



Oregon's Sardine Fishery  
2002 Summary

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## INTRODUCTION

### Background

Sardines 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. The harvest guideline is then allocated 2/3 to the southern California fishery and 1/3 to the northern California, Oregon, and Washington fisheries. The division between northern and southern areas is Point Piedreas Blancas (35°40' N). Any portion of the harvest guideline that is unused by October may be re-allocated 50/50 between the northern and southern areas. For 2002, the coast-wide harvest guideline was 118,442 mt and the initial northern allocation was 39,481 mt.

Except for the coast-wide harvest guideline, management of sardines north of 39° N continues under state management as long as the management measures are consistent with the FMP. In Oregon, sardines are 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 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.
- 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.

## 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. In 2000, just over 21 million pounds (9,524 mt) were landed by 14 vessels. In 2001, over 28.2 million pounds (12,798 mt) were landed by 18 vessels.

In 2002, over 50 million pounds (22,711 mt) were landed. Seventeen vessels targeted sardines using seine gear, one vessel landed a small amount as incidental catch in the whiting fishery with trawl gear. The seine vessels made 657 landings averaging 76,208 lb (34.5 mt) per landing.

Individual landings ranged from 1,500 lb (0.7 mt) to over 153,000 lb (69.8 mt) (Figure 1). Table 1 compares details for the 1999 through 2002 fisheries.

Of the 17 vessels targeting sardines, eight made >85 % of the landings (Figure 2). Each of these eight vessels worked during 10 - 17 weeks of the fishery. Six vessels worked during 1 -2 weeks of the fishery. Two vessels made only one landing; just enough to qualify their permit for renewal.

In the four years of the fishery, landings began in early to mid-June and continued through mid-September through mid-October (Figure 3). July and August continue to be the peak months of harvest with 34% and 38% of the total harvest in each month, respectively. Ocean conditions and weather that allow effective operation of the gear are a major factor determining the start and end of the fishery. Because of the high landings into Oregon and Washington, the National Marine Fisheries Service (NMFS) determined the northern allocation of the harvest guideline would be reached before the October 1 reallocation date. NMFS closed the northern fishery effective September 14<sup>th</sup>. The Pacific Fishery Management Council requested that NMFS take emergency action to reallocate the unharvested portion of the harvest guideline before October 1<sup>st</sup>. The Council was concerned with negative economic impacts to the northern fishery. NMFS reallocated the remaining harvest guideline and reopened the fishery effective September 20<sup>th</sup>. However, with the uncertainty as to whether the fishery would re-open, many vessels left the fishery and many plant workers found other jobs. Therefore, the Oregon fishery did not return to its full potential once it reopened on September 20<sup>th</sup>. Landings after re-opening totaled 1,440,746 lb (654 mt). Final landings were made in early October.

## Processing

A total of seven buyers bought sardines in 2002. Average ex-vessel price was \$0.06 per pound (\$120 per ton). Midway through the season, it was brought to our attention, some buyers were not recording some landings correctly. Sardines of poor quality and given no price to the fishers were sometimes not recorded on the fish ticket. Most of the records were corrected, but a few were not. Consequently, total landings may actually be slightly higher than recorded. We will be working with buyers next year to make sure all landings are accurately recorded.

Table 1. Comparison of 1999 through 2002 Oregon sardine fisheries.

	1999	2000	2001	2002
pounds landed (metric tons)	1,709,686 (776)	21,005,311 (9,528)	28,214,988 (12,798)	50,068,717 (22,711)
permits issued	15	15	20	20
vessels targeting sardines	3	14	18	17
landings by target vessels	23	349	453	657
average landing (lb)	74,306	60,183	62,260	76,208
start date	6/21	6/14	6/4	6/10
end date	9/15	10/12	10/5	10/14*
buyers	1	3	5	7
average ex-vessel price	\$0.05	\$0.05	\$0.06	\$0.05

