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

3/14/07

CRUISE INSTRUCTIONS

NOAA Ship: NOAA Ship *David Starr Jordan*

Cruise Number: DS-07-02

Cruise Dates: 27 March - 1 May, 2007

Cruise Title: CalCOFI/Sardine Biomass Survey.

Study Area: US/Mexican border to San Francisco out to 400 nautical miles.

Itinerary:

Ship loading and gear preparation:	21 - 26 MAR.
Leg 1: 27 MAR - Station 93.3/26.7	12 APR - Arrive San Diego, CA
Leg 2: 13 APR - Station 91.7/30.0	20 APR - Arrive Morro Bay, CA
Leg 3: 20 APR - Station 73.3/50.0	01 MAY - Arrive San Francisco, CA

Tracklines and station positions are included at the end of this document in Appendix1.

Sponsoring Institution: NOAA/NMFS, Southwest Fisheries Science Center (SWFSC) Fisheries Resources Division (FRD)

Cruise Description and Objectives:

1. To conduct continuous underway sampling of surface waters. Temperature and salinity will be automatically logged by computer with the output from the GPS navigational unit.

2. To record current profiles throughout the duration of the cruise with the Acoustic Doppler Current Profiler.

3. To continue an ongoing assessment of pelagic fish stocks between La Jolla and San Francisco, California.

4. To monitor environmental conditions within the CalCOFI survey area.

5. To make continuous observations of sea birds and marine mammals.

6. To record continuous acoustic targets obtained with a Simrad EK-60 scientific sounder and a Simrad SM20/SM2000 200 kHz multi-beam sonar.

Chief Scientist: David A. Griffith, SWFSC (858) 546-7155, Dave.Griffith@noaa.gov

PLAN OF OPERATIONS

1.0 OPERATIONS

1.1 The *Jordan* will conduct operations in the Southern California Bight as well as occupying stations north of Point Conception up to San Francisco.

1.1.1 Each standard CalCOFI station will include the following:

1.1.1.1 CTD/Rosette - consisting of 24 10-liter hydrographic bottles (only a 12 bottle rosette will be used north of Point Conception) will be lowered to 500 meters (depth permitting) to measure physical parameters and collect water at discrete depths for analysis of: salinity, nutrients and chlorophyll.. Casts conducted on line 66.7 will be to a depth of 1000 meters.

1.1.1.2 CalBOBL (CalCOFI Bongo) - standard oblique plankton tow with 300 meters of wire out, depth permitting, using paired 505 µm mesh nets with 71 cm diameter openings. The technical requirements for this tow are: Descent wire rate of 50 meters per minute and an ascent wire rate of 20 meters per minute. All tows with ascending wire angles lower than 38° or higher than 51° in the final 100 meters of wire will be repeated. Additionally, a 45° wire angle should be closely maintained during the ascent and descent of the net frame. A self contained LOPC (Laser Optical Particle Counter) will be mounted in the port side opening during each tow.

1.1.1.3 Manta net (neuston) tow - using a 505 µm mesh net on a frame with a mouth area of 0.1333 m². Tows are 15 minutes in duration at towing speed of approximately 1.5 - 2.0 knots. Wire angles should be kept between 15˚ and 25˚.

1.1.1.4 Weather observations.

1.1.1.5 Pairovet net - will be fished from 70 meters to the surface (depth permitting) using paired 25 cm diameter 150 µm mesh nets out to and including station 70. The technical requirements for Pairovet tows are: Descent rate of 70 meters per minute, a terminal depth time of 10 seconds and an ascent rate of 70 meters per minute. All tows with wire angles exceeding 15° during the ascent will be repeated.

1.1.1.6 PRPOOS (Planktonic Rate Processes in Oligotrophic Ocean Systems net - will be 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 are 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.

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

1.1.1.8 A light meter - will be used to measure the light intensity in the euphotic zone once a day with the primary productivity cast.

1.1.2 Thermosalinometer sampling - The ship will provide and maintain a thermosalinometer (TSG), which is calibrated and in working order, for continuous measurement of surface water temperature and salinity. A backup unit (calibrated and in working order) will also be provided by the vessel and remain aboard during the cruise. The Scientific Computing System (SCS) will serve as the main data collection system.. All SCS data will be provided to SWFSC personnel at the completion of the cruise.

