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CHIEF SCIENTIST CRUISE REPORT
CRUISE MF94-04 (FOCI 4MF94)
11 - 30 April 1994

Scientific Party

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Major Objectives

- 1) calibrate physical and biophysical sensors moored in Shelikof Strait,
- 2) determine abundance and distribution of larval pollock in the southeastern Bering Sea over the continental slope and outer shelf,
- 3) collect samples to determine larval diet, condition, and prey availability over the continental slope,
- 4) collect samples to determine vertical distribution of larvae, their prey and predators,
- 5) collect underway surface chlorophyll and PAR measurements for modeling and mapping the timing of the spring bloom,
- 6) collect calibration samples for biophysical sensors on Peggy mooring (ADCP backscatter, chlorophyll absorbance meters, and temperature salinity sensors,
- 7) collect bio-optical and physical samples to determine horizontal spatial variability around Peggy mooring,
- 8) estimate copepod egg/prey production from shipboard experiments and preserved samples (CalVET).
- 9) examine physical and biological gradients (which are relevant to larval pollock) along the Aleutian Island chain.

Operations

Phase 1 was a calibration of biophysical sensors on Shelikof Strait moorings 94-M2, 9401, 9402, 94-M4, and 9443 (Figure 1). At each mooring (1) CTD cast and (3) CalVET (CalCOFI Vertical Egg Tow for Pseudocalanus egg production estimates) were conducted. Chlorophyll and nutrient samples were collected from the CTD rosette. Samples were also taken at mooring 9403.

Phase 2 was a large-scale survey of larval pollock and zooplankton over the continental slope and outer shelf. A presurvey station (BJ-4) was occupied to determine the maximum depth of pollock larvae (Figure 2). After determining that > 99 % of the larvae were in the upper 200 m of the water column, the survey began at Station BP-25. At all stations, a 60 cm bongo w. 333

micron mesh nets to 200 m was used. At selected stations a 20 cm bongo w. 150 micron mesh nets was fished above the 60 cm frame. CTD casts (for chlorophyll, plant pigment absorbance, and protozoan microplankton) and Larval Condition Tows (muscle DNA and gut histology) were also taken at selected stations (Figure 2). Every other day around a Live Zooplankton Net was towed to collect female copepods for egg production studies. One satellite-tracked drogue was deployed to mark an area of relatively high larval concentrations.

Phase 3 was approx. 48 hours of sampling in an area of greater than average larval concentration over the Continental Slope (as marked by the satellite drifter deployed in Phase 2). Before beginning the operations a RADAR buoy was launched; all samples were taken relative to the buoy as it drifted approx. 15 - 20 cm/s to the NNW. Daytime MOCNESS samples for larval vertical distribution and gut contents at 6 depths were attempted. Triplicate samples were taken at each depth (necessitating three separate tows). Between tows, quadruplicate microzooplankton samples were collected with the CTD rosette water bottles at the location were the second of three nets that were fished for that depth. At the end, after sampling all six depths with the MOCNESS, microzooplankton samples were also collected at the locations of the beginning and end of the tow path. Other sampling at the drifter station included MOCNESS tows for vertical distribution of larvae and zooplankton, Tucker tows for abundance and vertical distribution of larval predators, CalVET tows for Pseudocalanus egg production, Larval Condition tows for muscle DNA and gut histology analyses. At the end of the operations the RADAR buoy was recovered.

Phase 4 was a 36 hr. occupation of a calibration station at the Peggy mooring (nominally 54° 50.5' N and 168° 36.4' W; Figure 2) for CTD casts (with bottles for chlorophyll and nutrient samples), CalVET tows for Pseudocalanus egg production, 2 day and 1 nighttime MOCNESS tows for calibration of the ADCP backscatter measurements and Tucker tows for predators. Between MOCNESS tows the ship occupied two lines of CTD stations in an "L" configuration for additional chlorophyll, nutrient, preserved phytoplankton and plant pigment absorption calibration samples (Figure 3). Near the end of our operations at Peggy, the ship launched a small boat to replace a faulty sensor on the Peggy mooring. We concluded our operations with two ADCP data quality control exercises: a backtrack "L" and backscatter background noise measurement.

Phase 5 was deployment of five satellite-tracked drifters over the Middle Shelf Domain to measure physical dispersion/diffusion as a precursor to a larval mortality experiment next year.

Phase 6 was a survey along the Aleutian Chain in the Outer Shelf Domain to find a location with suitable concentration of larval fish for another series of MOCNESS and Larval Condition tows and CTD casts for larval diet, condition, and prey availability. All sampling was conducted around a RADAR buoy. Larval predators were also sampled using a 1 m Tucker trawl. At the end of the operations the RADAR buoy was recovered.

