UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Science Center
8604 La Jolla Shores Drive
La Jolla, CA 92037

May 31, 2007 F/SWC1:DAG

CRUISE REPORT

VESSEL: NOAA Vessel *David Starr Jordan*, 0704-JD, DS 07-02.

CRUISE DATES: March 27 - May 1, 2007.

PROJECT: CalCOFI/Sardine Biomass Survey, Fisheries Resources Division.

ITINERARY: Leg I: Departed the Nimitz Marine Facility (MARFAC) at 0800 on March 27, 2007 and moved to an anchorage off of Harbor Island to calibrate the EK-60 scientific sounder. Completed calibration operations around noon and moved to the Navy fuel pier for fueling operations. Departed the fuel pier around 1600 and proceeded to the first station (93.3/26.7 - position 32° 57.38'N 117° 18.32'W). Continued to occupy stations up to 80.0 100.0 at which time operations were discontinued and the ship pulled back into San Diego (MARFAC), California to complete leg I on April 16.

Leg II: Departed the Nimitz Marine Facility on April 19 after exchanging scientific personnel and gear and began trawling operations within the California bight. Pulled into Port San Luis on April 23 to exchange scientific personnel which completed leg II.

Leg III: After completion of the personnel exchange, the ship remained anchored in the lee of Point San Luis to complete the overboard installation of the multi-beam transducer. Once installment was complete, operations continued at station 76.7/49.0 (35° 5.295'N 120° 46.644'W)since occupation of line 76.7 was not performed on leg I due to delays and weather. The *Jordan* concluded the survey in San Francisco, California on May 1, 2007.

OBJECTIVES:

1. To continue an ongoing assessment of pelagic fish stocks between San Francisco and San Diego, California.
2. To monitor environmental conditions within the CalCOFI survey area.
3. To conduct a continuous sampling of surface waters using the ship's underway system. Temperature, salinity and chlorophyll were automatically logged by computer with the output from the GPS navigational unit.
4. To record current profiles throughout the duration of the cruise with the Acoustic Doppler Current Profiler (ADCP).
5. To measure optical profiles within the California bight. The optical profile measurements will include pigment concentration and particle absorption.
6. To make continuous observations of marine mammals.

PROCEDURES:

1. Each standard CalCOFI station included the following:

   a. Up to line 76.7, a CTD/Rosette consisting of twenty four 10-liter hydrographic bottles was lowered to 500

meters (depth permitting) to measure physical parameters and collect water at discrete depths. For lines 76.7 and 66.7, only a twelve bottle rosette was used. Additional intermediate stations were added to line 66.7 and the CTD casts were sent down to 1000 meters. Sea water from selected hydrographic bottles was analyzed for chlorophyll, salinity, oxygen and nutrients. Continuous profiling during the cast was obtained for oxygen, temperature, conductivity, light transmittance and chlorophyll fluorescence.

b. A CalBOBL (CalCOFI Bongo) standard oblique plankton tow with 300 meters of wire out, depth permitting, used paired 505 μm mesh nets with 71 cm diameter openings. The technical requirements for this tow were: Descent rate of fifty meters per minute, ascent rate of twenty meters per minute. All tows with ascending wire angles lower than 38° or higher than 51° in the final 100 meters of wire were repeated. Additionally, a 45° wire angle was closely maintained during the ascent and descent of the net frame. Contents of the starboard side net were preserved in buffered formalin for later identification. The port side net contents were preserved in buffered ethanol for later identification of ichthyoplankton and DNA studies for stations at and inshore of station 70.

c. A Manta net (surface) tow, using a 505 μm mesh net on a frame with a mouth area of 0.1333 m^2. The duration of each tow is fifteen minutes at approximately 1½ knots.

d. Weather observations.

e. A Pairovet (vertical) plankton tow was taken at all stations inshore of, and including station 70. The Pairovet net was fished from seventy meters (depth permitting) to the surface using a twenty five centimeter diameter 150 μm mesh net. The technical requirements for Pairovet tows are: Descent rate of seventy meters per minute, ascent rate of seventy meters per minute. All tows with wire angles exceeding 15° during the ascent were repeated.

f. A PRPOOS(Planktonic Rate Processes in Oligotrophic Ocean Systems) net tow was taken at all stations on line 90.0 and 80.0 as well as stations out to and including station 70.0 on lines 86.7 and 83.3. These stations were occupied as part of the LTER(Long Term Ecological Research) project. The mesh of the PRPOOS net is 202 μm and the tow is a vertical cast up from 210 meters, depth permitting.

