3.12 VISUAL RESOURCES

3.12.1 INTRODUCTION

This visual resource analysis addresses the scenic resources at Lake Mead and Lake Powell. The analysis centers on the potential effects of increased shoreline exposure that could result from implementation of the interim surplus criteria alternatives considered in this document.

3.12.2 METHODOLOGY

The evaluation of the effects of the alternatives on the visual resources is based on an assessment of the changes in reservoir shorelines caused by potential decreases in reservoir water surface elevations. More precisely, the modeling indicates the increased range of water level swings between the highs when reservoirs are full and the lows that could occur when Colorado River Basin natural runoff is low. The potential water level lows have been described in Section 3.3 in terms of probability of occurrence, based on operation model output. Consequently the visual effects are also presented in terms of the probabilities of shoreline changes. Owing to the subjective nature of visual qualities, this analysis is presented as a qualitative assessment of potential visual effects.

Changes in water elevation have differing effects on the amount of exposed shoreline depending on topography; the analysis relates the changes in lake levels to shoreline topography. The shoreline changes were interpreted from existing topographic maps. The description of the affected environment is derived from NPS documents and commercial maps and literature describing scenery in the LMNRA and the GCNRA.

3.12.3 AFFECTED ENVIRONMENT

Both Lake Mead and Lake Powell are situated in desert areas of the Colorado River Basin. While the desert vistas at the reservoir sites have a certain scenic attractiveness of their own, the reservoirs have added a contrasting visual element that increases the visual attractiveness of the areas, which are now dedicated as national recreation areas. The uniqueness of the reservoirs with their contrasting surroundings has been widely illustrated in travel and vacation literature, and have formed well known visual images which help to draw multi-day visitors seeking water related recreation, and touring motorists making day visits.

The reservoir water levels fluctuate both yearly and, to a lesser degree, seasonally. During high runoff years reservoir inflows exceed the required releases and water is stored, causing the water level to rise. During lower runoff years, when releases are greater than inflows, water levels decline. The effects of water level changes on

visual qualities in the GCNRA and LMNRA depend greatly on the distance from which the shoreline is viewed, and the type of topography forming the shoreline.

3.12.3.1 LAKE POWELL

Glen Canyon National Recreation Area is located in the Canyonlands area of the Colorado Plateau. The plateau includes parts of Utah, Colorado, New Mexico, and Arizona and is drained by the Colorado River and its many tributaries. The primary attraction of the GCNRA is Lake Powell, a 186-mile-long reservoir on the Colorado River that is formed by Glen Canyon Dam. Lake Powell extends along what was once the Colorado River, through Glen Canyon and numerous side canyons to form more than 1,960 miles of reservoir shoreline. Recreationists enjoy exploring the endless side channels and canyons of the reservoir by boat, often spending several days on the water in houseboats or camping in remote areas. The combined qualities of visual attractiveness and branching waterways create an attraction for many recreationists.

3.12.3.1.1 Landscape Character

In "carving" out the canyon landforms, the Colorado River and its tributaries formed a labyrinthine pattern of deep twisted canyons whose towering walls exhibit the geologic history of the region. The sedimentary rock formations show multihued sandstone and limestone layers and changes color under differing sun angles occurring during the day. Much of the land surface is bare rock with no soil cover. With little soil cover or moisture, there is minimal vegetation and little relief from the sun and the winds that blow across the vast plateau. Consequently, the terraced plateau landscape above the canyon walls displays the vast expanse of red sandstone and limestone. These red, orange and beige rock formations result in a dramatic landscape of towering rock spires, undulating plateaus of slick rock and steep-sided canyons. Since the filling of Lake Powell several decades ago, a dramatic contrast to this arid red rock environment evolved in the form of the deep blue waters of Lake Powell, with their erratic patterns on the landscape likened to a blue lightening bolt in the red-orange desert. Secluded side canyons support cottonwoods and poplars because of the shelter from the wind provided by the canyon walls, and presence of water from tributaries. Tamarisk, a non-native, invasive species, thrives along the lakeshore and in stream bottoms, wherever it can find abundant water, forming a ring of green vegetation along the less steep slopes of the reservoir. The reservoir and its protected surroundings in the GCNRA form a valued recreation resource.

3.12.3.1.2 Sensitive Viewing Locations

The shoreline of Lake Powell and its adjacent landscape is can be viewed from the surrounding land at Glen Canyon Dam and its vicinity and from limited areas of the canyon rim, notably the recreation-oriented area extending up stream of the lake from the west end of the dam.

