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Economic Impact of the Recreational Fisheries on Local County Economies in Monterey Bay National Marine Sanctuary 2010, 2011 and 2012

U.S. Department of Commerce
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Economic Impact of the Recreational Fisheries on Local County Economies in the Monterey Bay National Marine Sanctuary 2010, 2011 and 2012

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Abstract

This report estimates the economic impact or contribution of recreational fishing within the Monterey Bay National Marine Sanctuary (MBNMS). The methodology applies the IMPLAN input-output model to estimates of total annual expenditures derived by taking estimates of person-days by mode of access (e.g. shore, private/rental boat and commercial passenger fishing vessels) from the State of California's Recreational Fishing Statistics Program and multiplying by NOAA's National Marine Fisheries Service's (NMFS or NOAA Fisheries) expenditure profiles by mode of access. The IMPLAN model is then used to calculate output, income, value- added and employment for the collection of nine counties (study area) where most of the economic impact takes place. Economic impacts are estimated for 2010, 2011, 2012 and the three-year average. Expenditure impacts are estimated separately for trip expenditures and durable good expenditures. Trip expenditures' impacts are appropriate for analyzing regulations or other policy/management alternatives that involve small or marginal changes in fishing effort. This report also presents the trends in person–days of recreational fishing by mode from 2004 through 2012.

The three-year average for 2010 to 2012 finds the total economic impact/contribution from marine recreational fishing in MBNMS to be $152.8 million in output, $92.5 million in value-added, $53.2 million in income and approximately 900 jobs. During the study period, 2010 saw the lowest levels of output, value added, income and jobs. In total MBNMS accounted for 36.2% of the total person-days of recreational fishing from California Districts 3 and 4 and 10.1% of the entire State of California's total marine recreational fishing effort. Recreational shore fishing accounted for an average of 32.3% of person-days, 49.3% of private/rental boat person-days, and commercial fishing passenger boats accounted for 42.6% of person-days of all the person-days in Districts 3 and 4 each year of the study period. Shore fishing in MBNMS accounted for 8.9%, private/rental boat fishing for 17.9% and commercial passenger fishing vessels for 7.6% of the total State of California's fishing effort by mode of access on average each year of the study period.

Key Words

Economic impact, income, jobs, California, recreational fishing, Monterey Bay, output, value-added, person-days.

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Chapter 1 Introduction

This report is part of the Socioeconomic Research & Monitoring Program for Monterey Bay National Marine Sanctuary (MBNMS). Socioeconomic priorities were established for all West Coast Region (WCR) sanctuaries in the "*Office of National Marine Sanctuaries West Coast Region Socioeconomic Plan FY2013 – FY2014* (Office of National Marine Sanctuaries, 2012)". This report also supports a "national" Office of National Marine Sanctuaries (ONMS) priority to document the connection between the national marine sanctuary resource uses and local, regional and national economies.

Sources of Information and Estimation of Effort

This report addresses magnitude of recreational fishing in MBNMS and the resulting economic impacts/contributions from 2010-2012. The data used to estimate the number of recreational fishing person-days in MBNMS comes from the California Department of Fish and Wildlife (CDFW). The data are available from the Pacific RecFIN public site or via written request to the CDFW. Data presented in this report are from years 2004-2012, and the economic analysis is for years 2010 -2012. The RecFIN data are used to show trends in the number of recreational fishing person-days within the sanctuary by resident and non-resident status.

To obtain estimates of recreational shore fishing within MBNMS, data sent to ONMS from CDFW was used to determine if an access point is within the sanctuary. The data from CDFW contained GIS layers with the California Recreational Fishing Survey (CRFS) district and site locations of man-made structures and beach/bank sites. If an access point was in the sanctuary or within a 1.25 mile buffer of the sanctuary's border, then the location was considered to be in MBNMS.

For boat modes, the amount of fishing effort that takes place in national marine sanctuaries is based on the best overlay of CDFW ten-minute by ten-minute blocks on sanctuary boundaries. See Chen, Leeworthy and Schwarzmann (2015) for detailed methods of estimation.

The next step is to determine what counties should be included in the MBNMS study area. If the sanctuary was adjacent to the full coastal boundary of a county it was included in the study area. Then, data from the American Community Survey (U.S. Department of Commerce, Bureau of the Census) was used to determine the percentage of workers from neighboring counties that worked within the coastal counties. If more than one percent of workers in a non-adjacent county worked in an adjacent coastal county, the non-adjacent county was included in the study area. This inclusion was made to account for the majority of multiplier impacts from spending in local area counties.

The study area counties for MBNMS are listed in Table 1.1 below. Figure 1.1 presents the map of the study area and fishing block IDs that are included in the study area. Additionally, the CDFW districts are also presented on the map. CDFW districts are used to geographically identify different regions along the coast. Block 568 only partly

covers Davidson Seamount. It is the best overlay that can be done with CDFW blocks. A more detailed description of this process can be found in Chen, Leeworthy and Schwarzmann (2015).

Table 1.1 The MBNMS Study Area

County	*Coastal*
Alameda	Non-Coastal
Contra Costa	Non-Coastal
Santa Clara	Non-Coastal
Solano	Non-Coastal
Monterey	Coastal
Santa Cruz	Coastal
San Francisco	Coastal
San Luis Obispo	Coastal
San Mateo	Coastal

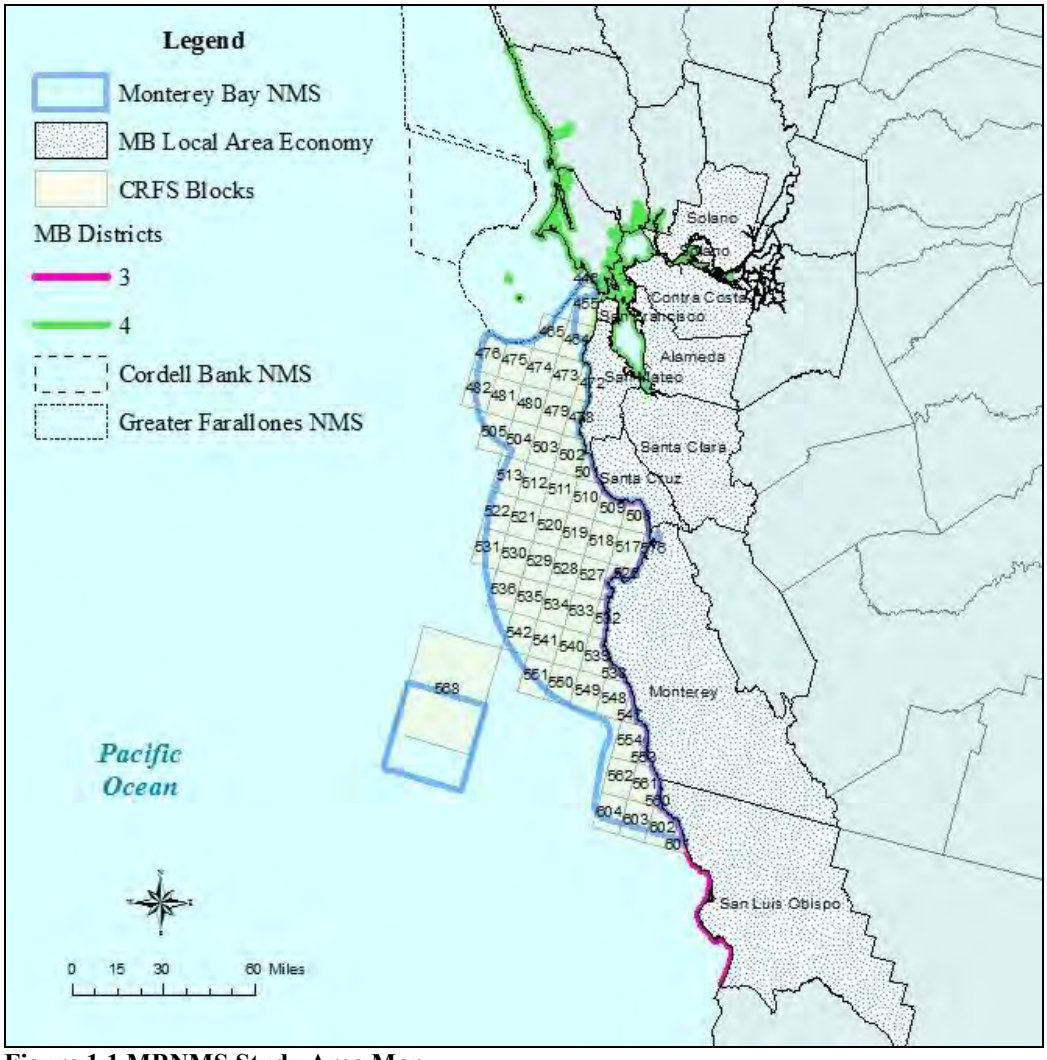

Figure 1.1 MBNMS Study Area Map

If a person lives within the study area they were considered a resident of MBNMS. If the person lived outside of one of the nine counties in the study area then they were considered a non-resident.

