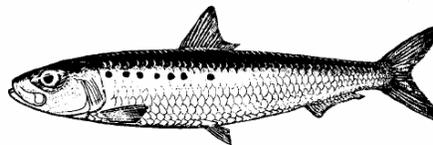


13th Annual

TRINATIONAL SARDINE FORUM

FORO TRINACIONAL DE LA SARDINA



**2012
PROGRAM**

November 28-29, 2012

Hotal Deca, 4507 Brooklyn Ave NE

Seattle, Washington, USA

TABLE OF CONTENTS

AGENDA	3
WORKING GROUPS/CONTRIBUTERS/COMMITTEES	5
ACRONYMS	6
CONTRIBUTED ABSTRACTS AND SUMMARIES	7

AGENDA

Tuesday, November 27th

Afternoon: Arrival in Seattle. Travel to Hotel Deca

18:00-21:00 Non-hosted welcome gathering in the Hotel Deca bar/lounge

Wednesday, November 28th

8:00 Registration

9:00 Welcome and opening remarks: Mark Strom (NWFSC)

9:20 Meeting Logistics: Lorna Wargo (WDFW)

9:30 Regional Sardine Fishery Reports

British Columbia for 2012 by Jordan Mah (DFO)

10:00 Break

10:20-11:45 Regional Sardine Fishery Reports (cont'ed)

10:20 2012 Washington State and Quinault Indian Nation Sardine Fisheries: Lorna Wargo and Alan Sarich, presented by Wargo Lorna (WDFW)

10:40 2012 Oregon Sardine Fishery Report: Jill Smith and Cyreis Schmitt, presented by Lorna Wargo (WDFW)

11:00 2012 California Sardine Fishery Report: Chelsea Protasio (CDFG), presented by Lorna Wargo (WDFW)

11:20 The Sardine Fishery In Bahia Magdalena, 2011-2012 : R. Félix-Uraga, F. N. Melo-Barrera, C. Quiñonez-Velázquez, E. Álvarez-Trasviña, M. E. Hernández-Rivas and V. D. Hernández-Valdéz (CICIMAR-IPN La Paz) (COFAA and EDI), presented by Kevin Hill

11:45 Lunch

13:00-14:40 Research Plans and Reports:

13:00 Stock structure (genetics, microchemistry, traditional approaches, others): John Hyde (SWFSC)

13:20 Regional Biomass estimates: Nancy Lo (SWFSC)

13:40 West coast of Vancouver Island 2012 sardine trawl survey: Linnea Flostrand, Vanessa Hodes, Jennifer Boldt, Jake Schweigert (DFO)

14:00 Acoustic-trawl surveys of sardine during spring and summer 2012: David A. Demer, Juan P. Zwolinski, Beverly J. Macewicz, George R. Cutter Jr., Kyle A. Byers, Josiah S. Renfree, and Thomas S. Sessions (SWFSC)

14:20 Stock assessment: Kevin Hill (NMFS)

14:40 Break

15:00-17:00 Contributed papers:

15:00 The Impact of Spatial Structure Assumptions on the Pacific Sardine Assessment: Felipe Hurtado-Ferro¹, André E. Punt (SAFS) & Kevin T. Hill (SWFSC)

15:20 Development of a Prediction System for California Current Ocean Conditions: Isaac Kaplan and Greg Williams (NWFSC), Samantha Siedlecki, Nicholas Bond, Albert Hermann, Phil Levin, Jan Newton, William Peterson

15:40 Measurements of natural mortality for Pacific sardine :Juan P. Zwolinski and David A. Demer, (SWFSC)

16:00 2012 DEPM adult parameters of Pacific sardine (*Sardinops sagax*): results and comparison to previous years: Beverly Macewicz, Dave Griffith, and Nancy Lo (SWFSC)

16:20 Recent shift in the California population of Pacific sardine (*Sardinops sagax*) detected in otolith feature: Barbara Javor (SWFSC), presented by John Hyde.

