A general description of the SEAMAP larval king mackerel dataset with updated indices of larval occurrence and abundance, 1982 to 2000

Joanne Lyczkowski-Shultz and David S. Hanisko
NOAA/NMFS/SEFSC Mississippi Laboratories,
Pascagoula Facility, Pascagoula MS 39564

Abstract
Survey indices of king mackerel larval occurrence and abundance from Southeast Area Monitoring and Assessment Program (SEAMAP) resource surveys in the Gulf of Mexico reflect trends in spawning stock size and have been used in stock assessments since 1996. Annual mean abundance and occurrence of larvae are calculated from catches in bongo net samples taken during two, sampling periods that encompass the king mackerel spawning season in the Gulf of Mexico: June and July during the Summer Shrimp/Groundfish Survey and late-August to mid-October during the Fall Plankton Survey. Since 1982 the number of samples taken each year during summer surveys has ranged from 10 to 76 samples. The summer survey area includes continental shelf and coastal waters west of 88° W longitude; although in the earliest years of the time series (1982 to 1988) sampling was conducted further east off northwest Florida. In 1986 a Gulfwide fall plankton survey of continental shelf and coastal waters between Brownsville, Texas and south Florida was initiated. The number of samples taken during that survey has ranged from 35-141; although, 24 samples taken during the Louisiana seasonal trawl survey in September 1985 were used in the index for that year. A thorough examination of these data is being undertaken at the Mississippi Labs principally to determine the influence of deviations from survey design, duplicated sampling effort and inter-annual differences in size composition on larval indices over the time series.

General Description of SEAMAP Plankton Surveys and Data:
Ichthyoplankton samples have been collected during fishery-independent, resource surveys in the Gulf of Mexico (GOM) since 1982 under the Southeast Area Monitoring and Assessment Program (SEAMAP; Rester et al. 2000). Surveys are conducted by the National Marine Fisheries Service in cooperation with the states of Florida, Alabama, Mississippi, and Louisiana. The original plan for SEAMAP plankton surveys was to sample both the open (shelf edge to U.S. EEZ) and continental shelf (10 to 200 m) portions of the Gulf in their entirety at least once during each season. This ambitious goal has not been achieved because survey data relevant to fisheries-related issues must encompass the entire geographic extent of spawning which, for most species, includes either the entire open Gulf or continental shelf regions. Furthermore, once established, these surveys must be conducted on an annual basis in order to build a historical database from which population trends can be assessed. The current surveys do encompass the spawning seasons of many of the managed species in the Gulf.

Due to these constraints SEAMAP ichthyoplankton data have been collected primarily during four survey periods: spring (April and May, 1982 to present), summer (June and July, 1982 to present), late summer /early fall (typically in September, 1986 to present)

and fall (October and November, 1982 to present). The spring survey covers only open U.S. GOM waters, while the summer and fall surveys encompass only continental shelf waters from south Texas to Mobile Bay; and the late summer/early fall survey from south Texas to south Florida. There have been three, winter plankton surveys in open Gulf waters during the SEAMAP time series (in 1983, 1984 and 1996).

The sampling gear and methodology used during SEAMAP surveys (Rester et al. (2000) are similar to those recommended by Kramer et al. (1972), Smith and Richardson (1977) and Posgay and Marak (1980). A 61 cm bongo net fitted with 0.333 (0.335)[1] mm mesh netting is fished in an oblique tow path from a maximum depth of 200 m or to 2-5 m off the bottom at depths less than 200 m. A mechanical flowmeter is mounted off-center in the mouth of each bongo net to record the volume of water filtered. Volume filtered ranges from ~20 to 600 m^3 but is typically 30 to 40 m^3 at the shallowest stations and 300 to 400 m^3 at the deepest stations. A single or double 2x1 m pipe frame neuston net fitted with 0.947 (0.950)[1] mm mesh netting is towed at the surface with the frame half-submerged for 10 minutes. Non-standard gear has been used to collect plankton samples from smaller vessels operated by the states are coded as such in the database and are not used to calculate larval indices.

Catches of larvae from bongo nets are standardized to account for sampling effort and expressed as number of larvae under 10 m^2 of sea surface. This is accomplished by dividing the number of larvae of each taxon caught in a sample by the volume of water filtered during the tow; and than multiplying the resultant by the maximum depth of the tow in meters and the factor 10. Catches of larvae from neuston nets are standardized to account for sampling effort and expressed as number of larvae per 10 min tow.

Most but not all SEAMAP, standard plankton stations are located at 30 mile or ½ degree (~56 km) intervals in a fixed, systematic grid across the GOM (Figure 1), although, only every other N-S transect of stations is sampled during spring surveys and during fall plankton surveys in 1988-1991. Occasionally during surveys, samples are taken at non-standard locations or stations are moved to avoid navigational hazards these have not yet been coded as such in the database. Samples are taken upon arrival on station regardless of time of day. At each station either a bongo and/or neuston tow are made depending on the specific survey.

Initial processing of SEAMAP plankton samples is carried out at the Sea Fisheries Institute, Plankton Sorting and Identification Center (ZSIOP), in Szczecin, Poland, under a Joint Studies Agreement with NMFS. Samples collected by the Louisiana Department of Wildlife and Fisheries during their SEAMAP cruises are sorted and identified in-house following the same protocols used at ZSIOP. Fish eggs and larvae are removed from bongo net samples, and fish larvae only from neuston net samples. Fish eggs are not identified further, whereas, larvae are identified to the lowest possible taxon which in most cases is the family level. Body length (either notochord or standard length) is

[1] Mesh size change in database does not represent an actual change in gear but only a change in the accuracy at which plankton mesh aperture size can be measured by the manufacturer.

measured but for many taxa, especially in the early years of the SEAMAP time series, only size range was recorded. Vials of eggs and identified larvae, plankton displacement volumes, total egg counts, and counts and length measurements of identified larvae are sent to the SEAMAP Archive at the Florida Marine Research Institute in St. Petersburg, FL. There data are entered into the SEAMAP database and specimens are curated and loaned to interested scientists. Data files containing specimen identifications and lengths are sent to the NMFS Mississippi Laboratories where these data are combined with field collection data and edited according to established SEAMAP editing routines. SEAMAP survey data are currently maintained in dBase file structures but conversion to an Oracle based system is underway.

Description of Larval King Mackerel Dataset and Updated List of Indices:
Survey indices of king mackerel larval occurrence and abundance from SEAMAP resource surveys in the Gulf of Mexico reflect trends in spawning stock size and have been used in stock assessments since 1996 (Gledhill and Lyczkowski-Shultz 2000). Annual mean abundance and occurrence of larvae are calculated from catches in bongo net samples from two, sampling periods that encompass the king mackerel spawning season in the Gulf of Mexico: June and July during the Summer Shrimp/Groundfish Survey and late-August to mid-October during the Fall Plankton Survey (Appendix Table 1). King mackerel larvae collected in bongo net samples range in length from 2 to 10 mm and are estimated to be 2 to 11 days old (Gledhill and Lyczkowski-Shultz 2000). Larvae are occasionally taken during spring surveys in open Gulf waters (April to May) and during fall shrimp/groundfish surveys (mid October to November). Over the time series the occurrence of king mackerel larvae during those surveys has been < 1%.

Since 1982 the number of samples taken each year during SEAMAP summer shrimp/groundfish surveys has typically ranged from 10 to 76 samples. The summer survey area includes the continental shelf and coastal waters west of 88° W longitude; although in the earliest years of the time series (1982 to 1988) sampling was conducted further east off northwest Florida. Samples from late August to mid-October are taken during the SEAMAP fall plankton survey which only became a Gulfwide survey of continental shelf and coastal waters between Brownsville, Texas and south Florida in 1986. This survey has produced from 35 to 141 samples per year since 1986; however, 24 plankton samples taken during the Louisiana seasonal trawl survey in September 1985 are included in the estimate of mean abundance and occurrence for that year. The total number of samples on which the annual king mackerel larval index is based ranged from 45 in 1998 to 215 in 1987 (Table 1). On average the summer survey has produced 45 samples and the fall survey 110 samples since 1986 when that was instituted. Samples used in annual estimates are collected on both state and federal cruises. This has resulted in duplication of sampling effort especially off Louisiana. A recent change in survey coverage was instituted with the fall plankton survey in 1999. Twelve, standard SEAMAP stations were added to the survey track off the continental shelf in the western Gulf. This was deemed necessary because king mackerel larvae have been consistently taken at the offshore-most stations in recent years. This may mean that the mackerel spawning area has expanded in the northwestern Gulf thus necessitating the need for additional coverage.

The larvae of king mackerel are well described and are not difficult to distinguish from the larvae of other scombrids. Few misidentifications (< 5%) were found during re-examination by JL-S of SEAMAP mackerel larvae collected in 1984-1986 and 1988-1995 prior to the first use of catch data to calculate indices. Some specimens are identified only as *Scomberomorus* but after re-examination identification to species can be made in most cases.

