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# Economic Impact of the Commercial Fisheries on Local County Economies from Catch in All California National Marine Sanctuaries 2010, 2011 and 2012

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## **Abstract**

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The three-year average for 2010 to 2012 finds that landings of commercial fish catch from CA NMS generated over \$69.2 million in harvest revenue, almost \$114 million in output, \$76.9 million in value added, \$69.8 million in total income and 1,841 full- and part-time jobs across 15 counties. Consequently, almost one third of all CA commercial fish catch comes from CA NMS. During the study period harvest revenue demonstrated a consistent decline from almost \$75.7 million in 2010 to almost \$64.9 million in 2012. In 2012 the top five species/species groups caught in CA NMS were Dungeness crab, Squid, Salmon, Urchin and Groundfish. These top five species/species groups accounted for almost 86% of all CA NMS landings in 2012. In 2012 the top four ports where catch from the CA NMS was landed were Princeton-Half Moon, San Francisco, Moss Landing and Santa Barbara Harbor. Dependency on the sanctuaries for total port landings varied, ranging from a high of over 96% at Princeton Half-Moon to a low of almost 60% at San Francisco. In addition, the largest numbers of vessels in CA NMS were out of the San Francisco, Monterey and Santa Barbara Harbor port complexes.



## **Economic Impact of the Commercial Fisheries on Local County Economies from Catch in All California National Marine Sanctuaries 2010, 2011 and 2012**

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



January 2014

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January 2014

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## **Cover**

Clockwise, from top right: Sunrise at Stinson Beach in Marin County is a sight to behold in the early glow of morning. Twenty minutes from San Francisco, this is a popular weekend destination. (photo: Patty Gaffney); 34 different species of marine mammals live in, or visit the Monterey Bay National Marine Sanctuary. Of those, many are large whales such as Humpbacks; A mixed species school of rockfish hang mid water in the boundless blue ocean above Cordell Bank. (photo: Cordell Bank Expeditions); The sanctuary also serves as a playground for divers. In addition to uncovering a diverse array of marine life within the kelp forests and rocky reef habitats, there are over 200 documented shipwrecks to explore within the boundaries of the Sanctuary. It is strictly prohibited to collect any artifacts from these sites. (photo: Channel Islands NMS)

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## Key Words

Economic impact, income, jobs, commercial fishing, harvest revenue, California, output, multiplier, Channel Islands, Cordell Bank, Monterey Bay, Gulf of the Farallones, National Marine Sanctuaries

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## Introduction

This report is part of a series of reports meeting “Office of National Marine Sanctuaries (ONMS) West Coast Region Socioeconomic Plan FY 2013 – FY 2014” priorities and “National program priorities” on establishing connections between sanctuary resource uses and local, regional and national economies. This report summarizes analyses on economic impacts on local county economies from commercial fishing catch across all California National Marine Sanctuaries (CA NMS). This report also describes vessel activity by port complex, port dependency on commercial fisheries in CA NMS and species/species group trends. In some instances, commercial fishing in CA NMS is compared with statewide commercial fishing trends. For details in each NMS: Cordell Bank (CBNMS), Channel Islands (CINMS), Gulf of the Farallones (GFNMS), and Monterey Bay (MBNMS), there are separate reports containing the results of the estimation for each site (Leeworthy et al 2013a, Leeworthy et al 2013b, Leeworthy et al 2013c, and Leeworthy et al 2013d). For the methods of estimation, see the technical appendix (Leeworthy et al 2013e).

Economic impact here is limited to the impacts of commercial fishing operations and the multiplier impacts from the spending in conducting their fishing operations. The estimates underestimate the total economic impact because the COFHE Model used here did not include the processing, wholesaling, retail and restaurant market channels and market markups of the fish landed in each county. Only the costs of production from commercial fishing operations was included and the associated indirect and induced economic impacts (i.e. the ripple or multiplier impacts) of this spending. Although information on market channels and market-markups are presented in Hackett et al (2009), the information was not available at the county level to include in the COFHE Model.

The economic impacts estimated here relative to the “full” economic impacts will vary greatly by fishery and county of landings. For fisheries characterized by little processing, wholesaling, local retail sales and local restaurant sales, the differences will be small. In these cases, most of the landings are exported out of the county with little added value locally. Estimating the market channels and market mark-ups by county should be a high priority for the next version of the COFHE Model. In the peer review of this document, one of the authors in Hackett et al (2009) argued that the COFHE Model was designed to estimate the impacts of management strategies and regulations and the effects on processing, wholesaling, retail and restaurant markets would be minimal since these sectors can easily substitute lost catch from other places and therefore there would be little, if any, impacts on local economies. The reviewer also admitted that this might be less true for some processors.

In Leeworthy et al, 2005, the Fishery Economic Assessment Model (FEAM) developed by the Pacific Fishery Management Council (PFMC 1999) was used to estimate the potential economic impacts of the network of marine reserves (no-take areas) in the Channel Islands National Marine Sanctuary (CINMS). FEAM multipliers were very similar to the COFHE Model’s in that the IMPLAN input-output model was used to derive multipliers defined in terms of income to harvest revenues. The FEAM multipliers were only done for income in each county by

species/species groups instead of OCs as in the COFHE Model and the FEAM multipliers included all market channels (e.g. processing, wholesaling, retailing and restaurant sales). In 1998, the CINMS multipliers for income to harvest revenue (ratio of income generated at all market levels divided by harvest revenue) ranged from 1.2 for most *Finfish* to 4.5 for *Market Squid*, while for *Crab* it was 2.8. The overall average was about 3.1, which was heavily influenced by *Market Squid* which accounted for 59% of CINMS harvest revenue. In comparison, the COFHE Model income multipliers for CINMS averaged about 1.00 for years 2010 through 2012. So the total economic impact could be three times higher than was estimated here using the COFHE Model for the CINMS. We don't have the FEAM multipliers for the other ONMS sites in California, but given the dominance of *Market Squid* and *Dungeness crab* in MBNMS, the total economic impact for MBNMS could also be about three times higher than estimated here. For CBNMS and GFNMS, which are more dominated by *Finfish* catch, the multipliers for total economic impact are likely lower, probably less than 2.0, so the estimates of total economic impact for these sanctuaries could be double that estimated here for total income generated.

Chapter 1 provides the results of applying the California Ocean Fish Harvester Economic Model (COFHE) to landings from CA NMS (Hackett et al 2009). Harvest revenue (what the fishermen receive when they land their catch at various California ports) is converted to estimates of total output, value added, income and employment (measured in number of full and part-time jobs) using the multipliers in the COFHE Model for each county. Results are presented for years 2010, 2011, 2012 and the three-year average. Details of the COFHE Model are presented in a separate technical appendix report (Leeworthy et al. 2013).

Chapter 2 provides a profile of vessels operating in CA NMS and ports receiving catch from CA NMS. Profile elements include: trends in the number of vessels active in CA NMS by port complex and port dependence on catch from CA NMS (i.e. the percent of total harvested fish landings at the port from CA NMS).

Chapter 3 provides a profile of key species/species groups in CA NMS. The profile includes trends in catch for the top five species/species groups for years 2000 through 2012. Trends in catch are also presented for any species/species groups that ranked in the top five species/species groups for an individual sanctuary. All trends in catch within CA NMS are compared with trends in catch in CA waters.

# Chapter 1: Summary of Economic Impact of the Commercial Fisheries on Local County Economies from Catch from in all CA NMS

To obtain estimates of the commercial catch from CA NMS the first step is defining the “best” spatial area from the CDFW-CFIS that “best” approximates the area within the CA NMS. The California Fishery Information System (CFIS) from the California Department of Fish and Wildlife (CDFW) maintains commercial landings by where the fish is caught and where it is landed. 10-minute by 10-minute blocks (100 nautical square mile cells) describe where the fish is caught. Latitude and longitude coordinates define these blocks. Figure 1.1 shows the overlay of CA NMS boundaries on the CDFW-CFIS blocks. Each block has a three digit database code.



Figure 1.1. Definition of CA NMS using CDFW-CFIS Blocks

### Definitions of Terms (Adapted from Hackett et al. 2009)

**Harvest Revenue:** What fishermen receive when they land their catch at various CA ports.

**Output:** Total industry production, equal to shipments plus net additions to inventory.

**Value Added:** The value added during production to all purchased intermediate goods and services. This is equal to employee compensation plus proprietor's income plus other property income plus indirect business taxes.

**Total Income:** Sum of employee compensation, proprietor's income, corporate income, rental income, interest and corporate transfer payments.

**Employment:** Full- and part-time jobs.

### *Harvest Revenue*

Harvest revenue is variable across the four NMS sites; however, aggregate harvest revenue for all sites shows a steady decline over the study period. In 2010, harvest revenue was over \$75.7 million or 37.7% of total harvest in all of CA waters. By 2012, harvest revenue declined to over \$65 million or 26.6% of total harvest in all of CA waters. The three-year average for harvest revenue is \$69.3 million, or about 31.6% of total harvest in all of California waters. On average, the CINMS recorded the largest harvest revenue of all four sites. It declined from over 50% of total harvest revenue in 2010 to over 28% in 2012. The MBNMS accounted for the second largest amount of catch among CA NMS. Over the study period the MBNMS showed trends opposite those of the CINMS, growing from 32% of total harvest revenue in 2010 to almost 46% in 2012. As a percent of total CA NMS catch, the three-year average for the GFNMS harvest revenue was almost 22%, while the CBNMS represents just over 1%.

**Table 1.1. Harvest Revenue from CA NMS, 2010 to 2012 (2013 \$)**

Sanctuary	2010	2011	2012	3-yr Average
CBNMS	1,444,174	777,192	758,078	993,148
GFNMS	11,650,643	17,364,388	16,145,908	15,053,646
MBNMS	24,353,992	23,980,407	29,661,358	25,998,586
CINMS	38,336,620	25,104,732	18,455,950	27,299,101
<b>Total existing sites</b>	<b>75,785,429</b>	<b>67,226,719</b>	<b>65,021,294</b>	<b>69,344,481</b>
California Totals	201,087,774	212,102,128	244,568,018	219,252,640
Existing Sites' Percent of CA	37.7%	31.7%	26.6%	31.6%

Source: California Department of Fish and Wildlife, CFIS, 2000 to 2012.

## Results

Using the COFHE Model, economic impact of harvest revenue from the CA NMS was estimated by county for the years 2010, 2011, 2012 and the three-year average (Tables 1.2 to 1.5). This was done due to volatile fluctuation in some influential fisheries from year to year (see trends of top five species/species groups in Chapter 3). Results presented here include a 15-county study area of coastal CA counties from Mendocino County in the north to Orange County in the south. Far distant counties, or those receiving minimal catch, were excluded from the study area. In addition, harvest revenue that did not map into one of the 20 operational categories was excluded.

Harvest revenue, output, value added and total income all show a steady decline from 2010 on 2012. Conversely, employment consistently increased over the study period. In 2010, 1,714 part-time and full-time jobs were generated from commercial fishing in CA NMS. By 2012, this number grew to 1,964 part-time and full-time jobs.

In 2010, harvest revenue for all CA NMS was almost \$75.7 million, generating almost \$124.9 million in output, almost \$87.5 million in value added, just under \$79.4 million in income and 1,714 part-time and full-time jobs (Table 1.2).

**Table 1.2. Economic Impact on Local County Economies from Commercial Fishing in CA NMS, 2010 (2013 \$)**

County	Harvest Revenue	Output	Value Added	Total Income	Employment <sup>1</sup>
Alameda	112,890	185,326	74,779	66,156	3.23
Contra Costa	13,632	23,922	15,145	13,543	0.45
Los Angeles	2,041,230	3,953,790	2,867,624	2,620,995	25.76
Marin	1,025,936	1,586,782	1,048,749	935,088	33.18
Mendocino	53,234	81,345	56,052	50,530	0.86
Monterey	14,417,766	23,296,219	17,570,121	16,161,049	370.08
Orange	0	0	0	0	0
San Francisco	9,414,111	15,215,939	10,224,226	9,193,468	148.71
San Luis Obispo	692,041	1,101,638	595,183	514,064	41.02
San Mateo	7,170,473	11,578,499	7,513,939	6,725,672	154.05
Santa Barbara	5,460,517	8,996,581	4,699,586	4,018,572	228.78
Santa Cruz	594,254	1,005,841	561,097	489,601	58.17
Solano	3,344	5,226	3,155	3,712	0.06
Sonoma	3,843,023	6,708,186	4,311,031	3,861,207	103.12
Ventura	30,845,966	51,117,821	37,933,623	34,741,780	546.28
<i>Total</i>	<i>75,688,417</i>	<i>124,857,115</i>	<i>87,474,310</i>	<i>79,395,437</i>	<i>1,714</i>

1. Number of part-time and full-time employees.

In 2011, harvest revenue declined to almost \$67.2 million, resulting in \$110.6 million in output, almost \$73.9 million in value added, just under \$67.2 million in income and 1,846 part-time and full-time jobs (Table 1.3).

**Table 1.3. Economic Impact on Local County Economies from Commercial Fishing in CA NMS, 2011 (2013 \$)**

County	Harvest Revenue	Output	Value Added	Total	Income	Employment <sup>1</sup>
Alameda	192,083	307,447	65,506		63,212	4.02
Contra Costa	24,815	41,237	15,213		12,345	10.6
Los Angeles	573,245	1,116,310	791,474		724,433	9.1
Marin	430,784	660,380	556,010		479,714	35.43
Mendocino	445,539	680,146	456,183		411,451	9.54
Monterey	12,915,897	20,887,822	14,864,291		13,514,113	472.39
Orange	32,408	63,930	48,076		45,196	0.51
San Francisco	9,585,143	15,512,185	10,318,163		9,262,300	159.63
San Luis Obispo	918,348	1,459,016	796,899		686,609	52.05
San Mateo	7,585,248	12,248,163	7,842,831		7,007,967	176.82
Santa Barbara	6,153,407	10,139,472	5,351,926		4,587,602	265.8
Santa Cruz	1,081,263	1,840,392	996,440		862,589	140.77
Solano	2,004,548	3,250,760	2,244,445		2,836,344	27.08
Sonoma	6,916,683	12,100,509	7,692,943		6,886,468	139.96
Ventura	18,304,885	30,293,345	21,832,995		19,775,659	342
<i>Total</i>	<i>67,164,296</i>	<i>110,601,114</i>	<i>73,873,395</i>		<i>67,156,002</i>	<i>1,846</i>

1. Number of part-time and full-time employees.



In 2012, harvest revenue continued to decline to almost \$64.9 million, generating just under \$106.5 million in output, over \$69.2 million in value added, \$62.9 million in income and 1,964 part-time and full-time jobs (Table 1.4).

**Table 1.4. Economic Impact on Local County Economies from Commercial Fishing in CA NMS, 2012 (2013 \$)**

County	Harvest Revenue	Output	Value Added	Total Income	Employment <sup>1</sup>
Alameda	240,240	394,180	122,332	123,104	6.62
Contra Costa	16,879	27,521	8,905	11,330	2.35
Los Angeles	286,063	556,791	357,175	319,736	6.9
Marin	321,247	489,230	230,333	190,975	23.8
Mendocino	164,057	246,410	144,495	127,437	6.77
Monterey	11,775,813	19,056,857	13,185,010	11,938,546	454.74
Orange	7,528	13,556	8,621	7,554	0.12
San Francisco	8,739,552	14,132,273	9,248,712	8,289,895	168.88
San Luis Obispo	673,449	970,899	552,194	477,914	30.72
San Mateo	15,070,339	24,345,865	16,658,638	15,288,185	298.25
Santa Barbara	6,816,624	11,227,828	5,849,796	4,995,919	289.75
Santa Cruz	2,054,032	3,489,726	1,860,221	1,606,646	224.41
Solano	1,673,787	2,715,945	1,867,986	2,356,304	22.95
Sonoma	5,746,079	10,033,187	6,150,748	5,474,356	164.1
Ventura	11,313,545	18,757,615	12,972,815	11,698,433	264.05
<i>Total</i>	<i>64,899,234</i>	<i>106,457,883</i>	<i>69,217,981</i>	<i>62,906,334</i>	<i>1,964</i>

1. Number of part-time and full-time employees.

**Table 1.5. Economic Impact on Local County Economies from Commercial Fishing in CA NMS, 3-year Average 2010, 2011 and 2012 (2013 \$)**

County	Harvest Revenue	Output	Value Added	Total Income	Employment <sup>1</sup>
Alameda	181,737	295,651	87,539	84,157	4.63
Contra Costa	18,442	30,894	13,088	12,406	4.47
Los Angeles	966,846	1,875,630	1,338,758	1,221,721	13.92
Marin	592,655	912,131	611,697	535,259	30.8
Mendocino	220,944	335,967	218,910	196,473	5.72
Monterey	13,036,492	21,080,299	15,206,475	13,871,235	432.4
Orange	13,312	25,829	18,899	17,583	0.21
San Francisco	9,246,268	14,953,466	9,930,367	8,915,220	159.08
San Luis Obispo	761,280	1,177,184	648,092	559,530	41.26
San Mateo	9,942,020	16,057,509	10,671,803	9,673,941	209.71
Santa Barbara	6,143,516	10,121,294	5,300,436	4,534,031	261.44
Santa Cruz	1,243,183	2,111,986	1,139,253	986,279	141.11
Solano	1,227,226	1,990,644	1,371,862	1,732,120	16.7
Sonoma	5,501,928	9,613,960	6,051,575	5,407,344	135.73
Ventura	20,154,799	33,389,594	24,246,478	22,071,958	384.11
<i>Total</i>	<i>69,250,648</i>	<i>113,972,038</i>	<i>76,855,232</i>	<i>69,819,257</i>	<i>1,841</i>

1. Number of part-time and full-time employees.

Most of the economic impact is concentrated in Ventura and Monterey. For the three-year average, Ventura County accounted for 29% of harvest revenue and output, 32% of value added and income and 21% of employment. Monterey County accounted for 19% of harvest revenue and output, 20% of value added and income and 24% of employment. Combined, the two counties accounted for 48% of harvest revenue and output, 51% of value added and income and 44% of employment.

