

AIRCRAFT MANAGEMENT PLAN

ENVIRONMENTAL ASSESSMENT

1986



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GRAND CANYON NATIONAL PARK

ARIZONA

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AIRCRAFT MANAGEMENT PLAN
ENVIRONMENTAL ASSESSMENT

GRAND CANYON NATIONAL PARK
ARIZONA

MAY 1986

U.S. Department of the Interior
National Park Service

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I. PURPOSE AND NEED

The purposes for developing an Aircraft Management Plan for Grand Canyon National Park (GCNP) are:

(1) To meet the requirements of the 1916 National Park Service (NPS) Organic Act and the 1978 Public Law 95-250 "to conserve" the resources of the park and the values and purposes for which the park was established, as well as "to provide for the enjoyment" of those resources and values "in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

(2) To protect the public health, welfare, and safety, and the natural environment within the park, including the natural quiet and experience, as stated in the 1975 GCNP Enlargement Act.

The need for developing an Aircraft Management Plan is primarily embodied in Section 8 of Public Law 93-620, the 1975 GCNP Enlargement Act, which states:

Whenever the Secretary has reason to believe that any aircraft or helicopter activity or operation may be occurring or about to occur within the Grand Canyon National Park, as enlarged by this Act, including the air space below the rims of the canyon, which is likely to cause an injury to the health, welfare, or safety of visitors to the park or to cause a significant adverse effect on the natural quiet and experience of the park, the Secretary shall submit to the Federal Aviation Agency, the Environmental Protection Agency pursuant to the Noise Control Act of 1972, or any other responsible agency or agencies such complaints, information, or recommendations for rules and regulations or other actions as he believes appropriate to protect the public health, welfare, and safety or the natural environment within the park. After reviewing the submission of the Secretary, the responsible agency shall consider the matter, and after consultation with the Secretary, shall take appropriate action to protect the park and visitors.

In accordance with the above legislation and the NPS planning process, the park has determined that aircraft activity occurring over or within the park is currently causing a significant adverse effect on the natural quiet and experience of the park, and that aircraft activity may be likely to cause an injury to the health, welfare, or safety of visitors to the park (GCNP memorandum dated March 10, 1986). This Environmental Assessment is written as a step in developing recommendations to the Secretary of the Interior as required by the GCNP Enlargement Act, and outlines the potential park-specific approaches which have been developed based on public input, general and specific laws/policies, and scientific studies. The nature and complexity of the aircraft overflight issue at GCNP provide a unique situation which does not necessarily lend itself to a simple solution.

Other laws and policies which also support preparation of a plan are detailed in Appendix I and include: the National Environmental Policy Act (1969, as amended); the Noise Control Act of 1972; the 1964 Wilderness Act; NPS Management Policies (1981); Title 36, Code of Federal Regulations, Chapter 1, Part 2, Section 2.17; and the GCNP Final Master Plan (1976).

There are currently no GCNP-specific regulations which provide protection for resources from aircraft activities over or within GCNP. In

addition, existing requests and agreements to fly at certain altitudes over the park are confusing, ineffective, conflicting, outdated, ignored, and/or unknown by many members of the aviation community (see Appendix IV).

It is estimated that more than 50,000 flights occur annually over the park. This is based upon an estimate that 80 to 90 percent of operations recorded by the Federal Aviation Administration (FAA) at GCNP Airport, located 3 miles south of the park in the community of Tusayan, are associated with flights over the park (an operation is any approach or departure at the airport). Data furnished by air tour operators also supports this figure.

From 1974 to 1980, FAA figures show that operations at the GCNP Airport increased approximately 300 percent. However, operations at the airport have remained relatively constant since 1980. In the GCNP Airport Master Plan (1984) the Arizona Department of Transportation states that GCNP Airport is the third busiest transient airport in the state, and forecasts up to double the current number of operations at the airport by the year 2003. Anticipating that increase, current expansion proposals for the airport call for a new main terminal, a new operations building for commercial aircraft, and an enlarged aircraft parking area.

The aircraft management issue at GCNP has received widespread interest as evidenced by national media coverage and a fall 1985 public review period during which approximately 1,000 persons attended 5 public meetings and almost 9,000 written comments were received. There has also been considerable coordination and correspondence with Members of Congress and other elected officials and with many other public agencies. In addition, recently completed studies support several previous studies in concluding that a large number of backcountry users express dissatisfaction with the numbers and noise intrusion of aircraft overflights at GCNP. The effects of aircraft use within and above the park have been identified by the NPS as the number one resource management issue in the GCNP Natural and Cultural Resource Management Plan.

II. AFFECTED ENVIRONMENT

A. LOCATION AND ACCESS

GCNP encompasses 1,215,734 acres of the Grand Canyon of the Colorado River in northern Arizona (see Map 1). The Colorado River, running westerly 277 miles within the park from Lees Ferry to the Grand Wash Cliffs, divides the park into north and south sections. The canyon itself ranges from 1 to 25 miles wide and is over 1 mile deep in places. GCNP is located within Mohave and Coconino Counties and Arizona's Third Congressional District. The park is bounded on the north by Kaibab National Forest and the Bureau of Land Management's Arizona Strip District, on the northeast by Glen Canyon National Recreation Area, on the east by the Navajo Indian Reservation, on the south by Kaibab National Forest and the Hualapai and Havasupai Indian Reservations, and on the west by Lake Mead National Recreation Area.

Some lands in and adjacent to the park have been determined suitable or are designated as wilderness areas. Areas determined suitable for wilderness designation include eastern portions of Lake Mead National Recreation Area, and 93 percent of GCNP. The 1984 Arizona Wilderness Act designated nearly 400,000 acres of wilderness in the Arizona Strip north of the park, some of which are contiguous to the park.

The park lies entirely on the southern portion of the Colorado Plateau. The higher elevations of the plateau are forested, while the lower elevations are a series of desert basins or deeply incised canyons. The park ranges in elevation from 1,200 feet at the western end to over 9,000 feet on the North Rim.

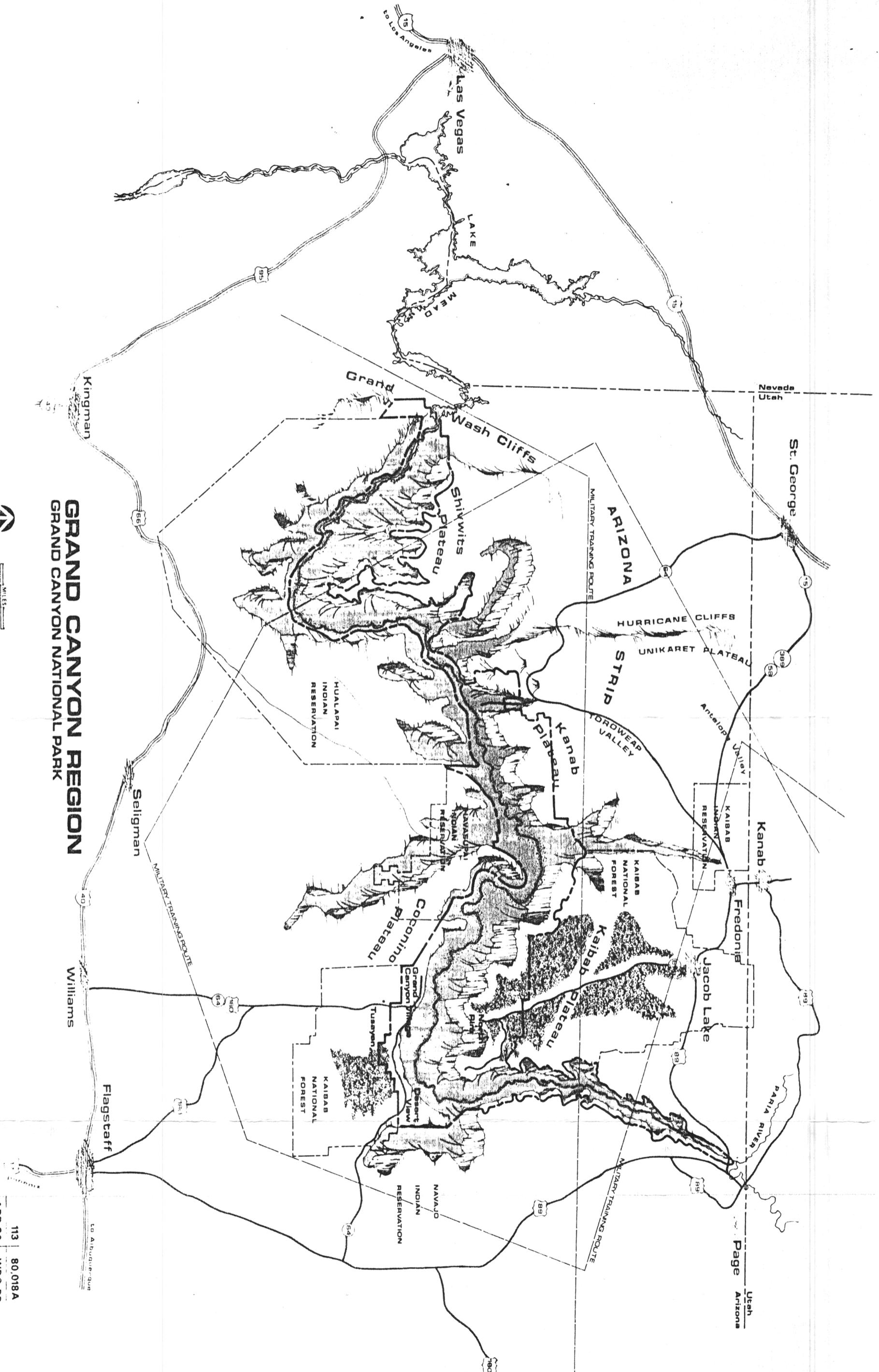
On both rims, the topography is generally flat, making land travel relatively easy. In contrast, topography below the rims is characterized by steep talus slopes, precipitous cliffs, crumbly decomposing rock ledges, and long narrow side canyons.

Most visitors enter the park using Highway 180 from the south and Highway 64 from the east. These roads lead to the South Rim developed areas, including Grand Canyon Village, elevation 7,000 feet, and Desert View, elevation 7,400 feet. The North Rim, elevation 8,200 feet, is accessed by Highway 67 from Jacob Lake. Approximately 80 miles of paved roads access rim view points on the North and South Rims, with dirt roads accessing many additional rim overlooks in more remote sections of the park. Access below the rims of the canyon is limited to foot travel, river trips, aircraft overflights and mule or horseback rides. Scheduled bus routes serve Grand Canyon Village from both Flagstaff and Williams. There is currently no access via train.

Via road, Grand Canyon Village is approximately 78 miles northwest of Flagstaff, 59 miles north of Williams, 291 miles east of Las Vegas, and 220 miles north of Phoenix.

GCNP Airport, elevation 6,600 feet, is approximately 9 miles south of Grand Canyon Village and 3 miles south of the park boundary in the community of Tusayan. It is served by scheduled air service year round to and from Las Vegas, and to and from a dirt airstrip just north of the park during the summer.

GRAND CANYON REGION GRAND CANYON NATIONAL PARK



B. SIGNIFICANCE OF THE PARK

GCNP is a place of tremendous natural, scenic and cultural interest, as well as a place of beauty, peace, and awesome grandeur. The 1975 GCNP Enlargement Act identifies the park as a "natural feature of national and international significance." This was further recognized when the park was designated a World Heritage Site in 1979. This designation identifies the park as a place of universal value to all mankind containing superlative natural and cultural features which should be preserved as part of the heritage of the world. GCNP is one of the few places in the world which meets all four criteria for a natural heritage site as well as three of the six criteria for a cultural site.

Park visitation has ranged from 2.5 to 3.0 million persons annually since 1969. At least 15 percent of these visitors are from foreign countries, making GCNP one of the most important U.S. attractions for foreign visitors.

The Grand Canyon offers a geologic record covering the first three eras of geological time, or 2.5 billion years, making it one of the most complete records of geological history found anywhere in the world.

GCNP also includes 277 miles of the Colorado River, one of the longest and most challenging recreational whitewater rivers in the world, with 160 recognized rapids.

Five of the seven recognized life zones of North America are found within GCNP. Within the park, there are about 1,500 plant species, 287 bird species, 88 species of mammals, 58 reptile and amphibian species, and 26 species of fish. This includes one plant and five animal species on the U.S. List of Endangered and Threatened Species.

Grand Canyon contains more than 2,500 known archeological sites indicating 4,000 years of human habitation. The State Historic Preservation Office has indicated that all archeological resources in the park may be eligible for the National Register of Historic Places as the Grand Canyon multiple resource area.

The park includes 312 buildings on the List of Classified Structures and/or on the National Register of Historic Places, and at least another 138 structures considered potentially eligible.

The NPS has developed an analysis of how well existing units of the National Park System represent the various themes or categories of natural phenomena in the different physiographic regions of the country. GCNP plays an integral role in the 78-percent representation of natural themes within the Colorado Plateau natural region. GCNP contains significant examples of the following themes: plains, plateaus, and mesas; work of volcanism; sculpture of the land; river systems and lakes; geologic history; boreal forest; and dry coniferous forest and woodland.

Grand Canyon National Park is a mandatory Class I air quality area as designated by the Federal Clean Air Act.

C. EXISTING FLIGHT OPERATIONS

1. Aircraft Use History

The first known flight over the Grand Canyon was made by the U.S. Army Air Service in February, 1919. Three years later, a barn-storming flyer made two successful landings on a hastily prepared runway at Plateau Point, 3,200 feet below the canyon rim. Scenic tour flights began over the park in 1926 when an airstrip was developed on the South Rim near Red Butte. The first plane to fly within the Inner Gorge was a U. S. Army search plane in 1929. In 1965, the current GCNP Airport was completed, two miles south of the park boundary in Tusayan.

In 1984, FAA recorded 96,011 operations at GCNP Airport. An operation is defined as any approach or departure; thus, each operation does not necessarily represent a flight over the canyon. For example, a tour beginning and ending at the airport accounts for two operations at the airport but only one flight over the canyon. However, a flight from Las Vegas which lands at the airport and then returns to Las Vegas accounts for two operations and two flights over the canyon. Total operations at the airport since 1981 have ranged from a high of 108,859 in 1981 to a low of 88,688 in 1985. Of these total operations, the FAA estimates that approximately 80 to 90 percent represent flights by commercial sightseeing aircraft. In addition to flights which are counted as operations at the airport, many flights over the park do not come into the traffic pattern of GCNP Airport and are not counted in the operations figures.

2. Types Of Air Operations Over Grand Canyon National Park

a. Commercial Sightseeing Tours

Commercial sightseeing tours account for the majority of aircraft flights with about 40 companies offering tours over the park. There are two main categories of tour flights depending on the origin and destination of the flight: point-to-point transportation/tour flights and fixed-base, non-stop tours. Point-to-point transportation/tour flights provide transportation from one location to another and incidentally include a tour of the canyon along the way. Most of these flights are from Las Vegas to Grand Canyon and return. The fixed-base, non-stop tours depart from and return to a particular location and primarily sell time over the canyon. Most of these tours originate from Tusayan, Arizona, but tours also originate from other locations in Arizona, Utah, and Nevada. According to flight number information supplied by air tour operators for 1985, point-to-point transportation/tour flights constitute about 45 percent and fixed-base, non-stop tours about 55 percent of commercial air operations at GCNP Airport.

According to air tour operators, specific points of interest on air tours can be created or deleted in the minds of the public through promotion and advertising. However, even though tapes and brochures for tours are updated at least once each year, major route changes usually require a 2- to 3-year lead time due to advance booking commitments and brochure turnover time. There are two aspects of the tours which many operators consider essential to a successful tour. The first is the opportunity

to fly below the rim, and the second is to overfly Havasu Canyon within the Havasupai Indian Reservation.

Another operational consideration is flexibility in scheduling times and routes to avoid bad weather. Deviations of up to 20 miles can be necessary to avoid weather cells and to avoid backtracking so that every view is a new one.

The commercial air tour industry in the Grand Canyon area has changed significantly over the past several years. Some of these changes (e.g. larger and quieter aircraft) have helped reduce aircraft noise within the canyon. Also, some tour companies have initiated various practices over the years in an effort to minimize their effects on persons on the ground.

Over the years, commercial air tour pilots have assisted park management through detection of the majority of wildfires as well as distress signals from park visitors in remote sections of the park.

1) Point-to-Point Transportation/Tour Flights

Most passengers on these flights fly to Grand Canyon in the morning and return to Las Vegas in the afternoon. Over half the passengers on these trips are from countries other than the United States.

Cost effectiveness is the most important operational need of this type of tour. In order to conduct a cost effective operation, these flights reduce fuel consumption by spending the least possible amount of time in the air, while still providing transportation and a tour. Aircraft fly approximately 175 nautical miles from Las Vegas to Grand Canyon with a formal tour, and 150 nautical miles on the return trip with no tour.

Flight arrival and departure times at GCNP Airport, for companies who do not have their own buses, depend to a large extent upon bus schedules of other companies to transport passengers from the airport to the park and back.

2) Fixed-base, Non-stop Tour Flights

There are three different types of fixed-base, non-stop tours, each having slightly different operational needs. These are the local fixed-wing tours, the local helicopter tours, and the non-local tours.

The local fixed-wing tours use strategic loading of passengers and low power settings to minimize fuel consumption (this also has the effect of reducing noise). There are three fixed-wing companies currently based at GCNP Airport.

Helicopter tours need to sell specific points of interest as well as time over the canyon. This is to take advantage of a helicopter's slow-flight capability, ability to hover, and minimal terrain clearance requirements in order to compete economically with fixed-wing aircraft which are inherently less costly to fly. To compete with fixed-wing aircraft, helicopter tour operators feel they must fly "below the rim." There are currently two helicopter companies operating within the GCNP Airport traffic area.

Non-local tour operators (both fixed wing and helicopter) in the western part of the canyon feel that low-level flights are appropriate due to the presence of extensive motor boat traffic. These companies rarely fly into GCNP Airport. They sell the canyon from above and below the rim, but there are no specific attraction sites. Many aircraft fly 500 feet above the Colorado River, but both helicopters and airplanes have been observed less than 50 feet above the river in the west end.

b. Military Operations

There are two Military Training Routes which each cross the park in two places. The first, listed as VR-1200, is a visual route 4 nautical miles in width which is used for low-level navigation 500 to 1,500 feet above ground level. This route encircles the park crossing in the Marble Canyon and Pierce Ferry areas. The second, a navigator training route listed as IR-400, is an instrument route 8 nautical miles in width. It transits Marble Canyon at 11,000 feet mean sea level elevation (MSL) approximately 5,500 feet above the ground, and crosses the Shivwits Plateau at 9,000 feet MSL approximately 2,000 feet above the ground.

Cross-country military flights are regulated by the same Federal Aviation Regulations (FARs) as all other aircraft, unless base, command, or service-wide restrictions are imposed. Nellis Air Force Base lists GCNP as a "No Fly Area", which means the area should not be flown below 10,000 feet MSL or 2,000 feet above the ground, whichever is higher. Map coordinates define the area, which includes most of GCNP, except the western end. The Navy has its own in-house flight rules which address endangering private property, annoying civilians and disturbing wildlife (see Appendix IV). All military pilots file flight plans under visual or instrument flight rules (VFR or IFR).

One section of the FARs applicable to high-speed aircraft is of particular importance to GCNP. FAR 91.70 states that no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots (288 mph). However, if the minimum safe airspeed for any particular operation is greater than 250 knots, the aircraft may be operated at that minimum speed below 10,000 feet MSL.

Military aircraft flying over the canyon, away from the training routes, are sightseeing while in transit. Detours from training routes and military operations areas are discouraged because they are expensive in fuel consumption.

There is little data available on the number and locations of military flights occurring over the canyon outside the training routes. However, FAA and commercial tour operators have identified a problem with military aircraft sightseeing over the park and are aware of many near misses. Military aircraft normally cannot communicate over civilian VHF radio frequencies. Although military airborne radar systems may be effective enough to make mid-air collisions unlikely, many military aircraft do not have radar. Also, this radar is less effective at low altitudes within the canyon due to topographic interference.

Civilian and military authorities agree that problem aircraft can usually be identified by reporting time, location, direction of travel,

altitude, and a description of the aircraft (including tail number if visible).

Military representatives strongly support continuation of the designated training routes.

c. National Park Service Aircraft Use

The park contracts for aircraft services through the Department of the Interior Office of Aircraft Services (OAS). NPS aircraft uses include sewage removal, maintenance/repair of facilities, search and rescue, law enforcement, research and resource monitoring, wildfire suppression, and transportation of persons and supplies. Medivac flights include medical evacuations from the canyon and medical flights to hospitals outside the park. Other agencies also use the NPS contract helicopter. Primary users include: U.S. Geological Survey, Arizona Public Service Company, Fred Harvey Company, Arizona Game and Fish, and the Museum of Northern Arizona.

In January 1986, GCNP implemented an Internal Aviation Management Plan which regulates use of NPS aircraft (see Appendix II). The NPS contract helicopter was recently painted a distinctive white color to assist visitors in identifying it.

d. General Aviation (Private Aircraft)

Private aircraft are estimated to be approximately 5 to 10 percent of total flights in the area. Almost all are transient.

Many general aviation aircraft detour significantly to fly over Grand Canyon. They often do not land at the airport or have any contact with the control tower or other pilots.

In 1984, the FAA placed an informational radio message on the Automatic Terminal Information Service (ATIS) broadcast from the GCNP Airport control tower. The message requested general aviation to fly no lower than 9,000 feet MSL to reduce the possibility of conflicts with tour aircraft traffic at and below 8,500 feet MSL. However, this message was deleted in fall 1985 by the FAA.

e. Commercial Jetliners

Commercial jetliners (major air carriers) usually fly over the park on one of five high altitude jet routes. These jet routes are no lower than 18,000 feet MSL. The NPS has no data on the number of flights over the park on these jet routes.

Until they discontinued service in September 1984, Republic Airlines flew DC-9 jets into GCNP Airport on a regularly scheduled basis. There is continuing interest on behalf of the local community to reinstitute this service.

f. Corporate Aircraft

Energy Fuels Nuclear is the only company known to frequently fly corporately-owned commercial aircraft (usually helicopters) in the area.

Their primary aircraft use is for mineral exploration. Since the entire park is closed to mineral entry, their use over the park is limited.

3. Air Tour Routes

About 40 companies in 5 states offer airplane and helicopter tours over the park. Because of differences in aircraft, the physical location of the business, and other company-specific concerns, tour routes vary considerably. See Appendix III for the most common airplane and helicopter tour routes.

4. Flight Environment

The great diversity of topography at Grand Canyon directly affects flights over the area. Climate is likewise diverse. This is due partially to elevation changes and partially to the unique effect the canyon itself has on weather.

The North Rim is closed during the winter due to as much as 10 feet of snow. Average winter high and low temperatures are 39 and 18 degrees Fahrenheit. In the summer, days are generally clear and crisp with occasional afternoon thunderstorms or heavy rain. Evenings are chilly. Average summer high and low temperatures are 75 and 43 degrees Fahrenheit. The North Rim receives more precipitation than any other location in the park, with an average of 25 inches per year.

The South Rim is always open, generally receiving less than 3 feet of snow. Average winter high and low temperatures are 43 and 20 degrees Fahrenheit. During the summer, afternoon thundershowers and occasional heavy rains can be expected. Average summer high and low temperatures are 82 and 51 degrees Fahrenheit.

At Phantom Ranch (at the bottom of the canyon) daytime temperatures are extremely high during the summer months, with highs and lows averaging 106 and 78 degrees Fahrenheit. Winters are also mild with maximum temperatures averaging 56 degrees Fahrenheit and the lows rarely dipping below freezing. The canyon below the rims receives about 8 inches of precipitation each year.

During winter months, the Grand Canyon region experiences snowstorms and low-level stratus clouds. There are also short periods of temperature inversions, when clouds fill the canyon (cold air drains into and is trapped within the canyon) while the rims are being warmed by direct sunshine. Summer days are warm and turbulent. Thunderstorms develop almost daily from late June through early September as a result of local convective disturbances due to excessive heating of the ground. These storms are frequent, heavy and often violent. Turbulence, hail, rain, snow, lightning, severe updrafts and downdrafts, and icing conditions are all associated with these thunderstorms. The storms usually last less than 30 minutes but pilots must modify their flight routes to avoid such weather. The FAA recommends that pilots stay at least 10 to 20 miles away from thunderstorms.

