THE POTENTIAL ECONOMIC BENEFITS OF THE PROPOSED ALAMEDA NATIONAL WILDLIFE REFUGE: AN OVERVIEW

A REPORT PREPARED FOR

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EXECUTIVE SUMMARY

The USDI Fish and Wildlife Service has proposed the establishment of the Alameda National Wildlife Refuge on a portion of what is presently the Alameda Naval Air Station, in the central portion of the San Francisco Bay Area. The air station is scheduled for closure by 1997. The wildlife refuge would occupy approximately 575 acres of land on the western end of Alameda Island. The Service's proposal also calls for the establishment of a 120-acre open space day-use area, to be managed by another agency such as the East Bay Regional Park District.

The proposed wildlife refuge is home to over 100 avian wildlife species, including at least three species of regional and national significance: the endangered California least tern, Caspian tern, and brown pelican. The site provides nesting habitat for the only successful northern California colony of the California least tern and the largest west coast colony of the Caspian tern. The bay waters breakwater portion of the site provides important aquatic habitat as well as a significant roosting area for the brown pelican. Harbor seals use the site as a haul-out protected from human interference. There are also 55 acres of wetlands found within the proposed refuge. By any standard, the proposed refuge site possesses unique and significant value as habitat for wildlife species, strategically located in the center of an increasingly urbanized and impacted region.

While important in their own right, the benefits that would be generated by establishment of the wildlife refuge are not limited to habitat and species protection. Additional benefits are associated with the other attributes that a refuge/day-use area on the western end of Alameda island would possess, including:

- **The site as a destination for visitation by people engaged in non-consumptive wildlife use (e.g., birdwatching, nature viewing, participation in educational and interpretive programs), and general day-use recreation including picnicking, fishing and site-seeing.** The location of the site is advantageous for attracting visitation, as it is close to high residential concentrations, it affords close-up and unobstructed views of the San Francisco skyline and the central bay waters, and there is convenient ferry service linking the site with San Francisco's Pier 39. Further, the Fish and Wildlife Service's proposal calls for installation of state-of-the-art wildlife viewing technology. Visitors will spend money in the pursuit of their recreational activities. This spending will benefit businesses in Alameda, the East Bay, and the greater Bay Area. Annual visitor expenditures have the potential to exceed several million dollars. Through re-spending patterns, the total economic benefit to the region has the potential to be roughly double that initially spent by visitors to the refuge/day-use area.

- **The site as an administrative unit of the Fish and Wildlife Service.** Establishment of the wildlife refuge could require as much as $2.5 million in

federal expenditures, which constitute "new money" introduced into businesses in Alameda and the Bay Area. Each year, the Service would spend several hundred thousand dollars on payroll, payments in lieu of taxes, and administrative expenses. Administration of the day-use area would also require an administrative budget. These expenditures would directly benefit local and regional business selling supplies and services in support of the operation and its employees. In turn, this economic activity generates tax revenues for local and county jurisdictions.

- **The site as open space.** In an increasingly urbanized and congested region, the retention of strategically-located open space in the form of a wildlife refuge generates community benefits to regional inhabitants, particularly those living in and near Alameda. Generally, quality of community life is enhanced by maintenance of open space and recreational areas. This community amenity can be reflected in higher land values, particularly for properties in proximity to the open space. As well, open space contributes other benefits such as the avoidance of additional freeway congestion and air pollution. More tangibly, open space land use designations may mean that local jurisdictions avoid fiscal costs associated with alternative land uses. If designated as open space, the City of Alameda, for instance, would not be exposed to the fiscal burdens of providing, maintaining, and repairing services and infrastructure to the western end of the island. In that the site is land fill located in a region of high earthquake activity, the financial exposure of local and regional jurisdictions to the costs of earthquake damage repair could be significant, were the site to be developed.

The potential benefits that could be generated by the proposed national wildlife refuge and day-use recreational areas are both market-based (e.g., visitor spending, administrative budgets, fiscal cost avoidance) and independent of market transactions (e.g., habitat and species conservation, community amenities). As detailed in this report, the proposed wildlife refuge/day-use area could generate annual visitor expenditures of up to $10 million (benefiting Alameda, the East Bay and the greater Bay Area), generate up to $575,000 in annual administrative expenditures, and generate up to $2.7 million in total net social value of public use.

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INTRODUCTION AND OVERVIEW

In response to the announced plans to close the Alameda Naval Air Station (NAS), in the central San Francisco Bay Area, the U.S. Fish and Wildlife Service (Service) has stepped forward with a base conversion/land use proposal for a portion of the naval base. Circulated in September, 1994, the Service's proposal calls for the establishment of the Alameda National Wildlife Refuge (NWR)[1] on approximately 595 acres of land and 375 acres of bay waters on the west end of Alameda Island. The proposed refuge site includes the present location of the air station's tarmac, runways and control tower. As will be described in more detail, below, the Service is proposing a national wildlife refuge primarily because of the unique environmental attributes of the proposed site, particularly with respect to its habitat value for the endangered California least tern and other notable wildlife species.

While there exists statutory authority for transfer to the Service of surplus federal land with particular value for migratory birds (P.L. 92-432), the Service and other supporters of the refuge proposal recognize that other land use proposals will surface for this portion of the NAS. The task of determining the base reuse configuration that best serves the public interest will fall to the Alameda Reuse and Redevelopment Authority (ARRA) in collaboration with the Department of the Navy. As the deliberations unfold over the relative attributes of alternative land use proposals, the regional economic implications of competing land uses will surely be a factor in the ARRA's final decision. With this in mind, and as a supporter of the Service's wildlife refuge proposal, the Golden Gate Audubon Society commissioned this study and report.

The purpose of this report is to present, in accessible terms, evidence and arguments that there are indeed potential economic benefits that could derive from a

[1]More accurately, the Alameda National Wildlife Refuge would constitute an addition to the San Francisco Bay National Wildlife Refuge Complex, headquartered in Newark, CA.

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wildlife refuge/day-use recreation area located in the central Bay Area. That is, the wildlife refuge proposal is not an "either/or" choice between environmental quality and economic development. Rather, it constitutes a land use that not only will take optimal advantage of the environmental attributes the site has to offer but also will generate economic activity that benefits the local region. Further, it will enhance the economic value for development of the remainder of the NAS. This report will detail the dimensions of potential economic benefit that can be generated by a wildlife refuge and, where data enables, offer estimates of the magnitude of benefit. There is no pretense that a low intensity/low impact land use such as a wildlife refuge will generate employment and income figures rivaling those of high intensity land uses. But when considering the environmentally friendly economic activity that would be generated by a wildlife refuge, in conjunction with the avoidance of undesirable fiscal and environmental consequences likely to be associated with alternative land uses, a wildlife refuge should indeed prove to be an attractive alternative.

SUMMARY DESCRIPTION OF THE NWR PROPOSAL AND SITE

Of the 595 acres of land within the proposed wildlife refuge, approximately 400 acres are covered by paved runways and tarmac. The Service would leave the paved areas in place, as they provide protection from predation for the birds that occupy the site. There are approximately 40 acres of grassland and 55 acres of wetlands on the site. Collectively, the landed portion of the site is the home to many avian species of regional and national significance (US F&WS, 1994). On the site is one of the most successful breeding colonies of the endangered California least tern. Also located within the proposed refuge (in one of the wetland areas) is the largest Pacific coast breeding colony of Caspian terns. Other avian species found nesting and foraging in the upland portion of the proposed refuge include the northern harrier, American kestrel, loggerhead shrike, burrowing owl, and the endangered snowy plover (Feeney, 1994). The wetlands and shore areas of the site offer habitat to numerous avian species as well, including ducks, herons, kingfisher, gulls and other shorebirds. Small mammals such as the California vole and jack rabbits are also present on the site.