To estimate the economic impacts/contributions on the local counties of MBNMS CDFW data from years 2010-2012 was used in conjunction with Angler Expenditure Profiles developed by the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) (Lovell et al., 2013).

The IMPLAN model was used to estimate the market economic impacts/contributions of recreational fishing to the MBNMS study area. IMPLAN is an input-output model developed to estimate the impacts of changes in a specified region (Day, 2011). The 2009 IMPLAN data set was used to estimate the economic recreational fishing impacts/contributions. These economic estimates take into account recreational fin-fishing and recreational invertebrate fishing.

The economic estimates in this report include both the direct and indirect impacts of recreational fishermen's expenditures throughout the economy. The direct effect considers the initial expenditures made by fishermen. The indirect effect considers the initial expenditures' backward linkages in other industries; the flow of spending is traced back through the supply chain. They are called indirect effects because spending by fishermen is stimulating increased production in other industries within the study area. Lastly, induced effects account for increased employee income, and consequently employee spending, resulting from the directly and indirectly affected industries within the study area (Day, 2011). The addition of the indirect and induced impacts is what is generally referred to as the "multiplier" impacts. The break-out of these impacts/ contributions is not presented here. For those details, see Chen, Leeworthy and Schwarzmann (2015).

Chapter 2 focuses on trends in person-days of recreational fishing within the sanctuary. There are three types of fishing that were analyzed; shore-mode fishing, private/rental boat and commercial passenger fishing vessels. It is customary to group together private boats and rental boats, both the State of California CDFW and NOAA Fisheries analyze these two forms of boating as a unit. Shore fishing is defined as fishing accessed on beaches, banks and man-made structures. Private boats are defined as boats belonging to an individual not for rent or with paying passengers. Rental boats are defined as a boat that is rented without crew or a guide. The last section of Chapter 2 reviews Commercial Passenger Fishing Vessels (CPFV). There are two types of boats that fall into the CPFV category. The first is a charter boat, which is operating under charter for a specified price, time, etc. It usually means the boat is closed to anyone not in the group hiring the charter boat. The second type, a party boat, is a boat on which fishing space and privilege are provided for a fee per angler and are often referred to as head-boats (RecFIN, 2014). The terminology to describe person-days and mode of access is presented in Table 1.2.

Table 1.2 Definition of Key Terms (adapted from RecFin, 2014)

Term	Definition
Person-Days	The number of days (not trips) a person fishes
Shore Fishing	Fishing accessed on beaches, banks and man-made structures.
Private-Rental Boat Fishing	Private boats are defined as belonging to an individual not for rent or with paying passengers. Rental boats are defined as a boat that is rented without crew or a guide.
Commercial Passenger Vehicle Fishing (CPFV)	There are two categories. The first is a charter boat, operating under charter for a specified price, time, etc. A party boat, is a boat on which fishing space and privilege are provided for a fee per angler.

Chapter 3 presents and discusses expenditure profiles of recreational anglers in California. NOAA produces estimates of expenditures by person-day based on the three types of recreational fishing and resident status. In addition, the annual expenditures on durable goods are also estimated.

Chapter 4 presents the results of the IMPLAN model. These results include total output, value added, income and employment (measured in number of full and part-time jobs) resulting from recreational fishing in the sanctuary. Results are estimated for each year from 2010-2012 and a three-year average.

Chapter 5 presents a summary and conclusions.

Chapter 2 Recreational Fishing Person-days

Shore Angler Person-days

Person-days are defined as the number of days a person fishes. If a person takes a one week trip and fishes for five days, then that would be counted as five person-days. Raw survey data was extrapolated from the CDFW, RecFIN website and used to make population estimates of person-days in MBNMS. A more detailed explanation of the process can be found in Chen, Leeworthy and Schwarzmann (2015). The person-day trends account for recreational fin-fishing from 2004 through 2012, but beginning in 2010 through 2012 the CRFS data includes invertebrate recreational fishing person-day effort too.

Figure 2.1 presents the number of person-days of recreational shore fishing in the sanctuary from 2004 to 2012. From 2004 to 2012 the number of person-days varied with significant ups and downs reaching a low point in 2010. Person-days were highest in 2011, and have seen a significant increase from 2010 to 2012 exceeding the level achieved in 2004.

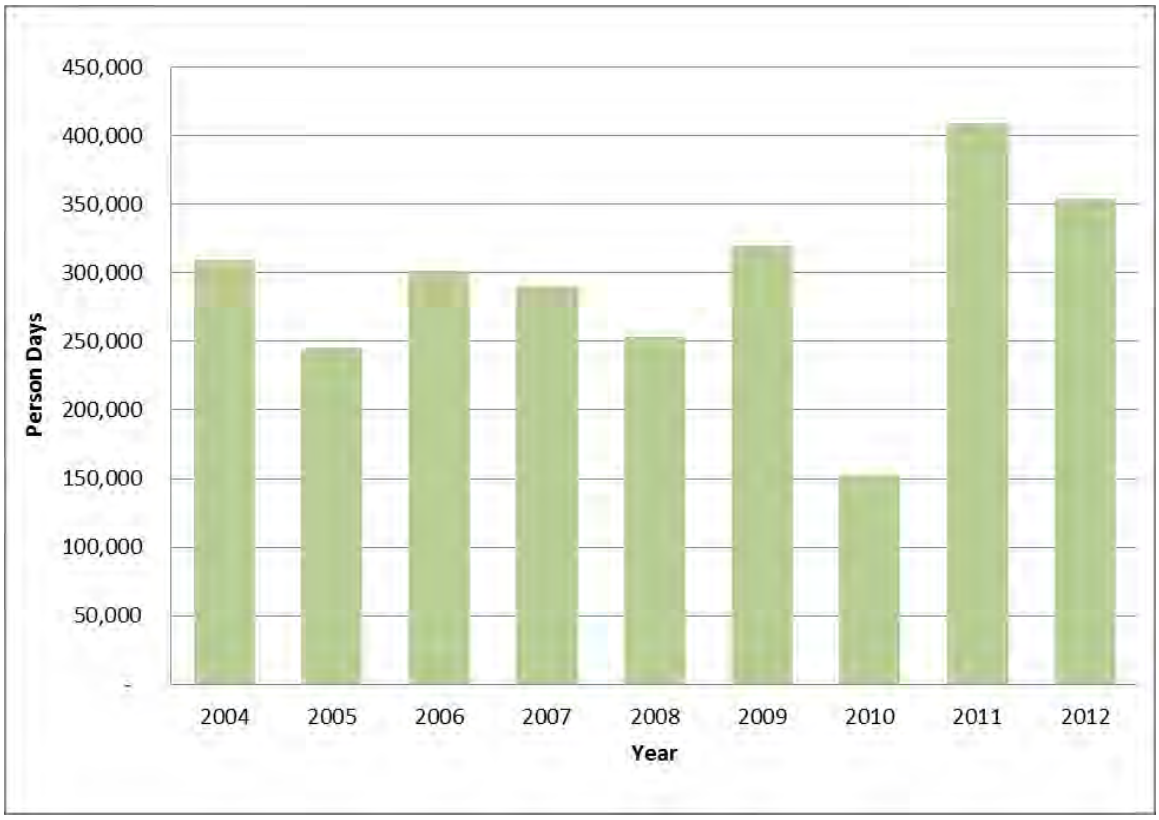

Figure 2.1 MBNMS Shore Fishing Person-days

Next, the person-days were analyzed by resident or non-resident status. As is evident in Table 2.1 and Figure 2.2, most of those accessing the shore for recreational fishing are residents of the study area. From 2010 to 2012 more than 80% of total shore anglers