\*closure from 9/14-9/20

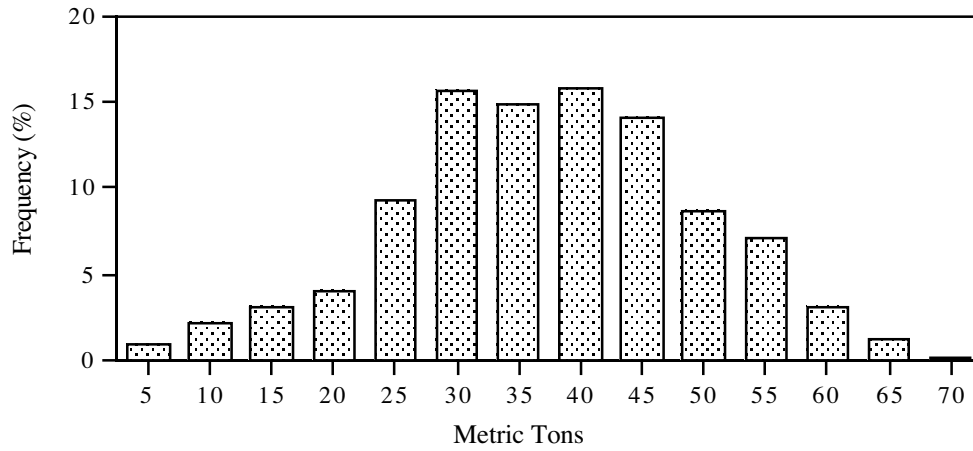


Figure 1. Frequency (%) of sardine landings (mt) per ticket, 2002.

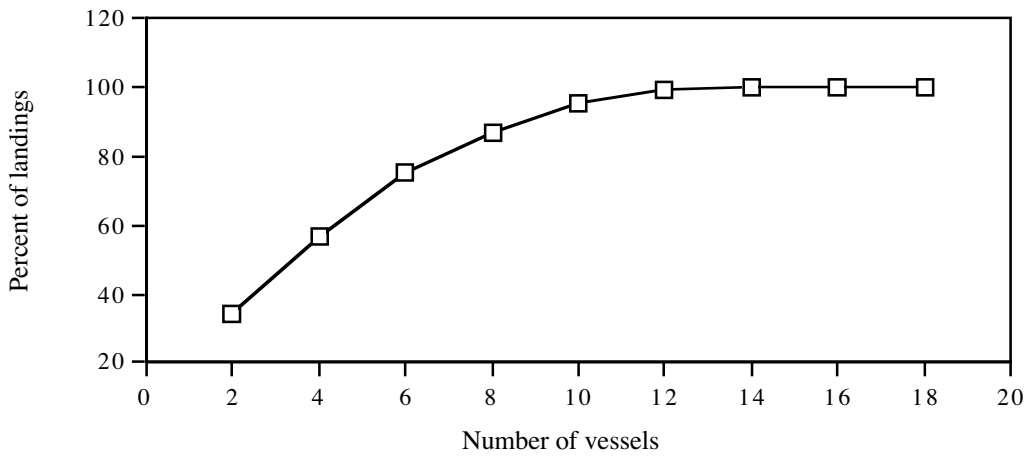


Figure 2. Cumulative percent of landings of sardines into Oregon, 2002.

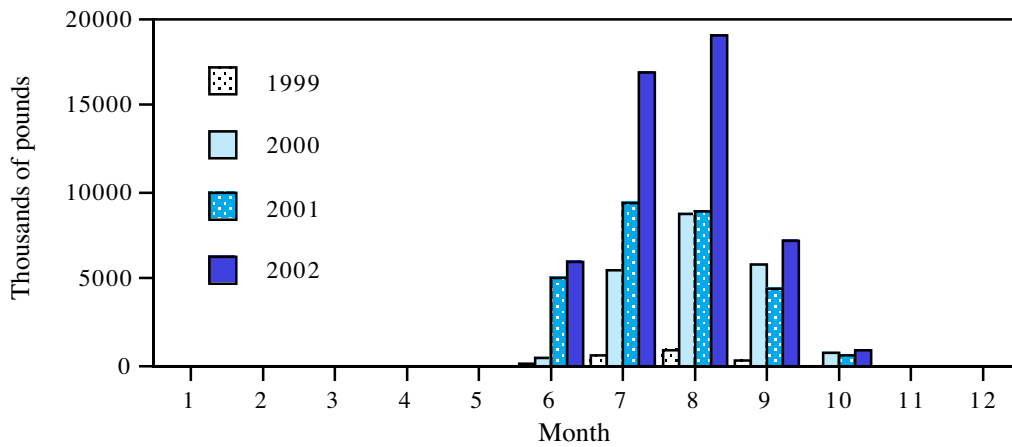


Figure 3. Monthly landings of sardines into Oregon, 1999-2002.

