

APPENDIX C

METHODOLOGY FOR ESTIMATING CURRENT AND ANTICIPATED FUTURE WATERCRAFT USE AT LAKE PLEASANT

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In order to determine the anticipated impact from the Proposed Action and Alternative A on the number of watercraft (boats and jet skis) using Lake Pleasant, the following questions were considered:

1. What point(s) in time or unit(s) of measure should be used to compare current and future conditions?
2. What data are available regarding the number of watercraft (boats and jet skis) that use Lake Pleasant?
3. What amount of watercraft using Lake Pleasant is not included in the available data and how should that use be estimated?
4. How should increased use of Lake Pleasant resulting from the proposed project be estimated?

Each of these questions is discussed in more detail below, to assist in explaining the process by which estimates of current and future watercraft use on Lake Pleasant were developed for this study. Following these discussions, the actual calculations are presented.

Question 1. What point(s) in time or unit(s) of measure should be used to compare current conditions with the future with and without the project? This question is related to the next two questions; however, to aid in understanding the discussions that follow, we first describe the two points in time that were used to compare current and future watercraft use of Lake Pleasant.

- a. Annual Average¹ Daily Number of Watercraft. This number represents the average number of watercraft entering Lake Pleasant each day of the study year. It was calculated by taking the total number of boats actually counted or estimated to have entered Lake Pleasant over the course of that year, and then dividing that total by 365 days.
- b. Number of Watercraft on a Peak Season Weekend Day. This number represents the average number of watercraft that might typically use Lake Pleasant on a Saturday or Sunday during peak season (May through July). This count is more difficult to estimate because watercraft fees collected by Pleasant Harbor Marina (PHM), a privately owned and operated marina located on the southeast side of Lake Pleasant, are reported not less than monthly to Maricopa County Parks and Recreation Department (MCPRD). To obtain

¹ As used herein, the term “average” refers to the arithmetic mean, which is calculated by adding together a set of variables (e.g., number of watercraft visiting in a year), then dividing by the number of variables in that set (e.g., 365 days in a year).

this number, the month experiencing the highest watercraft count during the study year was identified. Then the total number of watercraft visiting on all the Saturdays and Sundays in that month was counted or estimated, which was then divided by the number of Saturdays and Sundays in that month. The Lake and LPRP typically experience the greatest visitation over the July 4th weekend. Some might argue the number of boats launched on a peak season holiday weekend, such as July 4th or Memorial Day, should be used. Although this might represent the maximum number of boats on the Lake, it only occurs two to four times a year. Therefore, it was not considered to reasonably reflect the conditions during the majority of the peak season weekends.

More information is provided in the discussions for each question below, and also in Section B that follows.

Question 2. What data are available from MCPRD and PHM, regarding the number of watercraft (boats and jet skis) that use Lake Pleasant?

Maricopa County Parks and Recreation Department (MCPRD) maintains daily tallies of the number of watercraft entering Lake Pleasant Regional Park (LPRP), which it operates and maintains under a 1990 contract with Reclamation. No distinction is made between boats and jet skis. These daily data are then aggregated by week, month, and then annually, using Maricopa County's fiscal year (FY), July through June. These daily tallies include visitors with watercraft using annual 4- and 7-day passes that can be purchased at the entry station. An annual 4-day pass allows the holder to launch watercraft Monday through Thursday throughout the year for one set fee paid up front. An annual 7-day pass allows the holder to launch watercraft any time throughout the year for one set fee paid up front.

As mentioned above, PHM reports the number of watercraft entering PHM on a monthly basis to MCPRD. PHM differentiates between boats and jet skis. PHM also reports the number of annual 4- and 7-day passes purchased each month; however, the number of watercraft entering the lake in a given month using a pass, once it is purchased, is not specifically tracked. These annual 4- and 7-day passes have the same launch privileges as MCPRD's annual passes.

