



Oregon's Sardine Fishery  
2005 Summary

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## INTRODUCTION

### Background

Pacific sardines (*Sardinops sagax*) are managed under the Pacific Fishery Management Council's Coastal Pelagic Species Fishery Management Plan (FMP). Under the FMP, the biomass of sardines is estimated each year and a coast-wide harvest guideline is established. In 2002, the Council adopted an interim allocation system for the 2003-2005 seasons. Discussions to design a new allocation system began in 2004. Under the interim allocation system, the harvest guideline is allocated 2/3 to the southern area (south of Point Arena, California) and 1/3 to the northern area (north of Point Arena, mainly Oregon and Washington). Any portion of the harvest guideline that is unused by September 1 may be re-allocated 80/20 between the southern and northern areas. For 2005, the coast-wide harvest guideline was 136,179 mt (up from 122,747 mt for 2004) and the initial northern allocation was 45,393 mt.

Except for the coast-wide harvest guideline, management of sardines north of 39° N (approximately Point Arena) continues under state management as long as the management measures are consistent with the FMP. In Oregon, sardines were managed under the Developmental Fishery Program which limits the number of harvest permits. Prior to 2001, 15 permits were allowed and all were issued in 1999 and 2000. In 2001, five additional permits were added (for a total of 20) to encourage an increase in processing capabilities.

### 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 bycatch 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.
- Document bycatch, in terms of species, amount, and condition. Recommend management measures to reduce bycatch if necessary.
- Document harvest methods, distribution of harvest, and catch per unit of effort.

## FISHERY DESCRIPTION

### Landings / Effort

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. Landings and effort have increased each year since (Table 1).

In 2005, over 99 million pounds (45,009 mt) were landed into Oregon, mostly into Astoria (99%). Twenty vessels targeted sardines using seine gear, and three vessels landed small amounts as incidental catch in the whiting fishery with trawl gear. A small amount was also harvested from

Winchester Bay for a local bait fishery. The seine vessels made 1090 landings averaging 91,216 lb (41.4 mt) per landing. Individual landings ranged from 4,032 lb (1.8 mt) to over 203,826 lb (92 mt) (Figure 1). Table 1 compares details for the 1999 through 2005 fisheries.

This year, the first landing was made in April and a second in May (Table 1). However, because of the small size of the fish, major harvest activities did not start in earnest until mid-June. August continued to be the peak month of harvest with 37% of the year's total harvest (Table 2, Figure 3). September, rather than July, was the second highest month in 2005 because most fish found in the first part of the season were smaller than markets wanted. Combined Oregon and Washington landings through August (31,571 mt) were short of the initial allocation of 45,393 mt for the northern area fisheries (Table 3). Landings for the second period (September through November) (20,396 mt) went slightly over the allocation for the northern area fisheries (17,026 mt) and the fishery closed October 18<sup>th</sup> until December 1. At least one vessel planned to continue fishing after the December 1 coast-wide re-allocation, but fish were again too small and no landings were made in December.

Ten processors bought sardines from seine vessels in 2005. Average ex-vessel price was \$0.05 per pound (\$107 per mt). The average ex-vessel price has remained stable since the beginning of the fishery (Table 1).

The majority of sardines harvested in the OR/WA fishery is processed for bait in Japanese longline fisheries. In 2005, a Washington-based processing company expressed interest in using their large-scale reduction plant to reduce sardines (e.g. conversion into fish flour, fish meal, fish scrap, fertilizer, fish oil, or other by-products). Many individuals from the sardine industry expressed concerns with the proposed venture, citing problems associated with allowing a high-volume/low-value reduction fishery on a limited quota species. The Washington Department of Fish and Wildlife subsequently adopted regulations placing a limit (10% per landing) on the amount of sardines that can be delivered or used for reduction purposes. After the adoption of the Washington regulations, Oregon received information that the reduction company was investigating plans to land sardines into Oregon and truck them to their processing plant in Washington, circumventing the new WDFW rules. Oregon also adopted regulations placing the same limitation on the amount of sardines per landing that can be delivered or used for reduction purposes (10%).

