South Bay Salt Pond Restoration Project: Trail User Satisfaction Study
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Background. The South Bay Salt Pond Restoration Project (the Project) is a 15,000-acre San Francisco Bay wetland restoration project managed by the State Coastal Conservancy, US Fish and Wildlife Service and the California Department of Fish and Wildlife. A key objective of the Project is to provide quality public access. Trails and trail amenities, including interpretive displays and viewing platforms, were installed at each of the three pond complexes during Phase 1 of the Project (SBSP 2007). As part of our waterbird response to trail use research, we collected data on trail users, their trail activities, and their level of satisfaction with their public access experience. This study will help managers understand what experiences and/or amenities are sought by the public and how these interests can be integrated into an overall plan to provide public access while protecting species.

Data from the National Survey on Recreation and the Environment (2000) indicates that 87% of adults in the United States participated in trail/street/road activities during 1999-2000. Over 80% of Americans reported walking and 40% stated they went bicycling (Cordell et al. 2004). These results indicate that local trails can have health benefits by encouraging exercise (Dunton et al. 2009). Locally, Santa Clara County Parks and Recreation Department (2003) survey found 65% residents regularly walked, jogged or bicycled. The Project's Phase 1 public access trails are anticipated to be well used by residents and visitors.

The unique habitat of the Project ponds and marshes and the use of these habitats by millions of migrating shorebirds and waterfowl on the Pacific Flyway attract visitors interested in outdoor activities in a more natural setting and those specifically interested in wildlife watching. The National Survey on Hunting, Fishing and Wildlife-Associated Recreation found that more than 6.7 million California residents and visitors participated in wildlife watching activities in 2011. Of these participants, 4.0 million observed birds within 1 mile of home and 2.3 million on trips throughout the state. Around-the-home wildlife watching continues to grow in popularity as an outdoor-associated recreation in California (U.S. Department of Interior 2011). The proximity of the Project's pond complexes to highly developed urban centers suggests that residents interested in wildlife will continue to seek access for viewing opportunities.

The Don Edwards San Francisco Bay National Wildlife Refuge Final Comprehensive Conservation Plan (2013) indicates that visitation to the Refuge, the largest urban refuge in the United States, ranged from approximately 750,000 to 900,000 annually from 2006 to 2010. The majority of these visitors come to hike or bike the 30 miles of existing trails within the refuge. In the years to come, the Project will add additional trails to the pond complexes.

A number of studies evaluating visitor satisfaction with recreation facilities have helped agencies to develop long-range plans that focus financial resources on desired capital improvements and operations and maintenance activities (Carter 2004, Sexton et. al. 2006, San Jose 2011), to ascertain the public's willingness to entertain user fees (Bowker et al. 1999), and to understand behaviors of visitors relative to habitat concerns (Taylor and Knight 2003, Lynn and Brown 2003). For example, studies show trail users are frequently most dissatisfied with trail cleanliness and signage (Gobster and Westphal 2004, Lynn and Brown 2003, Shafer et al. 1999). Gobster (1995) found that trail users wanted to know trail conditions, distances at the

trailhead, and information at trail junctions; and, trail users most used and enjoyed short trails or loop trails close to home or work.

This trail user study assessed whether the Project is meeting the public's expectation for access and services and determined what features people would like to see in the future. We used a survey to gather information on visitor perceptions and level of satisfaction with the public access features and addressed these questions:

1. What are the characteristics and demographics of the trail users?
2. What trail qualities and features are important to trail users?
3. What is the level of trail user satisfaction with trail layout relative to access and viewsheds, trail surfacing, trail amenities, comfort services and signage?
4. What is the overall level of satisfaction with the trail experience including access, enforcement and maintenance?
5. How would trail users prioritize future capital improvement projects?

Based on our research, we provide recommendations on: 1) priorities for future expenditures on trail features and services, 2) providing a quality public access experience while protecting species, and 3) research needs.

Study Areas. We counted all trail users and conducted surveys at 5 sites in or near the Project: 2 sites which were newly implemented trails (A3W and Alviso Marina County Park) and 3 which were existing trails (Bedwell Bayfront Park, Charleston Slough and Eden Landing Bay Trail Spine/Alameda Creek Trail) (Figures 1, 2 and 3). Bedwell and Charleston Slough sites were out side the Project area and were managed by the City of Menlo Park and the City of Mountain View, respectively. We had planned to include the Phase 1 trail at SF2 in this study, but we did not encounter trail users on our site visits to this new trail extending south along the bayfront. At the time of data collection, the SF2 trail was effectively a spur trail extending from the trail crossing the Dumbarton Bridge. The discontinuous nature of this trail segment, newness of this site (lack of public awareness) and the on-going construction work on the Dumbarton Bridge might have been reasons for the lack of visitors. As a result of the very few trail users at the SF2 site, we doubled the data collection days at A3W. We had also planned to collect data only at Eden Landing, but found that this trail was rarely used on the weekends. Thus, we used the unpaved, northern levee of the Alameda Creek Trail as the weekend site for this pond complex. This trail was busier than usual due to the fact that the paved, southern levee was closed and under construction during the majority of our data collection.

Figure 1. Eden Landing Study Sites: Eden Landing (top star) and Alameda Creek (bottom star).

Figure 2. Ravenswood Study Site: Bedwell Bayfront Park (star).

Figure 3. Alviso Study Sites: Charleston Slough, A3W Trail, Alviso Marina County Park (stars from left to right).

Data Collection and Analysis. We developed a survey instrument that was modeled after other successful surveys (Carter 2004, Sexton, et al. 2006), but tailored to the Project's unique site conditions and goals (Appendix A). The survey was vetted by the South Bay Salt Pond Restoration Project managers. The survey included questions on trail user demographics, trail use frequency, recreational preferences, trail user perceptions and level of satisfaction with trail maintenance and features, future expectations for public access, and visitor suggestions.

In order to capture the potential differences in seasonal usage, we interviewed trail users for a full year beginning in April 2011 and extending through March 2012. We conducted the survey on one week day and one weekend day per season at each of the sites. The surveys were conducted for two hours at peak trail user times. These times generally fell within two timeframes morning (7:00 AM to 10:00 AM) or lunch (10:00 AM to 2:00 PM). Specific times were based upon available daylight each season. We sampled during late afternoons at trail sites typically once per quarter (4:00 PM to 6:00 PM), as daylight permitted. Winds were frequently high in the late afternoons diminishing trail users' interests in completing the surveys. Visitors were randomly selected whenever possible. However, we sometimes targeted different trail users types (such as bicyclists) to ensure we were gathering sufficient data from all trail user types based upon the trail user counts we were simultaneously conducting. User groups were passively targeted with the aid of signs on the back of the survey clipboards that read "Bicyclists Needed".