The set of king mackerel indices presented here includes samples through 2000 (Table 2). Data from Poland for cruises in 2001 and 2002 have been received and are being entered at the SEAMAP Archive at FMRI, St. Petersburg, FL. Analyses of samples in Poland from the summer and fall surveys are usually completed one year after collection.

Data Issues, Concerns and Recommendations:

1. Collection gear is consistently coded in the SEAMAP database and only 61 cm bongo net samples are used to generate larval king mackerel indices. King mackerel larvae are consistently taken in neuston samples and the potential usefulness of these catches should be investigated. Additional size classes, especially larger fish, may be better represented in neuston than bongo net samples. During the years 1988 through 1991 the fall plankton survey design was inexplicably changed from collection of a bongo and neuston sample at each station to collection of a neuston sample at each station and a bongo sample at every other station. The index for those years may be 'improved' by addition of occurrence data from the neuston samples.

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2. As noted earlier the status of larvae identified only to genus, *Scomberomorus*, has been inconsistently dealt with over the time series. Examination of these specimens from the earliest and more recent cruises should be undertaken. In the future all specimens identified to genus will be re-examined routinely by an experienced ichthyoplankton taxonomist from the SEAMAP Plankton Team at the Mississippi Labs.

3. Although SEAMAP plankton data is routinely edited with established routines there are several areas (data fields) where problems are difficult to uncover using the current system. Two of the most persistent errors are inconsistent time zone codes (early in the time series) and maximum tow depth values (throughout the time series). Additional error checking routines need to be established but until then critical data fields will continue to be closely examined prior to calculation of mean abundances.

4. Delayed entry of identification and size data at the SEAMAP Archive has resulted in our inability to provide the most current (within one year) larval indices. Improved communication between the Archive and Mississippi Labs and realignment in priorities at the Archive should improve this situation.

5. Spatially varying and duplicated sampling effort, as well as, deviations from the SEAMAP survey design are among the most important data issues. Survey station maps by year for the summer and fall surveys taken from SEAMAP Environmental and Biological Atlases are presented here only to illustrate sampling effort issues that require examination (Figures 2 to 7). It should be noted that there are numerous inaccuracies among these maps such as cases where valid stations are not indicated (most notably Louisiana cruises in 1986, and 1988 to 1993) or where non-standard stations, not used for larval indices, are shown. There are two major categories of sampling effort issues. The first includes 'over-sampling' and duplication of effort principally off Louisiana and especially prior to 1992. The second category includes areas that have been more-or-less consistently, under-sampled especially off east and central Texas during summer surveys, and off northwest and south Florida during fall surveys. These gaps in sampling have been caused by weather or ship related problems. Another outstanding problem in this time series is the 1998 field season when tropical storm activity severely impacted both surveys. Less than one-quarter and one-third of the anticipated samples were collected that year during the summer and fall surveys, respectively. The potential effect on larval indices of these and other issues related to spatial allocation of sampling effort will be examined and modeled.

6. Mean size and range in size of king mackerel larvae in SEAMAP survey samples during the time period 1982 to 1995 were relatively homogeneous (Gledhill and Lyczkowski-Shultz 2000) and appears to have remained so in recent years (Figure 8). Gledhill and Lyczkowski-Shultz (2000) derived an age-corrected index of larval abundance but it did not improve the correlation between larval abundance and stock size over the period 1982 to 1995. One explanation for this may have been the limited age-length data available for king mackerel larvae at that time. Since the fall survey of 2000 survey samples have been preserved in ethanol initially so that specimens can be aged using their otoliths. Age/length data from SEAMAP survey-caught king mackerel larvae may be used in the future to improve the precision of larval abundance indices.

Literature Cited:

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Kramer, D., M.J. Kalin, E.G. Stevens, J.R. Thrailkill, and J.R. Zweifel. 1972. Collecting and processing data on fish eggs and larvae in the California Current region. NOAA Technical Report. NMFS Circular 370. 38 p.

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Smith, P.E. and S. L. Richardson, eds. 1977. Standard techniques for pelagic fish egg and larva surveys. FAO Fisheries Technical Paper 175.

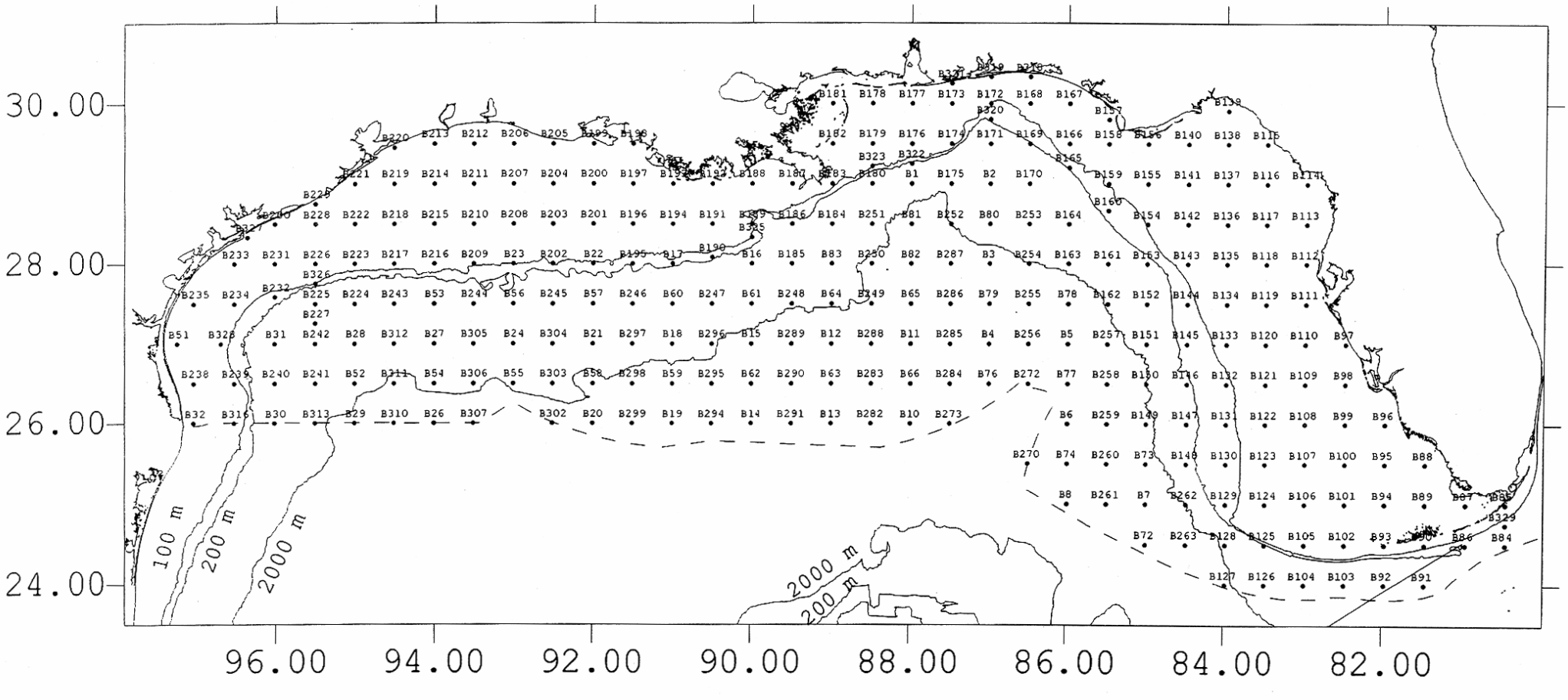
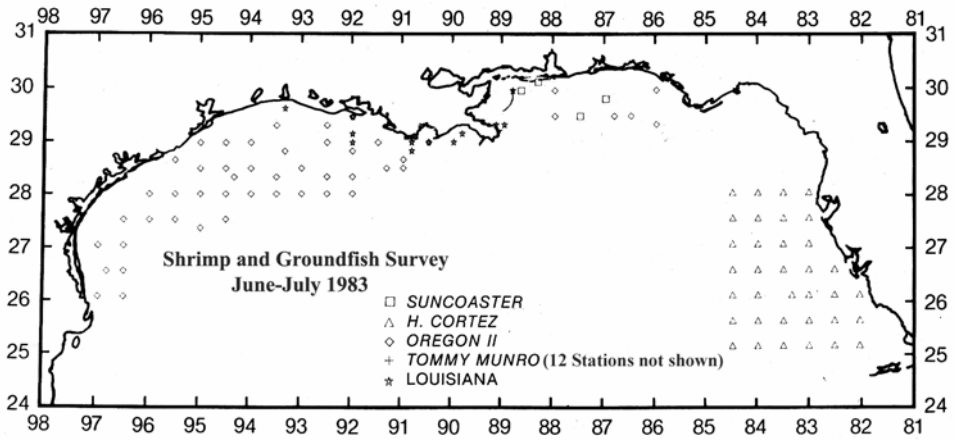
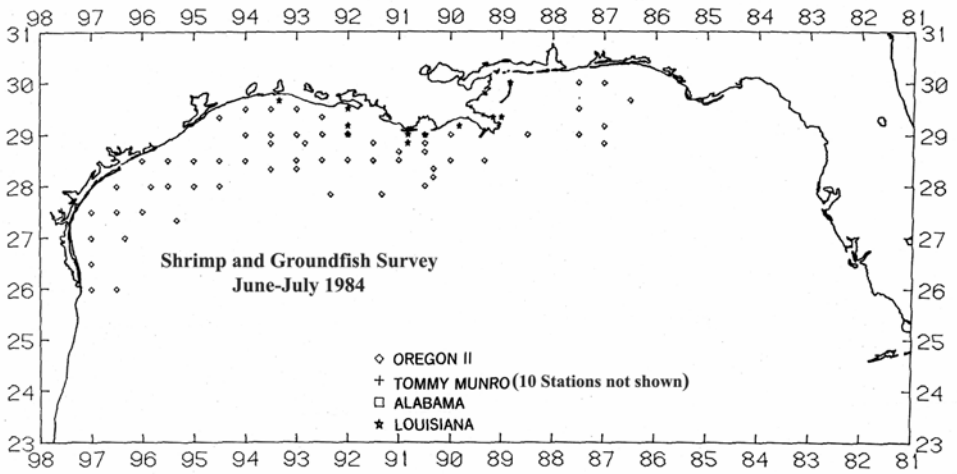
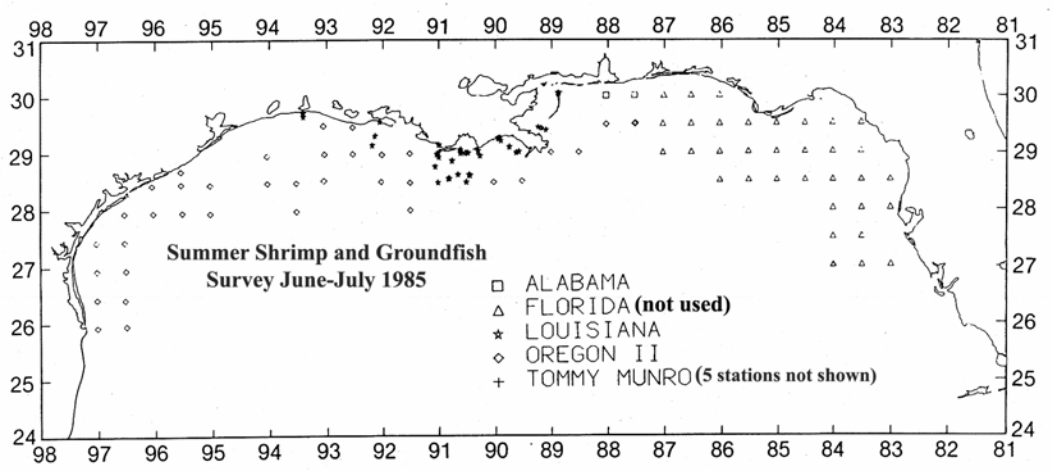