Table 1. Comparison of 1999 through 2005 Oregon sardine fisheries.

	1999	2000	2001	2002	2003	2004	2005
coast-wide harvest guideline (mt)		186,791	134,737	118,442	110,908	122,747	136,179
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)
permits issued	15	15	20	20	20	20	20
vessels targeting sardines	3	14	18	17	17	19	20
landings by target vessels	23	349	453	657	712	939	1,090
average landing (lb)	74,306	60,183	62,260	76,208	78,207	84,761	91,216
percent of OR landings harvested off OR		75%	73%	90%	65%	59%	39%
start date	6/21	6/14	6/4	6/10	6/22	6/8	4/26
end date	9/15	10/12	10/5	10/14*	10/2	12/17	10/18
buyers	1	3	5	7	7	8	10
average ex-vessel price/lb	\$0.05	\$0.05	\$0.06	\$0.05	\$0.05	\$0.05	\$0.05

\*closure from 9/14-9/20

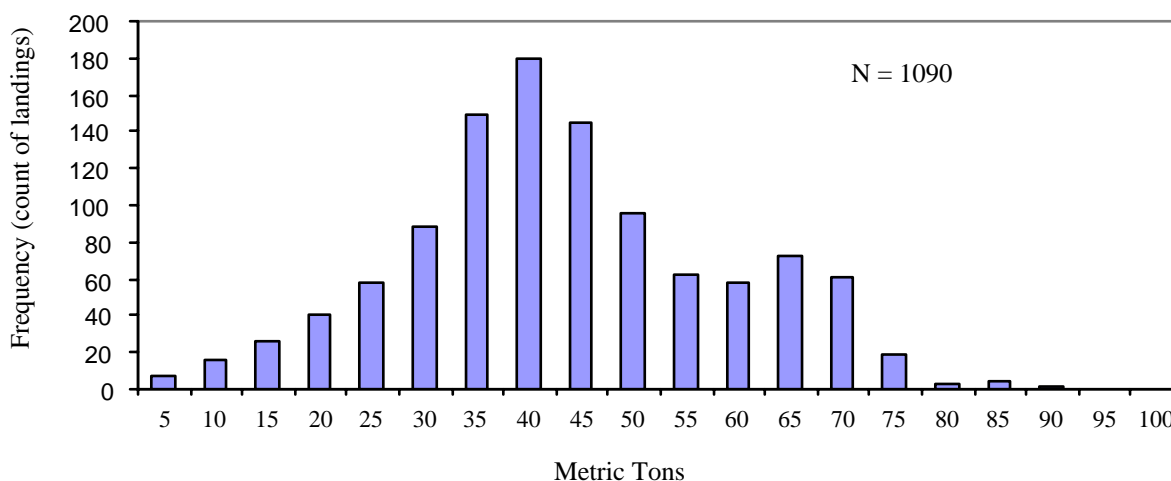


Figure 1. Frequency of sardine (mt) per landings, 2005.

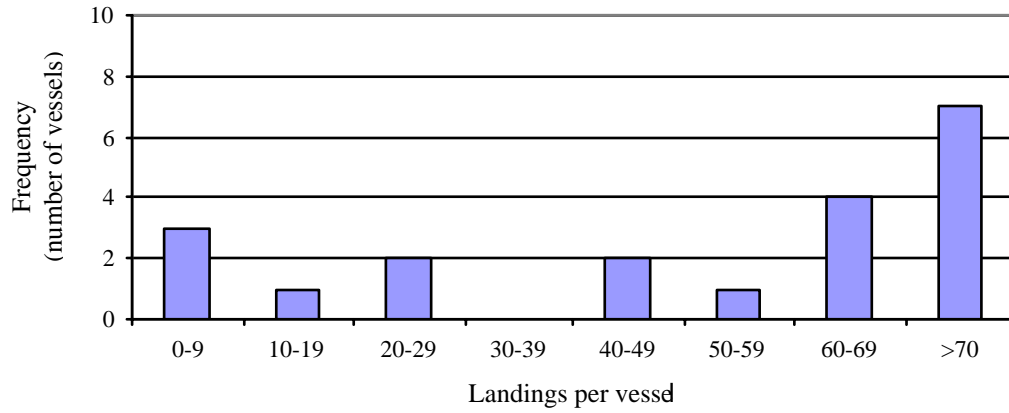


Figure 2. Frequency of landings per vessel, 2005.

