

Economic Analysis of Recreational and Other Values of Parks in the Adapting to Rising Tides Project Area

The San Francisco Bay Conservation and Development Commission (BCDC), with funding from NOAA Coastal Services Center, has requested that ERG estimate the value of eight low-lying parks along the shoreline of Alameda County, California with respect to what would be lost if they are exposed to impacts of two sea-level rise scenarios at two different timeframes. For simplicity, ERG has assumed that these low-lying coastal parks are lost completely under either sea-level rise scenario (16 and 55 inches). Additionally, ERG has assumed the following: complete loss of the park occurs in both timeframes (2050 or 2100); no mitigating measures are taken to protect the parks; and no slow loss occurs over time. Partial loss scenarios are very difficult to value because of the need to identify at what point a partial loss is a total loss of a park amenity. For example, with a baseball field, losing 10 percent of the field might be considered a total loss of that amenity. On the other hand, losing 10 percent of a wide beach might not be a total loss. We also assume that the park amenities cannot be relocated and no substitutes for the parks are available within a distance that would be willingly traveled by the existing visitors given the amenities provided.

The eight parks studied include (1) Crown Memorial State Beach, (2) Hayward Regional Shoreline, (3) Martin Luther King, Jr. Shoreline, (4) Oyster Bay Regional Shoreline, (5) Estuary Park (including the Jack London Aquatic Center), (6) Union Point Park, (7) Marina Park (in San Leandro), and (8) the Hayward Recreation and Park District (HARD) Hayward Shoreline Interpretive Center and trails.

The general methodology to derive the estimated monetary losses associated with these parks is discussed in Section 1. Section 2 provides the estimates of visitors by park and activity generated using the information provided by park personnel. Section 3 discusses how the unit recreational value of the parks are derived, and Section 4 discusses how all values are aggregated and discounted to create the current year value (present value) of the loss of the eight parks under consideration.

1.0 Overview of the Methodology to Value Losses at Eight East Bay Area Parks

In order to compute the dollar value losses of the eight parks, we need to determine the value of those parks. There are many components to the value of a park, some of which can be easily monetized, but many others are more difficult to assess, such as the value to park visitors of their recreational experience. ERG is focusing on three types of value components that can be assessed given the information provided. The components that were provided are the revenues collected by the parks and the replacement value of the structures and infrastructure of the parks. Also provided were the number of visitors to the parks, which we combine with the estimated value a visitor receives when that visitor uses one or more of a park's amenities, to estimate the recreational value of the park to all of its visitors. Other components of park value are not discussed here, such as the revenues to local businesses that abut the parks and the value of open space to the nearby residents.

The revenues and replacement values of park structures have been provided by BCDC. Numbers of visitors have also been provided in some cases, or have been estimated based on information provided.

Additionally, in most cases, we have been provided with the percentage breakdown of the activities in which the park visitors are involved.

The methodology for determining the value of those activities to the park visitors is as follows. Given the number of park visitors for each of the eight parks and the percentage of visitors undertaking each type of activity as specified, ERG determined the numbers of visitors by park and by activity for 17 different activities (See Section 2 for more details). These are:

- Hiking
- Running
- Walking
- Hiking/Running/Walking
- Beach/Swimming
- Visitor Center/Interpretive
- Picnicking
- Biking
- Special Events
- Sports
- Volunteer Activities
- Dog Walking
- Bird Watching
- Wildlife Viewing
- Kayaking/Canoeing
- Boating
- Playground

ERG then determined an appropriate value for each activity on a per-visitor basis, that is, what would a typical visitor be willing to pay to engage in the activity offered by the park. This willingness to pay is a measure of the value of that park to that visitor on that day. The method used to identify these appropriate values is discussed in Section 3, below.

We then multiply the number of visitors engaged in an activity at a park by the per-visitor unit value of that activity to estimate the value of that activity at that park. When all activities at a park are valued, the total value of the park to its visitors is estimated. This total recreational value is the value for one year's recreation for all visitors at that park.

Assuming that this recreational value for a park remains constant over time, we then assume that all of this value is lost in year 2050 or 2100. The loss of value occurs in every year thereafter (i.e., no replacement for the park is available). We further assume that revenues, to the extent they are incremental to the value of lost recreation, are also lost in 2050 or 2100. We assume this loss continues out every year thereafter. Finally, we assume that the replacement value of the structures at the parks is lost in 2050 or 2100 (a one-time loss). Because these losses occur many years out and some continue to occur in every year after the assumed 100 percent loss in either 2050 or 2100, we need to create a present value analysis.

