



# **Technical Appendix: A Socioeconomic Profile of Recreation Users of the California Northern Central Coast Region, Greater Farallones National Marine Sanctuary, and the northern portion of Monterey Bay National Marine Sanctuary, 2011**

**U.S. Department of Commerce**  
National Oceanic and Atmospheric Administration  
National Ocean Service  
**Office of National Marine Sanctuaries**



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# **Technical Appendix: A Socioeconomic Profile of Recreation Users of the California Northern Central Coast Region, Greater Farallones National Marine Sanctuary and the northern portion of the Monterey Bay National Marine Sanctuary, 2011**

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## **Abstract**

This is the technical appendix for the reports “*A Socioeconomic Profile of Recreation Users of the California Northern Central Coast Region, Greater Farallones National Marine Sanctuary and the northern portion of the Monterey Bay National Marine Sanctuary, 2011* (Leeworthy et al., 2015) . All the methods of estimation and statistical tests performed for differences in demographic profiles are documented here.

## **Key Words**

Demographics, recreation use, expenditures, economic impact, methods, surveys, income, jobs, sanctuaries

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# 1. Introduction

## Source of Information

The information used here was from a study conducted by Ecotrust (Chen et al., 2013) supported by the State Coastal Conservancy, the State of California, and the California Department of Fish and Wildlife through the California Sea Grant Program. The study provided a baseline for socioeconomic monitoring in the MPA Program under the Marine Life Protection Act for the North Central California (NCC) Region. The NCC Region covers an area which includes Greater Farallones National Marine Sanctuary (GFNMS), the northern portion of Monterey Bay National Marine Sanctuary (MBNMS) and Cordell Bank National Marine Sanctuary (CBNMS), however no observations were obtained for CBNMS. In 2015, we obtained the data and documentation from Ecotrust.

## Survey Methodology

Chen et al. (2013) used an Internet Panel developed by Knowledge Networks, Inc. (KN) for 13 counties in North Central California within a one-day's trip to the NCC Region. In 2010, the study area's population included 6,943,138 people age 18 or older out of the total population of 8,984,415 (U.S. Census 2010). The KN panel included 6,129 people and 5,079 panel members responded to the survey for a response rate of 82.9%. Spatial information was obtained using an on-line tool developed to obtain the spatial use by activity type on the respondent's last trip. About 60 percent of respondents completed the mapping portion of the survey (3,018 respondents that mapped 13,955 data points). The data was weighted by KN to make it representative of the study area population using the 2010 Census by gender, race, and ethnicity (Hispanic and Non-Hispanic) for those ages 18 or older. See Chen et al. (2013) for details.

## What was Estimated

The data was for the year 2011 and covered all recreation uses, but was primarily focused on non-consumptive recreation uses. Many users do both consumptive and non-consumptive recreation over a 12-month period or even on their last trip to the NCC Region. Since we recently had estimated recreational fishing use and the economic impacts of that use (Leeworthy and Schwarzman 2015), we focused here on non-consumptive recreation use. All the estimates included here cover the entire NCC Region, GFNMS and the northern portion of the MBNMS.

Since the data obtained spatial use, it allowed us to estimate recreation uses within the two sanctuary areas along with a socioeconomic profile of the users. Recreation use was estimated by type of recreation activity. Comparative demographic profiles of users were developed for the NCC Region, GFNMS and the northern portion of MBNMS and tested for statistical differences. Expenditure profiles by category were also developed for the three areas and the IMPLAN input-output model was used to estimate the economic impact of these expenditures on the local area economies for the NCC Region, GFNMS and the northern portion of MBNMS in terms of total output, value added, income and employment. The Chen et al. (2013) report did not include estimates of the economic impact of the expenditures, so we did two estimates for the economic

impact of the NCC Region; one with all visitors and all recreation activities and one with only non-consumptive recreation for comparison with the GFNMS and the northern portion of MBNMS.

### Definition of the Study Areas

In this report, there are three types of study areas: 1) the survey sampling area, 2) the areas where the recreation activity takes place, and the areas where the primary socioeconomic impacts take place.

**Survey Sampling Area.** The survey sampling area included 13 counties within a reasonable one-day's trip to the NCC Region (Table 1.1 and Figure 1.1).

**Table 1.1 Survey Sampling Study Area for the NCC Region**

| Counties      |
|---------------|
| Alameda       |
| Contra Costa  |
| Lake Marin    |
| Marin         |
| Mendocino     |
| Napa          |
| Sacramento    |
| San Francisco |
| San Mateo     |
| Santa Clara   |
| Santa Cruz    |
| Solano        |
| Sonoma        |

Source: Chen et al. (2013)



Figure 1.1 Map of Survey Sampling Area

***Areas of Recreation Activity.*** The NCC Region extends from Alder Creek in the north to Pigeon Point in the south. The GFNMS and the northern portion of the MBNMS are generally sub-sets of the NCC Region, however the northern portion of MBNMS doesn't include San Francisco Bay or an area offshore from the mouth of San Francisco Bay, which is being evaluated to be included in MBNMS. The GFNMS extends from a point just below the NCC Region boundary in the north to Rocky Point in Marin County in the south. The northern portion of MBNMS extends from the southern boundary of Marin County in the north to Pigeon Point in the south. The seaward sanctuary boundaries are shown in Figure 1.2.

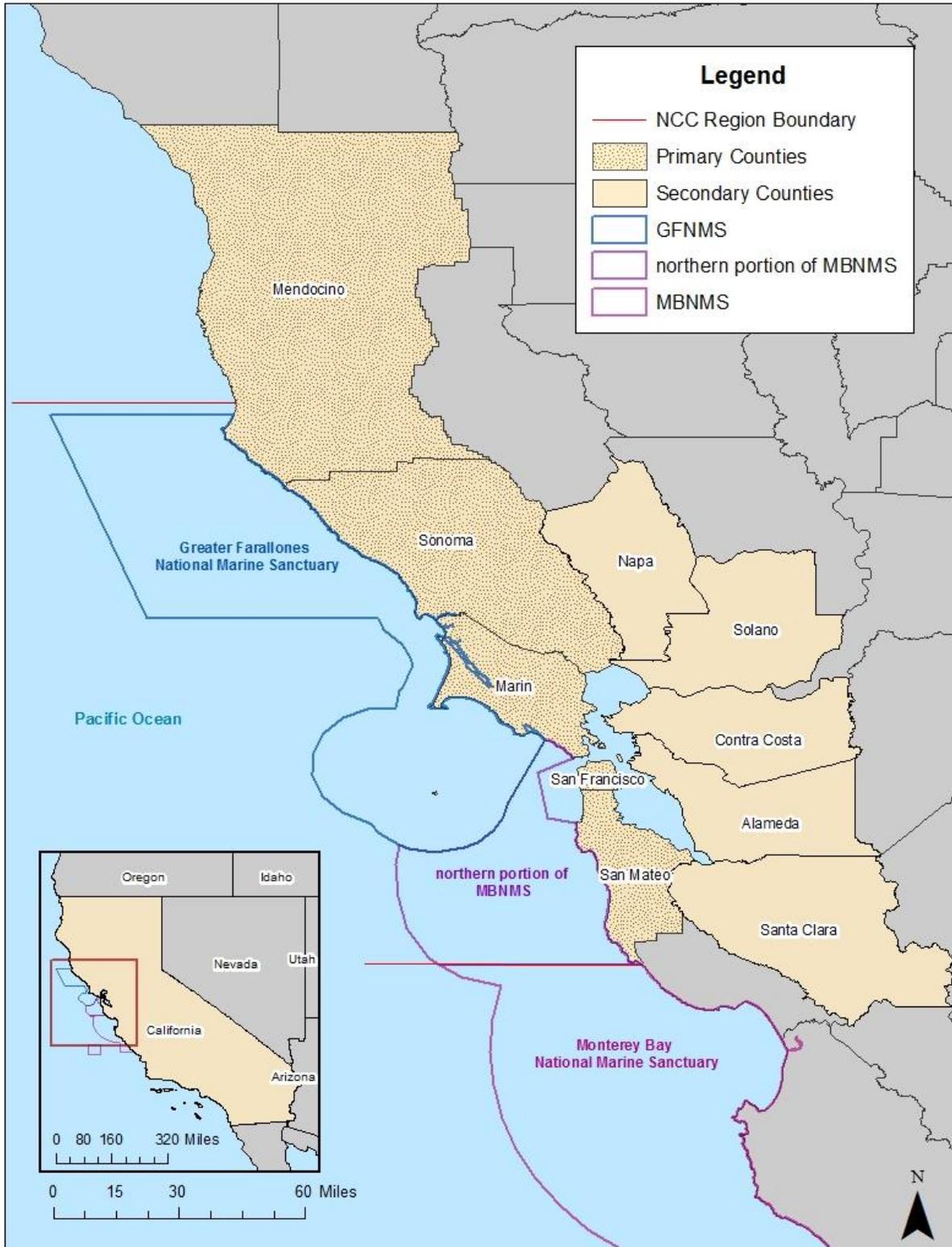


Figure 1.2 Map of the Areas of Recreation

***Areas of Economic Impact.*** Each of the three areas of recreation activity has their own separate areas where the primary socioeconomic impacts of the recreation activity take place. Here we focus on where the primary economic impacts take place from spending associated with the recreation activities. In using the IMPLAN input-output model, the first task is to define the study area for the economic impact estimation. IMPLAN uses a county as the basic unit and one can build a study area as an aggregation of counties. Because IMPLAN estimates the “multiplier” impacts, which include indirect and induced impacts (see Chapter 5 for definitions), it is important to capture counties which account for a high proportion of the inputs into production, especially labor since many people who work in coastal counties live inland in adjacent counties. We defined counties as primary counties (counties adjacent to the coastal and ocean waters) and secondary counties (counties for which a high number of employees in the primary counties live). The employees in primary counties that live in secondary counties spend a portion of their incomes in their home counties for housing, food, transportation and other services and this makes up the “induced” portion of the “multiplier” in IMPLAN.

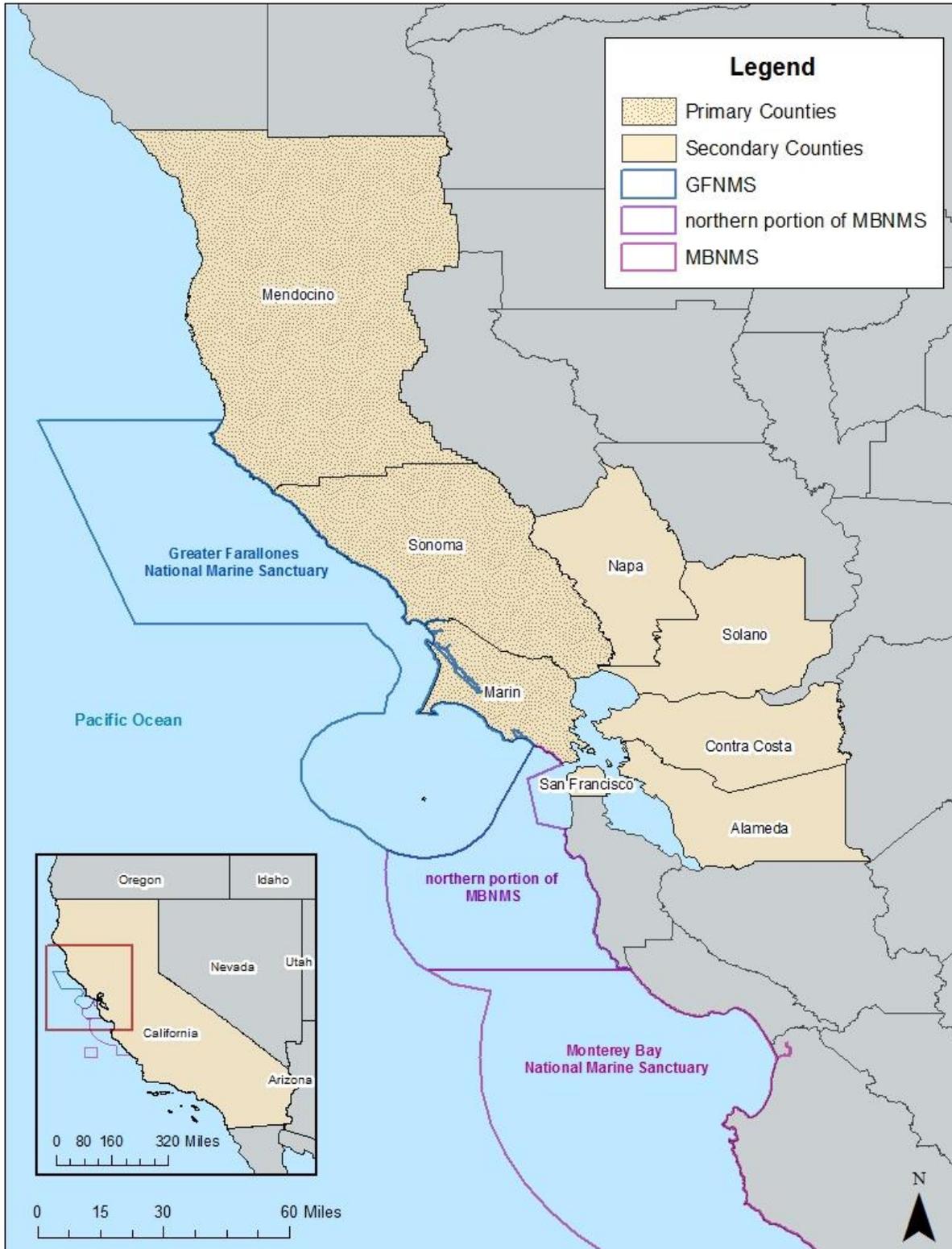
We used the “Census of Inter-county Commuters” (U.S. Census 2009-2013), which provides the employment by county of residence and county of work to determine secondary counties of impact. We used a cut-off of 4,000 employees to establish whether a county would be counted as a secondary impact county. The details of this estimation are provided in Chapter 5.

*NCC Region Economic Impact Study Area.*



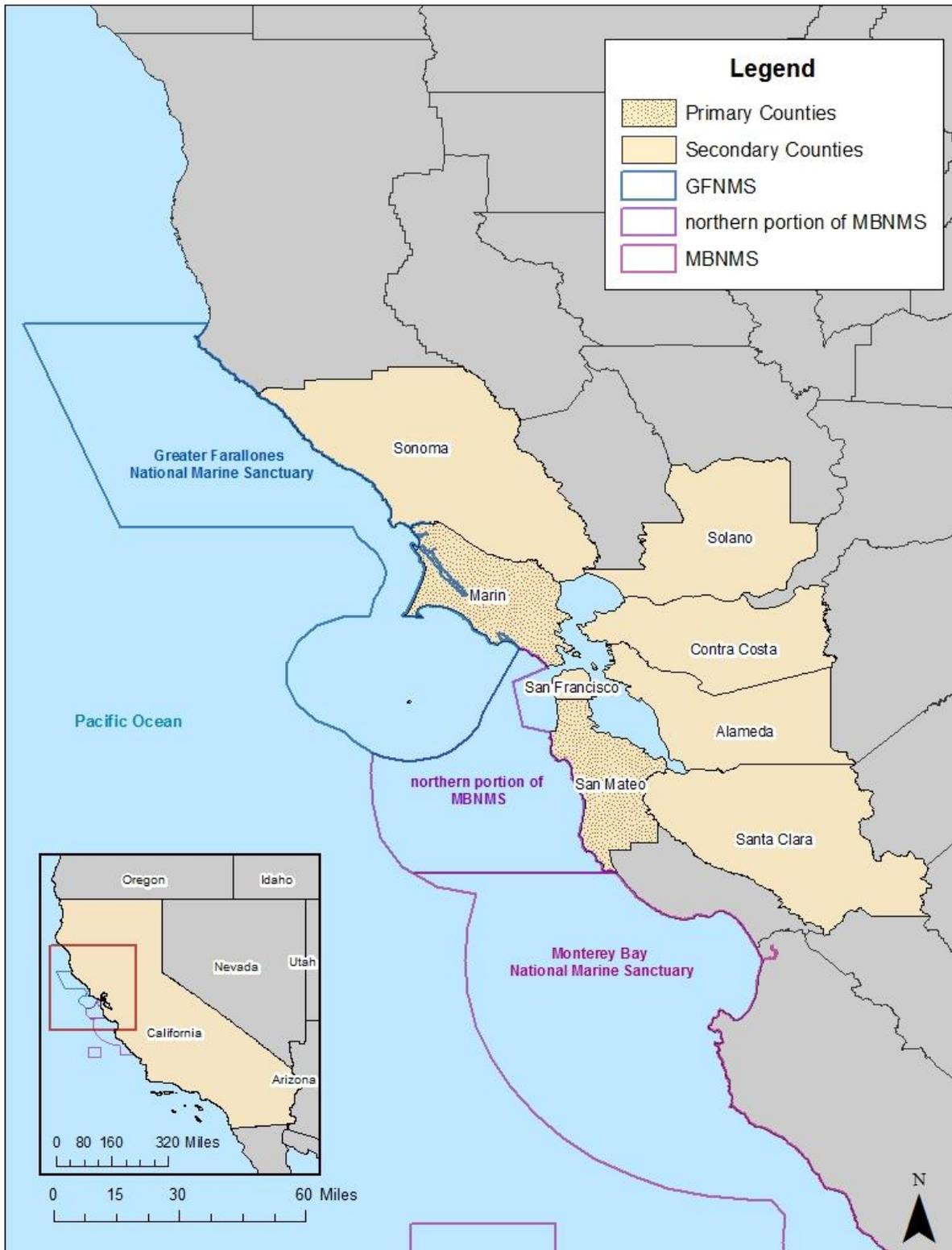
**Figure 1.3 NCC Region Economic Impact Study Area**

*GFNMS Economic Impact Study Area.*



**Figure 1.4 GFNMS Economic Impact Study Area**

*northern portion of MBNMS Economic Impact Study Area.*



**Figure 1.5 northern portion of MBNMS Economic Impact Study Area**

## **Organization of Report**

In Chapter 2, we address comparative demographic profiles for the three study areas of activities and test for statistical differences for each demographic variable. In Chapter 3, we provide estimates of total use measured as annual person-trips and annual person-days for 2011. Estimates are then provided for detailed activity profiles, including activity participation by type of activity for all trips over the past 12 months and the last trip, and the number of person-trips and person-days by activity type. In Chapter 4, we estimate expenditures per person-trip by category of expenditure and extrapolate these estimates to total expenditures. We also estimate expenditures per person-day by expenditure category to support expenditure profiles that could be used in management/policy applications that affect recreation use in the study areas. In Chapter 5, we take the estimated total expenditures and run the IMPLAN input-output model to estimate the economic impact/contribution of the spending on the local area economies in terms of total output, value-added, income and employment. In each Chapter, we provide definitions of terms used in estimation.

## 2. Demographic Profiles of Users

Chen et al. (2013) didn't provide demographic profiles of the recreation users for the NCC Region. Here we provide comparative demographic profiles between all recreators to the NCC Region, recreators in the GFNMS, and recreators in the northern portion of MBNMS. In addition, the data included demographics of the Internet Panel, which was a representative panel of the 13 counties in the State of California (see Table 1.1) for the population 18 years of age and older. We did not include comparisons between the recreating samples and the entire Internet Panel. This could be done in future research to develop recreation participation functions to forecast future recreation use. The data and documentation from this project can be obtained from the authors on request.

