Tuesday, July 9, 2024 10:02 AM
**To:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>; 'Bob Randall' <brandall@kaplankirsch.com>; 'Carl Slater' <carl@cdcarl.com>; 'Dick Hingson' <dhingson@infowest.com>; 'Eric Lincoln' <lincoln.eric2@gmail.com>; 'Huling, Murray' <Murray.Huling@aopa.org>; 'James Viola' <james.viola@rotor.org>; 'John Becker' <John@papillon.com>; 'Noise Pollution Clearinghouse' <npc@nonoise.org>
**Cc:** 'Ward, Vicki L' <Vicki_Ward@nps.gov>; Elmore, Eric (FAA) <eric.elmore@faa.gov>; 'Trevino, Karen' <Karen_Trevino@nps.gov>; Lares, Sheri (FAA) <sheri.lares@faa.gov>; 'Pipkin, Ashley R' <Ashley_Pipkin@nps.gov>; Deem, Patricia (FAA) <Patricia.Deem@faa.gov>; 'Porsia, Sara C' <sara.porsia@sol.doi.gov>
**Subject:** Re: Corrected: NPOAG Consultation Request: Canyon de Chelly Draft ATMP



Hi Sandra,

The attached letter of July 8 references an opportunity for a zoom call prior to the August deadline for NPOAG comments.

Can you please provide scheduling options for this call?

It would be helpful to have you & Vicky summarize the ATMP for CACH as part of this call.

Best

John Eastman

Get Outlook for iOS

---

**From:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Sent:** Monday, July 8, 2024 1:51 PM
**To:** 'Bob Randall' <brandall@kaplankirsch.com>; 'Carl Slater' <carl@cdcarl.com>; 'Dick Hingson' <dhingson@infowest.com>; 'Eric Lincoln' <lincoln.eric2@gmail.com>; 'Huling, Murray' <Murray.Huling@aopa.org>; 'James Viola' <james.viola@rotor.org>; 'John Becker' <John@papillon.com>; John W Eastman <john@teton.com>; 'Noise Pollution Clearinghouse' <npc@nonoise.org>
**Cc:** 'Ward, Vicki L' <Vicki_Ward@nps.gov>; Elmore, Eric (FAA) <eric.elmore@faa.gov>; 'Trevino, Karen' <Karen_Trevino@nps.gov>; Lares, Sheri (FAA) <sheri.lares@faa.gov>; 'Pipkin, Ashley R' <Ashley_Pipkin@nps.gov>; Deem, Patricia (FAA)

<Patricia.Deem@faa.gov>; 'Porsia, Sara C' <sara.porsia@sol.doi.gov>
**Subject:** Corrected: NPOAG Consultation Request: Canyon de Chelly Draft ATMP

Good afternoon NPOAG members,

Section 628 of the FAA Reauthorization Act of 2024 amends the National Parks Air Tour Management Act to require consultation with NPOAG when establishing an air tour management plan for a national park. Attached to this email are 1) a letter from the agencies requesting NPOAG consultation on the Canyon de Chelly Draft ATMP and 2) a copy of the Canyon de Chelly Draft ATMP.

Please refer to the attached letter for background information and further instructions. The deadline for receipt of the NPOAG consultation is **Aug 8, 2024** (date corrected from original email). As stated in the letter, the agencies will not accept comments from individual NPOAG members at this time.

Thank you very much for your attention to this matter,

r/
**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

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| | |
|---|---|
| **From:** | Fox, Sandra Y (FAA) |
| **To:** | Bob Randall; Carl Slater; Dick Hingson; Eric Lincoln; Huling, Murray; James Viola; John Becker; John W Eastman; Noise Pollution Clearinghouse |
| **Cc:** | Ward, Vicki L; Elmore, Eric (FAA); Trevino, Karen; Lares, Sheri (FAA) |
| **Subject:** | Canyon de Chelly Consultation |
| **Date:** | Wednesday, July 17, 2024 4:40:00 PM |

Good afternoon NPOAG members,

Below my signature block is a standing Zoom meeting invite that is set to recur with no specific time or expiration date. I'll cancel the meeting after Aug 8, but until then you can use this as a group to meet as often as you need. Eric Elmore and Sheri Lares are meeting hosts to that meeting as well, so if you experience any difficulties with the Zoom link you can reach out to them.

Next week I will be out of the office and will return the following week. If you need any assistance in the meantime, please reach out to this collective group in the CC: of this email. I hope that the public meeting video recording was helpful. If any of you want to do a test meeting of the Zoom this week either as a group or individually, please let me know. I'm happy to help with that before I am out of the office.

Please try to gather any group questions together we'll do our best to answer what we can – keeping in mind that we won't be able to provide deliberative or draft materials. It's important for our records that we have captured the groups questions related to the consultation and it will help minimize redundant questions. Perhaps nominating a spokesperson to manage all primary communications related to the consultation would be helpful for you all – not required, but just a suggestion.

As a reminder, the collective consultation response from NPOAG is due no later than Aug 8.

r/

**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

---

# FAA ZoomGov Meeting.

Optional ways to join are:

***Click to Join:***
https://faavideo.zoomgov.com/j/1606722591
• Passcode: 001002
• If prompted, accept the Zoom application as instructed.