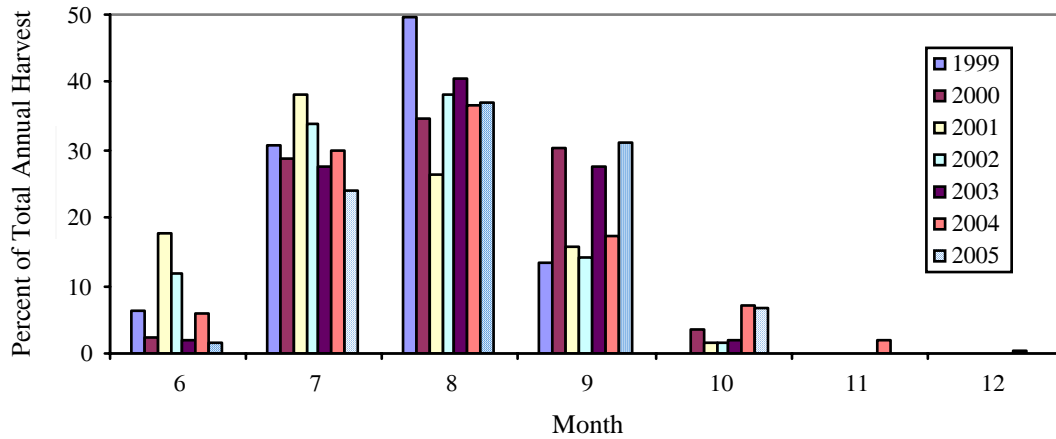


Figure 3. Monthly landings (mt) of sardines into Oregon, 1999-2005.

Table 2. Landings (mt) of sardines into Oregon, by month, 1999-2005.

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

Table 3. Landings (mt) of sardines into Oregon and Washington, by month and allocation period, 2005.

Month	OR	WA*	Total	initial allocation (Jan-Aug): 45,393 mt	
				Cumulative Total	Total for allocation period
Apr-Jun	692	324	1,016	1,016	31,571
Jul	10,735	1,281	12,016	13,032	
Aug	16,585	1,954	18,539	31,571	
Sep	14,114	2,694	16,808	48,379	20,468
Oct	2,984	676	3,660	52,039	
Nov					
Dec					0
<b>Total</b>	<b>45,110</b>	<b>6,928</b>	<b>52,039</b>		

\* WA landing data from WDFW

### Area of catch

Logbooks are required as a provision of the permit. Logs turned in for 2005 accounted for 87% of the landings (92% of the trips). The major area of catch in 2005 was approximately 50 nm north and 20 nm south of the Columbia River and out to approximately 25 nm off shore (Figure 4), similar to past years, but slightly farther to the north. However, a few landings were made as far north as Destruction Island on the northern Washington coast. In addition, based on log data, 40% of pounds landed were taken off Oregon and 60% off Washington. Whereas in past years, 60-90% was taken off Oregon.

