Red Snapper Abundance Indices from SEAMAP Groundfish Surveys in the Northern Gulf of Mexico

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Abstract: *Beginning in 1987, standardized groundfish surveys have been conducted in the northern Gulf of Mexico during the summer and fall under the Southeast Area Monitoring and Assessment Program (SEAMAP). These fisheries independent data was used to develop abundance indices for red snapper (Lutjanus campechanus). From length frequency data, age 0 red snapper were predominantly captured during the fall surveys, while age 1 red snapper were most abundant during the summer survey. A total of 45 indices were prepared for the workshop, which include overall red snapper abundance as well as abundance indices specifically for age 0 and 1 red snapper which historically have been included in the assessment models. Indices were prepared both regionally (east, west and Gulf of Mexico) and seasonally (summer, fall and overall).*

Introduction

The Southeast Fisheries Science Center (SEFSC) Mississippi Laboratories has conducted standardized groundfish surveys under the Southeast Area Monitoring and Assessment Program (SEAMAP) in the Gulf of Mexico (GOM) since 1987. SEAMAP is a collaborative effort between federal, state and university programs, designed to collect, manage and distribute fishery independent data throughout the region. The primary objective of this trawl survey is to collect data on the abundance and distribution of demersal organisms in the northern Gulf of Mexico (GOM). This survey, which is conducted semi-annually (summer and fall), provides an important source of fisheries independent information on many commercially and recreationally important species throughout the GOM. The purpose of this document is to provide abundance indices for red snapper (*Lutjanus campechanus*).

Methodology

Survey Design

The survey methodologies and descriptions of the datasets used herein have been presented in detail by Nichols (2004) and Pollack and Ingram (2010). A change to the survey design was implemented between the summer and fall surveys of 2008. Prior to the fall survey of 2008, the basic structure of the groundfish surveys (i.e. 1987- summer of 2008) follows a stratified random station location assignment with strata derived from depth zones (5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-22, 22-25, 25-30, 30-35, 35-40, 40-45, 45-50 and 50-60 fathoms), shrimp statistical zones (between 88° and 97° W longitude, statistical zones from west to east: 21-20, 19-18, 17-16, 15-13 and 12-10), and time of day (i.e. day or night). Starting in the fall of 2008 and continuing until the present, station allocation is randomized within each shrimp statistical zone with a weighting by area. Other notable changes included a standardized 30 minute tow and dropping the day/night stratification. The main purpose of these changes was to increase the sample size of each survey and expand the survey into the waters off of Florida.

Data

A total of 12,040 stations were sampled from 1987- 2011 (Table 1). Based upon the limited recent sampling that has taken place in shrimp statistical zones 3-9, it was decided to limit the data for this analysis to only zones 10-21 (note that zone 12 is completely outside of the depth range of this survey (5 to 60 fathoms), therefore it is not sampled). Trawl data was obtained from the Gulf States Marine Fisheries Commission database and incorporated data collected by the SEFSC and Alabama, Florida, Louisiana and Mississippi state agencies and other state partners.

Age Determination

Length data from all red snapper measured during an individual year/season were plotted in order to determine the size breaks for aging the red snapper captured. Based upon peaks and breaks in the length data, size ranges for age 0, 1 and 2+ were estimated for all red snapper. Once size ranges were determined, the red snapper catch at each station were proportioned between the three age classes. For stations where only a subsample of red snapper was measured, the ratio of fish in each age class was calculated and applied to the overall catch. For all other stations, the all fish were classified as one of the age groups. To validate this method for determining ages, ages from red snapper collected during the 2008 SEAMAP Summer Groundfish Survey were obtained from the NOAA Fisheries Panama City laboratory.

Selectivity

Experiments were carried out on the R/V *Caretta*, a 17.7 meter double-rigged shrimp trawler. The vessel was rigged with two Western Jib trawls constructed of 47 mm (1-7/8 inch) sapphire webbing. The trawls had head rope lengths of 15.24 m and each were spread by 2.4 m x 1.0 m wooden doors. Each trawl was equipped with large frame, bent bar Turtle Excluder Devices with double cover turtle escape openings fished in a top opening configuration. Paired tows were conducted on commercial shrimping grounds in the Exclusive Economic Zone off of Mississippi and Alabama between June and October, 2006-2008. Trawls were towed at 2.5 knots (1.2 ms^{-1}) form one to two hours in duration and conducted between sunset and sunrise.

A codend configuration used in the SEAMAP survey trawl was tested against a fine mesh codend in a paired comparison. The fine mesh codend was constructed two layers of webbing material. The outer layer measured 55 meshes long (3.8 m) and was constructed of 3 mm polyethylene webbing. The inner layer (liner) also measuring 3.8 m, was constructed of 12 mm nylon delta webbing. The SEAMAP codend was constructed of #36, 41 mm mesh size, nylon webbing measuring 120 meshes in length (5.3 m) and 120 meshes in circumference, and the aft portion of the SEAMAP codend was not covered with chaffing webbing.

Vessel position, depth, and towing speed were recorded at the start and end of each successful tow. Following each tow, the gear was inspected for equipment malfunctions (i.e., torn or bogged gear) that would bias the evaluation of the BRD. The catch was mixed to ensure homogeneity and shoveled into baskets and weighed. A sub-sample of approximately 32 kg was

collected from each net. Counts and weights of red snapper were obtained from the entire catch. Length frequency data were recorded for each red snapper caught (fork length).

A logistic-type selectivity curve was developed for red snapper collected in SEAMAP trawls:

$$(1) \qquad r(\text{length}) = \frac{e^{(a+b(\text{length}))}}{1+e^{(a+b(\text{length}))}},$$

where ***r*(length)** is a vector of the proportion of red snapper of a certain length retained in the fine mesh codend versus the regular SEAMAP codend, ***a*** and ***b*** are the parameter vectors for main effects, and **length** is the length of red snapper corresponding to the proportion retained in the fine mesh codend versus the regular SEAMAP codend. The parameter values (± standard errors) for the selectivity curve of red snapper in SEAMAP trawls are ***a*** = -5.31574952 (± 0.216596692) and ***b*** = 0.043911042 (±0.001419737). These values were used in the logistic equation to adjust for selectivity of red snapper collected in SEAMAP trawls by calculating the number of red snapper that should have been collected in the face of no selectivity. Figure 1 shows the length frequency histograms of red snapper collected in trawls with the fine mesh codend versus those with the regular SEAMAP codend. Figure 2 illustrates the selectivity curve developed.

Index Construction

Delta-lognormal modeling methods were used to estimate relative abundance indices for red snapper (Lo *et al*. 1992). The main advantage of using this method is allowance for the probability of zero catch (Ortiz *et al.* 2000). The index computed by this method is a mathematical combination of yearly abundance estimates from two distinct generalized linear models: a binomial (logistic) model which describes proportion of positive abundance values (i.e. presence/absence) and a lognormal model which describes variability in only the nonzero abundance data (Lo *et al*. 1992).

The delta-lognormal index of relative abundance (I_y) as described by Lo *et al*. (1992) was estimated as:

$$(2) \qquad I_y = c_y p_y,$$

where c_y is the estimate of mean CPUE for positive catches only for year y, and p_y is the estimate of mean probability of occurrence during year y. Both c_y and p_y were estimated using generalized linear models. Data used to estimate abundance for positive catches (c) and probability of occurrence (p) were assumed to have a lognormal distribution and a binomial distribution, respectively, and modeled using the following equations:

$$(3) \qquad \ln(c) = X\beta + \varepsilon$$

and

(4) $$p = \frac{e^{\mathbf{X\beta}+\varepsilon}}{1+e^{\mathbf{X\beta}+\varepsilon}},$$

respectively, where c is a vector of the positive catch data, p is a vector of the presence/absence data, X is the design matrix for main effects, β is the parameter vector for main effects, and ε is a vector of independent normally distributed errors with expectation zero and variance σ^2. Therefore, c_y and p_y were estimated as least-squares means for each year along with their corresponding standard errors, SE(c_y) and SE(p_y), respectively. From these estimates, I_y was calculated, as in equation (1), and its variance calculated as:

(5) $$V(I_y) \approx V(c_y)p_y^2 + c_y^2 V(p_y) + 2c_y p_y \mathrm{Cov}(c, p),$$

where:

(6) $$\mathrm{Cov}(c, p) \approx \rho_{c,p}\left[\mathrm{SE}(c_y)\mathrm{SE}(p_y)\right],$$

and $\rho_{c,p}$ denotes correlation of c and p among years.

The submodels of the delta-lognormal model were built using a backward selection procedure based on type 3 analyses with an inclusion level of significance of $\alpha = 0.05$. Binomial submodel performance was evaluated using AIC, while the performance of the lognormal submodel was evaluated based on analyses of residual scatter and QQ plots in addition to AIC. Variables that could be included in the submodels were: Year (1987-2011), Area (defined as Texas (statistical zones 18-21), West Delta (statistical zones 13-17), East Delta (statistical zones 10-11)), Depth Zone (<10 fathoms, 10-30 fathoms, >30 fathoms), Time of Day (Day, Night) and Season (Summer, Fall). Depth zone was partitioned according to how effort from the shrimp fleet was compiled. For the eastern GOM models, no area variable was used since the entire region fall under the 'East Delta' designation. Season was also excluded in the seasonal models.

Results and Discussion

The distribution of red snapper is presented in Figure 3, with seasonal/annual abundance and distribution presented in the Appendix Figure 1. The total number of red snapper captured ranged from 174 to 1397 in the summer (Table 2 (top)) and 327 to 5737 in the fall (Table 2 (bottom)). Of the 16,672 red snapper captured during the summer survey, a total of 12.710 were measured from 1987 – 2011 with an average fork length of 163 mm. While during the fall survey 62,876 red snapper were captured, with 41,190 measured, with an average fork length of 118 mm. From the length frequency histogram (Figures 4 and 6), the majority of red snapper captured are probably age 0 in the fall and age 1 fish in the summer. The comparison between ages assigned to fish based on length and actual ages is presented in Figure 6. Results indicate that even though some individual age 1 fish fall outside of the length range assigned based on lengths, the majority of ages are correctly assigned. This is important because no age data exists for the majority of the fish in the survey and no age specific indices would be able to be generated without again based on length.

The variables that were retained differed slightly among models. For ease of presentation, due to the large number of indices provided, index summaries are presented in Table 3. For each index,

the variables retained in each submodel are presented along with AIC values and the associated table and figure numbers. For a full breakdown of the backward selection procedure, diagnostic figures and final abundance index values see the associated tables and figures.

Literature Cited

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Table 1. Number of stations sampled by shrimp statistical zone during the Summer (top) and Fall (bottom) SEAMAP groundfish survey from 1987-2011.

	Shrimp Statistical Zone																			
Year	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	Total
1987									30	66	6	20	19	25	20	16	25	28	19	*274*
1988									19	49	5	4	3	19	24	14	25	28	23	*213*
1989									23	30		3	18	25	7	15	20	29	24	*194*
1990										68	11	20	15	23	16	20	23	24	20	*240*
1991										46	12	24	13	23	22	24	18	23	26	*231*
1992									1	45	2	20	24	20	25	12	31	26	20	*226*
1993										45	10	19	17	24	19	14	29	24	22	*223*
1994										61	6	17	22	25	17	20	22	26	22	*238*
1995										44	10	16	18	22	23	13	27	26	21	*220*
1996										46	14	12	19	22	18	17	21	26	25	*220*
1997										44		12	16	22	23	10	28	26	26	*207*
1998										35	2	14	21	25	18	14	22	36	17	*204*
1999										44	7	20	19	20	23	13	25	32	20	*223*
2000										45	2	19	15	19	27	8	29	31	21	*216*
2001										36	7	18	18	13	3	10	9	17	21	*152*
2002										44	11	14	21	27	19	15	25	29	22	*227*
2003										44	9	10	8	2	17	20	22	26	23	*181*
2004										39	11	18	17	20	25	21	19	25	21	*216*
2005										32	10	9	11	16	21	5	28	22	27	*181*
2006										45	11	21	12	20	23	17	23	31	18	*221*
2007										41		6	15	22	23	7	29	32	21	*196*
2008			1	8	11	6	11	8	11	43	24	19	27	23	22	17	24	21	29	*305*
2009			35	21	29	15	16	18	24	67	25	20	36	39	46	53	33	29	23	*529*
2010		31	26	21	24	10	12	14	14	22	5	20	16	21	33	34	27	27	19	*376*
2011	11	24	22	20	29	2	14	11	8	16	7	14	17	24	29	29	18	21	13	*329*
Total	*11*	*55*	*84*	*70*	*93*	*33*	*53*	*51*	*130*	*1097*	*207*	*389*	*437*	*541*	*543*	*438*	*602*	*665*	*543*	*6042*

	Shrimp Statistical Zone																			
Year	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	Total
1987									16	28	15	14	16	17	15	15	15	18	3	*172*
1988									8	28	7	22	17	18	26	19	21	31	20	*217*
1989										43	12	19	17	22	20	17	22	25	26	*223*
1990										52	14	12	23	22	19	18	22	19	27	*228*
1991										46	6	24	14	20	25	24	19	25	22	*225*
1992										33	7	23	14	25	18	17	27	30	18	*212*
1993										72	10	19	17	26	18	16	25	28	18	*249*
1994										50	9	16	21	25	20	21	23	24	20	*229*
1995										40	10	17	18	24	19	14	26	30	19	*217*
1996										45	9	18	19	17	28	13	25	29	24	*227*
1997										44	10	17	20	26	19	18	23	22	24	*223*
1998										44	10	22	14	34	11	15	24	29	22	*225*
1999										42	10	17	18	29	18	12	28	29	22	*225*
2000										43	10	14	22	20	26	12	30	25	21	*223*
2001										21	10	17	19	26	20	14	27	28	23	*205*
2002									1	51	10	13	22	22	23	14	26	30	21	*233*
2003									1	76	9	16	21	24	22	20	23	25	23	*260*
2004										43		11	18	17	27	14	24	30	21	*205*
2005										44	11	20	16	33	18	14	23	24	27	*230*
2006									1	47	7	22	14	18	28	13	23	32	19	*224*
2007										31	9	20	17	18	28	17	20	18	26	*204*
2008				15	14	4	4	3	4	35	18	28	34	42	46	44	19	36	20	*366*
2009			20	21	25	10	21	13	12	48	12	23	23	30	49	47	31	36	22	*443*
2010			9	27	27	18	16	11	14	16	7	15	18	26	31	29	18	19	14	*315*
2011							9	11	6	14	6	15	16	27	31	28	21	19	15	*218*
Total			*29*	*63*	*66*	*32*	*50*	*38*	*63*	*1036*	*238*	*454*	*468*	*608*	*605*	*485*	*585*	*661*	*517*	*5998*

Table 2. Summary of the red snapper length data collected during Summer (top) and Fall (bottom) SEAMAP groundfish surveys conducted between 1987 and 2011.

Survey Year	Number of Stations	Number Collected	Number Measured	Minimum Fork Length (mm)	Maximum Fork Length (mm)	Mean Fork Length (mm)	Standard Deviation
1987	274	464	222	100	304	170	46
1988	213	215	185	87	365	177	51
1989	194	240	184	31	423	145	56
1990	240	1312	775	42	760	159	38
1991	231	528	463	22	357	177	52
1992	226	465	334	31	774	158	54
1993	223	542	372	32	279	147	35
1994	238	904	555	39	378	153	38
1995	220	733	575	14	739	160	67
1996	220	1397	658	30	860	154	65
1997	207	768	502	29	636	163	44
1998	204	408	386	51	785	156	58
1999	223	375	352	25	776	169	89
2000	216	742	674	18	778	143	72
2001	152	174	172	31	339	147	63
2002	227	641	496	11	675	171	69
2003	181	312	286	13	830	162	70
2004	216	1248	568	30	752	157	45
2005	181	787	616	18	796	165	62
2006	221	598	576	20	324	151	57
2007	196	777	777	32	651	169	47
2008	305	954	952	24	648	175	71
2009	529	496	490	18	710	156	80
2010	376	707	659	29	811	191	92
2011	329	885	881	46	719	166	66

Total Number of Years	Total Number of Stations	Total Number Collected	Total Number Measured	Overall Mean Fork Length (mm)
25	6042	16,672	12,710	163

Survey Year	Number of Stations	Number Collected	Number Measured	Minimum Fork Length (mm)	Maximum Fork Length (mm)	Mean Fork Length (mm)	Standard Deviation
1987	172	327	164	50	606	154	83
1988	217	818	507	42	777	131	61
1989	223	2118	1077	40	852	109	45
1990	228	2090	1332	25	670	125	54
1991	225	2782	1782	36	407	118	41
1992	212	784	633	50	374	137	57
1993	249	1893	1288	20	680	128	63
1994	229	4807	1670	33	625	120	62
1995	217	4080	1886	32	630	114	48
1996	227	1935	1471	30	605	128	55
1997	223	3222	1616	40	549	117	46
1998	225	1614	1027	30	806	109	45
1999	225	2532	1869	37	453	112	39
2000	223	2047	1562	29	742	127	50
2001	205	2063	1239	40	780	126	61
2002	233	1609	1254	16	767	103	49
2003	260	3240	1867	31	750	103	38
2004	205	4964	2088	32	740	120	44
2005	230	3742	2239	33	754	128	53
2006	224	2900	1831	31	403	116	46
2007	204	2881	2825	31	365	101	37
2008	366	1239	1213	28	760	145	79
2009	443	5737	5346	26	692	115	38
2010	315	1645	1591	33	700	123	58
2011	218	1807	1813	31	805	125	69

Total Number of Years	Total Number of Stations	Total Number Collected	Total Number Measured	Overall Mean Fork Length (mm)
25	5998	62,876	41,190	118

Table 3. Red snapper index of abundance summary table from SEAMAP Groundfish Surveys. Index names are represented as area / age (selectivity refers to catch rates adjusted for net selectivity) / season (if applicable)

Index	Associated Tables	Associated Figures	Final Binomial Submodel		Final Lognormal Submodel	
			Variables	AIC	Variables	AIC
GOM / all ages	4-5	7-11	Year + Area + Depth Zone + TOD + Season	51242.3	Year + Area + Depth Zone + TOD + Season	17823.1
GOM / all ages / Summer	6-7	12-16	Year + Area + Depth Zone + TOD	24966.6	Year + Depth Zone +TOD	6182.1
GOM / all ages / Fall	8-9	17-21	Year + Area + Depth Zone + TOD	26555.8	Year + Depth Zone + TOD	11357.6
WGOM / all ages	10-11	22-26	Year + Area + Depth Zone + TOD + Season	40789.6	Year + Area + Depth Zone + TOD + Season	14715.8
WGOM / all ages / Summer	12-13	27-31	Year + Area + Depth Zone	19332.2	Year + Depth Zone +TOD	5165.7
WGOM / all ages / Fall	14-15	32-36	Year + Area + Depth Zone + TOD	21769.5	Year + Area + Depth Zone + TOD	9297.1
EGOM / all ages	16-17	37-41	Year + Depth Zone + TOD + Season	10811.7	Year + Depth Zone + TOD + Season	3044.1
EGOM / all ages / Summer	18-19	42-46	Year + Depth Zone + TOD	5758.6	Year + TOD	973.8
EGOM / all ages / Fall	20-21	47-51	Year + Depth Zone + TOD	5163.5	Year + Depth Zone +TOD	2001.2
GOM / age 0	22-23	52-56	Year + Area + Depth Zone + TOD + Season	69579.6	Year + Area + Depth Zone + TOD + Season	10668.5
GOM / age 0 / Summer	24-25	57-61	Year + Area + Depth Zone + TOD	37230.4	Year + Depth Zone +TOD	680.7
GOM / age 0 / Fall	26-27	62-66	Year + Area + Depth Zone + TOD	26931.4	Year + Area + Depth Zone + TOD	9828.8
WGOM / age 0	28-29	67-71	Year + Area + Depth Zone + TOD + Season	58977.4	Year + Area + Depth Zone + TOD + Season	8752.9
WGOM / age 0 / Summer	30-31	72-76	Year + Depth Zone +TOD	25508.4)	Year + Depth Zone +TOD	604.1
WGOM / age 0 / Fall	32-33	77-81	Year + Area + Depth Zone + TOD	22154.5	Year + Area + Depth Zone + TOD	7987.9
EGOM / age 0	34-35	82-86	Year + Depth Zone + TOD + Season	16085.7	Year + Depth Zone + Season	1856.1
EGOM / age 0 / Summer	36-37	87-91	Year + Depth Zone + TOD	4359.6	Year	48.6
EGOM / age 0 / Fall	38-39	92-96	Year + Depth Zone + TOD	5315.1	Year + Depth Zone	1763.8
GOM / age 0 selectivity	40-41	97-101	Year + Area + Depth Zone + TOD + Season	69579.6	Year + Area + Depth Zone + TOD	11952.2
GOM / age 0 selectivity / Summer	42-43	102-106	Year + Area + Depth Zone + TOD	37230.4	Year + Depth Zone + TOD	886.2
GOM / age 0 selectivity / Fall	44-45	107-111	Year + Area + Depth Zone + TOD	26931.4	Year + Area + Depth Zone + TOD	10860.2
WGOM / age 0 selectivity	46-47	112-116	Year + Area + Depth Zone + TOD + Season	58977.4	Year + Area + Depth Zone + TOD	9789.6
WGOM / age 0 selectivity / Summer	48-49	117-121	Year + Depth Zone + TOD	25508.4	Year + Depth Zone + TOD	779.1
WGOM / age 0 selectivity / Fall	50-51	122-126	Year + Area + Depth Zone + TOD	22154.5	Year + Area + Depth Zone + TOD	8809.8
EGOM / age 0 selectivity	52-53	127-131	Year + Depth Zone + TOD + Season	16085.7	Year + Depth Zone + TOD + Season	2097.6
EGOM / age 0 selectivity / Summer	54-55	132-136	Year + Depth Zone + TOD	4359.6	Year	48.6
EGOM / age 0 selectivity / Fall	56-57	137-141	Year + Depth Zone + TOD	5315.1	Year + Depth Zone + TOD	1972.7
GOM / age 1	58-59	142-146	Year + Area + Depth Zone + TOD + Season	53242.2	Year + Depth Zone + Season	8621.1
GOM / age 1 / Summer	60-61	147-151	Year + Area + Depth Zone	25687.8	Year + Depth Zone	5262.6
GOM / age 1 / Fall	62-63	152-156	Year + Area + Depth Zone	29338.3	Year + Depth Zone	3341.8
WGOM / age 1	64-65	157-161	Year + Depth Zone + Season	41675.5	Year + Depth Zone + Season	7350.6
WGOM / age 1 / Summer	66-67	162-166	Year + Area + Depth Zone	19757.8	Year + Depth Zone	4458.0
WGOM / age 1 / Fall	68-69	167-171	Year + Area + Depth Zone	23377.9	Year + Depth Zone	2865.8
EGOM / age 1	70-71	172-176	Year + Depth Zone + TOD + Season	11891.3	Year + Depth Zone	1231.1
EGOM / age 1 / Summer	72-73	177-181	Year + Depth Zone + TOD	6161.0	Year + TOD	752.4
EGOM / age 1 / Fall	74-75	182-186	Year + Depth Zone + TOD	5711.7	Year + Depth Zone	439.8
GOM / age 1 selectivity	76-77	187-191	Year + Area + Depth Zone + TOD + Season	53242.2	Year + Area + Depth Zone + TOD	8967.5
GOM / age 1 selectivity / Summer	78-79	192-196	Year + Area + Depth Zone	25687.8	Year + Area + Depth Zone + TOD	5534.7
GOM / age 1 selectivity / Fall	80-81	197-201	Year + Area + Depth Zone	29338.3	Year + Area + Depth Zone + TOD	3397.4
WGOM / age 1 selectivity	82-83	202-206	Year + Depth Zone + Season	41675.5	Year + Area + Depth Zone + TOD	7626.1
WGOM / age 1 selectivity / Summer	84-85	207-211	Year + Area + Depth Zone	19757.8	Year + Area + Depth Zone + TOD	4694.1
WGOM / age 1 selectivity / Fall	86-87	212-216	Year + Area + Depth Zone	23377.9	Year + Area + Depth Zone	2870.5
EGOM / age 1 selectivity	88-89	217-221	Year + Depth Zone + TOD + Season	11891.3	Year + Depth Zone + TOD	1292.2
EGOM / age 1 selectivity / Summer	90-91	222-226	Year + Depth Zone + TOD	6161.0	Year + Depth Zone + TOD	791.4
EGOM / age 1 selectivity / Fall	92-93	227-231	Year + Depth Zone + TOD	5711.7	Year + Depth Zone	452.9

Table 4. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / all ages) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 51242.3)*						*Lognormal Submodel Type 3 Tests (AIC 17823.3)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3977	222.02	9.22	<.0001	<.0001	24	5526	7.58	<.0001
Area	2	11E3	302.58	151.29	<.0001	<.0001	2	5526	136.45	<.0001
Depth Zone	2	11E3	1104.60	552.30	<.0001	<.0001	2	5526	213.09	<.0001
Time of Day	1	11E3	30.72	30.72	<.0001	<.0001	1	5526	31.32	<.0001
Season	1	11E3	894.63	894.63	<.0001	<.0001	1	5526	442.07	<.0001

Table 5. Indices of red snapper (GOM / all ages) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.30717	446	2.9722	0.36669	0.14338	0.27568	0.48776
1988	0.36744	430	3.0328	0.37417	0.13327	0.28696	0.48788
1989	0.40767	417	6.9273	0.85465	0.12723	0.66331	1.10118
1990	0.55342	468	12.0631	1.48828	0.09921	1.22102	1.81403
1991	0.51535	456	8.6601	1.06843	0.09577	0.88257	1.29344
1992	0.40868	438	3.4160	0.42145	0.12314	0.32976	0.53864
1993	0.43432	472	5.8924	0.72697	0.12013	0.57219	0.92361
1994	0.49251	467	10.6136	1.30944	0.10264	1.06700	1.60697
1995	0.54005	437	12.2476	1.51104	0.10020	1.23725	1.84541
1996	0.49217	447	7.3684	0.90906	0.10552	0.73654	1.12200
1997	0.51628	430	10.1521	1.25250	0.10817	1.00947	1.55405
1998	0.42424	429	4.4679	0.55122	0.11757	0.43607	0.69679
1999	0.47098	448	6.6512	0.82058	0.10038	0.67167	1.00251
2000	0.56720	439	9.0574	1.11744	0.09494	0.92459	1.35051
2001	0.44258	357	4.8771	0.60171	0.12709	0.46713	0.77506
2002	0.45435	460	5.5080	0.67954	0.10698	0.54898	0.84115
2003	0.51927	441	8.5912	1.05993	0.11053	0.85028	1.32127
2004	0.55107	421	14.0492	1.73330	0.10621	1.40242	2.14225
2005	0.62774	411	11.3355	1.39850	0.09580	1.15517	1.69309
2006	0.58427	445	10.1605	1.25354	0.08883	1.04986	1.49675
2007	0.52500	400	9.6124	1.18592	0.10962	0.95307	1.47565
2008	0.52048	586	5.6572	0.69795	0.09077	0.58230	0.83657
2009	0.49863	728	11.2391	1.38661	0.08043	1.18088	1.62817
2010	0.50337	445	7.9949	0.98636	0.10321	0.80283	1.21185
2011	0.54822	394	10.0890	1.24472	0.10656	1.00640	1.53946

Table 6. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / all ages / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 24966.6)*						*Lognormal Submodel Type 3 Tests (AIC 6188.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1925	139.75	5.78	<.0001	<.0001	24	1960	2.47	<.0001
Area	2	5419	134.82	67.41	<.0001	<.0001	2	1960	0.34	0.7107
Depth Zone	2	5347	240.51	120.25	<.0001	<.0001	2	1960	69.68	<.0001
Time of Day	1	5460	8.46	8.46	0.0036	0.0036	1	1960	11.17	0.0008
Model Run #2	*Binomial Submodel Type 3 Tests (AIC* 24966.6*)*						*Lognormal Submodel Type 3 Tests (AIC* 6182.1*)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1925	139.75	5.78	<.0001	<.0001	24	1962	2.45	0.0001
Area	2	5419	134.82	67.41	<.0001	<.0001		dropped		
Depth Zone	2	5347	240.51	120.25	<.0001	<.0001	2	1962	69.45	<.0001
Time of Day	1	5460	8.46	8.46	0.0036	0.0036	1	1962	11.11	0.0009