***Mobile Device:***
• Download the ‘Zoom Cloud Meetings’ App.
• Select ‘Join a Meeting’ and enter Meeting ID: 160 672 2591
• Passcode: 001002

***Phone Audio Only:***
• Call 1-888-924-3239 or 1-571-302-4908; enter Meeting ID: 160 672 2591
• Passcode: 001002
• Unmute or mute yourself by pressing *6.

| | |
|---|---|
| **From:** | Fox, Sandra Y (FAA) |
| **To:** | "Bob Randall"; "Carl Slater"; "Dick Hingson"; "Eric Lincoln"; "Huling, Murray"; "James Viola"; "John Becker"; "John W Eastman"; "Noise Pollution Clearinghouse" |
| **Cc:** | "Ward, Vicki L"; Elmore, Eric (FAA); "Trevino, Karen"; Lares, Sheri (FAA) |
| **Subject:** | RE: Canyon de Chelly Consultation |
| **Date:** | Thursday, July 18, 2024 8:34:00 AM |

Good morning all –

It was brought to my attention that I incorrectly described the due out from NPOAG in my email below. To correct my mistake, let me point back to the letter with the original instructions. In my email below I used the phrase "collective consultation response" which was not accurate and could lead to confusion as to the expected deliverable.

The original instructions from the letter sent to NPOAG state: *"In this consultation, the agencies are requesting a single submission from the NPOAG comprised of the NPOAG's consolidated consensus advice, information, and recommendations for the agencies' consideration."*

To provide further clarification, it is not intended to be a collection of individual responses from NPOAG members, but rather all advice, information, and recommendations provided are ***consensus responses*** from the group, as stated in the instruction letter. As brought to my attention, the use of the phrase "collective consultation response" could be interpreted as a collection of individual responses that do not reflect the consensus of NPOAG – it was not my intention to introduce any confusion to the group.

Please accept my apologies for the error.

Thanks and have a great rest of the week.

r/

**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

---

**From:** Fox, Sandra Y (FAA)
**Sent:** Wednesday, July 17, 2024 4:41 PM
**To:** Bob Randall <brandall@kaplankirsch.com>; Carl Slater <carl@cdcarl.com>; Dick Hingson <dhingson@infowest.com>; Eric Lincoln <lincoln.eric2@gmail.com>; Huling, Murray <Murray.Huling@aopa.org>; James Viola <james.viola@rotor.org>; John Becker <John@papillon.com>; John W Eastman <john@teton.com>; Noise Pollution Clearinghouse <npc@nonoise.org>
**Cc:** Ward, Vicki L <Vicki_Ward@nps.gov>; Elmore, Eric (FAA) <eric.elmore@faa.gov>; Trevino, Karen

<Karen_Trevino@nps.gov>; Lares, Sheri (FAA) <sheri.lares@faa.gov>
**Subject:** Canyon de Chelly Consultation

Good afternoon NPOAG members,

Below my signature block is a standing Zoom meeting invite that is set to recur with no specific time or expiration date. I'll cancel the meeting after Aug 8, but until then you can use this as a group to meet as often as you need. Eric Elmore and Sheri Lares are meeting hosts to that meeting as well, so if you experience any difficulties with the Zoom link you can reach out to them.

Next week I will be out of the office and will return the following week. If you need any assistance in the meantime, please reach out to this collective group in the CC: of this email. I hope that the public meeting video recording was helpful. If any of you want to do a test meeting of the Zoom this week either as a group or individually, please let me know. I'm happy to help with that before I am out of the office.

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As a reminder, the collective consultation response from NPOAG is due no later than Aug 8.

r/
**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

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• Call 1-888-924-3239 or 1-571-302-4908; enter Meeting ID: 160 672 2591
• Passcode: 001002
• Unmute or mute yourself by pressing *6.

**From:** Fox, Sandra Y (FAA)
**To:** dhingson@infowest.com
**Cc:** Ward, Vicki L
**Subject:** RE: Canyon de Chelly Consultation etc .
**Date:** Thursday, July 18, 2024 8:47:00 AM

---

Hi Dick –

Yes, I'm working with NPS and my fellow FAA team members to discuss what is in a shareable format and what can be shared. If you can share your questions with the rest of NPOAG, it'd be very helpful for the reasons I describe below.

We need to ensure documentation shared with the Group feels is the minimum needed to address issues for the purposes of the consultation. And such, as this is part of a process for the ATMP development, it is easier to track for the purposes of our administrative record that we do not maintain 9 individual communication chains to answer questions individually.

I appreciate your engagement and the fact that you jumped right into the consultation request, but please coordinate any of your questions/concerns/actions with the rest of NPOAG and not directly with Vicki and I. We'd like to keep this process as clean as we can in terms of it being a consensus action from NPOAG. So, any answer provided will be provided to the group – not individually – which is why I've asked in the previous email that questions come from the group.

This is one small thing that would be incredibly helpful to ensure that we aren't providing any one NPOAG member preferential treatment and that any questions and resulting recommendations are in fact, a consensus activity from NPOAG.

I hope that you can appreciate the challenge we have in managing this process and we'll continue to do the best we can to support you all!

Thanks so much.

r/
**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

---

**From:** dhingson@infowest.com <dhingson@infowest.com>
**Sent:** Wednesday, July 17, 2024 6:46 PM
**To:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Subject:** Re: Canyon de Chelly Consultation etc .

Thank you, Sandi,

1) I trust you're still coordinating, through Vicki, to get us attendance records, testimony from officials etc. as reviewed earlier today, re/from the April 16th Public Meeting in Chinle, *with details* as to speakers, testimony, officials , number in attendance, etc length of meeting, submitted Written Testimony, i.e., what would ordinarily go with Minutes.

2) I further have advised Carl Slater of Navajo Tribe, today, that Rep Gosar's House subcommittee hearing on Air Tours. Dec 5th, wrongly substituted his (Slater's) testimony with that from a different Party, on a different day, Dec 12th, on a different issue.

I think that should be of general concern for FAA/NPS too, if not addressed promptly;

but I'm leaving to Carl Slater for now to make his own Overture first, being the Party at stake.

One redress for him clearly would be to *repost his December 3 Subcommittee Testimony at least to the NPOAG*. ( Together with any clarifications or supplements, since Dec 3rd, he feels appropriate.)

Below, I simply bulleted, item by item (for myself, in keeping things straight), the directions you gave, just to keep elements distinct, straight, as whatever happens proceeds.