For recreators, we do three sets of comparisons; NCC Region versus GFNMS, NCC Region versus the northern portion of MBNMS and GFNMS versus the northern portion of MBNMS. We used a non-parametric test for statistical differences, the Kolmogorov-Smirnov two-sample test and the Kuiper two-sample exact test, testing the empirical distribution function (SAS V.9.4, NPAR1WAY procedure). The demographics tested included age, gender, race/ethnicity, marital status, head of household, household size, housing type, employment status, educational level, and household income.

To perform the statistical tests we first had to rearrange the data and form three groups for the pairwise tests. Since people who did recreation activities in the NCC Region could also do recreation activities in the GFNMS and the northern portion of MBNMS, and some that did recreation activities in the GFNMS could also have done activities in the northern portion of MBNMS, we pulled all those who did recreation activities in the GFNMS and the northern portion of MBNMS into separate data files. We then concatenated the three files (NCC Region, GFNMS and the northern portion of MBNMS). We treated each area sample as separate samples, but we know there is some correlation because of the overlapping users. This was one of the reasons we chose the KS and Kuiper two-sample nonparametric tests for statistical differences. The only statistically significant differences found were for educational level between recreators in the GFNMS and the northern portion of MBNMS and between recreators in the NCC Region and GFNMS (Table 2.1).

**Table 2.1 Statistical Test Results for Differences in Demographic Factors**

| Demographic Factors         |           | NCC Region      | NCC Region         | GFNMS              |
|-----------------------------|-----------|-----------------|--------------------|--------------------|
|                             |           | versus<br>GFNMS | versus<br>np MBNMS | versus<br>np MBNMS |
| Age (Continuous)            | KS1,3     | 0.32            | 0.28               | 0.82               |
|                             | Kuiper1,3 | 0.67            | 0.45               | 0.49               |
| Age (Categories)            | KS1,3     | 0.65            | 1.00               | 0.92               |
|                             | Kuiper1,3 | 0.99            | 1.00               | 0.97               |
| Gender                      | KS1,3     | 0.58            | 1.00               | 1.00               |
|                             | Kuiper1,3 | 0.98            | 1.00               | 1.00               |
| Race/Ethnicity              | KS1,3     | 0.96            | 1.00               | 1.00               |
|                             | Kuiper1,3 | 1.00            | 1.00               | 1.00               |
| Marital Status              | KS1,3     | 0.65            | 0.47               | 0.15               |
|                             | Kuiper1,3 | 0.99            | 0.96               | 0.64               |
| Head of Household           | KS1,3     | 1.00            | 1.00               | 1.00               |
|                             | Kuiper1,3 | 1.00            | 1.00               | 1.00               |
| Household Size (Continuous) | KS1,3     | 0.43            | 0.11               | 0.96               |
|                             | Kuiper1,3 | 0.94            | 0.32               | 0.98               |
| Housing Type                | KS1,3     | 1.00            | 1.00               | 0.99               |
|                             | Kuiper1,3 | 1.00            | 1.00               | 1.00               |
| Employment Status           | KS1,3     | 1.00            | 0.92               | 0.87               |
|                             | Kuiper1,3 | 1.00            | 0.93               | 1.00               |
| Educational Level           | KS1,3     | <b>0.01</b>     | 0.19               | <b>0.00</b>        |
|                             | Kuiper1,3 | <b>0.05</b>     | 0.65               | <b>0.00</b>        |
| Household Income            | KS1,3     | 0.98            | 0.12               | 0.49               |
|                             | Kuiper1,3 | 1.00            | 0.24               | 0.42               |

1. Kolmogorov-Smirnov (KS) two-sample test of significance. Significant difference if less than or equal to 0.05.

2. Kuiper two-sample exact test of significance. Significant difference if less than or equal to 0.05

3. Bold indicates statistically significant difference.

**Age.** There were no statistically significant differences in the ages of the recreators years 18 and older between the three study areas (Table 2.1). The highest proportion of recreators was in the age category of “55-64” for the NCC Region and the northern portion of MBNMS, while for the

GFNMS it was “25-34” (Table 2.2). The mean ages ranged from 45 to 46 years old, while the median age ranged from 43 to 46 years old (Table 2.3).

**Table 2.2 Age Distributions of Recreators in the Three Study Areas**

| Age         | NCC Region | GFNMS | northern portion of MBNMS |
|-------------|------------|-------|---------------------------|
| 18 - 24     | 9.08       | 11.98 | 10.43                     |
| 25 - 34     | 19.06      | 20.15 | 19.71                     |
| 35 - 44     | 18.3       | 18.69 | 15.46                     |
| 45 - 54     | 17.17      | 12.56 | 17                        |
| 55 - 64     | 24.03      | 19.48 | 27.84                     |
| 65 - 74     | 11.45      | 15.76 | 9.37                      |
| 75 and over | 0.91       | 1.37  | 0.18                      |

Source: Ecotrust Survey of North Central California Region

**Table 2.3 Summary Statistics for Age of Recreators in the Three Study Areas**

| Statistic | NCC Region | GFNMS | northern portion of MBNMS |
|-----------|------------|-------|---------------------------|
| Minimum   | 18         | 19    | 18                        |
| Maximum   | 100        | 78    | 75                        |
| Mean      | 46.21      | 45.56 | 45.34                     |
| Median    | 46         | 43    | 46                        |
| Mode      | 56         | 56    | 56                        |

Source: Ecotrust Survey of North Central California Region

**Gender.** There were no statistically significant differences in gender between the three study areas (Table 2.1). There were a higher proportion of male recreators in each of the three study areas ranging from 52.41% in the NCC Region to 56.25% and 56.34% in the GFNMS and northern portion of MBNMS, respectively (Table 2.4).

**Table 2.4 Gender of Recreators in the Three Study Areas**

| Gender | NCC Region Recreators | Greater Farallones NMS | northern portion of MBNMS |
|--------|-----------------------|------------------------|---------------------------|
| Male   | 52.41%                | 56.25%                 | 56.34%                    |
| Female | 47.59%                | 43.75%                 | 43.66%                    |

Source: Ecotrust Survey of North Central California Region

**Race/Ethnicity.** There were no statistically significant differences in race/ethnicity between recreators in the three study areas (Table 2.1). In all three study areas, the highest proportion of recreators was “White, non-Hispanic ranging from 54.96% in the northern portion of MBNMS to 56.97% in the NCC Region (Table 2.5). The Hispanic population ranged from 15.76% in the NCC Region to 19.47% in the northern portion of the MBNMS (Table 2.5).

**Table 2.5 Race/Ethnicity of Recreators in the Three Study Areas**

| Race/Ethnicity         | NCC Region Recreators | Greater Farallones NMS | northern portion of MBNMS |
|------------------------|-----------------------|------------------------|---------------------------|
| White, non-Hispanic    | 56.97%                | 56.92%                 | 54.96%                    |
| Black, non-Hispanic    | 4.63%                 | 4.38%                  | 3.34%                     |
| Other, non-Hispanic    | 16.87%                | 14.12%                 | 17.12%                    |
| Hispanic               | 15.76%                | 17.18%                 | 19.47%                    |
| 2+ Races, non-Hispanic | 5.78%                 | 7.41%                  | 5.10%                     |

Source: Ecotrust Survey of North Central California Region

**Marital Status.** There were no statically significant differences in the marital status of recreators in the three study areas (Table 2.1). In the three study areas, the highest proportion of recreators were married ranging from 51.16% in the GFNMS to 56.61% in the northern portion of MBNMS, while the second highest proportion of recreators in all three study areas were “Never Married” ranging from 28.81% in the northern portion of MBNMS to 35.03% in the NCC Region (Table 2.6).

**Table 2.6 Marital Status of Recreators in the Three Study Areas.**

| Marital Status | NCC Region Recreators | Greater Farallones NMS | northern portion of MBNMS |
|----------------|-----------------------|------------------------|---------------------------|
| Married        | 52.19%                | 51.16%                 | 56.61%                    |
| Widowed        | 2.74%                 | 3.18%                  | 1.33%                     |
| Divorced       | 8.88%                 | 10.78%                 | 11.75%                    |
| Separated      | 1.16%                 | 1.95%                  | 1.50%                     |
| Never Married  | 35.03%                | 33.00%                 | 28.81%                    |

Source: Ecotrust Survey of North Central California Region

**Head of Household.** There were no statistically significant differences in the proportion of survey respondents who were “head of household” in the three study areas (Table 2.1). In all three study areas, the highest proportion of survey respondents were “Head of Household” ranging from 78.45% in the northern portion of MBNMS to 83.93% for the NCC Region (Table 2.7).

**Table 2.7 Head of Household of Recreators in the Three Study Areas**

| Household Head | NCC Region Recreators | Greater Farallones NMS | northern portion of MBNMS |
|----------------|-----------------------|------------------------|---------------------------|
| No             | 16.07%                | 16.50%                 | 21.55%                    |
| Yes            | 83.93%                | 83.50%                 | 78.45%                    |

Source: Ecotrust Survey of North Central California Region

**Household Size.** There were no statistically significant differences in the household sizes of survey respondents in the three study areas (Table 2.1). In all three study areas, the highest proportion of recreators was from “2 person households” ranging from 38.00% in the GFNMS to 42.90% in the NCC Region (Table 2.8). The mean household size of recreators ranged from 2.57 in the NCC Region to 2.77 in the northern portion of MBNMS (Table 2.9).

**Table 2.8 Household Size of Recreators in the Three Study Areas**

| Household Size             | NCC Region<br>Recreators | Greater<br>Farallones NMS | northern portion<br>of MBNMS |
|----------------------------|--------------------------|---------------------------|------------------------------|
| 1 person household         | 16.70%                   | 15.60%                    | 10.10%                       |
| 2 person household         | 42.90%                   | 38.00%                    | 39.80%                       |
| 3 person household         | 18.60%                   | 21.30%                    | 21.40%                       |
| 4 person household         | 14.40%                   | 16.70%                    | 21.30%                       |
| 5 person household         | 5.20%                    | 5.40%                     | 6.70%                        |
| 6 person household         | 1.20%                    | 1.70%                     | 0.10%                        |
| 7 or more person household | 0.90%                    | 1.20%                     | 0.50%                        |

Source: Ecotrust Survey of North Central California Region

**Table 2.9 Summary Statistics for Household Size for Recreators in the Three Study Areas**

| Statistic | NCC Region<br>Recreators | Greater Farallones<br>NMS | northern portion of<br>MBNMS |
|-----------|--------------------------|---------------------------|------------------------------|
| Minimum   | 1                        | 1                         | 1                            |
| Maximum   | 15                       | 12                        | 7                            |
| Mean      | 2.57                     | 2.69                      | 2.77                         |
| Median    | 2                        | 2                         | 3                            |
| Mode      | 2                        | 2                         | 2                            |

Source: Ecotrust Survey of North Central California Region

**Housing Type.** There were no statistically significant differences in the type of housing recreators lived in for the three study areas (Table 2.1). In all three study areas, the highest proportion of recreators lived in “detached houses” ranging from 58.81% in the northern portion of MBNMS to 65.5% in the NCC Region (Table 2.10).

**Table 2.10 Housing Type of Recreators in the Three Study Areas**

| Housing Type       | NCC Region Recreators | Greater Farallones NMS | northern portion of MBNMS |
|--------------------|-----------------------|------------------------|---------------------------|
| House- detached    | 65.50%                | 64.92%                 | 58.81%                    |
| House- attached    | 11.32%                | 14.30%                 | 18.42%                    |
| Apartment building | 21.63%                | 18.36%                 | 19.81%                    |
| Mobile Home        | 1.44%                 | 1.50%                  | 2.96%                     |
| Boat, RV, Van      | 0.11%                 | 0.92%                  | -                         |

Source: Ecotrust Survey of North Central California Region

**Employment Status.** There were no statistically significant differences in the employment status of recreators in the three study areas (Table 2.1). In all three study areas, the highest proportion of recreators' employment status was "Working-paid employee" ranging from 52.29% in the northern portion of MBNMS to 58.56% in the NCC Region. The second highest proportion of recreators' employment status for all three areas was for "Not Working-retired" ranging from 11.86% in the northern portion of MBNMS to 17.66% for the GFNMS (Table 2.11).

**Table 2.11 Employment Status of Recreators in the Three Study Areas**

| Current Employment Status     | NCC Region Recreators | Greater Farallones NMS | northern portion of MBNMS |
|-------------------------------|-----------------------|------------------------|---------------------------|
| Working- paid employee        | 58.56%                | 57.14%                 | 52.29%                    |
| Working- self employed        | 9.84%                 | 11.34%                 | 8.14%                     |
| Not Working- temp layoff      | 0.76%                 | 1.75%                  | 1.68%                     |
| Not Working- looking for work | 7.75%                 | 7.70%                  | 12.20%                    |
| Not Working- retired          | 16.22%                | 17.66%                 | 11.86%                    |
| Not Working- disabled         | 1.91%                 | 2.08%                  | 6.82%                     |
| Not Working- other            | 4.96%                 | 2.33%                  | 7.02%                     |

Source: Ecotrust Survey of North Central California Region

**Educational Level.** There were statistically significant differences between recreators in the NCC Region and recreators in the GFNMS and between recreators in the GFNMS and in the northern portion of MBNMS; however there wasn't a statistically significant difference between recreators in the NCC Region and the northern portion of MBNMS (Table 2.1). Of the recreators in the three study areas, recreators in the GFNMS had the lowest level of educational achievement, while the recreators in the northern portion of MBNMS had the highest level. Recreators in the northern portion of MBNMS had the highest proportion of recreators with a Bachelors Degree of higher at 57.75% versus 49.23% for the NCC Region and 42.82% for the GFNMS (Table 2.12).

**Table 2.12 Educational Level of Recreators in the Three Study Areas**

| Education                      | NCC Region<br>Recreators | Greater<br>Farallones NMS | northern portion<br>of MBNMS |
|--------------------------------|--------------------------|---------------------------|------------------------------|
| No formal education            | 0.11%                    | -                         | -                            |
| 1st, 2nd, 3rd, or 4th grade    | -                        | -                         | -                            |
| 5th or 6th grade               | 0.07%                    | 0.56%                     | -                            |
| 7th or 8th grade               | -                        | -                         | 0.80%                        |
| 9th grade                      | 0.06%                    | -                         | -                            |
| 10th grade                     | 0.02%                    | -                         | -                            |
| 11th grade                     | 0.02%                    | -                         | -                            |
| 12th grade                     | 0.56%                    | 0.78%                     | 0.58%                        |
| High school grad or equivalent | 6.41%                    | 7.08%                     | 4.15%                        |
| Some college, no degree        | 28.48%                   | 35.02%                    | 21.58%                       |
| Associate degree               | 15.04%                   | 13.74%                    | 15.14%                       |
| Bachelor's degree              | 27.17%                   | 22.64%                    | 32.79%                       |
| Master's degree                | 13.57%                   | 13.89%                    | 14.20%                       |
| Professional or Doctorate      | 8.49%                    | 6.29%                     | 10.76%                       |

Source: Ecotrust Survey of North Central California Region

**Household Income.** Although there were differences in educational levels between the recreators in the three study areas, there were no statistically significant differences in household income for recreators in the three study areas (Table 2.1). In all three study areas, the highest proportion of recreators came from households with incomes “\$75,000-\$99,999” ranging from 19.39% in the NCC Region to 20.0% in the northern portion of MBNMS (Table 2.13).

**Table 2.13 Household Income for Recreators in the Three Study Areas**

| Household Income    | NCC Region Recreators | Greater Farallones NMS | northern portion of MBNMS |
|---------------------|-----------------------|------------------------|---------------------------|
| Less than \$10,000  | 2.90%                 | 2.99%                  | 2.94%                     |
| \$10,000-\$14,999   | 1.76%                 | 1.75%                  | 4.38%                     |
| \$15,000-\$19,999   | 1.53%                 | 2.00%                  | 0.49%                     |
| \$20,000-\$24,999   | 2.47%                 | 2.03%                  | 4.21%                     |
| \$25,000-\$29,999   | 2.69%                 | 1.10%                  | 3.34%                     |
| \$30,000-\$34,999   | 2.83%                 | 2.06%                  | 4.85%                     |
| \$35,000-\$39,999   | 2.68%                 | 3.37%                  | 1.94%                     |
| \$40,000-\$49,999   | 6.94%                 | 6.84%                  | 6.73%                     |
| \$50,000-\$59,999   | 7.53%                 | 8.50%                  | 1.76%                     |
| \$60,000-\$74,999   | 11.53%                | 12.04%                 | 8.00%                     |
| \$75,000-\$99,999   | 19.39%                | 19.79%                 | 20.00%                    |
| \$100,000-\$124,999 | 12.58%                | 10.89%                 | 16.99%                    |
| \$125,000-\$149,999 | 9.60%                 | 9.18%                  | 4.75%                     |
| \$150,000 or more   | 15.57%                | 17.44%                 | 19.63%                    |

Source: Ecotrust Survey of North Central California Region

**Place of Residence – Zip Code.** Statistical tests for differences were not done for place of residence-zip code. In the main report with only results, we selected only the top five zip codes for each study area to present in the body of the report and the complete distribution as presented here in the appendix of the main report.