The bay waters portion of the site (approximately 375 acres) offers habitat to numerous fishes and foraging areas for sea birds. Within the watered portion of the site is a rip-rap breakwater that hosts the largest California brown pelican roost (and only known night roost) in the San Francisco Bay Area as well as a very large colony of Western gulls. The breakwater is also a haul-out for harbor seals. In total, the proposed refuge is home to over 100 avian species and at least a dozen mammal species (US F&WS, 1994). By any standard, the proposed refuge site possesses unique and significant value as habitat for wildlife species, strategically located in the center of an

increasingly urbanized and impacted region.

Due to the sensitivity of the wildlife habitat areas, the Service's proposal calls for relatively little modification to the bulk of the proposed site. The tern colony areas, wetlands, grasslands, etc., would remain unaltered; the Service also would not remove the surfaced runway areas as they help to reduce tern predation. To avoid adverse habitat impacts, facility development activities would occur on the periphery. Such proposed developments include a visitor and education center, a day use area, and a perimeter trail.

As a national wildlife refuge, the principle purpose of the Service's proposed land use is to provide habitat for wildlife species of regional and national significance. However, other land uses are compatible with the basic purpose of a national wildlife refuge. In the case of the proposed Alameda National Wildlife Refuge, other compatible uses may include:

- wildlife viewing
- nature hiking
- wildlife and related research
- public information and education
- fishing
- wetland reserve
- grassland reserve
- open space
- refuge administration facilities and activities
- general day-use outdoor recreation

Public use of the refuge--for wildlife viewing, nature hiking, educational activities, and fishing--is a key element of the Service's proposal, in terms of the generation of economic activity and value. While public use opportunities must be designed so as not to compromise the primary function of habitat protection, the Service's proposal includes several components intended to attract visitation for wildlife viewing and other activities:

- a visitor and education center to be located within the present NAS air traffic control center (a four story building with control tower); the visitor center would include closed-circuit viewing facilities for remotely viewing the colonies and other wildlife activity areas, a viewing tower and observation decks, educational classrooms and labs, a restaurant and deck-level tables, an interpretation facility, a retail sales facility (e.g., bookstore), and administrative offices

- a day-use recreation area for fishing, picnicking, viewing of the bay and San Francisco skyline, etc., to be located on a 120-acre parcel immediately north of the habitat areas and on the western tip of the island; the day-use area would be managed under an open-space easement by a cooperating agency such as the East Bay Regional Park District

- a hiking and viewing trail around the perimeter of the refuge.

In summary, the Service's proposal calls for the protection of over 900 acres of terrestrial and aquatic habitat, with the establishment of compatible human activities on the periphery of the habitat areas.

A TAXONOMY OF POTENTIAL BENEFITS

The benefits associated with or generated by a land use such as the proposed Alameda National Wildlife Refuge (and associated day use area) are complex and varied. While some benefits are market based (i.e., a monetary exchange takes place), others are not recognized by established markets. Some benefits are realized by delineable groups such as the users of the facility, adjacent landowners, or the residents of the local community, while other benefits accrue to society at large. Some benefits either have market prices or otherwise lend themselves to monetary valuation, while for other benefits, monetary valuation is problematical. Some benefits are generated directly by the activities associated with the management and human use of a wildlife refuge, while other benefits arise indirectly or are induced by the refuge's direct economic activity. Some benefits take the form of avoidance of public sector fiscal costs that would be incurred if another land use were to be chosen. Other benefits/values derive from the social utility of wildlife preservation (particularly endangered species), habitat maintenance, and open space. The environmental attributes of a refuge/open space proposal as a land use also translate to economic utility in terms of enhancing adjacent and nearby land values and the ability to attract new businesses to the community.

To facilitate a comprehensive presentation of the potential benefits associated with the proposed Alameda National Wildlife Refuge, we offer the following taxonomy of benefit categories, typed by the nature of their generation, and a taxonomy of benefit accounts, categorized by spatial distribution and recipients of benefits.

Types of Benefits

The following list of benefit types are categorized by their source. Conceptually, each benefit type--even those not recognized by established markets--can be estimated in monetary terms. Ideally, monetary estimation of non-market values is accomplished through direct case-specific survey work that seeks to elicit from users and the general public their expenditure patterns and/or their willingness to pay for the resource protection and recreational opportunities created by a refuge. Lacking the resources or time to conduct survey-based estimation, an alternative approach is to utilize, with caution, available value indices generated in other studies. We will pursue this course of action in this paper, where pertinent data are available. Where applicable indices are not available, we will discuss benefits qualitatively.

▸ Visitor Expenditures

Consistent with the central purpose of habitat protection, national wildlife refuges have compatible uses that involve human use. Such uses attract visitors to the refuge for wildlife viewing and interpretive/educational activities. In the specific case of the proposed Alameda National Wildlife Refuge, there would also be general recreational visitation associated with the day-use area adjacent to the refuge, itself.

Visitation to the refuge/day use area triggers expenditures of money before, during, and after the visit, itself. The timing of purchases determines in what locales the expenditures take place and what entities may benefit from the expenditures. Purchases may be related to:

-- equipment (binoculars, cameras, field guides, etc.)
-- lodging
-- food
-- transportation
-- other retail purchases (e.g., souvenirs)

To the extent these expenditures are not merely associated with a transfer from one recreational activity to another, visitor purchases constitute an infusion of "new money" and an economic benefit to the regions and locales in which they occur[2]. The determination of "new money" versus transfer depends upon the type of visitor and the geographic area being considered. If the scale of consideration is the U.S. economy, then domestic visitor expenditures associated with refuge visitation probably constitutes

[2]We use the term "benefit", here, more generally than its connotation in the economics literature. From the standpoint of a local jurisdiction, for instance, visitor expenditures would be viewed as a benefit to local merchants and to the tax base whereas an economist would consider such transactions to be "economic impacts."

merely a shift from one recreational activity to another, with little or no net economic gain. If the scale of consideration is the San Francisco Bay Area economy, then any refuge-related expenditures *that otherwise would not have occurred within the Bay Area* constitute an infusion of new money and a net economic benefit to the region. A clear example of this situation would be expenditures by tourists who extended their stay in the Bay Area (e.g., one extra day and night) in order to visit the refuge. At the scale of the City of Alameda, refuge-related purchases within the city by non-Alameda residents most likely constitutes new money to the municipal economy. Local (i.e., Alameda residents) visitor expenditures related to the refuge/day use area are new money to the municipal economy if those visitors would have otherwise spent that portion of their disposable income outside of Alameda. These profiles on visitor expenditures are best estimated through on-site questionnaires, a technique that is unfortunately not available in this instance, as the refuge/open space facility does not yet exist. Instead, we will utilize:

-- published indices on average visitor expenditures for refuge-related recreational activities
-- estimates of regional visitation derived from surveys of similar facilities around the Bay Area
-- estimates of non-regional visitation based upon assumed "capture rates" of San Francisco/Bay Area tourism.

▸ **Consumer Surplus**

The direct net economic benefit or utility to those who visit the refuge is commonly estimated through contingent valuation (i.e., willingness-to-pay) or travel-cost methods. The net benefit to refuge visitors is termed "consumer surplus" and is defined as the difference between consumers' total willingness to pay for a refuge visit and the actual costs incurred in making a visit (see USDA Forest Service (1990) and USDI Fish & Wildlife Service (1994(b)) for discussions of this concept and its estimation). Again, development of a willingness to pay survey instrument is beyond the scope of this paper. However, the USDA Forest Service and USDI Fish and Wildlife Service have each published reference documents containing region-specific consumer surplus estimates for birdwatching and related recreational activities. These published indices will be used later in this paper.

▸ **Administrative Expenditures**

The establishment and subsequent administration of the refuge and open-space area involves the expenditure of public sector (i.e., federal) funds on payrolls and the purchase of goods and services from businesses located in Alameda and throughout the

Bay Area. These expenditures constitute an economic benefit in the form of additional employment and income to the region. Estimates of expenditures for developing the refuge (i.e., converting from the current use configuration) and administering it were obtained through interviews with personnel from the F&WS and the Navy and through phone surveys of comparable nature-oriented facilities around the Bay Area.

