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**UNDP/GEF PROJECT ENTITLED “REDUCING ENVIRONMENTAL STRESS IN THE  
YELLOW SEA LARGE MARINE ECOSYSTEM”**

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UNDP/GEF/YS/RSP.2/8  
Date: 15 November 2005  
English only

**Technical Meeting for the Co-operative Study Cruises  
In the Yellow Sea Marine Basin  
For the UNDP/GEF Yellow Sea Project  
Qingdao, China, 17-18 October 2005**

**Implementation Plan for the Co-operative Study Cruises  
In the Yellow Sea Marine Basin**

**1 BACKGROUND**

Based on the discussion and agreements during the preparation phase of the project (PDF-B), Joint Cruise activities were included in the YSLME Project Document, which was approved by the Government of China (8 August 2002), and the Government of Korea (23 July 2002). The first Project Steering Committee meeting approved the Implementation Plan of the project, during which the number of cruises originally planned was reduced from 6 to 2, due to changes in the financial conditions from within, and externally to the Project over the past 5 years.

Following the decisions of the Project Steering Committee (PSC), the Regional Working Groups (RWGs) and the Regional Scientific and Technical Panel (RSTP) further discussed the details of co-operative monitoring cruises, and two cruises were subsequently planned to be undertaken in the Yellow Sea marine basin, although excluding the territorial sea areas of the participating countries.

**2 OBJECTIVES OF THE CRUISES**

The main objectives of the co-operative study cruises are:

- (i) To provide basin-wide, data and information for the Yellow Sea covering all components identified in the Implementation Plan of the project, and based on the data and information gaps identified by the Regional Working Groups,;
- (ii) To provide data and information that will be used, together with other existing data and information, in the preparation of the Transboundary Diagnostic Analysis (TDA), in particular the data and information covering the entire Yellow Sea; and
- (iii) To prepare necessary baselines of the status of the Yellow Sea environment at start of the project implementation, when combined with all data and information

available to the project. The baseline information will be used in the later stage as one of the indicators for the evaluation of the project.

### **3 RESEARCH VESSEL**

Following the discussions and agreements of the RWGs and the RSTP, the research vessel “Bei Dou” was nominated for use in the co-operative study cruises. Detailed information on the research vessel is provided in [Annex I](#).

### **4 DATES OF THE CRUISES**

Based on the agreement of the RSTP, the first cruise, known as the ‘winter’ cruise will be conducted from 4<sup>th</sup>– 25<sup>th</sup> January, 2006, with participation of experts from both China and Republic of Korea.

The second cruise, known as the ‘spring’ cruise is planned to take place in May 2006.

### **5 OBSERVATION STATIONS AND TRANSECTS**

The First RSTP Meeting (*Dalian, China, 4-6 July, 2005*), agreed on an initial navigation plan including sampling stations and transect lines, these are shown in the attached map (Fig. 1), with the latitude/longitude coordinates of the sampling stations shown in Table 2.

In the initial plan, there are 52 observation stations, including:

- 52 stations, for bottom trawl, phytoplankton & zooplankton sampling;
- 15 stations for pelagic trawl (variable, based on acoustic echogram) and not dictated by fixed stations; and
- 27 Environmental Stations (for CTD deployment).

It was agreed that the vessel would leave the port of Qingdao and head to the southern-most sampling station and then track north along the route (Fig. 1). Although this was the agreed plan, it was understood that the track (and station points) may be altered (or survey terminated) depending on weather and other safety issues, with the remaining stations being abandoned.

As a result of the Technical Meeting for the Cooperative Study Cruises held in Qingdao, China, 17<sup>th</sup> to 18<sup>th</sup> October, 2005, the navigation plan was further modified by the group (comprised of chairs of the working groups and members participating in the cruise) and developed into two separate plans to reflect the two separate ‘winter’ (Fig. 2) and ‘spring’ (Fig. 3) surveys (black dots indicate agreed sampling stations for trawl and environmental activities, blue dots indicate stations where only environmental sampling will take place (not trawls), red dots indicate stations that were agreed to be deleted from the proposed set due to time constraints during the survey, and the white dot in the winter map is in error that could not be removed, and should not be considered).