Data for FY 2006 (July 2005 through June 2006) for both MCPRD and PHM became available subsequent to release of the initial draft environmental assessment (EA). Watercraft counts and comparisons in this revised draft EA are based upon FY 2006 data. Some annualized data for previous fiscal years are also used in the EA for comparison purposes.

Question 3. What amount of watercraft using Lake Pleasant is not included in the available data and how should that use be estimated? There are three types of watercraft use for which actual counts are not available. These include (a) watercraft stored at PHM (either wet or dry) that launch each day are not included in any count; (b) watercraft entering from PHM on weekends are not differentiated in monthly totals ; and

(c) watercraft using annual passes issued by PHM are not included in any count beyond the first visit.

a. Watercraft stored at PHM (either wet or dry) that launch on any day are not reported to MCPRD. A method for estimating the number of watercraft entering and using the lake from PHM needed to be established. The Forest Service uses percentages of marina capacity when determining the number of boats out on the lakes under its management. These percentages, ranging between 10 and 15 percent, were established for each lake based upon random sampling conducted at each lake over an extended period of time (personal communication, Mr. Kelly Jardine, Tonto National Forest, Cave Creek Ranger District, June 22, 2006). Owners/operators of the marinas located on the Tonto National Forest and Reclamation Phoenix Area Office's recreation expert were also queried. Their responses ranged anywhere from five to 30 percent of the boats in storage (either wet or dry) typically being out on the water at any given time (most estimated in the 10 to 20 percent range, with 20 percent occurring on weekends and major holidays).² The 20 percent was used for this study to provide for a conservative (maximum impact) estimate. Further research indicates this 20 percent estimate is exceptionally high. In *Techniques for Estimating Boating Carrying Capacity: A Literature Review*, Holly E. Bosley indicates research studies estimated peak use rate, for boats moored at existing shoreline developments, ranged from 3.6 percent to 25 percent (Bosley 2006).³ In another study, estimates of the percent of total moored boats in use on four lakes in Michigan based upon aerial flyovers ranged from 1 percent to 3 percent (Progressive AE 2001).

b. As mentioned above, PHM reports watercraft counts to MCPRD not less than monthly. Therefore, a method for estimating PHM watercraft counts occurring on weekends needed to be established. First, daily watercraft counts from MCPRD for FY 2006 were obtained. Then, for each month, the watercraft counts for all the Saturdays and Sundays were added together, and then divided by the number of weekend days in that month. This represented the average number of watercraft entering LPRP each weekend day for each month. The percent of the total LPRP monthly watercraft count occurring on weekend days was also calculated for each month.

To estimate the number of watercraft entering Lake Pleasant from PHM on weekends, the actual percentage of weekend use calculated for LPRP for each month was used to estimate PHM's watercraft count attributable to weekend use. The total number of watercraft entering Lake Pleasant from PHM each month was multiplied by the percentage of weekend use experienced at LPRP for that month. This number was then divided by the total number of weekend days occurring in that month, to come up with an average weekend day watercraft count at PHM for each month.

² Personal communication with Mr. Eric Church, Bartlett Lake Marina; Ms. Barb Recker, Saguaro Lake Marina; and Mr. David Schuster, Apache Lake Marina and Resort, on June 15, 2006; Ms. Cindy Tieman, Canyon Lake Marina, and Mr. Robert Michaels, Reclamation Phoenix Area Office, on June 16, 2006.

³ It should be noted the 25 percent was a theoretical estimate used in a study for a lake in north-central Saskatchewan, Canada (Jaakson, et al. 1990).

June had the highest average watercraft count occurring on a weekend day for both LPRP and PHM, as well as for the combined overall average weekend watercraft count (see Table 2 in Section B below).

c. A method for estimating the number of watercraft on Lake Pleasant throughout the year using an annual pass also needed to be established. In FY 2006, there were 666 annual 7-day passes for watercraft issued by PHM. In order to estimate how many watercraft this might represent, it was assumed the pass holder used the pass enough times to “break even” with the investment made to purchase the pass. The number of visits assumed to have been made with each pass was calculated by dividing the cost of the pass by the cost of the daily entry fee at each respective gate. This number was then rounded to the nearest whole number, and then multiplied by the total number of passes issued, representing the total number of watercraft visitations estimated to occur during the fiscal year. This number was then divided by 365 to arrive at the annual average daily number of watercraft using the lake with an annual 7-day pass (see discussion in Section A).