## Area of catch

Logbooks are required as a provision of the permit. Logs turned in by November 1<sup>st</sup> accounted for 98 % of the landings. The area of catch in 2002 was approximately 15 nm north and 35 nm south of the Columbia River and out to approximately 25 nm off shore (Figure 4). This area is similar to the areas fished in 2000 and 2001, but extends about 10 nm farther to the south. Depths in the harvest area ranged from 5 fm to over 300 fm, with an average of 50 fm. Based on log data, 90 % of the pounds landed were taken off Oregon and 10 % off Washington.

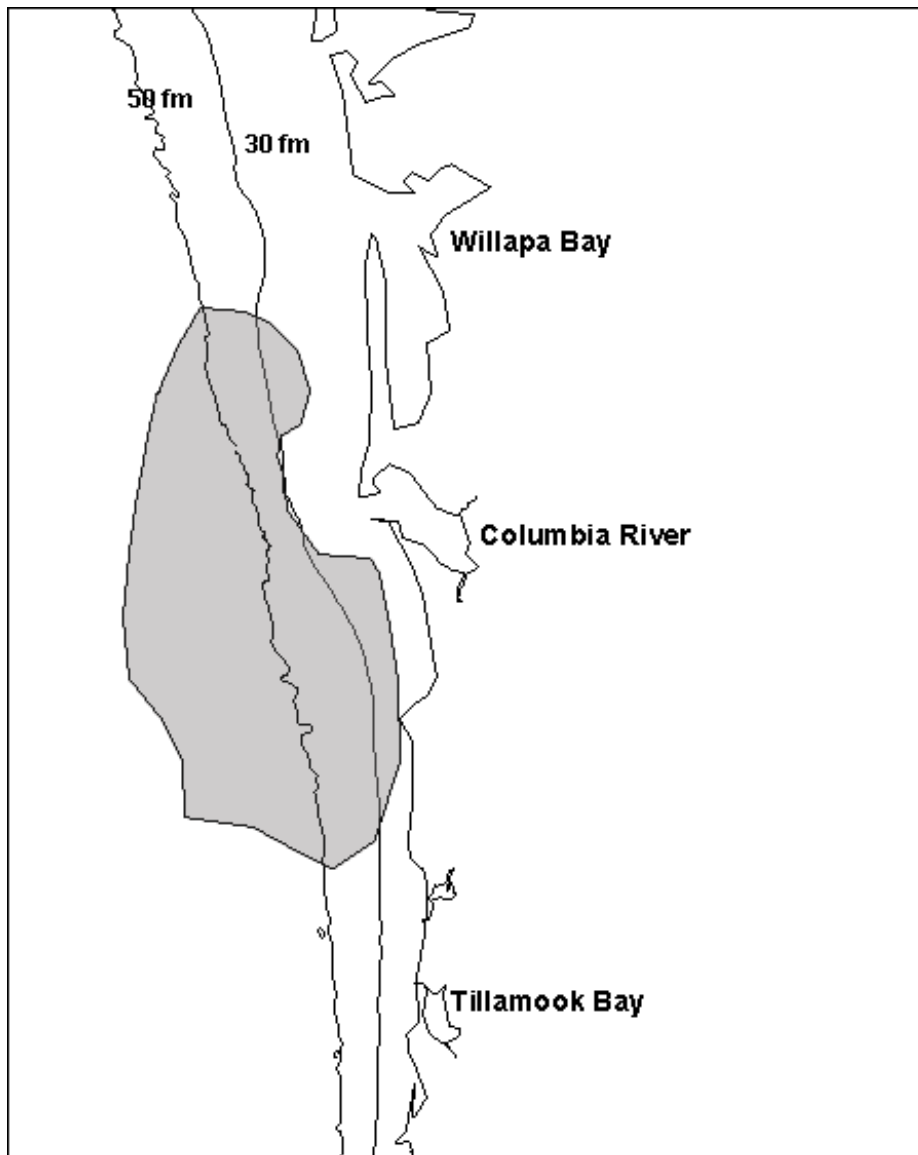


Figure 4. Area of harvest for Oregon's sardine fishery, 2002.