"Density altitude" is also a factor which must be considered in developing management alternatives involving aircraft. It is a measure of

air density which is used by pilots as an index in calculating the performance capability of aircraft. Density altitude becomes a serious factor in all warm-weather and high-altitude flight planning. High density altitude is a real hazard since it reduces all aircraft performance parameters. Elevation (or altitude), humidity, and temperature all determine air density. When all three are high, density altitude is high and normal horsepower output is reduced, propeller and wing efficiency decrease, an airplane requires a longer takeoff roll before becoming airborne, rate-of-climb is decreased, and a higher true airspeed is required to sustain the aircraft throughout its maneuvers. Flights are sometimes planned for the early morning or late afternoon hours to offset the effects of density altitude, as well as to take advantage of decreased turbulence.

Turbulence in the Grand Canyon is usually caused by differential heating of the canyon's surface or by strong winds. Updrafts caused by differential heating are often utilized by pilots to assist aircraft in climbing out of the canyon, sometimes a difficult task on a hot summer day when the aircraft is fully loaded. Canyon flying is much like mountain flying, and abrupt changes of wind direction and velocity must be anticipated.

5. Existing Controls On Aircraft Use

a. FAA Air Traffic Control

GCNP Airport has no radar. Air traffic control is by visual separation between aircraft. Radar coverage in the Grand Canyon area is provided only by the Los Angeles Air Traffic Control Center and is usually only effective when aircraft are 8,500 feet or higher above sea level. The GCNP Airport tower controls the airspace within a horizontal radius of 5 statute miles from the center of the airport, extending from the surface up to but not including 3,000 feet above the elevation of the airport. The tower's primary role is to control traffic into and out of the airport. Approach and departure patterns have been established so that aircraft can use any direction which provides safe and efficient traffic flow.

In response to a 1983 weather-related fatal crash of a tour airplane, the FAA proposed an AWOS (Automated Weather Observing System) station on Mt. Dellenbaugh. Although this meteorological station is considered critical for FAA to restrict any flights in the area based upon weather, there is presently no funding to construct the AWOS station.

b. Advisories and Regulations

A variety of advisories and regulations exist which are relevant to the issue of aircraft management within the airspace overlying GCNP. Advisories are requests, and are non-regulatory in nature. Regulations are law, and convicted violators usually receive a monetary fine and/or a suspended or revoked pilot's license. Advisories and regulations applicable to Grand Canyon overflights are listed in detail in Appendix IV, and include:

Advisories:

1. 1972 Tri-State Flight Operators Agreement.
2. Commonly agreed upon reporting points and radio frequencies.

3. FAA Advisory Circular 91-36C: VFR Flight Near Noise Sensitive Areas.
4. FAA's Airman's Information Manual, paragraph 565 (page C6-S4-2): Flights Over Charted U.S. Wildlife Refuges, Parks, and Forest Service Areas.
5. FAA/NPS/FWS Interagency Agreement - 1984.
6. Military In-House Flight Rules.

Regulations:

1. FAR Part 91: General Operating And Flight Rules:
 - a. 91.9: Careless or reckless operation.
 - b. 91.32: Supplemental oxygen.
 - c. 91.70: Aircraft speed.
 - d. 91.79: Minimum safe altitudes; general.
 - e. 91.109: VFR cruising altitude or flight level.
 - f. 91.119: Minimum altitudes for IFR operations.
2. FAR Part 135: Air Taxi Operators And Commercial Operators:
 - a. 135.89: Pilot requirements: use of oxygen.
 - b. 135.203: VFR minimum altitudes.
3. Title 36, Code Of Federal Regulations, Section 2.17: Aircraft And Air Delivery.

6. Aviation Sound Characteristics

Millions of people in the United States are exposed to aviation sound every year. In a great many instances, the aircraft sound simply merges with other urban sounds. However, in quieter locations, such as GCNP, aircraft sound is more of a contrast with the ambient (or background) sound and therefore of greater concern.

Sound is a physical disturbance in the air created by vibration. Upon reaching our ears, sound may be perceived as beautiful, desirable, or unwanted. Unwanted sound is normally referred to as noise.

Sound propagated from a simple source radiates more or less equally in all directions, forming what might be called a sphere of acoustic power. When an aircraft passes by, one hears a combination of sounds propagated from the engine, exhaust, propeller, wings, and fuselage. Design and materials of all these items affect the sound produced by an aircraft, but the operational practices of a pilot can also reduce, increase, or modify sound production.

Sound can be thought of as a complex pattern of waves or ripples moving outward from a sound source through the air similar to the way in which ripples radiate outward from the point at which a pebble enters a pond. Major components of these waves are amplitude (the relative height of those ripples in the pond) and frequency (the number of waves per unit area). Amplitude is commonly measured in decibels (dB) while frequency is measured in Hertz (Hz). Amplitude and frequency are often equated with the loudness and pitch of a sound; however, a listener's perception of loudness and pitch also depends upon the characteristics of the listener, the listener's subjective response to the sound, the listener's environment, changes in sound pressure level, and the rate of increase in the sound pressure

level. "Noisiness" depends upon the above factors as well as the degree to which the sound is unwanted.

The decibel has been generally found to relate well to the way in which people subjectively perceive the loudness of sound, so that, ignoring the effects of pitch and atmospheric absorption, a 10 dB increase in a sound seems twice as loud to the listener, while a 10 dB decrease seems only half as loud (i.e. 70 dB seems twice as loud as 60 dB). In general, changes in sound levels of 3 or 4 dB are barely perceptible (from FAA Report No. FAA-EE-85-2, March 1985). Again ignoring pitch and atmospheric absorption, sound intensity decreases inversely with the square of the distance from the source, while loudness is approximately proportional to the logarithm of sound intensity. In other words, each time the distance from the noise source to the listener doubles, the loudness perceived by the listener is reduced about 6 decibels (dB) (this information comes from the U.S. EPA's Office of Noise Abatement and Control "About Sound" booklet, published May 1976, and from a U.S. Forest Service booklet "Predicting Impact of Noise on Recreationists," published April 1980).

The role of doubling distance is sometimes referred to as spherical spreading; that is, sound energy is spread over a larger and larger sphere as it propagates outward from the source. This effect applies equally to high and low frequencies. If the sound of an aircraft at 500 feet is 82 dB, at 1,000 feet the level will be 76 dB; at 2,000 feet, it will be 70 dB and so forth according to this spherical spreading. However, as distances increase away from the sound source, atmospheric effects have more and more of an effect on sound propagation so that the 6 dB rule no longer necessarily applies. The atmosphere can absorb and change the direction of sound. Depending upon temperature, humidity, wind speed, and wind direction, sound can travel in distances or directions that would not otherwise be expected. Atmospheric absorption affects high sound frequencies more than low frequencies.

Unfortunately, when considering noise standards for sound sources such as aircraft, the effects of pitch and atmospheric absorption affect the audibility, or the perceived loudness, of sound in addition to the decibel level. That is why, in studies conducted at GCNP, the researcher could hear an aircraft flying near a waterfall even though his sound level meter recorded a higher decibel reading for the waterfall. That is also why, in general terms, a helicopter may seem louder than a fixed-wing aircraft even though the two may have very similar decibel level readings. Helicopter sound tends to be lower in frequency than fixed-wing aircraft sound (to a large extent due to the size and rpm's of a helicopter rotor compared to a fixed-wing propeller). Lower frequency sound tends to be less absorbed by the atmosphere and travels further than sound of higher frequencies. The frequency distribution of a sound giving an indication of the amount of acoustic energy generated at the various frequencies, or octave bands, is thus useful along with decibel readings in assessing loudness.

Sound level or decibel level meters often contain a filter which simulates the human hearing response. This filter and the human ear give greater emphasis to sounds in the speech-important frequency bands and less emphasis to the lower and higher frequencies. Decibel measurements made with such a filter are called an A-weighted decibels (or dBA). These can be

measured in terms of maximum single event levels or cumulative levels over a period of time to determine sound standards or levels.

Sound is a complex subject dependent upon many variables. Some aircraft under some conditions can be heard more than 20,000 feet above a listener. The same aircraft under different conditions may not be heard at 1,000 feet above the listener, or a very quiet aircraft may be distinctly heard far away given certain conditions. No single factor or measurement can be relied upon to produce consistent results in noise abatement. Many factors must be considered together.

7. Aviation Safety

Park records indicate that there have been no documented impacts to the health, welfare, or safety of park visitors on the ground resulting from air operations. However, there have been reports that low level helicopter flights have resulted in airborne dust and debris impacting back-country visitors in the Thunder River and Kaibab Trail areas.

Considering the safety of park visitors and air tour passengers flying in aircraft above the park, there have been 10 documented cases of aircraft crashes within the park over the last 5 years resulting in 17 fatalities, with an additional 3 crashes in the immediate vicinity of the park (within 10 miles of the boundary) resulting in 15 fatalities. The FAA has taken several steps to address aviation safety at Grand Canyon over the last couple of years. These steps have included: broadcasting a safety message over the GCNP Airport ATIS, holding annual meetings for companies which fly over the canyon in order to promote aircraft safety, and recommending Alert Area status for the park area. However, both Alert Area status and the ATIS message were both rejected by the Los Angeles FAA regional office which felt that traffic volume and safety concerns were not adequate to justify these actions.

The Office of Aircraft Services (OAS), which is concerned with the safety of Department of the Interior (USDI) employees as well as the safety of the flying public over lands administered by USDI agencies, has identified the Inner Gorge as a "hazardous flying environment" (October 21, 1985, memorandum from OAS) and the upper airspace of the canyon as an area of concern regarding the potential for mid-air collisions. The OAS position is that existing FARs and attempts by local air tour operators to coordinate flights over the canyon are commendable but not adequate when applied to the unique Grand Canyon flying environment. At a minimum, OAS proposes better use of advisory radio messages to pilots in the area, designation of "special use airspace" in the Inner Gorge, and establishment of an Alert Area for the remainder of the park airspace to adequately protect the safety of employees and the public. Thus, there is a concern that aircraft activity may be likely to cause an injury to the health, welfare, or safety of park visitors without positive action to increase the margin of safety.

D. NATURAL AND CULTURAL RESOURCES

1. Wildlife Species of Concern

Wildlife species of concern in developing an aircraft management plan are those which have been officially designated as endangered or

threatened by the U.S. Fish and Wildlife Service and those for which GCNP comprises a major portion of their range and which spend important parts of their lives in areas of the park where aircraft may commonly pass close to them.

All Federal agencies are required to consider potential impacts to federally-listed endangered or threatened species in any undertaking. Additionally, NPS policy requires full consideration of proposed species as well. There are two species in GCNP which are proposed or listed as endangered or threatened which could be affected by aircraft activity. These are the bald eagle (Haliaeetus leucocephalus) and the American peregrine falcon (Falco peregrinus anatum). Both are officially listed as endangered species.

The bald eagle is a rare year long transient along the Colorado River. It is present as a rare transient throughout the remainder of the Grand Canyon region in all seasons except summer. Due to the infrequent occurrence of this species within the park, and its distribution along the Colorado River where few aircraft fly, impacts to it are unlikely.

The American Peregrine Falcon Recovery Plan states that "prior to 1975, about 180 known pairs of peregrines nested in the Rocky Mountain/Southwest region. Approximately 55 pairs, most on public lands, were known to be present in 1983." The goals of the recovery plan include direct protection of peregrine falcons and their habitat, actions to increase natural productivity, and captive breeding and release programs. Peregrine falcons in the Rocky Mountain and Southwest region persist mainly on mountain cliffs, river gorges, and open ledges. Virtually all of Grand Canyon provides important breeding habitat for the species.

In general, it is not known whether aircraft are impacting wildlife at GCNP. Research on the peregrine falcon has only given an indication of population size and distribution at GCNP but has not been specifically designed to test for aircraft impacts. In an effort to determine the probability for impacts on the peregrine falcon and what should be done to mitigate impacts, the NPS asked the U.S. Fish and Wildlife Service and the Arizona Game and Fish Department for advice in an informal consultation under the Endangered Species Act. In that informal consultation, those agencies requested the NPS to discourage aircraft operators from flying closer than 1,500 feet from the canyon walls and a similar distance above the canyon rim to protect the endangered peregrine falcon.

Desert bighorn sheep inhabit the crags, cliffs and precipices of the canyon. The bighorn populations are distributed vertically from the rim to the river. Natural populations are concentrated primarily on the south side of the Colorado River from the Little Colorado River confluence to the west side of Havasu Canyon. Additionally, bighorn have been introduced to the north side of the Colorado River in several locations. Research is currently being conducted to determine if foraging efficiency of desert bighorn sheep is affected by aircraft overflights in certain areas of the park. Preliminary data suggest that some impacts may occur from very low flying aircraft. The field work for this study will be completed in summer 1986.

2. Cultural Resources

An Anasazi cliff ruin near Pt. Sublime is the only archeological site in the park which currently experiences significant nearby aircraft activity. A recently completed study (Brumbaugh 1986) of the effects of helicopter vibrations on the Point Sublime site concluded that tour helicopters of the type and number currently in use would not damage the ruins in the short-term and that no modifications were necessary to the present approach patterns and minimum distances of tour helicopters from this site (approximately 300 feet). The study analyzed the short-term vibrational effects of ground velocity/acceleration and resonant shaking of the walls, but did not address potential long-term effects due to fatigue of the walls. This is a continuing research need.

Since the Point Sublime site is the archaeological resource most visited by aircraft in the park, and is considered typical of most other potentially impacted sites, it is reasonable to conclude that aircraft vibration impacts are not a short-term concern to the archaeological resources of the park. Further research will be necessary before conclusions can be drawn concerning long-term impacts, however the Pt. Sublime archeological site is the only site in the park where long-term impacts from aircraft activity are considered possible.

E. NATURAL QUIET AND EXPERIENCE OF THE PARK

Natural quiet is defined to be the absence of man-made sounds. It is considered a natural resource for the purpose of this plan. Natural quiet in this plan is considered in reference to aircraft sound only, not in reference to any other sound. Natural quiet can be an integral part of a visitor's recreational experience in the park, whether the visitor seeks enjoyment from the rim or during a hike in a remote location. However, natural quiet is not a necessary part of the recreational experience of some park visitors and not all visitors are sensitive to aircraft sounds.

Approximately 93 percent of the park has been determined suitable for wilderness designation. Among other phrases concerning the absence of human influences, the 1964 Wilderness Act defines a wilderness experience as including "outstanding opportunities for solitude." For many people, natural quiet is integral to a wilderness experience. This sentiment was echoed by many persons during the fall 1985 public review period who supported the importance of quiet and/or solitude to their experience in the park, even if that experience involved something other than visiting an area of the park determined suitable for wilderness designation.

Visitor experience is difficult to define and must be considered in terms of a range of recreational opportunities provided by the park, as well as visitor expectations and the purposes for which the park was established.

In an attempt to provide indications of the nature of the aircraft issue in the park and to provide baseline information concerning the natural quiet and experience of the park, a number of studies have been conducted. The studies have been conducted over a 15-year period and have measured three aspects of aircraft activity. The first is the percent of time aircraft is heard in various locations within the park. The second is

measuring the noise level during aircraft overflights using the A-weighted decibel scale. The third is visitor perceptions concerning overflights.

1. In 1971, Dr. Charles H. Black of Northern Arizona University conducted a survey of noise levels at 12 sites along the South Rim, Clear Creek, North and South Kaibab Trails, and Phantom Ranch during Labor Day weekend. This study measured decibel levels and found that "During one day of the survey, aircraft noise was essentially continuous at all sites."

2. In 1975, Dr. Eldon G. Bowman of Northern Arizona University conducted 18 days of aircraft noise evaluation on the Bright Angel and South Kaibab Trails. A typical one day evaluation (8 a.m. to 5 p.m.) indicated an average of 72 observed aircraft whose combined noise was heard during 43 percent of the time. Bowman also measured increases in decibel levels at several locations from under 45 dBA to as much as 80 dBA due to aircraft.

3. In 1977, a sociological survey of backcountry hikers was conducted by William Towler. The survey indicated that 71 percent of the 251 backcountry users interviewed felt that aircraft flying overhead detracted from their enjoyment of the park.

4. From 1978 to 1980, GCNP personnel monitored aircraft noise utilizing procedures similar to those of Dr. Bowman, but at a variety of locations in the canyon and on the rim. Data indicated that, over a total of 433 sampled hours, aircraft could be heard an average of 47 percent of the time.

5. In 1983, P.S. Dara collected 500 hours of decibel sound level data from a variety of locations on the South Rim and in the canyon. Ambient sound level measurements were below 30 dBA in several locations, whereas some areas near waterfalls or rapids had ambient sound level measurements exceeding 70 dBA. Noise levels measured when aircraft flew over averaged 47 to 74 dBA at various altitudes, and were louder than the ambient noise level by up to 65 dBA. It is important to note that even at waterfalls and rapids, where the ambient noise level was louder in decibels than the aircraft flying overhead, aircraft could still be heard due to differences in sound quality (primarily pitch) of the sound sources.

6. In 1983-84 a survey of visitor perceptions of aircraft in the park's backcountry was completed by GCNP. A total of 1700 backcountry visitors were surveyed, of whom 32 percent said they were dissatisfied, and 27 percent said they were slightly dissatisfied with the number of aircraft heard on their trip. Despite their dissatisfaction with aircraft heard, almost 74 percent were very satisfied with their trip overall.

7. Two surveys of rim visitors were conducted by Underhill et. al. and Haas and Ross in 1983 which included questions concerning aircraft and many other aspects of visitor experience. Approximately 20 percent of the respondents to these surveys expressed dissatisfaction with aircraft heard or expressed a desire to stop aircraft flights over the canyon.

8. In 1986, a survey was completed among a 30-percent sample of all persons who obtained backcountry use permits from June 1, 1984, to May 31, 1985 (2412 responses were received with a response rate of over

80 percent). This survey of over 100 questions regarding backcountry use included two questions concerning aircraft. Thirty-two percent of the Cross-Canyon Corridor hikers (two-thirds of all hikers) responded that aircraft detracted from their trip, or agreed that too many aircraft fly over the backcountry, and approximately 20 percent were neutral. Sixty to 75 percent of the non-corridor hikers (one-third of all hikers) responded that aircraft detracted from their trip and/or agreed that too many aircraft fly over the backcountry. Approximately 15 percent were neutral.

F. SOCIOECONOMIC ENVIRONMENT

In 1985, GCNP received about 3 million visitors, approximately 2.7 million of whom traveled to the South Rim and approximately 260,000 of whom traveled to the North Rim.

Grand Canyon Village is located on the South Rim and has a resident population which varies from 1,500 in the winter to 3,500 in the summer. Up to 20,000 visitors per day may visit the village area during the peak summer season. The village has lodging accommodations for 3,628 visitors, a campground with 329 sites, and a trailer park with 88 sites. Desert View is at the eastern end of the South Rim and houses 15 permanent and up to 30 seasonal residents. Desert View has a campground with 50 sites but no visitor lodging.

The North Rim is open from approximately May 15 to October 15. It has a summer resident population of 100 with lodging for 700 persons and a campground with 83 sites.

Phantom Ranch, at the intersection of the Bright Angel and Kaibab Trails, has two ranger stations, lodging for 92 mule riders and hikers, and a 90 person backpacker campground. Indian Gardens, on the Bright Angel Trail, has a campground for 50 backpackers, while Cottonwood Camp on the North Kaibab Trail has a campground for up to 40 backpackers. Other ranger stations are staffed at Tuweep (Toroweap), Lees Ferry, and Meadview (Pearce Ferry). The Cross-Canyon Corridor, which includes the Bright Angel and Kaibab Trails and the three backpacker campgrounds mentioned above, is visited by approximately 23,000 overnight hikers, 4,300 overnight mule riders, 12,000 day-use mule riders, and an estimated 150,000 day hikers each year. In addition, lodging for over 15,000 persons is sold at Phantom Ranch every year which is not accounted for by mule riders; this lodging is sold to hikers or river runners who may or may not have permits for other nights away from Phantom Ranch. Tuweep annually receives about 8,000 visitors by automobile and over 1,000 campers each year. The remainder of the park backcountry is visited by approximately 12,000 overnight hikers, 16,000 river runners on the Colorado River, and an estimated 50,000 day hikers each year. Thus the total number of people below the rim annually (excluding persons in aircraft and at Tuweep) is approximately 332,000.

User nights are calculated based upon the number of nights a person spends in an area, with approximately 45,000 backpacker user nights in the Cross-Canyon Corridor, 35-40,000 backpacker user nights in the remainder of the park, and 130,000 river user nights each year. The majority of river and Cross-Canyon Corridor use occurs from May 1 to October 1 while the majority of use in the remainder of the backcountry occurs from October 1 to

May 1. This is primarily due to high summer temperatures and water availability. See Map 2 for information on backcountry use distribution.

The western end of the park from Diamond Creek to the Grand Wash Cliffs receives downriver use from approximately 8,500 river runners as well as upriver use to Separation Canyon from several thousand power boaters.

Immediately south of the park boundary, the community of Tusayan has a population of 250 and lodging for 1,100.

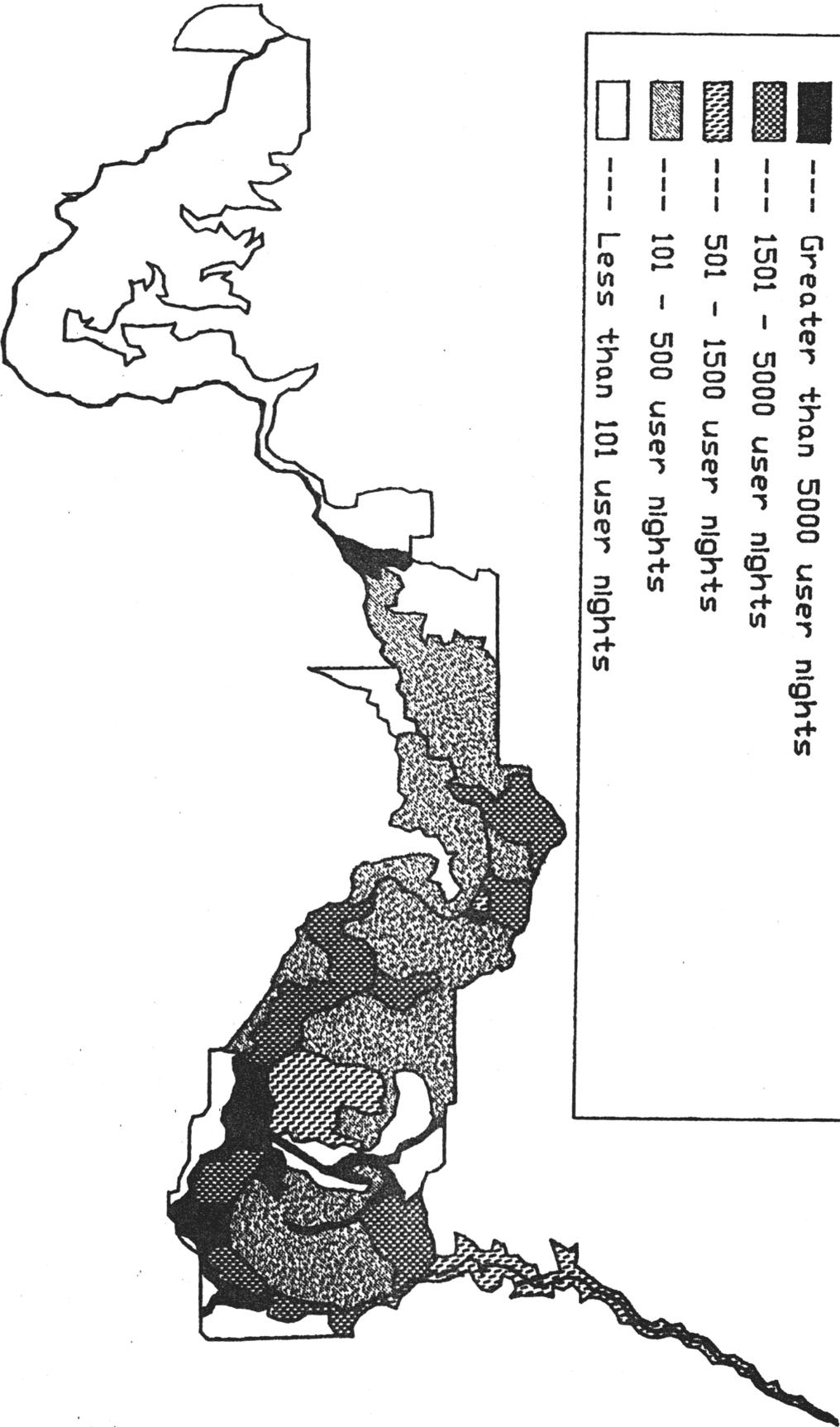
Air tour operators reported carrying approximately 250,000 passengers in 1985, for aerial tours and/or transportation access to the park, or slightly less than 10 percent of the total park visitors. In addition to air tour operators based at GCNP Airport in Tusayan, companies offering flights over the park regularly operate from airports in Las Vegas, Boulder City, Page, Williams, Flagstaff, Kanab, Sedona, the Phoenix area, southern California, and New Mexico. Regularly used airstrips in the Grand Canyon vicinity include Tuweep, Marble Canyon, Cliff Dwellers, and Whitmore Canyon. Helicopter landing spots also include Supai Village, Whitmore Wash, and Lava Falls Rapid.