There were only 22 annual 4-day passes sold by PHM during the entire fiscal year; these passes can only be used on Monday through Thursday, when watercraft use of the lake is relatively low. Given the conservative assumptions used in determining the contribution of watercraft using the lake during the week from PHM storage and the relatively minor amount users of the 4-day pass would contribute to the annual average daily count, no estimate was made or included for the contribution of watercraft on the lake using an annual 4-day pass purchased from PHM. (As noted above, the number of watercraft entering the lake using annual 4- or 7-day passes purchased from Maricopa County are included in LPRP’s daily watercraft count tallies.)

Question 4. How should increased use of Lake Pleasant resulting from the proposed marina be estimated? The amount of watercraft using the lake as a result of building and operating the proposed marina was estimated using the same 20 percent that was used to estimate the number of watercraft stored at PHM, as explained in Question 3a above.

A. CALCULATION OF THE ANNUAL AVERAGE DAILY WATERCRAFT COUNT

FY 2006 monthly data collected at the LPRP and PHM entry stations regarding the number of watercraft entering Lake Pleasant, as reported by MCPRD, were used to calculate the component of the annual average daily watercraft count based on the actual reported number of watercraft entering LPRP and PHM.

Table 1. Watercraft Use July 2005–June 2006 – Actual Watercraft Counts at Lake Pleasant, Maricopa County, Maricopa County, Arizona

FY 2006 Monthly Watercraft Counts				
FY 2006	LPRP Watercraft Count	PHM Total Monthly Count	Total # Watercraft Count	Total Average Daily Watercraft by Month
JULY 2005	10,558	5,640	16,198	523
AUG 2005	7,310	4,044	11,354	366
SEP 2005	6,280	3,361	9,641	311
OCT 2005	4,288	2,224	6,512	210
NOV 2005	2,601	1,476	4,077	132
DEC 2005	1,862	786	2,648	85
JAN 2006	2,210	1,300	3,510	113
FEB 2006	3,366	1,517	4,883	158
MAR 2006	3,797	2,185	5,982	193
APR 2006	8,323	3,920	12,243	395
MAY 2006	10,506	5,024	15,530	501
JUN 2006	11,308	5,331	16,538	537
TOTAL	72,409	41,470	109,217	
Annual average daily watercraft count: (109,217 total watercraft / 365 days)				<u>299</u>

The number of watercraft using Lake Pleasant that are stored at PHM’s marina was estimated, using 20 percent as explained in Question 3a above. PHM indicates it has 680 wet slips and 750 dry storage spaces for watercraft, for a total of 1,430 watercraft (Letter to Reclamation from Steptoe and Johnson dated August 18, 2006). In order to obtain a “worst case” estimate, it was assumed all of PHM’s 680 wet slips and 750 dry storage spaces currently store watercraft year-round, and a full 20 percent of all 1,430 watercraft would launch each day. Twenty percent of 1,430 is 286. It is highly unlikely this number of watercraft would launch on weekdays and even on weekends during off-peak months. It is anticipated there are times when there are less than 1,430 watercraft stored onsite at PHM; during a recent visit to PHM, not all dry storage spaces were occupied, and some areas were being used to store boat trailers and recreational vehicles rather than watercraft. Under these circumstances, there would be less than 286 watercraft entering Lake Pleasant, even if a full 20 percent of watercraft stored at PHM did launch.