1.1.3 Acoustics –The Simrad EK-60 depth sounder will be operated, at 38, 120 and 200 kHz and interfaced to a data acquisition system to estimate micronekton biomass between 0 and 500 m. An additional Simrad SM20/SM2000 200 kHz multi-beam sonar will be attached to the port side of the ship and operated in conjunction with the EK-60. The vessel's EQ-50, ES-60 or Skipper depth sounder may be used at the discretion of the Commanding Officer, but will normally remain off while underway. The ship shall inform the Cruise Leader of any use of the vessel's sounders, as it interferes with the signals received on the scientific EK-60. Its use will be continuous.

1.1.4 ADCP – The ship’s ADCP should run continuously and be logged to a data acquisition system. Complete system settings will be provided by the oceanographer, but will include 5-minute averaging of currents, AGC and 4 beam returns in 60 8-meter bins. The ADCP will be set to receive an external trigger from the EK-60 to avoid cross talk.

1.1.5 Marine mammal observations - During transit between stations, a marine mammal observer will be recording location and species of various marine mammals.

1.1.6 Acoustic hydrophone - During transit between most daylight stations, an acoustic hydrophone array will be towed from the stern with a cable/net reel on leg I only to record sounds from marine mammals. Upon approaching a station, a sonobuoy will be

deployed one nautical mile prior to stopping for station work.

1.1.7 CUFES - The egg pump will be mounted inside the ship's hull drawing water from a depth of three meters. During the grid occupation, the pump will run continuously between stations to sample any pelagic fish eggs. At any time during the survey when the CUFES detects sardine egg concentrations of one egg per minute or higher in two consecutive samples, the ship will begin conducting pairovet tows at four mile intervals until the egg concentration falls below a density of one egg per minute in two consecutive samples. This information will be relayed to the bridge by scientists monitoring the CUFES system.

1.1.8 SCCOOS - An additional nine stations will be occupied within the CalCOFI pattern for SCCOOS (S. California Coastal Ocean Observation System). These are 20 meter depth stations and will consist of a CTD lowered to within a few meters from the bottom and a Bongo tow. These stations are included in the original station plans provided to the ship.

1.1.9 Surface trawling - During legs II and III, a Nordic 264 surface trawl will be deployed between the hours of approximately 1800 and 0600 PST within the Southern California Bight and north up to San Francisco at positions indicated in appendix 1. The positions within the Southern California Bight may be changed at the discretion of the Chief Scientist or Cruise Leader depending on information gained during leg I.

2.0 SCIENTIFIC PERSONNEL

2.1 Chief Scientist - The Chief Scientist is David A. Griffith, SWFSC, at phone (858) 546-7155.

The Chief Scientist is authorized to alter the scientific portion of this cruise plan with the concurrence of the Commanding Officer, provided that the proposed changes will not: (1) jeopardize the safety of personnel or the ship, (2) exceed the time allotted for the cruise, (3) result in undue additional expense, or (4) change the general intent of the project.

2.2 Participating Scientists
Please see Appendix 3.

2.3 Medical Forms - All scientific personnel will complete a NOAA Health Services Questionnaire (NHSQ) prior to embarking, as per NC Instruction 6000. This form will be routed through MOP Health Services for approval 30 days prior to the cruise.

3.0 EQUIPMENT

3.1 Supplied by scientific party:

1. -80°C Freezer (SWFSC)
2. 37% Formalin (SWFSC)
3. Ethanol (SWFSC)
4. Tris buffer (SWFSC)
5. Sodium borate (SWFSC)
6. 30 cc and 50 cc syringes (SWFSC)
7. Canulas (SWFSC)
8. Pint, quart and gallon jars (SWFSC)
9. Inside and outside labels (SWFSC)
10. CalCOFI net tow data sheets (SWFSC)
11. 71 cm CalCOFI Bongo frames (SWFSC)
12. 71 cm CalCOFI 505 µm mesh nets (SWFSC)
13. CalCOFI 150 µm Calvet nets and codends (SWFSC)
14. CalCOFI Pairovet frames (SWFSC)
15. 333 µm mesh codends (SWFSC)
16. Inclinometer for bongo tows (SWFSC)
17. Digital flowmeters (SWFSC)
18. PRPOOS frames (SIO)
19. 170 lb PRPOOS weight (SIO)
20. 202 µm mesh PRPOOS nets and codends (SIO)
21. 75 lb Bongo weight (SWFSC)
22. 100 lb hydro weights (SWFSC)
23. CalCOFI Manta net frames (SWFSC)
24. 60 cm CalCOFI 505 µm mesh Manta nets (SWFSC)
25. Standard CalCOFI tool boxes (SWFSC)
26. Bucket thermometers and holders (SWFSC)
27. Hand held inclinometer for Pairovet tows(SWFSC)
28. Oxygen auto-titration rig with reagents (SIO)
29. Oxygen flasks (SIO)
30. Guildline Portasal (SWFSC, SIO)
31. Salinity bottles (SIO)
32. Standard sea water (SIO)
33. Data sheets for scheduled hydrographic work (SIO)
34. Weather observation sheets (SIO)
35. Primary productivity incubation rack (SIO)
36. C^{14} and other chemicals for primary productivity work (SIO, MBARI)
37. CTD and rosette (SIO)
38. SCCOOSBOP (S. Calif. Coastal Ocean Obs. Sys. Bio-optical Package (SIO)
39. 10 liter hydrographic bottles (SIO)
40. Turner fluorometer (SIO)
41. 90% acetone and all supplies for chlorophyll extraction (SIO)
42. Nutrient vials (SIO)

