

APPENDIX M



Regional Recreation

ENTRIX

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Appendix M Regional Recreation

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Appendix M Introduction

Recreation is a key economic industry for the Tribe, as well as the regional economies of Pinetop-Lakeside, Show low, Taylor, and Snowflake.¹ The Sunrise ski area, which is owned and operated by the Tribe, has been linked to major economic activity in the area in the winter. The White Mountain area is popular during the rest of year too, especially with retirees, a sector that continues to grow as a share of the Arizona population (see *Demographic Profile of the Fort Apache Indian Reservation* for more information). Regional recreation attractions that bring visitors to the area include two national forests bordering the Reservation; the Hon-Dah Casino, which is owned and operated by the Tribe; the Apache Cultural Center on the Reservation; and numerous restaurants and amenities that have developed to serve the visitor populations in the local towns. The White Mountain area of Arizona has long been a place where city and valley dwellers from Phoenix and Tucson travel to get away from the heat of the cities and enjoy the cool natural beauty of the pine forests.

Recreation revenues for the Tribe stem from the numerous recreational programs, such as world famous Trophy Elk hunts and the popular Sunrise Ski Area. Details of these programs are provided below. A separate section describes the Alchesay-Williams Creek (A-WC) fish hatchery, and the unique role that the hatchery plays in supporting fishing recreation on the Reservation. The current status of the recreation sector is demonstrated through the presentation of responses to visitor creel data developed over the past five years.

¹ Gibson, Lay James, Bryant Evans, Andrew Grogan, October 2001, *White Mountain Winter Tourism Study: Evaluating the Efficacy of Regional Investment Opportunity*, University of Arizona, Economic Development Research Program.

M.1 Tonto National Forest

The Fort Apache Indian Reservation is bordered on the west by the three million acre Tonto National Forest. The watersheds of Salt and Verde rivers are located inside the National Forest. These rivers, and the six man-made reservoirs associated with them, are the key attractions for visitors to the area. In fact, the creation of the National Forest in 1905 was a consequence of the construction of Roosevelt Dam and Reservoir. The Tonto National Forest is the fifth largest national forest in the United States. With an annual visitation of 5.8 million people, it enjoys the status of one of the most-visited “urban” forests.

There are tremendous recreation opportunities along the lakes, such as fishing and boating. These lakes have a combined capacity of two million acre-feet of water and are abundant with fish species. About 400 vertebrate species (fish as well as other animals) are found in the National Forest, including 21 that are listed as threatened or endangered under the Endangered Species Act (ESA). In addition to the six lakes, some prominent peaks, the variety of vegetation, and the variation in altitude between 1,300 and 7,900 feet also attract visitors year round for hiking, camping, sightseeing, etc. There are eight Wilderness Areas in the National Forest, comprising 589,600 acres.

According to the 2002 National Visitor Use Monitoring (NVUM) survey for the Tonto National Forest, there were more than 5.7 million national forest visits and 6.2 million site visits (an average of 1.1 site visits per national forest visit). The site visits also included almost 110,000 Wilderness visits (see Table M-1). NVUM defines a national forest visit as the entry of one person upon a national forest to participate in recreation activities for an unspecified period of time. A national forest visit can be composed of multiple site visits. A site visit is defined as the entry of one person onto a national forest site or area to participate in recreation activities for an unspecified period of time. Estimates of visitation for the sampled year are within 15 percent of actual visitation, at the 80-percent confidence level.²

Table M-1
Annual Tonto National Forest recreation use estimate

National Forest Visits	Site Visits	Wilderness Visits
5,745,937	6,246,766	109,381

Source: 2002 National Visitor Use Monitoring Survey for Tonto National Forest

On average, a national forest visit to the Tonto National Forest in 2002 lasted 13.8 hours. Over 27 percent of visitors stayed overnight in the national forest. Table M-2 presents the

² English, Donald B.K. et al, “Forest Service National Visitor Use Monitoring Process: Research Method Documentation”, United States Forest Service Southern Research Station, General Technical Report, SRS-57.

variation in visit duration by site. Additionally, the average recreation visitor went to 1.1 sites during their national forest visit, with 91 percent visiting only the site at which they were interviewed. There are five basic categories of sites: Day Use Developed Sites (DUDS), Overnight Use Developed Sites (OUDS), Wilderness, General Forest Areas (GFA), and View Corridors (VC). Only the first four categories are considered “true” national forest visits and were included in the estimate provided.

Table M-2
Site visit length of stay (in hours) by site type
at the Tonto National Forest

Site Visit Average	DUDS	OUDS	Wilderness	GFA
14.3	3.0	19.8	6.5	16.5

Source: 2002 National Visitor Use Monitoring Survey for Tonto National Forest

Table M-3 presents the recreation activities of visitors to the Tonto National Forest in 2002. The most popular visitor activities included viewing natural features, viewing wildlife, relaxing, hiking/walking, and driving for pleasure. Additionally, camping in developed campgrounds, driving for pleasure, hunting, hiking/walking, and off-highway vehicle travel were the leading primary activities of these visitors.

Table M-3
Tonto National Forest activity participation and primary activity

Activity	Percent participation	Percent who said it was their primary activity*
Camping in developed sites (family or group)	15.8	13.9
Primitive camping	11.4	3.4
Backpacking, camping in unroaded areas	3.2	1.3
Resorts, cabins and other accommodations on Forest Service managed lands (private or Forest Service run)	1.0	0.4
Picnicking and family day gatherings in developed sites (family or group)	13.5	3.5
**Viewing wildlife, birds, fish, etc on national forest system lands	53.7	4.8
**Viewing natural features such as scenery, flowers, etc on national forest system lands	61.6	6.3
Visiting historic and prehistoric sites/area	14.1	3.5
Visiting a nature center, nature trail or visitor information services	3.3	0.2
Nature study	3.7	0.4
General/other- relaxing, hanging out, escaping noise and heat, etc,	53.0	8.8
Fishing- all types	11.2	8.4
Hunting- all types	11.4	10.1
Off-highway vehicle travel (4-wheelers, dirt bikes, etc)	16.7	9.5
Driving for pleasure on roads	38.3	10.8
Snowmobile travel	0.0	0.0
Motorized water travel (boats, ski sleds, etc)	8.6	4.4
Other motorized land/air activities (plane, other)	0.1	0.0
Hiking or walking	41.3	9.8
Horseback riding	3.7	3.0
Bicycling, including mountain bikes	0.9	0.6
Non-motorized water travel (canoe, raft, etc.)	1.9	1.1
Downhill skiing or snowboarding	0.1	0.0
Cross-country skiing, snow shoeing	0.0	0.0
Other non-motorized activities (swimming, games and sports)	8.0	2.3
Gathering mushrooms, berries, firewood, or other natural products	4.1	0.8

* This column totals over 100 percent because some visitors selected more than one activity.
Source: 2002 National Visitor Use Monitoring Survey for Tonto National Forest

M.2 Apache-Sitgreaves National Forest

The Apache and Sitgreaves were two separate national forests prior to being administratively combined in 1974. The 2 million acre National Forest is located in east-central Arizona along the Mogollon Rim and the White Mountains, and borders the Fort Apache Indian Reservation on the Reservation's north and east. With 34 lakes and reservoirs and more than 680 miles of rivers and streams, the National Forest is known for its water and is a popular site for fishermen.

The Sitgreaves part of the National Forest has eight popular man-made cold-water lakes, while the Apache is noted for its trout streams and high elevation lakes and meadows. The Mogollon Rim, with its 7,600 feet elevation, offers great views of the low country to the south and west. The area known as the White Mountains of Arizona (from Mount Baldy east to Escudilla Mountain) is also located in the Apache-Sitgreaves National Forest.

According to the 2001 National Visitor Use Survey, recreation use on the Apache-Sitgreaves National Forest was 2.0 million national forest visits in 2001. There were 2.4 million site visits with an average of 1.2 site visits per national forest visit. The site visits also included more than 45,000 visits to Wilderness Areas (see Table M-4).

Table M-4
Annual Apache-Sitgreaves
National Forest recreation use estimate

National Forest Visits	Site Visits	Wilderness Visits
1,976,149	2,391,594	45,690

Source: 2001 National Visitor Use Monitoring Survey for Apache-Sitgreaves National Forest

On average, a national forest visit to the Apache-Sitgreaves National Forest lasted 42.3 hours in 2001, with more than 50 percent (51.6%) of visitors staying overnight. Table M-5 illustrates the variation in average time spent in the Forest by site. Additionally, while the average recreation visitor went to 1.2 sites during a national forest visit, 85 percent of the visitors went only to the site at which they were interviewed.

Table M-5
Site visit length of stay (in hours) by site/type on the
Apache-Sitgreaves National Forest

Site Visit Average	DUDS	OUDS	Wilderness	GFA
40.4	7.2	66.8	4.6	66.8

Source: 2001 National Visitor Use Monitoring Survey for Apache-Sitgreaves National Forest

Visitors to the National Forest identified relaxing, viewing natural features, viewing wildlife, hiking/walking, and driving for pleasure as the leading recreation activities in the National Forest during 2001 (see Table M-6). Additionally, the top primary activities were relaxing, fishing, hiking/walking, and developed camping.

**Table M-6
Apache-Sitgreaves National Forest activity participation and primary activity**

Activity	Percent participation	Percent who said it was their primary activity*
Camping in developed sites (family or group)	35.7	7.2
Primitive camping	19.4	3.3
Backpacking, camping in unroaded areas	4.0	0.1
Resorts, cabins and other accommodations on Forest Service managed lands (private or Forest Service run)	13.7	0.0
Picnicking and family day gatherings in developed sites (family or group)	47.8	1.5
Viewing wildlife, birds, fish, etc on national forest system lands	73.5	1.0
Viewing natural features such as scenery, flowers, etc on national forest system lands	79.3	3.5
Visiting historic and prehistoric sites/area	11.0	0.1
Visiting a nature center, nature trail or visitor information services	18.3	0.5
Nature study	4.8	0.0
General/other- relaxing, hanging out, escaping noise and heat, etc,	84.2	41.3
Fishing- all types	50.5	19.6
Hunting- all types	3.0	1.3
Off-highway vehicle travel (4-wheelers, dirt bikes, etc)	11.3	4.0
Driving for pleasure on roads	53.3	3.2
Snowmobile travel	0.0	0.0
Motorized water travel (boats, ski sleds, etc)	6.8	0.2
Other motorized land/air activities (plane, other)	1.1	0.0
Hiking or walking	62.2	8.7
Horseback riding	3.4	0.4
Bicycling, including mountain bikes	11.5	0.3
Non-motorized water travel (canoe, raft, etc.)	6.4	0.0
Downhill skiing or snowboarding	0.1	0.0
Cross-country skiing, snow shoeing	0.0	0.0
Other non-motorized activities (swimming, games and sports)	6.9	0.9
Gathering mushrooms, berries, firewood, or other natural products	27.6	0.2

* This column may not total 100 percent because some visitors selected more than one activity.
Source: 2001 National Visitor Use Monitoring Survey for Apache-Sitgreaves National Forest

M.3 Pinetop-Lakeside Community

The Pinetop-Lakeside community and the City of Show Low are nearby towns that reflect the growing interest in tourism and seasonal residences in the White Mountain area. Population growth in these towns has been between three and four percent annually for the past 15 years. In Pinetop-Lakeside, new building permits increased annually by 9.7 percent from 2000 to 2004 while taxable sales expanded by 7.4 percent annually during the same period. Employment in Pinetop-Lakeside community shows that the accommodations and food services sectors are the second largest employers in the town after government agencies. Retail trade and construction also provide substantial employment opportunities for the residents, since a growing 42 percent of single-family housing units are seasonal³ (see *Demographic Profile of the Fort Apache Indian Reservation* for more information). Just under 50 percent of employment is connected with tourism.⁴

Similar to Pinetop-Lakeside, tourism and recreation also play a significant role in the economy of the City of Show Low. Housing permits increased at an annual rate of 6.3 percent between 2000 and 2004 and taxable sales increased at a rate of 5.5 percent per year during the same period. In Show Low, 27 percent of single-family housing units are used seasonally in the city of Show Low. Construction, retail sales, and accommodations and food services are also high employment sectors for Show Low. Recreation accounts for over 35 percent of employment in Show Low.

M.4 Summary of Regional Recreation

People come to White Mountains to beat the heat in the metropolitan areas of Phoenix and Tucson. The two National Forests that border the Reservation generate nearly 8 million visitors annually, primarily to enjoy nature through walking, hiking, wildlife viewing and camping. The many lakes and reservoirs in the area provide fishing, boating, and swimming to tourists. Complementing the outdoor recreation available in the area, the Tribe's Hon-Dah Casino attracts visitors for gaming and conference facilities. The local towns of Pinetop/Lakeside, Show Low, Snowflake, Taylor,

³ Arizona Department of Commerce, June 2004, "Economy of Show Low (Zip Codes 85901, 85902, and 85912)."

⁴ Gibson, Lay James, Bryant Evans, Andrew Grogan, October 2001, *White Mountain Winter Tourism Study: Evaluating the Efficacy of Regional Investment Opportunity*, University of Arizona, Economic Development Research Program.

Springerville, and Eager are economically dependent on tourism with an overall 30 percent of employment occurring in the tourism sector. These towns are enjoying rapid economic growth as the tourism sector expands with the growing populations of Phoenix and the State of Arizona.

APPENDIX N



Recreation on the Reservation

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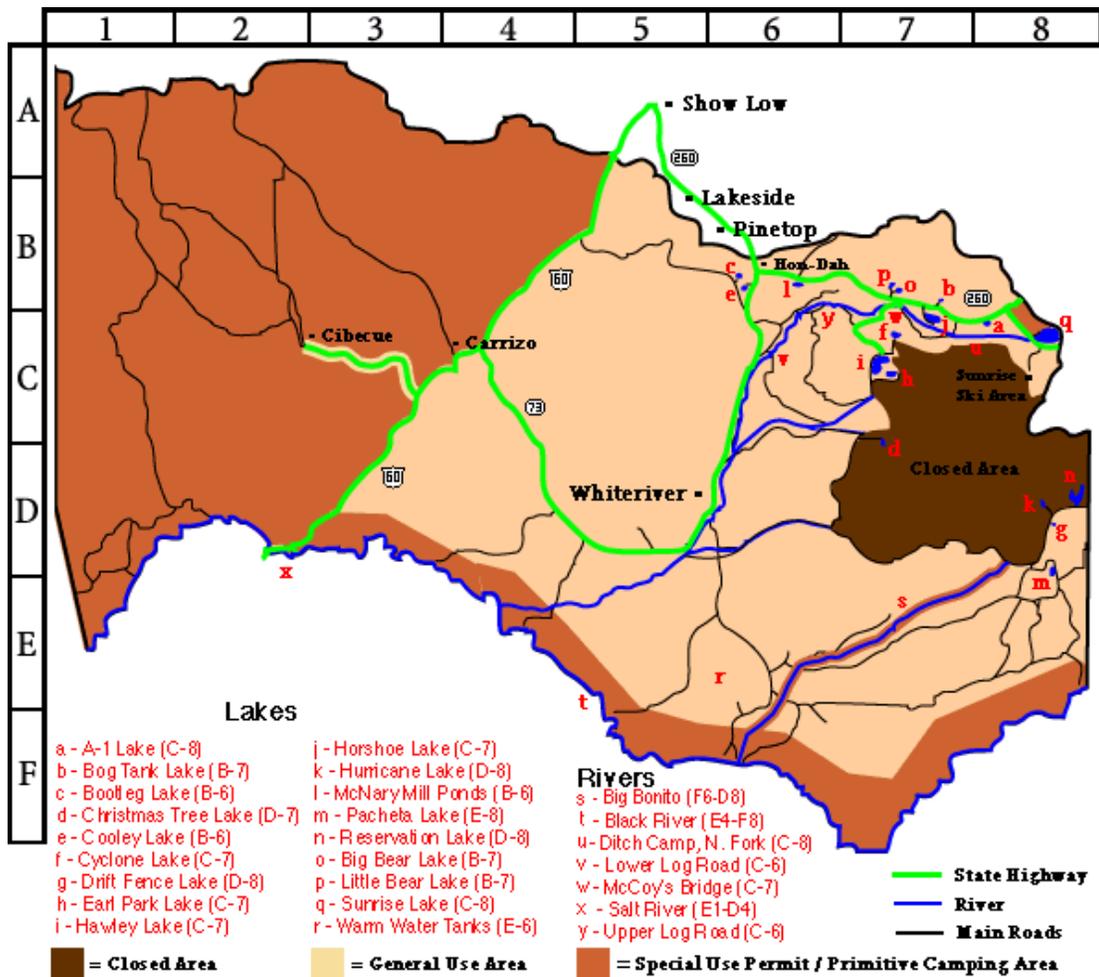
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Appendix N - Introduction

The Reservation provides a wide range of high-quality recreation opportunities to the public, as well as members of the Tribe. These opportunities arise from the combination of abundant natural resources found on the Reservation and an established and well-functioning recreation management system implemented by the Tribe. The purpose of this section is to describe the general characteristics of existing recreation on the Reservation, including the existing recreation management system, available recreation programs, and specific recreation activities and facilities.

The Reservation consists of approximately 1.6 million acres of undeveloped land, most of which is available for outdoor recreation purposes, although most of the existing recreation use is concentrated in the northeast and southern portion of the Reservation. The primary recreation activities occurring on the Reservation are fishing, camping, hunting, skiing and river rafting, in addition to general outdoor recreation activities such as hiking and sightseeing (see Figure N-1, next page). The peak recreation season on the Reservation is May through July, which corresponds to the summer months when weather conditions are most favorable for outdoor activities; however, there are substantial opportunities for recreation year round, including winter recreation activities at higher elevations. Visitors to the Reservation are mainly Arizona residents from the State's metropolitan areas, namely Phoenix and Tucson, who come to the White Mountain region to "beat the heat" in the valley. Out-of-state visitors are also common, with people coming to the region to recreate from a number of nearby states, including New Mexico, Colorado, Texas, and California. Typical visitors include families, groups of friends, as well as organized groups, such as fishing organizations. Most visitors are overnight users that come to recreate for the weekend, although day users also represent a substantial portion of the visitor base. Local residents from the nearby communities of Pinetop-Lakeside and Show Low also visit the Reservation to recreate to a lesser extent, although locals represent the substantial portion of visitors during non-peak periods, such as weekdays.

Figure N-1
Reservation Map



N.1 Recreation Management

Recreation on the Reservation is managed by several Tribal entities, including the Wildlife and Outdoor Recreation Division, Apache Office of Tourism, White Mountain Apache Enterprises, and the White Mountain Community Development Corporation (CDC). Primary management responsibility rests with the Wildlife and Outdoor Recreation Division, which is responsible for managing natural resources, developing and implementing recreation regulations, tracking recreation permits, and collecting permit revenues. The Apache Office of Tourism helps to promote all recreational activities on the Reservation, including outdoor recreation, as well as managing Fort Apache and the Apache Cultural Center. White Mountain Apache Enterprises is responsible for operating Tribal businesses, many of which are linked to the recreation resources found on the Reservation. Specifically, it operates a number of convenience stores on the Reservation, including Apache Service, Canyon Day Store, Carrizo Food Store, Cedar Creek Food Store, Hawley Lake Store, McNary Food Store, North Fork Food Store, Reservation Lake Store, and Seven Mile Food Store. Many of these businesses sell recreation supplies and permits. In the context of recreation, CDC's role is the operation of the cabin rental program at Hawley Lake. Due to the number of entities and interests involved, close collaboration between the Wildlife and Outdoor Recreation Division, Apache Office of Tourism, Apache Enterprises, and CDC is critical to efficient management of recreation resources on the Reservation.

Management of outdoor recreation resources on the Reservation must consider nearby recreation opportunities, particularly management of nearby National Forest lands managed by the U.S. Forest Service. This is particularly important because recreationists visiting the White Mountain region typically consider National Forest and Reservation lands as a single recreation resource, particularly when planning their recreation experience. For example, the U.S. Forest Service recently closed the Apache-Sitgreaves National Forest due to fire hazards, and during this period, visitors mistakenly assumed that Reservation lands were also closed to recreation, which adversely affected recreation levels.

Building on this example, fire hazard and management, generally, are important management considerations for recreation. Wildfires and fire risk affect recreation visitation. A classic example is the recent Rodeo-Chediski fire in 2002, which severely reduced the number of visitors to the Reservation and resulted in substantial economic impacts on the Tribe. In addition, fire management prescriptions, such as restrictions on campfires imposed by the U.S. Forest Service and the Tribe during periods of high fire hazard also adversely affects recreation visitation in the region.

Lastly, recreation management on the Reservation is implemented via a comprehensive set of regulations developed by the Wildlife and Outdoor Recreation Division. A key component of

these regulations is the outdoor recreation permit system, which applies to all outdoor recreation on the Reservation; this permit system is described in detail in Section 2.1.3. Other key regulations that apply to outdoor recreation on the Reservation include, but are not limited to:

- No swimming allowed in waters location on the Reservation
- All-Terrain Vehicles (ATVs) may not be operated on the Reservation
- Dogs must be on leash at all times
- Visitation by non-tribal members to archaeological, historical and paleontological sites is prohibited except for Fort Apache and Kinishba Ruins

For a complete set of regulations, please refer to the White Mountain Apache Tribe, 2006 Outdoor Recreation Regulations.

regulations, tracking recreation permits, and collecting permit revenues. The Apache Office of Tourism helps to promote all recreational activities on the Reservation, including outdoor recreation, as well as managing Fort Apache and the Apache Cultural Center. White

N.2 Recreation Programs

The Tribe implements a number of formal recreation programs designed to promote recreation visitation and economic sustainability. These programs include the “Rent-a-Lake” program, “Rent-a-Campground” program, a cabin rental program, and the Fishing Camp.

The “Rent-a-Lake” program is a successful recreation endeavor implemented by the Tribe that allows exclusive rental of two lakes, providing for a more private and isolated recreation experience. Campgrounds and all recreation amenities are included. The Wildlife and Outdoor Recreation Division will ensure that the lakes are adequately stocked with fish and provide necessary permits, potable water and firewood. The two lakes available via the Rent-a-Lake program are Cyclone Lake and Hurricane Lake. Of these, Cyclone Lake is most popular, and is normally booked Memorial Day through Labor Day. There is a three-day minimum stay at Cyclone Lake during weekends. Hurricane Lake is relatively more remote and less booked compared to Cyclone Lake. The fee for the Rent-a-Lake program is \$400 per day in addition to a \$3 per person charge for recreation permits. Hon-Dah Ski and Outdoor Sport handles all reservations for the Rent-a-Lake program.

A “Rent-a-Campground” program is a new program currently being implemented at Hawley Lake. This program is similar to a group campground concept, where large parties can

reserve a campground for group use. This program is also coordinated through Hon-Dah Ski and Outdoor Sport.

Hawley Lake is also the location of the Cabin Rental Program. Numerous cabins surround Hawley Lake (and are a walking distance to nearby Earl Park Lake). Of these cabins, 68 have been acquired and are now operated as rental units by CDC. These furnished units can accommodate 2 to 20 people. The rates for these units vary according to the size and location of the cabin, ranging from \$100 to \$400 per night. There is a minimum stay of two nights, except for holiday weekends when there is a three-night minimum stay. These cabins are a popular attraction on the Reservation and are typically booked May through October, attracting families and groups from across the country.