16:40 Growth and maturation of Pacific sardine off California from 2004 to 2010: Emmanis Dorval, Kevin Hill, Jenny McDaniel, Beverly Macewicz (SWFSC) and Dianna Porzio (CDFG)

17:00 Adjourn

18:30-21:00 Dinner at Ivar's Fish House

Thursday, November 29th

8:30 Working group (WG) breakout sessions:

WG1) Regional biomass: Nancy Lo (SWFSC)

WG2) Stock structure, age structure and adult sampling: John Hyde (SWFS)

WG3) Industry trends and issues: Mike Okoniewski (Pacific Seafood)

10:00 Plenary Sessions results of WG discussions

11:30 Closing remarks: Nancy Lo

11:45 Adjourn

WORKING GROUPS/CONTRIBUTERS/COMMITTEES

WORKING GROUPS:

The principal goal of the working groups is to promote coast-wide cooperation in producing information needed regarding the biology and dynamics of the population:

WG1) Regional biomass: Nancy Lo (SWFSC)

WG2) Stock structure, age structure and adult sampling: John Hyde (SWFSC)

WG3) Industry trends and issues: Mike Okoniewski (Pacific Seafood)

CONTRIBUTORS:

California Wetfish Producers Association

PROGRAM COMMITTEE:

Dr. Nancy Lo (SWFSC)

Dr. Sharon Z. Herzka (CICESE)

Dr. Timothy Baumgartner (CICESE)

Dr. Robert Emmett (NWFSC)

Dr. Jake Schweigert (DFO)

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Dr. Sharon Herzka (CICESE)

Dr. Robert Emmett (NWFSC)

Dr. Jake Schweigert (DFO)

Linnea Flostrand (DFO)

ACRONYMS

CDFG	California Department of Fish and Game
CIAD	Centro de Investigación en Alimentación y Desarrollo
CICESE	Centro de Investigación Científica y de Educación Superior de Ensenada
CICIMAR	Centro Interdisciplinario de Ciencias Marinas
CONAPESCA	Comisión Nacional de Acuacultura y Pesca
CRIP	Centro Regional de Investigación Pesquera
DFO	Department of Fisheries and Oceans, Canada
FACIMAR	Facultad de Ciencias del Mar
IMECOCAL	Investigaciones Mexicanas de la Corriente de California
INAPESCA	Instituto Nacional de la Pesca
IPN	Instituto Politécnico Nacional
NMFS	National Marine Fisheries Service
NWFSC	Northwest Fisheries Science Center
ODFW	Oregon Department of Fish and Wildlife
PSC	Pacific Seafood Co
SAFS	School of Aquatic and Fishery Sciences, University of Washington
SARDI	South Australia Research and Development Institute
SIO	Scripps Institution of Oceanography, University of California San Diego
SWFSC	Southwest Fisheries Science Center, National Marine Fisheries Service
UBC	University of British Columbia
WDFW	Washington Department of Fish and Wildlife

CONTRIBUTED ABSTRACTS AND SUMMARIES

Wednesday, November 28th – 9:30 A.M.

Regional Sardine Fishery Report: British Columbia for 2012

Jordan Mah, Department of Fisheries & Oceans Canada

ABSTRACT:

The regional fisheries report for Canada will be presented by Jordan Mah, the Sardine Resource Manager for the Department of Fisheries and Oceans. The presentation will cover management of the fishery (including management measures and allocation of the resource); catch and effort of the fleet; and challenges to the fishery faced by both government and industry. Management topics such as licensing, monitoring and bycatch/discards will also be reviewed. A comparison of catch and effort for the Canadian sardine fleet over the past ten years will be included.

2012 Washington Sardine Fishery Report

Lorna Wargo

Carol Henry

ABSTRACT:

Pacific sardines are the primary coastal pelagic species harvested in Washington waters. The Washington sardine fishery opens annually by rule on April 1. In 2012, the first landing was made on June 15. Nine of the 16 Washington limited entry licenses were actively fished, as was one temporary annual permit issued for 2012.

