



Oregon's Sardine Fishery  
2007 Summary

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# Fishery Management

## ***Federal Fishery Management Plan***

In the past sardines were managed by individual states of California, Oregon and Washington. In 1999, Amendment 8 to the Pacific Fishery Management Council's [Coastal Pelagic Species Fishery Management Plan](#) (formerly the Northern Anchovy Fishery Management Plan) 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, a biomass estimate of sardines and coast-wide harvest guideline is established annually (Table 1).

From 1999 to 2001 the coast-wide harvest guideline was allocated 2/3 to the southern California fishery and 1/3 to the northern California (approximately Point Arena, CA), Oregon, and Washington fishery. Then in 2002, the Council adopted an interim allocation system for the 2003-2005 seasons that changed the definition of subareas by moving the geographical boundary between Subarea A and B from 35 degrees 40 minutes to 39 degrees latitude; move the date when unharvested allocation from October 1 to September 1 and change the percent reallocated from 50% to both areas to 20% to Sub area A and 80% to Subarea B and reallocate all unharvest sardine that remains on December 1 coast wide. 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 sardine which released allocations of fish coast wide at three set calendar dates rather than to northern and southern areas. The new allocation framework was implemented for the 2006 Pacific sardine fishery under Amendment 11 to the Coastal Pelagic Species Fishery Management Plan.

## ***A Developmental Fishery to State Limited Entry***

Except for the coast-wide harvest guideline, management of sardines north of 39° N (approximately Point Arena, CA) continues under state management programs and must be consistent with the Federal Fishery Management Plan. From 1999 to 2005 the Oregon sardine fishery was managed under the Developmental Fisheries Program which limits the number of harvest permits. Initially, fifteen permits were allowed and all were issued in 1999 and 2000. Then in 2001, five additional permits were added (for a total of 20) to encourage an increase in processing capabilities. In 2004, the sardine industry asked the Department of Fish and Wildlife to remove Pacific sardines from the developmental fisheries species list and create a state limited entry system for the fishery. The Department began work with the Developmental Fisheries Board and the industry to develop alternatives for a limited entry fishery. In December 2005, the Oregon Fish and Wildlife Commission (Commission) moved the Pacific sardine fishery from a developing fishery into a state run limited entry fishery system and created Oregon Administrative Rules to govern the fishery. Twenty Oregon permits were established and made available to qualifying participants for the 2006 fishery. At that point, the Commission directed the Department to create minimum landing requirements for permit renewal. In April, the Commission established permit renewal requirements that included annual minimum landing requirements of at least 10 landings of at least

5 metric tons (mt) each, or landings valued at \$40,000 or more based on ex-vessel price of sardines into Oregon. The industry expressed concern over the current lack of markets and the possibility of not being able to meet the minimum landing requirements. Therefore, rules allow a waiver of landing requirements due to illness, injury, or circumstances beyond the control of the permit holder and also authorize the Commission to waive the landing requirements for the industry as a whole for any particular year due to unusual market conditions. In May and August of 2006, the Commission heard public petitions to amend limited entry permit eligibility rules to include all 2005 developmental fishery permit holders that did not meet eligibility requirements chosen by the Commission in December. The Commission amended a rule which resulted in an immediate addition of six permits for a total of twenty-six limited entry permits in 2006.

## ***Oregon Fishery Goals and Objectives***

The goals for this year's work were to continue to gather information on sardines off Oregon to improve the coast-wide stock assessment of sardines and document the extent of by-catch in the fishery.

Objectives include:

- Collect size, age, and distribution data of adult sardines off Oregon, from both the harvest areas and outside harvest areas to support stock assessments and fishery resource monitoring.
- Document bycatch, in terms of species, amount, and condition. Recommend management measures to reduce by-catch if necessary.
- Document harvest methods, distribution of harvest, and catch per unit of effort.
- Continue efforts to observe vessel fishing activity at sea.

## **2007 Fishery**

### ***2007 Sardine Fishery Allocation***

The 2007 harvest guideline for Pacific sardines was established at 152,654 metric tons for the fishing year beginning January 1, 2007. The Pacific sardine HG was allocated seasonally as follows: January 1, 35% of the HG to be allocated coast wide; July 1, 40% of the HG, plus any portion not harvested from the initial allocation, to be reallocated coast wide; and September 15, the remaining 25% of the HG, plus any portion not harvested from earlier allocations, to be reallocated coast wide.

### ***Landings & Effort***

The Oregon sardine fishery is open all year and landings are made by the directed limited entry fishery, small bait fisheries and as bycatch in other fisheries. The first directed landings of sardines into Oregon since 1948 occurred in 1999 for a total of 1.7 million pounds (775.7 mt) by three vessels (Table 1).

The 2007 Oregon sardine fishery saw the second highest harvest on record since the current Oregon fishery began in 1999. Vessels landed a total of 42,151 mt (92,927,053 lbs) of sardines in 2007; this a 16% increase from the 35,648 mt landed in 2006 (Table 1). As in the past spotter planes, hired by

the industry, were used to locate fish and the first landing of the year into Oregon was made on June 7th but major harvest activities did not start in earnest until mid July. Approximately 4,700 mt per week were landed during August, the peak of the fishery, and 3,909mt per week in September, with an overall fishery average of 48mt (105,960 lbs) of sardine per landing (Table 2, Figure 1). Individual landings ranged from 1,756 lbs (0.79 mt) to over 252,661 lb (114.6 mt) and the last directed landing occurred on October 13<sup>th</sup>. A total of 877 landings were made at eight different processors throughout Warrenton and Astoria.

Monthly landings of sardine varied between states (Table 3 and Figure 2). Oregon had the largest monthly landings and overall California landed 66% of the allocation while Oregon landed 31%.