Dick Hingson

p.s., yes the Public Video Recording of April 17th was very helpful! Thank you.

I assume any "group questions" could include questions from sub-groups or even from individuals? i.e. that such questions could be submitted by one, several, or all.

Flagstaff

On 2024-07-17 13:40, Fox, Sandra Y (FAA) wrote:

> Good afternoon NPOAG members,
>
> Below my signature block is a
>
> - **standing Zoom meeting invite** that is set to recur with no specific time or expiration date.

- I'll cancel the meeting after **Aug 8**, but until then you can use this as a group to meet as often as you need.

- Eric Elmore and Sheri Lares are meeting hosts to that meeting as well, so if you experience any difficulties with the Zoom link you can reach out to them.

- Next week I will be out of the office and will return the following week.

- If you need any assistance in the meantime, please reach out to this collective group in the CC: of this email.

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- It's important for our records that we have captured the groups questions related to the consultation and it will help minimize redundant questions.

- Perhaps nominating a spokesperson to manage all primary communications related to the consultation would be helpful for you all – not required, but just a suggestion.

- As a reminder, the **collective consultation response from NPOAG is due no later than Aug 8.**

r/

**Sandi Fox**

Environmental Protection Specialist

*Environmental Policy Division*

*Office of Environment & Energy*

*Federal Aviation Administration*

sandra.y.fox@faa.gov

(202) 267-0928

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- Passcode: 001002
- Unmute or mute yourself by pressing *6.

| | |
|---|---|
| **From:** | Fox, Sandra Y (FAA) |
| **To:** | Bob Randall; Carl Slater; Dick Hingson; Huling, Murray; James Viola; John Becker; John W Eastman; Noise Pollution Clearinghouse |
| **Cc:** | Elmore, Eric (FAA); Lares, Sheri (FAA); Trevino, Karen; Ward, Vicki L |
| **Subject:** | Canyon de Chelly NPOAG Consultation - due date reminder |
| **Date:** | Friday, August 2, 2024 2:59:00 PM |

Good afternoon NPOAG,

I have made it through most of my inbox and did not see any emails with questions regarding the Canyon de Chelly consultation. I'm sending this note as a quick reminder that the deadline to provide a consensus response is next Thursday, Aug 8.

If you have any questions, please let me know.

Thank you very much!!

r/

**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

**From:** Cade Clark <cadec@verticalavi.org>
**Sent:** Tuesday, August 6, 2024 11:12 AM
**To:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Cc:** Bob Randall <brandall@kaplankirsch.com>
**Subject:** NPOAG



Sandi,

Bob and I had a good call this morning about the NPOAG consultation for Canyon de Chelly.

We are working on a response but would like to ask if we could have a 2 week extension for comments.

Thank you for the consideration,

Cade

Cade Clark
Chief Government Affairs Officer
**VERTICAL AVIATION INTERNATIONAL | Powering Up**
*Fueling the Growth of Vertical Aviation*
1920 Ballenger Ave., 4th Flr., Alexandria, VA 22314-2898
Office: 703-302-8457 | Cell: 202-494-9176
CadeC@verticalavi.org | verticalavi.org

**From:** Fox, Sandra Y (FAA)
**To:** Ward, Vicki L; Trevino, Karen; Elmore, Eric (FAA); Lares, Sheri (FAA)
**Subject:** FW: NPOAG
**Date:** Tuesday, August 6, 2024 11:42:00 AM

---

Hi all –

See below, NPOAG is requesting a 2-week extension on comments. Given that we are waiting on Keeper comments anyways, do you think it would fit in the schedule?

Thoughts?

Thanks.

r/
**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

---

**From:** Cade Clark <cadec@verticalavi.org>
**Sent:** Tuesday, August 6, 2024 11:12 AM
**To:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Cc:** Bob Randall <brandall@kaplankirsch.com>
**Subject:** NPOAG



Sandi,

Bob and I had a good call this morning about the NPOAG consultation for Canyon de Chelly.

We are working on a response but would like to ask if we could have a 2 week extension for comments.

Thank you for the consideration,

Cade

Cade Clark
Chief Government Affairs Officer

**VERTICAL AVIATION INTERNATIONAL | Powering Up**
*Fueling the Growth of Vertical Aviation*
1920 Ballenger Ave., 4th Flr., Alexandria, VA 22314-2898
Office: 703-302-8457 | Cell: 202-494-9176
CadeC@verticalavi.org | verticalavi.org

**From:** Trevino, Karen <Karen_Trevino@nps.gov>
**Sent:** Tuesday, August 6, 2024 2:49 PM
**To:** Bob Randall <brandall@kaplankirsch.com>; Carl Slater <carl@cdcarl.com>; dhingson_contact <dhingson@infowest.com>; Huling, Murray <Murray.Huling@aopa.org>; James Viola <james.viola@rotor.org>; John Becker <John@papillon.com>; John W Eastman <john@teton.com>; Noise Pollution Clearinghouse <npc@nonoise.org>
**Cc:** Elmore, Eric (FAA) <eric.elmore@faa.gov>; Lares, Sheri (FAA) <sheri.lares@faa.gov>; Ward, Vicki L <Vicki_Ward@nps.gov>; Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Subject:** Re: NPOAG Request for Time Extension

To clarify in case there was any confusion , the below email stating that the agencies determination that 30 days was sufficient time for commenting means that the extension will be not be granted.