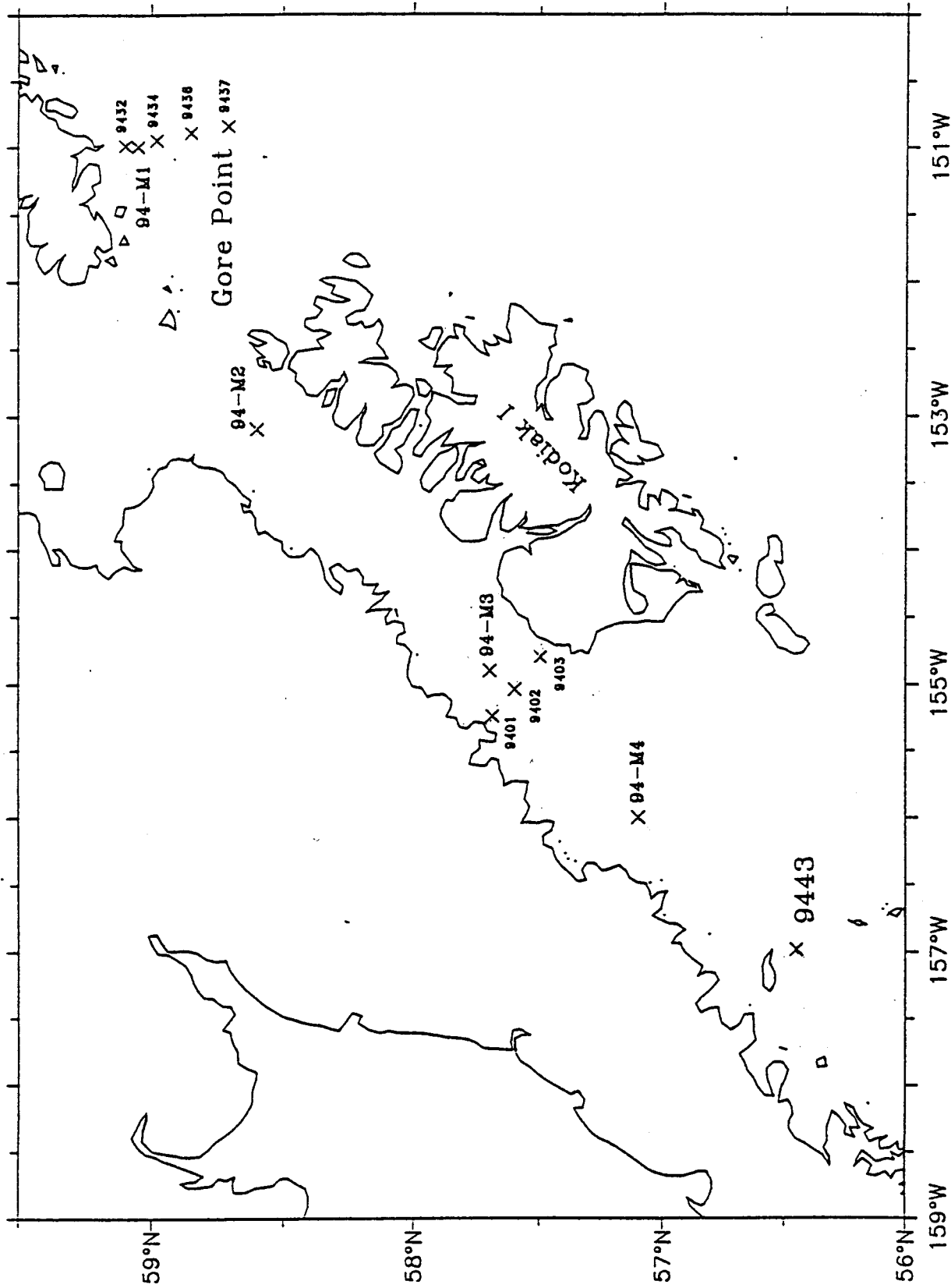
Phase 7 was an investigation of slope/shelf biological gradients along the Aleutian Island Chain (Figure 4). Triplicate 20 and 60 cm bongo samples for zoo- and ichthyoplankton, (1) CTD cast, and triplicate CalVET Copepod Egg Production tows will be taken at each of three stations along six transects from the shelf to the slope beginning in the southeast and working towards the southwest. Near the end of the operation Live Plankton Tows were taken to collect copepods for shipping to Dr. A.J. Paul (Univ. Alaska, Fairbanks, Seward Marine Center) and CalVET tows were taken to return copepod females and nauplii to Seattle for video filming. Larval predators were also sampled using a 1 m Tucker trawl.