Table 7. Indices of red snapper (GOM / all ages / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.24818	274	2.36238	0.66886	0.18335	0.46494	0.96223
1988	0.23005	213	1.32619	0.37548	0.23035	0.23828	0.59168
1989	0.20103	194	1.80085	0.50988	0.27370	0.29786	0.87280
1990	0.44167	240	7.47091	2.11524	0.15264	1.56149	2.86537
1991	0.33766	231	3.04037	0.86082	0.16608	0.61892	1.19727
1992	0.30973	226	2.74076	0.77599	0.19319	0.52916	1.13797
1993	0.30493	223	2.53348	0.71731	0.20334	0.47959	1.07284
1994	0.36555	238	3.94024	1.11560	0.15712	0.81634	1.52457
1995	0.36818	220	4.04413	1.14502	0.18110	0.79943	1.64000
1996	0.38182	220	4.34258	1.22952	0.17468	0.86925	1.73910
1997	0.41546	207	3.79152	1.07349	0.17405	0.75988	1.51655
1998	0.30392	204	2.07800	0.58835	0.18054	0.41122	0.84177
1999	0.28700	223	1.90316	0.53884	0.18994	0.36978	0.78520
2000	0.45370	216	4.37977	1.24005	0.15219	0.91622	1.67833
2001	0.24342	152	1.77436	0.50238	0.23991	0.31301	0.80631
2002	0.34361	227	3.10948	0.88039	0.17522	0.62176	1.24659
2003	0.32597	181	1.87902	0.53201	0.19810	0.35934	0.78766
2004	0.40278	216	4.80342	1.35999	0.16959	0.97113	1.90456
2005	0.45856	181	5.06221	1.43327	0.16323	1.03629	1.98231
2006	0.45249	221	3.41105	0.96577	0.13584	0.73692	1.26569
2007	0.44898	196	4.42995	1.25426	0.15613	0.91957	1.71075
2008	0.41538	260	5.27402	1.49324	0.15198	1.10376	2.02014
2009	0.29114	395	1.62477	0.46002	0.12708	0.35714	0.59253
2010	0.43277	238	4.95442	1.40275	0.14398	1.05332	1.86809
2011	0.46939	196	6.22148	1.76149	0.15122	1.30398	2.37952

Table 8. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / all ages / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 26555.8)*						*Lognormal Submodel Type 3 Tests (AIC 11357.6)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1996	188.68	7.80	<.0001	<.0001	24	3537	13.84	<.0001
Area	2	5530	184.11	92.06	<.0001	<.0001	2	3537	204.12	<.0001
Depth Zone	2	5537	998.38	499.19	<.0001	<.0001	2	3537	147.38	<.0001
Time of Day	1	5616	26.77	26.77	<.0001	<.0001	1	3537	20.32	<.0001

Table 9. Indices of red snapper (GOM / all ages / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.40116	172	2.2776	0.15879	0.20052	0.10675	0.23619
1988	0.50230	217	5.8755	0.40962	0.15832	0.29903	0.56111
1989	0.58744	223	17.0069	1.18568	0.14041	0.89661	1.56796
1990	0.67105	228	15.4582	1.07771	0.12083	0.84709	1.37112
1991	0.69778	225	17.9072	1.24845	0.11027	1.00202	1.55547
1992	0.51415	212	3.6823	0.25672	0.14732	0.19151	0.34414
1993	0.55020	249	10.5509	0.73559	0.14171	0.55483	0.97523
1994	0.62445	229	19.6175	1.36769	0.12621	1.06364	1.75865
1995	0.71429	217	23.1170	1.61167	0.10900	1.29680	2.00297
1996	0.59912	227	10.7152	0.74704	0.12631	0.58085	0.96078
1997	0.60987	223	18.3417	1.27874	0.12759	0.99175	1.64877
1998	0.53333	225	7.1865	0.50103	0.14202	0.37767	0.66467
1999	0.65333	225	14.5352	1.01336	0.11161	0.81119	1.26592
2000	0.67713	223	14.2368	0.99256	0.11602	0.78762	1.25082
2001	0.59024	205	9.2042	0.64170	0.14061	0.48506	0.84892
2002	0.56223	233	8.4597	0.58979	0.12822	0.45686	0.76140
2003	0.65385	260	18.4528	1.28649	0.12052	1.01181	1.63574
2004	0.70732	205	26.7735	1.86659	0.12800	1.44652	2.40865
2005	0.76087	230	18.6638	1.30120	0.10842	1.04821	1.61525
2006	0.71429	224	20.1991	1.40823	0.11025	1.13032	1.75447
2007	0.59804	204	15.5536	1.08437	0.14274	0.81624	1.44057
2008	0.60429	326	5.9381	0.41399	0.10624	0.33494	0.51169
2009	0.74474	333	31.9299	2.22608	0.09073	1.85736	2.66800
2010	0.58454	207	9.6133	0.67022	0.13580	0.51145	0.87828
2011	0.62626	198	13.2922	0.92670	0.14100	0.69995	1.22690

Table 10. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / all ages) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 40789.6)*						*Lognormal Submodel Type 3 Tests (AIC 14715.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3147	195.17	8.09	<.0001	<.0001	24	4562	8.94	<.0001
Area	1	8829	246.42	246.42	<.0001	<.0001	1	4562	271.14	<.0001
Depth Zone	2	8726	1011.98	505.99	<.0001	<.0001	2	4562	197.83	<.0001
Time of Day	1	8851	12.91	12.91	0.0003	0.0003	1	4562	24.35	<.0001
Season	1	8847	686.05	686.05	<.0001	<.0001	1	4562	390.58	<.0001

Table 11. Indices of red snapper (WGOM / all ages) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.34314	306	3.1293	0.35966	0.17086	0.25618	0.50493
1988	0.41104	326	3.1916	0.36682	0.14730	0.27365	0.49170
1989	0.39564	321	4.6094	0.52977	0.13713	0.40321	0.69604
1990	0.56196	347	12.5877	1.44673	0.11312	1.15463	1.81272
1991	0.50549	364	7.8631	0.90372	0.10713	0.72987	1.11898
1992	0.42340	359	3.0626	0.35199	0.12905	0.27221	0.45515
1993	0.45070	355	5.4859	0.63051	0.13106	0.48567	0.81854
1994	0.51685	356	13.2890	1.52733	0.11382	1.21727	1.91635
1995	0.57507	353	15.0985	1.73530	0.10895	1.39643	2.15640
1996	0.51831	355	8.7230	1.00255	0.11642	0.79492	1.26441
1997	0.54252	341	11.6254	1.33612	0.11969	1.05257	1.69606
1998	0.45429	350	5.3797	0.61829	0.12529	0.48172	0.79359
1999	0.50693	361	7.8845	0.90619	0.10695	0.73212	1.12163
2000	0.58857	350	9.2363	1.06154	0.10485	0.86122	1.30846
2001	0.46667	300	5.4557	0.62704	0.13515	0.47911	0.82064
2002	0.49725	364	6.6979	0.76980	0.11503	0.61206	0.96820
2003	0.53125	320	8.9636	1.03021	0.12893	0.79690	1.33182
2004	0.60472	339	18.0869	2.07876	0.11189	1.66310	2.59831
2005	0.65269	334	12.8300	1.47457	0.10333	1.19992	1.81209
2006	0.58807	352	9.6037	1.10377	0.09950	0.90504	1.34615
2007	0.49695	328	8.2938	0.95322	0.12642	0.74100	1.22622
2008	0.53144	493	4.9319	0.56683	0.09560	0.46839	0.68597
2009	0.50260	577	11.3762	1.30749	0.08726	1.09848	1.55627
2010	0.51323	378	8.5558	0.98333	0.10598	0.79598	1.21478
2011	0.57429	350	11.5588	1.32847	0.10929	1.06833	1.65196

Table 12. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / all ages / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 19338.9)*						*Lognormal Submodel Type 3 Tests (AIC 5168.9)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1494	129.73	5.35	<.0001	<.0001	24	1634	3.09	<.0001
Area	1	4243	86.36	86.36	<.0001	<.0001	1	1634	0.73	0.3930
Depth Zone	2	4180	218.65	109.33	<.0001	<.0001	2	1634	74.23	<.0001
Time of Day	1	4272	3.54	3.54	0.0598	0.0599	1	1634	7.53	0.0061
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 19332.2)*						*Lognormal Submodel Type 3 Tests (AIC 5165.7)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1494	129.19	5.33	<.0001	<.0001	24	1635	3.08	<.0001
Area	1	4244	86.42	86.42	<.0001	<.0001		dropped		
Depth Zone	2	4181	218.70	109.35	<.0001	<.0001	2	1635	73.86	<.0001
Time of Day				dropped			1	1635	7.47	0.0064

Table 13. Indices of red snapper (WGOM / all ages / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.26404	178	2.71515	0.69079	0.22932	0.43925	1.08638
1988	0.26207	145	1.17329	0.29851	0.25474	0.18078	0.49290
1989	0.17730	141	0.92771	0.23603	0.30758	0.12937	0.43063
1990	0.46512	172	9.68247	2.46343	0.17183	1.75136	3.46502
1991	0.33514	185	3.22167	0.81966	0.18180	0.57148	1.17562
1992	0.31667	180	2.01334	0.51224	0.19862	0.34564	0.75914
1993	0.33146	178	3.15072	0.80161	0.21467	0.52432	1.22555
1994	0.37853	177	4.54346	1.15596	0.17585	0.81539	1.63877
1995	0.41477	176	5.08220	1.29302	0.18939	0.88829	1.88217
1996	0.41379	174	5.41920	1.37876	0.18974	0.94654	2.00835
1997	0.43558	163	4.53859	1.15472	0.19562	0.78371	1.70135
1998	0.34911	169	2.48143	0.63133	0.17863	0.44291	0.89990
1999	0.32961	179	2.44651	0.62244	0.19654	0.42170	0.91876
2000	0.49123	171	5.33565	1.35751	0.16518	0.97775	1.88475
2001	0.27586	116	2.22854	0.56699	0.25869	0.34081	0.94327
2002	0.39891	183	4.02776	1.02475	0.18017	0.71676	1.46510
2003	0.36496	137	1.93427	0.49212	0.20800	0.32607	0.74273
2004	0.44068	177	5.81156	1.47859	0.17834	1.03790	2.10639
2005	0.49324	148	5.49589	1.39827	0.17143	0.99487	1.96525
2006	0.51136	176	4.29857	1.09365	0.14170	0.82492	1.44993
2007	0.41935	155	3.66908	0.93349	0.17638	0.65778	1.32477
2008	0.41262	206	3.70865	0.94356	0.16144	0.68462	1.30044
2009	0.29605	304	1.73364	0.44107	0.13783	0.33524	0.58032
2010	0.44279	201	5.25725	1.33756	0.14768	0.99708	1.79430
2011	0.49419	172	7.36544	1.87393	0.15467	1.37784	2.54863

Table 14. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / all ages / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 21769.5)*						*Lognormal Submodel Type 3 Tests (AIC 9297.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1600	152.36	6.29	<.0001	<.0001	24	2900	13.46	<.0001
Area	1	4525	176.65	176.65	<.0001	<.0001	1	2900	408.68	<.0001
Depth Zone	2	4437	904.58	452.29	<.0001	<.0001	2	2900	137.40	<.0001
Time of Day	1	4527	12.37	12.37	0.0004	0.0004	1	2900	16.61	<.0001

Table 15. Indices of red snapper (WGOM / all ages / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.45313	128	2.2201	0.14841	0.21766	0.09652	0.22821
1988	0.53039	181	6.6346	0.44352	0.17319	0.31448	0.62550
1989	0.56667	180	11.7901	0.78815	0.15311	0.58129	1.06863
1990	0.65714	175	12.9569	0.86616	0.13545	0.66143	1.13425
1991	0.68156	179	15.4142	1.03042	0.12521	0.80294	1.32234
1992	0.53073	179	4.0252	0.26908	0.16117	0.19534	0.37066
1993	0.57062	177	8.2166	0.54927	0.15675	0.40222	0.75008
1994	0.65363	179	25.7538	1.72161	0.13782	1.30855	2.26507
1995	0.73446	177	28.2001	1.88514	0.12015	1.48372	2.39516
1996	0.61878	181	11.9575	0.79935	0.13998	0.60497	1.05617
1997	0.64045	178	20.4966	1.37017	0.13895	1.03911	1.80671
1998	0.55249	181	8.6346	0.57721	0.15821	0.42147	0.79051
1999	0.68132	182	16.7890	1.12233	0.11888	0.88557	1.42238
2000	0.68156	179	12.3598	0.82624	0.12705	0.64150	1.06418
2001	0.58696	184	9.6018	0.64187	0.14806	0.47813	0.86169
2002	0.59669	181	9.5679	0.63960	0.14023	0.48384	0.84551
2003	0.65574	183	19.3268	1.29197	0.14353	0.97100	1.71905
2004	0.78395	162	36.0355	2.40893	0.13220	1.85137	3.13441
2005	0.77957	186	21.4333	1.43279	0.11677	1.13528	1.80828
2006	0.66477	176	15.8631	1.06043	0.13051	0.81771	1.37519
2007	0.56647	173	14.0937	0.94215	0.16610	0.67738	1.31042
2008	0.61672	287	6.1681	0.41233	0.11258	0.32943	0.51609
2009	0.73260	273	30.6750	2.05059	0.09494	1.69669	2.47831
2010	0.59322	177	10.9202	0.73000	0.14054	0.55189	0.96560
2011	0.65169	178	14.8435	0.99227	0.14582	0.74239	1.32625

Table 16. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / all ages) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 10811.7)*						*Lognormal Submodel Type 3 Tests (AIC 3044.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	750	110.59	4.52	<.0001	<.0001	24	936	3.16	<.0001
Depth Zone	2	2120	127.42	63.71	<.0001	<.0001	2	936	22.47	<.0001
Time of Day	1	2200	24.05	24.05	<.0001	<.0001	1	936	8.37	0.0039
Season	1	2206	240.26	240.26	<.0001	<.0001	1	936	77.69	<.0001

Table 17. Indices of red snapper (EGOM / all ages) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.22857	140	2.6360	0.35154	0.26087	0.21043	0.58727
1988	0.23077	104	2.8473	0.37973	0.34238	0.19511	0.73903
1989	0.44792	96	21.6931	2.89305	0.25928	1.73701	4.81847
1990	0.52893	121	11.6353	1.55171	0.19867	1.04692	2.29991
1991	0.55435	92	13.9438	1.85958	0.19966	1.25224	2.76149
1992	0.34177	79	7.3116	0.97509	0.34233	0.50107	1.89755
1993	0.38462	117	7.7858	1.03833	0.28085	0.59842	1.80162
1994	0.41441	111	3.8747	0.51674	0.20876	0.34188	0.78103
1995	0.39286	84	4.1183	0.54923	0.23733	0.34390	0.87717
1996	0.39130	92	3.7872	0.50507	0.23828	0.31567	0.80810
1997	0.41573	89	6.1746	0.82345	0.25101	0.50227	1.35003
1998	0.29114	79	1.5741	0.20992	0.32868	0.11063	0.39835
1999	0.32184	87	2.9713	0.39626	0.27316	0.23172	0.67762
2000	0.48315	89	9.5051	1.26762	0.21698	0.82544	1.94667
2001	0.31579	57	2.5714	0.34292	0.34718	0.17465	0.67331
2002	0.29167	96	2.3357	0.31150	0.27427	0.18177	0.53379
2003	0.48760	121	7.8069	1.04115	0.21537	0.68008	1.59393
2004	0.32927	82	2.9004	0.38681	0.27971	0.22341	0.66971
2005	0.51948	77	6.7100	0.89487	0.24454	0.55263	1.44905
2006	0.56989	93	13.6226	1.81675	0.18726	1.25326	2.63359
2007	0.65278	72	18.0350	2.40519	0.18751	1.65840	3.48828
2008	0.46237	93	12.9027	1.72074	0.24812	1.05539	2.80553
2009	0.48344	151	12.0091	1.60156	0.19154	1.09564	2.34110
2010	0.44776	67	6.4070	0.85445	0.32556	0.45290	1.61203
2011	0.34091	44	2.2999	0.30673	0.36300	0.15176	0.61993

Table 18. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / all ages / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 5758.6)*						*Lognormal Submodel Type 3 Tests (AIC 972.2)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	371	60.60	2.43	<.0001	0.0003	24	299	2.68	<.0001
Depth Zone	2	1051	30.70	15.35	<.0001	<.0001	2	299	3.00	0.0512
Time of Day	1	1118	6.88	6.88	0.0087	0.0088	1	299	12.70	0.0004
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 5758.6)*						*Lognormal Submodel Type 3 Tests (AIC 973.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	371	60.60	2.43	<.0001	0.0003	24	301	2.62	<.0001
Depth Zone	2	1051	30.70	15.35	<.0001	<.0001		dropped		
Time of Day	1	1118	6.88	6.88	0.0087	0.0088	1	301	11.97	0.0006

Table 19. Indices of red snapper (EGOM / all ages / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.21875	96	1.7521	0.57868	0.28236	0.33256	1.00694
1988	0.16176	68	1.8065	0.59664	0.49004	0.23591	1.50893
1989	0.26415	53	6.4410	2.12727	0.47091	0.86916	5.20653
1990	0.38235	68	3.0067	0.99303	0.27053	0.58361	1.68968
1991	0.34783	46	3.0209	0.99772	0.34192	0.51308	1.94012
1992	0.28261	46	8.9659	2.96117	0.45181	1.25056	7.01167
1993	0.20000	45	0.8990	0.29691	0.49653	0.11611	0.75923
1994	0.32787	61	2.7145	0.89651	0.32315	0.47732	1.68382
1995	0.18182	44	0.9532	0.31483	0.53400	0.11561	0.85730
1996	0.26087	46	1.6144	0.53320	0.36378	0.26344	1.07919
1997	0.34091	44	2.2702	0.74977	0.36412	0.37021	1.51849
1998	0.08571	35	0.9031	0.29825	1.04820	0.05330	1.66895
1999	0.11364	44	0.3903	0.12891	0.59090	0.04315	0.38514
2000	0.31111	45	1.7762	0.58662	0.35388	0.29512	1.16603
2001	0.13889	36	0.6252	0.20647	0.54011	0.07506	0.56796
2002	0.11364	44	0.5844	0.19302	0.53387	0.07090	0.52548
2003	0.20455	44	2.2189	0.73283	0.53735	0.26763	2.00666
2004	0.23077	39	2.0739	0.68496	0.47071	0.27995	1.67586
2005	0.30303	33	5.4703	1.80667	0.48088	0.72563	4.49822
2006	0.22222	45	0.8919	0.29457	0.36406	0.14546	0.59651
2007	0.56098	41	8.0830	2.66957	0.28842	1.51673	4.69866
2008	0.42593	54	10.4029	3.43576	0.26828	2.02786	5.82113
2009	0.27473	91	1.5775	0.52101	0.26401	0.31002	0.87562
2010	0.37838	37	5.7464	1.89787	0.42349	0.84234	4.27608
2011	0.29167	24	1.5072	0.49777	0.47192	0.20302	1.22042

Table 20. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / all ages / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 5163.5)*						*Lognormal Submodel Type 3 Tests (AIC 2001.2)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	330	96.27	3.84	<.0001	<.0001	24	610	5.25	<.0001
Depth Zone	2	958	135.06	67.53	<.0001	<.0001	2	610	17.28	<.0001
Time of Day	1	1005	18.07	18.07	<.0001	<.0001	1	610	4.83	0.0284

Table 21. Indices of red snapper (EGOM / all ages / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.25000	44	2.3833	0.17114	0.43005	0.07508	0.39008
1988	0.36111	36	3.1756	0.22803	0.37109	0.11117	0.46771
1989	0.67442	43	47.7907	3.43165	0.29283	1.93360	6.09034
1990	0.71698	53	27.1895	1.95236	0.26347	1.16291	3.27775
1991	0.76087	46	31.1968	2.24011	0.22420	1.43851	3.48840
1992	0.42424	33	2.4139	0.17333	0.37154	0.08444	0.35581
1993	0.50000	72	18.1292	1.30179	0.29857	0.72564	2.33539
1994	0.52000	50	4.4366	0.31857	0.25043	0.19453	0.52171
1995	0.62500	40	9.4026	0.67516	0.23631	0.42358	1.07618
1996	0.52174	46	7.0323	0.50496	0.29929	0.28110	0.90711
1997	0.48889	45	11.7821	0.84603	0.31407	0.45811	1.56240
1998	0.45455	44	2.9058	0.20865	0.33168	0.10935	0.39814
1999	0.53488	43	7.6263	0.54761	0.31146	0.29797	1.00640
2000	0.65909	44	21.5509	1.54748	0.24837	0.94867	2.52427
2001	0.61905	21	6.7405	0.48401	0.39641	0.22543	1.03916
2002	0.44231	52	5.2496	0.37695	0.30789	0.20649	0.68815
2003	0.64935	77	15.8267	1.13645	0.22534	0.72818	1.77363
2004	0.41860	43	4.2060	0.30202	0.34184	0.15534	0.58719
2005	0.68182	44	9.4228	0.67661	0.26962	0.39834	1.14930
2006	0.89583	48	36.4698	2.61875	0.18784	1.80449	3.80043
2007	0.77419	31	23.6908	1.70114	0.24031	1.05908	2.73244
2008	0.51282	39	4.7814	0.34333	0.31054	0.18714	0.62988
2009	0.80000	60	37.8752	2.71966	0.25215	1.65527	4.46849
2010	0.53333	30	4.2750	0.30697	0.42303	0.13635	0.69107
2011	0.40000	20	2.6073	0.18722	0.42285	0.08319	0.42135

Table 22. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / age 0) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 69579.6)*						*Lognormal Submodel Type 3 Tests (AIC 10668.5)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	4001	462.34	19.19	<.0001	<.0001	24	3333	13.32	<.0001
Area	2	8990	244.06	122.03	<.0001	<.0001	2	3333	245.42	<.0001
Depth Zone	2	9382	868.56	434.28	<.0001	<.0001	2	3333	71.71	<.0001
Time of Day	1	9176	47.69	47.69	<.0001	<.0001	1	3333	28.79	<.0001
Season	1	9472	1742.97	1742.97	<.0001	<.0001	1	3333	217.38	<.0001

Table 23. Indices of red snapper (GOM / age 0) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.08969	446	0.09454	0.03991	0.42290	0.01773	0.08982
1988	0.19070	430	0.39958	0.16868	0.23072	0.10697	0.26600
1989	0.27098	417	2.28809	0.96591	0.26076	0.57831	1.61329
1990	0.28632	468	1.59816	0.67466	0.24308	0.41780	1.08944
1991	0.34649	456	3.45468	1.45838	0.17925	1.02190	2.08131
1992	0.21918	438	0.42873	0.18099	0.25288	0.11000	0.29779
1993	0.25212	472	0.97876	0.41318	0.19576	0.28035	0.60895
1994	0.27623	467	2.06487	0.87168	0.17240	0.61902	1.22746
1995	0.39359	437	5.70406	2.40795	0.18288	1.67534	3.46092
1996	0.27293	447	1.26084	0.53226	0.18316	0.37012	0.76543
1997	0.30465	430	2.71715	1.14704	0.17277	0.81397	1.61639
1998	0.25874	429	0.90413	0.38168	0.22695	0.24380	0.59752
1999	0.35045	448	3.69946	1.56172	0.19631	1.05852	2.30411
2000	0.41230	439	4.84537	2.04546	0.20714	1.35756	3.08193
2001	0.32773	357	1.34058	0.56592	0.24002	0.35252	0.90850
2002	0.30870	460	1.73645	0.73304	0.25777	0.44139	1.21741
2003	0.36508	441	2.72302	1.14952	0.18054	0.80344	1.64467
2004	0.31354	421	3.38234	1.42785	0.17497	1.00891	2.02074
2005	0.40389	411	3.19384	1.34827	0.21475	0.88175	2.06163
2006	0.40000	445	5.24363	2.21358	0.18761	1.52598	3.21101
2007	0.30000	400	2.03463	0.85891	0.26515	0.50997	1.44662
2008	0.26109	586	0.55356	0.23368	0.36611	0.11497	0.47498
2009	0.36126	728	6.66463	2.81345	0.13553	2.14810	3.68490
2010	0.20000	445	0.72441	0.30581	0.25945	0.18355	0.50950
2011	0.24873	394	1.18554	0.50047	0.21153	0.32934	0.76051

Table 24. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / age 0 / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 37230.4)*						*Lognormal Submodel Type 3 Tests (AIC 682.9)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	23	5289	137.93	6.00	<.0001	<.0001	23	222	1.62	0.0401
Area	2	5289	17.38	8.69	0.0002	0.0002	2	222	0.46	0.6321
Depth Zone	2	5289	23.85	11.92	<.0001	<.0001	2	222	13.44	<.0001
Time of Day	1	5289	30.75	30.75	<.0001	<.0001	1	222	10.33	0.0015
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 37230.4)*						*Lognormal Submodel Type 3 Tests (AIC 680.7)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	23	5289	137.93	6.00	<.0001	<.0001	23	224	1.69	0.0285
Area	2	5289	17.38	8.69	0.0002	0.0002		dropped		
Depth Zone	2	5289	23.85	11.92	<.0001	<.0001	2	224	13.13	<.0001
Time of Day	1	5289	30.75	30.75	<.0001	<.0001	1	224	10.29	0.0015

Table 25. Indices of red snapper (GOM / age 0 / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.00000	274	.	.	.	.	.
1988	0.00469	213	0.00440	0.03729	4.42060	0.00115	1.2070
1989	0.02577	194	0.10944	0.92719	0.79784	0.22780	3.7739
1990	0.02083	240	0.01537	0.13022	1.34015	0.01714	0.9895
1991	0.04762	231	0.08463	0.71697	0.60907	0.23314	2.2049
1992	0.00885	226	0.01932	0.16368	1.81109	0.01468	1.8254
1993	0.01794	223	0.03404	0.28839	1.12636	0.04719	1.7625
1994	0.01261	238	0.02259	0.19139	1.44671	0.02285	1.6028
1995	0.10909	220	0.29982	2.54003	0.40621	1.16250	5.5499
1996	0.01818	220	0.03279	0.27779	1.14041	0.04476	1.7240
1997	0.01932	207	0.02888	0.24470	1.18489	0.03760	1.5926
1998	0.01471	204	0.00786	0.06663	2.17406	0.00475	0.9356
1999	0.08072	223	0.20962	1.77587	0.45768	0.74236	4.2482
2000	0.17130	216	0.71427	6.05124	0.34134	3.11526	11.7542
2001	0.05263	152	0.14063	1.19144	0.63945	0.36942	3.8426
2002	0.07930	227	0.18083	1.53202	0.46230	0.63532	3.6943
2003	0.02210	181	0.01768	0.14976	1.40043	0.01864	1.2034
2004	0.00926	216	0.01040	0.08807	2.29447	0.00586	1.3225
2005	0.06630	181	0.11907	1.00872	0.56195	0.35379	2.8760
2006	0.11312	221	0.28175	2.38697	0.40168	1.10131	5.1735
2007	0.05612	196	0.07562	0.64061	0.62248	0.20395	2.0121
2008	0.07692	260	0.19548	1.65608	0.44418	0.70877	3.8695
2009	0.05823	395	0.11499	0.97415	0.45021	0.41255	2.3002
2010	0.00420	238	0.07531	0.63802	1.66744	0.06356	6.4043
2011	0.03061	196	0.03810	0.32277	0.92510	0.06697	1.5556

Table 26. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / age 0 / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 26931.4)*						*Lognormal Submodel Type 3 Tests (AIC 9828.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1997	339.58	14.04	<.0001	<.0001	24	3083	17.68	<.0001
Area	2	5463	336.58	168.29	<.0001	<.0001	2	3083	270.83	<.0001
Depth Zone	2	5367	1109.39	554.69	<.0001	<.0001	2	3083	74.20	<.0001
Time of Day	1	5559	29.93	29.93	<.0001	<.0001	1	3083	21.96	<.0001