Figure 1: SEAMAP standard, plankton station grid with ‘B’ number designations.







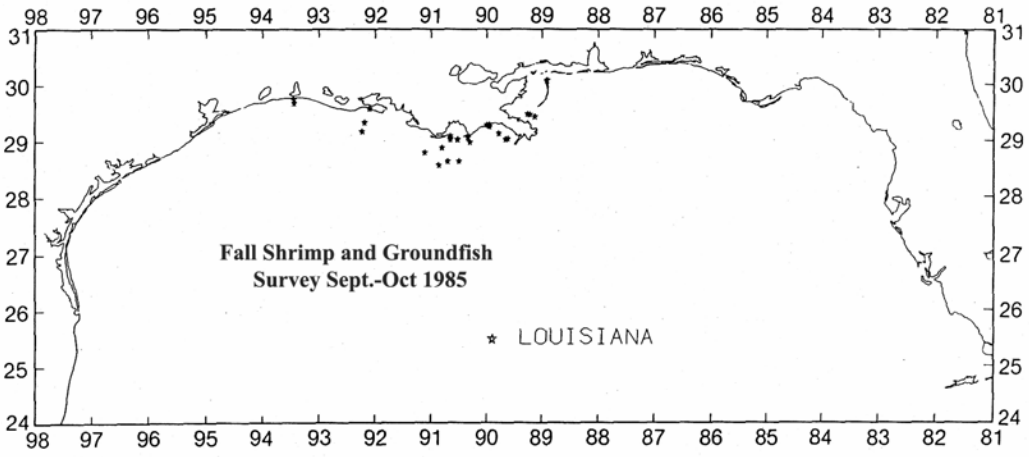
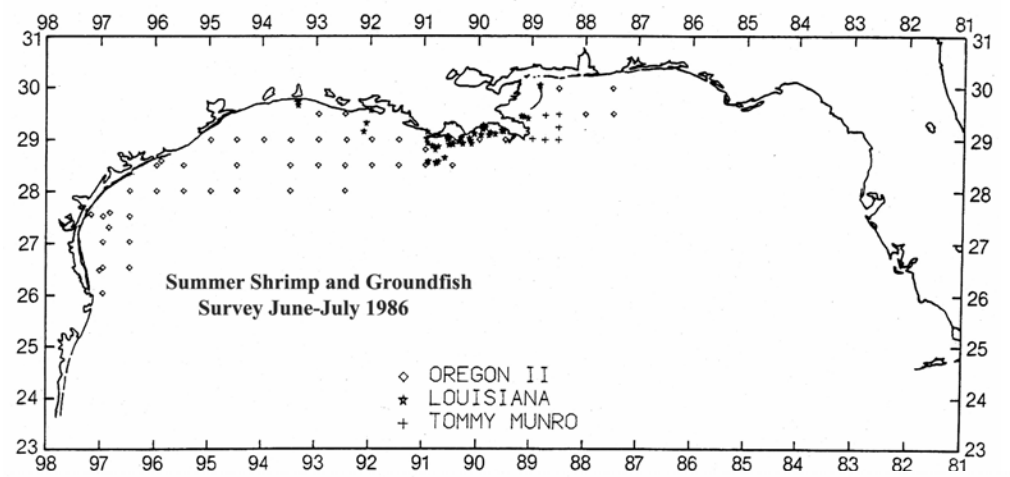
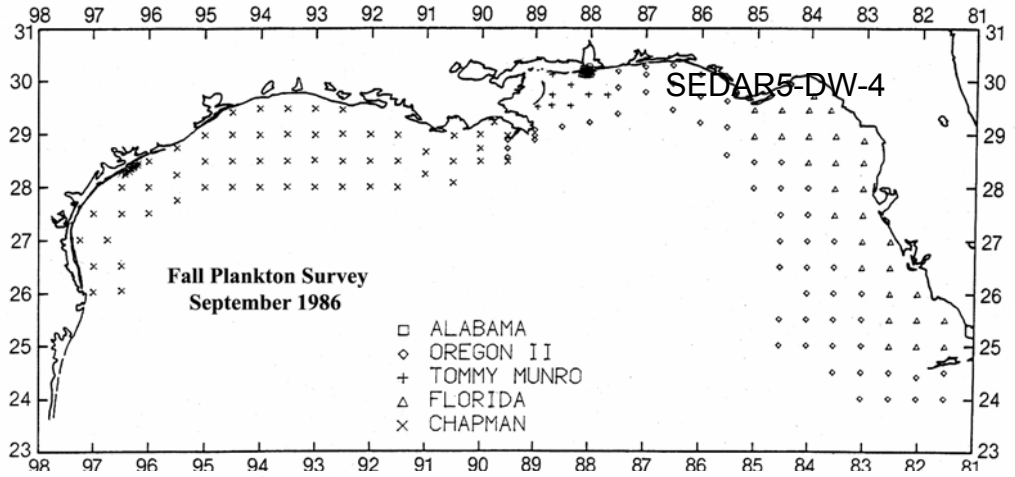
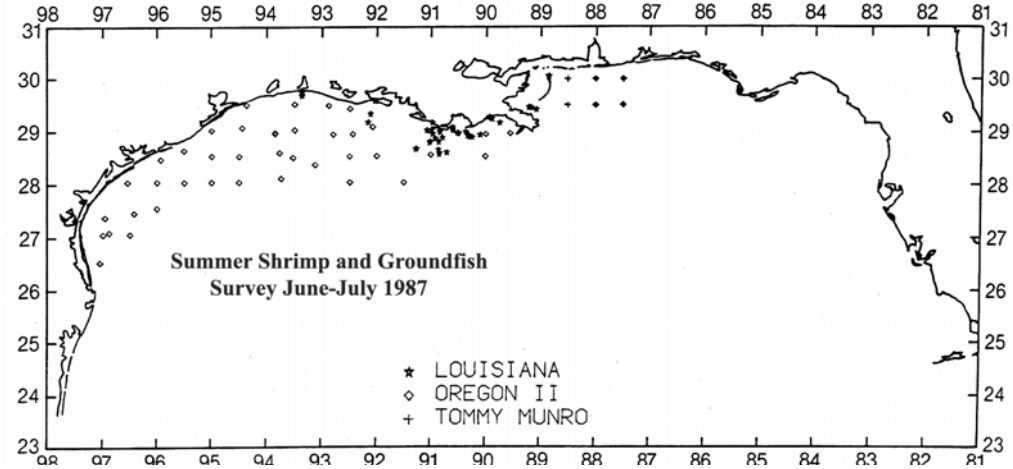
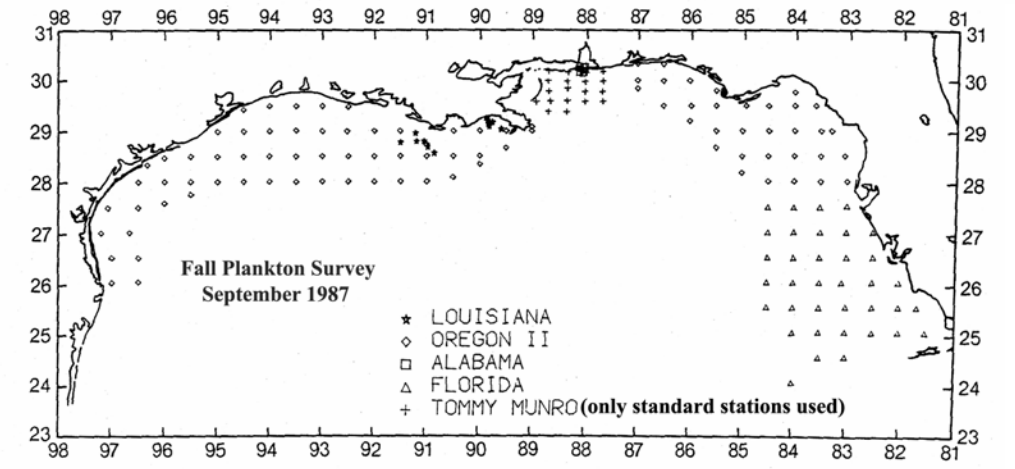