A preliminary total of 34,602 metric tons of sardines were landed into Washington through October 12, 2012. The season remains open through December 31, 2012, but weather and colder waters moving in prevented fishermen from successful fishing after mid-October. Approximately 40, 25 and 20 percent of the 584 landings made to-date fell in July, August and September, respectively. All landings were made into either Westport or Ilwaco, and according to logbook records nearly 96% of the catch was from waters adjacent to Washington. The average landing was about 59 metric tons. Approximately 735 sets were made with 687 (94%) of them successful. The average catch per successful set was about 54 metric tons.

Pacific sardines are the targeted catch in the Washington fishery, but anchovy, mackerel, and squid can also be retained and landed. In 2012, logbook records documented landings of 118 metric tons of mackerel. Logbook data also showed salmon released in the sardine fishery.

2012 Oregon Sardine Fishery Report

Jill Smith and Cyreis Schmitt

ABSTRACT:

The Pacific sardine fishery in Oregon operates as a day fishery with vessels based primarily in Astoria where processing plants for sardine operate. In addition to the timing of peak availability of sardines in northwest waters, environmental factors greatly affect when vessels fish. Aircraft are often used to assist in locating schools for sardines and weather and tides are major factors affecting when vessels are able to transit in and out of the Columbia River. Twenty of the 25 vessels in the Oregon limited entry permit fishery made landings into Oregon during 2012. As of November 1, 2012, the fishery remained open and active, although both fishing and processing activity decreased as the third fishing period progressed. As of late October, sardine landings into Oregon totaled approximately 40,000 metric tons (mt). A preliminary estimate of the mean weight of these landings is 58 mt. Small, incidental amounts of Pacific mackerel and jack mackerel, approximately 1,400 mt and 80 mt, respectively, were also landed.

Sardines were landed in Oregon during all three allocation periods. In the previous four years, allocation periods closed early because allocation limits were reached. However in 2012, allocation limits were higher and, as of November 1, only the second period allocation limit was reached before the fishing period ended.

2012 California Sardine Fishery Report

Chelsea Protasio
California Department of Fish and Game
831-649-2994

ABSTRACT:

The Pacific Sardine fishery in California operates as both a day and night fishery, with landings concentrated in two distinct fisheries, north and south of Pt. Conception. The vessels in California tend to not fish on the weekend, following the same pattern as the Market Squid fishery. Since 2000, most landings have been from the southern portion of the state, while the northern/central fishery (primarily centered around the Monterey Bay) has made up only 30 percent of the state's total landed catch. Aircraft spotter planes are frequently used to assist fishing vessels in locating schools of sardines and other coastal pelagic species. Forty-seven of the 55 permitted vessels in the California limited entry permit fishery made landings into California ports during 2012. As of November 19, 2012, the fishery remained open and active, although both fishing and processing activity decreased during the third fishing period, mainly due to an increased interest in the Market Squid fishery. As of early November, California landings totaled approximately 21,000 metric tons (mt). A preliminary estimate of the mean weight of these landings is 32 mt. Incidental amounts of Pacific mackerel, jack mackerel, and market squid were also landed.

The 2012 Harvest Guideline (HG) was set at 109,409 mt for the entire Pacific coast. Sardines were landed in California during all three allocation periods. In the previous four years, allocation periods closed early because allocation limits were reached. However in 2012, allocation limits were higher and, as of November 19, only the second period allocation limit was reached before the fishing period ended. For the fourth straight year squid accounted for more landed tonnage than sardine during September for the California fleet, a change from prior years.

THE SARDINE FISHERY IN BAHIA MAGDALENA, 2011-2012.

R. Félix-Uraga¹, F. N. Melo-Barrera¹, C. Quiñonez-Velázquez¹, E. Álvarez-Trasviña, M. E. Hernández-Rivas¹ and V. D. Hernández-Valdéz¹.