Two researchers went to each site to collect data, one to intercept trail users, distribute the survey and check the returned surveys for completeness with the respondent and one researcher to count all visitors by trail use activity. Researchers stayed 2 hours or until at least 7 surveys were collected.

Data were analyzed using SYSTAT 13 and were summarized using descriptive statistics. Qualitative responses were summarized. The number of survey responses per question (the "n") varied based on the number of people who responded. For many question not all people responded so the "n" will be less than the total number of surveys we collected.

Results.

General Findings. We collected 568 surveys, 207 of which were at new trail locations and 361 at existing trail sites. We collected 118 surveys in Spring (April, May, June), 149 in Summer (July, Aug, Sept), 145 in Fall (Oct, Nov, Dec) and 156 in Winter (Jan, Feb, Mar). We counted a total of 3,099 trail users over the course of the study: 59% walkers, 16% runners, 17% bicyclists and 6% dog walkers.

Demographics and Trail Use. Of the respondents we surveyed, 58% were male and 40% female (n=549). Figure 4 shows the ethnicity of the respondents. Whites dominated, followed by Asian Americans and Hispanics. The ethnicities of respondents by pond complex are compared to 2010 census data in Table 1. In general, whites were over-represented compared to the census data; the percent of Hispanic visitors was under-represented or evenly represented, depending on the pond complex; and both Asian and African Americans were underrepresented compared to the census. Approximately 70% of respondents were between 35 and 64 years old (Figure 5). At least 80% of respondents said they visit alone or with 1-2 people; 11% visit with 3-5 people, 5% with 5-25, and 6% other.

Figure 4. Ethnicities of Respondents (n=556)

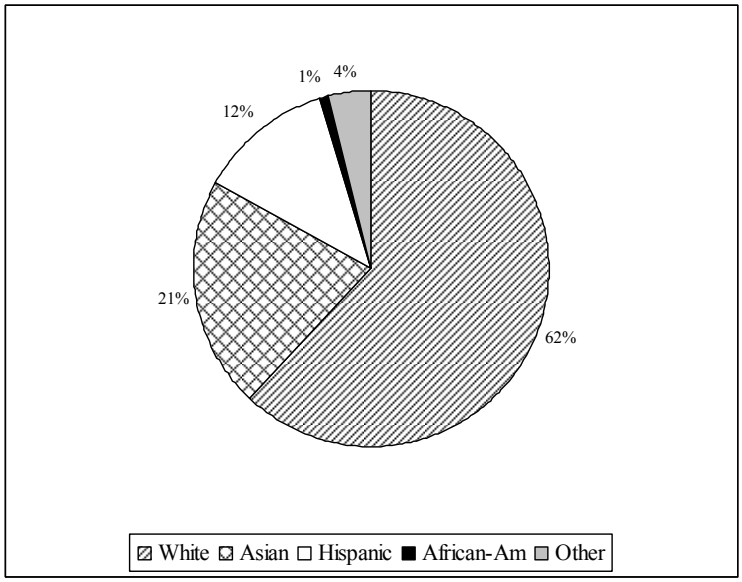
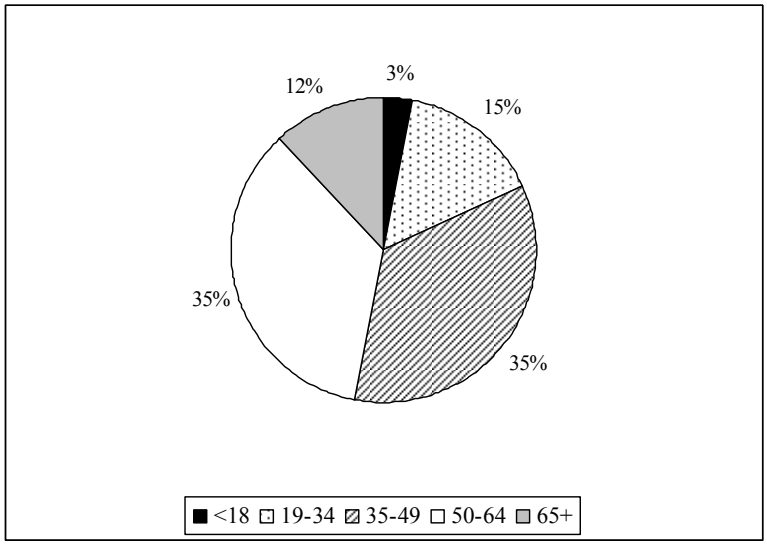


Table 1. Ethnicities of Study Respondents compared to 2010 Census Data by Pond Complex

Ethnicity (Bay Area %)	Ravenswood		Eden Landing		Alviso - A3W & Charleston Slough		Alviso - Alviso County Park	
	Study	Census	Study	Census	Study	Census	Study	Census
White (42%)	45%	40%	46%	22%	72%	38%	61%	29%
Asian (23%)	7%	9%	36%	41%	18%	36%	21%	32%
Hispanic (24%)	39%	39%	5%	25%	5%	20%	12%	33%
AfricanAm (6%)	1%	6%	1%	6%	0.5%	2%	1%	3%
Other (5%)	8%	6%	11%	6%	4%	4%	6%	4%

Figure 5. Ages of Respondents (n=557)



Seventy-four percent of respondents said the primary reason they used trails was for "exercise and fitness", 43% said they used trails for "recreation", and 6% primarily for "commuting to work" and/or "local transportation" (n=568). Primary methods of travel on trails were walking (56%), biking (26%), and running (18%) (n=568). The most common activities undertaken by trail users are shown in Table 2. Other trail user activities included dog walking, environmental education programs, fishing and mediation/relaxation.

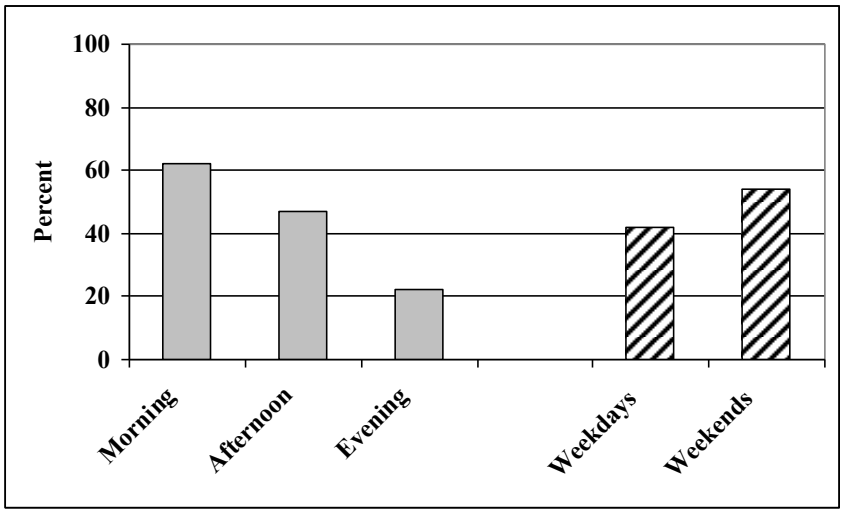
Table 2. Percent of trail users undertaking different activities (n=568)