## NON-TARGET SPECIES

### Bycatch

Due to budget restrictions, we did not hire a seasonal employee to ride along on sardine vessels and observe bycatch of non-target species. Available staff was able to observe seven trips. Vessel skippers also were required to record all species caught in the logbook. Logs turned in by November 1 accounted for 98 % of the landings.

Based on both observer and logbook data, bycatch continues to be low. Bycatch (species caught but not landed) included salmon, sharks, hake, and cod (Table 2). Numerous jellyfish were also observed in the net and pumped into the hold but not quantified. Salmon was the major species of concern. Based on log records, salmon catch averaged 0.4 per trip, with 71 % released alive. The estimated total catch of salmon for the fishery, based on log data, is 280 salmon (0.012 salmon/mt) (Table 3).

Table 2. Observed and reported catches of non-target species caught in Oregon sardine fishery, 2002.

Species	Logbook data	Observer data
	# Caught	# Caught
Blue shark	1	2
Thresher shark	1	
unknown shark	450 lb	1
Salmon (unknown)	274 (71% alive; 29% dead)	8 (50% alive; 50% dead)
Herring	55,000 lb	
Mackerel	133,430 lb	2,500 lb
Anchovy	22,550 lb	
Shad	200 lb	300 lb
Hake		15 lb
Cod		4 lb

Table 3. Estimated salmon caught in sardine fishery, 2000-2002. For 2000 and 2001, estimate is based on salmon/trip from observer data. For 2002, estimate is based on log data.

Year	Salmon	Salmon / mt
2000	663	0.070
2001	491	0.038
2002	280	0.012

## Incidental catch

Incidental catch (landed non-target species) was more varied in 2002. In addition to the usual mackerel, herring, anchovy, and shad were also recorded on fish tickets (Table 4). Midway through the season, it was brought to our attention, some buyers were not recording some incidental catch correctly; sometimes not recorded at all. Consequently, actual landings of incidental species are incomplete. We will be working with buyers next year to make sure all landing are accurately recorded.

Table 4. Recorded incidental catch (mt) in Oregon sardine fishery, 2000-2002 (from fish ticket data).

Species	2000		2001		2002	
	mt landed	percent of catch	mt landed	percent of catch	mt landed	percent of catch
Pacific mackerel	27.3	0.3	52.8	0.4	126.3	0.6
Jack mackerel	18.2	0.2	1.2	<0.1	0.3	<0.1
Pacific herring	-	-	-	-	3.3	<0.1
anchovy	-	-	-	-	0.2	<0.1
shad	-	-	-	-	0.3	<0.1

## BIOLOGICAL SAMPLES

Staff collected 62 biological samples of 25 sardines. Data collected from each fish included weight (gm), standard length (mm), sex, and maturity. Otoliths were extracted and sent to California Department of Fish and Game (CDFG) for age-reading. Other data included on the data sheets were vessel, date, and location and depth of catch. Sex and maturity were determined using the CDFG Sex and Maturity Stages of Pacific Sardine, *Sardinops sagax*, and Pacific Mackerel, *Scomber japonicus*. Sexual maturity codes 1-5 were used for the sardine samples (Table 5).

Table 5. CDFG sex and maturity stages of Pacific sardine (abbreviated).

Code	Description
1	Virgin individuals.
2	Maturing virgins or recovering spent.
3	Sexual organs becoming swollen.
4	Ovaries and testis nearly filling 2/3 of ventral cavity.
5	Ovaries and testis filling ventral cavity.
6	Roe and milt running.