A present value analysis is used because the value of a dollar today is worth more than a dollar in the future. This concept underlies the reason that interest is charged on loans. We use a discount rate (similar to an interest rate) of 3 percent, based on recommendations by the Office of Management and Budget. This agency, which is responsible for overseeing regulatory analyses issued by Federal agencies, suggests that an appropriate discount rate for public goods is 3 percent per year (OMB, 2003). That is, a dollar today of a public good is worth \$0.97 next year, \$0.94 the following year, \$0.89 the year after that, etc. So a loss occurring 38 years from now (2050) in present value terms would be calculated as $\$ \text{Value of Loss} / (1 + 0.03)^{38}$. Although this equation reduces a one-year loss 38 years hence by about two-thirds compared to a loss occurring now, many of the losses continue to occur in every year after the 2050 or 2100 assumed inundation (assuming no substitute for the parks is available). We analyze these losses under both timeframes out to 2161. Analyzing farther into the future adds little to the losses in present value terms.

When all losses are arrayed over the timeframe from 2012 to 2161 and discounted, we can aggregate the present value losses by park and over all eight parks to estimate the total losses for all parks analyzed.

2.0 Counts of Visitors by Activity

Table 1 presents information that arrays the numbers of visitors that visit the park each year and the percentage of those visitors engaging in the activities listed above. Certain assumptions needed to be made because of a lack of data. These assumptions can be seen in the footnotes to the table and, for the HARD Interpretive Center and Trails, in Table 2. The information for the HARD Interpretive Center and Trails was provided only generally by numbers of visitors per day or per week. The estimated annual counts of visitors and the distribution of visitors by activities are shown in both Tables 1 and 2, along with the information provided and additional ERG assumptions made using that information. As Table 1 shows, combinations of hiking, running, and walking, biking, and picnicking appear to be the most common activities at many of the eight parks, with several offering special amenities, such as boating, kayaking and canoeing, swimming, and sports fields.

Using the distribution of activities and the total numbers of visitors shown in Table 1, Table 3 calculates the total numbers of visitors each year by activity. As the table shows, about 1.7 million visitors visit these eight parks each year. The largest numbers of visitors (more than half) visit Crown Memorial State Beach and Martin Luther King, Jr. Shoreline. A large portion of visitors walk, run, or hike; bike; picnic; visit nature/interpretive centers; or swim.

All of these visits have a value to the visitor that can, in some cases, be monetized. Section 3 discusses how these values can be identified and how the value of all visits can be estimated for each park.

3.0 Per-Visitor Recreational Values

There are several methods for estimating the recreational value of parks on a per-visitor basis. Typically, these methods include:

- 1) The travel-cost method. The cost to travel to a park is an indication of an individual's willingness to pay for the use of that park.
- 2) The contingent valuation method. Through a series of questions, park goers' willingness to pay for the use of that park is elicited.

- 3) The unit-day method. This method uses a value estimated using a combination of professional judgment, travel cost studies, and/or contingent valuation studies to derive a value per visit to a park.

The travel-cost method can be less appropriate for urban parks, many of which are walking distance or very short distances from nearby residents, who are likely to comprise a major portion of the park visitors. This valuation method could lead to an understatement of residents' willingness to pay to use a specific park and does not allow for a convenience factor to be valued. Furthermore, performing site-specific contingent valuations or travel-cost surveys of the eight parks under study is beyond the scope of this analysis. Therefore, we need to rely on some form of unit-day method.

Many travel cost and contingent valuation studies focusing on the types of activities that can be provided by parks, including picnicking, biking, hiking, wildlife viewing, and other similar types of activities, have been performed throughout the country. An excellent compilation of these studies is the one prepared by Dr. Randall Rosenberger, which uses 352 studies to create use values for dozens of recreational activities that can be selected and/or averaged to create unit-day values by specific activity and in specific regions (in some cases) (Rosenberger, 2011). Of particular utility is that the database provides values in consumer surplus terms, which means the values cited are those beyond the fees paid by those participating in the park activities. Therefore, the values calculated can be added to any data on fees collected by the East Bay parks. Unfortunately, the vast majority of the studies in the database have been performed in rural or wilderness area parks, where people tend to spend an entire vacation period, travel long distances to visit, and which have, in some cases, very high willingness to pay values associated with them.

Urban parks do not offer the same types of aesthetic experiences as those reflected in most of the studies compiled by Dr. Rosenberger. However, it is important to note that while urban parks might not offer the aesthetic experience, the willingness to pay for urban park amenities could actually be much greater than values calculated for rural areas. This is because of the potential scarcity of open space or outdoor recreational opportunities, travel cost savings, and sometimes greater capital investment and specialized amenities offered by urban parks. These potentially higher values, nevertheless, need to be tempered with consideration of the possibility of larger numbers of potential substitutes, congestion, and lowered environmental quality (Stynes, undated).

