Project Instructions

Date Submitted: March 27, 2013
Platform: NOAA Ship *Bell M. Shimada*
Project Number: SH-13-05 (OMAO)
Project Title: 2013 Joint U.S.-Canada Integrated Acoustic and Trawl Survey of Pacific Hake and Pacific Sardine (SaKe 2013)
Project Dates: June 6, 2013 to August 30, 2013

Prepared by: _____ Dated: 6-4-13
Survey Co-Lead Name: Larry Hufnagle
Affiliation (Program or Lab): Northwest Fisheries Science Center (NWFSC)/Fishery Resource Analysis and Monitoring (FRAM) Division/Groundfish Monitoring Program/Acoustics Team

Prepared by: _____ Dated: _____
Survey Co-Lead Name: David Demer
Affiliation (Program or Lab): Southwest Fisheries Science Center (SWFSC)/Fisheries Resources Division (FRD)/ Advanced Survey Technologies Program

Approved by: _____ Dated: 6/1/13
Program Director Name: Michelle McClure
Title: Division Director
Affiliation (Program or Lab): NWFSC/FRAM

Approved by: _____ Dated: _____
Program Director Name: Russ Vetter
Title: Division Director
Affiliation (Program or Lab): SWFSC/FRD

Approved by: _____ Dated: 6/3/13
Lab Director Name: John Stein
Title: Science and Research Director
Affiliation (Program or Lab): NWFSC

Approved by: _____ Dated: _____
Lab Director Name: Francisco Werner
Title: Science and Research Director
Affiliation (Program or Lab): SWFSC

Approved by: _____ Dated: _____
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Date: 2013.06.06 11:06:13 -07'00'
Captain Wade J. Blake, NOAA
Commanding Officer
Marine Operations Center – Pacific

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Prepared by: _____ Dated: 28 MAY 2013
Survey Co-Lead Name: David Demer
Affiliation (Program or Lab): Southwest Fisheries Science Center (SWFSC)/Fisheries Resources Division (FRD)/ Advanced Survey Technologies Program

Approved by: _____ Dated: _____
Program Director Name: Michelle McClure
Title: Division Director
Affiliation (Program or Lab): NWFSC/FRAM

Approved by: _____ Dated: 27 May 2013
Program Director Name: Russ Vetter
Title: Division Director
Affiliation (Program or Lab): SWFSC/FRD

Approved by: _____ Dated: _____
Lab Director Name: John Stein
Title: Science and Research Director
Affiliation (Program or Lab): NWFSC

Approved by: _____ Dated: 5/30/13
for Lab Director Name: Francisco Werner
Title: Science and Research Director
Affiliation (Program or Lab): SWFSC

Approved by: Wade J Blake Digitally signed by BLAKE.WADE.JAMES.1025936538 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=BLAKE.WADE.JAMES.1025936538 Date: 2013.06.06 11:05:45 -07'00' Dated: _____
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I. Overview

A. Brief Summary and Project Period: The 2013 joint U.S.-Canada integrated acoustic and trawl survey of Pacific hake (*Merluccius productus*) and Pacific sardine (*Sardinops sagax*), hereafter 2013 SaKe survey, will assess the biomasses, distributions, and biological compositions of hake and sardine populations in U.S. and Canadian waters off the Pacific coast. The survey period is June 6, 2013 through August 30, 2013.

B. Service Level Agreements: Of the 79 days at sea (DAS) scheduled for this project, 79 DAS are funded by the program, 0 DAS are funded by OMAO. This project is estimated to exhibit a High Operational Tempo. An 80th program funded DAS was used on 5/21/2013 to calibrate ship's equipment for this project.

C. Operating Area: The 2013 SaKe survey will span the west coast of the U.S. and Canada from approximately lat 32.8°N (San Diego) to approximately lat 50.8°N (north end of Vancouver Island, Canada) (**Appendix 2**, **Fig.1**; waypoints are listed in **Appendix 3**, **Table 1**). Eastern and western extents will ordinarily range from no less than 30-m isobath (or as close to shore as is safely navigable) to either the 1,500-m isobath or a point 35 nmi west of the inshore waypoint, whichever is farther offshore.

D. Summary of Objectives:

- The primary goal of the survey is to estimate the biomasses, distributions, and biological compositions of Pacific hake and Pacific sardine populations using data from an integrated acoustic and trawl survey off the west coast of the U.S. and Canada from approximately San Diego, California (lat 32°48.0174'N) to the north end of Vancouver Island, Canada (lat 50°45.65'N).
- Continuously sample multi-frequency acoustic backscatter data using the ship's Simrad EK60 scientific echo sounder system. These data will be used to estimate the distributions and abundances of hake and sardine.
- Conduct daytime trawling to classify observed backscatter layers to species and size composition and to collect specimens of hake and other organisms.
- Conduct nighttime (i.e., between sunset and sunrise) surface trawling to collect specimens of coastal pelagic fishes (CPS) and other organisms. These data will be used to classify observed backscatter to species and their size distributions. Nighttime sampling operations will conclude in time for the ship to resume running east-west acoustic transects by sunrise.
- Image fish using a portable X-radiograph machine for the purpose of target strength modeling and estimation (See **Appendix 1 and 4**).
- Collect a variety of other acoustic, biological, and oceanographic samples relevant to hake and sardine distributions. These data are vital for the surveys and assessments of hake and sardine.
- Continuously sample sea-surface temperature, salinity, and chlorophyll a using the ship's thermosalinograph and fluorometer. These data will be used to estimate the physical oceanographic habitats for each target species.

- Continuously sample air temperature, barometric pressure, and wind speed and direction using the ship's integrated weather station.
- Continuously sample pelagic fish eggs using the Continuous Underway Fish Egg Sampler (CUFES). The data will be used to estimate the distributions and abundances of spawning hake, anchovy, mackerel, and sardine.
- Sample profiles of temperature and salinity using either an underway conductivity-temperature-depth (CTD) system during the day or a standard CTD system with water-sampling rosette and other instruments at nighttime stations, as time allows.
- Sample plankton using a CalBOBL (CalCOFI Bongo) net at nighttime stations, as time allows. These data will be used to estimate the distribution and abundance of ichthyoplankton and zooplankton species.
- Continuously sample multi-frequency acoustic backscatter data using the ship's Simrad ME70 multibeam echosounder system, synchronized and configured to not interfere with the EK60s.
- Optically verify CPS backscatter while underway conducting acoustic transects, using a towed stereo camera system.
- Optically observe fish behavior inside nighttime trawls using cameras and lights mounted inside the net.

E. Participating Institutions:

NOAA/NMFS/NWFSC, 2725 Montlake Blvd. E, Seattle, WA 98112

NOAA/NMFS/SWFSC, 8604 La Jolla Shores Drive, La Jolla, CA 92037

F. Personnel/Science Party: name, title, gender, affiliation, and nationality

Leg I: 6/6/2013 to 6/28/2013

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Baxter, Anne	Biologist	6/5/2013	6/29/2013	F	NWFSC	U.S.
Billings, Alicia	Lead Biologist	6/5/2013	8/10/2013	F	NWFSC	U.S.
Davis, Julia	Acoustician	6/5/2013	7/19/2013	F	NWFSC	U.S.
Thomas, Rebecca	Acoustician/ Hake Field Party Chief (FPC)	6/5/2013	6/29/2013	F	NWFSC	U.S.
Whiteside, Cassie	Biologist	6/5/2013	6/29/2013	F	NWFSC	U.S.
Session, Steve	Acoustician	6/5/2013	6/29/2013	M	SWFSC	U.S.
Cutter, Randy	Chief Scientist	6/5/2013	6/29/2013	M	SWFSC	U.S.
Griffith, Dave	FPC	6/5/2013	7/20/2013	M	SWFSC	U.S.
Overcash, Bryan	Biologist	6/5/2013	6/29/2013	M	SWFSC	U.S.
Macewicz, Bev	Biologist	6/5/2013	6/29/2013	F	SWFSC	U.S.

Charter, Sherri	Biologist	6/5/2013	7/20/2013	F	SWFSC	U.S.
Shultz, Dana	Biologist	6/5/2013	6/29/2013	F	SWFSC	U.S.
Freire, Anne	Biologist	6/5/2013	6/29/2013	F	SWFSC	U.S.
Haworth, David	Fisherman	6/5/2013	6/29/2013	M	SWFSC	U.S.

