



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 4, 2006

F/SWC1:RCD

CRUISE REPORT

VESSEL: NOAA Vessel *David Starr Jordan*, 0604-JD, DS 06-02

CRUISE DATES: April 1 – April 30, 2006

PROJECT: Coast-wide sardine survey, Fisheries Resources Division

ITINERARY: Leg 1a: The *David Starr Jordan* was scheduled to depart on April 1, 2006 but unresolved problems with the generators necessary for trawling delayed departure until 09:00 AM on April 5, 2006. The supposed solution of the generator problem did not work and the ship was unable to undertake trawling operations. The station activities on CalCOFI lines 95.0 and 91.7 were completed without any trawl work and the ship returned to San Diego on April 10, 2006 so that contractors could work on the generators. The *David Starr Jordan* left San Diego at 11:00 PM, April 12 and immediately tested the trawl system, which again failed, causing the ship to return to port the following morning. On April 14, it was decided that the trawl capabilities could not be restored in a timely manner and the trawling portion of the cruise was dropped, retaining the oceanographic and ichthyoplankton portions of the survey on a cruise pattern modified to maximize coverage in the time remaining for the cruise. Trawling personnel and equipment were disembarked.

Leg 1b: The *David Starr Jordan* departed San Diego on April 14, 2006 at 6:30 PM and headed for CalCOFI station 86.7 33.0 to begin station operations. On April 18 the ship stopped off in Avila Bay, CA. for personnel exchange and parts.

Leg II: Departed Avila Bay on April 18 and continued survey transect with station work beginning on CalCOFI line 76.7. On April 20 we stop off in Sta. Cruz, CA. to pick up a switch needed to bring the generator on-line which runs the hydraulic systems and then continue with the station pattern. On April 25, we enter San Francisco harbor to drop off one person by small boat.



Leg III: Departed San Francisco at 10:00AM April 25 and continued with the station transects. Very severe weather and rough seas caused us to terminate transects on April 28 while on CalCOFI line 51.7, station 60, and headed for San Francisco Harbor and the end of the cruise. The ship arrived in San Francisco at 5:00PM, April 28, 2006 and scientific personnel disembarked April 29.

OBJECTIVES:

1. To describe the spatial distribution of eggs, larvae and adult sardine (*Sardinops sagax*).
2. To obtain measurements of instantaneous egg production and adult fecundity required for an estimate of spawning biomass.
3. To collect environmental data to describe the coastal and offshore habitats.
4. To record current profiles throughout the duration of the cruise with the Acoustic Doppler Current Profiler.
5. To make continuous observations of sea birds and marine mammals.
6. To collect specimens throughout the survey pattern for genetics, micro chemistry, maturity, age and fecundity determination.
7. To acoustically identify and quantify pelagic fish schools during transit between stations with the Simrad EK-60 scientific sounder.

PROCEDURES:

1. Each coast-wide survey station was to include the following:
 - a. A CTD/Rosette consisting of twelve 2.5 liter hydrographic bottles lowered to 500 meters (depth permitting) to measure physical parameters and collect water at discrete depths for analysis of : salinity, nutrients and chlorophyll.
 - b. A CalBOBL (CalCOFI Bongo) standard oblique plankton tow with 300 meters of wire out, depth permitting, using a 505 μm mesh net paired with a 333 μm mesh net with 71 cm diameter openings. The technical requirements for this tow are: Descent wire rate of 50 meters per minute, held at terminal depth for 30 seconds and retrieved at a wire rate of 20 meters per minute. A 45° wire angle should be closely maintained during the ascent and descent of the net frame. All tows with ascending wire angles lower than 38° or higher than 51° in the final 100 meters of wire will be repeated.