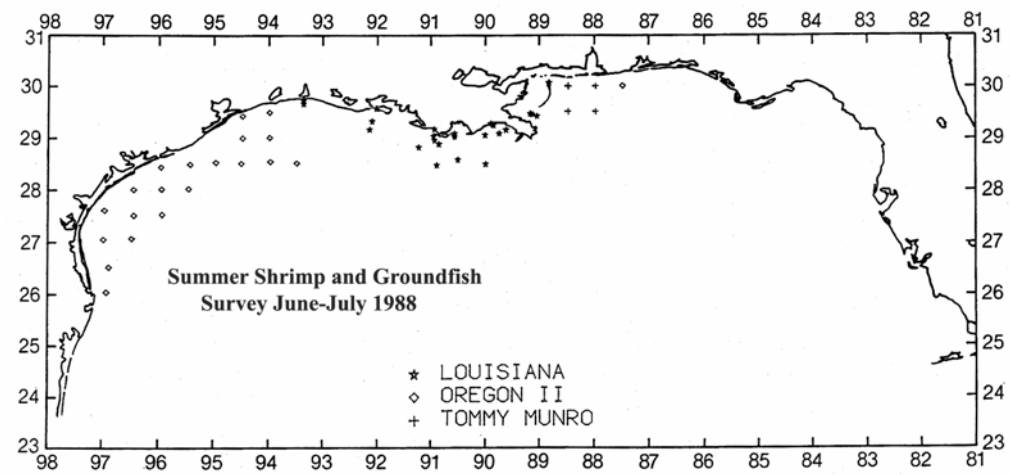
Figure 2: Location of plankton stations sampled during SEAMAP surveys, 1983 – 1985. (Source of all maps from SEAMAP Environmental and Biological Atlas, Gulf States Marine Fisheries Commission, Ocean Springs, MS)











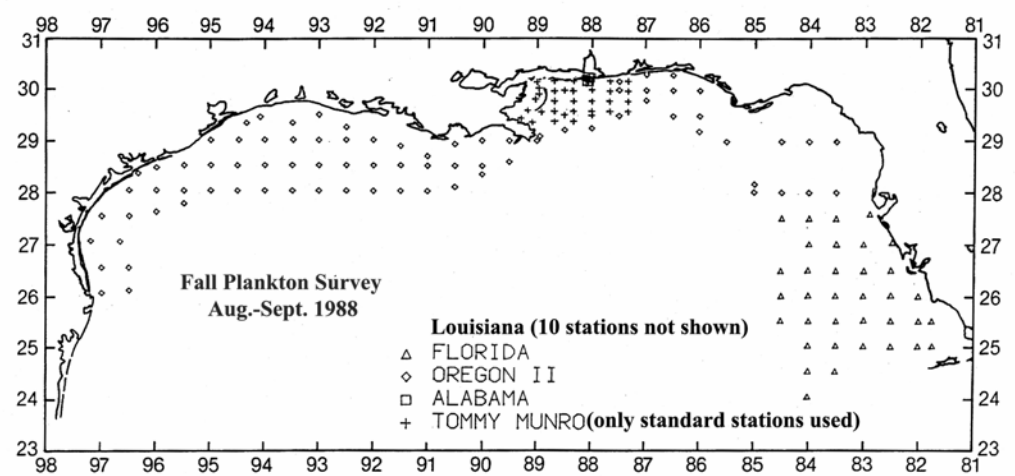
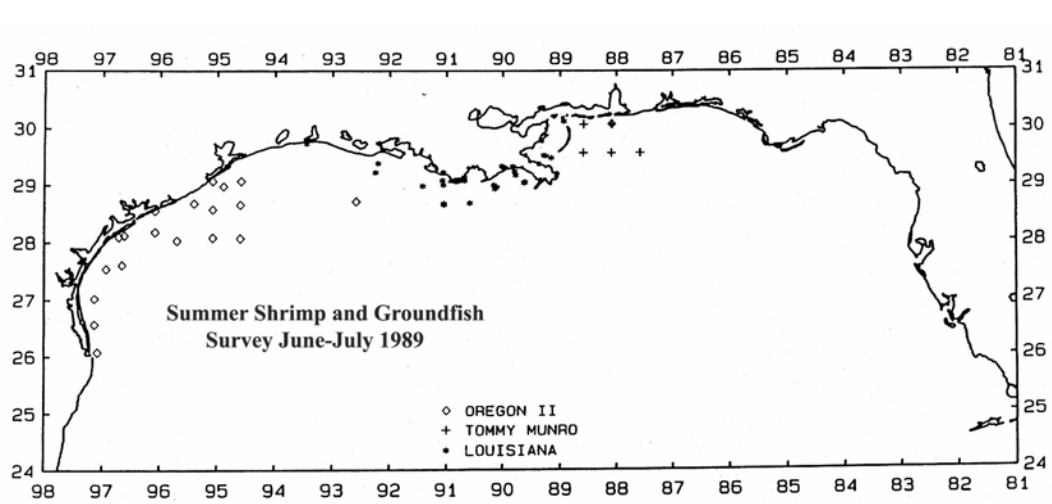
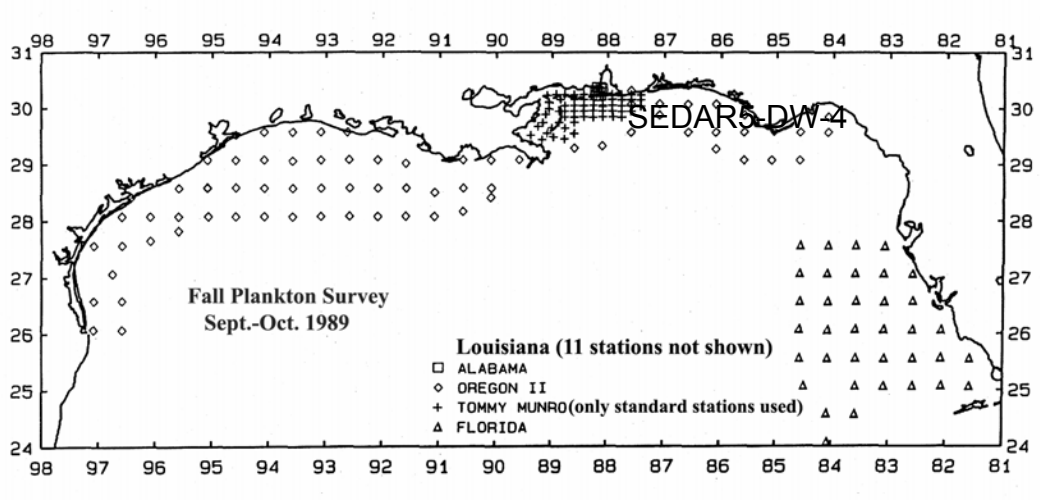
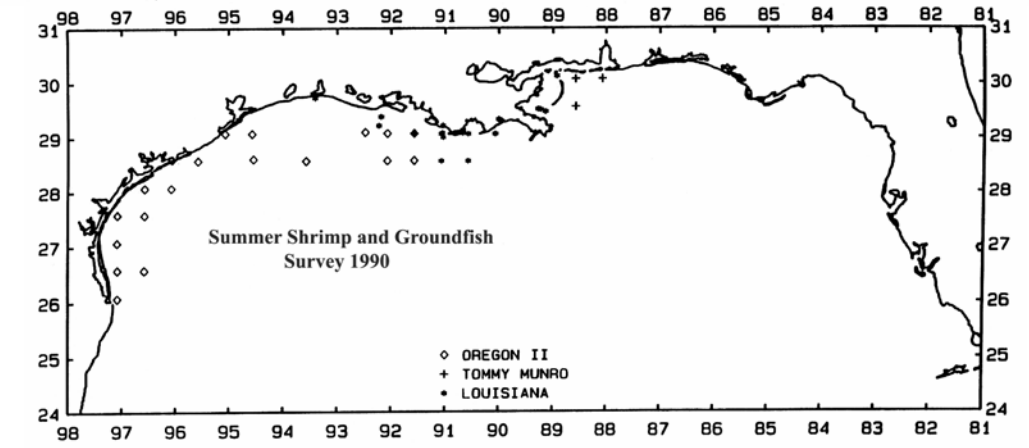
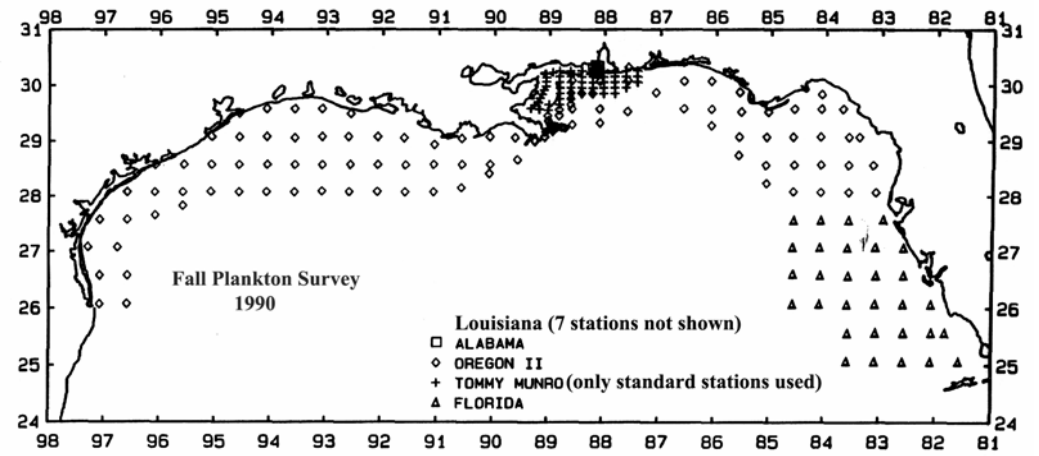