The winter cruise now consists of 50 sampling stations and is a variation of the original plan, whilst the spring survey is much larger, possessing over sampling 70 stations. Both charts still attempts to consider territorial limitations. At this current time the PMO is working on producing an accurate navigational plan, showing the exact navigational coordinates in GIS format in relation to the Yellow Sea basin.

The relevant approvals for the survey based on these plans are currently being obtained by both China and Korea.

## 6 SCIENTISTS ON-BOARD VESSEL DURING SURVEY

The research vessel can accommodate a maximum of 31 scientists at any one time, in addition to the standard crew. The more personnel on-board, the more stress is placed on the vessel in terms of living conditions and consumables.

Previously, the Biodiversity Component had stated that it did not need to send a representative on the cruise; however, at the Technical Meeting for the Cooperative Study Cruise (Qingdao), this component voiced a new interest to undertake surveys for seabirds and marine mammals during both the winter and spring survey.

Based on the discussion of the workload for the different project components, the distribution of the scientists on-board the vessel is agreed as follows:

Regional Working Group for Fisheries:	10
Regional Working Group for Ecosystem:	12
Regional Working Group for Pollution:	6
Regional Working Group for Biodiversity	2

In addition, the PMO is also providing one staff member for the cruise:

PMO:	1
<b>Total:</b>	<b>31</b>

## 7 PARAMETERS TO BE OBSERVED AND SAMPLED

Following the discussion and agreements of the regional working groups and the RSTP, the parameters to be observed and sampled during the co-operative study cruise are shown in Table 1.

Table 1. Sampling parameters for co-operative study cruises.

<b>Fisheries component</b>	<ul style="list-style-type: none"> <li>• Bottom trawl sampling at predetermined stations</li> </ul>
	<ul style="list-style-type: none"> <li>• Adaptive pelagic and/or bottom trawl sampling at selected site based on acoustic observations</li> </ul>
<i>Population</i>	<ul style="list-style-type: none"> <li>• Continuous acoustic sampling along transects</li> <li>• Species composition by station</li> </ul>
	<ul style="list-style-type: none"> <li>• Total number and weight of all catch by station</li> </ul>
	<ul style="list-style-type: none"> <li>• Abundance by dominant pelagic species and zoo plankton</li> </ul>
<i>Biometrics</i>	<ul style="list-style-type: none"> <li>• Number, weight, size, age, by species, by station</li> <li>• Stomach content</li> </ul>
<i>Ichthyoplankton</i>	<ul style="list-style-type: none"> <li>• Larval composition of dominant species</li> </ul>
<i>Condition of Fishing Grounds</i>	<ul style="list-style-type: none"> <li>• Water temperature and salinity by depth</li> </ul>