The Grand Canyon scenic flight industry is a multi-million-dollar business at the above airports and adjoining communities, and is reported by the travel industry to help attract a majority of the tourist business which is important to the economies of most southwestern states. Several hundred jobs depend on these industries and airports.

ANNUAL BACKCOUNTRY USE DISTRIBUTION

User nights for backcountry use-areas from January 1982 until October 1985 (numbers were added to smooth out fluctuations caused by such variables as weather for any particular year).

- Greater than 5000 user nights
- ▨ 1501 - 5000 user nights
- ▧ 501 - 1500 user nights
- ▩ 101 - 500 user nights
- Less than 101 user nights



III. ALTERNATIVE ACTIONS

A. ASSUMPTIONS IN DEVELOPING ALTERNATIVES

In developing the alternatives, the following points were considered:

1. The mission of the NPS to "conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same" (1916 NPS Organic Act) contains a potentially inherent conflict. Where that conflict arises, the issue is to be decided in favor of resource protection.

2. "To protect" park resources and values, as required in the 1975 GCNP Enlargement Act, does not necessarily mean that all effects of aircraft must be eliminated.

3. Aircraft sound as it affects the natural quiet and visitor experience is the primary issue, although safety and a feeling of intrusion to some visitors caused by aircraft are also concerns.

4. Aircraft have been flying over GCNP since its establishment. The opportunity to view the park from the air is a well-established recreational opportunity and means for enjoying the park. Aircraft can also aid in protection of the public, aid in management of the park, and provide transportation access to the park.

5. Aircraft do not have an inherent right to free access to the park without control or restriction, or a right to impact other visitors or park resources.

6. The 1975 GCNP Enlargement Act references aircraft activity "within the Grand Canyon National Park, as enlarged by this Act, including the air space below the rims of the canyon." This reference may be interpreted to mean that the air space below the rims of the canyon could be considered within the boundaries of GCNP.

7. Both low flying aircraft and the frequent sight and sound of aircraft flying relatively high overhead have been identified as intrusive by many backcountry users.

8. The final aircraft management plan would consist of two components: 1) actions based on the following alternatives and 2) methods for implementing the actions based on the mechanisms contained in Section VI. In comparing and analyzing the alternatives, it is necessary to assume that they would be fully implemented regardless of the mechanism(s) selected. The NPS recognizes that public input to date has indicated a lack of consensus as to whether particular parts of some alternatives could be implemented through voluntary compliance, or whether regulations or legislation would be required. Section VI of this document contains an analysis of the various mechanisms, or tools, which could be used to implement the alternatives. It should be stressed that there will be no differences in impacts resulting from using different mechanisms since compliance will be fully achieved through implementation of the alternative selected. Only the amount of time or effort needed to implement the alternative may vary.

B. ACTIONS COMMON TO ALL ALTERNATIVES

In addition to the specific goals or actions proposed for each alternative, the following actions are included in all alternatives:

1. Education/information programs. Programs will be developed to educate all GCNP user groups concerning the major concerns, needs, actions, and constraints of each group interested in the aircraft issue. These will include training sessions for pilots and NPS personnel, development and exchange of educational materials among all user groups to promote understanding and compliance, an information radio message to pilots, news media coverage, presenting Grand Canyon concerns and information in as many aviation publications as possible, and distributing information and publications to the aircraft community at all levels.

2. Enforce existing Federal Aviation Regulations (FARs). This will involve the NPS actively looking for and reporting any possible violations of FARs over or within the park to the FAA for their action. Under a 1984 cooperative agreement between the NPS and the FAA, the FAA will provide feedback to the NPS on actions taken for each reported incident. The NPS will also provide information to park users to assist them in reporting any possible violations of rules or policies regarding overflights of the park.

3. Minimize NPS aircraft use. GCNP has developed an Internal Aviation Management Plan (IAMP) which requires each NPS flight request to be reviewed by a committee which makes recommendations to the Superintendent concerning approval or denial of the flight. Emergency flights are exempt from this process, but are reviewed later. It is the policy and practice of GCNP to limit park use of aircraft to emergencies, the administration and/or protection of resources, research, and for individually approved special purpose missions. Each flight must be in compliance with the NPS mission, protect park resources and facilities, and be the most efficient, economical, and effective method of accomplishing the required task consistent with park goals. The goal of the IAMP is to significantly reduce the number of NPS flights over the park. NPS aircraft use will be consistent with this plan under all alternatives.

4. Monitor the effects of the selected action(s). A monitoring program will be implemented to assess actions which may be taken as a result of the current planning process. It will be designed based upon the specific actions implemented.

5. Provide for periodic review of the plan. Public comment will be solicited and a report to the public will be made concerning implementation of the plan.

6. Enhanced communication among all parties. Communication will be encouraged and facilitated among all interested parties through such means as formal or informal meetings, an ad hoc advisory group, a "hot line" telephone system, a newsletter, sharing telephone and address lists, and developing informal contacts.

7. Identify military aircraft which do not comply with regulations or directives, and cooperate with the military in a program to eliminate military sightseeing flights over the park. The military has stated that if their pilots are not in designated training routes over the park, they should be in full compliance with FARs, FAA Advisories, and military flight directives. They have agreed to request the Defense Mapping Agency to include NPS areas on military flight charts (they are currently not indicated on the charts). They have also directed pilots to comply with the FAA request to fly not lower than 2,000 feet above the uppermost rim of canyons or valleys in national park areas, and have requested notification about aircraft which violate any of the above or otherwise create a problem. They have assured the NPS that appropriate action will be taken and that they will provide feedback to the NPS about what was done.

8. Request the FAA Air Route Traffic Control Centers to refuse permission for transient aircraft to deviate from their normal routes for tours of the canyon. Currently, some pilots (primarily of high-altitude commercial jet liners and military aircraft) routinely receive permission from Air Route Traffic Control Centers controlling IFR flights to deviate from established flight plans for a tour over GCNP. The NPS will request the FAA to develop procedures to minimize these deviations by such means as identifying the park as a noise sensitive area to pilots who make such requests and/or routinely refusing such requests unless other justification warrants granting permission.

9. Establish noise level standards or procedures for approaches and take-offs at GCNP Airport which would minimize aircraft noise effects on the park. The NPS will request the FAA to develop such standards or procedures.

C. DEFINITIONS COMMON TO ALL ALTERNATIVES

"Flight-free areas" in all alternatives would be defined as areas where all flights are prohibited below 14,500 feet Mean Sea Level elevation (MSL), except as specifically authorized by the Superintendent and/or except for aircraft which have been certified as meeting noise level standards as discussed in the alternatives. Detailed boundary descriptions for flight-free areas are described in Appendix V of this Environmental Assessment.

"Developed areas" are defined to be Grand Canyon Village, the North Rim developed area, and Desert View.

"Noise level standards" would be defined as follows:

1. An aircraft would meet "Noise Level Standard #1" if it was measured and certified by the FAA as being no louder than the quietest production aircraft currently available which could reasonably be used to carry passengers on tours over the park. All factors which contribute to audibility would be considered in this certification process.

2. An aircraft would meet "Noise Level Standard #2" if it was measured and certified by the FAA as not audible on the ground (in the canyon) 1,000 feet overhead considering all factors which contribute to audibility. This standard is reported by several sources to be feasible.

Procedures for measuring and certifying both of the above standards would be developed jointly by the NPS and the FAA. Aircraft which are certified as meeting one of the above noise level standards would be permitted to fly into certain flight-free areas as an incentive for aircraft owners to buy and aircraft manufacturers to produce aircraft which meet or exceed the standards.

The alternatives contain a variety of proposals for altitude restrictions. The FAA has informed the NPS that minimum altitude levels must be defined in terms of elevation above mean sea level (MSL). This is in order to make such altitudes easy to understand for pilots and thus legally enforceable. Reasonable approaches and departures from GCNP and Tuweep Airports would be exempt from these definitions. Exceptions may also be considered if specifically requested by the Hualapai Tribe to allow for helicopter access to river take-outs on Hualapai land. Minimum altitude definitions for "rim level," "2,000 feet above rim level," and "Inner Gorge" follow.

For the purposes of these alternatives, "rim level" is the uppermost rim of the canyon consistent with the FAA Advisory Circular 91-36C (i.e. Kaibab limestone level in most places) and is defined by MSL elevations as follows (see Map 3):

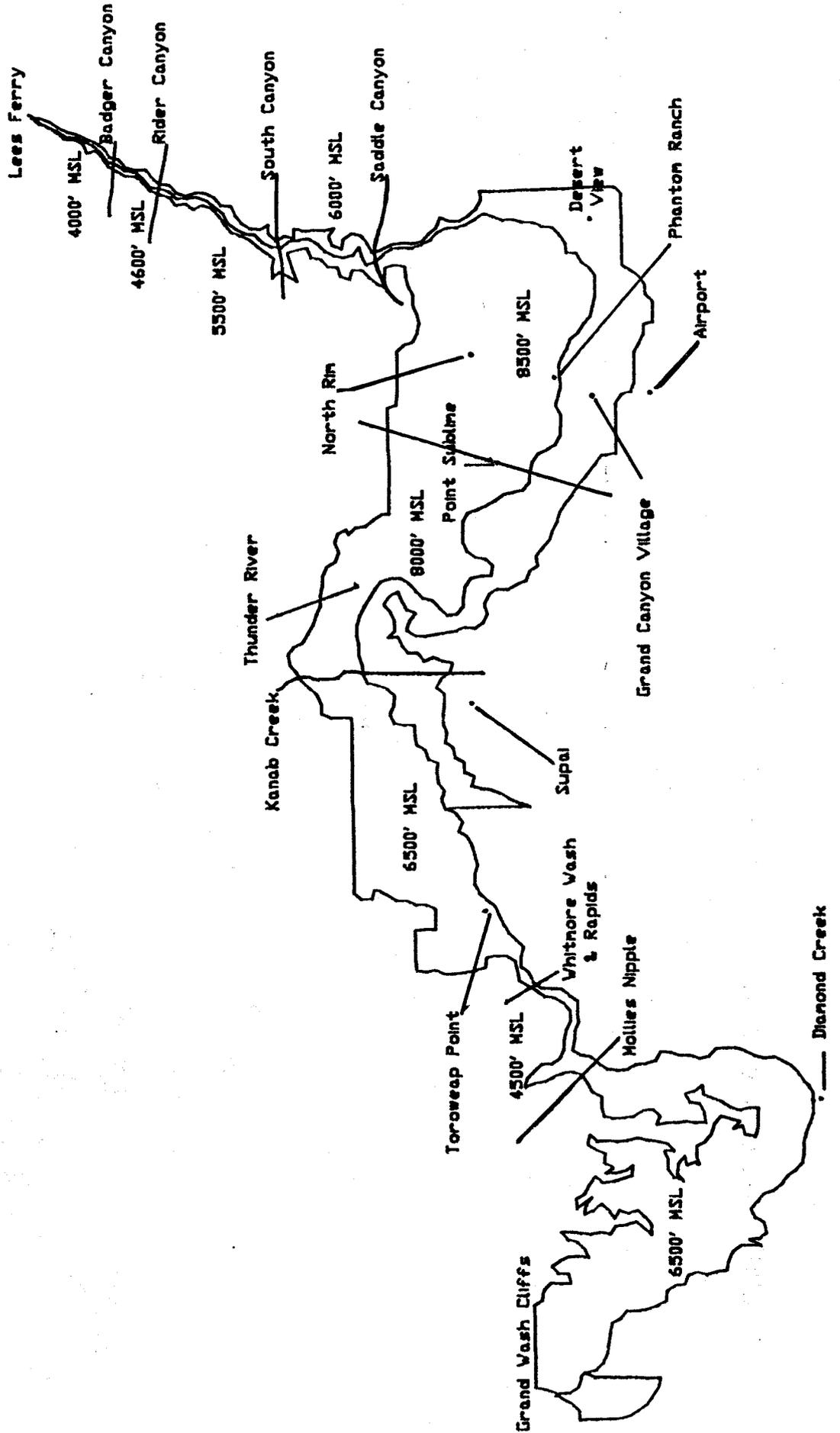
1. 4,000 feet MSL from Lees Ferry to Badger Canyon,
2. 4,600 feet MSL from Badger Canyon to Rider Canyon,
3. 5,500 feet MSL from Rider Canyon to South Canyon,
4. 6,000 feet MSL from South Canyon to Saddle Canyon,
5. 8,500 feet MSL from Saddle Canyon to a line drawn between Point Sublime and Mescalero Point,
6. 8,000 feet MSL from a line drawn between Point Sublime and Mescalero Point west to Kanab Creek/Mt. Akaba,
7. 6,500 feet MSL from Kanab Creek/Mt. Akaba to Whitmore Wash,
8. 4,500 feet MSL from Whitmore Wash to Mollies Nipple, and
9. 6,500 feet MSL from Mollies Nipple to the westernmost boundary of the park at the Grand Wash Cliffs.

For the purposes of these alternatives, "2,000 feet above rim level" is defined by MSL elevations by adding 2,000 feet to the definitions of "rim level" above except for the following: 1) 11,000 feet MSL for a two mile radius around Point Imperial and a corresponding four mile wide strip from Point Imperial to the North Rim Entrance Station at the park boundary, and 2) 10,000 feet MSL over the Uinkaret Mountains including Mt. Emma (see Map 4).

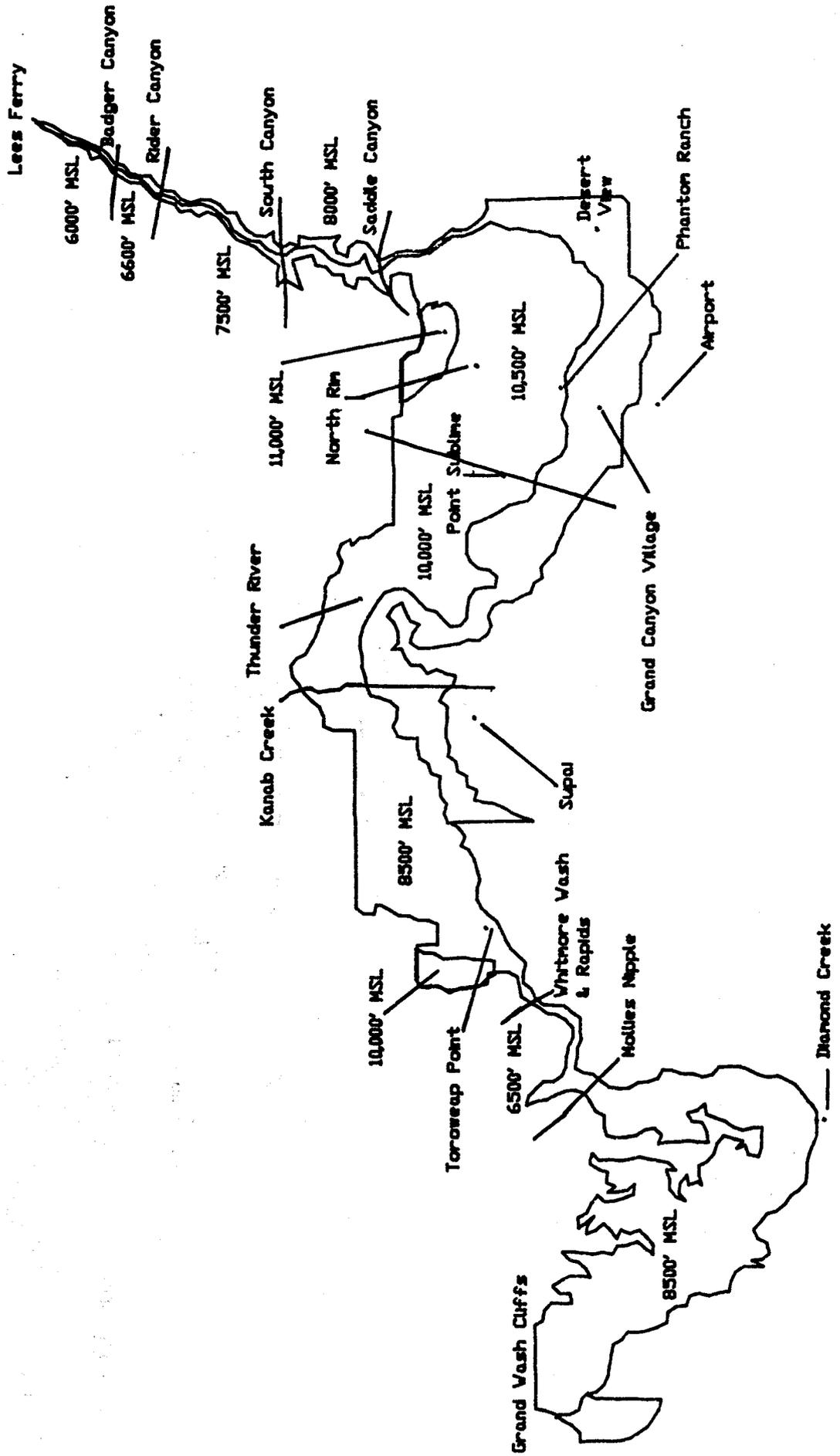
For the purposes of these alternatives, the "Inner Gorge" is defined as that part of the Grand Canyon which is below the following MSL elevations (see Map 5):

1. 4,000 feet MSL from Lees Ferry to Badger Canyon,
2. 4,600 feet MSL from Badger Canyon to Rider Canyon,
3. 5,500 feet MSL from Rider Canyon to South Canyon,
4. 6,000 feet MSL from South Canyon to Saddle Canyon,
5. 4,500 feet MSL from Saddle Canyon to the Little Colorado River confluence,
6. 4,000 feet MSL from the Little Colorado River confluence to Royal Arch Creek (Elves Chasm),
7. 4,500 feet MSL from Royal Arch Creek (Elves Chasm) to Deer Creek,
8. 4,000 feet MSL from Deer Creek to Whitmore Wash and Rapids, and
9. 3,000 feet MSL from Whitmore Wash and Rapids to the westernmost boundary of the park at the Grand Wash Cliffs.

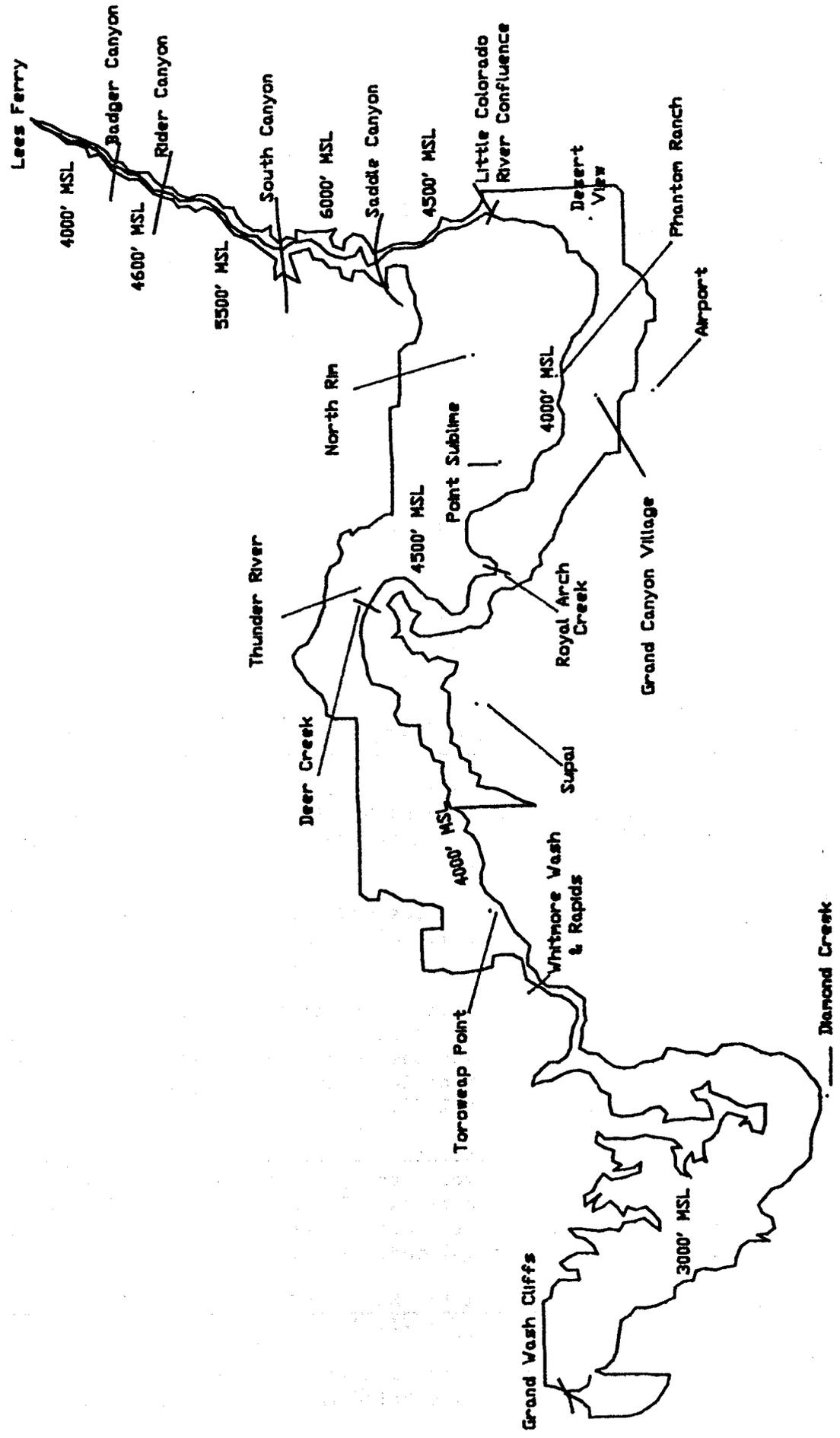
Rim Level - Definition



2000 Feet Above Rim Level - Definition



Inner Gorge - Definition



D. ALTERNATIVES

Alternative 1: NO ACTION

The No Action Alternative is defined to be the status quo as of May 1986. No Action is essentially defined by the Affected Environment Section of this Environmental Assessment with the addition of the Actions Common To All Alternatives Section described above.

Alternative 2: 2,000 FEET ABOVE THE RIM

Except as specifically authorized by the Superintendent, no flights would be allowed lower than 2,000 feet above rim level, as shown on Map 4.

Alternative 3: NO FLIGHTS IN INNER GORGE PLUS FLIGHT-FREE AREAS

Except as specifically authorized by the Superintendent, no flights would be allowed in the Inner Gorge, as shown on Map 5.

Flight-free areas would be established as follows (see Map 6):

- Thunder River/Deer Creek,
- Toroweap, and
- Developed Areas.

Alternative 4: NO FLIGHTS WITHIN 1,500 FEET OF LANDFORMS PLUS FLIGHT-FREE AREAS WITH QUIET AIRCRAFT INCENTIVES

Except as specifically authorized by the Superintendent, no flights would be allowed within 1,500 feet of all landforms and no flights would be allowed in the Inner Gorge. Landforms would include all land and water surfaces in the park whether horizontal or vertical.