Access by boat permits the greatest amount and variety of scenic vistas; boaters generally look forward to viewing canyon scenery during their visit to the area. The vistas are relatively short in relation to the surface area of the lake, because of the sinuous shape of the lake, and the fact that much of the area lies in side canyons and isolated basins along the meandering course of the former Colorado River corridor.

When Lake Powell water level declines, a white band of calcium carbonate appears on rock surfaces where cliffs or rocky slopes form the reservoir rim. In areas where the lakeshore consists of sand and gravel, an exposed beach belt emerges.

3.12.3.2 LAKE MEAD

3.12.3.2.1 Landscape Character

Lake Mead is situated in the northern part of the Mojave Desert and is surrounded by an austere desert landscape. The lake extends about 66 miles upstream from Hoover Dam and has about 695 miles of irregular shorelines with large bays and small coves.

Lake Mead is framed by low mountains with jagged rocky faces and profiles. Intervening canyons and washes provide variation to the terrain, with the combination presenting an interesting rugged type of scenery for many visitors. While the landscape at midday is relatively subdued in terms of color, the contrast with the blue water of the lake provides an appealing scenic area for visitors. Moreover, the contrasting "moods" of the surrounding desert visible between sunrise and sunset create memorable scenic experiences.

3.12.3.2.2 Sensitive Viewing Locations

The portion of the Colorado River corridor where Lake Mead is located consists of alternating narrow rocky canyons and wide alluvial basins. Most of the lake and its shoreline is visible only to people at widely scattered access points and from boats on the lake. The major exceptions are the broad Hemenway Wash area on the west side of the Boulder Basin of the lake, the Las Vegas Bay area on the west side of Boulder Basin, and Hoover Dam.

The Hemenway wash area is a broad colluvial fan extending upslope from the lake to the River Mountains on the west, with one contiguous area named Hemenway Valley extending upslope southward and forming the northern part of Boulder City. At the lake shore, the broad expanse of gradually sloping desert terrain has been developed into a series of water-based recreation areas, consisting of, in a northward direction, Hemenway boat launching area and water craft area (boating area with launching ramps, docks, and shoreline areas designated for personal water craft use), the Boulder Beach area, a largely unimproved gravel beach area for recreation including swimming, windsurfing and sunbathing, with an adjacent overnight campground and

a mobile home community, and then the Lake Mead Marina, providing a boat berthing area, restaurant, and boat launching and docking facilities.

Westerly of the shoreline area, up the sloping desert terrain, is the boundary between the LMNRA and the beginning of the Hemenway Valley section of Boulder City. This area has been extensively developed with condominiums and homes ranging in price up to millions of dollars, with much of the area having been developed to take advantage of lake vistas and views of the surrounding hills and desert landforms.

Las Vegas Bay to the north is a relatively narrow area of Lake Mead that is the initial vista presented to people driving to the lake from the Las Vegas Valley. Vistas of the lake are distant because the roads serving the area tend to be on benches above the lake from which direct views of the shoreline are distant and intermittent. Hoover Dam is at the south end of a narrow, steep-walled canyon, which is visible only from the dam and the Arizona abutment and visitor parking areas.

When Lake Mead water level declines, two elements of the area's vista are readily visible. One element is the exposed beach belt around the perimeter of the reservoir where the bottom consists of sand and gravel. The other element is a white band of calcium carbonate on rock surfaces where cliffs or rocky slopes form the reservoir rim.

3.12.4 ENVIRONMENTAL CONSEQUENCES

3.12.4.1 BASELINE CONDITIONS

3.12.4.1.1 Lake Powell

The water surface elevation of Lake Powell under baseline conditions would fluctuate between full level and lower levels, with the amount and duration of fluctuations depending on natural runoff in the Colorado River system. Moreover, the potential range of fluctuations would increase with the passage of time as the Upper Divisions states increase their use of river water. An annual fluctuation of approximately 20 feet is projected, in step with the seasonal runoff cycle. Considering the annual fluctuation, the "current" Lake Powell elevation for this analysis is considered to be an average of approximately 3690 feet msl.