Sometimes vessels set on fish that exceed the capacity of the vessel and will often share the fish with another vessel. Rather than releasing the fish a vessel may allow another vessel to pump the catch. According to logbook information approximately 970 mt were shared between vessels.

Although twenty-six permits were issued, only twenty-five permits were actively utilized in the 2007 fishery (Table 1). Five of those twenty-five permits were transferred to active vessels with the intention of qualify them under the renewal requirements. One permit holder did not meet the minimum landing requirements.

### ***Fishery Value***

Sardine value varied from \$0.01 to \$0.16 per pound. Roughly 1,429 mt of sardines (3.4% of landings) were valued at less than \$0.02/lb while less than 1% was valued greater than \$0.08 per pound. About 87% of the fishery landings were valued between \$0.04 and \$0.06 per pound. The ex-vessel value of sardine in the 2007 sardine fishery is roughly \$4.45 million at an average price per pound of \$0.054 or \$105 per mt.

### ***Non Target species***

Oregon's permit stipulations include at sea observers when requested by the Department or the Federal Government. Oregon did not have personnel dedicated to ride along on sardine vessels and observe bycatch of non-target species and no federal observers were place on the vessels.

Available state staff was able to observe 6 of 877 trips (0.7%). Only two of the six observational trips were successful in catching fish therefore observation of bycatch in the 2007 fishery was extremely low. The state requires the use of a grate over the hold opening to sort out larger species of fish (such as salmon or mackerel) and the use of seine gear logbooks.

Vessel skippers are required to record all species caught in a logbook. We received nearly 100% of the logbooks for trips in 2007 and a total of 1152 sets were made with 99% of them successful for sardines. Various bycatch include mackerel, sharks, and salmon (Tables 5 & 6). The estimated total catch of salmon for the fishery, based on log data, is 519 salmon and landed weight of sardines for those trips is 11,088 mt. Based on log data for these trips, the incidental catch rate is 0.045 salmon per mt of sardine landed. An estimated 67% of all salmon were released alive.

Based on Oregon fish tickets, bycatch in the fishery continues to be low. Incidental catch landed and recorded on fish tickets consisted of 699 mt of Pacific mackerel, 8 mt of jack mackerel, and 0.14 mt of thresher shark (Table 6). The 2007 Pacific mackerel ex-vessel value in the sardine fishery was roughly \$49,700.

## **Area of Catch**

Most of the 2007 fishing activity took place inside of state waters and shoreward of the 75 fathom line of the non-trawl Rockfish Conservation Area (Figure 3). The major area of catch was similar to areas fished in 2006.

## **Biological Collections**

Sardine biological collections were done each year (Table 7). Data collected from each fish include weight (gm), standard length (mm), sex, and maturity. Other data included on the data sheets were vessel, date, and location and depth of catch. Sex and maturity were determined using the maturity codes developed at the aging and maturing workshop in April, 2003 (Table 9). Most fish collected were maturity code 2 (not clearly immature) and only a handful showed signs of maturity stage 3 and 4 in early June.

Under the direction of the Pacific Fishery Management Council's Coastal Pelagic Species Management Team, sample numbers for 2007 were increased to a level proportional to the metric tons landed. A goal of four fish samples (25 fish) for every 1000 mt landed was set. In 2007, ODFW Astoria staff collected 83 biological samples; 3 samples were taken in June, 21 in July, 38 in August (peak of the fishery) and 21 in September. These samples were processed and data were recorded on weight, length, and sexual maturity. Otoliths were also extracted and sent to Washington Department of Fish and Wildlife (WDFW) for age reading.

## **Weight, length and age of sardine**

Fish selectivity (catch of fish a certain size or age) varies from year to year and the presence of dominant year classes may be seen (Figure 4). The Oregon sardine fishery typically catches fish between two and five years old. Age data from the 2007 fishery is not yet available but the 2006 fishery samples showed fish ages between two and eleven years with a dominant year class of three year old fish (Figure 4). The age composition reflects the age of fish caught and not necessarily all ages of fish in the population.

In general as a fish increases in length it increases in weight (Figure 5). Fish sampled in 2007 ranged from 67 g to 270 g, with an overall average of 109 g (Table 7, Figure 6). Standard length ranged from 170 mm to 271 mm, with an overall average of 196 mm and a mode (most often) of 195 mm (Table 7, Figure 7).

## **Future Management**

During the January 2008 Oregon Fish and Wildlife Commission meeting, the Commission established a new permit renewal deadline. Previously the permit renewal deadline was December 31 of the year the permit was issued. It is now December 31<sup>st</sup> of the year in which the permit is sought for renewal. For example, to renew a 2008 permit the permit must be renewed by Dec 31, 2009 in order to receive a 2009 permit and fish in 2009.

Effective January 2008 permit holders must either own or operate a vessel that is permitted. Only one vessel may be identified at time of renewal to meet the minimum landing requirements required for renewal and those permit holders must either own or operate the vessel that is identified.

At the November Pacific Fisheries Management Council meeting, the 2008 harvest guideline (HG) for Pacific sardines was established at 89,093 metric tons (mt) for the fishing year beginning January 1, 2008. Also, an incidental catch set aside of 10% (8,909 mt) of the HG was established to prevent premature closures of other coastal pelagic species (CPS) fisheries mainly occurring in the southern half of California. Furthermore, incidental catch set aside amounts for each seasonal period were created based on historical landings of sardine catch in other CPS fisheries such as squid and anchovy. Therefore the directed sardine fishery will operate under an Adjusted Allocation of 80,184 mt (Table 9). If the incidental set aside is not fully attained or is exceeded in a given allocation period, the National Marine Fisheries Service may adjust the directed harvest allocation to account for the discrepancy for the next allocation period as an automatic action. For example, if the directed commercial sardine harvest is attained and other CPS fisheries achieve their incidental set aside, retention of sardines may be prohibited. If a set aside amount is not used it may be rolled into the next seasonal period Adjusted Allocation.