**Table 2.14 Place of Residence-Zip Code of Recreators in the Three Study Areas**

| Zip Code | NCC Region Recreators | Greater Farallones NMS | northern portion of MBNMS |
|----------|-----------------------|------------------------|---------------------------|
| 94002    | 0.95                  | 0.26                   | 2.64                      |
| 94005    | 0.03                  | -                      | -                         |
| 94010    | 0.52                  | 0.71                   | -                         |
| 94014    | 0.65                  | 1.16                   | 0.92                      |
| 94015    | 0.37                  | 0.43                   | 0.17                      |
| 94019    | 0.38                  | -                      | 1.25                      |
| 94020    | 0.11                  | -                      | -                         |
| 94022    | 0.12                  | -                      | -                         |
| 94024    | 0.17                  | -                      | -                         |
| 94025    | 0.46                  | -                      | 0.94                      |
| 94027    | 0.09                  | -                      | -                         |
| 94028    | 0.01                  | -                      | -                         |
| 94030    | 0.49                  | 0.55                   | -                         |
| 94037    | 0.13                  | -                      | -                         |
| 94038    | 0.07                  | -                      | 0.62                      |
| 94040    | 0.53                  | 0.24                   | 1.46                      |
| 94041    | 0.23                  | 0.16                   | 1.04                      |
| 94043    | 0.34                  | -                      | 0.53                      |
| 94044    | 0.89                  | 0.47                   | 0.53                      |
| 94061    | 0.27                  | -                      | 1.25                      |
| 94062    | 0.33                  | -                      | -                         |
| 94063    | 0.05                  | -                      | 0.18                      |
| 94065    | 0.05                  | 0.18                   | -                         |
| 94066    | 0.86                  | -                      | 0.97                      |
| 94070    | 0.39                  | -                      | 0.45                      |
| 94080    | 1.07                  | 2.19                   | 1.59                      |
| 94085    | 0.16                  | -                      | 0.29                      |
| 94086    | 0.76                  | 0.67                   | 1.72                      |
| 94087    | 0.67                  | 0.16                   | 2.42                      |
| 94089    | 0.17                  | 0.57                   | 0.83                      |
| 94102    | 0.36                  | -                      | -                         |
| 94103    | 0.58                  | -                      | -                         |
| 94104    | 0.21                  | 0.45                   | 0.17                      |
| 94105    | 0.16                  | -                      | -                         |
| 94106    | 0.02                  | -                      | -                         |
| 94107    | 0.18                  | 0.18                   | 0.76                      |
| 94108    | 0.14                  | 0.62                   | -                         |
| 94109    | 1.26                  | 0.17                   | 2.50                      |

**Table 2.14 Place of Residence-Zip Code of Recreators in the Three Study Areas (continued)**

| Zip Code | NCC Region Recreators | Greater Farallones NMS | northern portion of MBNMS |
|----------|-----------------------|------------------------|---------------------------|
| 94110    | 0.65                  | 1.30                   | -                         |
| 94111    | 0.19                  | 0.22                   | -                         |
| 94112    | 0.63                  | 0.59                   | 0.32                      |
| 94114    | 1.18                  | 0.48                   | 1.47                      |
| 94115    | 0.24                  | 0.69                   | -                         |
| 94116    | 0.51                  | 0.32                   | 0.46                      |
| 94117    | 0.99                  | 0.50                   | 0.31                      |
| 94118    | 0.32                  | 0.44                   | 0.48                      |
| 94119    | 0.04                  | -                      | -                         |
| 94121    | 0.81                  | -                      | -                         |
| 94122    | 0.77                  | 0.21                   | 0.07                      |
| 94123    | 0.27                  | 0.23                   | -                         |
| 94124    | 0.11                  | -                      | -                         |
| 94125    | 0.04                  | -                      | -                         |
| 94127    | 0.40                  | 0.74                   | -                         |
| 94131    | 0.69                  | 0.55                   | 0.71                      |
| 94132    | 0.18                  | -                      | -                         |
| 94133    | 0.26                  | 0.05                   | 0.31                      |
| 94134    | 0.22                  | 0.21                   | -                         |
| 94137    | 0.09                  | -                      | -                         |
| 94141    | 0.02                  | -                      | 0.26                      |
| 94150    | 0.03                  | -                      | -                         |
| 94158    | 0.07                  | -                      | -                         |
| 94301    | 0.29                  | 0.30                   | 0.43                      |
| 94303    | 0.52                  | 0.16                   | -                         |
| 94304    | 0.21                  | -                      | 0.73                      |
| 94305    | 0.04                  | -                      | 0.29                      |
| 94306    | 0.37                  | -                      | 0.42                      |
| 94309    | 0.03                  | -                      | -                         |
| 94401    | 0.51                  | -                      | 0.10                      |
| 94402    | 0.36                  | 0.27                   | -                         |
| 94403    | 0.60                  | 0.35                   | 0.81                      |
| 94404    | 0.51                  | -                      | 0.31                      |
| 94501    | 0.81                  | 0.32                   | -                         |
| 94502    | 0.19                  | -                      | -                         |
| 94503    | 0.12                  | 0.77                   | 0.11                      |
| 94505    | 0.14                  | 0.26                   | -                         |
| 94506    | 0.32                  | 0.12                   | 0.63                      |

**Table 2.14 Place of Residence-Zip Code of Recreators in the Three Study Areas (continued)**

| Zip Code | NCC Region Recreators | Greater Farallones NMS | northern portion of MBNMS |
|----------|-----------------------|------------------------|---------------------------|
| 94507    | 0.26                  | 0.85                   | 0.41                      |
| 94508    | 0.03                  | -                      | -                         |
| 94509    | 0.47                  | 0.73                   | -                         |
| 94510    | 0.05                  | 0.16                   | 0.40                      |
| 94511    | 0.01                  | -                      | -                         |
| 94513    | 0.32                  | 0.20                   | -                         |
| 94515    | 0.15                  | -                      | -                         |
| 94517    | 0.43                  | 0.25                   | 0.55                      |
| 94518    | 0.21                  | 0.74                   | -                         |
| 94519    | 0.26                  | 0.16                   | -                         |
| 94520    | 0.28                  | 0.48                   | -                         |
| 94521    | 1.12                  | 1.86                   | 1.07                      |
| 94523    | 0.67                  | 1.10                   | 0.54                      |
| 94525    | 0.01                  | -                      | -                         |
| 94526    | 0.43                  | 0.33                   | 1.44                      |
| 94530    | 0.35                  | 0.17                   | 0.70                      |
| 94531    | 0.10                  | -                      | -                         |
| 94533    | 0.31                  | -                      | 0.31                      |
| 94536    | 0.82                  | 0.17                   | 1.25                      |
| 94538    | 0.53                  | -                      | 2.23                      |
| 94539    | 0.33                  | 0.21                   | -                         |
| 94541    | 0.89                  | 0.50                   | 6.06                      |
| 94542    | 0.23                  | -                      | -                         |
| 94544    | 0.41                  | 0.15                   | 0.84                      |
| 94545    | 0.31                  | 0.77                   | 0.62                      |
| 94546    | 0.72                  | 0.23                   | 1.56                      |
| 94547    | 0.51                  | 0.91                   | -                         |
| 94549    | 0.36                  | 0.36                   | -                         |
| 94550    | 0.64                  | 0.36                   | 1.88                      |
| 94551    | 0.49                  | -                      | -                         |
| 94552    | 0.15                  | -                      | -                         |
| 94553    | 0.57                  | 0.78                   | 0.24                      |
| 94555    | 0.19                  | 0.11                   | 0.63                      |
| 94556    | 0.12                  | 0.40                   | -                         |
| 94558    | 0.40                  | 0.55                   | -                         |
| 94559    | 0.31                  | 0.27                   | -                         |
| 94560    | 0.33                  | -                      | -                         |
| 94561    | 0.71                  | 0.94                   | -                         |

**Table 2.14 Place of Residence-Zip Code of Recreators in the Three Study Areas (continued)**

| Zip Code | NCC Region Recreators | Greater Farallones NMS | northern portion of MBNMS |
|----------|-----------------------|------------------------|---------------------------|
| 94562    | 0.01                  | -                      | -                         |
| 94563    | 0.18                  | -                      | 0.08                      |
| 94564    | 0.71                  | -                      |                           |
| 94565    | 0.65                  | 0.58                   | 0.42                      |
| 94566    | 0.51                  | 1.40                   | 0.14                      |
| 94568    | 0.59                  | 0.12                   | 0.91                      |
| 94572    | 0.11                  | 0.51                   | -                         |
| 94574    | 0.01                  | -                      | -                         |
| 94577    | 0.39                  | 0.36                   | 1.05                      |
| 94578    | 0.31                  | -                      | -                         |
| 94579    | 0.07                  | 0.33                   | -                         |
| 94580    | 0.55                  | -                      | 0.46                      |
| 94582    | 0.23                  | 0.38                   | 0.44                      |
| 94583    | 0.63                  | 0.25                   | 1.18                      |
| 94587    | 0.16                  | 0.42                   | -                         |
| 94588    | 0.38                  | 0.19                   | -                         |
| 94589    | 0.01                  | -                      | -                         |
| 94590    | 0.15                  | -                      | -                         |
| 94595    | 0.24                  | 1.32                   | 0.24                      |
| 94596    | 0.39                  | 0.34                   | 0.47                      |
| 94597    | 0.33                  | 0.12                   | -                         |
| 94598    | 0.32                  | 0.87                   | -                         |
| 94599    | 0.03                  | -                      | -                         |
| 94601    | 0.11                  | 0.20                   | 0.29                      |
| 94602    | 0.16                  | 0.05                   | -                         |
| 94603    | 0.06                  | -                      | -                         |
| 94604    | 0.02                  | -                      | -                         |
| 94605    | 0.63                  | -                      | -                         |
| 94606    | 0.26                  | -                      | 0.28                      |
| 94607    | 0.10                  | 0.16                   | -                         |
| 94608    | 0.45                  | -                      | -                         |
| 94609    | 0.39                  | -                      | -                         |
| 94610    | 0.22                  | 0.25                   | 0.36                      |
| 94611    | 0.63                  | 0.65                   | 0.50                      |
| 94612    | 0.25                  | 0.81                   | 0.39                      |
| 94614    | 0.02                  | -                      | -                         |
| 94618    | 0.38                  | 0.48                   | -                         |
| 94619    | 0.22                  | 0.62                   | -                         |

**Table 2.14 Place of Residence-Zip Code of Recreators in the Three Study Areas (continued)**

| Zip Code | NCC Region<br>Recreators | Greater<br>Farallones NMS | northern portion<br>of MBNMS |
|----------|--------------------------|---------------------------|------------------------------|
| 94621    | 0.10                     | 0.87                      | 1.26                         |
| 94702    | 0.16                     | 0.26                      | -                            |
| 94703    | 0.45                     | 0.80                      | -                            |
| 94704    | 0.36                     | 0.20                      | 0.60                         |
| 94705    | 0.23                     | 0.16                      | 0.08                         |
| 94706    | 0.21                     | 0.16                      | -                            |
| 94707    | 0.32                     | 0.36                      | 0.56                         |
| 94708    | 0.14                     | 0.44                      | -                            |
| 94709    | 0.16                     | 0.16                      | -                            |
| 94710    | 0.02                     | -                         | -                            |
| 94720    | 0.01                     | 0.10                      | -                            |
| 94801    | 0.07                     | -                         | 0.08                         |
| 94803    | 0.42                     | -                         | 0.70                         |
| 94804    | 0.28                     | 0.04                      | -                            |
| 94805    | 0.05                     | -                         | 0.15                         |
| 94806    | 0.34                     | 0.48                      | 0.53                         |
| 94901    | 0.52                     | 0.41                      | 0.14                         |
| 94903    | 0.50                     | 1.20                      | 0.58                         |
| 94904    | 0.04                     | -                         | -                            |
| 94920    | 0.12                     | 0.45                      | -                            |
| 94924    | 0.01                     | -                         | -                            |
| 94925    | 0.12                     | -                         | 0.35                         |
| 94928    | 0.53                     | 0.33                      | -                            |
| 94930    | 0.04                     | -                         | -                            |
| 94939    | 0.06                     | 0.13                      | -                            |
| 94941    | 0.28                     | -                         | -                            |
| 94945    | 0.23                     | -                         | -                            |
| 94947    | 0.85                     | 1.52                      | -                            |
| 94949    | 0.27                     | 0.48                      | 0.33                         |
| 94952    | 0.42                     | 0.27                      | -                            |
| 94954    | 0.59                     | 0.98                      | -                            |
| 94957    | 0.05                     | -                         | -                            |
| 94960    | 0.20                     | -                         | 0.23                         |
| 94963    | 0.03                     | 0.30                      | -                            |
| 94965    | 0.10                     | 0.34                      | 0.42                         |
| 94966    | 0.02                     | -                         | -                            |
| 94976    | 0.12                     | -                         | -                            |
| 95003    | 0.30                     | 0.21                      | 1.02                         |

**Table 2.14 Place of Residence-Zip Code of Recreators in the Three Study Areas (continued)**

| Zip Code | NCC Region<br>Recreators | Greater<br>Farallones NMS | northern portion<br>of MBNMS |
|----------|--------------------------|---------------------------|------------------------------|
| 95005    | 0.01                     | -                         | 0.07                         |
| 95006    | 0.14                     | 0.08                      | -                            |
| 95008    | 0.61                     | 0.48                      | 0.50                         |
| 95010    | 0.03                     | -                         | -                            |
| 95013    | 0.11                     | -                         | 1.35                         |
| 95014    | 0.53                     | -                         | 1.67                         |
| 95018    | 0.09                     | -                         | 0.78                         |
| 95019    | 0.09                     | -                         | -                            |
| 95020    | 0.29                     | -                         | -                            |
| 95030    | 0.04                     | -                         | -                            |
| 95032    | 0.49                     | 1.53                      | 0.33                         |
| 95033    | 0.19                     | -                         | 0.09                         |
| 95035    | 0.46                     | 0.39                      | 0.57                         |
| 95037    | 0.14                     | 0.04                      | 0.29                         |
| 95046    | 0.03                     | -                         | -                            |
| 95050    | 0.50                     | 0.43                      | 1.69                         |
| 95051    | 0.43                     | 0.55                      | 0.75                         |
| 95052    | 0.02                     | -                         | -                            |
| 95053    | 0.06                     | -                         | 0.80                         |
| 95054    | 0.23                     | 0.05                      | 1.04                         |
| 95060    | 0.45                     | 0.59                      | 0.84                         |
| 95062    | 0.70                     | -                         | 3.33                         |
| 95064    | 0.04                     | -                         | -                            |
| 95065    | 0.10                     | -                         | 0.97                         |
| 95066    | 0.11                     | -                         | 0.86                         |
| 95070    | 0.46                     | -                         | -                            |
| 95073    | 0.04                     | -                         | 0.07                         |
| 95076    | 0.20                     | -                         | -                            |
| 95110    | 0.16                     | 0.18                      | -                            |
| 95111    | 0.16                     | 0.45                      | -                            |
| 95112    | 0.47                     | 0.37                      | -                            |
| 95115    | 0.02                     | -                         | -                            |
| 95116    | 0.08                     | -                         | 0.66                         |
| 95117    | 0.46                     | 0.27                      | -                            |
| 95118    | 0.12                     | 0.14                      | -                            |
| 95119    | 0.19                     | -                         | 0.15                         |
| 95120    | 0.39                     | 0.18                      | 1.52                         |
| 95121    | 0.33                     | 0.19                      | -                            |

**Table 2.14 Place of Residence-Zip Code of Recreators in the Three Study Areas (continued)**

| Zip Code | NCC Region<br>Recreators | Greater<br>Farallones NMS | northern portion<br>of MBNMS |
|----------|--------------------------|---------------------------|------------------------------|
| 95122    | 0.41                     | -                         | -                            |
| 95123    | 0.94                     | 1.09                      | 0.43                         |
| 95124    | 0.41                     | 0.29                      | 0.74                         |
| 95125    | 0.48                     | 0.29                      | -                            |
| 95126    | 0.47                     | -                         | 1.28                         |
| 95127    | 0.26                     | 0.85                      | -                            |
| 95128    | 0.29                     | -                         | 0.81                         |
| 95129    | 0.30                     | 0.34                      | 1.01                         |
| 95130    | 0.21                     | 0.33                      | -                            |
| 95131    | 0.28                     | -                         | -                            |
| 95132    | 0.27                     | -                         | 0.45                         |
| 95133    | 0.23                     | -                         | 1.45                         |
| 95134    | 0.52                     | 0.38                      | 0.65                         |
| 95135    | 0.18                     | 0.11                      | -                            |
| 95136    | 0.19                     | -                         | -                            |
| 95138    | 0.10                     | 0.69                      | -                            |
| 95139    | 0.05                     | -                         | 0.18                         |
| 95148    | 0.54                     | 1.25                      | -                            |
| 95401    | 0.46                     | 1.98                      | -                            |
| 95403    | 0.60                     | 0.71                      | 0.49                         |
| 95404    | 0.48                     | 0.26                      | 0.21                         |
| 95405    | 0.79                     | 1.94                      | -                            |
| 95407    | 0.22                     | 0.10                      | -                            |
| 95409    | 0.67                     | 0.30                      | -                            |
| 95412    | 0.02                     | -                         | -                            |
| 95420    | 0.01                     | -                         | -                            |
| 95425    | 0.17                     | 0.72                      | -                            |
| 95436    | 0.14                     | 0.88                      | -                            |
| 95437    | 0.27                     | 0.57                      | -                            |
| 95442    | 0.04                     | -                         | -                            |
| 95445    | 0.04                     | 0.29                      | -                            |
| 95446    | 0.10                     | -                         | -                            |
| 95448    | 0.12                     | 0.26                      | -                            |
| 95453    | 0.02                     | -                         | -                            |
| 95458    | 0.11                     | -                         | -                            |
| 95460    | 0.06                     | -                         | -                            |
| 95461    | 0.01                     | -                         | -                            |
| 95462    | 0.04                     | -                         | -                            |
| 95467    | 0.13                     | -                         | -                            |

**Table 2.14 Place of Residence-Zip Code of Recreators in the Three Study Areas (continued)**

| Zip Code | NCC Region<br>Recreators | Greater<br>Farallones NMS | northern portion<br>of MBNMS |
|----------|--------------------------|---------------------------|------------------------------|
| 95472    | 0.63                     | 0.72                      | -                            |
| 95476    | 0.45                     | -                         | -                            |
| 95482    | 0.12                     | -                         | -                            |
| 95485    | 0.02                     | -                         | -                            |
| 95490    | 0.08                     | -                         | -                            |
| 95492    | 0.30                     | 0.08                      | -                            |
| 95608    | 1.02                     | 1.32                      | -                            |
| 95610    | 0.14                     | -                         | -                            |
| 95620    | 0.02                     | -                         | -                            |
| 95621    | 0.57                     | 0.91                      | -                            |
| 95624    | 0.64                     | 0.40                      | -                            |
| 95626    | 0.01                     | 0.06                      | -                            |
| 95628    | 0.72                     | 1.27                      | 1.46                         |
| 95630    | 0.91                     | 1.95                      | 0.26                         |
| 95632    | 0.41                     | 2.23                      | -                            |
| 95655    | 0.04                     | 0.23                      | -                            |
| 95660    | 0.21                     | 0.10                      | -                            |
| 95662    | 0.17                     | -                         | -                            |
| 95670    | 0.46                     | 0.36                      | -                            |
| 95673    | 0.19                     | 0.65                      | -                            |
| 95683    | 0.01                     | -                         | -                            |
| 95687    | 0.39                     | 2.44                      | -                            |
| 95693    | 0.22                     | -                         | -                            |
| 95742    | 0.09                     | -                         | -                            |
| 95757    | 0.55                     | -                         | -                            |
| 95758    | 0.90                     | 0.17                      | -                            |
| 95811    | 0.07                     | -                         | -                            |
| 95814    | 0.54                     | 1.26                      | 0.35                         |
| 95815    | 0.17                     | -                         | -                            |
| 95816    | 0.26                     | 0.61                      | 0.22                         |
| 95817    | 0.14                     | -                         | -                            |
| 95818    | 0.78                     | 3.94                      | 0.28                         |
| 95819    | 0.40                     | -                         | -                            |
| 95820    | 0.10                     | 0.06                      | 0.29                         |
| 95821    | 0.16                     | 0.33                      | -                            |
| 95822    | 0.28                     | 0.49                      | 0.93                         |
| 95823    | 0.22                     | -                         | -                            |
| 95824    | 0.10                     | -                         | -                            |
| 95825    | 0.57                     | 1.41                      | -                            |

**Table 2.14 Place of Residence-Zip Code of Recreators in the Three Study Areas (continued)**

| Zip Code | NCC Region<br>Recreators | Greater<br>Farallones NMS | northern portion<br>of MBNMS |
|----------|--------------------------|---------------------------|------------------------------|
| 95826    | 0.63                     | -                         | -                            |
| 95827    | 0.33                     | -                         | 0.72                         |
| 95828    | 0.11                     | 0.08                      | -                            |
| 95829    | 0.28                     | 0.18                      | -                            |
| 95831    | 1.25                     | 0.94                      | 0.73                         |
| 95832    | 0.01                     | -                         | -                            |
| 95833    | 0.42                     | 0.18                      | 0.22                         |
| 95834    | 0.47                     | 1.24                      | 0.42                         |
| 95835    | 0.33                     | 0.83                      | 0.17                         |
| 95838    | 0.09                     | -                         | 1.09                         |
| 95841    | 0.4                      | 0.90                      | -                            |
| 95842    | 0.19                     | 0.36                      | 0.14                         |
| 95843    | 0.45                     | 1.10                      | 0.23                         |
| 95864    | 0.42                     | 0.59                      | -                            |
| 95866    | 0.04                     | -                         | -                            |

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Source: Ecotrust Survey of North Central California Region

**Place of Residence – County.** As with zip code, we did not do statistical tests on the differences in place of residence-county for recreators in the three study areas. Again, in the main report we presented the top five counties for each study area in the main body of the report and included the full results in an appendix table.