Another source for unit-day values for urban parks is a report issued in 2000 commissioned by the East Bay Regional Park District. The value of this study is that it reflects recreational unit-day values that the Park District selected based on their detailed knowledge of the park amenities and their assessment of various willingness to pay studies, which they had determined were applicable. The drawbacks of this study are that the many of the unit-day values selected reflect the per-person fees in effect at the time. Most of these fees are subsidized and it is very likely that actual willingness to pay is higher than the fees actually paid. The actual consumer surplus for the some of the activities valued cannot be determined and have been effectively set at \$0.

Another possible source of unit-day values is a U.S. Army Corps of Engineers (USACE) series of reports. The unit-day values in this series are updated by the Corps annually, and the values in 2011 dollars are available (USACE, 2012).¹ The unit-day values span a wide range, but the methodology that can be used

¹ These unit-day values are used by USACE in evaluating their own projects related to recreational areas.

with these values is somewhat flexible. Each park can be assigned points based on a number of different criteria. Higher points are available to assign to parks for those with more amenities and services, for example, or for those that provide substantially greater aesthetic experiences than the average. Additionally, if use statistics by activity are available, the activity by itself can be valued independently from other activities. There are also multiple point systems and values depending on, for example, whether general recreational activities are being assessed (e.g., walking, running, or biking), or whether specialized recreational activities are being assessed. Stynes [undated], for example, recommends using these specialized values for golf courses and zoos. We believe the HARD Interpretive Center and the Crab Cove Visitor Center (at Crown Memorial State Beach) fit this description and, possibly, Crown Memorial Beach. This beach is a unique asset, given the rarity of easy access to true beach facilities from inner city locations.

We investigated all of the values generated for each of the activities identified for the eight parks presented in these three sources. Table 4 provides the list of values derived using the Recreational Values Database. This source provided values for 12 of the activities of interest in this analysis. The average values shown are generally the average values for Western U.S. studies (see footnote 1 in the table). The best estimate values have been selected using judgment about which studies are most applicable to the type of activity offered by the parks in this analysis. The rationale for the selection of the best estimates is also provided in the table footnotes.

Table 4 also presents the list of values ERG derived using the Army USACE report on unit-day values and the methods that the Corps uses to estimate representative general and specialized recreational values for parks when specific surveys are not available. These are willingness to pay values, that is, they are not recreational values above fees paid (consumer surplus).² As noted earlier, the unit-day values provided by the USACE report (2012) are used with a points system to define the relative desirability of the various park amenities. Table 5 presents the unit-day values associated with a park's aggregate points, and Table 6 reproduces the USACE's guidance for assigning points to general recreational activities. Guidance is similar for assigning points for specialized recreational activities, but is not reproduced here. Table 7 presents ERG's assignment of points. These assignments are somewhat subjective, and should be reviewed by those more knowledgeable of the park amenities to ensure the points are reasonably estimated. Because ERG only has a general impression of the parks from information provided by park system personnel and online photos and discussion of park amenities, we have tended to assign points conservatively and generically. Thus the sum of points for each of the eight parks is estimated to lie generally within the same range (26-42), and the value of a visitor day for each park (with the exception of two activities present at only two parks—nature center and swimming/beach) does not vary by park or activity using this source of unit values. When the specialized amenities for Crown Memorial State Beach and the HARD Interpretive Center are considered, ERG estimates that the specialized amenities raise the point value for these parks, which lies in the range of 39-55. This point range is then matched to the values for specialized recreation as shown in Table 5.

The values obtained from the last source of unit-day values ERG reviewed, the East Bay study (East Bay Regional Park District, 2000), have been updated to 2011 dollars. Table 7 shows the values presented in

² USACE (2000), in the document that originally compiled the unit-day value estimates, states: "unit day value does include entry and use fees actually paid for the site. Therefore, entry and use fees should not be added to the unit day value to determine total willingness to pay."

the report inflated to 2011 values. Many of these values are roughly in the same range as those generated using the Army Corps of Engineers values and approach. They are willingness to pay values that sometimes use fees paid as the measure of the willingness to pay, thus might understate actual willingness to pay because park fees are subsidized and because some visitors might have been willing to pay much more for the activity than they actually did pay.