were residents. Excluding 2004, the total percent of shore anglers was greater than 90, each year. Overall, from 2004 to 2012 the number of shore angler person-days has increased, as has the percentage of residents fishing from the shore.
For estimating the economic impacts/contributions of recreational fishing, we limited this to years 2010, 2011, and 2012 and then report the three-year average. Table 2.1 reports the person-days for shore mode access for the three years and the average and the proportion of all shore mode person-days in Districts 3 & 4 that took place in MBNMS. The proportion of shore mode person-days in Districts 3 and 4 accounted for in MBNMS varied from a low of 20.7% in 2010 to a high of 36.8% in 2012 with a three-year average of 32.3%.

Table 2.1 MBNMS Shore Fishing Person-days in Districts 3 and 4 by Resident Status

Year	Resident	Non-Resident	Total
2010	141,659	11404.43	153,064
% in MBNMS[1]			20.7%
2011	393,428	15,984	409,412
% in MBNMS[2]			36.1%
2012	337,642	16,096	353,737
% in MBNMS[3]			36.8%
Average	290,910	14,495	305,405
% in MBNMS[4]			32.3%

[1] This is the 2010 number of total shore mode person-days in Districts 3 and 4. The value is 740,026 person-days.
[2] This is the 2011 number of total shore mode person-days in Districts 3 and 4. The value is 1,134,531 person-days.
[3] This is the 2012 number of total shore mode person-days in Districts 3 and 4. The value is 961,613 person-days.
[4] This is the average number of total shore mode person-days in years 2010, 2011 and 2012 in Districts 3 and 4. The value is 945,390 person-days.

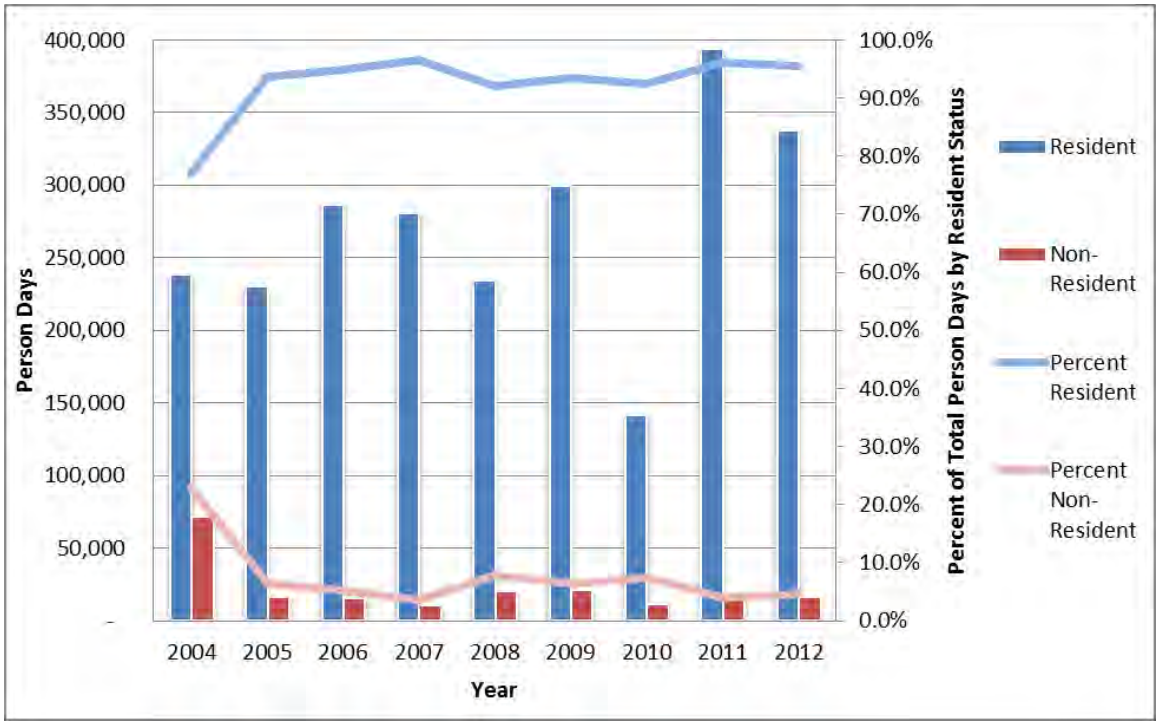

Figure 2.2 MBNMS Shore Fishing Person-days by Resident Status

Private/rental Boat Person-days

As previously discussed private boats are defined as boats belonging to an individual not for rent or with paying passengers. A rental boat is defined as a boat that is rented without crew or a guide. With the exception of 2004, private/rental boat person-days, takes the shape of 'U' from 2005 through 2012, with the minimum number of person-days having occurred in 2008. Figure 2.3 shows the number of person-days from 2004 to 2012.

Residents accounted for the overwhelming proportion of person-days of private/rental boat fishing, but this proportion has been declining from 2010 to 2012. In 2010, residents accounted for 88.3% of person-days and declined to 80.6% in 2012. The three-year average was 84.1% (Figure 2.4).

For the three years 2010 to 2012, person-days of private/rental boat fishing in MBNMS as a proportion of Districts 3 and 4 total person-days ranged from a low of 36.5% in 2010 to a high of 56.5% in 2012 with a three-year average of 49.3% (Table 2.2).

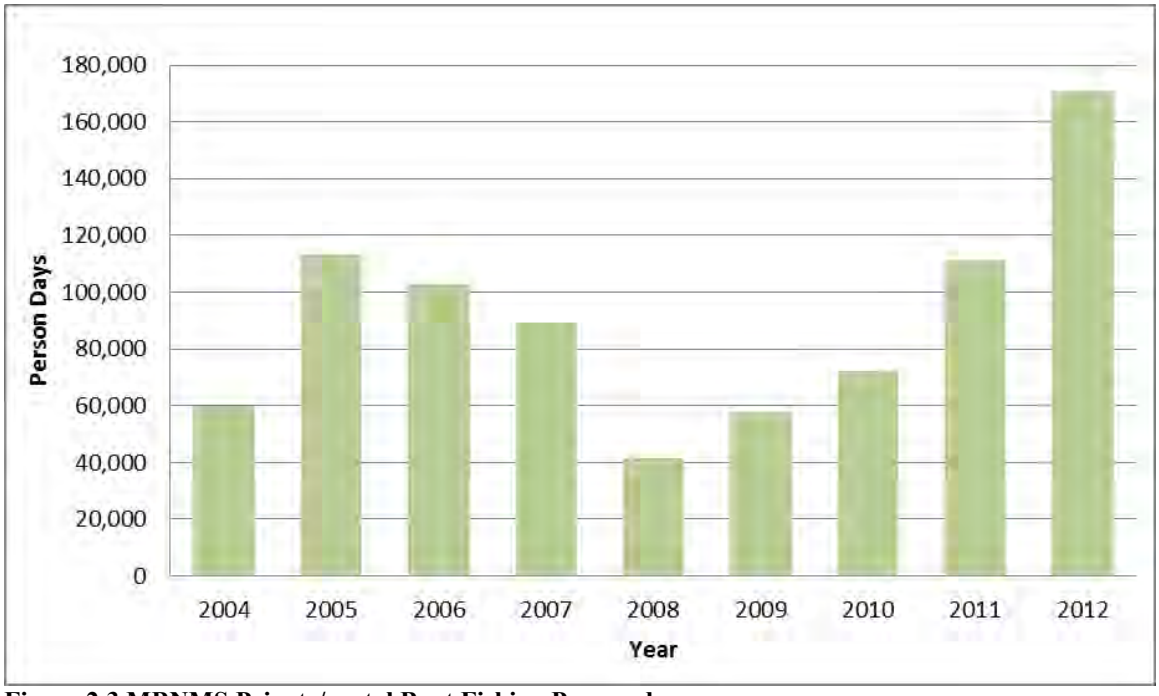

Figure 2.3 MBNMS Private/rental Boat Fishing Person-days

Table 2.2 MBNMS Private/rental Boat Fishing Person-days in Districts 3 and 4 by Resident Status