The Fishing Camp program is a fully-outfitted fishing experience at Christmas Tree Lake, which has been in operation for approximately eight years. It is operational for a three-week period prior to the opening of Christmas Tree Lake to the general public. There are 20 openings in this program at a cost of \$200 per day, and the program serves higher-end clientele. In 2006, this program was approximately 85 percent booked. Christmas Tree Lake is managed by the Tribe as a trophy Apache trout fishery.

Finally, the Tribe implements an informal marketing program used to promote recreational opportunities on the Reservation to potential visitors outside the local area. Representative marketing efforts include attendance at trade shows/expos in the metropolitan areas of the State. In addition, the Tribe is looking for permit vendors outside the local area, such as in the Phoenix area.

N.3 Recreation Permits and Fees

The Tribe implements a comprehensive permit system used to manage visitation and generate revenues (or income). All non-Tribal members are required to obtain a permit for any recreation activities on the Reservation, with separate permits required for each distinct recreation activity in which individuals participate.¹ Permits are not site specific, i.e., someone can participate in a particular activity anywhere on the Reservation. Permits are not required for general travel on paved roads/highways through Reservation; however, a permit is required if entering off-highway recreational areas and remote locations within the Reservation. Annual permits for certain activities are available and purchased predominantly by locals. State of Arizona licenses/permits are not required for recreational activities conducted on the Reservation; State regulations do not apply on the Reservation.

¹ Except for Special Use Permits, which considers all recreation activities together.

There are also areas that require Special Use Permits. Special Use Permits are required in the Black and Salt River areas of the Reservation. These areas serve visitors primarily seeking a more remote and primitive experience. Because all types of recreation are allowed with a Special Use Permit, except for river rafting, the Tribe does not track recreation use by activity; however, it is believed that most of the recreation consists of camping, fishing, and river rafting.

The Wildlife and Outdoor Recreation Division (Whiteriver office) sells the majority of recreation permits, accounting for about 55 percent of total permit sales in 2005. The biggest seller of permits outside the Wildlife and Outdoor Recreation Division is Hon-Dah Ski and Outdoor Sports.

Tribal members are not required to obtain recreation permits and can fish/recreate anywhere on reservation under the same recreation regulations. In addition, there is one lake (Tonto Lake), which is only open to Tribal members. Because permits are not required, visitation by tribal members is not tracked. There is a new proposal being considered that would require tribal members to obtain recreation permits at no cost, which would provide information that could be used as a management tool. Anecdotal information suggests that recreation use levels for Tribal members are approximately equal to levels for non-tribal members. Further, it is believed that recreation activity by Tribal members has increased over time, consisting mainly of family-oriented trips and activities.

The revenue generated by the sale of recreation permits is an important source of income for the Tribe. In fact, outdoor recreation permits represent the second largest money making enterprise on the Reservation, next to Hon-Dah Casino. All recreation income goes directly to Tribe's general fund. Permit prices have been relatively stable over time, with the exception of Special Use Permits, which have increased from \$10 to \$15. A summary of permit fee structure is presented in Table N-1 below.

**Table N-1
Reservation Permit Fees**

Type of Permit	Permit Fee
Fishing	
Fishing (Adult – Daily)	\$6
Fishing (Adult – Annual)	\$65
Fishing (Adult – Annual – Incl. Earl Park Lake)	\$100
Fishing (Juvenile – Daily)	\$3
Fishing (Juvenile – Annual)	\$32
Fishing (Juvenile – Annual – Incl. Earl Park Lake)	\$67
Fishing (Affiliates – Annual)	\$45
Fishing (Annual Waterdog)	\$25
Camping	
Camping (Daily – Per Vehicle)	\$8
Camping (30-Day – Per Vehicle)	\$175
Boating	
Boating (Annual)	\$25
Boating (Daily)	\$5
Outdoor Recreation	
Outdoor Recreation (General – Daily)	\$8
Outdoor Recreation (General-Affiliate – Annual)	\$150
Special Use Permits	
Black & Salt River (Special Use Permit)	\$15
Black & Salt River (Daily River Rafting)	\$15

Source: White Mountain Apache Tribe, 2006 Outdoor Recreation Regulations

N.4 Recreation Activities

A wide range of recreation opportunities are available on the Reservation. As stated above, the most popular activity is fishing. Other popular outdoor recreation activities include, but are not limited to, camping, hunting, skiing, and river rafting, as well as general activities outdoor activities, such as hiking and picnicking. A description of each of the primary recreation activities occurring on the Reservation is presented below.

N.4.1 Fishing

The high quality of fishing on the Reservation is the primary driver of recreation visitation to the Reservation. In addition, fishing permit sales represent the largest source of recreation-based income to the Tribe. There are 16 lakes on the Reservation that are available for fishing, in addition to a number of streams and creeks. Fall is considered to be the prime fishing season. The high quality of fishing is attributed to a number of factors. First, a number of fish species are found and caught on the Reservation, including rainbow trout, brown trout, Apache trout, brook trout, cutthroat trout, largemouth and smallmouth bass, sunfish, northern pike, waterdogs and crayfish, and channel, flathead and bullhead catfish. The once-endangered Apache Trout is native to the Arizona's White Mountains and is a draw for experienced anglers, particularly fly fisherman. Second, the Reservation is known for its trophy-sized fish. In fact, three state records for fish size are attributed to lakes at the Reservation – brown trout (22 lbs., 9 oz.), brook trout (4 lbs., 15 oz.), and Apache trout (5 lbs., 15.5 oz.).² Third, the types of fishing on the Reservation are diverse and include bait and cast, fly fishing, and even ice fishing. Lastly, the Tribe offers organized fishing events that caters to experienced and novice anglers, including a number a fishing derbies at various locations throughout the Reservation. With this variety and quality, fishing opportunities are available to a wide range of angler types.

The quantity of fish in Reservation waters is directly attributed to the comprehensive fish stocking program implemented by the Tribe. Two systems of fishing stocking take place on the Reservation – “put-and-catch” and “put-and-grow.” The “put-and-catch” approach involves stocking lakes with catchable-size fish for immediate harvest by anglers. Most of the lakes off the Highway 260 corridor fall under the “put-and-catch” program, and, as a result, provide an extraordinarily high number of fish that can be caught, which caters to families seeking a relatively easy and successful fishing experience. Under the “put-and-grow” approach, fish are stocked after the peak angling season in an effort to allow the fish to grow to larger sizes by the next season. Hawley, Sunrise and Horseshoe Lakes are “put-and-grow” fisheries.

The fish stocking effort is facilitated by the operation of the A-WC National Fish Hatchery Complex located on Reservation lands. This facility, which is operated by the U.S. Fish and Wildlife Service raises five species of trout, including the Apache trout, for stocking in Indian waters in Arizona (including the Fort Apache Indian Reservation), New Mexico, and Colorado. In 2004, nearly 770,000 fish were planted on the Reservation³, accounting for about 63 percent of total fish stocked from this facility.

² The state record for Apache trout is also a world record.

³ Caudill, James, February 2006, *The Economic Effects of the Recreational Use of Alchesay-Williams Creek National Fish Hatchery 2004 Stocking*.

N.4.2 Camping

Next to fishing, camping represents the second most popular recreation activity on the Reservation based on permit revenues. The demand for camping opportunities on the Reservation has been increasing in recent years, particularly in the Miner Flat and North Fork areas. Camping is restricted to designated areas on the Reservation. There are 15 sites on the Reservation that allow camping, providing about 730 campsites; please refer to the facility list in Table 9 for more information. The largest campground is located at Sunrise Lake, which has 150 campsites and an RV park. Hawley and Horseshoe Lakes also have relatively high campground capacities with about 125 campsites each. Generally, the campgrounds on the Reservation do not reach carrying capacity in terms of number of visitors, and are generally only at maximum capacity during the Fourth of July holiday weekend.

N.4.3 Hunting

Similar to fishing, the diversity and size of game species available on the Reservation makes it a premier hunting destination. Hunting activity is seasonal, running mainly from September through December, and is regulated by a comprehensive set of hunting regulations and permit fees, which are separate from the standard recreation regulations and permit fee structure described above. The Reservation is organized into 12 hunting units, within which certain types of hunts are allowed and regulations apply. Below is a summary of allowed hunts on the Reservation and permits prices.

The Tribe offers a range of guided big game hunts, which requires a Wildlife and Outdoor Recreation Division licensed guide. These include trophy bull elk (package cost up to \$19,000, fully outfitted); management bull elk (package cost of \$5,000, fully outfitted); cull bull elk (permit cost of \$500, available only to trophy and management hunt clients); pronghorn antelope (\$3,500, not outfitted), bighorn sheep,⁴ spring gobbler (1,500, fully outfitted), black bear (permit price: \$300), mountain lion (permit price: \$300), and bobcat (permit price: \$75).

There are also a number of self-guided big game hunting opportunities. These include: javelina (permit price: \$100); archery elk (permit price: \$375); archery elk-“raghorn” bull (permit price: \$500); youth rifle elk-“raghorn” bull (permit price: \$400); depredation elk (permit price: \$325); and general elk-nonmember spouse (permit price: \$200).

Hunts of predator species are also available on the Reservation, including hunts for coyote and fox at a permit cost of \$100.

⁴ Information on permit and/or hunting package price is not available.

Finally, a range of small-game hunts are available at a cost of \$50 for an annual permit and an additional \$10 for a daily permit. Small game species include cottontail rabbit, tree squirrel, and quail, as well as a range of migratory birds, such as doves, pigeons and waterfowl.

N.4.4 Downhill Skiing and Snowboarding

The predominant winter recreation activity occurring on the Reservation is downhill skiing at Sunrise Ski Park. Sunrise Ski Park, Arizona's largest ski resort is located in the northeast side of Reservation spanning three mountains. It has a base elevation of 9,300 feet and with a peak elevation of about 11,000 feet. It receives an average of 300 inches of snow per year and typically opens in late November to early December. The park primarily serves downhill skiers, but also caters to snowboarders at its fully-developed Snowboard Park. Other winter activities include sleigh rides, cross-country skiing, and sledding. Between 100,000 and 200,000 winter sports enthusiasts typically visit the resort each year. Permits are not required, but lift tickets are needed, which cost \$41 (adults, all-day); discounted lift ticket prices are available for juniors, senior citizens, and half-day passes.

Sunrise Ski Park is served by a number of facilities and provides a range of amenities. In terms of skiing, the park has 65 trails and 10 ski lifts, including Arizona's only high-speed lift. The lift system can accommodate up to 16,000 skiers per hour. The park also has two rental shops and a full-service ski school. Amenities include six day lodges and a funland/childcare building serving family visitors. Sunrise Lodge, a 100-room hotel with full-service restaurant, is also located adjacent to the park.

Other activities also take place at Sunrise Ski Park during the non-winter season. These recreation activities include scenic lift rides (beginning Memorial Day weekend), mountain biking, fishing at nearby Sunrise Lake, fly-fishing workshops, Sunrise 3-D Shootout (archery shoot), hiking, horseback riding, and camping (Sunrise Lake is one of two recreation sites on the Reservation with RV hookups).

Downhill skiing at the Sunrise Ski Park has emerged as an important recreation activity at the Reservation. The facility is located on the northeast side of the Reservation and spans three mountains. In addition to skiing, the park hosts other activities such as snowboarding, sleigh rides, cross-country skiing, and sledding. Table N-2 presents the number of visits to the park for downhill skiing from 1997/1998 season to 2004/2005 season. During the 2004/2005 season, 172,912 people skied at the park. As illustrated in Table 13, the number of skiers visiting the facility fluctuates every year based on the snow level. At an average, approximately 135,291 skiers visited the park annually between 1997/1998 and 2003/2004

ski seasons. The low visitor numbers for the 1998/99, and 1999/2000 seasons were due to remarkably poor snowfall during seasons.⁵

Table N-2
Skiing Visits to the Sunrise Ski Park

Ski Season	Park Opening Date	Park Closing Date	Skier Counts
1997/1998	Dec. 12	April 5	196,199
1998/1999	Dec. 9	March 7	70,000
1999/2000	Dec. 26	Mar 19	51,069
2000/2001	Nov. 17	April 1	173,526
2001/2002	Dec. 14	March 17	120,294
2002/2003	Dec. 19	April 13	161,249
2003/2004	Dec. 19	March 28	137,081
2004/2005	Dec. 10	April 3	172,912

Note: Skier counts are based on tickets sold with estimated season pass usage.

Information on revenue generated from skiing at the park is extrapolated for the 2004/2005 ski season from visitation data and charges associated with the activity. Since there are no permits required for skiing at the facility, the only cost to customers is the lift ticket. An all-day adult ski lift ticket costs \$41.⁶ Thus, an approximation of revenue from downhill skiing is \$7.1 million for the 2004/2005 ski season. Again, additional revenue is generated at the Sunrise Ski Lodge, and through the other revenue generating programs associated with skiing, so the lift tickets may be considered a minimum estimate of the revenue generated.

N.4.5 River Rafting

River rafting is allowed in the Salt River located in the southern portion of the Reservation; all other Reservation waters are closed to rafting. The extent of rafting activity fluctuates greatly depending on water flows in the Salt River. Under normal conditions, stretches of the river contain Class 3 and 4 rapids, making it a popular destination for whitewater enthusiasts. Three commercial businesses run rafting trips in this area under license to the Reservation; license costs are \$2,500 per year paid directly to the Tribe. With this license, there are no restrictions on the number of rafting trips these businesses can run, and they are free to charge

⁵ Gibson, Lay James, Bryant Evans, Andrew Grogan, October 2001, *White Mountain Winter Tourism Study: Evaluating the Efficacy of Regional Investment Opportunity, Technical Report*, Rural Economic Development Initiative (REDI) Program, Arizona Department of Commerce.

⁶ Discounted lift ticket prices are available for juniors, senior citizens, and half-day passes.

whatever price they desire, but must charge a \$15 daily permit fee per rafter, which is transferred to the Tribe. Rafters do not need to pay the separate Special Use Permit fee required for all other recreational activities in this area.

N.4.6 Other Outdoor Recreation

A range of other outdoor recreation activities also occur on Reservation lands. These activities include, but are not limited to: sightseeing/scenic driving, hiking, bicycling, and horseback riding. These activities are allowed in conjunction with any type of permit (i.e., Outdoor Recreation, Fishing, Hunting, and Camping). Hiking and mountain biking activities take place on the White Mountains Trail System. Canyoneering, defined as technical hiking/climbing, is allowed in the Salt River canyon and requires a Special Use Permit. Finally, snowmobiling also occurs on the Reservation during the winter months.

N.5 Recreation Facilities

The recreation activities described above occur at numerous locations throughout the Reservation. Fishing and other water-dependent activities occur at the numerous water bodies (i.e., lakes/reservoirs, streams and creeks) on the Reservation. A list of facilities, amenities, and applicable regulations is provided in Table N-3.

Overall, the most popular lake destination on the Reservation is Hawley Lake. Along with Reservation Lake, it is one of the most developed recreation sites on the Reservation, and includes a small lodge/motel, cabin rentals, rental boats, convenience store, and RV hookups. It also offers the “Rent-a-Campground” program. It is a scenic location, with high-quality fishing opportunities. As a “put-and-grow” fishery, Hawley Lake contains big fish, which draws larger number of visitors.

Some facilities on the Reservation are relatively poor, and some visitors have identified the lack of picnic tables, lack of RV hookups, and poor drinking water quality (water is currently piped in to most facilities and often does not pass water quality standards). It is believed that facility improvements would generate a significant increase in visitation.

**Table N-3
Outdoor Recreational Facilities on the Fort Apache Indian Reservation**

Area	Size Acres	Season of Use	Fishing	Boating	Camping	Special	Trailer OK	Safe Water	Notes
A-1 Lake	24	Mid-May – Sept. 15	X	X	15 units		X		
Bog Tank	12		X						
Bootleg Lake	10		X						Primitive
Christmas Tree Lake	41	June – Sept.; Oct. – Nov. 12	X						Special Regulations, Special Use Permit
Cibecue Creek		Mid-May – Sept. 15							Special Regulations
Cooley Lake	11		X	X					Special Regulations, Primitive
Cyclone Lake	37	Mid-May – Sept. 7	X	X	5 units				Special Regulations, Rent-a-Lake
Diamond Creek Junction			X						Special Regulations, Primitive
Diamond Creek 3		Mid-May – Sept. 15	X		6 units				Special Regulations
Ditch Camp, N. Fork			X		5 units				Special Regulations, Catch-and-Release
Drift Fence Lake	16	Mid-May – Sept. 15	X	X	10 units		X		
Earl Park Lake	47	Mid-May – mid-Nov.	X	X		Boat rentals	X	X	Catch-and-Release
East Fork (1)	--	Mid-May – Sept. 15	X						
East Fork (2)	--	Mid-May – Sept. 15							Primitive
Hawley Lake	260	Mid-May – Mid-Nov.	X	X	125 units	Boat rentals	X	X	Store (in season)
Horseshoe Lake	121	Mid-May – Mid-Nov.	X	X	125 units	Boat rentals	X	X	Store (in season)
Hurricane Lake	19	--	x	X	3 units			X	Special Regulations; Rent-a-Lake
Lower Big Bonito Creek	--	Mid-May – Sept. 15	X						Primitive
Lower Diamond Creek	--	--	X						
Lower Log Road	--	Mid-May – Sept. 15	X				X		
McCoy's Bridge	--	Mid-May – Sept. 15	X						
North Fork	--	Mid-May – Sept. 15	X		40 units (Lower Log) 80 units (Upper Log)				
Pacheta Lake	68	Mid-May – Sept. 15	X	X	15 units		X		Special Regulations; Catch-and-Release
Paradise Park					25 units				Special Regulations
Reservation Lake	280	Mid-May – mid-Nov.	X	X	60 units	Boat rentals	X	X	Store (in season)
Salt River Canyon		Mid-May – Sept. 15	X				X		Special Regulations, Primitive
Shush Be Tou Lake	18	Mid-May – Sept. 15	X	X	50 units		X	X	
Shush Be Zahze Lake	15	Mid-May – Sept. 15	X	X	20 units		X	X	
Sunrise Lake	891	Mid-May – Sept. 15	X	X	150 units	Boat rentals	X	X	Store (in season)
Tonto Lake	82								Tribe members only

N.6 Hon-Dah Resort and Casino

Hon-Dah Resort Casino is owned and operated by the Tribe. The resort is located three miles outside the town of Pinetop, Arizona on the Reservation. Hon-Dah includes a casino, a hotel, a gift shop, a convenience store with a gas station, an RV park, and a ski shop.⁷ The resort as a whole employs 450 people.⁸

Hon-Dah casino has 250 employees.⁹ The casino offers its customers a total of 20,000 ft² of space, which includes 741 slot machines, six table games, and a poker room, where players may choose between playing Texas Hold'em, Omaha, or Seven-Card Stud poker. Casino entertainment also includes the Timbers Lounge, which features live concerts and a comedy club, presented every Monday.

Casino guests have two lodging options within the resort. The Hon-Dah Hotel offers visitors 128 rooms, with prices ranging from \$79 per night for a King Bed room in the off-season to \$180 per night for a Luxury Suite. All rooms have a television set and a refrigerator. The fact that the Hon-Dah Hotel offers its visitors a high level of comfort and customer service is evident in the fact that it is rated Triple-Diamond by AAA.

The second choice for lodging is the Recreation Vehicle Park located within the immediate vicinity of the casino. The Park offers 258 sites, equipped with power, satellite TV, laundry, showers, phone hookups, free broadband wireless, and 24-hour security. Because White Mountain's main attraction is its nature and wildlife, especially fishing, the area attracts a large number of visitors with recreation vehicles.

There are also two sources for demand for rooms at the Hon-Dah Hotel. The first, as with the RV Park, recreation/tourist visitors who come to the area and stay in the hotel. The second is the Conference Center that is a part of the resort. The Conference Center includes six rooms, the largest of which is 8,482 ft² and serves as the area's largest meeting room. It accommodates up to 700 people utilizing theater-style seating or up to 450 people, utilizing banquet-style seating. Other rooms range between 268 and 2,735 ft².

⁷ Unless otherwise stated, information in this section comes from: "Hon-Dah Resort-Casino and Conference Center," White Mountain Apache Tribe, Web page: <http://www.hon-dah.com/>, last accessed: October 3, 2006.

⁸ AzTourist, "AzTourist News: Northern Regional," Web page: http://www.aztourist.com/Northern_AZ_guide_part1.pdf, last accessed: October 2, 2006.

⁹ "Economic Development Element," Pinetop Lakeside, Web page: <http://ci.pinetop-lakeside.az.us/genplan/Section%204.3.pdf>, last accessed: October 3, 2006.

Dining at the resort is provided by the Indian Pine Restaurant, which serves American-style dishes, including a buffet for its guests, as well as by several retail establishments. Hon-Dah Convenience Store employs fifteen people and offers groceries, fishing supplies, reservation permits, and gasoline. The other two stores are Hon-Dah Ski and Outdoor Sport, serving primarily winter time guests and Reel High Gift Shop, located inside the hotel lobby, which offers snacks and souvenirs to hotel guests. Approximately seven people are employed by this store. Lastly, Spirits Cigar Pub serves visitors with food and beverages in an informal atmosphere.¹⁰

N.7 Historical and Cultural Museum

The Apache Cultural Center and Museum also generates tourism on the Reservation. In recent years, approximately 15,000 visitors annually have visited the Museum (see Table N-4). People come from the U.S. and Europe to visit the museum and gift shop. The European tourists are often Geronimo admirers, or people otherwise familiar with Apache history.¹¹ The Center burned down, was rebuilt in 1997, and has both a permanent collection as well as feature shows. Prior to the development of the new building, the visitation averaged almost 7,000 visitors per year during the period between 1986 and 1994.¹² Plans are underway to continue the development of the Center, by refurbishing the rooms in the original Fort Apache.

Table N-4
Apache Cultural Center and Museum Visitation

Year	Visitation
1999	13,596
2000	14,012
2001	n/a
2002	n/a
2003	n/a
2004	12,613
2005	13,863
2006 – through Sept.	14,992

Source: Apache Cultural Center and Museum Administrative Manager.

¹⁰ Hoover's Online, "Hon-Dah Casino," Web page: <http://www.hoovers.com/>, last accessed: October 2, 2006. AzTourist, "AzTourist News: Northern Regional," Web page: http://www.aztourist.com/Northern_AZ_guide_part1.pdf, last accessed: October 2, 2006.

¹¹ Personal communication with Administrative Manager for the Apache Cultural Center, Oct. 11, 2006.

¹² Ibid.