Table 4 also shows which values were chosen to be used in the analysis for each activity. The values chosen are from the East Bay study or the Army Corps of Engineers, but also generally tend to reflect central values seen for the activity listed among the three sources when a best estimate from the Recreational Values Database was considered available for an activity. We avoided using the Recreational Values Database values because of the relatively high values associated with the activities. Relatively high values persisted even after ERG eliminated studies that clearly were not representative of the parks in our analysis. We considered the best estimates values we derived from this database to reflect a high end of a reasonable values range.

4.0 Results

ERG used the number of visitors per year by activity estimated in Table 3 and applied the chosen unit-day values from Table 4 by activity. Table 8 presents the recreational values by activity for each park and also aggregates the values by park and activity. As the table shows, the total recreational value of all eight parks is estimated at over \$17 million per year in 2011 dollars. The recreational value of Crown Memorial State Park makes up about half this estimate. MLK, Jr. Shoreline offers the next largest portion of recreational value among the eight parks.

Additional to the recreational value of the parks are the revenues and replacement costs for park structures. Table 9 presents the data provided by BCDC on replacement cost and revenues generated at the eight parks in the analysis.

ERG then determined the discounted present value of losing the eight parks in 2050 and 2100. We assume all losses are complete, occur in the year considered and that no substitutes exist for the amenities offered by these parks. A no-substitutes scenario could occur if the parks cannot be relocated, which is likely, or if similar amenities are located at too far a distance and/or are of a much poorer quality such that the cost to reach a replacement park is greater than the willingness to pay for that replacement park's amenities of all current visitors to the eight parks in question.

Included in these estimates are the replacement costs of the parks. As noted, ERG was also provided the revenues generated by the parks. However, because the unit-day values we used reflect the total willingness to pay (including fees paid) and not consumer surplus, revenues cannot be combined with these values. Had we selected values from the Recreational Values Database, however, the revenues could have been added to the recreational values estimated because those values reflect consumer surplus (what visitors would be willing to pay above fees paid).

Table 10 presents the dollar value lost when the parks are inundated in 2050 or 2100 (in 2011 dollars). As the table shows, the total dollar value lost when the parks are inundated in 2050, assuming 100 percent loss and no suitable substitutes for those activities, is about \$190 million, whereas when the loss occurs in 2100, the total dollar value lost is much less, about \$38 million. This reduction in value occurs because

the losses are assumed to occur very far in the future, leaving many more years for residents and other visitors to continue to enjoy the park amenities.

References

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Table 1. Visitor Days and Activity Breakdown for Eight Parks

Park	Crown Memorial State Beach	Hayward Regional Shoreline	MLK, Jr. Shoreline	Oyster Bay Regional Shoreline	Estuary Park (1)	Union Point Park (1) (2)	Marina Park (3)	HARD Interpretive Center & Trails (4)
Total Visitor Days	682,022	80,308	514,854	165,033	15,000	2,500	260,000	9,175
Hiking				50%				
Running								
Walking					10%	70%	25%	
Hiking/Running/Walking	38%	35%	45%					10%
Beach	19%							
Visitor Center/Interpretive	14%					5%		67%
Picnicking	12%		15%	25%		15%	35%	
Biking	7%	25%	20%	25%	10%		25%	10%
Special Events	4%		5%		10%	5%		
Sports	3%				55%	5%	5%	
Volunteer Activities	3%							
Dog Walking		35%						
Bird Watching		5%						
Wildlife Watching								13%
Kayaking/Canoeing			10%		15%			
Boating			5%					
Playground							10%	
	100%	100%	100%	100%	100%	100%	100%	100%

(1) Assume "passive use" equivalent to walking

(2) Assume "special events and activities" at 30% means 15% picnicking (bbq grills and tables available), 5% interpretive (interpretive center is present), 5% special events, and 5% sports (ball field present).

(3) Marina Park appears to be predominantly a picnic area, but includes playgrounds, a sand volleyball court, and walking and biking trails. Assume 10% playground, 5% sports, 35% picnicking, 25% walking and 25% biking. Numbers of visitors calculated by ERG using the following information: Provided by park system: spring/summer = 700/weekday, 3,000 per weekend; fall/winter = 400/weekday, 1,000/weekend. Calculation is (26 weeks * 5 days * 700) + (26 weeks*3000) + (26 weeks*5*400) + (26 weeks*1000).

(4) See assumptions in Table 2.

Source: Information provided by BCDC and ERG estimates.