Table 27. Indices of red snapper (GOM / age 0 / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.23256	172	0.7497	0.06233	0.30251	0.03449	0.11264
1988	0.37327	217	3.0445	0.25311	0.18964	0.17380	0.36862
1989	0.48430	223	14.2399	1.18387	0.16355	0.85543	1.63841
1990	0.56579	228	11.1016	0.92295	0.14363	0.69352	1.22829
1991	0.65333	225	17.0655	1.41878	0.11874	1.11979	1.79760
1992	0.44340	212	2.5188	0.20940	0.17178	0.14889	0.29452
1993	0.46185	249	6.9644	0.57900	0.15429	0.42604	0.78687
1994	0.55022	229	16.1056	1.33897	0.14879	0.99595	1.80013
1995	0.68203	217	21.6052	1.79620	0.11718	1.42207	2.26875
1996	0.51982	227	6.8476	0.56929	0.14106	0.42995	0.75379
1997	0.56951	223	18.5045	1.53841	0.14379	1.15562	2.04801
1998	0.48000	225	6.0719	0.50480	0.15927	0.36783	0.69278
1999	0.61778	225	14.4613	1.20227	0.12699	0.93356	1.54832
2000	0.64574	223	12.5957	1.04717	0.12476	0.81671	1.34266
2001	0.53171	205	7.3384	0.61010	0.15959	0.44427	0.83781
2002	0.53219	233	7.4790	0.62179	0.13542	0.47484	0.81421
2003	0.60385	260	17.0626	1.41853	0.12722	1.10098	1.82768
2004	0.63415	205	23.5155	1.95501	0.13994	1.47975	2.58291
2005	0.66957	230	13.5311	1.12493	0.11737	0.89029	1.42142
2006	0.68304	224	18.2546	1.51764	0.11529	1.20604	1.90974
2007	0.53431	204	13.5425	1.12589	0.16331	0.81391	1.55745
2008	0.40798	326	1.9442	0.16163	0.14061	0.12218	0.21383
2009	0.72072	333	32.3734	2.69143	0.09606	2.22197	3.26007
2010	0.42512	207	4.9815	0.41415	0.17499	0.29262	0.58615
2011	0.46465	198	8.8090	0.73236	0.17657	0.51586	1.03972

Table 28. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / age 0) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 58977.4)*						*Lognormal Submodel Type 3 Tests (AIC 8752.9)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3164	336.87	13.97	<.0001	<.0001	24	2744	13.80	<.0001
Area	1	5129	266.03	266.03	<.0001	<.0001	1	2744	474.38	<.0001
Depth Zone	2	5266	801.57	400.78	<.0001	<.0001	2	2744	61.49	<.0001
Time of Day	1	5154	12.06	12.06	0.0005	0.0005	1	2744	30.55	<.0001
Season	1	5020	1379.11	1379.11	<.0001	<.0001	1	2744	182.59	<.0001

Table 29. Indices of red snapper (WGOM / age 0) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.12745	306	0.09182	0.04121	0.45827	0.01721	0.09869
1988	0.21166	326	0.28829	0.12940	0.29149	0.07309	0.22907
1989	0.27414	321	1.07305	0.48164	0.22093	0.31125	0.74532
1990	0.27666	347	1.00398	0.45064	0.20285	0.30158	0.67336
1991	0.34066	364	2.47452	1.11069	0.24487	0.68547	1.79970
1992	0.23398	359	0.30578	0.13725	0.33161	0.07194	0.26186
1993	0.23380	355	0.53913	0.24199	0.29405	0.13604	0.43046
1994	0.30056	356	2.91326	1.30762	0.23305	0.82551	2.07128
1995	0.41360	353	6.51887	2.92600	0.25392	1.77485	4.82379
1996	0.29014	355	1.01758	0.45674	0.22330	0.29381	0.71002
1997	0.32258	341	2.93434	1.31708	0.22649	0.84205	2.06011
1998	0.26571	350	0.85448	0.38354	0.33704	0.19902	0.73912
1999	0.37119	361	3.52949	1.58422	0.26588	0.93930	2.67192
2000	0.44000	350	4.73866	2.12696	0.28074	1.22608	3.68975
2001	0.35333	300	1.20468	0.54072	0.32179	0.28862	1.01303
2002	0.32692	364	1.74415	0.78287	0.38924	0.36936	1.65930
2003	0.35000	320	2.46987	1.10860	0.24329	0.68626	1.79086
2004	0.33333	339	4.87506	2.18818	0.17035	1.56019	3.06894
2005	0.43114	334	3.72986	1.67415	0.27392	0.97760	2.86700
2006	0.38352	352	3.32674	1.49321	0.31386	0.80887	2.75652
2007	0.28049	328	1.47794	0.66337	0.41026	0.30142	1.45997
2008	0.28803	493	0.39127	0.17562	0.57098	0.06070	0.50813
2009	0.37088	577	6.39158	2.86887	0.16278	2.07609	3.96437
2010	0.19841	378	0.57436	0.25780	0.21071	0.16992	0.39114
2011	0.26286	350	1.22896	0.55162	0.25530	0.33372	0.91179

Table 30. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / age 0 / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC* 25537.2*)*						*Lognormal Submodel Type 3 Tests (AIC* 606.1*)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	21	3781	128.84	6.14	<.0001	<.0001	21	197	1.16	0.2908
Area	1	3781	2.24	2.24	0.1348	0.1349	1	197	0.02	0.8824
Depth Zone	2	3781	23.09	11.54	<.0001	<.0001	2	197	10.92	<.0001
Time of Day	1	3781	26.12	26.12	<.0001	<.0001	1	197	13.07	0.0004
Model Run #2	*Binomial Submodel Type 3 Tests (AIC* 25508.4*)*						*Lognormal Submodel Type 3 Tests (AIC* 604.1*)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	21	3782	128.56	6.12	<.0001	<.0001	21	198	1.17	0.2836
Area				dropped				dropped		
Depth Zone	2	3782	23.10	11.55	<.0001	<.0001	2	198	11.11	<.0001
Time of Day	1	3782	26.25	26.25	<.0001	<.0001	1	198	13.20	0.0004

Table 31. Indices of red snapper (WGOM / age 0 / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.00000	178	.	.	.	.	.
1988	0.00690	145	0.00767	0.04517	5.1316	0.00119	1.7164
1989	0.02128	141	0.03451	0.20316	1.6997	0.01975	2.0897
1990	0.00581	172	0.00111	0.00655	13.0908	0.00007	0.6132
1991	0.05405	185	0.11154	0.65673	0.7098	0.18306	2.3560
1992	0.01111	180	0.02870	0.16899	2.1668	0.01209	2.3630
1993	0.01685	178	0.05058	0.29779	1.4763	0.03465	2.5591
1994	0.01695	177	0.03440	0.20252	1.7029	0.01964	2.0881
1995	0.13068	176	0.42364	2.49428	0.4206	1.11269	5.5913
1996	0.02299	174	0.04869	0.28667	1.3265	0.03822	2.1503
1997	0.01840	163	0.03523	0.20745	1.6864	0.02037	2.1126
1998	0.01775	169	0.01098	0.06467	2.7606	0.00343	1.2177
1999	0.09497	179	0.27122	1.59686	0.4943	0.62685	4.0679
2000	0.21053	171	1.06128	6.24854	0.3381	3.23615	12.0650
2001	0.06897	116	0.21714	1.27844	0.6764	0.37458	4.3633
2002	0.09290	183	0.25371	1.49376	0.4952	0.58550	3.8110
2003	0.02190	137	0.02314	0.13622	1.9970	0.01079	1.7193
2004	0.00000	177	.	.	.	.	.
2005	0.06757	148	0.14942	0.87977	0.6656	0.26202	2.9540
2006	0.13636	176	0.42225	2.48607	0.4141	1.12195	5.5088
2007	0.04516	155	0.07636	0.44959	0.9076	0.09539	2.1190
2008	0.08738	206	0.24553	1.44559	0.4899	0.57170	3.6553
2009	0.06908	304	0.17645	1.03889	0.4931	0.40867	2.6410
2010	0.00000	201	.	.	.	.	.
2011	0.03488	172	0.05304	0.31227	1.0872	0.05337	1.8271

Table 32. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / age 0 / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 22154.5)*						*Lognormal Submodel Type 3 Tests (AIC 7987.9)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1602	284.53	11.74	<.0001	<.0001	24	2522	16.95	<.0001
Area	1	4490	332.00	332.00	<.0001	<.0001	1	2522	557.49	<.0001
Depth Zone	2	4292	977.36	488.68	<.0001	<.0001	2	2522	70.22	<.0001
Time of Day	1	4482	11.10	11.10	0.0009	0.0009	1	2522	22.36	<.0001

Table 33. Indices of red snapper (WGOM / age 0 / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.30469	128	1.0540	0.08398	0.31648	0.04527	0.15578
1988	0.37569	181	3.0041	0.23935	0.21681	0.15591	0.36745
1989	0.47222	180	9.7740	0.77876	0.18108	0.54373	1.11538
1990	0.54286	175	8.4976	0.67706	0.16717	0.48576	0.94369
1991	0.63687	179	14.9967	1.19488	0.13919	0.90574	1.57632
1992	0.45810	179	2.6353	0.20997	0.18918	0.14430	0.30551
1993	0.45198	177	4.6495	0.37045	0.17974	0.25933	0.52920
1994	0.58101	179	21.7434	1.73243	0.16203	1.25554	2.39046
1995	0.69492	177	26.1669	2.08488	0.13000	1.60929	2.70102
1996	0.54696	181	7.6139	0.60665	0.15565	0.44519	0.82665
1997	0.60112	178	20.9827	1.67183	0.15790	1.22148	2.28820
1998	0.49724	181	7.3163	0.58294	0.17783	0.40961	0.82962
1999	0.64286	182	16.9000	1.34653	0.13522	1.02871	1.76254
2000	0.65922	179	11.1534	0.88866	0.13406	0.68047	1.16055
2001	0.53261	184	7.5894	0.60469	0.16877	0.43248	0.84548
2002	0.56354	181	8.4659	0.67453	0.14770	0.50280	0.90490
2003	0.59563	183	17.9937	1.43367	0.15338	1.05681	1.94491
2004	0.69753	162	31.9091	2.54240	0.14178	1.91739	3.37115
2005	0.72043	186	16.5603	1.31946	0.11668	1.04567	1.66494
2006	0.63068	176	13.9762	1.11357	0.13896	0.84448	1.46839
2007	0.49133	173	11.8986	0.94804	0.19727	0.64138	1.40131
2008	0.43206	287	2.0281	0.16159	0.14555	0.12096	0.21586
2009	0.70696	273	31.3801	2.50025	0.09909	2.05174	3.04680
2010	0.42373	177	5.6141	0.44731	0.18007	0.31293	0.63939
2011	0.48315	178	9.8667	0.78614	0.18351	0.54629	1.13130

Table 34. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / age 0) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 16085.7)*						*Lognormal Submodel Type 3 Tests (AIC 1856.7)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	758	206.78	8.45	<.0001	<.0001	24	561	4.47	<.0001
Depth Zone	2	1388	136.67	68.33	<.0001	<.0001	2	561	7.46	0.0006
Time of Day	1	1407	33.81	33.81	<.0001	<.0001	1	561	2.23	0.1360
Season	1	1016	276.83	276.83	<.0001	<.0001	1	561	33.33	<.0001
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 16085.7)*						*Lognormal Submodel Type 3 Tests (AIC 1856.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	758	206.78	8.45	<.0001	<.0001	24	562	4.48	<.0001
Depth Zone	2	1388	136.67	68.33	<.0001	<.0001	2	562	7.82	0.0004
Time of Day	1	1407	33.81	33.81	<.0001	<.0001		dropped		
Season	1	1016	276.83	276.83	<.0001	<.0001	1	562	32.27	<.0001

Table 35. Indices of red snapper (EGOM / age 0) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.00714	140	0.00342	0.00181	7.73079	0.00003	0.1041
1988	0.12500	104	0.33813	0.17884	0.54450	0.06455	0.4955
1989	0.26042	96	5.84952	3.09393	0.81100	0.74643	12.8242
1990	0.31405	121	2.65333	1.40340	0.67579	0.41158	4.7853
1991	0.36957	92	4.96885	2.62812	0.40213	1.21160	5.7007
1992	0.15190	79	0.25502	0.13488	0.71310	0.03741	0.4863
1993	0.30769	117	1.01972	0.53935	0.40589	0.24698	1.1778
1994	0.19820	111	0.33701	0.17825	0.47697	0.07207	0.4408
1995	0.30952	84	1.79755	0.95076	0.43195	0.41573	2.1744
1996	0.20652	92	0.49013	0.25924	0.49038	0.10245	0.6560
1997	0.23596	89	1.11244	0.58839	0.51647	0.22249	1.5561
1998	0.22785	79	0.26483	0.14007	0.58968	0.04697	0.4177
1999	0.26437	87	0.88005	0.46548	0.62478	0.14766	1.4673
2000	0.30337	89	2.61641	1.38387	0.55966	0.48719	3.9309
2001	0.19298	57	0.66847	0.35356	0.58883	0.11873	1.0528
2002	0.23958	96	0.52159	0.27588	0.66398	0.08237	0.9240
2003	0.40496	121	1.49741	0.79201	0.41314	0.35803	1.7520
2004	0.23171	82	0.50915	0.26930	1.04042	0.04856	1.4933
2005	0.28571	77	0.61120	0.32328	0.94423	0.06548	1.5960
2006	0.46237	93	9.85609	5.21308	0.28807	2.96380	9.1694
2007	0.38889	72	6.49754	3.43668	0.52281	1.28579	9.1856
2008	0.11828	93	0.23608	0.12487	1.35909	0.01614	0.9659
2009	0.32450	151	3.85015	2.03642	0.41166	0.92299	4.4930
2010	0.20896	67	0.27773	0.14690	1.29187	0.02025	1.0656
2011	0.13636	44	0.15437	0.08165	0.93692	0.01669	0.3994

Table 36. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / age 0 / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 4359.6*						*Lognormal Submodel Type 3 Tests (AIC 41.0)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	16	663	8.81	0.55	0.9211	0.9198	16	9	1.82	0.1830
Depth Zone	1	663	5.46	5.46	0.0195	0.0198	1	9	3.67	0.0877
Time of Day	1	663	6.78	6.78	0.0092	0.0094	1	9	0.72	0.4183
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 4359.6*						*Lognormal Submodel Type 3 Tests (AIC 43.0)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	16	663	8.81	0.55	0.9211	0.9198	16	10	1.85	0.1629
Depth Zone	1	663	5.46	5.46	0.0195	0.0198	1	10	4.56	0.0585
Time of Day	1	663	6.78	6.78	0.0092	0.0094				
Model Run #3	*Binomial Submodel Type 3 Tests (AIC 4359.6*						*Lognormal Submodel Type 3 Tests (AIC 48.6)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	16	663	8.81	0.55	0.9211	0.9198	16	11	2.25	0.0883
Depth Zone	1	663	5.46	5.46	0.0195	0.0198				
Time of Day	1	663	6.78	6.78	0.0092	0.0094				

Table 37. Indices of red snapper (EGOM / age 0 / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987							
1988							
1989	0.037736	53	94.552	6.44594	1.08303	1.10687	37.5384
1990	0.058824	68	2.365	0.16124	0.83175	0.03781	0.6876
1991	0.021739	46	0.674	0.04595	1.42637	0.00559	0.3780
1992							
1993	0.022222	45	0.143	0.00978	1.49494	0.00112	0.0854
1994							
1995	0.022727	44	0.235	0.01601	1.46145	0.00189	0.1358
1996							
1997	0.022727	44	0.107	0.00732	1.52297	0.00082	0.0655
1998							
1999	0.022727	44	8.825	0.60164	1.40693	0.07444	4.8629
2000	0.022222	45	3.352	0.22855	1.41082	0.02818	1.8538
2001							
2002	0.022727	44	0.189	0.01287	1.47110	0.00150	0.1101
2003	0.022727	44	0.726	0.04952	1.42472	0.00603	0.4067
2004	0.051282	39	4.340	0.29588	1.07963	0.05100	1.7165
2005	0.060606	33	8.199	0.55897	1.07914	0.09641	3.2409
2006	0.022222	45	0.093	0.00635	1.53951	0.00070	0.0576
2007	0.097561	41	3.303	0.22519	0.81994	0.05367	0.9449
2008	0.037037	54	1.156	0.07880	1.09416	0.01336	0.4647
2009	0.021978	91	3.705	0.25261	1.09250	0.04292	1.4869
2010	0.027027	37	117.397	8.00337	1.40431	0.99253	64.5360
2011							

Table 38. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / age 0 / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 5315.1)*						*Lognormal Submodel Type 3 Tests (AIC 1763.9)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	329	116.52	4.64	<.0001	<.0001	24	534	4.59	<.0001
Depth Zone	2	865	135.75	67.87	<.0001	<.0001	2	534	8.03	0.0004
Time of Day	1	944	22.61	22.61	<.0001	<.0001	1	534	2.72	0.0998
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 5315.1)*						*Lognormal Submodel Type 3 Tests (AIC 1763.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	329	116.52	4.64	<.0001	<.0001	24	535	4.58	<.0001
Depth Zone	2	865	135.75	67.87	<.0001	<.0001	2	535	8.49	0.0002
Time of Day	1	944	22.61	22.61	<.0001	<.0001		dropped		

Table 39. Indices of red snapper (EGOM / age 0 / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.02273	44	0.0476	0.00416	2.81943	0.00022	0.08040
1988	0.36111	36	3.9364	0.34412	0.43179	0.15051	0.78676
1989	0.53488	43	38.0472	3.32608	0.32981	1.74913	6.32472
1990	0.64151	53	15.4772	1.35301	0.25372	0.82101	2.22973
1991	0.71739	46	28.3855	2.48145	0.23058	1.57405	3.91196
1992	0.36364	33	2.8486	0.24902	0.55963	0.08767	0.70732
1993	0.48611	72	9.8597	0.86193	0.25960	0.51719	1.43647
1994	0.44000	50	3.5599	0.31120	0.34305	0.15971	0.60640
1995	0.62500	40	12.9279	1.13015	0.30283	0.62496	2.04372
1996	0.41304	46	5.3332	0.46623	0.38563	0.22141	0.98177
1997	0.44444	45	10.8322	0.94695	0.34463	0.48455	1.85061
1998	0.40909	44	2.8744	0.25128	0.41773	0.11267	0.56042
1999	0.51163	43	7.6017	0.66454	0.37821	0.31984	1.38074
2000	0.59091	44	20.4232	1.78540	0.31805	0.95964	3.32172
2001	0.52381	21	6.0016	0.52466	0.49475	0.20580	1.33757
2002	0.42308	52	5.1546	0.45061	0.34387	0.23090	0.87939
2003	0.62338	77	11.6979	1.02263	0.21767	0.66502	1.57254
2004	0.39535	43	4.3581	0.38098	0.43247	0.16644	0.87209
2005	0.45455	44	4.9135	0.42954	0.42588	0.18984	0.97188
2006	0.87500	48	36.8896	3.22488	0.19777	2.17959	4.77146
2007	0.77419	31	25.5478	2.23339	0.28140	1.28583	3.87922
2008	0.23077	39	1.8443	0.16123	0.58857	0.05417	0.47992
2009	0.78333	60	23.7437	2.07567	0.23430	1.30726	3.29573
2010	0.43333	30	1.9730	0.17248	0.52318	0.06449	0.46129
2011	0.30000	20	1.6976	0.14840	0.63125	0.04660	0.47257

Table 40. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / age 0 selectivity) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 69579.6)*						*Lognormal Submodel Type 3 Tests (AIC11954.5)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	4001	462.34	19.19	<.0001	<.0001	24	3333	10.67	<.0001
Area	2	8990	244.06	122.03	<.0001	<.0001	2	3333	282.83	<.0001
Depth Zone	2	9382	868.56	434.28	<.0001	<.0001	2	3333	142.94	<.0001
Time of Day	1	9176	47.69	47.69	<.0001	<.0001	1	3333	83.46	<.0001
Season	1	9472	1742.97	1742.97	<.0001	<.0001	1	3333	0.52	0.4705
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 69579.6)*						*Lognormal Submodel Type 3 Tests (AIC 11952.2)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	4001	462.34	19.19	<.0001	<.0001	24	3334	10.65	<.0001
Area	2	8990	244.06	122.03	<.0001	<.0001	2	3334	283.15	<.0001
Depth Zone	2	9382	868.56	434.28	<.0001	<.0001	2	3334	143.04	<.0001
Time of Day	1	9176	47.69	47.69	<.0001	<.0001	1	3334	82.97	<.0001
Season	1	9472	1742.97	1742.97	<.0001	<.0001		dropped		

Table 41. Indices of red snapper (GOM / age 0 selectivity) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.08969	446	0.4607	0.03370	0.32045	0.01803	0.06298
1988	0.19070	430	2.1821	0.15961	0.21524	0.10428	0.24428
1989	0.27098	417	13.7686	1.00710	0.26448	0.59872	1.69405
1990	0.28632	468	8.3117	0.60796	0.24407	0.37579	0.98358
1991	0.34649	456	17.6608	1.29180	0.18735	0.89097	1.87294
1992	0.21918	438	2.1464	0.15700	0.23409	0.09892	0.24918
1993	0.25212	472	5.8310	0.42651	0.19595	0.28928	0.62882
1994	0.27623	467	12.3970	0.90678	0.18064	0.63366	1.29761
1995	0.39359	437	32.5978	2.38436	0.19120	1.63224	3.48306
1996	0.27293	447	6.6972	0.48987	0.18760	0.33770	0.71059
1997	0.30465	430	16.4466	1.20299	0.18225	0.83801	1.72692
1998	0.25874	429	5.3449	0.39095	0.22330	0.25149	0.60775
1999	0.35045	448	23.6064	1.72669	0.20331	1.15453	2.58241
2000	0.41230	439	30.7418	2.24861	0.21308	1.47533	3.42720
2001	0.32773	357	8.4429	0.61756	0.23977	0.38488	0.99091
2002	0.30870	460	13.2127	0.96644	0.25742	0.58232	1.60395
2003	0.36508	441	18.9926	1.38922	0.18701	0.95881	2.01283
2004	0.31354	421	16.8318	1.23116	0.18525	0.85263	1.77774
2005	0.40389	411	17.8282	1.30404	0.21992	0.84435	2.01401
2006	0.40000	445	32.6437	2.38772	0.19510	1.62219	3.51452
2007	0.30000	400	11.0010	0.80467	0.26760	0.47554	1.36159
2008	0.26109	586	2.8142	0.20584	0.34585	0.10509	0.40317
2009	0.36126	728	32.8819	2.40514	0.14390	1.80632	3.20250
2010	0.20000	445	3.5704	0.26116	0.25195	0.15901	0.42893
2011	0.24873	394	5.3746	0.39313	0.21553	0.25671	0.60203

Table 42. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / age 0 selectivity / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 37230.4)*						*Lognormal Submodel Type 3 Tests (AIC 882.5)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	23	5289	137.93	6.00	<.0001	<.0001	23	222	2.11	0.0030
Area	2	5289	17.38	8.69	0.0002	0.0002	2	222	2.53	0.0817
Depth Zone	2	5289	23.85	11.92	<.0001	<.0001	2	222	10.26	<.0001
Time of Day	1	5289	30.75	30.75	<.0001	<.0001	1	222	4.81	0.0293
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 37230.4)*						*Lognormal Submodel Type 3 Tests (AIC 886.2)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	23	5289	137.93	6.00	<.0001	<.0001	23	224	2.35	0.0008
Area	2	5289	17.38	8.69	0.0002	0.0002		dropped		
Depth Zone	2	5289	23.85	11.92	<.0001	<.0001	2	224	8.90	0.0002
Time of Day	1	5289	30.75	30.75	<.0001	<.0001	1	224	4.80	0.0295

Table 43. Indices of red snapper (GOM / age 0 selectivity / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.00000	274	.	.	.	.	.
1988	0.00469	213	0.0099	0.00288	4.77493	0.00008	0.1013
1989	0.02577	194	1.8300	0.53435	0.83123	0.12540	2.2769
1990	0.02083	240	0.1170	0.03416	1.10520	0.00572	0.2040
1991	0.04762	231	2.2721	0.66345	0.61239	0.21460	2.0511
1992	0.00885	226	0.3130	0.09140	1.30530	0.01244	0.6717
1993	0.01794	223	0.2391	0.06981	1.04973	0.01245	0.3914
1994	0.01261	238	0.4042	0.11802	1.09754	0.01994	0.6986
1995	0.10909	220	9.7153	2.83685	0.45915	1.18287	6.8035
1996	0.01818	220	0.4923	0.14375	0.96830	0.02826	0.7312
1997	0.01932	207	0.4885	0.14265	0.96912	0.02802	0.7263
1998	0.01471	204	0.0532	0.01553	1.66997	0.00154	0.1562
1999	0.08072	223	8.5489	2.49627	0.50670	0.95955	6.4940
2000	0.17130	216	23.1178	6.75039	0.39514	3.15127	14.4601
2001	0.05263	152	3.6351	1.06146	0.68597	0.30656	3.6753
2002	0.07930	227	4.8138	1.40562	0.50640	0.54059	3.6549
2003	0.02210	181	0.3428	0.10009	1.00603	0.01880	0.5329
2004	0.00926	216	0.1566	0.04571	1.45608	0.00541	0.3860
2005	0.06630	181	4.0780	1.19079	0.58911	0.39971	3.5475
2006	0.11312	221	10.3542	3.02341	0.45099	1.27866	7.1489
2007	0.05612	196	0.7946	0.23202	0.63673	0.07224	0.7452
2008	0.07692	260	4.9501	1.44544	0.48961	0.57195	3.6529
2009	0.05823	395	3.0782	0.89884	0.46987	0.36791	2.1960
2010	0.00420	238	1.9694	0.57507	1.46117	0.06780	4.8774
2011	0.03061	196	0.4180	0.12205	0.84266	0.02820	0.5282

Table 44. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / age 0 selectivity / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 26931.4)*						*Lognormal Submodel Type 3 Tests (AIC 10860.2)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1997	339.58	14.04	<.0001	<.0001	24	3083	13.89	<.0001
Area	2	5463	336.58	168.29	<.0001	<.0001	2	3083	338.19	<.0001
Depth Zone	2	5367	1109.39	554.69	<.0001	<.0001	2	3083	159.80	<.0001
Time of Day	1	5559	29.93	29.93	<.0001	<.0001	1	3083	75.70	<.0001

Table 45. Indices of red snapper (GOM / age 0 selectivity / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.23256	172	3.451	0.05790	0.30306	0.03200	0.10474
1988	0.37327	217	14.573	0.24449	0.20122	0.16414	0.36418
1989	0.48430	223	86.352	1.44871	0.18480	1.00417	2.09004
1990	0.56579	228	57.841	0.97038	0.16334	0.70146	1.34240
1991	0.65333	225	67.774	1.13703	0.12836	0.88052	1.46827
1992	0.44340	212	10.362	0.17384	0.18002	0.12163	0.24847
1993	0.46185	249	47.692	0.80012	0.18062	0.55915	1.14492
1994	0.55022	229	107.404	1.80190	0.17504	1.27303	2.55048
1995	0.68203	217	105.209	1.76508	0.13364	1.35270	2.30319
1996	0.51982	227	29.161	0.48922	0.15022	0.36288	0.65956
1997	0.56951	223	87.176	1.46254	0.15165	1.08178	1.97732
1998	0.48000	225	29.113	0.48843	0.16686	0.35064	0.68036
1999	0.61778	225	73.337	1.23037	0.13826	0.93435	1.62016
2000	0.64574	223	63.653	1.06789	0.13417	0.81754	1.39490
2001	0.53171	205	36.477	0.61196	0.16736	0.43890	0.85327
2002	0.53219	233	56.764	0.95233	0.15603	0.69835	1.29867
2003	0.60385	260	95.227	1.59762	0.13618	1.21824	2.09513
2004	0.63415	205	91.626	1.53720	0.14929	1.14228	2.06864
2005	0.66957	230	60.172	1.00949	0.12887	0.78096	1.30490
2006	0.68304	224	87.997	1.47632	0.12568	1.14933	1.89634
2007	0.53431	204	81.250	1.36313	0.18634	0.94202	1.97247
2008	0.40798	326	8.234	0.13814	0.14981	0.10254	0.18608
2009	0.72072	333	129.017	2.16450	0.10580	1.75272	2.67302
2010	0.42512	207	23.290	0.39073	0.19611	0.26493	0.57625
2011	0.46465	198	36.998	0.62070	0.19312	0.42332	0.91011

Table 46. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / age 0 selectivity) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 58977.4)*						*Lognormal Submodel Type 3 Tests (AIC 9792.3)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3164	336.87	13.97	<.0001	<.0001	24	2744	10.80	<.0001
Area	1	5129	266.03	266.03	<.0001	<.0001	1	2744	558.62	<.0001
Depth Zone	2	5266	801.57	400.78	<.0001	<.0001	2	2744	132.16	<.0001
Time of Day	1	5154	12.06	12.06	0.0005	0.0005	1	2744	82.32	<.0001
Season	1	5020	1379.11	1379.11	<.0001	<.0001	1	2744	0.01	0.9033
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 58977.4)*						*Lognormal Submodel Type 3 Tests (AIC9789.6)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3164	336.87	13.97	<.0001	<.0001	24	2745	10.86	<.0001
Area	1	5129	266.03	266.03	<.0001	<.0001	1	2745	558.87	<.0001
Depth Zone	2	5266	801.57	400.78	<.0001	<.0001	2	2745	133.52	<.0001
Time of Day	1	5154	12.06	12.06	0.0005	0.0005	1	2745	82.91	<.0001
Season	1	5020	1379.11	1379.11	<.0001	<.0001		dropped		