Flight-free areas would include those areas described in Alternative 3, with the addition of Hermit Creek to Kaibab Trail to North Rim (see Map 7).

Aircraft certified as meeting Noise Level Standard #1 would be allowed to fly no lower than rim level in the following flight-free areas: Toroweap, Thunder River/Deer Creek, and that part of Hermit Creek to Kaibab Trail to North Rim which is greater than 1 mile north of the Colorado River from October 1 to April 30.

Aircraft certified as meeting Noise Level Standard #2 would be allowed to fly no lower than 1,000 feet below rim level year round in the following flight-free areas: Toroweap, Thunder River/Deer Creek, and that part of Hermit Creek to Kaibab Trail to North Rim which is greater than 1 mile north of the Colorado River.

Alternative 5: NO FLIGHTS BELOW RIM LEVEL PLUS FLIGHT-FREE AREAS WITH QUIET AIRCRAFT INCENTIVES

Except as specifically authorized by the Superintendent, no flights would be allowed below rim level, as shown on Map 3.

Permanent flight-free areas would be established as follows (see Map 8):

- Thunder River/Deer Creek,
- Toroweap,
- Boucher to Red Canyon to North Rim (including Clear Creek and Shiva Saddle), and
- Developed areas.

Seasonal flight-free areas would be established as follows (see Map 8):

- Nankoweap to Red Canyon and South Bass to Boucher (no flights from October 1 to April 30), and
- Kanab Creek and Tuckup (no flights from October 1 to April 30).

Aircraft certified as meeting Noise Level Standard #1 would be allowed to fly no lower than 2,000 feet above rim level in the following flight-free areas: Thunder River/Deer Creek, Toroweap, Kanab Creek, and those parts of South Bass to Boucher and Nankoweap to Red Canyon which are north of the Colorado River from October 1 to April 30.

Aircraft which are certified as meeting Noise Level Standard #2 would be allowed to fly no lower than rim level in the following flight-free areas: Thunder River/Deer Creek, Toroweap, Kanab Creek, Tuckup, South Bass to Boucher, and Nankoweap to Red Canyon.

An ad hoc advisory group would be established to monitor plan implementation and identify potential changes which may be necessary or desirable. This advisory group would provide input to the Superintendent.

Alternative 6: 2,000 FEET ABOVE RIM LEVEL PLUS FLIGHT-FREE AREAS

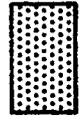
Except as specifically authorized by the Superintendent, no flights would be allowed lower than 2,000 feet above rim level, as shown on Map 4.

Flight-free areas would be the same as in Alternative 5 (see Map 8).

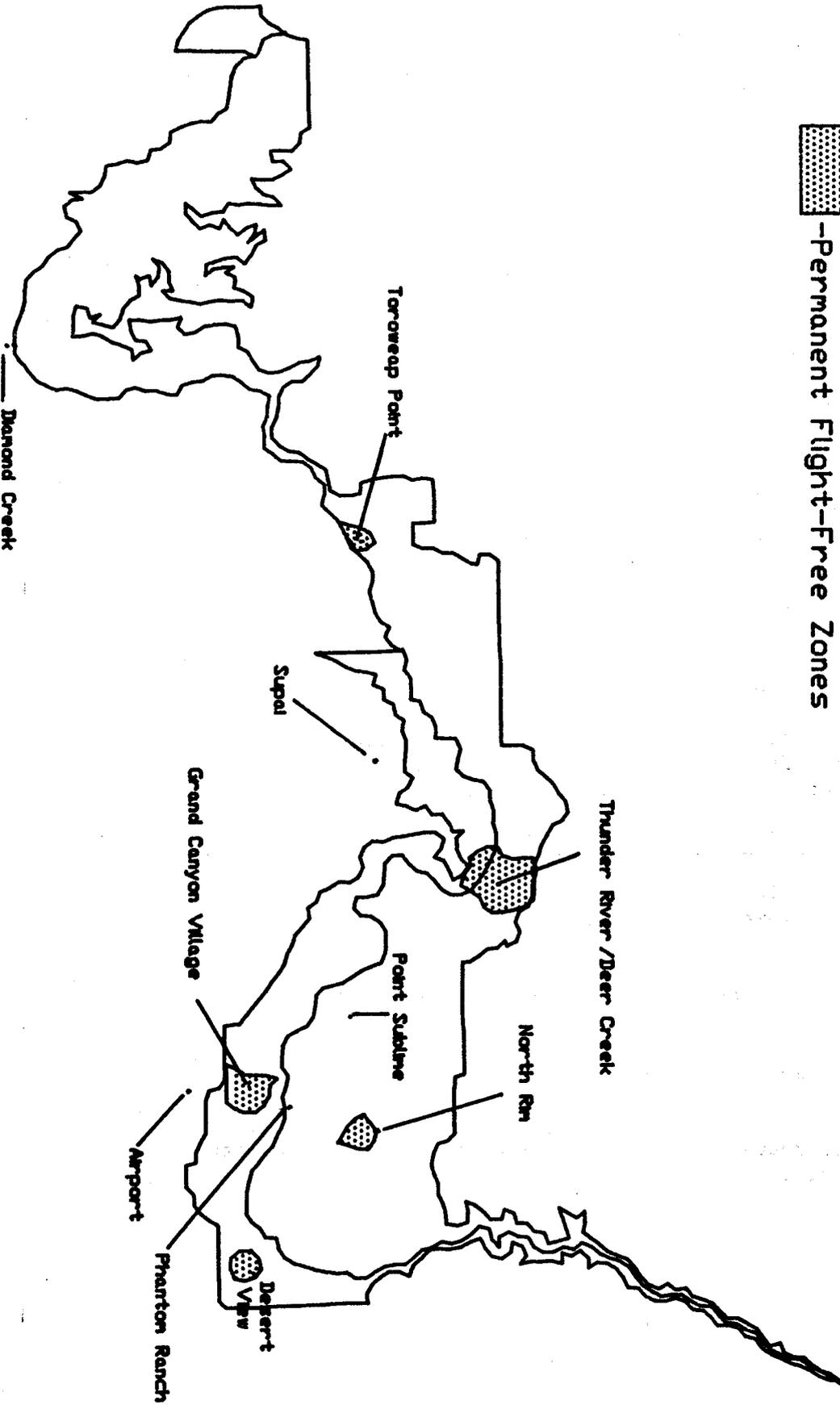
An ad hoc advisory group would be established the same as in Alternative 5.

The NPS would request the FAA to shift East-West high altitude jet routes away from the park.

Alternative #3 Map

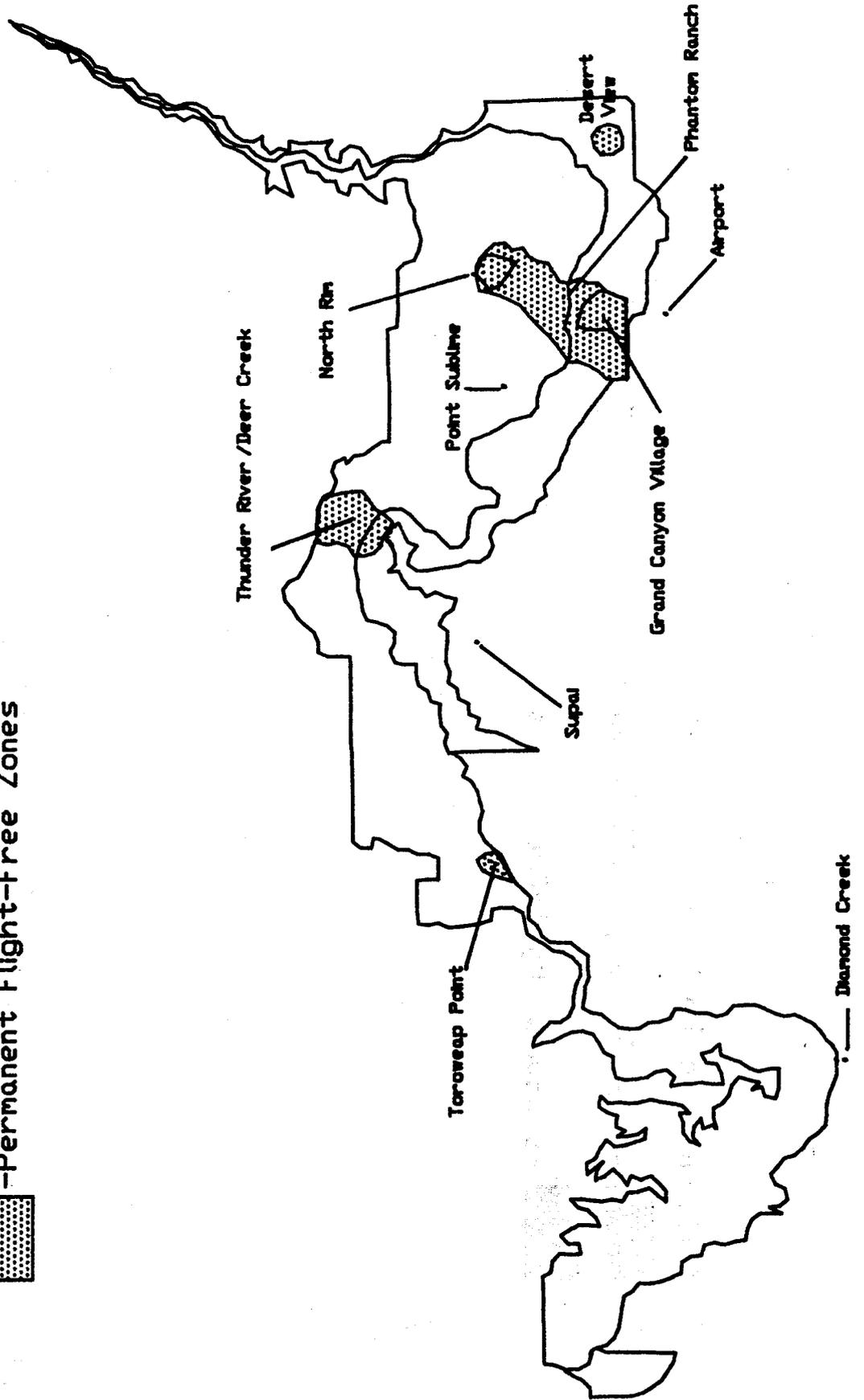
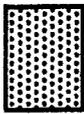


-Permanent Flight-Free Zones



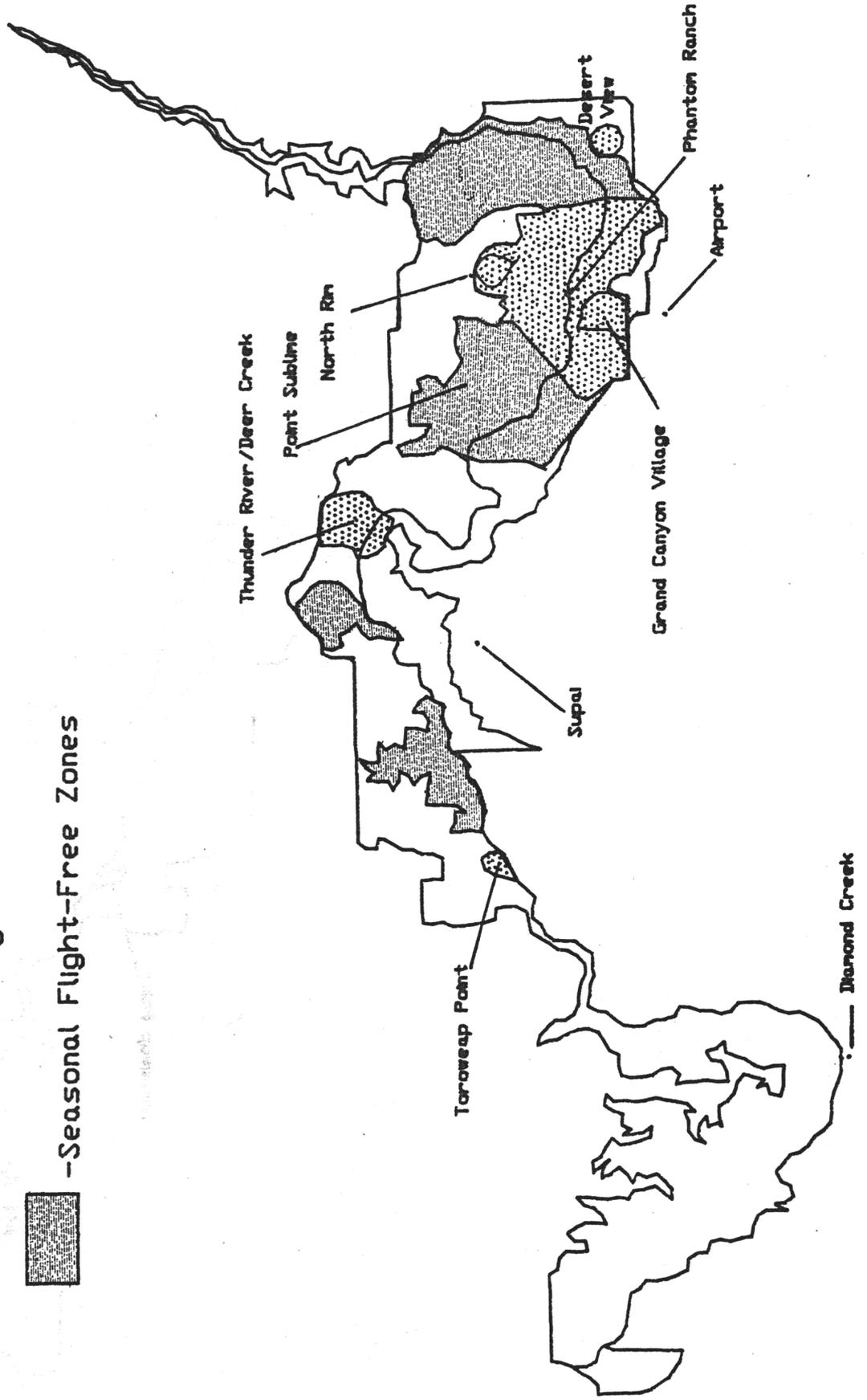
Alternative #4 Map

-Permanent Flight-Free Zones



Alternatives #5 & #6 Map

-  -Permanent Flight-Free Zones
-  -Seasonal Flight-Free Zones



IV. ACTIONS WHICH WERE CONSIDERED THEN DELETED FROM THE PLANNING PROCESS

A. Eliminate Hikers or Other Visitors and Camping or Other Facilities From Conflict Areas as an Alternative to Eliminating Aircraft

It was suggested that if elimination of aircraft from certain areas was being considered, then elimination of hikers and other visitors who may object to aircraft flying overhead should also be considered. This was considered, then deleted because it would not be necessary to eliminate visitors from the ground to reduce or eliminate conflicts. Visitors could be informed that they would see and hear aircraft in certain areas, and advised not to visit those areas if they felt that aircraft would conflict with their goals or values. Alternative areas could be suggested. In this way, people could still visit an area on the ground even though they would hear aircraft and may consider that a conflict with their values or goals.

B. Designate One Helicopter Landing Spot in the Park, and Restrict All Helicopter Use Over the Park to Transporting Passengers To and From That Landing Spot

Landing in the canyon is the most popular request received by helicopter tour companies. Phantom Ranch is the most requested place for landing. Special permission from the Superintendent is required before anyone can land in the park. The suggestion was made that air tour companies could make a business solely out of landing in the canyon at one or more designated sites, and that other helicopter tour flights could be eliminated as a trade-off. Such a service would satisfy the desires of a large number of visitors who want a quicker and/or less strenuous way of getting to and from the bottom of the canyon rather than hiking, riding a mule, or floating down the river.

NPS has consistently opposed such actions because of the extensive impacts which would be likely to occur in the general vicinity of a landing area and the danger of such a precedent. Opening up the backcountry to a large new influx of people would require substantial visitor-related development in the backcountry at the designated landing area, resulting in unacceptable impacts.

C. Establish a Maximum Number of Flights

Limiting the number of flights over the park would limit the impacts and safety concerns associated with overflights. It would also encourage the use of larger aircraft so that the same number of passengers could be carried on fewer flights.

There appears to be no feasible way to implement this action. Limiting numbers of flights over any area would require a control facility with radar to enforce the limits. There is no precedent for such limits and control over an area the size of GCNP, or for any location other than arrival and departure patterns for major airports. Several control facilities with radar would be necessary to control airspace over the almost 300 mile length of GCNP. Congressional action would be necessary to provide the legal basis as well as the funding needed to construct and operate such control facilities. These items in combination are not feasible at this time.

D. Eliminate All Aircraft Flights Over the Park

After detailed analysis of research data collected over the past 15 years, relevant laws, regulations, policies, and public input collected over the last 2 years, the NPS has determined that total elimination of aircraft flights over the park is not a reasonable alternative.

As previously mentioned, key legislative provisions directing this review of the aircraft overflight issue have included the NPS Organic Act (as amended) and the GCNP Enlargement Act. While the NPS Organic Act establishes the priority of resource preservation over visitor use, it clearly provides for visitor use where consistent with the resource preservation goals. Similarly, the GCNP Enlargement Act requires the NPS to respond if a "significant adverse effect on the natural quiet and experience of the park" is determined, but does not prescribe total elimination as the required response. Congressional direction expressed through the GCNP Enlargement Act allows continuation of aircraft use provided there is no significant adverse effect to park resources. Had Congress considered total elimination as the appropriate remedy to address this issue, such a solution would have been identified prior to the passage of the Act since aircraft use was already well-established.

The NPS has determined that viewing the park from the air (and traveling to the park via aircraft) are important aspects of a park experience for many visitors which have continued for almost 60 years. This was confirmed during the 1985 public review process, when many persons expressed the positive impact of flying over the park on their appreciation for the park.

Additionally, aircraft serve as an important tool in the management of a complex and heavily visited park such as GCNP. The need to respond to medical emergencies, conduct search and rescue activities, and support maintenance of facilities below rim level all necessitate periodic use of a helicopter.

Through the course of this planning process, a number of different actions have been considered for the management of aircraft use (e.g. closures, permit systems). To some persons, any form of restriction constitutes a ban. In that sense, the NPS does intend to pursue some action or constraint to address the existing impacts. The alternative actions as presented in this Environmental Assessment meet the legislative mandate of protecting park resources from aircraft overflight impacts to varying degrees. The final Aircraft Management Plan to be developed based on these alternatives would mitigate any "significant adverse effect," yet provide for continued opportunities for aircraft overflights.

E. Establish Hourly/Daily Restrictions on When Flights Occur

Further consideration of this alternative was deleted because this action would be ineffective in addressing the overall issue of noise impacts and difficult to administer. If implemented, there would still be time periods when aircraft would be heard. Also, due to the concentration of aircraft within certain flight times, some persons on the ground may perceive even more impact than if the same number of aircraft were distributed over a longer period of time. The relatively short duration of hourly/daily aircraft-free time periods would be unlikely to eliminate aircraft impacts

from most backcountry trips, yet could greatly impact persons desiring aircraft tours who are on a relatively short time frame for their visit.

It would also be difficult to inform all pilots, and especially difficult to administer due to confusion created because all of Arizona except the Navajo Reservation adjacent to GCNP is on Mountain Standard Time all year.

F. Eliminate Military Training Routes Over the Park

Eliminating military training routes would not result in a significant reduction in impacts from overflights within the park. The greatest concern about military overflights is from military sightseeing activities which are being addressed by these alternatives. While elimination of the training routes would reduce the possibility of mid-air collisions between military and other aircraft in the training routes over the park, it would relocate this potential conflict elsewhere. Additionally, since these training routes are well known by most pilots (as well as being indicated on aeronautical charts) it is felt that these routes do not represent a significant safety hazard. A greater safety hazard is presented by military aircraft flying at high speeds outside the designated training routes below the rims of the canyon. The military is currently considering raising the level of the two training routes to a higher elevation over the park.

G. Encourage More Aircraft Flights Over the Park

Based on a continuation of existing patterns of aircraft use, this alternative would increase the concerns and adverse effects associated with overflights. Therefore, encouraging more flights over the park would contradict laws and policies regarding protection of park resources. In addition, by policy, NPS does not promote one form of commercial transportation for sightseeing purposes over another (NPS Guidelines #48).

V. IMPACTS

A. ALTERNATIVE 1: NO ACTION

1. General Impacts: No Action

Because the No Action Alternative actually represents the status quo and includes the "Actions Common to All Alternatives", the impacts of this alternative are less than if absolutely no action were to be taken regarding this issue. In fact, some actions have already been taken over the years in an attempt to mitigate potential problems of aircraft overflights (e.g. 1972 Tri-State Flight Operators Agreement, FAA Advisory Circulars, shifting of air tour routes in places, air tour operators switching to larger, quieter aircraft, and meetings). The Actions Common To All Alternatives are essentially an extension of these previous efforts.

Despite the actions taken over the years, the park recently determined that aircraft activity is causing a significant adverse effect on the natural quiet and experience of the park, and that it may also be likely to cause an injury to the health, welfare, or safety of visitors. These adverse effects would continue under this alternative.

There would be no areas in the park free of aircraft flights or noise under this alternative.

2. Impacts to Flight Operations: No Action

No Action would be a distinct non-endorsement of FAA Advisory Circular 91-36C which requests pilots to maintain an altitude no lower than 2,000 feet above the uppermost rim of the canyon. Therefore, many pilots would probably choose to ignore the request, although the education/information programs proposed for all alternatives would insure the opportunity for pilots to be made aware of it. The advisory request may even be withdrawn by the FAA due to lack of endorsement by the NPS if the No Action alternative is selected.

Existing overflight patterns would continue influenced only by market forces or other factors without input from the NPS.

3. Impacts to Natural and Cultural Resources: No Action

If aircraft are currently impacting wildlife, those impacts would continue.

No short-term impacts would occur to cultural resources due to overflights. Long-term impacts are possible only at the Point Sublime site as discussed in the Affected Environment section.

4. Impacts to Natural Quiet and Visitor Experience: No Action

Aircraft activity would continue to cause a significant adverse effect on the natural quiet and experience of the park. Aircraft would continue to be seen and heard well below the rims of the canyon virtually

anywhere in the park. High-altitude jets would also continue to be seen and heard over the park.

Due to the Actions Common To All Alternatives, a slight reduction would be expected in the number of backcountry visitors expressing dissatisfaction with aircraft impacting their experience. However, aircraft noise would continue to be a primary source of visitor complaints, with fifty to seventy percent of backcountry users continuing to express dissatisfaction regarding aircraft noise impacts and a sense of intrusion on their experience (especially those seeking natural quiet or a wilderness experience).

Some aircraft would continue to fly very low in the canyon, so that safety in the narrow Inner Gorge would continue to be a concern.

Air tour passengers would be able to view the entire park from the air, and have a "below the rim" or "inner canyon" experience which many air tour operators feel is very important to passenger enjoyment.

Detection of emergency messages and fires from the ground will not be affected.

5. Socioeconomic Impacts: No Action

There would be no incentives for manufacturing or buying quieter aircraft technology under this alternative.

Because existing overflight patterns would continue, there would be no socioeconomic impacts to air tour operators, passengers, communities, or related businesses.

B. ALTERNATIVE 2: 2,000 FEET ABOVE RIM LEVEL

1. General Impacts: Alternative 2

This alternative would essentially be an endorsement of FAA Advisory Circular 91-36C which requests all pilots to fly no lower than 2,000 feet above the uppermost rim of canyons or valleys or 2,000 feet above the highest point within 2,000 feet laterally of the route of flight in national park areas. As a request, this action already applies to all national park areas. This alternative differs from the existing advisory request, which is generally not complied with by pilots over GCNP, in that (1) compliance with the minimum altitude would be fully achieved through implementation of this alternative, and (2) because 2,000 feet above rim level would be defined in terms of MSL elevations. Selection of this alternative would provide a basis for a consistent approach to the aircraft overflight issue throughout the National Park System.

Although this alternative already applies as a request nationwide, it was not designed to address the unique conditions at Grand Canyon.

2. Impacts to Flight Operations: Alternative 2

It would be difficult for ground observers to monitor compliance with the 2,000 feet above rim level minimum altitude due to the difficulty of determining that altitude from the ground.