In 2010 and 2011, the commercial fisheries directly (and indirectly through multipliers) accounted for 0.01% of total income by place of work and 0.01% of total income by place of residence in the 15-county study area. The commercial fisheries accounted for 0.02% of all jobs in 2010 and 2011 in the 15-county study area (Tables 1.6 and 1.7). For 2012, county estimates of income by place of work and residence are not available to make comparisons. Usually, county estimates of income are lagged by about 18 months (U.S. Department of Commerce, Bureau of Economic Analysis 2013).

By county the percent of income by place of residence from commercial fishing in CA NMS ranged from a high of 0.10% in Monterey and Ventura in 2010, to a low of 0% in Orange County in 2010. Commercial fishing as a percent of total income by place of work ranged from a high of 0.16% in Ventura County in 2010, to a low of 0% in Orange County in 2010. Employment ranged from a high of 0.19% in Monterey County in 2010 to a low of 0% in Orange County in 2010 (Table 1.6).

**Table 1.6. Local/ Regional Dependence on Commercial Fishing in CA NMS, 2010**

County	Commercial Fishing		Total Income by Place of Residence (\$000)	Total Income by Place of Work (\$000)	Total Employment
	Income	Employment			
<b>2010</b>					
Alameda	\$66,156	3	\$72,024,822	\$55,762,084	676,047
%			0.0001%	0.0001%	0.0005%
Contra Costa	\$13,543	0	57,700,398	\$29,351,680	465,486
%			0.00002%	0.00005%	0.0001%
Los Angeles	\$2,620,995	26	403,144,483	\$317,660,189	5,414,763
%			0.0007%	0.0008%	0.0005%
Marin	\$935,088	33	20,854,466	\$9,895,696	122,558
%			0.004%	0.009%	0.03%
Mendocino	\$50,530	1	3,049,993	\$1,644,157	38,461
%			0.002%	0.003%	0.002%
Monterey	\$16,161,049	370	16,677,674	\$11,640,804	193,111
%			0.10%	0.14%	0.19%
Orange	\$0	0	147,138,449	\$110,971,524	1,870,491
%			0.00%	0.00%	0.00%
San Francisco	\$9,193,468	149	55,850,894	\$62,256,151	413,291
%			0.02%	0.01%	0.04%
San Luis Obispo	\$514,064	41	10,436,017	\$6,346,739.00	147,720
%			0.005%	0.01%	0.03%
San Mateo	\$6,725,672	154	47,946,507	\$35,037,442	342,370
%			0	0.02%	0.04%
Santa Barbara	\$4,018,572	229	18,309,874	\$12,507,607	246,968
%			0.02%	0.03%	0.09%
Santa Cruz	\$489,601	58	12,246,607	\$6,276,809	131,123
%			0.004%	0.01%	0.04%
Solano	\$3,712	0	15,293,223	\$9,080,662	188,959
%			0.00002%	0.00004%	0.00003%
Sonoma	\$3,861,207	103	20,975,353	\$12,387,049	229,466
%			0.02%	0.03%	0.04%
Ventura	\$34,741,780	546	36,506,222	\$22,313,520	416,794
%			0.10%	0.16%	0.13%
<i>Total</i>	<i>\$79,395,437</i>	<i>\$1,714</i>	<i>\$938,154,982</i>	<i>\$703,132,113</i>	<i>\$10,897,608</i>
<i>% of Total from Commercial Fishing</i>			<i>0.01%</i>	<i>0.01%</i>	<i>0.02%</i>

Source: U.S. Department of Commerce, Bureau of Economic Analysis (BEA) and U.S. Department of Labor, Bureau of Labor Statistics (BLS).

**Table 1.7. Local Regional Dependence on Commercial Fishing in the CA NMS, 2011**

County	Commercial Fishing		Total Income by Place of Residence (\$000)	Total Income by Place of Work (\$000)	Total Employment
	Income	Employment			
<b>2011</b>					
Alameda	\$63,212	4	\$75,908,145	\$57,401,672	686,091
%			0.0001%	0.0001%	0.0006%
Contra Costa	\$12,345	11	60,778,675	\$30,600,694	473,938
%			0.00002%	0.00004%	0.002%
Los Angeles	\$724,433	9	\$420,913,463	\$329,102,308	4,322,993
%			0.0002%	0.0002%	0.0002%
Marin	\$479,714	35	\$21,871,623	\$10,249,177	126,292
%			0.002%	0.005%	0.03%
Mendocino	\$411,451	10	\$3,170,419	\$1,686,462	38,077
%			0.01%	0.02%	0.03%
Monterey	\$13,514,113	472	\$17,355,940	\$11,904,437	193,977
%			0.08%	0.11%	0.24%
Orange	\$45,196	1	\$154,131,535	\$115,381,941	1,460,050
%			0.00003%	0.00004%	0.00003%
San Francisco	\$9,262,300	160	\$60,432,766	\$67,017,958	425,479
%			0.02%	0.01%	0.04%
San Luis Obispo	\$686,609	52	\$10,966,438	\$6,610,972	126,318
%			0.01%	0.01%	0.04%
San Mateo	\$7,007,967	177	\$50,596,839	\$36,930,765	353,431
%			0.01%	0.02%	0.05%
Santa Barbara	\$4,587,602	266	\$19,303,120	\$13,065,357	205,602
%			0.02%	0.04%	0.13%
Santa Cruz	\$862,589	141	\$12,919,550	\$6,496,062	131,168
%			0.01%	0.01%	0.11%
Solano	\$2,836,344	27	\$15,858,521	\$9,226,093	231,203
%			0.02%	0.03%	0.01%
Sonoma	\$6,886,468	140	\$22,126,957	\$12,840,293	231,203
%			0.03%	0.05%	0.06%
Ventura	\$19,775,659	342	\$38,141,164	\$23,091,225	392,262
%			0.05%	0.09%	0.09%
<i>Total</i>	<i>\$67,156,002</i>	<i>1845.7</i>	<i>\$984,475,155</i>	<i>\$731,605,416</i>	<i>9398084</i>
<i>% of Total from Commercial Fishing</i>			0.01%	0.01%	0.02%

Source: U.S. Department of Commerce, Bureau of Economic Analysis (BEA) and U.S. Department of Labor, Bureau of Labor Statistics (BLS).

## Chapter 2: Vessel Trends and Port Dependency

In addition to where catch is caught and landed, the CDFW-CFIS database includes vessel and fisherman identification codes for who caught the fish and gear types for how the catch was made. Using this information, estimates are provided on the number of vessels operating in CA NMS by year and port complex. Definitions of each port complex are available in the technical appendix report (Leeworthy et al 2013e). Port dependence, the percent of total port landings from CA NMS, is also calculated in this section.

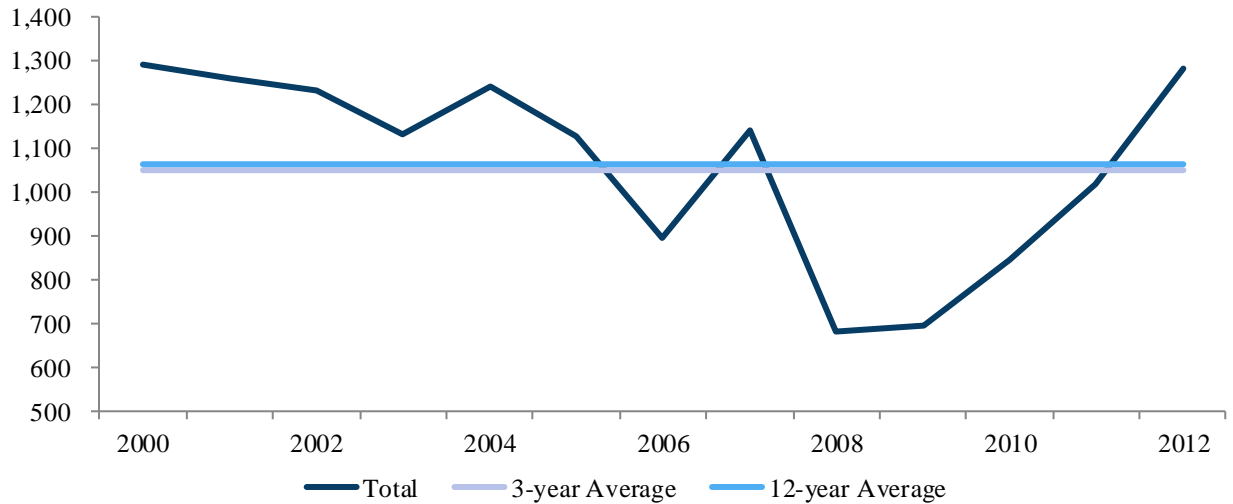
### *Trends in Number of Vessels*

The total number of vessels in CA NMS has fluctuated over the past 12 years, ranging from a low of 679 in 2008 to a high of 1,291 in 2000. Vessel traffic remained above the three-year average through 2005. In 2006, vessel traffic dropped, rebounded in 2007 and then fell below average from 2008 to 2011. In 2012, the number of vessels operating in CA NMS was only 8 fewer than the high in 2000. The three-year average (1,065) is almost the same as the 12-year average (1,049) for the total of all CA NMS. In 2012, the top three port complexes; San Francisco, Monterey and Santa Barbara, accounted for 75% of the total number of vessels operating in all CA NMS (Table and Figure 2.1).

**Table 2.1 Trends in Number of Vessels in CA NMS by Port Complex, 2000 to 2012**

Year	Eureka	Fort Bragg	Bodega Bay	San Francisco	Monterey	Morro Bay	Santa Barbara	Los Angeles	South Coast	Total
2000	2	3	160	277	328	76	323	109	11	1,291
2001	2	8	157	287	334	85	280	96	6	1,259
2002	0	4	164	292	305	73	296	80	14	1,234
2003	7	33	135	231	307	59	275	75	7	1,132
2004	2	8	168	371	298	55	260	73	6	1,241
2005	3	10	148	354	272	59	234	39	3	1,129
2006	2	3	131	231	210	44	223	47	5	896
2007	0	11	182	348	269	46	235	44	5	1,140
2008	3	7	48	191	129	35	225	33	4	679
2009	3	2	44	175	138	53	233	44	0	694
2010	2	7	91	223	198	46	224	48	2	843
2011	0	16	91	293	290	47	243	34	3	1,020
2012	4	25	193	374	372	53	227	29	3	1,283
<b>Average</b>	<b>2</b>	<b>11</b>	<b>132</b>	<b>281</b>	<b>265</b>	<b>56</b>	<b>252</b>	<b>58</b>	<b>5</b>	<b>1,065</b>
<b>3-year Average</b>	<b>2</b>	<b>16</b>	<b>125</b>	<b>297</b>	<b>287</b>	<b>49</b>	<b>231</b>	<b>37</b>	<b>3</b>	<b>1,049</b>

Source: California Department of Fish and Wildlife, CFIS, 2000 to 2012.



**Figure 2.1 Trends in Total Number of Vessels in CA NMS, 2000 to 2012**

*San Francisco*

The San Francisco port complex had the most vessel activity in CA NMS over the past three years, averaging 297 vessels per year. The three-year average is greater than the 12-year average of 280, indicating that recent years have had more vessels than the overall study period. The San Francisco port complex had a high traffic of 372 vessels in 2012, followed by 371 vessels in 2004. Low traffic occurred in 2009 with only 175 vessels. The overall trend was continued vacillation between above- and below-average (Figure 2.2).



**Figure 2.2 Trends in Number of Vessels in San Francisco Port Complex, 2000 to 2012**

### Monterey

The Monterey port complex had the second highest three-year average traffic with 287 vessels. The three-year average is greater than the 12-year average of 265 vessels, indicating more vessel activity in recent years. Over the twelve year period, vessel traffic was above average from 2000 to 2004, below average from 2005 to 2010 and above average for 2011 and 2012. High traffic for Monterey occurred in 2012 with 372 vessels; the next-highest traffic was 334 in 2011. In 2008, vessel traffic reached a low of 129. Overall, the trend decreases until 2008, after which point vessel traffic rebounds completely (Figure 2.3).

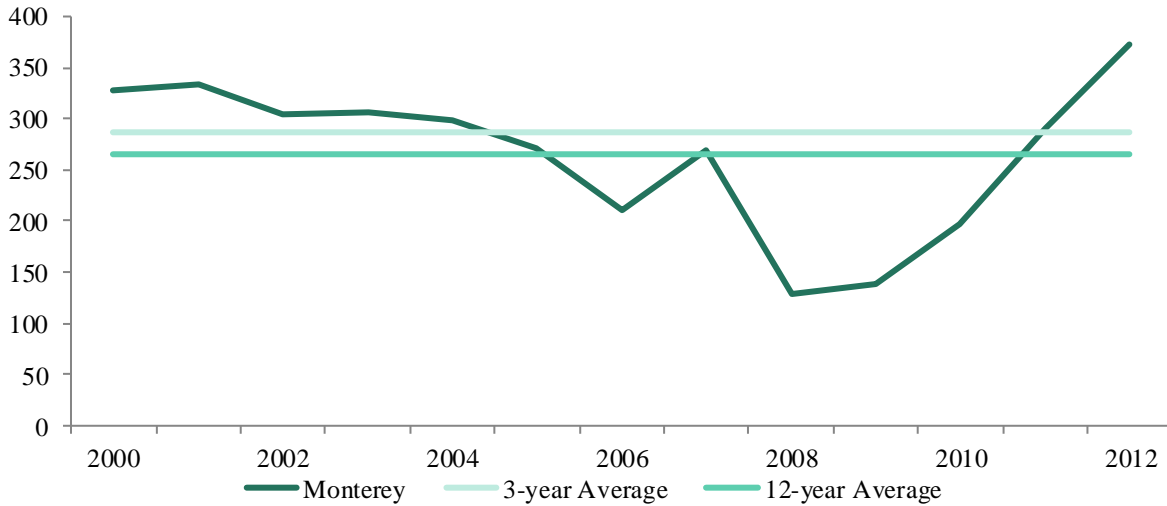


Figure 2.3 Trends in Number of Vessels in Monterey Port Complex, 2000 to 2012

### Santa Barbara

The Santa Barbara port complex ranked third for three-year average vessel traffic with 231 vessels, which is below the 12-year average (252) following the declining vessel traffic trend. Traffic ranged from a low of 223 vessels in 2006 to a high of 323 in 2000. In 2005, traffic dropped below the 12-year average and has never fully rebounded, vacillating just above and below the three-year average since 2006 (Figure 2.4).

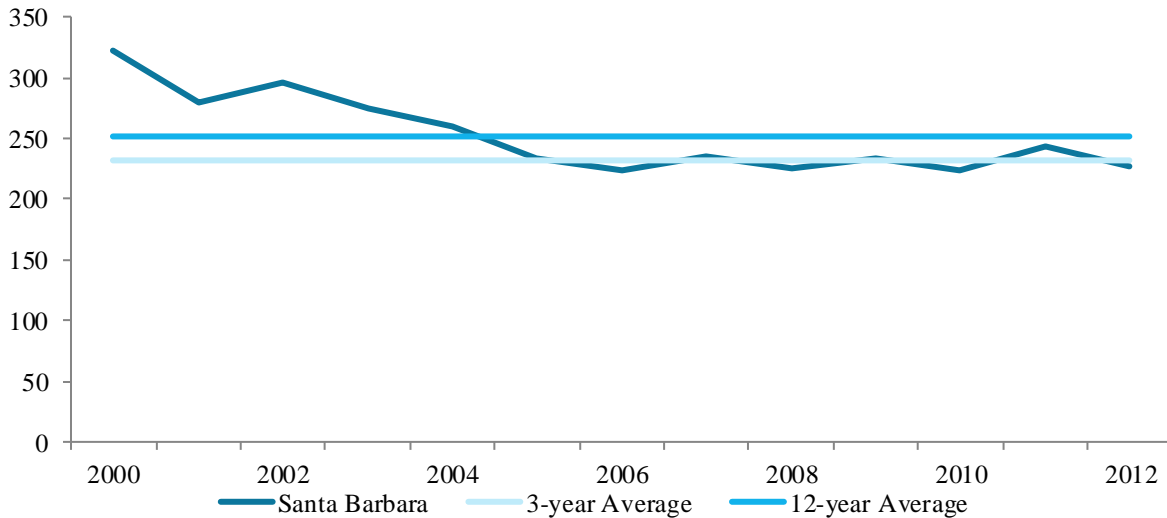
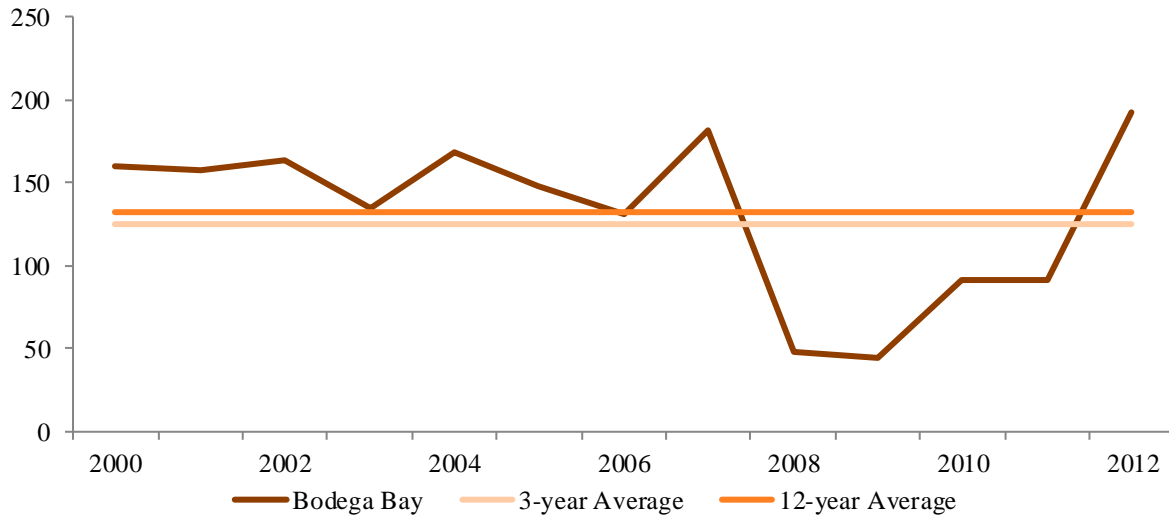


Figure 2.4. Trends in Number of Vessels in Santa Barbara Port Complex, 2000 to 2012

### *Bodega Bay*

The Bodega Bay port complex ranked fourth by three-year average with 125 vessels, which is slightly below the 12-year average of 132 vessels per year. Over the 12-year period, traffic stayed above or nearly at the average from 2000 to 2007. In 2008, vessel traffic plummeted, not rebounding to above average until 2012. High traffic occurred in 2004 with 168 vessels. Low traffic occurred in 2009 with 44 vessels. Overall trend is approximately steady until the drop in 2008, and then a recovery in 2012 (Figure 2.5).