- **Avoided Costs to Local Jurisdictions**

Were the Service's wildlife refuge/day use proposal not part of the Alameda NAS re-use, other land uses would take place on the site, most likely involving residential and/or commercial development. These alternative land uses may generate local jurisdictional costs that would not arise or would be much lower if the area became a refuge/day use area. Such costs relate to clean-up and remediation of hazardous sites, extension of public infrastructure such as roads and utilities, and the costs of repairing/rebuilding public and private structures in the event of a disaster such as an earthquake[3]. To the extent that these development-dependent costs would cause an alternative land use to have a net negative fiscal impact on the local jurisdiction, the net costs would constitute a benefit attributable to the refuge/day use proposal. It is beyond the scope of this paper to estimate the fiscal revenues and costs that may be generated by alternative land uses. However, we will attempt to identify and discuss the potentially most significant cost elements and to offer rough monetary estimates, where possible.

- **Amenity Values**

As a wildlife refuge and day-use recreational area, the Service's proposal essentially amounts to designating the western end of Alameda island as open space. In light of its locations within the central portion of the highly-urbanized and developed Bay Area, open space possesses substantial amenity values realized in several regards:

-- Community quality of life for residents of Alameda--particularly those living on the west end of the island--is enhanced by the presence within the community of open space, semi-natural environments, day-use recreational facilities, and environmental education facilities.

-- Businesses may be more willing to relocate to other portions of the present air station because of the undisturbed views of the Bay and San Francisco skyline afforded by the refuge/day-use area.

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[3]It is relevant to note that the site at issue is entirely land-fill. Structures on land-fill are subject to the greatest damage from earthquakes.

-- Adverse environmental and community effects associated with increases in residential population that would occur with alternative land uses are avoided (e.g., additional congestion on freeways due to more commuters).

-- The absence of higher-intensity development on the west end of Alameda island means one less incremental contribution to the degradation of the waters and remaining shorelines of the Bay Area, thereby benefiting those groups who directly or indirectly rely upon the maintenance of an environmentally healthy aquatic environmental (e.g., commercial and sport fishermen).

- **Option and Existence Values**

Though not commercially exploited, endangered species possess inherent value to societies that place utility on the maintenance of a healthy environment and the fauna contained therein. Likewise, society recognizes the inherent worth of maintaining and enhancing dwindling supplies of sensitive ecosystems such as wetlands. The mere knowledge that such resources continue to exist due to their protection in a new wildlife refuge constitutes a benefit to society.

Likewise, the non-development of the west end of Alameda Island associated with the Service's proposal means that future land use options are not foreclosed. The maintenance of such options constitutes another societal benefit of the proposed refuge/day-use area.

Benefit Accounts

As the discussion reveals, the following benefit accounts are not all mutually exclusive nor are they all subsets of one another. Rather, they constitute different perspectives or approaches to describing the potential benefits that might be attributable to the proposed wildlife refuge. The relevance of each account depends upon the policy question that is being addressed which, in turn, is usually framed in terms of the interests of or impacts on a specified stakeholder group, constituency, or geo-political region.

- **Benefits to society, at large**

At the broadest level, a national wildlife refuge generates benefits to society at large, particularly to those members of society who derive utility/benefit from knowledge that endangered species and habitats, including wetlands, are being preserved and/or who actually visit the refuge. In that visitors to the refuge will include people from throughout the U.S. and other nations, the direct benefits to refuge visitors accrue over a very broad geographic region.

The option and/or existence value to society of preserving colonies of California least terns, Caspian terns, and brown pelicans, and their habitat is difficult, at best, to estimate accurately. The common approach to such valuation is through contingent valuation/willingness to pay surveys. This methodology is beyond the scope of this paper, however.

In summary, benefits to society at large, that could be generated by the proposed Alameda National Wildlife Refuge include:

-- endangered species, and their habitat, protection
-- wetlands protection
-- consumer surplus of total visitation to the refuge

- **Benefits to the greater San Francisco Bay Area**

Aside from the broader benefits accruing to society, at large, a wildlife refuge located within the greater San Francisco Bay Area generates benefits associated with the refuge as a recreational destination (for both Bay Area and non-regional visitors) and the refuge as open-space in an increasingly urbanized region. The regional benefits associated with visitation at the refuge can be estimated through expenditure patterns of visitors, including lodging, food, transportation, and retail purchases, much but not all of which would occur within the Bay Area.[4] Similarly, administrative expenditures by the F&WS within the greater Bay Area (e.g., payroll, equipment purchases) constitutes an economic benefit to the region. Through use of employment and income multipliers, the indirect and induced effects of visitor and administrative expenditures can be estimated (to be discussed in more detail later in this paper).

Though difficult to isolate and quantify, the wildlife refuge--because it preserves a portion of the San Francisco Bay shoreline--can create an economic benefit to commercial fisheries that are dependent upon environmentally healthy bay shorelines.

In summary, benefits to the greater San Francisco Bay Area include:

-- protection of the San Francisco Bay shoreline
-- open-space in an increasingly urbanized region
-- visitor expenditures
-- F&WS purchases
-- consumer surplus of Bay Area visitors to refuge and day-use area

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[4]As discussed later in this paper, a portion of expenditures for equipment such as binoculars and cameras by non-regional visitors would not accrue within the Bay Area.

- **Benefits to the East Bay**

The logic for tracking or considering refuge benefits at the geographic scale of the East Bay is that the re-use of the Alameda NAS will be decided in a multi-jurisdictional decision-making process involving several East Bay municipalities. Benefits to residents of the East Bay are, in part, a subset of total Bay Area benefits (e.g., the portion of visitor expenditures made in the East Bay, and the personal utility/consumer surplus of East Bay residents who visit the refuge). Additionally, East Bay residents would be the most direct recipients of other refuge benefits such as the positive effects on congestion associated with open space as opposed to residential or commercial development.

In summary, the potential benefits of the refuge to the East Bay include:

-- a portion of visitor expenditures and F&WS purchases
-- consumer surplus of East Bay visitors to refuge and day-use area
-- beneficial effects of less land development:
    -- less freeway congestion
    -- better air quality
    -- reduced exposure to risk of property damage remediation costs from a major earthquake

- **Benefits to the City of Alameda**

Since the refuge would be located within the City of Alameda, some of the benefits would accrue exclusively or predominantly to the City and its residents. Some of the benefits, not easily quantifiable, relate to landscape and community-level amenity values of open space within an urban setting. These benefits include a general enhancement of the quality of life within the community and a heightened ability to attract new businesses due to "community quality" attributes. To some extent, these benefits can be captured in higher land values due to proximity to an open space area that also, because it is undeveloped, provides attractive viewsheds of the bay waters and San Francisco skyline. Techniques for quantifying these land value effects, such as hedonic pricing methods, are beyond the scope of this paper.

Another set of benefits directly accruable to the City of Alameda relate to avoidance of costs associated with alternative land uses. Were another land use to be pursued involving residential development, for instance, the City would likely be financially burdened with substantial support infrastructure investments such as roads, utilities, fire/police services. Though developer exactions may be imposed to help off-set these fiscal burdens, residential developments nonetheless commonly result in net negative fiscal impacts on local jurisdictions. In the highly competitive arena of military

base re-use, local jurisdictions are increasingly more likely to be required to offer financial inducements, rather than imposing exactions, in order to attract key developments. In this environment, it is all the more likely that large-scale residential and mixed use developments would result in net negative fiscal impacts on local jurisdictions.

Local benefits derived from visitor and administrative expenditures are tied to the portion of total expenditures that takes place within the City of Alameda. Estimates of the geographic breakdown of total expenditures and the portion attributed to transactions within Alameda will be presented later in this paper.

Within the consumer surplus benefit account, a segment of total visitation to the refuge would be associated with local use by Alameda residents. The net social value of that local use could be estimated directly through use of contingent valuation surveys. For this paper, we will employ visitor-day consumer surplus indices available in the literature.