¹Centro Interdisciplinario de Ciencias Marinas-IPN, Departamento de Pesquerías y Biología Marina. La Paz, Baja California Sur. Becarios COFAA y EDI. rfelix@ipn.mx

ABSTRACT:

Total landings of small pelagic fishes in Bahía Magdalena during 2011 were 62,141 mt, and 709 fishing trips were carried out. The Pacific sardine, *Sardinops sagax*, caught in this year was 54,729 mt and represented 88.1% of the total catch. Other species landed were *Opisthonema sp* (8.2%), *Etrumeus teres* (1.4%), *Scomber japonicus* (0.6%), *Cetengraulis mysticetus* (0.5%), and mixture of species (1.3%). The Pacific sardine was caught throughout the year, with a peak in April (8,476 mt) and a minimum in December (2,281 mt), but 67% was recorded from March to August. Landings of Pacific sardine in 2011 doesn't show the typical pattern this fishing area, as catches in May and June were lower than the average monthly catch for Bahía Magdalena. Sizes of *S. sagax* varied between 135 to 205 mm SL, but the bulk (65 %) was among 175 to 190 mm SL and practically all the sardines caught were above the minimum legal size. Six age groups were found (0-5), being the groups 2 (47%) and 1 (30%) the most abundant. The maturity cycle of the Pacific sardine during 2011 don't showed the typical pattern of the reproductive cycle for Bahía Magdalena, where usually the maximum occurs between February to August. Practically throughout year sardines in reproductive activity were found, specially en the second half of the year. In previous years, the 2nd half of the year the reproductive activity was minimum. From January to August of 2012; 43,130 mt of small pelagic fishes has been caught in 549 fishing trips. Pacific sardine catch was 35,675 mt and represented 82.7% of total landings. Others species caught in these months were *Opisthonema sp* (6.0%), *Etrumeus teres* (7.1%), *Cetengraulis mysticetus* (0.1%), *Scomber japonicus* (0.6%) and mixture of species (1.3%). Size of Pacific sardine varied between 135-215 mm SL. Smallest sardines that the minimum legal size represented only 6.8%. Six age groups has been found (0-5) being the groups 2 (36%) and 1 (34%) the most abundant and compared with previous years, age groups 4 and 5 were relatively abundant. During January to February most of the sardines were in reproductive activity.

West coast of Vancouver Island 2012 sardine trawl survey

Linnea Flostrand, Vanessa Hodes, Jennifer Boldt, Jake Schweigert

¹Pacific Biological Station, 3190 Hammond Bay Rd. Nanaimo, BC V9T 6N7

ABSTRACT:

Summer surveys directed at collecting information on sardines off the WCVI started in 1997. Fishing is conducted in surface waters (≤ 30 m) using a mid water trawl towed at average speeds approximating 5 knots. Since 2006, sampling has been conducted at night. In 2012, the locations of stations were identified prior to the survey by randomly selecting sites along a $\sim 5 \times 5$ km grid representing approximately equal sampling intensity within 8 strata identified for the region.

In 2012, a total of 88 trawl tows were made. Four trawl stations were sampled within inlets, 4 stations were sampled seaward of the boundaries of a core region (defined in 2011) and replicate sampling was conducted at 13 different stations (inside the core region). The incorporation of replicate sampling was to collect information on temporal variation during the survey period representing a time difference of approximately 1 week. Excluding inlet sampling, 67 different stations were sampled within the core region and 71 different stations were sampled with the inclusion of seaward stations.

Compared to previous years (2006-2012), overall trawl survey catch densities in 2012 were considerably lower and no sardines were caught in the northwest and southeast strata. Based on average estimates of observed trawl survey catch densities for the region, the preliminary biomass estimate is 40,000-45,000 tonnes, which is less than a third of what was estimated for 2011. From pooled (unweighted) samples, the mean fork length was 22.9 cm and most sardines ranged in fork length from 19-26 cm, with a peak mode at 21-22 cm and a secondary mode at 23-24 cm.