This alternative would establish a minimum altitude at or above 10,000 feet MSL over approximately 50 percent of the park. FAR 135.89 requires air taxi and commercial pilots to use oxygen for flights over 30 minutes duration over 10,000 feet MSL. Most tour aircraft already have this capability or could attain it easily and inexpensively. Also, most areas of the park where the 2,000 feet minimum altitude causes an aircraft to fly above 10,000 feet MSL can be easily traversed in less than 30 minutes.

Aircraft would tend to concentrate near the minimum altitudes, increasing the danger of mid-air collisions. Confusion would continue over application of the hemispherical rule (FAR 91.109) to flying over the canyon. Pilots would want to fly as close to the minimum altitude as possible; however, under visual flight rules and 3,000 feet above ground level, east and west bound aircraft are required to be at different altitudes (e.g. west bound at 10,500 and east bound at 11,500 feet MSL). This would be further complicated when flying over some rim areas, high mesas or buttes, where aircraft would only be 2,000 feet above ground level and this rule would not apply. Special procedures would be needed to deal with this confusion.

Existing flight patterns would change. Some aircraft would have to detour around high elevations when the 2,000 feet minimum causes the minimum altitude to be above the service ceiling of the aircraft. To the extent that pilots try to take an aircraft above its service ceiling, safety would be decreased.

Improved safety would result because pilots flying at higher altitudes have a greater opportunity to take corrective action if a problem arises, such as engine failure.

Those parts of the Grand Canyon which are not in the park (e.g. Kanab Creek, Parashant and Whitmore Canyons, and parts of the Hualapai and Havasupai Indian Reservations) would experience more overflights as some transportation and tour flights detour out of the park to avoid high minimum altitudes, causing increased impacts to those areas.

Low cloud ceilings coupled with the minimum altitude may affect the ability of pilots to conduct tours, although transportation flights would be unaffected.

The military training routes over the park would be affected if the minimum altitudes applied to them also, possibly affecting some of the training value of the routes.

3. Impacts to Natural and Cultural Resources: Alternative 2

No impacts would occur to wildlife or cultural resources.

4. Impacts To Natural Quiet and Visitor Experience: Alternative 2

Aircraft activity would continue to cause a significant adverse effect on the natural quiet and experience of the park. There would be no

designated quiet areas in the park under this alternative, so aircraft could be heard throughout the park. Although the intensity (or loudness) of aircraft sound heard on the ground decreases as aircraft fly higher above the ground, the area on the ground and the amount of time aircraft are heard becomes greater. This is a trade-off which is not quantifiable due to the large number of variables involved (including the aircraft, the listener, the terrain, and atmospheric conditions). However, several persons during the fall 1985 public review period reported being disturbed by the sight and sound of commercial jets above 30,000 feet MSL over the park. Thus, the beneficial effects of high altitude in reducing sound intensity would be counter-balanced by the adverse effects of hearing aircraft over more area more often.

Due to the "Actions Common To All Alternatives" and the decreased noise intensity resulting from higher aircraft altitudes, a reduction in the number of backcountry visitors expressing dissatisfaction with aircraft impacting their experience would be expected. However, aircraft noise would continue to be a primary source of visitor complaints, and a majority of backcountry users would continue to express dissatisfaction regarding aircraft noise impacts on their experience (especially those seeking natural quiet or a wilderness experience).

Aircraft are easier to see against a background of sky than against a background of canyon walls, so that requiring all aircraft to fly above the canyon would cause persons on the rims to see more aircraft than if aircraft were flying lower. This is somewhat mitigated by the fact that two 1983 surveys reported that less than 20 percent of rim visitors were dissatisfied with aircraft activity at that time.

Air tour passengers would have no opportunity for a "below the rim" or "inner canyon" experience. Compared to lower level flights, air tour operators feel that flights 2,000 feet above rim level would be much less exciting, less intimate (fewer details, less of a sense of exploring otherwise inaccessible territory), and less satisfying (closer to the experience persons get from the rim overlooks without paying for a flight). Other people feel that flights are very satisfying at that altitude, and that the "big picture" or overall spatial relationships of the Grand Canyon area are more apparent from higher altitudes. To the extent that either viewpoint prevails, the number of passengers and/or the type of people who become passengers may be affected.

Visitor experience would be enhanced on the ground and the river in the Inner Gorge in the west end of the park where aircraft have historically flown very low. High-altitude jets could still be seen and heard over the park.

Pilots would still be able to detect emergency mirror flashes, radio messages, and fires from anywhere in the park.

5. Socioeconomic Impacts: Alternative 2

There would be no incentives for quieter aircraft technology or operating procedures.

Helicopter companies feel that they could not compete economically with fixed-wing companies at the 2,000 feet minimum altitude, so could go out of business. Some fixed-wing companies feel that they could also go out of business due to a lack of demand by passengers. To the extent that this occurs, the economies of several communities and the viability of a portion of the travel and tour industry in the southwest could be adversely affected. Differing opinions exist among persons within and outside the air tour and travel industries as to the severity of these impacts. At a minimum, major advertising, tour narration, and brochure changes would be required.

Since "below the rim" is a major feature of current air tour advertising, changes in that advertising would be necessary to positively influence expectations and satisfaction of passengers concerning the 2,000 feet limitation. Because of advance booking commitments and advertising lead times, air tour operators report that such changes usually require a 2- to 3-year lead time to take effect.

The NPS and/or the FAA would incur costs in monitoring and administering the closure of airspace, even if it was a voluntary closure. There would be substantial resistance among the aviation community to locking up airspace because they feel that a substantial part of the country has already been restricted from flying.

C. ALTERNATIVE 3: NO FLIGHTS IN INNER GORGE PLUS FLIGHT-FREE AREAS

1. General Impacts: Alternative 3

Areas outside the Inner Gorge and flight-free areas would continue to receive similar impacts to what they are receiving now.

Approximately 34,000 acres, or 3 percent, of the park would be included in flight-free areas under Alternative 3.

2. Impacts to Flight Operations: Alternative 3

According to the agency responsible for the safety of Department of the Interior aircraft (OAS), flights in the Inner Gorge are a safety concern due to the narrow, winding nature of the gorge and the hazards it presents (primarily the inability to see oncoming aircraft or obstacles such as cables far enough in advance to take action to avoid them). Emergency and administrative flights on official business must fly in the gorge. In many parts of the gorge, the only way for one aircraft to avoid colliding with an oncoming aircraft is by luck or to know that the aircraft is coming and for both to agree ahead of time on the evasive action to take. Alternative 3 will increase safety for the few emergency and administrative flights which may be approved by the Superintendent to fly in the Inner Gorge. In addition, pilots flying above the Inner Gorge would have a greater opportunity to take corrective action in the event of a problem such as engine failure.

Only flights specifically authorized by the Superintendent would be allowed in the Inner Gorge. Many air tour operators flying in the park west of Diamond Creek feel a need to fly well below the elevation which is

defined in this document to be the top of the Inner Gorge. Other transportation/tour routes would be unaffected.

In some areas, especially west of Diamond Creek, there would be a concentration of flights just above the Inner Gorge altitude. This would decrease safety in those areas.

3. Impacts to Natural and Cultural Resources: Alternative 3

If impacts are now occurring to wildlife due to current aircraft activity, they will continue or increase in magnitude outside the Inner Gorge and flight-free areas. Aircraft could fly very close to many landforms in the canyon under this alternative, which would not be in compliance with the recommendations received from the U.S. Fish and Wildlife Service concerning the endangered peregrine falcon.

There would be no short-term impacts to cultural resources. Long-term impacts could occur only at the Point Sublime Anasazi site, if such impacts occur in the park at all.

4. Impacts To Natural Quiet and Visitor Experience: Alternative 3

In areas where flying is allowed, there would continue to be a significant adverse effect on the natural quiet and experience of the park aggravated by a compression of available airspace and the resulting concentration of aircraft.

Some preferred areas for aerial viewing could no longer be seen from the air (e.g. Thunder River and Deer Creek Falls) because they occur within flight-free areas. Aircraft would have to detour over or around those areas. However, most of the park could still be seen from the air.

Approximately 27 percent of backcountry overnight permits are issued for areas included in flight-free areas. Developed areas and all of the Colorado River are also included in flight-free areas and in the Inner Gorge. Visitor experience would be enhanced on the ground in these areas, especially in the west end of the park where aircraft have historically flown very low. Outside those areas, there would be little or no change in impacts to the visitor experience due to aircraft. Visitors would continue to see and hear aircraft flying low in the canyon. A majority of visitors who have taken the time and effort to travel to remote sections of the park would continue to feel that aircraft passing close by detract from their experience. Some visitors would continue to feel a sense of intrusion from aircraft flying fairly close to them.

Aircraft would be allowed to fly quite low outside the flight-free areas and Inner Gorge and could still be seen and heard to some extent inside those areas. High-altitude jets would still be seen and heard over the park.

Pilots could still detect emergency mirror flashes, radio messages, and fires from all areas of the park.

5. Socioeconomic Impacts: Alternative 3

Several air tour operators, primarily those who fly in the west end of the park, feel that their passengers' experience is significantly enhanced by flying in parts of the Inner Gorge. They feel that many persons would not take tour flights in the west end without being able to enjoy that experience. Other people feel unsafe flying in the Inner Gorge and would prefer higher flights. To the extent that either viewpoint prevails, the number and/or type of people who become passengers may be affected. At a minimum, air tour operators who fly low in the west end would have to change their tour routes, narration, brochures, and advertising. The demand for tours and the routes in the rest of the park would be unaffected.

There would be no incentives for quieter aircraft technology and improved operating procedures.

The FAA and/or the NPS will incur management responsibilities and costs for monitoring and implementation.

D. ALTERNATIVE 4: NO FLIGHTS WITHIN 1,500 FEET OF LANDFORMS PLUS FLIGHT-FREE AREAS WITH QUIET AIRCRAFT INCENTIVES

1. General Impacts: Alternative 4

Approximately 76,000 acres, or approximately 6 percent, of the park would be included in flight-free areas under Alternative 4. This would decrease the area affected by aircraft noise compared to Alternatives 1, 2, and 3.

To the extent that aircraft owners and manufacturers take advantage of the incentives for quiet aircraft technology, the noise standards would tend to lower the amount of noise produced by aircraft throughout the park.

2. Impacts to Flight Operations: Alternative 4

According to the agency responsible for the safety of Department of the Interior aircraft (OAS), flights in the Inner Gorge are a safety concern due to the narrow, winding nature of the gorge and the hazards it presents (primarily the inability to see oncoming aircraft or obstacles such as cables far enough in advance to take action to avoid them). Emergency and administrative flights on official business must fly in the gorge. In many parts of the gorge, the only way for one aircraft to avoid colliding with an oncoming aircraft is by luck or to know that the aircraft is coming and for both to agree ahead of time on the evasive action to take. Not allowing flights in the Inner Gorge will increase safety for the few emergency and administrative flights which may be approved by the Superintendent to fly there. Pilots flying above the Inner Gorge would also have a greater opportunity to take corrective action in the event of a problem such as engine failure.

Only flights specifically authorized by the Superintendent would be allowed in the Inner Gorge and flight-free areas. Many air tour operators flying in the park west of Diamond Creek feel a need to fly well below

the elevation which is defined to be the top of the Inner Gorge in this document.

The Hermit Creek to Kaibab Trail to North Rim flight-free area would cause significant changes in transportation and tour routes. It would effectively be a wall which most aircraft would have to detour around. Many east-west transients would avoid a much larger area around that flight-free area because of the wall effect.

Some narrow "passes," such as Confucius and Mescalero Gaps, could no longer be flown through due to the 1,500 feet limitation. This would increase the length of some tour routes. The Point Sublime ruins would not be able to be viewed at the currently normal 300 to 600 feet distance. Although the ruins could still be seen from 1,500 feet away, this could adversely impact the experience of the passengers on the ruins tour.

In some areas, especially west of Diamond Creek, there would be a concentration of flights just above the Inner Gorge altitude. The 1,500 feet limitation would also narrow the canyon in some areas so that bottlenecks would be created. Both of these effects would increase the possibility for mid-air collisions.

Flying higher and further away from the canyon walls would increase safety by allowing more time and opportunities to take corrective action in the event of a problem, such as engine failure. It would also place pilots in more open airspace where they would have more opportunities to see (and be seen) and avoid potential danger.

3. Impacts To Natural and Cultural Resources: Alternative 4

This alternative would mitigate potential impacts to the endangered peregrine falcon since it complies with the recommendations of the U.S. Fish and Wildlife Service. Potential impacts to other wildlife species would also be mitigated due to the prohibition of flights within 1,500 feet of all landforms. However, this prohibition would be difficult to monitor and enforce.

No impacts are expected to cultural resources in any part of the park. Aircraft would be far enough away from the Point Sublime ruins so that long-term impacts could not occur.

4. Impacts To Natural Quiet and Visitor Experience: Alternative 4

In areas where flying is allowed, there would continue to be a significant adverse effect on the natural quiet and experience of the park aggravated by a compression of available airspace and the resulting concentration of aircraft. However, natural quiet would predominate in flight-free areas.

Some preferred areas for aerial viewing could no longer be seen from the air (e.g. Thunder River, Deer Creek Falls, Phantom Ranch) because they occur within flight-free areas. Aircraft would have to detour over or around those areas. However, most of the park could still be seen from the air.

Approximately 56 percent of backcountry overnight permits are issued for areas included in flight-free areas. Developed areas and all of the Colorado River are also included in flight-free areas and in the Inner Gorge. Visitor experience would be enhanced on the ground in these areas, especially in the west end of the park where aircraft have historically flown very low. Outside those areas, there would be little or no change in impacts to the visitor experience due to aircraft. Visitors would continue to see and hear aircraft flying low in the canyon. Some visitors who have taken the time and effort to travel to remote sections of the park would continue to feel that aircraft passing by detract from their experience. Some visitors would continue to feel a sense of intrusion from aircraft flying as close as 1,500 feet from them.

Visitors could still view most of the canyon from the air, although parts of the flight-free areas may no longer be visible.

Aircraft would be allowed to fly quite low outside the flight-free areas and Inner Gorge so that aircraft would still be seen and heard to some extent inside those areas. High-altitude jets would still be seen and heard over the park.

Pilots could still detect emergency mirror flashes, radio messages, and fires from all areas of the park.

Air tour passengers would not have the opportunity to get very close to canyon features due to the 1,500 feet from landforms restriction, or to fly within the Inner Gorge.

5. Socioeconomic Impacts: Alternative 4

Many air tour operators feel that flights would be less exciting, less intimate, and less satisfying under these conditions. Because of this, they feel that fewer passengers would want to take an air tour, which would create economic impacts.

Noise standards would encourage investment in new equipment, causing possible higher operating costs to air tour operators and higher ticket prices for passengers. Due to the flight-free areas, some routes would require longer flying times which would result in increased costs to passengers. Tour routes currently passing through the Hermit Creek to Kaibab Trail to North Rim flight-free area would have to significantly reroute. Tours would also probably have to spend more time over the rim getting to and from the canyon, which would decrease time available for viewing the canyon.

Companies which could not afford quieter technology would eventually find it difficult to compete with companies which did invest in the technology, and could go out of business.

Helicopter companies would be adversely impacted by not being able to fly close to the Point Sublime ruins, but would still be able to show the ruins to passengers. Some changes in advertising and tour narration would be necessary.

The NPS and/or the FAA would incur costs in monitoring and administering the closure of airspace, even if it was a voluntary closure. There would be substantial resistance among the aviation community to locking up airspace.

E. ALTERNATIVE 5: NO FLIGHTS BELOW RIM LEVEL PLUS FLIGHT-FREE AREAS WITH QUIET AIRCRAFT INCENTIVES

1. General Impacts: Alternative 5

To the extent that aircraft owners and manufacturers take advantage of the incentives for quiet aircraft technology, the noise standards would tend to lower the amount of noise produced by aircraft throughout the park.

An advisory group would increase communications between interested parties, which would increase the effectiveness of implementation.

Approximately 139,000 acres, or 12 percent, of the park would be included in permanent flight-free areas, and approximately 216,000 acres, or 18 percent, of the park would be included in seasonal flight-free areas under Alternative 5. This would decrease the area affected by aircraft noise compared to Alternatives 1 through 4.

2. Impacts to Flight Operations: Alternative 5

Only flights specifically authorized by the Superintendent would be allowed in flight-free areas and airspace below rim level. Major detours in flight routes would be necessary to detour around or over these areas.

Tour/transportation routes would detour out of the park more. To the extent that this occurs, impacts would be transferred from the park to adjoining areas.

Many currently popular areas would no longer be available for aerial viewing (e.g. Point Sublime ruins and "Snoopy" in addition to those mentioned for Alternative 4). No areas in the park would be available for close-up or low level aerial viewing, although 70 to 88 percent of the park could still be viewed from above rim level, especially if aircraft meet the noise level standards.

Available airspace would be compressed horizontally and vertically. Flights would tend to concentrate at rim level outside flight-free areas to get passengers as close as possible to canyon features. The possibility of mid-air collisions would increase in these areas.

Pilots flying at higher altitudes would have more time and opportunities to take corrective action if a problem arises, such as engine failure. Aircraft would also be flying in more open airspace where pilots would have more opportunities to see (and be seen) and avoid potential danger.

Due to the large flight-free areas, pilots would have less flexibility to avoid weather hazards or take other factors such as cloud ceiling into account in flight planning.

3. Impacts To Natural and Cultural Resources: Alternative 5

Impacts to wildlife below rim level would be mitigated. Aircraft could continue to fly low over the rim areas; however, wildlife species of concern occur almost exclusively below rim level.

No short-term or long-term impacts would occur to cultural resources due to overflights.

4. Impacts to Natural Quiet and Visitor Experience: Alternative 5

Approximately 96 percent of backcountry overnight permits are issued for areas included in flight-free areas. Most of the park would be included in flight-free areas and below rim level. Visitor experience would be enhanced on the ground in these areas. Visitors would not see and hear aircraft flying low in the canyon.

Seasonal flight-free areas would target the closure to times when the majority of backcountry use is taking place in those areas. This would maximize positive impacts to backcountry users while minimizing impacts to aircraft operators.

There would be more opportunities for visitors to experience natural quiet and a wilderness experience free of man-made influences than in Alternatives 1 through 4 (the flight-free areas would increase these opportunities over Alternative 2). There would not be a significant adverse effect on the natural quiet and experience of any part of the park.

Aircraft are easier to see against a background of sky than against a background of canyon walls, so that requiring all aircraft to fly above rim level could cause persons on the rims outside the flight-free areas to see more aircraft than if aircraft were flying lower. This is somewhat mitigated by the fact that two 1983 surveys reported that less than 20 percent of rim visitors were dissatisfied with aircraft activity at that time.

Air tour passengers would have no opportunity for a "below the rim" or "inner canyon" experience. Compared to lower level flights, air tour operators feel that flights above rim level would be much less exciting, less intimate (fewer details, less of a sense of exploring otherwise inaccessible territory), and less satisfying (closer to the experience persons get from the rim overlooks without paying for a flight). Other people feel that flights are very satisfying at that altitude, and that the "big picture" or overall spatial relationships of the Grand Canyon area are more apparent from higher altitudes. To the extent that either viewpoint prevails, the number of passengers and/or the type of people who become passengers would be affected.

Natural quiet would predominate in flight-free areas, and much of the area below rim level as well. Flight-free areas are large enough that aircraft would not be heard inside most of them. However, high-altitude jets would continue to be seen and heard over the park.

Incentives for quiet aircraft would decrease aircraft noise throughout the park to the extent that aircraft owners purchase and manufacturers make available quiet aircraft.

Pilots would still be able to detect emergency mirror flashes, radio messages, and fires.

5. Socioeconomic Impacts: Alternative 5

Helicopter companies feel they could not compete with the fixed-wing operators above rim level, so could go out of business. Some fixed-wing companies feel they could also go out of business because they feel that fewer people would want to take tours above the rim and outside flight-free areas.

Noise standards would encourage investment in new equipment, causing possible higher operating costs to air tour operators and higher ticket prices for passengers. Due to the flight-free areas, some routes would require longer flying times which could result in increased costs to passengers. Tour routes originating at GCNP Airport would have to significantly reroute to avoid flight-free areas, especially from October 1 to April 30. Tours would also have to spend more time over the rim getting to and from the canyon which would decrease time available for viewing the canyon or increase overall flight times.

Companies which could not afford quieter technology would eventually find it difficult to compete with companies which did invest in the technology, and could go out of business.

Helicopter companies would be adversely impacted by not being able to show the Point Sublime ruins to passengers.

The NPS and/or the FAA would incur costs in monitoring and administering the closure of airspace, even if it was a voluntary closure. There would be substantial resistance among the aviation community to locking up airspace.

"Certified quiet aircraft" could still provide a visitor with the opportunity to see most of the park by air all year.

If companies went out of business there would be fewer jobs and less revenue, consequently an impact on the airports, airport communities, and related businesses.

At a minimum, air tour operators would have to develop new routes, narrations, brochures, and advertising.

The NPS and/or the FAA would incur costs in monitoring and administering the closure of airspace and noise level standards. Seasonal flight-free areas would require extensive notification procedures and publicity by the NPS and the FAA each time the season changes. There would be substantial resistance among the aviation community to locking up airspace.

F. ALTERNATIVE 6: 2,000 FEET ABOVE THE RIM PLUS FLIGHT-FREE AREAS

1. General Impacts: Alternative 6

This alternative would be an endorsement of FAA Advisory Circular 91-36C which requests all pilots to fly no lower than 2,000 feet above the uppermost rim of canyons or valleys or 2,000 feet above the highest point within 2,000 feet laterally of the route of flight in all national park areas. Additionally, flight-free areas would also be established. The 2,000 feet minimum would provide a basis for a consistent approach to the aircraft overflight issue throughout the National Park System, and the flight-free areas could set a precedent which transfers to other areas.

Approximately 139,000 acres, or 12 percent, of the park would be included in permanent flight-free areas and approximately 216,000 acres, or 18 percent, of the park would be included in seasonal flight-free areas under Alternative 6.

2. Impacts to Flight Operations: Alternative 6

Only flights specifically authorized by the Superintendent would be allowed in flight-free areas and airspace below 2,000 feet above rim level. Major detours in flight routes would be necessary to detour around or over these areas, even more so than in Alternative 5. Many non-tour aircraft would probably avoid the park.

It would be difficult for ground observers to monitor compliance with the 2,000 feet above the rim minimum altitude due to the difficulty of determining that altitude from the ground.

This alternative would establish a minimum altitude at or above 10,000 feet MSL over more than 50 percent of the park. FAR 135.89 requires air taxi and commercial pilots to use oxygen for flights over 30 minutes duration over 10,000 feet MSL. Most tour aircraft already have this capability or could attain it easily and inexpensively. Also, most areas of the park where the 2,000 feet minimum altitude causes an aircraft to fly above 10,000 feet MSL can be easily traversed in less than 30 minutes.

Aircraft would tend to concentrate near the minimum altitudes and some flight-free area boundaries, increasing the danger of mid-air collisions. Confusion would continue over application of the hemispherical rule (FAR 91.109) to flying over the canyon. Pilots would want to fly as close to the minimum altitude as possible, however under visual flight rules and 3,000 feet above ground level, east and west bound aircraft are required to be at different altitudes (e.g. west bound at 10,500 and east bound at 11,500 feet MSL). This would be further complicated when flying over some rim areas, high mesas or buttes, where aircraft would only be 2,000 feet above ground level and this rule would not apply. Special procedures would be needed to deal with this confusion.

Existing flight patterns would change. Some aircraft would have to detour around high elevations when the 2,000 feet minimum causes the minimum altitude to be above the service ceiling of the aircraft. To the extent that pilots try to take an aircraft above its service ceiling, safety would be decreased.

Improved safety would result because pilots flying at higher altitudes have a greater opportunity to take corrective action if a problem arises, such as engine failure, and to see and avoid other aircraft.

Those parts of the Grand Canyon which are not in the park (e.g. Kanab Creek, Parashant and Whitmore Canyons, and parts of the Hualapai and Havasupai Indian Reservations) would experience more overflights as some transportation and tour flights detour out of the park to avoid high minimum altitudes and flight-free areas, causing increased impacts to those areas.

Low cloud ceilings coupled with the minimum altitude may affect the ability of pilots to conduct tours, although transportation flights would be unaffected.