Activities	*Exercise*	*Wildlife Viewing*	*Photography*	*Nature Education*	*Commute & Local Transit*
Percent	90%	45%	21%	17%	7%

The majority of respondents, 54%, visited trails around the San Francisco Bay once a week or more and an additional 17% said they visited daily. Fourteen percent visited approximately once a month, 12% visited a few times a year, and 3% less than once a year (n=568). When asked how they found out about the trail they were on the day of the survey, 63% said they lived near trail/have seen the trail, 19% were referred by someone, 10% used a website, and 8% saw it on a trail map. The most common "other" way visitors said they found trails was that they worked near by (6%). However, this percentage is likely to be greater, as near-work trail users may have selected the "live near trail/have seen trail" category.

People stated on the survey that they were most likely to visit trails in the mornings and least likely in the evenings (Figure 6). The percent of people stating they visit on weekdays was somewhat less than on weekends (Figure 6) and similar for each season--45% in spring and summer, 44% in fall and 39% in winter.

Figure 6. When People Visit Trails (n=569)



Trail Use Satisfaction. Overall satisfaction with their trail experience the day of the survey was high with 66% saying they were very satisfied and 31% saying they were satisfied—a total of 97%. One percent of respondents had no opinion, 1% were dissatisfied and 1% were very dissatisfied (n=545). Problems that people cited were smell (perhaps due to ponds or landfills), loose dogs and dog feces on the trail, need for more signage and bumpy/uneven/muddy trail surfaces. Satisfied visitors cited the beauty, quiet and safety of their trails. They remarked on the abundance of birds/wildlife, lack of crowds, cleanliness and the relaxing nature of the experience.

We collected 140 responses from visitors at new trails and 405 responses from those at existing trails. At both trail types, 97% of trail users were either satisfied or very satisfied with their trail experience that day. Approximately 97% of both men (n=310) and women (n=217) were satisfied or very satisfied with their trail experience and this rating by ethnicity was 97% for whites (n=325), 93% for Asian Americans (n=114), 97% for Hispanics (n=60) and 100% for African Americans (n=4).

A large portion of respondents, 46%, had heard of the South Bay Salt Pond Restoration Project (n=551). Of those who knew about the Project, 26% thought they would benefit through overall bay/habitat restoration, 23% were looking forward to more trails, 16% were excited by the prospect of more wildlife, 12% thought more open space would be a primary benefit, and 6% thought the restoration would provide value to the urban community. Twenty percent were not sure what benefits the Project might bring them.

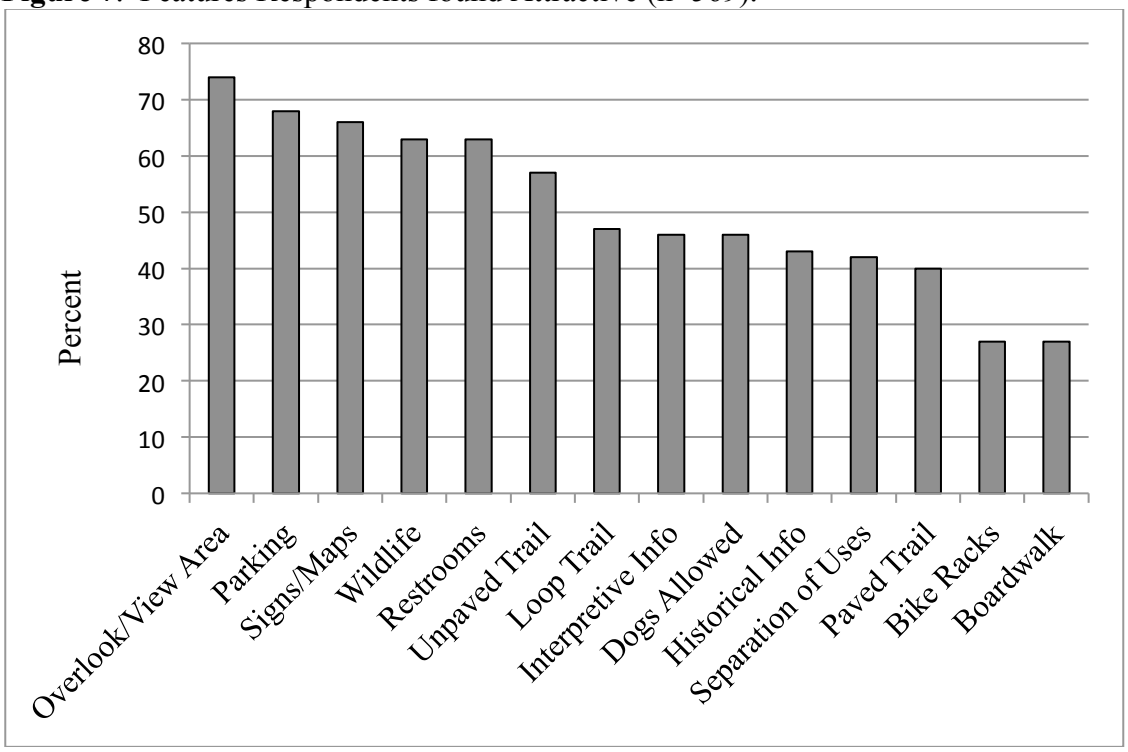
Important Trail Qualities and Features. The trail qualities respondents looked for in trails are shown in Table 3. Other qualities mentioned were dog accessible, well maintained/clean, and birds/wildlife present.

The physical features respondents found most attractive in trails (>60% favoring) were overlooks/view areas, parking, maps/signs, restrooms and the presence of wildlife. Features of least interest (<45%) were boardwalks, bike racks, paved trails, historical features and separating trail uses (walkers from bicyclists). Of interest to a moderate number of visitors were unpaved trails, loop trails, interpretive information and allowing dogs (Figure 7).