Table 2. Assumptions Used to Calculate Visitors and Activities at HARD Interpretive Center and Trails

Information Provided	ERG Assumptions Made	Calculation of Total Visitors and % Activities
Interpretive Center		
Open Wed-Sun.		
Spring weekdays, 35-40 children, 10-15 adults	50 visitors/day, 13 weeks, 3 weekdays per week	1,950
Spring and Summer weekends, 20-50 per day	35 visitors/day, 26 weeks, 2 weekend days per week	1,820
Summer weekdays, 20-50 per day	35 visitors/day, 13 weeks, 3 weekdays per week	1,365
Winter--no data (less use)	20 visitors/day, 26 weeks, weekends only, 2 days	1,040
Total center visits		6,175
Trails		
Trail visits--several thousand	3,000	3,000
Total visits center plus trail		9175
% Center/nature study		67%
%Trail activities		33%
Wildlife viewing	40%	13%
Running/walking/ hiking	30%	10%
Biking	30%	10%

Source: Information provided by BCDC and ERG estimates.

Table 3. Total Numbers of Visitors by Park and Activity

Park	Crown Memorial State Beach	Hayward Regional Shoreline	MLK, Jr. Shoreline	Oyster Bay Regional Shoreline	Estuary Park	Union Point Park	Marina Park	HARD Interpretive Center & Trails	Total Visitors
Hiking	0	0	0	82,517	0	0	0	0	82,517
Running	0	0	0	0	0	0	0	0	0
Walking	0	0	0	0	1,500	1,750	65,000	0	68,250
Hiking/ Running/Walking	259,168	28,108	231,684	0	0	0	0	900	519,860
Beach/ Swimming	129,584	0	0	0	0	0	0	0	129,584
Visitor Center/ Interpretive	95,483	0	0	0	0	125	0	6,175	101,783
Picnicking	81,843	0	77,228	41,258	0	375	91,000	0	291,579
Biking	47,742	20,077	102,971	41,258	1,500	0	65,000	900	279,448
Special Events	27,281	0	25,743	0	1,500	125	0	0	54,649
Sports	20,461	0	0	0	8,250	125	13,000	0	41,836
Volunteer Activities	20,461	0	0	0	0	0	0	0	20,461
Dog Walking	0	28,108	0	0	0	0	0	0	28,108
Bird Watching	0	4,015	0	0	0	0	0	0	4,015
Wildlife Watching	0	0	0	0	0	0	0	1,200	1,200
Kayaking/Canoeing	0	0	51,485	0	2,250	0	0	0	53,735
Boating	0	0	25,743	0	0	125	0	0	25,868
Playground	0	0	0	0	0	0	26,000	0	26,000
Total Visitors	682,022	80,308	514,854	165,033	15,000	2,500	260,000	9,175	1,728,892

Source: Table 1.

Table 4. Unit-Day Values for Recreational Activities

Activity		Recreation Use Values Database (1) (4) (updated to \$2011)	Army Corps Unit Day Values (2) (\$2011)	East Bay Regional Park District 2000 Report (updated to \$2011) (3)	Chosen Value
Hiking	low/BE	\$10.69	\$5.24	\$2.62	\$6.11
	avg	\$57.21	\$6.11	\$5.90	
	high		\$6.98	\$9.17	
Running	low/BE	\$4.73	\$5.24	\$2.62	\$6.11
	avg		\$6.11	\$5.90	
	high		\$6.98	\$9.17	
Walking	low/BE	NA	\$5.24	\$2.62	\$6.11
	avg	\$17.99	\$6.11	\$5.90	
	high		\$6.98	\$9.17	
Hiking/ Running/ Walking	low/BE	\$10.86	\$5.24	\$2.62	\$6.11
	avg	\$56.67	\$6.11	\$5.90	
	high		\$6.98	\$9.17	
Beach/ Swimming	low/BE	\$40.29	\$19.78		\$21.64
	avg	\$51.03	\$21.64	\$5.90	
	high		\$23.51		
Visitor Center/ Interpretive	low/BE	NA	\$19.78	\$32.75	\$32.75
	avg	\$13.18	\$21.64		
	high		\$23.51		
Picnicking	low/BE	\$10.08	\$5.24		\$6.55
	avg	\$19.63	\$6.11	\$6.55	
	high		\$6.98		
Biking(1)	low/BE	\$13.86	\$5.24		\$6.11
	avg	\$43.95	\$6.11		
	high		\$6.98		
Special Events	low		\$5.24		\$9.83
	avg		\$6.11	\$9.83	
	high		\$6.98		
Sports	low		\$5.24		\$6.11
	avg		\$6.11		
	high		\$6.98		
Volunteer Activities	low		\$5.24		\$6.11
	avg		\$6.11		
	high		\$6.98		
Dog Walking	low		\$5.24		\$6.11
	avg		\$6.11	\$3.28	
	high		\$6.98		
Bird Watching	low		\$5.24		\$6.11
	avg	\$51.23	\$6.11		
	high		\$6.98		
Wildlife Watching	low/BE	\$48.54	\$5.24		\$6.11
	avg	\$65.91	\$6.11		
	high		\$6.98		
Kayaking/ Canoeing	low/BE	\$47.72	\$5.24	\$17.03	\$26.20
	avg	\$115.48	\$6.11	\$26.20	