43. Simrad EK-60 GPTs and software (SWFSC)
44. Simrad SM20/SM2000 200 kHz multi-beam sonar and mounting hardware (SWFSC)
45. LOPC (SIO)
46. Isotope van (SIO)
47. LTER van (SIO)
48. CUFES (SWFSC)
49. Dissecting microscopes (SWFSC)
50. Marine mammal hydrophone (SIO)
51. Disposable sonobuoys (SIO)
52. Nordic 264 rope trawl (SWFSC)
53. Trawl rigging (SWFSC)
54. 3.0 m^2 XL-Lite foam core trawl doors (SWFSC)
55. Motion compensated balances (SWFSC)
56. Fish measuring boards (SWFSC)

3.2 Supplied by ship - We request the following systems and their associated support services, sufficient consumables, back-up units, and on-site spares. All measurement instruments are assumed to have current calibrations and we request that all pertinent calibration information be included in the data package.

1. Starboard hydro winch with ¼" cable for standard Bongo, Pairovet and Manta tows
2. Port winch with .322" conductive cable
3. Port and starboard combo trawl winch with ⅝" trawl cable
4. Port and starboard gantries with trawl blocks for ⅝" trawl cable
5. J-frame w/block to accommodate .322" cable
6. Constant temperature room set at 22°C ±1°C (71.5°F ±2°F)
7. Winch monitoring system
8. Seabird thermosalinometer
9. Knudsen 12 kHz depth recorder
10. Acoustic Doppler Current Profiler w/writeable CD drive
11. Multiple frequency transducer of 38, 120 and 200 kHz frequencies for the EK-60

3.3 Installation and Maintenance - Prior to departure from San Diego the Chief Scientist and members of the scientific party may board the vessel, with permission of the Commanding Officer, to test survey equipment and environmental sensors. It is also requested that the constant temperature room be set at 22°C ±1°C (71.5°F ±2°F) prior to departure.

3.4 Hazardous Materials - The Chief Scientist shall be responsible for complying with NC Instruction 6280a, Hazardous Materials and Hazardous Waste; policy, guidance, and training, dated February 4, 1991, paragraph 7.g and paragraph 9. By Federal Law, the ship may not sail without a complete inventory of Material Safety Data Sheets (MSDS's) and appropriating neutralizing agents, buffers, and/or absorbents in amounts adequate to address spills of a size equal to the amount of chemicals brought on board. The Chief

Scientist will provide the Commanding Officer with a copy of all MSDS's prior to the cruise.

4.0 DATA RESPONSIBILITIES

4.1 Collection of Data - The Chief Scientist will receive all original data related to the project. The Chief Scientist will in turn furnish the Commanding Officer with a complete inventory listing of all data gathered by the scientific party, detailing types of operations and quantities of data prior to departing the ship. All data gathered by the vessel's personnel that are desired by the Chief Scientist will be released to her, including supplementary data specimens and photos gathered by the scientific crew.

4.2 Dissemination of Data - The Chief Scientist is responsible for the quality assurance, disposition and archiving of data and specimens collected aboard the ship. The Chief Scientist is also responsible for the dissemination of copies of these data to cruise participants and to any other requesters. The SWFSC cruise report will be submitted according to SWFSC procedures to appropriate persons and groups.

4.3 Evaluation Form - The Chief Scientist will complete the Ship Operations Evaluation Form and forward it to the Office of Marine and Aviation Operations. The Commanding Officer will provide this form.