While the timing of major water level variations can not be predicted, nor the length of time the water level would remain at the full level or at any other specific level, the probable range of future water levels has been estimated by the model. As shown on Figure 3.3-6, the median water level decline would be 20 feet below the current level by the end of 15 years, after which the median decline could be as low as 40 feet by the end of 50 years. There is also a 10 percent probability that the water level would decline as much as 70 feet below the current level by the end of 15 years, and as much as 110 feet by the end of 50 years. However, as noted above,

these lows would be temporary, with a likelihood that the reservoir level would fluctuate up to full level as natural runoff returned to average conditions or greater. The declines cited above represent the average water levels under an annual 20-foot variation.

The visual consequences of such water level declines would affect boaters viewing two types of shoreline. First, colorful sandstone canyon walls could show a white band of calcium carbonate deposit between the full water level and the lower water level, which would detract from the visual contrast of rock and water. Second, the shoreline areas consisting of sandy or gravelly desertscapes with their unique desert vegetation would be altered by the interposition of a beach belt of sand and gravel between the full water level and the lower water level. This could also alter the contrasting contact between the blue water and the natural desert, and in some cases, distance boaters from the natural terrain.

3.12.4.1.2 Lake Mead

As described in Section 3.3, the water surface elevation of Lake Mead under baseline conditions would fluctuate between a full pool and increasingly lower lake levels, with the amount and duration of fluctuations depending on natural runoff in the Colorado River system. The potential range of fluctuations would increase with the passage of time as the Upper Division states increase their use of river water. While the timing of major water level variations can not be predicted, nor the length of time the water level would remain at the full level or at any other specific level, the probable range of water levels has been estimated by the model. An annual fluctuation of up to 20 feet is projected, in step with the seasonal runoff cycle. Considering the annual fluctuation, the "current" Lake Mead elevation for this analysis is considered to be an average of approximately 1215 feet msl.

The results of modeling for the baseline indicate that median water level would decline 45 feet below the current level by the end of 15 years, after which the median decline would increase to 90 feet by the end of 50 years. There is also a 10 percent probability that the median water level would decline as much as 85 feet below the current level by the end of 15 years, and then continue a gradual decline to 200 feet by the end of 50 years. However, as noted above, these lows would be temporary, with the probability that the level of Lake Mead would again rise and at times refill as natural runoff returns to average conditions or greater.

The visual effect of such a decline perceived by the public would vary depending on the proximity to the reservoir. Persons close to, or on, Lake Mead would perceive that the water level had dropped greatly. However, along most of the alluvial shoreline the exposed bottom would exhibit expanses of gravel. Boaters viewing cliff shorelines would see a band of white calcium carbonate deposits that would probably detract from their appreciation of the rock walls. Persons outside the LMNRA could notice a reduction in reservoir level, depending on their distance

from the lake and the degree of visibility of the lake shore. However, beyond the alteration of the water shoreline and the increased prominence of islands and outcrops in the lake, no degradation of the viewshed would be anticipated.

3.12.4.2 FLOOD CONTROL ALTERNATIVE

3.12.4.2.1 Lake Powell

The results of modeling for this alternative indicate that median water level would decline 20 feet below the current level by the end of 15 years, after which the median decline would be as low as 40 feet by the end of 50 years. There is also a 10 percent probability that water levels would temporarily decline as much as 70 feet below the current level by the end of 15 years, and continue a gradual decline to 110 feet by the end of 50 years. However, as noted above, these lows would be temporary, with a likelihood that the reservoir level would fluctuate up to full level as natural runoff returns to average conditions or greater. The declines cited above represent the average water levels under an annual 20-foot variation.

The visual consequences of such water level declines would involve the same scenic changes described above for baseline conditions. The degree of visual change between this alternative and baseline conditions is not expected to be noticeable to the viewer.

3.12.4.2.2 Lake Mead

The results of modeling for this alternative indicate that median water level would decline 45 feet below the current level by the end of 15 years, after which the median decline would increase to 90 feet by the end of 50 years. There is also a 10 percent probability that water level would temporarily decline as much as 85 feet below the current level by the end of 15 years, and then continue a gradual decline to 200 feet by the end of 50 years.

The visual consequences of such water level declines would involve the same scenic changes described above for baseline conditions. The degree of visual change between this alternative and baseline conditions is not expected to be noticeable to the viewer.