The weight of individual fish ranged from 83 gm to 302 gm, with an overall average of 183 gm. Standard length ranged from 116 mm to 260 mm, with an overall average of 222 mm (Figure 5). Overall, the sardines have been significantly larger by weight (+20%) and length (+5%) than in 2001 (Table 6).



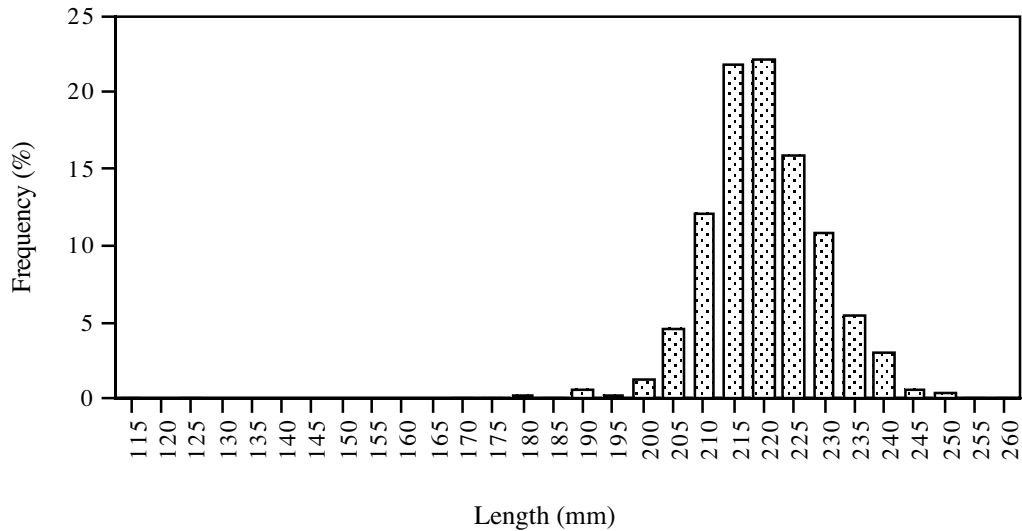


Figure 5. Length frequency (%) of sardines sampled in 2002.

Table 6. Average and range of weight (gm) and length (mm) of sardines sampled from Oregon sardine fishery, 2000-2002.

		2000	2001	2002
Weight (gm)	average	153.4	153.8	183.1
	range	79.9 - 273.3	46.4 - 241.0	83.2 - 301.6
Length (mm)	average	209	212	222
	range	118 - 257	145 - 256	116 - 260

CDFG has completed aging about half the samples to date (mid March). The aged samples range through out the season (from 6/11/02 to 10/11/02), but there are a few more from the beginning of the season.

Age composition shows an increase in average age from mostly 2-4 year olds in 2000 and 2001 to mostly 3-5 year olds in 2003 (Figure 6). Average length at age in 2002 was either similar or slightly higher than in 2000 or 2001 (Figure 7).