Table 47. Indices of red snapper (WGOM / age 0 selectivity) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.12745	306	0.4765	0.03684	0.34672	0.01878	0.07227
1988	0.21166	326	1.5551	0.12022	0.25836	0.07231	0.19987
1989	0.27414	321	6.9354	0.53613	0.22834	0.34155	0.84158
1990	0.27666	347	6.5987	0.51010	0.21392	0.33413	0.77874
1991	0.34066	364	12.8924	0.99663	0.24823	0.61113	1.62529
1992	0.23398	359	1.4813	0.11451	0.29668	0.06406	0.20470
1993	0.23380	355	3.1218	0.24133	0.28119	0.13899	0.41900
1994	0.30056	356	23.3599	1.80580	0.24819	1.10742	2.94462
1995	0.41360	353	39.9595	3.08900	0.26048	1.85041	5.15667
1996	0.29014	355	4.7995	0.37102	0.21713	0.24153	0.56993
1997	0.32258	341	15.5052	1.19861	0.22830	0.76365	1.88131
1998	0.26571	350	4.4060	0.34060	0.32257	0.18154	0.63902
1999	0.37119	361	21.2758	1.64469	0.26785	0.97152	2.78432
2000	0.44000	350	28.3656	2.19276	0.28217	1.26062	3.81415
2001	0.35333	300	7.0355	0.54387	0.31308	0.29505	1.00254
2002	0.32692	364	15.9277	1.23126	0.38935	0.58080	2.61022
2003	0.35000	320	15.1112	1.16814	0.24510	0.72061	1.89361
2004	0.33333	339	21.3147	1.64770	0.17936	1.15429	2.35201
2005	0.43114	334	20.2950	1.56887	0.27694	0.91089	2.70214
2006	0.38352	352	21.6063	1.67024	0.31561	0.90184	3.09335
2007	0.28049	328	10.0932	0.78024	0.40992	0.35473	1.71612
2008	0.28803	493	2.6071	0.20154	0.54432	0.07276	0.55825
2009	0.37088	577	30.2340	2.33719	0.16780	1.67478	3.26161
2010	0.19841	378	2.5689	0.19859	0.20983	0.13111	0.30078
2011	0.26286	350	5.8746	0.45412	0.25722	0.27373	0.75340

Table 48. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / age 0 selectivity / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 25537.2)*						*Lognormal Submodel Type 3 Tests (AIC 778.9)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	21	3781	128.84	6.14	<.0001	<.0001	21	197	1.94	0.0104
Area	1	3781	2.24	2.24	0.1348	0.1349	1	197	1.33	0.2495
Depth Zone	2	3781	23.09	11.54	<.0001	<.0001	2	197	5.64	0.0042
Time of Day	1	3781	26.12	26.12	<.0001	<.0001	1	197	5.06	0.0257
Model Run #1	*Binomial Submodel Type 3 Tests (AIC 25508.4)*						*Lognormal Submodel Type 3 Tests (AIC 779.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	21	3782	128.56	6.12	<.0001	<.0001	21	198	2.01	0.0074
Area				dropped				dropped		
Depth Zone	2	3782	23.10	11.55	<.0001	<.0001	2	198	5.19	0.0064
Time of Day	1	3782	26.25	26.25	<.0001	<.0001	1	198	5.29	0.0225

Table 49. Indices of red snapper (WGOM / age 0 selectivity / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.00000	178	.	.	.	.	.
1988	0.00690	145	0.0157	0.00316	5.6419	0.00008	0.1327
1989	0.02128	141	0.3343	0.06724	1.2650	0.00952	0.4750
1990	0.00581	172	0.0015	0.00030	17.7613	0.00000	0.0365
1991	0.05405	185	3.3894	0.68179	0.6313	0.21409	2.1712
1992	0.01111	180	0.4694	0.09441	1.3753	0.01202	0.7414
1993	0.01685	178	0.3351	0.06741	1.2626	0.00956	0.4751
1994	0.01695	177	0.6417	0.12908	1.1342	0.02094	0.7957
1995	0.13068	176	14.0485	2.82587	0.4567	1.18327	6.7487
1996	0.02299	174	0.6655	0.13388	1.0121	0.02496	0.7180
1997	0.01840	163	0.9370	0.18847	1.0850	0.03229	1.1000
1998	0.01775	169	0.0739	0.01486	1.9793	0.00119	0.1854
1999	0.09497	179	10.1605	2.04381	0.5122	0.77838	5.3665
2000	0.21053	171	32.1818	6.47343	0.3873	3.06485	13.6729
2001	0.06897	116	5.4587	1.09803	0.6810	0.31951	3.7735
2002	0.09290	183	7.0034	1.40874	0.5094	0.53902	3.6818
2003	0.02190	137	0.4500	0.09052	1.1979	0.01372	0.5972
2004	0.00000	177	.	.	.	.	.
2005	0.06757	148	4.9338	0.99245	0.6265	0.31400	3.1368
2006	0.13636	176	15.7523	3.16860	0.4483	1.34647	7.4566
2007	0.04516	155	0.8333	0.16761	0.7925	0.04149	0.6771
2008	0.08738	206	7.0154	1.41116	0.5016	0.54711	3.6398
2009	0.06908	304	4.1409	0.83295	0.4826	0.33358	2.0799
2010	0.00000	201	.	.	.	.	.
2011	0.03488	172	0.5282	0.10624	0.8943	0.02293	0.4922

Table 50. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / age 0 selectivity / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 22154.5)*						*Lognormal Submodel Type 3 Tests (AIC 8809.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1602	284.53	11.74	<.0001	<.0001	24	2522	13.65	<.0001
Area	1	4490	332.00	332.00	<.0001	<.0001	1	2522	695.93	<.0001
Depth Zone	2	4292	977.36	488.68	<.0001	<.0001	2	2522	149.24	<.0001
Time of Day	1	4482	11.10	11.10	0.0009	0.0009	1	2522	77.12	<.0001

Table 51. Indices of red snapper (WGOM / age 0 selectivity / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.30469	128	5.037	0.08015	0.32359	0.04264	0.15066
1988	0.37569	181	14.652	0.23316	0.23040	0.14795	0.36744
1989	0.47222	180	57.485	0.91480	0.20301	0.61202	1.36736
1990	0.54286	175	47.136	0.75010	0.18958	0.51512	1.09228
1991	0.63687	179	63.622	1.01245	0.15071	0.75024	1.36630
1992	0.45810	179	10.821	0.17221	0.19814	0.11631	0.25497
1993	0.45198	177	25.060	0.39880	0.20141	0.26764	0.59423
1994	0.58101	179	154.376	2.45667	0.18991	1.68599	3.57965
1995	0.69492	177	134.726	2.14396	0.14821	1.59656	2.87905
1996	0.54696	181	32.481	0.51688	0.16318	0.37375	0.71483
1997	0.60112	178	94.848	1.50937	0.16492	1.08769	2.09452
1998	0.49724	181	33.457	0.53241	0.18392	0.36968	0.76679
1999	0.64286	182	88.051	1.40120	0.14614	1.04769	1.87398
2000	0.65922	179	57.486	0.91481	0.14232	0.68917	1.21431
2001	0.53261	184	39.614	0.63040	0.17813	0.44269	0.89770
2002	0.56354	181	62.984	1.00230	0.16963	0.71565	1.40375
2003	0.59563	183	97.770	1.55587	0.16503	1.12096	2.15952
2004	0.69753	162	126.358	2.01080	0.15521	1.47691	2.73769
2005	0.72043	186	77.815	1.23832	0.13195	0.95217	1.61045
2006	0.63068	176	71.354	1.13550	0.14960	0.84326	1.52901
2007	0.49133	173	74.961	1.19289	0.22470	0.76530	1.85939
2008	0.43206	287	8.642	0.13753	0.15563	0.10093	0.18739
2009	0.70696	273	127.229	2.02466	0.10796	1.63250	2.51102
2010	0.42373	177	22.350	0.35567	0.19846	0.24006	0.52693
2011	0.48315	178	42.675	0.67912	0.20070	0.45639	1.01053

Table 52. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / age 0 selectivity) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 16085.7)*						*Lognormal Submodel Type 3 Tests (AIC 2097.6)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	758	206.78	8.45	<.0001	<.0001	24	561	3.15	<.0001
Depth Zone	2	1388	136.67	68.33	<.0001	<.0001	2	561	16.22	<.0001
Time of Day	1	1407	33.81	33.81	<.0001	<.0001	1	561	5.70	0.0173
Season	1	1016	276.83	276.83	<.0001	<.0001	1	561	4.91	0.0272

Table 53. Indices of red snapper (EGOM / age 0 selectivity) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.00714	140	0.0050	0.00053	6.32253	0.00001	0.0252
1988	0.12500	104	1.8842	0.20262	0.49336	0.07966	0.5153
1989	0.26042	96	33.3482	3.58615	0.82096	0.85344	15.0689
1990	0.31405	121	11.4147	1.22750	0.67757	0.35902	4.1968
1991	0.36957	92	20.1388	2.16566	0.42254	0.96281	4.8713
1992	0.15190	79	1.3013	0.13994	0.60022	0.04615	0.4244
1993	0.30769	117	7.0509	0.75823	0.39955	0.35117	1.6371
1994	0.19820	111	1.3228	0.14225	0.43329	0.06205	0.3261
1995	0.30952	84	7.6948	0.82747	0.44494	0.35367	1.9360
1996	0.20652	92	2.0499	0.22044	0.46361	0.09121	0.5328
1997	0.23596	89	6.7242	0.72310	0.51133	0.27579	1.8959
1998	0.22785	79	1.6772	0.18036	0.49331	0.07092	0.4587
1999	0.26437	87	4.4744	0.48116	0.60293	0.15799	1.4654
2000	0.30337	89	12.9705	1.39481	0.56815	0.48429	4.0172
2001	0.19298	57	3.3438	0.35958	0.57274	0.12392	1.0434
2002	0.23958	96	3.7953	0.40813	0.60504	0.13356	1.2472
2003	0.40496	121	10.8316	1.16480	0.41146	0.52813	2.5690
2004	0.23171	82	3.2329	0.34766	0.95868	0.06916	1.7475
2005	0.28571	77	3.1746	0.34139	0.88701	0.07439	1.5667
2006	0.46237	93	44.1709	4.74999	0.31565	2.56451	8.7979
2007	0.38889	72	33.9563	3.65154	0.54132	1.32481	10.0647
2008	0.11828	93	0.9612	0.10336	1.16168	0.01628	0.6564
2009	0.32450	151	14.4006	1.54859	0.42401	0.68669	3.4923
2010	0.20896	67	2.0260	0.21787	1.10555	0.03648	1.3013
2011	0.13636	44	0.5288	0.05687	0.76986	0.01453	0.2226

Table 54. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / age 0 selectivity / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 4359.6)*						*Lognormal Submodel Type 3 Tests (AIC 41.0)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	16	663	8.81	0.55	0.9211	0.9198	16	9	1.82	0.1830
Depth Zone	1	663	5.46	5.46	0.0195	0.0198	1	9	3.67	0.0877
Time of Day	1	663	6.78	6.78	0.0092	0.0094	1	9	0.72	0.4183
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 4359.6)*						*Lognormal Submodel Type 3 Tests (AIC 43.0)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	16	663	8.81	0.55	0.9211	0.9198	16	10	1.85	0.1629
Depth Zone	1	663	5.46	5.46	0.0195	0.0198	1	10	4.56	0.0585
Time of Day	1	663	6.78	6.78	0.0092	0.0094		dropped		
Model Run #3	*Binomial Submodel Type 3 Tests (AIC 4359.6)*						*Lognormal Submodel Type 3 Tests (AIC 48.6)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	16	663	8.81	0.55	0.9211	0.9198	16	11	2.25	0.0883
Depth Zone	1	663	5.46	5.46	0.0195	0.0198		dropped		
Time of Day	1	663	6.78	6.78	0.0092	0.0094		droppe		

Table 55. Indices of red snapper (EGOM / age 0 selectivity / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987							
1988							
1989	0.037736	53	94.552	6.44594	1.08311	1.10676	37.5419
1990	0.058824	68	2.365	0.16124	0.83424	0.03769	0.6899
1991	0.021739	46	0.674	0.04595	1.44148	0.00551	0.3831
1992							
1993	0.022222	45	0.143	0.00978	1.56154	0.00106	0.0903
1994							
1995	0.022727	44	0.235	0.01601	1.50341	0.00182	0.1408
1996							
1997	0.022727	44	0.107	0.00732	1.60978	0.00076	0.0703
1998							
1999	0.022727	44	8.825	0.60164	1.40811	0.07436	4.8681
2000	0.022222	45	3.352	0.22855	1.41390	0.02810	1.8590
2001							
2002	0.022727	44	0.189	0.01287	1.52255	0.00144	0.1151
2003	0.022727	44	0.726	0.04952	1.43875	0.00596	0.4118
2004	0.051282	39	4.340	0.29588	1.08144	0.05090	1.7200
2005	0.060606	33	8.199	0.55897	1.08009	0.09630	3.2444
2006	0.022222	45	0.093	0.00635	1.63805	0.00065	0.0624
2007	0.097561	41	3.303	0.22519	0.82169	0.05354	0.9472
2008	0.037037	54	1.156	0.07880	1.10096	0.01326	0.4683
2009	0.021978	91	3.705	0.25261	1.09464	0.04281	1.4905
2010	0.027027	37	117.397	8.00337	1.40440	0.99245	64.5411
2011							

Table 56. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / age 0 selectivity / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 5315.1)*						*Lognormal Submodel Type 3 Tests (AIC)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	329	116.52	4.64	<.0001	<.0001	24	534	3.37	<.0001
Depth Zone	2	865	135.75	67.87	<.0001	<.0001	2	534	15.81	<.0001
Time of Day	1	944	22.61	22.61	<.0001	<.0001	1	534	6.78	0.0095

Table 57. Indices of red snapper (EGOM / age 0 selectivity / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.02273	44	0.065	0.00121	2.38105	0.00008	0.01904
1988	0.36111	36	20.122	0.37729	0.47108	0.15411	0.92368
1989	0.53488	43	193.906	3.63570	0.36899	1.77935	7.42874
1990	0.64151	53	62.080	1.16399	0.28851	0.66121	2.04908
1991	0.71739	46	108.232	2.02933	0.27019	1.19341	3.45075
1992	0.36364	33	13.461	0.25238	0.58430	0.08537	0.74611
1993	0.48611	72	64.133	1.20249	0.29192	0.67873	2.13045
1994	0.44000	50	12.899	0.24185	0.37478	0.11712	0.49940
1995	0.62500	40	51.590	0.96730	0.34082	0.49845	1.87715
1996	0.41304	46	20.472	0.38385	0.41934	0.17162	0.85852
1997	0.44444	45	65.036	1.21942	0.38401	0.58077	2.56034
1998	0.40909	44	16.531	0.30995	0.44341	0.13283	0.72323
1999	0.51163	43	31.666	0.59373	0.41024	0.26979	1.30664
2000	0.59091	44	89.067	1.67000	0.35327	0.84109	3.31580
2001	0.52381	21	27.669	0.51880	0.53704	0.18956	1.41986
2002	0.42308	52	35.888	0.67290	0.37662	0.32480	1.39409
2003	0.62338	77	78.234	1.46688	0.24741	0.90091	2.38839
2004	0.39535	43	24.925	0.46733	0.46251	0.19373	1.12733
2005	0.45455	44	21.403	0.40131	0.45350	0.16899	0.95305
2006	0.87500	48	156.186	2.92846	0.23559	1.83978	4.66136
2007	0.77419	31	136.472	2.55883	0.32419	1.35975	4.81529
2008	0.23077	39	8.149	0.15280	0.61146	0.04950	0.47170
2009	0.78333	60	77.054	1.44476	0.26346	0.86058	2.42550
2010	0.43333	30	12.691	0.23796	0.54025	0.08649	0.65472
2011	0.30000	20	5.412	0.10147	0.66651	0.03018	0.34115

Table 58. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / age 1) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 53242.2)*						*Lognormal Submodel Type 3 Tests (AIC 8631.3)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3978	300.24	12.46	<.0001	<.0001	24	2823	3.45	<.0001
Area	2	11E3	74.40	37.20	<.0001	<.0001	2	2823	0.13	0.8750
Depth Zone	2	11E3	420.26	210.13	<.0001	<.0001	2	2823	84.44	<.0001
Time of Day	1	11E3	5.44	5.44	0.0196	0.0197	1	2823	2.39	0.1220
Season	1	11E3	188.80	188.80	<.0001	<.0001	1	2823	47.11	<.0001
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 53242.2)*						*Lognormal Submodel Type 3 Tests (AIC 8623.3)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3978	300.24	12.46	<.0001	<.0001	24	2825	3.46	<.0001
Area	2	11E3	74.40	37.20	<.0001	<.0001		dropped		
Depth Zone	2	11E3	420.26	210.13	<.0001	<.0001	2	2825	85.65	<.0001
Time of Day	1	11E3	5.44	5.44	0.0196	0.0197	1	2825	2.45	0.1176
Season	1	11E3	188.80	188.80	<.0001	<.0001	1	2825	48.61	<.0001
Model Run #3	*Binomial Submodel Type 3 Tests (AIC 53242.2)*						*Lognormal Submodel Type 3 Tests (AIC 8621.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3978	300.24	12.46	<.0001	<.0001	24	2826	3.42	<.0001
Area	2	11E3	74.40	37.20	<.0001	<.0001		dropped		
Depth Zone	2	11E3	420.26	210.13	<.0001	<.0001	2	2826	85.96	<.0001
Time of Day	1	11E3	5.44	5.44	0.0196	0.0197		dropped		
Season	1	11E3	188.80	188.80	<.0001	<.0001	1	2826	47.94	<.0001

Table 59. Indices of red snapper (GOM / age 1) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.12108	446	0.74185	0.42047	0.23200	0.26599	0.66469
1988	0.15581	430	1.05266	0.59664	0.21822	0.38759	0.91845
1989	0.14628	417	0.91077	0.51622	0.20504	0.34401	0.77464
1990	0.33974	468	4.04881	2.29483	0.12678	1.78268	2.95412
1991	0.25219	456	1.45094	0.82238	0.15641	0.60261	1.12229
1992	0.23059	438	1.34499	0.76233	0.16347	0.55092	1.05487
1993	0.22881	472	1.54067	0.87324	0.16400	0.63042	1.20958
1994	0.28480	467	2.46410	1.39663	0.13484	1.06779	1.82675
1995	0.24027	437	1.62535	0.92123	0.15438	0.67775	1.25219
1996	0.31767	447	2.63878	1.49564	0.13530	1.14246	1.95800
1997	0.26977	430	1.72058	0.97521	0.14615	0.72917	1.30428
1998	0.20746	429	1.00865	0.57169	0.16439	0.41241	0.79250
1999	0.17188	448	0.63150	0.35793	0.18276	0.24909	0.51432
2000	0.25740	439	1.45331	0.82372	0.14279	0.61998	1.09441
2001	0.18487	357	1.05237	0.59647	0.19184	0.40781	0.87241
2002	0.18696	460	1.00780	0.57121	0.18100	0.39889	0.81799
2003	0.22449	441	1.07790	0.61094	0.16419	0.44090	0.84658
2004	0.32542	421	2.74661	1.55675	0.13870	1.18120	2.05171
2005	0.36253	411	3.32152	1.88261	0.12460	1.46875	2.41309
2006	0.26517	445	1.39747	0.79208	0.13529	0.60504	1.03693
2007	0.31500	400	2.00906	1.13872	0.13189	0.87569	1.48075
2008	0.32765	586	2.43561	1.38048	0.11231	1.10352	1.72695
2009	0.18407	728	0.75307	0.42684	0.12816	0.33067	0.55096
2010	0.36404	445	2.77917	1.57521	0.11422	1.25444	1.97801
2011	0.36802	394	2.89439	1.64052	0.12344	1.28282	2.09796

Table 60. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / age 1 / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 25696.1)*						*Lognormal Submodel Type 3 Tests (AIC 5270.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1924	184.65	7.63	<.0001	<.0001	24	1667	2.44	0.0001
Area	2	5365	152.52	76.26	<.0001	<.0001	2	1667	0.13	0.8760
Depth Zone	2	5203	314.59	157.30	<.0001	<.0001	2	1667	56.81	<.0001
Time of Day	1	5401	3.58	3.58	0.0584	0.0584	1	1667	2.72	0.0993
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 25687.8)*						*Lognormal Submodel Type 3 Tests (AIC 5264.0)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1924	183.64	7.59	<.0001	<.0001	24	1669	2.43	0.0001
Area	2	5368	152.94	76.47	<.0001	<.0001		dropped		
Depth Zone	2	5207	314.12	157.06	<.0001	<.0001	2	1669	56.75	<.0001
Time of Day				dropped			1	1669	2.68	0.1018
Model Run #3	*Binomial Submodel Type 3 Tests (AIC 25687.8)*						*Lognormal Submodel Type 3 Tests (AIC 5262.6)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1924	183.64	7.59	<.0001	<.0001	24	1670	2.41	0.0002
Area	2	5368	152.94	76.47	<.0001	<.0001		dropped		
Depth Zone	2	5207	314.12	157.06	<.0001	<.0001	2	1670	57.53	<.0001
Time of Day				dropped				dropped		

Table 61. Indices of red snapper (GOM / age 1 / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.13504	274	1.12393	0.43268	0.25365	0.26259	0.71295
1988	0.20188	213	0.91117	0.35077	0.25520	0.21225	0.57969
1989	0.16495	194	0.97268	0.37445	0.30009	0.20813	0.67369
1990	0.42083	240	6.72641	2.58947	0.16104	1.88030	3.56611
1991	0.29870	231	2.16737	0.83437	0.18698	0.57590	1.20886
1992	0.27876	226	2.14822	0.82700	0.21121	0.54457	1.25592
1993	0.27354	223	2.07636	0.79934	0.22239	0.51510	1.24042
1994	0.30672	238	2.88734	1.11154	0.17914	0.77903	1.58598
1995	0.29091	220	2.78610	1.07257	0.20806	0.71058	1.61896
1996	0.35909	220	3.67224	1.41370	0.18282	0.98371	2.03165
1997	0.37198	207	2.96139	1.14005	0.18665	0.78738	1.65067
1998	0.26961	204	1.59176	0.61278	0.20124	0.41138	0.91278
1999	0.20628	223	0.84523	0.32539	0.23450	0.20485	0.51685
2000	0.33796	216	2.35391	0.90619	0.18602	0.62664	1.31044
2001	0.20395	152	1.10932	0.42706	0.28034	0.24636	0.74028
2002	0.26432	227	1.84191	0.70908	0.20621	0.47146	1.06646
2003	0.30387	181	1.63960	0.63120	0.21627	0.41158	0.96799
2004	0.39352	216	4.50763	1.73530	0.17746	1.22019	2.46788
2005	0.40884	181	3.63872	1.40080	0.17270	0.99419	1.97370
2006	0.35747	221	2.22099	0.85501	0.16220	0.61944	1.18017
2007	0.42857	196	3.87393	1.49135	0.16962	1.06487	2.08863
2008	0.34615	260	3.55562	1.36881	0.17680	0.96373	1.94415
2009	0.22278	395	1.06805	0.41117	0.15447	0.30244	0.55898
2010	0.39916	238	3.57139	1.37488	0.15145	1.01732	1.85810
2011	0.42347	196	4.68883	1.80506	0.16475	1.30122	2.50399

Table 62. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / age 1 / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 29350.5)*						*Lognormal Submodel Type 3 Tests (AIC 3349.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1993	153.49	6.35	<.0001	<.0001	24	1127	2.36	0.0002
Area	2	5231	81.01	40.51	<.0001	<.0001	2	1127	1.35	0.2597
Depth Zone	2	5064	198.00	99.00	<.0001	<.0001	2	1127	27.14	<.0001
Time of Day	1	5265	1.19	1.19	0.2746	0.2746	1	1127	0.14	0.7108
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 29338.3)*						*Lognormal Submodel Type 3 Tests (AIC 3346.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1993	153.66	6.35	<.0001	<.0001	24	1128	2.36	0.0002
Area	2	5235	81.21	40.61	<.0001	<.0001	2	1128	1.32	0.2685
Depth Zone	2	5069	198.04	99.02	<.0001	<.0001	2	1128	27.31	<.0001
Time of Day				dropped				dropped		
Model Run #3	*Binomial Submodel Type 3 Tests (AIC 29338.3)*						*Lognormal Submodel Type 3 Tests (AIC3341.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1993	153.66	6.35	<.0001	<.0001	24	1130	2.32	0.0003
Area	2	5235	81.21	40.61	<.0001	<.0001		dropped		
Depth Zone	2	5069	198.04	99.02	<.0001	<.0001	2	1130	29.21	<.0001
Time of Day				dropped				dropped		

Table 63. Indices of red snapper (GOM / age 1 / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.09884	172	0.26023	0.33128	0.49322	0.13028	0.84237
1988	0.11060	217	0.88096	1.12148	0.37159	0.54628	2.30235
1989	0.13004	223	0.52793	0.67206	0.29771	0.37523	1.20372
1990	0.25439	228	1.42088	1.80881	0.21204	1.18915	2.75137
1991	0.20444	225	0.60510	0.77030	0.29866	0.42931	1.38215
1992	0.17925	212	0.50676	0.64512	0.25437	0.39098	1.06446
1993	0.18876	249	0.77704	0.98919	0.27289	0.57876	1.69069
1994	0.26201	229	1.56399	1.99099	0.22111	1.28618	3.08204
1995	0.18894	217	0.54873	0.69855	0.24904	0.42769	1.14095
1996	0.27753	227	1.27760	1.62642	0.20926	1.07502	2.46063
1997	0.17489	223	0.57011	0.72576	0.24048	0.45169	1.16611
1998	0.15111	225	0.36674	0.46687	0.28348	0.26774	0.81411
1999	0.13778	225	0.30909	0.39348	0.32244	0.20977	0.73807
2000	0.17937	223	0.53967	0.68701	0.25166	0.41853	1.12772
2001	0.17073	205	0.62992	0.80190	0.27721	0.46535	1.38184
2002	0.11159	233	0.25388	0.32319	0.36101	0.16049	0.65084
2003	0.16923	260	0.43072	0.54831	0.30917	0.29963	1.00337
2004	0.25366	205	1.05838	1.34734	0.23017	0.85531	2.12240
2005	0.32609	230	1.97080	2.50887	0.19442	1.70675	3.68796
2006	0.17411	224	0.56937	0.72482	0.28153	0.41720	1.25925
2007	0.20588	204	0.53912	0.68631	0.23347	0.43293	1.08801
2008	0.31288	326	1.05130	1.33832	0.16441	0.96541	1.85529
2009	0.13814	333	0.32593	0.41492	0.21603	0.27068	0.63602
2010	0.32367	207	1.56255	1.98916	0.20914	1.31507	3.00877
2011	0.31313	198	1.09152	1.38953	0.19501	0.94419	2.04493

Table 64. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / age 1) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 41677.2)*						*Lognormal Submodel Type 3 Tests (AIC 7358.4)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3146	224.37	9.30	<.0001	<.0001	24	2401	3.75	<.0001
Area	1	8667	1.54	1.54	0.2144	0.2144	1	2401	0.08	0.7745
Depth Zone	2	8448	366.32	183.16	<.0001	<.0001	2	2401	77.66	<.0001
Time of Day	1	8677	0.83	0.83	0.3619	0.3619	1	2401	0.97	0.3260
Season	1	8644	169.41	169.41	<.0001	<.0001	1	2401	40.01	<.0001
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 41674.3)*						*Lognormal Submodel Type 3 Tests (AIC 7354.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3146	224.15	9.29	<.0001	<.0001	24	2402	3.75	<.0001
Area	1	8668	1.55	1.55	0.2136	0.2136		dropped		
Depth Zone	2	8449	366.33	183.16	<.0001	<.0001	2	2402	77.95	<.0001
Time of Day				dropped			1	2402	0.98	0.3235
Season	1	8644	168.84	168.84	<.0001	<.0001	1	2402	41.31	<.0001
Model Run #3	*Binomial Submodel Type 3 Tests (AIC 41675.5)*						*Lognormal Submodel Type 3 Tests (AIC 7350.6)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3147	223.27	9.26	<.0001	<.0001	24	2403	3.73	<.0001
Area				dropped				dropped		
Depth Zone	2	8447	365.96	182.98	<.0001	<.0001	2	2403	78.06	<.0001
Time of Day				dropped				dropped		
Season	1	8643	169.77	169.77	<.0001	<.0001	1	2403	40.98	<.0001