N.8 Fish Hatchery and Recreation

The creation of reservoirs on the White Mountain Fort Apache Indian Reservation will allow the Alchesay-Williams Creek National Fish Hatchery (A-WC) access to additional water resources. The A-WC actually consists of two hatcheries. The Williams Creek hatchery obtains water from springs and the headwaters of Williams Creek and the Alchesay Hatchery is located on the North Fork of the White River. The A-WC produces five types of trout and these trout are used to stock the Reservation and other tribal lands in the surrounding area with trout. The A-WC hatchery is also the only hatchery in the world to have a brood stock of Apache trout, a threatened species of trout indigenous to the White Mountains. The species is cooperatively managed by the state and the Tribe.¹³ The Williams Creek portion of the hatchery was built with funds by the Bureau of Indian Affairs in the mid-1930s. The second portion of the fish hatchery is the Alchesay, which was established in 1959. The two units work in cooperation with the Tribe and the U.S. Fish and Wildlife Service.¹⁴

The hatchery supplies trout to tribal lands in Arizona, New Mexico, and Colorado. Over 60 percent of the fish produced by the hatchery are stocked on Reservation lands with an additional 12 percent stocked within the state on other reservations. Table N-5 below shows the number and percentage of fish stocked by reservation location.

Table N-5
A-WC Fish Stocked by Reservation Location in 2004

Reservation Location	Fish Stocked	Percent of total fish stocked
Fort Apache	769,389	62.6%
Other Arizona	143,282	11.7%
New Mexico	306,909	25.0%
Colorado	9,000	0.7%
Total	1,228,580	100%

Source: Caudill, 2006.

The A-WC hatchery production does not currently meet on-or off-reservation demand for stocked fish. In some Reservation camping areas, the Tribe stocks 1,000 8" fish every

¹³ Personal Communication with Robert David, Hatchery Complex Manager at the A-WC during August, 2006.

¹⁴ Caudill, James, February 2006, *The Economic Effects of the Recreational Use of Alchesay-Williams Creek National Fish Hatchery 2004 Stocking*.

week,¹⁵ and they currently stock the Reservation and surrounding reservations with more than 1.2 million fish annually.¹⁶ However, according to the creel survey of Reservation anglers (discussed in the next section), the primary concern among anglers is a low fish population leading to a low catch rate. Additional water for hatchery operations can help eliminate the shortage of trout produced by the hatchery. With increased access to secure water quantities and with the increased water quality afforded by the Miner Flat Dam, hatchery managers and Tribal biologists estimate that the hatchery could double its current level of production.¹⁷ At present, the lowest flows to the hatchery are in June and July. With new dams, the hatchery could control the water temperature more accurately, and produce more fish. Furthermore water quality below a dam is typically excellent and it is possible that the Tribe could develop a “blue ribbon” fishery downstream of the proposed Miner Flat dam.¹⁸

¹⁵ Personal Communication with Robert David, Hatchery Complex Manager at the A-WC during August, 2006.

¹⁶ Caudill, James, February 2006, *The Economic Effects of the Recreational Use of Alchesay-Williams Creek National Fish Hatchery 2004 Stocking*.

¹⁷ Personal Communication with Robert David, Hatchery Complex Manager at the A-WC during August, 2006.

¹⁸ Ibid.

APPENDIX O



Survey of Current Recreationists

ENTRIX

FEBRUARY 2007

Appendix O Survey of Current Recreationists

**Prepared for
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White River, AZ**

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January 2007

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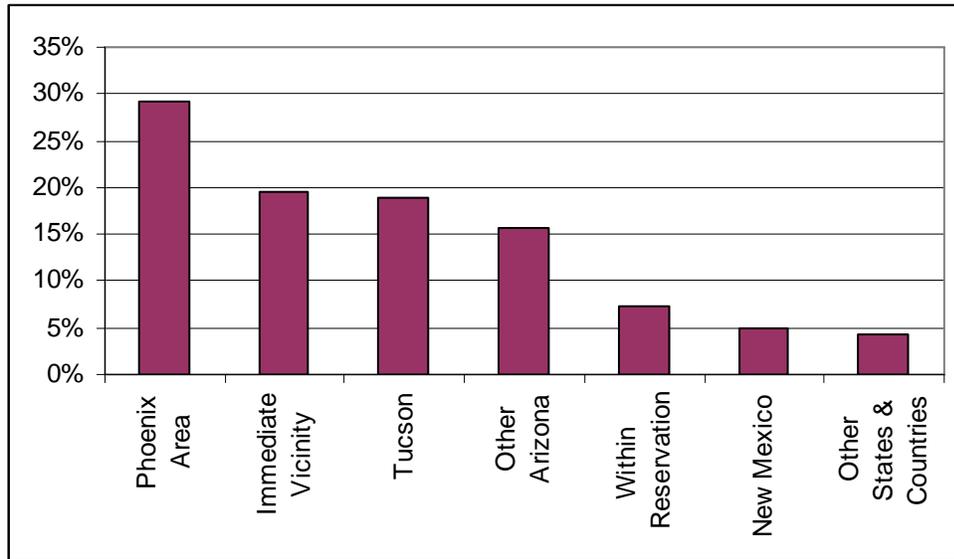
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Appendix O Introduction

The Wildlife and Outdoor Recreation Division of the WMAT has conducted interviews with recreationists for the past three years (5,544 surveys conducted during the period August 2003 through August 2006). The interviews included basic demographics about the recreationists, questions about fishing including where they had fished, how many of each species were caught, expenditures, and general comments. The interview responses were then analyzed to better understand both the economic impact from the recreationists, and ways that the tribe may further serve the recreationists.

The majority of recreationists, 29 percent, are from the Greater Phoenix area. Next, 19 percent of the visitors come from the Reservation or nearby communities (e.g. Show Low), and another 19 percent are from Tucson, Arizona. Overall, 91 percent of all visitors to the lakes come from within the State of Arizona. Other states represented include California, New Mexico, Tennessee, North Carolina, and Texas. There were also visitors from Romania and Spain. Figure O-1 presents this information graphically.

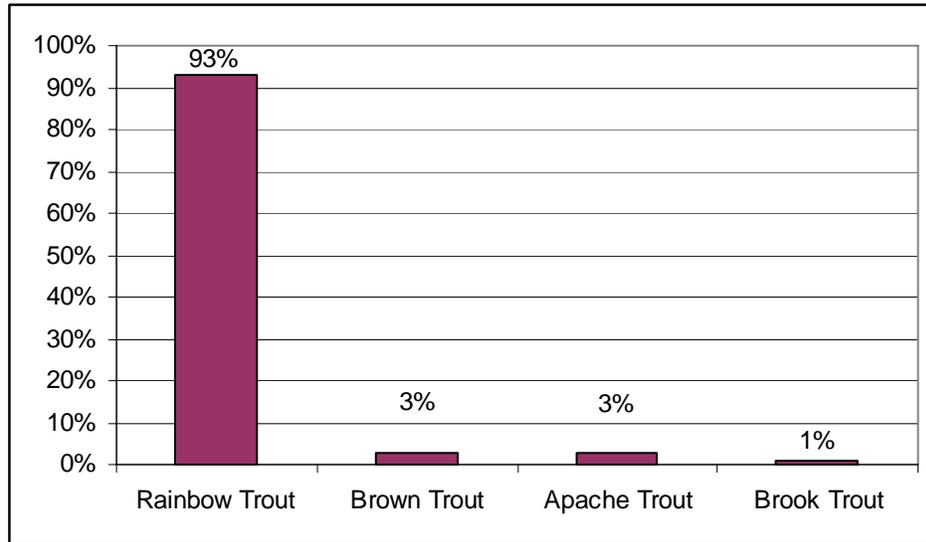
**Figure O-1
Visitors by Place of Residence**



O.1 Catch Rate

Interviews also revealed the main concerns that visitors have about the lakes. The number one concern is the apparent low fish population. The survey reveals that for 5,544 people, a total of 6,657 fish were caught, or approximately 1.2 fish per visitor, and that rainbow trout, represent 93 percent of all fish caught (See Figure O-2). Many fishermen also suggest that if the lakes are not currently being stocked with fish, they should be, and if the lakes are being stocked, than more fish need to be released.

**Figure O-2
Fish Caught By Visitors**



Among the fishing spots represented in the survey, A-1 Lake appears to be the most productive for catching rainbow trout, with 2.14 fish caught per person per day. While the least productive site for rainbow trout is Upper Log Campground and Sunrise Lake, with 0.5 and 1.15 fish caught per person per day. In terms of brown trout, Upper Log appears to be the most productive with 0.52 fish caught per person per day. This incidentally is the only fishing spot surveyed where the catch rate for rainbow trout is lower than the catch rate for other trout. Moving on to apache trout, Lower Log Campground appears to be the most productive site with an average of 1.62 fish caught per person per day. Finally, Upper Log is the most productive site when it comes to catching brook trout, with an average of 0.67 fish caught per person per day. Both brook and apache trout were only caught in any sizable amounts at Upper and Lower Log Lakes. As for Tonto Creek, only fourteen visitors were interviewed at this location. While few visitors were surveyed at this site, the catch rate for rainbow trout was 2.50 fish per person per day. The complete information on this catch is presented in Table O-1.

**Table O-1
Daily Catch Rate by Location**

Location	Rainbow Trout	Brown Trout	Apache Trout	Brook Trout
A-1 Lake	2.14	0.03	0.02	0.02
Big Bear Lake	1.62	0.03	0.02	0.00
Bog Tank Lake	1.67	0.00	0.00	0.00
Hawley Lake	1.32	0.06	0.07	0.00
Horseshoe Lake	1.64	0.05	0.01	0.02
Little Bear Lake	1.44	0.10	0.06	0.02
Lower Log Campground	1.58	0.17	1.62	0.50
McCoy's Bridge Campground	1.50	0.22	0.00	0.00
Reservation Lake	1.46	0.14	0.00	0.01
Sunrise Lake	1.15	0.01	0.03	0.05
Tonto Lake	2.50	0.00	0.00	0.00
Upper Log Campground	0.50	0.52	1.07	0.67

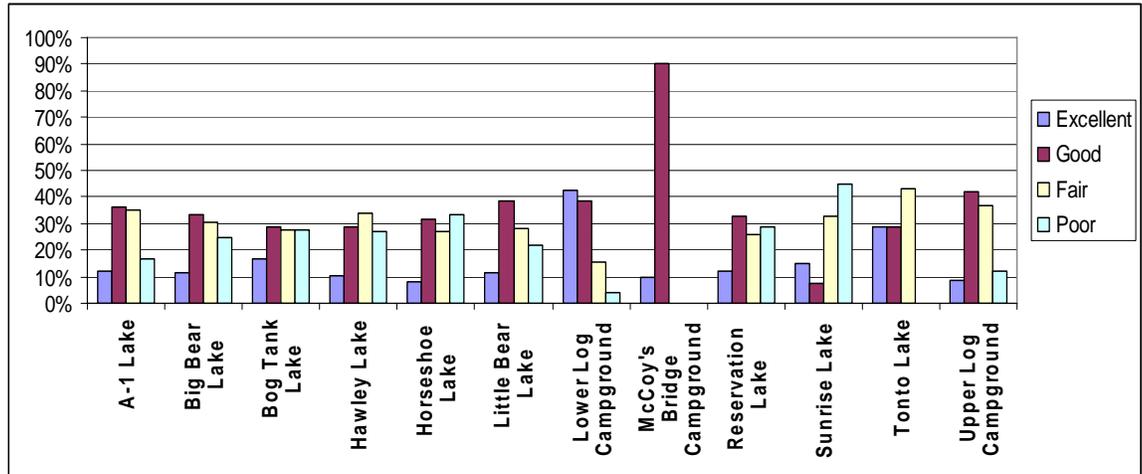
O.2 Visitor Satisfaction and Concerns

An interesting picture is also seen when visitor satisfaction is broken down by location (Figure O-3). The lowest level of satisfaction is observed among the visitors of Sunrise Lake. In fact, 45 percent of those surveyed at that location rate their experience as “Poor” and 33 percent gave a rating of “Fair”. At the same time, this location appears to produce the lowest catch rate (even though Upper Log Campground does have the lower catch rate for rainbow trout, it is one of only two locations surveyed where other trout species were caught in any significant numbers). One other location, Horseshoe Lake, has similar results where more fishermen rate their experience as “Poor” (34 percent) than fair or good. The opposite is observed at Lower Log Campground and McCoy’s Bridge Campground, which exhibit the highest level of satisfaction. At Lower Log Campground, 42 percent rate their experience as “Excellent” and 38 percent, as “Good”, while only 19 percent rate it as either “Fair” or “Poor”. McCoy’s Bridge Campground exhibits an even higher level of satisfaction with 90 percent rating their experience as “Good” and 10 percent as “Excellent”. However, only ten visitors were surveyed at this last location and therefore, the results are not conclusive.

It is important to note that Lower Log Campground, which exhibits the highest satisfaction ratings among visitors, does not produce the highest catch rates. In fact, six other locations have higher catch rates. The difference in satisfaction then may be due to the fact that fish other than rainbow trout are caught at Lower Log Campground, and that fishermen value this

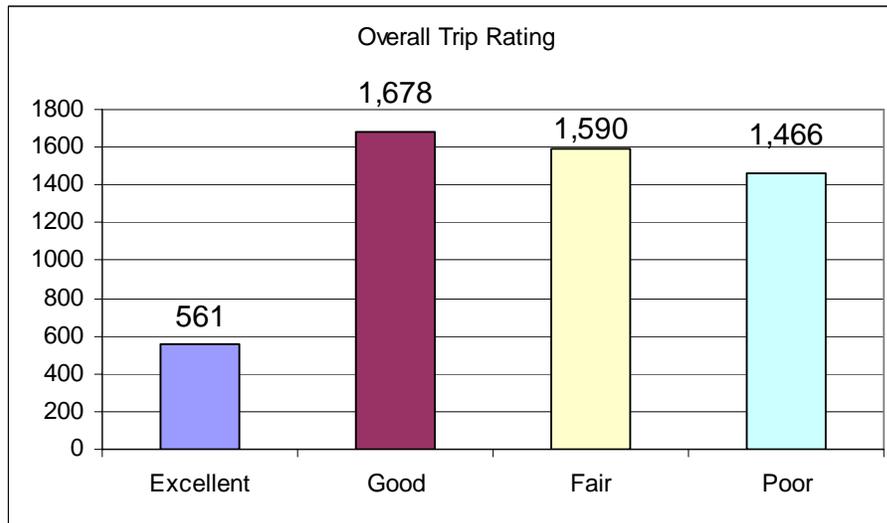
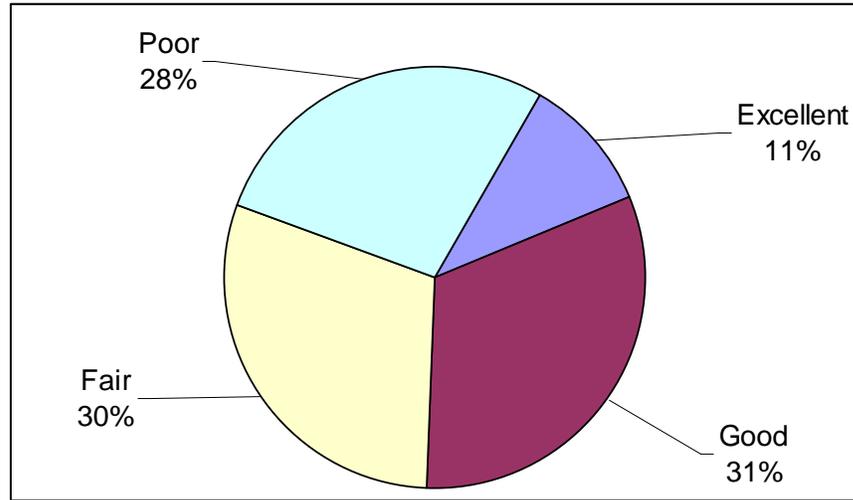
variety. The campground is also known for its scenic beauty along the White river, where the new Miner Flat Dam will be built.

**Figure O-3
Satisfaction Distribution by Location**



Analyzing the overall satisfaction of visitors, the majority rates their fishing experience as “Good” (31 percent of those surveyed). With fewer than one-third rating their fishing experience as “Poor”, most of which is due to low catch rates. Therefore, stocking more fish in Reservation lakes should greatly increase visitor satisfaction. Interestingly, while the only reason given by those that rate their experience as “Poor” or “Fair” is the fact that they are not catching many fish, those that give ratings of “Good” or “Excellent” provide several reasons for their level of satisfaction. One reason is the beauty of the lakes themselves, and another is the “great time” they are having. A third important reason among those that rate their experience as “Excellent” is the nice weather. The complete ratings breakdown is presented in Figure O-4.

**Figure O-4
Trip Experience Rating**



Several more concerns expressed by those visitors' rating their experience as "Poor" or "Fair" include high winds, large populations of crawfish, rain, and weeds in the lakes. Obviously, these are an integral part of the surroundings and would be difficult or impossible to improve.

Another measure of success for visitors is their satisfaction with the lakes themselves. The overwhelming majority of those surveyed comment on the great beauty of the lakes and on the fact that recently, the lakes have become cleaner, both in terms of trash on their shores and water quality. However, there are some comments mentioning the fact that there is trash in some places around the lakes. Therefore, while the majority of the lakes are clean and getting cleaner, there still is work to be done on eliminating the rest of the trash that builds up near the lakes.

A relatively large number of visitors expressed concern about the store at Horseshoe Lake not being open when they visit, as well as suggesting that portable toilets be located near the store. This also leads to two other, more general suggestions about placing more portable toilets around the lakes (this was specifically mentioned for A-1 Lake and more generally, for all lakes on the Reservation), as well as increasing the number of trash bins and adding wheelchair facilities in the area. Many visitors do express their satisfaction with the way the existing portable toilets are kept up, specifically mentioning the fact that these facilities are clean and that they have a pleasant smell.

Road condition is also mentioned by many visitors. Many suggest that gravel roads should be bladed more often to make it easier on cars, or paved altogether. In addition, there are suggestions to conduct more frequent maintenance on boat ramps. More “no parking” signs are also suggested near boat ramps as some of those interviewed complained about cars parking too close to ramps. The less than ideal dock condition is also mentioned in the interviews. And finally, it is voiced that Sunrise and Big Bear Lakes are difficult to find and that additional signage may help visitors find their way to the lakes, while at the same time, some visitors to Hawley Lake suggest that the lake’s campground should be located next to the lake shore.

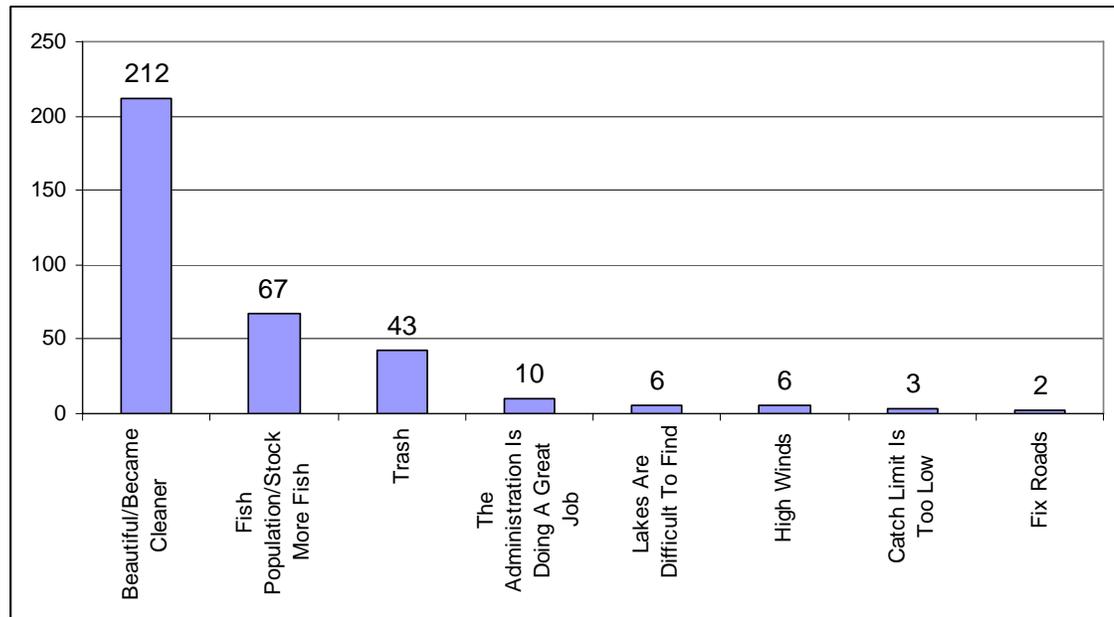
One last concern expressed by more than one visitor is that the catch limit for fish is too low. Some suggest raising it to six fish per day. With only 1.2 fish being caught per person on average, raising the limit to six fish should not have any sizable impacts on fish populations in the lakes. This may also increase visitor satisfaction with the lakes on the Reservation.

Overall, the main source of dissatisfaction among visitors appears to be low catch rates and weather, specifically wind and rain. On the other hand, the condition of lakes, the presence of lake facilities presence and facility upkeep are a source of increased satisfaction. A number of those surveyed also expressed their thanks to the Reservation for doing a good job in managing the lakes and keeping them desirable for fishing and camping. However, the fact that 58 percent of visitors rated their experience as either poor or fair suggests that there is a more the Tribe can do to improve visitor satisfaction and thereby further increase recreation revenues.

The relative importance of comments may be assessed through the frequency of their occurrence. Figure O-5 presents a histogram of the more frequently voiced comments and concerns. The most frequently heard comment is one addressing the beauty of the lakes and the area as a whole and on the recent positive changes in lake condition, the second-most frequent concern is about fish population, with sixty seven people suggesting that more fish be stocked in the lakes. The third relatively important concern deals with trash on the banks of the lakes. In fact, forty three people comment on seeing trash on their visits to the lakes. Compared to the three most frequent comments above, the remaining comments are not voiced frequently, with the next most frequent comment occurring only ten times (this is a positive comment on the fact that the administration is doing a good job with the lakes).

Therefore, the rest of the concerns are not as important to the visitors as a whole, as are the first three.

Figure O-5
Frequency of Comments



O.3 Visitor Expenditures

The average expenditure by visitors is shown to be a considerable sum. Because some of those interviewed do not report all of their expenditures, assumptions are made in order to separate those that report complete expenditures from those that report incomplete expenditures, or fail to report expenditures altogether. The expenditure amounts are reported on a per-group basis, so the resulting analysis is also based on group expenditures. It is assumed that the minimum number of people in a group is one person. Furthermore, the minimum expenditure on gasoline is assumed to be \$5.00 (a minimum trip of 25 miles one-way, an average automobile fuel economy of 20 mpg, and an average gasoline price in the Western United States for 2003-2005 of \$2.14), the minimum expenditure on food is assumed to be \$10.00, the minimum expenditure on bait and lodging is assumed to be \$0.00, and the minimum expenditure on permits is assumed to be \$6.00. Expenditure estimations then are made using data that meet all of the minimum requirements in order to present a more accurate estimate of visitor expenditures.

The largest portion of a travel budget appears to be food, with an average group spending approximately \$84, or 30 percent of their travel budget, on food (Figure O-6a). Lodging is

the second-largest expense with an average cost of \$76 per group, or 27 percent of average total expenditures. The average expenditure on gasoline is estimated at \$51 per group, while bait and permits cost approximately \$36 and \$33, respectively. Gasoline, bait, and permits make up 18, 13, and 12 percent of the travel budget, respectively. In total, the trip budget is estimated at approximately \$279 per group for 2003-2005.