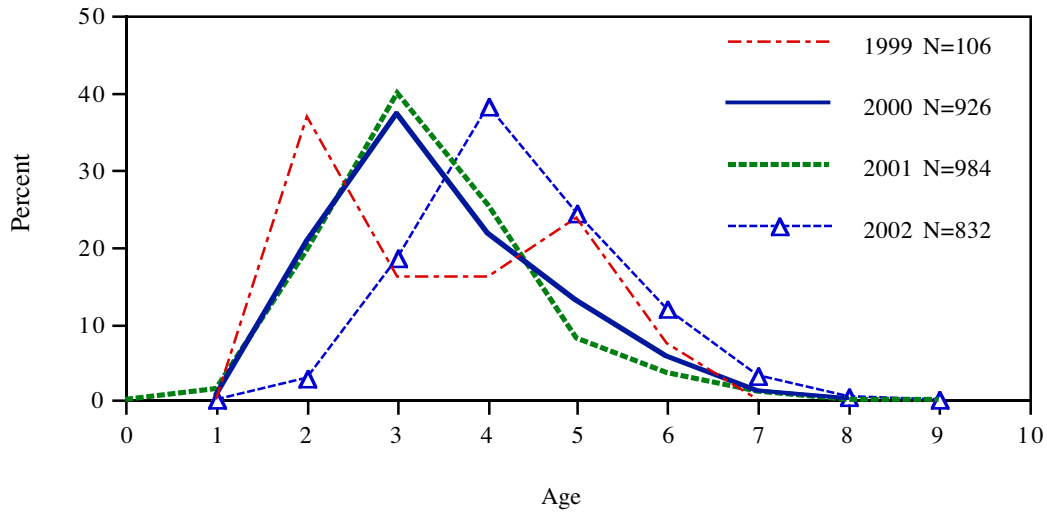


Figure 6. Age composition (%) of sardines sampled in Oregon, 1999 - 2002.

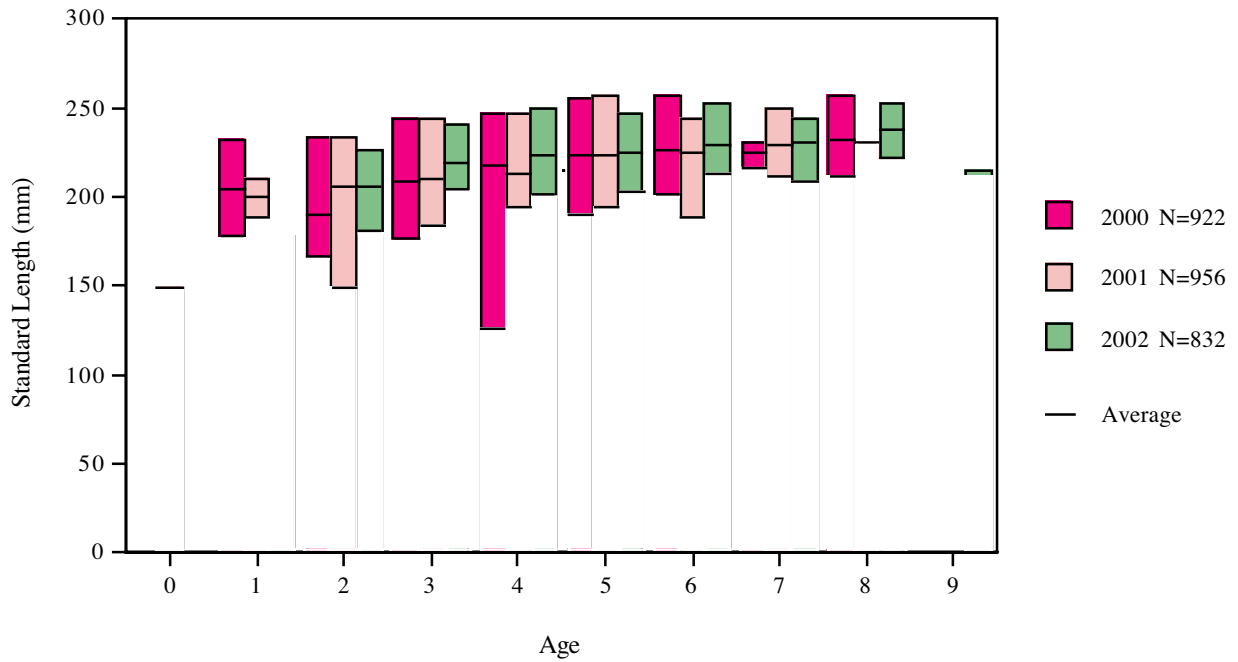


Figure 7. Average, minimum, and maximum standard length (mm) by age of sardines sampled, 2000-2002.

## **FUTURE ISSUES / RECOMMENDATIONS**

From a management perspective, the sardine fishery in 2002 went smoothly. Bycatch was low and no major conflicts arose. For 2003, we plan to continue the at-sea observations for bycatch and a similar biological sampling program.

We will be working with buyers next year to make sure all incidental and discard landings are recorded accurately.

## **ACKNOWLEDGMENTS**

Many big thanks go to: Jill Smith and Tiffany Hughes for their at-sea observations, and collecting and working up biological samples and logs; Keith Matteson for working up the biological samples; Darrin Bergen of CDFG for aging otoliths; and all the vessel skippers and crew members for their cooperation.