**Figure 2.5 Trends in the Number of Vessels in the Bodega Bay Port Complex, 2000 to 2012**

### *Port Dependence on Catch from CA NMS*

Another indicator of economic dependence is port dependence, measured as the percent of total port landings from CA NMS. For calculations of the percent of total landings from CA NMS for all ports receiving CA NMS see Tables 2.2, 2.3, and 2.4. Overall port dependence on catch from CA NMS has decreased steadily from 2010 to 2012. In 2012, ports depended on CA NMS for over a third of their total landings (37.69%). By 2012, this number had decreased to 29.59%. This trend in port dependence is consistent with declining CA NMS harvest revenues and increasing landings from all CA waters. CA NMS harvest revenue has declined from 2010 (\$75.8 million) to 2012 (\$65 million). Conversely, total harvest revenue from all CA waters has increased from 2010 (\$201 million) to 2012 (\$245 million).



In 2010, 15 ports had a dependency of 90% or higher, accounting for \$15 million or 20% of CA NMS landings and \$16 million or 8% of the total port revenue. Twenty-five ports had a dependency above 50%, accounting for \$69 million or 91% of landings from CA NMS, and almost \$99 million or 49% of total port landings (Table 2.2).

**Table 2.2. Total California Port Dependency on Catch from all CA NMS, 2010**

Port Name	Catch from CA NMS	Total Port Landings	Percent of Total Port Landings from CA NMS (%)
San Ysidro	\$5,376	\$5,376	100.00
Marshall	\$3,440	\$3,440	100.00
Emeryville	\$1,495	\$1,495	100.00
Drakes Bay	\$1,234	\$1,234	100.00
Guadalupe Beach	\$791	\$791	100.00
Willow Creek	\$418	\$418	100.00
Hermosa Beach	\$347	\$347	100.00
Tomales Bay	\$164	\$164	100.00
Pacifica	\$96	\$96	100.00
Alameda	\$53,047	\$53,889	98.44
Monterey	\$5,011,331	\$5,100,740	98.25
Santa Cruz	\$594,253	\$621,141	95.67
Mill Creek	\$24,763	\$25,904	95.59
Bolinas	\$213,399	\$224,908	94.88
Moss Landing	\$9,417,640	\$10,113,206	93.12
Princeton-Half Moon	\$7,170,838	\$8,209,159	87.35
Oakland	\$5,679	\$7,338	77.38
Port Hueneme	\$14,193,736	\$19,240,563	73.77
Sausalito	\$801,463	\$1,190,971	67.29
Big Creek	\$11,495	\$17,141	67.06
San Francisco	\$9,412,769	\$14,764,244	63.75
Oxnard	\$2,846,391	\$4,551,858	62.53
Santa Barbara Harbor	\$5,459,863	\$8,892,214	61.40
Berkeley	\$52,667	\$87,931	59.90
Ventura	\$13,812,257	\$25,458,316	54.25
Marconi Cove	\$4,039	\$8,832	45.73
Bodega Bay	\$3,843,024	\$8,806,839	43.64
Pinole	\$5,338	\$12,512	42.66
Richmond	\$9,026	\$34,138	26.44
Morro Bay	\$670,444	\$4,620,465	14.51
Vallejo	\$3,343	\$30,312	11.03
Terminal Island	\$1,063,830	\$19,038,457	5.59
San Simeon	\$12,857	\$247,483	5.20
China Camp	\$2,197	\$45,449	4.83
San Pedro	\$975,926	\$24,389,796	4.00
South San Francisco	\$1,339	\$94,078	1.42
Avila/Port San Luis	\$9,740	\$1,078,095	0.90
Fort Bragg	\$53,235	\$7,249,128	0.73
Marina Del Rey	\$1,128	\$381,483	0.30
Crescent City	\$26,592	\$11,375,485	0.23
Eureka	\$8,043	\$10,115,009	0.08
Dana Point	\$379	\$2,160,065	0.02
<i>Total<sup>1</sup></i>	<i>\$75,785,429</i>	<i>\$201,087,774</i>	<i>37.69</i>

Source: California Department of Fish and Wildlife, CFIS, 2000 to 2012.

1. Statewide total includes ports omitted here for lack of NMS landings.

In 2011, seven ports had a dependency of 90% or higher, accounting for \$9 million or 14% of the landings by value from CA NMS, and almost \$10 million or 5% of total port landings. Seventeen ports had a dependency above 50%, accounting for \$33 million or 50% of the landings by value from CA NMS, and \$44 million 21% of the value of total port landings.

**Table 2.3 Total California Port Dependency on Catch from all CA NMS, 2011**

Port Name	Catch from CA NMS	Total Port Landings	Percent of Total Port Landings from CA NMS (%)
Marshall	\$4,526	\$4,526	100.00
Pacifica	\$404	\$404	100.00
Willow Creek	\$95	\$95	100.00
Alameda	\$121,641	\$122,874	99.00
Vallejo	\$2,004,547	\$2,052,583	97.66
Santa Cruz	\$1,081,375	\$1,109,518	97.46
Monterey	\$6,210,485	\$6,658,763	93.27
Bolinas	\$240,776	\$276,613	87.04
Moss Landing	\$6,705,940	\$7,744,547	86.59
Inverness	\$3,472	\$4,104	84.60
Oakland	\$15,924	\$19,865	80.16
Princeton-Half Moon	\$7,590,094	\$10,621,987	71.46
Berkeley	\$54,285	\$80,707	67.26
Oxnard	\$3,164,031	\$5,195,214	60.90
Santa Barbara Harbor	\$6,153,427	\$10,324,732	59.60
Tomales Bay	\$8,537	\$15,142	56.38
Mill Creek	\$20,093	\$37,564	53.49
Ventura	\$9,316,835	\$19,614,305	47.50
Bodega Bay	\$6,916,683	\$14,844,172	46.60
Point Reyes	\$655	\$1,474	44.40
San Francisco	\$9,583,390	\$21,910,877	43.74
Sausalito	\$170,860	\$447,517	38.18
Port Hueneme	\$5,839,574	\$15,309,421	38.14
Big Creek	\$4,077	\$15,686	25.99
San Simeon	\$31,181	\$127,414	24.47
Richmond	\$24,815	\$120,687	20.56
Morro Bay	\$885,752	\$7,161,684	12.37
China Camp	\$1,958	\$19,401	10.09
South San Francisco	\$1,754	\$27,968	6.27
San Leandro	\$233	\$4,430	5.27
Fort Bragg	\$445,539	\$11,766,831	3.79
Newport Beach	\$32,936	\$1,315,278	2.50
Terminal Island	\$427,149	\$18,716,978	2.28
San Pedro	\$143,033	\$21,761,554	0.66
Redondo Beach	\$2,671	\$630,221	0.42
Alviso	\$466	\$120,731	0.39
San Diego	\$5,406	\$1,923,698	0.28
Avila/Port San Luis	\$2,095	\$1,423,850	0.15
Long Beach	\$286	\$282,492	0.10
Eureka	\$8,264	\$8,849,470	0.09
Avalon	\$106	\$128,128	0.08
Dana Point	\$1,350	\$2,316,735	0.06
<i>Total<sup>1</sup></i>	<i>67,226,718</i>	<i>212,102,128</i>	<i>31.70</i>

Source: California Department of Fish and Wildlife, CFIS, 2000 to 2012.

1. Statewide total includes ports omitted here for lack of NMS landings.

In 2012, 19 ports had a dependency of 90% or higher, accounting for \$31 million or 48% of total CA NMS landings, and almost \$33 million or 13% of total port landings.

**Table 2.4 Total California Port Dependency on Catch from all CA NMS, 2012**

Port Name	Catch from CA NMS	Total Port Landings	Percent of Total Port Landings from CA NMS (%)
Dillon Beach	\$12,592	\$12,592	100.00
Inverness	\$10,940	\$10,940	100.00
Pacifica	\$6,886	\$6,886	100.00
Newark	\$5,536	\$5,536	100.00
Rodeo	\$4,597	\$4,597	100.00
Anchor Bay	\$2,415	\$2,415	100.00
Willow Creek	\$2,293	\$2,293	100.00
Guadalupe Beach	\$2,084	\$2,084	100.00
Marshall	\$1,376	\$1,376	100.00
Big Creek	\$644	\$644	100.00
Point Reyes	\$423	\$423	100.00
Pinole	\$407	\$407	100.00
Alameda	\$139,953	\$143,235	97.71
Vallejo	\$1,673,786	\$1,717,906	97.43
Monterey	\$3,104,607	\$3,210,811	96.69
Santa Cruz	\$2,054,032	\$2,127,117	96.56
Princeton-Half Moon	\$15,068,487	\$15,645,005	96.32
Moss Landing	\$8,647,972	\$9,412,196	91.88
Bolinas	\$272,421	\$299,867	90.85
Emeryville	\$7,316	\$9,427	77.61
Oxnard	\$2,955,821	\$4,408,529	67.05
Santa Barbara Harbor	\$6,836,100	\$10,618,541	64.38
Sausalito	\$19,722	\$31,032	63.55
Mill Creek	\$29,326	\$46,876	62.56
San Francisco	\$8,780,186	\$14,719,243	59.65
Berkeley	\$64,883	\$133,029	48.77
Bodega Bay	\$5,754,527	\$11,948,668	48.16
Oakland	\$22,550	\$48,398	46.59
Petaluma	\$4,476	\$11,766	38.04
Gaviota Beach	\$948	\$2,491	38.04
Port Hueneme	\$3,844,901	\$10,846,297	35.45
Tomales Bay	\$1,265	\$3,945	32.06
Ventura	\$4,515,816	\$14,822,990	30.46
Richmond	\$13,673	\$49,064	27.87
China Camp	\$4,898	\$31,323	15.64
Morro Bay	\$663,549	\$6,328,526	10.49
Avalon	\$3,498	\$131,365	2.66
Westport	\$371	\$15,529	2.39
San Simeon	\$1,515	\$127,347	1.19
Fort Bragg	\$161,642	\$14,787,608	1.09
Terminal Island	\$221,161	\$24,957,138	0.89
Mission Bay	\$16,760	\$2,619,093	0.64
Avila/ Port San Luis	\$8,386	\$1,471,086	0.57
Newport Beach	\$5,494	\$1,205,021	0.46
Redondo Beach	\$2,632	\$577,502	0.46
Marina Del Rey	\$2,148	\$693,624	0.31
San Pedro	\$58,864	\$23,827,115	0.25
Point Arena	\$901	\$518,809	0.17
San Diego	\$2,857	\$2,219,499	0.13
Dana Point	\$2,034	\$1,915,557	0.11
Shelter Cove	\$289	\$496,750	0.06
Eureka	\$1,099	\$24,224,659	0.005
Crescent City	\$233	\$28,660,961	0.001
<i>Total</i> <sup>1</sup>	<i>\$65,021,294</i>	<i>\$244,568,018</i>	<i>26.59</i>

Source: California Department of Fish and Wildlife, CFIS, 2000 to 2012.

1. Statewide total includes ports omitted here for lack of NMS landings.

### Chapter 3: Trends in Catch for Key Species/Species Groups

In 2012 the top five species/species group by value include: *Dungeness crab*, *Squid*, *Salmon*, *Urchin* and *Groundfish*. *Dungeness crab* accounted for almost 36% of total value from all California NMS, while *Squid* accounted for just over 28%. This section also describes all additional species/species groups which ranked in the top five of at least one of the sanctuaries (Table 3.1). Each description for Tables 3.2 through 3.13 indicates in which of the sanctuaries the species ranked and contains further detail on trends in these species/species groups. Information on ocean conditions, regulatory changes and market conditions provide context for the strong fluctuation observed in many of the species/species groups. In addition, CA NMS trends are compared with statewide trends for catch in all CA waters.

**Table 3.1. Key Species Caught in CA NMS, 2012 (2013 \$)**

Species/Species Group	Pounds	Value
<i>Dungeness Crab</i>	7,140,317	\$23,278,828
<i>Squid</i>	61,208,989	\$18,346,759
<i>Salmon</i>	1,191,731	\$6,376,132
<i>Urchin</i>	6,296,223	\$4,239,344
<i>Groundfish</i>	2,025,161	\$3,442,664
<i>Spiny Lobster</i> <sup>1</sup>	178,774	\$2,984,071
<i>Shrimp &amp; Prawn</i> <sup>1</sup>	192,989	\$2,155,617
<i>Coastal Pelagic</i> <sup>1</sup>	16,669,799	\$1,617,267
<i>Sablefish Non-Trawl</i> <sup>1</sup>	427,237	\$1,057,900
<i>CA Halibut</i> <sup>1</sup>	175,145	\$874,154
<i>Dover Sole-Thornyheads-Sablefish Trawl</i> <sup>1</sup>	754,559	\$475,607
<i>Other Flatfish</i> <sup>1</sup>	143,247	\$168,969
<i>Total</i> <sup>2</sup>	96,115,123	\$65,021,294

Source: California Fishing Information System, California Department of Fish and Wildlife.

1. Species ranked in top five for at least one of the NMS.

2. Due to overlapping species/species groups and species/species groups not presented here, total is not the sum of each species/species group.

### ***Dungeness crab***

*Dungeness crab* was the predominant species caught in all CA NMS in 2012. In 2012, *Dungeness crab* ranked first for the CBNMS and the GFNMS and second in the MBNMS by value in 2012 (Leeworthy et al 2013a, Leeworthy et al 2013c, Leeworthy et al 2013d).

For CA NMS, *Dungeness crab* catch has increased over the 2000 to 2012 period. Harvest revenues ranged from a high of almost \$26 million in 2011 to a low of just over \$1 million in 2000. Pounds landed ranged from a low of 325 thousand pounds in 2000 to a high of almost 11 million pounds in 2010 (Table 3.2). These trends are consistent with state totals that peaked at a value of almost \$87 million in 2012 and a low of almost \$12 million in 2001 (Figures 3.2 and 3.3). The statewide fishery is characterized by two distinct fisheries, northern and central, delineated at the Sonoma-Mendocino county line (CDFW 2013, 2-1). Variation in *Dungeness crab* abundance is correlated with cool water ocean conditions according to the Pacific Decadal Oscillation (PDO) and a three-year lag time for larval maturation (CDFW 2013, 2-7). In addition, recent increases in international demand contribute to more exportation of *Dungeness crab* overseas and higher prices (CDFW 2013, 2-4).

**Table 3.2. Trends in *Dungeness crab* Caught in CA NMS, 2000 to 2012 (2013 \$)**

Year	Pounds	Value
2000	325,670	\$1,165,849
2001	485,944	\$1,751,830
2002	1,247,440	\$3,375,101
2003	1,796,576	\$4,091,070
2004	2,063,925	\$4,695,134
2005	1,595,332	\$3,611,260
2006	2,184,704	\$5,465,172
2007	1,529,389	\$4,703,380
2008	1,555,582	\$5,544,062
2009	1,777,419	\$4,884,273
2010	10,712,273	\$20,745,473
2011	10,072,800	\$25,851,233
2012	7,140,317	\$23,278,828

Source: California Fishing Information System, California Department of Fish and Wildlife.