- c. A Manta net (neuston) tow, using a 505 μm mesh net on a frame with a mouth area of 0.133 m^2 . The frame will be towed for 15 minutes at a target speed of 60-70 cm/sec or an angle of stray between 20-25 degrees.
 - d. Weather observations.
 - e. A Pairovet (vertical) plankton tow will be taken at all stations inshore of, and including station 70. The Pairovet net will be fished from 70 meters to the surface (depth permitting) using paired 25 cm diameter 150 μm mesh nets. The technical requirements for Pairovet tows are: Descent rate of 70 meters per minute, held at depth for 10 second duration then an ascent rate of 70 meters per minute. All tows with wire angles exceeding 15° during the ascent will be repeated.
 - f. A surface tow using a Nordic 264 pelagic trawl will be conducted during nighttime operations. Each tow will be fished for a 30 minute duration at a towing speed of approximately 3.5 knots. The catch of each tow will be processed in the following manner: Sardines collected in each trawl will be randomly sub-sampled. Standard length and body weight will be measured, otoliths will be collected, and ovaries preserved in buffered formalin. These fish are assigned a maturity code based on a four stage system developed during a previous Tri-national Sardine Forum.
2. While underway during the coast-wide sardine survey, the following operations will be conducted:
- a. The Jordan will conduct directed adaptive sampling of pelagic fish eggs using the following protocol: Water will be continuously sampled using the CUFES (Continuous Underway Fish Egg Sampler) from a depth of three meters. Approximately 640 liters/minute is sent through a concentrator which filters all material larger than 505 μm . The sieved material is then collected and identified. All fish eggs are identified to lowest taxa, counted and entered into the data acquisition software. Each sample entry is coupled with sea surface temperature, geographical position, wind speed and direction, date and time, and surface salinity.

Sampling intervals will vary in length, depending on the number of fish eggs seen, from five to 30 minutes. If two consecutive samples have a concentration of Pacific sardine eggs equal to or greater than 1 egg per minute, the ship will stop to conduct a Pairovet tow. Pairovet tows will continue at four mile intervals until a concentration of less than one egg per minute is observed in two consecutive samples. All Pairovet samples will be taken concurrently with a CUFES sample in addition to sampling continuously between Pairovet samples.

- b. Once underway, the *Jordan's* Acoustic Doppler Current Profiler (ADCP, RDI 150 kHz model) will be sampling at all times. Data will be periodically backed up to a writable DVD.
- c. Once underway, the scientific sounder (Simrad EK-60, 38, 120, and 200 kHz split beam transducer) will be sampling at all times. Data will be periodically backed up to a writable DVD.

RESULTS:

<u>Activity</u>	<u>Requested</u>	<u>Completed</u>	<u>Aborted</u>
OPC/Bongo Tows	105	22	83
Manta	105	7	98
Pairovet	105	44(+38)*	61
CTD	105	64	41
Salinity	210	122	88
Nutrients**	132	132	0
Chlorophyll**	132	132	0
Weather	105	58(+42)*	47
Surface Temp.	105	58(+42)*	47
ADCP (hours)	720	449	271
EK-500 (hours)	720	449	271
Mid-Water Trawl	70	0	70
Bird & Mammal Obs.	210 hrs.	65 hrs.	145 hrs.
Fish Egg O2 uptake***	2 series	3 series	0
Norpac Net Tow***	21	15	6

- * Supplemental due to high sardine egg counts/ancillary projects
- ** Monterey Bay Aquarium Samples on line 66.7 only
- *** Ancillary Projects

DISPOSITION
OF DATA:

CalBOBL, Pairovet, 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)

ADCP data – Dave Griffith, FRD (SWFSC)

EK-500 data – David Demer, FRD (SWFSC)

Water analysis data (temperatures, salinities, nutrients, and chlorophylls)
– Marguerite Blum, MBARI, Monterey.

CTD data – Dave Griffith, FRD (SWFSC)

Alcohol preserved bongo samples – Russ Vetter, FRD (SWFSC)

Mid-water trawl samples – Beverly Macewicz, FRD (SWFSC)

CUFES samples – Richard Charter, FRD (SWFSC)

INCIDENTS & MALFUNCTIONS:

The port and starboard generators on the *David Starr Jordan* would not operate in parallel necessary for trawling and departure was delayed four days while searching for a solution. The attempt at running them independently for trawling also did not work, requiring that we survey the first two transect lines without trawling capability and then return to port for five more days of work before we decided a solution was not imminent and canceled all trawling on the *Jordan*. The *David Starr Jordan* and *Oscar Dyson* cruise patterns were both modified in an attempt to salvage an adequate sardine biomass assessment out of the time and capabilities left to us. All Manta surface plankton tows on the *Jordan* had to be canceled, as were Bongo tows south of Pt. Conception in order to make up lost time. The responsibility for the trawling work necessary to collect adult sardine was all put on the *Oscar Dyson*. The distance between *Jordan* cruise transects was increased from 40 n. mile spacing to 60 n. miles, while the *Dyson's* were increased from 60 n. miles to 80 n. miles in order to extend the *Dyson's* transect pattern southward to San Diego to collect adult sardine in the southern survey area. Survey personnel on the *D.S. Jordan* whose primary purpose was sampling of the trawling catch and associated equipment disembarked from the *Jordan* on April 14 once trawling operations were canceled at the end of Leg Ia. Some of those personnel were flown to Oregon to board the *Dyson* and assist with the additional trawl sampling.