Warm regards,
*Karen*

**********

Karen Treviño
Natural Sounds and Night Skies Division
National Park Service
NSNSD Publications
970-225-3563 o
970-631-5256 c
Follow us! Facebook | Twitter | Instagram

"Optimism is true moral courage"
Ernest Henry Shackleton - shipwrecked Antarctic explorer ( Endurance 1917)

---

**From:** Trevino, Karen <Karen_Trevino@nps.gov>
**Sent:** Tuesday, August 6, 2024 2:29 PM
**To:** Bob Randall <brandall@kaplankirsch.com>; Carl Slater <carl@cdcarl.com>; dhingson_contact <dhingson@infowest.com>; Huling, Murray <Murray.Huling@aopa.org>; James Viola <james.viola@rotor.org>; John Becker <John@papillon.com>; John W Eastman <john@teton.com>; Noise Pollution Clearinghouse <npc@nonoise.org>
**Cc:** Elmore, Eric (FAA) <eric.elmore@faa.gov>; Lares, Sheri (FAA) <sheri.lares@faa.gov>; Ward, Vicki L <Vicki_Ward@nps.gov>; Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Subject:** NPOAG Request for Time Extension

Good afternoon everyone - Pursuant to our July 8, 2024 letter sent via email to you all from Vicki Ward and Sandi Fox requesting consolidated consensus input on the Canyon de Chelly draft ATMP by COB August 8, 2024, we received a request for a time extension from the NPOAG leads Cade Clark and Bob Randall. The FAA and NPS have considered the request and determined that 30 days notice to provide additional comment outside of the public comment period is sufficient. Additionally, we have received various requests for information from different NPOAG members and therefore, we kindly ask that NPOAG requests are agreed to by all NPOAG members and directed to myself and Karen Trevino with a cc to all NPOAG members. This request will ensure all NPOAG members are aware of communications by other members and allow the agencies to better manage our limited staff resources and coordinate our agency response

Thank you,

Eric Elmore
Sr. Policy Advisor
AEE-6, FAA

Karen Trevino
NPS

**********

Karen Treviño
Natural Sounds and Night Skies Division
National Park Service
NSNSD Publications
970-225-3563 o
970-631-5256 c
Follow us! Facebook | Twitter | Instagram

"Optimism is true moral courage"
Ernest Henry Shackleton - shipwrecked Antarctic explorer ( Endurance 1917)

## Correction: NPOAG Request for Time Extension

Trevino, Karen <Karen_Trevino@nps.gov>

Tue 8/6/2024 3:43 PM

To:Bob Randall <brandall@kaplankirsch.com>;Cade Clark <cadec@verticalavi.org>
Cc:dhingson_contact <dhingson@infowest.com>;Carl Slater <carl@cdcarl.com>;John Becker <john.becker@papillon.com>;John Eastman <john@teton.com>;Les Blumberg <npc@nonoise.org>;Huling, Murray <murray.huling@aopa.org>

Hi everyone - Les just advised me that there was an extra "be" in the sentence "means that the extension will be not begranted." which may have caused confusion. I apologize as I wanted to get this out asap since we just got it from you all this morning and was drafting it as we are sitting here in a room with 10 FAA and NPS staff working on various post ATMP issues and preparing for our upcoming NPOAG meeting. I was going to say "will be denied" and then changed my mind to " will not be granted" and the result was a little bit of both. I think my follow up however was clear that we do not think an extension is warranted under the circumstances.

Thank you Les, I appreciate your letting me know in case any one else caught it too.

Warm regards,
*Karen*

**********
Karen Treviño
Natural Sounds and Night Skies Division
National Park Service
NSNSD Publications
970-225-3563 o
970-631-5256 c
Follow us! Facebook | Twitter | Instagram

"Optimism is true moral courage"
Ernest Henry Shackleton - shipwrecked Antarctic explorer ( Endurance 1917)

---

**From:** Noise Pollution Clearinghouse <npc@nonoise.org>
**Sent:** Tuesday, August 6, 2024 3:09 PM
**To:** Trevino, Karen <Karen_Trevino@nps.gov>
**Subject:** Re: [EXTERNAL] Re: NPOAG Request for Time Extension

Karen,

I think the "will be not be" is confusing. The extra "be" is hard to make out

I'm just getting back up from my surgery which was 2 weeks ago tomorrow. So I've been out of the loop since the Enviros met on this issue 3 weeks ago. The others were going to take the lead on this.

Les

On 8/6/2024 5:03 PM, Trevino, Karen wrote:

**From:** Fox, Sandra Y (FAA)
**To:** Cade Clark
**Subject:** RE: NPOAG
**Date:** Tuesday, August 6, 2024 11:53:00 AM

---

Great question,

Letter format works great and addressing it to both myself and Vicki since we both signed the letter to NPOAG with the consultation request would work fine.

r/

**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

---

**From:** Cade Clark <cadec@verticalavi.org>
**Sent:** Tuesday, August 6, 2024 11:43 AM
**To:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Subject:** RE: NPOAG



Process question – our comments should be a letter addressed to who?

Cade Clark
Chief Government Affairs Officer
**VERTICAL AVIATION INTERNATIONAL | Powering Up**
*Fueling the Growth of Vertical Aviation*
1920 Ballenger Ave., 4th Flr., Alexandria, VA 22314-2898
Office: 703-302-8457 | Cell: 202-494-9176
CadeC@verticalavi.org | verticalavi.org

---

**From:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Sent:** Tuesday, August 6, 2024 11:39 AM
**To:** Cade Clark <cadec@verticalavi.org>
**Cc:** Bob Randall <brandall@kaplankirsch.com>
**Subject:** RE: NPOAG

Hi Cade –

I'll get this request off to the right Agency folks and get back with you as soon as I can.

Thanks!

r/
**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

---

**From:** Cade Clark <cadec@verticalavi.org>
**Sent:** Tuesday, August 6, 2024 11:12 AM
**To:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Cc:** Bob Randall <brandall@kaplankirsch.com>
**Subject:** NPOAG



Sandi,

Bob and I had a good call this morning about the NPOAG consultation for Canyon de Chelly.

We are working on a response but would like to ask if we could have a 2 week extension for comments.