Table of Selected Operations

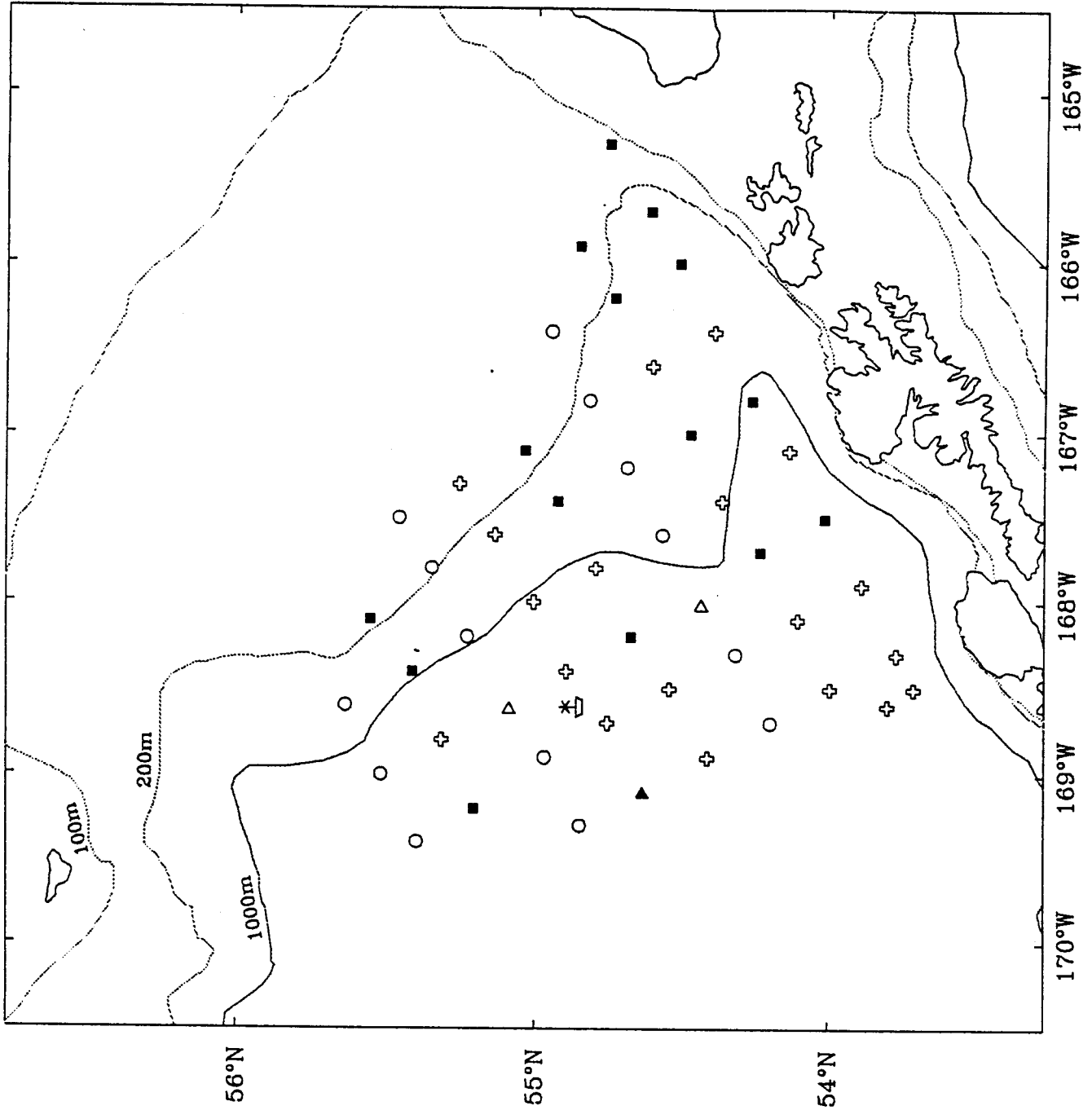
Operations	Number Accomplished
60 cm Bongo Tows	128
20 cm Bongo Tows	101
CalVET Tows	85
Tucker Trawls	9
MOCNESS Tows	18
CTD Casts	85
Preserved Phytoplankton (Lugols) Samples	58
Preserved Phytoplankton (formalin) Samples	20
Plant Pigment Absorbance Samples	64
Satellite Buoys Deployed	6
ADCP Backtrack L	1
ADCP Backscatter Noise Level Calibration	1
Sea Surface Fluorescence, Temp. & Salinity	Continuous
Photosynthetically Active Radiation	Continuous

Conclusion

Almost all of our Program objectives were met. Many samples were collected for both NOAA and academic Bering Sea FOCI Principal Investigators. The abundance and distribution of larvae in the southeastern Bering Sea was very different from last year. The timing of the spring bloom and major production of prey for larval pollock also appeared to be delayed relative to last year. We thank the Captain and the crew for their diligent efforts to help us meet our objectives. We look forward to analyzing the results of this year's experiments and contrasting them to those from 1992 and 1993.



1994 FOCI Shelikof Strait Moorings



* PEGGY

○ 60cm Bongo

⊕ 60cm/20cm Bongo

■ 60cm/20cm Bongo & CTD Cast

△ 60cm Bongo & Larval Condition

▲ 60cm/20cm Bongo & Larval Condition