Leg II: 7/1/2013 to 7/19/2013

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Billings, Alicia	Lead Biologist	6/5/2013	8/10/2013	F	NWFSC	U.S.
Brasseur, Eric	Biologist	6/5/2013	7/19/2013	M	NWFSC	U.S.
Davis, Julia	Acoustician	6/5/2013	7/19/2013	F	NWFSC	U.S.
de Blois, Steve	Chief Scientist	6/30/2013	7/20/2013	M	NWFSC	U.S.
McClure, Michelle	Div. Director	6/30/2013	7/20/2013	F	NWFSC	U.S.
Stierhoff, Kevin	Acoustican	6/30/2013	7/20/2013	M	SWFSC	U.S.
Murfin, David	Acoustician	6/30/2013	7/20/2013	M	SWFSC	U.S.
Griffith, Dave	FPC	6/5/2013	7/20/2013	M	SWFSC	U.S.
Bowlin, Noelle	Biologist	6/30/2013	7/20/2013	F	SWFSC	U.S.
Charter, Sherri	Biologist	6/5/2013	7/20/2013	F	SWFSC	U.S.
Lynn, Eric	Biologist	6/30/2013	7/20/2013	M	SWFSC	U.S.
Sweetnam, Dale	Biologist	6/30/2013	7/20/2013	M	SWFSC	U.S.
Herzog, Margarite	Volunteer	6/30/2013	7/20/2013	F	SWFSC	U.S.

Leg III: 7/23/2013 to 8/10/2013

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Billings, Alicia	Lead Biologist	6/5/2013	8/10/2013	F	NWFSC	U.S.
Chu, Dezhang	Acoustician	7/22/2013	8/10/2013	M	NWFSC	U.S.
Donovan, Cassandra	Biologist	7/22/2013	8/10/2013	F	NWFSC	U.S.
Eastland, Grant	Acoustician	7/22/2013	8/10/2013	M	NWFSC	U.S.
Hufnagle, Larry	Chief Scientist	7/22/2013	8/10/2013	M	NWFSC	U.S.
Kamikawa, Dan	Biologist	7/23/2013	8/10/2013	M	NWFSC	U.S.
Zwolinski, Juan	Acoustician	7/22/2013	8/10/2013	M	SWFSC	Portugal
Mau, Scott	Acoustician	7/22/2013	8/10/2013	M	SWFSC	U.S.
Manion, Sue	FPC	7/22/2013	8/10/2013	F	SWFSC	U.S.
Henry, Annette	Biologist	7/22/2013	8/10/2013	F	SWFSC	U.S.
Bowlin, Noelle	Biologist	6/30/2013	7/20/2013	F	SWFSC	U.S.
Watson, Bill	Biologist	7/22/2013	8/10/2013	M	SWFSC	U.S.

Acuna, Elaine	Biologist	7/22/2013	8/10/2013	F	SWFSC	U.S.
Bretney, Maraid	Biologist	7/22/2013	8/10/2013	F	SWFSC	U.S.
Okoniewski, Mike	Industry Rep.	7/22/2013	8/10/2013	M	SWFSC	U.S.

Leg IV: 8/13/2013 to 8/30/2013

Name (Last, First)	**Title**	**Date Aboard**	**Date Disembark**	**Gender**	**Affiliation**	**Nationality**
Baxter, Anne	Biologist	8/12/2013	8/31/2013	F	NWFSC	U.S.
de Blois, Steve	Acoustician	8/12/2013	8/31/2013	M	NWFSC	U.S.
Draper, Doug	Biologist	8/12/2013	8/30/2013	M	MWFSC	U.S.
Frey, Peter	Biologist	8/12/2013	8/31/2013	M	NWFSC	U.S.
Thomas, Rebecca	Acoustician	8/12/2013	8/31/2013	F	NWFSC	U.S.
Demer, David	Chief Scientist	8/12/2013	8/31/2013	M	SWFSC	U.S.
Elliot, Brian	ENS	8/12/2013	8/31/2013	M	SWFSC	U.S.
Manion, Sue	FPC	7/22/2013	8/31/2013	F	SWFSC	U.S.
Macewicz, Bev	Biologist	7/22/2013	8/31/2013	F	SWFSC	U.S.
Hays, Amy	Biologist	8/12/2013	8/31/2013	F	SWFSC	U.S.
Thompson, Andrew	Biologist	8/12/2013	8/31/2013	M	SWFSC	U.S.
Weber, Ed	Biologist	8/12/2013	8/31/2013	M	SWFSC	U.S.
McClatchie, Sam	Biologist	8/12/2013	8/31/2013	M	SWFSC	U.S.

Note, if approved by the Chief Scientist and the CO, personnel transfers via the ship's launch or a chartered small craft may occur during any or all of the cruise legs.

G. Administrative

1. Points of Contacts:

NWFSC:

Larry Hufnagle, Joint Survey Co-Lead, 2725 Montlake Blvd. E, Seattle, WA 98112, (206) 860-3346, lawrence.c.hufnagle@noaa.gov

Alternate: Rebecca Thomas, 2725 Montlake Blvd. E, Seattle, WA 98112, (206) 302-2412, rebecca.thomas@noaa.gov

SWFSC:

David Demer, Joint Survey Co-Lead, 8604 La Jolla Shores Drive, La Jolla, CA 92037, (858) 546-5603, david.demer@noaa.gov

Alternate: Juan Zwolinski, 8604 La Jolla Shores Drive, La Jolla, CA 92037, (858) 546-5654, juan.zwolinski@noaa.gov

Ops Officer *Bell M. Shimada*:

LT Patrick Sweeney, 2002 SE Marine Science Dr., Newport, OR 97365, (541) 867-8775, ops.bell.shimada@noaa.gov

2. Diplomatic Clearances:

   This project involves Marine Scientific Research in waters under the jurisdiction of Canada. Diplomatic clearance has been requested.

3. Licenses and Permits:

   This project will be conducted under the Scientific Research Permits (U.S.) issued by:

   a. NMFS/NWR on May 1, 2013 to Larry Hufnagle (SRP-09-2013)

   b. NOAA/ONMS on May 6, 2013, 2013 to Dr. John Stein (MULTI - 2013-004)

   c. NOAA/SWR on June 5, 2013, 2013 to David Demer (SRP-06/08-2013)

   d. CDFW on April 21, 2013 to John Stein (SC-11678)

   e. CDFW ON 11 April, 2013 to NOAA-SWFSC-FRD (SC-12372)

   f. ODFW on May 28, 2013 to Larry Hufnagle (STP #17979)

   g. ODFW on May 23, 2013, 2013 to Dave Demer (STP #17979)

   h. NMFS/NWR on April 29, 2011 to the NWFSC (ESA Section 10(a)(1)(A), #16335)

II. Operations

A. Project Itinerary

The 2013 SaKe survey will be conducted during June 6, 2013 through August 30, 2013, aboard the NOAA Ship *Bell M. Shimada*. The survey will provide essential data for Pacific hake and Pacific sardine stock assessments.

The cruise will start in Newport, OR. First, the ship will transit to the most southern transect in the Southern California Bight (SCB) to begin the survey transects.

During Leg IV, on August 28, 2013, at the conclusion of the northernmost transect, the ship will anchor on the west side of Vancouver Island, at a site which

is suitable for a post-survey calibration of the EK60s. The ship will then transit to Newport for demobilization.

Leg	Mission	Days	Date start	Date end
CAL	Calibrate EK60s and ME70 in Elliott Bay, Seattle	1	5/21/2013	5/21/2013
Staging	Staging in Newport, OR	2	6/4/2013	6/5/2013
I	Transit from Newport, OR to waypoint SCB01	4	6/6/2013	6/9/2013
	Transects in SCB	3	6/10/2013	6/12/2013
	Transects from lat 34°55.65'N to lat 38°35.65'N, plus two "weather days"	15	6/13/2013	6/27/2013
	Transit	0.3	6/28/2013	6/28/2013
Inport	San Francisco, CA	4	6/28/2013	7/1/2013
II	Transit	0.3	7/1/2013	7/1/2013
	Transects from lat 38°45.65'N to lat 43°25.65'N, plus one "weather day"	17	7/2/2013	7/18/2013
	Transit	0.3	7/19/2013	7/19/2013
Inport	Newport, OR	5	7/19/2013	7/23/2013
III	Transit	0.2	7/23/2013	7/23/2013
	Transects from lat 43°35.65'N to lat 47°55.65'N, plus one "weather day"	17	7/24/2013	8/9/2013
III	Transit	0.3	8/10/2013	8/10/2013
Inport	Port Angeles, WA	4	8/10/2013	8/13/2013

Leg	Mission	Days	Date start	Date end
IV	Transit	0.3	8/13/2013	8/13/2013
	Transects from lat 48°05.65'N to lat 50°45.65'N, plus one "weather day"	14	8/14/2013	8/27/2013
	Transit	0.5	8/27/2013	8/28/2013
CAL	Calibrate EK60s and ME70 in Vancouver Island bay TBD	1	8/28/2013	8/28/2013
	Transit	1.1	8/29/2013	8/30/2013
Inport	Newport, OR	1	8/30/2013	8/30/2013
Destaging	Newport, OR	1	8/31/2013	8/31/2013

B. Staging and Destaging

Staging will be in Newport, OR on approximately June 4–5, 2013 and destaging will be in Newport on August 31, 2013.

C. Operations

The following list of survey priorities includes detailed descriptions of the planned activities.