Table 4. Unit-Day Values for Recreational Activities

Activity		Recreation Use Values Database (1) (4) (updated to \$2011)	Army Corps Unit Day Values (2) (\$2011)	East Bay Regional Park District 2000 Report (updated to \$2011) (3)	Chosen Value
	high		\$6.98	\$52.40	
Boating	low/BE	\$22.79	\$5.24	\$17.03	\$26.20
	avg	\$50.01	\$6.11	\$26.20	
	high		\$6.98	\$52.40	
	low		\$5.24		
Playground	avg		\$6.11		\$6.11
	high		\$6.98		

BE=Best Estimate--Applies only to Recreation Values Database

(1) Recreation Use Values Database (Rosenberger, 2011): Average values shown are based studies reflecting the Western U.S. region and reflect means for the activities identified, with the exception of a) biking, which has no studies available for the Western U.S. Region; the overall U.S. average is used for biking; b) birdwatching, data averaged over all studies (U.S. and Canada); one CA study is in the San Joaquin Valley and is higher than the overall average; overall average used for a conservative estimate; c) Running consists of one study (U.S.). All other running studies are for Pikes Peak; d) Walking consists of one study (U.S.). No others are available in database; e) Hiking/Running/Walking average is the average of all running studies in the Western U.S. Regions plus the one walking study plus all Western U.S. Hiking; f) visitor center/interpretive is the mean of one "visiting nature center" study and one study characterized as "nature study"; g) Beach/Swimming is Western U.S. Beach and Western U.S. Swimming averaged. All values have been updated to \$2011 using the Consumer Price Index (CPI). See footnote 4 for values used as Best Estimates.

(2) Unit Day Values for Recreation, Fiscal Year 2011 (USACE, 2012): The values for general recreation are assigned based on ratings of each park's recreational experience, availability of the other similar opportunities nearby, the carrying capacity, accessibility, and environmental quality (see Table 5). Each park was individually assessed, but the values for parks for their general recreation attributes fell within similar ranges, leading to uniform values per unit day for each activity. The two exceptions are beach and nature center, two specialized activities given the urban nature of these parks. We deemed that beach access in an urban area was unusual, and was thus a specialized attribute. "Nature center" is similar to the types of specialized activities noted by Stynes (undated) that should receive a higher valuation. A high, low, and average are given for both the general recreation activities and the specialized activities.

(3) East Bay Regional Park District (2000): Values have been updated from \$2000 to \$2011 using the CPI.

(4) Best estimates for values from the Recreation Values Database are derived as follows:

Hiking: Hiking/CA/Nonwilderness

Running: Running/USA (one study)

Hiking/Running/Walking: Average of Hiking/CA/Nonwilderness, Running/USA (one study) and all (one) walking study

Picnicking: CA/Nonwilderness

Beach/Swimming: Cabrillo-Long Beach CA beach values (4 studies) plus one study of CA swimming, averaged

Biking: Urban/Suburban rail trail in Washington DC area

Wildlife viewing: CA/Nonwilderness

Kayaking/Canoeing: Floating/Rafting/Canoeing: removed whitewater and tubing/rafting (average contains studies characterized as non whitewater kayaking/canoeing/rafting and rowing/other boating

Boating: Western U.S. without AK and with one extreme outlier removed.

Table 5. Values Associated with Specific Points Values Assigned to Parks

Point Values	General Recreation Values	Specialized Recreation Values
0	\$3.72	\$15.13
10	\$4.42	\$16.06
20	\$4.89	\$17.22
30	\$5.58	\$18.62
40	\$6.98	\$19.78
50	\$7.91	\$22.34
60	\$8.61	\$24.67
70	\$9.08	\$29.79
80	\$10.01	\$34.67
90	\$10.70	\$39.56
100	\$11.17	\$44.21

Source: USACE, 2012.