**Table 2.15 Place of Residence - County for Recreators in the Three Study Areas**

| County        | NCC Region<br>Recreators | Greater<br>Farallones NMS | northern portion<br>of MBNMS |
|---------------|--------------------------|---------------------------|------------------------------|
| Alameda       | 16.04                    | 12.38                     | 21.95                        |
| Contra Costa  | 12.57                    | 15.52                     | 9.88                         |
| Lake          | 0.28                     | -                         | -                            |
| Marin         | 3.57                     | 4.84                      | 2.06                         |
| Mendocino     | 0.57                     | 0.85                      | -                            |
| Napa          | 1.05                     | 1.59                      | 0.11                         |
| Sacramento    | 16.45                    | 24.15                     | 7.50                         |
| San Francisco | 11.61                    | 7.94                      | 7.81                         |
| San Mateo     | 10.15                    | 6.57                      | 12.73                        |
| Santa Clara   | 17.52                    | 13.13                     | 28.50                        |
| Santa Cruz    | 2.49                     | 0.88                      | 8.04                         |
| Solano        | 0.93                     | 2.60                      | 0.72                         |
| Sonoma        | 6.76                     | 9.54                      | 0.70                         |

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Source: Ecotrust Survey of North Central California Region

### 3. Recreation Use

Chen et al. (2013) provided estimates of total person-trips for the NCC Region for all visitors to the NCC Region including those who did not do any recreation activities. They also provided activity profiles for annual (last 12 months) activity participation by activity and activity participation on the last trip to the NCC Region. Last trip information is important for two reasons: 1) mapping of activity by type of activity was done for the last trip and 2) expenditures were obtained for the last trip.

We go much further in estimating recreation use. We used the mapped data to estimate the proportion of use in each sanctuary area. This requires the assumption that the last trip is representative of the distribution of activity across the entire year. Since the survey wasn't specifically designed to estimate the amount of use in each sanctuary area (i.e. we simply exploited existing data to estimate the amount of use in the two sanctuary areas), there is some unknown amount of error in estimation.

For activity participation, we estimated the annual and last trip participation rates for all activities and for non-consumptive recreation only. The reason for the latter is that when we estimate expenditures and economic impact for the two sanctuary areas, we limit it to non-consumptive recreation activities because we have previously estimated recreational fishing activity, expenditures and economic impact in another study (Leeworthy and Schwarzmann, 2015).

For each study area, we estimated the total annual amount of person-trips and person-days of visitation and the distribution of person-trips and person-days by type of recreation. A person-trip is one person taking a trip of any length (measured in days per trip). A person-day is a better measurement of intensity of activity and is defined as one person visiting or taking part in an activity for a day or any part of a day. To estimate person-trips and person-days by recreation activity, we take the estimates of total person-trips and person-days of recreation activity and distribute across activities using the percentage distribution of activities mapped in the geographic information system (GIS) with the percentages across activities adding to 100 percent to eliminate double-counting across activities, since a person could do multiple activities in a single day. Again, we do this for with and without fishing.

#### **Annual and Last Trip Activity Participation**

##### ***NCC Region***

The activity participation estimates provided here are in agreement with those provided in Chen et al. (2013) for the NCC Region. They are repeated here for easy comparison with the profiles for the two sanctuary areas. We departed from Chen et al. (2013) in that we formed nine activity groupings. Some of our groupings are single activity groups. We use the criterion that a group had to enough sample observations that we could develop separate activity maps. Diving was an exception to this since only 1.4% of respondents did it on their last trip for which activities were mapped. Table 3.1 summarizes the estimates for participation in the NCC Region.

Table 3.1 Activity Participation by Activity Group and Activity for the Last 12 months and Last Trip: NCC Region

| Activity Group/Activity  | Last 12 Months (%) | Last Trip (%) |
|--|--------------------|---------------|
| <b>Beach</b>   | <b>67.15</b>       | <b>47.59</b>  |
| Beach going (dog walking, kite-flying, jogging, etc.)                                | 65.10              | 44.56         |
| Collection of non-living resources/beachcombing (agates, fossils, driftwood)         | 15.10              | 10.31         |
| <b>Watching from Car</b>   | <b>36.57</b>       | <b>27.25</b>  |
| Sitting in your car watching the scene   | 36.57              | 27.25         |
| <b>Sightseeing</b>   | <b>76.99</b>       | <b>69.40</b>  |
| Scenic Enjoyment   | 76.99              | 69.40         |
| <b>Photography</b>   | <b>40.95</b>       | <b>37.71</b>  |
| Photography  | 40.95              | 37.71         |
| <b>Wildlife</b>  | <b>38.60</b>       | <b>28.31</b>  |
| Bird Watching  | 38.60              | 28.31         |
| <b>Shore Based</b>   | <b>39.26</b>       | <b>27.16</b>  |
| Hang gliding /parasailing  | 0.27               | 0.51          |
| Biking and hiking  | 39.24              | 26.83         |
| <b>Surface Water Sports</b>  | <b>19.10</b>       | <b>7.54</b>   |
| Kayaking in ocean or estuary/slough  | 4.95               | 1.27          |
| Kite boarding  | 0.59               | 0.36          |
| Using a personal water craft (jet skis)  | 1.26               | 0.26          |
| Power boating  | 2.40               | 0.74          |
| Sail boating   | 2.66               | 1.02          |
| Skim boarding  | 1.67               | 0.40          |
| Surfing (board, boogie, stand-up paddle, kayak)                                      | 3.67               | 1.15          |
| Surfing (tow-in)   | 0.43               | 0.14          |
| Swimming or body surfing   | 11.77              | 4.40          |
| Windsurfing  | 0.55               | 0.15          |
| <b>Diving</b>  | <b>3.72</b>        | <b>1.40</b>   |
| Diving (picking or spear fishing) from a boat  | 0.62               | 0.33          |
| Diving (picking or spear fishing) from shore   | 1.37               | 0.70          |
| Free-diving/snorkeling (from shore, from boat)                                       | 2.36               | 0.65          |
| Scuba diving (from shore, from boat)   | 1.91               | 0.27          |
| <b>Fishing</b>   | <b>13.14</b>       | <b>6.32</b>   |
| Fishing (hook and line) from a boat  | 4.78               | 1.71          |
| Fishing (hook and line) from pier/shore  | 7.21               | 2.46          |
| Trap/net from boat (crabbing)  | 0.92               | 0.38          |
| Trap/net from pier or shore (crabbing)   | 2.39               | 0.84          |
| Collecting/picking/harvesting sea life from shore (clamming, seaweed, mussels, etc.) | 4.32               | 2.78          |

Source: Ecotrust Survey of North Central California Region

## ***GFNMS***

The results for GFNMS are in Table 3.2.

Table 3.2 Activity Participation by Activity Group and Activity for the Last 12 months and Last Trip: GFNMS

| Activity Group/Activity   | Last 12 Months (%) | Last Trip (%) |
|---|--------------------|---------------|
| <b>Beach</b>  | <b>69.43</b>       | <b>55.73</b>  |
| Beach going (dog walking, kite-flying, jogging, etc.)                           | 66.76              | 51.32         |
| Collection of non-living resources/beachcombing<br>(agates, fossils, driftwood) | 21.86              | 15.88         |
| <b>Watching from Car</b>  | <b>38.46</b>       | <b>29.51</b>  |
| Sitting in your car watching the scene  | 38.46              | 29.51         |
| <b>Sightseeing</b>  | <b>71.33</b>       | <b>63.65</b>  |
| Scenic Enjoyment  | 71.33              | 63.65         |
| <b>Photography</b>  | <b>48.87</b>       | <b>46.76</b>  |
| Photography   | 48.87              | 46.76         |
| <b>Wildlife</b>   | <b>44.07</b>       | <b>39.40</b>  |
| Bird Watching   | 44.07              | 39.40         |
| <b>Shore Based</b>  | <b>39.03</b>       | <b>30.49</b>  |
| Hang gliding /parasailing   | 1.94               | 1.74          |
| Biking and hiking   | 38.96              | 30.31         |
| <b>Surface Water Sports</b>   | <b>47.88</b>       | <b>33.48</b>  |
| Kayaking in ocean or estuary/slough   | 16.47              | 7.86          |
| Kite boarding   | 3.08               | 2.01          |
| Using a personal water craft (jet skis)   | 4.33               | 2.22          |
| Power boating   | 8.99               | 4.57          |
| Sail boating  | 7.50               | 5.36          |
| Skim boarding   | 6.20               | 3.10          |
| Surfing (board, boogie, stand-up paddle, kayak)                                 | 9.94               | 5.41          |
| Surfing (tow-in)  | 2.41               | 1.27          |
| Swimming or body surfing  | 29.37              | 19.52         |
| Windsurfing   | 5.53               | 1.46          |
| <b>Diving</b>   | <b>14.17</b>       | <b>10.18</b>  |
| Diving (picking or spear fishing) from a boat                                   | 2.87               | 2.78          |
| Diving (picking or spear fishing) from shore                                    | 5.04               | 5.04          |
| Free-diving/snorkeling (from shore, from boat)                                  | 9.47               | 4.36          |
| Scuba diving (from shore, from boat)  | 4.66               | 1.94          |

**Table 3.2 Activity Participation by Activity Group and Activity for the Last 12 months and Last Trip:  
GFNMS (continued)**

| Activity Group/Activity   | Last 12 Months (%) | Last Trip (%) |
|---|--------------------|---------------|
| <b>Fishing</b>  | <b>38.83</b>       | <b>34.34</b>  |
| Fishing (hook and line) from a boat   | 16.86              | 10.73         |
| Fishing (hook and line) from pier/shore   | 21.64              | 13.29         |
| Trap/net from boat (crabbing)   | 4.79               | 3.12          |
| Trap/net from pier or shore (crabbing)  | 9.57               | 6.25          |
| Collecting/picking/harvesting sea life from shore<br>(clamming, seaweed, mussels, etc.) | 15.32              | 16.49         |

Source: Ecotrust Survey of North Central California Region

*northern portion of the MBNMS*

The results for the northern portion of MBNMS are in Table 3.3.

**Table 3.3 Activity Participation by Activity Group and Activity for the Last 12 months and the Last Trip:  
northern portion of MBNMS**

| Activity Group/Activity  | Last 12 Months (%) | Last Trip (%) |
|--|--------------------|---------------|
| <b>Beach</b>   | <b>73.85</b>       | <b>60.96</b>  |
| Beach going (dog walking, kite-flying, jogging, etc.)                        | 72.42              | 57.61         |
| Collection of non-living resources/beachcombing (agates, fossils, driftwood) | 16.66              | 12.03         |
| <b>Watching from Car</b>   | <b>42.36</b>       | <b>33.90</b>  |
| Sitting in your car watching the scene                                       | 42.36              | 33.90         |
| <b>Sightseeing</b>   | <b>76.05</b>       | <b>72.32</b>  |
| Scenic Enjoyment   | 76.05              | 72.32         |
| <b>Photography</b>   | <b>49.63</b>       | <b>48.61</b>  |
| Photography  | 49.63              | 48.61         |
| <b>Wildlife</b>  | <b>50.75</b>       | <b>39.07</b>  |
| Bird Watching  | 50.75              | 39.07         |
| <b>Shore Based</b>   | <b>40.29</b>       | <b>29.13</b>  |
| Hang gliding /parasailing  | 0.53               | 3.27          |
| Biking and hiking  | 40.02              | 26.02         |
| <b>Surface Water Sports</b>  | <b>31.59</b>       | <b>25.07</b>  |
| Kayaking in ocean or estuary/slough  | 5.85               | 3.19          |
| Kite boarding  | 0.57               | 0.00          |
| Using a personal water craft (jet skis)                                      | 0.79               | 0.68          |
| Power boating  | 3.19               | 0.91          |
| Sail boating   | 5.00               | 0.72          |
| Skim boarding  | 1.27               | 0.53          |
| Surfing (board, boogie, stand-up paddle, kayak)                              | 10.02              | 7.27          |
| Surfing (tow-in)   | 0.78               | 0.00          |
| Swimming or body surfing   | 19.84              | 14.99         |
| Windsurfing  | 1.38               | 0.53          |
| <b>Diving</b>  | <b>2.42</b>        | <b>1.56</b>   |
| Diving (picking or spear fishing) from a boat                                | 0.25               | 0.00          |
| Diving (picking or spear fishing) from shore                                 | 0.60               | 0.57          |
| Free-diving/snorkeling (from shore, from boat)                               | 1.37               | 1.40          |
| Scuba diving (from shore, from boat)   | 1.46               | 0.40          |

**Table 3.3 Activity Participation by Activity Group and Activity for the Last 12 months and the Last Trip: northern portion of MBNMS (continued)**

| Activity Group/Activity  | Last 12 Months (%) | Last Trip (%) |
|--|--------------------|---------------|
| <b>Fishing</b>   | <b>22.55</b>       | <b>13.47</b>  |
| Fishing (hook and line) from a boat  | 6.31               | 1.76          |
| Fishing (hook and line) from pier/shore  | 11.23              | 4.44          |
| Trap/net from boat (crabbing)  | 1.40               | 0.78          |
| Trap/net from pier or shore (crabbing)   | 1.01               | 0.17          |
| Collecting/picking/harvesting sea life from shore (clamming, seaweed, mussels, etc.) | 10.14              | 6.49          |

Source: Ecotrust Survey of North Central California Region

### **Total Person-trips and Person-days**

#### ***NCC Region – All Visitors***

*Person-trips - All Visitors.* All estimation here uses as its starting point the estimates of person-trips for all visitors to the NCC Region found in Chen et al. (2013):

6,943,138 Study Area Population 18 years old or older that visited the NCC Region Last 12 months

x

3.20 mean number of trips to the NCC Region Last 12 month

= 22,197,663 Total Person-trips by All Visitors to the NCC Region Last 12 months

x .7766 Percent of All Visitors that are Residents of the Study Area

= 17,238,705 Resident Person-trips – All Visitors

22,197,663 – 17,238,705 = 4,958,958 Non-Resident Person-trips – All Visitors

Chen et al. (2013) estimated that 6,943,138 people 18 years of age and older visited the NCC Region in 2011. They estimated that the average person took 3.20 trips per year to the NCC Region (includes those who did not visit as zero trips) yielding an estimate of 22,197,663 person-trips for all visitors to the NCC Region in 2011. We then defined “Residents” of the NCC Region as anyone who lived in the area we defined as our study area for estimating economic impact (see Figure 1.3). For the NCC Region our estimate was 77.66%. This was multiplied by the estimate of person-trips for all visitors to yield an estimate of 17,238,705 resident person-trips. Non-resident person-trips were then the difference between total person-trips and resident person-trips. These estimates are important because they are used to extrapolate expenditures per person-trip by resident status to total expenditures in Chapter 5.

*Person-days – All Visitors.* Person-trips derived above were then used to estimate person-days by multiplying by the mean length of trips measured in days by residential status. The mean days per trip were 2.09 for “All Visitors”, 2.01 for “Resident Visitors” and 2.37 for “Non-resident Visitors”. This yielded estimates for person-days for “All Visitors” of 46,393,116; 34,649,797

person-days for “*Resident Visitors*”; and 11,743,319 person-days for “*Non-Resident Visitors*” to the NCC Region.

### ***NCC Region – Recreating Visitors***

We estimated person-trips and person-days for those who visited the NCC region and did at least one recreation activity there in the past 12 months. The estimates of total person-trips for those who recreated were important as control totals for distributing person-trips by activity/activity group. The estimates for person-days served as control totals for distributing person-days by activity/activity group and to normalize total expenditures by spending category to expenditures per person-day for Chapter 4. These estimates can be used for assessing the impacts on the local economies from oil spills, chemical spills or other hazards that affect use or in assessing changes in rules and regulations.

*Person-trips – Recreating Visitors.* We first estimated the percent of all visitors that took at least one trip to the NCC region in the last 12 months that did at least one recreation activity. We estimated that 60.03% of all visitors to the NCC Region did at least one recreation activity there in the past 12 month. This was then multiplied by the estimate of 6,943,138 people who visited the NCC Region to yield an estimate of 4,167,966 people age 18 years of age and older that visited the NCC Region and did at least one recreation activity there in the past 12 month. On average, these visitors made 5.16 trips per year yielding an estimate of 21,506,705 person-trips for recreation. Table 3.4 includes the estimates of person-trips by activity and activity group for all activities, including fishing.

6,943,138 Number of people 18 years of age or older that Visited the NCC Region in the past 12 months  
x  
0.6003 The percent of all visitors to the NCC Region that did at least one recreation activity in past 12 months  
= 4,167,966 Number of Visitors 18 years of age and older that did recreation in the past 12 months  
x  
5.16 Mean number of trips where at least one recreation activity was done in the last 12 month  
= 21,506,705 Total number of person-trips where at least one recreation activity was done in the past 12 months

*Person-days – Recreating Visitors.* The person-trips estimated above were then used to estimate person-days for the recreating visitors. For all recreating visitors, the mean length of trip was 1.75 days. Multiplying the mean days per trip by the person-trips yielded estimates of 37,636,734 person-days for all recreating visitors. Table 3.5 includes the estimates of person-days by activity and activity group for all activities, including fishing.

### ***NCC Region – Recreating Visitors (Non-Consumptive Recreation Only)***

Since we restricted our estimates of person-trips and person-days for the two sanctuary areas to non-consumptive recreation activities only, we also developed comparable estimates for the NCC Region. To do this required using the last trip information in the GIS to estimate the percent of trips that were for non-consumptive recreation and estimating the proportion of trips for fishing and subtracting it from the totals for person-trips and person-days.

*Person-trips Recreating Visitors (Non-Consumptive Recreation Only).* We estimated that 98.87% of all person-trips by recreating visitors to the NCC Region where non-consumptive recreation was done yielding an estimate of 21,221,593 person-trips (Table 3.4). Next we estimated that 78.72% of the person-trips that were done by residents of the economic impact study area were done in the NCC Region yielding an estimate of 16,705,638 person-trips for residents and 4,515,955 person-trips for non-residents. These estimates can then be used to estimate the relative proportion of non-consumptive recreation activity in the NCC Region which is done in each of the sanctuary areas. The estimates can also be used as control totals for distributing person-trips by activity/activity group and for extrapolating expenditures per person-trip to total expenditures for estimating economic impact in Chapter 5. Table 3.6 provides the distribution by activity and activity group for person-trips for only non-consumptive recreation. The estimates of person-trips are the same as in Table 3.4, the difference is the percentages. The percentages are the distribution across non-consumptive recreation adding to 100 percent.