	<ul style="list-style-type: none"> <li>• Food (chlorophyll, Zoo plankton)</li> </ul>
<b>Ecosystem component</b>	
Oceanographic variables	<ul style="list-style-type: none"> <li>• CTD with PAR, beam-transmission, fluorescence</li> </ul>
	<ul style="list-style-type: none"> <li>• Nutrients</li> </ul>
<i>Phytoplankton</i>	<ul style="list-style-type: none"> <li>• Phytoplankton species counts</li> </ul>
	<ul style="list-style-type: none"> <li>• Size-fractionated biomass (chl-a) and primary production</li> </ul>
	<ul style="list-style-type: none"> <li>• pico-Phytoplankton cell counts and primary production</li> </ul>
	<ul style="list-style-type: none"> <li>• Bio-optics (down-welling and upwelling spectral radiance, attenuation, HPLC, particulate absorption, pigment absorption, etc)</li> </ul>
<i>Zooplankton</i>	<ul style="list-style-type: none"> <li>• Zooplankton species abundance</li> </ul>
	<ul style="list-style-type: none"> <li>• Meso-zooplankton biomass</li> </ul>
	<ul style="list-style-type: none"> <li>• Meso-zooplankton fecal pellet production</li> </ul>
	<ul style="list-style-type: none"> <li>• Meso-zooplankton egg production</li> </ul>
	<ul style="list-style-type: none"> <li>• Vertical distribution of fecal pellets from water sample</li> </ul>
	<ul style="list-style-type: none"> <li>• Zooplankton vertical distribution, in selected station(s), using MOCNESS (or MPS)</li> </ul>
<i>Benthos</i>	<ul style="list-style-type: none"> <li>• Benthos species diversity, abundance, and biomass (by grab-sample)</li> </ul>
	<ul style="list-style-type: none"> <li>• Sediment core (&lt;1m length)</li> </ul>
	<ul style="list-style-type: none"> <li>• Grain size of bottom sediments</li> </ul>
	<ul style="list-style-type: none"> <li>• Sediment organic content</li> </ul>
	<ul style="list-style-type: none"> <li>• Bottom temperature, salinity, and oxygen level</li> </ul>
<i>Bacteria</i>	<ul style="list-style-type: none"> <li>• Abundance &amp; biodiversity</li> </ul>
	<ul style="list-style-type: none"> <li>• Heterotrophic bacterial production</li> </ul>
	<ul style="list-style-type: none"> <li>• Limiting resources for bacterial growth (potential impact by yellow sand)</li> </ul>
	<ul style="list-style-type: none"> <li>• Heterotrophic bacterial respiration</li> </ul>
<i>Protozoa</i>	<ul style="list-style-type: none"> <li>• Protistan (flagellate &amp; ciliates, etc.) abundance and composition</li> </ul>
	<ul style="list-style-type: none"> <li>• Protozoan grazing on the picoplankton</li> </ul>
<b>Pollution Component</b>	
	<ul style="list-style-type: none"> <li>• Common environmental parameters: including temperature, salinity, pH, transparency, DO, COD, SS, Chlorophyll a;</li> </ul>
	<ul style="list-style-type: none"> <li>• Nutrients</li> </ul>
	<ul style="list-style-type: none"> <li>• Organic pollutants</li> </ul>
	<ul style="list-style-type: none"> <li>• Heavy metals</li> </ul>
<i>In Seawater</i>	<ul style="list-style-type: none"> <li>• Routine parameters: temperature, salinity, pH, turbidity, DO, COD, SS, chlorophyll a;</li> </ul>
	<ul style="list-style-type: none"> <li>• Nutrients: nitrogen (nitrate, nitrite and ammonia), phosphate, silicates;</li> </ul>
	<ul style="list-style-type: none"> <li>• Organic pollutants: total organic carbon, oil, PAHs, PCBs, OCPs;</li> </ul>

	<ul style="list-style-type: none"> <li>• Heavy metals: Cd, Cr, Cu, Pb, Hg, Zn, As.</li> </ul>
<i>In Sediment</i>	<ul style="list-style-type: none"> <li>• Sulfide, TOC, Oil, Total nitrogen, Total phosphate, Heavy metals (Cd, Cr, Cu, Pb, Hg, Zn, As), Eh;</li> </ul>
	<ul style="list-style-type: none"> <li>• Organic pollutants: PAHs, PCBs, OCPs.</li> </ul>
<i>In Biota</i>	<ul style="list-style-type: none"> <li>• Heavy metals: Cd, Cr, Cu, Pb, Hg, Zn, As.</li> </ul>
	<ul style="list-style-type: none"> <li>• Organic pollutants: oil, PAHs, PCBs, OCPs;</li> </ul>
<b>Biodiversity Component</b>	
<i>Seabirds</i>	<ul style="list-style-type: none"> <li>• Presence, abundance of Species</li> </ul>
<i>Marine Mammals</i>	<ul style="list-style-type: none"> <li>• Presence, abundance of Species</li> </ul>

## 8 LOGISTICAL ARRANGEMENTS

During the Meeting, a number of other issues were discussed and addressed. These were:

- Sampling stations
- Transportation of equipment and personnel
- Scientists' roles and responsibilities
- Preparation of equipment and research vessel
- Sample and data sharing and follow up work
- Contracts for cruise participants.

All sampling equipment will be ready and on-board the vessel before January 4<sup>th</sup> and all scientists are required to be on-board in Qingdao, China, on the morning of January 4<sup>th</sup>. The vessel will depart in the evening on January 4<sup>th</sup> and return to Qingdao on the January 25<sup>th</sup>.

