MEXUS-Gulf Ichthyoplankton Research, 1977-84

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Introduction

The Ichthyoplankton Working Group is one of the original working groups established at the founding of MEXUS-Gulf. The objectives of the working group have undergone little change over the past nine years and the results have advanced our understanding of the Gulf of Mexico. Basic ichthyoplankton studies entail the collection of plankton samples from the sea. These samples are then analyzed to provide: 1) Fishery-independent estimates of spawning stock size, 2) information on distribution and abundance of eggs and larvae of fish, 3) information on kinds of fish spawning, and 4) information on habitat preferences of the early life history of fish. This paper describes the objectives, methods, and accomplishments of the Ichthyoplankton Working Group since the establishment of MEXUS-Gulf.

Objectives

The continuing objective of the Ichthyoplankton Working Group has been to assess the biomass of major fishery resources of the Gulf of Mexico by the fishery-independent method of cooperative ichthyoplankton surveys. Specific objectives have been to: 1) Estimate the biomass of spawning stocks of priority species of finfishes and shellfishes in the Gulf of Mexico, 2) determine the geographic distribution, time of spawning, and amount of spawning of eggs, larvae, and juveniles, and 3) study environmental factors affecting the abundance and distribution of eggs, larvae, and juveniles. These objectives have been supplemented from time to time with short-term specific objectives to conduct synoptic surveys, carry out intercalibration stations, describe distribution patterns of early life history stages, analyze zooplankton communities, analyze hydrographic conditions in relation to the distribution of organisms, cooperate with other institutions, and provide training and technology transfers.

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Methods

The major activity is to conduct large-scale ichthyoplankton surveys from both U.S. and Mexican research vessels. These surveys entail the use of a grid pattern of stations at a minimum distance of every 60 n.mi. or intersection of each degree of latitude and longitude. This grid pattern covers the waters of the Gulf of Mexico in the exclusive economic zones of the Unites States and Mexico and also includes the Caribbean coast of Mexico. The long-term intent is to sample each of these stations in each month of the year to provide eventually complete temporal and spatial coverage of the area. The principal sampling gear is the 60 cm bongo net using 0.333 mm mesh netting. The net is towed from 200 m depth or within 5 m of the bottom if less than 200 m to the surface with the vessel's speed maintaining a 45° wire angle as the net is retrieved at 20 m/second. Simultaneously a 10 minute surface tow is made with a neuston net. Ancillary data includes sea surface temperature, bathythermographs at each station, and, if possible, measurements of salinity, chlorophyll, Secchi disk, irradiance, nutrients, C_{14} updake, and Gelbstoff. These latter measurements were not required and were only collected intermittently. The resulting plankton samples are sorted by the respective agency supporting the cruise, or as in 1982, by the Plankton Sorting and Identification Center (Zaklad Sortowania I Oznaczania Planktonu) in Szczecin, Poland. Training and technology transfers include: The training of Mexican scientists at the NMFS Southeast Fisheries Center's Miami Lababory in identification, U.S. scientists have visited the Instituto Nacional de Pesca (INP) laboratory in Mexico City to identify larvae, Mexican scientists have served on the field parties of U.S. research vessels for training, U.S. scientists have furnished Mexican colleagues with literature pertinent to the discipline, and, finally, both U.S. and Mexican scientists have exchanged data and manuscripts.

Results

Table 1 summarizes the results of the ichthyoplankton surveys of the Gulf of Mexico since the formation of MEXUS-Gulf in 1977. In 1982 the first major cooperative survey took place and the participants are listed in Table 2. This extensive survey covered the entire area as shown in Figure 1. Preliminary results of that survey were jointly published by U.S. and Mexican scientists (Richards et al., 1984). Both Mexican and U.S. scientists have been interested in tunas and Figure 2 denotes the distribution of blackfin tuna larvae during 1982 as an example of the type of information generated by these surveys. Additionally, five reports have appeared which utilize data from this cooperative work. These include a description of the ecosystem by Sherman et al. (1983), a