*Person-days Recreating Visitors (Non-Consumptive Recreation Only).* Using our estimates of person-trips above, we multiply these by estimates of the mean number of days per trip. All non-consumptive recreators had an estimated 1.75 days per trip; resident non-consumptive recreators had an estimated mean number of days per trip of 1.60; and non-resident non-consumptive recreators had a mean number of days per trip of 2.30. This yielded estimates of 37,137,788 person-days for all non-consumptive recreation in the NCC Region. Residents of the economic impact study area for the NCC Region had an estimated 26,729,021 person-days, and non-residents had 10,408,767. These person-day estimates are used as control totals for estimating the person-days by activity/activity group and for normalizing total expenditures on a per person-day basis in Chapter 4. Table 3.7 provides the distribution by activity and activity group for person-days for only non-consumptive recreation. The estimates of person-days are the same as in Table 3.5, the difference is the percentages. The percentages are the distribution across non-consumptive recreation adding to 100 percent.

### ***All Sanctuary Areas in NCC Region – All Recreating Visitors***

*Person-trips All Recreating Visitors.* We estimated the proportion of all recreating visitors to both sanctuaries using the proportion of activity points in the GIS that took place in both sanctuary areas at 10.52%. This translated into 2,262,505 person-trips. More than half of these person-trips (56.33%) were in the GFNMS and 43.67% in the northern portion of MBNMS. This translated into 1,274,469 person-trips in the GFNMS and 988,036 person-trips in the northern portion of MBNMS. These estimates are only used as control totals for estimating person-trips by recreation activity/activity group and for estimating the proportion of NCC Region activity done in sanctuary areas. Table 3.4 provides the distribution by activity and activity group to

person-trips. Table 3.4 includes the estimates of person-trips by activity and activity group for all activities, including fishing. These estimates are only provided for comparison with those of the NCC Region and are not used in estimating the economic impact of these activities on the local area economies.

*Person-days All Recreating Visitors.* Using the person-trips estimated above and multiplying by the mean number of days per trip for all recreating visitors for each sanctuary, we estimated total person-days by sanctuary area. On average, recreating visitors to the GFNMS spent 2.48 days per trip, while those who visited the northern portion of MBNMS took 1.63 days per trip. This yielded an estimate of 3,160,683 person-days for GFNMS and 1,610,499 person-days for the northern portion of MBNMS, and an estimate of 4,771,182 person-days across both sanctuary areas. These estimates were used as control totals in estimating person-days by activity/activity group and the proportion of NCC Region activity done in the sanctuary areas. Table 3.5 provides the distribution by activity and activity group for person-days. These estimates are not used to normalize expenditures on a per person-day basis since they include consumptive recreation (Fishing).

#### ***All Sanctuary Areas in NCC Region – Non-Consumptive Recreation Only***

For both sanctuary areas, non-consumptive recreation was the main focus for estimating the economic impact associated with spending while undertaking these activities. Estimates of non-consumptive recreation use drive this estimation. Non-consumptive recreation was estimated by simply subtracting the fishing numbers from the total recreation numbers.

*Person-trips Non-Consumptive Recreation Only.* For the GFNMS, we estimated 1,104,951 person-trips, while for the northern portion of MBNMS the estimate was 938,711 person-trips (Table 3.4 and Table 3.6).

*Person-days Non-Consumptive Recreation Only.* For the GFNMS, we estimate 2,740,278 person-days, while for the northern portion of MBNMS the estimate was 1,530,100 person-days (Table 3.5 and Table 3.7).

**Table 3.4 Person-trips by Activity/Activity Group for the Three Study Areas**

| Activity Group/Activity  | NCC Region       |              | GFNMS          |              | northern portion of MBNMS |              |
|--|------------------|--------------|----------------|--------------|---------------------------|--------------|
|  | Person-Trips     | (%)          | Person-Trips   | (%)          | Person-Trips              | (%)          |
| <b>Beach</b>   | <b>4,088,663</b> | <b>19.01</b> | <b>174,141</b> | <b>13.66</b> | <b>175,719</b>            | <b>17.78</b> |
| Beach going (dog walking, kite-flying, jogging, etc.)                        | 3,402,852        | 15.82        | 146,402        | 11.49        | 141,809                   | 14.35        |
| Collection of non-living resources/beachcombing (agates, fossils, driftwood) | 685,810          | 3.19         | 27,739         | 2.18         | 33,911                    | 3.43         |
| <b>Watching from Car</b>   | <b>1,792,354</b> | <b>8.33</b>  | <b>43,150</b>  | <b>3.39</b>  | <b>66,280</b>             | <b>6.71</b>  |
| Sitting in your car watching the scene                                       | 1,792,354        | 8.33         | 43,150         | 3.39         | 66,280                    | 6.71         |
| <b>Sightseeing</b>   | <b>6,465,111</b> | <b>30.06</b> | <b>231,161</b> | <b>18.14</b> | <b>245,082</b>            | <b>24.80</b> |
| Scenic Enjoyment   | 6,465,111        | 30.06        | 231,161        | 18.14        | 245,082                   | 24.80        |
| <b>Photography</b>   | <b>3,552,344</b> | <b>16.52</b> | <b>146,402</b> | <b>11.49</b> | <b>155,681</b>            | <b>15.76</b> |
| Photography  | 3,552,344        | 16.52        | 146,402        | 11.49        | 155,681                   | 15.76        |
| <b>Wildlife</b>  | <b>2,431,930</b> | <b>11.31</b> | <b>110,957</b> | <b>8.71</b>  | <b>103,274</b>            | <b>10.45</b> |
| Bird Watching  | 2,431,930        | 11.31        | 110,957        | 8.71         | 103,274                   | 10.45        |
| <b>Shore Based</b>   | <b>2,299,391</b> | <b>10.69</b> | <b>101,711</b> | <b>7.98</b>  | <b>81,694</b>             | <b>8.27</b>  |
| Hang gliding /parasailing  | 16,953           | 0.08         | 0              | 0.00         | 1,541                     | 0.16         |
| Biking and hiking  | 2,282,439        | 10.61        | 101,711        | 7.98         | 80,153                    | 8.11         |
| <b>Surface Water Sports</b>  | <b>513,202</b>   | <b>2.39</b>  | <b>246,572</b> | <b>19.35</b> | <b>104,815</b>            | <b>10.61</b> |
| Kayaking in ocean or estuary/slough  | 63,187           | 0.29         | 47,773         | 3.75         | 7,707                     | 0.78         |
| Kite boarding  | 12,329           | 0.06         | 6,164          | 0.48         | 0                         | 0.00         |
| Using a personal water craft (jet skis)                                      | 20,035           | 0.09         | 13,870         | 1.09         | 1,541                     | 0.16         |
| Powerboating   | 44,693           | 0.21         | 20,034         | 1.57         | 4,624                     | 0.47         |
| Sail boating   | 55,481           | 0.26         | 27,739         | 2.18         | 4,624                     | 0.47         |
| Skim boarding  | 21,576           | 0.10         | 15,411         | 1.21         | 0                         | 0.00         |
| Surfing (board, boogie, stand-up paddle, kayak)                              | 70,893           | 0.33         | 16,952         | 1.33         | 23,121                    | 2.34         |
| Surfing (tow-in)   | 4,623            | 0.02         | 1,541          | 0.12         | 0                         | 0.00         |
| Swimming or body surfing   | 211,137          | 0.98         | 90,923         | 7.13         | 63,197                    | 6.40         |
| Windsurfing  | 9,247            | 0.04         | 6,164          | 0.48         | 0                         | 0.00         |

**Table 3.4 Person-trips by Activity/Activity Group for the Three Study Areas (continued)**

| Activity Group/Activity   | NCC Region        |             | GFNMS            |              | northern portion of MBNMS |             |
|---|-------------------|-------------|------------------|--------------|---------------------------|-------------|
|   | Person-Trips      | (%)         | Person-Trips     | (%)          | Person-Trips              | (%)         |
| <b>Diving</b>   | <b>78,598</b>     | <b>0.37</b> | <b>50,855</b>    | <b>3.99</b>  | <b>6,166</b>              | <b>0.62</b> |
| Diving (picking or spear fishing) from a boat   | 12,329            | 0.06        | 6,164            | 0.48         | 0                         | 0.00        |
| Diving (picking or spear fishing) from shore  | 27,741            | 0.13        | 21,575           | 1.69         | 1,541                     | 0.16        |
| Free-diving/snorkeling (from shore, from boat)  | 26,199            | 0.12        | 16,952           | 1.33         | 3,083                     | 0.31        |
| Scuba diving (from shore, from boat)  | 12,329            | 0.06        | 6,164            | 0.48         | 1,541                     | 0.16        |
| <b>Fishing</b>  | <b>285,112</b>    | <b>1.33</b> | <b>169,518</b>   | <b>13.30</b> | <b>49,325</b>             | <b>4.99</b> |
| Fishing (hook and line) from a boat   | 50,858            | 0.24        | 38,527           | 3.02         | 6,166                     | 0.62        |
| Fishing (hook and line) from pier/shore   | 80,140            | 0.37        | 35,445           | 2.78         | 15,414                    | 1.56        |
| Trap/net from boat (crabbing)   | 18,494            | 0.09        | 10,788           | 0.85         | 3,083                     | 0.31        |
| Trap/net from pier or shore (crabbing)  | 35,446            | 0.16        | 20,034           | 1.57         | 3,083                     | 0.31        |
| Collecting/picking/harvesting sea life from shore<br>(clamming, seaweed, mussels, etc.) | 100,175           | 0.47        | 64,725           | 5.08         | 21,580                    | 2.18        |
| <b>Total with Fishing</b>   | <b>21,506,705</b> | <b>100</b>  | <b>1,274,469</b> | <b>100</b>   | <b>988,036</b>            | <b>100</b>  |
| <b>Total without Fishing</b>  | <b>21,221,593</b> |             | <b>1,104,951</b> |              | <b>938,711</b>            |             |

Source: Ecotrust Survey of North Central California Region

**Table 3.5 Person-days by Activity/Activity Group for the Three Study Areas**

| Activity Group/Activity  | <i>NCC Region</i> |              | <i>GFNMS</i>   |              | <i>northern portion of MBNMS</i> |              |
|--|-------------------|--------------|----------------|--------------|----------------------------------|--------------|
|  | Person-Days       | (%)          | Person-Days    | (%)          | Person-Days                      | (%)          |
| <b>Beach</b>   | <b>7,155,160</b>  | <b>19.01</b> | <b>431,871</b> | <b>13.66</b> | <b>286,423</b>                   | <b>17.78</b> |
| Beach going (dog walking, kite-flying, jogging, etc.)                        | 5,954,992         | 15.82        | 363,077        | 11.49        | 231,148                          | 14.35        |
| Collection of non-living resources/beachcombing (agates, fossils, driftwood) | 1,200,168         | 3.19         | 68,794         | 2.18         | 55,275                           | 3.43         |
| <b>Watching from Car</b>   | <b>3,136,619</b>  | <b>8.33</b>  | <b>107,012</b> | <b>3.39</b>  | <b>108,037</b>                   | <b>6.71</b>  |
| Sitting in your car watching the scene                                       | 3,136,619         | 8.33         | 107,012        | 3.39         | 108,037                          | 6.71         |
| <b>Sightseeing</b>   | <b>11,312,087</b> | <b>30.06</b> | <b>573,280</b> | <b>18.14</b> | <b>399,484</b>                   | <b>24.80</b> |
| Scenic Enjoyment   | 11,313,945        | 30.06        | 573,280        | 18.14        | 399,484                          | 24.80        |
| <b>Photography</b>   | <b>6,216,601</b>  | <b>16.52</b> | <b>363,077</b> | <b>11.49</b> | <b>253,760</b>                   | <b>15.76</b> |
| Photography  | 6,216,601         | 16.52        | 363,077        | 11.49        | 253,760                          | 15.76        |
| <b>Wildlife</b>  | <b>4,255,877</b>  | <b>11.31</b> | <b>275,174</b> | <b>8.71</b>  | <b>168,336</b>                   | <b>10.45</b> |
| Bird Watching  | 4,255,877         | 11.31        | 275,174        | 8.71         | 168,336                          | 10.45        |
| <b>Shore Based</b>   | <b>4,023,935</b>  | <b>10.69</b> | <b>252,243</b> | <b>7.98</b>  | <b>133,161</b>                   | <b>8.27</b>  |
| Hang gliding /parasailing  | 29,667            | 0.08         | 0              | 0.00         | 2,512                            | 0.16         |
| Biking and hiking  | 3,994,268         | 10.61        | 252,243        | 7.98         | 130,649                          | 8.11         |
| <b>Surface Water Sports</b>  | <b>898,103</b>    | <b>2.39</b>  | <b>611,499</b> | <b>19.35</b> | <b>170,849</b>                   | <b>10.61</b> |
| Kayaking in ocean or estuary/slough  | 110,577           | 0.29         | 118,478        | 3.75         | 12,562                           | 0.78         |
| Kite boarding  | 21,576            | 0.06         | 15,287         | 0.48         | 0                                | 0.00         |
| Using a personal water craft (jet skis)                                      | 35,061            | 0.09         | 34,397         | 1.09         | 2,512                            | 0.16         |
| Powerboating   | 78,213            | 0.21         | 49,684         | 1.57         | 7,537                            | 0.47         |
| Sail boating   | 97,092            | 0.26         | 68,794         | 2.18         | 7,537                            | 0.47         |
| Skim boarding  | 37,758            | 0.10         | 38,219         | 1.21         | 0                                | 0.00         |
| Surfing (board, boogie, stand-up paddle, kayak)                              | 124,062           | 0.33         | 42,041         | 1.33         | 37,687                           | 2.34         |
| Surfing (tow-in)   | 8,091             | 0.02         | 3,822          | 0.12         | 0                                | 0.00         |
| Swimming or body surfing   | 369,490           | 0.98         | 225,490        | 7.13         | 103,012                          | 6.40         |
| Windsurfing  | 16,182            | 0.04         | 15,287         | 0.48         | 0                                | 0.00         |

**Table 3.5 Person-days by Activity/Activity Group for the Three Study Areas (continued)**

| Activity Group/Activity   | <i>NCC Region</i> |               | <i>GFNMS</i>     |               | <i>northern portion of MBNMS</i> |               |
|---|-------------------|---------------|------------------|---------------|----------------------------------|---------------|
|   | Person-Days       | (%)           | Person-Days      | (%)           | Person-Days                      | (%)           |
| <b>Diving</b>   | <b>137,547</b>    | <b>0.37</b>   | <b>126,122</b>   | <b>3.99</b>   | <b>10,050</b>                    | <b>0.62</b>   |
| Diving (picking or spear fishing) from a boat   | 21,576            | 0.06          | 15,287           | 0.48          | 0                                | 0.00          |
| Diving (picking or spear fishing) from shore  | 48,546            | 0.13          | 53,506           | 1.69          | 2,512                            | 0.16          |
| Free-diving/snorkeling (from shore, from boat)  | 45,849            | 0.12          | 42,041           | 1.33          | 5,025                            | 0.31          |
| Scuba diving (from shore, from boat)  | 21,576            | 0.06          | 15,287           | 0.48          | 2,512                            | 0.16          |
| <b>Fishing</b>  | <b>500,804</b>    | <b>1.33</b>   | <b>420,405</b>   | <b>13.30</b>  | <b>80,399</b>                    | <b>4.99</b>   |
| Fishing (hook and line) from a boat   | 405,597           | 0.28          | 95,547           | 3.02          | 10,050                           | 0.62          |
| Fishing (hook and line) from pier/shore   | 113,028           | 0.30          | 87,903           | 2.78          | 25,125                           | 1.56          |
| Trap/net from boat (crabbing)   | 31,778            | 0.08          | 26,753           | 0.85          | 5,025                            | 0.31          |
| Trap/net from pier or shore (crabbing)  | 54,709            | 0.15          | 49,684           | 1.57          | 5,025                            | 0.31          |
| Collecting/picking/harvesting sea life from shore<br>(clamming, seaweed, mussels, etc.) | 195,693           | 0.52          | 160,518          | 5.08          | 35,175                           | 2.18          |
| <b>Total with Fishing</b>   | <b>37,636,734</b> | <b>100.00</b> | <b>3,160,683</b> | <b>100.00</b> | <b>1,610,499</b>                 | <b>100.00</b> |
| <b>Total without Fishing</b>  | <b>37,135,788</b> |               | <b>2,740,278</b> |               | <b>1,530,100</b>                 |               |

Source: Ecotrust Survey of North Central California Region

**Table 3.6 Person-trips by Activity/Activity Group for the Three Study Areas: Non-Consumptive Recreation Only**

| Activity Group/Activity   | <i>NCC Region</i> |              | <i>GFNMS</i>   |              | <i>northern portion of MBNMS</i> |              |
|---|-------------------|--------------|----------------|--------------|----------------------------------|--------------|
|   | Person-Trips      | (%)          | Person-Trips   | (%)          | Person-Trips                     | (%)          |
| <b>Beach</b>  | <b>4,088,663</b>  | <b>19.27</b> | <b>174,141</b> | <b>15.76</b> | <b>175,719</b>                   | <b>18.72</b> |
| Beach going (dog walking, kite-flying, jogging, etc.)                           | 3,402,852         | 16.03        | 146,402        | 13.25        | 141,809                          | 15.11        |
| Collection of non-living resources/beachcombing<br>(agates, fossils, driftwood) | 685,810           | 3.23         | 27,739         | 2.51         | 33,911                           | 3.61         |
| <b>Watching from Car</b>  | <b>1,792,354</b>  | <b>8.45</b>  | <b>43,150</b>  | <b>3.91</b>  | <b>66,280</b>                    | <b>7.06</b>  |
| Sitting in your car watching the scene  | 1,792,354         | 8.45         | 43,150         | 3.91         | 66,280                           | 7.06         |
| <b>Sightseeing</b>  | <b>6,465,111</b>  | <b>30.46</b> | <b>231,161</b> | <b>20.92</b> | <b>245,082</b>                   | <b>26.11</b> |
| Scenic Enjoyment  | 6,465,111         | 30.46        | 231,161        | 20.92        | 245,082                          | 26.11        |
| <b>Photography</b>  | <b>3,552,344</b>  | <b>16.74</b> | <b>146,402</b> | <b>13.25</b> | <b>155,681</b>                   | <b>16.58</b> |
| Photography   | 3,552,344         | 16.74        | 146,402        | 13.25        | 155,681                          | 16.58        |
| <b>Wildlife</b>   | <b>2,431,930</b>  | <b>11.46</b> | <b>110,957</b> | <b>10.04</b> | <b>103,274</b>                   | <b>11.00</b> |
| Bird Watching   | 2,431,930         | 11.46        | 110,957        | 10.04        | 103,274                          | 11.00        |
| <b>Shore Based</b>  | <b>2,299,391</b>  | <b>10.84</b> | <b>101,711</b> | <b>9.21</b>  | <b>81,694</b>                    | <b>8.70</b>  |
| Hang gliding /parasailing   | 16,953            | 0.08         | 0              | 0.00         | 1,541                            | 0.16         |
| Biking and hiking   | 2,282,439         | 10.76        | 101,711        | 9.21         | 80,153                           | 8.54         |
| <b>Surface Water Sports</b>   | <b>513,202</b>    | <b>2.42</b>  | <b>246,572</b> | <b>22.32</b> | <b>104,815</b>                   | <b>11.17</b> |
| Kayaking in ocean or estuary/slough   | 63,187            | 0.30         | 47,773         | 4.32         | 7,707                            | 0.82         |
| Kite boarding   | 12,329            | 0.06         | 6,164          | 0.56         | 0                                | 0.00         |
| Using a personal water craft (jet skis)   | 20,035            | 0.09         | 13,870         | 1.26         | 1,541                            | 0.16         |
| Powerboating  | 44,693            | 0.21         | 20,034         | 1.81         | 4,624                            | 0.49         |
| Sail boating  | 55,481            | 0.26         | 27,739         | 2.51         | 4,624                            | 0.49         |
| Skim boarding   | 21,576            | 0.10         | 15,411         | 1.39         | 0                                | 0.00         |
| Surfing (board, boogie, stand-up paddle, kayak)                                 | 70,893            | 0.33         | 16,952         | 1.53         | 23,121                           | 2.46         |
| Surfing (tow-in)  | 4,623             | 0.02         | 1,541          | 0.14         | 0                                | 0.00         |
| Swimming or body surfing  | 211,137           | 0.99         | 90,923         | 8.23         | 63,197                           | 6.73         |
| Windsurfing   | 9,247             | 0.04         | 6,164          | 0.56         | 0                                | 0.00         |