The 2008 Pacific sardine HG is allocated seasonally as follows:

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

## **Acknowledgements**

Many thanks Jill Smith and Keith Matteson for at-sea observations, data collections, and working up biological samples; Washington Department of Fish and Wildlife for aging otoliths, Carol Henry of WDFW and all the vessel skippers, crew members, and processors for their cooperation.

Table 1. Comparison of Oregon sardine fisheries, 1999-2007.

	1999	2000	2001	2002	2003	2004	2005	2006	2007
coast-wide harvest guideline (mt)		186,791	134,737	118,442	110,908	122,747	136,179	118,936	152,654
initial northern allocation (mt)		62,264	44,912	39,481	36,969	40,917	45,393		
pounds landed (metric tons)	1,709,686 (776)	21,005,311 (9,528)	28,214,988 (12,798)	50,068,717 (22,711)	55,683,476 (25,258)	79,610,370 (36,111)	99,449,714 (45,110)	78,590,903 (35,648)	92,927,053 (42,151)
permits issued	15	15	20	20	20	20	20	26	26
vessels targeting sardines	3	14	18	17	17	19	20	16	22
landings by target vessels	23	349	453	657	712	939	1,090	766	877
average landing (lb)	74,306	60,183	62,260	76,208	78,207	84,761	91,216	102,599	105,960
percent of OR landings harvested off OR		75%	73%	90%	65%	59%	39%	36%	27%
start date	6/21	6/14	6/4	6/10	6/22	6/8	4/26	6/29	6/7
end date	9/15	10/12	10/5	**10/14	10/2	12/17	10/18	10/18	10/13
buyers	1	3	5	7	7	8	10	7	8
average ex-vessel price/lb	\$0.05	\$0.05	\$0.06	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05

\*New allocation system established

\*\*Coastwide fishery closure from 9/14/2002 - 9/20/2002



Table 2. Landings (mt) of sardines into Oregon, by month 1999-2007.

Month	1999	2000	2001	2002	2003	2004	2005	2006	2007
April - June	50	205	2,288	2,724	503	2,203	692	102	2100
July	238	2,457	4,898	7,677	6,991	10,825	10,735	3,819	5560
August	383	3,960	3,393	8,650	10,263	13,214	16,585	12,960	18,818
September	104	2,599	1,993	3,258	7,006	6,291	14,114	13,462	15,630
October		303	208	402	495	2,603	2,984	5,305	35
November		3				762			
December		2				213			

Table 3. Landings (mt) of sardines into Oregon and Washington by month and allocation period, 2007.

Month	OR	WA*	CA	Total
Jan-Jun	2100		35,550	37,650
Jul	5560	114	6,030	11,704
Aug	18,818	1,830	7,733	28,381
Sep	15,638	2,555	9,348	27,541
Oct	35	163	10,919	11,117
Nov			10,060	10,060
Dec			7,589	7,589
Total	42,151	4662	87,229	134,043
Percent landed	31%	3%	66%	

\*WA landing data from WDFW website

Table 4. Reported logbook catches of non-target species caught in Oregon sardine fishery, 2006 & 2007.

Species	2006 Logbook data	2007 Logbook data
Blue shark	3	0
Thresher shark	2	3 (2 of 3 released alive)
unknown shark	1	5
Salmonids	257 (55% alive; 45% dead)	519 (67% alive; 33% dead)
Mackerel	292,150 lb	473,441
Anchovy	1000 lb	500
Squid	150	0
Jelly fish	<100 lb	0

Table 5. Estimated salmon caught in sardine fishery by year, 2000-2007, based on logbook data.

	2000	2001	2002	2003	2004	2005	2006	2007
salmon recorded	206	472	274	460	823	541	257	519
% log coverage	94%	93%	95%	88%	95%	92%	97%	99.9%
salmon/trip	0.6	1.1	0.4	0.7	0.9	0.5	0.03	0.6
salmon/mt	0.020	0.040	0.013	0.020	0.023	0.013	0.007	0.012

Table 6. Recorded incidental catch (mt) in Oregon sardine fishery, 2001-2007 (state fish ticket data).

	2001	2002	2003	2004	2005	2006	2007
Pacific mackerel	52.8	126.3	158.3	161.5	316.1	665	699.7
Jack mackerel	1.2	0.3	3.2	24.1	3.6	1.4	8
Pacific herring	-	3.3	-	10.3	0.1	1.2	-
Northern anchovy	-	0.2	-	1.0	68.4	8.6	-
American shad	-	0.3	-	1.2	-	0.44	-
Pacific hake	-	-	0.1	-	-	-	-
thresher shark	-	-	0.3	0.3	0.4	0.16	0.14
squid	-	-	-	13.9	-	-	-
jellyfish	-	-	-	5.5	-	-	-

Table 7. Average and range of weight (gm) and length (mm) of sardines sampled from Oregon sardine fishery, 2000-2007.

Year		2000	2001	2002	2003	2004	2005	2006	2007
Weight (gm)	average	153.4	153.8	183.1	174.6	154.4	87.2	117.9	109.6
	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
Length (mm)	average	209	212	222	217	206	174	194	196
	range	118 - 257	145 - 256	116 - 260	70 - 300	76 - 259	120 - 287	174.0 - 254.0	170 - 271
Number of fish sampled		940	1000	1549	968	1024	399	300	2075

Table 8. Sex and maturity stages of Pacific sardine (abbreviated).