Table 65. Indices of red snapper (WGOM / age 1) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.15359	306	0.85711	0.42703	0.25314	0.25941	0.70297
1988	0.18712	326	1.30887	0.65211	0.22546	0.41774	1.01797
1989	0.14330	321	0.67284	0.33523	0.22866	0.21343	0.52653
1990	0.34582	347	4.75349	2.36831	0.14532	1.77368	3.16229
1991	0.24725	364	1.38444	0.68976	0.16994	0.49219	0.96663
1992	0.23955	359	1.17852	0.58717	0.16786	0.42070	0.81951
1993	0.27042	355	1.98854	0.99074	0.16858	0.70886	1.38471
1994	0.30618	356	3.20419	1.59641	0.14823	1.18876	2.14383
1995	0.27479	353	2.14083	1.06661	0.16016	0.77584	1.46635
1996	0.33521	355	3.15966	1.57422	0.14811	1.17250	2.11358
1997	0.28446	341	2.03558	1.01418	0.16216	0.73481	1.39976
1998	0.23143	350	1.21311	0.60440	0.16535	0.43518	0.83941
1999	0.19391	361	0.80919	0.40316	0.18739	0.27805	0.58457
2000	0.27429	350	1.63733	0.81576	0.15670	0.59742	1.11389
2001	0.20333	300	1.31640	0.65586	0.19895	0.44226	0.97263
2002	0.21978	364	1.33297	0.66412	0.18715	0.45823	0.96251
2003	0.24375	320	1.01162	0.50402	0.17332	0.35729	0.71101
2004	0.36283	339	3.45193	1.71984	0.14510	1.28857	2.29545
2005	0.37425	334	3.58226	1.78477	0.13569	1.36226	2.33833
2006	0.28409	352	1.67367	0.83387	0.14707	0.62235	1.11726
2007	0.31098	328	1.78666	0.89016	0.14142	0.67179	1.17950
2008	0.32049	493	2.21027	1.10121	0.12020	0.86664	1.39927
2009	0.18718	577	0.85224	0.42461	0.14128	0.32054	0.56247
2010	0.38095	378	3.16103	1.57491	0.11796	1.24494	1.99232
2011	0.39143	350	3.45540	1.72156	0.12540	1.34100	2.21014

Table 66. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / age 1 / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC19761.5)*						*Lognormal Submodel Type 3 Tests (AIC 4464.0)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1493	143.06	5.90	<.0001	<.0001	24	1411	3.08	<.0001
Area	1	4210	89.49	89.49	<.0001	<.0001	1	1411	0.09	0.7685
Depth Zone	2	4096	278.78	139.39	<.0001	<.0001	2	1411	58.02	<.0001
Time of Day	1	4240	0.60	0.60	0.4405	0.4405	1	1411	1.57	0.2105
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 19757.8)*						*Lognormal Submodel Type 3 Tests (AIC 4460.3)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1494	142.88	5.89	<.0001	<.0001	24	1412	3.08	<.0001
Area	1	4211	89.51	89.51	<.0001	<.0001		dropped		
Depth Zone	2	4098	278.88	139.44	<.0001	<.0001	2	1412	58.06	<.0001
Time of Day				dropped			1	1412	1.56	0.2117
Model Run #3	*Binomial Submodel Type 3 Tests (AIC 19757.8)*						*Lognormal Submodel Type 3 Tests (AIC 4458.0)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1494	142.88	5.89	<.0001	<.0001	24	1413	3.06	<.0001
Area	1	4211	89.51	89.51	<.0001	<.0001		dropped		
Depth Zone	2	4098	278.88	139.44	<.0001	<.0001	2	1413	58.80	<.0001
Time of Day				dropped				dropped		

Table 67. Indices of red snapper (WGOM / age 1 / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.17978	178	1.40938	0.46766	0.27934	0.27030	0.80914
1988	0.25517	145	0.99209	0.32920	0.26961	0.19381	0.55917
1989	0.15603	141	0.68279	0.22657	0.34511	0.11583	0.44316
1990	0.44186	172	8.76486	2.90836	0.18067	2.03227	4.16214
1991	0.28649	185	2.32866	0.77270	0.20905	0.51094	1.16856
1992	0.28333	180	1.49174	0.49499	0.21624	0.32279	0.75906
1993	0.29775	178	2.73281	0.90680	0.23260	0.57297	1.43514
1994	0.33898	177	3.92157	1.30126	0.19453	0.88504	1.91323
1995	0.32386	176	3.72480	1.23597	0.21995	0.80023	1.90898
1996	0.39080	174	4.62049	1.53318	0.19761	1.03656	2.26772
1997	0.38650	163	3.51821	1.16741	0.20996	0.77058	1.76860
1998	0.31361	169	1.96561	0.65223	0.19813	0.44051	0.96570
1999	0.24022	179	1.14673	0.38051	0.24040	0.23685	0.61129
2000	0.36257	171	2.74209	0.90988	0.20399	0.60758	1.36259
2001	0.24138	116	1.41120	0.46826	0.29563	0.26246	0.83544
2002	0.31148	183	2.47076	0.81985	0.20954	0.54160	1.24105
2003	0.33577	137	1.67736	0.55658	0.22375	0.35773	0.86598
2004	0.43503	177	5.67103	1.88177	0.18658	1.29983	2.72424
2005	0.45270	148	4.05922	1.34694	0.17822	0.94570	1.91841
2006	0.40341	176	2.90885	0.96522	0.16909	0.68990	1.35039
2007	0.40000	155	3.21456	1.06666	0.18970	0.73233	1.55362
2008	0.33495	206	2.46278	0.81720	0.18982	0.56094	1.19054
2009	0.23026	304	1.25734	0.41721	0.16848	0.29857	0.58301
2010	0.42289	201	4.32924	1.43653	0.15461	1.05637	1.95350
2011	0.45349	172	5.83766	1.93706	0.16602	1.39289	2.69381

Table 68. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / age 1 / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 23382.8)*						*Lognormal Submodel Type 3 Tests (AIC 2872.0)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1595	115.15	4.75	<.0001	<.0001	24	962	2.65	<.0001
Area	1	4360	64.35	64.35	<.0001	<.0001	1	962	0.43	0.5121
Depth Zone	2	4259	173.52	86.76	<.0001	<.0001	2	962	21.70	<.0001
Time of Day	1	4372	0.08	0.08	0.7757	0.7757	1	962	0.85	0.3563
Model Run #1	*Binomial Submodel Type 3 Tests (AIC 23377.9)*						*Lognormal Submodel Type 3 Tests (AIC 2868.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1596	115.20	4.75	<.0001	<.0001	24	963	2.65	<.0001
Area	1	4361	64.39	64.39	<.0001	<.0001		dropped		
Depth Zone	2	4260	173.52	86.76	<.0001	<.0001	2	963	22.09	<.0001
Time of Day				dropped			1	963	0.82	0.3664
Model Run #1	*Binomial Submodel Type 3 Tests (AIC 23377.9)*						*Lognormal Submodel Type 3 Tests (AIC 2865.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1596	115.20	4.75	<.0001	<.0001	24	964	2.64	<.0001
Area	1	4361	64.39	64.39	<.0001	<.0001		dropped		
Depth Zone	2	4260	173.52	86.76	<.0001	<.0001	2	964	22.46	<.0001
Time of Day				dropped				dropped		

Table 69. Indices of red snapper (WGOM / age 1 / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.11719	128	0.22198	0.26310	0.58083	0.08950	0.77347
1988	0.13260	181	1.10919	1.31466	0.37960	0.63114	2.73839
1989	0.13333	180	0.37176	0.44062	0.34191	0.22660	0.85678
1990	0.25143	175	1.24788	1.47904	0.25510	0.89512	2.44386
1991	0.20670	179	0.43907	0.52040	0.30824	0.28488	0.95065
1992	0.19553	179	0.61399	0.72773	0.27268	0.42595	1.24331
1993	0.24294	177	0.98982	1.17317	0.26967	0.69061	1.99293
1994	0.27374	179	1.91610	2.27104	0.26002	1.36163	3.78783
1995	0.22599	177	0.72281	0.85670	0.26209	0.51163	1.43451
1996	0.28177	181	1.40094	1.66045	0.24174	1.03092	2.67439
1997	0.19101	178	0.65415	0.77532	0.27141	0.45490	1.32144
1998	0.15470	181	0.41166	0.48791	0.31991	0.26135	0.91090
1999	0.14835	182	0.35289	0.41826	0.32645	0.22133	0.79041
2000	0.18994	179	0.55882	0.66234	0.29781	0.36973	1.18653
2001	0.17935	184	0.73644	0.87286	0.29305	0.49162	1.54974
2002	0.12707	181	0.30983	0.36723	0.41133	0.16654	0.80974
2003	0.17486	183	0.31585	0.37436	0.32756	0.19769	0.70890
2004	0.28395	162	1.31071	1.55351	0.24613	0.95644	2.52328
2005	0.31183	186	2.04834	2.42777	0.23440	1.52872	3.85555
2006	0.16477	176	0.58263	0.69056	0.37168	0.33632	1.41791
2007	0.23121	173	0.53602	0.63531	0.24455	0.39233	1.02878
2008	0.31010	287	1.07354	1.27240	0.17865	0.89263	1.81375
2009	0.13919	273	0.32920	0.39018	0.25080	0.23809	0.63944
2010	0.33333	177	1.61854	1.91835	0.23432	1.20812	3.04611
2011	0.33146	178	1.22063	1.44674	0.20618	0.96198	2.17576

Table 70. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / age 1) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 11891.3)*						*Lognormal Submodel Type 3 Tests (AIC 1234.7)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	751	119.81	4.89	<.0001	<.0001	24	394	2.86	<.0001
Depth Zone	2	1800	66.30	33.15	<.0001	<.0001	2	394	15.73	<.0001
Time of Day	1	1946	13.61	13.61	0.0002	0.0002	1	394	1.66	0.1982
Season	1	1918	18.98	18.98	<.0001	<.0001	1	394	1.01	0.3160
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 11891.3)*						*Lognormal Submodel Type 3 Tests (AIC 1232.6)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	751	119.81	4.89	<.0001	<.0001	24	395	2.98	<.0001
Depth Zone	2	1800	66.30	33.15	<.0001	<.0001	2	395	17.82	<.0001
Time of Day	1	1946	13.61	13.61	0.0002	0.0002	1	395	1.64	0.2015
Season	1	1918	18.98	18.98	<.0001	<.0001		dropped		
Model Run #3	*Binomial Submodel Type 3 Tests (AIC 11891.3)*						*Lognormal Submodel Type 3 Tests (AIC 1231.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	751	119.81	4.89	<.0001	<.0001	24	396	3.03	<.0001
Depth Zone	2	1800	66.30	33.15	<.0001	<.0001	2	396	18.53	<.0001
Time of Day	1	1946	13.61	13.61	0.0002	0.0002		dropped		
Season	1	1918	18.98	18.98	<.0001	<.0001		dropped		

Table 71. Indices of red snapper (EGOM / age 1) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.05000	140	0.46976	0.31660	0.48550	0.12616	0.79453
1988	0.05769	104	0.58568	0.39473	0.82174	0.09384	1.66039
1989	0.15625	96	2.07104	1.39581	0.39066	0.65687	2.96605
1990	0.32231	121	2.59778	1.75082	0.23794	1.09498	2.79948
1991	0.27174	92	2.22222	1.49770	0.33938	0.77383	2.89873
1992	0.18987	79	3.82136	2.57548	0.46798	1.05760	6.27179
1993	0.10256	117	0.45079	0.30382	0.57094	0.10501	0.87899
1994	0.21622	111	0.82901	0.55873	0.28313	0.32063	0.97364
1995	0.09524	84	0.27851	0.18770	0.51898	0.07068	0.49849
1996	0.25000	92	1.36375	0.91913	0.30654	0.50475	1.67369
1997	0.21348	89	1.04149	0.70193	0.30879	0.38385	1.28358
1998	0.10127	79	0.41940	0.28266	0.70566	0.07927	1.00791
1999	0.08046	87	0.15968	0.10762	0.62151	0.03432	0.33752
2000	0.19101	89	1.11504	0.75150	0.31482	0.40636	1.38978
2001	0.08772	57	0.35621	0.24008	0.69967	0.06793	0.84847
2002	0.06250	96	0.16841	0.11350	0.61190	0.03674	0.35063
2003	0.17355	121	1.47748	0.99577	0.39159	0.46783	2.11949
2004	0.17073	82	0.83082	0.55994	0.42819	0.24647	1.27212
2005	0.31169	77	3.05075	2.05611	0.29422	1.15552	3.65860
2006	0.19355	93	0.72916	0.49143	0.31985	0.26326	0.91736
2007	0.33333	72	4.53666	3.05756	0.30583	1.68133	5.56028
2008	0.36559	93	5.49740	3.70507	0.26967	2.18105	6.29401
2009	0.17219	151	0.57904	0.39026	0.27642	0.22681	0.67148
2010	0.26866	67	1.77618	1.19709	0.35300	0.60321	2.37564
2011	0.18182	44	0.66613	0.44895	0.46211	0.18624	1.08224

Table 72. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / age 1 / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 6161.0)*						*Lognormal Submodel Type 3 Tests (AIC 754.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	372	89.26	3.57	<.0001	<.0001	24	229	2.85	<.0001
Depth Zone	2	895	46.30	23.15	<.0001	<.0001	2	229	1.65	0.1942
Time of Day	1	1028	8.63	8.63	0.0033	0.0034	1	229	13.27	0.0003
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 6161.0)*						*Lognormal Submodel Type 3 Tests (AIC 752.4)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	372	89.26	3.57	<.0001	<.0001	24	231	3.04	<.0001
Depth Zone	2	895	46.30	23.15	<.0001	<.0001		dropped		
Time of Day	1	1028	8.63	8.63	0.0033	0.0034	1	231	23.46	<.0001

Table 73. Indices of red snapper (EGOM / age 1 / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.05208	96	0.52384	0.26079	0.52133	0.09781	0.69533
1988	0.08824	68	1.24948	0.62205	0.75584	0.16216	2.38630
1989	0.18868	53	2.18873	1.08966	0.52825	0.40400	2.93898
1990	0.36765	68	2.48390	1.23661	0.28761	0.70367	2.17319
1991	0.34783	46	2.41940	1.20450	0.35877	0.60057	2.41571
1992	0.26087	46	7.84268	3.90448	0.47695	1.57880	9.65605
1993	0.17778	45	0.55085	0.27424	0.54667	0.09862	0.76257
1994	0.21311	61	0.91115	0.45362	0.40373	0.20853	0.98677
1995	0.15909	44	0.47946	0.23870	0.58039	0.08125	0.70123
1996	0.23913	46	1.30530	0.64984	0.38725	0.30770	1.37244
1997	0.31818	44	1.99669	0.99405	0.38689	0.47099	2.09801
1998	0.05714	35	0.87139	0.43382	1.34217	0.05698	3.30282
1999	0.06818	44	0.10935	0.05444	0.70112	0.01537	0.19282
2000	0.24444	45	1.39130	0.69266	0.37706	0.33406	1.43617
2001	0.08333	36	0.35382	0.17615	0.69824	0.04995	0.62122
2002	0.06818	44	0.21953	0.10929	0.66902	0.03238	0.36885
2003	0.20455	44	2.03976	1.01550	0.60731	0.33112	3.11433
2004	0.20513	39	1.61472	0.80389	0.50135	0.31182	2.07250
2005	0.21212	33	4.24232	2.11204	0.53912	0.76907	5.80017
2006	0.17778	45	0.45020	0.22413	0.43143	0.09809	0.51211
2007	0.53659	41	6.94963	3.45987	0.31302	1.87718	6.37699
2008	0.38889	54	6.54305	3.25746	0.31310	1.76707	6.00487
2009	0.19780	91	0.73980	0.36831	0.32076	0.19697	0.68870
2010	0.27027	37	1.87674	0.93433	0.47717	0.37766	2.31156
2011	0.20833	24	0.86286	0.42958	0.56070	0.15097	1.22231

Table 74. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / age 1 / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 5711.7)*						*Lognormal Submodel Type 3 Tests (AIC 442.5)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	23	1041	51.30	2.23	0.0006	0.0008	23	139	17.31	<.0001
Depth Zone	2	1041	24.96	12.48	<.0001	<.0001	2	139	6.62	0.0018
Time of Day	1	1041	4.26	4.26	0.0391	0.0394	1	139	0.22	0.6401
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 5711.7)*						*Lognormal Submodel Type 3 Tests (AIC 439.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	23	1041	51.30	2.23	0.0006	0.0008	23	140	13.48	<.0001
Depth Zone	2	1041	24.96	12.48	<.0001	<.0001	2	140	6.63	0.0018
Time of Day	1	1041	4.26	4.26	0.0391	0.0394		dropped		

Table 75. Indices of red snapper (EGOM / age 1 / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.04545	44	0.47201	0.55716	0.99992	0.10541	2.94500
1988	0.00000	36	.	.	.	.	.
1989	0.11628	43	1.52836	1.80407	0.49888	0.70271	4.63162
1990	0.26415	53	2.29267	2.70625	0.37295	1.31496	5.56959
1991	0.19565	46	2.42294	2.86002	0.63585	0.89175	9.17270
1992	0.09091	33	0.13559	0.16005	0.76858	0.04097	0.62521
1993	0.05556	72	0.39052	0.46096	0.77463	0.11700	1.81622
1994	0.22000	50	0.85866	1.01356	0.41492	0.45674	2.24923
1995	0.02500	40	0.04697	0.05545	1.57578	0.00594	0.51781
1996	0.26087	46	1.17250	1.38402	0.43693	0.59990	3.19306
1997	0.11111	45	0.37774	0.44589	0.54721	0.16021	1.24096
1998	0.13636	44	0.27168	0.32069	0.62799	0.10122	1.01601
1999	0.09302	43	0.20258	0.23913	0.59976	0.07891	0.72461
2000	0.13636	44	0.61419	0.72499	0.49000	0.28668	1.83342
2001	0.09524	21	0.12072	0.14249	0.81781	0.03406	0.59617
2002	0.05769	52	0.10512	0.12409	0.74076	0.03306	0.46581
2003	0.15584	77	1.01227	1.19488	0.48441	0.47702	2.99304
2004	0.13953	43	0.27656	0.32645	0.64273	0.10071	1.05821
2005	0.38636	44	2.29584	2.71000	0.33632	1.40810	5.21561
2006	0.20833	48	0.77386	0.91346	0.42209	0.40643	2.05301
2007	0.06452	31	0.81705	0.96444	0.76283	0.24891	3.73682
2008	0.33333	39	1.53356	1.81020	0.35330	0.91166	3.59437
2009	0.13333	60	0.39181	0.46250	0.46848	0.18976	1.12724
2010	0.26667	30	1.76594	2.08451	0.52800	0.77318	5.61992
2011	0.15000	20	0.45302	0.53475	0.69207	0.15303	1.86859

Table 76. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / age 1 selectivity) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 53242.2*						*Lognormal Submodel Type 3 Tests (AIC 8971.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3978	300.24	12.46	<.0001	<.0001	24	2823	3.04	<.0001
Area	2	11E3	74.40	37.20	<.0001	<.0001	2	2823	20.05	<.0001
Depth Zone	2	11E3	420.26	210.13	<.0001	<.0001	2	2823	231.49	<.0001
Time of Day	1	11E3	5.44	5.44	0.0196	0.0197	1	2823	21.41	<.0001
Season	1	11E3	188.80	188.80	<.0001	<.0001	1	2823	0.07	0.7852
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 53242.2)*						*Lognormal Submodel Type 3 Tests (AIC 8967.5)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3978	300.24	12.46	<.0001	<.0001	24	2824	3.05	<.0001
Area	2	11E3	74.40	37.20	<.0001	<.0001	2	2824	20.55	<.0001
Depth Zone	2	11E3	420.26	210.13	<.0001	<.0001	2	2824	246.12	<.0001
Time of Day	1	11E3	5.44	5.44	0.0196	0.0197	1	2824	21.50	<.0001
Season	1	11E3	188.80	188.80	<.0001	<.0001		dropped		

Table 77. Indices of red snapper (GOM / age 1 selectivity) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.12108	446	1.04945	0.32735	0.23604	0.20547	0.52150
1988	0.15581	430	1.45716	0.45452	0.22180	0.29323	0.70452
1989	0.14628	417	1.95650	0.61027	0.20968	0.40305	0.92404
1990	0.33974	468	6.30227	1.96581	0.12487	1.53285	2.52106
1991	0.25219	456	2.31836	0.72315	0.15132	0.53522	0.97706
1992	0.23059	438	2.18810	0.68251	0.16564	0.49115	0.94844
1993	0.22881	472	2.73193	0.85214	0.16692	0.61168	1.18714
1994	0.28480	467	4.71191	1.46974	0.13501	1.12331	1.92302
1995	0.24027	437	4.79800	1.49660	0.17135	1.06499	2.10312
1996	0.31767	447	4.81306	1.50129	0.13455	1.14847	1.96252
1997	0.26977	430	2.73336	0.85259	0.14343	0.64091	1.13419
1998	0.20746	429	1.92478	0.60038	0.16068	0.43626	0.82623
1999	0.17188	448	1.34699	0.42015	0.18195	0.29286	0.60278
2000	0.25740	439	3.69529	1.15264	0.15262	0.85093	1.56132
2001	0.18487	357	2.08428	0.65013	0.19260	0.44384	0.95229
2002	0.18696	460	1.83291	0.57172	0.18146	0.39889	0.81945
2003	0.22449	441	2.33728	0.72905	0.16770	0.52252	1.01721
2004	0.32542	421	4.49960	1.40352	0.13611	1.07037	1.84036
2005	0.36253	411	5.99678	1.87052	0.12614	1.45491	2.40486
2006	0.26517	445	2.79833	0.87286	0.13643	0.66525	1.14524
2007	0.31500	400	3.64441	1.13677	0.13333	0.87171	1.48242
2008	0.32765	586	4.23245	1.32019	0.11388	1.05206	1.65665
2009	0.18407	728	1.54960	0.48335	0.13404	0.37013	0.63120
2010	0.36404	445	4.07100	1.26983	0.11313	1.01344	1.59108
2011	0.36802	394	5.07479	1.58293	0.12392	1.23661	2.02624

Table 78. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / age 1 selectivity / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 25696.1)*						*Lognormal Submodel Type 3 Tests (AI 5534.7C)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1924	184.65	7.63	<.0001	<.0001	24	1667	2.25	0.0005
Area	2	5365	152.52	76.26	<.0001	<.0001	2	1667	7.44	0.0006
Depth Zone	2	5203	314.59	157.30	<.0001	<.0001	2	1667	128.31	<.0001
Time of Day	1	5401	3.58	3.58	0.0584	0.0584	1	1667	12.30	0.0005
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 25687.8)*						*Lognormal Submodel Type 3 Tests (AIC 5534.7)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1924	183.64	7.59	<.0001	<.0001	24	1667	2.25	0.0005
Area	2	5368	152.94	76.47	<.0001	<.0001	2	1667	7.44	0.0006
Depth Zone	2	5207	314.12	157.06	<.0001	<.0001	2	1667	128.31	<.0001
Time of Day				dropped			1	1667	12.30	0.0005

Table 79. Indices of red snapper (GOM / age 1 selectivity / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.13504	274	1.62497	0.34919	0.25124	0.21289	0.57274
1988	0.20188	213	1.20457	0.25885	0.25496	0.15670	0.42759
1989	0.16495	194	1.80549	0.38798	0.30590	0.21332	0.70565
1990	0.42083	240	9.75603	2.09646	0.16099	1.52247	2.88686
1991	0.29870	231	3.45781	0.74305	0.18797	0.51187	1.07862
1992	0.27876	226	3.37308	0.72484	0.21511	0.47371	1.10911
1993	0.27354	223	4.09632	0.88025	0.23071	0.55822	1.38806
1994	0.30672	238	4.90691	1.05444	0.17792	0.74078	1.50092
1995	0.29091	220	9.64316	2.07221	0.24498	1.27861	3.35839
1996	0.35909	220	6.56856	1.41151	0.18401	0.97990	2.03322
1997	0.37198	207	4.15840	0.89360	0.18387	0.62053	1.28683
1998	0.26961	204	2.72195	0.58492	0.19783	0.39528	0.86553
1999	0.20628	223	1.63949	0.35231	0.23235	0.22272	0.55730
2000	0.33796	216	6.88150	1.47876	0.20613	0.98336	2.22373
2001	0.20395	152	2.49350	0.53583	0.28962	0.30375	0.94523
2002	0.26432	227	3.29753	0.70860	0.21568	0.46258	1.08547
2003	0.30387	181	3.09628	0.66536	0.22303	0.42823	1.03379
2004	0.39352	216	6.73210	1.44665	0.17599	1.02015	2.05147
2005	0.40884	181	6.57299	1.41247	0.18121	0.98595	2.02349
2006	0.35747	221	4.51976	0.97125	0.17080	0.69190	1.36338
2007	0.42857	196	6.42103	1.37981	0.17270	0.97929	1.94414
2008	0.34615	260	6.42019	1.37963	0.18088	0.96364	1.97520
2009	0.22278	395	2.21276	0.47550	0.16621	0.34179	0.66151
2010	0.39916	238	4.96352	1.06661	0.15006	0.79138	1.43755
2011	0.42347	196	7.77113	1.66993	0.16456	1.20425	2.31570

Table 80. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (GOM / age 1 selectivity / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC* 29350.5*)*						*Lognormal Submodel Type 3 Tests (AIC* 3397.4*)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1993	153.49	6.35	<.0001	<.0001	24	1127	2.25	0.0005
Area	2	5231	81.01	40.51	<.0001	<.0001	2	1127	16.80	<.0001
Depth Zone	2	5064	198.00	99.00	<.0001	<.0001	2	1127	108.14	<.0001
Time of Day	1	5265	1.19	1.19	0.2746	0.2746	1	1127	4.80	0.0287
Model Run #2	*Binomial Submodel Type 3 Tests (AIC* 29338.3*)*						*Lognormal Submodel Type 3 Tests (AIC* 3397.4*)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1993	153.66	6.35	<.0001	<.0001	24	1127	2.25	0.0005
Area	2	5235	81.21	40.61	<.0001	<.0001	2	1127	16.80	<.0001
Depth Zone	2	5069	198.04	99.02	<.0001	<.0001	2	1127	108.14	<.0001
Time of Day				dropped			1	1127	4.80	0.0287

Table 81. Indices of red snapper (GOM / age 1 selectivity / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.09884	172	0.26123	0.17659	0.49513	0.06922	0.45050
1988	0.11060	217	1.38593	0.93692	0.38986	0.44155	1.98805
1989	0.13004	223	1.29416	0.87488	0.29622	0.48983	1.56261
1990	0.25439	228	2.48489	1.67984	0.20434	1.12097	2.51732
1991	0.20444	225	0.97742	0.66076	0.27825	0.38269	1.14087
1992	0.17925	212	0.83752	0.56618	0.25357	0.34366	0.93278
1993	0.18876	249	1.26705	0.85655	0.27004	0.50386	1.45612
1994	0.26201	229	3.46778	2.34429	0.22170	1.51269	3.63306
1995	0.18894	217	1.22849	0.83049	0.23669	0.52064	1.32472
1996	0.27753	227	2.46057	1.66340	0.20518	1.10820	2.49676
1997	0.17489	223	1.06141	0.71753	0.22506	0.46001	1.11923
1998	0.15111	225	0.85516	0.57811	0.27334	0.33795	0.98892
1999	0.13778	225	0.77260	0.52230	0.31639	0.28160	0.96873
2000	0.17937	223	1.01612	0.68692	0.24432	0.42439	1.11185
2001	0.17073	205	1.11933	0.75669	0.26928	0.44577	1.28448
2002	0.11159	233	0.47239	0.31934	0.32661	0.16894	0.60366
2003	0.16923	260	1.15071	0.77791	0.30128	0.43142	1.40267
2004	0.25366	205	1.99583	1.34922	0.22065	0.87237	2.08673
2005	0.32609	230	3.58740	2.42516	0.18796	1.67069	3.52034
2006	0.17411	224	1.10460	0.74673	0.26356	0.44470	1.25389
2007	0.20588	204	1.14175	0.77185	0.23165	0.48859	1.21931
2008	0.31288	326	1.85043	1.25093	0.16451	0.90218	1.73449
2009	0.13814	333	0.65084	0.43998	0.21326	0.28857	0.67084
2010	0.32367	207	2.47698	1.67449	0.20639	1.11296	2.51933
2011	0.31313	198	2.06050	1.39295	0.19609	0.94452	2.05426