**Figure 1. Observation Stations and Transect Lines of the Co-operative Study Cruises**

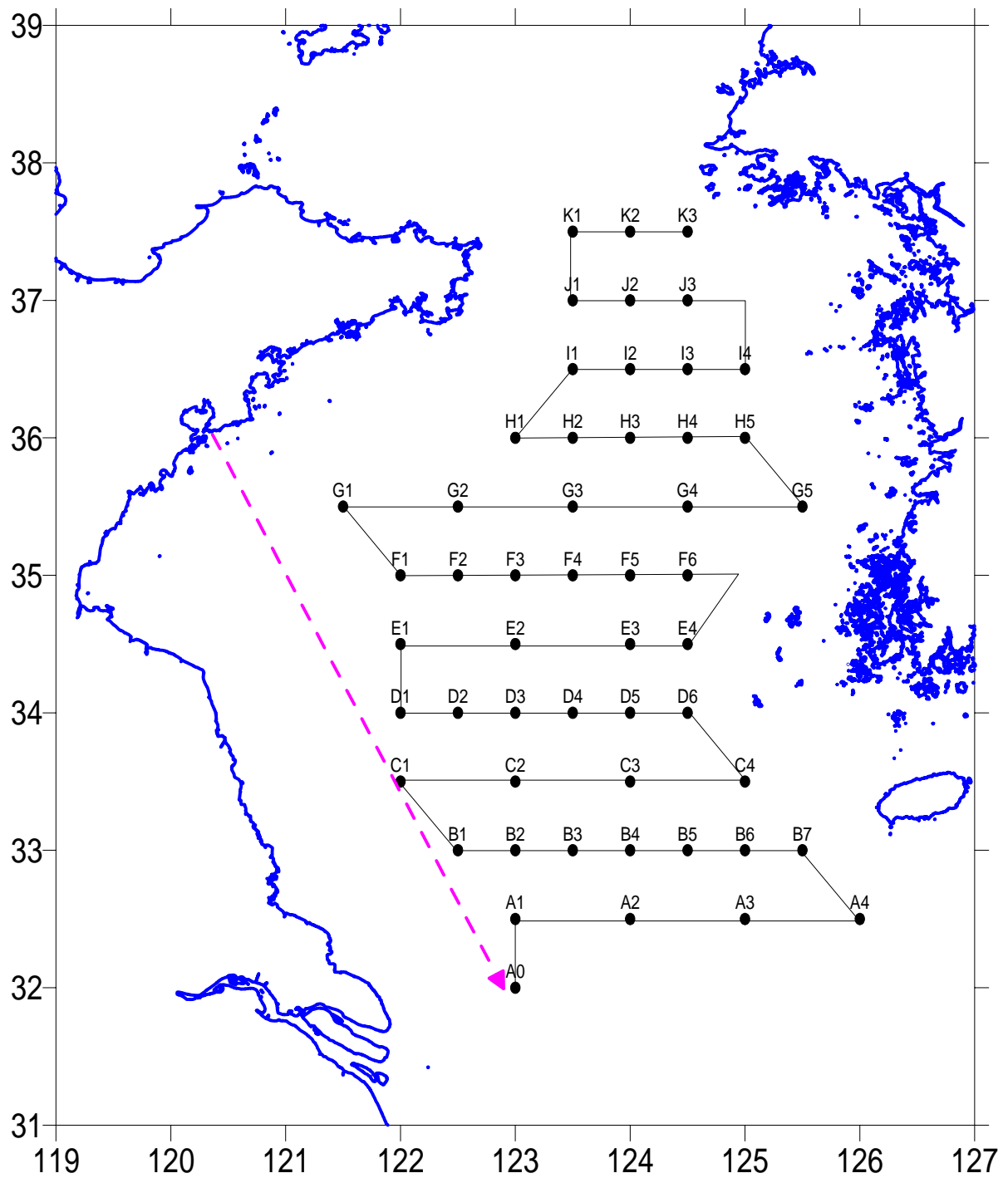
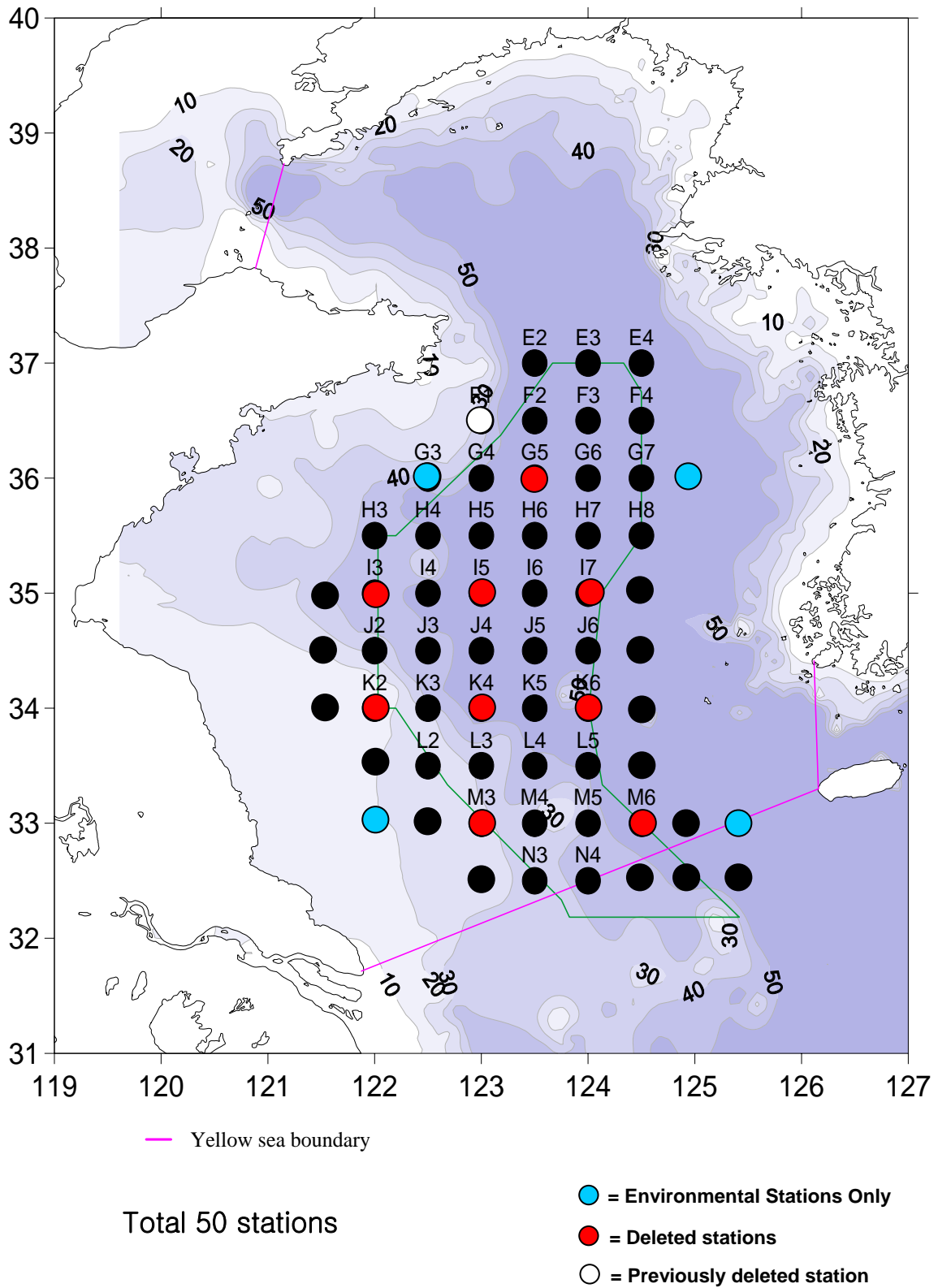