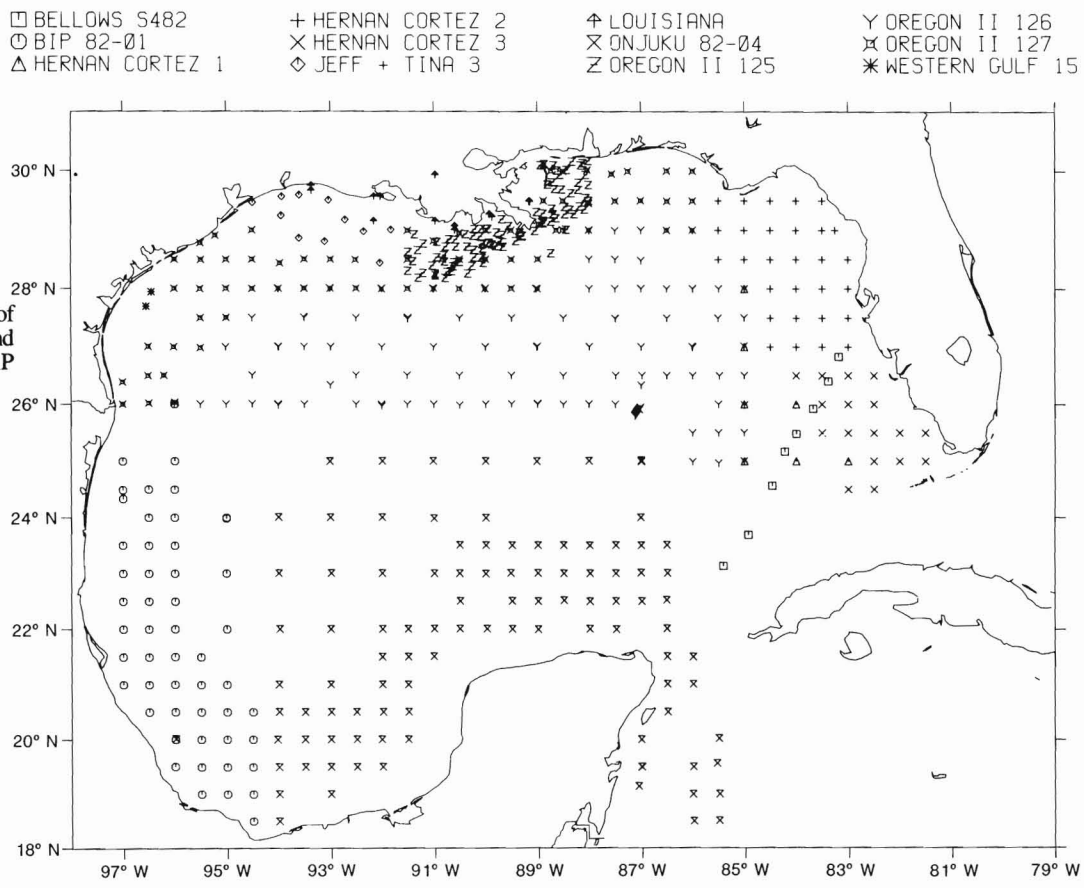

Figure 1.—Distribution of ichthyoplankton stations and vessels during SEAMAP 1982.