There would be less flexibility for pilots to avoid weather hazards since there would be less available airspace to fly in.

The military training routes over the park would be affected if the minimum altitudes applied to them, possibly affecting some of the training value of the routes.

Less airspace would be available for flying than in any other alternative.

The 2,000 feet above the rim minimum altitude and noise level standards would be difficult to monitor and enforce by the NPS and/or the FAA.

3. Impacts To Natural and Cultural Resources: Alternative 6

There would be no impacts to wildlife or cultural resources.

4. Impacts To Natural Quiet and Visitor Experience: Alternative 6

Outside flight-free areas, visitors may actually perceive aircraft more because they will be flying higher and are easier to see against a background of sky than against the canyon walls. Sound levels will be less, however, and this may be additionally mitigated because studies have shown that less than 20 percent of rim visitors are dissatisfied with present aircraft activity.

There would be large areas of the park where natural quiet would predominate. Some aircraft could still be heard in some parts of the park, but the number of aircraft heard and the sound intensity would be much reduced from any of the other alternatives. The duration and area covered by sound would also be reduced due to the flight-free areas. Areas near the park boundary could receive aircraft noise impacts because aircraft could fly low just outside the park.

Visitor experience on the ground would be unimpacted by aircraft activity in most of the park. Opportunities for experiencing natural quiet and a wilderness experience would increase.

Air tour passengers would have no opportunity for a "below the rim" or "inner canyon" experience, which many air tour operators feel is essential for visitor enjoyment of the tour flights. They feel that flights 2,000 feet above the rim would be much less exciting, intimate (fewer details, less of a sense of exploring otherwise inaccessible territory), and satisfying (much closer to the experience potential passengers could get from the rim overlooks). Other people feel that flights are very satisfying at that altitude, and that the "big picture" or overall spatial relationships of the Grand Canyon area are more apparent from higher altitudes. To the extent that either viewpoint prevails, the number of passengers and/or the type of people who become passengers may be affected.

Pilots would still be able to spot emergency mirror flashes, radio messages, and fires. In some areas of the canyon, however, it may be more difficult to get such a message to an aircraft because the high-altitude jet routes would be requested to be moved.

Some passengers could experience high altitude related health problems by flying at higher altitudes in unpressurized tour aircraft.

5. Socioeconomic Impacts: Alternative 6

There would be no incentives for quieter aircraft technology or operating procedures.

Helicopter companies could be put out of business. Some fixed-wing companies feel that they could also go out of business because there would be little demand for tour flights. To the extent that this occurs, the economies of several communities and the viability of the travel and tour industry in the southwest could be adversely affected. Differing opinions exist among persons within and outside the air tour and travel industries as to the severity of these impacts. At a minimum, major advertising, narration, and brochure changes would be required.

Air tour operators would not be able to take passengers on a low level tour of any part of the canyon except in those areas outside the park.

The NPS and/or the FAA would incur costs in monitoring and administering the closure of airspace, whether it was voluntary or not. There would be substantial resistance among the aviation community to locking up airspace.

Seasonal flight-free areas would require extensive notification procedures and publicity by the NPS and the FAA each time the season changes.

High altitude jets may travel slightly further if routes are shifted, resulting in slightly higher fuel costs.

The FAA would incur costs in relocating the east-west high-altitude jet routes.

VI. MECHANISMS FOR IMPLEMENTING ALTERNATIVES

Mechanisms could be combined or used singularly to accomplish the specific goals of the alternatives.

A. VOLUNTARY RESTRICTIONS

1. Cooperative agreements to implement the alternatives could be instituted between NPS, air tour operators, military, and backpackers/environmental groups to include such means as: voluntary procedures and practices, a means of communicating and resolving problems and/or conflicts, and sanctions imposed on a non-complying party by the other parties to the agreement. The 1972 Tri-State Flight Operators Agreement, which worked fairly well for several years, is an example of such an agreement (see Appendix IV).

2. Advisory requests to implement the alternatives could be issued through such media as: an FAA Advisory Circular specifically on Grand Canyon procedures, an ATIS or other information radio message to pilots, a Notice to Airmen concerning Grand Canyon procedures and concerns, information and park boundaries on aeronautical charts, and aviation publications. Such requests have been issued in the past (see Appendix IV), although they have generally not been Grand Canyon-specific and have not always been well known.

3. Recommended procedures and practices to implement the alternatives could be included in commercial air taxi operators' certification manuals. Such items are normally not included in the manuals unless they are voluntarily agreed upon in advance by air taxi operators. However, once such provisions are included in the manuals, any noncompliance is considered to be a violation of FARs.

4. Committees or work groups could be formed to develop, monitor, discuss and/or modify voluntary measures to implement the alternatives, and to discuss problems concerning overflights. Similar meetings among the NPS, the FAA, and air tour operators have occurred since 1972 with some success. The work group meetings of 1984 to 1986 were also such meetings.

5. An official statement or certificate from the NPS could be prepared stating that an air tour operator has met certain training requirements, follows approved practices, uses noise abatement equipment or techniques, or otherwise meets criteria which implement the alternatives. The statement or certificate could be displayed or otherwise used by an air tour operator to show prospective passengers that they are complying with the alternative selected in the aircraft management plan. This recognition could serve as an incentive for air tour operators to implement plan procedures. Such a mechanism has not been tried to date.

B. FAA REGULATIONS (Either Grand Canyon-specific or Nationwide)

1. Procedures and/or practices to implement the alternatives could be required by FAA to be included in certification manuals of commercial air taxi operators flying over the park, or could be included in FARs for all aircraft.

2. Special Use Airspace could be designated at Grand Canyon to implement the alternatives. Special Use Airspace consists of airspace where activities must be confined because of their nature, or where limitations are imposed upon aircraft operations that are not a part of those activities,

or both. There are three types of Special Use Airspace that could be applicable to GCNP: alert area, restricted area, and prohibited area. All three are administrative designations and would be shown on aeronautical charts.

An alert area is the least restrictive of the three designations. Alert areas are created to inform pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity. Pilots should be particularly alert when flying in these areas. The Las Vegas Flight Standards District Office of the FAA recently recommended that the Grand Canyon area be designated as an alert area. However, the alert area was not approved because, in the opinion of the FAA at the regional level, Grand Canyon's airspace does not have high enough levels of air traffic to warrant alert area status. An alert area designation would address the safety issue over the park, but would be less effective in addressing the sound issue.

The second type of Special Use Airspace is the restricted area. In restricted areas, authorization from the using or controlling agency is required to enter the airspace. These areas are designated because of unusual, often invisible hazards to aircraft such as artillery firing, aerial gunnery or guided missiles.

The final type of Special Use Airspace is the prohibited area. Flights are forbidden in these areas for security reasons or other reasons associated with the national welfare. This type of designation is rare.

Since both restricted and prohibited airspace designations are well-known and enforceable, any such designation over all or portions of the park would be very effective in restricting aircraft activity over those areas. Either NPS or FAA could be designated as the controlling agency. However, any such designation would raise numerous questions. Designation of Special Use Airspace over the park would be an unusual application of such a restriction. There are currently only a few areas in the country with Special Use Airspace designations for environmental protection purposes (Boundary Water Canoe Area in Superior National Forest, Farallon Islands National Marine Sanctuary, and Mt. Vernon).

The current trend is to eliminate Special Use Airspace. The FAA generally opposes restrictions on airspace unless they are absolutely necessary since their dual mission is to promote air travel as well as air safety. There is considerable opposition to designation of Special Use Airspace from the aviation community which feels that airspace is already too restricted. Further restriction would funnel existing traffic into other areas or higher altitudes, reducing choices of places to fly and options to avoid inclement weather. Obviously, any such designation might reduce the opportunities to enjoy the park from the air. Finally, this type of designation could impact the ability of the park to address emergency or administrative needs and would require additional persons and facilities to administer the airspace.

C. NPS REGULATIONS (Either Grand Canyon-specific or National Park System-wide)

The NPS could promulgate regulations to implement actions concerning aircraft use below the rims of the canyon under an interpretation of

several existing authorities regarding the inclusion of airspace below the rims within the boundaries of GCNP (Public Law 93-620). Procedures would have to be developed to monitor and enforce such regulations.

D. CONCESSION OR COMMERCIAL USE LICENSE

Concession permits, contracts, or commercial use licenses could be used to regulate the activities of air tour operators providing tours or transportation over the park to at least partially implement the alternatives. Such existing authorities have not been used before by the NPS to regulate aircraft activity, but may be interpreted to apply. This appears to be the most effective method to control numbers and timing of flights over the park.

E. CONGRESSIONAL OR PRESIDENTIAL ACTION

1. Congress or the President could create an "Airspace Reservation" at GCNP, and the proposed action could be implemented under authority contained in the reservation legislation or executive order.

2. Congress could establish and/or affirm NPS regulatory authority to control airspace over or within the park through NPS promulgation of regulations, issuance of concession permits or contracts or commercial use licenses, and/or establishment and enforcement of noise level standards.

3. Congress could establish noise level standards for Grand Canyon and/or all noise-sensitive areas and designate an agency to administer the standards.

VII. CONSULTATION AND COORDINATION

A. PUBLIC INVOLVEMENT PROCESS

A dialogue with various agencies, organizations, and individuals concerning aircraft use over the park has been ongoing for about 15 years. During the first 10 years of this public involvement process, most of the interaction was informal among the NPS, air tour operators, and the FAA. Notable during this early phase of involvement was a 1972 agreement among the NPS, the Tri-State Flight Operators Association, and the FAA requesting that pilots maintain certain altitudes over certain portions of the park (See Appendix IV).

In May 1981, the present planning effort was initiated when the park called a meeting of all air tour companies and several environmental groups. The main concern expressed during that meeting was whether the aircraft overflight issue was really significant or whether it reflected the interest of only a small minority of park visitors. Based on the results of that meeting, the park initiated a research program designed to measure the magnitude of the issue both from a visitor perception and a resource impact standpoint. The research effort continued over the next 3 1/2 years.

In October 1984, the park called a meeting of all the air tour operators to discuss the results of the research. At that meeting, it was decided that individual work groups representing the various interest groups should be formed to discuss the issue and research and to collect further information. Three separate work groups were formed: one consisting of air tour operator representatives, another including representatives from several environmental groups, and the other group consisting of representatives from the FAA, Aircraft Owners and Pilots Association, GCNP Airport Facility Manager, USDI Office of Aircraft Services, and the military.

These six- to eight-person groups met separately to facilitate unbiased and efficient data gathering. A total of seven meetings were held with these work groups in the winter/spring of 1984/85.

In July 1985, a meeting of all three work groups was held to verify the information received at the individual work group meetings, to encourage dialogue among the different work groups, to discuss and identify the pros and cons of possible mitigation actions, and to discuss the upcoming public review process.

Following the combined work group meeting, a preplanning booklet was completed which summarized the input received to date and identified 17 possible mitigation actions to address the aircraft management issue. An information packet, consisting of this preplanning booklet and a task directive (revised June 1985), was the basis for public comment during a 3-month public review period from September 17 to December 17, 1985. During that time, approximately 600 copies of this packet were distributed. Five formal public meetings were held in San Francisco, Las Vegas, Phoenix, Williams, and Flagstaff. Oral statements were presented by 216 individuals during these meetings. In addition, approximately 760 written statements or letters, petitions with 4,300 signatures, and 3,600 form letters were received. These comments were analyzed, summarized and distributed to all participants in the public review process in February 1986.

The preplanning booklet, task directive, and public comments provide the basis for the alternatives which are contained in this document. These alternatives were presented in draft form at a combined work group meeting consisting primarily of members of the three original work groups in April 1986. After considering the input from this meeting, the alternatives were finalized and this Environmental Assessment was prepared.

This document will form the basis for a public review period from May 20 through August 1, 1986. Based upon the information presented in this document and the public input received during this period, a final recommendation will be made to the Director of the National Park Service by August 29, 1986.

B. TIME SCHEDULE

| | |
|---|-----------------|
| Public Review Period Begins | May 20, 1986 |
| Public Meetings: | |
| Las Vegas | June 9, 1986 |
| San Francisco | June 10, 1986 |
| Phoenix | June 11, 1986 |
| Flagstaff | June 12, 1986 |
| Public Review Period Ends | August 1, 1986 |
| Analysis of Public Comments Completed, Summary of Public Comments Sent to All Participants in the Public Review | August 15, 1986 |
| Recommendations Submitted to the Director of the National Park Service and the Secretary of the Interior | August 29, 1986 |

C. AGENCIES AND ORGANIZATIONS REPRESENTED IN THE VARIOUS WORK GROUPS

Federal Aviation Administration
U.S. Department of the Interior - Office of Aircraft Services
U.S. Air Force
U.S. Army
U.S. Navy
Aircraft Owners and Pilots Association
AVCO Services, Inc. (GCNP Airport Manager)
Grand Canyon Flight Operators Association
Arizona Wildlife Federation
Friends of the River
National Parks and Conservation Association
Northern Arizona Audubon Society
Sierra Club
Wilderness Society
Air Grand Canyon
Grand Canyon Airlines
Grand Canyon Helicopters
Lake Mead Air
Madison Aviation
Scenic Airlines
Havasupai Tribe

D. OTHER ORGANIZATIONS OR AGENCIES WHICH COMMENTED DURING THE FALL
1985 PUBLIC REVIEW PROCESS

State and Federal Agencies

Arizona Department of Transportation
Arizona Game and Fish Department
Bureau of Land Management
U.S. Fish and Wildlife Service
U.S. Geological Survey
U.S. Forest Service

Organizations

City of Las Vegas
Clark County Commission
Governor's Commission on Arizona Environment
Grand Canyon Chamber of Commerce
Las Vegas Convention and Visitor's Association
Las Vegas Convention Authority
Maricopa Association of Governments
Mesa Arizona Convention and Visitor's Bureau
Phoenix Arizona Convention and Visitor's Bureau
Pima Association of Governments
Public Lands Council

Hualapai Tribe
Navajo Tribe

Arizona Pilots Association
Arizona Soaring Association
Helicopter Association International
Non-Commissioned Officers Association of the U.S.A.
Regional Airline Association
Williams Municipal Airport
Women Pilots Association "99's"

Allstate Tour and Travel
Arrangements and Tours, Inc.
Explorer Travel Service, Inc.
Grand Canyon Tourist Center
Grayline Tours
Universal Travel
Windows of the West Tours

American Wilderness Alliance
Arizona Mountaineering Club
Cape Cod Outdoor Education Center
Earth First
Friends of Grand Canyon
Gloria Dei Hiking Club
Golden Gate Audubon Society
Grand Canyon Pioneers
Museum of Northern Arizona
National Campers and Hikers Association
Nature Conservancy
New Mexico State Audubon Society
Northern Arizona Paddlers Club
Resource Center for Environmental Education
Sierra Club Legal Defense Fund
South Rim Trundlers
Southwest Environmental Services
Wilderness Sports and Recreation Association

Babbitt Brothers Trading Company
Grand Canyon National Park Lodges (Fred Harvey Company)
Grand Canyon Squire Inn
Hotel Westcourt
Imax Theater
Riviera Hotel

Arizona Raft Adventures
Arizona River Runners
Canyon Country Outfitters
Canyononeers Inc.
Colorado River and Trail Expeditions, Inc.
Cross Tours and Explorations, Inc.
Diamond River Adventures, Inc.
Expeditions, Inc.
Georgie's Royal River Rats
Grand Canyon Dories
Grand Canyon Expeditions
Grand Canyon Trail Guides

Grand Canyon Trail Rides
Hatch River Expeditions, Inc.
Hikers, Inc.
International Creative Artists
Moki Mac River Expeditions, Inc.
OARS, Inc.
Outdoors Unlimited
Professional River Equipment
Sleight Expeditions, Inc.
Western River Expeditions, Inc.
White Water River Expeditions, Inc.
Wilderness River Adventures, Inc.
Wilderness World, Inc.

Action Helicopters
Action Jet Helicopter, Inc.
Advance Aviation/Canyon Express
Air Cortez
Air Irvine
Air L.A.
Air Sedona
Air Vegas
Air West
Arizona Air
Arizona Flightline
Bauer Helicopters
Braswell Aviation, Inc.
California Air Taxi
Commercial Air Charter
Corporate Jets
Desert Air
Desert Southwest Airlines
Dynamic Air Charter
Grand Canyon Scenic Air Tours
Hystar Aerospace
Kellen Air Service
Key Airlines, Inc.
Lake Powell Air Service
Lang Air Service
Las Vegas Airlines
Las Vegas Helicopters
Las Vegas Propeller Corporation
Martin Aviation
Monarch Aviation
National Executive Airlines
North-Aire Corporation
North American Helicopter Airways
Pacific Executive Charters
Piper Air Center
Ray Aviation
Republic Airlines
Rio Colorado Airways
Sawyer Aviation
Sedona Airport Services

Skyway Air, Inc.
Southern Express Airlines
Southwest Safaris
Tour West, Inc.
Valko Jet Charter
Venture Aviation
Walls Aviation
Western Sun Aviation
Womack Aviation

Governor's Committee for Employment of the Handicapped (Wyoming and
Connecticut)
International Handicapper's Net
National Association of the Deaf
National Council on the Handicapped
Spinal Cord Society

APPENDIX I

LAWS AND POLICIES MANDATING ACTION ON AIRCRAFT

A. National Environmental Policy Act (1969, as amended): "Federal agencies shall to the fullest extent possible...use all practicable means... to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment."

B. Noise Control Act of 1972: "Inadequately controlled noise presents a growing danger to the health and welfare of the Nation's population ...major sources of noise include transportation vehicles...Federal action is essential to deal with major noise sources in commerce...it is the policy of the United States to promote an environment for all Americans free from noise that jeopardizes their health or welfare..."

C. Wilderness Act (1964) (applicable because 93 percent of the park has been determined suitable for wilderness designation): "A wilderness... undeveloped Federal land retaining its primeval character and influence... which is protected and managed so as to preserve its natural conditions... affected primarily by the forces of nature, with the impact of man's work substantially unnoticeable...has outstanding opportunities for solitude or a primitive and unconfined type of recreation..." "except as necessary to meet the minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving health and safety of persons within the area), there shall be...no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft...", (with the exception that) "...the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue..."

D. NPS Management Policies (1978): "Activities causing excessive or unnecessary noise in and adjacent to parks will be monitored and action taken to avoid or minimize noise..." "When commercial, military or private aircraft adversely affect the enjoyment or resources of the park area, cooperation of agencies exerting flight control will be sought to institute such measures as will minimize or eliminate the disturbance."

E. Title 36, Code of Federal Regulations, Chapter 1, Part 2, Section 2.17, states that the operation of all aircraft shall be in accordance with Federal Aviation Regulations, and provides for the NPS to issue citations if violations of those regulations are observed.

F. Grand Canyon National Park Final Master Plan, 1976: "The National Park Service has negotiated with the United States Air Force, Federal Aviation Administration, and aircraft operators to zone flights away from the main viewing areas and portions of the inner canyon where noise pollution presents the greatest problem. If this zoning approach proves inadequate, the National Park Service will seek legislation to limit aircraft activity below the rims."

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
Grand Canyon National Park
Grand Canyon, Arizona 86023

January 4, 1986

INTERNAL AVIATION MANAGEMENT PLAN

EXECUTIVE SUMMARY

I. POLICY AND PURPOSE

A. Policy. It is the policy of Grand Canyon National Park (GRCA) to limit the use of its aircraft to activities involving life or health-threatening emergencies, the administration and/or protection of resources, research, and for individually approved special purpose missions.

B. Purpose. The purpose of the Internal Aviation Management Plan (IAMP) is to establish general guidelines for the official and professional use of aircraft within the Park, with specific direction for those individuals involved in the use of aircraft as a significant portion of their position description. This plan will ensure (1) safety, (2) protection of park resources (including natural quiet) and facilities, (3) compliance with the National Park Service mission, and (4) that each flight is the most efficient, economical and effective method of performing the required task consistent with Park goals. Users of park aircraft will be aware of and comply with all segments of the IAMP.

II. TYPES OF FLIGHTS, PRIORITY/SEQUENCING, AND FLIGHT TIMES

A. Types Of Flights. The IAMP states that there are only two types of flights: routine and non-routine.

(1) "Routine" flights cover all activities not mentioned below, and are defined as those that can be scheduled well in advance; if a routine flight does not take place, there will be no significant threat to life, property, park resources or services, and an alternate flight at a later time can be scheduled. Routine flights do not receive automatic approval. (Refer to IAMP Section V, Part A).

(2) "Non-routine" or emergency flights, because of their life or health-threatening nature, are unable to be scheduled in advance and will occur in both approved and primitive landing zones as well as at remote and isolated duty stations. The following projects meet the intent of the "non-routine" definition and only they are exempted from the normal flight-approval process (this is not a priority listing): administrative emergencies, fire suppression, law enforcement emergencies, medical evacuations, pipeline breaks, search and rescue operations, sewage removal and utility outages. (Refer to IAMP Section V, Part A).

B. Flight Priority/Sequencing. Flight priority or sequencing will be to conduct all non-routine flights first, followed by routine flights. Refer to the IAMP, Section V, Part A, for further details.

C. Flight Times.

(1) Routine flights can occur Monday through Friday, between the hours of 8 a.m. and 5 p.m., but attempts will be made to concentrate them between 10 a.m. and 3 p.m. Routine flights will NOT be scheduled to take place on weekends at any time during the year.

(2) Non-routine flights will be scheduled as necessary and given appropriate priority anytime during the year. If a non-routine flight must be conducted on a weekend, and there is some flexibility as to the time of day the flight can go, it will occur between the hours of 10 a.m. and 3 p.m. This is a park-wide, year-round policy.

III. HOW TO SCHEDULE A FLIGHT

A. Routine Flights. Use the following checklist:

_____ Trip organizer completes applicable portions of the Routine Flight Request (RFR) Form and signs it

_____ Trip organizer submits RFR Form to Division Chief or her/his Acting for review and approval/disapproval. Approval of the request will be based on the criteria in the IAMP (specifically Sections IV and V). If the Division Chief is uncertain whether an activity justifies use of park aircraft, s/he can consult the Park Aviation Officer or members of the Internal Aviation Oversight Committee (IAOC) for help in making a determination.

_____ Division Chief or Acting indicates on the RFR Form whether a flight has division approval/disapproval, and signs it.

_____ Division Chief or Acting forwards approved RFR Form to Superintendent's Office, where it will be reviewed by the Park's IAOC at their next meeting. Disapproved forms will be returned to the Trip Organizer.

NOTE: Disapproved routine flight requests can be appealed through the Superintendent's Office (i.e., by the IAOC) only after the appropriate division chief and Park Aviation Officer have been consulted.

_____ The IAOC either approves or disapproves the Routine Flight Request. Their word is final and cannot be appealed.

_____ IAOC-approved Routine Flight Requests are sent to the South Rim Heliport Manager. Disapproved flight request forms are returned to the Division Chief.

_____ South Rim Heliport Manager schedules the routine flight, taking into consideration all the items mentioned in the IAMP, especially Section VI (e.g., combining flights).

B. Non-Routine Flights. Use the following checklist:

- _____ Trip organizer fills out and signs Non-Routine Flight Request Form
- _____ Form is presented to South Rim Heliport Manager and he arranges for flight to occur

NOTE: Outlying areas can transmit (via telephone or radio) pertinent information to the South Rim Heliport Manager; in such cases, the heliport manager will complete and sign the Non-Routine Flight Request Form for the trip organizer.

IV. PHANTOM RANCH, NORTH RIM AND INDIAN GARDENS SCHEDULED FLIGHTS

A. Phantom Ranch. Routine flights to the Phantom Ranch Delta Heliport are scheduled to occur at 10 a.m. every Tuesday morning throughout the year. See paragraph D of this section for guidelines.

B. North Rim. Routine flights to the North Rim Heliport are scheduled to occur at 10 a.m. every Wednesday morning throughout the year. During summer months the North Rim District will utilize the regularly scheduled service offered by Grand Canyon Airlines between VT Park Airstrip (near Kaibab Lodge) and the Grand Canyon National Park Airport when numbers of passengers and/or amount of cargo make this an advantage. See paragraph D of this section for other guidelines.