Year	Resident	Non-Resident	Total
2010	63,547	8,436	71,983
% in MBNMS[5]			36.5%
2011	96,697	14,679	111,376
% in MBNMS[6]			50.9%
2012	137,519	33,121	170,640
% in MBNMS[7]			56.5%
Average	99,254	18,746	118,000
% in MBNMS[8]			49.3%

[5] This is the 2010 number of total private/rental boating person-days in Districts 3 and 4. The value is 197,301 person-days.
[6] This is the 2011 number of total private/rental boating person-days in Districts 3 and 4. The value is 218,727 person-days.
[7] This is the 2012 number of total private/rental boating person-days in Districts 3 and 4. The value is 302,267 person-days.
[8] This is the average number of total private/rental boating person-days in years 2010, 2011 and 2012 in Districts 3 and 4. The value is 239,432 person-days.

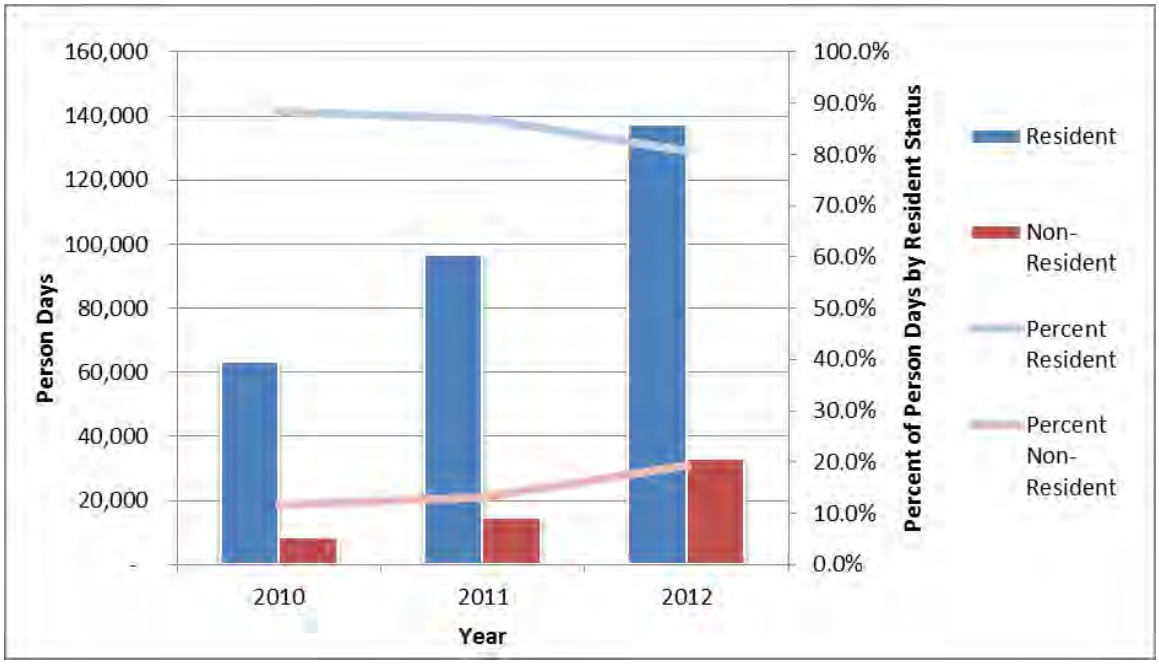

Figure 2.4 MBNMS Private/rental Boat Fishing Person-days by Resident Status

Commercial Passenger Fishing Vessels – Person-days

From 2004 through 2012 the number of CPFV fishing person-days declined, but from 2008 through 2012 the number of person-days has been increasing. However, the total number of person-days in 2012 was not as great as the number of person-days in 2004. It was roughly two-thirds of 2004 days.

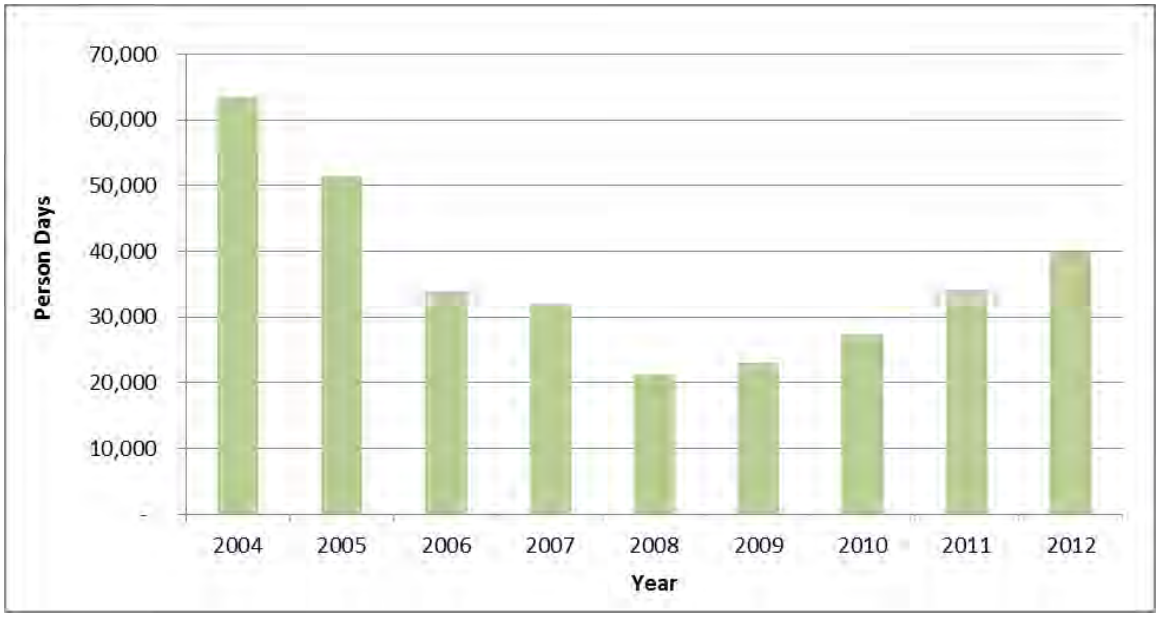

Figure 2.5 MBNMS CPFV Fishing Person-days

CPFV is the only mode of recreational fishing in Monterey Bay that non-residents participated in at greater numbers than residents. However, from 2011 to 2012 the difference in total person-days between residents and non-residents declined. More than 50 percent of total CPFV person-days from 2010 through 2012 were completed by non-residents (Figure 2.6).