Table 82. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / age 1 selectivity) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 41677.2)*						*Lognormal Submodel Type 3 Tests (AIC 7629.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3146	224.37	9.30	<.0001	<.0001	24	2401	3.70	<.0001
Area	1	8667	1.54	1.54	0.2144	0.2144	1	2401	36.85	<.0001
Depth Zone	2	8448	366.32	183.16	<.0001	<.0001	2	2401	212.44	<.0001
Time of Day	1	8677	0.83	0.83	0.3619	0.3619	1	2401	15.30	<.0001
Season	1	8644	169.41	169.41	<.0001	<.0001	1	2401	0.44	0.5084
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 41674.3)*						*Lognormal Submodel Type 3 Tests (AIC 7626.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3146	224.15	9.29	<.0001	<.0001	24	2402	3.71	<.0001
Area	1	8668	1.55	1.55	0.2136	0.2136	1	2402	36.93	<.0001
Depth Zone	2	8449	366.33	183.16	<.0001	<.0001	2	2402	224.49	<.0001
Time of Day				dropped			1	2402	15.42	<.0001
Season	1	8644	168.84	168.84	<.0001	<.0001		dropped		
Model Run #3	*Binomial Submodel Type 3 Tests (AIC 41675.5)*						*Lognormal Submodel Type 3 Tests (AIC 7626.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	3147	223.27	9.26	<.0001	<.0001	24	2402	3.71	<.0001
Area				dropped			1	2402	36.93	<.0001
Depth Zone	2	8447	365.96	182.98	<.0001	<.0001	2	2402	224.49	<.0001
Time of Day				dropped			1	2402	15.42	<.0001
Season	1	8643	169.77	169.77	<.0001	<.0001		dropped		

Table 83. Indices of red snapper (WGOM / age 1 selectivity) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.15359	306	1.25705	0.34065	0.25733	0.20529	0.56526
1988	0.18712	326	1.81275	0.49123	0.22839	0.31292	0.77117
1989	0.14330	321	1.41418	0.38323	0.22885	0.24390	0.60214
1990	0.34582	347	6.80548	1.84421	0.13936	1.39747	2.43377
1991	0.24725	364	2.17911	0.59052	0.16229	0.42775	0.81523
1992	0.23955	359	1.92100	0.52057	0.16857	0.37247	0.72756
1993	0.27042	355	3.46201	0.93817	0.17161	0.66727	1.31906
1994	0.30618	356	6.31594	1.71155	0.14869	1.27334	2.30058
1995	0.27479	353	6.59979	1.78847	0.17948	1.25263	2.55353
1996	0.33521	355	5.92080	1.60447	0.14671	1.19834	2.14826
1997	0.28446	341	3.25262	0.88143	0.15869	0.64299	1.20827
1998	0.23143	350	2.27273	0.61589	0.15878	0.44921	0.84441
1999	0.19391	361	1.80263	0.48849	0.18691	0.33721	0.70764
2000	0.27429	350	4.53324	1.22846	0.16885	0.87847	1.71788
2001	0.20333	300	2.59557	0.70337	0.20064	0.47274	1.04651
2002	0.21978	364	2.36132	0.63989	0.18673	0.44188	0.92664
2003	0.24375	320	1.99411	0.54038	0.17141	0.38450	0.75946
2004	0.36283	339	5.63990	1.52835	0.14243	1.15115	2.02916
2005	0.37425	334	6.82568	1.84969	0.13776	1.40607	2.43327
2006	0.28409	352	3.47002	0.94034	0.14872	0.69954	1.26403
2007	0.31098	328	3.24686	0.87987	0.14134	0.66413	1.16568
2008	0.32049	493	3.93837	1.06726	0.12075	0.83900	1.35761
2009	0.18718	577	1.86386	0.50509	0.14763	0.37656	0.67749
2010	0.38095	378	4.64807	1.25958	0.11711	0.99735	1.59075
2011	0.39143	350	6.12144	1.65885	0.12588	1.29092	2.13164

Table 84. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / age 1 selectivity / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 19761.5)*						*Lognormal Submodel Type 3 Tests (AIC 4694.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1493	143.06	5.90	<.0001	<.0001	24	1411	2.88	<.0001
Area	1	4210	89.49	89.49	<.0001	<.0001	1	1411	11.16	0.0009
Depth Zone	2	4096	278.78	139.39	<.0001	<.0001	2	1411	127.57	<.0001
Time of Day	1	4240	0.60	0.60	0.4405	0.4405	1	1411	9.29	0.0023
Model Run #2	*Binomial Submodel Type 3 Tests (AI 19757.8C)*						*Lognormal Submodel Type 3 Tests (AIC 4694.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1494	142.88	5.89	<.0001	<.0001	24	1411	2.88	<.0001
Area	1	4211	89.51	89.51	<.0001	<.0001	1	1411	11.16	0.0009
Depth Zone	2	4098	278.88	139.44	<.0001	<.0001	2	1411	127.57	<.0001
Time of Day				dropped			1	1411	9.29	0.0023

Table 85. Indices of red snapper (WGOM / age 1 selectivity / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.17978	178	2.0785	0.37548	0.27982	0.21682	0.65022
1988	0.25517	145	1.3090	0.23646	0.27013	0.13907	0.40204
1989	0.15603	141	1.5098	0.27274	0.36270	0.13502	0.55094
1990	0.44186	172	11.9320	2.15548	0.17899	1.51113	3.07459
1991	0.28649	185	3.6500	0.65937	0.21011	0.43510	0.99922
1992	0.28333	180	2.3296	0.42083	0.21924	0.27284	0.64909
1993	0.29775	178	5.5394	1.00068	0.24527	0.61711	1.62266
1994	0.33898	177	6.6754	1.20588	0.19670	0.81672	1.78048
1995	0.32386	176	13.9548	2.52089	0.26328	1.50208	4.23072
1996	0.39080	174	8.5040	1.53622	0.20004	1.03372	2.28300
1997	0.38650	163	4.9687	0.89757	0.20764	0.59514	1.35370
1998	0.31361	169	3.3309	0.60171	0.19439	0.40936	0.88445
1999	0.24022	179	2.2792	0.41172	0.23982	0.25657	0.66070
2000	0.36257	171	9.0143	1.62840	0.23032	1.03344	2.56588
2001	0.24138	116	3.3151	0.59885	0.30712	0.32851	1.09167
2002	0.31148	183	4.4816	0.80958	0.22068	0.52342	1.25217
2003	0.33577	137	2.9462	0.53222	0.22477	0.34139	0.82970
2004	0.43503	177	8.4563	1.52759	0.18400	1.06051	2.20039
2005	0.45270	148	7.5575	1.36523	0.18895	0.93869	1.98561
2006	0.40341	176	6.0979	1.10157	0.17912	0.77207	1.57168
2007	0.40000	155	5.2528	0.94891	0.19021	0.65085	1.38347
2008	0.33495	206	4.6207	0.83472	0.19384	0.56850	1.22561
2009	0.23026	304	2.7918	0.50433	0.18361	0.35040	0.72590
2010	0.42289	201	6.0144	1.08649	0.15369	0.80040	1.47483
2011	0.45349	172	9.7819	1.76707	0.16715	1.26786	2.46284

Table 86. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / age 1 selectivity / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 23382.8)*						*Lognormal Submodel Type 3 Tests (AIC 2872.4)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1595	115.15	4.75	<.0001	<.0001	24	962	3.13	<.0001
Area	1	4360	64.35	64.35	<.0001	<.0001	1	962	36.65	<.0001
Depth Zone	2	4259	173.52	86.76	<.0001	<.0001	2	962	98.18	<.0001
Time of Day	1	4372	0.08	0.08	0.7757	0.7757	1	962	1.97	0.1608
Model Run #1	*Binomial Submodel Type 3 Tests (AIC 23377.9)*						*Lognormal Submodel Type 3 Tests (AIC 2870.5)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	1596	115.20	4.75	<.0001	<.0001	24	963	3.16	<.0001
Area	1	4361	64.39	64.39	<.0001	<.0001	1	963	36.08	<.0001
Depth Zone	2	4260	173.52	86.76	<.0001	<.0001	2	963	97.25	<.0001
Time of Day				dropped				dropped		

Table 87. Indices of red snapper (WGOM / age 1 selectivity / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.11719	128	0.23524	0.14769	0.54710	0.05307	0.41097
1988	0.13260	181	1.75930	1.10454	0.39327	0.51737	2.35811
1989	0.13333	180	0.74474	0.46757	0.30708	0.25651	0.85229
1990	0.25143	175	2.03071	1.27495	0.23422	0.80308	2.02406
1991	0.20670	179	0.67396	0.42313	0.26451	0.25154	0.71179
1992	0.19553	179	1.01857	0.63949	0.26312	0.38116	1.07291
1993	0.24294	177	1.49760	0.94024	0.25771	0.56622	1.56132
1994	0.27374	179	4.45812	2.79894	0.25342	1.69939	4.60994
1995	0.22599	177	1.61662	1.01496	0.24475	0.62654	1.64419
1996	0.28177	181	2.82176	1.77159	0.23183	1.12106	2.79961
1997	0.19101	178	1.19873	0.75260	0.24468	0.46464	1.21902
1998	0.15470	181	0.94355	0.59239	0.28712	0.33740	1.04010
1999	0.14835	182	0.96758	0.60748	0.31145	0.33056	1.11638
2000	0.18994	179	1.05286	0.66102	0.27506	0.38516	1.13446
2001	0.17935	184	1.22702	0.77036	0.28034	0.44441	1.33537
2002	0.12707	181	0.49371	0.30997	0.34924	0.15727	0.61091
2003	0.17486	183	0.73240	0.45982	0.29405	0.25850	0.81794
2004	0.28395	162	2.39010	1.50058	0.23358	0.94638	2.37933
2005	0.31183	186	4.00427	2.51401	0.22237	1.62011	3.90111
2006	0.16477	176	1.21227	0.76110	0.34032	0.39256	1.47563
2007	0.23121	173	1.16327	0.73034	0.23700	0.45759	1.16566
2008	0.31010	287	1.97172	1.23791	0.17559	0.87364	1.75407
2009	0.13919	273	0.69015	0.43330	0.23481	0.27262	0.68866
2010	0.33333	177	2.59014	1.62617	0.22837	1.03590	2.55277
2011	0.33146	178	2.32524	1.45986	0.20295	0.97681	2.18178

Table 88. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / age 1 selectivity) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AI 11891.3)*						*Lognormal Submodel Type 3 Tests (AIC 1294.5)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	751	119.81	4.89	<.0001	<.0001	24	394	2.53	0.0001
Depth Zone	2	1800	66.30	33.15	<.0001	<.0001	2	394	27.45	<.0001
Time of Day	1	1946	13.61	13.61	0.0002	0.0002	1	394	4.07	0.0442
Season	1	1918	18.98	18.98	<.0001	<.0001	1	394	0.52	0.4725
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 11891.3)*						*Lognormal Submodel Type 3 Tests (AIC 1292.2)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	751	119.81	4.89	<.0001	<.0001	24	395	2.45	0.0002
Depth Zone	2	1800	66.30	33.15	<.0001	<.0001	2	395	26.99	<.0001
Time of Day	1	1946	13.61	13.61	0.0002	0.0002	1	395	4.16	0.0420
Season	1	1918	18.98	18.98	<.0001	<.0001		dropped		

Table 89. Indices of red snapper (EGOM / age 1 selectivity) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.05000	140	0.53388	0.21247	0.43217	0.09287	0.48610
1988	0.05769	104	0.76074	0.30275	0.79578	0.07460	1.22872
1989	0.15625	96	4.75580	1.89266	0.42389	0.83944	4.26732
1990	0.32231	121	5.47643	2.17945	0.26085	1.30464	3.64083
1991	0.27174	92	3.75589	1.49472	0.33770	0.77468	2.88403
1992	0.18987	79	5.44449	2.16674	0.46871	0.88864	5.28304
1993	0.10256	117	1.07988	0.42976	0.56232	0.15064	1.22606
1994	0.21622	111	1.36616	0.54369	0.27157	0.31889	0.92694
1995	0.09524	84	0.41139	0.16372	0.47097	0.06688	0.40075
1996	0.25000	92	2.16748	0.86259	0.30317	0.47670	1.56087
1997	0.21348	89	1.60743	0.63971	0.30685	0.35110	1.16556
1998	0.10127	79	0.99169	0.39466	0.68812	0.11361	1.37094
1999	0.08046	87	0.23673	0.09421	0.55998	0.03315	0.26775
2000	0.19101	89	1.80820	0.71961	0.31854	0.38643	1.34005
2001	0.08772	57	0.66961	0.26648	0.53039	0.09845	0.72131
2002	0.06250	96	0.47069	0.18732	0.65248	0.05692	0.61642
2003	0.17355	121	4.51086	1.79518	0.42343	0.79686	4.04424
2004	0.17073	82	1.45858	0.58047	0.40059	0.26834	1.25564
2005	0.31169	77	4.23827	1.68670	0.28576	0.96313	2.95385
2006	0.19355	93	1.22333	0.48685	0.30962	0.26582	0.89165
2007	0.33333	72	7.35515	2.92712	0.32380	1.55659	5.50436
2008	0.36559	93	7.75908	3.08787	0.27520	1.79876	5.30083
2009	0.17219	151	0.85675	0.34096	0.27563	0.19845	0.58580
2010	0.26866	67	2.76264	1.09944	0.34333	0.56393	2.14348
2011	0.18182	44	1.11788	0.44488	0.43615	0.19310	1.02497

Table 90. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / age 1 selectivity / Summer) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 6161.0)*						*Lognormal Submodel Type 3 Tests (AIC 791.4)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	24	372	89.26	3.57	<.0001	<.0001	24	229	2.91	<.0001
Depth Zone	2	895	46.30	23.15	<.0001	<.0001	2	229	5.99	0.0029
Time of Day	1	1028	8.63	8.63	0.0033	0.0034	1	229	4.03	0.0458

Table 91. Indices of red snapper (EGOM / age 1 selectivity / Summer) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.05208	96	0.6312	0.19705	0.45745	0.08241	0.47119
1988	0.08824	68	1.3086	0.40854	0.75725	0.10628	1.57038
1989	0.18868	53	2.6916	0.84030	0.51645	0.31776	2.22217
1990	0.36765	68	5.1385	1.60423	0.32694	0.84815	3.03434
1991	0.34783	46	4.1418	1.29307	0.36785	0.63415	2.63664
1992	0.26087	46	10.4310	3.25653	0.48384	1.30135	8.14922
1993	0.17778	45	1.0368	0.32368	0.58065	0.11014	0.95127
1994	0.21311	61	1.5515	0.48436	0.37644	0.23386	1.00316
1995	0.15909	44	0.6863	0.21426	0.55364	0.07617	0.60264
1996	0.23913	46	2.1265	0.66390	0.39735	0.30870	1.42780
1997	0.31818	44	2.4566	0.76695	0.36895	0.37538	1.56699
1998	0.05714	35	1.6563	0.51708	1.33912	0.06811	3.92542
1999	0.06818	44	0.1332	0.04159	0.61723	0.01335	0.12957
2000	0.24444	45	2.2669	0.70770	0.39608	0.32982	1.51855
2001	0.08333	36	0.5658	0.17663	0.80462	0.04299	0.72571
2002	0.06818	44	0.3860	0.12051	0.70941	0.03361	0.43210
2003	0.20455	44	5.3595	1.67322	0.66402	0.49956	5.60425
2004	0.20513	39	2.3149	0.72270	0.51554	0.27370	1.90826
2005	0.21212	33	4.7335	1.47777	0.49201	0.58236	3.74988
2006	0.17778	45	0.8292	0.25887	0.45348	0.10901	0.61476
2007	0.53659	41	12.2493	3.82420	0.33707	1.98428	7.37020
2008	0.38889	54	12.1490	3.79286	0.34971	1.92278	7.48177
2009	0.19780	91	1.0054	0.31387	0.32805	0.16560	0.59490
2010	0.27027	37	2.6139	0.81604	0.48666	0.32453	2.05195
2011	0.20833	24	1.6147	0.50409	0.56866	0.17488	1.45304

Table 92. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / age 1 selectivity / Fall) index of relative abundance from 1987 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 5711.7)*						*Lognormal Submodel Type 3 Tests (AIC 452.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	23	1041	51.30	2.23	0.0006	0.0008	23	139	2.08	0.0051
Depth Zone	2	1041	24.96	12.48	<.0001	<.0001	2	139	13.91	<.0001
Time of Day	1	1041	4.26	4.26	0.0391	0.0394	1	139	2.45	0.1199
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 5711.7)*						*Lognormal Submodel Type 3 Tests (AIC 452.9)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	23	1041	51.30	2.23	0.0006	0.0008	23	140	2.13	0.0039
Depth Zone	2	1041	24.96	12.48	<.0001	<.0001	2	140	14.41	<.0001
Time of Day	1	1041	4.26	4.26	0.0391	0.0394		dropped		

Table 93. Indices of red snapper (EGOM / age 1 selectivity / Fall) abundance developed using the delta-lognormal model for 1987-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1987	0.04545	44	0.44621	0.26700	1.07135	0.04646	1.5344
1988	0.00000	36	.	.	.	.	.
1989	0.11628	43	7.50164	4.48884	0.65327	1.36243	14.7895
1990	0.26415	53	4.75752	2.84681	0.40138	1.31418	6.1668
1991	0.19565	46	1.77594	1.06269	0.50625	0.40880	2.7625
1992	0.09091	33	0.22237	0.13306	0.95399	0.02663	0.6650
1993	0.05556	72	0.67716	0.40520	0.78166	0.10183	1.6124
1994	0.22000	50	1.37783	0.82447	0.45894	0.34390	1.9766
1995	0.02500	40	0.09670	0.05786	1.77455	0.00533	0.6288
1996	0.26087	46	1.83442	1.09768	0.43594	0.47662	2.5280
1997	0.11111	45	0.94292	0.56422	0.67617	0.16538	1.9250
1998	0.13636	44	0.44590	0.26682	0.64658	0.08182	0.8701
1999	0.09302	43	0.40925	0.24489	0.79110	0.06073	0.9874
2000	0.13636	44	1.35407	0.81025	0.61347	0.26164	2.5091
2001	0.09524	21	0.86243	0.51606	1.03008	0.09420	2.8273
2002	0.05769	52	0.42317	0.25322	0.89945	0.05429	1.1810
2003	0.15584	77	1.98483	1.18768	0.44895	0.50409	2.7983
2004	0.13953	43	0.66652	0.39883	0.62966	0.12556	1.2669
2005	0.38636	44	3.75493	2.24688	0.35916	1.11951	4.5095
2006	0.20833	48	1.82563	1.09242	0.47814	0.44083	2.7072
2007	0.06452	31	1.92737	1.15330	1.01090	0.21534	6.1767
2008	0.33333	39	2.54532	1.52307	0.40702	0.69606	3.3327
2009	0.13333	60	0.74967	0.44859	0.55500	0.15913	1.2646
2010	0.26667	30	2.89424	1.73186	0.52759	0.64281	4.6660
2011	0.15000	20	0.63221	0.37830	0.85884	0.08555	1.6729

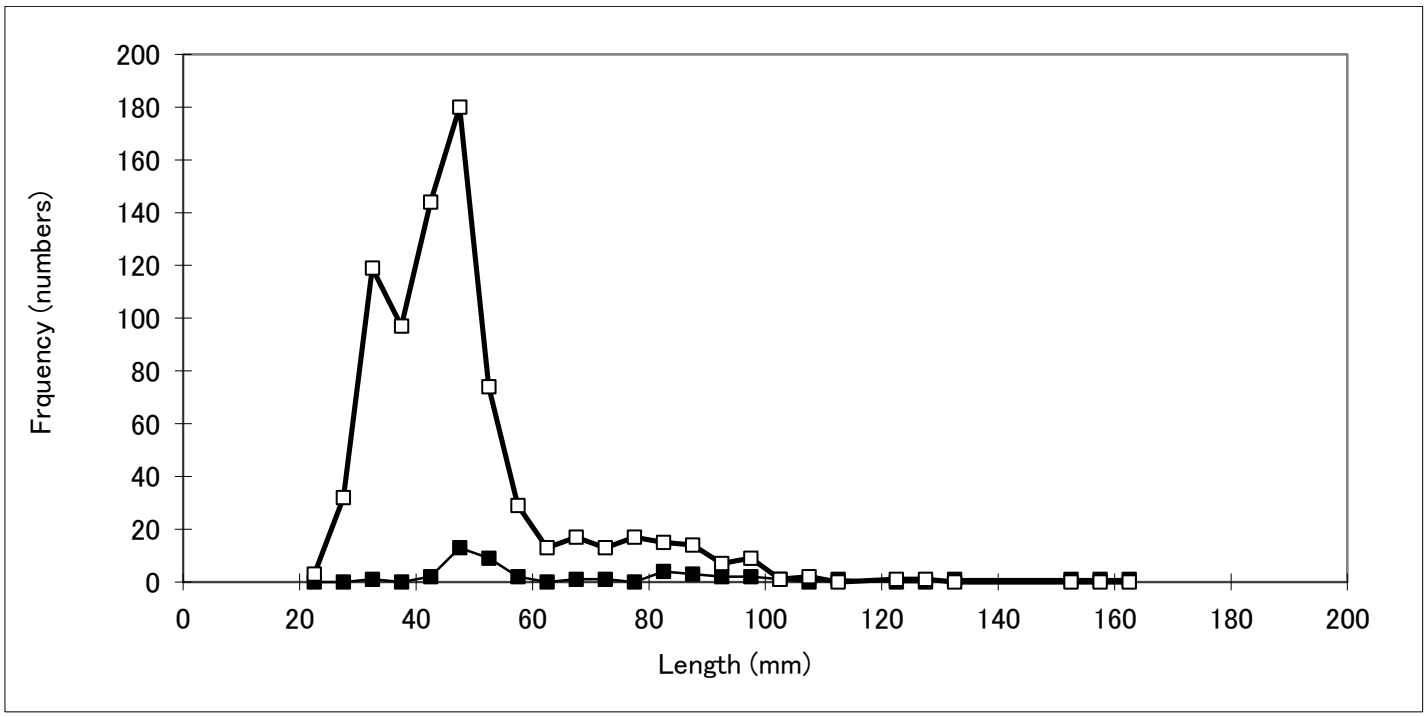


Figure 1. Length frequency histograms of red snapper collected in trawls with the fine mesh codend (white squares) versus those with the regular SEAMAP codend (black squares).

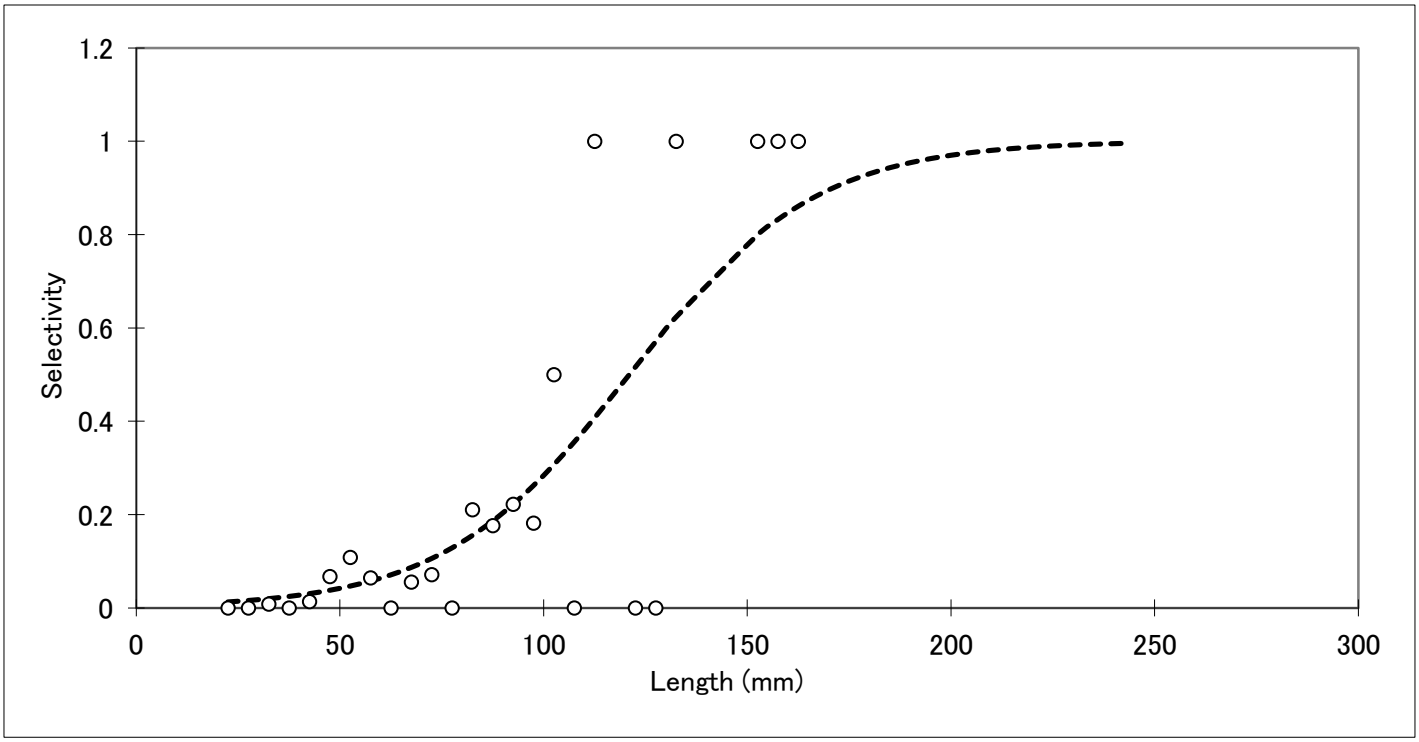


Figure 2. The selectivity curve of red snapper collected in the SEAMAP trawl.

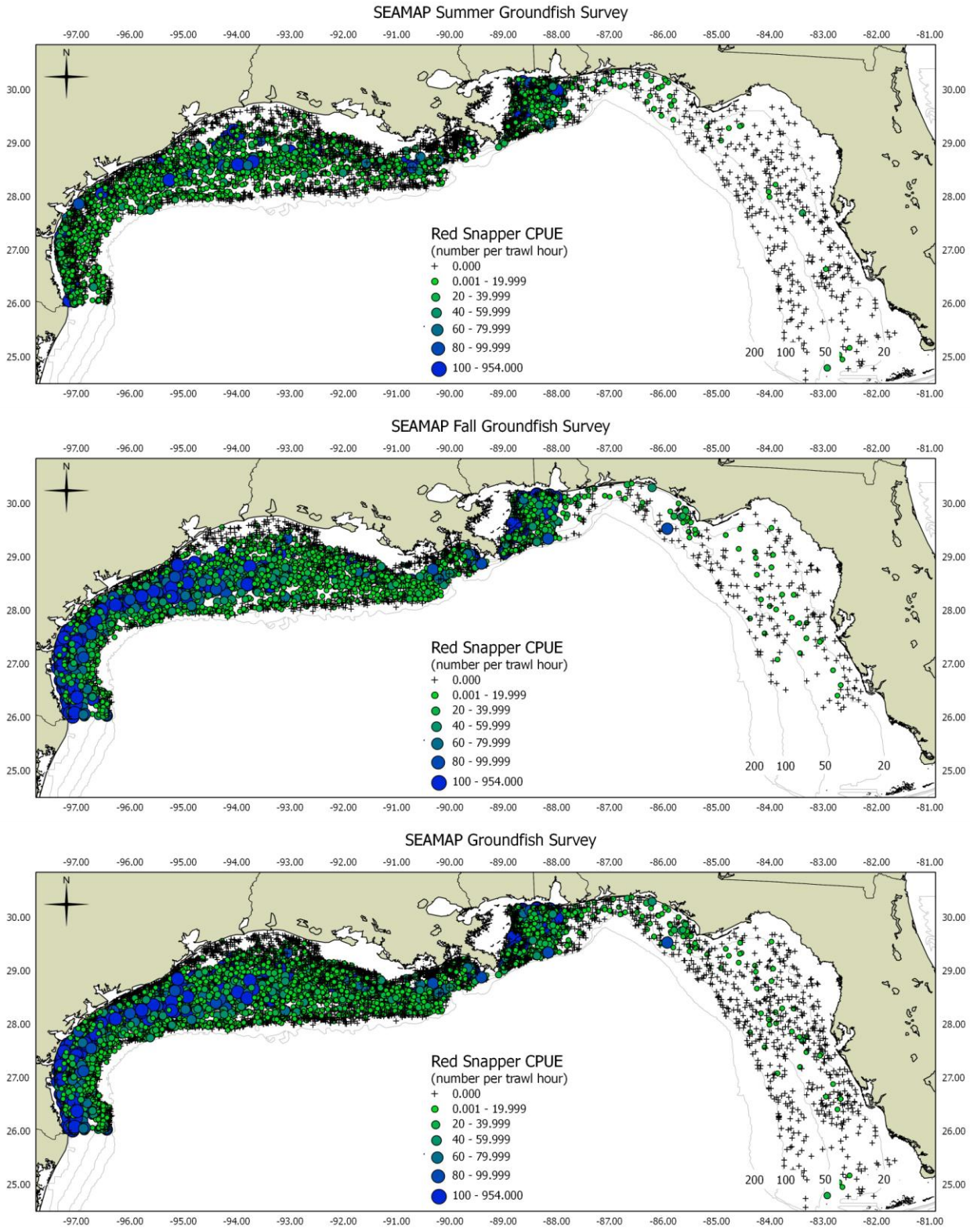


Figure 3. Stations sampled from 1987 to 2011 during the Summer (top), Fall (middle) and overall (bottom) SEAMAP Groundfish Survey with the CPUE for red snapper.