Priorities:

1. Daytime: EK60 acoustic transects, and mid-water trawls targeting hake.
2. Nighttime: Surface trawls targeting CPS, maximally spread.
3. Crepuscular periods: CTD profiles and bongo tows.

The ship's echo sounders and Doppler velocity log (DVL) should be secured as much as possible. When their use is necessary, the crew shall inform the Chief Scientist of any use of the vessel's sounders or DVL. They interfere with the signals received on the EK60s.

a. Acoustic data collection:

Acoustic backscatter data will be collected with EK60s operating at 18, 38, 70, 120, and 200 kHz. The .raw files will be telemetered continuously, as collected, to the SWFSC via a Matlab script, secure ftp, and the ship's VSAT. The protocol for data transfers meets NOAA IT security requirements. The split-beam transducers are mounted on the ship's retractable centerboard. During the survey, the centerboard will be extended to mid-depth, which extends the transducers to ~7.2 m below the surface, to reduce the unsampled region near the sea surface. Any changes to the centerboard depth will be reported to the Chief Scientist and recorded in the SCS. The echo sounder calibrations and collections of EK60 data take priority over all other daytime operations.

i. *Calibration*: Pre- and post-survey calibrations of the EK60s and ME70 will be conducted in Elliott Bay, Seattle, WA, and off the west side of Vancouver Island, respectively. The calibration procedure involves suspending tungsten carbide and copper spheres with known backscattering cross sections below the transducers and measuring the acoustic returns. Prior to the pre-survey calibration, the transducers will be visually inspected and cleaned, if necessary. Before and after each calibration, CTD casts will be required to determine local sound speed and absorption values. During calibrations, the vessel should be anchored from the bow, and the water beneath the ship should be at least 40 m deep and preferably devoid of fish and other marine life.

ii. *Survey Transects*: The survey will start in the SCB with nine parallel transects, spaced roughly 20 nmi and oriented northeast-southwest, that span from San Diego to Point Conception. In the SCB, if hake are detected acoustically we will trawl on the aggregation during daytime hours. Parallel transects spaced 10 nmi and oriented east-west will span from ~25 nmi south of Morro Bay, CA to the northwest end of Vancouver Island (**Appendix 1**, **Fig. 1**). Acoustic transects will be run only during the daytime (approximately 14.5 hours per day). Vessel speed will be 9 kts on SW-NE and W-E transects, and 12 kts on SE-NW and S-N connecting legs. If hake are detected acoustically at the western end of a transect, that transect will be extended farther west until the ship reaches the end of the hake aggregation, plus an additional 0.5 nmi. In such cases, the next transect north will also be extended west by the same amount. If CPS echoes are observed within 1 nmi of the western end of a transect, that transect will be incrementally extended another 1 nmi westward until the last nmi of the transect is devoid of CPS backscatter or the transect has been extended by 5 additional nmi. In such cases, the next transect north will begin at the longitude where the previous transect ended. Planned waypoints defining the transect lines (listed in **Appendix 2**, **Table 1**) were provided to the ship in Nobeltec format.

If there is no acoustic cross-talk with the EK60s, the following acoustic instruments may be run and their data collected:

ME70: The ME70 will be operated continuously throughout the survey. Data will be stored in .raw format and may be telemetered to the SWFSC.

ADCP: Only if configured to not crosstalk with the scientific echosounders, the ADCP will be operated continuously throughout the survey. To minimize acoustic cross talk with the EK60s and ME70, the ADCP transmissions will be triggered by, and thereby synchronized with, the EK60. ADCP data will be collected with the assistance of the ship's survey technicians and monitored by a member of the science party.

b. Biological data collection:

Biological data are important to provide information about fish species and their sizes for interpreting acoustic data. Two types of biological sampling methods, involving different sampling gears, will be used during nighttime. One type of biological sampling method will be used during daytime. Nighttime sampling must be completed in time for the ship to be back on the acoustic transect at sunrise, as decided by the sardine fishing FPC in charge of nighttime operations.

i. *Trawl Sampling, NWFSC*: Trawl samples will provide the primary information for interpreting the acoustic data. During the day, twice on average, mid-water and near-bottom sound scatterers will be sampled using an Aleutian Wing Trawl 24/20 (AWT). Trawl gear performance will be monitored for depth, net opening, and other parameters with a Simrad FS70 third-wire trawl sonar attached to the headrope. A temperature-depth recorder (Sea-Bird SBE39) will also be deployed. The AWT will be deployed with a digital video camera system mounted inside the net. The system includes a low-light camera connected to a high-capacity micro digital video recorder, an LED-light array, and two scaling lasers for measuring fish lengths. The camera's housing has a pressure switch that automatically activates the camera when the depth exceeds a preset value and deactivates it when the depth is less.

Trawl catches will be sorted and weighed completely, and total numbers will be determined for most species. Hake will be sub-sampled to estimate their length distributions by sex, and their ages. For subsequent age determination, the hake otoliths will be preserved in 50% ethanol. Stomachs and ovaries from hake will be collected and preserved in 10% neutral-buffered formalin. Hake blood samples will be collected and frozen during the first and last legs of the survey.

Trawl Sampling, SWFSC: Nighttime trawling will be conducted with a Nordic 264 surface trawl. This trawl has been modified with a marine mammal excluder device (MMED) designed to expel marine mammals and other large animals (e.g., turtles, sharks) before they are swept to the rear of the net. The MMED consists of a rigid aluminum grid in the intermediate

section forward of the codend. The trawl will be fitted with cameras and lights to observe animal behaviors and assess the performance of the MMED. Each nighttime trawl, as many as time allows, will be fished at the discretion of the sardine fishing FPC for 30–45 minutes at a towing speed of approximately 3.5 to 5 kts. Trawl locations will be selected each day by the acoustician and Field Party Chief (FPC), based on nearby acoustic backscatter.

All fish in each catch will be sorted to species, if possible, and the catch weighed and lengths measured. In cases of large catches, the catch will be randomly sub-sampled. Standard length and body weight will be measured, fish sexed, maturity graded, otoliths collected, ovaries preserved in buffered formalin, and tails preserved in ethanol vials. Sardine samples will take priority, but measurements will also be made for northern anchovy, jack and Pacific mackerels, hake, and other species, as time permits. All salmon caught in the trawl will be immediately returned to the sea and assumed to survive. Any incidentally killed will be measured and frozen for genetic analyses.

Each night, one of the nighttime trawl stations will also include a CTD-rosette cast, and a pairovet and CalBOBL tow. One CalBOBL net will be 505 µm mesh and the other will be 1 mm or larger to retain adult krill and other large zooplankton. The samples from the larger mesh net will be preserved in ethanol and provided to SWFSC/FRD/AST for analysis.

Pairs of digital X-ray images, dorsal and lateral aspects, will be obtained for samples of sardine, jack mackerel, Pacific mackerel, anchovy, hake, and salmon spp. spanning their observed size ranges. These images will be paired with camera images of the individual fish on a length measurement board, dorsal and lateral aspects, and measurements of standard length, weight, and sex.

ii. *Marine Mammal Protocols, NWFSC*: Before deploying gear/nets that have a potential to cause a marine mammal "take", the Chief Scientist must ascertain if any marine mammals are within 500 m of the planned deployment.

The Chief Scientist must confirm with the Captain or the Bridge Watch that no marine mammals have been seen within 500 m for ten (10) min prior to deployment of any gear. This can be accomplished by either: 1) Having designated scientists and the Captain (and/or designated ship's crew) make observations for a minimum of 10 min prior to a deployment to determine if any marine mammals have been observed; or 2) asking the Bridge Watch to make similar observations for 10 min while the vessel searches for an appropriate area to deploy gear or while motoring on-station prior to deploying gear.

If there are marine mammals in the vicinity, the vessel will remain on site for 10 min to see if they leave the vicinity. If the marine mammals leave, another

10-min watch will be conducted (restarting the clock at the end of the first 10-minute watch). If no additional marine mammals are sighted, the gear/nets may be deployed. If the marine mammals do not leave the vicinity or if they reappear during the second 10-minute watch, the site may be abandoned and the vessel may proceed to an alternate site.

A log documenting the marine mammal watches is required and should contain: 1) Confirmation that the watch was completed prior to deployment of gear; 2) A record of any stations dropped because of the presence of marine mammals; and 3) Species or types of marine mammals observed, and wait times.

If science or deck personnel visually detect marine mammals while conducting non-trawling operations, they shall alert the Captain and the Chief Scientist of its distance and bearing.