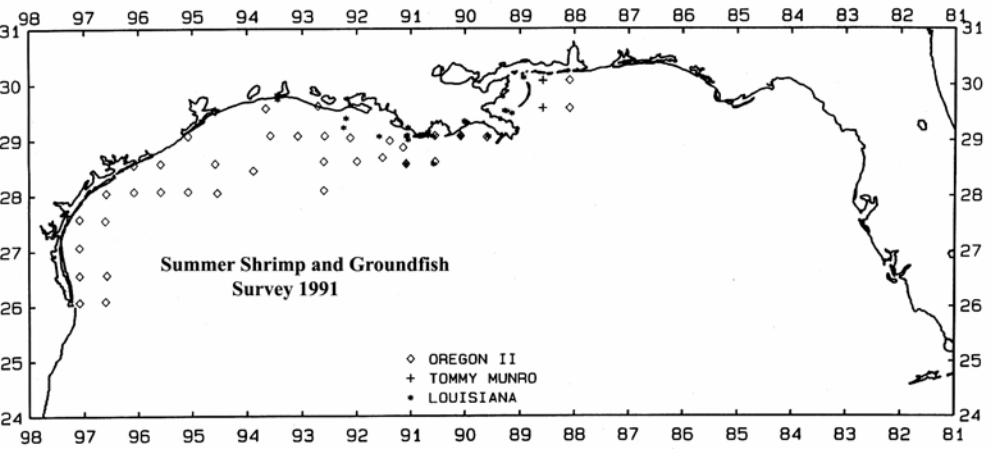
Figure 3: Location of plankton stations sampled during SEAMAP surveys, 1986 – 1988 (Source: SEAMAP Atlas).











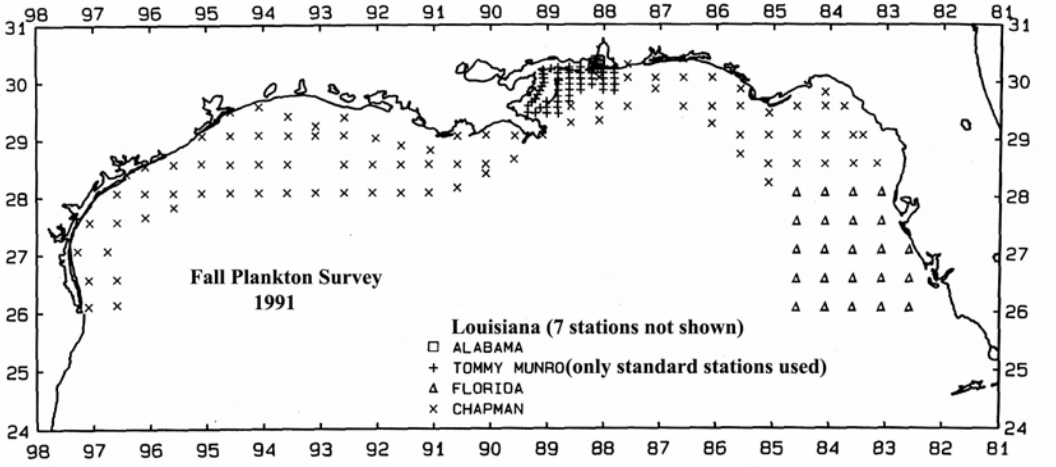
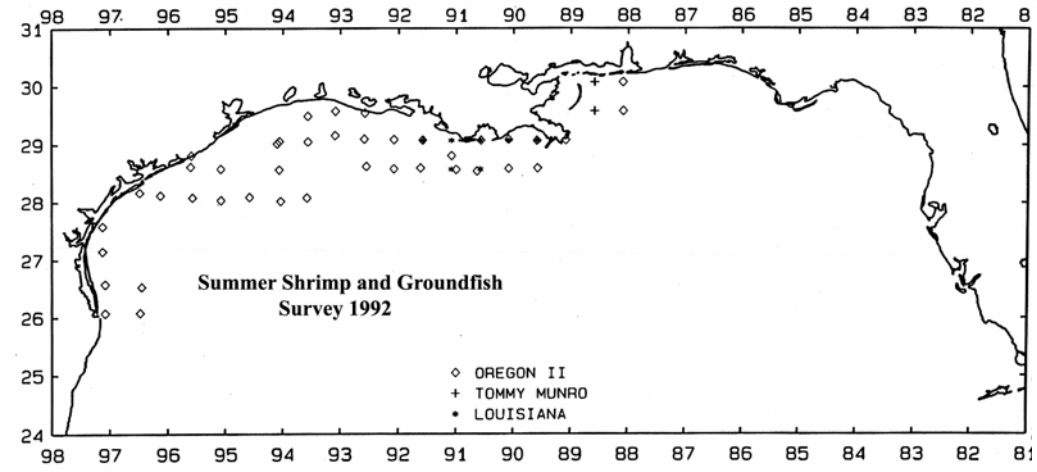
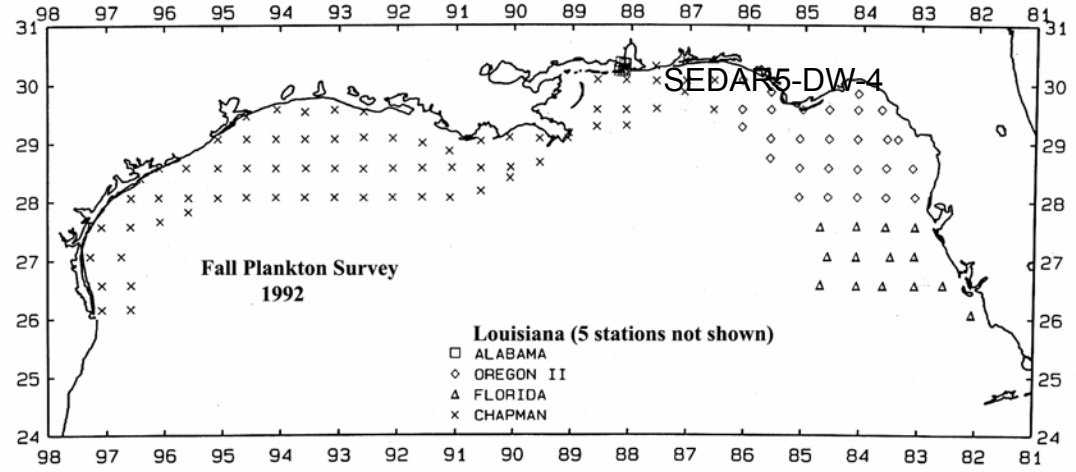
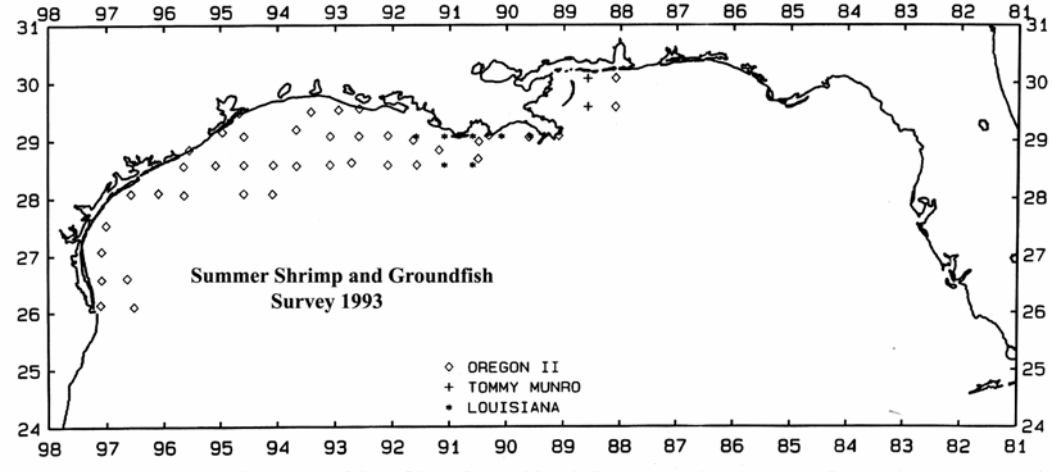
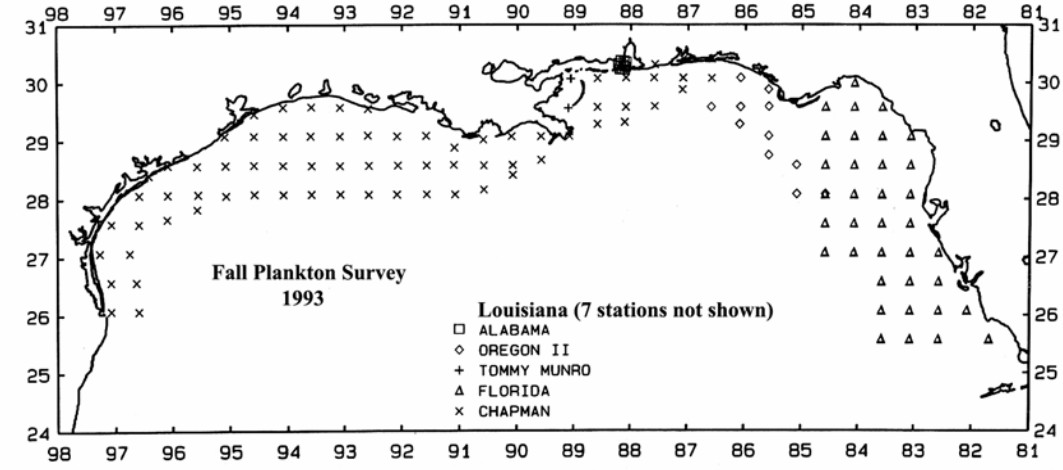