5.0 ADDITIONAL INVESTIGATIONS AND PROJECTS

5.1 Ancillary Projects - Ancillary projects are secondary to the objectives of the cruise, should be treated as additional investigations, do not have representation aboard, and are accomplished by the ship's force. Ancillary tasks will be accomplished in accordance with the NOAA Fleet Standing Ancillary Instructions. Any additional work will be conducted so as not to interfere with operations as outlined in these instructions. The Chief Scientist will be responsible for determining the priority of additional work relative to the primary project with approval from the Commanding Officer.

6.0 COMMUNICATIONS

6.1 Radios - The Cruise Leader or designee may request, from the Commanding Officer, the use of radio transceivers aboard the ship to communicate with other vessels and aircraft, if necessary.

6.2 Telephone - The Cruise Leader or designee may require access to the ship's INMARSAT or cellular telephone systems with permission from the Commanding Officer. The Commanding Officer will provide the Cruise Leader with a log of all INMARSAT calls made from the ship for SWFSC business at the end of each leg. In accordance with the Communications Reimbursement Policy, SWFSC will pay these charges via a transfer of funds from SWFSC to the ship.

6.3 Electronic Mail - All members of the scientific party will have access to e-mail for

communications with persons not aboard the ship. The amount of such communication traffic will be determined by the Chief Scientist.

6.4 Routine Reports - The Cruise Leader will submit a weekly cruise report, along with time and attendance for the scientific party, to the Survey Coordinator each Thursday during the cruise via e-mail or, if e-mail is not functioning properly, via fax. Richard Charter at SWFSC will be on the distribution list for the ship's noon position reports.

7.0 MISCELLANEOUS

7.1 Pre-cruise Meeting - A pre-cruise meeting between the Chief Scientist and the Commanding Officer (and his staff) will be held prior to the start of the cruise to identify operational requirements (i.e., overtime, modifications, repairs or procurement). The date and time for this meeting is yet to be scheduled.

7.2 Underway Meetings - Meetings between the Commanding Officer (and other officers) and the Cruise Leader should occur at the beginning and end of each leg to discuss and solve any problems or changes that may arise. Additional meetings should occur as needed.

7.3 Debrief - A post-cruise debriefing will be held between the Chief Scientist and the Commanding Officer. If serious problems are identified, the Commanding Officer shall notify the Marine Operations Center, Pacific, in the most direct means available. The Chief Scientist shall document identified problems in the Ship Operations Evaluation Form. The time and date for the debrief will be determined toward the end of the cruise.

7.4 Time and Attendance - Time and Attendance will be filled out by the SWFSC timekeeper while the ship is at sea, based on information transmitted by the Cruise Leader to the Survey Coordinator. Scheduled overtime is authorized for Saturdays, Sundays, holidays and any hours over a standard eight hour week day. Irregular overtime will be authorized by the Cruise Leader as required. SWFSC personnel are authorized per diem at the rate of $3.00 per day to be paid via a travel voucher at the termination of the cruise. Task Number 28LEF01-P15 will pay for per diem and overtime for any SWFSC permanent, term or temporary employees.

7.5 Navigation - Primary control will be GPS, also dead reckoning based on visual bearings and radar ranges when possible.

7.6 Scientific Spaces - The Cruise Leader shall be responsible for the proper upkeep and cleaning of all spaces assigned to the scientific party, both laboratory and living spaces, throughout the cruise. The Cruise Leader or Chief Scientist will make berthing assignments for scientific personnel on a per-leg basis, with approval of the Commanding Officer.

`7.7 Foreign Nationals Access to NMAO Vessels -
Please see Appendix 4.