Code	Females - Description	Males - Description
1	Clearly immature - ovary is very small	Clearly immature - testis is very small
2	Not clearly immature - individual oocytes not visible	No milt evident and is not a clear immature
3	Yolked oocytes visible	Milt is present
4	Hydrated oocytes present	

Table 9. The 2008 allocation, set aside totals, and adjusted allocation. Bold numbers are available for directed harvest.

	Jan 1- June 30	July 1- Sept 14	Sept 15 – Dec 31	Total
Seasonal Allocation (mt)	31,183	35,637	22,273	89,093
Set Aside (mt)	4,633	1,069	3,207	8,909
Adjusted Allocation (mt)	<b>26,550</b>	<b>34,568</b>	<b>19,066</b>	<b>80,184</b>

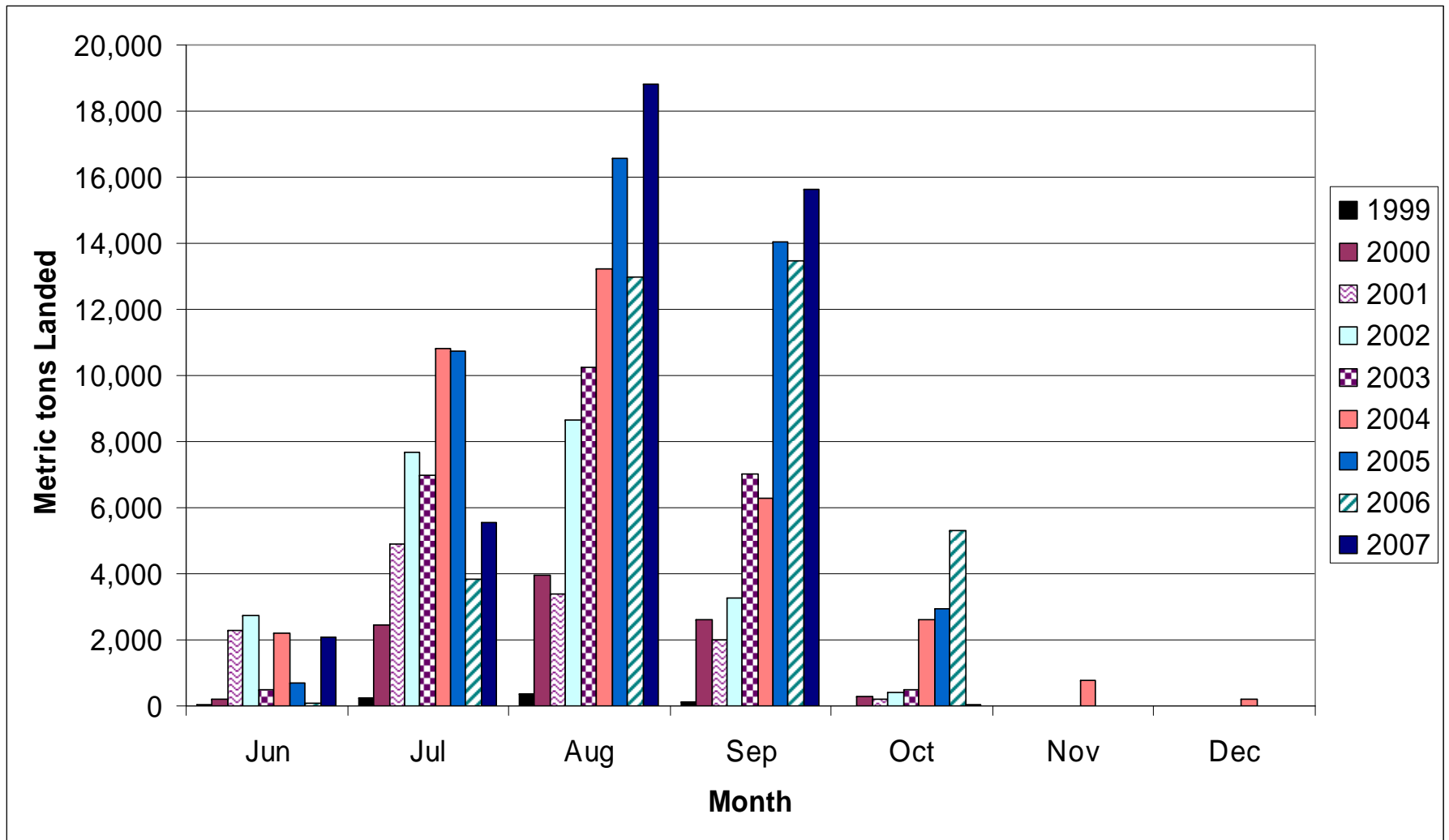


Figure 1. Monthly landings (mt) of sardines into Oregon, 1999-2007.