Table 2.3 MBNMS CPFV Person-days in Districts 3 and 4 by Resident Status

Year	Resident	Non-Resident	Total
2010	12,867	14,508	27,375
% in MBNMS[9]			31.3%
2011	15,921	18,199	34,120
% in MBNMS[10]			45.6%
2012	19,422	20,496	39,918
% in MBNMS[11]			52.9%
Average	16,070	17,734	33,804
% in MBNMS[12]			42.6%

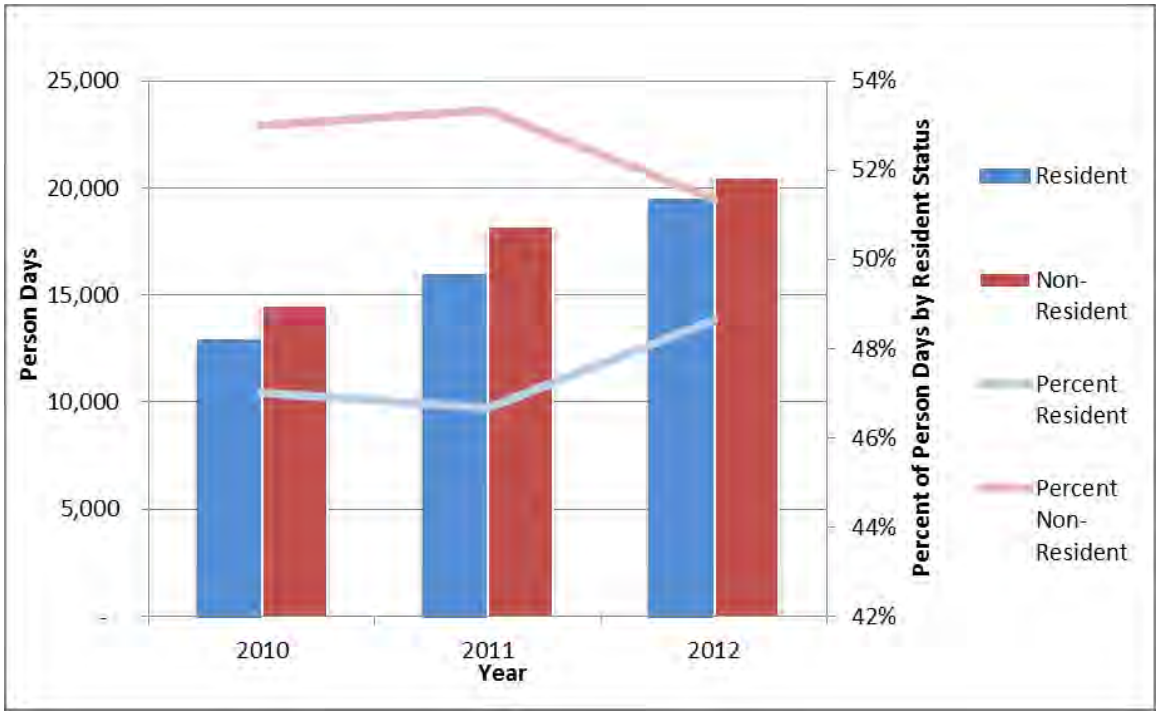

Figure 2.6 MBNMS CPFV Fishing Person-days by Resident Status

[9] This is the 2010 number of total CPFV person-days in Districts 3 and 4. The value is 87,565 person-days.
[10] This is the 2011 number of total CPFV person-days in Districts 3 and 4. The value is 74,905 person-days.
[11] This is the 2012 number of total CPFV person-days in Districts 3 and 4. The value is 75,426 person-days.
[12] This is the average number of total CPFV person-days in years 2010, 2011 and 2012 in Districts 3 and 4. The value is 79,299 person-days.

Summary

Total person-days of recreational fishing in MBNMS have been steadily increasing from rising from more than 252 thousand to more than 457 thousand and approximately 79% increase. On average, slightly more than one third of total recreational fishing person-days that occurred in the Monterey Bay Districts, (3 and 4) occurred within MBNMS (Table 2.4).

Table 2.4 MBNMS Total Recreational Person-Days in Districts 3 and 4 by Fishing Mode and Year

Mode	2010	2011	2012	Average
Shore	153,064	409,412	353,737	305,405
% in MBNMS[13]	20.7%	36.1%	36.8%	32.3%
Private/rental Boating	71,983	111,376	170,640	118,000
% in MBNMS[14]	36.5%	50.9%	56.5%	49.3%
CPFV	27,375	34,120	39,918	33,804
% in MBNMS[15]	31.3%	45.6%	52.9%	42.6%
Total of All Modes	252,423	554,909	564,296	457,209
% in MBNMS[16]	24.6%	38.9%	42.1%	36.2%

[13]The 2010 number of total shore mode person-days in Districts 3 and 4 is 740,026, 2011 had 1,134,531 person-days, 2012 had 961,613 person-days, and the average number across the study period of 2010 through 2012 is 945,390 person-days.

[14]The 2010 number of total private/rental person-days in Districts 3 and 4 is 197,301, 2011 had 218,727 person-days, 2012 had 302,267 person-days, and the average number across the study period of 2010 through 2012 is 239,432 person-days.

[15]The 2010 number of total CPFV person-days in Districts 3 and 4 is 87,565, 2011 had 74,905 person-days, 2012 had 75,426 person-days, and the average number across the study period of 2010 through 2012 is 79,299 person-days.

[16]The 2010 number of total recreational fishing person-days in Districts 3 and 4 is 1,024,892, 2011 had 1,428,163 person-days, 2012 had 1,339,306 person-days, and the average number across the study period of 2010 through 2012 is 1,264,121 person-days.

Chapter 3 Recreational Fishing Expenditures

Total expenditures were estimated using the Angler Expenditure Profiles developed by NOAA Fisheries (Lovell et al., 2013). This is based on survey data collected by NOAA from anglers and is completed approximately every five years. The latest year Angler Expenditure Profiles were completed was 2011 and those estimates are used here. Total expenditures are estimated by fishing mode and residential status for years 2010, 2011, and 2012, plus the three-year average. In addition, estimates are made separately for trip-related expenditures and durable goods expenditures. Trip-related expenditures are made by fishing mode, while durable goods expenditures are made across all modes. Durable good expenditures are only estimated for residents, since non-residents are not likely to have made purchases within the MBNMS study area. Total expenditures are equal to person-days multiplied by expenditure per person-day and are converted to 2014 dollars for all years using the consumer price index (CPI). Gasoline expenditures were converted to 2014 dollars using the gasoline adjustment factor provided by the CPI to account for the increased volatility of prices relative to other goods and services (see Chen, Leeworthy and Schwarzmann 2015).

Table 3.1 shows how the percentage of trip-related expenditure by type has variation in both mode and residential status. For example, the percentage spent on auto-fuel by residential status does not vary much, but across modes of fishing the variation is greater. Shore fishermen spend a higher percentage of their total expenditures on auto fuel when compared to those who are using CPFVs. In regards to food purchases, residents spent a larger portion of their expenditures on grocery store purchases regardless of the mode of fishing. Alternatively, non-residents spent a larger portion of their expenditures on food from restaurants when compared to residents of the MBNMS study area.

Table 3.1 Percent of Trip-related Expenditure by Fishing Mode

	Resident			Non-Resident		
	Shore	Private/Rental	CPFV	Shore	Private/Rental	CPFV
Auto Fuel	28.8%	23.8%	12.7%	30.0%	27.5%	13.4%
Auto Rental	-	-	0.3%	1.8%	6.9%	7.4%
Bait	18.8%	13.6%	2.2%	8.8%	5.2%	0.6%
Boat Fuel	-	28.5%	-	-	10.3%	-
Boat Rental	-	0.7%	-	-	1.2%	-
Charter Fees	-	-	51.3%	-	-	35.9%
Crew Tips	-		8.0%	-	-	3.5%
Fish Processing	-	-	0.1%	-	-	0.0%
Food from Grocery Stores	29.1%	16.9%	8.3%	14.2%	11.0%	6.8%
Food from Restaurants	9.9%	6.6%	7.9%	17.2%	11.3%	7.3%
Gifts & Souvenirs	1.6%	0.2%	0.9%	9.6%	2.3%	7.9%
Ice	2.4%	3.0%	1.1%	2.4%	1.5%	0.5%
Lodging	5.5%	1.4%	2.2%	14.6%	10.4%	8.8%
Parking & Site Access	3.7%	5.0%	1.9%	0.7%	1.8%	2.4%
Public Transportation	0.0%	0.0%	0.0%	0.9%	10.5%	4.5%
Tournament Fees	0.1%	0.3%	2.1%	0.1%	0.1%	0.5%

Shore Angler Trip-related Expenditures

Over the three-year period from 2010 to 2012, residents accounted for between 95 and 98% of all trip-related spending by those who access MBNMS via shore modes of fishing. This is due mostly to the fact that residents account for a greater number of person-days of shore fishing. However, non-residents had higher total trip-related expenditures for shore fishing for auto rental and public transportation. Residents tend to spend a higher percentage of trip-related expenditures on food from grocery stores (29%) than non-residents (14%), while non-residents spend a larger portion of trip-related expenditure on food from restaurants (17%) than residents (9.9%) (Table 3.2).