Figure O-6a
Itemized Average Spending Per Group

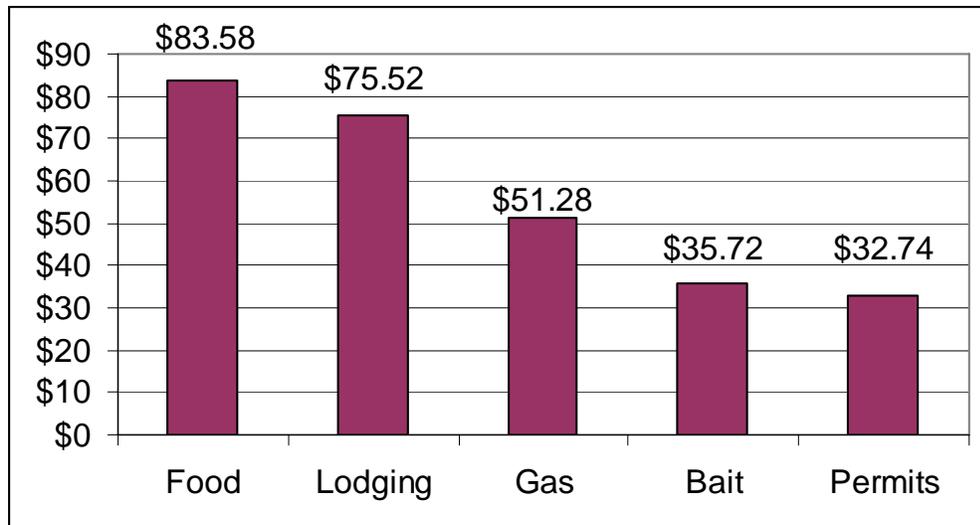
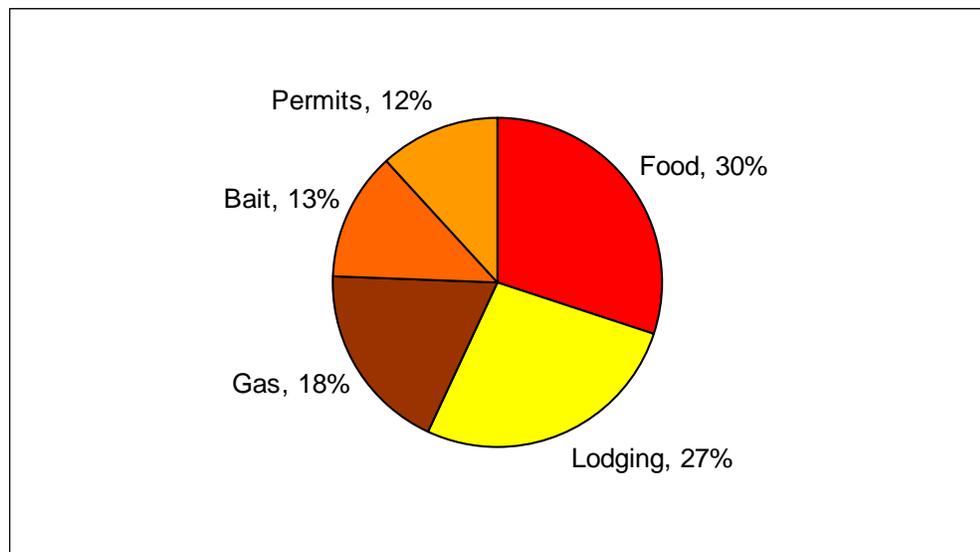


Figure O-6b
Percentage of Overall Spending Per Group



APPENDIX P



Recreation Participation and Expenditures

ENTRIX

FEBRUARY 2007

Appendix P Recreational Participation and Expenditures

**Prepared for
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P.1 Overview

The proposed new reservoirs of Miner Flat, Bonito Creek, and Salt Creek are expected to build on existing traditions and trends within the recreation industry of the Reservation, and provide additional economic benefits to the Tribe as well as to the people who enjoy the recreational experience afforded by the Reservation. The analysis of these economic benefits involves several steps. First, current economic benefits are established by presenting the existing data for recreational visits that involve fishing, boating, or camping, since each is influenced by the water. Data regarding other recreational activities on the Reservation are included in order to put the water-based activities in perspective. This will establish the caliber of other programs operating on the Reservation and highlight the fact that the Tribe already earns significant income from recreational activities. The seasonality of the current water-based programs is also shown, establishing that the summer months are the most popular for visitors. Using the current visitation data, expected future visitation is developed based on current population growth trends. This will establish the Baseline scenario.

Once the Baseline scenario is established, an alternative scenario for visitation is developed based on the proposed reservoirs. Visitation is analyzed using an estimate of the number of additional people expected to visit the Reservation if the reservoirs are built. An increase in visitation is expected due to the additional lakes created, as well as additional fish that will be produced in the hatchery and stocked in the lakes. Special programs targeting the specific market sectors are also anticipated to attract increased visitation. The analysis assumes that most programs are run approximately as they are presently run. The special programs will attract more family visitors and more fly fishermen respectively.

For all the different benefit estimation approaches (see Appendix Q), benefits are derived from changes in recreational participation, or changes in the number of visitors expected at the Baseline, and with the project. The following sections of this appendix first cover how the Baseline visitation and expenditure scenario was developed. Next, methodological descriptions of how and why these figures are expected to change with the project in place are developed.

P.2 Baseline Visitation and Expenditures

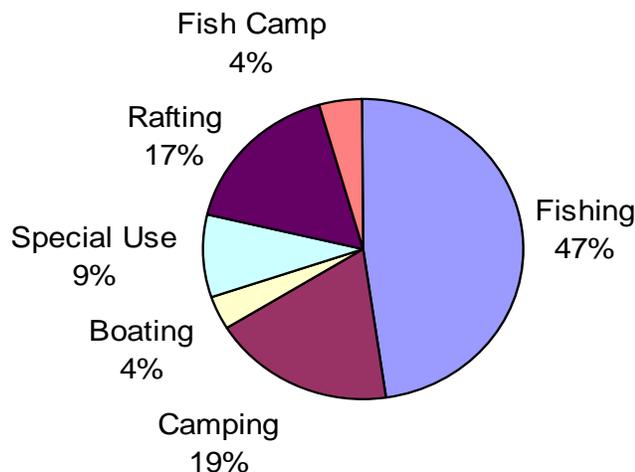
The Baseline visitation and expenditure scenario was developed based on the current levels of recreation and expenditures. Using information about trends in recreation and population growth, current recreation visitation and expenditures are projected into the future, for the 100-year life of the project.

P.2.1 Current Recreation Participation and Permit Sales

The information presented in this section was obtained from the Wildlife and Outdoor Recreation Division of the WMAT. All recreation permit sales on the Reservation over the 2005 calendar year are included in this analysis. Sales information includes purchase date, price, quantity, total cost, activity, and location. Recreation activities are grouped into categories including fishing, hunting, camping, boating, rafting, fish camp, and special use. Hunting is not incorporated in the summary statistics tables for 2005 while skiing is handled separately because it is run through a different governmental mechanism organizationally.

Figure P-1 presents each activity's contribution to total recreation permit sales over the 2005 calendar year. Together, fishing and camping make up two-thirds of the total revenue for the year, with \$629,405 and \$245,678 in sales, respectively. River rafting is the third largest recreational revenue base for the Reservation, with \$223,815 in sales. The remaining three recreation activities brought in \$225,810 in combined sales in 2005 capturing the remaining 17 percent of the total recreation revenue. Total recreational revenue in 2005 was \$1.3 million, which is nearly a 20 percent increase from 2004, when the total recreational revenue was \$1.1 million.

Figure P-1
Percent of Permit Revenue by Recreational Activity for the 2005 Calendar Year

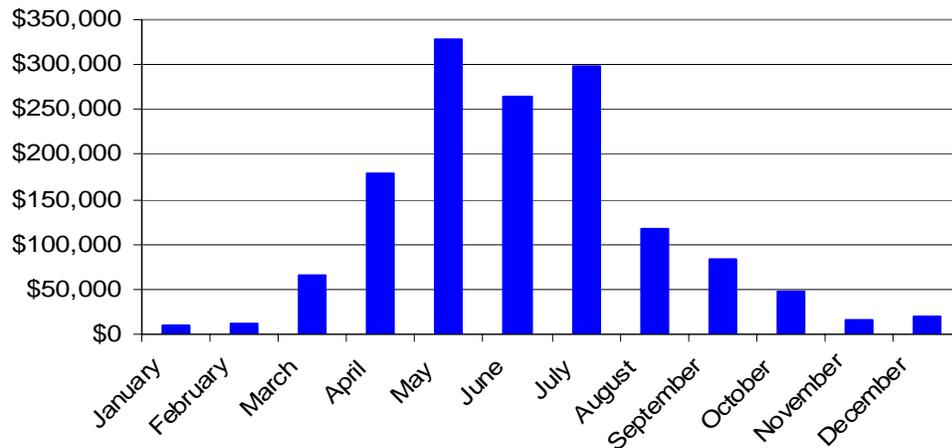


Note: Values do not include all recreation types.

In 2005, \$1.3 million in recreation permits were sold by the WMAT. This is a substantial increase from 2004, when just under \$1.0 million dollars was collected from permits. Though these permits are sold throughout the year for various recreational activities, the summer months experience the highest revenue and number of sales.

Figure P-2 illustrates the revenue from permit sales by month. The months of May, June, and July boast the highest revenues from recreational permits, with \$327,464, \$265,452, and \$297,324 in sales, respectively. Recreation revenue decreases dramatically during the winter months with a low of \$10,836 in January. This information does not include big game hunting revenue, which occurs between September and November generates over \$2 million in revenue. The seasonal variation is largely a result of the type and amount of available recreational activities.

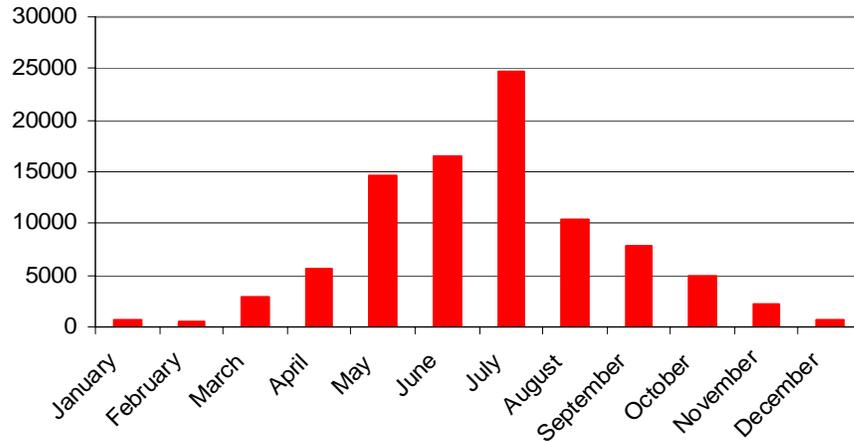
**Figure P-2
Recreational Permit Sale Revenue over the 2005 Calendar Year**



Note: Values do not include all recreation types.

Figure P-3 depicts the number of recreation permits sold by the WMAT each month over the 2005 calendar year. The number of permits sold per month is at a high during the summer months and decreases in the winter months. This number peaks in July with 24,727 permits sold. Although the months of May and June immediately follows July in terms of permit sales, these have significantly fewer sales compared to July, with 14,593 and 16,522 permits respectively though they are the next highest months. Permit sales drop to a low of 446 permits in February, with 446 permits when hunting permits are not considered.

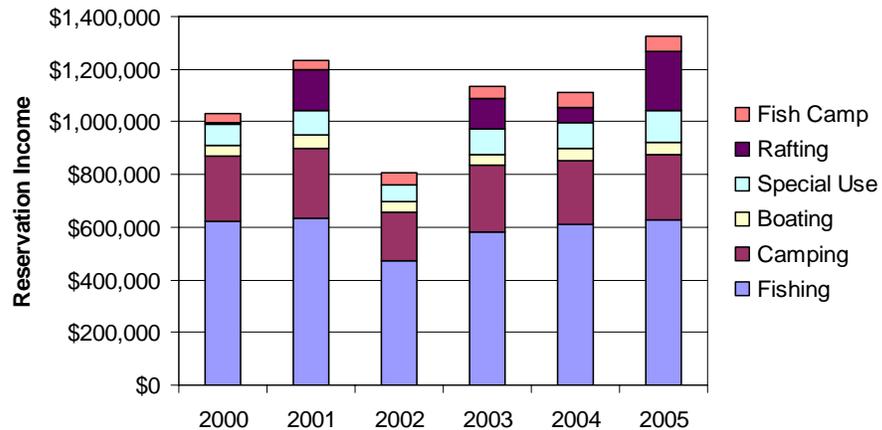
**Figure P-3
Recreational Permits Sold over the 2005 Calendar Year**



Note: Values do not include all recreation types.

Total Reservation recreation income is dependent upon permit price and participation. Between 2000 and 2005, recreation revenue increased by close to \$300 thousand. Fishing consistently accounts for close to one half of all Reservation recreation income, while camping makes up nearly one fourth of total income. Rafting permit sales have increased thirty-two times over the six year period from \$7 thousand in 2000 to \$224 thousand in 2005. Figure P-4 shows the Reservation income by recreation type over a six year time period, excluding hunting.

**Figure P-4
Yearly Reservation Income by Recreation Type**



Note: Values do not include all recreation types.

Hunting on the Reservation is big business. A single hunting trip can bring in as much as \$19,000 in revenue for the Tribe. For the 2006-2007 hunting season, all 1,144 hunting permits were sold prior to the start of the season.¹ The majority of the hunting revenue is generated from guided big game hunts. There are 817 tags available for just under \$2 million, not including the two trophy bull elk tags that are auctioned to the highest bidder. An additional 295 big game tags are available for self-guided trips creating an additional \$107 thousand in recreation revenue for the Tribe. Table P-1 includes the cost and availability of hunting permits, packages and other fees on the Reservation.

¹ Personal communication with Jesse Palmer, White Mountain Fort Apache Indian Reservation, August 24, 2006.

**Table P-1
Reservation Non-Member Hunting Cost and Availability 2006-2007**

Non-Member Hunting	Number Available	Package Cost	Permit and/or Application Fee	Trophy Fee	Total Revenue	Notes
<u>Guided-Only Big Game Hunts</u>						
Trophy Bull Elk Auction Hunt	2					Bid Price
Trophy Bull Elk East End	66	\$16,000		\$3,000	\$1,254,000	
Trophy Bull Elk West End	24	\$16,000		\$3,000	\$456,000	
Management Bull Elk East and West End	30	\$5,000				
Cull Bull Elk East and West End	30		\$500		\$15,000	
Pronghorn Antelope	2	\$3,500			\$7,000	
Bighorn Sheep						Hunt Closed
Spring Gobbler	60		\$1,500		\$90,000	
Black Bear	200		\$325		\$65,000	
Mountain Lion	100		\$325		\$32,500	
Elk Season-Depredation Mountain Lion	305		\$1		\$305	
Guided-Only Big Game Hunts Total					\$1,919,805	
<u>Self Guided Big Game</u>						
Javelina	25		\$105		\$2,625	
West End Archery Elk - General	70		\$380		\$26,600	
East End Archery Elk - 'Raghorn' Bull	40		\$505		\$20,200	
West End Archery Elk - 'Raghorn' Bull	40		\$505		\$20,200	
Youth Rifle Elk - 'Raghorn' Bull	20		\$405		\$8,100	
West End Depredation Elk - General	75		\$330		\$24,750	
Non-Member Spouse - General Elk	25		\$205			
Self Guided Big Game Total					\$107,600	
<u>Small Game and Predator Hunts</u>						
Predators Coyote and Fox	30		\$105		\$3,150	
Small Game/Migratory Birds						Annual \$50, Day \$10
Small Game and Predator Hunts Total					\$3,150	
Total Non-Member Hunting					\$2,025,430	

Source: White Mountain Apache Tribe Wildlife and Outdoor Recreation Division Non-Member Hunting Regulations, 2006-2007.

The Reservation has created a multi-million dollar business in outdoor recreation. The Reservation received over two million dollars for hunting permits for the 2006-2007 hunting season before the season even began suggesting excessive demand for the supply of hunting permits on the Reservation. In addition, the fishing, camping, and rafting industries created sales of over one million dollars for the Tribe in 2005. The recreation income for the Reservation has increased in recent years with fishing permits continually accounting for half of the total recreation income (excluding hunting). The number of visitors has also increased in recent years. Between 2004 and 2005, there was a 30 percent increase in recreation permit revenue, which suggests an expanding recreation market on the Reservation.

For each type of recreational activity on the Reservation, data of varying quality and for different years have been assembled. Table P-2 assembles the information for one representative recent year, 2005. For the most part, this information excludes revenue earned by the WMAT for lodging, supplies, and other expenditures made by recreationists. The rows shown in the bold font – fishing, camping, boating, and special uses, are those that are expected to be affected by the project.

**Table P-2
Summary of Visitors and Revenues, 2005**

<i>Activity</i>	<i>Estimated Number of Visitors</i>	<i>Revenue</i>	<i>Permit Price</i>
<i>Fishing*</i>	<i>92,517</i>	<i>\$687,455</i>	<i>\$6</i>
<i>Camping</i>	<i>30,710</i>	<i>\$245,678</i>	<i>\$8</i>
<i>Boating</i>	<i>9,903</i>	<i>\$49,515</i>	<i>\$5</i>
<i>Rafting</i>	<i>14,421</i>	<i>\$223,815</i>	<i>\$15</i>
<i>Special Use</i>	<i>7,883</i>	<i>\$118,245</i>	<i>\$15</i>
<i>Hunting</i>	<i>1,114</i>	<i>\$2,025,030</i>	<i>variable</i>
<i>Skiing</i>	<i>172,912</i>	<i>\$7,089,392</i>	<i>\$41</i>
<i>TOTAL</i>	<i>351,519</i>	<i>\$10,439,130</i>	

*Fishing includes fish camp revenues

By summing the lake-based recreational activities including fishing, boating, camping, and special use, a baseline value of \$1.1 million is the estimated revenue generated through lake-based recreation. This revenue is expected to increase in the future with the population increases expected in the local area, in the Phoenix and Tucson metropolitan areas, and with population growth in Arizona.

P.2.2 Permit Revenue for Baseline Scenario

Compared to the state of Arizona, the Reservation is currently undercharging visitors for a fishing permit. The state charges an Arizona resident \$12.50 for a daily fishing license, and \$28.50 for an annual fishing pass allowing trout.² The state's daily pass is \$6.50 more than the Reservation daily pass. The Reservation daily permit price is also \$6.50 less than the state non-resident one-day fishing permit price. While the Reservation does charge more for a resident annual fishing license than the state of Arizona, it charges considerably less than the state for a non-resident annual fishing license. Table P-3 below summarizes the trout fishing permit price for the Reservation and the state.

**Table P-3
Trout Permit Prices**

	Fishing Daily	Fishing Annual
Reservation Permit Price	\$6.00	\$65.00
Arizona Resident Permit Price	\$12.50	\$28.50
Arizona Non-Resident Permit Price	\$12.50	\$101.00

Source: Data obtained from the Arizona Game and Fish Department website accessed on October 13, 2006.

At current Arizona fishing permit prices, the Reservation can substantially increase their annual permit net revenue. The total revenue the tribe would receive from permit sales at the Arizona market price will be 180 percent of the revenue from tribal permit sales at tribal permit prices. This value is based on a weighted average of annual and daily permits sold at resident and non-resident prices. Previous research on Reservation recreation has consistently recommended the Tribe increase permit prices.³ For the purpose of this analysis, it is assumed that the Tribe increases permit prices to statewide averages under the Baseline condition.

P.2.3 Current Recreational Expenditures

Representative spending patterns for traditional angling activity were obtained from a recent economic study of the Alcheyay-Williams Creek National Fish Hatchery prepared by the U.S.

² Data obtained from the Arizona Game and Fish Department website on October 13, 2006.

³ White Mountain Apache Tribe, April 2003, *White Mountain Apache Tribe Recreation Planning Study*, U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center, Denver Colorado.

Fish and Wildlife Service (USFWS)⁴, in conjunction with data derived from the ongoing annual creel survey implemented by the Tribe. Specifically, expenditures per person per angling day for non-Tribal member permit holders were obtained from the USFWS study, and the distribution of these expenditures across expenditure categories was based on creel survey data. Table P-4 presents the representative spending data used in the analysis. This was used as a proxy for all potential recreation activities at the new reservoirs, with the exception of fly fishing, which has the potential to generate supplemental spending as described below. In sum, it is estimated that approximately \$84.76 would be spent by non-Tribal members per angling day, which consists of expenditures on food (\$17.62), lodging (\$28.74), gas (\$26.20), and bait (\$12.20). (Permit costs were excluded from the spending data as permit revenue benefits are estimated separately.) For the purposes of this analysis, it is assumed that recreational spending patterns would not change over time.

**Table P-4
Representative Recreation Spending
Patterns on the Reservation¹**

Expenditure Category	Amount ²	Percent of Total
Food	\$17.62	20.8
Lodging	\$28.74	33.9
Gas	\$26.20	30.9
Bait	\$12.20	14.4
Total	\$84.76	100.0

1/ Angling expenditures Per person per day

2/ 2005 dollars

Table Source: USFWS, 2006; WMAT, 2006; and ENTRIX, 2007

P.2.4 Baseline Visitation, Permit Revenues and Expenditures

Using the permit revenue data described above, and assuming that annual pass holders make at least ten trips per year (annual passes cost ten times as much as a single day pass), visitation numbers were developed for fishing-related recreational visits to the Reservation.

Fueled by the forecasted growth of the local Pinetop-Lakeside and Show Low areas, the city of Phoenix, and the state of Arizona, future recreation use on the Reservation is expected to increase in the coming years. In addition, many immigrants to Arizona, and more specifically

⁴ Caudill, James, January 2006, *The Economic Effects of the Recreational Use of Alchey-Williams Creek National Fish Hatchery 2004 Stocking*, U.S. Fish and Wildlife Service, Division of Economics, Arlington, VA. (Revised February 15, 2006).

to the local area, are anticipated to be retirees, who are typically active anglers and recreationists. The 30-year annual growth rate for the state of Arizona is forecast at 2.0 percent, which is considered a reasonable expectation for the growth of recreation visitation on the Reservation in the coming years. However, assuming the fish hatchery continues operating at its present production levels, the increase in visitors will also be associated with more pressure on fishing resources and a decrease in a visitor's fish catch rate.

Baseline recreational visitation, expected permit revenue, and expenditures are shown in Table P-5.