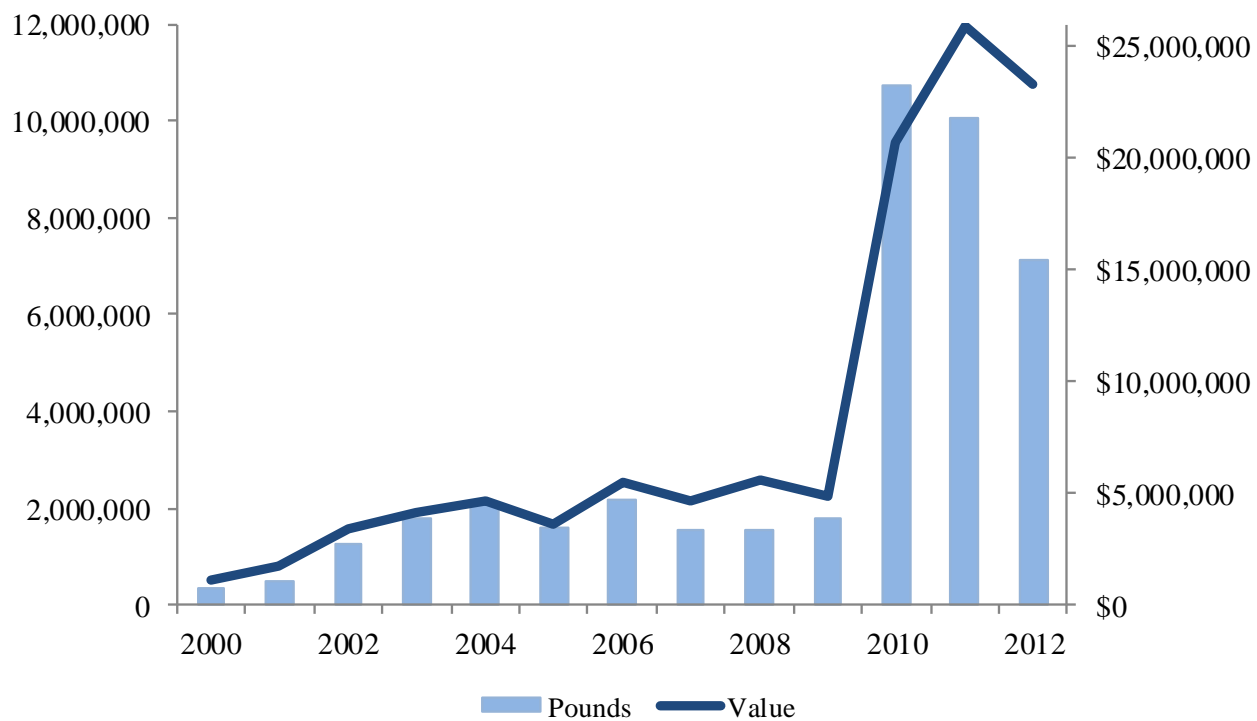


Figure 3.1. Trends in *Dungeness crab* Caught in CA NMS, 2000 to 2012 (2013 \$)

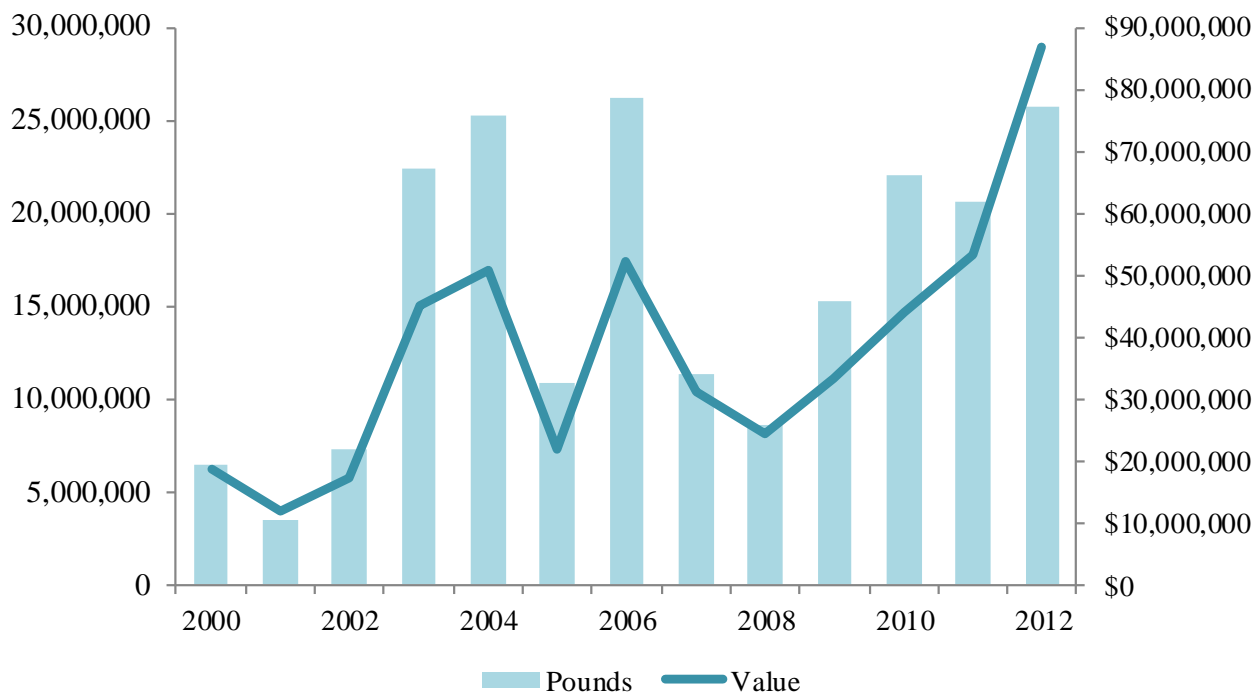


Figure 3.2. Trends in *Dungeness crab* Caught in all CA Waters, 2000 to 2012 (2013 \$)

## *Squid*

For all of CA NMS, *Squid* ranked second by value in 2012. *Squid* was the primary species in the MBNMS and the CINMS in 2012 (Leeworthy et al. 2013d, Leeworthy et al 2013b). The MBNMS accounted for 58% of *Squid* catch in all CA NMS, while the CINMS accounted for almost 42% of the catch.

The *Squid* fishery demonstrates considerable variation over the study period. Pounds landed reached the highest volume in 2000 with over 156 million pounds; however value peaked in 2010 at over \$35 million. On the other hand, lows for value and catch both occur in 2006 with 14 million pounds and \$4 million in harvest revenue (Table 3.3). Similar trends are seen in the statewide fishery; however year over year fluctuation is not as pronounced (Figures 3.3 and 3.4).

*Squid*, a yearly crop, is sensitive to changing ocean conditions and warm water periods of El Niño. Overall catch decreases in the warm-water phases, and then rebounds in cooler La Niña phases, which increase upwelling. However, the fishery is also subject to spatial fluctuations. In the southern fishery, *Market Squid* landings are minimal in El Niño years. Landings in the northern fishery often increase, then decrease for several years after El Niño. During these warm water events with nutrient poor water, landings can disappear entirely in some areas (CDFW 2008, 1-2). In addition to ocean conditions, regulatory changes also impact the fishery. The Market Squid Fishery Management Plan was instituted in 2005. This plan includes rules requiring permits to land or possess over 1.8 tons, an annual catch limit, temporal and spatial closures and lighting restrictions (Sweetnam 2011, 18).

**Table 3.3. Trends in *Squid* Caught in CA NMS, 2000 to 2012 (2013 \$)**

Year	Pounds	Value
2000	156,957,935	\$22,228,961
2001	92,498,254	\$10,281,251
2002	94,677,002	\$15,050,096
2003	74,566,372	\$24,055,967
2004	66,498,179	\$19,558,747
2005	54,479,536	\$15,782,764
2006	14,871,182	\$4,195,044
2007	81,848,874	\$24,147,992
2008	45,278,793	\$15,570,972
2009	101,824,724	\$30,414,994
2010	122,207,851	\$35,229,308
2011	87,108,874	\$22,036,732
2012	61,208,989	\$18,346,759

Source: California Fishing Information System, California Department of Fish and Wildlife.

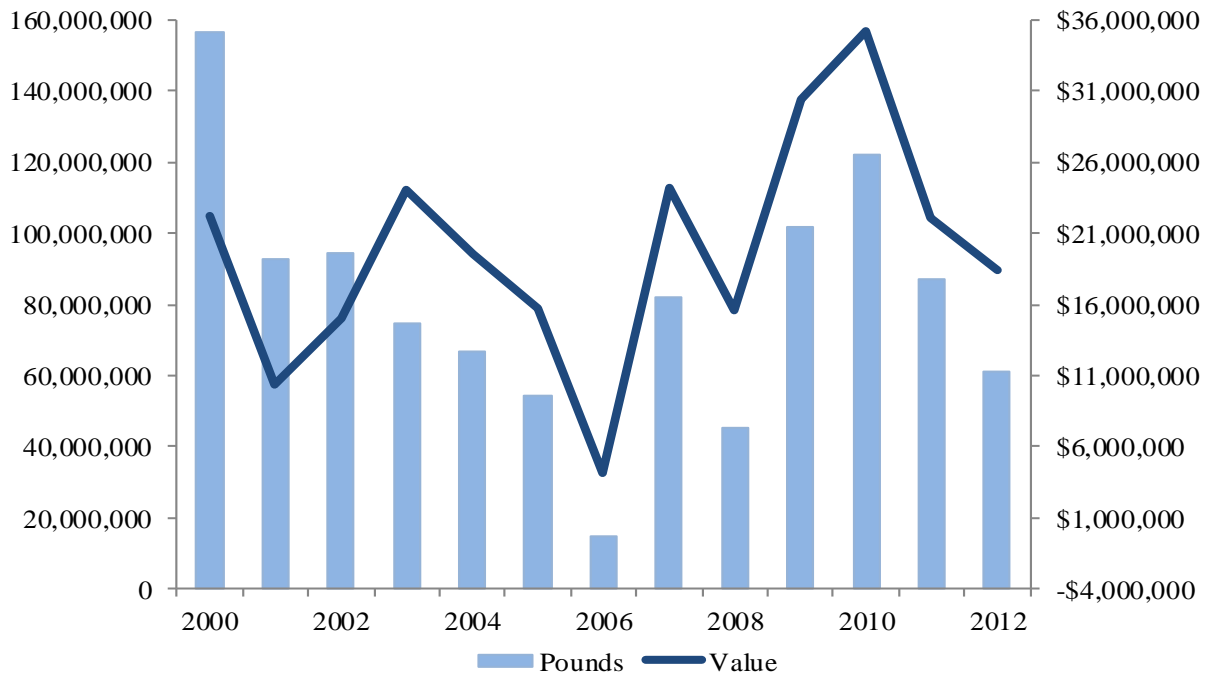


Figure 3.3. Trends in *Squid Caught in CA NMS, 2000 to 2012 (2013 \$)*

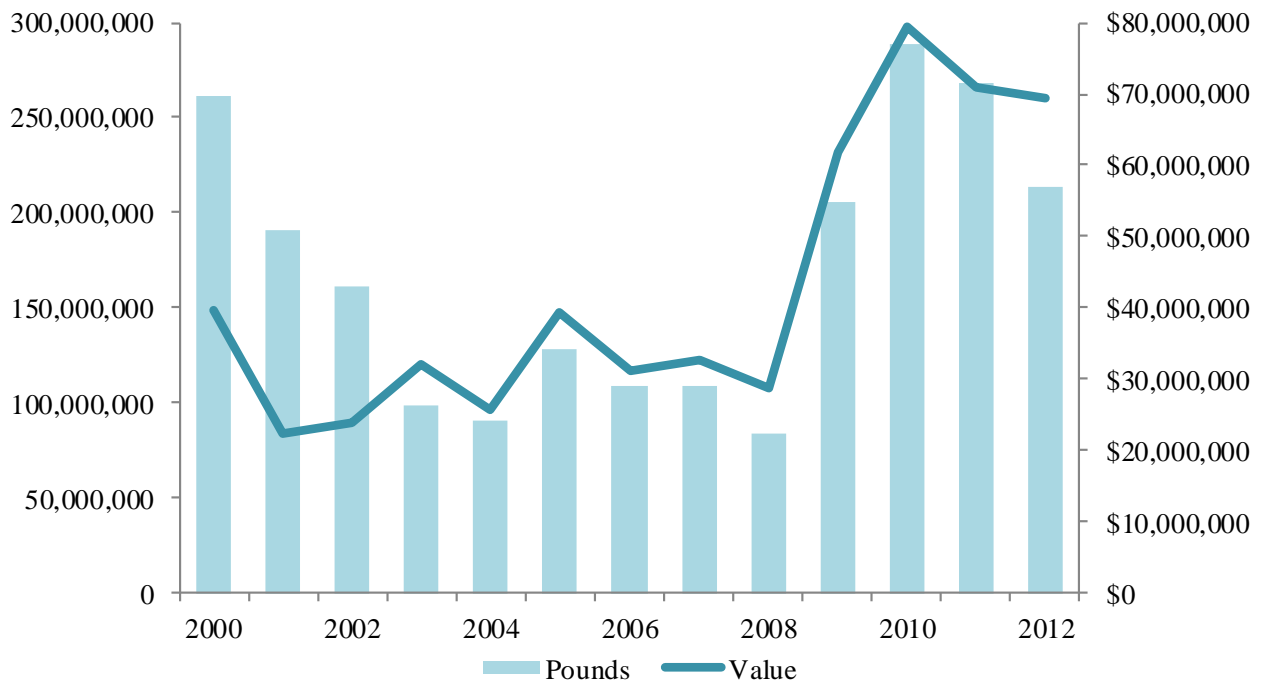


Figure 3.4. Trends in *Squid Caught in all CA Waters, 2000 to 2012 (2013 \$)*



## **Salmon**

*Salmon* was third leading species by value in CA NMS. *Salmon* ranked second in the CBNMS and the GFNMS and third in the MBNMS (Leeworthy et al 2013a, Leeworthy et al 2013c, Leeworthy et al 2013d).

*Salmon* catch within CA NMS fluctuated year to year from 2000 until it reached a peak of 2.1 million pounds and almost \$7.7 million in 2004. Catch and value subsequently declined until a brief increase in 2007 followed by zero or near-zero catch in 2008 and 2009. For the 2010 to 2012 period, catch has steadily increased, reaching a high of almost \$6.4 million in 2012 (Table 3.4). In general, trends within the sanctuary have been relatively similar to those across the entire state (Figures 3.5 and 3.6).

Prior to 1990, the industry enjoyed relatively high and consistent *Salmon* landings, averaging about 7.5 million pounds annually. During the last two decades, *Salmon* landings have been more variable and overall lower, averaging 3.5 million pounds a year. Although oceanic and river conditions play a major role in annual *Salmon* catches, variation among years can also be attributed to changes in fishery regulations and fishing effort (CDFW 2013, 5-3). For example, in 2006 the price per pound of *Salmon* nearly doubled as a result of increased costs to the fishermen and lower than average landings (CDFW 2013, 5-5). In addition, the Pacific *Salmon* fishery was closed in 2008 to meet conservation goals. The fishery was reopened in 2010 (Sweetnam 2011, 19).

**Table 3.4. Figure 3.4. Trends in *Salmon* Caught in CA NMS, 2000 to 2012 (2013 \$)**

Year	Pounds	Value
2000	1,092,352	\$3,106,759
2001	552,439	\$1,557,071
2002	1,045,367	\$2,200,270
2003	781,573	\$1,908,333
2004	2,065,765	\$7,658,758
2005	1,676,578	\$6,014,637
2006	183,778	\$1,227,012
2007	610,768	\$3,655,084
2008	0	\$0
2009	32	\$146
2010	16,821	\$85,841
2011	156,398	\$1,059,345
2012	1,191,731	\$6,376,132

Source: California Fishing Information System, California Department of Fish and Wildlife.

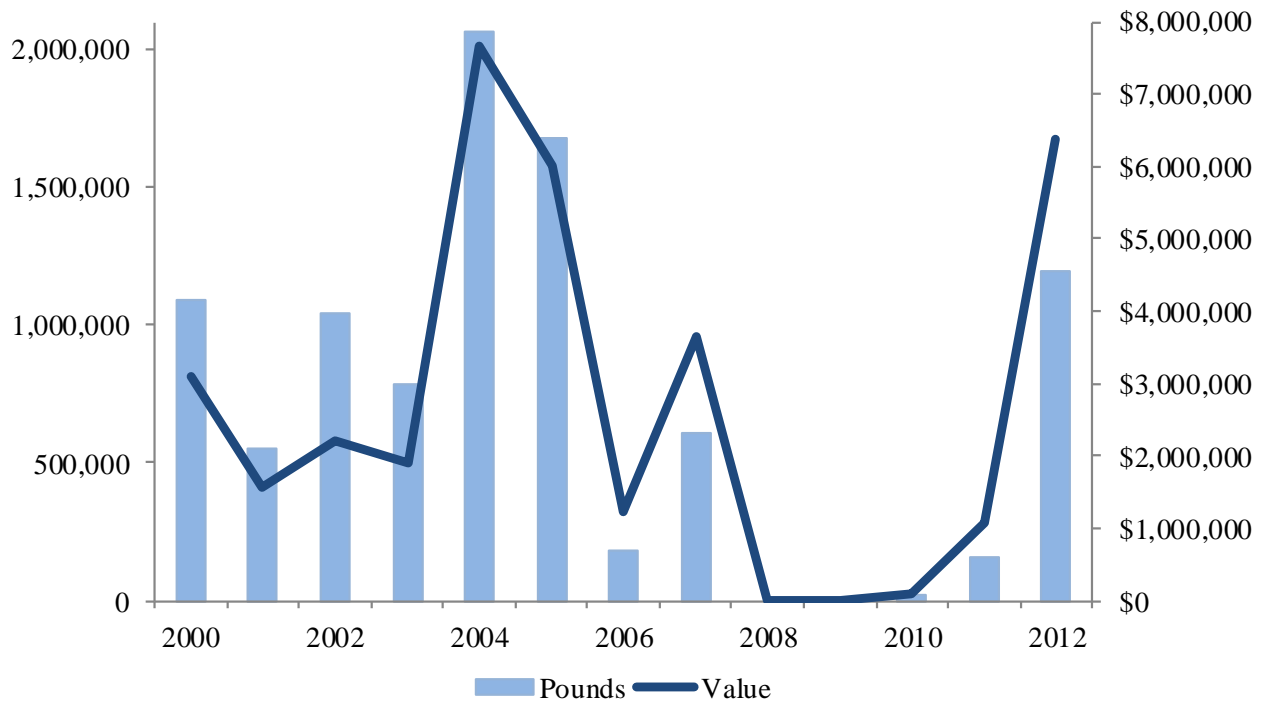


Figure 3.5. Trends in *Salmon* Caught in CA NMS, 2000 to 2012 (2013 \$)