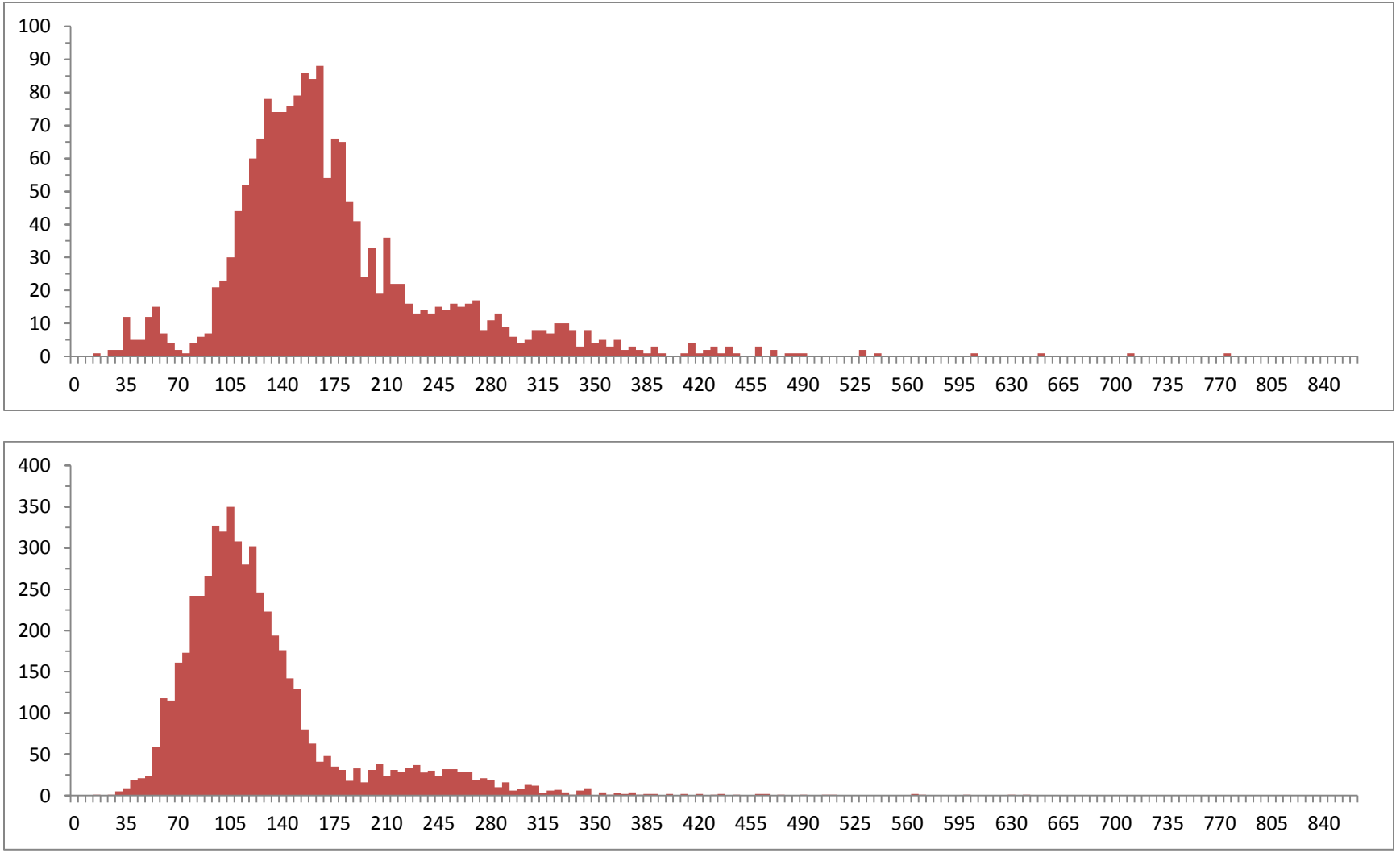


Figure 4. Length frequency histograms for red snapper captured in the eastern Gulf of Mexico during the Summer (top) and Fall (bottom) SEAMAP Groundfish surveys from 1987-2010.

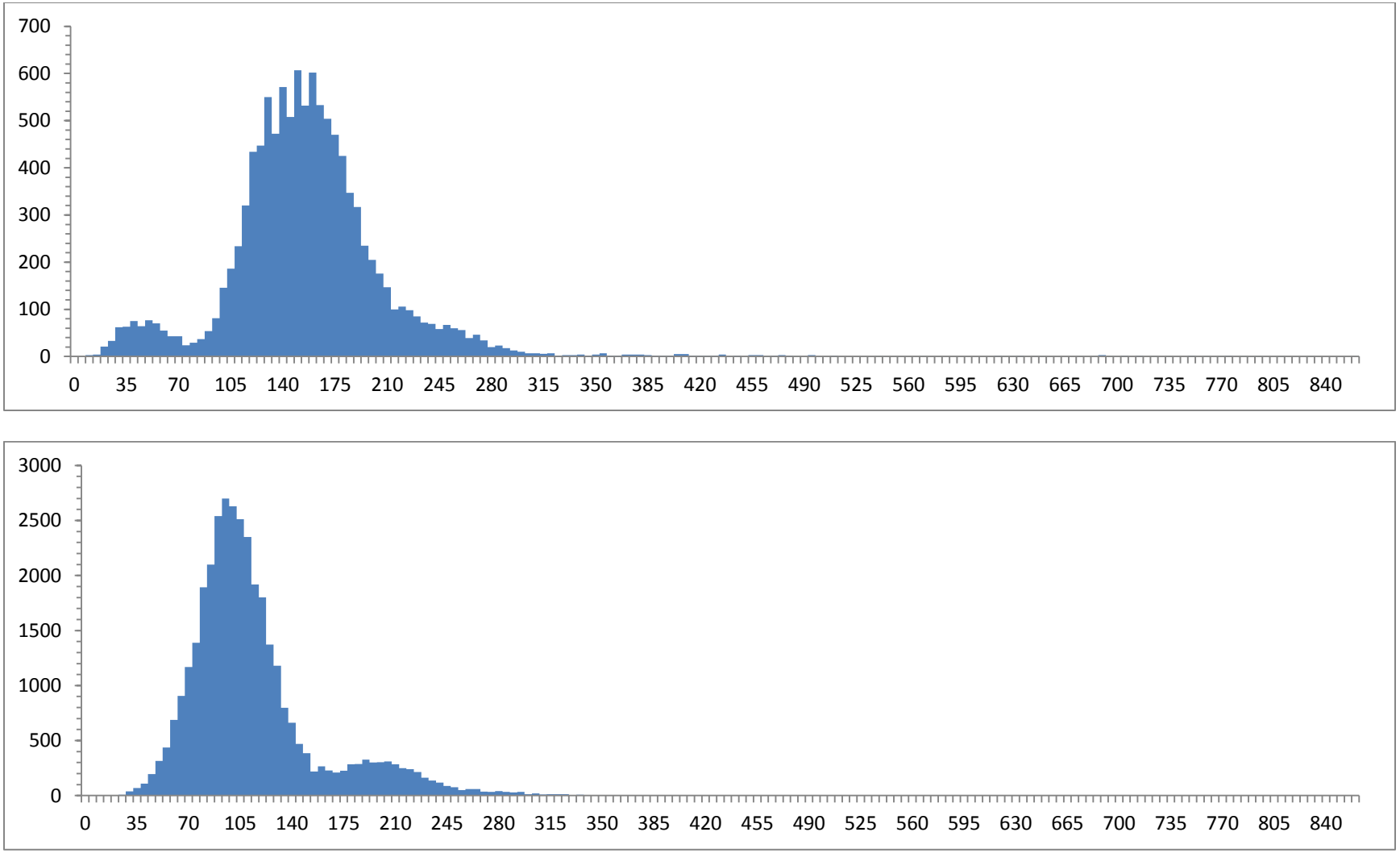


Figure 5. Length frequency histograms for red snapper captured in the western Gulf of Mexico during the Summer (top) and Fall (bottom) SEAMAP Groundfish surveys from 1987-2010.

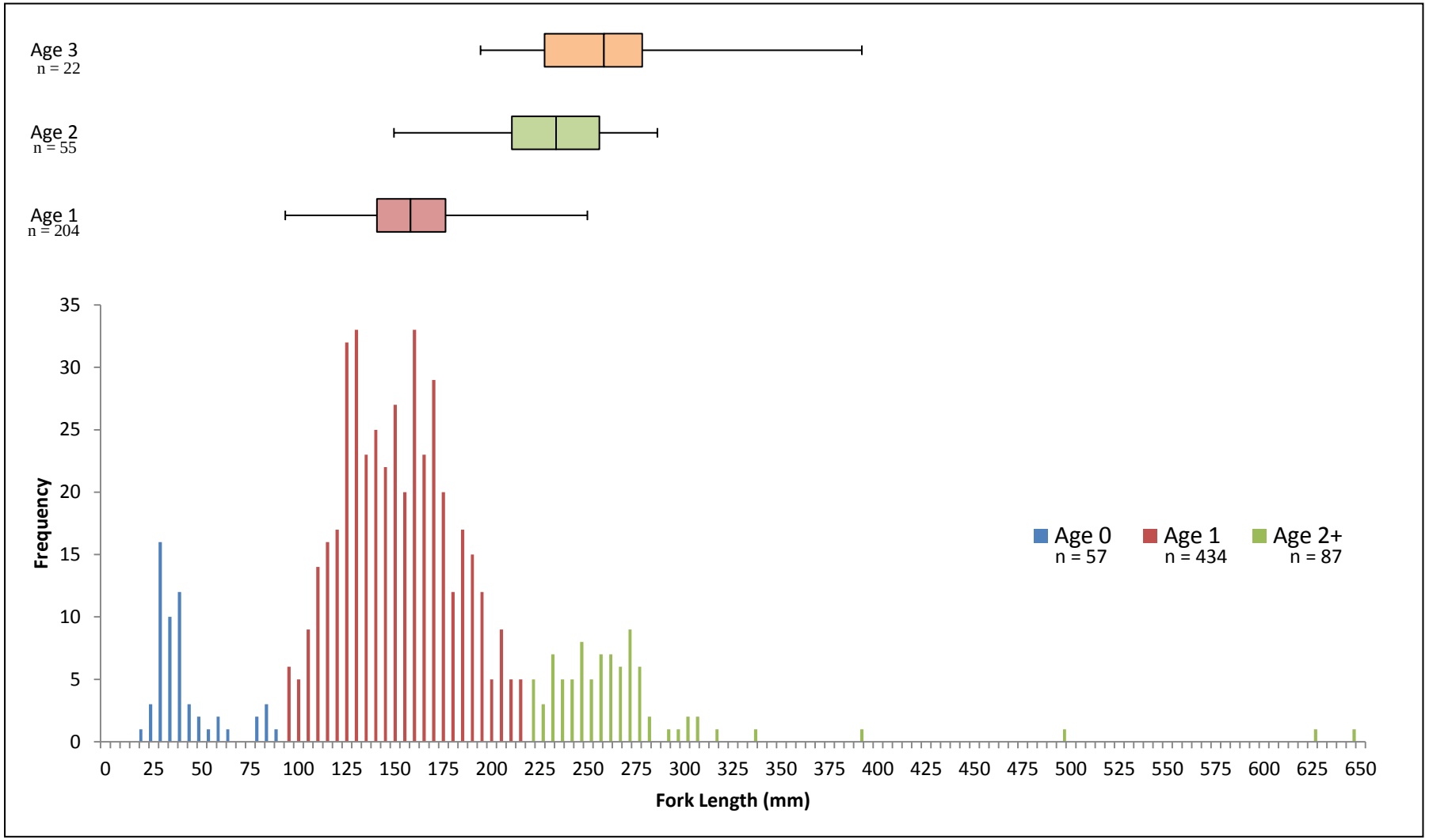


Figure 6. Comparison of red snapper ages based on length distribution (columns) and otolith analysis (bars).

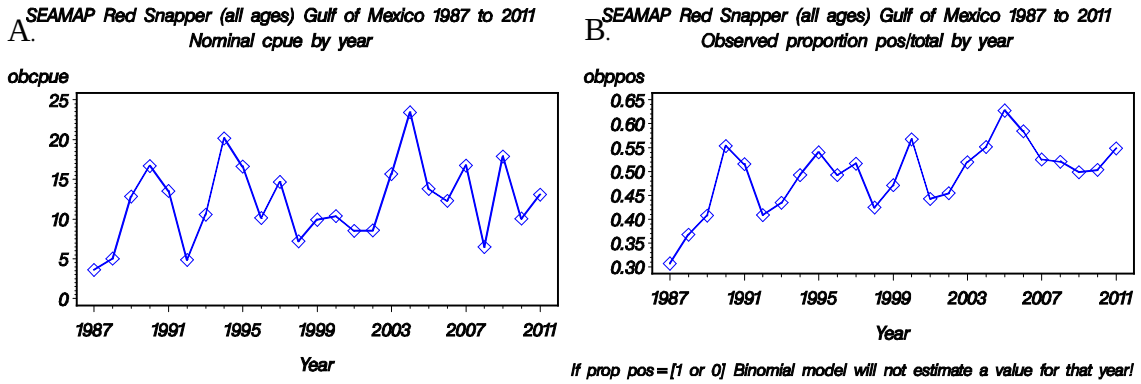


Figure 7. Annual trends for red snapper (GOM / all ages) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

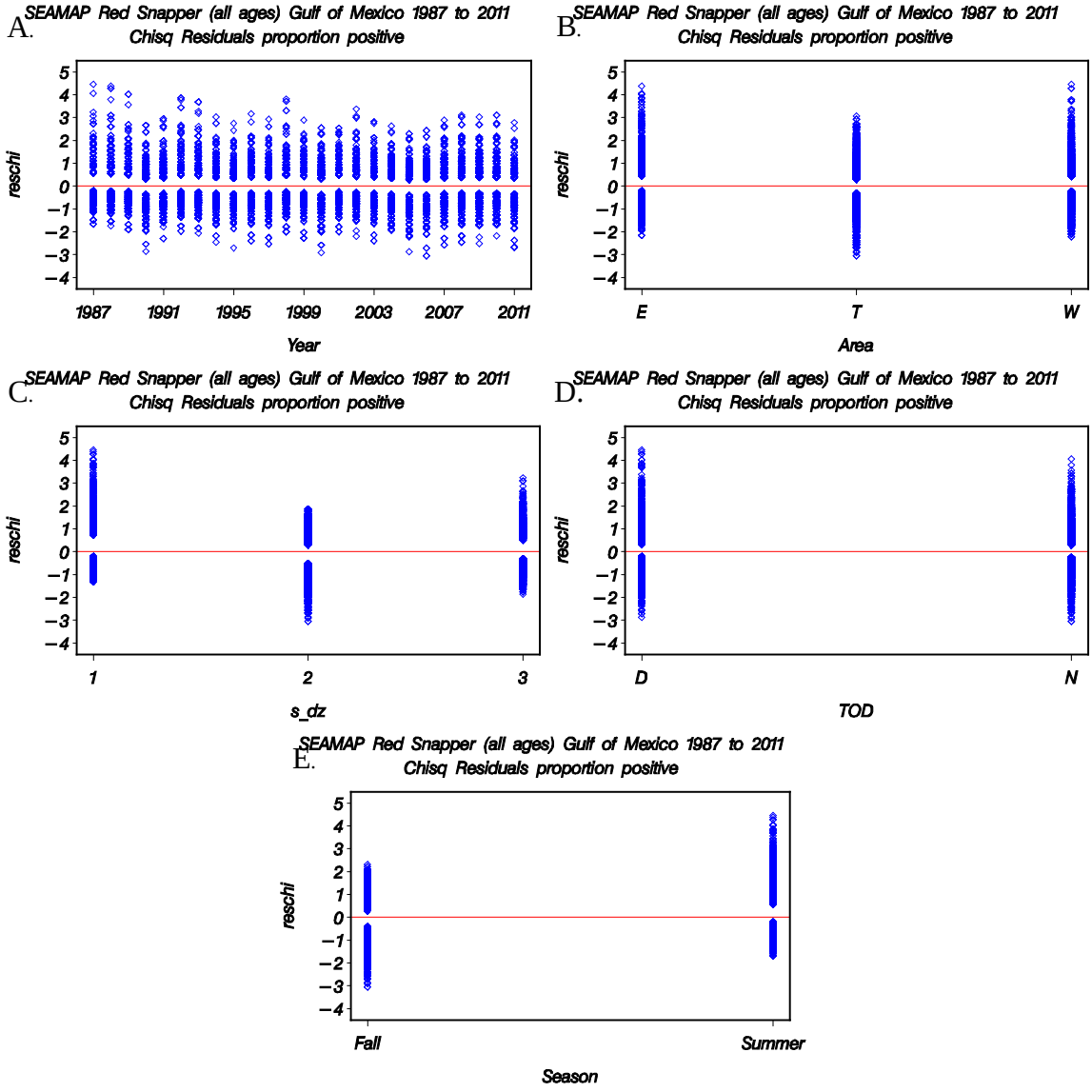


Figure 8. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / all ages) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone, **D.** the Chi-Square residuals by time of day and **E.** the Chi-Square residuals by season.

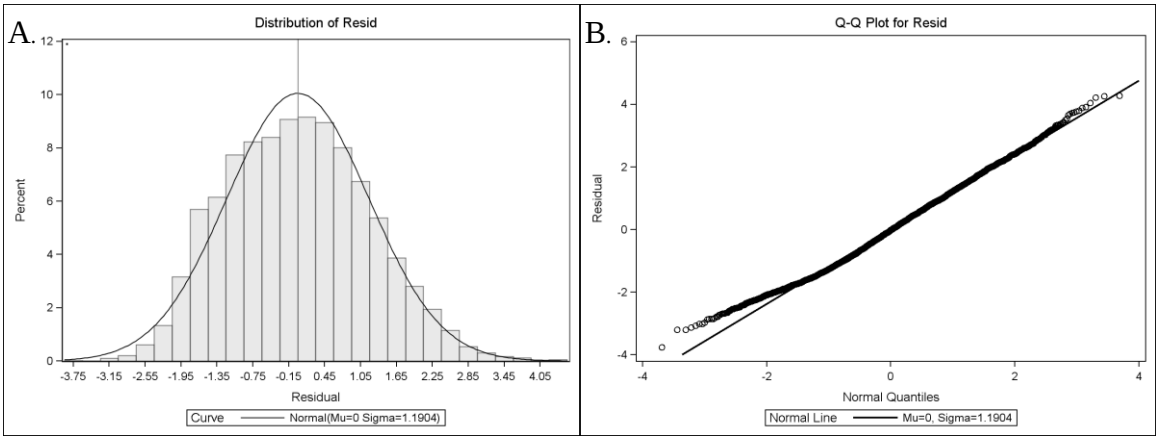


Figure 9. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / all ages) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

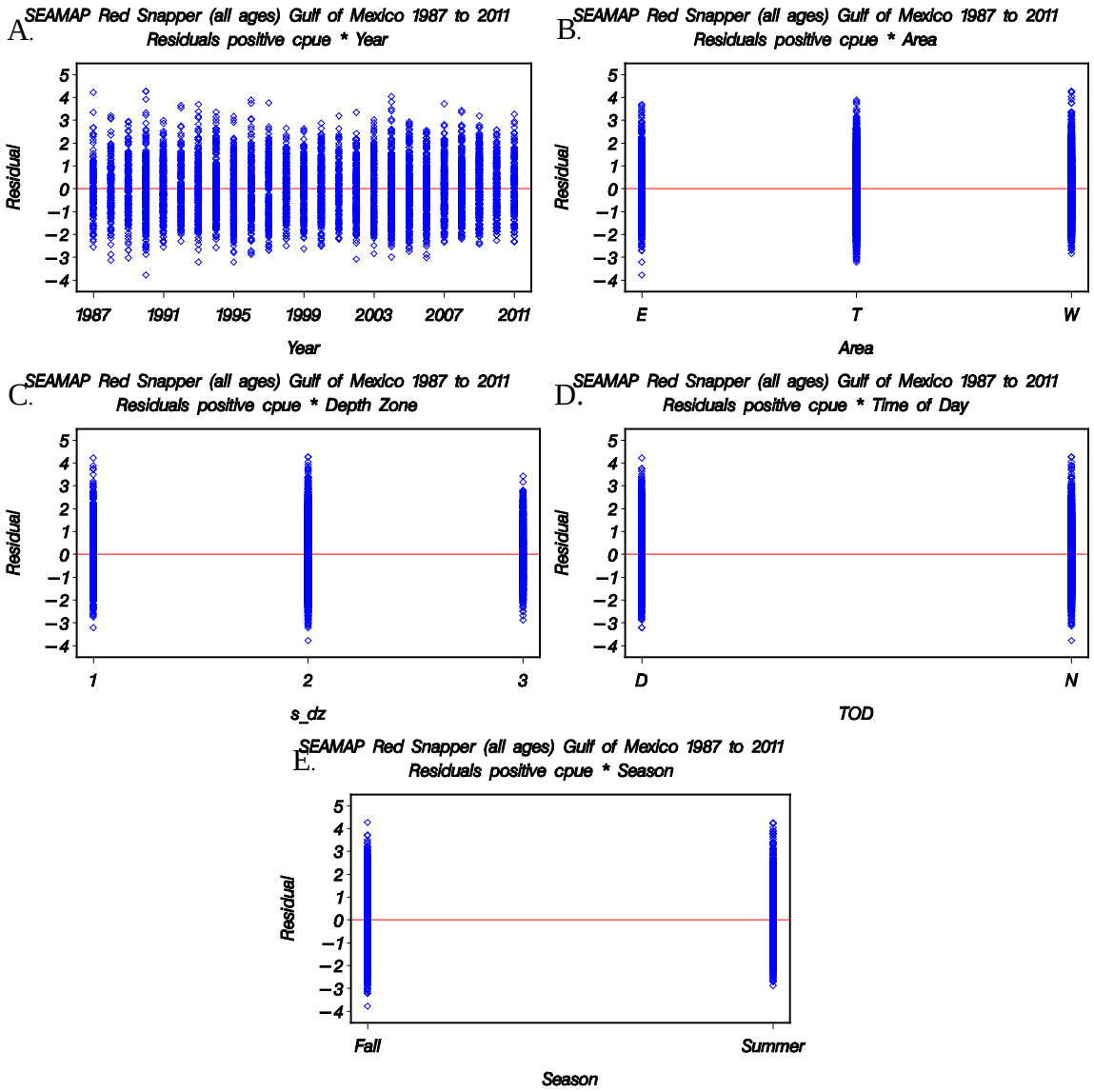


Figure 10. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / all ages) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone, **D**. the Chi-Square residuals by time of day and **E.** the Chi-Square residuals by season.

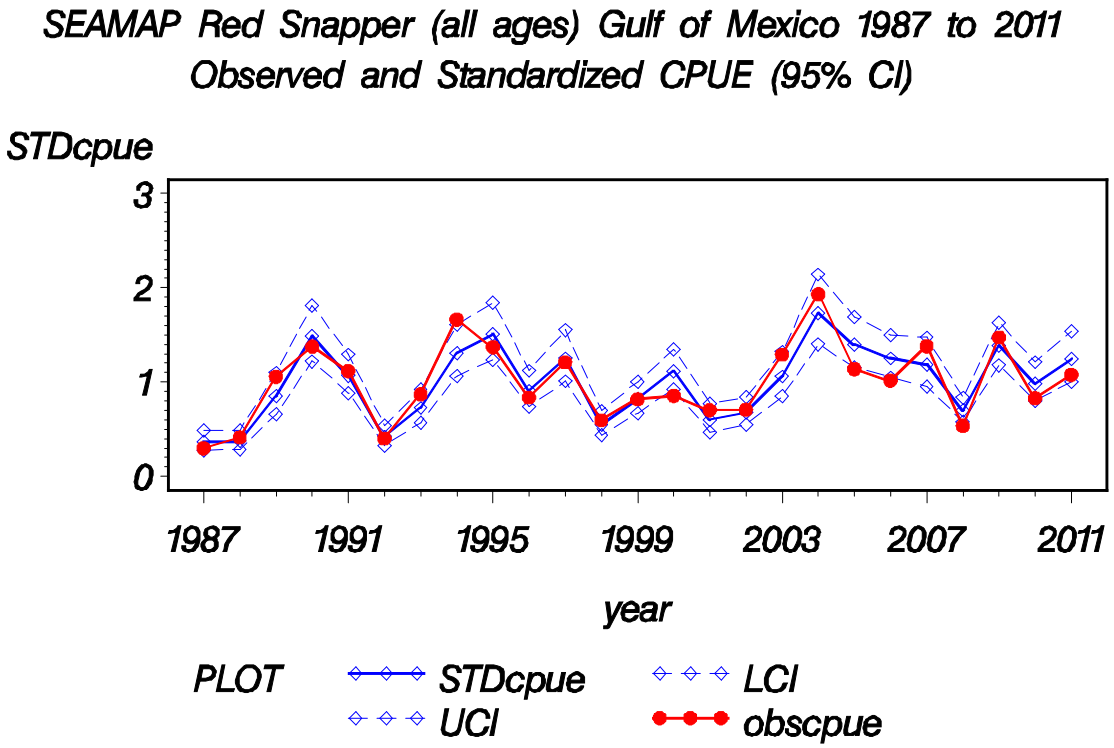


Figure 11. Annual index of abundance for red snapper (GOM / all ages) from the SEAMAP Groundfish Survey from 1987 – 2011.

