



Oregon's Sardine Fishery  
2010-2011 Summary

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## **Fishery Management**

Management of the Pacific sardine (*Sardinops sagax*) fishery has undergone significant changes in recent years. Below is a brief overview of the federal and state management related to Pacific sardine.

### **Federal Fishery Management**

In the past, sardines were only managed by the individual states of California, Oregon, and Washington. In 1999, Amendment 8 to the [Coastal Pelagic Species Fishery Management Plan](#) (formerly the Northern Anchovy Fishery Management Plan) adopted by the Pacific Fishery Management Council (PFMC) placed Pacific Sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), Jack mackerel (*Trachurus symmetricus*), and market squid (*Loligo opalescens*) in a management unit with Northern anchovy (*Engraulis mordax*). Under the plan, an annual maximum coastwide harvest guideline (HG) for sardines was established beginning in 2000 (Table 1). The HG is based on annual sardine biomass assessments and a harvest control rule defined in the Fishery Management Plan.

From 2000 to 2001, the coastwide HG was allocated 2/3 to southern California and 1/3 to northern California (north of Morro Bay), Oregon, and Washington. In 2002, the Council adopted an interim allocation system for the 2003-2005 seasons that changed the definition of the sub areas and other rules by the following:

- Moved the geographical boundary between sub area A and B from 35 degrees 40 minutes to 39 degrees latitude (Point Arena California).
- Moved the date for un-harvested allocation from October 1 to September 1.
- Changed the percent reallocated from 50% for both areas to 20% for sub area A and 80% for sub area B.
- Reallocated all un-harvested sardines that remained on December 1, coastwide.

Discussions to design a new long-term allocation system began in 2004 and in June 2005, the Council approved the new allocation formula for Pacific sardines which released allocations of fish coastwide at three set calendar dates rather than to northern and southern areas. The new allocation framework was implemented for the directed Pacific Sardine fishery under Amendment 11 of the Coastal Pelagic Species Fishery Management Plan in 2006:

1. January 1: 35% of the HG to be allocated coastwide;
2. July 1: 40% of the HG, plus any portion not harvested from the initial allocation, to be reallocated coastwide;
3. September 15: the remaining 25% of the HG, plus any portion not harvested from earlier allocations, to be reallocated coastwide.

In June 2010 the Pacific Fisheries Management Council adopted Amendment 13 to the CPS FMP for compliance with the reauthorized Magnuson-Stevens Act and the National Standard 1 guidelines. This amendment defines how the Over Fishing Limit (OFL), Acceptable Biological Catch (ABC), Annual Catch Limit (ACL), and Annual Catch Target (ACT) for Pacific sardine and other CPS will be established and the relationship to the HG (Table 2). These newly defined benchmarks from Amendment 13 were not part of the 2010 harvest specification for Pacific sardine. The harvest specifications for the 2011 fishing year for Pacific sardine adopted at the November 2010 PFMC meeting included provisions for the newly

adopted benchmarks. These benchmarks were noted in the 2011 annual specifications published in the Federal Register but the final rule adopting Amendment 13 was not published until November 2011 so they were not part of the annual specifications for the 2011 fishing year.

### **2010 Management Decisions and Harvest Specifications**

Based on a biomass estimate of 702,024 mt the coastwide maximum HG for Pacific sardine was set at 72,039 mt for 2010 in accordance with the Coastal Pelagic Species Fisheries Management Plan (CPS FMP) and procedures for the annual management cycle of Coastal Pelagic Species Fisheries. This was a 7.6% increase from the 66,932 mt HG set in 2009. A set aside of 5,000 mt from the HG was established for an exempted fishing permit (EFP) to allow for an industry sponsored research project to take place during the 2<sup>nd</sup> allocation period. An incidental catch set-aside of 3,000 mt was established to prevent premature closure of other fisheries by allowing for restricted incidental landings of Pacific sardines in fisheries targeting other species. A management uncertainty buffer of 4,000 mt was also established and deducted from the third allocation period. Thus, the directed sardine fishery opened under an initial overall HG of 60,0392 mt in 2010. Table 3 summarizes the 2010 allocation of the coastwide sardine HG. Regulations allow for automatic adjustments to the seasonal allocations for the directed fishery based on amounts taken in the previous period. For example, if the incidental catch set aside of 1,000 mt is not taken during one period, any portion remaining will be added to the directed fishery for the next period.

### **2011 Management Decisions and Harvest Specifications**

Based on a biomass estimate of 537,173 mt the coastwide maximum HG was set at 50,526 mt. The Pacific Fishery Management Council also recommended benchmarks for 2011 consistent with Amendment 13 to the CPS FMP with an OFL of 92,767 mt, and an ABC of 84,681 mt. The PFMC recommended that the ACL be set equal to the ABC. The coastwide maximum HG set at 50,526 mt is functionally similar to an ACT under Amendment 13. The National Marine Fisheries Service adopted Amendment 13 in November 2011, so the sardine fishery regulations in force for 2011 did not utilize the newly defined benchmarks from Amendment 13. The HG for 2011 was a 29.9 % decrease from 72,039 mt for 2010. A set aside of 4,200 for an EFP to conduct industry sponsored sardine research was adopted along with a 3,000 mt set aside for incidental catch in other fisheries and a 2,000 mt management uncertainty buffer. Thus, in 2011 the directed sardine fishery started with an adjusted allocation totaling 41,326 mt. Table 4 summarizes the 2011 allocation of the coastwide HG. Regulations again provided for automatic adjustments to the seasonal allocations for the directed fishery based on landings during the previous period(s).

### **State Fishery Management**

The Oregon sardine fishery was managed under the Oregon Fish and Wildlife (ODFW) Developmental Fisheries Program from 1999 through 2005. The sardine fishery was moved to a state limited entry permit system in December 2005. A number of changes to state management have been implemented since that time. The change from the developmental fisheries program to a limited entry permit fishery and subsequent changes to state management are covered in state reports on this fishery in previous years. No changes to state management regulation other than compliance with federal regulations were undertaken in 2010 or 2011.

## **ODFW Goals and Objectives**

The goals for the 2010 and 2011 seasons were to monitor sardine landings in Oregon, sample sardine landings to provide data for the coastwide stock assessment of sardines, and document the extent of by-catch in the fishery.

Objectives include

- Monitor landings and share information with state and federal managers
- Collect size, weight, and otoliths for aging from sardines landed in Oregon to support stock assessments.
- Collect location information for fishing areas utilized by the fishing fleet off the Oregon and Washington coast.
- Document by-catch in terms of species, amount and condition. Recommend management measures to reduce by-catch if deemed necessary.
- Document harvest methods.
- Continue efforts to observe vessel fishing activities at sea.

## **Oregon Sardine Fishery for 2010-2011**

The Oregon sardine fishery had similar challenges in the 2010 and 2011 seasons due to two more years of relatively low coastwide HG (Table 1). Although there was an overall increase in the HG for 2010 from the previous year, there was a significant increase in the industry sponsored research project conducted under an EFP. The industry research set aside increased from 1,200 mt in 2009 to 5,000 mt in 2010 (Table 3). The fishing year opened with an adjusted directed harvest allocation of 60,039 mt in 2010. In 2011 the coastwide HG was the lowest to date (Table 1), the EFP set aside was 4,200 mt and the fishery opened with an adjusted directed harvest allocation of 41,326 mt (Table 4).

The Astoria, Oregon area has unique challenges compared to Washington and California. Most vessels that deliver into Oregon must travel approximately fifteen nautical miles or more up the Columbia River to deliver their catch. At times it can take as little as one hour from the jetty entrance to the processors, but if motoring against the tide, it can be four or more hours to their final destination. The locations of the sardines up and down the coast were major factors for 2010 and 2011. Most of the fishing activity and catches for both years were north of the Columbia River plume off the coast of Washington (Table 1, Figures 1 and 2).

Tides and weather events, such as storms, heavy fog, and high seas are all factors that reduce the success rate of sardine fishing. Such events make it difficult to predict how many pounds of sardines will be delivered on any given day (Figures 3 and 4). Another variable considered by Oregon based fishermen is the quality of the sardines. Belly thickness, quantity of food in the stomach tissues, average size of the fish, and oil content, can influence the quality of the fish for human consumption. All of these factors can also affect the ex-vessel price paid to the fishermen. Traditionally sardines were caught and processed as bait. Over time the Oregon sardine industry has shifted from mainly bait markets to a higher value fishery with greater markets for human consumption.