Table 3.2 Shore Angler Annual Trip-related Expenditures, 2010-2012 (2014 Dollars)

	2010		***2011***		***2012***	
Shore	*Resident*	*Non-Resident*	*Resident*	*Non-Resident*	*Resident*	*Non-Resident*
Auto Fuel	$2,855,758	$211,040	$7,931,275	$295,793	$6,806,631	$297,854
Auto Rental	$0	$13,265	$0	$18,592	$0	$18,722
Bait	$1,975,753	$65,481	$5,487,221	$91,777	$4,709,152	$92,417
Fish Processing	$0	$0	$0	$0	$0	$0
Food from Grocery Stores	$3,060,245	$105,879	$8,499,160	$148,399	$7,294,008	$149,433
Food from Restaurants	$1,036,559	$128,309	$2,878,815	$179,837	$2,470,609	$181,090
Gifts & Souvenirs	$170,763	$71,872	$474,256	$100,736	$407,008	$101,438
Ice	$256,144	$17,606	$711,383	$24,677	$610,512	$24,849
Lodging	$576,698	$109,256	$1,601,653	$153,131	$1,374,544	$154,199
Parking & Site Access	$384,965	$4,944	$1,069,155	$6,930	$917,553	$6,978
Public Transportation	$0	$6,391	$0	$8,958	$0	$9,020
Tournament Fees	$13,481	$724	$37,441	$1,014	$32,132	$1,021
Total	$10,504,895	$747,666	$29,175,042	$1,047,920	$25,038,121	$1,055,225

Private/rental Boat Trip-related Expenditures

Over the three-year period 2010 to 2012, residents accounted 75 to 85% of all trip-related expenditures for those who accessed MBNMS via private/rental boats for fishing. Again, this is mostly due to the greater number of person-days of fishing by residents. However, non-residents had greater total trip-related expenditures for auto rental, gifts & souvenirs, lodging and public transportation. Fuel expenditures are the largest portion of expenditures for both residents and non-residents (Table 3.3).

Table 3.3 Private/rental Boat Annual Trip-related Expenditures, 2010-2012 (2014 Dollars)

	2010		2011		2012	
Private/rental	*Resident*	*Non-Resident*	*Resident*	*Non-Resident*	*Resident*	*Non-Resident*
Auto Fuel	$1,869,342	$442,961	$2,844,526	$770,757	$4,045,374	$1,739,061
Auto Rental	$2,688	$117,932	$4,090	$205,202	$5,817	$462,999
Bait	$1,131,558	$88,940	$1,721,853	$154,755	$2,448,759	$349,175
Boat Fuel	$2,232,825	$166,121	$3,397,628	$289,052	$4,831,975	$652,189
Boat Rental	$59,803	$20,785	$91,001	$36,166	$129,418	$81,603
Charter Fees	$0	$0	$0	$0	$0	$0
Fish Processing	$0	$0	$0	$0	$0	$0
Food from Grocery Stores	$1,410,416	$187,692	$2,146,182	$326,584	$3,052,223	$736,875
Food from Restaurants	$548,308	$194,204	$834,342	$337,915	$1,186,572	$762,442
Gifts & Souvenirs	$14,783	$39,876	$22,495	$69,384	$31,991	$156,551
Ice	$247,948	$25,781	$377,294	$44,859	$536,575	$101,215
Lodging	$118,935	$177,522	$180,979	$308,889	$257,381	$696,950
Parking & Site Access	$413,247	$30,330	$628,824	$52,775	$894,291	$119,077
Public Transportation	$0	$179,574	$0	$312,459	$0	$705,005
Tournament Fees	$25,534	$2,230	$38,854	$3,881	$55,257	$8,756
Trip Total	$8,325,418	$1,711,262	$12,668,504	$2,977,599	$18,016,698	$6,718,384

Commercial Passenger Fishing Vessels Trip-related Expenditures

Unlike shore and private/rental boat modes of fishing, non-residents who accessed MBNMS via CPFV had higher trip-related expenditures than residents. Over the three-year 2010 to 2012 period, non-residents accounted for between 66 and 68% of all trip-related expenditures. However, residents had higher trip-related expenditures for bait, crew tips and tournament fees.

CPFV trip-related expenditures are the only profiles with charter fees and crew tips. Although non-residents spend more total on charter fees, residents are spending more than 50% of their CPFV trip-related expenditures on charter fees compared to 36% for non-residents. Residents spend roughly 8% of their total expenditures on crew tips compared to less than 4% of non-residents. Non-residents expenditures are approximately 17 times more on gifts and souvenirs than residents each year. Further they are spending nearly ten times more on lodging than residents (Table 3.4).

Table 3.4 CPFV Annual Trip-related Expenditures, 2010-2012 (2014 Dollars)

	2010		2011		2012	
CPFV	Resident	Non-Resident	Resident	Non-Resident	Resident	Non-Resident
Auto Fuel	$355,037	$768,417	$439,318	$963,893	$535,920	$1,085,552
Auto Rental	$8,571	$449,494	$10,606	$563,837	$12,938	$635,004
Bait	$65,714	$33,904	$81,314	$42,528	$99,194	$47,896
Charter Fees	$1,520,816	$2,189,785	$1,881,832	$2,746,829	$2,295,632	$3,093,531
Crew Tips	$237,415	$216,002	$293,773	$270,950	$358,372	$305,149
Fish Processing	$1,497	$1,688	$1,852	$2,117	$2,259	$2,384
Food from Grocery Stores	$246,259	$414,516	$304,716	$519,962	$371,721	$585,591
Food from Restaurants	$233,061	$444,124	$288,386	$557,102	$351,800	$627,419
Gifts & Souvenirs	$27,211	$480,483	$33,670	$602,709	$41,074	$678,782
Ice	$31,156	$32,676	$38,552	$40,989	$47,030	$46,162
Lodging	$64,490	$533,409	$79,799	$669,099	$97,346	$753,553
Parking & Site Access	$55,918	$145,894	$69,192	$183,006	$84,407	$206,105
Public Transportation	$0	$275,219	$0	$345,230	$0	$388,804
Tournament Fees	$63,673	$31,142	$78,788	$39,064	$96,113	$43,995
Trip Total	$2,932,517	$6,063,714	$3,628,647	$7,606,219	$4,426,557	$8,566,269

Durable Good Expenditures

Durable good expenditures are only calculated for residents of the study area, since non-residents are unlikely to purchase these kinds of items in the MBNMS study area. NMFS calculates the mean durable expenditures for all modes by participant. When estimating durable good expenditures they are not disaggregated by fishing mode, but presented as the expenditure value for all modes. We converted the mean durable good expenditures by participant to durable good expenditures by person-day. See Chen, Leeworthy and Schwarzmann (2015) for detailed methods of this approach.

Total durable good expenditures were higher in 2011 and 2012 when compared to 2010. This is because there were more person-days of fishing in 2011 and 2012 than 2010. The highest spending categories were for rods & reels, durable tackle and boat storage. See Table 3.5 for a more detailed breakdown of durable goods for the study period.