**Table P-5
Baseline Angler Days and Expenditures**

Year	Non-Member	Member	Non-Member	
	Angler Days	Angler Days	Permit Revenue	Expenditures
1	109,563	22,557	\$1,981,607	\$9,287,040
2	110,659	22,782	\$2,001,423	\$9,379,910
3	111,765	23,010	\$2,021,438	\$9,473,709
4	112,883	23,240	\$2,041,652	\$9,568,446
5	114,012	23,472	\$2,062,069	\$9,664,131
6	115,152	23,707	\$2,082,689	\$9,760,772
7	116,303	23,944	\$2,103,516	\$9,858,380
8	117,466	24,184	\$2,124,551	\$9,956,963
9	118,641	24,425	\$2,145,797	\$10,056,533
10	119,827	24,670	\$2,167,255	\$10,157,098
11	121,026	24,916	\$2,188,927	\$10,258,669
12	122,236	25,166	\$2,210,817	\$10,361,256
13	123,458	25,417	\$2,232,925	\$10,464,869
14	124,693	25,671	\$2,255,254	\$10,569,517
15	125,940	25,928	\$2,277,807	\$10,675,213
16	127,199	26,187	\$2,300,585	\$10,781,965
17	128,471	26,449	\$2,323,591	\$10,889,784
18	129,756	26,714	\$2,346,826	\$10,998,682
19	131,054	26,981	\$2,370,295	\$11,108,669
20	132,364	27,251	\$2,393,998	\$11,219,756
21	133,688	27,523	\$2,417,938	\$11,331,953
22	135,025	27,798	\$2,442,117	\$11,445,273
23	136,375	28,076	\$2,466,538	\$11,559,725
24	137,739	28,357	\$2,491,204	\$11,675,323
25	139,116	28,641	\$2,516,116	\$11,792,076
26	140,507	28,927	\$2,541,277	\$11,909,997
27	141,912	29,216	\$2,566,689	\$12,029,097
28	143,331	29,509	\$2,592,356	\$12,149,388
29	144,765	29,804	\$2,618,280	\$12,270,881
30	146,212	30,102	\$2,644,463	\$12,393,590
31	147,674	30,403	\$2,670,907	\$12,517,526
32	149,151	30,707	\$2,697,616	\$12,642,701
33	150,643	31,014	\$2,724,593	\$12,769,128
34	152,149	31,324	\$2,751,839	\$12,896,820
35	153,671	31,637	\$2,779,357	\$13,025,788
36	155,207	31,954	\$2,807,151	\$13,156,046
37	156,759	32,273	\$2,835,222	\$13,287,606
38	158,327	32,596	\$2,863,574	\$13,420,482
39	159,910	32,922	\$2,892,210	\$13,554,687
40	161,509	33,251	\$2,921,132	\$13,690,234
41	163,124	33,584	\$2,950,343	\$13,827,136
42	164,756	33,919	\$2,979,847	\$13,965,408
43	166,403	34,259	\$3,009,645	\$14,105,062
44	168,067	34,601	\$3,039,742	\$14,246,112
45	169,748	34,947	\$3,070,139	\$14,388,574
46	171,445	35,297	\$3,100,841	\$14,532,459
47	173,160	35,650	\$3,131,849	\$14,677,784
48	174,891	36,006	\$3,163,167	\$14,824,562
49	176,640	36,366	\$3,194,799	\$14,972,807
50 - 100	178,407	36,730	\$3,226,747	\$15,122,535

P.3 Changes in Participation with Project

The amount of recreation that occurs on a reservoir is dependent on many aspects including the water level of the reservoir itself. A relationship exists between the surface area of a reservoir and the number of recreationists using the reservoir. This relationship can be captured in multiple ways detailed in the brief literature review below. Participation is also expected to change with improved fish hatchery operations, and with the new fly fishing and family target marketing activities. Each aspect of project-related changes in participation is described below. A summary table shows the aggregate participation forecast with the water storage project in place.

P.3.1 Visitation Changes with Increased Surface Area

Coughlin, et al. (2006) created a model for quantifying the benefits of an environmental conservation program. A portion of this study focuses on environmental services (i.e. recreation) provided by increasing the surface area of a reservoir. In order to do this, they create a model relating a change in the surface area of a reservoir to a change in the level of recreation use. This model is created in three stages. First, the storage level of a reservoir is related to its area, which leads to the second stage; a change in the storage level induces a change in the area of the reservoir. In the final equation, they look at the coefficient of elasticity between visitation and surface area.

Economists often wish to describe how a change in one variable (reservoir surface area) affects another variable (recreation participation). When the two variables do not have the same unit of measure, as is the case with reservoir surface area and participation, elasticity is used to describe the relationship. Elasticity is simply the percentage change in a variable (recreation participation) due to a one percent change in the other variable (reservoir surface area).⁵

The number of users a reservoir can support is strongly related to the available area of that reservoir.⁶ Thus, a change in the number of visitors with respect to a change in the surface area of a reservoir is measured by elasticity. This elasticity coefficient is typically close to one,⁷ suggesting that a percentage increase in the surface area of a reservoir is related to an equal percentage increase in the number of reservoir recreationists.

⁵ Nicholson, *Microeconomic Theory, Basic Principles and Extensions*, Eighth Edition.

⁶ Coughlin, Katie, Chris Boldue, Peter Chan, Camilla Dunham-Whitehead, Robert van Buskirk, March 27, 2006, *Valuing the Environmental Benefits of Urban Water Conservation: Final Report*.

⁷ Ibid.

There are many other techniques available to estimate the relationship between water levels and recreation participation. A 1999 study by the Bureau of Reclamation proposes four visitation based approaches to measuring changes in recreation due to fluctuations in reservoir water levels. The researchers suggest a positive relationship between reservoir water levels, or surface area, and recreation use. The intuitive theory is consistent with existing literature on reservoir recreation.⁸

The first method discussed in the study is the called the Ratio Method. A change in the water level or surface acreage of a reservoir by a given percentage will change recreation use by that same percentage. The use of elasticity to explain the relationship between the change in surface area and recreation use is consistent with Coughlin's (2006) study discussed above.

The second approach is the Facilities or Resource Access Method. In this method, changes in recreation use are based on the exclusivity of the reservoir. As water levels change, some facilities may become inaccessible. The approach looks at the visitation level by activity associated with the inaccessible facilities due to changes in water level to estimate recreation use changes. Extensive data on the affected site's visitation, recreation activities, and water levels and possible substitute sites is necessary for this approach. The approach is oriented for current use, so is difficult to apply it to future facilities unless extensive data on the prospective site is available.

The third approach uses a statistical Use Estimating Model (UEM). The simplest of the UEMs presented here has a dependent variable of visitation for a specific site and time. The independent variables include water level at the specific site and time, the level of annual change in the water levels, and an annual time variable. Another form of this model looks at monthly visitation, and would be a better estimate if monthly data is available. An even more accurate UEM would include contingent behavior or valuation data gathered by surveying recreationists about their response to changes in water levels. The final UEM technique is a Delphi technique, which is simply a technique that makes use of knowledgeable recreation professionals. In this case, the technique will use professionals to develop estimates of the change in users based on a change in water levels.

Recreation visitation on the Flaming Gorge Reservoir is examined in the 2005 report by the Bureau of Reclamation.⁹ The analysis includes a section on recreation visitation estimates by recreation activity for taking action and not taking action. The action being considered is a change in reservoir water levels and river instream flows. The study intended to use existing site

⁸ Platt, Johnathan and Dawn Munger, 1999, *Impact of Fluctuating Reservoir Elevation on Recreation Use and Value*, U.S. Department of the Interior, Bureau of Reclamation.

⁹ U.S. Bureau of Reclamation, 2005, *Operation of Flaming Gorge Dam Final Environmental Impact Statement, Recreation Visitation and Valuation Analysis Technical Appendix*.

specific information on recreation visitation, values and water levels/flows, but when the data were not available, an on-site survey was implemented. These data were combined with the existing data and estimates of use were developed by activity for current and preferred flow conditions. Then the high and low threshold conditions were included to create a distribution that describes visitation through linear interpolation.

The demand for freshwater recreation in California is calculated in a 2002 study by Energy and Water Economics.¹⁰ The revealed preference data for the study comes from a survey randomly sampling California residents about their recreation use. The dependent variable in the model is recreation demand. The explanatory variables include travel cost, boat lanes, fish yields, parking spaces, and surface acreage. The study finds the elasticity of surface acreage to be a very important factor in determining recreation demand with a value of 0.88, suggesting that recreation visitation increases with respect to reservoir size in an almost linear manner. The overall model is a reliable explanation of the relationship existing between recreation participation and the explanatory variables.

This analysis will follow the reservoir recreation visitation estimation methods used by Coughlin (2006) and Platt (1999). These studies find that the coefficient of elasticity between reservoir recreation usage and surface area is close to one. Where:

$$\text{Usage} = f(\text{Area})$$

and

$$\text{Area} = f(\text{Storage and Site Specific Constants})$$

The coefficient of elasticity reported by Platt (1999) suggests that for a 10 percent increase in the surface area of a reservoir, there is an 8.8 percent increase in the recreational usage of the reservoir.

This approach is limited due to the assumption that elasticity is constant for all surface area values, which does not take into account high and low thresholds for reservoir surface area. Thresholds occur as the surface area of the reservoir becomes very large or small. When the surface area approaches zero it is not accurate to assume that people will visit the reservoir, and as the surface area of the lake grows, there will be decreasing marginal returns as the rate of visitation growth does not keep up with the surface area growth. Since we will not be examining thresholds values in this analysis, this approach will provide an accurate estimate of the recreationists that will use the reservoir for the projected surface area values.

¹⁰ Plater, Jason & William W. Wade, 2002, "Estimating Potential Demand for Freshwater Recreation Activities in the Sacramento-San Joaquin Delta Rivers: 1997-2020, Sacramento-San Joaquin Delta Boating Needs Assessment," *Energy and Water Economics*.

Individual permit sales are not a complete representation of visitation use. Annual permits allow recreationists greater use of outdoor recreation facilities for a higher price than daily permits, so it can be assumed that increased usage is reflected in the permit price paid by the recreationist. Permit revenue is therefore used as an indicator for recreation use on the Reservation. Since we are interested in the revenue gained by expanding the surface area of available water sources for recreations, only those lakes that allow recreation will be included in this analysis. They are listed along with their estimated surface area in Table P-6.

Table P-6
Existing Lakes Used for Recreation on the Reservation

Lakes with Recreation	Surface Area (Acres)
A-1	24
Shush Be Tou and Shush Be Zahze	33
Bog Tank	12
Bootleg Lake	10
Cooley Lake	11
Drift Fence Lake	16
Hawley Lake	260
Horseshoe Lake	121
Pacheta Lake	68
Reservation Lake	280
Sunrise Lake	891
Christmas Tree Lake	41
Earl Park Lake	47
Cyclone Lake	37
Hurricane Lake	19
Tonto Lake	82
<i>Total</i>	<i>1,952</i>
Representative Lake	122

Source: White Mountain Apache Tribe, 2006 Outdoor Recreation Regulations.

The combined surface area of all lakes offering recreation on the Reservation is 1,952 acres correlating to over \$1.1 million in recreation permit sales. A representative lake is created with a surface area of 122 acres with \$564 per acre in recreation permits sales using values from the Table P-6 and permit sales data. This representative lake has a total of \$68,808 in permit sales associated with its total surface area of 122 acres.

Three of the proposed reservoirs on the Reservation will allow recreation. They are Miner Flat, Bonito Creek, and Salt Creek with surface areas of 159 acres, 1,012 acres, and 288 acres, respectively. Table P-7 shows the surface area capacity of the proposed reservoirs offering recreation.

Table P-7
Proposed Reservoirs with Recreation Capabilities

	Surface Area (Acres)
Miner Flat	159
Bonito Creek	1,012
Salt Creek	288
Total	1,459

The water level of the proposed reservoirs will fluctuate throughout the year. In the summer months, the reservoirs will be drawn down as water is diverted for agricultural use, which will decrease the surface area of the reservoirs. In order to account for this, the surface area values calculated below are a weighted average of the average monthly surface area weighted by the recreation use that month, which is represented by the number of permits sold over the month. The weighted average is used instead of the simple average because the surface area values will be used to derive the benefits to recreation from increased surface area in the next section, so the value must reflect the portion of annual use associated with the specific average monthly water levels.

During the winter months, the reservoirs are assumed to be at full capacity, which are the values presented in Table P-7. The reservoirs have the lowest water levels in the summer months as recreation use is at its highest. To arrive at the annual surface area values for each reservoir, the monthly average surface area of the reservoirs are weighted by the portion of annual permit sales taking place in that month. These values are presented in Table P-8 below. The annual weighted average surface area values are 119.59 acres, 755.40 acres, and 173.04 acres for Miner Flat Dam, Bonito Creek, and Salt Creek, respectively.

**Table P-8
Annual Average Surface Area Calculation**

Month	Proposed Reservoirs	Recreation Permits Sold	% of Annual permit sales	Surface	Area (Acres)
				Monthly Avg	Weighted Avg
January	Miner Flat Dam	627	0.69%	159.00	1.09
	Bonito Creek			1,012.00	6.95
	Salt Creek			288.00	1.98
February	Miner Flat Dam	446	0.49%	159.00	0.78
	Bonito Creek			1,012.00	4.94
	Salt Creek			288.00	1.41
March	Miner Flat Dam	2,824	3.09%	145.15	4.49
	Bonito Creek			743.22	22.98
	Salt Creek			171.54	5.30
April	Miner Flat Dam	5,564	6.09%	141.67	8.63
	Bonito Creek			782.83	47.68
	Salt Creek			173.21	10.55
May	Miner Flat Dam	14,593	15.98%	138.43	22.11
	Bonito Creek			766.49	122.45
	Salt Creek			166.06	26.53
June	Miner Flat Dam	16,522	18.09%	124.79	22.57
	Bonito Creek			742.17	134.24
	Salt Creek			160.18	28.97
July	Miner Flat Dam	24,727	27.07%	97.29	26.34
	Bonito Creek			710.96	192.46
	Salt Creek			156.73	42.43
August	Miner Flat Dam	10,384	11.37%	95.92	10.90
	Bonito Creek			692.46	78.72
	Salt Creek			156.91	17.84
September	Miner Flat Dam	7,785	8.52%	105.30	8.97
	Bonito Creek			677.81	57.77
	Salt Creek			155.11	13.22
October	Miner Flat Dam	5,028	5.50%	159.00	8.75
	Bonito Creek			1,012.00	55.71
	Salt Creek			288.00	15.85
November	Miner Flat Dam	2,141	2.34%	159.00	3.73
	Bonito Creek			1,012.00	23.72
	Salt Creek			288.00	6.75
December	Miner Flat Dam	702	0.77%	159.00	1.22
	Bonito Creek			1,012.00	7.78
	Salt Creek			288.00	2.21
Annual	Miner Flat Dam	91,343	100.00%	136.96	119.59
	Bonito Creek			847.99	755.40
	Salt Creek			214.98	173.04

The additional recreation revenue attributable to the increase in water surface area on the Reservation can be calculated. To accomplish this, the representative lake developed above will be used as a comparison point for the analysis. The difference in area between the representative lake and the reservoirs is calculated in both acres and as a percentage. The relationship between surface area and visitation is then exploited to find the increase in revenue due to reservoir creation. Three elasticity coefficients for recreation use with respect to surface area are included in this analysis. The coefficients are chosen to be close to one based on past work in reservoir recreation economics.¹¹ The increase in revenue for each reservoir at the three different elasticity coefficient values is reported in Table P-9. The additional annual revenue associated with the three new reservoirs offering recreation is expected to range between \$533,389 and \$552,622.

**Table P-9
Permit Revenue (Visitation) Response to Increased Surface Area**

	Surface Area (Weighted Acres)	Surface Area Difference (Acres)	Percentage Difference	New Reservoir Revenue		
				Elasticity Coefficients		
				0.85	0.88	0.90
Representative Lake	122	0	0%	\$68,808	\$68,808	\$68,808
Proposed Reservoirs						
Miner Flat	119.59	-2.41	-2%	\$67,653	\$67,612	\$67,585
Bonito Creek	755.4	633.4	519%	\$372,460	\$383,177	\$390,322
Salt Creek	173	51	42%	\$93,277	\$94,140	\$94,716
Reservoirs Total	1,048	926	759%	\$533,389	\$544,929	\$552,622

Note: The difference refers to the difference between the representative lake and the proposed reservoirs.

P.3.2 Visitation Changes from Improved Fish Hatchery Yield

In addition to the benefits from recreation, the Reservation will receive benefits from increased fishery yields due to the additional water flow. Loomis (2005) looks at the

¹¹ Coughlin, Katie, Chris Boldue, Peter Chan, Camilla Dunham-Whitehead, Robert van Buskirk, March 27, 2006, *Valuing the Environmental Benefits of Urban Water Conservation: Final Report*.

relationship between increased fishing quality and use, to find how use changes when catch rates are increased as part of a 2005 study. The study's primary goal is to estimate the contribution the river makes to the surrounding area's income and employment. In addition, the study estimates the willingness-to-pay (WTP) for increased catch rates to recreation users of the Snake River. The second part of this work is useful to the analysis presented in this study.

The relationship between improved fishing quality and fishing use is measured using the coefficient of elasticity. The study predicts that an increase in quality will lead to an increase in use. The coefficient of elasticity is found to be 0.645, which suggests that if the catch rate is doubled (an increase of 100 percent) there will be a 64.5 percent increase in use.¹² The coefficient of elasticity found in this study is higher than expected. More typically, an elasticity of 0.43¹³ to 0.456¹⁴ is found relating fishing use to fishing quality.¹⁵

A 1999 study examined the validity of using multi-site cross-sectional data as a proxy for single-site, time-series data when estimating the demand for recreation use based on changes in quality.¹⁶ The study uses the number of fish caught as the quality variable, which is consistent with the recreation demand literature. To compare the two types of analysis techniques, two separate regressions were performed. The first is a multi-site cross-sectional regression that looked at the effect of quality on trips. The second analysis is a time-series regression for six specific river sections. The study finds that the estimates of benefits due to quality improvements may be unreliable when using the cross-sectional data to perform a benefit-cost analysis of changes in quality at a single site for which a time-series site specific model is more appropriate. The analysis provides both site-specific and cross-sectional estimates of the elasticity of demand for a change in quality.

¹² Loomis, John, May 2005, *The Economic Value of Recreational Fishing and Boating to Visitors and Communities along the Upper Snake River*.

¹³ Cooper J. and J. Loomis, 1990, "Comparison of Environmental Quality Induced Demand Shifts Using Time Series and Cross-Sectional Data," *Western Journal of Agricultural Economics* 15(1): 83-90.

¹⁴ Loomis, J., and P. Fix, 1998, "Testing the Importance of Fish Stocking as a Determinant of the Demand for Fishing Licenses and Fishing Effort in Colorado," *Human Dimensions of Wildlife* 3(3): 46-61.

¹⁵ Loomis, John, May 2005, *The Economic Value of Recreational Fishing and Boating to Visitors and Communities along the Upper Snake River*.

¹⁶ Cooper J. and J. Loomis, 1990, "Comparison of Environmental Quality Induced Demand Shifts Using Time Series and Cross-Sectional Data," *Western Journal of Agricultural Economics* 15(1): 83-90.

In the first analysis, the fish catch quality variable was significant each year. The coefficient of elasticity ranged from 0.41 to 0.83¹⁷ suggesting that as fish catch doubles, use increases by 41 to 83 percent, so quality is generally inelastic. The second equation found quality to be significant in two specific river sections. The coefficient of elasticity for recreation demand as quality increases ranges from 0.73 to 0.79¹⁸ suggesting that for a 100 percent increase in fish catch (quality) there is a 73 to 79 percent increase in use.

This study will use an elasticity of 0.5 taking into account the different values available in the literature. The elasticity of 0.5 suggests that when the number of fish caught doubles, fishing will increase by 50 percent of current use.

P.3.3 Visitation and Expenditure Changes from Target Markets

To develop scenarios of future angling on the Reservation, ENTRIX reviewed the 2006 data mining project on angling trends prepared by Southwick Associates. Southwick Associates (SA) is conducting a nationwide analysis of angling trends. In 2006 SA reported on angling trends for 13 states, three of which are located in the western United States: Nebraska, Colorado, and Idaho. Their work provides a foundation from which to develop various recreation projection scenarios for angling on Reservation lands. For purposes of comparison, their findings for Colorado are provided below. Colorado was chosen since it has experienced major surges in population growth in the past, is known for “blue ribbon” trout fishing, and has experienced rapid population growth in its mountainous counties.

The SA analysis of Colorado angling focused on annual license sales from 2001 through 2005. Annual licenses could be viewed as representing a greater level of commitment to angling compared to individuals who purchase a 1, 2, or 3 day fishing license. The annual license allows anglers to fish as many days as they want in a given year, subject to fishing season constraints and other regulations. Overall in Colorado annual license sales decreased from 2001 until 2002, then increased from 2002 through 2005. SA matched license sales with a database called TAPESTRY, built from Census Bureau data and other sources. This market segmentation database divides U.S. residential areas into 65 segments using variables such as age, income, home value, household type, as well as other consumer behavior characteristics. These segments are found in various proportions in all states. The top six market segments for Colorado anglers for the period 2001 through 2005 are summarized below.

¹⁷ Cooper J. and J. Loomis, 1990, “Comparison of Environmental Quality Induced Demand Shifts Using Time Series and Cross-Sectional Data,” *Western Journal of Agricultural Economics* 15(1): 83-90.

¹⁸ Ibid.

Table P-10
Top Market Segments in Colorado for purchase of annual fishing licenses

Rank	TAPESTRY segment	License Sales, 2001-2005		% of Pop.	Summary description
		Percent	Percent Change		
1	<i>Up and Coming families</i>	7.84	13.81	6.59	<i>Fast growing segment, average age is 32, married with children, affluent, own home, on suburban fringe, little time, fast food</i>
2	<i>Boomburbs</i>	6.06	14.54	5.57	<i>Younger families with busy upscale lifestyle, two incomes, college education, homeowners, computers and technology, CNN, Disney Channel</i>
3	<i>Green Acres</i>	5.10	6.12	4.45	<i>Married with children, blue collar baby boomers, with college education, above average income, suburban fringe, do-it-yourselfers, outdoors</i>
4	<i>Rural Resort Dwellers</i>	4.97	5.26	3.62	<i>Rural non-farm, married with children that moved out, typically older, average income, boats/fish/hunt.</i>
5	<i>Sophisticated Squires</i>	4.83	1.56	4.38	<i>Country living on urban fringe, above average income, ages 35-54, SUVs, married with children, golf.</i>
6	<i>Exurbanites</i>	4.67	3.04	4.36	<i>Affluent, like open space, on urban edge, married/empty nesters, golf, kayakers, active and volunteer groups and donates to causes.</i>

Source: AFWA-ASA Data Mining Project, Initial Colorado Findings, Southwick Associates, 2006, www.southwickassociates.com, website accessed on December 23, 2006.

The first segment is entitled “Up and Coming”, and represents almost 8 percent of license sales in Colorado during the survey period. This is the fastest growing segment among the 65 segments profiled in TAPESTRY, and showed the second greatest increase in license sales in Colorado. “Boomburbs” is the second segment, and represents about 6 percent of license sales in Colorado over the five year time period. This segment showed the greatest increase in purchases of licenses (14.54 percent). This segment is comprised of young families with two incomes. Segment three is entitled “Green Acres” and

represents individuals married with children with above average income. In Arizona it would be more likely to find these segments in or near Phoenix and Tuscon. Segment four through six represent older individuals with children not living at home. Members of this segment (“Rural Resort Dwellers”) would be more likely to be found living in communities such as Show Low. Finally, segments five and six represent older individuals likely to be found living near Phoenix or Tuscon. These segments may include individuals that own second homes in communities such as Show Low. Collectively these six segments represent about 32 percent of annual fishing licenses sold in Colorado during the survey period.

In addition to growth in recreation use attributable to population growth, and the presence of new reservoirs, there would be growth in recreation use from the result of implementing new marketing strategies. To examine the effect of implementing each of these strategies on benefits to the Tribe, two separate marketing approaches for increasing angler-trips are described below.