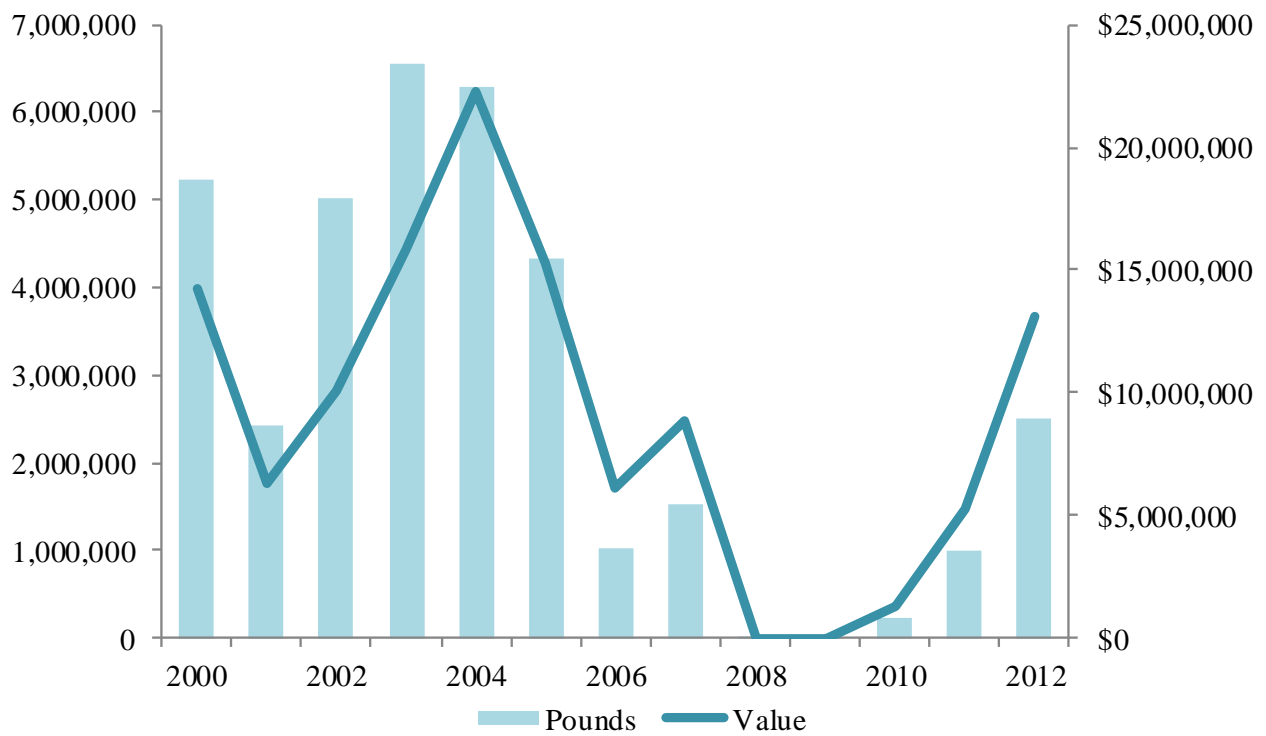


Figure 3.6. Trends in *Salmon* Caught in all CA Waters, 2000 to 2012 (2013 \$)

### *Urchin*

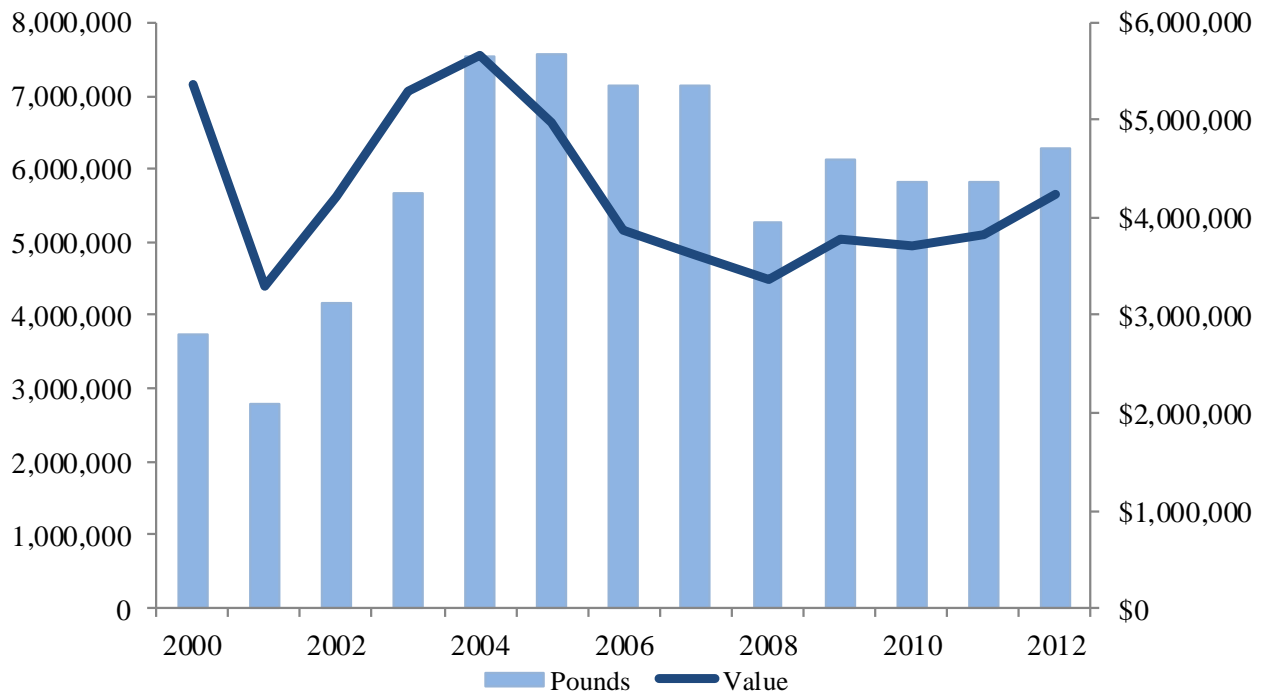
In 2012, *Urchin* was the fourth most valuable species in CA NMS. *Urchin* was the second-ranked species in the CINMS. The vast majority of *Urchin* catch in all CA NMS comes from the CINMS, accounting for over 99.9% (Leeworthy et al 2013b).

Following a marked increase from 2001 to 2005, *Urchin* catch has remained relatively steady, declining slightly from 2005 to 2008 and then increasing slightly through 2012. Highest catch was in 2005 with 7.85 million pounds. Highest value was in 2004 with \$5.6 million. The fishery reached lows of 2.77 million pounds and \$3.3 million in 2001 (Table 3.5). These trends within all CA NMS are inconsistent with statewide trends. Throughout all of CA waters *Urchin* catch has remained relatively constant, however, value declined considerably from 2000 through 2007 (Figures 3.7 and 3.8).

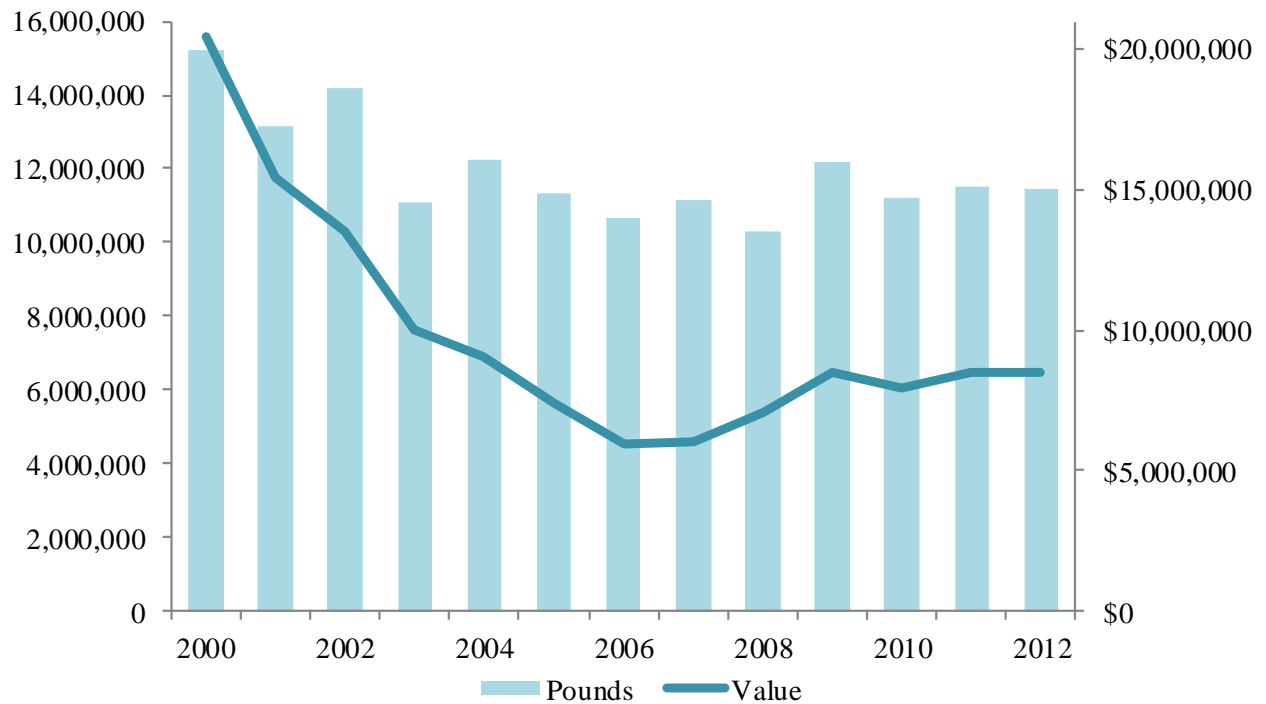
**Table 3.5. Trends in *Urchin* Caught in CA NMS 2000 to 2012 (2013 \$)**

Year	Pounds	Value
2000	3,749,789	\$5,375,550
2001	2,781,114	\$3,304,876
2002	4,155,457	\$4,205,955
2003	5,660,690	\$5,302,481
2004	7,525,833	\$5,654,432
2005	7,580,392	\$4,968,093
2006	7,129,374	\$3,871,073
2007	7,151,162	\$3,621,975
2008	5,265,763	\$3,367,050
2009	6,130,322	\$3,782,885
2010	5,822,983	\$3,718,677
2011	5,836,864	\$3,819,580
2012	6,296,223	\$4,239,344

Source: California Fishing Information System, California Department of Fish and Wildlife.



**Figure 3.7. Trends in *Urchin* Caught in CA NMS, 2000 to 2012 (2013 \$)**



**Figure 3.8 Trends in *Urchin* Caught in all CA Waters, 2000 to 2012 (2013 \$)**

## ***Groundfish***

In 2012, *Groundfish* was the fifth most valuable species group in CA NMS. This species group is also analyzed as a special issue for the CBNMS (Leeworthy et al 2013a). A full description of the species included in *Groundfish* is available in the technical appendix report (Leeworthy et al 2013e).

*Groundfish* catch shows strong fluctuation in price, as value and pounds do not follow the same trends. Landings of *Groundfish* peaked in 2003 with almost 3.8 million pounds and reached a low in 2005 with just over 1.6 million pounds. Harvest revenue peaked in 2011 with over \$5.2 million and reached a low in 2005 with almost \$3 million (Table 3.6). Generally, these trends are consistent with state trends; however, CA NMS trends show greater year to year fluctuation (Figures 3.9 and 3.10).

Since 1982, the Pacific Fishery Management Council (PFMC) has managed the Pacific *Groundfish* through a Fishery Management Plan (FMP) (PFMC 2011). Over the years, the fishery has been subject to many regulatory changes. Recent regulations include: a trawl vessel buyback program implemented in 2003, depth-based Trawl Rockfish Conservation Areas begun at the same time and a new tradable quota system introduced in 2011 (CDFW 2013, 17.1-17.2; ONMS 2009 18-19).

**Table 3.6. Trends in *Groundfish* Caught in CA NMS, 2000 to 2012 (2013 \$)**

Year	Pounds	Value
2000	2,710,596	\$4,279,665
2001	2,424,167	\$3,732,759
2002	2,407,956	\$3,496,165
2003	3,784,017	\$4,426,570
2004	2,577,537	\$3,506,002
2005	1,644,329	\$2,970,484
2006	1,948,029	\$3,158,200
2007	2,669,334	\$3,673,383
2008	2,719,249	\$3,701,123
2009	2,983,431	\$4,318,602
2010	2,716,762	\$4,178,102
2011	2,484,140	\$5,233,076
2012	2,025,161	\$3,442,664

Source: California Fishing Information System, California Department of Fish and Wildlife.

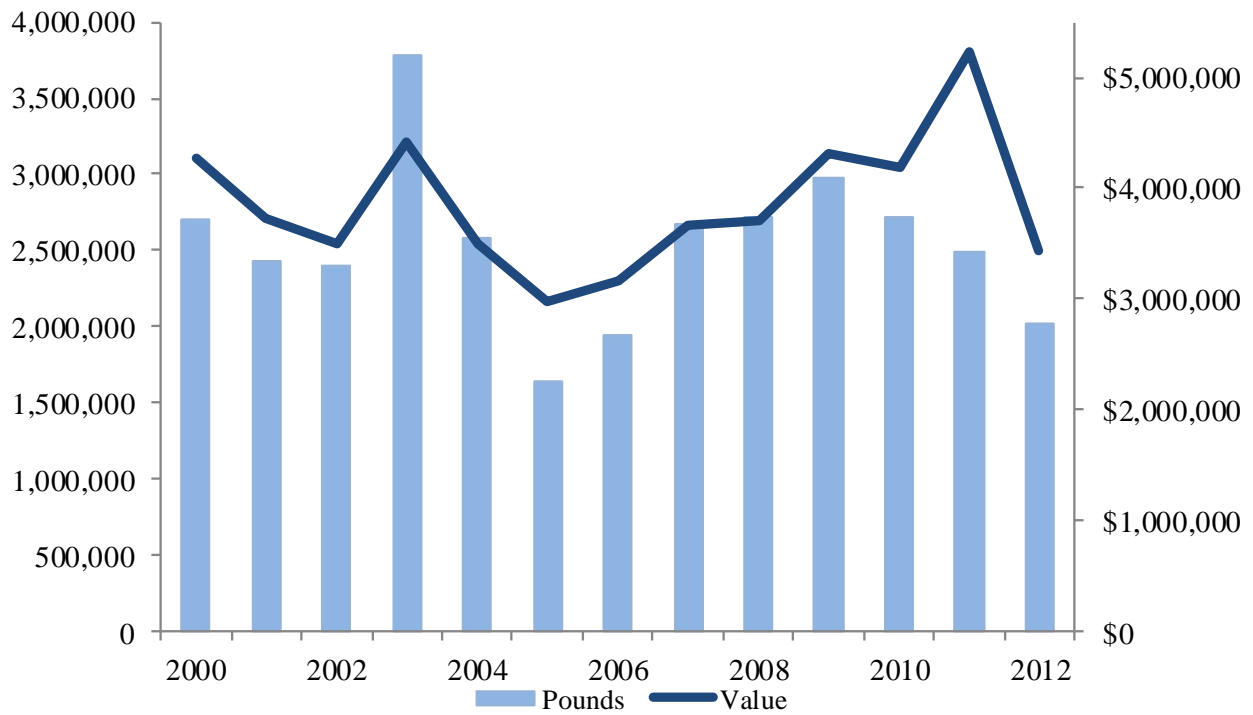


Figure 3.9. Trends in *Groundfish Caught in CA NMS, 2000 to 2012 (2013 \$)*

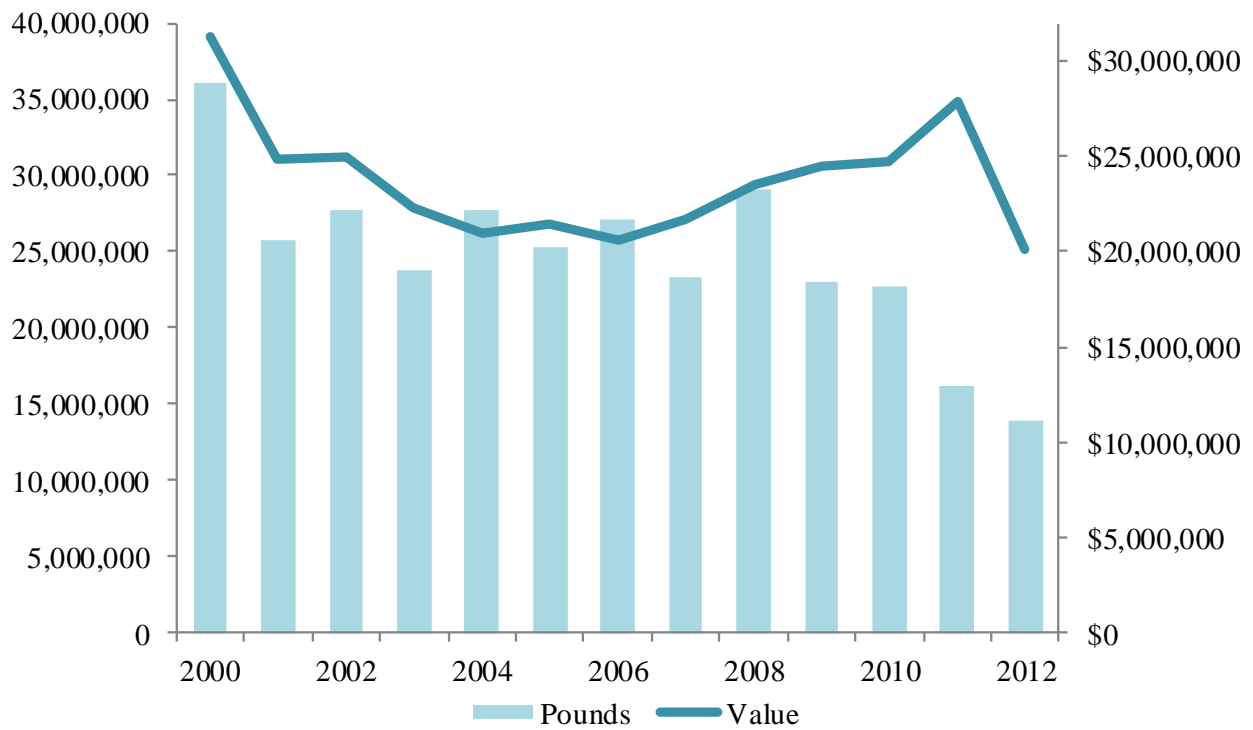


Figure 3.10. Trends in *Groundfish Caught in all CA Waters, 2000 to 2012 (2013 \$)*

### *Spiny lobster*

In 2012, *Spiny lobster* was the third ranked species/species group by value in the CINMS. The CINMS *Spiny lobster* catch represented over 99.9% of total CA NMS *Spiny lobster* catch (Leeworthy et al 2013b).