Sardines caught in the summer months off Oregon and Washington are feeding in productive nutrient-rich waters. The fish are increasing their oil content or “fat”. High oil content is important in the palatability

for human consumption. The peak in oil content for sardine generally occurs in August and September. August was the peak month for Oregon sardine landings in seven of the nine years from 1999-2007 and the proportion harvested in September generally increased over that time period (Figure 5). The reduced HG in recent years has altered the timing of Oregon sardine landings and led to a derby style fishery. From 2008 through 2011 peak sardine landings in Oregon shifted to July (Figure 5). Most or all of August was closed to directed sardine fishing once the allocation for the second period was reached which occurred before the end of July in some years (Table 5). In 2010 and 2011 the 76 day long second allocation period closed after 21 and 11 days respectively. September landings have also declined substantially in recent years. The third and final allocation period which starts September 15<sup>th</sup> was only open for a matter of days in each of the 2008 - 2011 seasons. In 2011 both the second and the third allocation periods had the shortest openings on record.

Sardine fishing in Oregon and Washington waters is generally a day-time fishery. When possible, spotter planes are used to assist fishing vessel captains in locating large schools of fish. The spotter plane pilots and fishing boat captains work as a team which in turns increases the efficiency in catching sardines and saves time searching for schools. Most offloads begin in the late afternoon and/or at night. It is rare for a fisherman to make more than one landing in Oregon in a day.

### **ODFW Sampling and Biological Collections**

Collection of biological data from the directed sardine fishery started in 2000. Data collected from each fish includes: weight in grams (g), standard length in millimeters (mm), sex, and maturity stage. Sex and maturity are determined by using the maturity codes system developed at the aging and maturity workshop as an extension of the Annual Tri-National Sardine Conference in April, 2003 (below). Under the direction of the Pacific Fishery Management Council's Coastal Pelagic Species Management Team, biological sampling was based on a formula proportional to the number of metric tons landed in the ports. The goal of four fish samples (25 fish per sample) for every 1,000 mt landed is the current guideline. In 2010 the ODFW staff collected 67 biological samples: 2 samples (3%) were collected from the first allocation, 45 (67%) samples were collected during the second allocation period, and 20 (30%) during the third period. In 2011 the ODFW staff collected 33 biological samples; 27 samples were collected during the second allocation period and 6 during the third period. All of the otoliths collected were sent to the Washington Department of Fish and Wildlife for age reading.

#### Gross Anatomical Maturity Classification System

##### FEMALE - OVARY

- 1 - Clearly Immature: oocytes not visible, ovary is very small, translucent/clear and thin but with rounded edges (torpedo shape).
- 2 - Intermediate: Individual oocytes are not visible to unaided eye (no visible yolk or hydrate oocytes in the ovaries) and ovary is not clearly immature. This includes possible maturing and regressed ovaries.
- 3 - Active: Yolked oocytes visible, any size or amount as long as you can see them by the unaided eye in ovaries. This includes the smaller opaque oocytes (around 0.4-0.5 mm) to the large

yellowish oocytes (about 0.6-0.8mm). If hydrated oocytes are also present, then classify ovary as stage 4.

- 4 - Hydrated oocytes present, yolked oocytes may or may not, also be seen; any amount of hydrate oocytes (large and transparent) qualifies for this class from few to many or even if loose or “oozing/running” from ovary.

#### MALE – TESTIS

- 1 - Clearly Immature: testis is very small, knife-shaped, translucent/clear, and thin with a flat ventral edge.
- 2 - Intermediate: no milt evident and is not clearly immature; includes maturing or regressed testes
- 3 - Milt is present: either oozing from pore, in the duct, or when testis is cut with a knife.

### **2010 Summary**

#### ***Landings and Effort***

The number of vessels targeting sardine in 2010 held steady from the previous year at 20 of the 25 permitted vessels (Table 1). The top three vessels targeting sardines in Oregon accounted for 28% of the harvest landed in the state. Individual vessel landings ranged from 13,574 lbs (6 mt) to over 234,392 lbs. (106 mt). The average landing was approximately 112,952 lbs. (51mt). In Oregon, a total of 202 landings were made to nine different processors throughout Warrenton and Astoria and the Coos Bay areas. Occasionally, vessels set on schools of fish that exceed the capacity of their holds. Rather than releasing the fish, the vessel will sometimes hold the fish in the net and allow another vessel to pump from its net. According to logbook information approximately 1,234,000 lbs (560 mt) were shared between vessels.

The directed sardine fishery closed early in all three allocation periods for the third year in a row (Table 5). The directed sardine fishery for Oregon in 2010 was open for a total of 192 of 365 days, or 52% of the fishing year, but the Oregon directed sardine fishery is seasonal in nature with the greatest landing over the years occurring during the second and third allocation periods. The second and third allocation periods were open for 37 of 184 days (20%). Oregon permitted fishermen did land some sardine early in the year, but the first period landings total for Oregon were less than 2% of the period one coastwide landings total (Table 6). During the second period, which started July 1, fishermen were able to fish for 22 days before the early closure. Oregon landings in period 2 accounted for approximately 43% of sardine landed in the coastwide directed fishery. The third allocation period, September 15 lasted for 9 days. Oregon fishermen harvested 36% of the coastwide landings in period 3. As noted above early closures when the directed harvest allocations for periods were reached influenced the timing of effort and landings. Late June, late July, all of August and most of September, times when sardine were often harvested in previous years when the HG was greater, were closed to directed harvest in 2010 (Table 5, Figure 3, Figure 5). Directed sardine fishery landings varied widely among states in the three allocation periods (Table 6). Overall Oregon harvested approximately 28%, California landed 54%, and Washington landed 18% of the directed sardine harvest coastwide in 2010.



### ***Fishery Value***

The 18,826 mt of sardines landed in Oregon continues to have a strong market for both human consumption and bait. Sardine value varied from zero value to as high as \$0.136 per pound, but the average price was approximately \$0.115. The ex-vessel value of the 2010 sardine fishery in Oregon was approximately \$4.7 million, the fourth highest on record (Table 1).

### ***Non Target Species***

An Oregon sardine permit rule stipulates that an at sea observer be permitted to board a vessel when requested by ODFW. Currently, ODFW does not have personnel dedicated to observe and document by-catch of non-target species on sardine vessels. Available staff made attempts to observe trips, however; only 1 of the 202 trips (0.5%) had an observer on board. At that time no sets were observed because of poor fishing conditions.

Oregon's limited entry sardine permit rules require fishermen to report all incidental catches including salmonids and other species, in their logbooks. Logbooks' data indicate approximately 601 sets were made. Eighty four percent of those sets were successful for catching sardines.

Based on logbook data, the estimated total catch of salmon for the fishery was 186 salmon (Table 7). The incidental catch rate was 0.01 salmon per mt of sardines landed. An estimated 59.1% of all the netted salmon were released alive. Other non-target species caught in the 2010 season included Pacific mackerel and northern anchovy (Table 8).

### ***Area of Catch***

According to logbook data, most of the fishing activity took place off the coast of Washington with relatively few sets off Oregon. Sardine sets or catch in Oregon waters were only 4% of the total sets. The southernmost set was made off Coos Bay, Oregon and the most northern set was made off of Point Grenville, Washington. The main area of fishing effort was north of the Columbia River (Figure 1).

The range of depth at fishing locations was from 23 fathoms to 400 fathoms with the average depth at 60 fathoms. The average water temperature taken from logbook data was 56.2 degrees Fahrenheit. Of the 601 sets made, 295 (49%) were made before twelve noon.

### ***Weight, Length, Maturity and Age***

The Oregon sardine fishery catches fish of various ages with the majority of fish aged in any given year being two years old or greater (Figure 6). The presence of dominant year classes may be seen in the age data from sampled catch over time. Fishery samples for 2010 included fish from one to nine years old with four to six year old fish making up 85% of the fish aged (Figure 6). The average age of fish sampled was 5.2 years (Figure 7). The age composition reflects the age of fish caught and sampled not necessarily all ages of fish in the population. Fish sampled in 2010 ranged from 41 g to 209.6 g, with an overall average of 131.8 g (Table 9, Figure 8). Standard length ranged from 141 mm to 237 mm, with an overall average of 200 mm (Table 9, Figure 9). Fish weight generally increased as length increased (Figure 10).

In 2010 most of the fish (98 %), both male and female, were a maturity code 2, intermediate (Figure 11). Less than 1% of fish sampled were maturity code 3. Females have an additional 4<sup>th</sup> stage within the maturity code guideline. Only six females sampled were code 4.

## **2011 Summary**

### ***Landings and Effort***

The number of permits issued was 25 but the number of vessels fishing dropped from 20 in 2010 to 16 in 2011 (Table 1). The top three vessels targeting sardines and landing in Oregon accounted for 34% of the harvest. Individual vessel landings ranged from 21,705 lbs (11 mt) to over 200,000 lbs. (100 mt). The average landing was approximately 125,649 lbs. (63 mt). A total of 144 landings were made to seven different processors throughout Warrenton and Astoria. Occasionally, vessels set on schools of fish that exceed the capacity of the vessel. Rather than releasing the fish, the vessel will sometimes hold the fish in the net and allow another vessel to pump from the first fishing vessels net. According to logbook information approximately 740,000 lbs (370 mt) were shared between vessels.