C. Indian Gardens. Sewage maintenance flights will continue to occur every Thursday morning, as in past years. Passengers cannot be transferred during slingload operations; however, small amounts of internal cargo can be flown in addition to the slingload. See paragraph D of this section for guidelines.

D. Guidelines. These guidelines apply to the Phantom Ranch, North Rim and Indian Gardens flights described above. Although flights are approved and scheduled well in advance, they are not obligated to go. That is, if the South Rim Heliport Manager is not notified by 5 p.m. of the day prior to the flight of any personnel or cargo that need to be transferred, the flight will be scrapped. If adverse weather causes a flight to be canceled, the South Rim Heliport Manager will re-schedule it later in the day or on the next available day. This paragraph provides permission for (1) flights to be shifted one day (before or after the normally scheduled day) if that is more efficient, or (2) multiple, back-to-back flights to be scheduled instead of the single flight if that is what it takes to get the job done. If that is impractical, a flight the next available day can be scheduled so the task started the previous day can be completed. All flights will select altitudes and routes which maximize noise abatement procedures. As noted in paragraph B above, the North Rim District will also be using Grand Canyon Airlines.

E. Abuse. Air operations personnel observing instances of flight abuse will funnel this information through the South Rim Heliport Manager, who will immediately inform the Chief Ranger.

APPENDIX III

AIR TOUR ROUTES

On December 24, 1985, Grand Canyon National Park distributed a questionnaire and map to 47 air tour operators requesting information to aid in the aircraft management planning process. The information requested included flight routes and numbers, numbers of passengers, preferred tour features, and any concerns or comments. Eighteen air tour operators returned completed questionnaires and maps, and four reported they were no longer in business. The routes shown on the accompanying maps include only the reported air tour routes of 18 companies, and do not include military training routes, high altitude jet routes, or transient general aviation flights. Based on public input during the past 2 years, it is estimated that the 18 air tour operators represented in the accompanying maps account for 60 to 80 percent of commercial flights over the park (excluding high altitude jets).

Fixed-wing and helicopter routes are on different maps. Fixed-wing tour routes were further separated into high, moderate, and low use based on the number of flights per year that 15 fixed-wing air tour operators reported in the questionnaire. Based on the fixed-wing tour data, subdivisions of greater than 1,000 flights per year, between 200 and 1,000 flights per year, and less than 200 flights per year were reasonable separation points for high, medium, and low use rates. Some air tour operators use more than one route per year; therefore, there are more than 18 routes represented on the maps.

Map #A1: High Use, Greater Than 1,000 Flights/Year

Routes reported by six fixed-wing companies are shown on the high use map. The number of flights per year varies from 1842 to 4186. The routes are flown year round.

Map #A2: Moderate Use, 200 to 1,000 Flights/Year

Routes reported by six fixed-wing companies are shown on the moderate use map. The number of flights per year varies from 208 to 316 with the exception of one company reporting 530 flights per year. Not all the routes are flown year-round. Two companies fly seasonally, but still report over 200 flights per year.

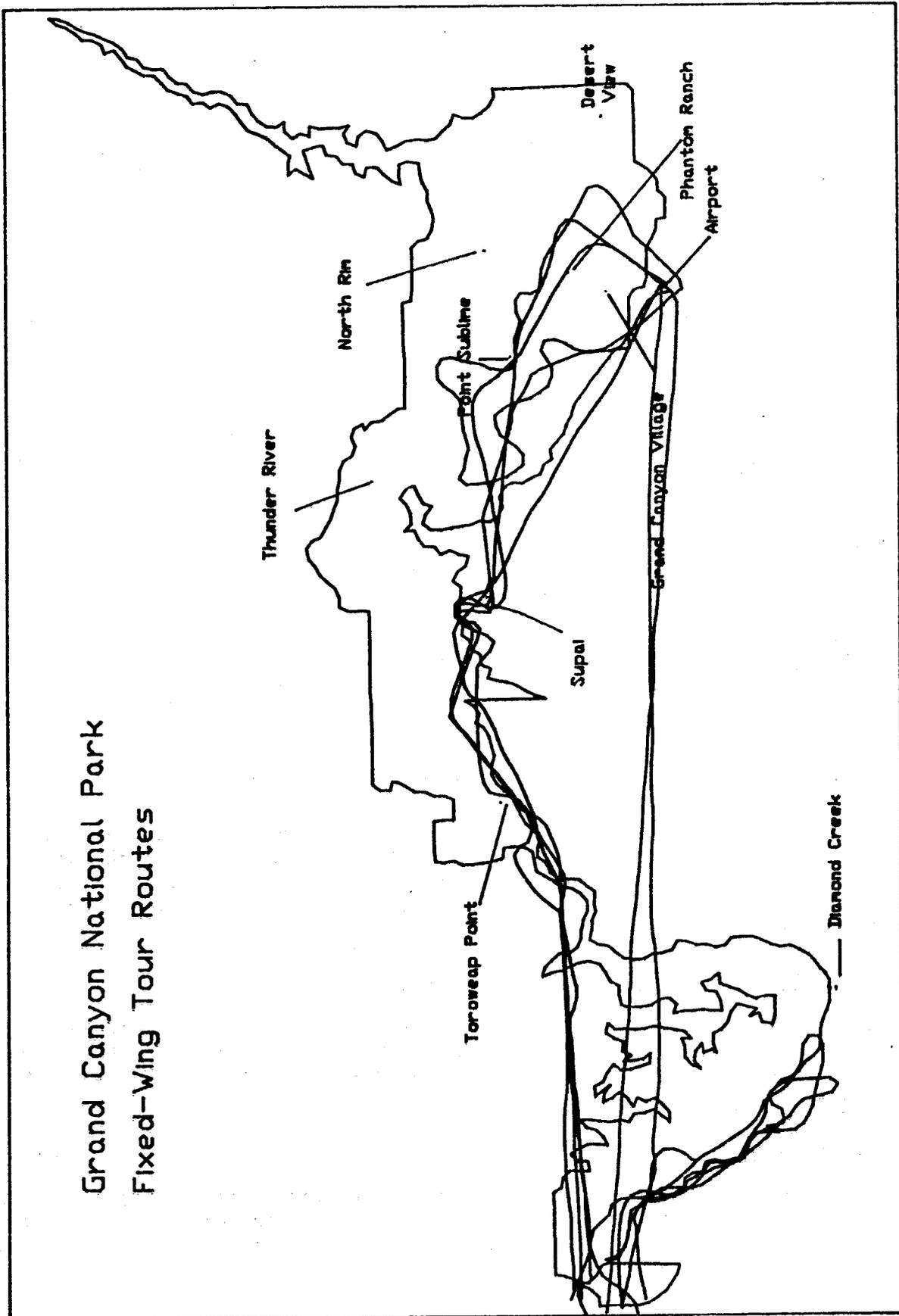
Map #A3: Low Use, Less Than 200 Flights/Year

Routes reported by five fixed-wing companies are shown on the low use map. The number of flights per year varies from 7 to 143. Not all the routes are flown year round. Three companies have seasonal routes, mainly for river-runners going to Marble Canyon.

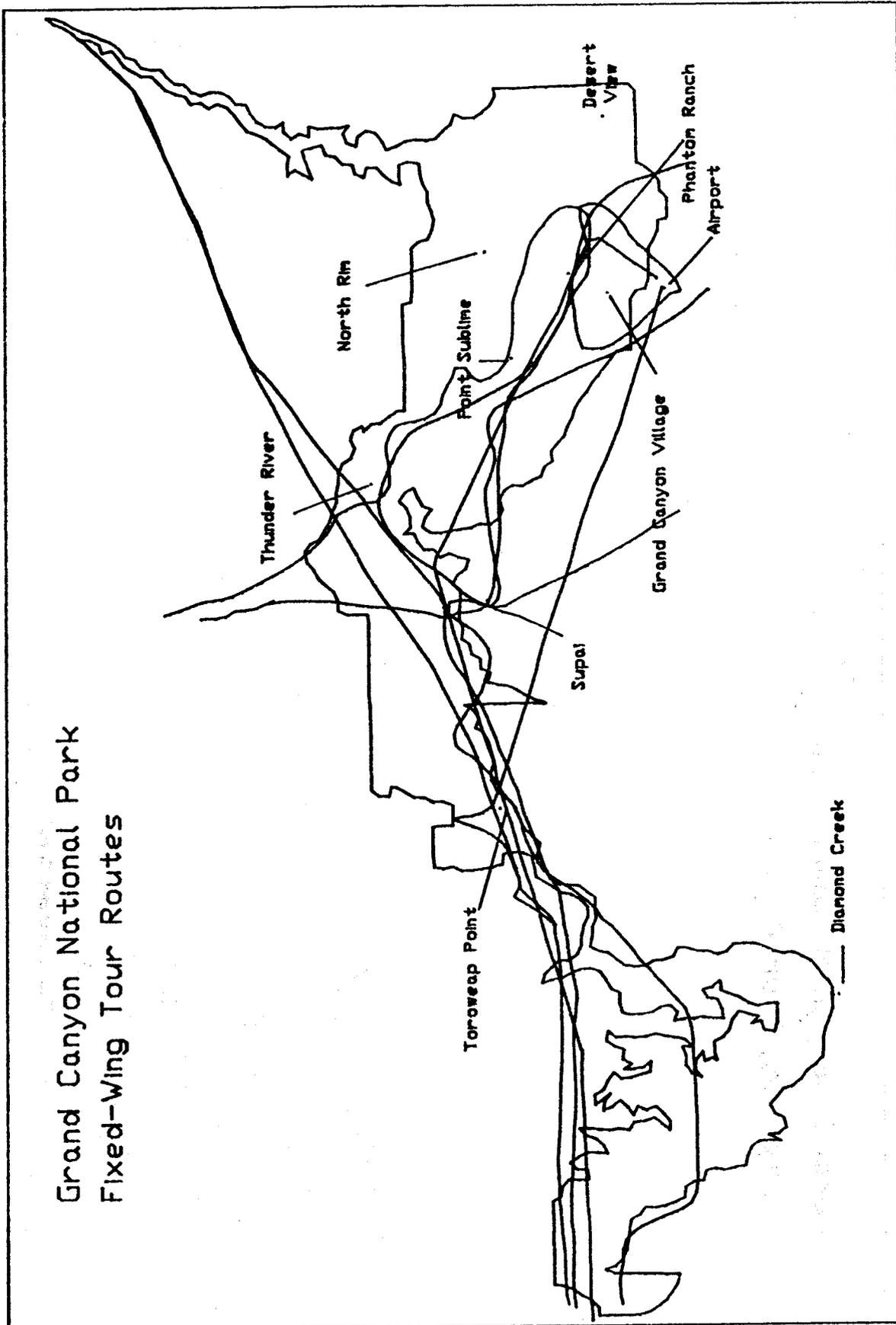
Map #A4: Helicopter Routes

Only three helicopter companies returned questionnaires and maps. Two companies reported less than 200 flights per year in the western end of the park from September to January, while the third company reported over 10,000 flights for 4 routes year-round.

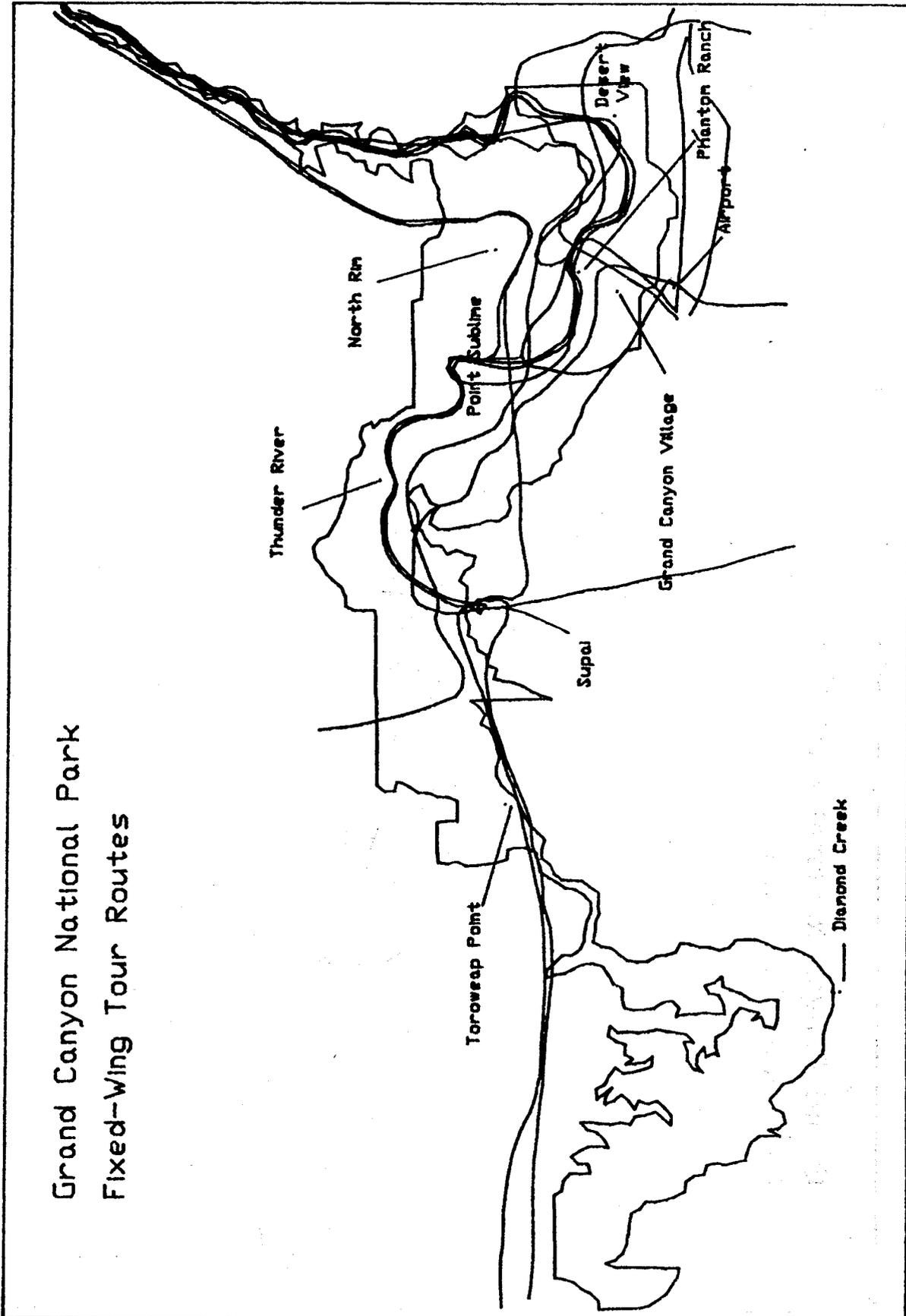
Grand Canyon National Park Fixed-Wing Tour Routes



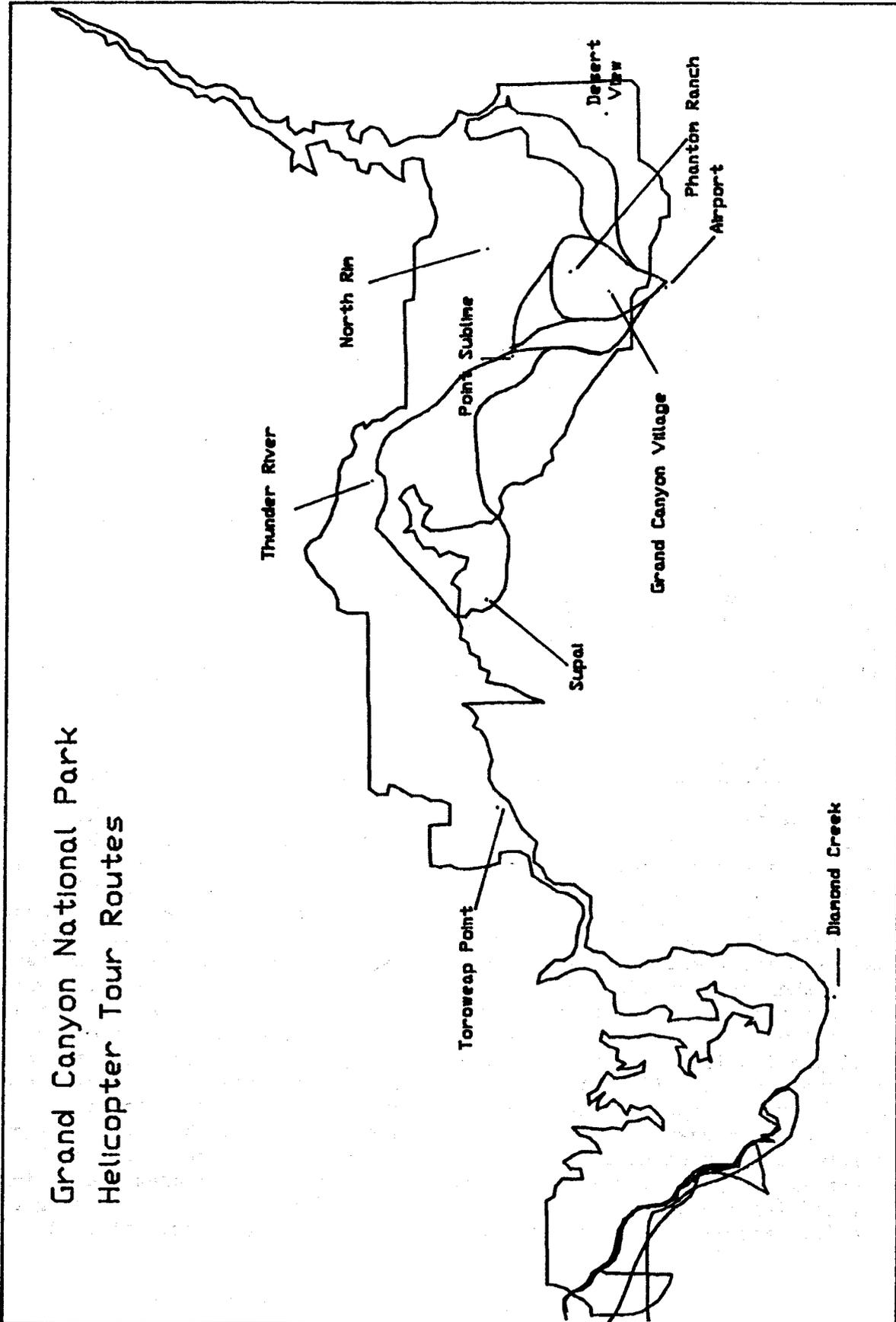
Grand Canyon National Park Fixed-Wing Tour Routes



Grand Canyon National Park Fixed-Wing Tour Routes



Grand Canyon National Park Helicopter Tour Routes



APPENDIX IV

EXISTING CONTROLS ON AIRCRAFT USE WITHIN GRAND CANYON NATIONAL PARK

Guidance on the use of the airspace over GCNP includes the following advisories and regulations:

A. Advisories:

1. 1972 Tri-State Flight Operators Agreement

In 1972, the Tri-State Flight Operators Association signed an agreement with the NPS and the FAA to avoid certain areas in the park below specified altitudes to the greatest extent possible. The agreement also placed responsibility on the NPS to call meetings as necessary to review and recommend amendments to the agreement, and to discuss problems with compliance. The current planning process is an extended review of the 1972 agreement. Many air tour operators have stated that updating this agreement would be the most desirable and effective means of addressing aircraft concerns.

The areas and specific altitudes (all given as MSL elevations) identified in the agreement are Havasu Creek (which was in the park in 1972) at 5,000 feet, Bass Trail at 6,500 feet within the canyon and 8,500 feet at the rim, North Rim/Cape Royal/North Kaibab Trail area at 10,000 feet, Desert View at 8,500 feet, Grandview at 8,500 feet at the rim and 5,000 feet for helicopters below the rim, South Rim (including South Kaibab Trail to Hermit Trail) at 8,500 feet, and Phantom Creek to Clear Creek at 6,000 feet.

Some air tour operators continue to follow this agreement. However, there are other pilots flying over the park who are either unaware of the agreement or who do not abide by it.

2. Commonly agreed upon reporting points and radio frequencies

For the past several years, air tour operators, the FAA, and the NPS have held an annual meeting at the FAA's Flight Standards District Office concerning safety and park concerns. One product of such meetings has been to designate two primary radio frequencies for air-to-air communications while touring the canyon, and specific geographic points where tour aircraft are supposed to announce their location and intentions. The primary purpose of establishing these reporting points and radio frequencies was to increase safety. When an aircraft overflies a certain point or area, the pilot will (using the appropriate radio frequency) transmit the aircraft's identification, altitude, and direction of travel; sometimes the next anticipated reporting point is also given. Problems with this system are: (1) radio frequencies utilized (122.75 and 123.05 MHz) have previously been designated by the Federal Communications Commission for other uses; (2) reporting points are often unknown since location names are invented by pilots without consulting maps or other pilots; (3) some pilots are not specific enough when transmitting their exact location in relation to the nearest reporting point; and (4) there is a continuing problem of adequately disseminating the latest frequency/reporting point information so all pilots are informed.

3. FAA Advisory Circular 91-36C: VFR Flight Near Noise Sensitive Areas (dated October 19, 1984)

This advisory is a request, not a regulation. Currently, most pilots flying over GCNP do not comply with this request.

VOLUNTARY PRACTICES...

b. Pilots operating fixed- and rotary-wing aircraft under VFR over noise-sensitive areas should make every effort to fly not less than 2,000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of Federal Aviation Regulations 91.79, Minimum Safe Altitudes. Typical of noise-sensitive areas are: ...National Park Areas...For the purpose of this Advisory Circular, the surface of a National Park Area is defined as: the highest terrain within 2,000 feet laterally of the route of flight, or the upper-most rim of a canyon or valley.

4. FAA's Airman's Information Manual (1985), paragraph 565 (page C6-S4-2): Flights Over Charted U.S. Wildlife Refuges, Parks, And Forest Service Areas

a. The landing of aircraft is prohibited on lands or waters administered by the National Park Service, U.S. Fish and Wildlife Service, or U.S. Forest Service without authorization from the respective agency. Exceptions include:

- (1) when forced to land due to an emergency beyond the control of the operator,
- (2) at officially designated landing sites, or
- (3) an approved official business of the Federal Government.

b. All aircraft are requested to maintain a minimum altitude of 2,000 feet above the terrain of...National Parks...

c. Federal regulations also prohibit airdrops by parachute or other means of persons, cargo, or objects from aircraft on lands administered by the three agencies without authorization from the respective agency. Exceptions include:

- (1) emergencies involving the safety of human life, or
- (2) threat of serious property loss.

5. 1984 FAA/NPS/FWS Interagency Agreement

In December 1984, the NPS, the FAA, and the US Fish and Wildlife Service (FWS) and the Secretaries of the Interior and Transportation signed an Interagency Agreement "to act in cooperation to reduce the incidence of low flying aircraft" over national park areas and wildlife refuges "by seeking voluntary cooperation with the established 2,000 feet minimum requested altitude" (FAA Advisory Circular 91-36C). The NPS and the FWS agreed to identify specific field units where low-flying aircraft conflict with resource values, to document incidents of low-flying aircraft, to develop training programs and instructional materials, and to hold meetings and develop public informational materials to help pilots understand resource management objectives in park and refuge areas. The FAA agreed to communicate to pilots and aviation groups concerns of the NPS and the FWS about low-flying aircraft, to investigate and discourage pilot deviations from the minimum altitude recommendation, to assist in communicating with the

Department of Defense about problems with military aircraft, to make available to the NPS and the FWS upon request the status and results of incidents reported by the NPS and the FWS, and to participate in meetings. All three agencies agreed to assess situations where impacts are sufficiently serious to warrant site-specific action by the FAA to minimize or eliminate the causes of the problems.

6. Military In-House Flight Rules such as the U. S. Navy's OPNAVINST 3710.7L, Flight Rules 425 and 426:

Flight Rule 425: Annoyance to Civilians and Endangering Private Property. Flights of Naval aircraft shall be conducted so that a minimum of annoyance is experienced by persons on the ground. It is not enough for the pilot to be satisfied that no person is actually endangered. Definite and particular effort shall be taken to fly in such a manner that individuals do not believe they or their property is endangered. The following specific restrictions apply in view of the particularly unfavorable effect of the fear, extreme annoyance, and damage which can be inflicted.