Table 6. Unit-Day Method Point Assignments Reproduced from USACE (2012)—Table 1: Guidelines for Assigning Points for General Recreation Criteria

Criteria	Judgment Factors				
Recreation experience ¹ Total Points: 30 Point Value:	Two general activities ² 0-4	Several general activities 5-10	Several general activities: one high quality value activity ³ 11-16	Several general activities; more than one high quality value activity 17-23	Numerous high quality value activities; some general activities 24-30
Availability of opportunity ⁴ Total Points: 18 Point Value	Several within 1 hr. travel time; a few within 30 min. 0-3	Several within 1 hr. travel time; none within 30 min. 4-6	One or two within 1 hr. travel time; none within 45 min. 7-10	None within 1 hr. travel time 11-14	None within 2 hr. travel time 15-18
Carrying capacity ⁵ Total Points: 14 Point Value	Minimum facility for development for public health and safety 0-2	Basic facility to conduct activity(ies) 3-5	Adequate facilities to conduct without deterioration of the resource or activity experience 6-8	Optimum facilities to conduct activity at site potential 9-11	Ultimate facilities to achieve intent of selected alternative 12-14
Accessibility Total Points: 18 Point Value	Limited access by any means to site or within site 0-3	Fair access, poor quality roads to site; limited access within site 4-6	Fair access, fair road to site; fair access, good roads within site 7-10	Good access, good roads to site; fair access, good roads within site 11-14	Good access, high standard road to site; good access within site 15-18
Environmental Total Points: 20 Point Value	Low esthetic factors ⁶ that significantly lower quality ⁷ 0-2	Average esthetic quality; factors exist that lower quality to minor degree 3-6	Above average esthetic quality; any limiting factors can be reasonably rectified 7-10	High esthetic quality; no factors exist that lower quality 11-15	Outstanding esthetic quality; no factors exist that lower quality 16-20

¹ Value for water-oriented activities should be adjusted if significant seasonal water level changes occur.

² General activities include those that are common to the region and that are usually of normal quality. This includes picnicking, camping, hiking, riding, cycling, and fishing and hunting of normal quality.

³ High quality value activities include those that are not common to the region and/or Nation, and that are usually of high quality.

⁴ Likelihood of success at fishing and hunting.

⁵ Value should be adjusted for overuse.

⁶ Major esthetic qualities to be considered include geology and topography, water, and vegetation.

⁷ Factors to be considered to lowering quality include air and water pollution, pests, poor climate, and unsightly adjacent areas.

Table 7. ERG Estimates of Point Values for Parks in the Analysis

Park	Criteria	Recreation Experience	Availability of Opportunity	Carrying Capacity	Accessibility	Environmental	Total Points
Crown Memorial State Beach	min	5	0	3	15	3	26
	max	10	3	5	18	6	42
Hayward Regional Shoreline	min	5	0	3	15	3	26
	max	10	3	5	18	6	42
MLK, Jr. Shoreline	min	5	0	3	15	3	26
	max	10	3	5	18	6	42
Oyster Bay Regional Shoreline	min	5	0	3	15	3	26
	max	10	3	5	18	6	42
Estuary Park	min	5	0	3	15	3	26
	max	10	3	5	18	6	42
Union Point Park	min	5	0	3	15	3	26
	max	10	3	5	18	6	42
Marina Park	min	5	0	3	15	3	26
	max	10	3	5	18	6	42
HARD Interpretive Center & Trails	min	5	0	3	15	3	26
	max	10	3	5	18	6	42

Note: For Crown Memorial State Beach and HARD Interpretive Center and Trails, the points selected reflect recreational values that are associated with other activities than the beach/swimming or nature center. In relation to these two activities, we assigned points ranging from 11-16 for recreation experience and 7-10 for availability of opportunity. The other values remain the same, but we apply the values for specialized activities to the sum of the points range generated (points for these two activities sum to 39-55).

Source: ERG estimates.