The year's directed fishery was open for 81 of 365 days, or 22% of the fishing year (Table 5). This was less than half of the number of fishing days available coastwide in 2010. The first allocation period closed March 5, 2011. Vessels landing in California caught all the sardines for the first period. The second allocation period closed after 11 days of fishing and the third allocation period in 2011 closed after 6 days, the shortest opening of an allocation period on record. The second and third allocation periods, when sardine are most available to Oregon vessels, totaled 17 days available for fishing. The harvest of sardines in Oregon was 8,321 mt in 2011, less than half that of 2010 (Table 1). In recent years, only 1999 when the Oregon sardine fishery started up again after a 51 year hiatus had a lower landing total.

Directed sardine fishery landings varied among states in each of the allocation periods (Table 10). Overall, Oregon harvested approximately 19%, California landed 63% and Washington landed 18% of the directed coastwide harvest of sardines (Table 10). Oregon's percentage of the total coastwide harvest was down substantially from the 28% landed in 2010 (Table 6). Both fewer vessels participating in the fishery and fewer available fishing days during the time sardine were available to the Oregon fleet in 2011 were likely factors contributing to the decline.

### ***Fishery Value***

The 8,321 mt of sardines landed in Oregon continues to have a strong market for both human consumption and bait. Sardine value varied from zero value to \$0.14 per pound with the average price being \$0.12 per pound. The ex-vessel value of the 2011 sardine fishery in Oregon was approximately \$2.4 million, substantially lower than in recent years because of the reduced volume (Table 1).

### ***Non Target Species***

An Oregon sardine permit rule stipulates that an at sea observer is required to be allowed on the vessel when requested by ODFW. Currently ODFW does not have personnel dedicated to observe on sardine vessels and document by-catch of non-target species. No staff from ODFW was able to observe any trips for the 2011 season.

Oregon's limited entry sardine permit rules require fishermen to report in the logbook all incidental catch including salmonids and other species. Logbook data indicate approximately 200 sets were made of which 90% of sets were successful for catching sardines. The estimated total catch of salmon for the fishery, based on logbook data, was 72 salmon (Table 7). The incidental catch rate was 0.009 salmon per mt of sardines landed which is similar to recent years. An estimated 49% of all the salmon netted were released alive. Pacific mackerel was the other non-target species caught in the 2011 season (Table 8).

### ***Area of Catch***

According to logbook data, most of the fishing activity took place in waters off the coast of Washington. Less than 1 % of fish were caught off Oregon. The average depth was 49 fathoms. The range of depth was as little as 15 fathoms and as much as 689 fathoms. The average temperature of the water was 55.8 degrees Fahrenheit. Of the 200 sets, approximately half (50%) were sets made before twelve noon. The southernmost set was made off Clatsop beach and the most northern set was made off of La Push Washington. The main fishing area was north of the Columbia River off the Washington coast (Figure 2).

### ***Weight, Length, Maturity and Age***

The Oregon sardine fishery catches fish of various ages with the majority of fish aged in any given year being two years old or greater (Figure 6). The presence of dominant year classes may be seen in the age data from sampled catch over time. Fishery samples that were aged from the 2011 catch included fish from two to eight years old, with the three most frequently occurring age classes, five to seven year olds, comprising 73% of the fish sampled. The average age for fish sampled in 2011 was 5.3 years. The age composition reflects the age of fish caught and not necessarily all ages of fish in the population. Fish sampled in 2011 ranged from 45.4 g to 231.5 g, with an overall average of 151.3 g (Table 9, Figure 8). Standard length ranged from 145 mm to 237 mm, with an overall average of 208 mm (Table 9, Figure 9). Weight of fish generally increased with length (Figure 12). Fish sampled in 2011 had higher average weight, length and age than those sampled in 2010.

Most of the fish (93 %) sampled in 2011, both male and female, were a maturity code 2, intermediate (Figure 13). A small proportion of sampled fish (2.5%) were maturity code 3. Females have an additional 4<sup>th</sup> stage within the maturity code guideline. There were no females sampled that were stage 4.

### **Future Management**

The 2012 stock assessment for Pacific sardine estimated the biomass at 988,385 mt and the Pacific Fishery Management Council recommended an OFL of 154,781 mt, with an ABC and ACL of 141,289 mt. The HG and ACT were recommended to be 109,209 mt. This represents an increase of 116% in the quantity available for harvest from 2011. For the first time there was a set aside for Tribal use of 9,000 mt. There was also set aside of 3,000 mt for an EFP in the Pacific Northwest similar to the last several years. Set asides for incidental catch of 1,000 mt in each period were also recommended. The initial adjusted allocation for directed sardine harvest recommended by the Council was thus 94,409 mt.

### **Acknowledgments**

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## **Tables and Figures**

**Table 1. Comparison of Oregon Sardine Fishery 2000-2011.**

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Maximum Coast-wide Harvest Guideline (mt)	186,791	134,737	118,442	110,908	122,747	136,179	118,936	152,654	89,093	66,932	72,039	50,526
Adjusted Coast-wide Harvest Guideline (mt)									80,184	59,232	60,039	41,326
Initial Northern Allocation (mt)	62,264	44,912	39,481	36,969	40,917	45,393	--	--	--	--	--	--
Permits Issued	15	20	20	20	20	20	26	26	25	25	25	25
Vessels Targeting Sardine	14	18	17	17	19	20	16	22	22	20	20	16
Number of Landings	349	453	657	712	939	1,090	766	877	471	371	202	144
Total OR Directed Fishery Landings (mt)	9,528	12,798	22,771	25,258	36,111	45,110	35,648	42,151	22,949	20,298	18,826	8,321
First OR Landing Date	14-Jun	4-Jun	10-Jun	22-Jun	8-Jun	26-Apr	29-Jun	7-Jun	1-Jul	1-Jul	9-Feb	1-Jul
OR Last Landing Date	12-Oct	5-Oct	14-Oct	2-Oct	17-Dec	18-Oct	18-Oct	13-Oct	22-Sep	23-Sep	23-Sep	20-Sep
Number of Buyers	3	5	7	7	8	10	7	8	8	8	9	7
Average ex-vessel price/lb	\$0.05	\$0.06	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.11	\$0.11	\$0.115	\$0.12
Total Value of Sardine Fishery	\$1,108,126	\$1,547,878	\$2,633,988	\$2,718,336	\$4,596,848	\$5,550,238	\$3,714,520	\$4,539,791	\$5,659,963	\$4,980,577	\$4,724,227	\$2,395,057
*Percent of Sardines Harvested in Oregon Waters	75%	73%	90%	65%	59%	39%	36%	27%	49%	37%	4%	<1%

\* Information from logbook data.

**Table 2. Amendment 13 to the Coastal Pelagic Species Fishery Management Plan defines the calculations for and relationships between the Overfishing Limit (OFL), Allowable Biological Catch (ABC), Annual Catch Limit (ACL), Harvest Guideline (HG) and Annual Catch Target (ACT) for the Pacific sardine stock off the U. S. West Coast.**

OFL	BIOMASS * $F_{MSY}$ * DISTRIBUTION
ABC	BIOMASS * BUFFER * $F_{MSY}$ * DISTRIBUTION
ACL	LESS THAN OR EQUAL TO ABC
HG	(BIOMASS - CUTOFF) * FRACTION * DISTRIBUTION.
ACT	EQUAL TO HG OR ACL, WHICHEVER VALUE IS LESS

**Table 3. Coastwide Sardine Allocation for 2010**

	Jan 1 - June 30	July 1 - Sept 14	Sept 15 - Dec 31	Total
Harvest Guideline	-	-	-	72,039
Exempted Fishing Permit set aside (mt)	-	-	-	5,000
Incidental Set Aside (mt)	1,000	1,000	1,000	3,000
Management Uncertainty	-	-	4,000	4,000
<b>Adjusted Directed Coastwide Allocation (mt)</b>	<b>22,463</b>	<b>25,816</b>	<b>11,760</b>	<b>60,039</b>

**Table 4. Coastwide Sardine Allocation for 2011**

Harvest Guideline (mt)	-	-	-	50,526
Exempted Fishing Permit set aside (mt)	-	-	-	4,200
Incidental Set Aside (mt)	1,000	1,000	1,000	3,000
Management Uncertainty	-	-	2,000	2,000
<b>Adjusted Directed Coastwide Allocation (mt)</b>	<b>16,214</b>	<b>17,530</b>	<b>8,582</b>	<b>41,326</b>