In summary, the potential benefits of the proposed wildlife refuge to the residents and municipality of Alameda include:

- -- positive land value price effects on adjacent land due to the open space and viewshed amenity
- -- a portion of visitor expenditures
- -- consumer surplus of Alameda residential use of the refuge and day-use area
- -- improved quality of life for residents
- -- better ability to attract new businesses
- -- a portion of employment and income effects from administration and visitation
- -- local share of sales and payroll taxes
- -- federal payments in lieu of taxes (PILT)
- -- avoidance of costs associated with other land uses:
    - -- environmental planning and documentation costs
    - -- hazardous materials clean-up and remediation
    - -- installation and maintenance of public infrastructure, e.g.:
        - -- roads and interchanges
        - -- sewer and utilities
        - -- police, fire, and emergency medical services
        - -- schools and libraries
        - -- park facilities
    - -- earthquake damage to property and infrastructure

- **Benefits to visitors**

As discussed above, the net economic value of a public use facility such as a wildlife refuge can be measured, at least in part, in terms of the consumer surplus realized by visitors. This approach to valuation is distinct from and not additive to other approaches that, for instance, assess value in terms of income and employment generation or cost avoidance. Using published net consumer benefit indices and estimated visitation levels, based upon surveys of similar facilities around the Bay Area, we will present estimates of total consumer surplus later in this paper.

MARKET TRANSACTION BENEFITS[5] ASSOCIATED WITH VISITOR USE AND ADMINISTRATION OF THE REFUGE

In this section of the paper, we offer best available estimates of the likely magnitude of monetary benefits that the Service's proposal may generate. In the absence of first-hand data on actual visits and visitor/administrative expenditures, information was gather from numerous sources:

- interviews with personnel and data from similar nature-oriented facilities around the Bay Area and other National Wildlife refuges located in urban areas around the U.S.
- data on average daily per capita expenditures on and consumer surplus associated with various recreational activities published by the F&WS and the USDA Forest Service
- data on Bay Area tourism compiled by the San Francisco Convention and Visitors Bureau
- published data available in the scientific literature

[5] It is common in the economics literature to label market transactions as "economic impacts" rather than benefits. However, as the focus of this paper is largely on the implications of the proposed refuge/day-use area on the City of Alameda, the East Bay, and the greater Bay Area, we believe that "benefit" more accurately depicts how local and regional land use decision-making bodies relate to consumer and administrative expenditures that would be associated with the proposed refuge/day-use area.

Visitor Expenditures

The estimation of potential visitor expenditure levels--and the geographic distribution of those expenditures--relies upon two key components: (a) estimated visitation levels and average per capita daily expenditures, both stratified by broad visitor type (e.g., Alameda residents, Bay Area residents, non-local tourists), and (b) assumed expenditure profiles for each visitor type (i.e., where the average per capita daily expenditures associated with a visit to the refuge are spent).

HOW MANY VISITORS MIGHT THE REFUGE/DAY-USE AREA ATTRACT?

There are numerous factors that would play a role in determining the magnitude and profile of visitation at a national wildlife refuge and day-use recreational area located in the heart of the Bay Area at the western end of Alameda island. These factors include:

- the total number of tourists visiting the Bay Area
- the percentage of Bay Area residents who engage in wildlife viewing and Bay shoreline recreation
- the proximity of the refuge/day-use area to large population and tourism areas (e.g., San Francisco, Berkeley)
- ease of access
- the extent to which the public is made aware of the refuge/day-use area
- the uniqueness of the proposed facility (in terms of visitor features and amenities) relative to similar environmental and Bay shoreline day-use areas around the Bay Area

For some of these factors, it is possible to make fairly definitive statements about the Service's proposal. For instance, the proposed refuge/day-use area is, indeed, centrally located in the middle of the central San Francisco Bay just south of the Bay Bridge. In this regard, it is much more strategically located to attract visitation than is the current San Francisco National Wildlife Refuge. It is also closer to the Oakland/San Francisco area than are most of the existing day-use environmental education and bay shoreline recreational facilities. Conversely, the extent to which the public will become aware of the proposed facility is largely indeterminate before the fact and depends in large part on the extent to which the F&WS and the cooperating agency that manages the day-use area "market" their facilities. Given its location, features, and other attributes, we believe there is great potential to effectively market this facility to both Bay Area residents and tourists and, thereby, capture a substantial share from both pools of potential visitors.

Visitation by Tourists

Tourism is extremely important to San Francisco and the Bay Area. In 1992, over 8.5 million people from outside the Bay Area visited San Francisco, generating almost 29 million visitor-days of total activity involving the expenditure of $3.1 billion (San Francisco Convention & Visitor Bureau, 1993). Over 66,000 jobs are directly supported by visitor spending in San Francisco. Visitors came from all fifty states; over 36% of visitation was associated with foreign visitors, particularly from Germany, Japan and the U.K. In 1992, average daily visitor spending was $127 per person ($157 per day for those visitors staying in San Francisco hotels). Spending was on: accommodations (36%), food & beverage (28%), retail stores (20%), entertainment (7%), local transportation (7%), and sightseeing (2%). Almost 9 out of 10 visitors to San Francisco (87%) visited Fisherman's Wharf and 29% visited Alcatraz. This is particularly relevant to the proposed Wildlife Refuge since there is ferry service running between Pier 39 and Alameda, stopping within 1/2 mile of the refuge site.[6] The high percentage of visitors taking a ferry to Alcatraz indicates a proclivity of tourists to incorporate ferry boat rides into their sightseeing activities.

Tourists visiting San Francisco commonly include in their itineraries side trips to surrounding areas; more than 60% of all San Francisco visitors take side trips. Over 40% of visitors go to Sausalito/Tiburon/Muir Woods and 15% visit the Berkeley/Oakland area (San Francisco Convention & Visitor Bureau, 1993).

In light of this level of tourism to San Francisco and the greater Bay Area, what is a reasonable estimation as to the number of tourists who might extend their stay by at least one night and day in order to visit the Alameda National Wildlife Refuge[7] [8]? For the following reasons, we believe it is reasonable--indeed, quite conservative--to suggest that somewhere in the range of 0.25% to 0.75% of the tourists who visit San Francisco and the surrounding environs could be induced to extend their trip by one day and night in order to visit the refuge:

- approximately 16% of U.S. residents over the age of 16 took trips of at least 1

[6]As will be discussed in the section on administrative expenditures, it would be necessary to procure and run perhaps two shuttlebuses between the Alameda ferry terminal and the refuge.

[7]We assume that there would be essentially no tourist use of the day-use area as it will lack the features and identity required of a tourist destination site.

[8]To avoid counting expenditures that are merely transfers from one Bay Area tourist activity to another, we frame the question in terms of tourists who would extend their stay in the Bay Area, which would result in an increase in total Bay Area tourist expenditures and a net benefit to the regional economy.

mile in 1991 for the primary purpose of observing, photographing, or feeding wildlife (USDI F&WS, 1992); that is, it is reasonable to expect that approximately the same percentage of San Francisco tourists also enjoy wildlife viewing and, as such, would be potentially inclined to visit a nearby national wildlife refuge offering some unique viewing attractions

- as a national wildlife refuge containing endangered avian species and a unique high-tech viewing capacity, there is a heightened and unique identity that can be generated for the Alameda refuge

- a high percentage of San Francisco area tourists visit Pier 39, where the ferry to Alameda departs seven times daily; the ferry ride, itself, could become a contributing attribute of the refuge visitation experience, especially if interpretative services were offered during the ferry transit

- the F&WS, perhaps in cooperation with the Jack London Square merchants, could aggressively market a day ferry trip to Alameda/Oakland as an attraction for the millions of tourists who visit Pier 39 every year

Using the low- and high-bound capture rates of 0.25% and 0.75%, the estimated annual tourist visitor-days (i.e., not including visitation by Bay Area residents) to the proposed Alameda National Wildlife Refuge would be between 21,000 and 63,000.