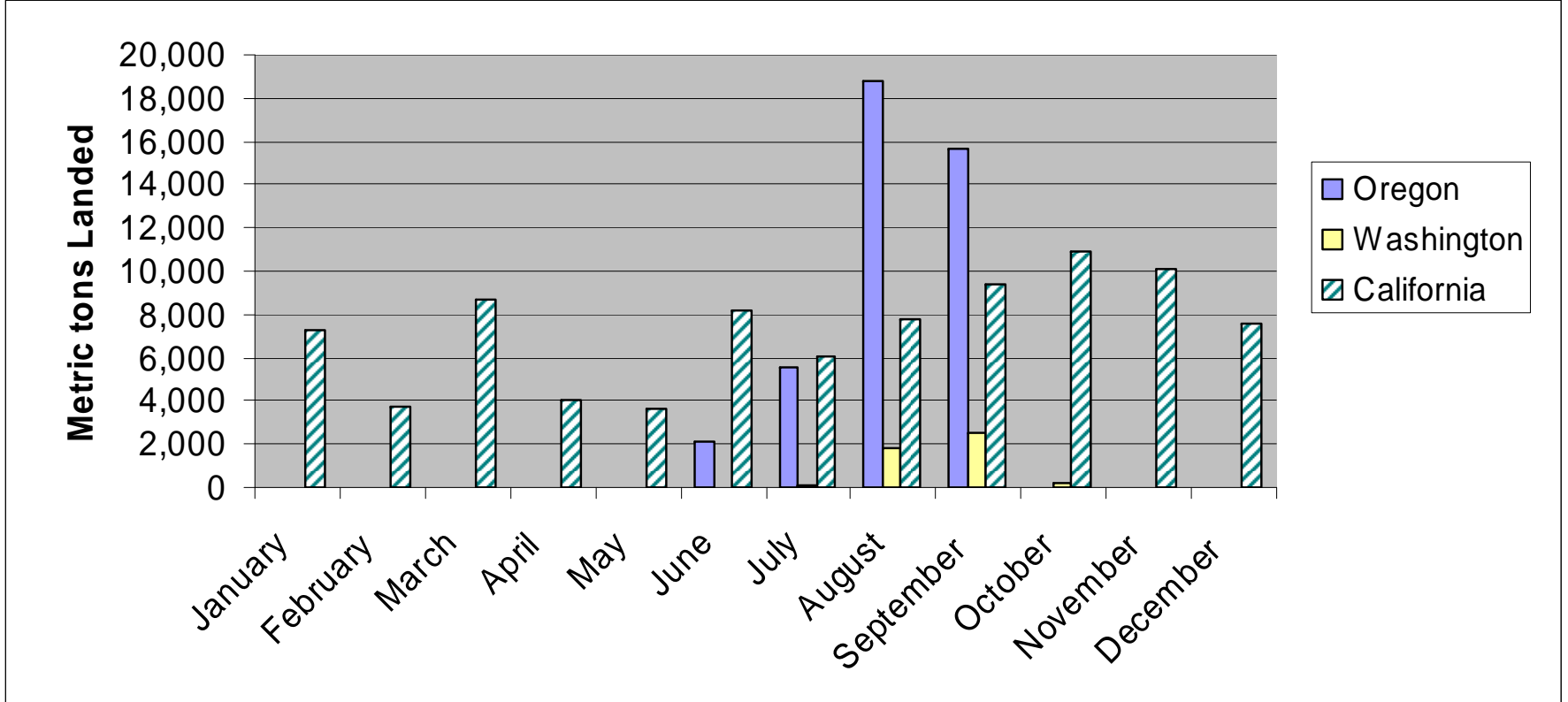


Figure 2. The 2007 sardine landings by month for each state.