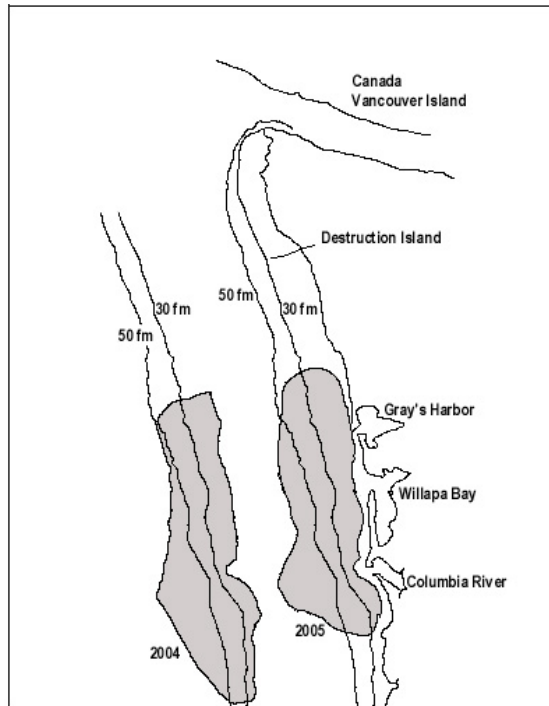


Figure 4. Area of harvest for Oregon's sardine fishery, 2004 - 2005.

## NON-TARGET SPECIES

### Bycatch

We did not have personnel dedicated to ride along on sardine vessels and observe bycatch of non-target species. Available staff was able to observe 14 trips (1%). Vessel skippers were also required to record all species caught in the logbook. Logs turned in for 2005 accounted for 87% of the landings (92% of trips).

Based on both observer and logbook data, bycatch (species caught but not landed) continues to be low. Permit stipulations require a grate must be placed over the intake of the vessel's hold to sort out larger sized fish. Bycatch included mostly salmon, and sharks (Table 4). Numerous jellyfish were also observed in the net and pumped into the hold but not quantified. Salmon is the major species of concern. The number of salmon caught increased based on observer data. However, percent of observed trips was low (1%). In addition, much of the increase in numbers of salmon caught may be due to the increase in volume of sardines landed, as the rate of salmon taken (salmon/mt) was similar to past years (Table 5). Based on log records, salmon catch averaged 0.5 per trip, with 70 % released alive. The estimated total catch of salmon for the fishery, based on log data, is 587 salmon (0.013 salmon/mt) (Table 5).

Table 4. Observed and reported catches of non-target species caught in Oregon sardine fishery, 2005.

Species	Logbook data	Observer data
	# Caught	# Caught
Blue shark	4	2
Thresher shark	9	1
dogfish shark	1	
unknown shark	4	1
Salmonids	541 (70% alive; 30% dead)	29 (62% alive; 38% dead)
Mackerel	397,390 lb	mixed in - not quantified
Anchovy	62,400 lb	2 tows released
Hake		20 lb
Sanddab		10 lb
Sunfish	1	1
Black Rockfish		1
Pigeon Guillemot (bird)		1
Jelly fish		present



Table 5. Estimated salmon caught in sardine fishery, 2000-2005, based on logbook and observer data.

		2000	2001	2002	2003	2004	2005
Logbooks	salmon recorded	206	472	274	460	823	541
	% log coverage	94%	93%	95%	88%	95%	92%
	salmon/trip	0.6	1.1	0.4	0.7	0.9	0.5
	estimated total no of salmon	209	498	288	498	845	587
	salmon/mt	0.020	0.040	0.013	0.020	0.023	0.013
Observed	salmon observed	46	22	8	4	-	29
	trips observed	22	21	7	3	3	14
	% observer coverage	6%	5%	1%	<1%	<1%	1%
	salmon/trip	2.1	1.0	1.1	1.3	-	2.1
	estimated total no of salmon	733	453	715	926	-	2,252
	salmon/mt	0.077	0.035	0.031	0.037	-	0.050

### Incidental catch

The amount of incidental catch (landed non-target species) in 2005 was similar to past years, approximately 1% of the total landings (Table 6). Mackerel, anchovy, herring, and thresher shark were recorded on fish tickets.

Table 6. Recorded incidental catch (mt) in Oregon sardine fishery, 2001-2005 (from fish ticket data).