The number of watercraft using the lake with an annual 7-day pass purchased from PHM was estimated. Assuming all pass holders used their passes enough times to equal the amount they would have spent paying the full price daily entry fee, a “break-even” number

of visits was determined. This number was rounded to the nearest whole number. This adjusted number of visits was then multiplied by the number of passes issued during FY 2006, to arrive at an estimated total number of visits made in FY 2006 by all pass holders (for purposes of this exercise it was assumed all these visits occurred in FY 2006, although in reality they do not, since passes are issued throughout the year). To arrive at an annual average daily watercraft count attributable to pass holders, this total number of visits was divided by 365 days.

A PHM annual 7-day pass costs \$200 and the daily entry fee with watercraft is \$6; therefore, to break even, the pass holder would visit at least 33 times. The total number of annual 7-day passes issued by PHM in FY 2006 was 666. The total number of visits in FY 2006 by annual 7-day pass holders is estimated to have been 666 passes multiplied by 33 visits each, representing a total of 21,978 additional watercraft entering LPRP to use the lake in FY 2006. This represents an annual average daily watercraft count of 60 watercraft.

The annual average daily watercraft count attributable to PHM annual 7-day pass holders was estimated to be 60.

The adjusted annual average daily watercraft count was then calculated:

Annual average daily watercraft count based on actual count:	299
+ Annual average daily watercraft count from PHM storage	+286
+ Annual average daily watercraft count from pass holders	+ <u>60</u>
Adjusted total FY 2006 annual average daily watercraft count	<u>645</u>

B. CALCULATION OF THE PEAK SEASON WEEKEND DAY AVERAGE DAILY WATERCRAFT COUNT

As described in Question 3b, LPRP daily watercraft counts were used to identify the number of watercraft using the lake on weekends each month in FY 2006. The total number of watercraft visiting on a Saturday or Sunday for each month was then divided by the total number of Saturdays and Sundays in that particular month, to arrive at an average number of watercraft using the lake on a weekend day for that month. The LPRP percentage of weekend use for each month was then used to estimate the portion of PHM's actual monthly watercraft counts (see Table 1) that would be attributed to visits on a Saturday or Sunday. The estimated average number of watercraft entering the lake from PHM on a weekend day was then calculated in the same manner as LPRP. These two totals were added together to arrive at a combined average weekend day watercraft count (Table 2). June had the highest average weekend day count, which was estimated to be 1,239 watercraft.

Table 2. Estimated Average Peak Season Weekend Day Use at Lake Pleasant Using Monthly Watercraft Counts for July 2005-June 2006, Maricopa County, Arizona

FY 2006 Estimated Peak Season Weekend Day Watercraft Count						
FY 2006	Total # LPRP Watercraft Count on Weekends	# Week-end Days in Month	LPRP Average Weekend Day Count	LPRP % Watercraft Use on Weekends	PHM Avg. Weekend Daily Watercraft	Total Average Weekend Daily Watercraft Count
JULY 2005	6,974	10	697	66	373	1070
AUG 2005	5,083	8	635	70	351	986
SEP 2005	3,915	8	489	62	262	751
OCT 2005	2,867	10	287	67	149	436
NOV 2005	1,377	8	172	53	98	270
DEC 2005	954	10	95	51	40	135
JAN 2006	1,305	9	145	59	85	230
FEB 2006	1,936	8	242	58	109	351
MAR 2006	1,847	8	231	49	133	364
APR 2006	5,961	10	596	72	281	877
MAY 2006	5,831	8	729	56	349	1078
JUN 2006	6,734	8	842	60	397	1239

As with the annual average daily watercraft count, adjustments were then made to this estimated average peak season weekend day count, to take into account watercraft visiting on an annual 7-day pass and watercraft launching from PHM storage (wet or dry). To determine the number of watercraft visiting on a PHM annual 7-day pass in June, the annual average daily count (60) was multiplied by 30 days to arrive at the total number of visits in June from annual 7-day pass holders. This number was multiplied by 60 percent, which is the percentage of watercraft attributed to weekend visitation, and then divided by the number of weekend days in June (8):