Should a marine mammal take occur the Chief Scientist will notify Larry Hufnagle, Michelle McClure or their designate at the FRAM Division.

iii. *Marine Mammal Protocols, SWFSC*: Marine mammal protocols will be followed prior to, during, and following any trawl deployment. During transit to each station, for a period of at least 30 minutes, the OOD, lookouts, and all available scientists will visually scan the sea surface for marine mammals and other protected species (e.g., sea turtles). If marine mammals or other protected species are sighted during this period, or upon arrival at the station, the Chief Scientist, in consultation with the OOD and other knowledgeable members of the crew and scientific staff, will determine if trawling operations can commence without likelihood of interaction between the gear and the animals sighted. This determination will be based on the species and number of animals sighted, their behavior, their position, their vector relative to the path of the vessel, and the professional judgment of the Chief Scientist, OOD, and Fishing Master. If marine mammals or protected species are observed during this period and are determined to be at appreciable risk of interaction with gear, then the vessel will move away at least 0.5 nmi from the animals to a new location within the same general area. The visual scan for marine mammals and turtles will continue during each subsequent move until it is determined that trawling operations can safely commence, or until the station is abandoned.

To reduce the potential of attracting marine mammals and other protected species to the vessel, trawl operations will be the first activity undertaken upon arrival at a new station. During each tow, the OOD and other designated individuals will keep a continuous watch for protected species. If animals are sighted while the net is in the water, the Chief Scientist, in consultation with others, will determine the best strategy to follow to avoid potential takes. In some situations, the decision may be to retrieve the net immediately and move

away from the area. In other situations, the decision may be to continue towing until the animal(s) are clear of the area and away from potential contact with the gear during haul back, when the risk of entanglement may be highest. Every effort will be made to deploy and retrieve the trawl net as quickly as safely possible to avoid possible interactions with marine mammals.

If one or more marine mammals or sea turtles are inadvertently caught in the trawl net and brought aboard, it will be our highest priority to release the animal back into the water as soon as is safely possible. After release, the Designated SWFSC Marine Mammal Point of Contact will be responsible for recording the event, noting the status of the animal (e.g., healthy and alive, injured slightly), the species, and if possible other details such as sex and size. Any marine mammal capture will trigger an immediate telephone contact to the SWFSC leadership, regardless of the time of day, who will take immediate action. Specifically, the Chief Scientist or the SWFSC sardine fishing FPC will immediately notify Cisco Werner (858-334-3207; cisco.werner@noaa.gov), Kristen Koch (858-546-7081; kristen.c.koch@noaa.gov), or Russ Vetter (858-361-2361; russ.vetter@noaa.gov) via telephone and email to convey all the pertinent information regarding the event.

iv. *CalBOBL (CalCOFI Bongo)*: This plankton net is comprised of paired 505-µm mesh nets with 71-cm diameter openings. It is fished obliquely with 300 m of wire out, depth permitting. The wire rates for descent and ascent are 50 and 20 m/min, respectively. The wire angle should be 45° during the ascent and descent of the net frame. Tows will be repeated, if time permits, if the ascending wire angle is less than 38° or greater than 51° during the final 100 m of wire.

c. Physical oceanographic and other projects data collection:

i. *ADCP*: Data from the ship's ADCP will be recorded during the cruise only if doing so does not cause cross-talk with the EK60. Operation of the ADCP should be synchronized with the trigger pulse from the Simrad EK60. Assistance of a survey tech will be needed for daytime and nighttime operations of the ADCP.

ii. *Underway CTD deployments*: The underway CTD will be deployed during the day along acoustic transects at selected locations. The underway CTD requires a vessel speed less than or equal to 10 kts.

iii. *CTD rosette deployments:* The ship's CTD rosette will be augmented with a video plankton recorder (VPR) to provide high-resolution optical images of zooplankton. The CTD rosette with VPR will be cast during crepuscular

periods, at the discretion of the SWFSC sardine fishing FPC, as time permits. The ship's Survey Tech is needed to assist with the operation and maintenance of this equipment.

iv. Thermosalinograph and meteorological sensors: TSG and SCS data will be recorded continuously during the survey. These data will be logged to the ship's computers, and copied to media hard disk drive (HDD) that we provide. The ship's station and position information (MOA log) will also be copied to this HDD. During the pre-cruise meeting, we will specify what to include in the MOA and how the bridge and survey departments wish to number stations and transects.

v. *CUFES*: The egg pump will be mounted inside the ship's hull drawing water from a depth of three meters. The pump will run continuously between stations to sample any pelagic fish eggs. Approximately 640 liters/minute is sent through a concentrator which filters all material larger than 505µm. 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. It is requested that prior to departure on June 6 that the CUFES intake be cleared from all marine growth.

vi. Wave Glider AUV and Towfish: The Wave Glider AUV and Towfish will be loaded in Newport, OR between Legs II and III. Liquid Robotics field technicians with train Shimada crew to deploy and recover AUV in Newport and may sail to deploy AUV during departure day of Leg III. Technicians will be removed via small boat back to Newport, OR (vessel TBD). AUV will be deployed on aggregation of hake to be observed over time (up to 15 days) then be instructed remotely to navigate north along the 200 m isobath until it reaches the US Canada border or is instructed to navigate for recovery during Leg IV.

D. Dive Plan

All dives are to be conducted in accordance with the requirements and regulations of the NOAA Diving Program (http://www.ndc.noaa.gov/dr.html) and require the approval of the ship's Commanding Officer.

No dives are planned during this survey.

E. Applicable Restrictions

Conditions which preclude normal operations: If sea conditions and vessel ride deteriorate to a point where the quality of collected acoustic data is compromised, the

vessel may need to break from running acoustic transects and seek shelter until conditions improve enough for satisfactory collection of acoustic data.

III. Equipment

A. Equipment and Capabilities provided by the ship (itemized)

	Item Name
1	CTD (main unit plus spare), rosette, carousel, water sampling bottles, computer/deck unit, hydrographic winch
2	ADCP computer/deck unit
3	Underway sensors (SCS) and computer/deck unit
4	FSCS computer system
5	Trawl winch, net mensuration (e.g., Simrad third wire)
6	Ship's computer network (at least 4 static IP addresses on SH)
7	Centerboard-mounted transducers
8	Spaces needed: Fish Processing Lab, Chem Lab, Dry Lab, Hydro Lab, Constant Environment Room, and Preservation Alcove
9	Email, telephones, intercom system, handheld radios
10	VHF Radios with NOAA F-Channels
11	Simrad EK60: 18-, 38-, 70-, 120-, and 200-kHz GPTs
12	Simrad ME70 Multibeam echo sounder system
13	FS70 third-wire trawl sounder
14	Applanix POS MV position and attitude sensor system
15	Internal CUFES pump and concentrator
16	Large Marel fish lab scale

B. Equipment and Capabilities provided by the scientists (itemized)

NWFSC Equipment:

	Category	Brand & Quantity
1	Computers	8 laptops
2	Networking	2 16-port and 1 4-port Netgear switches
3	External hard drives	A number of assorted 250-GB, 750-GB, and 1-TB Western Digital drives with cables

4	Software	Software media
5	Trawl gear	2 midwater (AWT) nets
		2 sets of Fishbuster 4-m^2 doors
		necessary spare components of trawling gear
6	Video camera	1 digital video recorder with light array, scaling lasers, and pressure housing
7	Temperature-depth recorders	3 Sea-Bird SBE39s
8	Biological sampling gear	20 fish baskets and 12 tubs (to be shared with the SWFSC)
9		3 Scantrol fish measuring boards
10		2 large and 2 small Marel motion-compensating
11	Video plankton recorder (VPR)	1 SeaScan VPR
12	Calibration gear	5 downriggers (with clamps) and 4 battery packs
13		calibration spheres
14		ultrasonic cleaner
15	UnderwayCTD system	
16	Wave Glider AUV and Towfish	Liquid Robotics and BioSonics

SWFSC Equipment:

	Category	**Brand & Quantity**
1	Computers	2 laptops
2	External hard drives	2 - 1-TB Western Digital drives with cables
3	Software	Software media
4	Trawl gear	2 midwater (AWT) nets
		2 sets of 4-m^2 doors
		necessary spare components of trawling gear
5	Temperature-depth recorders	3 Sea-Bird SBE39s
6	Biological sampling gear	30 tubs / trays (to be shared with the NWFSC)
7		Fish measuring boards
8		2 small Marel motion-compensating scales
9	Net Cam	2 trawl cameras and associated hardware

IV. Hazardous Materials

A. Policy and Compliance

The Chief Scientist is responsible for complying with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it). By Federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and the anticipated quantity brought aboard, MSDS and appropriate neutralizing agents, buffers, or absorbents in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and a chemical hygiene plan. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Per FEC 07, the scientific party will include with their project instructions and provide to the CO of the respective ship 60 to 90 days before departure:

- A list of hazardous materials by name and anticipated quantity
- Include a chemical spill plan the addresses all of the chemicals the program is bringing aboard. This shall include:
    - Procedures on how the spilled chemicals will be contained and cleaned up.
    - A complete inventory (including volumes/amounts) of the chemical spill supplies and equipment brought aboard by the program. This must be sufficient to clean and neutralize all of the chemicals brought aboard by the program.
    - A list of the trained personnel who will be accompanying the project and the training they've completed.

