

Aircraft overflights at national parks: Conflict and its potential resolution

By Paul A. Bell, Britton L. Mace, and Jacob A. Benfield

THE TOURIST ATTRACTION KNOWN AS AYERS ROCK, or Uluru, in central Australia has undergone remarkable management transformation over the last 25 years. In 1959, experienced bush pilots would bank their single-engine planes tightly around the large rock monolith and turn the aircraft so that passengers had a scenic view of the deep erosion in the red sandstone, just before touching down on the desert landing strip at the base of the massive formation. Thousands of other tourists would follow over the next 25 years, many of them climbing the trail to the top of the monolith and staying in commercial lodging at its base. In 1985 the land was returned to the local Anangu people and then leased to the government as a jointly managed park, known today as Uluru-Kata Tjuta National Park. Out of respect for the spiritual significance of Uluru to the Anangu people, the airstrip and lodgings at the base of the monolith have been replaced by a modern airport and Yulara Resort outside the park, but the airstrip is still visible in satellite photos even though it is unused and covered with scattered desert flora. Commercial jet aircraft deliver tourists to the new airport, and as they engage in the popular activity of viewing the sunset over the rock formations, noisy helicopters fly other tourists over the terrain. Climbing the formation is still permitted but discouraged, also out of respect for its spiritual significance. In what would come as a surprise to many in park management in other parts of the world, the nearby visitor center at Yulara has a display actually *encouraging* tourists to take a helicopter tour of Uluru rather than climb it, again as a sign of respecting its spiritual significance.

This rather unusual circumstance is but one example of the many conflicts park managers encounter when faced with multiple mandates of preserving nature and facilitating visitor enjoyment of parks. These conflicts are especially apparent when it comes to dealing with aircraft overflights, wherein the interests of tourists on the ground (such as backcountry hikers) vs. those in the air, air tour operators vs. whitewater rafting outfitters, and military and commercial entities and safety authorities vs. visitors who want to listen to nature are regularly at odds. Yet, there is hope for at least some degree of resolution to these conflicts.

Commercial aircraft flights are increasingly common. Miller (2008) shows how 3,435 jet departures in one hour in October 2000 essentially overlay the entire United States with their flight paths. Such flights are so common that on 11 September 2001, backcountry hikers knew that something had gone very wrong because there were no sounds from overflights. Diverting commercial flights around national parks raises economic issues for operators and safety issues from altering flight paths. These aircraft are high enough by the time they get over most national



The National Park Service works with the Federal Aviation Administration to develop air tour management plans for units of the National Park System that have commercial air tours. Though no air tour management plans have been implemented yet, a few parks have made progress toward reducing noise and visual intrusions. At Haleakala National Park (Hawaii), for example, air tour operators honor a voluntary agreement to not fly within the crater rim. The photo depicts the historical flight path that no longer occurs here.

parks that they yield less noise than tourist aircraft, but visitors do notice them and they can interfere with some activities (e.g., Williams 2007). Noise may be louder for parks close to a commercial or military airfield.

More common in many parks are overflights from air tours—mostly helicopters or smaller propeller-driven planes that fly low for the view and thus generate louder and more disturbing sounds for those on the ground. These overflights represent a type of conflict derived from multiple-use mandates wherein the enjoyment by one type of visitor comes at the expense of enjoyment by visitors who want a different type of experience. The beauty and expanse of many national parks are particularly spectacular viewed from a tourist aircraft, and for some with disabilities air tours are the only realistic means of accessing the splendid scenery of the backcountry. The popularity of such flights makes them very profitable for operators and contributes to the local economy. A 1996 study of Grand Canyon air tours departing out of Las Vegas, for example, estimated that air tours contributed \$504 million to the southern Nevada economy, and that if the tours were eliminated, some \$249 million would be lost from tourists who would not visit southern Nevada (Schwer et al. 2000).

The noise from such air tours, however, is considerable. Horonjeff et al. (1993) obtained baseline information about the intensity and duration of aircraft noise in three national parks. Measurements made at 23 separate locations in Grand Canyon National

Park found aircraft sound levels as high as 76 dB(A).¹ By way of comparison, 35 dB(A) is typical of a quiet residential neighborhood at night; the crater at Haleakala National Park is 10 dB(A) in the absence of external sounds; crickets at 5 meters' (16 ft) distance in Zion National Park are 40 dB(A), and a snowcoach at 30 meters (98 ft) in Yellowstone National Park is 80 dB(A) (Ambrose and Burson 2004). (See table 1 to compare the volume of park, urban, and other sounds.) Aircraft noise is audible 79% of the time in some Grand Canyon areas, with as many as 43 separate aircraft noise events occurring within every 20-minute interval. Tour overflights in the Grand Canyon increased from 40,000 in 1987 (Kanamine 1997) to approximately 55,000 in 2005 (Elrod and Joly 2006). On the busiest days, more than 100 helicopters may be in the airspace above the Grand Canyon at any given time. Furthermore, a number of the measured locations in the Grand Canyon produced interesting echo phenomena, where it was possible for a single aircraft to sound as if three or four aircraft were present, even without the aircraft being visible. Aircraft noise can echo up to 16 miles along the inner walls of the canyon (Kanamine 1997). Not a single location recorded in Grand Canyon National Park is totally free of aircraft noise (Mace et al. 2004).