Total # of pass holders using lake in June:	$60 \times 30 = 1,800$
Total # of pass holders using lake on weekend:	$1,800 \times 60\% = 1,080$
Average daily weekend day use in June	$1,080 / 8 = \underline{135}$ watercraft

The annual average daily watercraft count launched from watercraft stored at PHM was used because the 20 percent factor already reflects a maximum number or peak season use. Thus, the adjusted estimated peak season weekend day watercraft count would be as follows:

Estimated peak season weekend day average watercraft count:	1,239
+ Annual average daily watercraft count from pass holders	+ 135
+ Annual average daily watercraft count from PHM storage	+ 286
Adjusted estimated peak season weekend day average watercraft count	<u>1,660</u>

C. CALCULATION OF THE NUMBER OF WATERCRAFT THAT WOULD USE THE LAKE AS A RESULT OF IMPLEMENTING THE PROPOSED ACTION OR ALTERNATIVE A

Using the 20 percent estimate applied to watercraft stored at PHM that might enter the lake on any given day, the number of watercraft stored at the proposed marina that might enter the lake on any given day was calculated for both the Proposed Action and Alternative A.

Proposed Action:	1,000 storage spaces x 20% =	200
	+ 36 public boat ramp spaces	<u>+ 36</u>
	Total watercraft entering lake	<u>236</u>
Alternative A:	804 storage spaces x 20% =	160.8
	+ 36 public boat ramp spaces	<u>+ 36.0</u>
	Total watercraft entering lake	196.8 or <u>197</u>

It should be noted the marina proposal also includes a 5-acre fenced area where boats could be stored. This area would also be used for parking by vehicles with trailers; storage of trailers, boat racks, personal watercraft, and supplies; and for repair and service of watercraft. Because the assumptions made in estimating the increase in the number of boats on the lake as a result of this project have been chosen to maximize this increase as a “worst case” scenario (e.g., all slips are rented to boats new to Lake Pleasant; marina is fully rented 100 percent of the time; and 20 percent of the marina’s occupants launch each day), no additional adjustment for boats that might be stored and launched from this 5-acre fenced area has been made.

It has been pointed out that PHM has the ability to add an additional 160 wet slips and 400 dry storage spaces (Steptoe and Johnson 2006). The 20 percent factor was also applied to these additional 560 storage spaces in order to address the cumulative effects of the proposed project.

Table 3 provides a comparison of the estimated number of watercraft anticipated to occur on the lake on an annual average daily basis and on an average peak season weekend day with the proposed action, as compared to current conditions.

Table 3. Estimated Annual Average Daily and Peak Season Weekend Day Watercraft Counts at Lake Pleasant with the Proposed Project, Maricopa County, Arizona

	No Action		Proposed Action (1000-space Marina)		Alternative A (804-space Marina)	
	Annual Average Daily	Peak Season Weekend Day	Annual Average Daily	Peak Season Weekend Day	Annual Average Daily	Peak Season Weekend Day
Current Watercraft #s	645	1,660	645	1,660	645	1,660
+ 20% New Marina capacity + 36 new boat ramp spaces	0	0	200 36	200 36	161 36	161 36
Total w/ Project	645	1,660	881	1,896	842	1,857
% increase over current	0	0	37	14	31	12
Cumulative						
PHM build-out (160 wet slips & 400 dry)	112	112	112	112	112	112
Cumulative Total	757	1,772	993	2,008	954	1,969
% increase over current	17	7	54	21	48	19

It should be noted the estimates used in this study represent the total number of boats estimated to enter the lake on a given day; they do not represent the number of boats on the water at any one time (BAOT).⁴ The number of BAOT would be less than the total number of boats entering the lake on any given day. This is because many if not most watercraft do not spend the entire day traveling around the lake. Boaters out fishing may go out early in the morning and/or towards sunset, returning to shore during midday. Many boaters like to anchor in a certain place off the main body of the lake for the entire day. Also, many watercraft docked at the marina might not even leave their slips, or do not go out on the lake proper for the entire day.