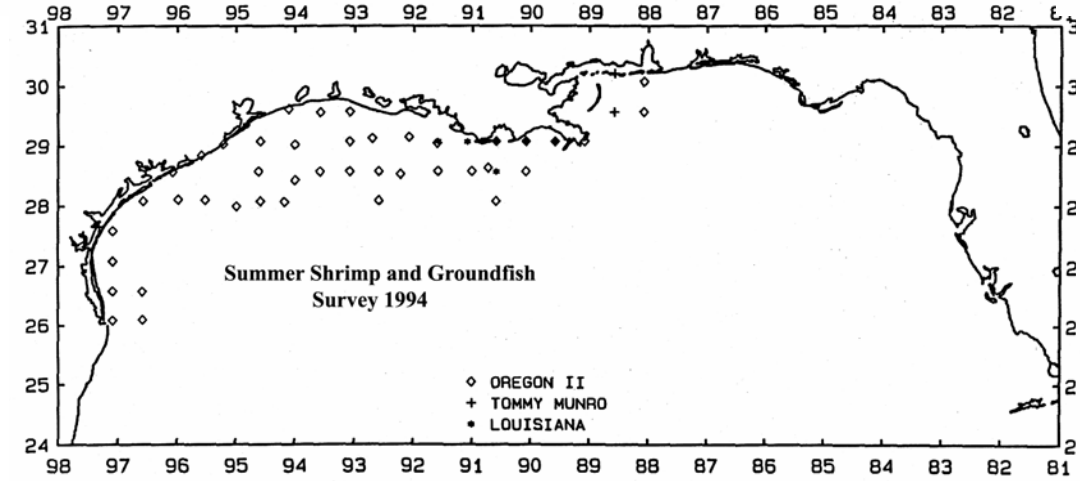
Figure 4: Location of plankton stations sampled during SEAMAP surveys, 1989 – 1991 (Source: SEAMAP Atlas).











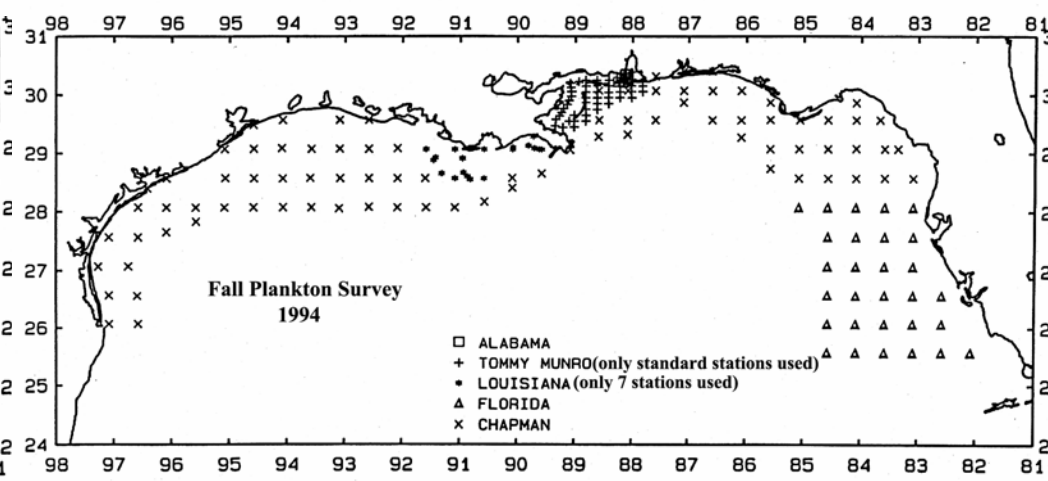


Figure 5: Location of plankton stations sampled during SEAMAP surveys, 1992 – 1994 (Source: SEAMAP Atlas).