Acoustic-trawl surveys of sardine during spring and summer 2012

¹David A. Demer, ²Juan P. Zwolinski, ¹Beverly J. Macewicz, ¹George R. Cutter Jr., ¹Kyle A. Byers, ¹Josiah S. Renfree, and ¹Thomas S. Sessions

¹ Southwest Fisheries Science Center, ² Ocean Associates

ABSTRACT:

The abundances, distributions, and demographics of Pacific sardine (*Sardinops sagax*) in the California Current Ecosystem (CCE) have been surveyed using the acoustic-trawl method (ATM) during spring 2006, 2008, 2010, 2011, and 2012, and summers 2008 and 2012. Based on the scientific literature and results of the 2006-2011 ATM surveys, oceanographic conditions in the north Pacific have shifted to a colder period, sardine biomass has declined in the CCE, survey-trawl catches with sardine increasingly include other pelagic fish species, and the abundance of mackerel (*Trachurus symmetricus* and *Scomber japonicus*) is increasing in the survey area. Here, these observations are reviewed considering new information from the spring and summer 2012 surveys.

Estimates are provided for the 2012 distributions and abundances of sardine and mackerels, estimates of uncertainty, and density-weighted sardine lengths distributions. The summer ATM survey was conducted as part of the first international sardine-hake survey off the west coasts of the USA and Canada. The 2012 sardine stock assessment was updated with data from both of the 2012 surveys.

The Impact of Spatial Structure Assumptions on the Pacific Sardine Assessment

Felipe Hurtado-Ferro¹, André E. Punt¹ & Kevin T. Hill²

¹ University of Washington, School of Aquatic and Fishery Sciences

² NOAA, National Marine Fisheries Service

ABSTRACT:

The conventional model of the dynamics of the northern subpopulation of Pacific sardine (*Sardinops sagax caerulea*) is that it concentrates in a “core” area off southern California and northern Mexico during periods of low abundance, but expands its range to the north during periods of high abundance. The stock assessment, conducted using the Stock Synthesis 3 (SS3) framework, uses this model and assumes a spatially-aggregated stock with constant growth across the entire coast and fleets with different selection patterns. However, seasonal length-dependent migration has been described in the literature, as well as the possible presence of two stocks, rather than one.

A simulation-based approach, using operating models including several hypothetical scenarios of spatial structure and seasonal movement, is used to evaluate the performance of SS3. Specifically, we evaluated (1) how much error can arise because assessments of sardine are conducted using a spatially-aggregated stock assessment method when this assumption is violated, and (2) whether moving to a spatially-structured stock assessment could reduce this error. We found that the assessment model is sensitive to the presence of seasonal migrations and the occasional persistence in the Pacific Northwest of Pacific sardine, while relatively insensitive to the presence of a southern (Mexican) subpopulation in the area in which the northern subpopulation is usually found. We also found that an assessment model that includes several fleets (i.e. 2009-2010 model configuration) is more flexible than a model with fewer fleets (i.e. 2011-2012 model configuration) when dealing with spatial uncertainty. A spatially-explicit model using the same data available for the current assessment model was not able to converge.

Wednesday, November 28th – 15:20 P.M.

Development of a Prediction System for California Current Ocean Conditions

Isaac Kaplan and Greg Williams, NOAA Northwest Fisheries Science Center

Isaac.Kaplan@noaa.gov, Greg.Williams@noaa.gov

Collaborators: Samantha Siedlecki, Nicholas Bond, Albert Hermann, Phil Levin, Jan Newton, William Peterson

ABSTRACT:

We will discuss a new project that will forecast ocean conditions 6-9 months in advance. We aim to link these forecasts to ocean conditions that are relevant to sardines. Predictions will include ocean temperature, salinity, chlorophyll, nutrients, oxygen, and zooplankton. The oceanographic modeling links CFS (Climate Forecast System) to a ROMS (Regional Ocean Modeling System). We will predict presence/absence or density of sardine life stages on the basis of predicted ocean conditions, recognizing that Trinational Sardine Forum participants have fitted similar relationships between sardine survey data and observed ocean conditions. We will compare hindcasts to recent observations of physical variables as well as sardine densities. Forecasts will be communicated as part of the California Current Integrated Ecosystem Assessment and via the NANOOS public website (www.NANOOS.org). We seek feedback regarding this new effort.