Species	2001		2002		2003		2004		2005	
	mt landed	% of catch	mt landed	% of catch	mt landed	% of catch	mt landed	% of catch	mt landed	% of catch
Pacific mackerel	52.8	0.4	126.3	0.6	158.3	0.6	161.5	0.5	316.1	0.7
Jack mackerel	1.2	<0.1	0.3	<0.1	3.2	<0.1	24.1	0.1	3.6	<0.1
Pacific herring	-	-	3.3	<0.1	-	-	10.3	<0.1	0.1	<0.1
anchovy	-	-	0.2	<0.1	-	-	1.0	<0.1	68.4	0.2
shad	-	-	0.3	<0.1	-	-	1.2	<0.1	-	-
whiting	-	-	-	-	0.1	<0.1	-	-	-	-
thresher shark	-	-	-	-	0.3	<0.1	0.3	<0.1	0.4	<0.1
squid	-	-	-	-	-	-	13.9	<0.1	-	-
jellyfish	-	-	-	-	-	-	5.5	<0.1	-	-

### BIOLOGICAL SAMPLES

Since vessels that land in Oregon and Washington fish in the same areas, the two states agreed to a combined sampling program. Each state collected samples on alternate weeks; two samples per week in July and August and one sample per week the rest of the season. ODFW staff collected 16 biological samples of 25 sardines each. Data collected from each fish included weight (gm), standard length (mm), sex, and maturity. Otoliths were extracted and sent to Washington Department of Fish and Wildlife (WDFW) for age-reading. Other data included on the data sheets

were vessel, date, and location and depth of catch. Sex and maturity were recorded using the maturity codes developed at the aging and maturing workshop in April, 2003 (Table 7).

Table 7. Sex and maturity stages of Pacific sardine (abbreviated).

Code	Description	
	Females	Males
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	

The weight of individual fish ranged from 29 gm to 222 gm, with an overall average of 87 gm. Standard length ranged from 120 mm to 237 mm, with an overall average of 174 mm (Table 8, Appendix Table A).

The size of sardines harvested in 2005 was smaller than in past years (Figure 5 and Table 8). The abundance of small fish caused problems for harvesters and processors, as established markets were geared toward the larger sized fish. The harvest as a whole started later in the season (hoping larger fish would show up) and harvesters traveled farther north than in past years looking for larger fish.

Age data for 2005 samples were not yet available at the time of this report. Data for 2004 samples show an increase in younger fish that presumably corresponds to the increase in small sized fish seen in samples in 2004 (Figure 6).

Table 8. Average and range of weight (gm) and length (mm) of sardines sampled from Oregon sardine fishery, 2000-2005.

		2000	2001	2002	2003	2004	2005
Weight (gm)	average	153.4	153.8	183.1	174.6	154.4	87.2
	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
Length (mm)	average	209	212	222	217	206	174
	range	118 - 257	145 - 256	116 - 260	70 - 300	76 - 259	120 - 287

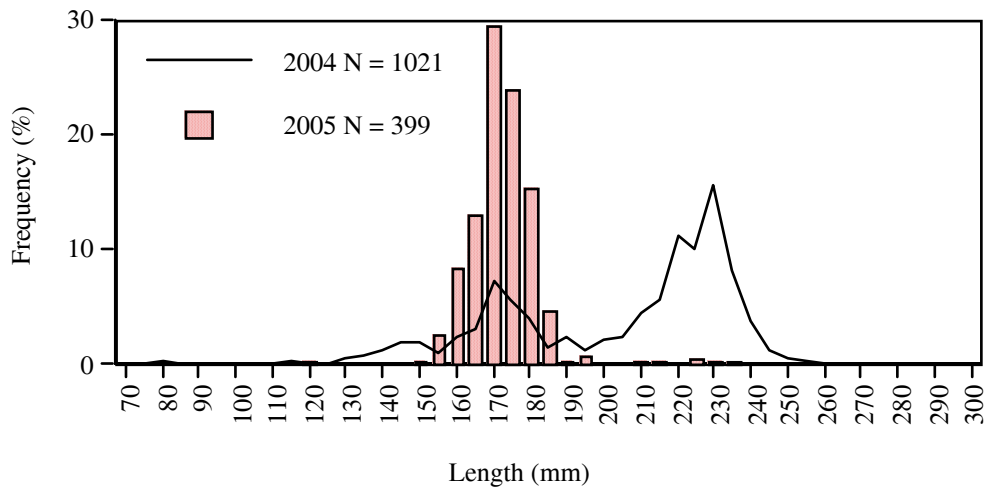


Figure 5. Length frequency (%) of sardines sampled in 2004-2005.