Visitation by Bay Area Residents

Non-consumptive wildlife recreation is a significant activity in California. In 1991, 3.8 million Californians (17% of the state population, 16 years of age or older) traveled at least 1 mile to engage in non-consumptive wildlife recreation (e.g., viewing, photographing wildlife); over $2.6 billion was spent by Californians in the course of engaging in these activities, in 1991. Statewide, the number of people engaged in non-consumptive wildlife recreation increased by 51% between 1980 and 1990 (USDI F&WS, 1994). Residents of large metropolitan statistical areas, such as the San Francisco Bay Area, were marginally less active in non-consumptive wildlife recreation than state and national level participation rates--13% as opposed to 16% for the U.S.-wide average and 17% for California (USDI F&WS, 1993).

Using the F&WS' 1993 estimate, based upon a national survey, that 16% of U.S. residents over 16 years of age engage in 10 days of wildlife viewing per year, it could be concluded that the residents of the Bay Area, alone, potentially generate several million "user days" of non-consumptive wildlife recreation activity per year. While we were not able to obtain any estimates on the total days of wildlife viewing occurring at sites within

the Bay Area, we believe that the total "demand" for wildlife viewing opportunities far exceeds the aggregate capacity of the current Bay Area sites. As such, we believe that an additional wildlife viewing facility in the central zone of the Bay Area would not result in an appreciable visitation shift away from existing facilities but, instead, would tap into the wildlife viewing by Bay Area residents that presently takes place outside of the Bay Area. Thus, the likely level of visitation by Bay Area residents to the Alameda refuge would be primarily determined by the capacity and "draw" of the facility. In that there are facilities of similar focus and character around the Bay Area[9], we believe that recorded visitation levels at those comparable facilities offer a reasonable and conservative estimate of possible visitation by Bay Area residents to the Alameda refuge (see Table 1).

TABLE 1: 1994 VISITATION TO SELECTED BAY AREA FACILITIES

SITE NAME	FEATURES	1994 VISITOR DAYS
Hayward Shoreline Interpretive Center	visitor & ed. center, trails, book store	30,000
Baylands Nature Center	education & interpretative building, hiking/viewing trails	36,000
S.F. Bay National Wildlife Refuge	interpretative and ed. center, gift shop, trails, some picnic tables, fishing pier--multiple sites	300,000[10]
Crab Cove Regional Shoreline	largely undeveloped: nature walks, beach hiking	15,000
Richardson Bay Audubon Center & Sanctuary	2 main structures: classrooms, native plant garden, trails	20,000
San Mateo Environmental Education Center	permanent indoor exhibits & museum, interpretative programs, gift shop	80,000
Pt. Isabel Regional Shoreline	undeveloped other than trails, play areas and picnic tables	748,000

[9]We interviewed staff and received information from the following Bay Area sites that, to varying extents, offer the same type of environmental education and viewing experience that the Alameda Wildlife Refuge would offer: Baylands Nature Center (Palo Alto), Hayward Shoreline Interpretive Center, Richardson Bay Audubon Center & Sanctuary (Tiburon), San Mateo Environmental Education Center, Crab Cove Regional Shoreline (Alameda), San Francisco Bay National Wildlife Refuge (Fremont/Newark).

[10]Of this total, the Fremont facility's environmental education center received about 15,000 visitor days of use.

None of these sites are fully comparable with the proposed Alameda refuge and day-use area, as they differ either with respect to visitor features or size/capacity. Generally, the Alameda site is comprised of three basic components, each similar to the features offered at other facilities but collectively rather unique:

1) Refuge visitor center: the proposed visitor and education center would occupy a substantial portion of the 4-story, 13,000 square foot air traffic control building that would be converted for occupancy by the F&WS. It is likely, therefore, that the indoor interpretive and educational facilities at Alameda would be most comparable with but offer more in terms of size and features than the San Mateo Environmental Education Center, which generates 80,000 visitor days per year.

2) Outdoor refuge features: due to the sensitivity of the habitat areas to be protected at the refuge, there would be relatively little in the way of outdoor visitor features such as wildlife and/or nature viewing trails. In this sense, it would be most comparable to smaller sites around the Bay Area such as Richardson Bay or Crab Cove, which generate 15,000 to 20,000 visitor days per year.

3) Day-use area: This area, intended for more intensive general recreation use including fishing, picnicking, kite-flying, strolling, and bay viewing, might be most comparable to a facility such as Pt. Isabel. While not as proximate to a major traffic artery as Pt. Isabel, the Alameda day-use area would have some superior attributes such as its location on the bay where close-up viewing of boating activities and views of San Francisco would draw visitors.

Based upon these comparisons, we offer the following numbers as reasonable bounded estimates of possible visitation to the refuge and to the day-use area:

TABLES 2: ESTIMATED VISITATION BY BAY AREA RESIDENTS

	Low-Bound Estimate	High-Bound Estimate
To the wildlife refuge:	25,000	50,000
To the day-use area:	75,000	125,000
TOTAL:	100,000	175,000

TABLE 3: ESTIMATED TOTAL ANNUAL VISITATION (VISITOR DAYS)

VISITATION BY:	TO THE REFUGE		TO THE DAY-USE AREA		**TOTAL**	
	Low	High	Low	High	Low	High
Bay Area Residents	25,000	50,000	75,000	125,000	100,000	175,000
Tourists	21,000	63,000	0	0	21,000	63,000
TOTAL	46,000	113,000	75,000	125,000	121,000	238,000

HOW MUCH WILL VISITORS SPEND, AND WHERE?

Indices on average daily per capita expenditures on wildlife viewing, general day-use recreation and San Francisco area tourism are available from several sources. Loomis and Unkel (1989) estimated that California birdwatchers spent an average of $13 per day[11]. This total is on trip-related expenses and does not include purchases of equipment such as field binoculars and cameras. In its 1991 national survey, the F&WS found that wildlife viewing participants (over 16 years of age) spent an average of $311 in the pursuit of this form of recreation--on trip-related expenses and on equipment purchases (USDI F&WS, 1993). The survey found that non-consumptive wildlife recreation participants pursued this activity an average of 11.4 days per person in 1991. This means that an average of $27.30 was spent per day on non-consumptive wildlife recreation.[12] We believe that the data from the F&WS national survey is the most comprehensive and accurate estimate of daily expenditures by participants over 16 years of age.

Data on per capita daily expenditures associated with general day-use recreation (e.g., picnicking, shore fishing, kite flying) is not as available. The Forest Service estimated the market-clearing price[13] for camping, picnicking, and swimming in

[11]Loomis and Unkel estimated the expenditure breakdown to be: 43%--food & beverage, 27%--gas & oil, 20%--lodging, 10%--supplies.

[12]The survey revealed the following expenditure breakdown: 53%--equipment, 41%--trip-related expenses, 6%--other. The portion spent on trip-related expenses is comparable to Loomis and Unkel's findings: $11.20 as opposed to $13 per day. The survey-based breakdown of trip-related expenses is likewise quite close to Loomis and Unkel's estimates found in the prior footnote: 40%--food, 35%--transportation, 19%--lodging, 6%--other.

California in 1989 at $4.54 per activity day (i.e., per daily participation event) (USDA Forest Service, 1990). In the same study, the Forest Service estimated the 1989 California market-clearing price for "other recreation except wildlife and fish" to be $11.74 per activity day and the market-clearing price for fishing to be $22.98 per activity day. In that these are state-wide averages, it is likely that they understate the market-clearing price for such activities within the San Francisco Bay Area (except perhaps for the transportation component). And, of course, estimates of market-clearing prices could serve only as rough approximations of total expenditures per activity day. In light of the Forest Service indices, in recognition of the mixed-use character of visitation to the proposed Alameda day-use area, and the likely age-distribution of participants, we suggest that an assumed per capita daily expenditure for day-use participation at the Alameda facility of $8 is reasonable and conservative.

As discussed earlier in this report, data on daily per capita Bay Area tourism expenditures are available from the San Francisco Convention and Visitor Bureau. The 1992 average daily per capita tourist spending was $127.