Landings of *Spiny lobster* have been fairly consistent, ranging from a low of almost 120 thousand pounds in 2007 to a high of over 200 thousand pounds in 2002. On the other hand, harvest revenue from *Spiny lobster* has been steadily increasing over the study period, ranging from a low of almost \$1.2 million in 2000 to a high of almost \$3 million in 2012 (Table 3.7). This reflects a change in per pound prices in the *Spiny lobster* markets. This price increase could be attributed to increased exports of *Spiny lobster* catch to Asian countries (CDFW 2013, 1- 3). Generally *Spiny lobster* catch trends in CA NMS are consistent with those of all CA waters. However, CA NMS demonstrates a more rapid increase in landings from 2000 to 2002 and a more pronounced decrease in 2011 landings relative to 2010 landings (Figures 3.11 and 3.12).

**Table 3.7. Trends in *Spiny lobster* Caught in CA NMS, 2000 to 2012 (2013\$)**

Year	Pounds	Value
2000	124,701	\$1,195,110
2001	162,788	\$1,395,961
2002	200,486	\$1,790,438
2003	176,849	\$1,637,422
2004	178,555	\$1,646,435
2005	137,981	\$1,360,754
2006	143,957	\$1,606,081
2007	119,848	\$1,442,077
2008	144,903	\$1,695,769
2009	142,151	\$1,766,207
2010	164,616	\$2,768,144
2011	137,714	\$2,476,889
2012	178,774	\$2,984,071

Source: California Fishing Information System, California Department of Fish and Wildlife.

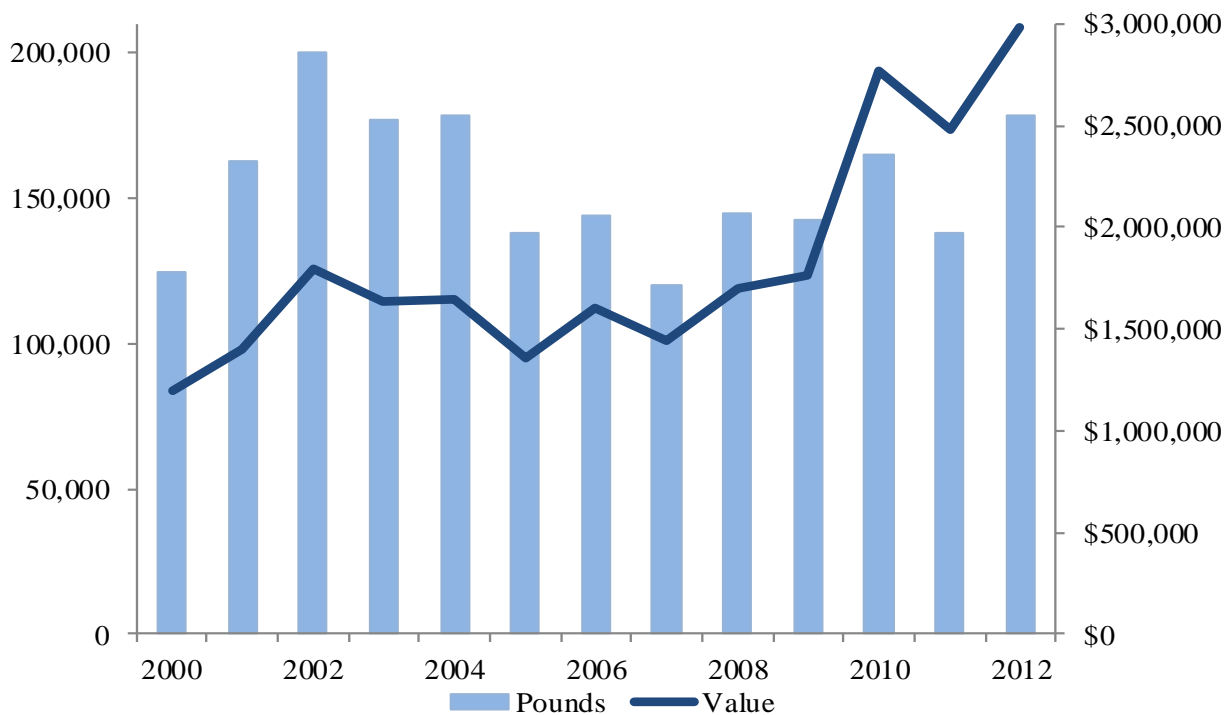


Figure 3.11. Trends in *Spiny lobster* Caught in CA NMS, 2000 to 2012 (2013 \$)

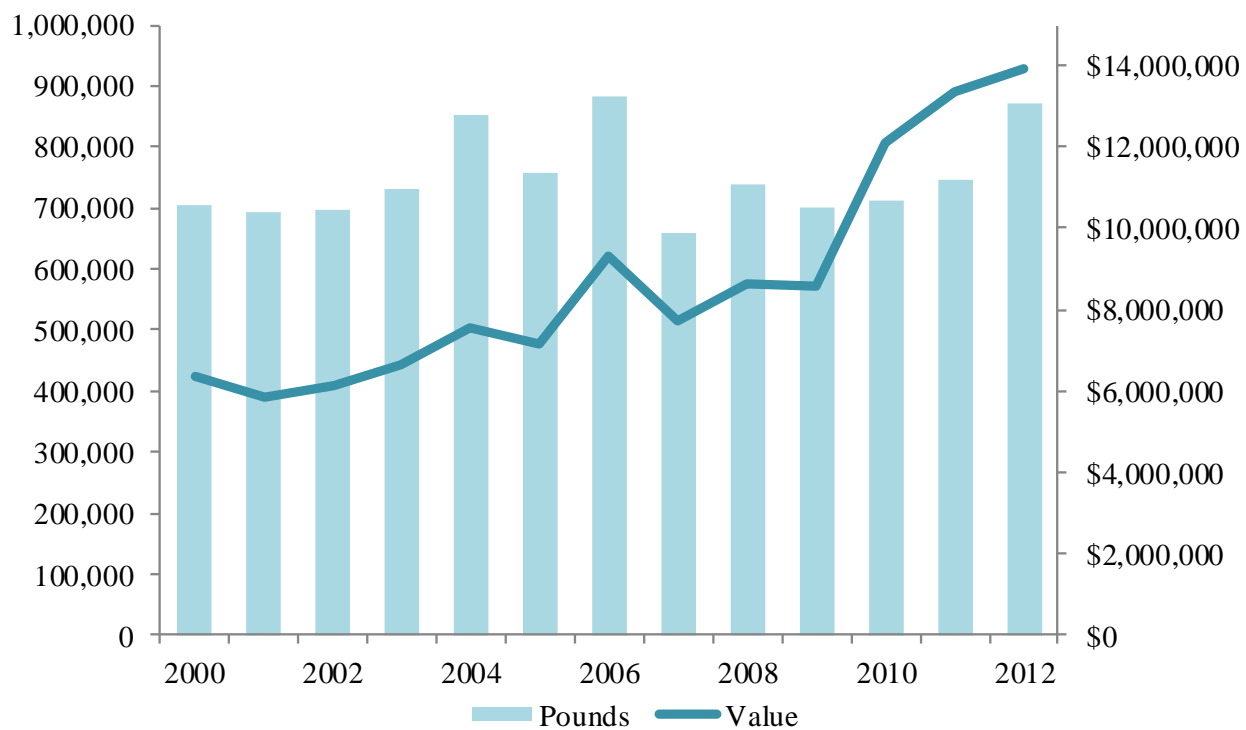


Figure 3.12. Trends in *Spiny lobster* Caught all CA Waters, 2000 to 2012 (2013 \$)



### ***Prawn & Shrimp***

The species group *Prawn & Shrimp* was ranked fifth in the CINMS in 2012 (Leeworthy et al 2013b). This aggregate species group was only analyzed in the CINMS. In other NMS sites, specific species within the aggregate *Shrimp & Prawn* group appear in the top five, including *Spot prawn* in the MBNMS and *Coonstriped shrimp* in the GFNMS (Leeworthy et al 2013d, Leeworthy et al 2013c).

Following a peak of over 370 thousand pounds and almost \$2.2 million, *Prawn & Shrimp* landings fell dramatically in all CA NMS. The minimum catch landed occurred in 2007 with over 86 thousand pounds. Low value occurred in 2010 with \$937 thousand (Table 3.8). These trends within CA NMS are highly irregular compared to statewide trends in all CA waters. For example, statewide landings did not experience a large decrease until 2006. In addition, the peak statewide catch was recorded in 2011. While landings by pound demonstrate considerable variation between CA and NMS sites, there also appear to be differences in the per pound prices of *Prawn & Shrimp* from all CA NMS and those from all CA waters (Figures 3.13-3.14). From 2000-2006, the number of active *Pacific ocean shrimp* vessels have decreased fourfold (CDFW 2008, 3-2).

**Table 3.8. Trends in *Prawn & Shrimp* Caught in CA NMS, 2000 to 2012 (2013 \$)**

Year	Pounds	Value
2000	370,485	\$2,175,940
2001	171,621	\$1,782,668
2002	167,930	\$1,894,864
2003	95,631	\$1,118,033
2004	87,343	\$1,099,090
2005	97,575	\$1,310,035
2006	118,713	\$1,668,307
2007	86,618	\$1,212,811
2008	100,403	\$1,329,297
2009	112,889	\$1,190,371
2010	87,936	\$937,019
2011	145,064	\$1,705,054
2012	192,989	\$2,155,617

Source: California Fishing Information System, California Department of Fish and Wildlife.

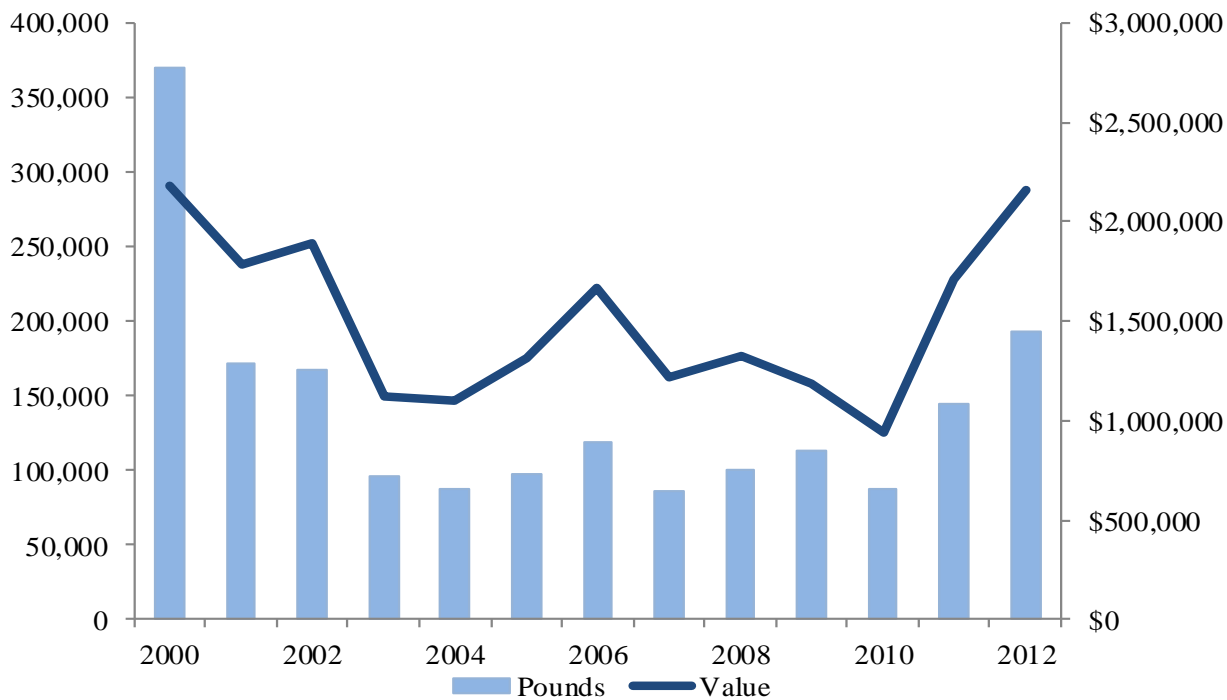


Figure 3.13. Trends in *Prawn & Shrimp* Caught in CA NMS, 2000 to 2012 (2013 \$)

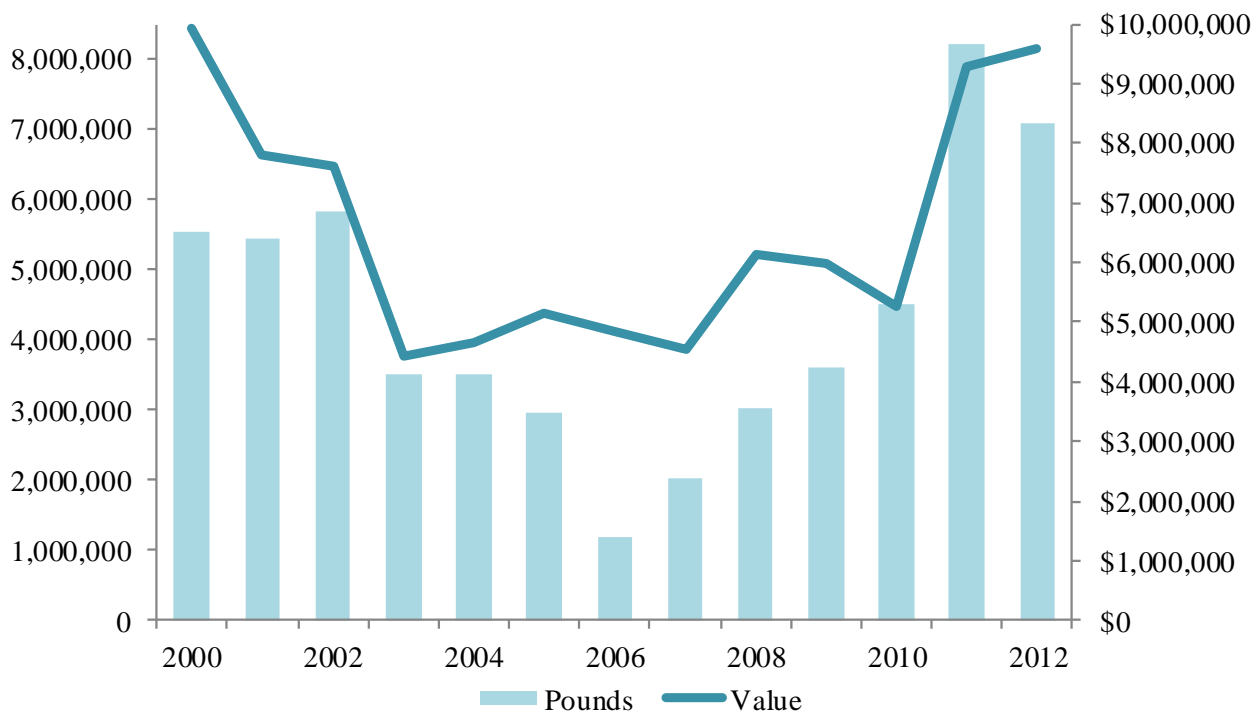


Figure 3.14. Trends in *Prawn & Shrimp* Caught in all CA Waters, 2000 to 2012 (2013 \$)

### ***Coastal Pelagic***

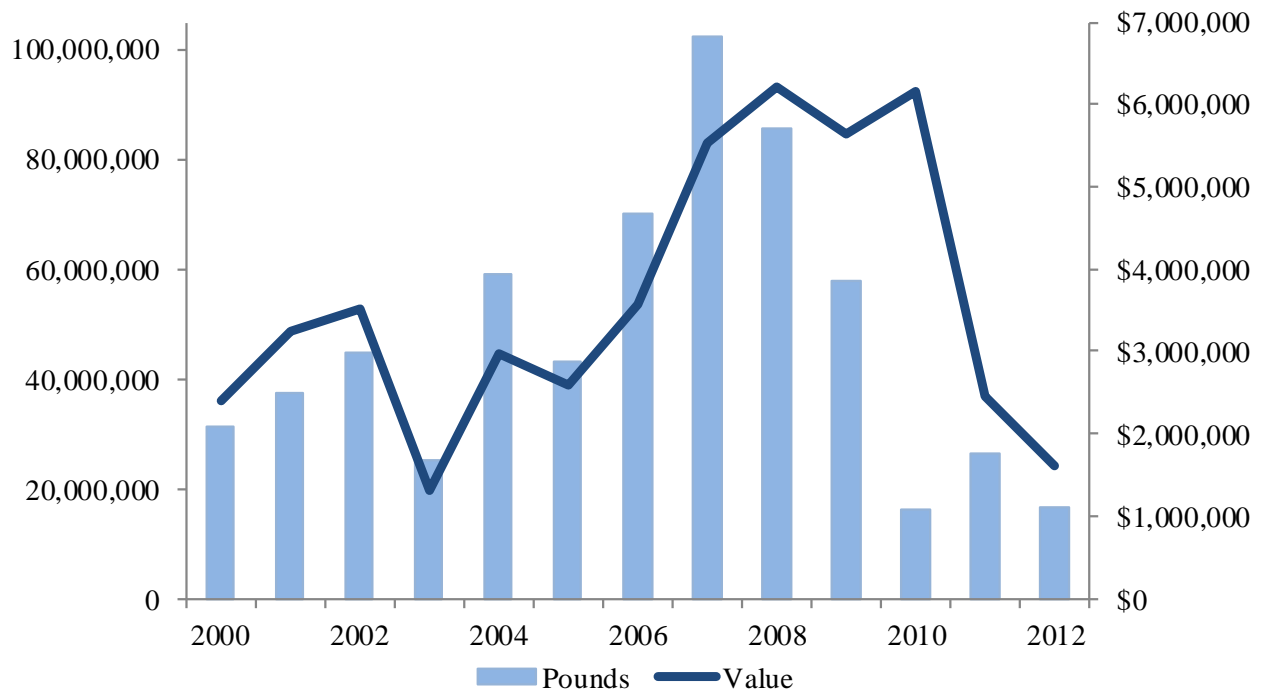
*Coastal Pelagic species* ranked fourth by value in the MBNMS in 2012. Catch from the MBNMS accounted for over 84% of all *Coastal Pelagic species* catch from CA NMS (Leeworthy et al, 2013d). Overall, *Coastal Pelagic species* accounted for almost 2.5% of total catch from all CA NMS.