Appendix Table A. Data summary for 2002 Oregon sardine biological samples.

Sample date	Julian day	No. of males	No. of females	Ave. wt (gm)	Ave. len (mm)	% Maturity code				
						1	2	3	4	5
6/11/02	162	11	14	175.1	231		4	52	44	
6/14/02	165	12	13	171.3	227		44	40	16	
6/19/02	170	12	13	173.9	227		24	64	12	
6/19/02	170	14	11	161.2	220		24	72	4	
6/19/02	170	11	14	168.6	223		8	60	32	
6/19/02	170	12	13	158.7	219		24	68	8	
6/20/02	171	13	12	160.4	220		20	56	24	
6/25/02	176	10	15	167.5	222		20	72	8	
6/25/02	176	13	12	180	227		24	44	32	
6/25/02	176	9	16	168.3	222		20	72	8	
7/3/02	184	9	16	175.5	220		92	8		
7/5/02	186	7	18	168.9	219	4	24	72		
7/7/02	188	6	16	161.2	218		96			
7/9/02	190	11	14	171.1	227	32	64	4		
7/10/02	191	15	10	164.5	220	16	84			
7/14/02	195	8	17	162.3	217		100			
7/16/02	197	12	13	180.2	219		88	12		
7/17/02	198	13	11	178.6	222		100			
7/17/02	198	14	11	175.4	222		100			
7/18/02	199	12	13	182.2	225	8	84	8		
7/18/02	199	11	14	173.9	222		92	8		
7/19/02	200	13	12	171.6		24	76			
7/23/02	204	8	17	166.8		20	80			
7/24/02	205	12	13	165.7	218		100			
7/25/02	206	17	8	171.1	223		96	4		
7/25/02	206	8	14	157.7	215		88			
7/26/02	207	12	10	157.4	216		88	12		
7/29/02	210	13	12	171.6	219		92	8		
8/1/02	213	11	14	169.7	222		96		4	
8/2/02	214	10	15	172.5	211	8	88	4		
8/3/02	215	14	11	184.8	223	20	76	4		
8/4/02	216	11	14	176.6	227	24	68	8		
8/8/02	220	9	16	197.8	229	8	80	8	4	
8/8/02	220	9	16	187.9	223		100			
8/11/02	223	9	16	188.8	228	16	68	16		
8/11/02	223	14	11	168.9	217	4	80	16		
8/12/02	224	8	17	173	219		100			
8/13/02	225	10	15	193.2	227	36	60	40		
8/14/02	226	11	14	192.6	225		96	4		
8/15/02	227	10	15	195.4	227	36	90	4		
8/17/02	229	15	10	196.5	220		100			
8/20/02	232	10	15	189	220		88	8	4	
8/21/02	233	9	16	222.9	231		96	4		
8/22/02	234	14	11	175	215	12	84	4		
8/26/02	238	12	13	201.3	226		96	4		
8/28/02	240	14	11	194	224		95	8		
8/29/02	241	10	15	208.1	226		92	8		
8/30/02	242	12	13	191	222		100			

Appendix Table A. (con't)

8/30/02	242	13	12	183.2	218		100			
8/30/02	242	14	11	196.5	222		100			
9/3/02	246	10	15	210.4	224		100			
9/4/02	247	13	12	170.5	211	4	96			
9/5/02	248	15	10	192.7	219		100			
9/5/02	248	13	12	201.1	223		100			
9/26/02	269	12	13	203.4	218	32	68			
9/27/02	270	7	18	198.8	216	4	92	4		
9/28/02	271	11	14	216.6	222	20	76	4		
9/28/02	271	8	17	218.9	223.8	36	60	4		
9/28/02	271	11	14	232.5	230	12	80	8		
10/9/02	282	22	3	184.5	215	4	96			
10/10/02	283	12	13	198.6	217	4	92	4		
10/11/02	284	11	14	197.1	218	4	92	4		
Total		712	828	183.1	222	6.3	76.8	14.6	3.2	