Table 2. Locations of the observation stations

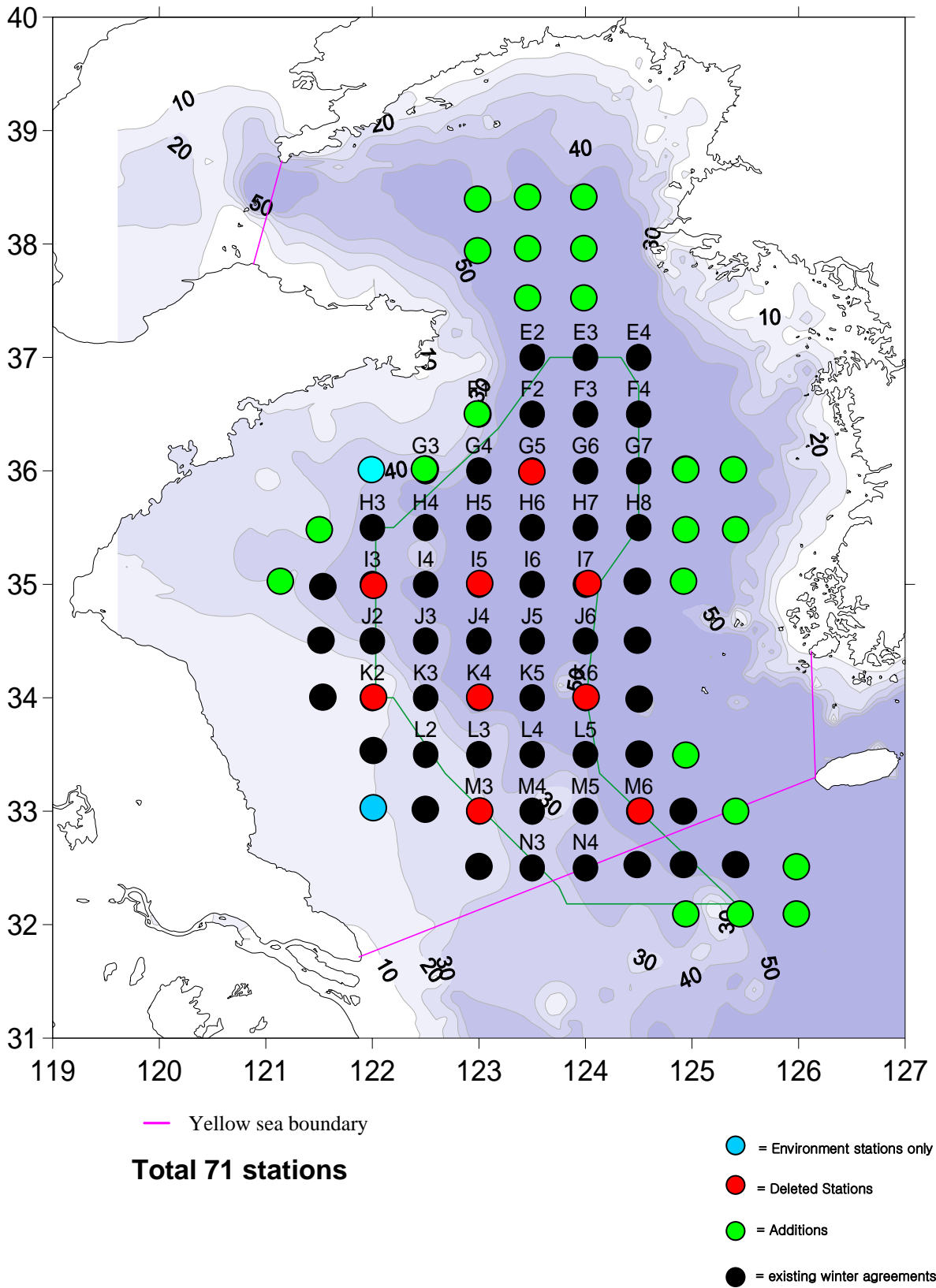
St. No.	Latitude	Longitude	St. No.	Latitude	Longitude
A0	32	123	F1	35	122
A1	32.5	123	F2	35	122.5
A2	32.5	124	F3	35	123
A3	32.5	125	F4	35	123.5
A4	32.5	126	F5	35	124
B1	33	122.5	F6	35	124.5
B2	33	123	G1	35.5	121.5
B3	33	123.5	G2	35.5	122.5
B4	33	124	G3	35.5	123.5
B5	33	124.5	G4	35.5	124.5
B6	33	125	G5	35.5	125.5
B7	33	125.5	H1	36	123
C1	33.5	122	H2	36	123.5
C2	33.5	123	H3	36	124
C3	33.5	124	H4	36	124.5
C4	33.5	125	H5	36	125
D1	34	122	I1	36.5	123.5
D2	34	122.5	I2	36.5	124
D3	34	123	I3	36.5	124.5
D4	34	123.5	I4	36.5	125
D5	34	124	J1	37	123.5
D6	34	124.5	J2	37	124
E1	34.5	122	J3	37	124.5
E2	34.5	123	K1	37.5	123.5
E3	34.5	124	K2	37.5	124
E4	34.5	124.5	K3	37.5	124.5