Thank you for the consideration,

Cade

Cade Clark
Chief Government Affairs Officer
**VERTICAL AVIATION INTERNATIONAL | Powering Up**
*Fueling the Growth of Vertical Aviation*
1920 Ballenger Ave., 4th Flr., Alexandria, VA 22314-2898
Office: 703-302-8457 | Cell: 202-494-9176
CadeC@verticalavi.org | verticalavi.org

| | |
|---|---|
| **From:** | Bob Randall |
| **To:** | Fox, Sandra Y (FAA); "Ward, Vicki L" |
| **Cc:** | Elmore, Eric (FAA); "Trevino, Karen"; Lares, Sheri (FAA); "Pipkin, Ashley R"; Deem, Patricia (FAA); "Porsia, Sara C"; "Carl Slater"; "Dick Hingson"; "Eric Lincoln"; "Huling, Murray"; "James Viola"; "John Becker"; "John W Eastman"; "Noise Pollution Clearinghouse" |
| **Subject:** | NPOAG Members" Ltr: Canyon de Chelly Draft ATMP |
| **Date:** | Thursday, August 8, 2024 6:28:41 PM |
| **Attachments:** | image623371.png<br>image260827.png<br>image141680.png<br>image695282.png<br>NPOAG Member Ltr-CACH Consultation-080824.pdf |



Dear Sandi and Vicki,

Attached is a letter submitted on behalf of a number of individual NPOAG members pursuant to agencies' request for NPOAG consultation on the Canyon de Chelly ATMP.

Please let us know if you have any questions.

Thank you,
Bob Randall

**Bob Randall**
Attorney at Law
He/Him/His

KAPLAN KIRSCH

O 303.825.7000 | C 303.319.6832
1675 Broadway | Suite 2300 | Denver, CO 80202

website | vCard

**From:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Sent:** Monday, July 8, 2024 1:52 PM
**To:** Bob Randall <brandall@kaplankirsch.com>; 'Carl Slater' <carl@cdcarl.com>; 'Dick Hingson' <dhingson@infowest.com>; 'Eric Lincoln' <lincoln.eric2@gmail.com>; 'Huling, Murray' <Murray.Huling@aopa.org>; 'James Viola' <james.viola@rotor.org>; 'John Becker' <John@papillon.com>; 'John W Eastman' <john@teton.com>; 'Noise Pollution Clearinghouse' <npc@nonoise.org>
**Cc:** 'Ward, Vicki L' <Vicki_Ward@nps.gov>; Elmore, Eric (FAA) <eric.elmore@faa.gov>; 'Trevino, Karen' <Karen_Trevino@nps.gov>; Lares, Sheri (FAA) <sheri.lares@faa.gov>; 'Pipkin, Ashley R' <Ashley_Pipkin@nps.gov>; Deem, Patricia (FAA) <Patricia.Deem@faa.gov>; 'Porsia, Sara C' <sara.porsia@sol.doi.gov>
**Subject:** Corrected: NPOAG Consultation Request: Canyon de Chelly Draft ATMP

Good afternoon NPOAG members,

Section 628 of the FAA Reauthorization Act of 2024 amends the National Parks Air Tour Management Act to require consultation with NPOAG when establishing an air tour management plan for a national park. Attached to this email are 1) a letter from the agencies requesting NPOAG consultation on the Canyon de Chelly Draft ATMP and 2) a copy of the Canyon de Chelly Draft ATMP.

Please refer to the attached letter for background information and further instructions. The deadline for receipt of the NPOAG consultation is **Aug 8, 2024** (date corrected from original email). As stated in the letter, the agencies will not accept comments from individual NPOAG members at this time.

Thank you very much for your attention to this matter,

r/
**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

August 8, 2024

**VIA E-MAIL**

Sandra Fox
Environmental Protection Specialist
Environmental Policy Division
Office of Environment & Energy
Federal Aviation Administration
sandra.y.fox@faa.gov

Vicki Ward
Overflights Program Manager
Natural Sounds and Night Skies Division
National Park Service
vicki_ward@nps.gov

Dear Ms. Fox and Ms. Ward:

Thank you for your letter dated July 8, 2024, regarding National Park Oversight Advisory Group (NPOAG) consultation on the Canyon de Chelly Draft Air Tour Management Plan (ATMP). The undersigned members of the NPOAG appreciate FAA and the NPS initiating consultation with the NPOAG on the Canyon de Chelly draft ATMP per the requirements of section 628 of the recently passed 2024 FAA Reauthorization bill, HR 3935.

While we have attempted to meet and confer within the timeframe provided by the agencies for this consultation, several NPOAG members were either unresponsive or unavailable due to summer travel or prior commitments. Our request for two additional weeks to attempt to reach NPOAG members to develop a response was denied. We have thus not been able to constitute the entire NPOAG to discuss this matter and, accordingly, are not able to offer consensus comments as requested by the agencies in the July 8, 2024 letter.

This exercise has led some NPOAG members to begin discussing procedures that might allow NPOAG to be more responsive to consultation opportunities in the future and to fully implement Section 628 of the 2024 FAA Reauthorization Act. We look forward to talking through such procedures with the agencies when we meet in San Francisco next month. We also encourage the FAA and the NPS to fill any vacant NPOAG seats in a timely manner.

Again, thank you for the invitation to consult on the Canyon de Chelly Draft ATMP.