The next step in the analysis requires an assessment of where within the Bay Area the daily expenditures associated with visiting the proposed Alameda wildlife refuge/day-use area would occur. In light of several factors, including those listed below, we used the assumed "nested" geographic distribution of expenditures found in Table 4.

-- the expenditure breakdowns for each visitor type (see Table 3),

-- the likely place of residence profile for Bay Area visitors[14] and,

-- likely modes of transit to the refuge by tourists (e.g., by automobile or ferry).

As shown in Table 4, for instance, a tourist would spend an average of $127 in the Bay Area by extending his/her stay by one day in order to visit the refuge. Of this total, it is assumed that $25 would be spent, on average, while in the East Bay. Of the East Bay total of $25, it is assumed that $20 would be spent, on average, within the City of Alameda.

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[13] A price is said to be "market clearing" if it is set at a level such that the quantity demanded is equal to the quantity offered for sale; that is, price is set so as to avoid excess demand or supply.

[14] Tourists are defined as having residences outside of the Bay Area. Non-tourist visitors to the refuge are assumed to have the following place-of-origin profile: 20%--Alameda residents, 60%-East Bay residents, 100%--Bay Area residents. Non-tourist visitors to the day-use area are assumed to have the following place-of-origin profile: 40%--Alameda residents, 90%--East Bay residents, 100%--Bay Area residents.

TABLE 4: GEOGRAPHIC DISTRIBUTION OF PER CAPITA DAILY VISITOR EXPENDITURES

	Within Alameda	Within the East Bay	Within the Bay Area
Visits by tourists	$20	$25	$127
Visits by Bay Area residents to the refuge	$13	$19	$27.30
Visits by Bay Area residents to the day-use area	$7.00	$8.00	$9.00

Combining the indices in these tables of projected visitation[15], by visitor type, and per capita daily expenditures, by visitor type and by geographic region, yields the total estimated annual expenditures associated with visitation to the proposed Alameda National Wildlife Refuge and day-use area (Table 5).

TABLE 5: PROJECTED ANNUAL VISITOR EXPENDITURES (X 1,000)

	Within Alameda		Within the East Bay		Within the Bay Area	
	Low	High	Low	High	Low	High
Tourists	$420	$1,260	$525	$1,580	$2,670	$8,000
Bay Area residents--refuge	$243	$485	$335	$665	$480	$960
Bay Area residents--day-use area[16]	$525	$875	$600	$1,000	$675	$1,125
TOTAL	**$1,188**	**$2,620**	**$1,460**	**$3,245**	**$3,825**	**$10,085**

[15]Because of the F&WS' estimation basis for the per capita expenditures on non-consumptive wildlife recreation--which is the visitation type associated with Bay Area residents visiting the refuge--projected visitation to the refuge by persons younger than 16 years cannot be applied to the $27.30 daily expenditure estimate. Based upon interviews with other similar facilities around the Bay Area, it is reasonable to expect that up to 30% of Bay Area resident visitation to the refuge will be attributable to school-aged children, predominantly in the form of class trips. It is likely that student visitor spending would be limited to on-site food items and not exceed, on average $2 per student per visit.

[16]Though it is not readily quantifiable, it should be recognized that a segment of visitation to the day-use area will likely entail a shifting away of use from other similar sites within the Bay Area. The spending associated with that segment of visitation to the day-use area would not constitute an infusion of "new money" into the Bay Area economy.

As the table reveals, the proposed national wildlife refuge and day-use shoreline recreation area has the potential to generate very substantial visitor spending levels. Based upon the assumed levels of visitation and per visit spending, the City of Alameda could realize increased expenditures of up to $2.6 million. Under the high-use scenarios, the proposed refuge and day-use recreation area could generate Bay Area-wide visitor expenditures in excess of $10 million.

F&WS Expenditures

The establishment, operation, and maintenance of the national wildlife refuge would require substantial expenditures of federal funds, which constitute an infusion of "new money" into the economies of Alameda, the East Bay, and the greater Bay Area. Funds would be spent on payrolls, contractor fees, professional fees, purchases of equipment and supplies, payments in lieu of property taxes, etc.

ONE-TIME EXPENDITURES

Initially, federal funds would be spent on converting the site from its current land use designation. Conversion costs include any closure requirements associated with hazardous areas within the project site and expenses associated with installing refuge-related structures and facilities, including:

- perimeter fencing
- habitat modifications (e.g., to the concrete-covered areas)
- conversion of the control tower building to office, viewing (including the remote closed-circuit camera equipment), interpretative, educational, and food-service facilities
- perimeter trail installation
- visitor parking, access routes, and signage
- demolition or reconfiguration of other structures presently standing within the project area
- purchase of a road grader for habitat maintenance work

Based upon discussions with F&WS personnel[17] and contacts with heavy equipment vendors, we estimate the total costs for setting up the refuge and its facilities to be between $2.4 and $2.8 million. The largest cost component ($1.7 million) is associated with converting the air traffic control building into an office/interpretive/visitors center complex.

[17] Fran Maiss and John Steiner, SF Bay Wildlife Refuge, Dick Kuener, Facilities Planning Staff, Portland.

ANNUAL EXPENDITURES

The F&WS has not yet developed estimates of the annual budget necessary to manage and maintain the proposed Alameda refuge. But based upon their estimates of staffing needs and by comparing the annual operating budgets of similar environmental facilities around the Bay Area, it is possible to arrive at a reasonable estimate of the federal funds that would be expended annually were the refuge to be established. Based upon discussions with F&WS staff[18], we estimate that the refuge, if operated as a satellite facility organizationally attached to the San Francisco Bay National Wildlife Refuge, would require a staff of at least 2-3. Staff would be responsible for habitat and facilities maintenance, interpretive programs, visitor information, supervision of volunteer activity, and law enforcement. Bare-bones staff, in our judgement, would include a GS-11/12 supervisory specialist, a GS-7/9 interpretive specialist, and a GS-5 maintenance person. If the Alameda refuge were not attached to the SF Bay refuge, there would likely be additional administrative staffing requirements. Additionally, the Service anticipates that an annual consulting contract would be awarded to a wildlife biologist for the purpose of monitoring the status of the tern colonies. This contract activity is already taking place under the supervision of the Department of the Navy, at an annual cost of approximately $35,000. The total contract including limited maintenance activities is approximately $50,000, annually.

It is also likely that the F&WS's Ecological Services Staff, based in Sacramento, would relocate 2-3 persons to Alameda, were the refuge to be established.[19] The Ecological Services Staff office contingent to be relocated to Alameda would not be involved in administration of the refuge; staffing would likely be: 1 GS-12, 1 GS-11, and 1 GS-5/7.

In total, the F&WS would have a staff of at least 6 professional-grade employees at the refuge, and probably substantially more if visitation approaches levels estimated in this analysis. The annual federal payroll for the bare bones staff would be approximately $235,000. We believe that visitation could easily require staffing that would generate an annual payroll well above the bare bones level.

In addition to paid staff at the refuge, the Service anticipates that 30-40 volunteers would regularly assist in maintenance and interpretive programs, each donating approximately 4 hours per week. While not generating a payroll, volunteers require supervision and supplies. They also spend money within the local community in

[18]Marge Kohler, Fran Maiss & John Steiner, SF Bay Wildlife Refuge.

[19]Personal communication with Joel Medlin, F&WS, Sacramento, CA.

the course of travelling to and from the refuge.

In total, we believe that the annual federal budget required to administer and maintain the proposed refuge will be approximately $500,000. We note that this level is commensurate with annual budget structures of similar facilities around the Bay Area.

TABLE 6: ANNUAL OPERATING BUDGETS OF SELECTED BAY AREA FACILITIES

SITE NAME	1994 VISITOR DAYS	ANNUAL BUDGET
Hayward Shoreline Interpretive Center	30,000	$200,000
Baylands Nature Center	36,000	$700,000
Crab Cove Regional Shoreline	15,000	$220,000
Richardson Bay Audubon Center & Sanctuary	20,000	$275,000
San Mateo Environmental Education Center	80,000	$1,000,000

Payments In Lieu of Taxes

Under the Revenue Sharing Act, the federal government makes payments to local jurisdictions in lieu of property taxes. Payment is based upon the greatest of: (a) 0.75% of fair market value, (b) 25% of net receipts or, (c) $0.75 per acre. For the proposed Alameda wildlife refuge, option (a) is most likely to be highest, as the direct income to the federal government from operation of the refuge would be minor and option (c) is equivalent to a per acre land value of $100.