Table 3.5 Durable Goods Expenditures, 2010-2012 (2014 Dollars)

	2010	*2011*	*2012*
Durable Tackle	$4,804,373	$11,148,720	$10,896,158
Rods & Reels	$6,441,931	$14,948,732	$14,610,086
Spearfishing Gear	$0	$0	$0
Binoculars	$194,040	$450,277	$440,077
Camping Equipment	$567,078	$1,315,926	$1,286,115
Clothing	$1,618,505	$3,755,799	$3,670,716
Club Dues	$308,860	$716,720	$700,484
License Fees	$1,690,706	$3,923,344	$3,834,465
Magazine Subscriptions	$269,751	$625,967	$611,786
Taxidermy	$66,686	$154,746	$151,241
New Boat Purchase	$1,846,640	$4,285,195	$4,188,118
Used Boat Purchase	$118,831	$275,751	$269,504
New Canoe Purchase	$55,655	$129,149	$126,224
Used Canoe Purchase	$0	$0	$0
New Accessory Purchase	$1,060,452	$2,460,816	$2,405,069
Used Accessory Purchase	$0	$0	$0
Boat Insurance	$1,144,686	$2,656,285	$2,596,110
Boat Maintenance	$2,389,651	$5,545,272	$5,419,650
Boat Registration	$298,330	$692,286	$676,603
Boat Storage	$4,178,631	$9,696,664	$9,476,997
Boat Purchase Fees	$73,705	$171,035	$167,161
New Vehicle Purchase	$1,645,580	$3,818,629	$3,732,122
Used Vehicle Purchase	$1,617,001	$3,752,309	$3,667,304
Vehicle Insurance	$1,216,887	$2,823,830	$2,759,860
Vehicle Maintenance	$419,167	$972,691	$950,656
Vehicle Registration	$384,570	$892,410	$872,193
Vehicle Purchase Fees	$266,241	$617,822	$603,826
New Home Purchase	$203,567	$472,384	$461,682
Second Home Property Taxes	$2,507	$5,818	$5,686
Total	$32,884,030	$76,308,578	$74,579,894

Summary

Trip-related Expenditures. Expenditures for both private/rental boat and CPFV have been steadily increasing from 2010 through 2012, while for shore modes expenditures made a significant jump from 2010 to 2011, and then declined in 2012. The sum of the total trip-related expenditures across all modes has steadily increased rising from nearly $30 million in 2010 to almost $63 million in 2012 (Table 3.6). In each of the three years, shore mode fishing had the highest total trip-related expenditures. Although the spending per person-day is lower than other modes of access, the total number of person-days is much higher for shore fishing than the other modes of access. For the three-year average, trip-related expenditures across all modes of fishing were roughly $49.5 million.

Durable Good Expenditures. Total durable goods expenditures more than doubled from 2010 to 2011, but saw a decline in from 2011 to 2012 due to a decline in person-days of fishing. The average annual durable good expenditures for the study period were $61.3 million (Table 3.7).

Total Expenditures. Total expenditures followed the same patterns as trip-related and durable goods expenditures. Total expenditures rose from almost $62.6 million in 2010 to more than $137.2 million in 2012. The three-year average was $110.7 million (Table 3.8). This information is used to estimate the economic impacts/contributions associated with recreational fishing in MBNMS. The findings are presented in the following chapter.

Table 3.6 Trip-related Annual Expenditures by Mode of Access, 2010-2012 (2014 Dollars)

Mode of Access	2010	2011	2012	Average
Shore	$11,065,134	$29,720,203	$25,659,171	$22,148,169
Private/rental Boat	$9,749,337	$15,200,746	$24,047,530	$16,332,537
CPFV	$8,927,572	$11,149,115	$12,893,733	$10,990,140
Total	$29,742,042	$56,070,064	$62,600,434	$49,470,847

Table 3.7 Annual Durable Goods Expenditures by Mode of Access, 2010-2012 (2014 Dollars)

	2010	2011	2012	Average
Total	$32,884,030	$76,308,578	$74,579,894	$61,257,501

Table 3.8 Total Annual Expenditures by Expenditure Type, 2010-2012 (2014 Dollars)

Mode of Access	2010	2011	2012	Average
Trip-related	$29,742,042	$56,070,064	$62,600,434	$49,470,847
Durable Goods	$32,884,030	$76,308,578	$74,579,894	$61,257,501
Total	$62,626,072	$132,378,642	$137,180,328	$110,728,348

Chapter 4 Market Analysis of Recreational Fishing

Using the person-day estimates from Chapter 2 and the expenditures from Chapter 3, this data can be inputted to IMPLAN to estimate market benefits associated with recreational fishing in MBNMS. First, it may be useful to discuss some IMPLAN terminology. Table 4.1 provides a more detailed explanation of the terminology used in this report, as defined by IMPLAN.

Table 4.1 IMPLAN Economic Indicators' Definitions

Indicator	*Definitions and Relationships*
Employment	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 twelve months
Labor Income	Defines the total value paid to local workers within a region. Labor income is the income source for induced household spending estimations. Labor Income = Employee Compensation + Proprietor Income
Value Added	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). Value Added = Labor Income + IBT + OPTI
Output	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. Output = Intermediate Inputs + Value Added

Source: Day, 2011

Impacts 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 their money on goods and services within the region. The indirect plus induced make-up what is generally referred to as the "multiplier" effects. Table 4.2 explains these types of impacts in more detail.

Table 4.2 Impact Type Definitions

Type of Impact	*Definition*
Direct Effect	The effect of spending by recreational fishermen at each business they purchase goods or services from within the study area.
Indirect Effect	The result of a sector purchasing goods and services to produce their product from other industries located within the study area.
Induced Effect	Results from spending of employee wages that stem from both the Direct and Indirect effects within the study area.

Source: Day, 2011

Economic Impacts/Contributions

The economic impacts/contributions are limited to the study area defined by nine local area counties (see Chapter 1). For each of the estimates of impacts on employment and income from recreational fishing in MBNMS, we provide estimates of what proportion of the study area's total employment and income are accounted for by recreational fishing in MBNMS. Because the study area is very large, recreational fishing accounts for only fractions of a percent of the total study area's economy, however in absolute dollars the impacts/contributions are significant. Table 4.3 provides the estimates of the Study area's employment and income for 2010 to 2012 and the three-year average.

The employment numbers presented here are the total full-time, part-time and seasonal jobs created each year within the study area. The percentages presented under Income and Employment is the percent of total income or employment that can be attributed to recreational fishing in the MBNMS study area (as defined in
Table 1.1 and Figure 1.1).

Table 4.3 Employment and Income in MB study area

	2010	2011	2012	Average
Employment	4,306,995	4,393,697	4,532,734	4,411,142
Income	$392,597,631,000	$426,540,881,000	$457,225,291,000	$425,454,601,000

Source: Bureau of Economic Analysis

Total economic impacts/contributions steadily increased over the three-year period. Each year recreational shore fishing attributes the most to the economy's output (of the three recreational fishing modes). This is the result of the higher person-days of shore fishing relative to the other modes of fishing. Tables 4.4 through 4.7 present the economic impacts/contributions of trip-related expenditures.

Table 4.4 2010 Trip-related Economic Impacts (2014 Dollars)[17]

2010				
	Output	Value Added	Income	Employment
Shore	$14,277,975	$8,703,121	$5,189,342	99
% of MB			0.001%	0.002%

[17] % of MB is the percent Income or Employment in the Monterey Bay study area (as defined by Table 1.1) that can be attributed to recreational fishing in Monterey Bay National Marine Sanctuary.