**Table 3.6 Person-trips by Activity/Activity Group for the Three Study Areas: Non-Consumptive Recreation Only (continued)**

| Activity Group/Activity                        | <i>NCC Region</i> |               | <i>GFNMS</i>     |               | <i>northern portion of MBNMS</i> |               |
|--|-------------------|---------------|------------------|---------------|----------------------------------|---------------|
|  | Person-Trips      | (%)           | Person-Trips     | (%)           | Person-Trips                     | (%)           |
| <b>Diving</b>                                  | <b>78,598</b>     | <b>0.37</b>   | <b>50,855</b>    | <b>4.60</b>   | <b>6,166</b>                     | <b>0.66</b>   |
| Diving (picking or spear fishing) from a boat  | 12,329            | 0.06          | 6,164            | 0.56          | 0                                | 0.00          |
| Diving (picking or spear fishing) from shore   | 27,741            | 0.13          | 21,575           | 1.95          | 1,541                            | 0.16          |
| Free-diving/snorkeling (from shore, from boat) | 26,199            | 0.12          | 16,952           | 1.53          | 3,083                            | 0.33          |
| Scuba diving (from shore, from boat)           | 12,329            | 0.06          | 6,164            | 0.56          | 1,541                            | 0.16          |
| <b>Total Non-Consumptive</b>                   | <b>21,221,593</b> | <b>100.00</b> | <b>1,104,951</b> | <b>100.00</b> | <b>938,711</b>                   | <b>100.00</b> |

Source: Ecotrust Survey of North Central California Region

**Table 3.7 Person-days by Activity/Activity Group for the Three Study Areas: Non-Consumptive Recreation Only**

| Activity Group/Activity  | <i>NCC Region</i> |              | <i>GFNMS</i>   |              | <i>northern portion of MBNMS</i> |              |
|--|-------------------|--------------|----------------|--------------|----------------------------------|--------------|
|  | Person-Days       | (%)          | Person-Days    | (%)          | Person-Days                      | (%)          |
| <b>Beach</b>   | <b>7,155,160</b>  | <b>19.27</b> | <b>431,871</b> | <b>15.76</b> | <b>286,423</b>                   | <b>18.72</b> |
| Beach going (dog walking, kite-flying, jogging, etc.)                        | 5,954,992         | 16.03        | 363,077        | 13.25        | 231,148                          | 15.11        |
| Collection of non-living resources/beachcombing (agates, fossils, driftwood) | 1,200,168         | 3.23         | 68,794         | 2.51         | 55,275                           | 3.61         |
| <b>Watching from Car</b>   | <b>3,136,619</b>  | <b>8.45</b>  | <b>107,012</b> | <b>3.91</b>  | <b>108,037</b>                   | <b>7.06</b>  |
| Sitting in your car watching the scene                                       | 3,136,619         | 8.45         | 107,012        | 3.91         | 108,037                          | 7.06         |
| <b>Sightseeing</b>   | <b>11,312,087</b> | <b>30.46</b> | <b>573,280</b> | <b>20.92</b> | <b>399,484</b>                   | <b>26.11</b> |
| Scenic Enjoyment   | 11,313,945        | 30.46        | 573,280        | 20.92        | 399,484                          | 26.11        |
| <b>Photography</b>   | <b>6,216,601</b>  | <b>16.74</b> | <b>363,077</b> | <b>13.25</b> | <b>253,760</b>                   | <b>16.58</b> |
| Photography  | 6,216,601         | 16.74        | 363,077        | 13.25        | 253,760                          | 16.58        |
| <b>Wildlife</b>  | <b>4,255,877</b>  | <b>11.46</b> | <b>275,174</b> | <b>10.04</b> | <b>168,336</b>                   | <b>11.00</b> |
| Bird Watching  | 4,255,877         | 11.46        | 275,174        | 10.04        | 168,336                          | 11.00        |
| <b>Shore Based</b>   | <b>4,023,935</b>  | <b>10.84</b> | <b>252,243</b> | <b>9.21</b>  | <b>133,161</b>                   | <b>8.70</b>  |
| Hang gliding /parasailing  | 29,667            | 0.08         | 0              | 0.00         | 2,512                            | 0.16         |
| Biking and hiking  | 3,994,268         | 10.76        | 252,243        | 9.21         | 130,649                          | 8.54         |
| <b>Surface Water Sports</b>  | <b>898,103</b>    | <b>2.42</b>  | <b>611,499</b> | <b>22.32</b> | <b>170,849</b>                   | <b>11.17</b> |
| Kayaking in ocean or estuary/slough  | 110,577           | 0.30         | 118,478        | 4.32         | 12,562                           | 0.82         |
| Kite boarding  | 21,576            | 0.06         | 15,287         | 0.56         | 0                                | 0.00         |
| Using a personal water craft (jet skis)                                      | 35,061            | 0.09         | 34,397         | 1.26         | 2,512                            | 0.16         |
| Powerboating   | 78,213            | 0.21         | 49,684         | 1.81         | 7,537                            | 0.49         |
| Sail boating   | 97,092            | 0.26         | 68,794         | 2.51         | 7,537                            | 0.49         |
| Skim boarding  | 37,758            | 0.10         | 38,219         | 1.39         | 0                                | 0.00         |
| Surfing (board, boogie, stand-up paddle, kayak)                              | 124,062           | 0.33         | 42,041         | 1.53         | 37,687                           | 2.46         |
| Surfing (tow-in)   | 8,091             | 0.02         | 3,822          | 0.14         | 0                                | 0.00         |
| Swimming or body surfing   | 369,490           | 0.99         | 225,490        | 8.23         | 103,012                          | 6.73         |
| Windsurfing  | 16,182            | 0.04         | 15,287         | 0.56         | 0                                | 0.00         |

**Table 3.7 Person-days by Activity/Activity Group for the Three Study Areas: Non-Consumptive Recreation Only (continued)**

| Activity Group/Activity                        | <i>NCC Region</i> |               | <i>GFNMS</i>     |               | <i>northern portion of MBNMS</i> |               |
|--|-------------------|---------------|------------------|---------------|----------------------------------|---------------|
|  | Person-Days       | (%)           | Person-Days      | (%)           | Person-Days                      | (%)           |
| <b>Diving</b>                                  | <b>137,547</b>    | <b>0.37</b>   | <b>126,122</b>   | <b>4.60</b>   | <b>10,050</b>                    | <b>0.66</b>   |
| Diving (picking or spear fishing) from a boat  | 21,576            | 0.06          | 15,287           | 0.56          | 0                                | 0.00          |
| Diving (picking or spear fishing) from shore   | 48,546            | 0.13          | 53,506           | 1.95          | 2,512                            | 0.16          |
| Free-diving/snorkeling (from shore, from boat) | 45,849            | 0.12          | 42,041           | 1.53          | 5,025                            | 0.33          |
| Scuba diving (from shore, from boat)           | 21,576            | 0.06          | 15,287           | 0.56          | 2,512                            | 0.16          |
| <b>Total Non-Consumptive</b>                   | <b>37,135,788</b> | <b>100.00</b> | <b>2,740,278</b> | <b>100.00</b> | <b>1,530,100</b>                 | <b>100.00</b> |

Source: Ecotrust Survey of North Central California Region

## 4. Expenditures

The first step in estimating expenditures was to replicate the estimates of expenditures per person per trip in Chen et al. (2013). In our first runs we were not able to replicate all the estimates. After consulting with the authors, we learned they eliminated some outliers. We conducted our own outlier analysis and after completing it, we were able to replicate, within rounding error, all the estimates except for three expenditure categories. Overall, the difference in total expenditures per person per trip was less than one-half of one percent (0.047%).

### Outlier Analysis

#### *NCC Region*

We eliminated observations for each category of expenditure if they accounted for a significant portion of the weighted sum of expenditures and therefore had high influence on the estimated mean expenditure per person per trip. The following outliers were eliminated:

- Food and Beverages at a restaurant or bar: Greater than \$200
- Lodging (if stayed overnight): Greater than \$400
- Food and Beverages from a store: Greater than or equal to \$500
- Souvenirs (t-shirts, posters, gifts, etc.): Greater than or equal to \$500
- Parking: Greater than or equal to \$400
- Museum, aquarium, or other entrance fee: Greater than or equal to \$3,000

After deleting these outliers, we were able to replicate all the published expenditures in Chen et al. (2013) except for Food and Beverages from a store (their estimate was \$6.24 and ours was \$6.19); Parking (their estimate was \$2.51 and ours was \$1.53); and Lessons, clinics, camps (their estimate was \$0.30 and ours was \$0.33). In total, the Chen et al. (2013) estimate was \$54.48 per person per trip, while our estimate was \$53.54, a difference of \$0.94 or 1.7%. Most of the difference was due to the estimate for “parking”. We could not resolve the difference. Our estimates for the NCC Region for All Visitors are summarized in Table 4.1.

**Table 4.1 Average Trip Expenditures Per Person Across All Respondents, Last Trip: NCC Region**

| Expenditure Type  | Average Expenditure (\$)¹ | N     | Min    | Max      |
|---|---------------------------|-------|--------|----------|
| Food and Beverages at a restaurant or bar   | \$18.47                   | 3,296 | \$0.00 | \$200.00 |
| Lodging (if you stayed overnight)   | \$18.02                   | 3,321 | \$0.00 | \$400.00 |
| Food and Beverages from a store   | <b>\$6.19</b>             | 3,328 | \$0.00 | \$180.00 |
| Souvenirs (t-shirts, posters, gifts, etc.)  | \$3.29                    | 3,347 | \$0.00 | \$250.00 |
| Parking   | <b>\$1.53</b>             | 3,337 | \$0.00 | \$150.00 |
| Museum, aquarium, or other entrance fee   | \$1.67                    | 3,353 | \$0.00 | \$75.00  |
| Car rental  | \$0.86                    | 3,379 | \$0.00 | \$400.00 |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | \$0.54                    | 3,361 | \$0.00 | \$100.00 |
| Boat rental   | \$0.49                    | 3,381 | \$0.00 | \$116.67 |
| Charter fee (whale watching, etc.)  | \$0.44                    | 3,382 | \$0.00 | \$200.00 |
| Bike rental   | \$0.34                    | 3,381 | \$0.00 | \$100.00 |
| Lessons, clinics, camps   | <b>\$0.33</b>             | 3,380 | \$0.00 | \$500.00 |
| Kayak rental  | \$0.28                    | 3,382 | \$0.00 | \$150.00 |
| Dive equipment rental and air fills   | \$0.28                    | 3,381 | \$0.00 | \$150.00 |
| Boat fuel   | \$0.24                    | 3,382 | \$0.00 | \$100.00 |
| Bait and tackle   | \$0.20                    | 3,376 | \$0.00 | \$50.00  |
| One-day fishing license fee   | \$0.15                    | 3,379 | \$0.00 | \$62.50  |
| Surfboard or body board rental  | \$0.14                    | 3,381 | \$0.00 | \$100.00 |
| Ramp fees   | \$0.06                    | 3,383 | \$0.00 | \$35.00  |
| Hang glide rental   | \$0.02                    | 3,383 | \$0.00 | \$100.00 |
| <b>Total Expenditures</b>   | <b>\$53.54</b>            |       |        |          |

1. Estimates in bold difference from those in Chen et al. (2013).

Source: Ecotrust Survey of NCC Region.

### **GFNMS**

For GFNMS, we only estimated expenditures for those that did non-consumptive recreation. We dropped the spending categories of “bait & tackle” and “One-day fishing license fee”. Since sample size for the GFNMS was much lower for all expenditure categories, we conducted further outlier analysis to determine if additional outliers needed to be eliminated. We eliminated the following outliers for estimation of the expenditures per person per trip for the GFNMS:

- Food and Beverages from a restaurant or bar: Greater than or equal to \$125
- Lodging: Greater than \$200

- Food and Beverages from a store: Greater than or equal to \$100
- Souvenirs (t-shirts, posters, gifts, etc.): Greater than or equal to \$1,500
- Parking: Greater than or equal to \$400
- Museum, aquarium, or other entrance fee: Greater than or equal to \$3,000
- Bike rental: Greater than or equal to \$50
- Surfboard or body board rental: Greater than or equal to \$100

### ***northern portion of MBNMS***

For the northern portion of MBNMS, there were only two expenditure categories with outliers. We eliminated the following outliers:

- Lodging: Greater than \$200
- Lessons, clinics, camps: Greater than or equal to \$500

### **NCC Region All Visitors**

In Chen et al. (2013), total expenditures were estimated by taking the mean expenditure per person per trip for all visitors (\$54.48) to the NCC Region and multiplying by the number of estimated person-trips to the NCC Region (22,197,663) yielding an estimate of \$1,209,258,380. They then provided a lower bound estimate for all recreation by multiplying by the percent of all visitor whose primary purpose for the last trip was for recreation (86.9%) yielding an estimate of \$1,050,845,532.

We take a different approach by separately estimating expenditures per person-trip for residents and non-residents by expenditure category and use the estimates we made of the number of person-trips by residents and non-residents (Chapter 3) for the economic impact study area (see Figure 1.3). The reason was we estimate the economic impact of total expenditures by resident status using the IMPLAN input-output model (Chapter 5).

Residents spent an average of \$46.03 per person per trip (Table 4.2) versus \$82.69 for non-residents (Table 4.3). Total expenditures were then estimated by multiplying the estimated per person trip expenditures by the estimated number of resident and non-resident person-trips. For residents, we estimate total expenditures of \$793,497,591, and for non-residents of \$410,056,237 for a total expenditure of \$1,203,553,828 (Table 4.4). This is compared to the Chen et al. (2013) estimate of \$1,209,258,380 a difference of \$5,704,552 or (0.47%), an insignificant difference.

We also estimated the expenditures on a per person-day basis. We do this by taking the total expenditures by residential status and dividing by the total estimated person-days by residential

status from Chapter 3. On average, residents spent \$22.90 per person-day, while non-residents spent \$34.92 (Table 4.5). These estimates can be used in benefits transfer applications, when estimates of person-days or the change in person-days are available to estimate total expenditures.

**Table 4.2 Average Trip Expenditures Per Person Last Trip: NCC Region, All Visiting Residents**

| Expenditure Type  | Average Expenditure (\$) | N     | Min | Max  |
|---|--------------------------|-------|-----|------|
| Food and Beverages at a restaurant or bar   | 17.48                    | 2,685 | 0   | 375  |
| Lodging (if you stayed overnight)   | 14.43                    | 2,705 | 0   | 400  |
| Food and Beverages from a store   | 5.60                     | 2,708 | 0   | 150  |
| Souvenirs (t-shirts, posters, gifts, etc.)  | 2.60                     | 2,725 | 0   | 250  |
| Parking   | 1.25                     | 2,711 | 0   | 150  |
| Museum, aquarium, or other entrance fee   | 1.22                     | 2,726 | 0   | 75   |
| Car rental  | 0.50                     | 2,749 | 0   | 400  |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | 0.48                     | 2,731 | 0   | 100  |
| Boat rental   | 0.30                     | 2,748 | 0   | 100  |
| Charter fee (whale watching, etc.)  | 0.41                     | 2,749 | 0   | 200  |
| Bike rental   | 0.29                     | 2,748 | 0   | 100  |
| Lessons, clinics, camps   | 0.37                     | 2,749 | 0   | 500  |
| Kayak rental  | 0.27                     | 2,749 | 0   | 150  |
| Dive equipment rental and air fills   | 0.10                     | 2,749 | 0   | 150  |
| Boat fuel   | 0.23                     | 2,750 | 0   | 100  |
| Bait and tackle   | 0.17                     | 2,745 | 0   | 50   |
| One-day fishing license fee   | 0.15                     | 2,748 | 0   | 62.5 |
| Surfboard or body board rental  | 0.12                     | 2,750 | 0   | 55   |
| Ramp fees   | 0.04                     | 2,750 | 0   | 25   |
| Hang glide rental   | 0.02                     | 2,750 | 0   | 100  |
| <b>Total Expenditures</b>   | <b>46.03</b>             |       |     |      |

**Table 4.3 Average Trip Expenditures Per Person Last Trip: NCC Region, All Visiting Non-Residents**

| Expenditure Type  | Average Expenditure (\$) | N   | Min | Max    |
|---|--------------------------|-----|-----|--------|
| Food and Beverages at a restaurant or bar   | 22.88                    | 612 | 0   | 150    |
| Lodging (if you stayed overnight)   | 31.68                    | 616 | 0   | 375    |
| Food and Beverages from a store   | 8.45                     | 620 | 0   | 180    |
| Souvenirs (t-shirts, posters, gifts, etc.)  | 5.88                     | 622 | 0   | 100    |
| Parking   | 2.59                     | 626 | 0   | 82.50  |
| Museum, aquarium, or other entrance fee   | 3.33                     | 627 | 0   | 66.67  |
| Car rental  | 2.22                     | 630 | 0   | 250    |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | 0.76                     | 630 | 0   | 60     |
| Boat rental   | 1.22                     | 633 | 0   | 116.67 |
| Charter fee (whale watching, etc.)  | 0.58                     | 633 | 0   | 120    |
| Bike rental   | 0.55                     | 633 | 0   | 100    |
| Lessons, clinics, camps   | 0.21                     | 631 | 0   | 200    |
| Kayak rental  | 0.31                     | 633 | 0   | 110    |
| Dive equipment rental and air fills   | 0.92                     | 632 | 0   | 125    |
| Boat fuel   | 0.24                     | 632 | 0   | 50     |
| Bait and tackle   | 0.34                     | 631 | 0   | 27.50  |
| One-day fishing license fee   | 0.14                     | 631 | 0   | 30     |
| Surfboard or body board rental  | 0.23                     | 631 | 0   | 100    |
| Ramp fees   | 0.16                     | 633 | 0   | 35     |
| Hang glide rental   | 0.00                     | 633 | 0   | 0      |
| Total Expenditures  | 82.69                    |     |     |        |