**Figure 2. Survey Plan for the WINTER Cruise**





**Figure 3. Survey Plan for the SPRING Cruise**





## Annex I

### Brief Information on the Research Vessel "Bei Dou"

**Ship Name:** RV Bei Dou ("North Star") (China)

**US NODC Code:** Yellow Sea Fisheries Research Institute

**Contact:** Prof. Qisheng Tang

**Operator:** Yellow Sea Fisheries Research Institute (YSFRI)  
106 Nanjing Road  
Qingdao,  
Shandong 266071  
China  
Phone: +86-532-8584 9430  
Fax: +86-532-8581 1514  
Cable: QINGDAO 4282

<b>Length (M):</b>	56.20
<b>Range (n. mi.):</b>	9000
<b>Crew:</b>	12
<b>Beam (M):</b>	12.5
<b>Endurance (days):</b>	30
<b>Officers:</b>	10
<b>Draft (M):</b>	6.50
<b>Cruise speed (kt):</b>	12.0
<b>Gross Tons (mt):</b>	1147
<b>Max. speed (kt):</b>	13.7
<b>Air Cond.:</b>	yes
<b>Power (HP):</b>	2250 (1685KW)
<b>Aux. Power (HP):</b>	700
<b>Main vessel activity:</b>	Fisheries
<b>Year built:</b>	1984
<b>Ocean area where vessel operates:</b>	Yellow Sea; East China Sea
<b>Capacities and working spaces</b>	
Dry cargo holds:	53m <sup>3</sup>
Fuel:	300m <sup>3</sup>
Fresh water:	60m <sup>3</sup>
Wet laboratories (total area):	25m <sup>2</sup>
Fish Lab (total area):	20m <sup>2</sup>
Dry laboratories (total area):	25m <sup>2</sup>
Fresh water generator capacity:	4m <sup>3</sup>
Freeboard to working deck:	2.7m
Free working deck area:	60m <sup>2</sup>
Space for container laboratory:	4m x 6m

Maximum number of Scientists:	31, all accommodation provided
Total beds:	56 (single, double, four, six)
<b>Design Particulars</b>	
Hull materials:	Steel
<b>Energy sources</b>	
Main engine(s): number:	1
Make:	Diesel
Model:	
Power (BHP) each main engine:	2250 at 825 rpm
Diameter and max. rpm propeller:	3.000m 164 rpm
Total power auxiliary diesels:	700HP
<b>Electrical systems</b>	
AC Voltage:	220/ 380V, total 1140kVA, 3phase, 50Hz
AC Voltage:	220/ 380V, total 560kVA, 3phase, 50Hz
DC Voltage:	0V, total 0V
Stabilized system for scientific equipment:	220VAC 10AMP 50Hz
<b>Fixed equipment</b>	
Navigation and communication	
Nav. equip:	Radar Loran SatNav Gyro DopLog
Comms:	Fax SatCom
Comm sat:	yes
GPS:	yes
<b>Acoustic</b>	
Echo-sounders for scientific research:	SIMRAD EK500/38kHz
Sonar:	Fisheries
<b>Oceanographic</b>	
Oceanographic winches: number:	2
Steel wire length:	3500m, safe working load: 1tons
Conducting cable length:	0m, safe working load: 0tons
Trawl winch length:	0m, safe working load: 0tons
Gantry	
Position:	Midships
Clearance above deck:	7m and outboard extension: 6m
Safe working load at max. reach:	3tons
<b>Crane</b>	
Use:	for CTD with Rosette sampler
Position:	Stern, midships

Clearance above deck:	9m and outboard extension: 4m
Safe working load at max. reach:	3tons
Other winches for instruments or sampling:	2
<b>Electronic data processing equipment permanently available on board</b>	
Computer:	IBM 80386:
<b>Vessel construction and maintenance supervision</b>	
Classification Society:	DNV,CLASS A1A
<b>Published vessel data</b>	
Magazine:	Marine Fisheries Research
Issue:	11
Date:	01-jan-1990