g. Up to line 76.7, at about 1100 hours on each day of the cruise a primary productivity CTD cast consisting of six 10-liter hydrographic bottles was carried out. The cast arrangement were determined by a Secchi disc observation. The purpose of the cast was to collect water from six discrete depths for daily *in situ* productivity experiments. Measurements of extracted chlorophyll and phaeophytin were obtained with a fluorometer. Primary production was measured as C^{14} uptake in a six hour *in situ* incubation. Nutrients were measured with an auto-analyzer. All radioisotope work areas were given a wipe test before the departure of the SIO technical staff.

h. Up to line 76.7 during transit between stations, marine mammal observers recorded locations and species of various sea birds and marine mammals.

i. Up to line 76.7 an acoustic hydrophone array was towed off the stern with a cable/winch to record sounds from marine mammals during transit between most daylight stations. Upon approaching

a station, a sonobuoy was deployed one nautical mile prior to stopping for station work.

2. The egg pump (CUFES - Continuous Underway Fish Egg Sampler)was mounted inside the ship's hull drawing water from a depth of three meters. During the grid occupation, the pump ran continuously between stations to sample any pelagic fish eggs.

3. An additional nine stations were occupied within the CalCOFI pattern for SCCOOS(Southern California Coastal Ocean Observation System). These were twenty meter depth stations and consisted of a CTD lowered to within a few meters from the bottom and a Bongo tow. These stations were included in the original station plans provided to the ship.

4. On line 76.7 and 66.7, a primary productivity CTD cast consisting of six 10-liter hydrographic bottles was carried out by personnel from MBARI. The cast arrangement was pre-determined prior to each cast. The purpose of the cast was to collect water from six discrete depths for daily *in situ* productivity experiments. Measurements of extracted chlorophyll and phaeophytin were obtained with a fluorometer. Primary production was measured as C^{14} uptake over a twenty four hour *in situ* incubation. Nutrients samples were frozen at sea and measured with an auto-analyzer after returning to MBARI. Additional analyses were also conducted for surface pigments (POC, FCM, A* and HPLC) and domoic acid. All radioisotope work areas were given a wipe test before the departure of the MBARI staff.

5. During legs II and III, a Nordic 264 surface trawl was deployed between the hours of approximately 1800 and 0600 PST within the Southern California Bight and north up to San Francisco at eighteen locations. Of the eighteen tows completed, fourteen were positive for adult sardines. The trawl is towed at the surface for thirty minutes at an average speed of approximately three and a half knots.

RESULTS:

Activity	Requested	Completed	Aborted
Bongo tows	109	69	40
Manta	100	66	34
Pairovet	125	84	41
PRPOOS tows	35	22	13
CTD	115	77	38
Salinity	115	77	38
Oxygen	115	77	38
Nutrients	115	77	38
Chlorophyll	114	76	38
Phytoplankton	66	61	5
Primary productivity	23	21	2
Weather	149	129	20
Surface Temp.	149	129	20
Secchi	69	31	38
Surface trawls	54	18	36
Underway data (hours)	805	805	0
ADCP (hours)	805	805	0
CUFES samples	960	960	0

In addition, approximately 220 total hours of marine mammal observations were logged by Greg Campbell and Stephen Claussen.

Summary of Trawl Catches:

Name	Kg	Count
Northern anchovy*(Engraulis mordax)*	608.9	20,698
Pacific sardine*(Sardinops sagax)*	75.4	913
Jack mackerel *(Trachurus symmetricus)*	41.0	142
Lanternfishes (Myctophidae)	40.2	0 n/c
Ocean sunfish *(Mola mola)*	26.5	4
Ca. smoothtongue *(Leuroglossus stilbius*)	19.0	0 n/c
Humboldt squid *(Dosidicus gigas*)	9.7	2
Pacific mackerel *(Scomber japonicus*)	7.0	27

n/c - not counted

DISPOSITION OF DATA:

CalBOBL, Manta tow data sheets and formalin preserved samples - Richard Charter, FRD (SWFSC).

Station activity logs, weather data and surface temperature data - Richard Charter, FRD (SWFSC) and Ralf Goericke, IOD (SIO).

ADCP data - Richard Charter, FRD (SWFSC).

CTD data - Ralf Goericke, IOD (SIO)and Tim Pennington (MBARI).