Table 3. Important trail qualities based on percent of respondents selecting them (n=568)

Quality	***Percent***		***Quality***	***Percent***
Natural Setting	70%		Next to Water	29%
Safe	57%		Next to Wetlands	26%
Near Home	56%		Near Work	23%
Relaxing Setting	54%		Place to Bring Kids	18%
Quiet Place	47%		Near SF Bay	16%
No Crowds	42%		New Experience	12%
Free	41%			

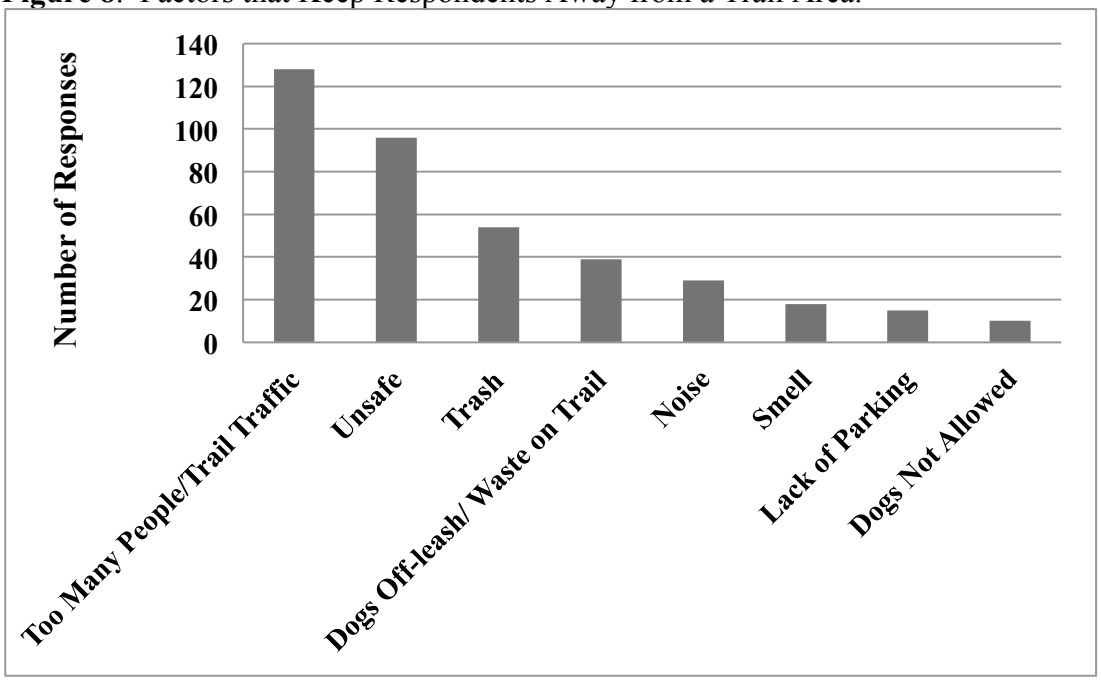
Figure 7. Features Respondents found Attractive (n=569).



Respondents were asked to identify factors that would keep them away from trails. The top two concerns were the potential for too many trail users and perceived unsafe conditions. These concerns were followed by trash, dogs off leash/dog feces and noise on the trail. Some respondents were concerned about smell and the lack of parking. A few respondents would be kept away from trails that did not allow dogs (Figure 8).

Survey participants also identified their favorite trails and provided reasons for their preferences. The majority of respondents indicated preferences for the "trail I am on" or "Bay Trail" others often listed nearby facilities including the Alameda Creek Trail, Coyote Hills Regional Park, Eden Landing, Hayward Shoreline and Don Edwards San Francisco Bay National Wildlife Refuge (refuge) in the East Bay. In the South Bay, respondents listed Alviso Marina County Park, Charleston Slough, San Tomas Aquino Creek Trail, Shoreline at Mountain View, Stevens Creek Trail and the refuge. On the Peninsula trail users noted Bedwell Bayfront Park and Palo Alto Baylands.

Figure 8. Factors that Keep Respondents Away from a Trail Area.

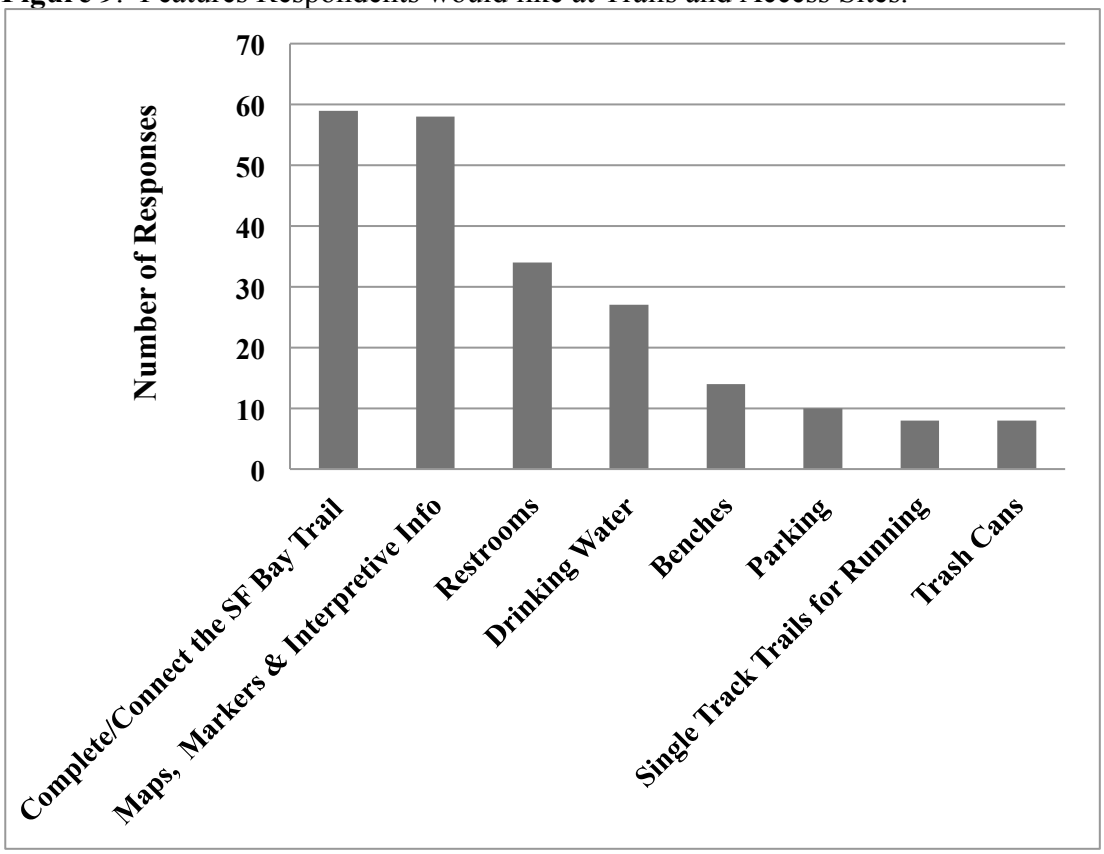


The primary response provided for trail preference can be summarized in one word – access. Survey participants noted "close to home", "close to work", "convenient", "nearby" and "easy access" for preferring their favorite route. Additional responses included "beauty", "birdlife", "natural setting", "views", "solitude" and "quiet". Some respondents also discussed their enthusiasm for the ability to undertake short, as well as very long distance routes from the same trailhead.