Common Name of Material	**Qty**	**Notes**	**Trained Individual**	**Spill control**
Formaldehyde solution (37%)	7 1-liter plastic bottles	1-liter bottles are stored in chem lab; are diluted to 10% formalin solution in 5-gallon buckets in fish processing lab	Alicia Billings, Steve de Blois, Doug Draper, Larry Hufnagle, Dan Kamikawa	F
Ethanol (95%)	3 x 5 gallons	5-gallon carboys, stored in chem lab	Alicia Billings, Steve de Blois	E
Formaldehyde solution (37%)	5 gallons	No waste, stored in preservation alcove fume hood	Dave Griffith Sue Manion Amy Hays	F

Common Name of Material	Qty	Notes	Trained Individual	Spill control
Buffered formalin (10%)	40 gallons (in 4 oz. and 8 oz. jars)	Stored in wet lab, no waste	Dave Griffith Sue Manion Amy Hays	F
Sodium borate powder	500 gr	Stored in chem lab	Dave Griffith Sue Manion Amy Hays	
Buffered ethyl alcohol (95%)	40 liters (in 20 ml vials)	Stored in chem lab, no waste	Dave Griffith Sue Manion Amy Hays	F
Tris buffer	500 ml	Stored in chem lab	Dave Griffith Sue Manion Amy Hays	

SPILL CONTROL

F: Formalin/Formaldehyde

- Ventilate area of leak or spill. Remove all sources of ignition.
- Wear appropriate personal protective equipment.
- Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible.
- Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e.g., vermiculite, dry sand, earth), and place in a chemical waste container.
- Do not use combustible materials, such as sawdust.

F: Ethanol

- Ventilate area of leak or spill. Remove all sources of ignition.
- Wear appropriate personal protective equipment.
- Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible.
- Use non-sparking tools and equipment. Absorb spill with inert material, then place in suitable container.

Inventory of Spill Kit supplies

Product Name	Amount	Chemicals it is useful against	Amount it can clean up
Spill-X-FP	12 lbs	formalin/formaldehyde	13.6 gallons
absorbent pads	10	formalin/ethanol	10x its weight
Formaldehyde Eater	5 gallons	Formaldehyde	10 gallons

Upon embarkation and prior to loading hazardous materials aboard the vessel, the scientific party will provide to the CO or their designee:

- An inventory list showing actual amount of hazardous material brought aboard
- An MSDS for each material
- Confirmation that neutralizing agents and spill equipment were brought aboard and are sufficient to contain and clean up all of the hazardous material brought aboard by the program.

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory of hazardous material indicating all materials have been used or removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of scientific chemicals is not permitted during projects aboard NOAA ships.

B. Radioactive Isotopes

The Chief Scientist is responsible for complying with OMAO 0701-10 Radioactive Material aboard NOAA Ships. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

At least three months in advance of a domestic project and eight months in advance of a foreign project start date the shall submit required documentation to MOC-CO, including:

1. NOAA Form 57-07-02, Request to Use Radioactive Material aboard a NOAA Ship
2. Draft Project Instructions
3. Nuclear Regulatory Commission (NRC) Materials License (NRC Form 374) or a state license for each state the ship will operate in with RAM on board the ship.
4. Report of Proposed Activities in Non-Agreement States, Areas of Exclusive Federal Jurisdiction, or Offshore Waters (NRC Form 241), if only state license(s) are submitted).
5. MSDS
6. Experiment or usage protocols, including spill cleanup procedures.

Scientific parties will follow responsibilities as outlined in the procedure, including requirements for storage and use, routine wipe tests, signage, and material disposal as outline in OMAO 0701-10.

All radioisotope work will be conducted by NRC or State licensed investigators only, and copies of these licenses shall be provided per OMAO 0701-10 at least three months prior to the start date of domestic projects and eight months in advance of foreign project start dates.

C. Inventory (itemized) of Radioactive Materials

Common Name Radioactive Material	Concentration	Amount	Notes
None			

V. Additional Projects

A. Supplementary (“Piggyback”) Projects

B. NOAA Fleet Ancillary Projects

VI. Disposition of Data and Reports

A. Data Responsibilities

The Chief Scientist will be responsible for disposition of data, feedback on data quality, and archiving of data and specimens collected for the primary project while on board the ship. The Chief Scientist will also be responsible for the dissemination of copies of these data to participants in each leg of the cruise. The Survey Co-Leads (Hufnagle and Demer) will be responsible for overall dissemination of these data to requesters and for archiving data and specimens post-cruise. The ship may assist in copying data and reports insofar as facilities allow. The Survey Co-Leads will also be responsible for pre- and post-cruise meetings and the ship operation evaluation report, with assistance and input from the Chief Scientist(s).

The Chief Scientist will receive all original data gathered by the ship for the primary project. Individuals in charge of supplementary projects conducted during the cruise have the same responsibilities for their project's data as the Chief Scientist has for the primary project’s data. All requests for data onboard the ship should be made through the Chief Scientist for that leg, and post-cruise through the Survey Co-Leads.

Data Requirements:

The ship’s SCS system should default to logging all possible parameters. The list of parameters to be logged can be modified by request from the Field Party Chiefs, the Chief Scientist, or Survey Co-Leads.

The ship will also provide the Chief Scientist with conductivity, temperature, and depth data from each CTD cast.

B. Pre and Post Project Meetings

A pre-cruise meeting among the Commanding Officer, Operations Officer, Chief Boatswain, Executive Officer, Survey Tech, Chief Scientist, and, if possible, the Survey Co Leads will be conducted either the day before (preferred) or the day of departure. The objective of this meeting is to identify day-to-day project requirements in order to best use shipboard resources and identify overtime needs. In addition, the Chief Scientist and Operations Officer will conduct a meeting of the scientific party prior to departure or soon thereafter to train them in sample collection and inform them of project objectives.

Vessel protocols (e.g., meals, watches, etiquette) will be presented by the ship's Operations Officer.

The Chief Scientist shall give a pre-cruise, all-hands mission objective meeting/presentation. This presentation will be provided for all scientific personnel as well as crew and can be 5–10 minutes long. Topics to include: mission objective, history of the project, survey protocol, how the data collected will be used and by whom, social and economic importance of the targeted resource, future plans as well as how the crew and scientists aboard will aid in this data recovery.

Post-Project Meeting: Upon completion of the project, a meeting will normally be held at 0830 (unless prior alternate arrangements are made) and attended by the ship's officers, the Chief Scientist and members of the scientific party to review the project. Concerns regarding safety, efficiency, and suggestions for improvements for future projects should be discussed. Minutes of the post-project meeting will be distributed to all participants by email, and to the Commanding Officer and Chief of Operations, Marine Operations Center.

C. Ship Operation Evaluation Report

Within seven days of the completion of the project, a Ship Operation Evaluation form is to be completed by the Chief Scientist. The preferred method of transmittal of this form is via email to omao.customer.satisfaction@noaa.gov. If email is not an option, a hard copy may be forwarded to:

Director, NOAA Marine and Aviation Operations
NOAA Office of Marine and Aviation Operations
8403 Colesville Road, Suite 500
Silver Spring, MD 20910

VII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example, a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the survey.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Chief Scientist. The Chief Scientist and Commanding Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current make-up of the ship's complement. The Chief Scientist is responsible for ensuring the scientific berthing spaces are left in the

condition in which they were received, for stripping bedding and linen return, and for the return of any room keys which were issued. The Chief Scientist is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the project and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Chief Scientist will ensure that all non-NOAA or non-Federal scientists aboard also have proper orders. It is the responsibility of the Chief Scientist to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 7, 1999 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, Revised: 02 JAN 2012) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website http://www.corporateservices.noaa.gov/~noaaforms/eforms/nf57-10-01.pdf. The completed form should be sent to the Regional Director of Health Services at Marine Operations Center. The participant can mail, fax, or scan the form into an email using the contact information below. The NHSQ should reach the Health Services Office no later than 4 weeks prior to the project to allow time for the participant to obtain and submit additional information that health services might require before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of the NHSQ. Be sure to include proof of tuberculosis (TB) testing, sign and date the form, and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

Contact information:

Regional Director of Health Services
Marine Operations Center—Pacific
2002 SE Marine Science Dr.
Newport, OR 97365
Telephone 541-867-8822
Fax 541-867-8856
Email MOP.Health-Services@noaa.gov

Prior to departure, the Chief Scientist must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the

following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. Steel-toed shoes are required to participate in any work dealing with suspended loads, including CTD deployments and recovery. The ship does not provide steel-toed boots. Hard hats are also required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

D. Communications

A progress report on operations prepared by the Chief Scientist may be relayed to the program office. Sometimes it is necessary for the Chief Scientist to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Chief Scientist. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via e-mail and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128 kbs^{-1} is shared by all vessel's staff and the science team at no charge. Increased bandwidth in 30-day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required and must be arranged at least 30 days in advance.

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *NMAO Fleet IT Security Policy* 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to:

(1) Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.(2) Installation of the latest critical operating system security patches.
(3) No external public Internet Service Provider (ISP) connections.