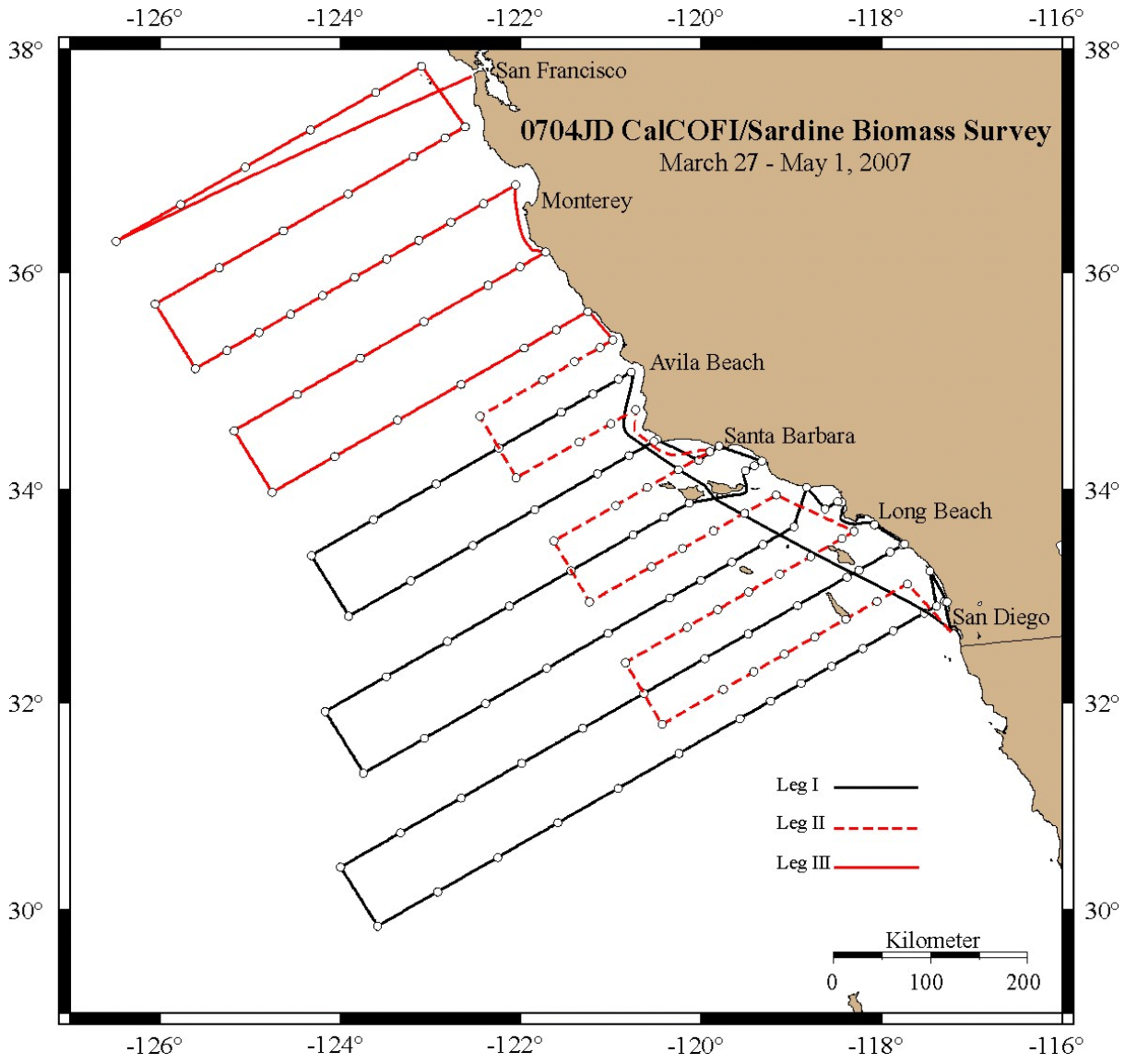
For further information contact Richard Charter, Southwest Fisheries Science Center, National Marine Fisheries Service, NOAA, 8604 La Jolla Shores Drive, La Jolla, CA 92037; Richard.Charter@noaa.gov, Phone (858) 546-7157. More information about the cruise and project can be found at the project's website: http://swfsc.nmfs.noaa.gov/frd/CalCOFI/CC1.htm

Prepared by: _____ Date: _____
David Griffith
Chief Scientist, SWFSC

Approved by: _____ Date: _____
William W. Fox, PhD.
Science & Research Director
Southwest Region

Approved by: _____ Date: _____
CAPT Jon Rix
Commanding Officer
NOAA Marine Operations Center - Pacific

Appendix 1. NOAA Ship *David Starr Jordan* track lines for CalCOFI 0704JD



Appendix 2. Station positions:

Leg I:

	Line	Station	Dlatitude	Dlongitude
1	93.3	26.7	32.9563724259334	117.305380884956
2	93.4	26.4	32.9490519178577	117.273565356497
3	91.7	26.4	33.2435005551444	117.465416851904
4	93.3	28	32.9130390926001	117.394381849645
5	93.3	30	32.8463724259334	117.531220575794
6	93.3	35	32.6797057592667	117.872864276587
7	93.3	40	32.5130390926001	118.213864925719
8	93.3	45	32.3463724259334	118.554227807481
9	93.3	50	32.1797057592667	118.893958166246
10	93.3	55	32.0130390926001	119.23306120696
11	93.3	60	31.8463724259334	119.571542095632
12	93.3	70	31.5130390926001	120.246657889086
13	93.3	80	31.1797057592667	120.919346114063
14	93.3	90	30.8463724259334	121.589646745145
15	93.3	100	30.5130390926001	122.257599178513
16	93.3	110	30.1797057592667	122.923242246037
17	93.3	120	29.8463724259334	123.586614228982
18	90	120	30.4179491924311	123.998932641908
19	90	110	30.7512825257645	123.331642935073
20	90	100	31.0846158590978	122.662016165004
21	90	90	31.4179491924311	121.990013097919
22	90	80	31.7512825257645	121.315593925696
23	90	70	32.0846158590978	120.638718251506
24	90	60	32.4179491924311	119.959345075056
25	90	53	32.6512825257645	119.482275576063
26	90	45	32.9179491924311	118.935511279229
27	90	37	33.1846158590978	118.387081239001
28	90	35	33.2512825257645	118.249710872496
29	90	30	33.4179491924311	117.905821155509
30	90	28	33.4846158590978	117.768078829933
31	90	27.7	33.4946158590978	117.747408255478
32	88.5	30.1	33.6744234802331	118.083693315436
33	86.8	32.5	33.8888721175198	118.444234704315
34	86.7	33	33.8895259589289	118.490333896291
35	86.7	35	33.8228592922622	118.62873194933
36	85.4	35.8	34.0213592305795	118.834130582204
37	86.7	40	33.6561926255955	118.974251576658
38	86.7	45	33.4895259589289	119.319096363084
39	86.7	50	33.3228592922622	119.66327183711
40	86.7	55	33.1561926255955	120.00678348427
41	86.7	60	32.9895259589289	120.349636747675
42	86.7	70	32.6561926255955	121.033389686697

43	86.7	80	32.3228592922622	121.714573370478
44	86.7	90	31.9895259589289	122.393229869654
45	86.7	100	31.6561926255955	123.069400625107
46	86.7	110	31.3228592922622	123.743126463453
47	83.3	110	31.9117565668356	124.170395260904
48	83.3	100	32.2450899001689	123.492322389608
49	83.3	90	32.5784232335023	122.811732057951
50	83.3	80	32.9117565668356	122.12858234363
51	83.3	70	33.2450899001689	121.442830682431
52	83.3	60	33.5784232335023	120.754433851958
53	83.3	55	33.7450899001689	120.409229807167
54	83.3	51	33.8784232335023	120.1325788179
55	83.3	42	34.1784232335023	119.508513168925
56	83.3	40.6	34.2250899001689	119.411235486711
57	83.3	39.4	34.2650899001689	119.327811312928
58	81.7	43.5	34.4055513627133	119.800369987975
59	81.8	46.9	34.2748975213043	120.025236690926
60	80	50.5	34.4666666666667	120.4890553542
61	80	51	34.45	120.523904781381
62	80	55	34.3166666666667	120.802448043127
63	80	60	34.15	121.15
64	80	70	33.8166666666667	121.843035137124
65	80	80	33.4833333333333	122.533349409826
66	80	90	33.15	123.220987208317
67	80	100	32.8166666666667	123.905992235638
68	76.7	100	33.3882434331644	124.32289128903
69	76.7	90	33.7215767664977	123.633345028367
70	76.7	80	34.0549100998311	122.941090637533
71	76.7	70	34.3882434331644	122.246083224437
72	76.7	60	34.7215767664977	121.548277179372
73	76.7	55	34.8882434331644	121.19831021606
74	76.7	51	35.0215767664977	120.917820619194
75	76.7	49	35.0882434331644	120.777402773743

Arrive back in San Diego

Leg II:

76	91.7	30	33.1235005551444	117.712585375203
77	91.7	35	32.9568338884777	118.055310129985
78	91.7	40	32.7901672218111	118.397382956817
79	91.7	45	32.6235005551444	118.738809207481
80	91.7	50	32.4568338884777	119.079594193004
81	91.7	55	32.2901672218111	119.41974318416
82	91.7	60	32.1235005551444	119.759261411971
83	91.7	70	31.7901672218111	120.436426305827
84	88.3	70	32.3790644963845	120.841703094622