Psychology of noise

Several interesting psychological factors come into play when assessing the impact of aircraft sounds on people. "Noise" is inherently psychological, since a sound must be unwanted to be noise; but what is noise to one park visitor may be music to another. Some people are more sensitive to noise and thus are more annoyed by it. Noise is more disturbing (i.e., has a detrimental impact on performance and enjoyment and is rated as irritating) if it is loud, occurs in bursts at irregular intervals (i.e., is unpredictable), and is perceived as not being under the control of the listener. Moreover, annoyance over the noise is higher if it interferes with tasks (such as listening for natural sounds), if the perpetrator is perceived as unconcerned about the welfare of the listener, and if it is perceived as unnecessary (Bell et al. 2001). All these characteristics contribute to disturbance from air tour overflight noise (Tarrant et al. 1995), and so far we are referring only to impact on humans. For an overview of impact on nonhumans, see Pepper et al. (2003) and several articles in this volume.

¹ The volume of sounds is often measured in decibels, or dB. Volume or loudness is a psychological experience of the sound pressure, which corresponds to the energy in sound waves as measured in microbars. The human range of audible sound pressures is 0.0002 to 2,000 microbars. The decibel scale, with a range of 0 to 140 dB, is a logarithmic function of microbars such that an increase of 20 decibels represents a tenfold increase in pressure. Thus, a sound of 80 dB is 100 times (10²) as intense as a 40 dB sound. Because different frequencies in the sound spectrum have different perceived loudness at the same pressure level, the A, B, and C decibel scales weight the frequencies differently, with the A scale being most common.

Table 1. National park, urban, and other sounds

Source/Location	Loudness (dB[A])
Crater at Haleakala National Park	10
Whisper (5 m [16 ft])	30
Residential neighborhood at night	35
Crickets in Zion National Park (5 m [16 ft])	40
Conversational speech (5 m [16 ft])	60
Loudest aircraft sound at Grand Canyon National Park (Horonjeff et al. 1993)	76
Snowcoach in Yellowstone National Park (30 m [98 ft])	80
Heavy truck (15 m [49 ft])	90
Auto horn (1 m [3.3 ft])	110
Military jet (100 m [328 ft] above ground)	120
Deck of an aircraft carrier	140

Another interesting psychological factor is the attribution people make about the source of aircraft noise; attributing a sound to something that is potentially beneficial might be broadly assumed to make it more pleasing. Mace et al. (1999) had participants rate Grand Canyon scenes while hearing either natural sounds (birds, brooks) or helicopter sounds at either 40 dB(A) or 80 dB(A). Both levels of helicopter sounds negatively impacted ratings of naturalness, preference, scenic beauty, freedom, annoyance, solitude, and tranquillity. Mace et al. (2003) had participants rate national park scenes while exposed to either natural sounds (birds, brooks, wind) or helicopter noise attributed to tourist overflights, backcountry maintenance operations, or the rescue of a backcountry hiker. Regardless of the source, 60 dB(A) helicopter noise resulted in the same lower ratings of the scenes as in the first study. Moreover, helicopter noise attributed to fighting a fire or rescuing an endangered species had similar negative effects (Mace et al. 2000). Results suggest that park management-related overflight noise is just as disturbing as tourist aircraft noise, and that its impact is substantial across demographic variables (Mace et al. 2004).

From a conflict-resolution perspective, overflight noise would be considered a "nuisance" type of conflict, the most common solution for which is segregation (e.g., mandating areas where noise is allowed and where it is not allowed; Deutsch 1973). Such a solution (Special Federal Regulation 50-2, for example) is difficult with overflight noise since it travels great distances. Diverting air tour overflights away from the most popular tourist areas simply results in more complaints from backcountry hikers who are there for solitude. Moreover, the Federal Aviation Administration (FAA) has jurisdiction over the airspace above U.S. national parks, not the National Park Service. Regulation, however, is at least partially successful. The FAA has instituted a limit of 93,971 annual tour overflights in Grand Canyon. The National Park Air

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Tour Management Act of 2000 requires the National Park Service and the FAA to produce management plans for each park where air tours occur, and the National Parks Overflights Working Group reports considerable progress in bringing together those representing multiple interests to develop air tour management plans for affected parks (Henry et al. 1999). Nevertheless, the popularity of overflights and the financial benefits that can accompany them will continue to put pressure on the National Park System to allow them, and the demonstrated impacts of overflight noise will continue to bring resistance from affected parties.

Further information

Updates on noise assessment and regulations can be found on the NPS Natural Sounds Program Web site at <http://www.nature.nps.gov/naturalsounds/>.

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