Completion of these requirements prior to boarding the ship is required.

Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

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). National Marine Fisheries Service personnel will use the Foreign National Registration System

(FRNS) to submit requests for access to NOAA facilities and ships. The Departmental Sponsor/NOAA (DSN) is responsible for obtaining clearances and export licenses and for providing escorts required by the NAO. DSNs should consult with their designated NMFS Deemed Exports point of contact to assist with the process.

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

Responsibilities of the Chief Scientist:

1. Provide the Commanding Officer with the e-mail generated by the FRNS granting approval for the foreign national guest's visit. This e-mail will identify the guest's DSN and will serve as evidence that the requirements of NAO 207-12 have been complied with.
2. 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.
3. 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.
4. Export Control—Ensure that approved controls are in place for any technologies that are subject to Export Administration Regulations (EAR).

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:

1. Ensure only those foreign nationals with DOC/OSY clearance are granted access.
2. 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.
3. Ensure foreign national access is permitted only if unlicensed deemed export is not likely to occur.
4. Ensure receipt from the Chief Scientist or the DSN of the FRNS e-mail granting approval for the foreign national guest's visit.
5. 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.
6. Export Control—8 weeks in advance of the project, 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 who 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.

7. 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:

1. 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.
2. The DSN 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 and a NOAA (or DOC) employee. According to DOC/OSY, this requirement cannot be altered.
3. Ensure completion and submission of Appendix C (Certification of Conditions and Responsibilities for a Foreign National.

Appendices

1. X-Ray Procedures aboard the NOAA Ship *Bell M. Shimada*

    a. X-Ray Generator will be secured in the controlled environment room, with the separate cassette reader/computer system in the acoustics lab. A lead sheet of no less than 1/8" thickness will be placed below the generator to provide adequate protection for the deck below.
    b. X-ray operator is required to wear a lead apron and thyroid shield, and to stand a minimum of 6 feet away from the x-ray generator when making an exposure, the operator will stand outside the controlled environment room.
    c. During the x-ray exposure, all personnel other than the operator are required to stay at least 12 feet away from the generator.
    d. When not in use the x-ray generator will be unplugged and secured at all times.
    e. In the event of fire or flooding the X-Ray generator should be treated as any other electrical appliance.
    f. The X-Ray generator contains no radioactive material and generates X-Rays only when powered up and creating an exposure.

2. Figures, maps, tables, images, etc.

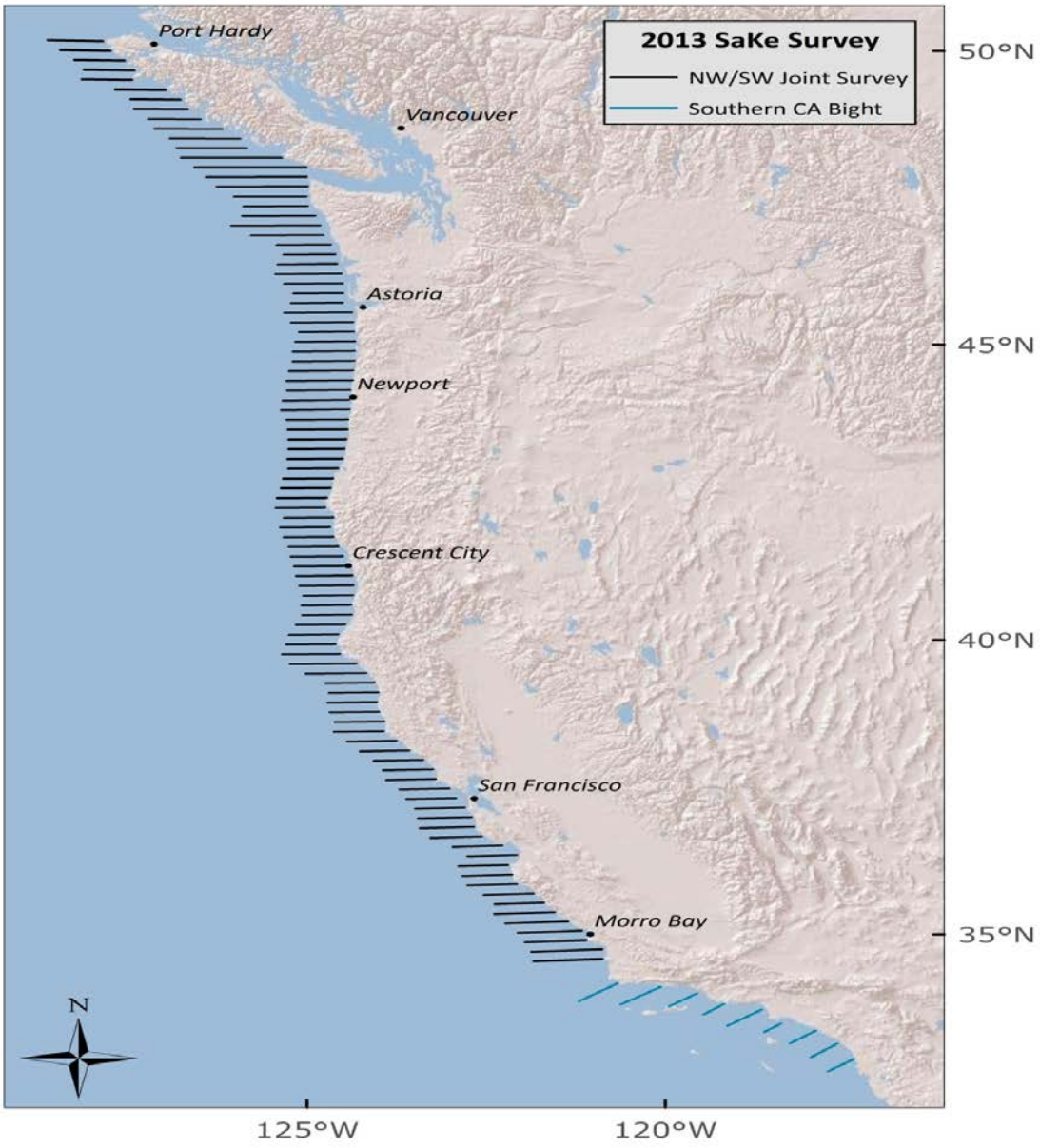

Figure 1. Proposed survey track design for the 2013 joint U.S.-Canada integrated acoustic and trawl survey of Pacific hake and Pacific sardine aboard the NOAA Ship *Bell M. Shimada*.

3. Station/Waypoint List (coordinates in Latitude, Longitude: degrees-minutes)

Table 1. Proposed waypoints for the 2013 joint U.S.-Canada integrated acoustic and trawl survey of Pacific hake and Pacific sardine aboard the NOAA Ship *Bell M. Shimada*.

Waypoint	Latitude	Longitude
SCB_r3_01	32 58.8720 N	117 17.4288 W
SCB_r3_02	32 48.0174 N	117 40.4736 W
SCB_r3_03	33 03.4584 N	117 53.4174 W
SCB_r3_04	33 16.0290 N	117 29.1768 W
SCB_r3_05	33 26.5950 N	117 44.8170 W
SCB_r3_06	33 30.8268 N	117 46.1790 W
SCB_r3_07	33 19.3092 N	118 09.0552 W
SCB_r3_08	33 32.4090 N	118 29.8128 W
SCB_r3_09	33 40.0188 N	118 14.6562 W
SCB_r3_10	33 43.8090 N	118 25.9902 W
SCB_r3_11	33 47.1378 N	118 27.7440 W
SCB_r3_12	33 55.9902 N	118 29.2410 W
SCB_r3_13	33 40.9746 N	119 00.2736 W
SCB_r3_14	33 53.7978 N	119 19.9494 W
SCB_r3_15	34 03.5382 N	119 01.3212 W
SCB_r3_16	34 07.0242 N	119 18.9960 W
SCB_r3_17	34 15.9618 N	119 23.4438 W
SCB_r3_18	34 04.0368 N	119 48.4002 W
SCB_r3_19	34 05.5968 N	119 54.9318 W
SCB_r3_20	34 06.6912 N	120 23.3310 W
SCB_r3_21	34 08.0370 N	120 29.8092 W
SCB_r3_22	34 24.3792 N	119 54.0078 W
SCB_r3_23	34 25.6230 N	120 29.5992 W
SCB_r3_24	34 29.7252 N	120 31.2618 W
SCB_r3_25	34 13.3038 N	121 05.0652 W
1.1	34 55.65 N	121 41.60 W
1.0	34 55.65 N	120 42.13 W
2.0	35 05.65 N	120 41.56 W
2.1	35 05.65 N	121 42.88 W
3.1	35 15.65 N	121 47.75 W
3.0	35 15.65 N	120 54.68 W
4.0	35 25.65 N	120 57.84 W
4.1	35 25.65 N	121 53.59 W
5.1	35 35.65 N	122 03.84 W
5.0	35 35.65 N	121 09.30 W
turn point 1	35 40.30 N	121 19.20 W
6.0	35 45.65 N	121 20.36 W
6.1	35 45.65 N	122 12.93 W