Improvements Recommended. Respondents were asked to comment on features they would like at shoreline trails and access sites. Of the 568 completed surveys, 339 respondents provided comments. The two most frequent comments were to complete the Bay Trail and connect it to other regional trail systems and to provide enhanced trail user information (Figure 9). Respondents wanted maps, mileage markers, marked trails and various forms of interpretive information ranging from signs, to equipment (mounted binoculars, telescopes and interactive exhibits), to software applications and docent led programs. The next features of interest to trail users fall into the category of comfort. Respondents wanted restrooms, areas to secure drinking water and benches. Finally, a handful of trail users mentioned soft single track trails for running, more trash cans and better parking (Figure 9).

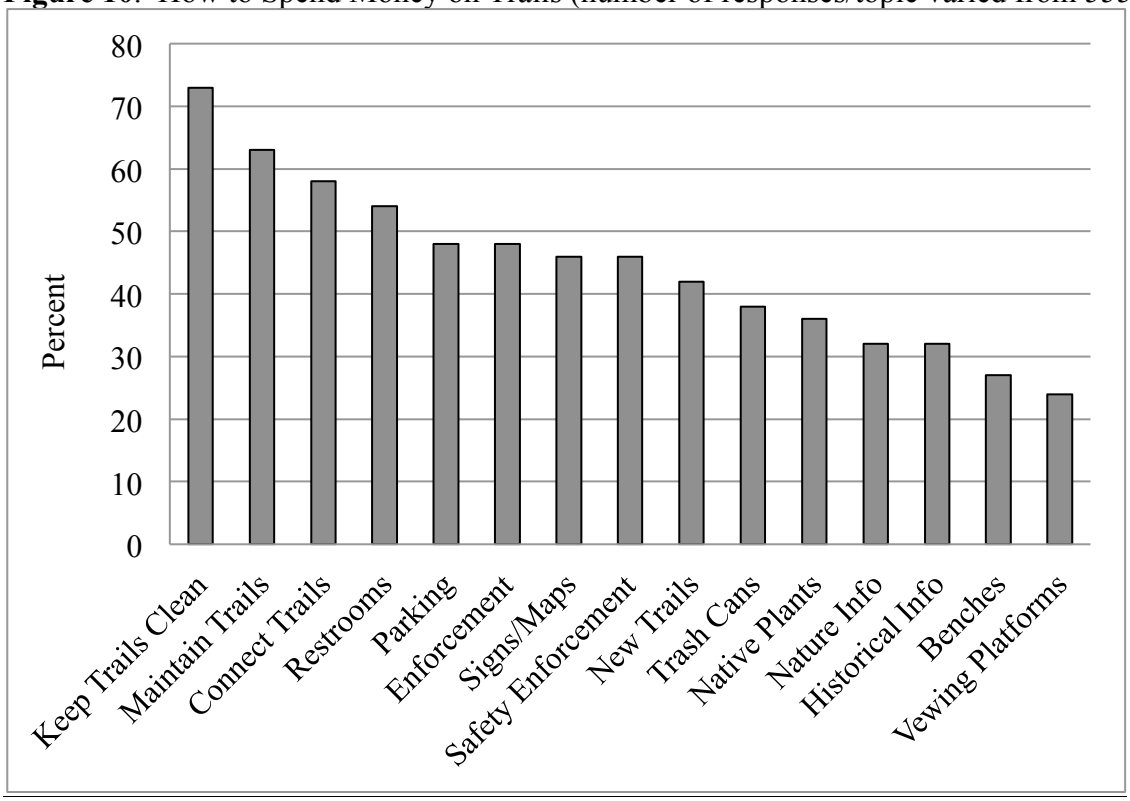
Many trail users expressed gratitude for their trails, with one user stating she felt "spoiled" by such excellent trail choices. A number of trail users noted environmental concerns including keeping development away from the Bay, restoring more habitat, removing feral cats and non-native plants, maintaining the natural setting, planting trees and protecting wildlife. A few comments also mentioned the desire for more trail access for dogs, while others expressed concern about off-leash dogs. Dogs being off-leash was mentioned as a factor that would keep trail users away from public areas.

Figure 9. Features Respondents would like at Trails and Access Sites.



Priorities for Future Projects. When asked what were the most important needs for trails, visitors cited the top needs (>50% favoring) as keeping trails clean, maintaining trails, connecting trails and more restrooms. Least important (<35%) were viewing platforms, benches, native plantings and nature or historical interpretation. Of importance to a moderate number of visitors were developing parking, signs/maps, enforcement of current regulations, more safety enforcement, new trails, and trash cans (Figure 10).

Figure 10. How to Spend Money on Trails (number of responses/topic varied from 555 to 564)



Discussion. Trail user satisfaction on the day visitors were interviewed was very high; approximately 97% of visitors were satisfied or very satisfied with their trail experience. This level was consistent by trail age (new or existing), gender and ethnicity. We expect that trail visitors are a self-selected group who enjoy the trail experience. Those that do not enjoy the trail experience are not likely to be found using the trails and we would have little chance of encountering them. In fact, since approximately 85% of visitors said they came to the trails once a month or more often, it is clear that the trail users we encountered appreciate the experience enough to visit repeatedly. Most people lived or worked near the trail they were using the day we interviewed them. Trail users at our sites showed little seasonal preference, which accords with seasonal counts of trail use around the Bay (Trulio and Sokale 2008). This is in contrast to other trail sites around the US that show great seasonal fluctuations (Lindsey, et al. 2006, for example).

Exercise was by far the most common reason for people visiting the trails we studied. Other studies have found exercise to be a top use for urban trails, supporting the importance of trails in promoting health in urban areas (Dunton, et al. 2009). We found wildlife viewing was the second most common reason for visiting with education and commuting as uncommon reasons.

Accessibility was a key quality drawing people to the Project trails, as has been found in other studies of trails in urban settings (Reynolds, et al. 2007). Users we interviewed typically stated that their favorite trail was the one they were on that day or the "Bay Trail". Other important qualities attracting trail users were wildlife/natural beauty, safety and solitude/uncrowded setting/quiet. Allowing dogs was an issue over which visitors were divided. While 45% of respondents listed "allowing dogs" as an important quality, many visitors

commented that dogs off-leash, dog feces on the trail and dogs, in general, were negative experiences for them. Free of charge was also an important quality.

Physical features visitors said were important included overlooks or view areas, parking, maps/signs, restrooms and the presence of wildlife. We also found that the availability of drinking water and connecting/completing trails, especially the Bay Trail, were listed as important trail features. Boardwalks ranked low as an attractive feature and visitors were divided on whether they preferred paved (55% of respondents) or unpaved (45%) trails. The combined responses from this study indicate that the most desired trail qualities and features include a clean, clearly marked, uncrowded, interconnected trail system with opportunities for expansive views and wildlife watching.