**Table 5. Closure dates and number of open fishing days for the 2008-2011 seasons.**

	2008	2009	2010	2011
Period 1 Jan 1 - Jun 30	Closed 5/29/2012 (148 days)	Closed 2/20/2012 (50 days)	Closed 6/12/2012 (162 days)	Closed 3/5/2012 (63 days)
Period 2 July 1 - Sept 14	8/8/2012 (38 days)	7/18/2012 (17 days)	7/22/2012 (21 days)	7/12/2012 (11 days)
Period 3 Sept 15 - Dec 31	9/23/2012 (8 days)	9/23/2012 (8 days)	9/24/2012 (9 days)	9/21/2012 (6 days)
Number of Coast-wide Fishable Days	194	75	192	81

**Table 6. Directed sardine landings (mt) into Oregon, Washington and California in 2010.**

Allocation Periods	Oregon	Washington	California	Total
Period 1 (mt) <i>Jan 1 - Jun 30</i>	434 (2%)	511 (3%)	22,006 (95%)	<b>22,951</b>
Period 2 (mt) <i>July 1 - Sept 14</i>	13,910 (43%)	9,300 (29%)	9,119 (28%)	<b>32,329</b>
Period 3 (mt) <i>Sept 15 - Dec 31</i>	4,482 (36%)	2,578 (21%)	5,420 (43%)	<b>12,480</b>
Total for year (mt)	<b>18,826</b> (28%)	<b>12,389</b> (18%)	<b>36,545</b> (54%)	<b>67,761</b>

**Table 7. Estimated salmon caught in directed sardine fishery based on logbook data.**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Salmon Recorded in Vessel Logs	206	472	274	460	823	541	257	519	198	241	186	72
Salmon/Trip	0.6	1.1	0.4	0.7	0.9	0.5	0.03	0.6	0.4	0.7	0.5	0.5
Salmon/mt	0.02	0.04	0.013	0.02	0.023	0.013	0.007	0.012	0.008	0.012	0.01	0.009
% of Logs Turned In to ODFW	94%	93%	95%	88%	95%	92%	97%	99.9%	100%	100%	100%	100%

**Table 8. Recorded incidental catch in metric tons from fish tickets, 2001-2011.**

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Pacific mackerel	52.8	126.3	158.3	161.5	316.1	665	699.7	58.1	49.5	43.2	5.2
Jack mackerel	1.2	0.3	3.2	24.1	3.6	1.4	8	1.6	2	-	-
Pacific herring	-	3.3	-	10.3	0.1	1.2	-	55.8	-	-	-
Northern anchovy	-	0.2	-	1	68.4	8.6	-	2.4	-	1	-
American shad	-	0.3	-	1.2	-	0.44	-	0.3	-	-	-
Pacific hake	-	-	0.1	-	-	-	-	-	-	-	-
sharks	-	-	0.3	0.3	0.4	0.16	0.14	0.01	1.1	-	-
squid	-	-	-	13.9	-	-	-	-	-	-	-
jellyfish	-	-	-	5.5	-	-	-	-	-	-	-

**Table 9. Weight and length data for 2000-2011 directed sardine fishery.**

Year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Weight (gm)	average	153.4	153.8	183.1	174.6	154.4	87.2	117.9	109.6	121.8	123.7	131.8	151.3
	range	79.9 - 273.3	46.4 - 241.0	83.2 - 301.6	29.0 - 279.0	31.3 - 293.6	29.4 - 222.0	77.2 - 241.1	67.3 - 270.2	53.9 - 232.2	48.2 - 211.0	41.0 - 209.6	45.4 - 231.5
Length (mm)	average	209	212	222	217	206	174	194	196	199	197	200	208
	range	118 - 257	145 - 256	116 - 260	70 - 300	76 - 259	120 - 287	174 - 254	170 - 271	118 - 257	145 - 243	141 - 237	145 - 237
Number of fish sampled		940	1000	1549	968	1024	399	300	2075	2000	2075	1677	850



**Table 10. Directed sardine landings (mt) into Oregon, Washington, and California in 2011.**

Allocation Periods	Oregon	Washington	California	Total
Period 1 (mt) Jan 1 - Jun 30	0	0	15,270 (100%)	<b>15,270</b>
Period 2 (mt) July 1 - Sept 14	6,810 (33%)	5,847 (29%)	7,822 (38%)	<b>20,479</b>
Period 3 (mt) Sept 15 - Dec 31	1,511 (20%)	2,014 (26%)	4,168 (54%)	<b>7,693</b>
Total for year	8,321 (19%)	7,861 (18%)	27,260 (63%)	<b>43,442</b>

# 2010 Sardine Fishing Area

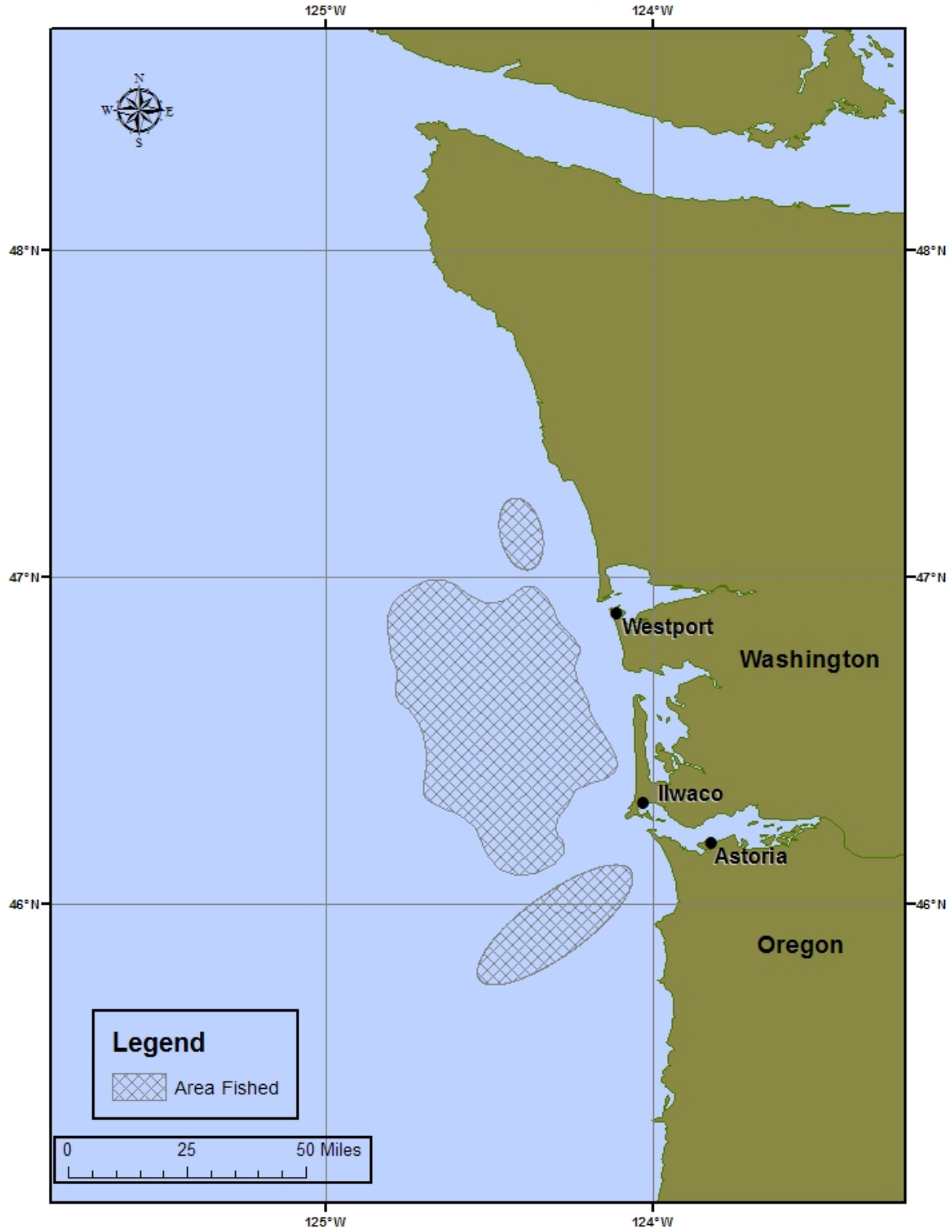
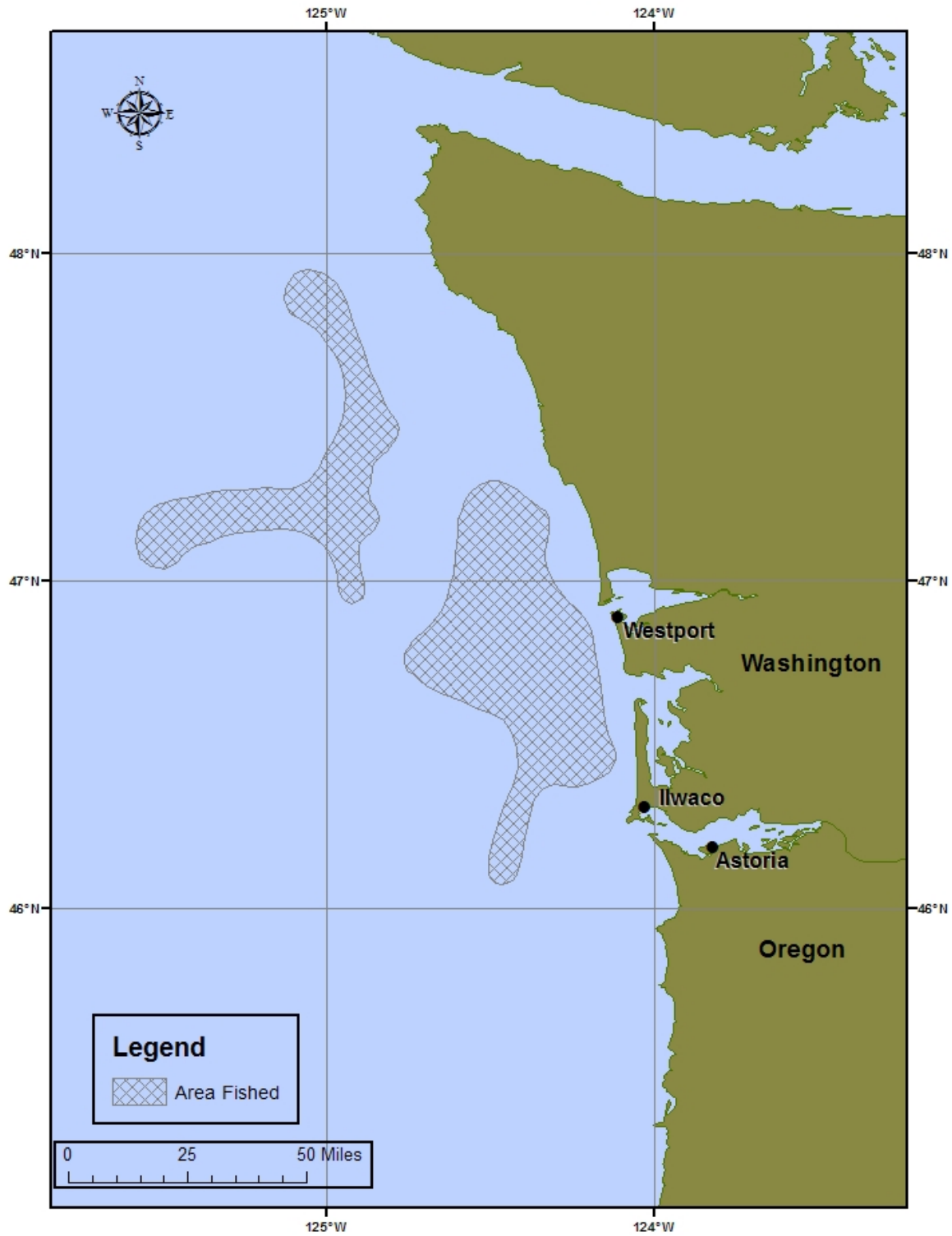