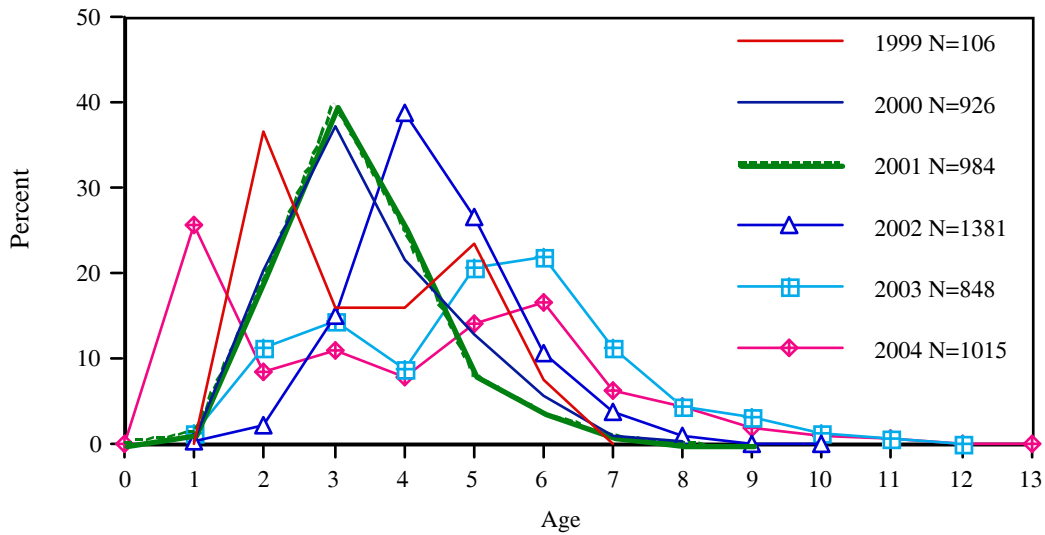


Figure 6. Age composition (%) of sardines sampled in Oregon, 1999 - 2004.

### ACKNOWLEDGMENTS

Many big thanks go to: Jill Smith and Sheryl Manley for their at-sea observations, and collecting and working up biological samples and logs; Washington Department of Fish and Wildlife for aging otoliths; and all the vessel skippers, crew members, and processors for their cooperation.

Appendix Table A. Data summary for 2005 Oregon sardine biological samples.

Sample date	Julian day	No. of males	No. of females	No. of unknown	Ave. wt (gm)	Ave.len (mm)	% Maturity code				
							1	2	3	4	unk
4/26/05	116	16	9		77.3	175	80	20	0	0	0
6/22/05	173	12	13		79.5	174	92	8	0	0	0
7/13/05	194	8	15	2	73.9	168	92	8	0	0	0
7/17/05	198	11	14		87.3	183	92	8	0	0	0
7/17/05	198	13	12		76.0	172	72	28	0	0	0
7/25/05	206	14	10	1	85.5	169	71	29	0	0	0
7/25/05	206	16	7	2	75.8	165	92	0	0	0	8
8/18/05	230	9	15	1	89.1	171	84	12	0	0	4
8/18/05	230	14	11		90.0	172	96	4	0	0	0
8/30/05	242	12	10	3	101.0	175	95	0	5	0	0
8/30/05	242	13	12		93.2	175	56	44	0	0	0
9/12/05	255	9	16		93.6	180	64	36	0	0	0
9/12/05	255	13	11		91.2	177	88	13	0	0	0
9/22/05	265	12	12	1	95.6	177	100	0	0	0	0
10/7/05	280	16	9		90.4	242	100	0	0	0	0
10/11/05	284	12	13		96.6	178	100	0	0	0	0
total		200	189	10	87.2	178	86	13	0	0	1