In a study of three multiuse trails in Texas the most important trail features included trail width, surface and maintenance, separation from traffic, lack of litter and drinking fountains (Shafer et. al., 1999). Our findings are similar, yet specific to the site. The majority of San Francisco Bay shoreline trails are completely separated from vehicular traffic with the exception of occasional maintenance and research vehicles. Trail width has generally been adequate, as most of the shoreline trails have been developed on the top of wide levees. Comments about muddy or bumpy trail surfaces were made by respondents, but this was balanced by the desire for unpaved trails as well.

When asked how money should be spent in the future on trails, the highest priorities were maintenance issues, maintaining trails and keeping them clean. Connecting trails, providing restrooms/drinking water, providing parking and law/safety enforcement were also listed as important needs. These findings correspond with visitors' stating that unsafe conditions and trash were two factors that would keep them away from a trail. Trail users ranked maps, mileage markers and marked trail junctions consistently high throughout the survey. Trail signs and software applications for navigating along the shoreline were noted by respondents.

It is interesting that overlooks/view areas were ranked highly as physical features that attracted people to trails, but viewing platforms did not appear as an important item for funding. We did not ask visitors to explain this discrepancy, but this difference in responses may suggest that visitors were happy with the current level of these amenities. Another interpretation has to do with the survey questions. We asked people what features they found attractive in a trail experience, and overlooks/view areas was one choice. For the funding question, visitors were asked to rank their priorities for trail funding and viewing platforms was the choice. In the first question, visitors may have selected overlooks/view areas as a way to communicate their enjoyment of the expansive views provided along the trails as opposed to a constructed viewing platform.

For respondents in a statewide study in Oregon, top funding priorities were routine upkeep, repair of major damage, clean up of litter and trash and reconstruction of deteriorated trails. Our findings echo these Oregon results. Trail support facilities and enforcement of rules and regulations were more important to Oregon trail users than the expansion of the existing trail system. Oregon trail users were satisfied with the trails, but similar to Project trail users, they found a need for improved trail signage at trailhead and trail junctions (Carter 2004). Arizona residents, similar to Oregon trail users, placed the highest emphasis on maintaining trails, but placed equal weighting on acquiring land for public trails. Arizona's second tier priorities also mirrored Oregon with addition of constructing new trails and promoting volunteerism (Arizona State Parks 2010).

Our demographic analysis showed under-represented and over-represented groups. White trail users were over-represented compared to the census results at each of the local areas. Hispanics residents were 12% of our respondents, but represent 24% of the Bay Area population; when compared to the census data for local areas adjacent to the study sites, Hispanics were well represented at the Ravenswood sites, but underrepresented at all others. Asian American trail users were 21% of our respondents and are 23% of the Bay Area population; but compared to the demographic numbers near the study sites, Asian Americans were consistently under-represented. African Americans were also under represented as only 1% of our surveys were completed by African American residents even though this group accounts for 2-7% of the population near our trail sites (United States Census Bureau, 2010). These ethnicity results might have been biased by the fact that our survey was only in English and was not absolutely random. However, we believe our large sample size and attempts to get every person to complete a survey provided a relatively accurate representation of the ethnic groups using the trails.

Providing features that would attract underrepresented groups might be a goal of the Project. Lindsey et al. (2006) found that the level of trail use correlated "positively and significantly with income, neighborhood population density, education, percent of neighborhood in commercial use, area of land in parking…" and the amount and greenness of vegetation on the trail (Lindsey et al. 2006, Dunton et al. 2009). Lindsey et al. (2006) also found some evidence to suggest trail traffic was higher near minority neighborhoods, but they were at a loss to explain this result, as the vast majority of their trail users were white. Linking minority neighborhoods with trails might attract minority groups.

The outdoor recreation industry annually surveys American families to gauge interest and participation in outdoor activities. For the past many years, this survey has indicated that outdoor recreation is highest among Caucasians and lowest among African Americans (The Outdoor Foundation, 2012). Although the participation rate in outdoor activities is lower among African Americans and Hispanics than Caucasians, those who do participate get outside more frequently than Caucasians. These levels of participation are consistent through the generations. Hispanic and African American youth cite a lack of access to places to enjoy outdoor activities in greater numbers than Caucasian and Asian/Pacific Islander youth. Providing access to the outdoors through trail connections, transit, and school programs may be critical for encouraging more diverse participation in trail related activities. While cultural factors influence recreational use, trail proximity to neighborhoods is also a major factor in visitorship numbers.

It is important to note that a key quality attracting trails users to the sites we studied was the solitude, the uncrowded experience and the ability to escape crowds. This attribute is one commonly sought by visitors to natural and protected areas (Manning et al. 2005), such as US national parks (Manning 2002). There is a large body of research on the "social or visitor carrying capacity" of natural areas. Social carrying capacity is the level of use, below which a quality experience for visitors is preserved (Manning et al. 2005). Although an essential mission of US national parks is to attract visitors, managers realize that "one of the greatest threats to national parks is commonly seen as their increasing popularity" (Manning 2002). If the Project managers seek to bring more people to existing trails, they should consider the social carrying capacity that is comfortable for trail users and provides a quality experience. Social carrying capacity studies can be designed, typically using survey methodology, to determine at what level of public use visitors find their enjoyment of trails is significantly reduced. There is a body of literature on this topic (Manning 2002) and river corridor studies of social carrying capacity may provide information and models relevant to the linear trails in the Project pond complexes.

Males (58%) were slightly over-represented and females under-represented (40%) compared to the gender ratio in the Bay Area (49.6% males to 50.4% females) (United States Census Bureau, 2010). Other trail studies have found men out number women (Lindsey et al. 2006), but our results were only mildly skewed. The trail user gender ratio at the Project sites was closer to Bay Area demographics than for the trail users who annually complete the San Jose trail survey, where the count was approximately 70% male and 30% female in 2011 (San Jose, 2011). One factor that may contribute to this difference is that approximately 43% of users in San Jose indicated they used trails to commute to work or run errands. At the Project trails, only 7% indicated they used the trails for commuting or local transportation. The higher percentage of commuters may attract more men and may reflect the fact that many of San Jose's trails are located in the heart of the urban core. The Project trails are on the perimeter of the urban core and attract visitors for other reasons.