7.1	35 55.65 N	122 12.26 W
7.0	35 55.65 N	121 29.04 W
turn point 2	36 00.70 N	121 36.10 W
8.0	36 05.65 N	121 37.82 W
8.1	36 05.65 N	122 21.13 W
9.1	36 15.65 N	122 35.28 W
9.0	36 15.65 N	121 51.87 W
turn point 3	36 18.20 N	121 55.80 W
10.0	36 25.65 N	121 55.54 W
10.1	36 25.65 N	122 39.04 W
11.1	36 35.65 N	122 42.07 W
11.0	36 35.65 N	121 58.48 W
turn point 4	36 37.30 N	121 58.10 W
12.0	36 45.65 N	121 50.12 W
12.1	36 45.65 N	122 33.81 W
13.1	36 55.65 N	122 46.33 W
13.0	36 55.65 N	122 02.55 W
turn point 5	36 57.90 N	122 10.90 W
14.0	37 05.65 N	122 20.24 W
14.1	37 05.65 N	123 05.83 W
15.1	37 15.65 N	123 14.76 W
15.0	37 15.65 N	122 26.97 W
16.0	37 25.65 N	122 28.38 W
16.1	37 25.65 N	123 15.97 W
17.1	37 35.65 N	123 18.17 W
17.0	37 35.65 N	122 34.00 W
18.0	37 45.65 N	122 41.62 W
18.1	37 45.65 N	123 25.89 W
19.1	37 55.65 N	123 31.70 W
19.0	37 55.65 N	122 47.01 W
turn point 6	37 59.40 N	123 03.20 W
20.0	38 05.65 N	122 58.98 W
20.1	38 05.65 N	123 43.45 W
21.1	38 15.65 N	123 45.79 W
21.0	38 15.65 N	123 01.21 W
way point 7	38 17.00 N	123 04.50 W
22.0	38 25.65 N	123 09.59 W
22.1	38 25.65 N	123 54.27 W
23.1	38 35.65 N	124 06.42 W
23.0	38 35.65 N	123 21.64 W
24.0	38 45.65 N	123 32.99 W
24.1	38 45.65 N	124 17.88 W
25.1	38 55.65 N	124 29.67 W
25.0	38 55.65 N	123 44.68 W

turn point 8	38 58.00 N	123 45.60 W
26.0	39 05.65 N	123 43.60 W
26.1	39 05.65 N	124 28.70 W
27.1	39 15.65 N	124 33.15 W
27.0	39 15.65 N	123 47.95 W
turn point 9	39 16.10 N	123 48.80 W
turn point 10	39 19.80 N	123 50.40 W
turn point 11	39 23.80 N	123 50.70 W
28.0	39 25.65 N	123 49.71 W
28.1	39 25.65 N	124 35.02 W
29.1	39 35.65 N	124 33.44 W
29.0	39 35.65 N	123 48.02 W
30.0	39 45.65 N	123 51.10 W
30.1	39 45.65 N	124 36.63 W
31.1	39 55.65 N	124 54.61 W
31.0	39 55.65 N	123 58.73 W
turn point 12	39 57.70 N	124 05.40 W
32.0	40 05.65 N	124 07.60 W
32.1	40 05.65 N	125 09.12 W
33.1	40 15.65 N	125 16.50 W
33.0	40 15.65 N	124 22.68 W
34.0	40 25.65 N	124 26.50 W
34.1	40 25.65 N	125 12.48 W
35.1	40 35.65 N	125 09.84 W
35.0	40 35.65 N	124 23.75 W
36.0	40 45.65 N	124 16.77 W
36.1	40 45.65 N	125 02.98 W
37.1	40 55.65 N	124 57.07 W
37.0	40 55.65 N	124 10.75 W
38.0	41 05.65 N	124 11.03 W
38.1	41 05.65 N	124 57.47 W
39.1	41 15.65 N	124 55.64 W
39.0	41 15.65 N	124 09.08 W
40.0	41 25.65 N	124 08.51 W
40.1	41 25.65 N	124 59.01 W
41.1	41 35.65 N	125 02.25 W
41.0	41 35.65 N	124 09.10 W
42.0	41 45.65 N	124 17.12 W
42.1	41 45.65 N	125 04.04 W
43.1	41 55.65 N	125 07.05 W
43.0	41 55.65 N	124 17.53 W
44.0	42 05.65 N	124 21.58 W
44.1	42 05.65 N	125 08.75 W
45.1	42 15.65 N	125 13.51 W

45.0	42 15.65 N	124 26.22 W
46.0	42 25.65 N	124 29.38 W
46.1	42 25.65 N	125 16.80 W
47.1	42 35.65 N	125 13.10 W
47.0	42 35.65 N	124 25.56 W
turn point 13	42 40.00 N	124 29.50 W
48.0	42 45.65 N	124 33.30 W
48.1	42 45.65 N	125 20.97 W
49.1	42 55.65 N	125 19.52 W
49.0	42 55.65 N	124 31.72 W
50.0	43 05.65 N	124 27.59 W
50.1	43 05.65 N	125 15.52 W
51.1	43 15.65 N	125 13.16 W
51.0	43 15.65 N	124 25.10 W
turn point 14	43 19.70 N	124 25.30 W
52.0	43 25.65 N	124 19.85 W
52.1	43 25.65 N	125 08.04 W
53.1	43 35.65 N	125 08.62 W
53.0	43 35.65 N	124 15.14 W
54.0	43 45.65 N	124 12.92 W
54.1	43 45.65 N	125 07.61 W
55.1	43 55.65 N	125 07.40 W
55.0	43 55.65 N	124 10.93 W
56.0	44 05.65 N	124 09.39 W
56.1	44 05.65 N	125 07.81 W
57.1	44 15.65 N	125 09.16 W
57.0	44 15.65 N	124 08.54 W
58.0	44 25.65 N	124 06.87 W
58.1	44 25.65 N	125 14.38 W
59.1	44 35.65 N	125 12.73 W
59.0	44 35.65 N	124 06.75 W
60.0	44 45.65 N	124 05.70 W
60.1	44 45.65 N	125 08.15 W
61.1	44 55.65 N	125 08.74 W
61.0	44 55.65 N	124 02.89 W
62.0	45 05.65 N	124 01.73 W
62.1	45 05.65 N	125 06.01 W
63.1	45 15.65 N	125 02.26 W
63.0	45 15.65 N	124 00.12 W
turn point 15	45 21.20 N	124 01.50 W
64.0	45 25.65 N	124 00.01 W
64.1	45 25.65 N	125 02.09 W
65.1	45 35.65 N	124 59.10 W
65.0	45 35.65 N	123 58.84 W

66.0	45 45.65 N	123 59.90 W
66.1	45 45.65 N	124 55.23 W
67.1	45 55.65 N	125 03.52 W
67.0	45 55.65 N	124 00.34 W
68.0	46 05.65 N	124 01.31 W
68.1	46 05.65 N	125 10.06 W
69.1	46 15.65 N	125 03.16 W
69.0	46 15.65 N	124 10.25 W
70.0	46 25.65 N	124 09.62 W
70.1	46 25.65 N	125 00.40 W
71.1	46 35.65 N	125 09.60 W
71.0	46 35.65 N	124 09.80 W
72.0	46 45.65 N	124 10.61 W
72.1	46 45.65 N	125 18.65 W
73.1	46 55.65 N	125 16.26 W
73.0	46 55.65 N	124 15.01 W
74.0	47 05.65 N	124 16.61 W
74.1	47 05.65 N	125 09.86 W
75.1	47 15.65 N	125 17.10 W
75.0	47 15.65 N	124 20.93 W
76.0	47 25.65 N	124 28.73 W
76.1	47 25.65 N	125 43.64 W
77.1	47 35.65 N	126 04.40 W
77.0	47 35.65 N	124 31.34 W
78.0	47 45.65 N	124 36.46 W
78.1	47 45.65 N	125 52.71 W
79.1	47 55.65 N	125 51.67 W
79.0	47 55.65 N	124 44.17 W
80.0	48 05.65 N	124 45.48 W
80.1	48 05.65 N	126 01.57 W
81.1	48 15.65 N	126 20.00 W
81.0	48 15.65 N	124 43.73 W
turn point 16	48 22.60 N	124 46.50 W
82.0	48 25.65 N	124 44.50 W
82.1	48 25.65 N	126 31.47 W
83.1	48 35.65 N	126 43.79 W
83.0	48 35.65 N	124 44.61 W
turn point 17	48 43.00 N	125 09.40 W
84.0	48 45.65 N	125 10.73 W
84.1	48 45.65 N	126 58.18 W
85.1	48 55.65 N	127 03.24 W
85.0	48 55.65 N	125 48.14 W
86.0	49 05.65 N	125 55.51 W
86.1	49 05.65 N	127 10.60 W