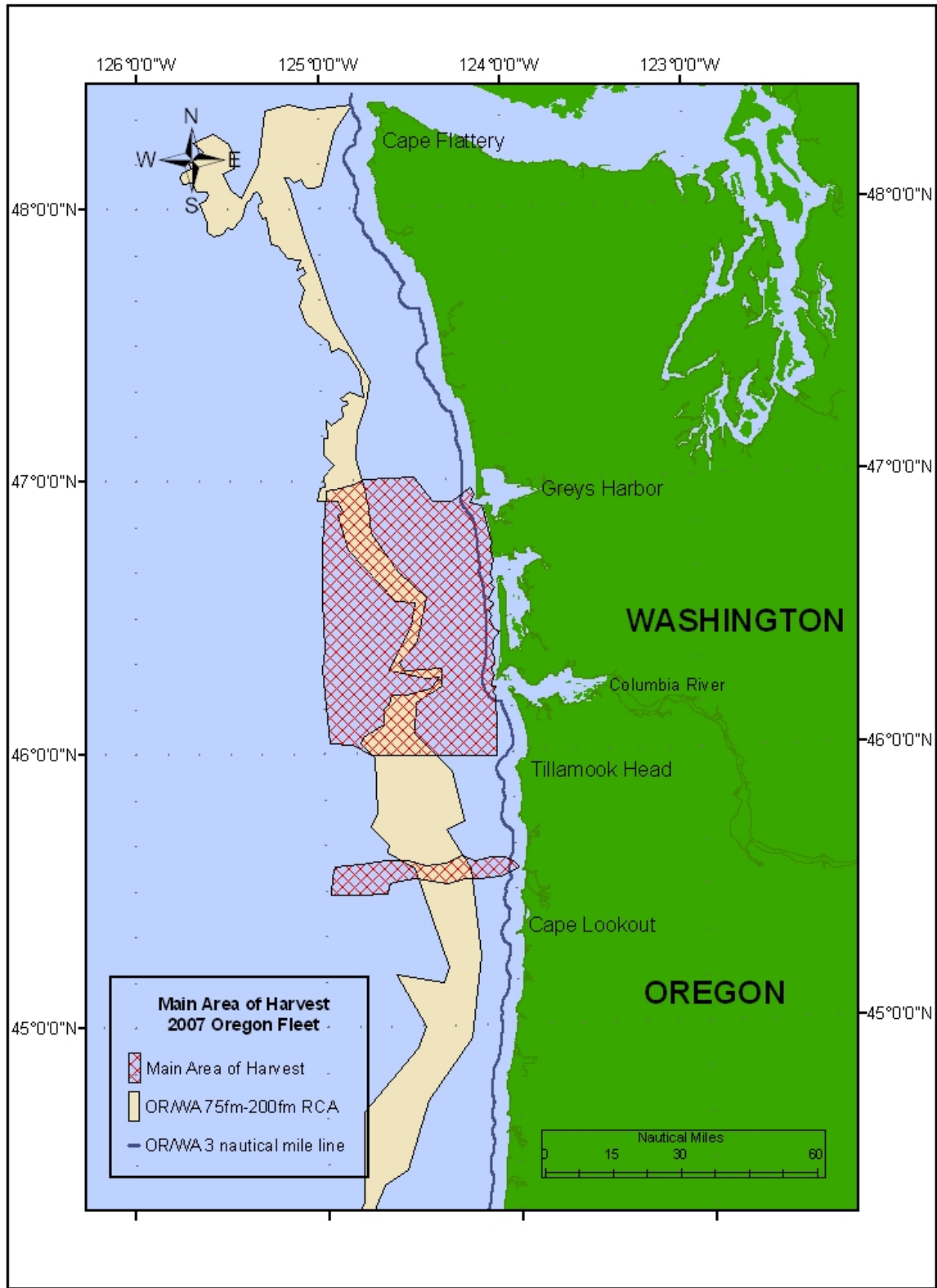


Figure 3. Major area of harvest during the 2007 Oregon sardine fishery.

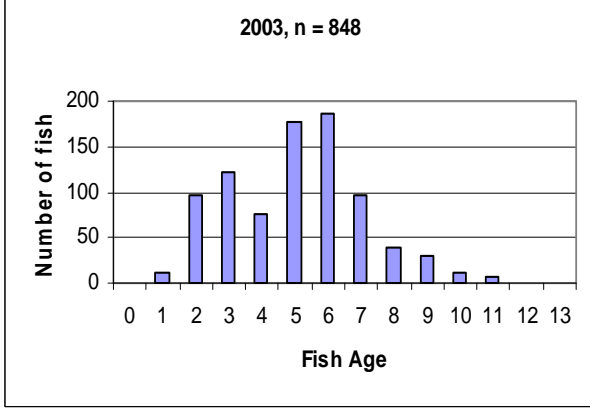
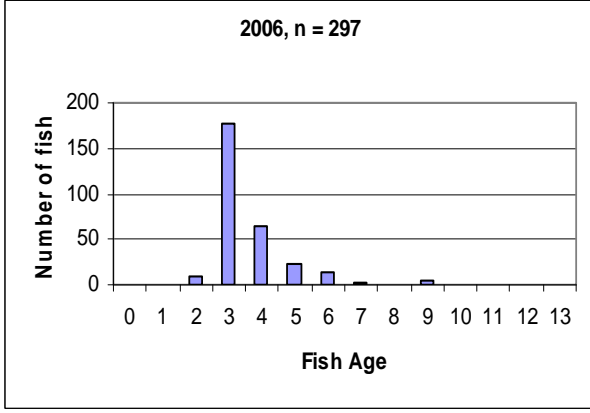
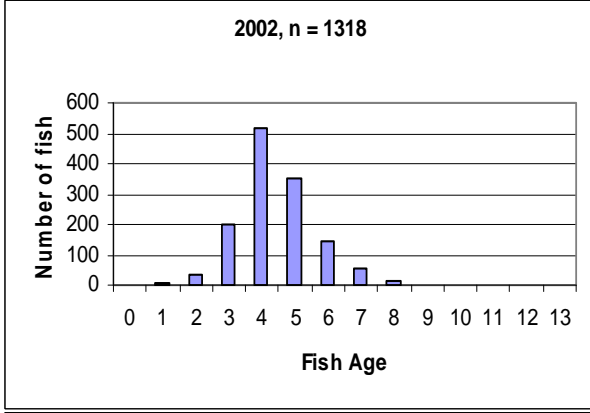
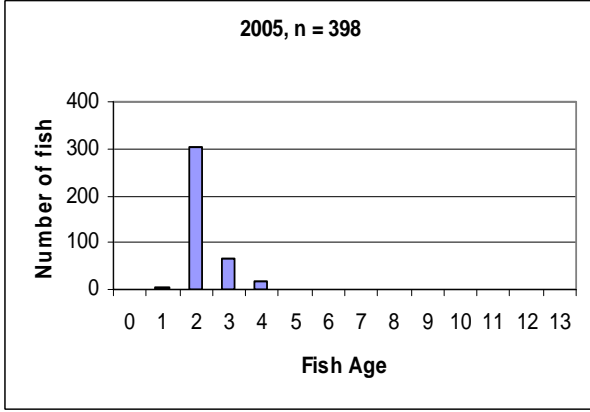
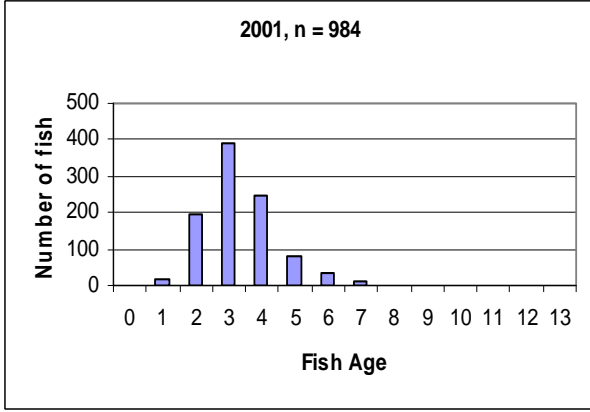
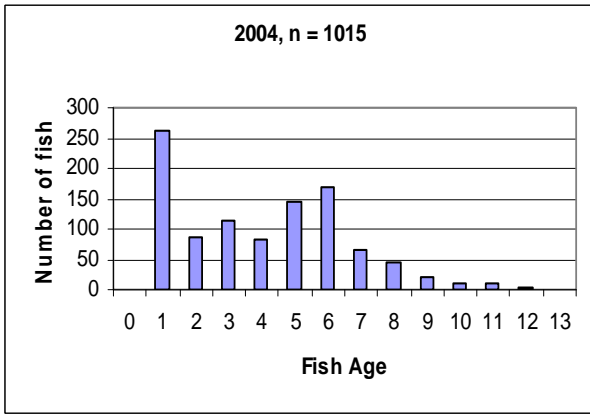
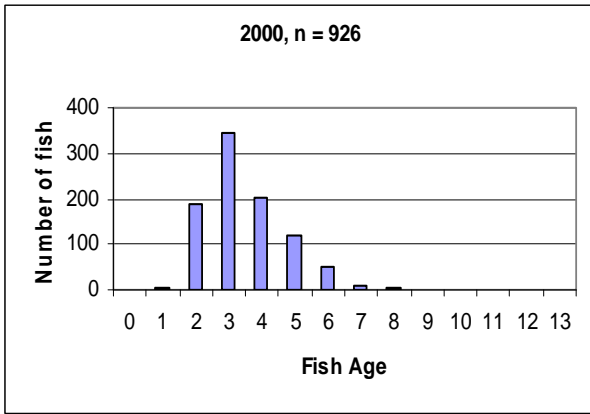