Two trails that did not attract many users and were dropped from this study for lack of visitors were those at SF2 adjacent to the Dumbarton Bridge and Eden Landing at the end of Eden Landing Road. Based on our research, we suspect that these were two major reasons trail use at SF2 was so low: 1) The trail is effectively a spur route adjacent to the trail crossing the Dumbarton Bridge and does not currently serve as the spine of the regional Bay Trail, and 2) The low density land uses and low residential density in the area did not provide a strong visitor base. Other issues with the site were: 1) no clear signage on State Route 84 about the parking or entering and exiting the site, 2) the fact that the site is isolated and may engender safety concerns, and 3) it is very noisy due to State Route 84. Eden Landing is also adjacent to land uses that did not create a strong visitor base. This is in a low job base, industrial area. On the weekend, we found even fewer people than during the weekdays because there is no housing nearby. The signage on State Route 92 is not adequate to advertise the site. A major issue is that there is very little access to trail and few places to get on and off this segment of the Bay Trail. The trail is fenced off from the local businesses and this makes the trail very isolated. Site managers might consider better highway signage at both SF2 and Eden Landing and access instruction on the website. Also, find a way to connect SF2 to the rest of the Bay Trail and provide more access points to the Eden Landing trail from local businesses. Perhaps target outreach to key groups such as birders.

Ultimately, these sites illustrated a key point we found in this study--density of land use drove trail use at different study sites. Over and over we heard from visitors that proximity of the trail to work or home was a key factor in their use of a trail, and SF2 and Eden Landing trails are not proximate to many people. In Phase 2, the Project Managers might consider focusing on closing Bay Trail gaps and developing trails in areas with high land use densities.

Wildlife and natural beauty consistently appeared in our results as qualities that attracted visitors to the trails. Forty-five percent of respondents listed wildlife viewing as the top reason they went to trails—the most important reason after exercise. Over 60% of visitors listed wildlife as an attractive feature. These results show the public visiting the trails were doing so, in large part, because of the wildlife. It is important for the Project to consider trail visitors as a contingent of the public who can potentially be asked to support the Project and its trails when needed. Equally important, trail users need to be kept informed of changes to the Project that may result in temporary or permanent decreases in wildlife in areas near trails. Since many visitors come often to their local trails, an effective way to reach this group might be to post information at trailheads about Project activities and effects on the wildlife.

Since trail visitors are so interested in the wildlife, they may be willing to make some sacrifices to protect that wildlife. For example, if dog owners were made aware of the impact of dogs on birds, they might be willing to tolerate some restrictions on where dogs can be. However, dog owners are very dedicated to their pets and to having more areas to take their canines. Currently, dogs are not allowed in any part of the Project; the dog walkers we encountered in our study were at Bedwell Park and Charleston Slough trail sites, outside the Project area. Determining where and how many dogs to allow will continue to be a struggle for open space managers.

The features and qualities that people said they desire—such as signs/maps, restrooms/drinking water, trail maintenance, and safety/law enforcement--are, in general, amenable to protecting wildlife. The public showed little interest in boardwalks, a feature that can negatively impact wetlands and wildlife by bringing people deep into habitats. Not adding this type of feature to marshes will be one less impact on the habitat. People did not rank viewing platforms as a top funding goal. While they have a lesser impact on wildlife, these features will reduce the amount of habitat area used by some species, such as waterfowl (Trulio, et al., 2012). Not adding any other overlooks means further habitat impacts will be avoided.

Some features people desire could increase impacts to wildlife and habitats. For example, more parking was a desirable feature. Lindsey et al. (2006) note, "many users drive to trails" and their research found a significant correlation between trail use and the area of parking associated with the trail. While they may attract users, parking lots have many negative environmental impacts, such as increasing driving (and therefore the burning of fossil fuel and concomitant release of greenhouse gases) and oil and grease run off into local waterways. The impacts on wildlife should be considered before adding parking lots. An alternative, which may be possible in some areas, would be to extend trails or develop trail connections to existing parking areas or into densely populated residential neighborhoods and corporate campus areas so that visitors are able to walk or bike along a spur trail to reach the Project trails.

Many respondents indicated that the Project trails were their preferred trails because of access. The Project trails are close enough to their home or workplace that they can simply walk or bike to the trails. In characterizing the use of transit and non-motorized transportation modes for visitor access to the National Wildlife Refuges (NWRs), the U. S. Department of Transportation (2010) urged a shift in visitor access to alternative transportation modes to relieve the need for new parking and to lessen the impact of automobiles on the environment. The Department of Transportation study highlighted the opportunities to provide connections between communities and the refuges to encourage bicycle and foot traffic to the refuge lands. Roadway infrastructure leading to the Project pond complexes should be modified to support pedestrian and bicycle travel and to interconnect the Project trails and surrounding communities. This concept was supported by respondents who expressed a strong preference to connect the trails and many offered very specific trail connection suggestions (Appendix B).

Many users enjoy having a loop trail. However, loop trails that encircle a sensitive habitat can have the effect of reducing the amount of habitat useful to some species (Trulio et al. 2012). Impacts to wildlife and habitat should be considered before developing loop trails around wetlands or ponds. To reduce impacts, loop trails could be designed to pass along just one side of sensitive habitat and then go into more urban park areas to form the loop or to join another trail.

The literature indicates that trail use increases with more vegetated trails (Lindsey et al. 2006, Dunton et al. 2009). While inappropriate plant species or densities of species should not

be put in wildlife habitat, vegetating spur trails through urban settings that lead to the Project trails could attract more users, especially from minority neighborhoods. Appropriate vegetation, especially native species, can increase the diversity of native wildlife (Young, et al. 2007).

Recommendations. Based on our findings and key literature, we recommend the following:

1. Focus future trail expenditures on:
    a. Completing the Bay Trail and connecting to existing trails to enhance pedestrian and bicycle access.
    b. Ensuring roadway infrastructure leading to the Project supports pedestrian and bicycle access.
    c. Working with neighboring cities and regional transportation agencies to promote trail and transit connections to the Project.
    d. Developing signs, maps and mileage markers at trailheads and trail junctions for way-finding and educating trail users about trail and wildlife conditions.
    e. Ensuring adequate Project funding for on-going trail maintenance and cleanliness.
    f. Vegetating connector or spur trails into minority and/or high-density communities to bring people to the Bay.
    g. Posting sites to keep the public informed of Project activities that may reduce or increase wildlife.
    h. Providing restrooms and drinking water along the trails.
    i. Developing new trails in areas with high-density land uses.

2. Focus trail-wildlife efforts on:
    a. Minimizing features (especially parking lots and loop trails) that can have impacts to wildlife; when they are essential, designing them to avoid wildlife impacts.
    b. Providing information to the public on what animals they are seeing and how to avoid impacts to wildlife.
    c. Mobilizing trail users to assist in Project-related actions that will benefit/protect wildlife and natural beauty.
    d. Planting appropriate vegetation on spur or connector trails to enhance biodiversity.

3. Conduct research on:
    a. Factors that would bring different ethnic groups to trails.
    b. Factors that keep non-trail users away from trails.
    c. Ways to screen wildlife from the public while still allowing the public good views of natural beauty.
    d. Social carrying capacity of trails.