Assessed valuations are made by the F&WS' regional Realty Staff in Portland, Oregon. Land values are assigned based upon an analysis of the highest and best use for a subject parcel while considering any public trust obligations or other encumbrances that may exist.[20] Highest and best use is generally associated with the development value of a parcel in the absence of any encumbrances or trust obligations.

[20]Personal communication with Georgia Schirilla, F&WS, Portland, Ore.

Typically, wetlands are assessed at around $6,000 per acre[21] while upland can be assessed as high as $250,000 per acre and as low as a few hundred dollars per acre.[22]

The assessed valuation of the proposed refuge site has not yet been determined by the F&WS. It is clear that portions of the proposed site are, indeed, significantly encumbered (e.g., the wetland areas, contaminated areas, and whatever areas are deemed critical habitat for the terns). These areas, at a minimum, would be assessed at the lower end of the spectrum, perhaps in the $5,000 to $10,000 per acre range. Estimating the assessed valuations of the remainder of the project, before the Navy and Service complete the environmental risk assessment and the Realty Staff conducts its analysis, is more problematical. If the Service and the Navy determine that most and perhaps all of the site is encumbered with hazardous materials problems and/or is critical habitat for threatened or endangered species, the valuations will be low. On the other hand, if portions are deemed to be largely unencumbered, assessed valuations could be extremely high due to the development potential. Another significant factor that will play a large role in assessed valuation is the public trust obligations that may exist on the entire site. As a bay land fill area that has never been in private ownership, a legal doctrine called the Public Trust Doctrine is likely to govern any attempted transfer to the private sector. The Public Trust Doctrine holds that legal title to lands such as the project site would revert to the State (administered by the State Lands Commission). Transfer to the private sector is substantially limited, which would be reflected in the assessed value.

Considering these factors, including the presence of wetlands on the site, we estimate that total assessed valuation for the proposed refuge and day-use area will be between $6 million and $77 million, depending upon how developable the bulk of the site is judged to be. This valuation would produce annual payments in lieu of taxes of between $43,000 and $575,000. It is our opinion that the risk assessment and realty analysis will reveal the site to be heavily encumbered and, thus, payments in lieu of taxes will be on the lower end of the spectrum.

Day-Use Area Establishment and Administrative Costs

While the proposal calls for no major structures to be constructed on the 120-acre day-use recreation area, there will nonetheless be expenses associated with

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[21]As discussed, for instance, in LSA (1990), the net social value of wetlands far exceeds, on average, the Service's standard assessed valuation. Per acre net social valuations of wetlands on the San Francisco Peninsula were estimated at $128,000 per acre.

[22]Presently, assessed valuations of national wildlife refuge parcels located around the greater Bay Area range from $250 per acre to $138,000 per acre (Marin Islands) (information provided by SF Bay National Wildlife Refuge staff).

converting the site from its present condition and in maintaining the day-use area. It will be necessary to install features such as: car access to the site, parking, signage, foot access around the site, picnic areas, rest rooms. Given that the management agency is not even known at this point, cost estimation is problematical. Based upon discussions with F&WS facilities planners, we believe that an estimated set-up cost of $150,000, exclusive of any necessary hazardous materials remediation, is quite conservative. As the day-use area will likely be managed by a local/regional parks agency, such as the East Bay Regional Parks Districts, the funds expended will not all necessarily represent "new money" to the Bay Area economy but, rather, a shift from another allocation within the Bay Area. From the standpoint of Alameda, it is more likely that the funds expended on the day-use area constitute a net increase in spending.

Annual administrative costs for the day-use area will be associated with maintaining the facilities: parking area, picnic area, shorelines, signs, rest rooms, as well as general refuse collection. There also be a law enforcement cost for the managing agency. In total, we estimate that annual site administrative costs would be approximately $75,000.

Total (Primary and Secondary) Market Transaction Benefits

The direct infusion of "new money" into the economy of Alameda and/or the Bay Area associated with the establishment and operation of the refuge/day-use area also creates secondary market transaction benefits due to the re-spending[23] of this additional personal income. In the economics literature, these secondary effects are termed indirect and induced benefits or impacts. Using techniques such as input/output modelling or export/base methods, economists can quantify the magnitude of these indirect and induced effects. The ratio of total effects (direct + indirect + induced) to direct effects is called an economic multiplier, which are usually measured either in terms of total income or employment. Generally, the larger and more economically diverse a geographic area being considered, the larger are the economic multipliers. This is because the re-spending of the initial net increase in income must be kept within the specified geographic area in order to generate secondary effects/benefits to that area. Money that "leaks out" (i.e., is spent outside) of the specified area ceases to generate benefit to that area.

[23]For instance: The refuge operation involves the hiring of new personnel. These personnel, some of whom live in or nearby Alameda, receive a salary (i.e., "new money") which they, in turn, spend on goods and services such as food, appliances, housing, etc. A portion of that spending takes place in Alameda and/or the East Bay. So local markets and appliance stores realize increased revenues due to the hiring of personnel at the refuge. The same relationship occurs for new monies associated with tourist spending.

Techniques for estimating economic multipliers for the proposed refuge/day-use area are beyond the budget and scope of this paper. Instead, and for purposes of offering rough estimates, we will rely upon the general rule of thumb that multipliers for recreational expenditures tend to be in the range of 1.5 to 2.5, depending upon the geographic region in question and the unit of measure (USDI Park Service, undated; Hudson, 1992). Following the conservative approach used throughout this paper, we will assume the income multipliers (for both visitor and administrative expenditures) to be:

- Alameda--1.25
- East Bay--1.50
- Bay Area--1.75

For Alameda, we will assume that 90% of day-use area visitor expenditures, 100% of the refuge visitor expenditures, and 100% of public agency expenditures estimated to occur in Alameda (see discussion, above) are new monies (i.e., net increase in total income to businesses and employees in Alameda). For the East Bay area, we will assume that 40% of day-use area visitor expenditures, 95% of refuge visitor expenditures, and 97.5% of public agency expenditures are new monies. For the greater Bay Area, we will assume that 5% of day-use area visitor expenditures, 90% of refuge visitor expenditures, and 95% of public agency expenditures are new monies.

Using the direct expenditure estimates (visitor and administrative) presented earlier in this paper adjusted by the assumed "new money" percentages and the assumed multipliers, total (direct, indirect, and induced) annual income that could be generated by the refuge/day-use area is presented in Table 7. The estimates are framed as low/high scenario bounds that reflect differences in assumed visitation levels (see earlier discussion).

TABLE 7: TOTAL[24] ESTIMATED ANNUAL NET INCOME GENERATED BY VISITOR AND ADMINISTRATIVE EXPENDITURES (X1,000)

	Low Bound Estimate	High Bound Estimate
To Alameda	$2,140	$3,880
To the East Bay	$2,430	$4,640
To the Bay Area	$5,980	$15,165

[24]Initial spending plus "multiplier effects."

NON-MARKET BENEFITS OF VISITOR USE

Thus far, we have focused on the beneficial impacts of refuge/day-use area visitor and administrative expenditures on the economies of Alameda, the East Bay, and the Bay Area. It is important to understand that these terms of reference do not capture the net social/economic benefit of public use of the refuge and day-use recreation area, as normally defined by economists. As discussed earlier in this paper, net benefit of public use is defined in terms of consumer surplus, as estimated through contingent valuation techniques. Consumer surplus is the amount a visitor would be willing to pay above what was actually expended to engage in a recreational activity.