Private/rental	$13,796,902	$8,109,404	$4,781,220	81
% of MB			0.001%	0.002%
CPFV	$14,002,475	$8,613,629	$5,187,756	112
% of MB			0.001%	0.003%
Total	$42,077,352	$25,426,154	$15,158,318	291
% of MB			0.004%	0.007%

Table 4.5 2011 Trip-related Economic Impacts (2014 Dollars) [18]

2011				
	Output	Value Added	Income	Employment
Shore	$38,242,183	$23,324,990	$13,912,195	264
% of MB			0.003%	0.006%
Private/rental	$21,545,559	$12,663,712	$7,467,977	126
% of MB			0.002%	0.003%
CPFV	$17,485,791	$10,756,190	$6,477,911	139
% of MB			0.002%	0.003%
Total	$77,273,533	$46,744,892	$27,858,083	530
% of MB			0.007%	0.012%

Table 4.6 2012 Trip-related Economic Impacts (2014 Dollars) [19]

2012				
	Output	Value Added	Income	Employment
Shore	$33,033,534	$20,145,807	$12,015,282	228
% of MB			0.003%	0.005%
Private/rental	$34,305,716	$20,162,921	$11,900,645	203
% of MB			0.003%	0.004%
CPFV	$20,229,302	$12,445,207	$7,496,846	161
% of MB			0.002%	0.004%
Total	$87,568,552	$52,753,935	$31,412,773	593
% of MB			0.007%	0.013%

Table 4.7 Average Trip-related Economic Impacts from 2010-2012 (2014 Dollars) [20]

Average from 2010-2012				
	Output	Value Added	Income	Employment
Shore	$28,517,897	$17,391,306	$10,372,273	197
% of MB			0.002%	0.004%

[18] % of MB is the percent Income or Employment in the Monterey Bay study area (as defined by Table 1.1) that can be attributed to recreational fishing in Monterey Bay National Marine Sanctuary.
[19] % of MB is the percent Income or Employment in the Monterey Bay study area (as defined by Table 1.1) that can be attributed to recreational fishing in Monterey Bay National Marine Sanctuary.
[20] % of MB is the percent Income or Employment in the Monterey Bay study area (as defined by Table 1.1) that can be attributed to recreational fishing in Monterey Bay National Marine Sanctuary.

Private/rental	$23,216,059	$13,645,346	$8,049,947	137
% of MB			0.002%	0.003%
CPFV	$17,239,189	$10,605,009	$6,387,504	137
% of MB			0.002%	0.003%
Total	$68,973,146	$41,641,660	$24,809,725	471
% of MB			0.006%	0.011%

Economic Impacts/Contributions by Type of Expenditure

When analyzing the economic impacts of regulations and policy/management strategies, it is important to distinguish between trip-related expenditures and durable good expenditures, and their associated impacts on the local area economies. For small or marginal changes in fishing effort, it is not appropriate to include durable goods expenditures and their associated impacts on the local area economies. So here we provide a break-down of the economic impacts by these two types of expenditures. By normalizing these estimates by person-days of activity one can derive multipliers for regulatory or policy/management analyses (see Chen, Leeworthy and Schwarzmann, 2015).

Trip-related expenditures from recreational fishing in MBNMS, on average, generated almost $69.0 million in output, more than $41.6 million in value added, almost $25 million in income, and more than 470 full and part-time jobs annually in the MBNMS study area (Table 4.8).

Table 4.8 Economic Impact of Annual Trip-related Expenditures, 2010-2012 (2014 Dollars) [21]

Measure	2010	2011	2012	Average
Output	$42,077,352	$77,273,533	$87,568,552	$68,973,146
Value Added	$25,426,154	$46,744,892	$52,753,935	$41,641,660
Labor Income	$15,158,318	$27,858,083	$31,412,773	$24,809,725
% of MB	0.004%	0.007%	0.007%	0.006%
Employment	291	530	593	471
% of MB	0.007%	0.012%	0.013%	0.011%

Durable goods purchases, on average generated, on average, almost $83 million in output, almost $51 million in value added, more than $28 million in income and over 440 full and part-time jobs annually in the MBNMS study area (Table 4.9).

[21] % of MB is the percent Income or Employment in the Monterey Bay study area (as defined by Table 1.1) that can be attributed to recreational fishing in Monterey Bay National Marine Sanctuary.

Table 4.9 Economic Impact of Annual Durable Goods Expenditures, 2010-2012 (2014 Dollars) [22]

Measure	2010	2011	2012	Average
Output	$51,784,297	$101,066,633	$98,777,084	$83,876,005
Value Added	$32,534,233	$60,680,124	$59,305,485	$50,839,947
Labor Income	$19,058,061	$33,439,119	$32,681,594	$28,392,925
% of MB	0.005%	0.008%	0.007%	0.007%
Employment	293	520	509	441
% of MB	0.007%	0.012%	0.011%	0.010%

In total, recreational fishing in MBNMS, on average, generated annual impacts/contributions of $152.8 million in output, almost $92.5 million in value-added, more than $53.2 million in income and more than 900 full and part-time jobs annually in the MBNMS study area (Table 4.10).

Table 4.10 Economic Impact of Annual Total Expenditures, 2010-2012 (2014 Dollars) [23]

Measure	2010	2011	2012	Average
Output	$93,861,649	$178,340,166	$186,345,636	$152,849,150
Value Added	$57,960,387	$107,425,016	$112,059,420	$92,481,608
Labor Income	$34,216,379	$61,297,202	$64,094,367	$53,202,649
% of MB	0.01%	0.01%	0.01%	0.01%
Employment	584	1,050	1,101	912
% of MB	0.01%	0.02%	0.02%	0.02%

[22] % of MB is the percent Income or Employment in the Monterey Bay study area (as defined by Table 1.1) that can be attributed to recreational fishing in Monterey Bay National Marine Sanctuary.
[23] % of MB is the percent Income or Employment in the Monterey Bay study area (as defined by Table 1.1) that can be attributed to recreational fishing in Monterey Bay National Marine Sanctuary.

Chapter 5 Conclusion

This report presents the results of the recreational fishing study completed for Monterey Bay National Marine Sanctuary (MBNMS) from 2010 through 2012. On average, MBNMS accounted for 36.2% of the total person-days of marine recreational fishing from Districts 3 and 4 and 10.1% of the entire State of California's total recreational fishing effort each year during the study period. Recreational shore fishing accounted for an average of 32.3% of person-days, 49.3% of private/rental boat person-days, and 42.6% of CPFV person-days of all the person-days in Districts 3 and 4. Shore fishing in MBNMS accounted for 8.9%, private/rental boat fishing for 17.9% and commercial passenger fishing vessels for 7.6% of the total State of California's fishing effort by mode of access.

Chapter 3 discussed expenditures. Fuel was one of the largest expenditure categories for anglers, regardless of their mode of fishing. If the angler was fishing using a private/rental boat, then fuel expenditures composed more than half of their total expenditures. Additionally, residents tended to spend a larger percentage of total expenditures on grocery store food when compared to non-residents. Residents had more total trip-related spending on shore and private/rental boat modes, but non-residents had higher trip-related expenditures for the CPFV mode of fishing. In all modes of fishing, non-residents had higher trip-related expenditures for auto rental and public transportation and for lodging in the private/rental boat mode of fishing. For durable goods purchases, the highest expenditures were for rods & reels, durable tackle and boat storage.

Lastly, Chapter 4 presented the economic impacts/contributions of recreational fishing in MBNMS. Although, employment and income compose a small percentage of total employment and income in the study area, recreational fishing in MBNMS still has a positive impact on the economy of the study area. In total, marine recreational fishing adds roughly $152.8 million in economic output; almost $92.5 million in value-added, more than $53.2 million in income and more than 900 full- and part-time jobs to the study area annually.

Glossary of Terms

(adapted from RecFin, 2014 and Day, 2011)

Commercial Passenger Fishing Vessel (CPFV) –There are two categories. The first is a charter boat, which operates under charter for a specified price, time, etc. A party boat is a boat on which fishing space and privilege are provided for a fee per angler.

Durable Goods –Goods that do not quickly wear out and typically last for a long period of time, such as a boat.

Employment –The total annual average jobs. This includes the self-employed in addition to wage and salary employees, and all full-time, part-time and seasonal jobs, based on a count of full-time and part-time job averages over twelve months.

Intermediate Inputs -Goods and service required to create a product.

Labor Income – Is equivalent to employee compensation + proprietor (business owner) income.

Output –The total value of an industry's production, comprised of the value of intermediate inputs and value added.

Person-Days –The number of days (not trips) a person fishes.

Private-Rental Fishing –A private boat is defined as belonging to an individual; it is neither for rent nor for transporting paying passengers. A rental boat is defined as a boat that is rented without crew or a guide; it does not transport paying passengers.

Shore Mode Fishing –Fishing accessed on beaches, banks and man-made structures.

Trip-Related Expenditures – Expenditures on goods and services for specific trip, such as food or live bait.

Value Added –Value added demonstrates an industry's value of production over the cost of the goods and services required to make its products. Value Added is often referred to as Gross Regional Product.

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