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APPENDIX A

Trail Location _____ Observers_____ Date _____ Time _____

Weekday or Weekend (circle) Trail User or Observer (circle who administered the survey) Trail User Type _____

South Bay Salt Pond Restoration Project
Trail User Survey – How do you want to experience the Bay?

One of the goals of the South Bay Salt Pond Restoration Project is to provide high-quality public access within the salt pond areas including access to and views of San Francisco Bay. To achieve this goal, the managers need input from the community about the trail experiences people seek and the public access features they enjoy. Your assistance is greatly appreciated, but completing this survey is entirely voluntary and completely anonymous. Answer solely at your discretion. Thank you for your help!

1. How often do you visit the trails around San Francisco Bay?

□ Daily □ Once a week or more □ Once a month □ Few times a year □ Less than 1 time a year

2. What is your primary reason for using trails around San Francisco Bay?

□ Recreation □ Commute to Work □ Exercise and Fitness □ Local Transportation □ Other ___

3. What number of people do you usually come with when you visit the Bay?

□ Myself □ 1-2 □ 3-5 □ 5-25 □ Groups larger than 25

4. When do you visit the shoreline trails and other access areas? (check all that apply)

□ Morning □ Afternoon □ Evening □ Before Work □ At Lunchtime □ After Work

□ Weekdays □ Weekends □ Spring □ Summer □ Fall □ Winter

5. What are your primary methods of travel on the trail? (check all that apply)

□ Jogging □ Biking □ Walking □ Rollerblading □ Dog Walking □ Other _____

6. How did you hear about this trail?

□ Live Near Trail/Have Seen Trail □ Family/Friend/Neighbor Referral □ Trail Map □ Website

□ Public Event □ Newspaper_____ □ Other _____

7. What activities do you do when you are on the trails around San Francisco Bay? (check all that apply)

□ Exercise □ Nature Education (Interpretation) □ Nature Photography

□ Commute to Work □ Local Transportation □ Wildlife Viewing

□ Hunting □ Fishing □ Environmental Education Programs

□ Other _____

8. What <u>qualities</u> do you typically look for in a trail experience?

□ Near home □ Near work □ Natural setting □ Safe

□ Directly next to SF Bay □ Next to water □ Next to wetlands

□ Place to bring children □ No cost □ Quiet place □ Relaxing setting

□ Not crowded □ New experience □ Other _____

9. What was your overall level of satisfaction with your shoreline trail experience today?

□ Very satisfied □ Satisfied □ No Opinion □ Dissatisfied □ Very Dissatisfied

Why? _____

10. In order of importance, please rank the features you find attractive in a trail experience,

1 = Not At All Important 2 = Not Very Important 3 = Somewhat Important 4 = Very Important

Unpaved Trail	1	2	3	4
Paved Trail	1	2	3	4
Loop Trail	1	2	3	4
Overlook/View Area	1	2	3	4
Boardwalk	1	2	3	4
Restrooms	1	2	3	4
Trail Signs and Maps	1	2	3	4
Adequate Parking	1	2	3	4
Bicycle Racks	1	2	3	4
Interpretive Information	1	2	3	4
Historical Features	1	2	3	4
Wildlife Features	1	2	3	4
Dogs on Leash Permitted	1	2	3	4
Separation of Walkers from Bicyclists	1	2	3	4

11. What factors would keep you away from a trail area?

12. What is your favorite shoreline trail/public access area and why?

13. What features would you like to see at shoreline trails and access sites around San Francisco Bay? Do you have other comments for us?

14. Trail managers have limited resources to develop and maintain trails, and must focus their money and time on the most serious needs first. Please rank trail needs using a scale from 1 to 10 where 1 is least important to 10, which is very important. In your opinion how important is it that the South Bay Salt Pond Restoration Project:

	Least Important ⇨⇨⇨⇨⇨								**Very Important**	
Develop new trails?	1	2	3	4	5	6	7	8	9	10
Interconnect shoreline trails to the regional trail network?	1	2	3	4	5	6	7	8	9	10
Install native plant landscaping and restore habitat along trails?	1	2	3	4	5	6	7	8	9	10
Provide support facilities like:										
Parking	1	2	3	4	5	6	7	8	9	10
Restrooms	1	2	3	4	5	6	7	8	9	10
Benches	1	2	3	4	5	6	7	8	9	10
Trash Cans	1	2	3	4	5	6	7	8	9	10
Trail Maps and Signage	1	2	3	4	5	6	7	8	9	10
Viewing Platforms	1	2	3	4	5	6	7	8	9	10
Enforce existing rules and regulations in trail areas?	1	2	3	4	5	6	7	8	9	10
Keep trails clean of litter and trash?	1	2	3	4	5	6	7	8	9	10
Maintain existing trail facilities (paving, trailheads, signs)?	1	2	3	4	5	6	7	8	9	10
Provide law and safety enforcement?	1	2	3	4	5	6	7	8	9	10
Provide interpretive information about plants and wildlife?	1	2	3	4	5	6	7	8	9	10
Provide interpretive information about history?	1	2	3	4	5	6	7	8	9	10

15. Are there any other trail needs you would like to mention? Please specify.

16. What is your age group?

□ under 18 □ 19 to 24 □ 25 to 34 □ 35 to 49 □ 50 to 64 □ 65 or over

17. What is your gender? □ Male □ Female □ Couple

18. What is your ethnic background?

□ White □ Hispanic □ Asian □ African American □ Other_____

19. What city do you live in? _____

20. What are your favorite non-work or free time activities?

21. Are you aware of the South Bay Salt Pond Restoration Project? □ Yes □ No

22. If 'Yes', how do you think the Project will benefit you?

THE RESEARCHERS THANK YOU FOR COMPLETING THIS SURVEY!

APPENDIX B

September 21, 2013

South Bay Salt Pond Restoration Project: Trail User Satisfaction Study
Jana Sokale, Environmental Consultant
Lynne Trulio, Ph.D., Ecologist

Trail Connection Suggestions:

- Complete the Bay Trail – many responses indicated a desire for a complete trail circumnavigating the Bay. Particular segments receiving attention included:
    - Close the gap between Fremont and Milpitas
    - Alviso to San Francisco
    - Palo Alto to the Dumbarton Bridge
    - Connect the Alameda Creek Trail to the Hayward Shoreline
- Complete the Stevens Creek Trail.
- Provide access between the cities and the trails.
- Adobe Creek underpass (Highway 101) is closed in the winter – need pedestrian overpass.
- Elevate the trails under the bridges along the Guadalupe River. There is water on the trail in the winter.
- Publicize existence of pedestrian walkways/direct access to get across the highways that separate people in towns from the Bay wetlands. Promote more foot and less vehicle traffic.