3.12.4.3 SIX STATES ALTERNATIVE

3.12.4.3.1 Lake Powell

The results of modeling for this alternative indicate that median water level would decline 35 feet below the current level by the end of 15 years, after which the median decline would gradually lessen to 40 feet by the end of 50 years. There is also a 10 percent probability that water level would temporarily decline as much as 80 feet

below the current level by the end of 15 years, and continue a gradual decline to 110 feet by the end of 50 years. However, as noted above, these lows would be temporary, with a likelihood that the reservoir level would fluctuate up to full level as natural runoff returns to average conditions or greater. The declines cited above represent the average water levels under an annual 20-foot variation.

The visual consequences of such water level declines would involve the same scenic changes described above for baseline conditions. The degree of visual change between this alternative and baseline conditions is not expected to be noticeable to the viewer.

3.12.4.3.2 Lake Mead

The results of modeling for this alternative indicate that median water level would decline 55 feet below the current level by the end of 15 years, after which the median decline would increase to 90 feet by the end of 50 years. There is also a 10 percent probability that water level would temporarily decline as much as 95 feet below the current level by the end of 15 years, and then continue a gradual decline to 200 feet by the end of 50 years.

The visual consequences of such water level declines would involve the same scenic changes described above for baseline conditions. The degree of visual change between this alternative and baseline conditions is not expected to be noticeable to the viewer.

3.12.4.4 CALIFORNIA ALTERNATIVE

3.12.4.4.1 Lake Powell

The water surface elevation of Lake Powell under baseline conditions would fluctuate between full level and lower levels, with the amount and duration of fluctuations depending on natural runoff in the Colorado River system. The potential range of fluctuations would increase with the passage of time as the Upper Divisions states increase their use of river water. An annual fluctuation of 20 feet routinely occurs, in step with the seasonal runoff cycle.

While the timing of major water level variations can not be predicted, nor the length of time the water level would remain at the full level or at any other specific level, the probable range of future water levels has been estimated. The modeling results for this alternative indicate that median water level would decline 40 feet below the current level by the end of 15 years, after which the median decline could be as much as 40 feet. There is also a 10 percent probability that the water level would decline as much as 80 feet below the current level by the end of 15 years, and continue a gradual decline to 110 feet by the end of 50 years. However, as noted above, these lows would be temporary, with a likelihood that the reservoir level would fluctuate

up to full level as natural runoff returned to average conditions or greater. The declines cited above represent the average water levels under an annual 20-foot variation.

The visual consequences of such water level declines would involve the same scenic changes described above for baseline conditions. The degree of visual change between this alternative and baseline conditions is not expected to be noticeable to the viewer.

3.12.4.4.2 Lake Mead

The results of modeling for this alternative indicate that median water level would decline 60 feet below the current level by the end of 15 years, after which the median decline would increase to 90 feet by the end of 50 years. There is also a 10 percent probability that water level would temporarily decline as much as 95 feet below the current level by the end of 15 years, and continue a gradual decline to 200 feet by the end of 50 years.

The visual consequences of such water level declines would involve the same scenic changes described above for baseline conditions. However, the degree of visual change between this alternative and baseline conditions is not expected to be noticeable to the viewer.

3.12.4.5 SHORTAGE PROTECTION ALTERNATIVE

3.12.4.5.1 Lake Powell

The results of modeling for this alternative indicate that median water level would decline 50 feet below the current level by the end of 15 years, after which the median decline would gradually lessen to 20 feet by the end of 50 years. There is also a 10 percent probability that the water level would decline as much as 90 feet below the current level by the end of 15 years, and continue a gradual decline to 110 feet by the end of 50 years. However, as noted above, these lows would be temporary lows, with a likelihood that the reservoir level would fluctuate up to full level as natural runoff returned to average conditions or greater. The declines cited above represent the average water levels under an annual 20-foot variation.

The visual consequences of such water level declines would involve the same scenic changes described above for baseline conditions. The degree of visual change between this alternative and baseline conditions is not expected to be noticeable to the viewer.

3.12.4.5.2 Lake Mead

Under this alternative, the probable range of Lake Mead water level fluctuation would be greater than under baseline conditions because of the increased diversions by the Lower Division states compared to baseline conditions. The results of model operation under this alternative indicate that median water level would decline 50 feet below the current level by the end of 15 years, after which the median decline would gradually lessen to 20 feet by the end of 50 years. There is also a 10 percent probability that the water level would decline as much as 90 feet below the current level by the end of 15 years, and continue a gradual decline to 110 feet by the end of 50 years.

The visual consequences of such water level declines would involve the same scenic changes described above for baseline conditions. The degree of visual change between this alternative and baseline conditions is not expected to be noticeable to the viewer.