Sincerely,

**John Becker**, Chief Operations Officer, Papillon Helicopters (representative of commercial air tour operators)

**Les Blomberg**, Executive Director, Noise Pollution Clearinghouse (representative of environmental concerns)

**Dick Hingson**, Sierra Club (representative of environmental concerns)

**Murray Huling**, Vice President, Regulatory Affairs, Aircraft Owners and Pilots Association (representative of general aviation)

**Bob Randall**, Kaplan Kirsch LLP (representative of environmental concerns)

**Carl Slater**, District #11 Council Delegate, Navajo Nation Council (representative of Indian tribes)

**James Viola**, President and CEO, Vertical Aviation International (representative of commercial air tour operators)

| | |
|---|---|
| **From:** | Fox, Sandra Y (FAA) |
| **To:** | Bob Randall; "Ward, Vicki L" |
| **Cc:** | Elmore, Eric (FAA); "Trevino, Karen"; Lares, Sheri (FAA); "Pipkin, Ashley R"; Deem, Patricia (FAA); "Porsia, Sara C"; "Carl Slater"; "Dick Hingson"; "Eric Lincoln"; "Huling, Murray"; "James Viola"; "John Becker"; "John W Eastman"; "Noise Pollution Clearinghouse" |
| **Subject:** | RE: NPOAG Members" Ltr: Canyon de Chelly Draft ATMP |
| **Date:** | Friday, August 9, 2024 9:20:00 AM |
| **Attachments:** | image001.png<br>image002.png<br>image003.png<br>image004.png |

Hi Bob,

Thank you so much, confirming receipt of your email.

Have a great weekend!

r/

**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

---

**From:** Bob Randall <brandall@kaplankirsch.com>
**Sent:** Thursday, August 8, 2024 6:28 PM
**To:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>; 'Ward, Vicki L' <Vicki_Ward@nps.gov>
**Cc:** Elmore, Eric (FAA) <eric.elmore@faa.gov>; 'Trevino, Karen' <Karen_Trevino@nps.gov>; Lares, Sheri (FAA) <sheri.lares@faa.gov>; 'Pipkin, Ashley R' <Ashley_Pipkin@nps.gov>; Deem, Patricia (FAA) <Patricia.Deem@faa.gov>; 'Porsia, Sara C' <sara.porsia@sol.doi.gov>; 'Carl Slater' <carl@cdcarl.com>; 'Dick Hingson' <dhingson@infowest.com>; 'Eric Lincoln' <lincoln.eric2@gmail.com>; 'Huling, Murray' <Murray.Huling@aopa.org>; 'James Viola' <james.viola@rotor.org>; 'John Becker' <John@papillon.com>; 'John W Eastman' <john@teton.com>; 'Noise Pollution Clearinghouse' <npc@nonoise.org>
**Subject:** NPOAG Members' Ltr: Canyon de Chelly Draft ATMP



Dear Sandi and Vicki,

Attached is a letter submitted on behalf of a number of individual NPOAG members pursuant to agencies' request for NPOAG consultation on the Canyon de Chelly ATMP.

Please let us know if you have any questions.

Thank you,
Bob Randall

**Bob Randall**
Attorney at Law
He/Him/His

KAPLAN KIRSCH

O 303.825.7000 | C 303.319.6832
1675 Broadway | Suite 2300 | Denver, CO 80202

website | vCard



**From:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Sent:** Monday, July 8, 2024 1:52 PM
**To:** Bob Randall <brandall@kaplankirsch.com>; 'Carl Slater' <carl@cdcarl.com>; 'Dick Hingson' <dhingson@infowest.com>; 'Eric Lincoln' <lincoln.eric2@gmail.com>; 'Huling, Murray' <Murray.Huling@aopa.org>; 'James Viola' <james.viola@rotor.org>; 'John Becker' <John@papillon.com>; 'John W Eastman' <john@teton.com>; 'Noise Pollution Clearinghouse' <npc@nonoise.org>
**Cc:** 'Ward, Vicki L' <Vicki_Ward@nps.gov>; Elmore, Eric (FAA) <eric.elmore@faa.gov>; 'Trevino, Karen' <Karen_Trevino@nps.gov>; Lares, Sheri (FAA) <sheri.lares@faa.gov>; 'Pipkin, Ashley R' <Ashley_Pipkin@nps.gov>; Deem, Patricia (FAA) <Patricia.Deem@faa.gov>; 'Porsia, Sara C' <sara.porsia@sol.doi.gov>
**Subject:** Corrected: NPOAG Consultation Request: Canyon de Chelly Draft ATMP

Good afternoon NPOAG members,

Section 628 of the FAA Reauthorization Act of 2024 amends the National Parks Air Tour Management Act to require consultation with NPOAG when establishing an air tour management plan for a national park. Attached to this email are 1) a letter from the agencies requesting NPOAG consultation on the Canyon de Chelly Draft ATMP and 2) a copy of the Canyon de Chelly Draft ATMP.

Please refer to the attached letter for background information and further instructions. The deadline for receipt of the NPOAG consultation is **Aug 8, 2024** (date corrected from original email). As stated in the letter, the agencies will not accept comments from individual NPOAG members at this time.

Thank you very much for your attention to this matter,

r/

**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

| | |
|---|---|
| **From:** | Fox, Sandra Y (FAA) |
| **To:** | Bob Randall; Carl Slater; Dick Hingson; Huling, Murray; James Viola; John Becker; John W Eastman; Noise Pollution Clearinghouse; Cade Clark |
| **Cc:** | Elmore, Eric (FAA); Trevino, Karen; Ward, Vicki L; Lares, Sheri (FAA); Porsia, Sara C; Deem, Patricia (FAA); Pearson, Georgina A |
| **Subject:** | NPOAG Consultation on draft Canyon de Chelly ATMP Extension Request Update |
| **Date:** | Monday, August 19, 2024 6:05:00 PM |
| **Attachments:** | NPOAG_CACH Consult_Extension_19Aug2024_sf_VW.pdf |

Good evening NPOAG members,

Please find attached a letter regarding the request for NPOAG consultation on the Canyon de Chelly draft ATMP.

The agencies have determined we will have sufficient time to fully consider NPOAG input on the CACH ATMP, if it is provided by September 3, 2024.