**Table 4.4 Total Expenditures for All Visitors to the NCC Region, by Residential Status**

| Expenditure Type  | Residents          | Non-Residents      | Total Expenditures   |
|---|--------------------|--------------------|----------------------|
|   | Total Expenditures | Total Expenditures |                      |
| Food and Beverages at a restaurant or bar   | 301,332,563        | 113,460,959        | 414,793,522          |
| Lodging (if you stayed overnight)   | 248,754,513        | 157,099,789        | 405,854,303          |
| Food and Beverages from a store   | 96,536,748         | 41,903,195         | 138,439,943          |
| Souvenirs (t-shirts, posters, gifts, etc.)  | 44,820,633         | 29,158,673         | 73,979,306           |
| Parking   | 21,548,381         | 12,843,701         | 34,392,082           |
| Museum, aquarium, or other entrance fee   | 21,031,220         | 16,513,330         | 37,544,550           |
| Car rental  | 8,619,353          | 11,008,887         | 19,628,239           |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | 8,274,578          | 3,768,808          | 12,043,386           |
| Boat rental   | 5,171,612          | 6,049,929          | 11,221,540           |
| Charter fee (whale watching, etc.)  | 7,067,869          | 2,876,196          | 9,944,065            |
| Bike rental   | 4,999,224          | 2,727,427          | 7,726,651            |
| Lessons, clinics, camps   | 6,378,321          | 1,041,381          | 7,419,702            |
| Kayak rental  | 4,654,450          | 1,537,277          | 6,191,727            |
| Dive equipment rental and air fills   | 1,723,871          | 4,562,241          | 6,286,112            |
| Boat fuel   | 3,964,902          | 1,190,150          | 5,155,052            |
| Bait and tackle   | 2,930,580          | 1,686,046          | 4,616,626            |
| One-day fishing license fee   | 2,585,806          | 694,254            | 3,280,060            |
| Surfboard or body board rental  | 2,068,645          | 1,140,560          | 3,209,205            |
| Ramp fees   | 689,548            | 793,433            | 1,482,981            |
| Hang glide rental   | 344,774            | 0                  | 344,774              |
| <b>Total</b>  | <b>793,497,591</b> | <b>410,056,237</b> | <b>1,203,553,828</b> |

**Table 4.5 Expenditures Per Person-day by Residential Status: NCC Region All Visitor**

| Expenditure Type  | Resident | Non-Resident |
|---|----------|--------------|
| Food and Beverages at a restaurant or bar   | 8.70     | 9.66         |
| Lodging (if you stayed overnight)   | 7.18     | 13.38        |
| Food and Beverages from a store   | 2.79     | 3.57         |
| Souvenirs (t-shirts, posters, gifts, etc.)  | 1.29     | 2.48         |
| Parking   | 0.62     | 1.09         |
| Museum, aquarium, or other entrance fee   | 0.61     | 1.41         |
| Car rental  | 0.25     | 0.94         |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | 0.24     | 0.32         |
| Boat rental   | 0.15     | 0.52         |
| Charter fee (whale watching, etc.)  | 0.20     | 0.24         |
| Bike rental   | 0.14     | 0.23         |
| Lessons, clinics, camps   | 0.18     | 0.09         |
| Kayak rental  | 0.13     | 0.13         |
| Dive equipment rental and air fills   | 0.05     | 0.39         |
| Boat fuel   | 0.11     | 0.10         |
| Bait and tackle   | 0.08     | 0.14         |
| One-day fishing license fee   | 0.07     | 0.06         |
| Surfboard or body board rental  | 0.06     | 0.10         |
| Ramp fees   | 0.02     | 0.07         |
| Hang glide rental   | 0.01     | 0.00         |
| Total   | 22.90    | 34.92        |

### **NCC Region – Non-Consumptive Recreation Only**

Since our purpose was to estimate the use and economic impact of the use for non-consumptive recreation in the two sanctuary areas in the NCC Region, we estimated the expenditures for only those who did non-consumptive recreation in the NCC Region so we could estimate the proportion of the NCC Region accounted for by activity in the sanctuaries. We first estimated the expenditures per person per trip for those who did non-consumptive recreation then multiplied these values times the number of person-trips for non-consumptive recreation trips from Chapter 3. As with all visitors, we did this by residential status.

Residents, on average, spent \$46.46 per person per trip (Table 4.6), while non-residents spent \$84.22 (Table 4.7). Multiplying these values by non-consumption recreation person-trips

yielded an estimate of \$776,143,941 for residents and \$380,333,730 for non-residents for a total expenditure of \$1,156,477,672 (Table 4.8). As with the estimates for all visitors, we then normalized these expenditures on a per person-day basis. Residents, on average, spent \$29.04 per person-day, while non-residents spent \$36.54 per person-day (Table 4.9).

**Table 4.6 Average Trip Expenditures Per Person Last Trip: NCC Region, Residents Non-Consumptive Recreation Only**

| Expenditure Type  | Average Expenditure (\$) | N     | Min | Max |
|---|--------------------------|-------|-----|-----|
| Food and Beverages at a restaurant or bar   | 17.66                    | 2,616 | 0   | 375 |
| Lodging (if you stayed overnight)   | 14.79                    | 2,611 | 0   | 400 |
| Food and Beverages from a store   | 5.73                     | 2,616 | 0   | 150 |
| Souvenirs (t-shirts, posters, gifts, etc.)  | 2.69                     | 2,631 | 0   | 250 |
| Parking   | 1.20                     | 2,616 | 0   | 100 |
| Museum, aquarium, or other entrance fee   | 1.26                     | 2,632 | 0   | 75  |
| Car rental  | 0.50                     | 2,655 | 0   | 400 |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | 0.51                     | 2,637 | 0   | 100 |
| Boat rental   | 0.31                     | 2,654 | 0   | 100 |
| Charter fee (whale watching, etc.)  | 0.39                     | 2,655 | 0   | 200 |
| Bike rental   | 0.30                     | 2,654 | 0   | 100 |
| Lessons, clinics, camps   | 0.35                     | 2,655 | 0   | 500 |
| Kayak rental  | 0.28                     | 2,655 | 0   | 150 |
| Dive equipment rental and air fills   | 0.11                     | 2,655 | 0   | 150 |
| Boat fuel   | 0.20                     | 2,656 | 0   | 100 |
| Surfboard or body board rental  | 0.12                     | 2,656 | 0   | 55  |
| Ramp fees   | 0.04                     | 2,656 | 0   | 25  |
| Hang glide rental   | 0.02                     | 2,656 | 0   | 100 |
| <b>Total Expenditures</b>   | <b>46.46</b>             |       |     |     |

**Table 4.7 Average Trip Expenditures Per Person Last Trip: NCC Region, Non-Residents Non-Consumptive Recreation Only**

| Expenditure Type  | Average Expenditure (\$) | N   | Min | Max    |
|---|--------------------------|-----|-----|--------|
| Food and Beverages at a restaurant or bar   | 23.39                    | 593 | 0   | 150    |
| Lodging (if you stayed overnight)   | 32.41                    | 596 | 0   | 375    |
| Food and Beverages from a store   | 8.65                     | 600 | 0   | 180    |
| Souvenirs (t-shirts, posters, gifts, etc.)  | 6.06                     | 602 | 0   | 100    |
| Parking   | 2.66                     | 606 | 0   | 82.5   |
| Museum, aquarium, or other entrance fee   | 3.42                     | 607 | 0   | 66.67  |
| Car rental  | 2.26                     | 610 | 0   | 250    |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | 0.78                     | 610 | 0   | 60     |
| Boat rental   | 1.26                     | 613 | 0   | 116.67 |
| Charter fee (whale watching, etc.)  | 0.60                     | 613 | 0   | 120    |
| Bike rental   | 0.57                     | 613 | 0   | 100    |
| Lessons, clinics, camps   | 0.22                     | 611 | 0   | 200    |
| Kayak rental  | 0.32                     | 613 | 0   | 110    |
| Dive equipment rental and air fills   | 0.96                     | 612 | 0   | 125    |
| Boat fuel   | 0.25                     | 612 | 0   | 50     |
| Surfboard or body board rental  | 0.24                     | 611 | 0   | 100    |
| Ramp fees   | 0.17                     | 613 | 0   | 35     |
| Hang glide rental   | 0.00                     | 613 | 0   | 0      |
| <b>Total Expenditures</b>   | <b>84.22</b>             |     |     |        |

**Table 4.8 Total Expenditures : NCC Region by Resident Status Non-Consumptive Recreation Only**

| Expenditure Type  | Residents   | Non-Residents | Total         |
|---|-------------|---------------|---------------|
| Food and Beverages at a restaurant or bar   | 295,021,567 | 105,628,187   | 400,649,755   |
| Lodging (if you stayed overnight)   | 247,076,386 | 146,362,102   | 393,438,488   |
| Food and Beverages from a store   | 95,723,306  | 39,063,011    | 134,786,316   |
| Souvenirs (t-shirts, posters, gifts, etc.)  | 44,938,166  | 27,366,687    | 72,304,854    |
| Parking   | 20,046,766  | 12,012,440    | 32,059,206    |
| Museum, aquarium, or other entrance fee   | 21,049,104  | 15,444,566    | 36,493,670    |
| Car rental  | 8,352,819   | 10,206,058    | 18,558,877    |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | 8,519,875   | 3,522,445     | 12,042,320    |
| Boat rental   | 5,178,748   | 5,690,103     | 10,868,851    |
| Charter fee (whale watching, etc.)  | 6,515,199   | 2,709,573     | 9,224,772     |
| Bike rental   | 5,011,691   | 2,574,094     | 7,585,786     |
| Lessons, clinics, camps   | 5,846,973   | 993,510       | 6,840,483     |
| Kayak rental  | 4,677,579   | 1,445,106     | 6,122,684     |
| Dive equipment rental and air fills   | 1,837,620   | 4,335,317     | 6,172,937     |
| Boat fuel   | 3,341,128   | 1,128,989     | 4,470,116     |
| Surfboard or body board rental  | 2,004,677   | 1,083,829     | 3,088,506     |
| Ramp fees   | 668,226     | 767,712       | 1,435,938     |
| Hang glide rental   | 334,113     | 0             | 334,113       |
| Total   | 776,143,941 | 380,333,730   | 1,156,477,672 |

**Table 4.9 Expenditures Per Person-day by Residential Status: NCC Region Non-Consumptive Recreation Only**

| Expenditure Type  | Residents | Non-Residents | Total |
|---|-----------|---------------|-------|
| Food and Beverages at a restaurant or bar   | 11.04     | 10.15         | 10.79 |
| Lodging (if you stayed overnight)   | 9.24      | 14.06         | 10.59 |
| Food and Beverages from a store   | 3.58      | 3.75          | 3.63  |
| Souvenirs (t-shirts, posters, gifts, etc.)  | 1.68      | 2.63          | 1.95  |
| Parking   | 0.75      | 1.15          | 0.86  |
| Museum, aquarium, or other entrance fee   | 0.79      | 1.48          | 0.98  |
| Car rental  | 0.31      | 0.98          | 0.50  |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | 0.32      | 0.34          | 0.32  |
| Boat rental   | 0.19      | 0.55          | 0.29  |
| Charter fee (whale watching, etc.)  | 0.24      | 0.26          | 0.25  |
| Bike rental   | 0.19      | 0.25          | 0.20  |
| Lessons, clinics, camps   | 0.22      | 0.10          | 0.18  |
| Kayak rental  | 0.17      | 0.14          | 0.16  |
| Dive equipment rental and air fills   | 0.07      | 0.42          | 0.17  |
| Boat fuel   | 0.12      | 0.11          | 0.12  |
| Surfboard or body board rental  | 0.07      | 0.10          | 0.08  |
| Ramp fees   | 0.02      | 0.07          | 0.04  |
| Hang glide rental   | 0.01      | 0.00          | 0.01  |
| Total   | 29.04     | 36.54         | 31.14 |

### **GFNMS – Non-Consumptive Recreation Only**

For the GFNMS, we were not able to estimate expenditures by residential status due to sample sizes. Instead, we pooled expenditures per person per trip, however they are properly weighted. We derived estimates of total expenditures by multiplying the expenditures per person per trip by the estimates of total person-trips for non-consumptive recreation in Chapter 3. We then estimated expenditures per person-day by dividing total estimated expenditures by the estimate of total person-days for non-consumptive recreation in Chapter 3.

Non-consumptive recreators in GFNMS, on average spent \$78.06 per person-trip (Table 4.10). Multiplying these values by the estimated number of person-trips for non-consumptive recreation yielded an estimate of total expenditures of \$86,252,475 (Table 4.11). Normalizing the

expenditures on a per person-day basis yielded an estimate of \$31.48 per person-day (Table 4.11).

**Table 4.10 Average Trip Expenditures Per Person, Last Trip: GFNMS Non-Consumptive Recreation Only**

| Expenditure Type  | Average Expenditure (\$) | N   | Min | Max   |
|---|--------------------------|-----|-----|-------|
| Food and Beverages at a restaurant or bar   | 22.68                    | 319 | 0   | 250   |
| Lodging (if you stayed overnight)   | 22.70                    | 309 | 0   | 200   |
| Food and Beverages from a store   | 10.53                    | 320 | 0   | 75    |
| Souvenirs (t-shirts, posters, gifts, etc.)  | 5.08                     | 325 | 0   | 100   |
| Parking   | 2.69                     | 329 | 0   | 100   |
| Museum, aquarium, or other entrance fee   | 2.87                     | 326 | 0   | 66.67 |
| Car rental  | 1.27                     | 331 | 0   | 100   |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | 1.36                     | 328 | 0   | 50    |
| Boat rental   | 1.79                     | 332 | 0   | 100   |
| Charter fee (whale watching, etc.)  | 1.12                     | 333 | 0   | 105   |
| Bike rental   | 0.77                     | 331 | 0   | 37.5  |
| Lessons, clinics, camps   | 0.26                     | 331 | 0   | 200   |
| Kayak rental  | 1.62                     | 333 | 0   | 100   |
| Dive equipment rental and air fills   | 1.29                     | 332 | 0   | 150   |
| Boat fuel   | 0.97                     | 332 | 0   | 50    |
| Surfboard or body board rental  | 0.65                     | 331 | 0   | 50    |
| Ramp fees   | 0.22                     | 333 | 0   | 25    |
| Hang glide rental   | 0.19                     | 333 | 0   | 100   |
| <b>Total Expenditures</b>   | <b>78.06</b>             |     |     |       |

**Table 4.11 Total Expenditures and Expenditures Per Person-day for GFNMS Non-Consumptive Recreation Only**

| Expenditure Type  | Total Expenditures | Expenditures Per Person-day |
|---|--------------------|-----------------------------|
| Food and Beverages at a restaurant or bar   | 25,060,289         | 9.15                        |
| Lodging (if you stayed overnight)   | 25,082,388         | 9.15                        |
| Food and Beverages from a store   | 11,635,134         | 4.25                        |
| Souvenirs (t-shirts, posters, gifts, etc.)  | 5,613,151          | 2.05                        |
| Parking   | 2,972,318          | 1.08                        |
| Museum, aquarium, or other entrance fee   | 3,171,209          | 1.16                        |
| Car rental  | 1,403,288          | 0.51                        |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | 1,502,733          | 0.55                        |
| Boat rental   | 1,977,862          | 0.72                        |
| Charter fee (whale watching, etc.)  | 1,237,545          | 0.45                        |
| Bike rental   | 850,812            | 0.31                        |
| Lessons, clinics, camps   | 287,287            | 0.10                        |
| Kayak rental  | 1,790,021          | 0.65                        |
| Dive equipment rental and air fills   | 1,425,387          | 0.52                        |
| Boat fuel   | 1,071,802          | 0.39                        |
| Surfboard or body board rental  | 718,218            | 0.26                        |
| Ramp fees   | 243,089            | 0.09                        |
| Hang glide rental   | 209,941            | 0.08                        |
| Total   | 86,252,475         | 31.48                       |

### **northern portion of MBNMS**

For the northern portion of MBNMS, we were not able to estimate expenditures by residential status due to sample sizes. Instead, we pooled expenditures per person per trip, however they are properly weighted. We derived estimates of total expenditures by multiplying the expenditures per person per trip by the estimates of total person-trips for non-consumptive recreation in Chapter 3. We then estimated expenditures per person-day by dividing total estimated expenditures by the estimate of total person-days for non-consumptive recreation in Chapter 3.

Non-consumptive recreators in the northern portion of MBNMS, on average spent \$43.49 per person-trip (Table 4.12). Multiplying these values by the estimated number of person-trips for non-consumptive recreation yielded an estimate of total expenditures of \$40,824,541 (Table

4.13). Normalizing the expenditures on a per person-day basis yielded an estimate of \$26.68 per person-day (Table 4.13).

**Table 4.12 Average Trip Expenditures Per Person: np MBNMS Non-Consumptive Recreation Only**

| Expenditure Type  | Average Expenditure (\$) | N   | Min | Max   |
|---|--------------------------|-----|-----|-------|
| Food and Beverages at a restaurant or bar   | 13.96                    | 229 | 0   | 140   |
| Lodging (if you stayed overnight)   | 8.99                     | 229 | 0   | 200   |
| Food and Beverages from a store   | 5.64                     | 228 | 0   | 150   |
| Souvenirs (t-shirts, posters, gifts, etc.)  | 2.68                     | 233 | 0   | 100   |
| Parking   | 1.53                     | 227 | 0   | 50    |
| Museum, aquarium, or other entrance fee   | 2.37                     | 232 | 0   | 66.67 |
| Car rental  | 0.54                     | 235 | 0   | 50    |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | 1.20                     | 233 | 0   | 100   |
| Boat rental   | 0.61                     | 235 | 0   | 37.5  |
| Charter fee (whale watching, etc.)  | 1.21                     | 235 | 0   | 120   |
| Bike rental   | 0.59                     | 235 | 0   | 40    |
| Lessons, clinics, camps   | 1.14                     | 234 | 0   | 200   |
| Kayak rental  | 1.07                     | 235 | 0   | 110   |
| Dive equipment rental and air fills   | 0.00                     | 234 | 0   | 0     |
| Boat fuel   | 0.71                     | 235 | 0   | 100   |
| Surfboard or body board rental  | 1.05                     | 235 | 0   | 55    |
| Ramp fees   | 0.04                     | 235 | 0   | 5     |
| Hang glide rental   | 0.16                     | 235 | 0   | 100   |
| <b>Total Expenditures</b>   | <b>43.49</b>             |     |     |       |

**Table 4.13 Total Expenditures and Expenditures Per Person-day for np of MBNMS Non-Consumptive Recreation Only**

| Expenditure Type   | Total Expenditures | Expenditures Per Person-day |
|--|--------------------|-----------------------------|
| Food and Beverages at a restaurant or bar  | 13,104,406         | 8.56                        |
| Lodging (if you stayed overnight)  | 8,439,012          | 5.52                        |
| Food and Beverages from a store  | 5,294,330          | 3.46                        |
| Souvenirs (t-shirts, posters, gifts, etc.)   | 2,515,745          | 1.64                        |
| Parking  | 1,436,228          | 0.94                        |
| Museum, aquarium, or other entrance fee  | 2,224,745          | 1.45                        |
| Car rental   | 506,904            | 0.33                        |
| Sundries (sunscreen, surf wax, motion sickness pills, batteriees, film and processing, etc.) | 1,126,453          | 0.74                        |
| Boat rental  | 572,614            | 0.37                        |
| Charter fee (whale watching, etc.)   | 1,135,840          | 0.74                        |
| Bike rental  | 553,839            | 0.36                        |
| Lessons, clinics, camps  | 1,070,131          | 0.70                        |
| Kayak rental   | 1,004,421          | 0.66                        |
| Dive equipment rental and air fills  | 0                  | 0.00                        |
| Boat fuel  | 666,485            | 0.44                        |
| Surfboard or body board rental   | 985,647            | 0.64                        |
| Ramp fees  | 37,548             | 0.02                        |
| Hang glide rental  | 150,194            | 0.10                        |
| <b>Total</b>   | <b>40,824,541</b>  | <b>26.68</b>                |

### Sanctuaries as a Proportion of the NCC Region – Non-Consumptive Recreation

Visitors to the GFNMS accounted for 7.46% of all expenditures made by non-consumptive recreators in the NCC Region and visitors to the northern portion of MBNMS accounted for 3.53%. In total, visitors to sanctuaries in the NCC Region accounted for 10.99% of all expenditures made by those doing non-consumptive recreation activities (Table 4.14).