Generally, *Coastal Pelagic species* experienced a rise from 2003 to 2008. Following fluctuation in 2009 and 2010, the fishery shows declining catch for 2011 and 2012. While 2010 represents the second highest year by value, catch reached its lowest point at just over 16 million pounds. The highest catch occurred in 2007 at over 102 million pounds. Revenue ranged from a high of over \$6.2 million in 2008 to a low of \$1.6 million in 2012 (Table 3.9). In general, high and low trends are consistent with statewide trends. However, while sanctuary catch was increasing from 2000 to 2002 and 2006 to 2007, statewide catch was decreasing (Figures 3.15 and 3.16).

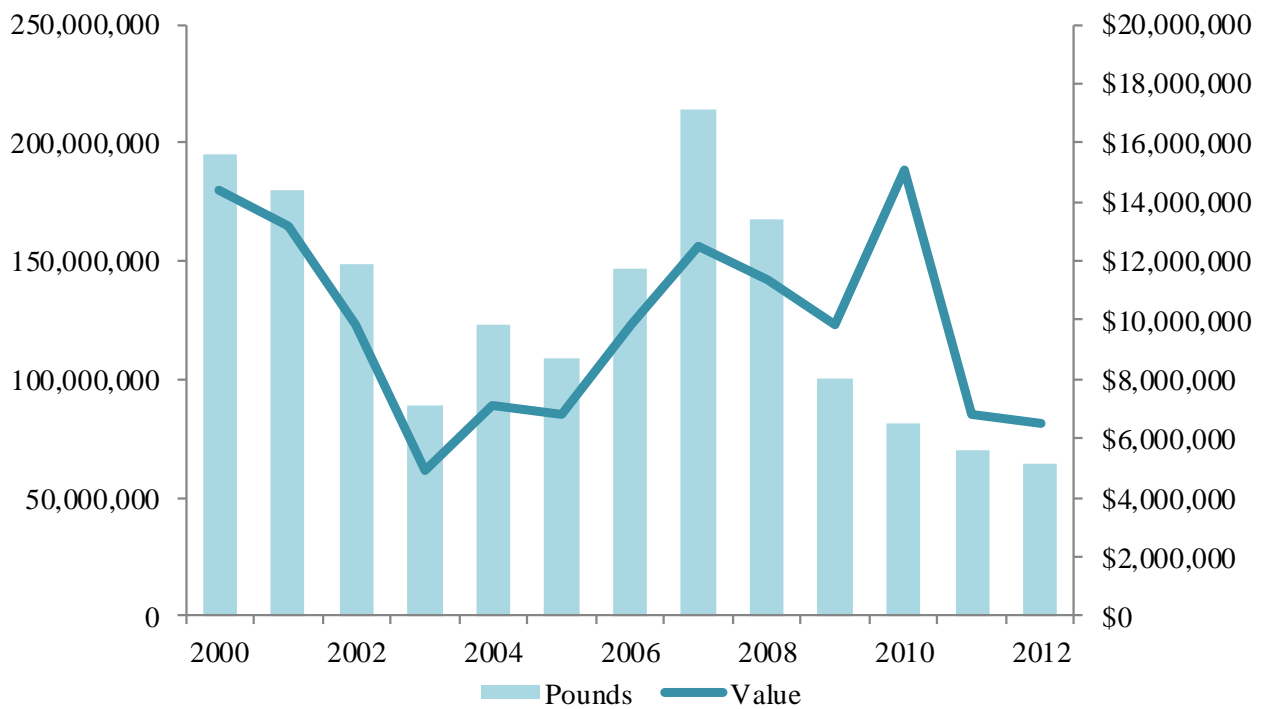
**Table 3.9. Trends in *Coastal Pelagic* Caught in CA NMS, 2000 to 2012 (2013 \$)**

Year	Pounds	Value
2000	31,425,661	\$2,386,999
2001	37,575,069	\$3,250,926
2002	44,857,289	\$3,526,229
2003	25,158,087	\$1,308,770
2004	58,901,316	\$2,967,283
2005	43,087,087	\$2,584,636
2006	70,256,542	\$3,581,257
2007	102,300,425	\$5,540,687
2008	85,728,162	\$6,201,976
2009	57,971,951	\$5,635,744
2010	16,017,338	\$6,157,559
2011	26,445,569	\$2,467,633
2012	16,669,799	\$1,617,267

Source: California Fishing Information System, California Department of Fish and Wildlife.



**Figure 3.15. Trends in Coastal Pelagic Caught in CA NMS, 2000 to 2012 (2013 \$)**



**Figure 3.16. Trends in Coastal Pelagic Caught in all CA Waters, 2000 to 2012 (2013 \$)**

### ***Sablefish Non-Trawl***

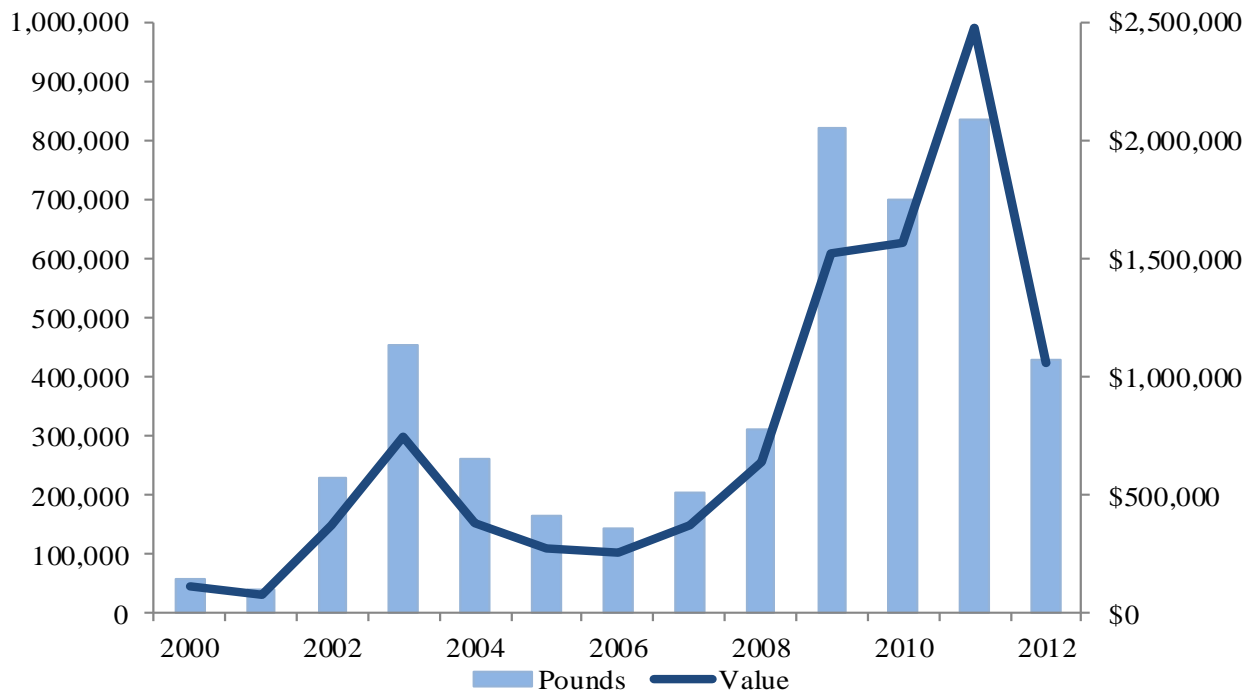
*Sablefish Non-Trawl* was the fourth species ranked by value in the GFNMS and the CBNMS in 2012 (Leeworthy et al 2013c, Leeworthy et al 2013a). While *Sablefish Non-Trawl* did not rank as a top five species/species group in the MBNMS, catch from the MBNMS accounted for over 62% of all *Sablefish Non-Trawl* caught in CA NMS (Leeworthy et al 2013d).

Landings of *Sablefish Non-Trawl* demonstrated a marked peak in 2011 with almost 835 thousand pounds and almost \$2.5 million in revenue. Minimum catch occurred in 2001 with just over 40 thousand pounds and almost \$75 million in revenue (Table 3.10). The clear trend in increasing *Sablefish Non-Trawl* catch through 2011 is consistent with state trends (Figures 3.17 and 3.18). The peak years for *Sablefish Non-Trawl* also correspond with the years that the *Salmon* fishery was closed. In 2011, implementation of the West Coast Individual Fishery Quota (IFQ) program began and many vessels traded trawl permits and switched gear for higher value quotas in *Sablefish Non-Trawl* fishery (CDFW 2013, 17-1).

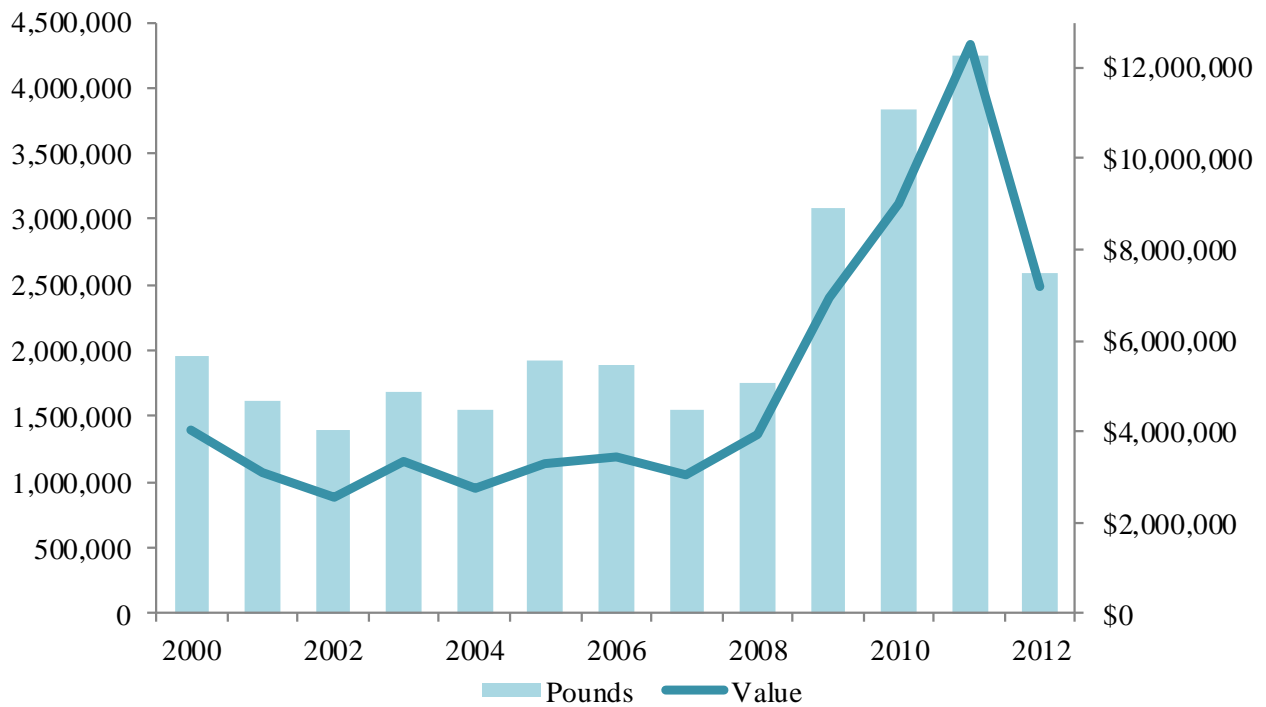
**Table 3.10. Trends in *Sablefish Non-Trawl* Caught in CA NMS, 2000 to 2012 (2013 \$)**

Year	Pounds	Value
2000	58,229	\$115,029
2001	40,373	\$74,516
2002	230,688	\$370,730
2003	454,319	\$746,036
2004	261,640	\$378,139
2005	165,051	\$276,054
2006	144,700	\$258,183
2007	203,586	\$370,585
2008	311,005	\$641,507
2009	820,719	\$1,522,789
2010	699,499	\$1,568,666
2011	834,663	\$2,475,837
2012	427,237	\$1,057,900

Source: California Fishing Information System, California Department of Fish and Wildlife.



**Figure 3.17. Trends in Sablefish Non-Trawl Caught in CA NMS, 2000 to 2012 (2013 \$)**



**Figure 3.18. Trends in Sablefish Non-Trawl Caught in all CA Waters, 2000 to 2012 (2013 \$)**

### ***California halibut***

*California halibut* ranked third in the GFNMS in 2012 (Leeworthy et al 2013c). Catch from the GFNMS accounted for almost 26% of total *California halibut* catch from all CA NMS sites in 2012.

Landings of *California halibut* in all CA NMS have been relatively consistent over the study period, despite a notable decline from 2005 to 2008. During this period, a low catch of almost 122 thousand pounds and almost \$614 thousand was landed in 2007. The highest catch was landed in 2005 with over 266 thousand pounds and \$999 thousand in revenue (Table 3.11). *California halibut* catch within CA NMS was consistent with statewide trends through 2010, at which point pounds and value statewide began to decline. In CA NMS, pounds landed remained very consistent while increasing revenues suggests higher prices (Figures 3.19 and 3.20). The decline in *California halibut* landings from 2003 to 2006 may be attributed to the closures of coastal waters to bottom trawling, the most productive gear type for *California halibut* (ONMS 2010, 25; Sweetnam 2011, 22).

**Table 3.11. Trends in *California halibut* Caught in CA NMS, 2000 to 2012 (2013 \$)**

Year	Pounds	Value
2000	187,870	\$697,557
2001	190,223	\$693,129
2002	207,394	\$757,342
2003	246,154	\$905,764
2004	224,526	\$842,819
2005	266,249	\$999,075
2006	211,352	\$907,755
2007	121,698	\$613,565
2008	123,392	\$623,508
2009	183,554	\$796,634
2010	170,832	\$777,163
2011	173,062	\$878,656
2012	175,145	\$874,154

Source: California Fishing Information System, California Department of Fish and Wildlife.

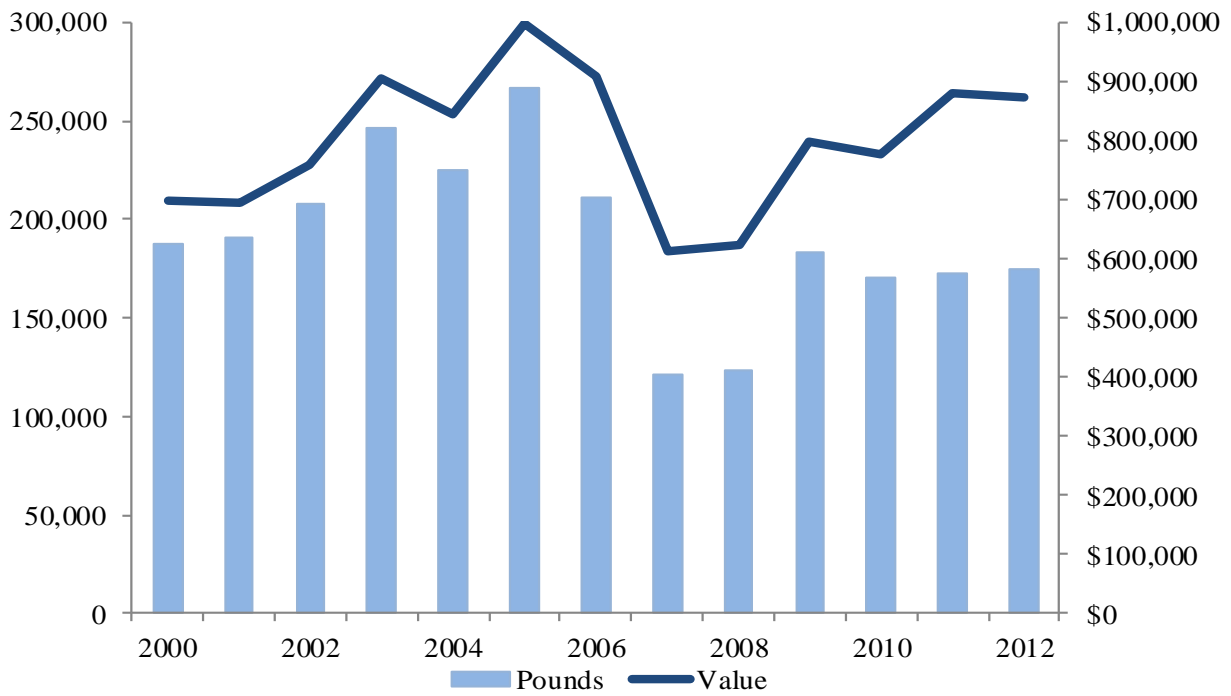


Figure 3.19. Trends in *California halibut* Caught in CA NMS, 2000 to 2012 (2013 \$)