Table 8. Total Annual Recreational Value to Visitors to Eight East Bay Parks

Park	Crown Memorial State Beach	Hayward Regional Shoreline	MLK, Jr. Shoreline	Oyster Bay Regional Shoreline	Estuary Park	Union Point Park	Marina Park	HARD Nature Center & Trails	Total
Hiking	\$0	\$0	\$0	\$504,176	\$0	\$0	\$0	\$0	\$504,176
Running	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Walking	\$0	\$0	\$0	\$0	\$9,165	\$10,693	\$397,150	\$0	\$417,008
Hiking/ Running/Walking	\$1,583,519	\$171,739	\$1,415,591	\$0	\$0	\$0	\$0	\$5,499	\$3,176,347
Beach/ Swimming	\$2,804,202	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,804,202
Visitor Center/ Interpretive	\$3,127,071	\$0	\$0	\$0	\$0	\$4,094	\$0	\$202,231	\$3,333,396
Picnicking	\$500,059	\$0	\$471,864	\$252,088	\$0	\$2,291	\$556,010	\$0	\$1,782,311
Biking	\$291,701	\$122,670	\$629,152	\$252,088	\$9,165	\$0	\$397,150	\$5,499	\$1,707,425
Special Events	\$268,035	\$0	\$252,922	\$0	\$14,738	\$1,228	\$0	\$0	\$536,922
Sports	\$125,015	\$0	\$0	\$0	\$50,408	\$764	\$79,430	\$0	\$255,616
Volunteer Activities	\$125,015	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$125,015
Dog Walking	\$0	\$171,739	\$0	\$0	\$0	\$0	\$0	\$0	\$171,739
Bird Watching	\$0	\$24,534	\$0	\$0	\$0	\$0	\$0	\$0	\$24,534
Wildlife Watching	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$7,332	\$7,332
Kayaking/ Canoeing	\$0	\$0	\$1,348,917	\$0	\$58,950	\$0	\$0	\$0	\$1,407,867
Boating	\$0	\$0	\$674,459	\$0	\$0	\$0	\$0	\$0	\$674,459
Playground	\$0	\$0	\$0	\$0	\$0	\$0	\$158,860	\$0	\$158,860
Total Rec Value	\$8,824,614	\$490,682	\$4,792,905	\$1,008,352	\$142,425	\$19,069	\$1,588,600	\$220,561	\$17,087,208

Source: Tables 3 and 4.

Table 9. Annual Revenues and Replacement Value of Structures for Eight East Bay Parks

Park	Annual Revenues	Replacement Value of Structures
Crown Memorial State Beach	\$70,000	\$9,536,000
Hayward Regional Shoreline	\$0	\$4,193,000
MLK, Jr. Shoreline	\$39,000	\$11,086,000
Oyster Bay Regional Shoreline	\$0	\$845,000
Estuary Park	\$10,500	\$2,753,277
Union Point Park	\$6,000	\$2,260,000
Marina Park	NA	NA
HARD Interpretive Center & Trails	\$0	\$5,000,000

Source: Information provided by BCDC.

Table 10. Present Value Losses Associated with Eight East Bay Parks Presumed Inundated in 2050 or 2100 Due to Sea Level Rise

Park	Present Value of Loss Occurring in 2050	Present Value of Loss Occurring in 2100
Crown Memorial State Park		
Annual Recreational Value	\$92,175,184	\$18,330,880
Annual Revenues	\$0	\$0
Replacement Value of Structures	\$3,011,026	\$686,836
Total present value of loss	\$95,186,210	\$19,017,716
Hayward Regional Shoreline		
Annual Recreational Value	\$5,125,288	\$1,019,266
Annual Revenues	\$0	\$0
Replacement Value of Structures	\$1,323,955	\$302,003
Total present value of loss	\$6,449,243	\$1,321,270
MLK, Jr. Shoreline		
Annual Recreational Value	\$50,063,022	\$9,956,034
Annual Revenues	\$0	\$0
Replacement Value of Structures	\$3,500,444	\$798,476
Total present value of loss	\$53,563,466	\$10,754,510
Oyster Bay Regional Shoreline		
Annual Recreational Value	\$10,532,471	\$2,094,593
Annual Revenues	\$0	\$0
Replacement Value of Structures	\$266,812	\$60,862
Total present value of loss	\$10,799,283	\$2,155,454
Estuary Park		
Annual Recreational Value	\$1,487,663	\$295,852
Annual Revenues	\$0	\$0
Replacement Value of Structures	\$869,357	\$198,307
Total present value of loss	\$2,357,020	\$494,158
Union Point Park		
Annual Recreational Value	\$199,184	\$39,612
Annual Revenues	\$0	\$0
Replacement Value of Structures	\$713,603	\$162,778
Total present value of loss	\$912,787	\$202,390
Marina Park		
Annual Recreational Value	\$16,593,303	\$3,299,910
Annual Revenues	\$0	\$0
Replacement Value of Structures	\$0	\$0
Total present value of loss	\$16,593,303	\$3,299,910
HARD Nature Center & Trails		
Annual Recreational Value	\$2,303,814	\$458,160
Annual Revenues	\$0	\$0
Replacement Value of Structures	\$1,578,768	\$360,128
Total present value of loss	\$3,882,582	\$818,288
All Parks		
Annual Recreational Value	\$178,479,930	\$35,494,306
Annual Revenues	\$0	\$0
Replacement Value of Structures	\$11,263,964	\$2,569,390
Total present value of loss	\$189,743,893	\$38,063,696

Source: ERG estimates and previous tables.