Water analysis data (temperatures, salinities, nutrients and chlorophylls) - Ralf Goericke, IOD (SIO) and Tim Pennington (MBARI).

CUFES data - Richard Charter, FRD (SWFSC).

Underway data - Richard Charter, FRD (SWFSC).

Alcohol preserved bongo samples - William Watson, FRD (SWFSC).

Marine mammal observation and acoustic data - John Hildebrand, GRD, MPL (SIO).

Underway PCO_2 data - Gernot Friederich, (MBARI).

INCIDENTS & MALFUNCTIONS:

On March 29 at 1400 after completing station 93.60, *David Starr Jordan* returned to San Diego to repair the starboard and port steering systems. The steering solenoids replaced prior to departure caused excessive vibration in the hydraulic lines and subsequent weld failures. Work was completed by 2000 on March 31. *David Starr Jordan* departed for station 93.70 at 1200 on April 1. Slight delay awaiting new battery for general alarm. Total time lost was three and a half days.

On April 10 at 1850 during station 83.80, we experienced a man overboard incident. A successful rescue of the man overboard via *David Starr Jordan's* J2 occurred at 1915. Station work was halted until 0930 the following day to accommodate a safety stand down meeting. Total time lost was eight hours.

Weather conditions worsened after station 83.70. *David Starr Jordan* slowly made progress towards Santa Barbara where it set anchor until the following morning. The ship pulled up anchor at 0830 and continued station work. Total time lost was one and a half days.

Delayed on station 77.100 after CTD cast to repair starboard side winch controls. Began work on winch at 0900 and successfully finished at 1430. A loss of a approximately five and a half hours.

Upon departure from station 77.100, weather deteriorated to a point that we could only make about three knots headway. With no indication of a relief within a short time period, we sailed for Monterey Bay to wait out the high winds and seas and then began working out line 66.7. A loss of approximately two days.

COMMENDATIONS: The personnel of the *David Starr Jordan* should be recognized and commended for their dedication and professional manner, ensuring the completion of the cruise:

The deck department for their ability to meet the needs of all types of gear with speed and expertise. Special thanks go out to the deck department for the safe return of our man overboard. Your professionalism saved a life.

The bridge officers for their assistance with all sampling operations as well as assuring the safety and well-being of all personnel aboard. Efforts to complete stations in a timely manner and meet specific time schedules contributed to the completion of the majority of the scheduled work. A huge thank you to CO Keith Roberts and his officers for facilitating the rescue of our man overboard.

The engineering department for their performance and ability correcting major and minor malfunctions to allow the completion of the cruise with little or no loss of time.

The electronics specialist for his assistance with communications and correcting any electronic malfunctions for both the ship and scientific gear.

The stewards department for providing excellent meals and accommodations in all weather conditions.

In addition, the combined scientific staff from SWFSC, SIO, MBARI, CDFG and Cascadia Research should be commended on their ability to continuously collect high quality data throughout the duration of the cruise.

PERSONNEL: Leg I:

Amy Hays, Cruise Leader	SWFSC
Ron Dotson	SWFSC
Dimitry Abramenkoff	SWFSC
Bryan Overcash	CDFG
Dave Wolgast	SIO
Jim Wilkinson, SIO coordinator	SIO
Jennifer Sheldon	SIO
Kathryn Stanaway	SIO
Greg Campbell	SIO
Stephen Claussen	Cascadia
Shonna Dovel	SIO
Robert Thombley	SIO
Susan Becker, chemist	SIO
Ed Davis, volunteer	SIO

Leg II:

Dave Griffith, Cruise Leader	SWFSC
Ron Dotson	SWFSC
Amy Hays	SWFSC
Noelle Bowlin	SWFSC
Bev Macewicz	SWFSC
Bryan Overcash	CDFG

Leg III:

Dave Griffith, Cruise Leader	SWFSC
Ron Dotson	SWFSC
Amy Hays	SWFSC
Noelle Bowlin	SWFSC
Bev Macewicz	SWFSC
Dimitry Abramenkoff	SWFSC
Randy Cutter	SWFSC
Ana Sirovic	AF
Marguerite Blum	MBARI
Cathy Preston	MBARI

SWFSC personnel authorized per diem at the rate of $3.00 per day to be paid via the Imprest Fund at the termination of the cruise.