Please provide your comments by September 3, 2024.

Thank you very much.

r/

**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

United States Department of the Interior
NATIONAL PARK SERVICE

U.S. Department of Transportation
Federal Aviation Administration

**NATIONAL PARKS AIR TOUR MANAGEMENT PROGRAM**

Aug 19, 2024

Via email

**Updated response to extension request for NPOAG consultation on the Canyon de Chelly Draft ATMP**

Dear NPOAG members,

The agencies have determined we will have sufficient time to fully consider NPOAG input on the CACH ATMP, if it is provided by September 3, 2024. Please provide your comments by September 3, 2024.

SANDRA YI FOX Digitally signed by SANDRA YI FOX
Date: 2024.08.19 17:53:56 -04'00'

Sandi Fox
Environmental Protection Specialist
Office of Environment & Energy
Federal Aviation Administration

VICKI WARD Digitally signed by VICKI WARD
Date: 2024.08.19 15:59:25 -06'00'

Vicki Ward
Overflights Program Manager
Natural Sounds and Night Skies Division
National Park Service

# Fw: [EXTERNAL] NPOAG Consultation on draft Canyon de Chelly ATMP Extension Request Update

Pearson, Georgina A <Gina_Pearson@nps.gov>
Tue 8/20/2024 9:24 AM
To:Repeta, Barbara J <Barbara_Repeta@nps.gov>

1 attachments (309 KB)
NPOAG_CACH Consult_Extension_19Aug2024_sf_VW.pdf;

Have a nice day,

Gina Pearson,
Environmental ProtecĀon Specialist
EducaĀon and Outreach Coordinator
Natural Sounds and Night Skies Program - public website
Natural Sounds & Night Skies Division - Home (sharepoint.com) - internal site
NaĀonal Park Service
Washington Support Office, based in Ft. Collins, CO

---

**From:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Sent:** Monday, August 19, 2024 4:05 PM
**To:** Bob Randall <brandall@kaplankirsch.com>; Carl Slater <carl@cdcarl.com>; dhingson_contact <dhingson@infowest.com>; Huling, Murray <Murray.Huling@aopa.org>; James Viola <james.viola@rotor.org>; John Becker <John@papillon.com>; John W Eastman <john@teton.com>; Noise Pollu on Clearinghouse <npc@nonoise.org>; Cade Clark <cadec@ver calavi.org>
**Cc:** Elmore, Eric (FAA) <eric.elmore@faa.gov>; Trevino, Karen <Karen_Trevino@nps.gov>; Ward, Vicki L <Vicki_Ward@nps.gov>; Lares, Sheri (FAA) <sheri.lares@faa.gov>; Porsia, Sara C <sara.porsia@sol.doi.gov>; Deem, Patricia (FAA) <patricia.deem@faa.gov>; Pearson, Georgina A <Gina_Pearson@nps.gov>
**Subject:** [EXTERNAL] NPOAG Consulta on on draft Canyon de Chelly ATMP Extension Request Update



Good evening NPOAG members,

Please find a ached a le er regarding the request for NPOAG consulta on on the Canyon de Chelly draft ATMP.

The agencies have determined we will have sufficient  me to fully consider NPOAG input on the CACH ATMP, if it is provided by September 3, 2024.

Please provide your comments by September 3, 2024.

Thank you very much.

r/
**Sandi Fox**
Environmental Protection Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

## [EXTERNAL] NPOAG Consultation on draft Canyon de Chelly ATMP Response

Cade Clark <cadec@verticalavi.org>

Tue 9/3/2024 7:23 PM

To:Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>;Bob Randall <brandall@kaplankirsch.com>;Carl Slater <carl@cdcarl.com>; dhingson_contact <dhingson@infowest.com>;Huling, Murray <Murray.Huling@aopa.org>;James Viola <jamesv@verticalavi.org>;John Becker <John@papillon.com>;John W Eastman <john@teton.com>;Noise Pollution Clearinghouse <npc@nonoise.org>;d.youpee.fortpecktribes_contact <d.youpee@fortpecktribes.net>;Eric Hamp <EHamp@bluehawaiian.com>;Ward, Vicki L <Vicki_Ward@nps.gov>
Cc:Elmore, Eric (FAA) <eric.elmore@faa.gov>;Lares, Sheri (FAA) <sheri.lares@faa.gov>;Porsia, Sara C <sara.porsia@sol.doi.gov>; Deem, Patricia (FAA) <patricia.deem@faa.gov>;Pearson, Georgina A <Gina_Pearson@nps.gov>;Trevino, Karen <Karen_Trevino@nps.gov>

1 attachments (49 KB)

NPOAG statement on Canyon de Chelly Sept 3 2024.pdf;



Sandi and Vicki,

Thank you for the opportunity to provide comment on the Canyon de Chelly draft ATMP.

Please find attached a response signed by members of the NPOAG.

Thank you,

Cade

Cade Clark
Chief Government Affairs Officer
**VERTICAL AVIATION INTERNATIONAL | Powering Up**
*Fueling the Growth of Vertical Aviation*
1920 Ballenger Ave., 4th Flr., Alexandria, VA 22314-2898
Office: 703-302-8457 | Cell: 202-494-9176
CadeC@verticalavi.org | verticalavi.org

---

**From:** Fox, Sandra Y (FAA) <sandra.y.fox@faa.gov>
**Sent:** Monday, August 19, 2024 6:05 PM
**To:** Bob Randall <brandall@kaplankirsch.com>; Carl Slater <carl@cdcarl.com>; Dick Hingson <dhingson@infowest.com>; Huling, Murray <Murray.Huling@aopa.org>; James Viola <jamesv@verticalavi.org>; John Becker <John@papillon.com>; John W Eastman <john@teton.com>; Noise Pollution Clearinghouse <npc@nonoise.org>; Cade Clark <cadec@verticalavi.org>
**Cc:** Elmore, Eric (FAA) <eric.elmore@faa.gov>; Trevino, Karen <Karen_Trevino@nps.gov>; Ward, Vicki L

<Vicki_Ward@nps.gov>; Lares, Sheri (FAA) <sheri.lares@faa.gov>; Porsia, Sara C <sara.porsia@sol.doi.gov>; Deem, Patricia (FAA) <Patricia.Deem@faa.gov>; Pearson, Georgina A <Gina_Pearson@nps.gov>
**Subject:** NPOAG ConsultaĀon on draft Canyon de Chelly ATMP Extension Request Update

Good evening NPOAG members,

Please find aĀached a letter regarding the request for NPOAG consultaĀon on the Canyon de Chelly draft ATMP.