Figure 1. Location of main fishing areas for sardines in 2010 based on logbook data.

# 2011 Sardine Fishing Area



**Figure 2. Locations main fishing areas for sardines in 2011 based on logbook data.**

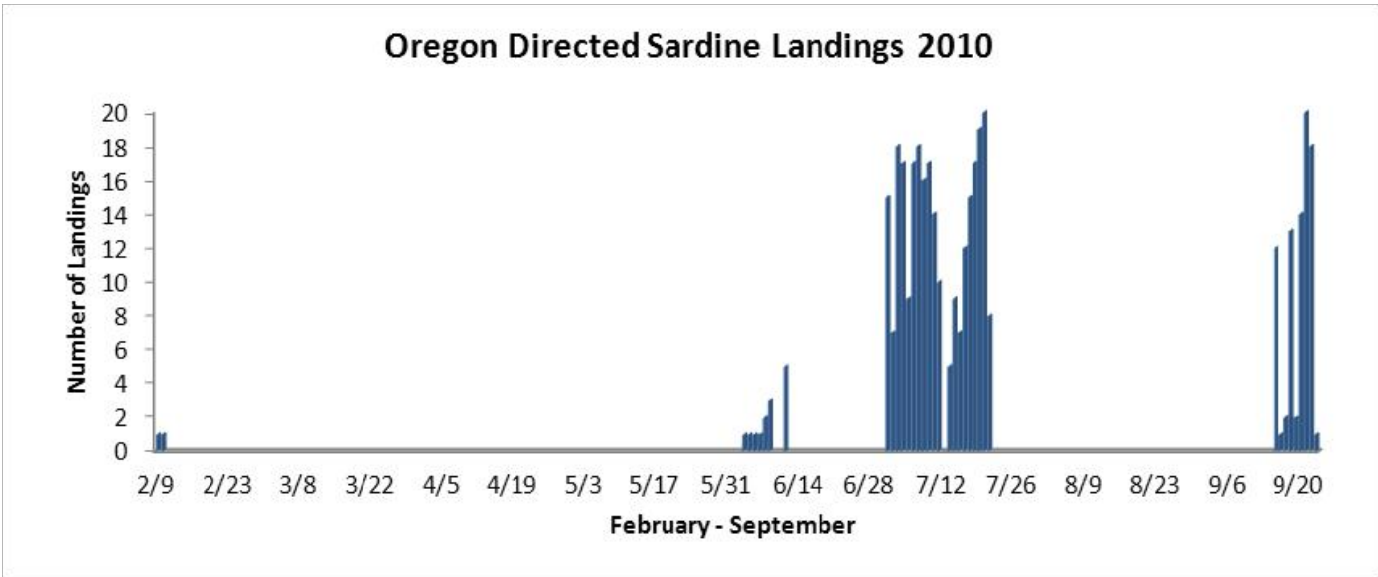


Figure 3. Daily sardine landings by vessels during the directed sardine fishery in 2010. The fishery was open from January 1 to June 11 during the 1<sup>st</sup> period, July 1- 21 during the 2<sup>nd</sup> period, and September 15 – 22 during the third period.