Measurements of natural mortality for Pacific sardine

Juan P. Zwolinski¹ David A. Demer¹⁻²

¹Ocean Associates, ²Southwest Fisheries Science Center

ABSTRACT:

The abundances and distributions of the migrating portion of the “northern” stock of Pacific sardine (*Sardinops sagax*) in the California Current Ecosystem (CCE) were surveyed using an acoustic-trawl method (ATM) during spring 2006, 2008, 2010, and 2011. To assess the stock, an integrated simulation model (Stock Synthesis) uses these and other survey data, and numerous fixed or estimated parameters including a constant value for an instantaneous natural mortality coefficient (M).

Here, the 2006-2011 ATM-estimated sardine abundances and demographics are combined to directly assess the length-structured sardine biomass, estimate M , and forecast the sardine stock biomass for 2012. The biomass-weighted fish-length distributions from the ATM surveys indicate that the sardine stock was dominated by 2003 and 2005 year classes (2003/2005 cohort) from 2006 to 2010, and by a 2009 cohort in 2011. The lack of significant recruits between 2006 and 2010 allowed the decline of the sardine-stock biomass to be tracked, providing bootstrap estimates of total mortality distributions. By subtracting deaths due to fishing, distributions of M were estimated for each inter-survey period (i.e., 2006-2008, 2008-2010, and 2010-2011), and for the entire survey period, 2006-2011.

2012 DEPM adult parameters of Pacific sardine (*Sardinops sagax*): results and comparison to previous years.

Bev Macewicz, Dave Griffith, and Nancy Lo

8604 Southwest Fisheries Science Center
La Jolla Shores Drive, La Jolla CA 92037-1508

ABSTRACT:

Four adult parameters are needed for estimation of spawning biomass: S) daily spawning fraction or the number of spawning females per mature female per day, F) the average batch fecundity (number of eggs spawned in a batch), W_f) the average weight of mature females (g), and R) the proportion of mature female fish by weight (sex ratio). Daily specific fecundity (number of eggs per population weight (g) per day) is $(RSF)/W_f$. For the standard DEPM area (CalCOFI lines 60-95 about San Diego to San Francisco), 126 mature female Pacific sardines, collected from 16 positive trawls, contributed to the following 2012 results: $W_f = 141.6$ g (CV = 0.04); $F = 38,682$ eggs/batch (CV = 0.06); $S = 0.138$ females spawning per day (CV = 0.24); and $R = 0.429$ (CV = 0.12). We compared the adult parameters from 2012 to results from 2004-2011. The average mature female weight was higher than 2005-2011 (65.34, 67.41, 81.62, 102.21, 112.4, 129.51, and 127.59 grams respectively) but lower than 2004 (166.99 g). The daily spawning fraction in 2012 (0.138 females spawning per day) was similar to 2004 (0.131) and higher than 2005-2011 (fraction spawning ranging between 0.07 and 0.119). Because lighter fish produce less eggs per batch than heavier fish every year, it is difficult to compare average batch fecundity, although it seems that females in 2012, that were slightly larger on average, produced less eggs per batch than the previous two years: 274 eggs/g-female in 2012 vs 301 eggs/g-female in 2011 and 302 eggs/g-female in 2010. In 2004 the adult samples were taken primarily in the high sardine egg density area, but beginning in 2005 adult Pacific sardine samples for reproductive output were taken in both high (Region 1) and low (Region 2) sardine egg density areas. Daily spawning fraction was higher in Region 1 than Region 2. Female size (weight in grams) was either similar or larger in Region 1, except for 2012 and 2009 when females were smaller.