P.3.3.1 Fly Fishing

One marketing strategy is to increase angler days and expenditures per group by targeting fly fishing enthusiasts. This strategy recognizes that creation of new reservoirs will improve fish habitat conditions downstream, possibly establishing conditions for “blue ribbon” trout streams. This strategy would borrow heavily from the highly successful effort on the Reservation to create high quality elk hunting opportunities. This strategy would be most sensitive to concerns about creating crowded fishing conditions on the Reservation.

We assume that implementing this strategy would result in an overall 8.25 percent increase in angler-days compared to Baseline conditions. The increase is based on two assumptions. One assumption is that the proportion of anglers that fly fish in Arizona is the same as for the national average which is 16.5 percent (Outdoor Industry Foundation, 2006). The second assumption is that 50 percent of the fly anglers in Arizona will fish on Reservation lands following establishment of a “blue ribbon” trout fishing resource. This assumption is based on the premise that White Mountain Reservation lands contain 50 percent of Arizona’s cold water resources (Cooley, personal communication, 2006).

Individuals procuring fly fishing guide services would be considered in the “high-end” of recreation expenditures per day. It is safe to assume that most guided fly fishing trips are likely to include only one or two anglers. Fly fishermen are interested in high quality fishing locales with little or no crowding. Guided trip fees for one to two anglers are an appropriate standard to use when assessing potential expenditures on the Reservation.

A small survey of guide services operating in the White Mountains region yielded a range of between \$225 to \$650 for guided trips in high country lakes and streams. The upper end of this range is represented by highly specialized, all-inclusive trips, comprising travel to and from the White Mountains from the Phoenix area, and all food and equipment required for the day. The most expensive of these trips, dubbed the “White Mountains Trophy Trout Adventure,” is \$650 per day for one to two anglers, and takes place on the Little Colorado River near Greer, just east of the Reservation.

The lower end of the range is the daily rate for a guide firm out of Show Low, just north of the Reservation. This outfitter charges \$225 per day for one angler and \$290 per day for two anglers. This fee does not include other equipment rental expenses, such as rods and reels, waders, float tubes, or boats.

Considering that local services charge fees of \$225, at a minimum, for high-quality guided trips in the White Mountains region, the introduction of this type of trip (with knowledgeable and licensed guides) on the Reservation could easily yield \$200 per day per angler. The highest rates are for exceptional streams, either with catch-and-release programs to yield very large fish, or with the possibility of catching Apache trout. There is no indication from these guide services that they operate on Tribal land (though they do operate in all adjacent national forest areas), so there is potential that guided fly fishing trips on the Reservation could command high daily rates.

Only a subset of anglers will choose to utilize guide services, but they will spend significantly more per day than anglers choosing to fish without these services. Even in the absence of guide services, however, particularly high quality, managed streams can command high daily fees. The X Diamond Ranch charges users a \$40 per day river fee to access the “blue ribbon” catch-and-release portion of the Little Colorado River.

P.3.3.2 Families with Children

Another strategy is to increase the total number of angler-days by recruiting new anglers to the Reservation. This strategy would focus on families with children at home and would entail recruiting anglers from other nearby trout fishing areas, and recruiting individuals who have never fished for trout. It would involve developing an integrated marketing strategy implemented by the various Tribal entities that have some responsibility for recreation management. The focus would be on segments “Up and Coming,” “Boomburbs,” and “Green Acres.” Each segment contains families with children, so the emphasis would be on teaching basic angling skills, and providing opportunities to easily catch fish. This type of strategy could be implemented by adding one fishing derby for each new reservoir. These events would serve as an opportunity to motivate individuals to fish on Reservation lands. It could also involve adding new services that would result in a more positive angling experience, particularly for first time

anglers. These new services might include angling instruction and fish cleaning services. This strategy is estimated to increase angler days an additional 50 percent (compared to effect of the new reservoirs and regional population growth) over the 50 year planning horizon, or one percent per year. Although not quantified, expenditures may increase as a result of adding new fishing derbies for categories such as food and lodging, and additional services such as angling instruction and fish cleaning would result in new expenditures in different expenditure categories.

P.4 Changes in Expenditures with Project

With the project, it is expected that the development of a high-quality trout fishery and related fishing services by the Tribe would result in additional spending by fly anglers visiting the Reservation. In addition to the spending values outlined in Table P-4, it is anticipated that fly anglers would make additional expenditures on guide and outfitting services, which would be provided by the Tribe. The additional expenditures associated with these services have been estimated based on a small survey of guide services operating in the White Mountains region, which yielded a range between \$225 to \$650 for guided trips in high country lakes and streams. Based on this range and considering that it includes some all-inclusive trips, which would capture some of the spending in Table P-4, as well as some multi-person trips, it is conservatively estimated that new fly anglers visiting the Reservation would spend, on average, an *additional* \$100 per recreation day during their fly fishing experience.

P.5 Summary

Recreation use projections were developed for this study based on the relationship between existing reservoir sizes and permit sales, development of new types of fishing opportunities and amenities, changes in fishery quality, regional demand for recreation, population forecasts, and increased marketing. These projections focus on expected changes in fishing activity on the Reservation, but also implicitly capture related recreation uses, such as boating and camping, which are often done in conjunction with fishing trips. A summary of the recreation use projections is presented in Table P-11. In total, approximately 37.1 million recreation days are expected on the Reservation over the next 100 years with the proposed water storage projects in place, which represents an increase of 21.1 million recreation days compared to Baseline conditions.

Separate projections were also prepared for fly fishing activity on the Reservation. These projections are based on the potential to develop a “blue ribbon” trout fishery downstream from the proposed water storage projects. It is estimated that such a fishery

could generate over 2.6 million recreation days associated with fly fishing trips on the Reservation over the next 100 years, all of which would represent new recreation activity relative to Baseline conditions.

Total expected permit revenue and total expenditures for non-member visits under Baseline conditions and with the project in place are shown in Table P-12.

**Table P-11
Projected Recreation Visitation by Non-Tribal Members**

Year	Baseline	Surface Area and Hatchery	Project Fly Anglers	Project Family Anglers	Recreation Days Total
1	109,563	144,603	18,068	1,253	254,166
2	110,659	146,049	18,249	1,976	256,708
3	111,765	147,510	18,431	2,706	259,275
4	112,883	148,985	18,615	3,444	261,868
5	114,012	150,475	18,802	4,189	264,486
6	115,152	151,980	18,990	4,941	267,131
7	116,303	153,499	19,180	5,701	269,803
8	117,466	155,034	19,371	6,468	272,501
9	118,641	156,585	19,565	7,244	275,226
10	119,827	158,151	19,761	8,027	277,978
11	121,026	159,732	19,958	8,817	280,758
12	122,236	161,329	20,158	9,616	283,565
13	123,458	162,943	20,359	10,423	286,401
14	124,693	164,572	20,563	11,237	289,265
15	125,940	166,218	20,769	12,060	292,158
16	127,199	167,880	20,976	12,891	295,079
17	128,471	169,559	21,186	13,731	298,030
18	129,756	171,254	21,398	14,579	301,010
19	131,054	172,967	21,612	15,435	304,020
20	132,364	174,697	21,828	16,300	307,061
21	133,688	176,444	22,046	17,173	310,131
22	135,025	178,208	22,267	18,055	313,233
23	136,375	179,990	22,490	18,946	316,365
24	137,739	181,790	22,714	19,846	319,528
25	139,116	183,608	22,942	20,755	322,724
26	140,507	185,444	23,171	21,673	325,951
27	141,912	187,298	23,403	22,601	329,211
28	143,331	189,171	23,637	23,537	332,503
29	144,765	191,063	23,873	24,483	335,828
30	146,212	192,974	24,112	25,438	339,186
31	147,674	194,903	24,353	26,403	342,578
32	149,151	196,852	24,596	27,378	346,004
33	150,643	198,821	24,842	28,362	349,464
34	152,149	200,809	25,091	29,356	352,958
35	153,671	202,817	25,342	30,360	356,488
36	155,207	204,845	25,595	31,374	360,053
37	156,759	206,894	25,851	32,399	363,653
38	158,327	208,963	26,110	33,433	367,290
39	159,910	211,052	26,371	34,478	370,963
40	161,509	213,163	26,634	35,533	374,672
41	163,124	215,295	26,901	36,599	378,419
42	164,756	217,448	27,170	37,676	382,203
43	166,403	219,622	27,441	38,763	386,025
44	168,067	221,818	27,716	39,861	389,885
45	169,748	224,036	27,993	40,970	393,784
46	171,445	226,277	28,273	42,090	397,722
47	173,160	228,540	28,556	43,222	401,699
48	174,891	230,825	28,841	44,364	405,716
49	176,640	233,133	29,130	45,519	409,774
50-100	178,407	235,465	29,421	46,684	413,871
Total	15,983,116	21,094,819	2,635,771	1,108,372	37,077,935

1/ Includes fishing, camping, boating, and other special uses.

**Table P-12
Projected Permit Revenues and Expenditures**

Year	Baseline Total Permit Revenue	Baseline Total Spending	With Project Total Permit Revenue	With Project Total Spending
1	\$1,981,607	\$9,287,040	\$5,585,985	\$23,351,050
2	\$2,001,423	\$9,379,910	\$5,641,845	\$23,584,561
3	\$2,021,438	\$9,473,709	\$5,698,264	\$23,820,406
4	\$2,041,652	\$9,568,446	\$5,755,246	\$24,058,610
5	\$2,062,069	\$9,664,131	\$5,812,799	\$24,299,196
6	\$2,082,689	\$9,760,772	\$5,870,927	\$24,542,188
7	\$2,103,516	\$9,858,380	\$5,929,636	\$24,787,610
8	\$2,124,551	\$9,956,963	\$5,988,932	\$25,035,486
9	\$2,145,797	\$10,056,533	\$6,048,822	\$25,285,841
10	\$2,167,255	\$10,157,098	\$6,109,310	\$25,538,700
11	\$2,188,927	\$10,258,669	\$6,170,403	\$25,794,087
12	\$2,210,817	\$10,361,256	\$6,232,107	\$26,052,027
13	\$2,232,925	\$10,464,869	\$6,294,428	\$26,312,548
14	\$2,255,254	\$10,569,517	\$6,357,372	\$26,575,673
15	\$2,277,807	\$10,675,213	\$6,420,946	\$26,841,430
16	\$2,300,585	\$10,781,965	\$6,485,155	\$27,109,844
17	\$2,323,591	\$10,889,784	\$6,550,007	\$27,380,943
18	\$2,346,826	\$10,998,682	\$6,615,507	\$27,654,752
19	\$2,370,295	\$11,108,669	\$6,681,662	\$27,931,300
20	\$2,393,998	\$11,219,756	\$6,748,479	\$28,210,613
21	\$2,417,938	\$11,331,953	\$6,815,964	\$28,492,719
22	\$2,442,117	\$11,445,273	\$6,884,123	\$28,777,646
23	\$2,466,538	\$11,559,725	\$6,952,964	\$29,065,422
24	\$2,491,204	\$11,675,323	\$7,022,494	\$29,356,077
25	\$2,516,116	\$11,792,076	\$7,092,719	\$29,649,637
26	\$2,541,277	\$11,909,997	\$7,163,646	\$29,946,134
27	\$2,566,689	\$12,029,097	\$7,235,283	\$30,245,595
28	\$2,592,356	\$12,149,388	\$7,307,635	\$30,548,051
29	\$2,618,280	\$12,270,881	\$7,380,712	\$30,853,532
30	\$2,644,463	\$12,393,590	\$7,454,519	\$31,162,067
31	\$2,670,907	\$12,517,526	\$7,529,064	\$31,473,688
32	\$2,697,616	\$12,642,701	\$7,604,355	\$31,788,424
33	\$2,724,593	\$12,769,128	\$7,680,398	\$32,106,309
34	\$2,751,839	\$12,896,820	\$7,757,202	\$32,427,372
35	\$2,779,357	\$13,025,788	\$7,834,774	\$32,751,645
36	\$2,807,151	\$13,156,046	\$7,913,122	\$33,079,162
37	\$2,835,222	\$13,287,606	\$7,992,253	\$33,409,954
38	\$2,863,574	\$13,420,482	\$8,072,176	\$33,744,053
39	\$2,892,210	\$13,554,687	\$8,152,898	\$34,081,494
40	\$2,921,132	\$13,690,234	\$8,234,427	\$34,422,309
41	\$2,950,343	\$13,827,136	\$8,316,771	\$34,766,532
42	\$2,979,847	\$13,965,408	\$8,399,938	\$35,114,197
43	\$3,009,645	\$14,105,062	\$8,483,938	\$35,465,339
44	\$3,039,742	\$14,246,112	\$8,568,777	\$35,819,992
45	\$3,070,139	\$14,388,574	\$8,654,465	\$36,178,192
46	\$3,100,841	\$14,532,459	\$8,741,010	\$36,539,974
47	\$3,131,849	\$14,677,784	\$8,828,420	\$36,905,374
48	\$3,163,167	\$14,824,562	\$8,916,704	\$37,274,428
49	\$3,194,799	\$14,972,807	\$9,005,871	\$37,647,172
50-100	\$3,226,747	\$15,122,535	\$9,095,930	\$38,023,644

APPENDIX Q



Benefit Estimation

ENTRIX

FEBRUARY 2007

Appendix Q Benefit Estimation

**Prepared for
White Mountain Apache Reservation
White River, AZ**

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Appendix Q Benefit Estimation

Recreation benefits associated with the proposed reservoirs may be calculated by comparing the future recreation benefits expected without the proposed reservoirs with the future benefits expected if the new reservoirs are built. Three different types of recreational benefits will accrue to the Tribe from three different sources. The three types of benefits are 1) producer surpluses, including profits to the Tribe from both permit revenues, and angler expenditures at Tribal lodging and retail facilities, 2) labor income benefits from the additional stimulus in the Tribal economy represented by the additional tourism, and 3) economic value to Tribal anglers. The three different sources of benefits are: 1) permit revenues, 2) expenditures and, 3) economic value. Because different methodologies are used to quantify benefits depending on the source of the benefit, this appendix is organized by source instead of type. A final section totals all project benefits.

Q.1 Future Permit Revenue with Project

The increase in recreation revenue with the project stems primarily from increased recreation visitation on the Reservation (see Appendix P for details). The project-related benefits to the Tribe from recreational permit sales may be calculated by evaluating the net revenue, or profit to the Tribe with the project in place compared to the net revenue or profit under Baseline conditions. As described in Appendix P, Baseline conditions include an average increase in permit prices of 80 percent so that recreation fees on the Reservation are comparable to similar resources throughout the state. Under “with project” conditions, the majority of fees are the same as the Baseline conditions, except for a \$2.50 per capita vehicle fee is added, and fly fishermen are expected to pay an average of \$40 per day for that unique resource.

Net revenue is estimated as the portion of revenue that is over and above costs. Program costs for the operation of the Wildlife and Outdoor Recreation Division (Division) of the Tribe were estimated based on the 2005 budget for the Division. Because the Division

operates recreational fishing, camping, hunting, and other activities it is difficult to separate the costs of just those programs that would operate and maintain recreation on the proposed reservoirs. However, based on budget information from the Tribe, an estimated cost of \$667,000 was used to generate permit revenue of \$1,428,850 in 2005, representing 47 percent of revenue. However, if permit fees increased as is anticipated in the Baseline, this share of revenues represented by costs will drop to just over 26 percent. Net revenues for all programs are calculated based on this percentage.

Although much of the costs will go to labor, labor income benefits were not counted as project benefits for program operation because much of the labor is skilled labor, and it is not clear what portion might come from otherwise unemployed Tribal members.

Net revenue to the Tribe from Recreational permit sales is presented in Table Q.3. Project benefits resulting from net permit fees is estimated to average \$3.4 million annually over the first 50 years of the project. The subsequent 50 years of the project will result in annual net revenues of \$3.9 million, with a total of \$388.5 million over the life of the project.

**Table Q-3
Net Permit Revenue Project Benefit**

Year	Baseline Net Revenue	With Project Net Revenue	Project Benefit
1	\$1,464,188	4,127,422	2,663,235
2	\$1,478,830	4,168,697	2,689,867
3	1,493,618	4,210,384	2,716,766
4	1,508,554	4,252,487	2,743,933
5	1,523,640	4,295,012	2,771,373
6	1,538,876	4,337,962	2,799,086
7	1,554,265	4,381,342	2,827,077
8	1,569,807	4,425,155	2,855,348
9	1,585,505	4,469,407	2,883,902
10	1,601,361	4,514,101	2,912,741
11	1,617,374	4,559,242	2,941,868
12	1,633,548	4,604,835	2,971,287
13	1,649,883	4,650,883	3,001,000
14	1,666,382	4,697,392	3,031,010
15	1,683,046	4,744,366	3,061,320
16	1,699,876	4,791,809	3,091,933
17	1,716,875	4,839,727	3,122,852
18	1,734,044	4,888,125	3,154,081
19	1,751,384	4,937,006	3,185,621
20	1,768,898	4,986,376	3,217,478
21	1,786,587	5,036,240	3,249,652
22	1,804,453	5,086,602	3,282,149
23	1,822,498	5,137,468	3,314,970
24	1,840,723	5,188,843	3,348,120
25	1,859,130	5,240,731	3,381,601
26	1,877,721	5,293,139	3,415,417
27	1,896,498	5,346,070	3,449,572
28	1,915,463	5,399,531	3,484,067
29	1,934,618	5,453,526	3,518,908
30	1,953,964	5,508,061	3,554,097
31	1,973,504	5,563,142	3,589,638
32	1,993,239	5,618,773	3,625,534
33	2,013,171	5,674,961	3,661,790
34	2,033,303	5,731,711	3,698,408
35	2,053,636	5,789,028	3,735,392
36	2,074,172	5,846,918	3,772,746
37	2,094,914	5,905,387	3,810,473
38	2,115,863	5,964,441	3,848,578
39	2,137,022	6,024,085	3,887,064
40	2,158,392	6,084,326	3,925,934
41	2,179,976	6,145,170	3,965,194
42	2,201,776	6,206,621	4,004,846
43	2,223,793	6,268,687	4,044,894
44	2,246,031	6,331,374	4,085,343
45	2,268,492	6,394,688	4,126,196
46	2,291,177	6,458,635	4,167,458
47	2,314,088	6,523,221	4,209,133
48	2,337,229	6,588,453	4,251,224
49	2,360,602	6,654,338	4,293,736
50 - 100	2,384,208	6,720,881	4,336,674

Q.2 Angler Expenditure Benefits with Project

In addition to permit revenues, recreation activity also generates economic benefits for the Tribe as a result of other types of spending by recreationists on the Fort Apache Indian Reservation (Reservation). These benefits come in the form of profits earned by Tribal businesses, which accrues directly to the Tribe as the owner-operator of these enterprises, as well as employment opportunities and related labor income earned by otherwise unemployed Tribal employees (see Chapter 5.10 for a review of labor benefits associated with utilization of unemployed labor). With the development of new water storage projects and fishery improvements, recreation visitation is expected to increase relative to Baseline (or without-project) conditions. Increases in recreation use levels translate into increased recreation spending on the Reservation, and thus, economic benefits for the Tribe. These expenditures represent direct inputs into the Reservation economy, which, in turn, generate additional indirect economic activity as businesses buy from other businesses and employees spend their earnings locally; these “ripple” (or multiplier) effects are not quantified as part of this analysis.

Q.2.2 Spending in the Local Economy

Recreationists make expenditures on a wide range of items during their recreation experience. Typical expenditures include travel costs (primarily fuel purchases), lodging, food, recreation equipment and supplies, as well as guide and outfitting services for specialized types of recreation activities. To the extent that visitors make these expenditures on the Reservation, and therefore support Tribal businesses, economic benefits will accrue to the Tribe. The surrounding local economy will also benefit from local expenditures that are made off the Reservation.

In order to estimate these direct recreation-spending benefits, a number of key information sources and assumptions were needed. First, it is assumed that economic benefits to the Tribe are only attributable to recreation spending by non-Tribal members. The premise of this assumption is that spending by Tribal members simply represents a shift in money from one Tribal entity to another, with no net change in the overall economic well being of the Tribe. Conversely, non-Tribal spending represents new money from outside the region that would likely not otherwise be captured in absence of the recreation opportunities provided on the Reservation. Based on this assumption, estimates of future recreation spending levels with and without the proposed water storage projects were required to estimate total recreation spending by non-Tribal members.

Of the total spending by non-Tribal members, it is necessary to further define the proportion of spending that occurs on the Reservation in order to estimate Tribal benefits. There are no Reservation-specific data that organize expenditures by location; therefore, it was necessary to estimate on-Reservation spending based on alternative data sources. For the purposes of this analysis, these estimates were based on reservoir recreation spending data collected by the U.S. Army Corps of Engineers (USACE). These data include total spending and spending within 30 miles of the recreation site, spending by fisherman versus other recreationists, and spending by residents and non-residents (see Table Q-5). The proportion of non-resident angler spending within 30 miles relative to total spending at the USCAE sites was used as a proxy for the proportion of recreation spending that occurs on the Reservation; this figure was calculated to be approximately 63 percent. For fly fishing expenditures, it is assumed that the additional \$100 in spending per day on guide and outfitting services would occur entirely on the Reservation since these services would be provided exclusively by the Tribe.

Table Q-5
Representative Patterns of Recreation Spending on the Reservation^{1,2}

Spending Location	NR/D/F	NR/C/F	NR/O/F	Average
Spending within 30 miles	\$30.67	\$41.04	\$95.72	\$55.81
Total spending	\$81.16	\$68.14	\$116.71	\$88.67
Proportion Local:	37.8%	60.2%	82.0%	62.9%

1/ Based on per party day expenditures.

2/ Data focused on reservoir recreation visitors and estimated trip and durable goods spending estimates from a sample of over 3,000 visitors at 12 USACE projects. Spending was measured via exit interviews and mail-back surveys between 1989-1990.

Key:

NR = Non-Resident
D = Day-User
F = Angler
C = Camper
O = Other Overnight

Table Source: USACE 2006; ENTRIX, 2007

Based on projected recreation use, representative recreation spending patterns and estimates of the proportion of spending by non-Tribal members that would occur on the Reservation, average and total recreation spending on the Reservation across expenditure categories was calculated for the 100 year period of analysis (see Table Q-6). Under future baseline conditions, total recreation expenditures are estimated to be \$852.7 million over the next 100 years, or an average of \$8.5 million annually. An additional \$1.4 billion in recreation spending is expected with the proposed water resource projects. In total, recreation spending on the Reservation with the implementation of the proposed projects is estimated to be over \$2.2 billion, or an average of \$22.4 million annually. Most of these expenditures are

attributed to food purchases, followed by expenditures on lodging, gas, bait, and guide/outfitting services.