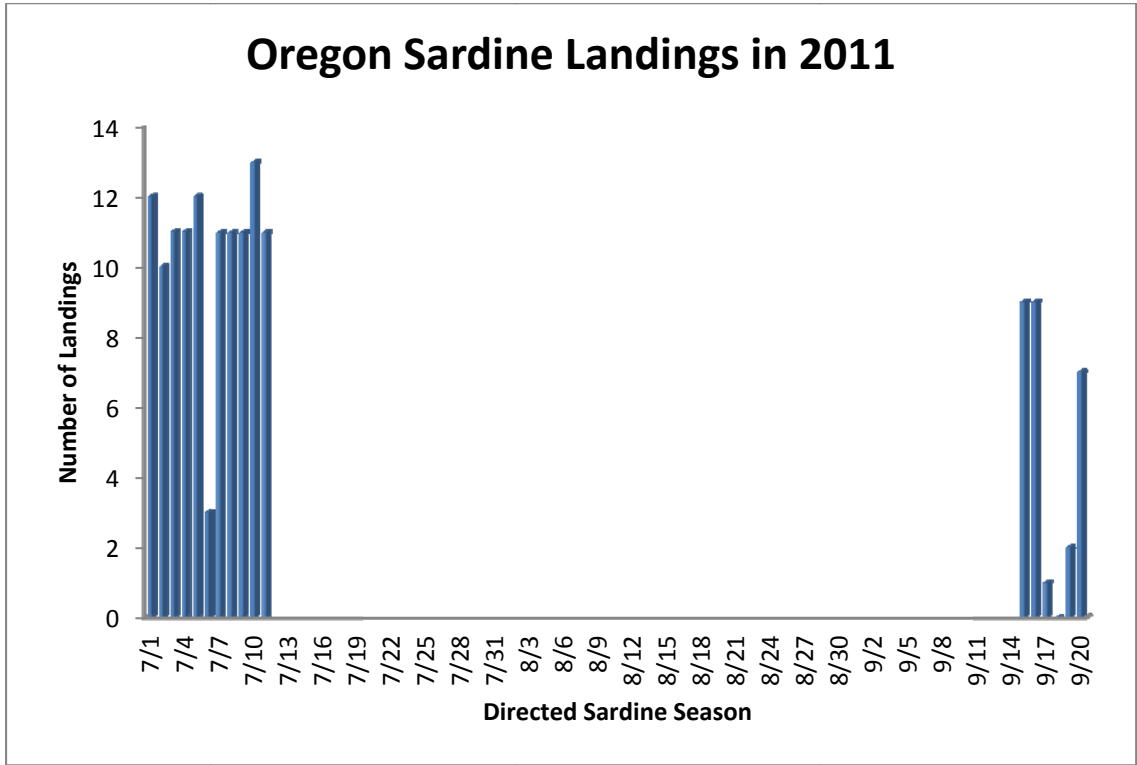
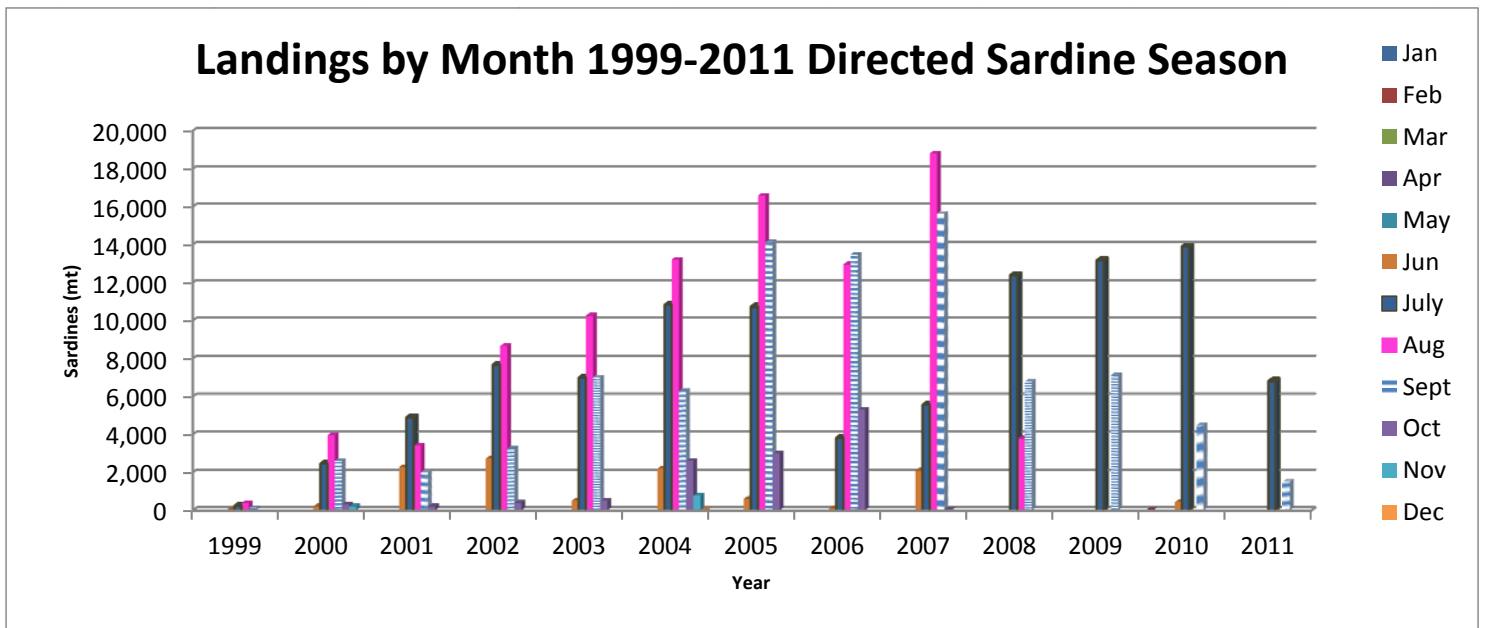


Figure 4. Daily landings by vessels during the directed sardine season 2011. The fishery was open from January 1 to March 4 during the 1<sup>st</sup> period, July 1- 11 during the 2<sup>nd</sup> period, and September 15 – 20 during the third period. No landings in Oregon were made during the 1<sup>st</sup> period.



**Figure 5. Annual landings (mt) of sardines into Oregon by month, 1999-2011.**

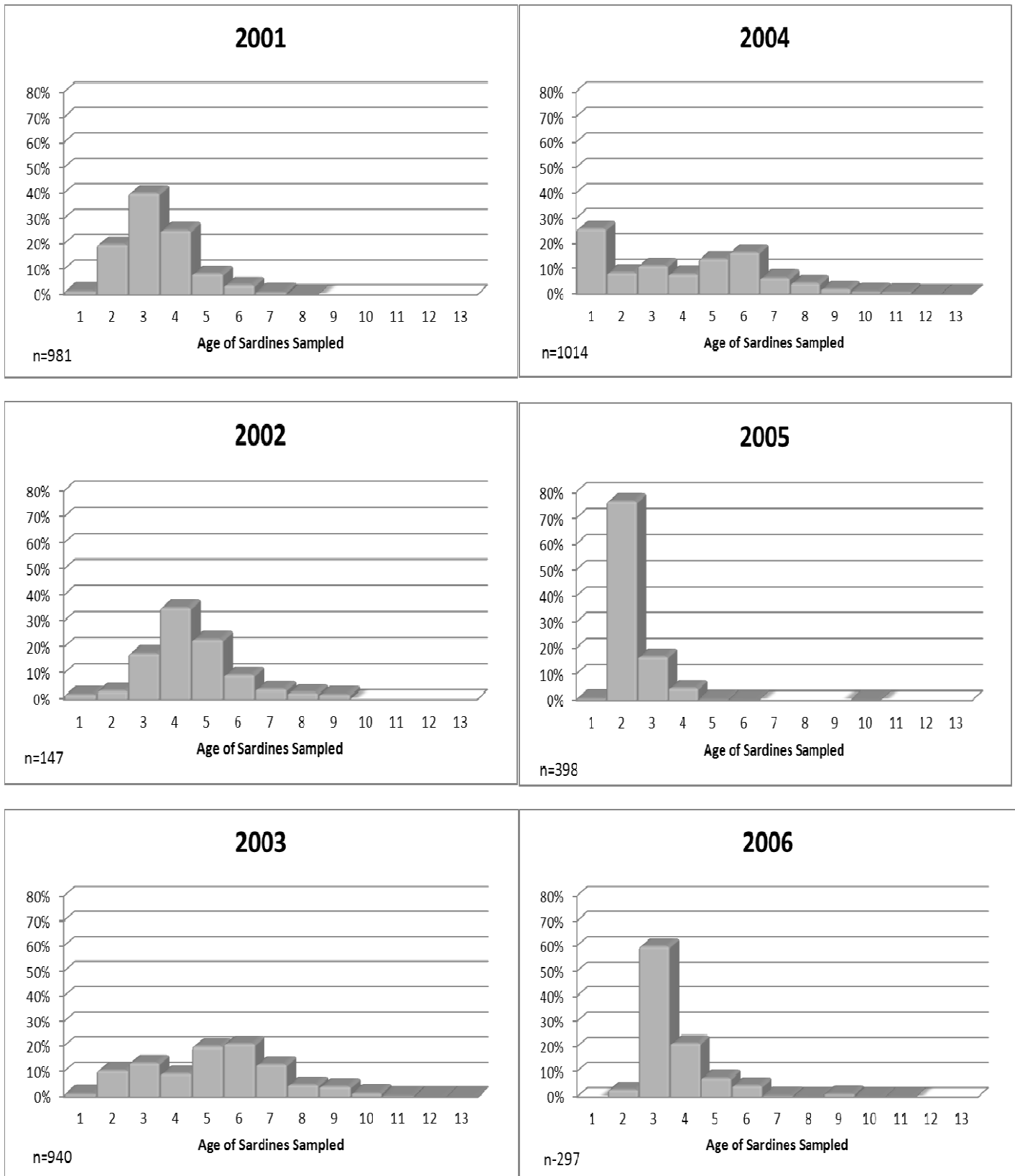
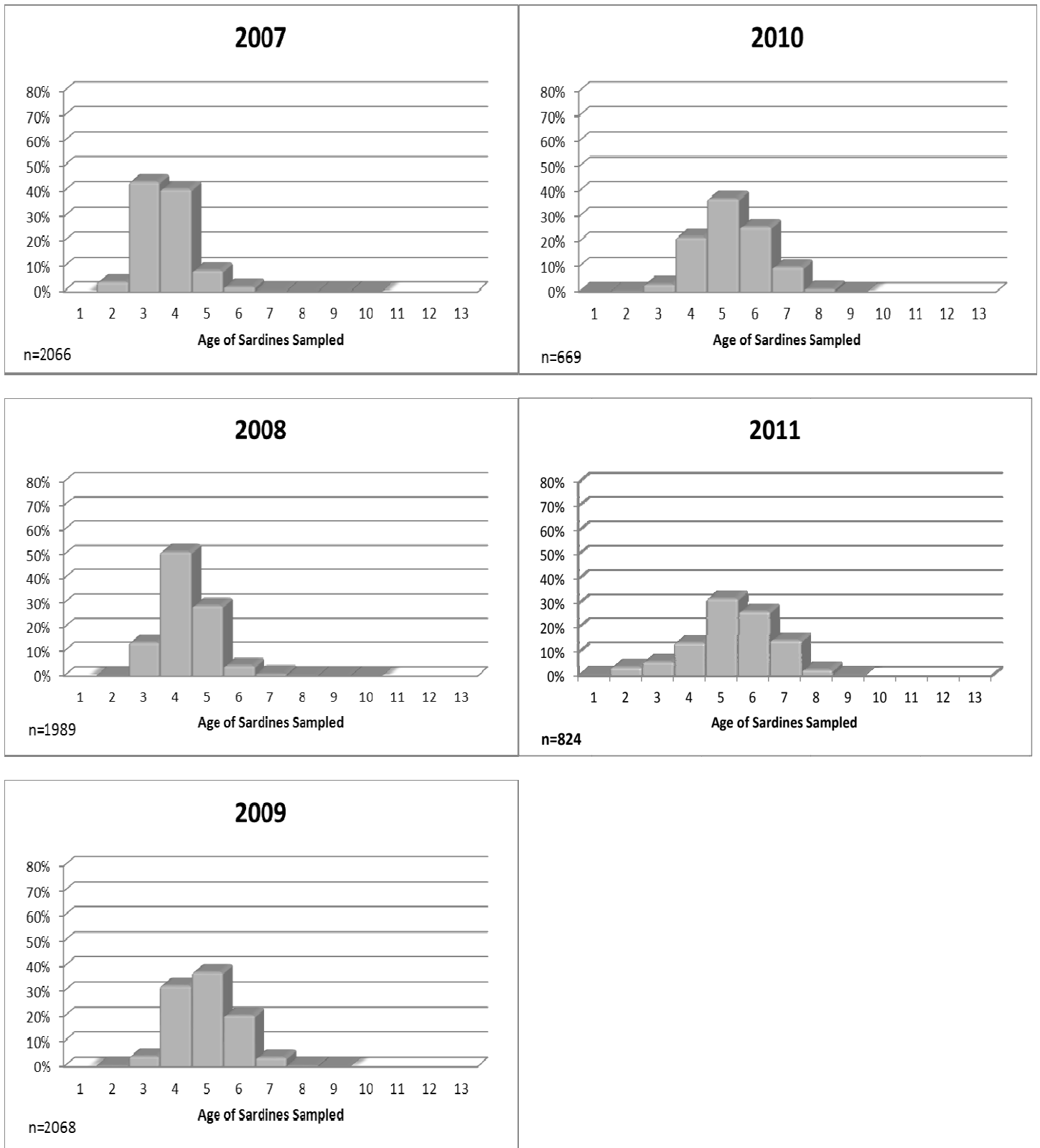
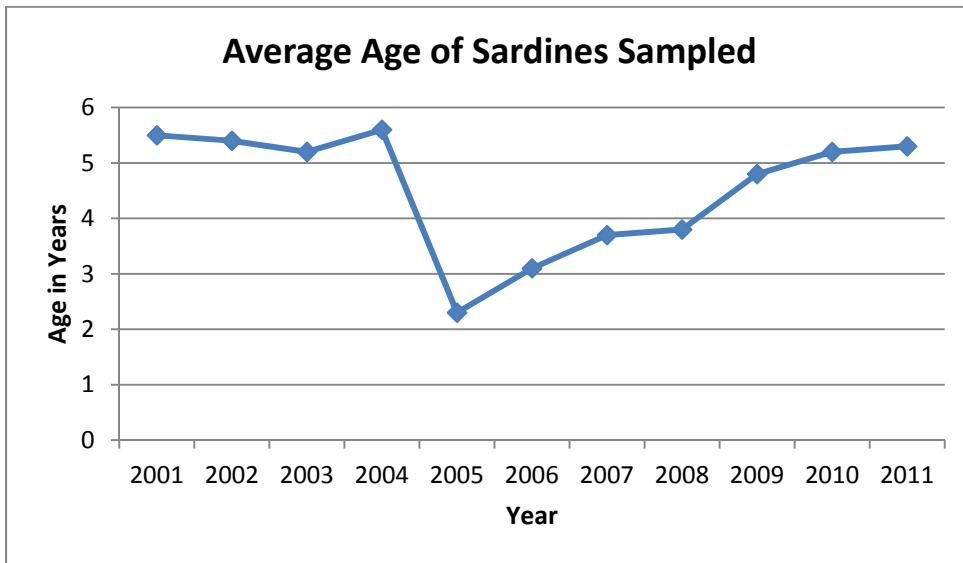