⁴ BAOT is a term commonly used when discussing the concept of a lake's carrying capacity, which relates to the number of boats using the lake at one time. Carrying capacity can be based upon a number of factors including, but not limited to, safety considerations, physical conditions of the lake and shoreline accessibility, social factors, and types of watercraft or watercraft activities carried out on the lake.

DESCRIPTION OF MAJOR CLASSES AS DEFINED BY THE WATER RECREATION OPPORTUNITY SPECTRUM GUIDEBOOK⁵

Urban – An urban WROS area may be found in extensively developed and populated cities and metropolitan spaces where virtually the entire landscape contains human-built structures. The water resources tend to be highly channelized, manipulated, or altered to contain large fluctuations in water flow and for the protection of public safety and property. There is a great deal of management presence (e.g., personnel, rules, facilities, signs, services, conveniences, and security). Recreation use is very extensive, there is a great deal of diversity, socialization, and concentration, and there is a sense of security and conveniences.

Suburban – A suburban WROS area is on the fringe of the urban area. The sights, sounds, and smells of development and built structures are widespread. The water resources tend to be highly channelized, manipulated, or altered to contain large fluctuations in water flow and for the protection of public safety and property. Recreation management is very prevalent (e.g., personnel, rules, facilities, signs, services, conveniences, security). Recreation use, diversity, socialization, concentration, sense of security, and conveniences are very prevalent and obvious. The sights, sounds, and smells of recreation and non-recreation use (e.g., municipal, industrial, residential) are obvious but not dominant in a suburban setting.

Rural Developed – A rural developed WROS area is beyond a metropolitan area and the suburban ring of development. Rural developed areas may serve as “bedroom” communities for urban areas and may contain working farms and ranches, and towns and primary road networks are common. Development will be prevalent and common, yet the setting has a pastoral sense because of an interspersing of forests, water resources, hills, valleys, canyons, wetlands, open spaces, and agricultural land uses. Natural appearing shoreline edges are common, although various water controls or other structures are also common. Recreation management is prevalent and common but not as extensive as in an urban setting.... Recreation use, diversity, socialization, concentration, sense of security, and conveniences are common but less so than in a developed suburban or urban setting. The sights, sounds, and smells of recreation and non-recreation use are common, yet interspersed with locations and times when a sense of tranquility and escape from everyday challenges may be experienced by the urbanized visitor.

Rural Natural – A rural natural WROS area is a considerable distance from metropolitan areas and communities. Natural features are predominant on the landscape, and the presence of development is occasional or infrequent. Rural natural areas are often large enclaves of public lands and waters. Natural resources dominate the landscape. The sights, sounds, and smells of development are infrequent. The water resources are bordered by natural appearing settings. Water controls or other structures are occasional along the shoreline. Management is occasionally noticeable in the form of patrols, facilities, signage, conveniences, and full services. Visitors desire a sense of tranquility and escape from their daily routine. Opportunity for visitors to see, hear, and smell nature is prevalent

⁵ Excerpted from Haas, et al. 2004.

and common, as are occasions to enjoy periods of solitude. Recreation use, diversity, socialization, concentration, sense of security, and conveniences are periodic and occasional.

Semi Primitive – A semi primitive WROS area is a large expanse of natural resources that is far from any city or metropolitan area and a considerable distance from small communities, subdivisions, or developments. Natural resources dominate the landscape. Development is minor and the sights and sounds of human activity are few, but may include such evidence of human activity as distant farming operations, power lines, livestock, small buildings, old roadways, historic structures, and historic logging or mining. These water resources are often within large expanses of public lands and waters. Management, in the form of patrols, facilities, and signage, is seldom noticeable and the visitors are expected to have the equipment and skills to be able to navigate and enjoy this setting. Facilities are rustic and blend well into the setting. Resource protection is very important. Opportunity for visitors to see, hear, and smell nature is wide spread.

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