85	88.3	60	32.7123978297178	120.160089160545
86	88.3	55	32.8790644963845	119.818318700226
87	88.3	50	33.0457311630512	119.47589881429
88	88.3	45	33.2123978297178	119.132824129004
89	88.3	40	33.3790644963845	118.789089229084
90	88.3	35	33.5457311630512	118.444688657173
91	88.3	33	33.6123978297178	118.306740809703
92	85	40	33.9506412628822	119.171579911148
93	85	45	33.7839745962156	119.517620704833
94	85	50	33.6173079295489	119.862982389521
95	85	55	33.4506412628822	120.207670527024
96	85	60	33.2839745962156	120.551690635768
97	85	70	32.9506412628822	121.237748627041
98	81.7	70	33.52221802938	121.63651910535
99	81.7	60	33.8555513627133	120.94588973316
100	81.7	55	34.02221802938	120.599555570829
101	81.7	50	34.1888846960466	120.25253427269
102	81.7	45	34.3555513627133	119.904820169224
103	78.3	51	34.7444486372867	120.726503060259
104	78.3	55	34.6111153039534	121.006042133742
105	78.3	60	34.4444486372867	121.354829689432
106	78.3	70	34.1111153039534	122.050305778822
107	75	70	34.6826920704511	122.454850284601
108	75	60	35.0160254037844	121.754533552181
109	75	55	35.1826920704511	121.403295699915
110	75	51	35.3160254037844	121.12178185306
111	75	49	35.3826920704511	120.980849354591

Exchange personnel in Morro Bay, CA

Leg III:

112	73.3	50	35.6438073744045	121.255747894604
113	73.3	55	35.4771407077378	121.609013403794
114	73.3	60	35.3104740410711	121.961540711566
115	73.3	70	34.9771407077378	122.664404814383
116	73.3	80	34.6438073744045	123.364387896118
117	73.3	90	34.3104740410711	124.061536879769
118	73.3	100	33.9771407077378	124.755897937714
119	70	100	34.5487174742355	125.179638074619
120	70	90	34.8820508075689	124.480468225638
121	70	80	35.2153841409022	123.77843081893
122	70	70	35.5487174742355	123.073478383124
123	70	60	35.8820508075689	122.365562662523
124	70	55	36.0487174742355	122.010478271032
125	70	51	36.1820508075689	121.725864373956
126	66.7	50	36.7869609073999	122.05632713793

127	66.7	55	36.6202942407333	122.414822630674
128	66.7	60	36.4536275740666	122.772537143971
129	66.7	65	36.2869609073999	123.129477069492
130	66.7	70	36.1202942407333	123.48564874494
131	66.7	75	35.9536275740666	123.841058454748
132	66.7	80	35.7869609073999	124.195712430771
133	66.7	85	35.6202942407333	124.549616852965
134	66.7	90	35.4536275740666	124.902777850052
135	66.7	95	35.2869609073999	125.255201500178
136	66.7	100	35.1202942407333	125.606893831566
137	63.3	100	35.7091915153067	126.050880006264
138	63.3	90	36.04252484864	125.341520250502
139	63.3	80	36.3758581819734	124.629124237471
140	63.3	70	36.7091915153067	123.913641675488
141	63.3	60	37.04252484864	123.195021414556
142	63.3	55	37.2091915153067	122.83451842233
143	63.3	52	37.3091915153067	122.617831127893
144	60	53	37.8474349484711	123.099418017894
145	60	60	37.6141016151378	123.608252546979
146	60	70	37.2807682818044	124.332374719062
147	60	80	36.9474349484711	125.05326942009
148	60	90	36.6141016151378	125.770989325167
149	60	100	36.2807682818044	126.485586211652

Finish in San Francisco, CA

Appendix 3. Personnel for the CalCOFI 0704 Survey

David Starr Jordan Leg I:

Position	Name	Affiliation	Berth
Chief Scientist	Amy Hays	SWFSC	
Fishery Biologist	Ron Dotson	SWFSC	
Fishery Biologist	Dimitri Abramenkoff	SWFSC	
Biologist	Bryan Overcash	CDFG	
Oceanographer	Dave Wolgast	SIO	
Oceanographer	Jim Wilkinson	SIO	
Oceanographer	Jennifer Sheldon	SIO	
Oceanographer	Kathryn Stanaway	SIO	
Oceanographer	Shonna Dovel	SIO	
Oceanographer	Robert Thombley	SIO	
Chemist	Susan Becker	SIO	
Marine Mammal Biologist	Greg Campbell	SIO	
Marine Mammal Biologist	Stephen Claussen	CR	
LTER Asst.	Ed Davis	SIO	

David Starr Jordan Leg II:

Position	Name	Affiliation	Berth
Chief Scientist	Dave Griffith	SWFSC	
Fishery Biologist	Amy Hays	SWFSC	
Fishery Biologist	Noelle Bowlin	SWFSC	
Fishery Biologist	Beverly Macewicz	SWFSC	
Fishery Biologist	Ron Dotson	SWFSC	
Biologist	Bryan Overcash	CDFG	

David Starr Jordan Leg III:

Position	Name	Affiliation	Berth
Chief Scientist	Dave Griffith	SWFSC	
Fishery Biologist	Amy Hays	SWFSC	
Fishery Biologist	Noelle Bowlin	SWFSC	
Fishery Biologist	Beverly Macewicz	SWFSC	
Fishery Biologist	Ron Dotson	SWFSC	
Acoustician	Randy Cutter	SWFSC	
Acoustician	Ana Sirovic	SWFSC	
Oceanographer	Marguerite Blum	MBARI	
Oceanographer	Cathy Preston	MBARI	

Appendix 4. Foreign National Access

Foreign National Access and Deemed Export Controls on NMAO Vessels

All foreign national access to the vessel shall be in accordance with NAO 207-12 and RADM De Bow's March 16, 2006 memo (http://deemedexports.noaa.gov). The foreign national's sponsor is responsible for obtaining clearances and export licenses required and for providing for required escorts by the NAO. Programs sponsoring foreign nationals should consult with their designated line office personnel to assist with the process (http://deemedexports.noaa.gov/contacts.html).

The following are basic requirements. Full compliance with NAO 207-12 is required.

Responsibilities of the Chief Scientist:

Ensure the following is provided to the Commanding Officer before any foreign national will be allowed on board for any reason:

1. Written notification identifying the NOAA Program individual who is responsible for ensuring compliance with NOAA and export regulations for the foreign

national (see Foreign National Sponsor responsibilities below).

2. A copy of the DOC/OSY clearance authorization for access by the foreign national.

3. A copy of Appendix B of NAO 207-12 with NOAA Chief Administrative Officer concurrence endorsement.

4. Written notification that the foreign national has been cleared against the State, Commerce and Treasury departments' Lists to Check. http://www.bis.doc.gov/ComplianceAndEnforcement/ListsToCheck.htm

5. Provide the NOAA Foreign National List spreadsheet for each foreign national in the scientific party.

Escorts – The Chief Scientist is responsible to provide escorts to comply with NAO 207-12 Section 5.10, or as required by the vessel's DOC/OSY Regional Security Officer.

Ensure all non-foreign national members of the scientific party receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the servicing Regional Security Officer.

Export Control - The Chief Scientist is responsible for complying with NAO 207-12 and the development of Technology Access Control Plans for items they bring aboard. The Chief Scientist must notify the Commanding Officer of any export controlled items they bring aboard and any access restrictions associated with these items.

The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

Responsibilities of the Commanding Officer:

Ensure only those foreign nationals with DOC/OSY clearance are granted access..

Deny access to OMAO platforms and facilities by foreign nationals from countries controlled for anti-terrorism (AT) reasons and individuals from Cuba or Iran without written NMAO approval and compliance with export and sanction regulations.

Ensure foreign national access is permitted only if unlicensed deemed export is not likely to occur.

Ensure receipt from the Chief Scientist of the NOAA Foreign National List spreadsheet for each foreign national in the scientific party.

Ensure Foreign Port Officials, e.g., Pilots, immigration officials, receive escorted access in accordance with maritime custom to facilitate the vessel's visit to foreign ports.

Export Control - 8 weeks in advance of the cruise, provide the Chief Scientist with a current inventory of OMAO controlled technology onboard the vessel and a copy of the vessel Technology Access Control Plan (TACP). Also notify the Chief Scientist of any OMAO-sponsored foreign nationals that will be onboard while program equipment is aboard so that the Chief Scientist can take steps to prevent unlicensed export of Program controlled technology.

The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

Ensure all OMAO personnel onboard receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the servicing Regional Security Officer.

Responsibilities of the Foreign National Sponsor

Export Control - The foreign national's sponsor is responsible for obtaining any required export licenses and complying with any conditions of those licenses prior to the foreign national being provided access to the controlled technology onboard regardless of the technology's ownership.

The Departmental Sponsor/NOAA of the foreign national shall assign an on-board Program individual, who will be responsible for the foreign national while on board. The identified individual must be a U.S. citizen, NOAA employee or be approved by the vessel's DOC Regional Security Officer homeport.

Ensure completion and submission of Appendix C (Certification of Conditions and Responsibilities for a Foreign National Guest) as required by NAO 207-12 Section 5.03.h