Figure 4. Fish age classes sampled in the Oregon sardine fishery 2000-2006 (n = number of fish). Data for 2007 not yet available.



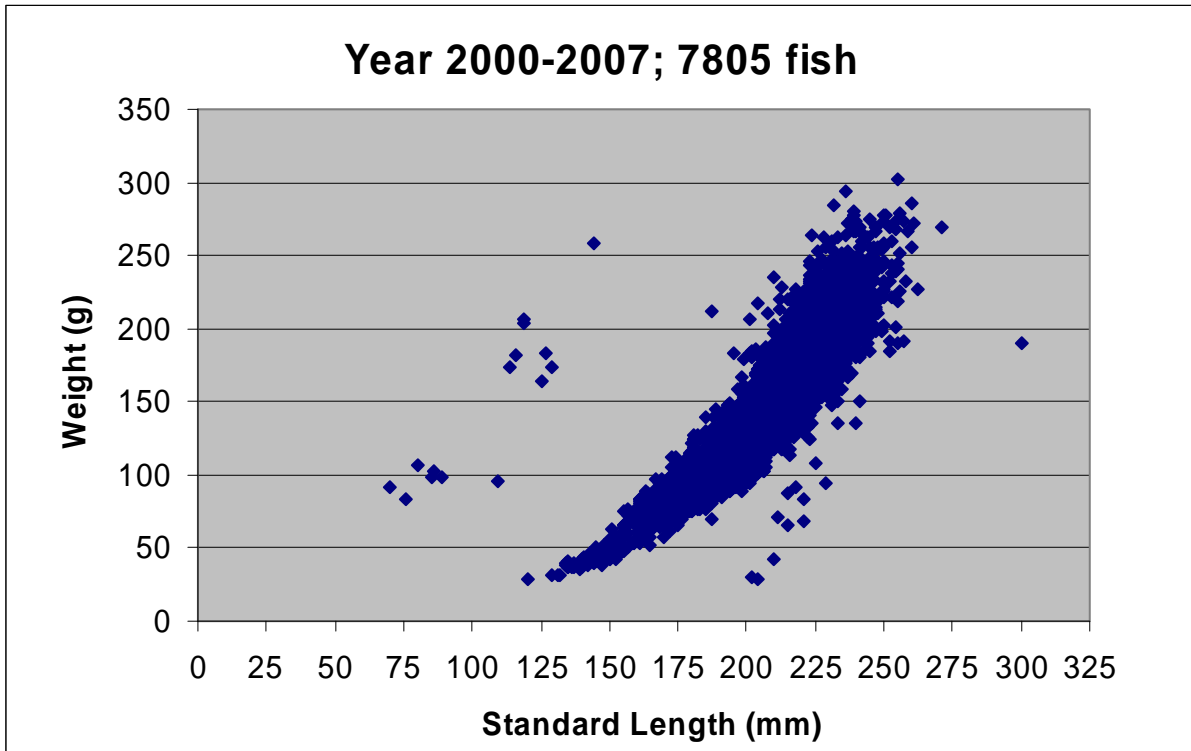


Figure 5. Fish length and weight relationship for Oregon sardine samples 2000-2007.