Table Q-6
Estimated Non-Tribal Average and
Total Recreation Spending on the Reservation^{1,2}

	Gas	Food	Lodging	Bait	Services	Total
Baseline						
Annual Average	\$1.77	\$2.89	\$2.64	\$1.23		\$8.53
Total	\$177.3	\$289.1	\$263.6	\$122.7		\$852.7
Project						
Annual Average	\$2.34	\$3.82	\$3.48	\$1.62	\$2.64	\$13.9
Total	\$233.9	\$381.6	\$347.9	\$162.0	\$263.6	\$1,389.0
Total						
Annual Average	\$4.11	\$6.71	\$6.11	\$2.85	\$2.64	\$22.4
Total	\$411.2	\$670.7	\$611.5	\$284.7	\$263.6	\$2,241.7

1/ Values in millions of undiscounted 2005 dollars

2/ Values calculated over the 100 year period of analysis

Q.2.3 Methodology

In order to translate recreation spending on the Reservation to economic benefits, it is necessary to understand the relationships between retail sales and labor earnings and profits realized by Tribal workers and the Tribe, respectively. Because data on individual Tribal business operations were not available, these economic relationships were derived based on regional data compiled by the Minnesota IMPLAN Group as part of their IMPLAN modeling system. IMPLAN is a commonly-used tool for regional economic impact analysis; however, the data also provide valuable insight into the structure of industries and inter-industry relationships within a local economy. The 2004 IMPLAN dataset for Navajo County was used because this is where most of the Tribe's commercial operations are located, including the Hon-Dah Casino, as well as other recreation-serving businesses in the Whiteriver, Pinetop, and Lakeside areas. The pertinent information from the IMPLAN data includes retail margins and relationships between employee compensation (i.e., labor income) and

profits,¹ relative to output levels for the potentially affected economic sectors on the Reservation. A summary of this information is presented in Table Q-7.

It is important to accurately map the spending data to the appropriate economic sector in the IMPLAN dataset. This information is presented in the last column in Table Q-8. All gasoline-related expenditures were applied to Sector 407 (*Gasoline Stations*), which is the retail sector for gasoline sales. Food-related expenditures were split evenly across Sector 405 (*Food and Beverage Stores*) and Sector 481 (*Food Services and Drinking Places*), the former representing primarily convenience stores and other grocery outlets and the latter mainly representing restaurant establishments. Seventy-five percent of lodging expenditures were assigned to Sector 479 (*Hotels and Motels*), with the remaining 25 percent assigned to Sector 480 (*Other Accommodations*). Finally, all expenditures on bait were applied to Sector 409 (*Sporting Goods Stores*).

Table Q-7
Economic Relationships in Navajo County,
Arizona and Spending Allocations ¹

Sector	Margin ²	Employee Compensation ³	Profit ⁴	Spending Allocation
407: Gasoline Stations	0.208	0.209	0.443	Gas - 100%
405: Food and Beverage Stores	0.275	0.420	0.193	Food - 50%
481: Food Services and Drinking Places	N/A ⁵	0.285	0.145	Food - 50%
479: Hotels and Motels	N/A ⁵	0.288	0.360	Lodging - 75%
480: Other Accommodations	N/A ⁵	0.192	0.230	Lodging - 25%
409: Sporting Goods Stores	0.378	0.245	0.301	Bait - 100%

1/ Based on 2004 IMPLAN data for Navajo County, Arizona.

2/ Margins represent the difference between producer and purchaser prices. At the retail level, margins represent the markup on goods that local business earn when selling to consumers, which is equivalent to the value of retail economic output at the local level.

3/ Values represent the proportion of economic output that is attributable to employee compensation.

4/ Values represent the proportion of economic output that is retained as profit.

5/ Margins do not apply to these non-retail economic sectors as output is already in producer prices.

Table Source: IMPLAN, 2004; ENTRIX, 2007

¹ For the purpose of this analysis, profit is defined to include proprietary income, other property income, and indirect business taxes. Indirect business tax income is included as profit since Reservation businesses do not have to pay sales tax and excise tax levied by local jurisdictions. Proprietary income is considered profit to the Tribe based on the fact that it is the sole proprietor of potentially-affected businesses on the Reservation. It is assumed that estimated values for indirect business taxes in the IMPLAN dataset would be realized as profits because the Tribe is not subject to federal, state, or local taxes.

Q.2.4 Labor Income Benefits

Lastly, benefits related to recreation-related employment and associated wage income need to be evaluated in the context of employment patterns and the labor pool on the Reservation. As discussed in Chapter 5.10, there is a very high unemployment rate on the Reservation, with the number of unemployed Tribal members far exceeding the employment requirements of all facets of the proposed project (recreation, agricultural, and industrial production). Employment of otherwise unemployed (and therefore assumed unproductive in an economic sense) Tribal members in recreation services and retail businesses represent a net gain to the Tribal society equivalent to their wage income. However, employment of Tribal members that would still be employed in the absence of the project does not represent a net gain to the Tribe. It is conservatively assumed that only new employment opportunities for unskilled labor would be drawn from the unemployed labor pool (and therefore represent a net benefit to the Tribe), while new employment opportunities for skilled labor are assumed to be filled by the currently employed labor force (and therefore do not represent a net benefit to the Tribe).

To estimate the proportion of labor in each recreation retail or service industry, Bureau of Labor Statistic data on the proportion of skilled versus unskilled labor in representative recreation retail and service industries were examined.² The data indicate that approximately 80 percent of workers at such retail and service establishments, such as those serving recreation visitors on the Reservation, are unskilled laborers. It is therefore assumed that approximately 80 percent of labor income generated by increased recreation spending on the Reservation will accrue to otherwise unemployed Tribal members, and therefore represents a net benefit to the Tribe.

Q.2.5 Results

Based on the data and methodology described above, the recreation spending benefits associated with and without the proposed water storage projects were estimated over a 100 year period, which would commence once the projects are constructed and available for public use. The results of the analysis are summarized in Table Q-8. The annual average and total recreation spending benefits realized by the Tribe without the projects (i.e., future baseline) are estimated to be \$2.6 million and \$262.5 million, respectively, over the 100 year analysis period. With the proposed projects, the annual average and total benefits are expected to increase to \$7.6 million and \$761.7 million, respectively. The difference in total economic benefits to the Tribe from recreation spending with and without the projects is

² U.S. Department of Labor, Bureau of Labor Statistics, Career Guide to Industries, Occupations in the Industry: Hotel and Other Accommodations; Food Services and Drinking Places; Clothing, Accessories and General Merchandise; Grocery Stores. Downloaded January 2007 from <http://www.bls.gov/oco/cg/indchar.htm>.

\$499.1 million, nearly a three-fold increase over the 100 year period. This differential (\$499.1 million) represents the incremental economic benefit attributed to recreation-related spending associated with the proposed water storage projects.

**Table Q-8
Recreation Spending Benefits of Proposed Reservoirs
Compared to Baseline Over 100 Years¹**

Year	Baseline	Total w/Project	Project Benefits
1	\$1,799,731	\$5,221,229	\$3,421,498
2	\$1,817,729	\$5,273,441	\$3,455,713
3	\$1,835,906	\$5,326,176	\$3,490,270
4	\$1,854,265	\$5,379,437	\$3,525,172
5	\$1,872,808	\$5,433,232	\$3,560,424
6	\$1,891,536	\$5,487,564	\$3,596,028
7	\$1,910,451	\$5,542,440	\$3,631,989
8	\$1,929,556	\$5,597,864	\$3,668,309
9	\$1,948,851	\$5,653,843	\$3,704,992
10	\$1,968,340	\$5,710,381	\$3,742,042
11	\$1,988,023	\$5,767,485	\$3,779,462
12	\$2,007,903	\$5,825,160	\$3,817,257
13	\$2,027,982	\$5,883,412	\$3,855,429
14	\$2,048,262	\$5,942,246	\$3,893,983
15	\$2,068,745	\$6,001,668	\$3,932,923
16	\$2,089,432	\$6,061,685	\$3,972,253
17	\$2,110,327	\$6,122,302	\$4,011,975
18	\$2,131,430	\$6,183,525	\$4,052,095
19	\$2,152,744	\$6,245,360	\$4,092,616
20	\$2,174,272	\$6,307,813	\$4,133,542
21	\$2,196,014	\$6,370,892	\$4,174,877
22	\$2,217,974	\$6,434,601	\$4,216,626
23	\$2,240,154	\$6,498,947	\$4,258,792
24	\$2,262,556	\$6,563,936	\$4,301,380
25	\$2,285,181	\$6,629,575	\$4,344,394
26	\$2,308,033	\$6,695,871	\$4,387,838
27	\$2,331,113	\$6,762,830	\$4,431,716
28	\$2,354,425	\$6,830,458	\$4,476,034
29	\$2,377,969	\$6,898,763	\$4,520,794
30	\$2,401,748	\$6,967,750	\$4,566,002
31	\$2,425,766	\$7,037,428	\$4,611,662
32	\$2,450,024	\$7,107,802	\$4,657,778
33	\$2,474,524	\$7,178,880	\$4,704,356
34	\$2,499,269	\$7,250,669	\$4,751,400
35	\$2,524,262	\$7,323,176	\$4,798,914
36	\$2,549,504	\$7,396,407	\$4,846,903
37	\$2,574,999	\$7,470,371	\$4,895,372
38	\$2,600,749	\$7,545,075	\$4,944,326
39	\$2,626,757	\$7,620,526	\$4,993,769
40	\$2,653,024	\$7,696,731	\$5,043,707
41	\$2,679,555	\$7,773,698	\$5,094,144
42	\$2,706,350	\$7,851,435	\$5,145,085
43	\$2,733,414	\$7,929,950	\$5,196,536
44	\$2,760,748	\$8,009,249	\$5,248,501
45	\$2,788,355	\$8,089,342	\$5,300,986
46	\$2,816,239	\$8,170,235	\$5,353,996
47	\$2,844,401	\$8,251,938	\$5,407,536
48	\$2,872,845	\$8,334,457	\$5,461,612
49	\$2,901,574	\$8,417,802	\$5,516,228
50-100	\$2,930,590	\$8,501,980	\$5,571,390
Annual Average	\$2,625,459	\$7,616,760	\$4,991,301
Total	\$262,545,887	\$761,676,012	
Difference Between Expected Recreation Spending Benefits With and Without the Proposed Project – Total Over 100 Years			\$499,130,125

1/ Undiscounted 2005 dollars

In terms of the types of recreation spending benefits, approximately 45 percent (\$225.9 million) of these benefits come in the form of net labor income earned by otherwise unemployed Tribal employees, with the remaining 55 percent (\$273.3 million) representing the business profits of Tribal enterprises that serve recreation visitors (see Table Q-9).

**Table Q-9
Recreation Spending Benefits by Type ^{1,2}**

Benefit Type	Baseline	Project	Total
Employee Compensation	\$117.3	\$225.9	\$343.1
Profit	\$145.3	\$273.3	\$418.5
Total	\$262.5	\$499.1	\$761.7

1/ Total benefits over the 100 year period of analysis (in millions)

2/ Undiscounted 2005 dollars

Q.2.6 Benefits to Local, Non-Tribal Businesses

As indicated above, the economic benefits of recreation spending would also be realized within the local economy, including the communities of Pinetop, Lakeside, and Show Low. These benefits are attributed to the recreation-related expenditures not captured on the Reservation, but instead made locally off the Reservation. Using the same methodology described above, economic benefits to the local economy were estimated and are presented in Table Q-10. In total, increased recreation activity in the region induced by the proposed projects and related recreation spending in local communities is estimated to generate approximately \$204 million in net economic benefits to non-Tribal interests over the next 100 years.

**Table Q-10
Recreation Spending Benefits of Proposed Reservoirs
in Local Communities (Off-Reservation) Compared to Baseline Over 100 Years¹**

	Baseline	Total w/Project	Project Benefits
Annual Average	\$1,545,827	\$3,586,038	\$2,040,211
Total	\$154,582,653	\$358,603,763	
Difference Between Expected Recreation Spending Benefits With and Without the Proposed Project – Total Over 100 Years			\$204,021,110

1/ Undiscounted 2005 dollars

Q.2.7 Summary

In summary, recreation spending on the Reservation has the potential to generate substantial economic benefits for the Tribe in the form of labor income and business profits. The extent to which benefits are realized are driven by a number of factors, primarily recreation visitation and spending levels, as well as the ability of the Tribe to capture these expenditures on the Reservation. There may be opportunities in the future to induce additional recreation use and spending by visitors by improving facilities and offering additional amenities and services that cater to recreationists, particularly in conjunction with the proposed reservoirs. Such strategies and related capital investments could increase the recreation spending benefits estimated above. Further, recreation spending has the potential to generate ancillary economic benefits off the Reservation in nearby local communities.

Q.3 Economic Value to Anglers

The net economic value from recreation is the total additional money recreationists are willing to pay above the actual price they pay to recreate. Thus, the benefit of increasing fishery output exceeds the recreation revenues generated by the Tribe. A 2006 study by the U.S. Fish and Wildlife Service finds the value of the economic benefit from the recreational use of fish stocked by the A-WC National Fish Hatchery.³ The study estimated the daily net economic value for fishing derived from a 2003 U.S. Fish and Wildlife Service study,⁴ which used data collected by the 2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation. The survey asked recreationists throughout the U.S. how much they were willing to pay to recreate. The net economic value for trout fishing was estimated at the equivalent of \$57.35⁵ per day for an Arizona resident in 2005 dollars. The study also estimated the net economic value for non-resident trout anglers. This value is the equivalent of \$100.36 in 2005 dollars. Non-Tribal member anglers recreating on the Reservation consist of Arizona residents and non-Arizona residents with 91 percent and nine percent of the total non-Tribal recreationists on the Reservation, respectively. To account for multiple states of residency among anglers on the Reservation, a weighted average of in-state and out of state anglers' economic value is derived. This value, Tribal members' economic value, and the number of angler days are provided in Table Q-11

³ Caudill, James, 2006. *The Economic Effects of the Recreational Use of Alchেসay-Williams Creek National Fish Hatchery 2004 Stocking*. U.S. Fish and Wildlife Service.

⁴ Aiken, Richard and Genevieve Pullis La Rouche. *Net economic Values for Wildlife-Related Recreation in 2001*. Addendum to the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Report 2001-3. Division of Federal Aid, U.S. Fish and Wildlife Service. Washington DC. September 2003.

⁵ Ibid.

**Table Q-11
The Economic Value of Fishing on the Reservation**

	Angler Days on Reservation	Percent of Total Angler Days	Economic Value per Angler
Tribal Members	109,563	83	\$57.35
Non-Tribal Members	22,557	17	\$61.22
Total	132,120		

Using the number of angler days and the economic value per angler for Tribal members and non-Tribal members, the total economic value of the project is derived. The current annual economic value of recreation on the Reservation without the project is \$6.7 million for non-Tribal members. If the proposed reservoirs are completed, the economic value increases by \$8.9 million to \$15.6 million. The benefits of the project are projected for 100 years. The total economic value of the project to non-members averages \$8.6 million over the first 50 years. The average yearly economic value of the project during the subsequent 50 years is \$11.4 million in undiscounted dollars. Table Q-12 presents the economic value with and without the project for the average yearly values during the first 50 years (as they are still increasing) and for the subsequent 50 year period. Over the life of the project, the total in undiscounted dollars to non-members is expected to be just under 1.3 billion.

**Table Q-12
Non-Member Economic Value Benefits of Project**

Average Annual Time Period	Baseline Net Revenue	With Project Net Revenue	Project Benefit
1 – 50 years	\$8,647,795	\$20,061,317	\$11,413,523
51-100 years	\$10,922,221	\$25,337,574	\$14,415,353
Project Life Total	\$978,500,751	\$2,269,944,553	\$1,291,443,802

Currently, Tribal members have \$1.7 million in Baseline economic value from angling on the Reservation. If the proposed reservoirs are built, the economic value they would create through Reservation recreation will increase to \$3 million. Thus, the project will increase economic value by \$1.7 million. The average annual economic value of the project is \$2.2 million over the first 50 years. Over the subsequent 50 year period, the average annual value is nearly 2.8 million. Over the life of the project, the Tribe will accrue an estimated \$249 million of economic value in undiscounted 2005 dollars. The economic value Tribal members receive from recreating due to the project is presented in Table Q-13.

Table Q-13
Tribal Economic Value Benefits of Project

Average Annual Time Period	Baseline Net Revenue	With Project Net Revenue	Project Benefit
1 – 50 years	\$1,667,811	\$3,869,020	\$2,201,209
51-100 years	\$2,106,456	\$4,886,597	\$2,780,141
Project Life Total	\$188,713,371	\$437,780,849	\$249,067,477

Table Q-14 shows the total economic value by year for members and non-members.

**Table Q-14
Economic Value of Project for Tribal and Non-Tribal Members**

Year	Economic Value Baseline		Economic Value with Project		Project Benefit	
	Member	Non-Member	Member	Non-Member	Member	Non-Member
1	\$1,293,615	\$6,707,545	\$3,000,953	\$15,560,291	\$1,707,338	\$8,852,745
2	\$1,306,551	\$6,774,621	\$3,030,963	\$15,715,894	\$1,724,411	\$8,941,273
3	\$1,319,617	\$6,842,367	\$3,061,272	\$15,873,053	\$1,741,655	\$9,030,686
4	\$1,332,813	\$6,910,791	\$3,091,885	\$16,031,783	\$1,759,072	\$9,120,992
5	\$1,346,141	\$6,979,899	\$3,122,804	\$16,192,101	\$1,776,663	\$9,212,202
6	\$1,359,603	\$7,049,698	\$3,154,032	\$16,354,022	\$1,794,429	\$9,304,324
7	\$1,373,199	\$7,120,195	\$3,185,572	\$16,517,562	\$1,812,374	\$9,397,368
8	\$1,386,931	\$7,191,397	\$3,217,428	\$16,682,738	\$1,830,497	\$9,491,341
9	\$1,400,800	\$7,263,311	\$3,249,602	\$16,849,565	\$1,848,802	\$9,586,255
10	\$1,414,808	\$7,335,944	\$3,282,098	\$17,018,061	\$1,867,290	\$9,682,117
11	\$1,428,956	\$7,409,303	\$3,314,919	\$17,188,242	\$1,885,963	\$9,778,938
12	\$1,443,246	\$7,483,396	\$3,348,068	\$17,360,124	\$1,904,823	\$9,876,728
13	\$1,457,678	\$7,558,230	\$3,381,549	\$17,533,725	\$1,923,871	\$9,975,495
14	\$1,472,255	\$7,633,812	\$3,415,365	\$17,709,062	\$1,943,110	\$10,075,250
15	\$1,486,977	\$7,710,151	\$3,449,518	\$17,886,153	\$1,962,541	\$10,176,003
16	\$1,501,847	\$7,787,252	\$3,484,013	\$18,065,015	\$1,982,166	\$10,277,763
17	\$1,516,866	\$7,865,125	\$3,518,854	\$18,245,665	\$2,001,988	\$10,380,540
18	\$1,532,034	\$7,943,776	\$3,554,042	\$18,428,121	\$2,022,008	\$10,484,346
19	\$1,547,355	\$8,023,214	\$3,589,583	\$18,612,403	\$2,042,228	\$10,589,189
20	\$1,562,828	\$8,103,446	\$3,625,478	\$18,798,527	\$2,062,650	\$10,695,081
21	\$1,578,456	\$8,184,480	\$3,661,733	\$18,986,512	\$2,083,277	\$10,802,032
22	\$1,594,241	\$8,266,325	\$3,698,351	\$19,176,377	\$2,104,109	\$10,910,052
23	\$1,610,183	\$8,348,988	\$3,735,334	\$19,368,141	\$2,125,151	\$11,019,153
24	\$1,626,285	\$8,432,478	\$3,772,687	\$19,561,822	\$2,146,402	\$11,129,344
25	\$1,642,548	\$8,516,803	\$3,810,414	\$19,757,440	\$2,167,866	\$11,240,638
26	\$1,658,974	\$8,601,971	\$3,848,518	\$19,955,015	\$2,189,545	\$11,353,044
27	\$1,675,563	\$8,687,991	\$3,887,004	\$20,154,565	\$2,211,440	\$11,466,574
28	\$1,692,319	\$8,774,871	\$3,925,874	\$20,356,111	\$2,233,555	\$11,581,240
29	\$1,709,242	\$8,862,619	\$3,965,132	\$20,559,672	\$2,255,890	\$11,697,053
30	\$1,726,335	\$8,951,245	\$4,004,784	\$20,765,268	\$2,278,449	\$11,814,023
31	\$1,743,598	\$9,040,758	\$4,044,831	\$20,972,921	\$2,301,234	\$11,932,163
32	\$1,761,034	\$9,131,165	\$4,085,280	\$21,182,650	\$2,324,246	\$12,051,485
33	\$1,778,644	\$9,222,477	\$4,126,133	\$21,394,477	\$2,347,488	\$12,172,000
34	\$1,796,431	\$9,314,702	\$4,167,394	\$21,608,422	\$2,370,963	\$12,293,720
35	\$1,814,395	\$9,407,849	\$4,209,068	\$21,824,506	\$2,394,673	\$12,416,657
36	\$1,832,539	\$9,501,927	\$4,251,159	\$22,042,751	\$2,418,620	\$12,540,824
37	\$1,850,864	\$9,596,947	\$4,293,670	\$22,263,178	\$2,442,806	\$12,666,232
38	\$1,869,373	\$9,692,916	\$4,336,607	\$22,485,810	\$2,467,234	\$12,792,894
39	\$1,888,067	\$9,789,845	\$4,379,973	\$22,710,668	\$2,491,906	\$12,920,823
40	\$1,906,947	\$9,887,744	\$4,423,773	\$22,937,775	\$2,516,825	\$13,050,031
41	\$1,926,017	\$9,986,621	\$4,468,010	\$23,167,153	\$2,541,993	\$13,180,532
42	\$1,945,277	\$10,086,487	\$4,512,690	\$23,398,824	\$2,567,413	\$13,312,337
43	\$1,964,730	\$10,187,352	\$4,557,817	\$23,632,813	\$2,593,088	\$13,445,460
44	\$1,984,377	\$10,289,226	\$4,603,396	\$23,869,141	\$2,619,018	\$13,579,915
45	\$2,004,221	\$10,392,118	\$4,649,430	\$24,107,832	\$2,645,209	\$13,715,714
46	\$2,024,263	\$10,496,039	\$4,695,924	\$24,348,910	\$2,671,661	\$13,852,871
47	\$2,044,506	\$10,601,000	\$4,742,883	\$24,592,399	\$2,698,377	\$13,991,400
48	\$2,064,951	\$10,707,010	\$4,790,312	\$24,838,323	\$2,725,361	\$14,131,314
49	\$2,085,600	\$10,814,080	\$4,838,215	\$25,086,707	\$2,752,615	\$14,272,627
50-100	\$2,106,456	\$10,922,221	\$4,886,597	\$25,337,574	\$2,780,141	\$14,415,353

APPENDIX R



Nearby Reservoir Case Studies

ENTRIX

FEBRUARY 2007

Appendix R Nearby Reservoir Case Studies

**Prepared for
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Appendix R Nearby Reservoir Case Studies

The following examples and analyses serve to enhance the position that the addition of new reservoirs or reservoir surface acreage may be expected to generate positive economic impacts and increased visitation. The analysis in section R.1 (Reservoir Visitation Estimation) seeks to establish a set of comparable visitation data for lakes and reservoirs similar in size to those of the Proposed Project, and then to extrapolate visitation projections that could result if the Proposed Project is implemented. Section R-2 (Roosevelt Reservoir Expansion, Arizona) establishes that increased reservoir surface acreage, in conjunction with enhanced recreation facilities, has yielded visitation growth elsewhere in the Phoenix metropolitan region. Finally, Section R.3 cites two small reservoirs currently under construction, and the estimated visitation use that accompanied their impact certification.