87.1	49 15.65 N	127 27.35 W
87.0	49 15.65 N	126 14.54 W
turn point 18	49 22.00 N	126 36.00 W
88.0	49 25.65 N	126 37.94 W
88.1	49 25.65 N	127 33.29 W
89.1	49 35.65 N	127 49.75 W
89.0	49 35.65 N	126 52.27 W
turn point 19	49 42.90 N	126 59.20 W
90.0	49 45.65 N	126 59.78 W
90.1	49 45.65 N	127 53.96 W
91.1	49 55.65 N	128 11.03 W
91.0	49 55.65 N	127 16.66 W
turn point 20	50 02.80 N	127 49.60 W
92.0	50 05.65 N	127 53.60 W
92.1	50 05.65 N	128 48.16 W
93.1	50 15.65 N	128 45.92 W
93.0	50 15.65 N	127 51.17 W
turn point 21	50 18.40 N	128 01.90 W
94.0	50 25.65 N	128 01.91 W
94.1	50 25.65 N	128 56.85 W
95.1	50 35.65 N	129 13.32 W
95.0	50 35.65 N	128 18.18 W
turn point 22	50 39.60 N	128 24.40 W
96.0	50 45.65 N	128 26.96 W
96.1	50 45.65 N	129 27.69 W

4. SWFSC X-Ray Basics

Reminders:

- Save original image in ImagePilot before manipulating. Cassettes are automatically erased when read.
- Always re-erase cassettes before first use of the day, as they acquire background noise while sitting. (To erase plate, press and hold erase button until the reader prompts you for the erase mode, once the reader starts its erase mode you will see it on the reader screen. Once the mode is on you can start loading the plates to erase them. Once you are done you can let the mode time out or push button twice and it will exit the erase mode.)
- Always rehang apron and thyroid shield. They should not be bent/folded, as this will create weaknesses where X-rays can penetrate in the future.
- Turn off x-ray head when not in use.
- Store cassettes vertically, not flat.

- When working on an unstable platform, ie. ship, KEEP LOCKED AT ALL TIMES. Also orient length bow to stern.

This document is intended as a basic guide to using SWFSC MinX-Ray digital head, REGIUS cassette reader, and ImagePilot software. For further details, please see the operation manuals, located on the desktop of the digital imaging computer.

Getting Started

- Turn on cassette reader (press "Operation")
- Turn on computer
- Open ImagePilot program
  - May open automatically or Icon located on desktop
  - Login using your Username & P/W

Using ImagePilot

Start session by starting a New Record ('New Exam'), or by returning to an old record - go to Retrieving previous images.

New Exam – please see illustration next page for button locations

- Click 'New Exam' button
- Click 'Create ID' button, this will automatically register the x-rays in sequence. <u>All images taken at SWFSC must follow this naming system, do not populate this field with your own information (to ensure that all images will have a unique, ImagePilot-generated ID).</u>
- Fill in the remaining fields, pulldown menus for some fields. Click add exam.
- You can add multiple "exams" (x-rays) per specimen ahead of time (if you plan to shoot multiple angles/exposure times, etc) or create a new record. (Repeat above directions.)
- Once you create a record, find it in the Specimen List and double click on it.
  - This brings up the viewer screen.

OR Hi-light the record and select the "View Images" button at right center of screen.

Taking X-rays

- Close door to room
- Turn on 'X-ray in use' light next to door (far right switch).
- Turn on x-ray head – flip switch located on top left back area on head (when facing front of machine).
- Choose appropriate cassette.
- If the specimen is gooey, runny, etc. cover cassette with protective bag (try to reuse bags if possible), but always use caution when using formalin.
- Place cassette (black side up) on table, under head.
- If using in an unshielded area, ie field, ship, etc., place lead shielding sheet under the cassette.
- Place specimen(s) on cassette.
- Turn on Collimare light -- press black button on center top of black box face (move plate in center of cross hairs, adjust beam appropriately).
- Note distance from head to specimen (for your records).

There is a tape measure that you can pull down from the bottom of Collimare (note: tape does not start at zero).

- Adjust kV
- Adjust mAs/sec as needed (note: choose one of these settings to adjust, the head will automatically change the other. Note settings for your records).
- Move lead shielding into place, don apron and thyroid shield, and make sure you are wearing the dosimeter on outside of clothing/apron.
- Take X-ray
    - Press plunger half way until the green 'ready' light on head illuminates (look through window)
    - Step behind shield, press and hold plunger all the way down
- If error displays, turn head off and on again, and repeat x-ray steps.
- Remove specimen(s) and plastic cover from cassette.
- Record settings in Green Log Book for future reference.
- Turn off X-ray head.

- Turn off ‘X-ray in use’ light, switch by door.
- Open room door, if you wish.

Acquiring images from cassette

- Look for “READY” in display on cassette reader.

If not, is the reader on? Is it plugged in? Is there an error message?--> may need to turn off and on again, if necessary see manual on desktop.

- In ImagePilot, select the “CR” button (Cassette Read). The button on the screen will change from deep grey to blue indicating that the system is ready to acquire your image from the cassette. Remember, once the cassette is read, the reader will immediately erase it.
- Gently place cassette in slot, see diagram on reader for positioning. Be patient, it will take a few minutes to read and return the cassette to you. The image will automatically display on the screen.
- Save this image as original, by selecting “Save as original” on right, under the “Image Tools” heading, to preserve your original image before annotating and manipulating.
- If you have taken multiple images of the same “study”, proceed reading the other cassettes.

If you are not satisfied with an image, you can designate it as “NG” (No Good) by selecting the NG button in upper right corner of image to dispose the x-ray.

Manipulating images

Image Processing Palette ImagePilot may be used to carry out additional processing of acquired images such as highlighting, density calibration and shutter adjustments.

Image Tools Palette Used for basic image processing.

Image Adjustment Palette Adjusts the processing degrees for image sharpness, correction low density and high density equalization.

Annotation Tools Palette Enables positioning and setting of annotations on images.

Analysis Tools Palette Used to scale distances or surface areas on images.

- Explore the palettes! You can measure distances, add labels, invert the image (very cool and useful), and a multitude of other items.

Transferring/Storing Images

- In the viewer screen click on the write button - There are two export to media modes: generic and PDI write. The mode may be changed using the drop down menu on the screen.

- What is [PDI] Write?
    - PDI is the acronym for Portable Data for Imaging and refers to a method of sending DICOM data by CD/DVD instead of via network. Since not only images, but also data such as Specimen Info is also included, the resulting data size is larger than that produced by generic writing. Selecting the [PDI] for write mode, enables for [Web Options] and [Simple Viewer] as well as the options relating to the auto-view becomes selectable.
- What is [Web Options]?
    - Allows the written data to be viewed with the Web viewer such as Internet Explorer.
- What is [Simple Viewer]?
    - PDI viewer(software) that allows simple viewing of the DICOM images is delivered together with the ImagePilot software.
        - To use PDI Viewer - Set the disc in the disc drive of the general purpose PC.
        - • The INDEX.HTM screen will be displayed.
        - If it does not start automatically, double-click “INDEX.HTM" file to start the PDI Viewer.
        - When the PDI viewer is started up from the Windows7 CD, a screen will be displayed. Click [Run rundll32.exe] to activate the PDI viewer.
        - A security warning message will be displayed. Click [Yes] button.
        - Click [Run] button.
- What is [Auto-View]?
    - Ticking this checkbox enables automatic display of the contents when the recorded media is inserted in the PC. This automatically displays the web screen when the Web option is selected, while starts the viewer when the Simple Viewer is selected. Note: To use this option, it is necessary that the PC supports the auto-view.
- What is [Generic] Write?
    - Allows normal writing to CD/DVD. A folder stamped with the time when the [Write] button is clicked will be created and the files are saved in this folder in order. Selecting the [Generic Write] for the write mode enables selection of the checkboxes for [Convert to JPEG before writing] and [Export All Multiframe Images].

- What is [Convert to JPEG before writing] ?
    - Write the data after converting the DICOM image to JPEG file. In addition, it becomes possible to select and output frame by frame as to the multiframe images. Note: Do not use the JPEG image for actual diagnosis.
- What is [Export All Multiframe Images] ?
    - Outputs all frames when the data is a multiframe image.

Export to Media Screen

- Select the write destination.
    - For PDI write, only disc drive may be selected as the save destination.
- Select the image to be written.
    - The frame of the selected image will change to blue. (Double-clicking the image will display the enlarged image.)
- Click the [Write] button.

• The data will be saved in the media.

• When data is written to disc, the drive tray automatically opens after completion of the write process.

Finishing

- Turn off computer.
- Turn off cassette reader, press and hold down ‘Operation’ button. Display will start counting down, you can release the button.
- Rehang apron and shield. It should not be bent/folded, as this will create weaknesses where X-rays can penetrate in the future.
- Turn off x-ray head (if not previously turned off)