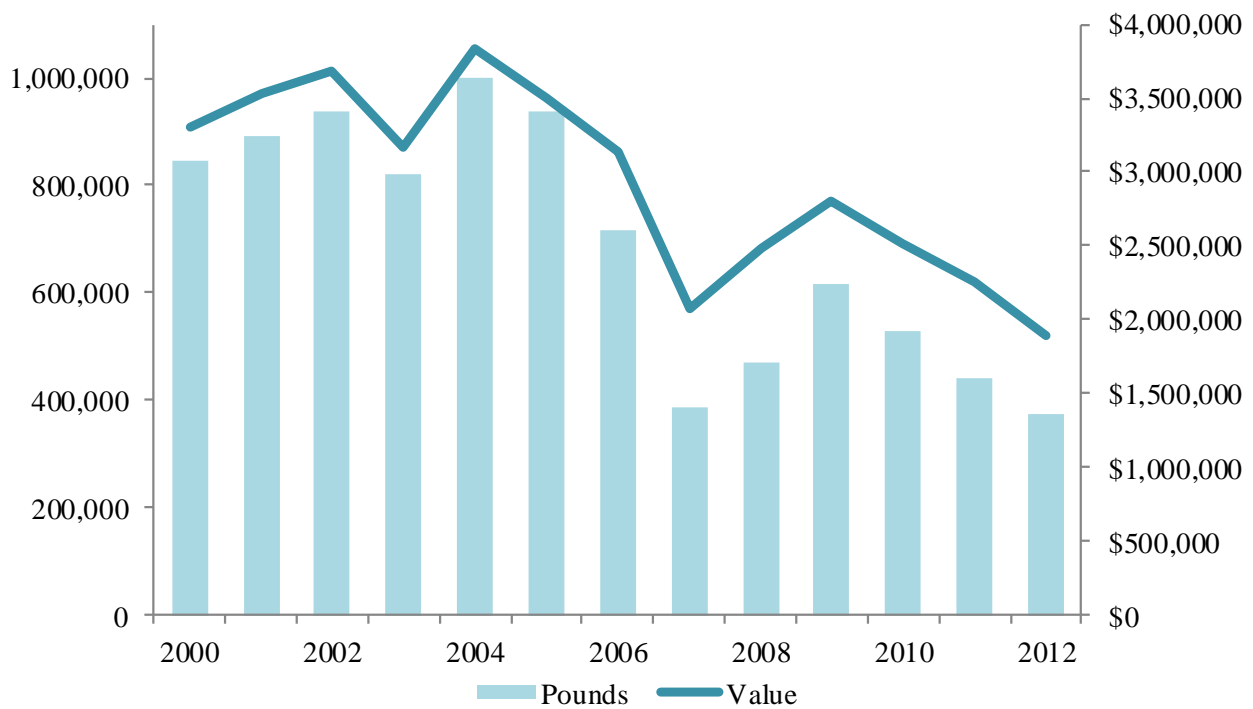


Figure 3.20. Trends in *California halibut* Caught in all CA Waters, 2000 to 2012 (2013 \$)



### ***Dover Sole-Thornyheads-Sablefish Trawl***

*Dover Sole-Thornyheads-Sablefish Trawl* ranked third in the CBNMS in 2012 (Leeworthy et al 2013a). However, the GFNMS only accounted for about 15% of the total *Dover Sole-Thornyheads-Sablefish Trawl* catch from all CA NMS.

Catch for *Dover Sole-Thornyheads-Sablefish Trawl* shows major fluctuation from 2003 to 2008, ranging from a low of almost 262 thousand pounds and \$240 thousand in 2005 to a high of almost \$861 thousand in 2008. Peak landings occurred in 2003 with almost 1.3 million pounds (Table 3.12). This decline from 2003 to 2005 followed by a recovery is more drastic for CA NMS catch than for statewide catch (Figures 3.21 and 3.22).

Some of this fluctuation could be at least partially attributed to many management changes impacting the fisheries. In late 2002, implementation of a Trawl Rockfish Conservation Area restricted gear and catch (PFMC 2011, 83). In addition, following the groundfish disaster in 2000, a federal and industry funded groundfish trawl vessel buyback program in 2003 greatly reduced the number of vessels and amount of catch (The Research Group 2006 IV-9). In order to offset increased restrictions on *Petrale sole* in 2009 and 2010, the council increased trip limits for species such as *Dover Sole-Thornyheads-Sablefish* (Sweetnam 2011, 24).

**Table 3.12. Trends in *Dover Sole-Thornyheads-Sablefish Trawl* Caught in CA NMS, 2000 to 2012 (2013 \$)**

Year	Pounds	Value
2000	706,397	\$487,581
2001	593,943	\$383,171
2002	944,021	\$669,567
2003	1,265,867	\$816,267
2004	682,811	\$531,394
2005	261,539	\$240,401
2006	474,060	\$370,989
2007	912,284	\$712,073
2008	1,109,303	\$860,796
2009	878,439	\$675,251
2010	880,591	\$565,056
2011	779,715	\$691,401
2012	754,559	\$475,607

Source: California Fishing Information System, California Department of Fish and Wildlife.

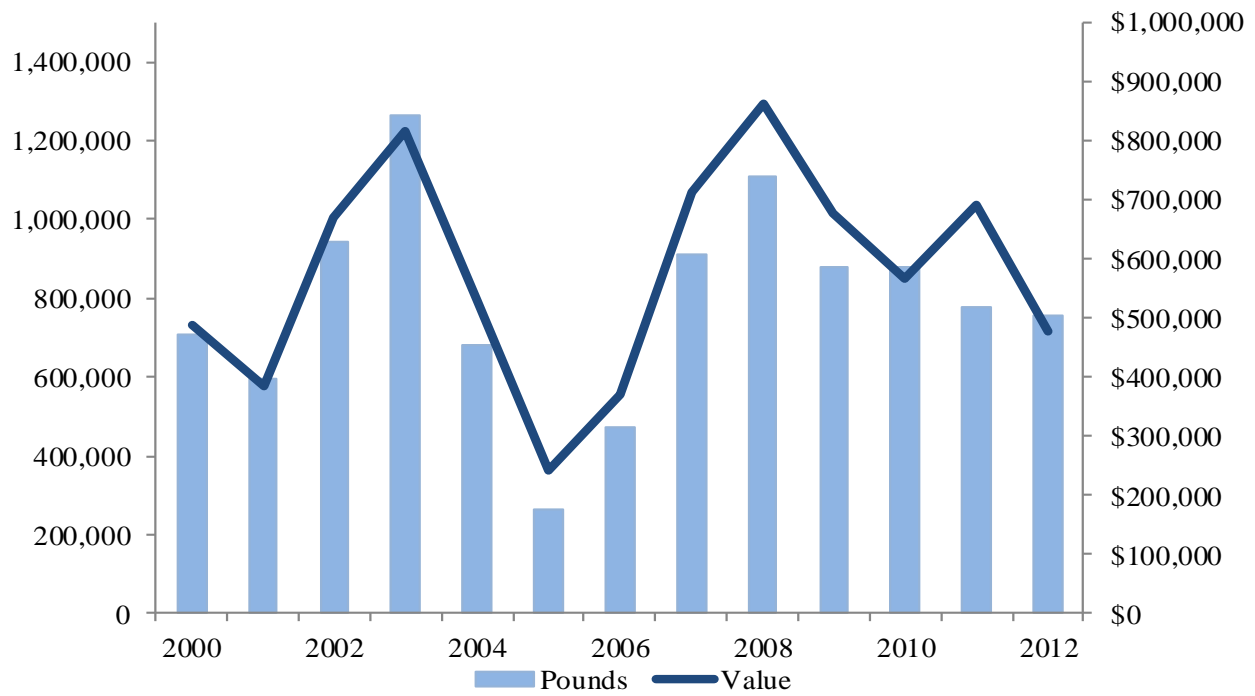


Figure 3.21. Trends in *Dover Sole-Thornyheads-Sablefish Trawl Caught in CA NMS, 2000 to 2012 (2013 \$)*

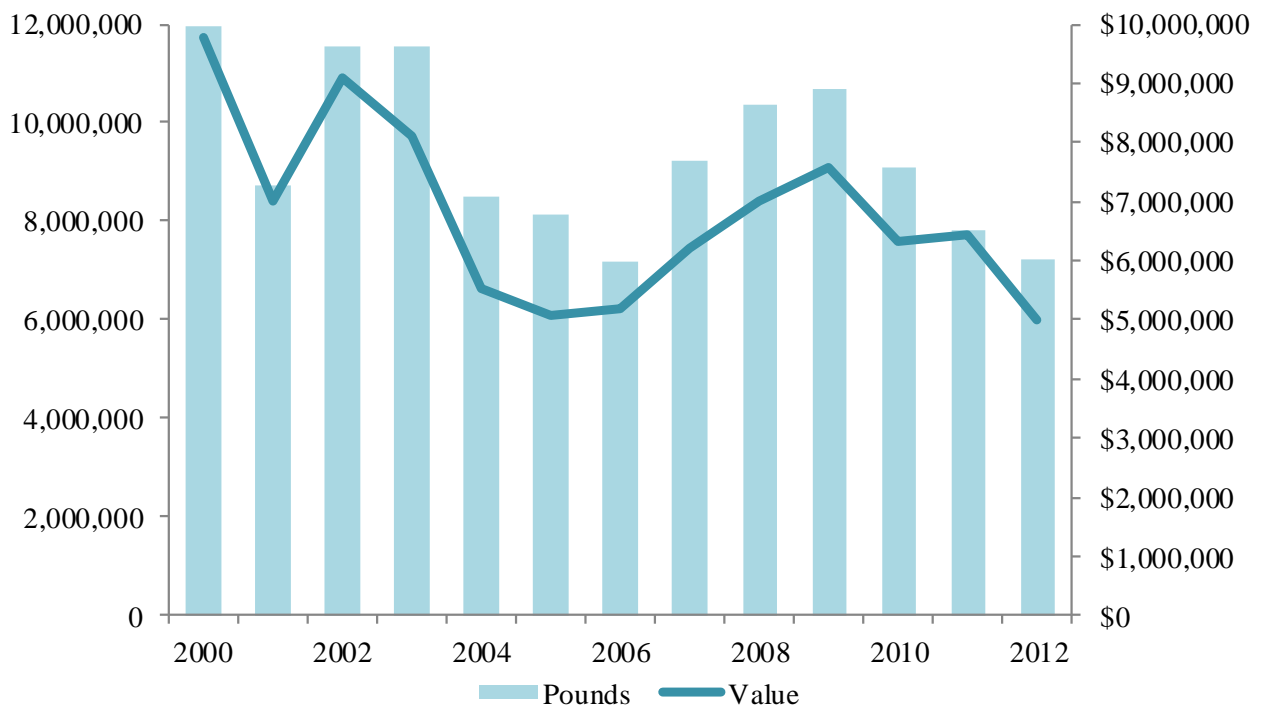


Figure 3.22. Trends in *Dover Sole-Thornyheads-Sablefish Trawl Caught in all CA Waters, 2000 to 2012 (2013 \$)*

### ***Other Flatfish***

In 2012, *Other Flatfish* ranked fifth in the CBNMS by value (Leeworthy et al 2013a). However, the CBNMS accounted for less than 10% of total catch from CA NMS in 2012.

Trends in *Other Flatfish* show a general increase through 2007 followed by a drastic decline through 2010. In recent years, catch has leveled off. *Other Flatfish* reached a peak catch of over 649 thousand pounds and almost \$687 thousand in 2007. The minimum catch occurred in 2012 with just over 143 thousand pounds and almost \$169 thousand in revenue. At least some of this decline has been attributed to increased restrictions on *Petrale sole*, which are commonly caught with *Other Flatfish* (CDFW 2013, 17-1).

**Table 3.13. Trends in *Other Flatfish* Caught in CA NMS, 2000 to 2012 (2013 \$)**

Year	Pounds	Value
2000	256,685	\$255,620
2001	288,019	\$313,657
2002	185,172	\$174,624
2003	264,045	\$264,612
2004	385,797	\$404,256
2005	431,196	\$509,604
2006	456,036	\$463,868
2007	649,209	\$686,885
2008	392,170	\$355,151
2009	288,088	\$246,468
2010	203,190	\$203,326
2011	156,363	\$190,138
2012	143,247	\$168,969

Source: California Fishing Information System, California Department of Fish and Wildlife.

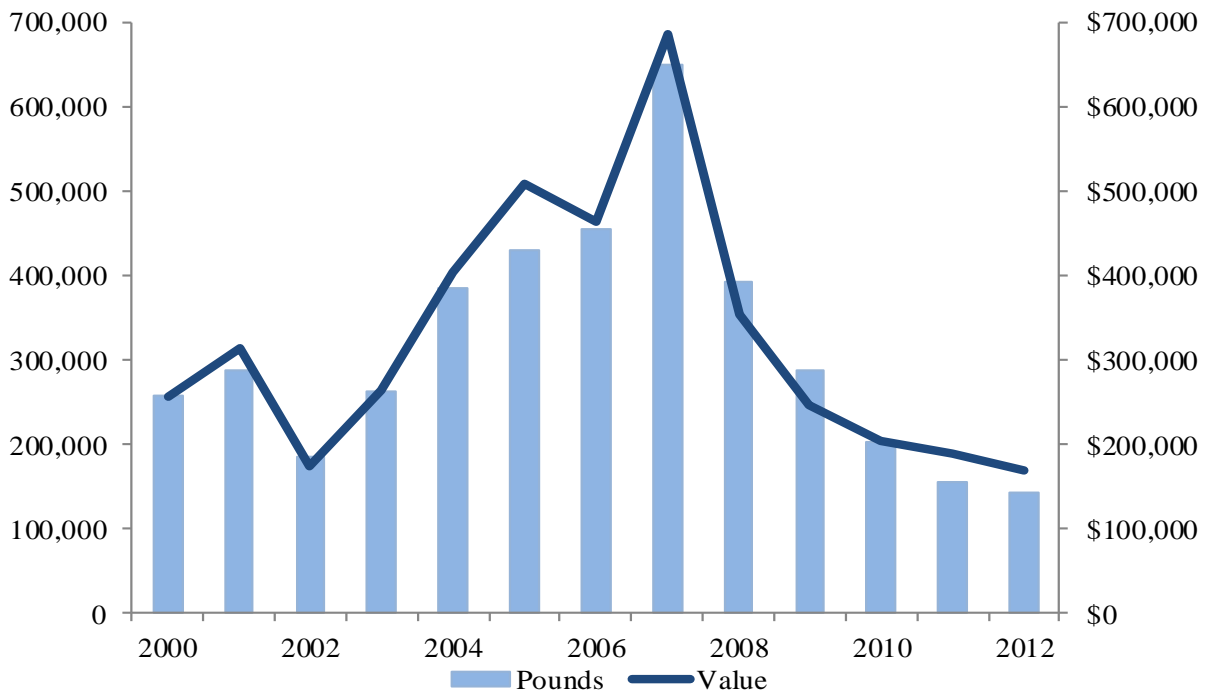


Figure 3.23. Trends in *Other Flatfish* Caught in CA NMS, 2000 to 2012 (2013 \$)

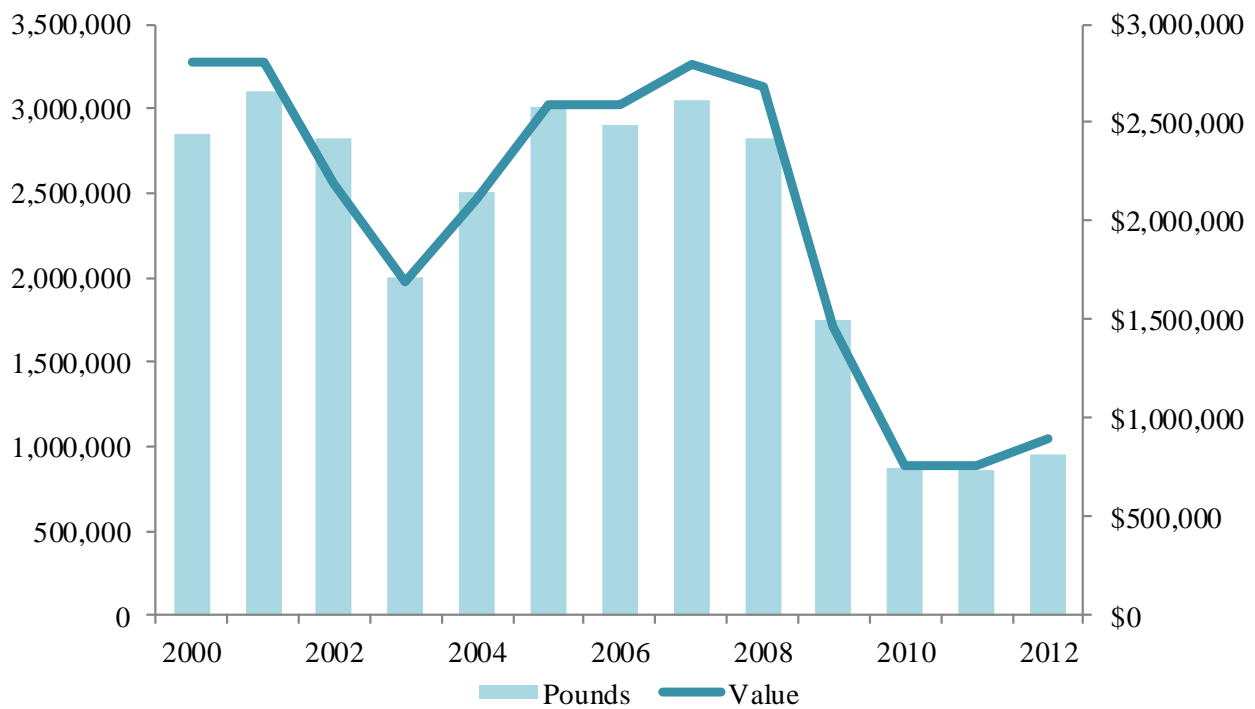


Figure 3.24. Trends in *Other Flatfish* Caught in CA Waters, 2000 to 2012 (2013 \$)

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