To generate an estimate of the total consumer surplus of refuge/day-use area visitation (i.e., the net economic benefit of the site), we will employ a contingent valuation-based net economic value per day for wildlife watching published by the Fish and Wildlife Service (USDI F&WS, 1994(b)). This dollar valuation is $29 per day of wildlife watching[25]. A comparable net value per day of general recreation--especially the mix of recreational activities likely to occur at the proposed day-use area--is not readily available in the literature. For purposes of exposition, we will assume a daily consumer surplus of $10 for general recreation at the day-use area.[26]

Using these indices, the total annual net economic value of public use of the refuge/day-use area is estimated at between $1.475 million and $2.7 million, depending upon the level of visitation (see Table 2).

NON-MARKET/NON-USE BENEFITS

Given the scope and budget of this paper, it is not possible to generate monetary valuations of the non-use benefits of the proposed wildlife refuge. As discussed earlier, these benefits are associated with the preservation of critical wildlife habitats, including wetlands, the conservation of wildlife species of regional and national significance, and the maintenance of open space in an increasingly urbanized and congested region. In that the social value of the 27 acres of jurisdictional wetlands on the site could alone

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[25]This value is likely an underestimate of consumer surplus realized by non-Bay Area visitors to the refuge, as their visit is not as precisely categorized purely as a wildlife watching experience. A daily consumer surplus for tourist recreation in the San Francisco Bay Area would likely be a better index for that segment of refuge visitation, were such an index available in the literature.

[26]Net economic value for trout fishing in California is estimated by the F&WS at $132/day. But only a portion of visitation to the day-use area will be related to fishing. For activities such as picnicking and general site-seeing, we would expect consumer surplus to be substantially lower. We believe that an average of $10 per day for all activities that would take place in the day-use area is a very conservative estimate of net economic value.

amount to over $3 million (see footnote 19), it is clear that the non-use benefits of the proposed national wildlife refuge could exceed many millions of dollars.

JUST HOW AVAILABLE ARE ALTERNATIVE LAND USES?

The purpose of this paper has been to demonstrate that a wildlife refuge/day-use land designation can generate economic benefit to the City of Alameda, the San Francisco Bay Area, and to society, at large. Such information may assist land use planners and decision-makers in arriving at socially responsive re-use decisions for the Alameda NAS. However, the implicit notion that the economic and non-economic attributes of a wildlife refuge must be weighed against the attributes of other land uses for the area may, in fact, be invalid. Due to several substantial encumbrances that exist on the project site, it is possible that alternative land uses for the site are not available or feasible. These encumbrances relate to federal statutory requirements to avoid harm to endangered species and their habitats and to avoid net losses of wetlands, as well as encumbrances that may emerge with respect to seismic safety and the appropriateness of development on bay fill[27]. From a financial feasibility standpoint, the need to clean the site of hazardous materials to levels safe for human habitation may preclude all but the most intensive development alternatives[28].

Resolution of these issues awaits the completion of the risk assessment currently being conducted by the Navy and the endangered species jeopardy determination presently being conducted by the F&WS.

SUMMARY AND CONCLUSIONS

The proposed Alameda National Wildlife Refuge and day-use recreation area comprises an Alameda Naval Air Station re-use option that offers multi-faceted attributes and public benefits. Simultaneously, the proposed land use possesses attributes as a destination for recreational visitation and expenditure, a site for the

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[27]The extremely high total dollar value of damages from the Loma Prieta, Northridge, and Kobe earthquakes provide vivid indication of the fiscal risks to local jurisdictions of allowing development of human structures in earthquake-prone areas, particularly land-fill. Even when approaching these risks in terms of expected loss valuations based upon the statistical likelihood of a major earthquake within a specified time period, many if not most major developments on land-fill areas within regions of high earthquake activity--such as the Bay Area--probably have negative fiscal impact profiles for the local and non-local governmental jurisdictions that will be responsible for earthquake repairs. It is only recently that local jurisdictions have begun to consider this fiscal risk exposure; over the coming years, it is increasingly less likely that development on bay land-fill will be allowed.

[28]The level of remediation required for human uses is assumed to be roughly the same regardless of the intensity of land use. As such, and on the assumption that remediation for human use would be the most stringent and expensive, only high intensity land uses would generate per acre land values sufficient to cover the costs of remediation.

expenditure of public agency funds, a viable means for avoiding the net fiscal costs that may be associated with other land uses, an open space amenity to the local and regional community, and a means for protecting increasingly scarce natural resources such as wetlands and endangered species.

As shown in this paper, some of these various attributes generate beneficial impacts to the City of Alameda, the East Bay, and the greater Bay Area due to the infusion of additional net income--through visitor and administration expenditures-- into the local and regional economy; monies that would not be spent in the region were the refuge/day-use area not to be established. This infusion of new income, annually, is estimated to range from $2-$4 million for the City Alameda to $5-$15 million for the greater Bay Area. The magnitude of beneficial economic impact is directly dependent upon the extent to which the Fish & Wildlife Service and the cooperating public recreation agency can successfully convey to potential visitors the unique public use attributes of the site.

Alternatively, the public use of the refuge/day-use area could generate an annual net economic benefit to society at large (consumptive value above actual visitor expenditures) ranging from $1.5 million to $2.7 million, annually.

The net economic value of the non-use attributes of the proposed refuge and day-use recreation area are more problematical but could easily exceed many millions of dollars, given the value that our society places on increasingly scarce natural resources, especially those still remaining in our large urban areas.

Finally, the proposed wildlife refuge and day-use recreation area may prove to be one of relatively few viable land use options for that portion of the Naval Air Station. Because of issues such as hazardous materials and the potential inappropriateness of putting human structures on land fill in an area of high earthquake activity, land uses that exclude or significantly limit human habitation may be the most reasonable direction for the post-military use of the western tip of Alameda.

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Americans Committed to Conservation • A Chapter of the National Audubon Society

To Interested Readers:

A $15 million net economic benefit to the Bay Area could result from the creation of the proposed Alameda National Wildlife Refuge.

This is the conclusion reached by Dr. Robert Hrubes, a well-known resource economist, in his Report, "The Potential Economic Benefits of the Proposed Alameda National Wildlife Refuge: An Overview", commissioned by the Golden Gate Audubon Society.

When the Navy announced the closing of the Alameda Naval Air Station, concern was expressed by the Bay Area community over the economic hardships that could result from the closure. A scientific symposium held by the Golden Gate Audubon Society revealed that the loss of the habitat on the Air Station would also have a tremendous impact on the Bay's wildlife populations. Over 100 avian species, including the endangered California least tern, Caspian tern and the brown pelican, make the Air Station their home. Responding to this latter concern, the U.S. Fish and Wildlife Service proposed the creation of an Alameda National Wildlife Refuge on 595 acres of the western end of the Air Station. The Refuge proposal also included 375 acres of Bay waters.

While nearly everyone recognizes the need to preserve endangered species, some questioned the allocation of so much land for wildlife.

Dr. Hrubes' study answers that question. This report clearly demonstrates that the establishment of an Alameda National Wildlife Refuge will provide not only an essential home for wildlife but also a substantial economic return to the Bay Area. Using very conservative assumptions, Dr. Hrubes has determined that an estimated annual net income generated by visitor and administrative expenditures could exceed $15 million.

Furthermore, Dr. Hrubes' analysis suggests that development alternatives for the land may prove infeasible, not only because of encumbrances such as the presence of endangered species and wetlands on the site but also because of the question of the appropriateness of development on a site so susceptible to seismic activity. Furthermore, the presence of hazardous wastes on the site may require any development to be unacceptably dense in order to cover the costs of cleaning up those wastes.

Finally, if development took place the City of Alameda would be, "...financially burdened with substantial support infrastructure investments such as roads, utilities, fire/police services. ..residential developments [for example] commonly result in negative fiscal impacts on local jurisdictions." Increased traffic impacts would also result from such development.

The Golden Gate Audubon Society believes that this report indicates the great benefits a wildlife refuge will bring to the City of Alameda, the East Bay and the entire Bay Area. It will not only help preserve the natural beauty of the Bay Area, but will provide considerable economic benefits to the community as a result of that preservation.