The agencies have determined we will have sufficient Āme to fully consider NPOAG input on the CACH ATMP, ifĀ it is provided by September 3, 2024.

Please provide your comments by September 3, 2024.

Thank you very much.

r/
**Sandi Fox**
Environmental ProtecĀon Specialist
*Environmental Policy Division*
*Office of Environment & Energy*
*Federal Aviation Administration*
sandra.y.fox@faa.gov
(202) 267-0928

September 3, 2024

Sandra Fox
Environmental Protection Specialist
Environmental Policy Division
Office of Environment & Energy
Federal Aviation Administration

Vicki Ward
Overflights Program Manager
Natural Sounds and Night Skies Division
National Park Service

Dear Ms. Fox and Ms. Ward:

Thank you for your letter dated July 8, 2024, regarding National Park Oversight Advisory Group (NPOAG) consultation on the Canyon de Chelly Draft Air Tour Management Plan (ATMP).

Congress passed the National Parks Air Tour Management Act of 2000 (NPATMA) to regulate commercial air tour operations over the National Park System. The Act required the Federal Aviation Administration (FAA) and the National Park Service (NPS) to develop ATMPs for the national parks. As part of the Act, Congress created the National Parks Overflight Advisory Group (NPOAG) to provide expert advice and recommendations to the agencies in the implementation of the NPATMA with respect to commercial air tour operations over and near national parks.

The NPOAG appreciates FAA and the NPS consulting with the NPOAG on the Canyon de Chelly draft ATMP per the requirements of section 628 of the recently passed 2024 FAA Reauthorization bill, HR 3935.

Due to the late stage of the Canyon de Chelly ATMP drafting process, the NPOAG is pleased to provide overarching comments regarding the ATMP process.

**Tribal Sovereignty and Community Compatibility**

Canyon de Chelly National Monument is a unique monument due to the park's location being entirely on lands held in trust by the United States for the Navajo Nation. The NPOAG recognizes the importance of the Navajo Nation's sovereignty and cultural resources, including archaeological sites, sacred sites, ancestral sites, cultural landscapes, cultural and ceremonial practices, and traditional cultural properties; related natural resources; and the privacy interests of the Navajo Nation residents living within and adjacent the ATMP boundary.

The NPOAG agrees that in the development of ATMPs, the agencies should take into consideration routes, flight times, and frequency in consultation with tribes whose lands are within or adjacent to the proposed ATMP as defined in the act. The NPOAG recognizes that tour operators have expressed their desire to alter their flight routes, times, and frequency in an attempt to respect community compatibility and protect sacred cultural sites. The NPOAG also recognizes that the Navajo Nation and its constituent local governments have issued their opposition to any overflights for a variety of reasons.

**Process considerations**

As you know, the NPOAG is comprised of ten members from diverse backgrounds, including representatives of general aviation, commercial air tour operators, environmental concerns, and Native tribes. NPOAG members may have different perspectives on which approach to take, but the NPOAG does question the use of the 2017-19 timeframe for operational and sound modeling purposes as we move further from the COVID shutdown era. Current data would be more relevant in the future to the current operations and sound impacts.

**Safety Considerations**

The Canyon de Chelly National Monument ATMP Draft Environmental Assessment indicates five air tour companies have IOA at the park but effectively only one operator has been conducting tours. Safety in the airspace is critical for all park visitors. When developing routes, especially for parks that deal with multiple operators and different types of aircraft, the NPOAG advises the agencies to consult on safety consideration within the NPOAG, to ensure that safety issues are factored into the ATMPs.

**Visitor Experience and Environmental Considerations**

Environmental considerations are an important factor in developing ATMPs. The NPOAG acknowledges the need to perform a complete and thorough assessment of environmental impacts. The NPOAG notes that the use of current data is an important factor in making appropriate recommendations. The NPOAG advises the agencies to consult on environmental perspectives within the NPOAG, to ensure that environmental considerations are factored into the ATMPs.

**Technology considerations**

The NPOAG recognizes that the aviation sector is moving forward with new technologies that can reduce the sound signature of aircraft which will benefit park visitors. An example of such new technologies is advanced air mobility (AAM). The vehicles typically associated with AAM include electric vertical takeoff and landing (eVTOL), electric short takeoff and landing (eSTOL), and hybrid-electric aircraft. These aircraft have the potential to be quiet and sustainable, providing societal, and environmental benefits to the parks and visitors. The NPOAG advises the agencies to consult on quiet technology developments within the NPOAG, to ensure that technology issues are factored into the ATMPs.

If and when such technology is proposed for deployment within ATMPs affecting tribal nations under the act, tribes should be consulted on this issue.

**Access considerations**

The NPOAG is committed to helping the agencies draft sound policy that will enable visitors to enjoy the beauties of the park for centuries to come.

The NPOAG is united in its desire to provide expert advice and recommendations to the agencies in the implementation of the NPATMA for the benefits of the parks and all those who visit. The NPOAG looks forward to future collaboration and consultation as the agencies work on ATMPs.

Respectfully submitted,

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