**Table 4.14 Estimated Proportion of Expenditures Accounted for by Sanctuaries**

| Area                      | Total Expenditure | Proportion Accounted for By Sanctuaries (%) |
|---------------------------|-------------------|---|
| NCC Region                | 1,156,477,672     | n/a   |
| GFNMS                     | 86,252,475        | 7.46  |
| northern portion of MBNMS | 40,824,541        | 3.53  |
| All Sanctuaries           | 127,077,016       | 10.99                                       |

## 5. Economic Contributions

### Study Area Identification

To estimate the economic impacts of recreational activities for the NCC Region and within GFNMS and the northern portion of MBNMS the study area must be identified and defined. Though the multiplier process, theoretically one could include all areas in the chain of producing goods and services used. This could even include other countries, i.e. a rod or reel or outboard motor could have been produced outside the country. In Chapter 1, we defined the study areas for economic impact for each sanctuary limiting our impact areas to more local area counties that capture the majority of the local economic impact.

The first step to determining the study areas were to identify the coastal counties that are adjacent to the sanctuaries. These are called the primary counties. The non-coastal counties included in the study areas were identified by analyzing data from the American Community Survey regarding inter-county commuter data. The non-coastal counties are referred to as secondary counties in this report. If roughly 5,000 or more residents lived in a non-coastal county, but commuted to a primary county for work, then that non-coastal county was included in the study area.

These secondary counties are included in the study area to prevent leakage. Leakage occurs when money leaves the study area resulting in that money not being multiplied throughout the study area when calculating impacts. By including counties that have a large amount of residents working in coastal counties, the study area is including these significant secondary economic impacts and prevents leakage. The study areas for NCC, GFNMS and the northern portion of MBNMS are presented below.

**Table 5.1 Primary and Secondary Counties in the Study Area for the Economic Impact Analysis NCC Region**

| Primary Counties (5) <sup>1</sup> | Secondary Counties (5) <sup>2</sup> |
|-----------------------------------|-------------------------------------|
| Mendocino                         | Alameda                             |
| Sonoma                            | Contra Costa                        |
| Marin                             | Napa                                |
| San Francisco                     | Santa Clara                         |
| San Mateo                         | Solano                              |

<sup>1</sup> Ocean adjacent counties where primary economic impact take place.

<sup>2</sup> Counties where significant secondary economic impacts take place.

Source: US Department of Commerce, Bureau of the Census, Inter-county Commuters.

**Table 5.2 Primary and Secondary Counties in the Study Area for the Economic Impact Analysis GFNMS**

| <u>Primary Counties (3)<sup>1</sup></u> | <u>Secondary Counties (5)<sup>2</sup></u> |
|---|---|
| Mendocino                               | Alameda                                   |
| Sonoma                                  | Contra Costa                              |
| Marin                                   | Napa                                      |
|   | San Francisco                             |
|   | Solano                                    |

<sup>1</sup> Ocean adjacent counties where primary economic impact take place.

<sup>2</sup> Counties where significant secondary economic impacts take place.

Source: US Department of Commerce, Bureau of the Census, Inter-county Commuters.

**Table 5.3 Primary and Secondary Counties in the Study Area for the Economic Impact Analysis northern portion of MBNMS**

| <u>Primary Counties (2)<sup>1</sup></u> | <u>Secondary Counties (6)<sup>2</sup></u> |
|---|---|
| Marin                                   | Alameda                                   |
| San Mateo                               | Contra Costa                              |
|   | San Francisco                             |
|   | Santa Clara                               |
|   | Solano                                    |
|   | Sonoma                                    |

<sup>1</sup> Ocean adjacent counties where primary economic impact take place.

<sup>2</sup> Counties where significant secondary economic impacts take place.

Source: US Department of Commerce, Bureau of the Census, Inter-county Commuters.

## **IMPLAN**

Using the person-trip estimates from Chapter 3 and the expenditure profiles developed in Chapter 4 of this report, the economic impacts of recreational activities in the sanctuaries and along the North Central California Coast can be estimated. Table 5.4 provides a more detailed explanation of the terminology used in this report, as defined by IMPLAN.

**Table 5.4 IMPLAN Economic Indicators' Definitions**

| <i>Indicator</i>    | <i>Definitions and Relationships</i>  |
|---------------------|---|
| <b>Employment</b>   | Total annual average jobs. This includes self-employed and wage and salary employees, and all full-time, part-time and seasonal jobs, based on a count of full-time/part-time averages over 12 months   |
| <b>Labor Income</b> | Defines the total value paid to local workers within a region. Labor income is the income source for induced household spending estimations.<br>$\text{Labor Income} = \text{Employee Compensation} + \text{Proprietor Income}$   |
| <b>Value Added</b>  | Comprised of Labor Income, Indirect Business Taxes (IBT), and Other Property Type Income (OPTI), Value Added demonstrates an industry's value of production over the cost of its purchasing the goods and services required to make its products. Value Added is often referred to as Gross Regional Product (GRP).<br>$\text{Value Added} = \text{Labor Income} + \text{IBT} + \text{OPTI}$  |
| <b>Output</b>       | The total value of an industry's production, comprised of the value of Intermediate Inputs and Value Added. In IMPLAN, this is typically viewed as the value of a change in sales or the value of increased production. However, annual production is not always equal to annual sales. If production levels are higher than sales, surpluses become inventory. Because inventory does not drive additional impacts in the year it was produced, in IMPLAN, Direct industry sales = Direct Output.<br>$\text{Output} = \text{Intermediate Inputs} + \text{Value Added}$ |

Source: Day, 2011

Impacts/contributions are defined as direct, indirect or induced. In short, direct effects are those that occur within the sector of the expenditure. Indirect effects occur as a result of spending within the primary sector on goods and services from other sectors. Induced impacts result from the wage earners within the study area spending money on goods and services within the region. The indirect plus induced make-up what is generally referred to as the "multiplier" effects. Table 5.5 explains these types of impacts in more detail.

**Table 5.5 Impact Type Definitions**

| <i>Type of Impact</i>  | <i>Definition</i>  |
|------------------------|--|
| <b>Direct Effect</b>   | The effect of spending by recreators at each business they purchase goods or services from within the study area.                  |
| <b>Indirect Effect</b> | The result of a sector purchasing goods and services to produce their product from other industries located within the study area. |
| <b>Induced Effect</b>  | Results from spending of employee wages that stem from both the direct and indirect effects within the study area.                 |

Source: Day, 2011

When inputting the expenditures into IMPLAN, the proper codes must be identified. The next table presents a description of the expenditures in addition to the assigned IMPLAN code. The

IMPLAN code corresponds to a North American Industry Classification System code. This determines the multiplier used for expenditures in different categories (Table 5.6).

**Table 5.6 IMPLAN Model Industry Sector Codes for each Expenditure Category**

| Category  | IMPLAN Code                 |
|---|-----------------------------|
| Food and Beverages at a restaurant or bar   | 413                         |
| Lodging (if you stayed overnight)   | 411                         |
| Food and Beverages from a store   | 324                         |
| Souvenirs (t-shirts, posters, gifts, etc.)  | 330                         |
| Parking   | 422                         |
| Museum, aquarium, or other entrance fee   | 422                         |
| Car rental  | 362                         |
| Sundries (sunscreen, surf wax, motion sickness pills, batteries, film and processing, etc.) | 330                         |
| Boat rental   | 410                         |
| Charter fee (whale watching, etc.)  | 410                         |
| Bike rental   | 363                         |
| Lessons, clinics, camps   | 410                         |
| Kayak rental  | 410                         |
| Dive equipment rental and air fills   | 410                         |
| Boat fuel   | 326                         |
| Bait and tackle   | 410                         |
| One-day fishing license fee   | Government Spending Pattern |
| Surfboard or body board rental  | 363                         |
| Ramp fees   | 410                         |
| Hang glide rental   | 363                         |

### **Economic Impacts/Contributions NCC Region – All Visitors**

The total impacts are estimated for both residents and non-residents and are presented in 2015 dollars. Within each residential status impacts are estimated by impact type (e.g. direct, indirect, induced and total). Total output generated from all resident visitors spending of about \$793.5 million (2011 \$) in the NCC Region was roughly \$1.391 billion. Value added generated was over \$826 million, total income was a little more than \$508 million and jobs were almost 10.7 thousand (Table 5.7). For all non-resident visitors, their spending of a little over \$410 million generated an estimated \$729 million in total output, a little over \$433.6 million in value added, \$264 million in income and 5.3 thousand jobs (Table 5.8). The total economic impact/contribution by spending from all visitors to the NCC Region was estimated at almost \$2.1 billion in total output, about \$1.26 billion in value added, a little over \$772 million in income and 16 thousand jobs (Table 5.9).

**Table 5.7 Total Economic Impacts for All Visiting Residents to the NCC Region (2015 \$)**

| Impact Type     | Employment | Labor Income | Value Added | Output        |
|-----------------|------------|--------------|-------------|---------------|
| Direct Effect   | 7,474      | 292,385,515  | 448,329,727 | 764,202,484   |
| Indirect Effect | 1,514      | 109,127,989  | 184,879,963 | 318,001,838   |
| Induced Effect  | 1,703      | 106,785,858  | 193,373,221 | 308,595,658   |
| Total effect    | 10,692     | 508,299,363  | 826,582,910 | 1,390,799,981 |

**Table 5.8 Total Economic Impacts for All Visiting Non-Residents to the NCC Region (2015 \$)**

| Impact Type     | Employment | Labor Income | Value Added | Output      |
|-----------------|------------|--------------|-------------|-------------|
| Direct Effect   | 3,607      | 149,541,975  | 234,223,783 | 399,276,709 |
| Indirect Effect | 818        | 59,031,178   | 98,550,611  | 169,302,078 |
| Induced Effect  | 885        | 55,489,096   | 100,483,881 | 160,351,078 |
| Total effect    | 5,310      | 264,062,249  | 433,258,275 | 728,929,865 |

**Table 5.9 Total Economic Impacts for All Visitors to the NCC Region (2015 \$)**

| Impact Type     | Employment | Labor Income | Value Added   | Output        |
|-----------------|------------|--------------|---------------|---------------|
| Direct Effect   | 11,081     | 441,927,490  | 682,553,510   | 1,163,479,193 |
| Indirect Effect | 2,332      | 168,159,167  | 283,430,574   | 487,303,916   |
| Induced Effect  | 2,589      | 162,274,954  | 293,857,102   | 468,946,736   |
| Total effect    | 16,002     | 772,361,612  | 1,259,841,185 | 2,119,729,846 |

### **Economic Impacts/Contributions NCC Region – Non-Consumptive Recreation Only**

Here we eliminated all fishing related expenditures and developed estimates for non-consumptive recreation only to develop estimates that could be compared with the estimates developed for the two sanctuary areas. We can then estimate the proportion of the NCC Region the non-consumptive activities in the sanctuary areas accounted for. The total impacts are estimated for both residents and non-residents and are presented in 2015 dollars. Within each residential status impacts are estimated by impact type (e.g. direct, indirect, induced and total). Total output generated, from all resident visitors doing non-consumptive recreation activities who spent about \$776.1 million (2011 \$) in the NCC Region, was about \$1.36 billion (2015 \$). Value added generated was over \$806 million, total income was a little more than \$495 million and jobs were a little over 10.4 thousand (Table 5.10). For all non-resident visitors that did non-consumptive recreation activities, their spending of a little over \$380 million generated an estimated \$675.5 million in total output, a little over \$401 million in value added, \$244.4 million in income and 4.9 thousand jobs (Table 5.11). The total economic impact/contribution by spending from all visitors that did non-consumptive recreation activities in the NCC Region was

estimated at little over \$2.0 billion in total output, about \$1.21 billion in value added, about \$739.5 million in income and 15.3 thousand jobs (Table 5.12).

**Table 5.10 Total Economic Impacts for All Residents to the NCC Region, Non-Consumptive Recreation Only (2015 \$)**

| Impact Type     | Employment | Labor<br>Income | Value Added | Output        |
|-----------------|------------|-----------------|-------------|---------------|
| Direct Effect   | 7,293      | 284,064,030     | 436,744,248 | 745,796,698   |
| Indirect Effect | 1,483      | 106,983,514     | 181,122,971 | 311,584,679   |
| Induced Effect  | 16,459     | 104,005,089     | 188,337,889 | 300,558,948   |
| Total effect    | 10,435     | 495,052,633     | 806,205,109 | 1,357,940,324 |

**Table 5.11 Total Economic Impacts for All Non-Residents to the NCC Region, Non-Consumptive Recreation Only (2015 \$)**

| Impact Type     | Employment | Labor<br>Income | Value Added | Output      |
|-----------------|------------|-----------------|-------------|-------------|
| Direct Effect   | 3,339      | 138,243,175     | 216,720,344 | 369,860,227 |
| Indirect Effect | 760        | 54,833,434      | 91,519,866  | 157,224,852 |
| Induced Effect  | 820        | 51,368,167      | 93,021,537  | 148,442,063 |
| Total effect    | 4,918      | 244,444,776     | 401,261,747 | 675,527,142 |

**Table 5.12 Total Economic Impacts for All Visitors to the NCC Region, Non-Consumptive Recreation Only (2015 \$)**

| Impact Type     | Employment | Labor<br>Income | Value Added   | Output        |
|-----------------|------------|-----------------|---------------|---------------|
| Direct Effect   | 10,632     | 422,307,205     | 653,464,592   | 1,115,656,925 |
| Indirect Effect | 2,243      | 161,816,948     | 272,642,837   | 468,809,531   |
| Induced Effect  | 2,479      | 155,373,256     | 281,359,426   | 449,001,011   |
| Total effect    | 15,354     | 739,497,409     | 1,207,466,856 | 2,033,467,466 |

### **Economic Impacts/Contributions from Greater Farallones National Marine Sanctuary**

The total economic impacts were estimated for GFNMS for non-consumptive recreation expenditures only. Additionally, expenditures are not differentiated between residents and non-residents due to the smaller sample size of those who recreate within GFNMS. Non-consumptive recreational activities that occurred within GFNMS resulted in spending of \$86.25

million (2011\$) which generated an estimated total output of \$145.8 million (2015\$), value added of \$87.2 million, income of \$53.8 million and 1.1 thousand jobs (Table 5.13).

**Table 5.13 GFNMS Non-Consumptive Recreation Only Impacts (2015 \$)**

| Impact Type     | Employment | Labor Income | Value Added | Output      |
|-----------------|------------|--------------|-------------|-------------|
| Direct Effect   | 777        | 31,455,346   | 48,068,461  | 80,796,050  |
| Indirect Effect | 163        | 11,017,910   | 18,628,425  | 32,211,667  |
| Induced Effect  | 190        | 11,356,179   | 20,536,704  | 32,802,479  |
| Total effect    | 1,131      | 53,829,435   | 87,233,590  | 145,810,197 |

### **Economic Impacts/Contributions from the northern portion of Monterey Bay National Marine Sanctuary**

The total economic impacts were estimated for the northern portion of MBNMS for non-consumptive recreation expenditures only. Additionally, expenditures are not differentiated between residents and non-residents due to the smaller sample size of those who recreate within the northern portion of MBNMS. As a result of recreational activities that occurred within the northern portion of MBNMS resulted in spending of \$40.82 Million (2011\$) which generated an estimated total output of about \$69.4 million (2015\$), \$41.75 million in value added, \$26.2 million in income and 542 jobs (Table 5.14).

**Table 5.14 northern portion of MBNMS Non-Consumptive Recreation Only Impacts (2015 \$)**

| Impact Type     | Employment | Labor Income | Value Added | Output     |
|-----------------|------------|--------------|-------------|------------|
| Direct Effect   | 381        | 15,393,331   | 22,703,916  | 38,037,303 |
| Indirect Effect | 74         | 5,326,774    | 9,124,524   | 15,521,321 |
| Induced Effect  | 87         | 5,472,957    | 9,920,114   | 15,807,385 |
| Total effect    | 542        | 26,193,062   | 41,748,553  | 69,366,010 |

## Proportion of Economic Impacts from Non-consumptive Recreation Activities Accounted for by Sanctuaries

In 2011, the two sanctuary areas accounted for 10.58 percent of total output, 10.68 percent of value added, 10.82 percent of income and 10.9 percent of the jobs generated by those who did non-consumptive recreation activities in the NCC Region. The GFNMS accounted for 7.17 percent of total output, 7.22 percent of value added, 7.28 percent of income and 7.37 percent of the jobs, while the northern portion of MBNMS accounted for 3.41 of total output, 3.46 percent of value added, 3.54 percent of income and 3.53 percent of the jobs generated by non-consumptive recreation activities in the NCC Region.

**Table 5.15 Estimated Proportion of Economic Impacts Accounted for by Sanctuaries in the NCC Region Non-Consumptive Recreation Only**

| Type of Impact              | <u>Proportion of Impacts in Sanctuaries</u> |                                   |                  |
|-----------------------------|---|-----------------------------------|------------------|
|                             | GFNMS Percent                               | northern portion of MBNMS percent | Both Sanctuaries |
| Total Output (2015\$)       | 7.17  | 3.41                              | 10.58            |
| Value Added (2015\$)        | 7.22  | 3.46                              | 10.68            |
| Income (2015\$)             | 7.28  | 3.54                              | 10.82            |
| Employment (number of jobs) | 7.37  | 3.53                              | 10.90            |

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