R.1 Reservoir Visitation Estimation

R.1.1 U.S. Army Corps of Engineers Standards and Guidelines

The U.S. Army Corps of Engineers (Corps) puts forth guidelines to value recreation.¹ The guidelines use willingness-to-pay (WTP) as a measurement standard for the benefits each increment of additional recreation output is created. Since measuring WTP directly is sometimes infeasible, other techniques are employed to measure the total value of recreation output from a plan. The three suggested techniques are the travel cost method (TCM), contingent valuation method (CVM), and the unit day value method (UDV). The TCM uses the cost of travel and value of time as the price variable to create a recreation demand curve.

¹ U.S. Army Corps of Engineers. April 22, 2000. Planning Guidance Notebook. Engineer Regulation 1105-2-100. Chapter 3-7.

This method assumes that the per capita use of a recreation sites will decrease as traveling distance to sites increases and may be applied to a regional model or a site-specific model.

The second method suggested by the Corps guidelines relies on individuals' stated WTP for changes in a specific site's recreation opportunities. Summing the individual WTP values will create a WTP aggregate for all users surveyed in the study area. This method, which may be applied to a regional model or site-specific model, is known as the CVM. The final method is the UDV, which relies on the opinion/judgment of experts to estimate the average recreational user's WTP. A project's recreational benefits are found by applying the adjusted unit day value based on the estimated WTP to estimated use, which may be applied to site-specific sites only. The projected visitation to a site must be based on existing project visitation data or similar resource visitation data.

Based on the Corps' recreation valuation guidelines, data from visitation to similar resources can be used to establish a projected visitation value to Minor Flat, Bonito Creek, and Salt Creek Reservoirs. Reservoir visitation data is based on entrance visitation data to state parks containing reservoirs or lakes used extensively for water recreation that are similar in size or location to the proposed reservoirs. Each reservoir represented in Table R-1 has less than 10,000 acres of surface area and have a combined average surface area of 1,873 acres. These reservoirs were chosen based on available data, size, and location. The average number of visitors per surface area acre varies substantially across the reservoirs. For example, John Martin Reservoir has 9 people annually per acre, while Roper Lake has 1,339 people per square acre annually. Visitation levels most certainly rely on recreation facilities, location of the reservoir, accessibility of the reservoir, and so forth. Selected reservoirs are discussed in detail below. The average annual visitation per surface area acre is 281 people per acre.

**Table R-1
Existing Reservoirs**

Reservoir or State Park	SA (acres)	Visitors Total	Visitors per SA acre	State	Source
Barr Lake	1,950	70,439	36	Colorado	Colorado State Parks
Black Butte Lake	4,460	350,000	78	California	California Dept. of Water Resources
Bonny	2,095	51,424	25	Colorado	Colorado State Parks
Boyd Lake	1,700	360,365	212	Colorado	Colorado State Parks
Chatfield	1,412	1,496,264	1,060	Colorado	Colorado State Parks
Carter Lake	1,100	290,000	264	Colorado	Colorado Dept. of Reclamation
Crawford	400	78,797	197	Colorado	Colorado State Parks
Dorena	2,200	343,000	156	Oregon	Oregon Water Resources Dept. / U.S.
East Park	132	53,000	402	California	California Dept. of Water Resources
Eleven Mile	3,405	313,204	92	Colorado	Colorado State Parks
Englebright	815	105,000	129	Nevada	Dept. of Reclamation Animas-La Plata
Flatiron	47	65,000	1,383	Colorado	Colorado Dept. of Reclamation
Fool Hollow Lake	150	84,527	564	Arizona	Arizona State Parks
Harvey Gap	160	32,453	203	Colorado	Colorado State Parks
Hills Creek	1,900	109,000	57	Oregon	Oregon Water Resources Dept. / U.S.
Horsetooth	1,900	539,929	284	Colorado	Colorado Dept. of Reclamation
Jackson Gulch	217	41,394	191	Colorado	Colorado State Parks
Jackson Lake	2,163	194,281	90	Colorado	Colorado State Parks
John Martin	9,929	86,515	9	Colorado	Colorado State Parks
Lake McClure	7,400	600,000	81	California	California Dept. of Water Resources
Lake Pueblo	4,646	1,580,304	340	Colorado	Colorado State Parks
Little Grass Valley	1,433	25,000	17	California	California Dept. of Water Resources
Lyman Lake	1,500	28,304	19	Arizona	Arizona State Parks
North Sterling	2,880	203,718	71	Colorado	Colorado State Parks
Paonia	334	21,440	64	Colorado	Colorado State Parks
Patagonia Lake	250	196,332	785	Arizona	Arizona State Parks
Pinewood	100	45,000	450	Colorado	Colorado Dept. of Reclamation
Rockport	1,080	159,570	148	Utah	Recreation.gov
Roper Lake ²	45	60,242	1,339	Arizona	Arizona State Parks
Spinney Mountain	2,450	30,698	13	Colorado	Colorado State Parks
Stagecoach	780	85,481	110	Colorado	Colorado State Parks
Vega	900	123,463	137	Colorado	Colorado State Parks
Average	1,873	244,505	281		

² Visitation data includes Dankworth Pond with 15 surface area acres and Roper Lake with 30 surface area acres.

R.1.2 Description of Lakes and Reservoirs Similar to the Proposed Project

Boyd Lake State Park in northern Colorado is known for its water-sports, including boating, fishing, water skiing, and sailing on the 1,700 surface area acre (when full) reservoir. A sandy beach and picnic areas provides day-use facilities for recreators. The park includes two boat ramps, four miles each of hiking and biking trails, 90 picnic sites, and 148 campsites. The state park has over 360 thousand visitors annually creating an annual average of 212 per acre of reservoir surface area. The total annual revenue generated at the park is close to \$621 thousand dollars.³

Carter Lake is a state park in Colorado with 1,100 acres of surface area attracting 290,000 visitors annually. The lake can be accessed by boat via three boat launches. Overnight use of the area is also permitted with 151 campsites in five campgrounds. Flatiron Reservoir, in nearby Larimer County, CO, has 47 acres of surface area and attracts 65,000 annual visitors.⁴ The reservoir has 1,383 visitors annually per acre of surface area, while the larger Carter Lake has 264 visitors per acre foot of surface area annually. Flatiron Reservoir has 38 campsites, two cabins, a picnic area, and a group use area. Boating and swimming are not allowed in the reservoir due to currents, but fishing is permitted.

Pinewood Reservoir in Colorado has 100 acres of surface area with an average of 450 visitors per surface area acre annually. The reservoir and the 327 acres of surrounding land make up the Pinewood Reservoir State Park are primarily used for boating, fishing, paddling, trail use, camping, and picnicking. There is a boat ramp with two lanes allowing boaters into the reservoir and 18 rustic campsites for overnight use.⁵

Horsetooth Reservoir's 1,900 acres of surface area and 2,040 acres of surrounding land comprise Horsetooth State Park. Visitation to the park is 539,929 annually, creating 284 visitors per acre of reservoir surface area. The reservoir includes a marina, five boat ramps with 12 lanes, and 25 boat-in campsites. In addition, there are seven cabins, 106 electric campsites, seven rustic campsites, five picnic areas, one group area, and a swimming beach.⁶

³ Boyd Lake State Park. Colorado State Parks Fact Sheet. Accessed at www.parks.state.co.us on December 28, 2006.

⁴ Parks Master Plan and Reservoirs Resource Management Plan. 2005. Colorado Department of Reclamation. Accessed at <http://www.co.larimer.co.us/parks/masterplan/> on 12/27/06.

⁵ Ibid.

⁶ Ibid

Lyman Lake is a 1,500 acre reservoir lying within Lyman Lake State Park in Apache County, AZ. The park includes 1,200 acres of land encompassing the 1,500 surface area acre reservoir at an elevation of 6,000 feet.⁷ The lake has no restrictions on boat size, but restricts boat speed at the west end of the lake as a 'no wake zone' for angler use. The park includes an ancient Pueblo Village near Rattlesnake Pointe Pueblo Trail, The park has two day-use picnic areas, 61 camping units (38 of which are hookup sites), a beach allowing camping, paved boat ramps, trails, horse shoe pits, volleyball court, restrooms, showers, seasonal camper supply store, and group use areas.

Roper Lake State Park includes two bodies of water with a combined surface area of 45 acres—Roper Lake (30 acres) and Dankworth Pond (15 acres). The park has 60,242 annual visitors creating an average of 1,339 visitors per acre of surface area.

Dorena Reservoir in Oregon has 343,000 visitors annually.⁸ The reservoir allows boating and has high levels of camping use. With 2,200 acres of surface area, the reservoir has an average of 156 visitors per surface area acre.

California's Lake McClure has 7,400 acres of surface area.⁹ There are five campgrounds with a total of 614 campsites, 165 picnic units, 13 boat ramp lanes, an archery range, group picnic and play areas, and a swimming lagoon. Lake McClure receives 600,000 visitors annually creating an average of 81 visitors per surface area acre annually.

Paonia Reservoir allows water-skiing, fishing, boating, wildlife viewing, and camping at 6,500 feet in Colorado. The park has a boat ramp, eleven picnic sites, and 15 campsites with over 21,000 visitors annually, yielding 64 visitors per acre of the 334 surface area acre. The park generates over \$17,000 in total revenue annually.

Jackson Gulch Reservoir is located within Mancos State Park in Montezuma County, CO. The 217 acre reservoir allows fishing and boating (wakeless only), which can be accessed through a boat ramp. Thirty one campsites and two yurts encourage overnight use of the area. In addition to water activities, there are five miles of trails allowing hiking, biking, cross country skiing and horseback riding. The park is used year-round attracting close to 41,400 visitors annually.¹⁰

⁷ Information found at <http://www.pr.state.az.us/Parks/parkhtml/lyman.html> on December 28, 2006.

⁸ <http://www1.wrd.state.or.us/pdfs/WillametteReservoirs.pdf>

⁹ http://orovillerelicensing.water.ca.gov/pdf_docs/rec_invent.pdf

¹⁰ Colorado State Parks Facts Sheet. Mancos State Park.

Patagonia Lake State Park in Arizona includes a beach, developed picnic area, fishing pad, hiking trails, boat ramps, marina, boat rental shop, 72 developed campsites, 34 hook-ups, 12 boat access sites, restrooms, showers, and a dump station. The park attracts 196,332 visitors annually, generating 785 visitors per Patagonia Lake Reservoir surface area acre.

R.1.3 Entrance and Camping Fees

Arizona State Park fees are charged on a per vehicle basis and a per person basis. A vehicle includes up to four adults where adults are people at least fourteen years old.¹¹ The cost to rent a campsite for one night is also included in Table R-2. If more than one rate per category is included in the fee schedule, the value represented in Table R-2 is an average of the values. Non-electric camping ranges from \$12 to \$19 per night depending on the park, while electric camping ranges from \$16 to \$25 per night. Colorado State Parks primarily charge \$5 per vehicle to gain entrance into the park and \$12 to \$16 for overnight camping. It is important to note that these figures do not include fishing license costs. The median park vehicle entrance fee value of reservoirs used in this analysis (Table R-1, Existing Reservoirs) is \$5.

**Table R-2
Arizona State Parks Fee Schedule¹²**

State Park	Per Vehicle	Per Person	Non-Electric Camping	Electric Camping
Fool Hallow Lake	\$4.5	\$2.0	\$12 - \$15	\$19 - \$25
Lyman Lake	\$5.0	\$2.0	\$12 - \$15	\$19 - \$22
Patagonia Lake	\$7.5	\$2.0	\$12 - \$19	\$19 - \$25
Roper Lake	\$4.0	\$2.0	\$10 - \$12	\$16 - \$20

R.1.4 Findings

If the 281 visitors per surface area acre value (the average of lakes and reservoirs in this analysis) is applied to the proposed reservoirs based on the Corps guidelines, we would anticipate over 294,000 visitors to the three reservoirs annually. Minor Flat reservoir would attract 336,000 visitors annually, Bonito Creek reservoir would have 212,500 visitors annually, and Salt Creek Reservoir could expect for 487,000 visitors every year. These results are presented in Table R-3.

¹¹ <http://www.pr.state.az.us/feeschedule.html> accessed Jan 2, 2006

¹² <http://www.pr.state.az.us/feeschedule.html>

Table R-3
Estimated Visitation to Proposed Reservoirs

Reservoir	Surface Area	Visitation based on 'existing reservoir average'
Miner Flat	119.6	33,647
Bonito Creek	755.4	212,536
Salt Creek	173.0	48,675
Total Estimated Visitation		294,858

R.2 Roosevelt Reservoir Expansion, Arizona

The Theodore Roosevelt Reservoir/Lake is impounded by the Theodore Roosevelt Dam, located about 60 miles northeast of Phoenix in Gila and Maricopa counties, where Tonto Creek and the Salt River converge. Since the reservoir is in the Tonto National Forest, the management of recreation and other public land uses related to it is the responsibility of the National Forest. The Roosevelt Reservoir is the largest of the six Salt River Project (SRP) reservoirs on the Salt and Verde rivers, accounting for 71 percent of total surface water storage capacity in the SRP system.¹³

The original construction of the Roosevelt Dam took place between 1903 and 1911, culminating in a 280 foot (ft.) high dam with a storage capacity of 1,284,205 acre-feet (AF) in the lake. The storage capacity was later increased to 1,348,314 AF. A \$430 million modification project carried out from 1989 to 1996 resulted in increasing the height of the dam by 77 ft., adding 304,729 AF to its storage capability. Presently, Roosevelt Dam is 357 ft. high, and the 22.4 mile long Roosevelt Reservoir has a capacity of 1,653,043 AF and a maximum depth of 249 ft. The reservoir has a 128 mile long shoreline and, when full, has a surface acreage of 21,493 acres.¹⁴

Roosevelt Dam and Reservoir provide water for municipal and industrial uses, irrigation, and generation of hydroelectric power. Additionally, the lake has become one of the most popular recreation attractions in central Arizona. Most visitors come to the area for fishing and boating, but camping, sightseeing, wildlife-viewing, water skiing, and jet skiing are also popular activities. The usage of the area is year-round with a peak recreation season between April 1 to October 1. A number of bass tournaments are also held on the Lake. Largemouth

¹³ U.S. Fish and Wildlife Service, December 2002, "Final Environmental Impact Statement for the Roosevelt Habitat Conservation Plan, Gila and Maricopa Counties, Arizona: Volume I."

¹⁴ Salt River Project, <http://www.srpnet.com/water/dams/roosevelt.aspx>, accessed June 30, 2006.

In terms of visitor use, reservoir expansion corresponded with a seven percent per year increase in visitation to the Tonto Basin Ranger District between years 1992 and 1996.¹⁶ In 2001, based on the increased capacity of recreation facilities at the Lake and projection of visitor growth by the Tonto National Forest, the number of visitor days was estimated to be close to 600,000.

R.3 Animas – La Plata Project, Colorado and New Mexico (under construction)

The Animas-La Plata Project is currently under construction in southwestern Colorado and northwestern New Mexico in order to implement the Colorado Ute Water Rights Settlement Act of 1988. The project is comprised of Ridges Basin Dam and Reservoir (also called Lake Nighthorse), a pumping plant, Ridges Basin Inlet Conduit, and a buried pipeline to deliver water for domestic use on the Navajo Nation. The Ridges Basin Reservoir is the principal structural component of the project and will be used to store water diverted from the Animas River. The Animas-La Plata Project will provide the Southern Ute and Ute Mountain Tribes with a reliable water supply, while protecting scarce water resources for other current water users. Construction of the project is planned for completion in 2012 and the Reservoir can begin to fill as early as 2009.

Upon completion, the Ridges Basin Reservoir will have a capacity to store about 120,000 acre-feet of Animas River water. This water will be released back to the Animas River as needed for municipal and industrial users. The 120,000 acre-feet capacity will also include an inactive pool of about 30,000 acre-feet for recreational, fishery, and water quality purposes. Facilities that would provide for a broad range of recreational activities are also planned around the Reservoir. These include opportunities for camping, hiking, picnicking, boating, fishing, and sightseeing. There will be 196 camping units, one four-lane boat ramp, 37 individual picnic sites, and one group picnic site. In addition, the Project will enhance public access to the Animas River by providing funds to secure additional access points to the river. The annual user days at the reservoir are expected to be 218,400.

¹⁶ Since data for visitor use is incomplete for the 1990s, these numbers are based on visual estimates by the Forest Service to tally visitation until 1996.

Table R-4
Theodore Roosevelt Reservoir Expansion and Animas La Plata Project Recreation Comparison

	Roosevelt Reservoir Expansion	Animas La Plata (Ridges Basin Dam) Reservoir
Primary purpose	Water for residents of Phoenix and surrounding areas	To provide reliable water supply for the Southern Ute and Ute Mountain Tribes (implementation of the Colorado Ute Water Rights Settlement Act of 1988) and protect water resources for current users
Other uses	Irrigation, water for generation of hydroelectric power, recreation	Recreation, fishery, and water quality
Recreation activities	Fishing (including bass tournaments), boating, camping, sightseeing, wildlife-viewing, water skiing, and jet skiing	Camping, hiking, picnicking, boating, fishing, and sightseeing
Storage capacity	1,653,043 AF	120,000 AF (including an inactive pool of 30,000 AF for recreational, fishery, and water quality purposes)
Shoreline	112 miles	
Location	Approximately 60 miles northeast of Phoenix, Arizona in the Tonto National Forest	Southwestern Colorado
Campgrounds	11 (10 individual and 1 group campground)	
Campsites (within the campgrounds)	1,524 (1,515 individual and 9 group campsites)	196
Picnic sites	80	38 (37 individual and 1 group picnic site)
Marinas	1 (Roosevelt Lake Marina)	
Boat launch areas/Boat ramps	9	1 (with four lanes)
Visitors' centers	1	
	Visitor use	
Total daily capacity	18,825 people	n/a
Annual recreation days based on daily capacity	867,796	n/a
Visitor days in 2001	Approximately 600,000	n/a
Expected annual user days in 2012		218,400

The 1996 Final Supplement to the Final Environmental Statement¹⁷ estimates user days at Ridges Basin Reservoir and Southern Ute Reservoir with the recreation market area (RMA) concept. The RMA estimate is based on two assumptions; 1) people living closest to the reservoir will use the reservoir facilities only during the day; and 2) people living nearest to the reservoir will have the strongest attraction to the reservoir which will decrease as distance to the reservoir increases. The user day figures were originally calculated in the 1979 Final Environmental Statement¹⁸ analysis, which provides the technical analysis utilized in the 1996 study. The analysis creates zonal per capita use rates by averaging the rates from similar reservoirs. The technique assumes a zonal per capita use rate in six zones of influence—one to ten miles (Zone 1), 11 to 20 miles (Zone 2), 21 to 30 miles (Zone 3), 31 to 40 miles (Zone 4), 41 to 50 miles (Zone 5), and 51 to 75 miles (Zone 6).

The 2,200 surface area acre Ridges Basin Reservoir has 19 miles of shoreline. The day-use values created for the reservoir are based on Dorena Reservoir, Hills Creek Reservoir, Success Reservoir, and Terminus Reservoir. These reservoirs have between 1,900 acres and 2,819 acres of surface area and 12 to 22 miles of shoreline. The average per capita participation rate for Ridges Basin Reservoir based on the four comparable reservoirs is 9.40 in Zone 1, 1.52 in Zone 2, .65 in Zone 3, .32 in Zone 4, .18 in Zone 5, and .04 in Zone 6. Day use visitation from the six zones is expected to account for 85 percent of total day-use visitation at Ridges Basin Reservoir. The final 15 percent of total day-use will come from greater than 75-miles away from the reservoir. An additional six percent is included to create the total visitation figure.

¹⁷ Department of Reclamation, 1996, *Animas-La Plata Project Final Supplement to the Final Environmental Statement*, Appendix G Volume 1 Appendix B pp 34-39.

¹⁸ Department of Reclamation, 1979, *Animas-La Plata Project Final Environmental Statement Definite Plan Report*, Appendix F Attachment B pp 82-86.

Table R-5
Per Capita Participation Rate Estimation

Reservoir	Surface Area (acres)	Shoreline (miles)	Zone 1 (1 to 10 miles)	Zone 2 (11 to 20 miles)	Zone 3 (21 to 30 miles)	Zone 4 (31 to 40 miles)	Zone 5 (41 to 50 miles)	Zone 6 51 to 75 miles)
<u>Ridges Basin</u>	2,200	19						
Dorena	1,900	12	8.41	1.38	0.59	0.34	0.23	-
Hills Creek	2,819	35	13.58	0.84	0.23	0.10	0.05	-
Success	2,400	30	12.31	1.85	0.76	0.43	0.28	0.16
Terminus	1,945	22	3.29	2.00	1.00	0.42	0.15	-
Average			9.40	1.52	0.65	0.32	0.18	0.04
<u>Southern Ute</u>	1,400	13						
Hords Creek	1,260	18	31.00	2.11	0.61	0.27	0.14	-
Cottage Creek	1,251	9	9.79	1.74	0.53	0.20	0.09	-
Dorena	1,900	12	8.41	1.38	0.59	0.34	0.23	-
Englebright	815	24	10.93	2.08	0.40	0.08	0.01	-
Average			9.71	1.83	0.53	0.22	0.12	0.04

The Southern Ute Reservoir will have 1,400 acres of water surface area and 13 shoreline miles. The comparison reservoirs are Hords Creek Reservoir, Cottage Creek Reservoir, Dorena Reservoir, and Englebright Reservoir with 815 to 1,900 acres of water surface area and 9 to 24 miles of shoreline. The average rate of per capita participation for these reservoirs is 9.71 in Zone 1, 1.83 in Zone 2, .53 in Zone 3, .22 in Zone 4, .12 in Zone 5, and .04 in Zone 6. The day-use visitation within the six zones is predicted to account for 87 percent of total day use for Southern Ute Reservoir. The remaining 13 percent of day-use is from outside the 75-mile area. An additional 19 percent is included to account for over-night use. The comparable rate estimation figures for Ridges Basin Reservoir and Southern Ute Reservoir are presented in Table R-5. The use rates created in this analysis—specific to Ridges Basin Reservoir and Southern Ute Reservoir—are forecasted in five year intervals until 2015, based on 1993 data. The current and forecasted visitation is presented in Table R-6.

**Table R-6
Projected Visitation by Reservoir**

		1990	1995	2000	2005	2010	2015
Ridges Basin Reservoir							
a	Day Use in all zones (a)	227,728	249,123	265,456	278,498	289,473	307,783
b	Total Day Use (b= a / .85)	267,915	293,086	312,301	327,645	340,556	362,098
c	Total Use (c = b * 1.06)	283,990	310,671	331,039	347,304	360,989	383,824
Southern Ute Reservoir							
d	Day Use in all zones (d)	102,040	110,103	117,146	123,305	128,915	135,936
e	Total Day Use (e= d / .87)	117,287	126,555	134,651	141,730	148,178	156,248
f	Total Use (f = e * 1.06)	139,572	150,600	160,235	168,659	176,332	185,935