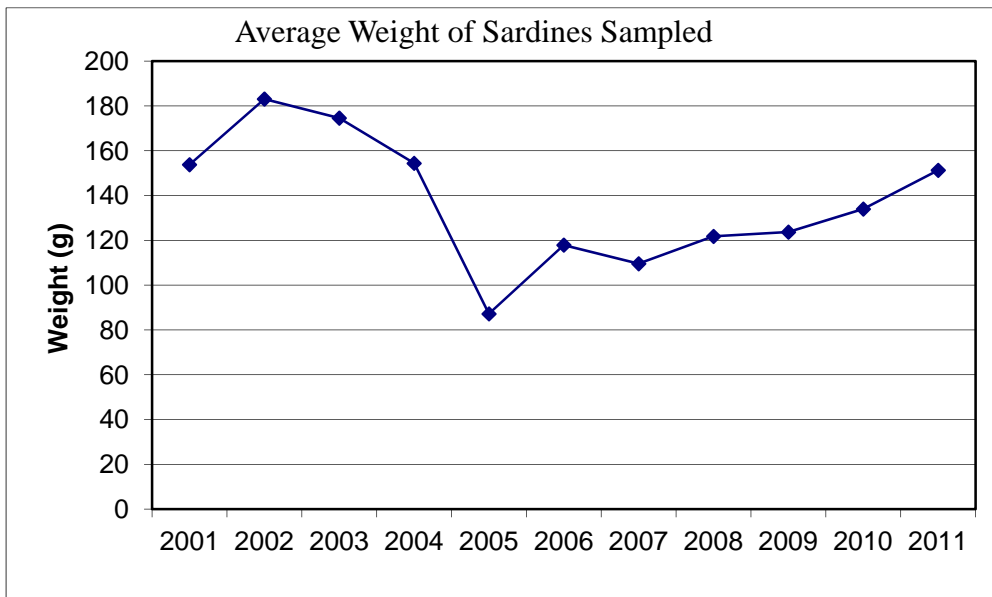
Figure 6. Age frequency (%) of sardines sampled 2001-2011 continued on next page.