Attempts to fix the trawling capabilities on Leg Ia made the hydraulics unavailable during a transect between stations. High concentrations of sardine eggs >1egg/min were sampled with the CUFES system but we were unable to do five supplemental Pairovet tows for calibration without the hydraulics.

The CTD oxygen sensor failed to operate properly the first few stations but was repaired by replacing the cable.

The SCUFA Fluorometer on the CTD worked only intermittently on Legs I and II. It imploded during the first 1,000 meter cast on line 66.7 (cast depth exceeded rating depth of the case) and was replaced by the MBARI fluorometer on board.

A switch that locked the port generator in line for operation of the hydraulics failed on Leg II and four stations were canceled while it was out of service. A run was made to Santa Cruz, CA. for a replacement switch that turned out not to be suitable. The original switch was

repaired by the DSJ Chief engineer. Time loss of approximately 12 hours and the station work on four stations.

The navigation lights on the mast went out on Leg II, preventing us from entering port in the dark.

The deployment and retrieval speeds on the starboard oceanographic winch used for plankton net tows begin to deteriorate during Legs Ib, II, and III. Changing filters, cleaning the strainer, and cleaning up electrical contacts on the control switch are all attempted to alleviate the problem with temporary and/or marginal success. Banging on a control valve with a hammer seemed to alleviate the problem near the end of Leg III but inclement weather prevents further testing of this solution. Time lost for maintenance/repair attempts is approximately 12 hours. In addition, Pairovet and Bongo tows on twelve stations do not meet acceptable tow deployment criteria although listed as completed.

Ten stations on the last two transect lines (56.7 and 51.7) during Leg III were canceled due to 30-50 knot winds and heavy seas. Most of the transect pattern was run in a zig-zag pattern with just the CUFES system, terminating at line 51.7, station 60.0, when the survey was terminated and the ship headed for San Francisco and the end of the cruise.

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.

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 for projects contributed to the completion of scheduled work.

The engineering department for their performance and ability correcting major and minor malfunctions to allow the completion of the cruise.

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.

The San Diego Port Captain for her efforts to obtain parts and contract personnel to address various problems encountered throughout this cruise.

In addition, the scientific staff personnel should be commended on their ability to continuously collect high quality data throughout the duration of the cruise.

I would particularly like to thank LTjg Lundy Pixton, San Diego Port Captain; Howard Boswell, DSJ Chief Marine Engineer; Kim Belveal, DSJ Chief Electronics Tech.; and LCDR Brian Parker, DSJ Acting Commanding Officer for their continuous efforts in addressing the trawling and hydraulics issues associated with this cruise.

PERSONNEL: Leg Ia:

Ron Dotson, Chief Scientist
Amy Hays
Beverly Macewicz
Kevin Hill
Eric Lynn
Bill Watson
Randy Cutter
Amy Bechter
Motomitsu Takahashi
Peter Grønkaer
Sarah Zao
Gary Friedrichson
Mike Bentley
Hannes Smit

Leg Ib:

Ron Dotson, Chief Scientist
Amy Hays
Eric Lynn
Bill Watson
Randy Cutter
Motomitsu Takahashi
Peter Grønkaer
Sarah Zao
Gary Friedrichson
Mike Bentley
Hannes Smit

Leg II:

Ron Dotson, Chief Scientist
Amy Hays

Bill Watson
Motomitsu Takahashi
Sarah Zao
Gary Friedrichson
Mike Bentley
Hannes Smit
Sue Manion
Marguerite Blum
Steve Sessions

Leg III:

Ron Dotson, Chief Scientist
Amy Hays
Bill Watson
Sarah Zao
Gary Friedrichson
Mike Bentley
Hannes Smit
Sue Manion
Marguerite Blum
Steve Sessions

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

WATCH HOURS: 0000-1159 Charge to account 28LEF01-P15
1200-2359
1800-0600
0600-1800

OVERTIME: 1356 hours (Authorized total for NMFS personnel)
NIGHT DIFF: 1386 hours (Authorized total for NMFS personnel)

Date: _____

Prepared by: _____
Ronald C. Dotson

Approved by: _____
William W. Fox Ph.D.
Science & Research Director
Southwest Region