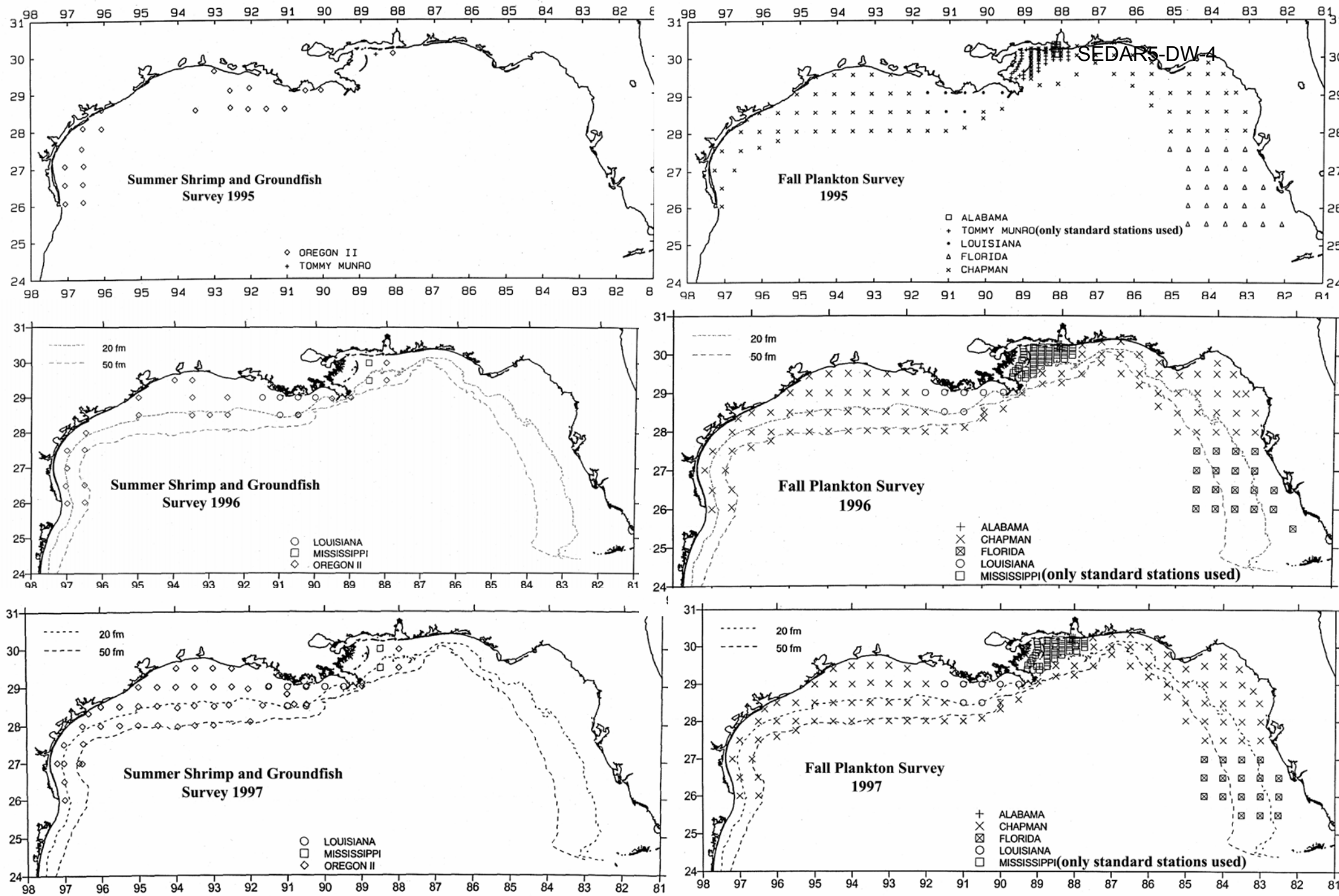


Figure 6: Location of plankton stations sampled during SEAMAP surveys, 1995 – 1997.

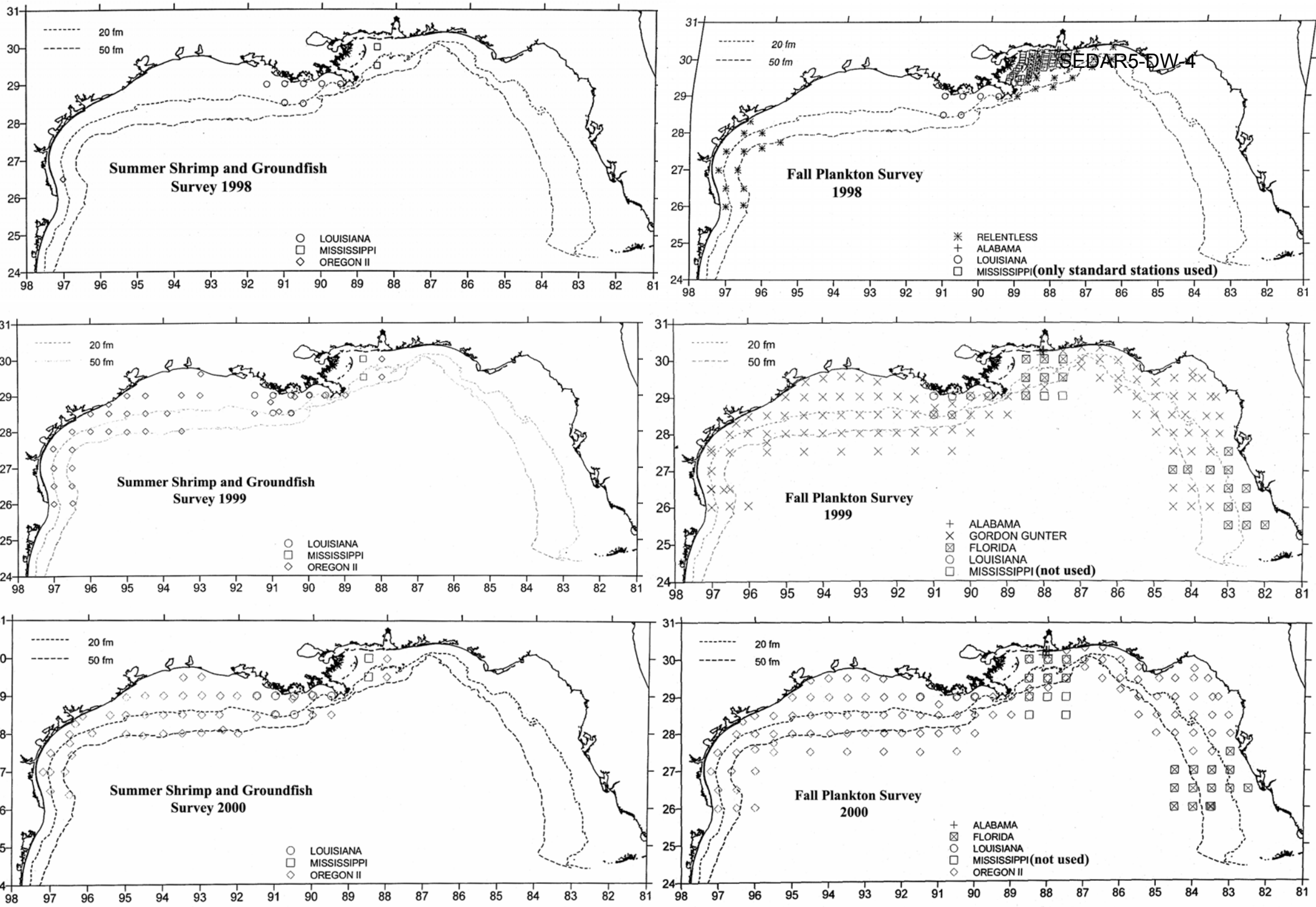


Figure 7: Location of plankton stations sampled during SEAMAP surveys, 1998 – 2000 (Source: SEAMAP Atlas).

Appendix Table 1: SEAMAP surveys used to estimate annual mean abundance and occurrence of king mackerel larvae in the Gulf of Mexico.

Year	Vessel/Cruise	Dates	No. of Bongo Samples	Survey Area and Type
1982				
	Oregon II 127	1 Jun-13 Jul	66	Summer Shrimp/Groundfish shelf & coastal, southwest TX to northwest FL
	Jeff&Tina 823	16 Jun-6 Jul	10	Su Sh/GRDF, shelf & coastal TX
1983				
	Oregon II 135	1 Jun - 13 Jul	47	Summer Shrimp/Groundfish shelf & coastal, southwest TX to northwest FL
	Tommy Munro 831	7 Jun - 14 Jun	12	Su Sh/GRDF,shelf & coastal, E LA & MS
1984				
	Oregon II 145	7 Jun - 22 Jul	60	Summer Shrimp/Groundfish shelf & coastal, southwest TX to northwest FL
	Tommy Munro 841	8 Jun - 10 Jun	10	shelf & coastal, E LA & MS
1985				
	Oregon II 153	11 Jun - 15 Jul	38	Summer Shrimp/Groundfish shelf & coastal, southwest TX to northwest FL
	Tommy Munro 851	11 Jun - 14 Jun	5	shelf & coastal, E LA & MS
	Pelican 853	22 Jul - 26 Jul	24	coastal, E & W LA
	Pelican 854	16 Sep - 4 Oct	24	Fall Plankton, coastal, E & W LA
1986				
	Oregon II 160	11 Jun - 6 Jul	43	Summer Shrimp/Groundfish shelf & coastal, southwest TX to northwest FL
	Tommy Munro 862	11 Jun - 12 Jun	6	shelf & coastal E LA & MS
	Pelican 863	11 Jun - 19 Jun	24	shelf & coastal, E & W LA
	Oregon II 161	2 Sep - 12 Sep	48	Fall Plankton, coastal NE & shelf E Gulf
	Chapman 865	13 Sep - 22 Sep	54	Fall Plankton, shelf & coastal W Gulf
	Hernan Cortez 862	4 Sep - 13 Sep	29	Fall Plankton, shelf & coastal, W FL
	Tommy Munro 864	9 Sep - 11 Sep	9	Fall Plankton, shelf & coastal E LA,MS & AL
1987				
	Oregon II 167	12 Jun - 14 Jul	44	Summer Shrimp/Groundfish shelf & coastal, southwest TX to northwest FL
	Tommy Munro 872	10 Jul - 16 Jul	8	shelf & coastal, E LA & MS
	Pelican 872	7 Jul - 12 Jul	22	coastal, E & W LA
	Oregon II 169	12 Sep - 27 Sep	91	Fall Plankton, shelf & coastal (Gulfwide)
	Hernan Cortez 875	1 Sep - 8 Sep	35	Fall Plankton, shelf & coastal, S FL
	Tommy Munro 873	15 Sep - 18 Sep	4	Fall Plankton, shelf & coastal, E LA, MS & AL
	Pelican 874	28 Sep - 10 Oct	11	Fall Plankton, coastal, E & W LA
1988				
	Oregon II 174	22 Jun - 6 Jul	19	Summer Shrimp/Groundfish shelf & coastal, southwest TX to northwest FL
	Tommy Munro 881	11 Jun - 11 Jul	6	shelf & coastal, E LA & MS
	Pelican 882	11 Jul - 14 Jul	12	coastal, E & W LA
	Oregon II 176	7 Sep - 24 Sep	39	Fall Plankton, shelf & coastal (Gulfwide)
	Hernan Cortez 882	26 Aug - 2 Sep	35	shelf & coastal, W FL
	Tommy Munro 882	12-13 Sep & 30 Sep - 1 Oct	3	shelf & coastal, E LA, MS, & AL