**Figure 6. Age frequency (%) of sardines sampled 2001-2011.**

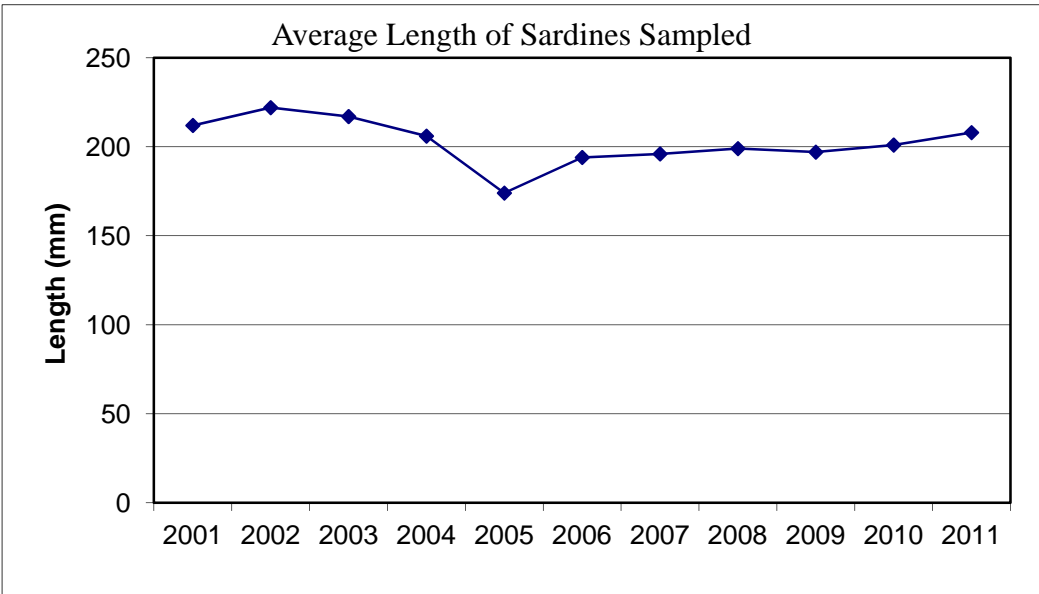


**Figure 7. Average age of sardine sampled from the fishery 2001-2011.**

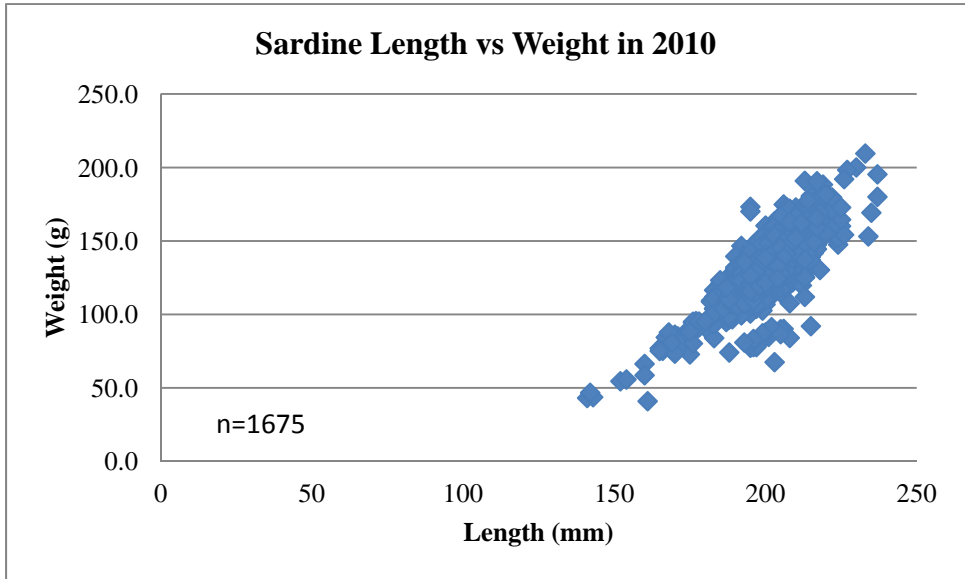


**Figure 8. Average weight (g) of sardines sampled 2001-2011.**

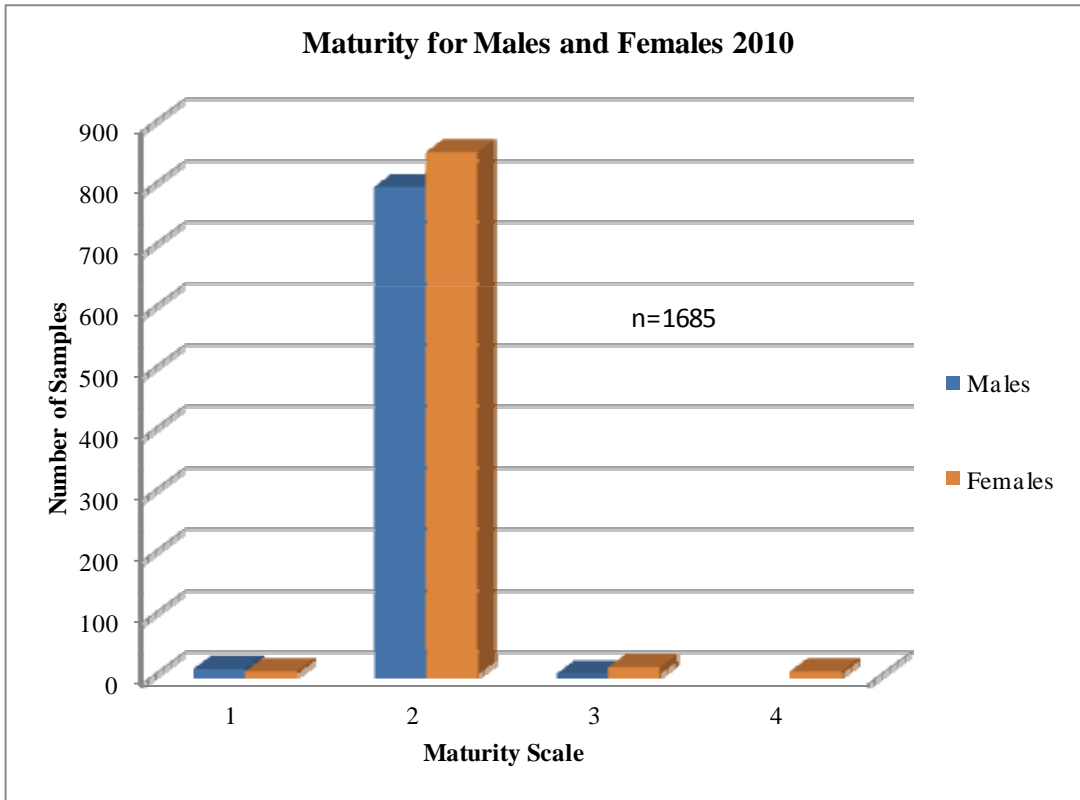




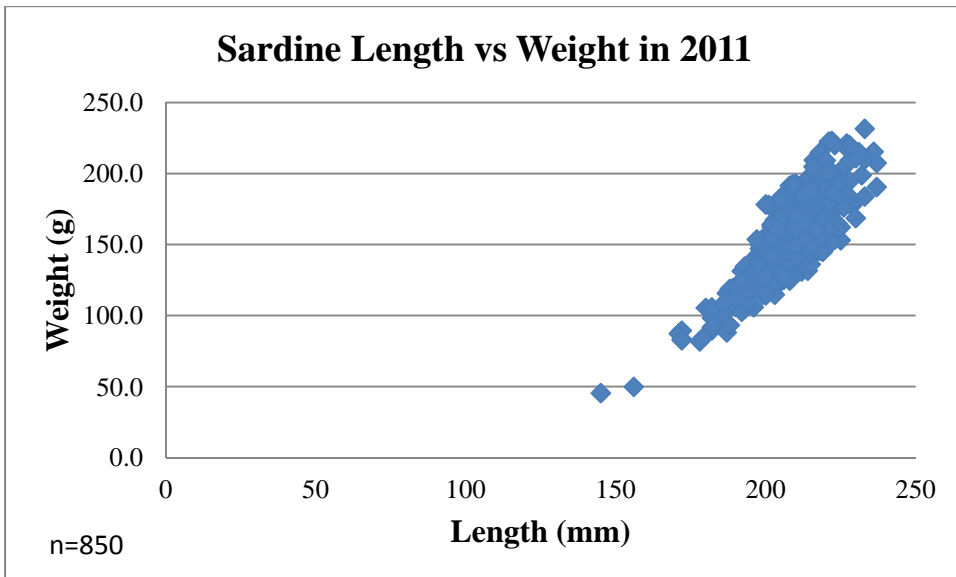
**Figure 9. Average length (mm) of sardines sampled 2001-2011.**



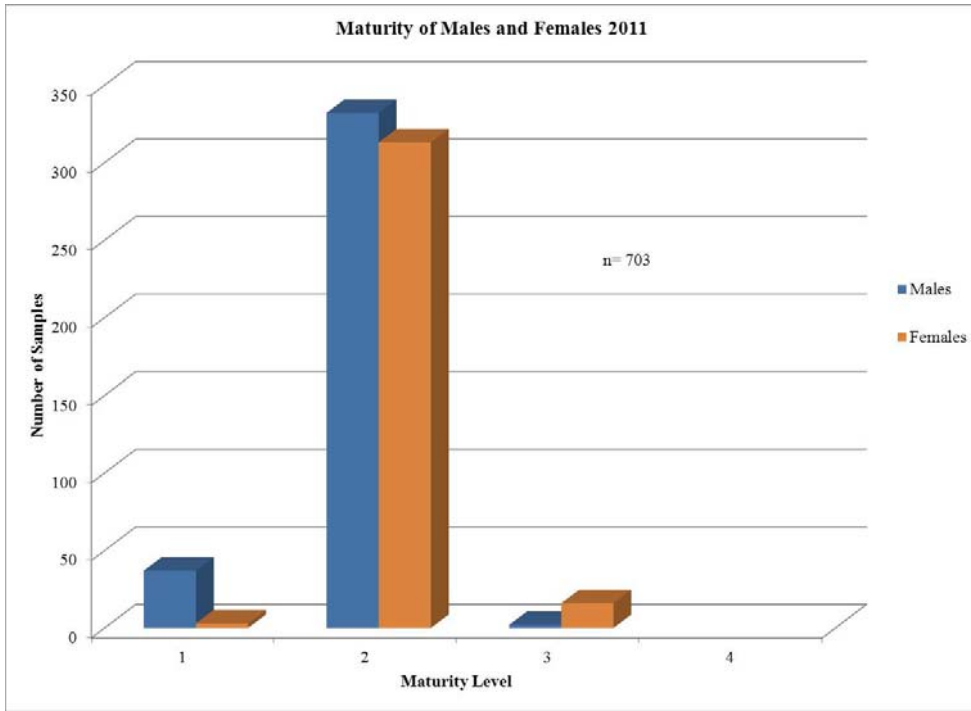
**Figure 10. Length vs. weight of sardines sampled 2010.**



**Figure 11. Maturity levels for both males and females 2010.**



**Figure 12. Length vs. weight of sardines sampled 2011.**



**Figure 13. Maturity levels for both males and females 2011.**