(1) NOISE SENSITIVE AREAS. Breeding farms, resorts, beaches, and those areas designated by the U.S. Department of Interior as National Parks, National Monuments, and National Recreational Areas are examples of noise sensitive areas.

(2) NOISE SENSITIVE AND WILDERNESS AREAS shall be avoided when at altitudes of less than 3000 feet AGL, except when in compliance with an approved:

- a. Traffic or approach patterns
- b. VR or IR route
- c. Special use airspace

Noise sensitive areas shall be avoided in the development of IR or VR routes and additional special use airspace unless the 3000-foot criteria can be observed.

(3) AERIAL REFUELING. Aerial refueling over densely populated areas shall be avoided whenever possible.

(4) EXTERNAL STORES/CARGO. Pilots carrying external stores/cargo shall avoid overflying populated areas whenever possible.

(5) TEMPORARY FLIGHT RESTRICTIONS. Aircraft shall not be operated within an area designated by a Notice To Airmen (NOTAM) within which temporary flight restrictions apply except as permitted in FAR 91.91.

(6) FLAT HATTING. Flat hatting or any maneuvers conducted at low altitude and/or a high rate of speed for thrill purposes over land or water are prohibited.

Flight Rule 426: Disturbance of Wildlife

(1) GENERAL. Commanding officers of aviation units shall take steps to prevent aircraft from frightening wild fowl or driving them from their feeding grounds. When it is necessary to fly over known wild fowl habitations, an altitude of at least 3000 feet shall be maintained, conditions permitting. During hunting season, pilots shall avoid flying near wildlife haunts except as noted above.

B. Regulations:

1. Federal Aviation Regulations (FARs)

It is often very difficult in practice to enforce some of the FARs. However, if a detailed report indicates that a violation may have occurred, the FAA will pursue the matter to the extent of their authority. The FAA has provided training for park rangers on reporting violations of FARs. Suspension of a pilot's license, often in conjunction with a fine, is the primary means for enforcing major violations.

If it can be established that there are no acceptable emergency landing areas in the inner gorge, then FAR 91.79a would prohibit any flights in that area. FAR 91.79a hinges on a pilot's ability to show that his flight altitude is adequate to make an emergency landing if a power unit fails.

In conversations with pilots, there seem to be many different interpretations of what constitutes a safe emergency landing spot. For example, some pilots believe it is possible to make an emergency landing on certain beaches along the Colorado River.

The term "property", found in several of the FARs, does not refer to national park resources, based on interpretation by the FAA. Property is defined based upon establishment of a real value. Thus, the NPS would have to establish a monetary value for park resources in order for the FARs regarding property to apply.

The FARs are promulgated by the FAA which is charged with promoting aircraft use and safety. Sections of the FARs most applicable to the aircraft management issue at Grand Canyon are reproduced below:

a. FAR Part 91: General Operating And Flight Rules
(these apply to all aircraft)

(1) 91.9 Careless Or Reckless Operation: No person may operate an aircraft in a careless or reckless manner so as to endanger the life or property of another.

(2) 91.32: Supplemental oxygen

(a) General. No person may operate a civil aircraft of U.S. registry -

(1) At cabin pressure altitudes above 12,500 feet (MSL) up to and including 14,000 feet (MSL), unless the required minimum flight crew is provided with and uses supplemental oxygen for that part of the flight at those altitudes that is of more than 30 minutes duration;

(2) At cabin pressure altitudes above 14,000 (MSL), unless the required minimum flight crew is provided with and uses supplemental oxygen during the entire flight time at those altitudes; and

(3) At cabin pressure altitudes above 15,000 (MSL), unless each occupant of the aircraft is provided with supplemental oxygen.

(Paragraph b deals with pressurized cabin aircraft operating at flight altitudes above 25,000 and 35,000 feet MSL.)

(3) 91.70: Aircraft Speed

(a) Unless otherwise authorized by the Administrator, no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots (288 m.p.h.).

(b) Unless otherwise authorized or required by ATC, no person may operate an aircraft within an airport traffic area at an indicated airspeed of more than -

(1) In the case of a reciprocating engine aircraft, 156 knots (180 m.p.h.); or

(2) In the case of a turbine-powered aircraft, 200 knots (230 m.p.h.).

(Paragraph (b) concludes by discussing speeds within a Terminal Control Area; paragraph (c) discusses speeds in airspace underlying Terminal Control Areas or in VFR corridors designated through Terminal Control Areas.)

Regulation 91.70 concludes by stating...

However, if the minimum safe airspeed for any particular operation is greater than the maximum speed prescribed in this section, the aircraft may be operated at that minimum speed.

(4) 91.79 Minimum Safe Altitudes: General: Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

(a) Anywhere. An altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.

(b) Over congested areas. ...1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

(c) Over other than congested areas. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In that case, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

(d) Helicopters. Helicopters may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section if the operation is conducted without hazard to persons or property on the surface.

(5) 91.109 VFR Cruising Altitude Or Flight Level: "... each person operating an aircraft under VFR in level cruising flight more than 3,000 feet above the surface shall maintain the appropriate altitude or flight level prescribed below, unless authorized by ATC:

(a) When operating below 18,000 feet MSL and -

(1) On a magnetic course of zero degrees through 179 degrees (eastbound), any odd thousand foot MSL altitude plus 500 feet (such as 3,500, 5,500, or 7,500); or

(2) On a magnetic course of 180 degrees through 359 degrees (westbound), any even thousand foot MSL altitude plus 500 feet (such as 4,500, 6,500, or 8,500).

(Paragraphs (b) and (c) discuss flights above 18,000 feet and 29,000 feet MSL respectively.)

(6) 91.119: Minimum altitudes for IFR operations

(a) Except when necessary for takeoff or landing, or unless otherwise authorized by the Administrator, no person may operate an aircraft under IFR below -

(1) The applicable minimum altitudes prescribed in Parts 95 (New) and 97 (New) of this chapter; or

(2) If no applicable minimum altitude is prescribed in those parts - (i) In the case of operations over an area designated as a mountainous area in Part 95 (New), an altitude of 2,000 feet above the highest obstacle within a horizontal distance of five statute miles from the course to be flown;...

(The Grand Canyon region is classified as mountainous. The remainder of this regulation discusses minimum altitudes for other than mountainous areas, as well as minimum enroute and obstacle clearance altitudes, or when climbing.)

b. Part 135: Air Taxi Operators And Commercial Operators

(1) 135.89 Pilot Requirements: Use Of Oxygen

(a) Unpressurized aircraft. Each pilot of an unpressurized aircraft shall use oxygen continuously when flying -

(1) At altitudes above 10,000 feet through 12,000 MSL for that part of the flight at those altitudes that is of more than 30 minutes duration; and

(2) Above 12,000 feet MSL

(Paragraph (b) discusses pressurized aircraft crew oxygen requirements.)

(2) 135.203 VFR Minimum Altitudes.

Except when necessary for takeoff and landing, no person may operate under VFR -

(a) An airplane -

(1) During the day, below 500 feet above the surface or less than 500 feet horizontally from any obstacle; or

(2) At night, at an altitude less than 1,000 feet above the highest obstacle within a horizontal distance of 5 miles from the course intended to be flown or, in designated mountainous terrain, less than 2,000 feet above the highest obstacle within a horizontal distance of 5 miles from the course intended to be flown; or

(b) A helicopter over a congested area at an altitude less than 300 feet above the surface.

2. Title 36 Code of Federal Regulations, Section 2.17: Aircraft and air delivery:

(a) The following are prohibited:

(1) Operating or using aircraft on lands or waters other than at locations designated pursuant to special regulations.

(2) Where a water surface is designated pursuant to paragraph (a)(1) of this section, operating or using aircraft under power on the water within 500 feet of locations designated as swimming beaches, boat docks, piers, or ramps, except as otherwise designated.

(3) Delivering or retrieving a person or object by parachute, helicopter, or other airborne means, except in emergencies involving public safety or serious property loss, or pursuant to the terms and conditions of a permit.

(b) The provisions of this section, other than paragraph (c) of this section, shall not be applicable to official business of the Federal government, or emergency rescues in accordance with the directions of the superintendent, or to landings due to circumstances beyond the control of the operator.

(Section (c) concerns downed aircraft.)

(d) The use of aircraft shall be in accordance with regulations of the Federal Aviation Administration. Such regulations are adopted as a part of these regulations.

(e) The operation or use of hovercraft is prohibited.

(f) Violation of the terms and conditions of a permit issued in accordance with this section is prohibited and may result in the suspension or revocation of the permit.

3. Title 14 Code of Federal Regulations, Part 36 Appendix F: Noise Requirements For Propeller-Driven Small Airplanes

Appendix F prescribes limiting noise levels, and procedures for measuring noise and correcting noise data, for the propeller driven small airplanes specified in Section 1, Part 36 of Title 14. This appendix also includes: Section F36.101 General Test Conditions; Section F36.103 Acoustical Measuring Equipment; Section F36.105 Sensing, Recording, and Reproducing Equipment; Section F36.107 Noise Measurement Procedures; Section F36.109 Data Recording, Reporting, and Approval; and Section F36.111 Flight Procedures.

Section F36.301 (Aircraft Noise Limits) is of special interest. It is stated in paragraph (b) that "for airplanes for which application for a type certificate is made on or after October 10, 1973, the noise level must not exceed 68 dB(A) up to and including aircraft weights of 1,320 pounds (600 kg.). For weights greater than 1,320 pounds up to and including 3,630 pounds (1,650 kg.) the limit increases at the rate of 1 dB/165 pounds (1 dB/75 kg.) to 82 dB(A) at 3,630 pounds, after which it is constant at 82 dB(A) up to and including 12,500 pounds."

Paragraph (c) of Section F36.301 states that "for airplanes for which application for a type certificate is made on or after January 1, 1975, the noise levels may not exceed the noise limit curve prescribed in paragraph (b) of this section, except that 80 dB(A) may not be exceeded at weights from and including 3,300 pounds to and including 12,500 pounds."

4. The Aviation Safety and Noise Abatement Act of 1979 (P.L. 96-193) and FAR Part 150

The topic of noise metrics has traditionally involved a rather confusing proliferation of units and indices. In response to the requirements of this Act, the FAA established a single system of metrics for measuring and evaluating noise for land use planning and environmental impact assessment. The FAA also has another system of metrics which it employs for certification of commercial aircraft.

Years of experience in airport planning and development have resulted in guidelines which match uses of land with normally compatible noise levels; these guidelines are published in FAR Part 150: Airport Noise Compatibility Programs. Implementation of an FAR 150 Study assists airport operators and neighbors in minimizing the extent of non-compatible land uses.

APPENDIX V

FLIGHT-FREE AREA BOUNDARY DESCRIPTIONS

This appendix describes the horizontal, two-dimensional boundaries of the various proposed permanent and seasonal flight-free areas. Readers will find it helpful to refer to the Grand Canyon National Park Backcountry Use Area Map as well other park maps while reading the following descriptions. See the Alternatives section of this environmental assessment for altitude or vertical limits for these same areas.

A. Grand Canyon Village Flight-Free Area

The flight-free area surrounding Grand Canyon Village begins at the intersection of the East Rim Drive and Yaki Point road; this is a short distance southeast of where the head of the Pipe Creek drainage intersects the South Rim. From the road intersection, the flight-free area boundary proceeds north-northwest to the rim and then down Pipe Creek drainage to the Tonto Plateau. The boundary proceeds in a westerly direction, following the Tonto Trail, until reaching a point immediately north of Dana Butte. The boundary then turns south, passes through Dana Butte, following a ridgeline south up to Hopi Point. From Hopi Point the boundary continues due south until it intersects the old Santa Fe railroad tracks. The flight-free area boundary follows the railroad tracks in a southwesterly direction until reaching the park boundary. At that point, the flight-free area boundary turns due east (following the park boundary for about 2 miles), crosses the South Entrance Road, until it runs into the Uncle Jim Canyon dirt road. At that location the boundary turns north-northeast and goes direct to the intersection of the East Rim Drive and Yaki Point road (where this description began).

B. Desert View Flight-Free Area

The flight-free area around the Desert View developed area approximates a 3-mile diameter circle the center of which is located about one-half mile north of the Desert View Watchtower. The flight-free area extends as far east as the southeast head of Tanner Canyon; the western extremity is Lipan Point.

C. North Rim Flight-Free Area

The flight-free area surrounding the North Rim developed area begins at the Scenic Junction (where Highway 67 and the road to Cape Royal/Point Imperial intersect). From this point, the boundary proceeds southwest to the head of Transept Canyon. It then follows the North Rim to the southwest and then southeast to Oza Butte. From Oza Butte, the boundary extends along a ridgeline directly southeast until it intersects with the North Kaibab Trail. The flight-free area boundary then follows the North Kaibab Trail and later the old Bright Angel Trail in a northerly direction for about 3 miles. At that point the boundary cuts off the old Bright Angel Trail in a northwesterly direction, proceeding directly to the Scenic Junction (where this description began).

D. Thunder River/Deer Creek Flight-Free Area

The flight-free area around the Thunder River and Deer Creek region begins at Great Thumb Point, on Great Thumb Mesa. From Great Thumb Point, the boundary proceeds northeast to the Colorado River. From the river, the

boundary follows the southeast edge of the Tapeats backcountry use area (#22) until it intersects the Tapeats Amphitheatre use area (#21). From there the boundary arcs north-northwest until it reaches the North Rim at a point halfway between Crazy Jug and Monument Points. The flight-free area boundary then follows the park boundary, cutting across a portion of the North Rim in a northwesterly direction until it connects with the canyon rim at the head of Deer Creek. It continues to follow the park boundary to the west until reaching the Indian Hollow area and the westernmost Thunder River trailhead. From this trailhead the flight-free area boundary follows the western edges of the Esplanade (#25) and Deer Creek (#24) backcountry use areas to the Colorado River. From the river, the boundary crosses in a southwesterly direction until it intersects Tahuta Terrace. It then follows Tahuta Terrace up to the canyon rim, just west of Tahuta Point. The boundary proceeds from there east along the rim, past Tahuta Point and around to Great Thumb Point (where this description began).

E. Toroweap Flight-Free Area

The flight-free area around the Toroweap Overlook begins at the head of Saddle Horse Canyon, at the Esplanade level. Saddle Horse is a small canyon a little over one-half mile northeast of the Toroweap Overlook. From the head of Saddle Horse Canyon, the flight-free area boundary travels northwest across a short stretch of Esplanade before moving up and connecting with the rim of the Kanab Plateau at Toroweap Point (not to be confused with the lower, Esplanade-level Toroweap Overlook). From Toroweap Point on the Kanab Plateau the boundary continues northwest until intersecting the main Toroweap Valley dirt road. The boundary then turns southwest, following the edge of the eastern Toroweap Valley backcountry use area (#69) all the way to the Colorado River. The flight-free area boundary then follows the park boundary and Colorado River upstream to the Saddle Horse Canyon drainage. From there it turns northwest and travels up to the head of Saddle Horse Canyon (where this description began).

F. Hermit Creek to Kaibab Trail to North Rim Flight-Free Area

This flight-free area begins on the rim at the same point as the Grand Canyon Village Flight-Free Area (see A. above); i.e., at the East Rim Drive-Yaki Point road intersection. This is just southwest of the South Kaibab Trailhead. From this location, the boundary follows the Yaki Point road all the way out to Yaki Point. From Yaki Point, the boundary follows the eastern edge of the Corridor backcountry use area (#48) to the Colorado River, staying east of the South Kaibab Trail. From the Colorado River, the boundary follows the eastern edge of the Manzanita backcountry use area (#11), passing through Sumner Butte, Brahma and Deva Temples and intersecting the North Rim near Ariel Point. The boundary proceeds west and then north from Ariel Point around the canyon rim until it reaches the south side of the Greenland Spring use area (#12), near the head of Manzanita Creek. From that point on the canyon rim, the flight-free area boundary follows the southern edge of the Greenland Spring use area, and then proceeds direct to the Scenic Junction (where Highway 67 and the road to Cape Royal/Point Imperial meet). The boundary then travels slightly southwest until it joins the western edge of the Widforss backcountry use area (#63), and it follows this western edge all the way to the canyon rim near Widforss Point. From Widforss Point the boundary proceeds west along the rim about a mile and one-half, and then starts southwest across the Grand Canyon. From the North Rim to the Colorado River the boundary passes through The Colonnade, goes

northwest of Isis Temple, passes between Horus Temple and Tower of Set, reaching the Colorado River about a mile downstream from Ninety-four Mile Creek. The boundary proceeds from the Colorado River up the western edge of the Hermit backcountry use area (#50); this edge stays west of Hermit Creek and reaches the South Rim at Dripping Spring Trailhead. From the Dripping Spring Trailhead, the boundary travels due south to a corner of the park boundary (Township 31 North, Range 1 East, one-half mile down the western edge of Section 25). The flight-free area boundary then follows the park boundary from this corner one and one-half miles south and then due east six miles. From this location (the southeast corner of Section 35, Township 31 North Range 2 East) the flight-free area boundary extends another mile due east, crossing the South Entrance road, and intersecting with the Uncle Jim Canyon dirt road. The boundary then turns north-northwest and goes direct to the intersection of the East Rim Drive and Yaki Point road (where this description began).

G. Boucher to Red Canyon to North Rim Flight-Free Area

This flight-free area includes Clear Creek and Shiva Saddle, and begins on the East Rim Drive immediately adjacent to the New Hance Trailhead (near the head of Red Canyon); this point is located on the East Rim Drive nearly halfway between Moran Point and Sinking Ship Overlook. From this location, the boundary travels in a more or less direct manner across the Grand Canyon to Cape Royal. It follows the New Hance/Red Canyon Trail to the Colorado River and then passes through Sheba and Vishnu Temples before reaching the Cape Royal overlook. From Cape Royal the boundary travels west along the canyon rim until it reaches Ariel Point. The boundary proceeds west and then north from Ariel Point around the canyon rim until it reaches the south side of the Greenland Spring use area (#12), near the head of Manzanita Creek. From that point on the canyon rim, the flight-free area boundary follows the southern edge of the Greenland Spring use area, and then proceeds direct to the Scenic Junction (where Highway 67 and the road to Cape Royal/Point Imperial meet). The boundary travels slightly southwest until it joins the western edge of the Widforss backcountry use area (#63), and it follows this western edge all the way to the canyon rim near Widforss Point. From Widforss Point the boundary proceeds west along the rim nearly six miles, until it reaches a point where the west edge of the Phantom Creek backcountry use area (#15) meets the south edge of the Outlet use area (#64). From this point the boundary starts southwest across the Grand Canyon, passing northwest of Shiva Temple, and going through Claude Birdseye Point and the Tower of Ra. The boundary travels along a ridgeline extending southwest from the Tower of Ra and intersects the Colorado River at Boucher Rapids. From Boucher Rapids the boundary goes direct to Diana Temple and Mescalero Point. The flight-free area boundary then extends southeast in a straight line to a corner of the park boundary (Township 31 North, Range 1 East, one-half mile down the western edge of Section 25). The flight-free boundary then follows the park boundary from this corner one and one-half miles south and then due east six miles. From this location (the southeast corner of Section 35, Township 31 North Range 2 East) the flight-free area boundary extends another mile due east, crossing the South Entrance road, and intersecting with the Uncle Jim Canyon dirt road. From this point the boundary turns north-northwest and goes direct to the intersection of the East Rim Drive and Yaki Point road. The boundary then follows the East Rim Drive about 14 miles east to a point immediately adjacent to the New Hance Trailhead (where this description began).

G. Nankoweap to Red Canyon Flight-Free Area

This flight-free area begins on the East Rim Drive immediately adjacent to the New Hance Trailhead (near the head of Red Canyon); this point is located on the East Rim Drive nearly halfway between Moran Point and Sinking Ship Overlook. From this location, the boundary travels in a more or less direct manner across the Grand Canyon to Cape Royal. It follows the New Hance/Red Canyon Trail to the Colorado River and then passes through Sheba and Vishnu Temples before reaching the Cape Royal overlook. From Cape Royal the boundary follows the paved road north to Point Imperial. From Point Imperial the flight-free area boundary follows the canyon rim to the northwest until it intersects the park boundary. The flight-free boundary travels along the park boundary and then the northern edge of the Nankoweap backcountry use area (#5) until it reaches the Colorado River. From the river the boundary jumps up to the east rim of the Grand Canyon (southern extremity of Marble Canyon), and follows this rim in a southerly direction to the Little Colorado Confluence. The boundary passes east of the confluence and ascends back up to the canyon rim at Cape Solitude. From Cape Solitude the boundary follows the canyon rim south along the Palisades of the Desert until it reaches Desert View. The boundary then follows the East Rim Drive about nine and one-half miles west to a point immediately adjacent to the New Hance Trailhead (where this description began).

H. South Bass to Boucher Flight-Free Area

This flight-free area begins at the Pasture Wash Ranger Station, about three and one-half miles southwest of the South Bass Trailhead. From the ranger station the boundary proceeds in a northerly direction along part of the South Bass Trailhead dirt road, intersecting the canyon rim about one-half mile west of the South Bass Trailhead. From this point on the rim the boundary works its way across the Grand Canyon, over to Masonic Temple on the eastern side of Powell Plateau. As it crosses the Grand Canyon, the boundary passes through Mt. Huethawali and the Evolution Amphitheater, and descends down Copper Canyon to the Colorado River. From the river the boundary follows the terrain upwards to Fan Island and Masonic Temple. The boundary extends from Masonic Temple to Dutton Point and then follows the canyon rim to Muav Saddle. Just west of Muav Saddle the boundary continues slightly northwest and then arcs around to Swamp Point, so that Muav Saddle itself is south of the flight-free area boundary. From Swamp Point the boundary follows the rim of the canyon all the way east to a point where the northwestern edge of the Phantom Creek backcountry use area (#15) meets the southern edge of the Outlet use area (#64), just west of Tiyo Point. From this location the boundary starts southwest across the Grand Canyon, passing northwest of Shiva Temple, and going through Claude Birdseye Point and the Tower of Ra. The boundary travels along a ridgeline extending southwest from the Tower of Ra and intersects the Colorado River at Boucher Rapids. From Boucher Rapids the boundary goes direct to Diana Temple and Mescalero Point. The flight-free area boundary then extends southeast in a straight line to a corner of the park boundary (Township 31 North, Range 1 East, one-half mile down the western edge of Section 25). From this corner of the park the flight-free boundary extends northwest in a straight line to the Pasture Wash Ranger Station (where this description began).

I. Kanab Creek Flight-Free Area

This flight-free area begins at Kanab Point on the eastern extremity of the Kanab Plateau. From Kanab Point south to the Colorado River the boundary is aligned with the Kanab Creek backcountry use area (#27), following

the canyon rim and passing through Paguekwash Point on the way. The flight-free area boundary continues to follow the southern edge of the Kanab Creek use area up the Colorado River over to the northwest corner of Fishtail Mesa. From this northwest corner the boundary leaves the edge of the Kanab Creek use area and proceeds northwest directly to the Jumpup Canyon and Kanab Creek confluence. The boundary again conforms with the western portion of the Kanab Creek backcountry use area and follows it around to Kanab Point (where this description began).

J. Tuckup Flight-Free Area

This flight-free area begins at SB Point, a southern projection of the Kanab Plateau, located about four miles northeast of The Dome (referred to as Shiprock by pilots). From SB Point the boundary follows the rim of the Kanab Plateau to the north and west until it reaches a point immediately north of Cove Canyon. The boundary leaves the rim at this point and descends Cove Canyon to the Colorado River. The boundary then follows the Colorado River upstream until reaching the Cork Spring drainage (about a mile below Havasu Rapids). The boundary turns northwest up the Cork Spring drainage, passes through Cork Spring, and continues upward to the rim of the Kanab Plateau. From that point the boundary follows the rim of the plateau to the southwest until it reaches SB Point (where this description began).

PLANNING TEAM

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| Richard W. Marks | Superintendent |
| Steve Hodapp | Chief, Division of Resources Management and Planning |
| C.R. Farabee | Management Assistant (after August 1985) |
| Bill Dickinson | Management Assistant (before August 1985) |
| Rick Ernenwein | Resources Management Specialist |
| Mike Ebersole | Tuweep Subdistrict Ranger, Park Pilot |
| Gina Dupuy | Resources Management Assistant |