	Pelican 884	3 Oct - 12 Oct	10	coastal, E & W LA

1989				
	Oregon II 180	18 Jun - 16 Jul	21	Summer Shrimp/Groundfish, shelf & coastal, south Texas to Alabama
	Tommy Munro 891	9 Jun - 11 Jul	7	shelf & coastal, E LA & MS
	Pelican 892	10-13 Jul	12	coastal, E & W LA
	Oregon II 183	11 Sep - 29 Sep	37	Fall Plankton, shelf & coastal (Gulfwide)
	Hernan Cortez 892	4 Oct - 11 Oct	35	shelf & coastal, SW FL
	Tommy Munro 892	16 Sep - 19 Sep	5	shelf & coastal, E LA, MS, & AL
	Pelican 894	2 Oct - 5 Oct	11	coastal, E & W LA

1990				
	Oregon II 189	11 Jun - 14 Jul	19	Summer Shrimp/Groundfish, shelf & coastal, south Texas to Alabama
	Tommy Munro 901	9-10 Jun, 11-13 & 27-29 Jul	4	shelf & coastal, E LA & MS
	Louisiana 903	9-11 Jul	7	coastal, E & W LA
	Pelican 902	9-13 Jul	7	coastal, E & W LA
	Oregon II 190	1 Sep - 29 Sep	52	Fall Plankton, shelf & coastal (Gulfwide)
	Hernan Cortez 902	4-120 Oct	30	shelf & coastal, SW FL
	Tommy Munro 902	7-16 Sep	2	shelf & coastal, E LA, MS, & AL
	Pelican 904	1-5 Oct	7	coastal, E & W LA

1991				
	Oregon II 195	11 Jun - 14 Jul	37	Summer Shrimp/Groundfish, shelf & coastal, south Texas to Alabama
	Tommy Munro 911	14-16. 24-25 Jun	2	shelf & coastal, E LA & MS
	Pelican 912	8-12 Jul	7	coastal, E & W LA
	Louisiana 913	9-10 Jul	2	coastal, E & W LA
	Chapman 914	23 Aug - 26 Sep	49	Fall Plankton, shelf & coastal (Gulfwide)
	Hernan Cortez 912	21-25 Aug	23	shelf & coastal, SW FL
	Tommy Munro 912	14-16, 21-23 Sep	2	shelf & coastal, E LA, MS, & AL
	Pelican 914	30 Sep - 4 Oct	7	coastal, E & W LA

1992				
	Oregon II 200	11 Jun - 14 Jul	41	Summer Shrimp/Groundfish, shelf & coastal, south Texas to Alabama
	Tommy Munro 922	12 & 14 Jun	2	shelf & coastal, E LA & MS
	Pelican 922	6-9 Jul	7	coastal, E & W LA
	Chapman 925	28 Aug - 20 Sep	73	Fall Plankton, shelf & coastal (Gulfwide)
	Oregon II 201	21-29 Sep	27	Fall Plankton, shelf & coastal (Gulfwide)
	Suncoaster 922	12-19 Oct	12	shelf & coastal, SW FL
	Pelican 923	28 Sep - 1 Oct	5	coastal, E & W LA

1993				
	Oregon II 205	18 Jun - 21 Jul	41	Summer Shrimp/Groundfish, shelf & coastal, south Texas to Alabama
	Tommy Munro 932	12 & 13 Jun	2	shelf & coastal, East Louisiana & Mississippi
	Pelican 932	5 - 8 Jul	7	coastal, Louisiana
	Chapman 936	29 Aug - 29Sep	72	Fall Plankton, shelf & coastal (Gulfwide)
	Oregon II 207	4-7 Oct	10	Fall Plankton, shelf & coastal (Gulfwide)
	Suncoaster 932	11 - 18 Oct	36	Shelf & coastal, off W Florida
	Pelican 933	4 - 7 Oct	7	coastal, Louisiana

1994				
	Oregon II 210	16 Jun - 18 Jul	41	Summer Shrimp/Groundfish, shelf & coastal, south Texas to Alabama
	Tommy Munro 941	12 & 13 Jun	2	shelf & coastal, East Louisiana & Mississippi
	Pelican 942	4 - 8 Jul	7	coastal, Louisiana
	Chapman 946	Sep 8-30	88	Fall Plankton, shelf & coastal (Gulfwide)
	Hernan Cortez II 942	8 Oct	29	Shelf & coastal, off W Florida
	Tommy Munro 943	Sep	2	shelf & coastal, East Louisiana & Mississippi
	Pelican 943	26-30 Sep	7	coastal, Louisiana

1995				
	Oregon II 217	Jun 17 - Jul 19	20	Summer Shrimp/Groundfish, shelf & coastal, south Texas to Alabama
	Tommy Munro 951	Jun 9 - 13	2	shelf & coastal, East Louisiana & Mississippi
	Pelican 952	Jun 26 - 30	7	coastal, E & W Louisiana
	Chapman 955	Sep 6 - 27	87	Fall Plankton, shelf & coastal (Gulfwide)
	Suncoaster 952	Sep 24 - 29	25	shelf & coastal, SW Florida
	Tommy Munro 952	Sep 16 - 18	5	shelf & coastal, East Louisiana & Mississippi
	Pelican 953	Sep 25 - 29	7	coastal, E & W Louisiana

1996				
	Oregon II 221	Jun 14 - Jul 17	22	Summer Shrimp/Groundfish, shelf & coastal, south Texas to Alabama
	Tommy Munro 961	Jun 6 - 10,25, Jul 5 - 9	2	shelf & coastal, East Louisiana & Mississippi
	Pelican 961	Jul 1-5	6	coastal, E & W Louisiana
	Chapman 965	Sep 3 - 26	92	Fall Plankton (Gulfwide)
	Suncoaster 962	Sep 11 - 14	19	shelf & coastal, SW Florida
	Tommy Munro 962	Sep 21 - 23	2	shelf & coastal, East Louisiana & Mississippi
	Pelican 962	Sep 30 - Oct 4	7	coastal, Louisiana

1997				
	Oregon II 226	June 13 - July 16	47	Summer Shrimp/Groundfish, shelf & coastal, south Texas to Alabama
	Tommy Munro 971	Jun 7-8, 16-17,Jul 7-12	2	shelf & coastal, East Louisiana & Mississippi
	Pelican 971	Jun 29 - Jul 2	7	coastal, E & W Louisiana
	Chapman 975	Sep 7 - 27	93	Fall Plankton (Gulfwide)
	Suncoaster 972	Oct 2 - 6	19	shelf & coastal, SW Florida
	Tommy Munro 972	Sep 20-22	4	shelf & coastal, East Louisiana & Mississippi
	Pelican 972	Oct 4 - 7	7	coastal, Louisiana

1998				
	Oregon II 230	June 18 - July 17	1	Summer Shrimp/Groundfish, shelf & coastal, south Texas to Alabama
	Tommy Munro 981	Jun 27-30, Jul 7-10	2	shelf & coastal, East Louisiana & Mississippi
	Pelican 981	Jul 6-10	7	coastal, E & W Louisiana
	Gordon Gunter 981	Sep 4-30	27	Fall Plankton/Marine Mammal Survey (Gulfwide)
	Tommy Munro 982	Sep 22-24	2	shelf & coastal, East Louisiana & Mississippi
	Pelican 982	Sep 30 - Oct 3	6	coastal, Louisiana

1999				
	Oregon II 235	June 15 - July 20	35	Summer Shrimp/Groundfish, shelf & coastal, south Texas to Alabama

	Tommy Munro 991	Jun 12 - Jun 13	2	shelf & coastal, East Louisiana & Mississippi
	Tommy Munro 992	Jul 12-15	7	coastal, E & W Louisiana
	Gordon Gunter 992	Aug 31 - Sep 30	117	Fall Plankton/Marine Mammal Survey (Gulfwide)
	Suncoaster 991	Sep 25-29	10	shelf & open Gulf, off W Florida
	Tommy Munro 994	Oct 12-14	6	coastal, Louisiana
	Oregon II 240	June 13 - July 19	44	Summer Shrimp/Groundfish, shelf & coastal, south Texas to Alabama
2000	Tommy Munro 001	June 24-29	2	shelf & coastal, East Louisiana & Mississippi
	Pelican 001	July 17-20	7	coastal, E & W Louisiana
	Oregon II 242	Sep 5 - Oct 2	112	Fall Plankton/Marine Mammal Survey (Gulfwide)
	Suncoaster 001	Sep 26-30	14	shelf & open Gulf, off W Florida
	Pelican 001	Oct 11-13	3	coastal, Louisiana