Recent shifts in the California population of Pacific sardine (*Sardinops sagax*) detected in otolith features

Barbara Javor
Southwest Fisheries Science Center
La Jolla, CA USA

ABSTRACT:

The causes of declining stocks and lengths of Pacific sardine along the west coast of the U.S.A. during the early 2000s have not been identified with certainty, but clues might be found within the fish themselves. An investigation of the otoliths from two California populations of immature sardine during 2006-2012 revealed a persistent increase in morphologies resembling otoliths from warmer Mexican waters that began in mid-2008. The relative decrease in northern-race juvenile otoliths correlated with declining spawning stock biomass estimates. The shift in juvenile otolith phenotypes did not appear in the adult population in 2009-2012. There was no difference in the sexual maturity between adult sardines with southern- and northern-type otoliths in annual spring surveys (2004-2012). Regressions of otolith weight vs. standard length of adults in annual surveys were similar, indicating growth rates were likely unaffected by the shift in the juvenile population. The persistent relative increase of southern-race juveniles in California without similar representation in the adult stock requires further investigation. Such population shifts may be intrinsic in the natural oscillations of Pacific sardine. Otolith morphology, particularly in immature sardine, should be considered as a validating factor in stock assessment estimates.

Wednesday, November 28th – 16:40 P.M.

Growth and maturation of Pacific sardine off California from 2004 to 2010.

Emmanis Dorval¹, Emmanis.dorval@noaa.gov, **Kevin Hill¹**, **Jenny McDaniel¹**, **Beverly Macewicz**, and **Dianna Porzio²**,

¹8604 Southwest Fisheries Science Center, La Jolla Shores Drive, La Jolla CA 92037-1508

²California Department of Fish and Game, 4665 Lampson Ave, Suite C Los Alamitos, CA 90720

ABSTRACT:

The northern Pacific sardine (*Sardinops sagax*) stock ranges from northern Baja California (Mexico) to British Columbia (Canada), but the core spawning area of this stock is located off California. The stock is fully exploited throughout its range, with the Ensenada (Mexico) and California fisheries targeting smaller and younger fish (0-4 years old) and the Pacific Northwest fishery exploiting larger and older fish (4-8 years old). During the last decade the spawning stock biomass steadily declined from a peak of 1,128,220 mt in 1999 to a low of 642,833 mt in 2010. This period of stock decline coincided with the expansion of the range of the population from California to the Pacific Northwest. Although growth rate and maturity at length were previously estimated for sardine collected in 1994, to our knowledge no studies have determined whether the decline in abundance and the northward migration have impacted growth and maturation of the sardine population off California. In this study, we used the von Bertalanffy growth model to estimate growth parameters of sardine collected during the Southwest Fisheries Science Center DEPM (i.e., Daily Egg Production Method) spring surveys from 2004 to 2010. As Pacific sardine were aged by multiple readers, we developed random-effects models to account for the effects of ageing imprecision on the estimation of the three parameters (i.e., k , L_{∞} , t_0) of the growth equation. Maturation status of females sardines were determined based on histological analysis of ovary samples. Further, fish were grouped in two aggregated cohorts, including fish that were born before after 2003 and before 2004. Growth rate of fish collected during the 2004-10 period was estimated to be 0.20 ± 0.02 , which was much slower than the growth rate estimated for fish collected in 1994 ($k = 1.19 \pm 0.04$) when the stock was recovering from the 1940's collapse. In contrast, length at 50% maturity (L_{50}) was estimated to be 148.96 mm for fish collected during the 2004-10 period, which varied slightly from L_{50} estimated for fish collected in 1994 (i.e., 153.8mm). Similarly, age at 50% maturity varied little among the two aggregated cohorts, and was estimated to be 0.59 for fish collected during the 2004-2010 period. These results suggest that Pacific sardine mature during the first semester of their life, and they exhibit compensatory growth rate off California, but with no significant effects on size and age at maturity.