SWFSC PERSONNEL
WATCH HOURS: 1200 - 2359
0000 - 1159
1800 - 0559

Charge to account #E8LAF28-P05

Date: _____

Prepared by: _____
David Griffith

Prepared by: _____
Amy Hays

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Science & Research Director
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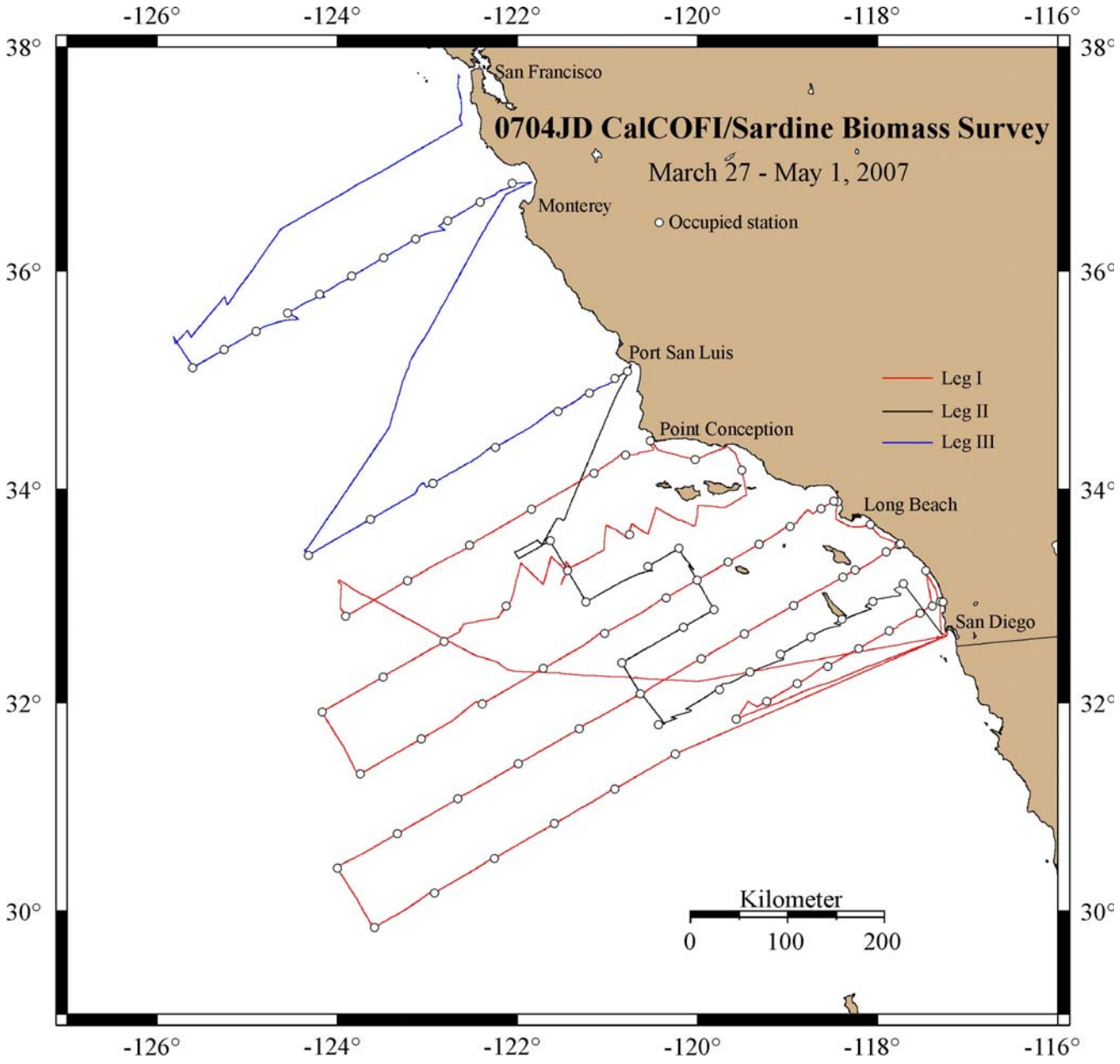
-126°
-124°
-122°
-120°
-118°
-116°
38°
36°
34°
32°
30°
San Francisco
0704JD CalCOFI/Sardine Biomass Survey
March 27 - May 1, 2007
Monterey
Occupied station
Port San Luis
Leg I
Leg II
Leg III
Point Conception
Long Beach
San Diego
Kilometer
0
100
200