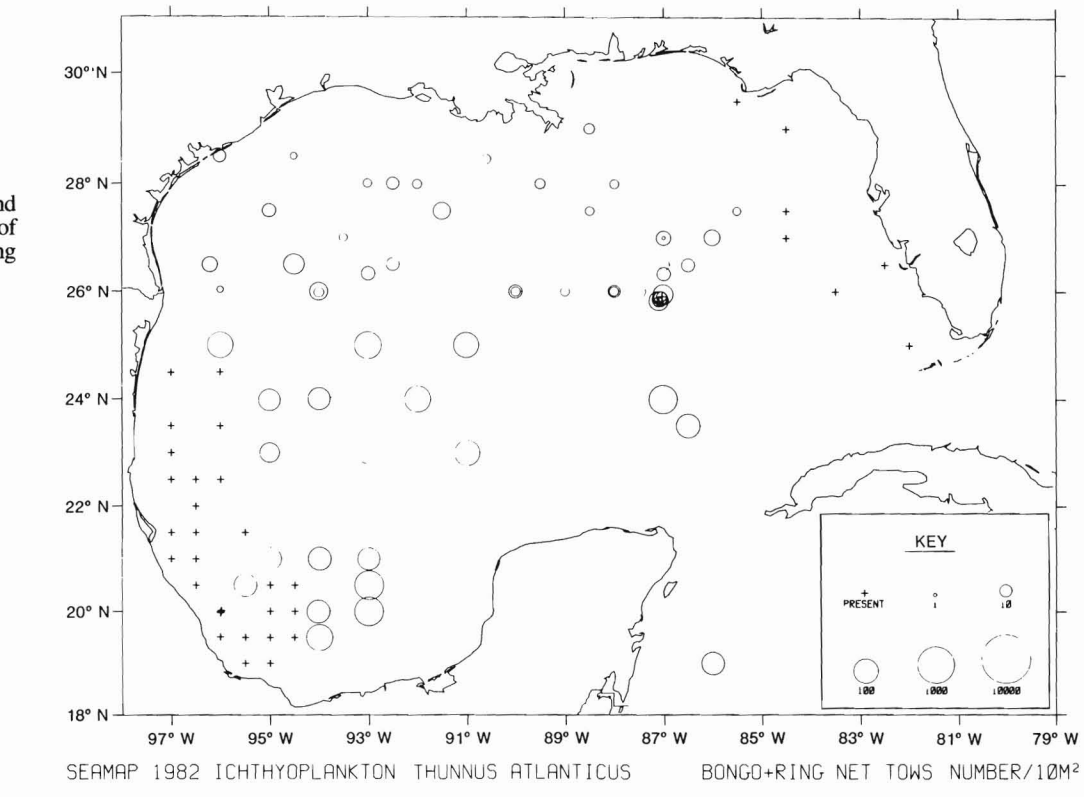

Figure 2.—Distribution and abundance of larvae of *Thunnus atlanticus* during SEAMAP 1982.

Table 1.—Summary of ichthyoplankton cruises and types of samples collected in the Gulf of Mexico 1977-1984.

Year	Cruise	Date	No. of completed stations	Environmental parameters										
				Bongo	Neuston	XBT	Surface temp.	Chloro-phyll	Salinity	Secchi disk	Irrad-iance	Nutri-ents	C_{14} uptake	Gelbs-toff
1977	*Oregon II*-77	April 29-May 24	48	X	X		X							
1978	*Oregon II*-87	May 2-May 30	134	X	X	X	X	X						
1980	*Oregon II*-105	Feb. 25-March 27	80	X	X	X	X	X			X	X	X	X
1981	*Oregon II*-117	May 1-May 26	102	X	X	X	X							
	Oregon II-120	August 15-August 28	45	X	X	X	X							
1982	*Oregon II*-126	April 15-May 23	120	X	X	X	X	X	X	X				
	SEAMAP	June-July	400	X	X	X	X	X	X					
1983	SEAMAP		—[1]	X	X	X	X	X	X					
1984	SEAMAP		—[1]	X	X	X	X	X	X					

[1]Incomplete data processing.

summary of research and bluefin tuna population estimates by Richards et al.,[1] a report on tuna larvae by Olvera (1984), a description of the results of the 1983 surveys by Kelley et al. (1986), and an analysis of the bluefin tuna larval results by McGowan and Richards (1986). This latter document formed the basis for a decision to index the bluefin stock in the Gulf of Mexico with larval data rather than a fishery.

The cooperative aspects of MEXUS-Gulf have yielded important information as already evidenced, and the continuance of this cooperative effort will yield outstanding results as the data are analyzed and as a long-term data base is generated. The Gulf of Mexico is one of the most dynamic ecosystems in the world and a continuing sampling program will yield important results. The long-term sampling will provide a long-term look at the dynamics of the system thus increasing the value of the data base each year as the data accumulate and refine the dynamic properties of the early life history stages of the fish and invertebrate communities.

Table 2.—SEAMAP 1982 participants.

Vessel	Cruise number	Station numbers	Gear	Dates 1982	Affiliation
Oregon II	126	36659-36787	Bongo, Neuston	4/15-5/25	NMFS
Bellows	S482	1-8	Neuston, Bongo	4/27-4/28	Fla. Dep. Nat. Resour.
Jeff & Tina	3	B213-B220	Bongo, Neuston	6/15-7/6	NMFS
Western Gulf	15	B233-B234	Bongo	6/23-6/24	Tex. Dep. Park Wildl.
Louisiana	0	1-43	Ring	6/1-7/30	La. Dep. Parks Wildl.
Oregon II	127	36788-37059	Bongo, Neuston	6/1-7/13	NMFS
Hernan Cortez	1	5-11	Neuston	5/16-5/20	Fla. Dep. Nat. Resour.
Hernan Cortez	2	A2-A30	Bongo, Neuston	6/9-6/13	Fla. Dep. Nat. Resour.
Hernan Cortez	3	31-49	Neuston, Bongo	6/20-6/22	Fla. Dep. Nat. Resour.
Oregon II	125	36005-36627	Bongo	2/24-3/17	NMFS
Onjuku	82	65-13050	Bongo		INP
BIP	82-01	11040-13050	Bongo		INP
Onjuku	82-04	50110-15011	Bongo	6/1-7/23	INP
BIP	82-01	70-30-80-30	Bongo	5/1-6/21	INP
Onjuku	82-04	14090-16023	Bondo	5/1-6/30	INP

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