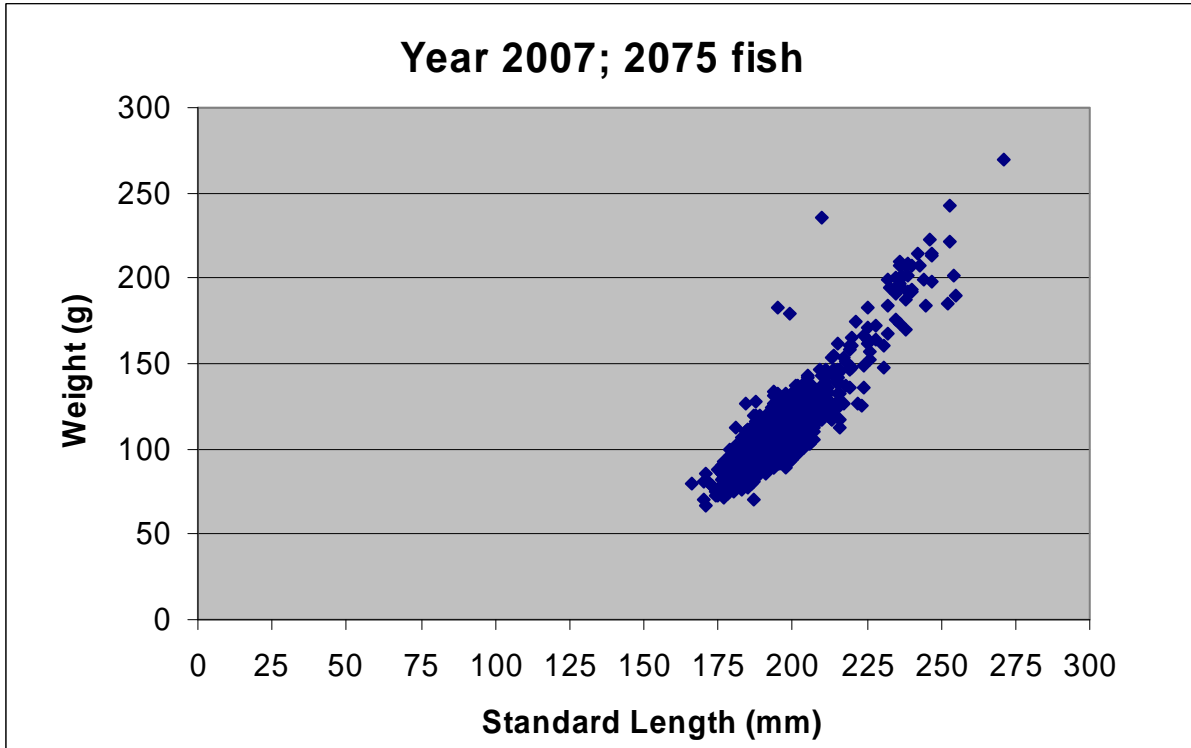


Figure 6. Fish length and weight relationship for Oregon sardine samples 2007.

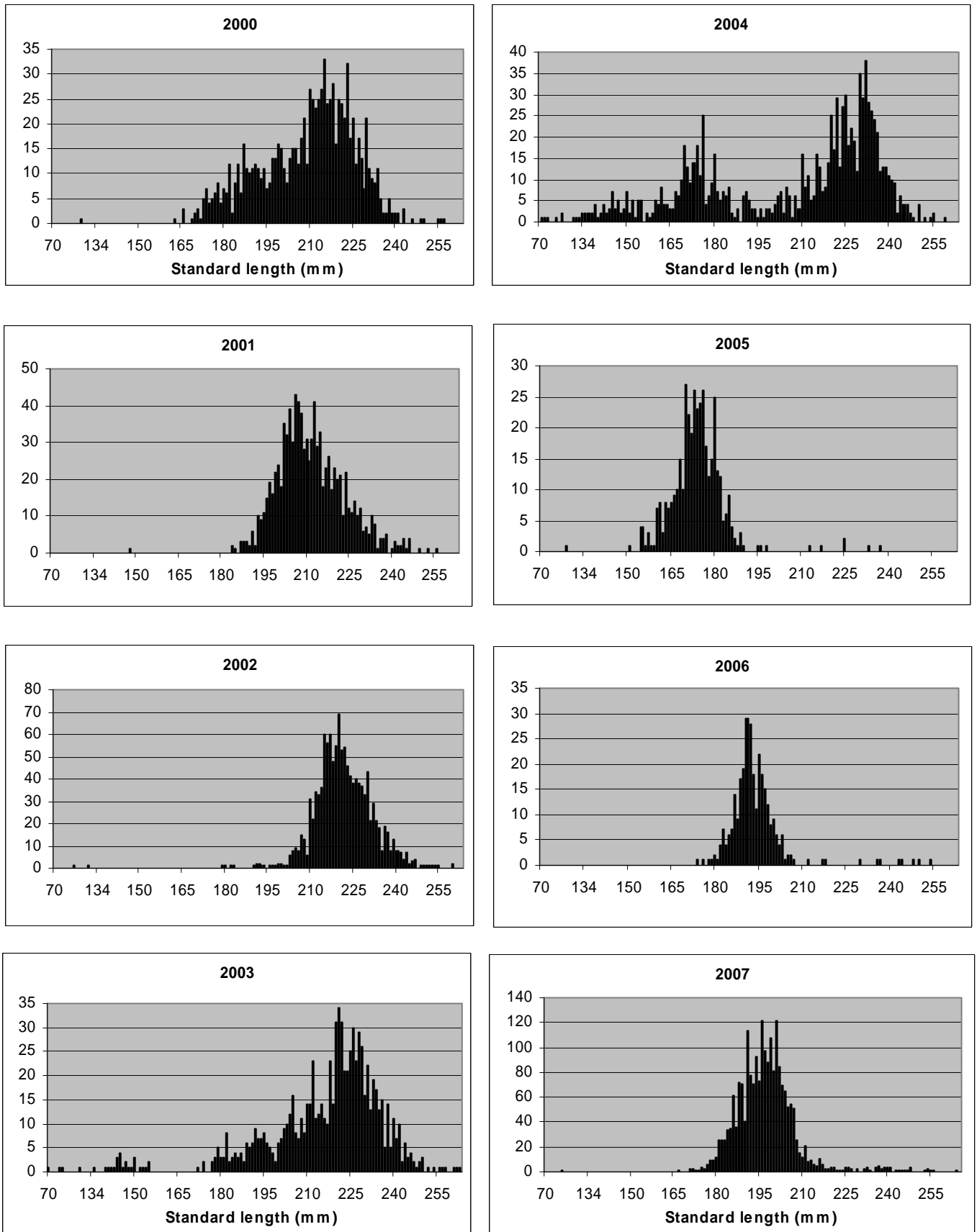


Figure 7. Sardine size frequencies in the Oregon sardine fishery 2000-2007. Y-axis is number of fish.