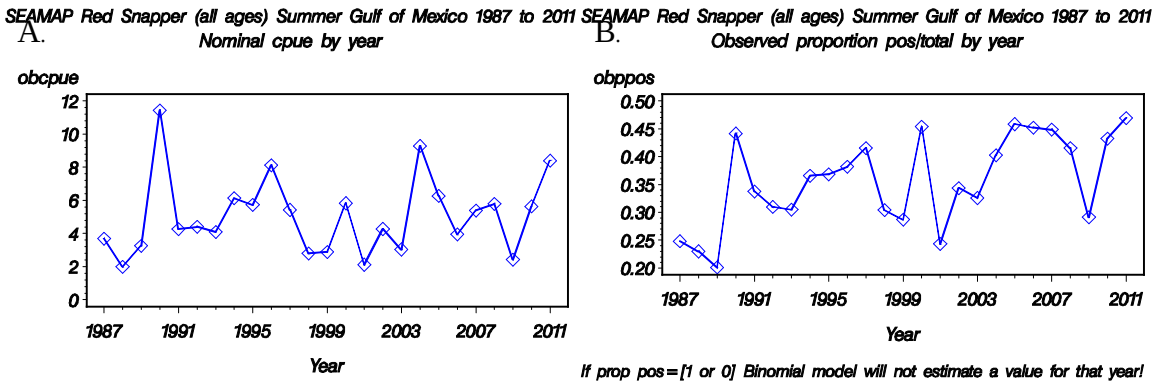


Figure 12. Annual trends for red snapper (GOM / all ages / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

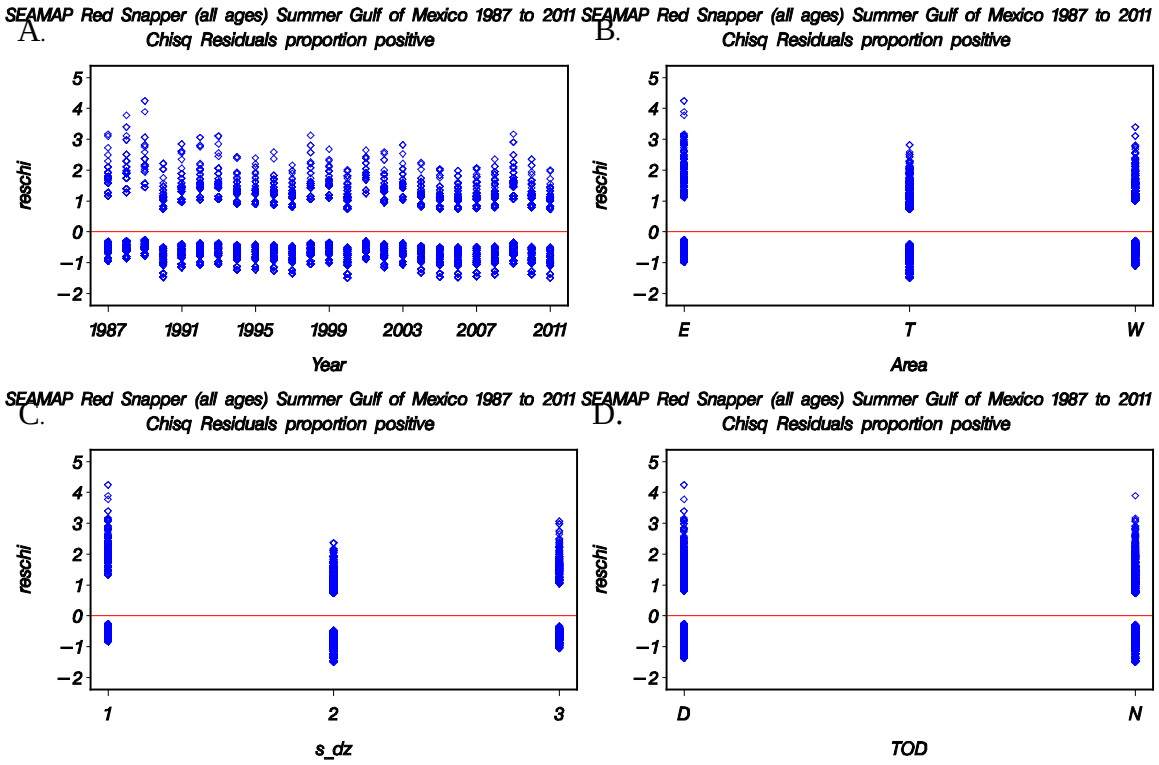


Figure 13. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / all ages / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.

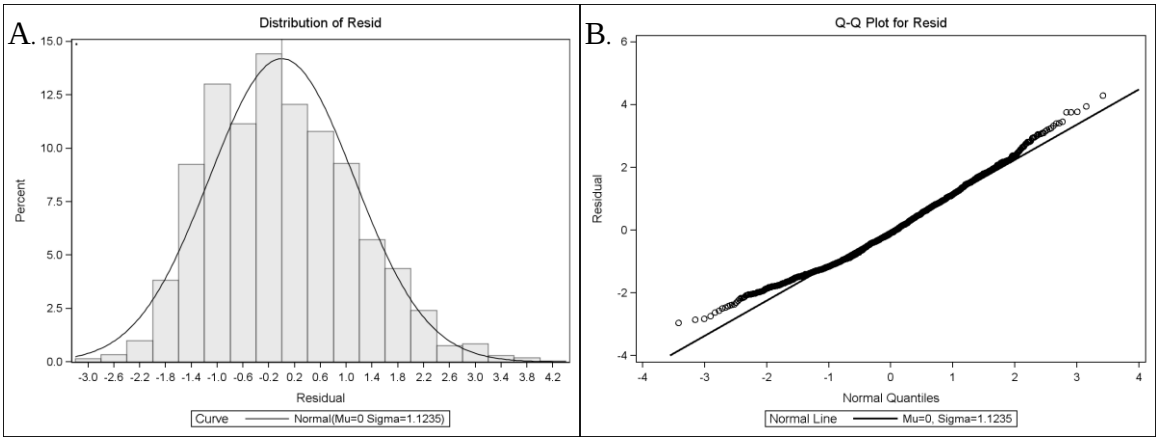


Figure 14. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / all ages / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

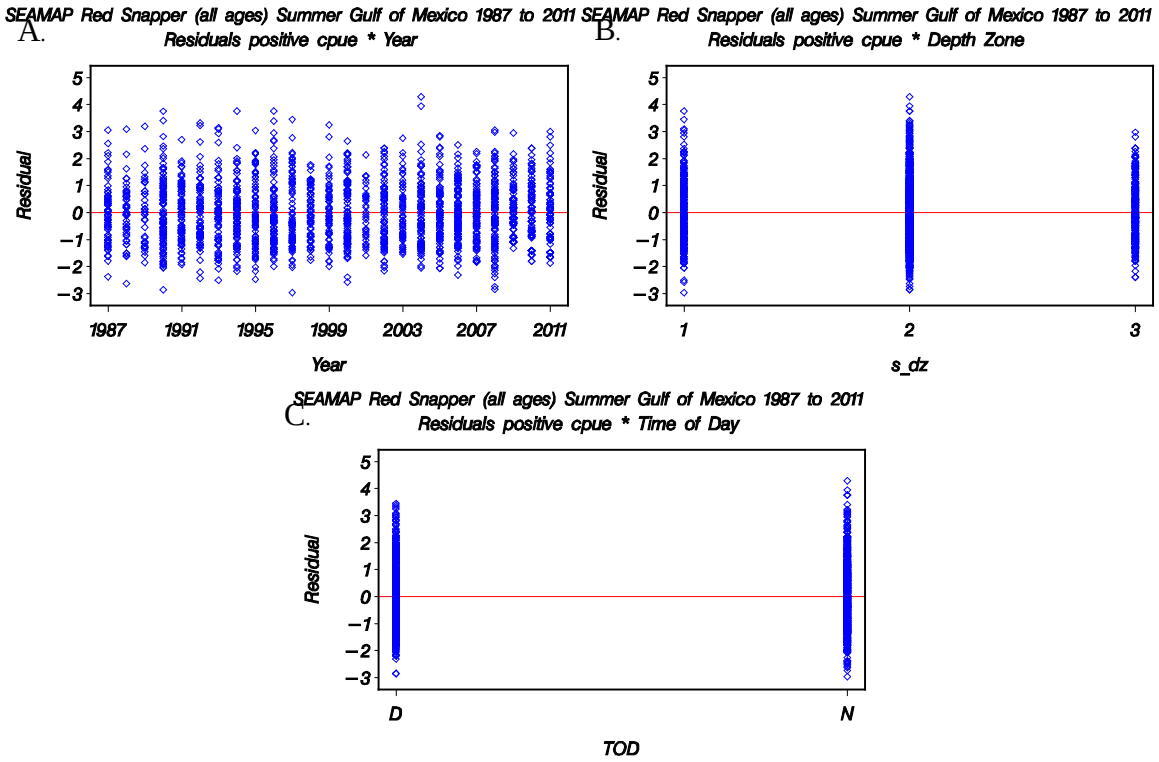


Figure 15. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / all ages / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

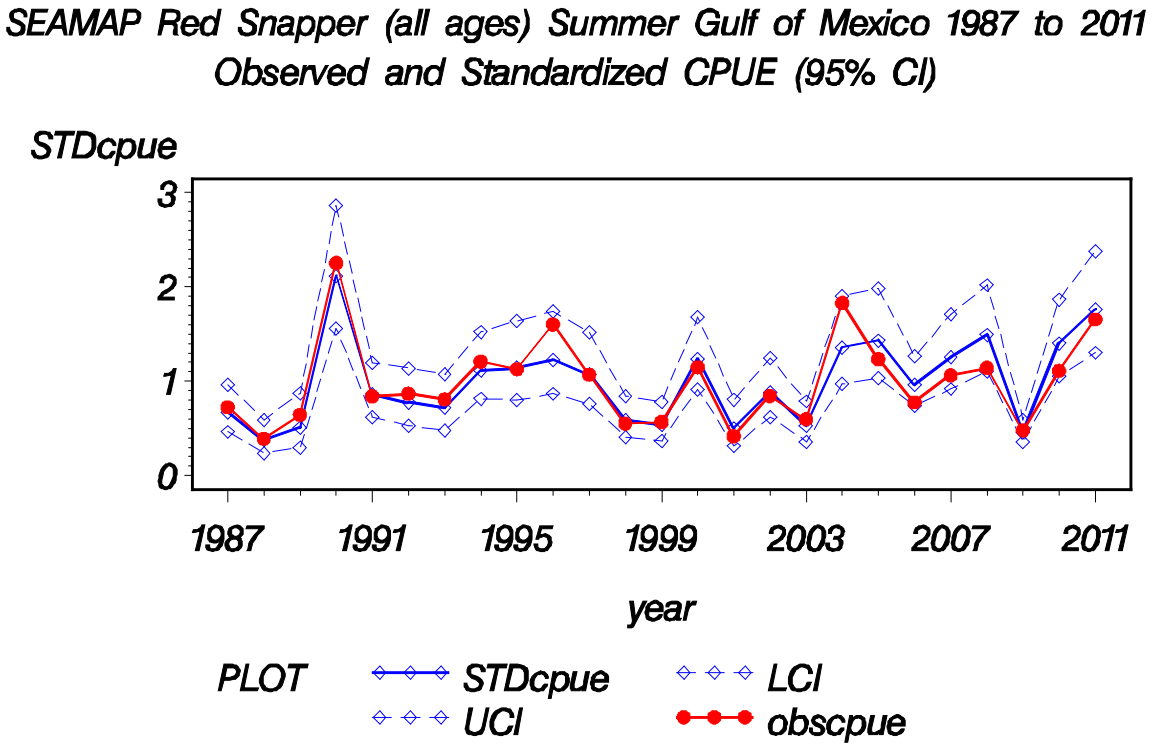


Figure 16. Annual index of abundance for red snapper (GOM / all ages / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

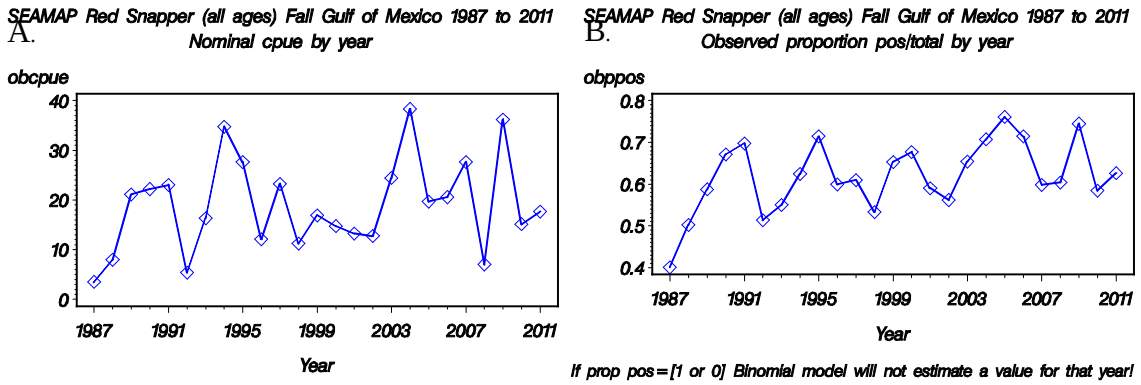


Figure 17. Annual trends for red snapper (GOM / all ages / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

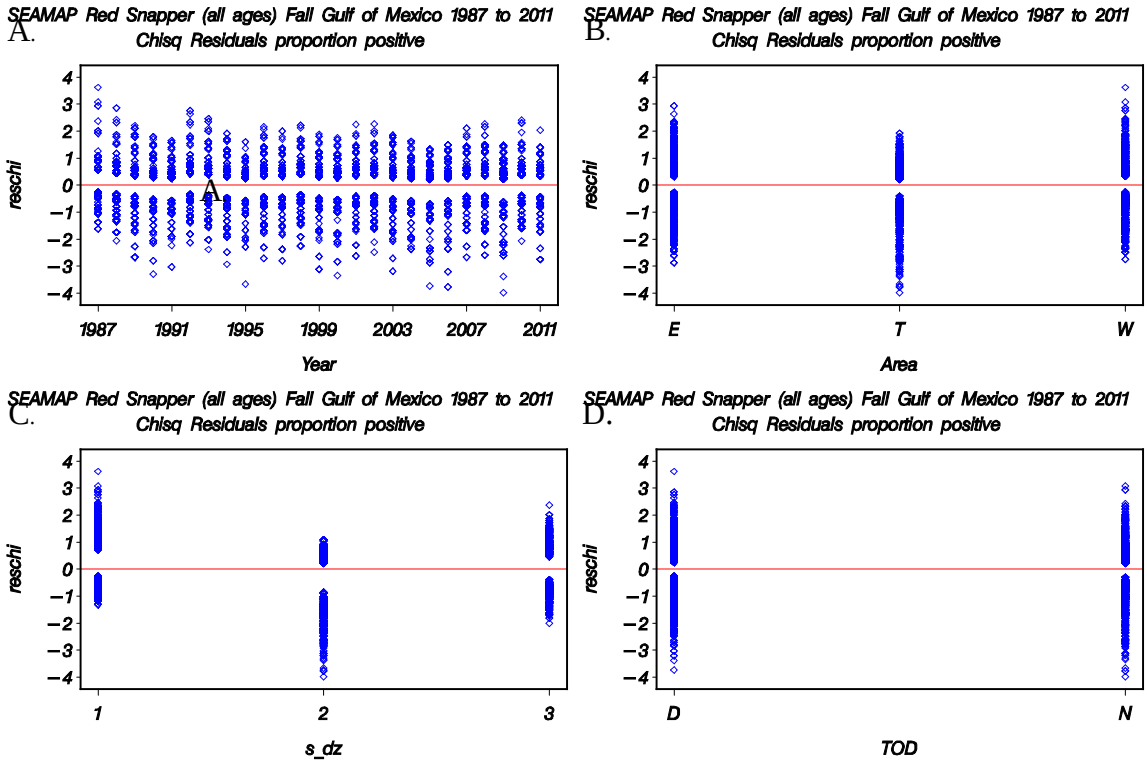


Figure 18. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / all ages / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.

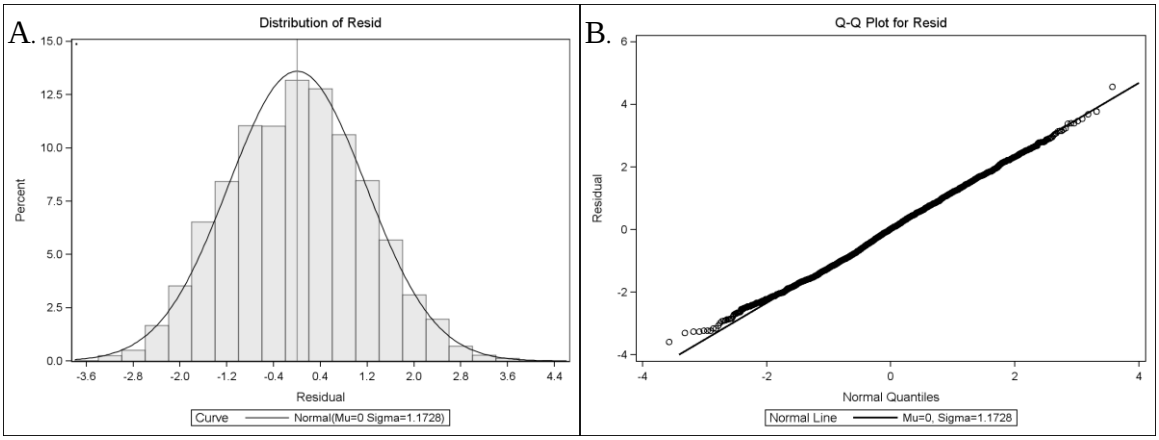


Figure 19. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / all ages / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

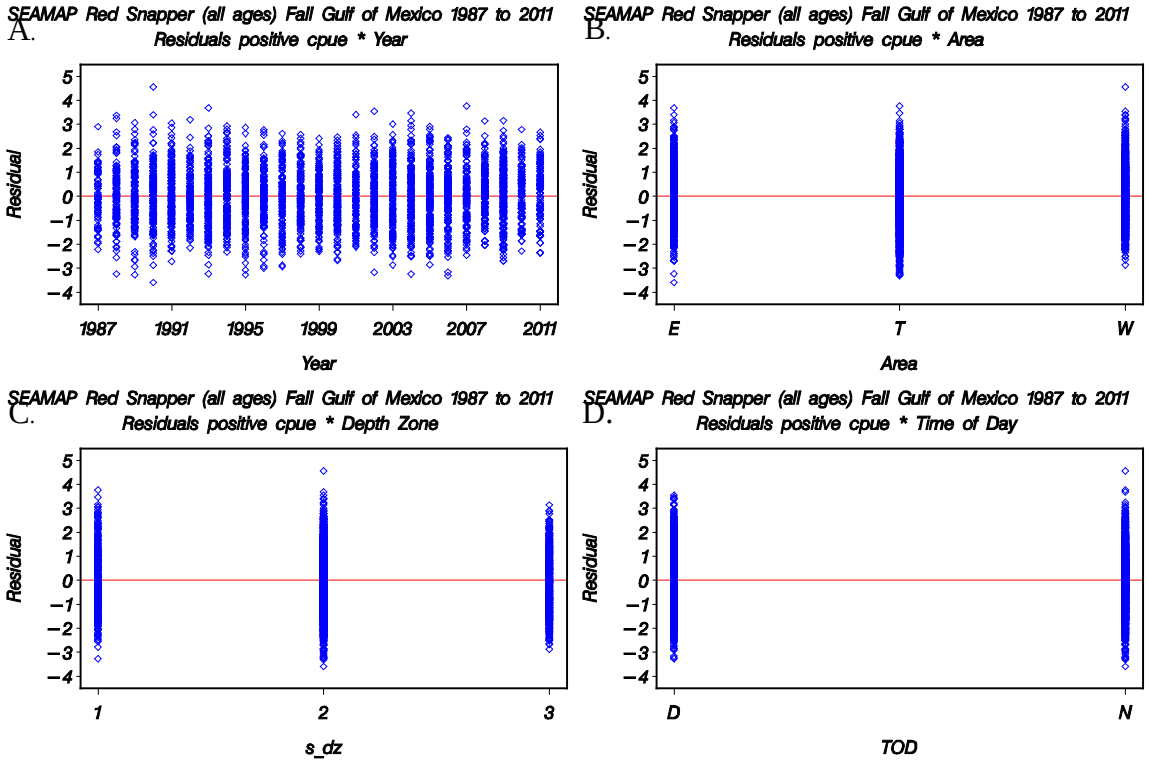


Figure 20. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / all ages / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D**. the Chi-Square residuals by time of day.

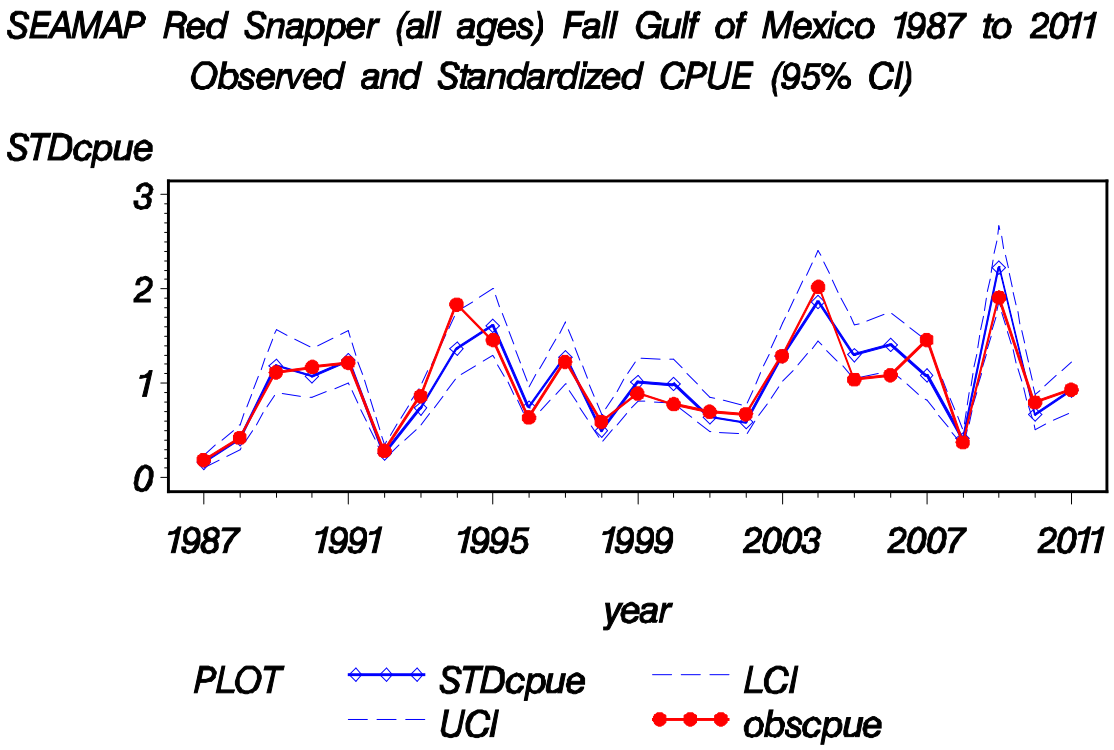


Figure 21. Annual index of abundance for red snapper (GOM / all ages / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

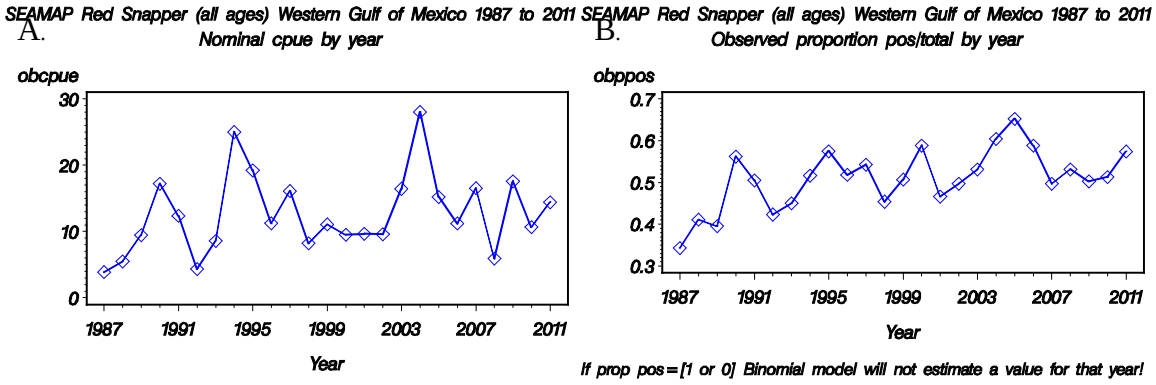


Figure 22. Annual trends for red snapper (WGOM / all ages) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

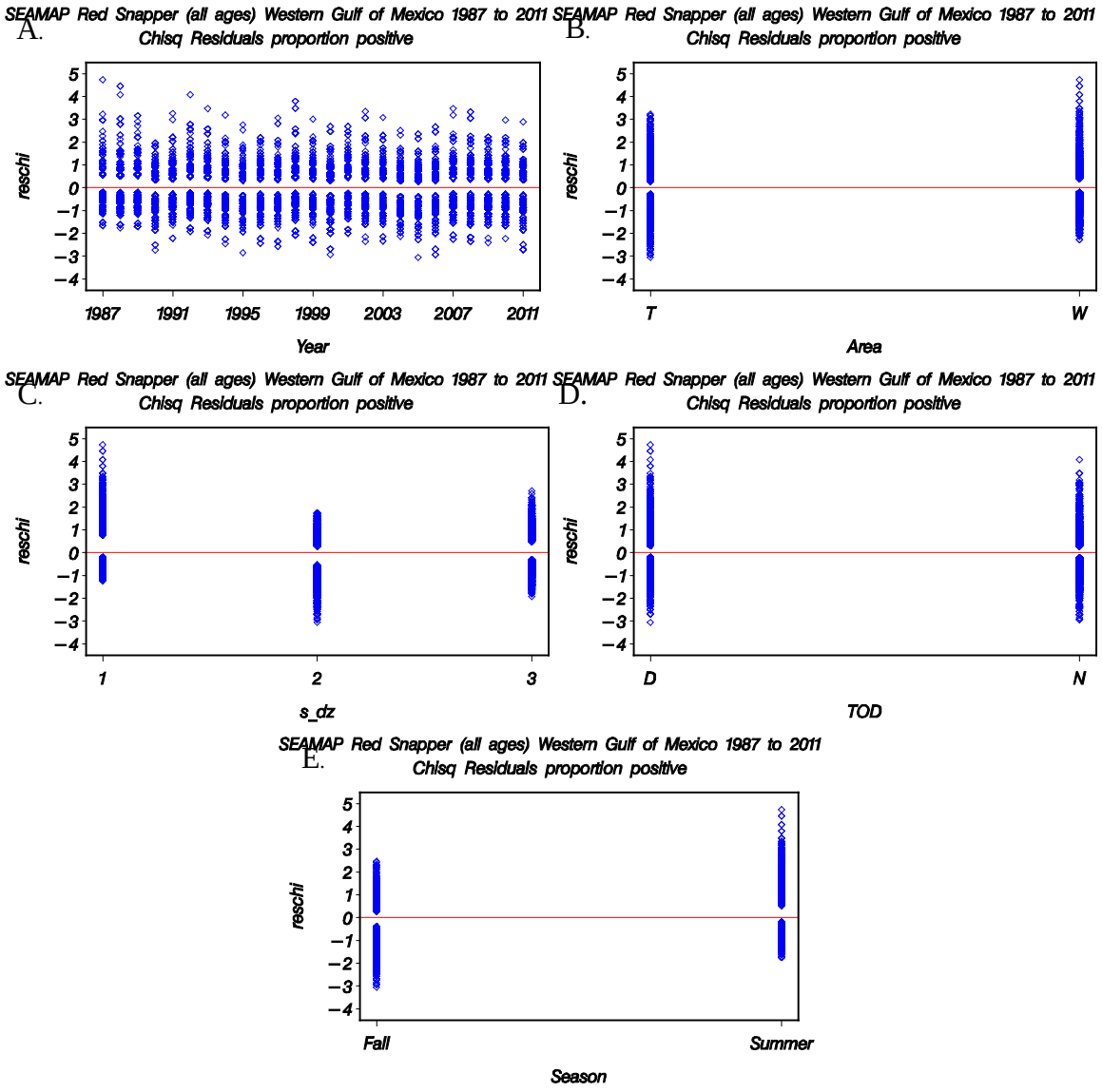


Figure 23. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / all ages) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone, **D.** the Chi-Square residuals by time of day and **E.** the Chi-Square residuals by season.

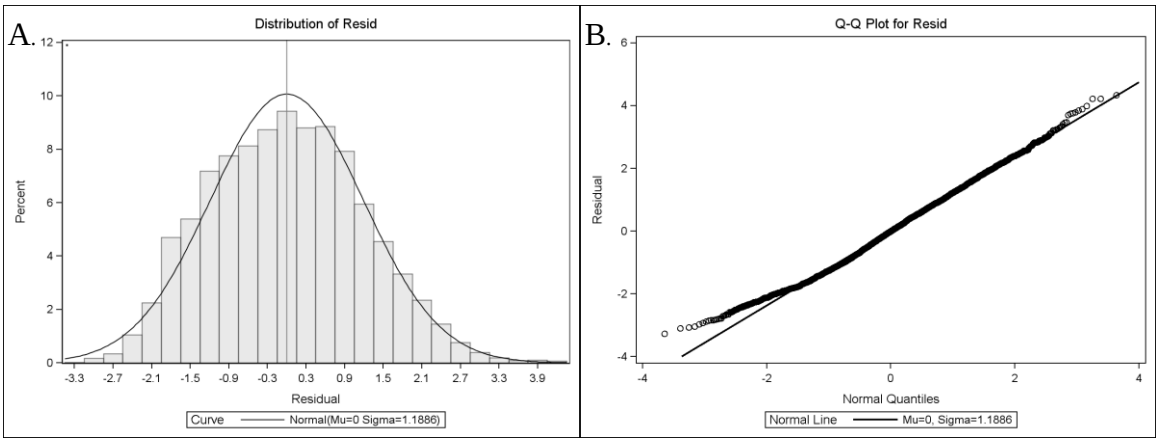


Figure 24. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / all ages) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

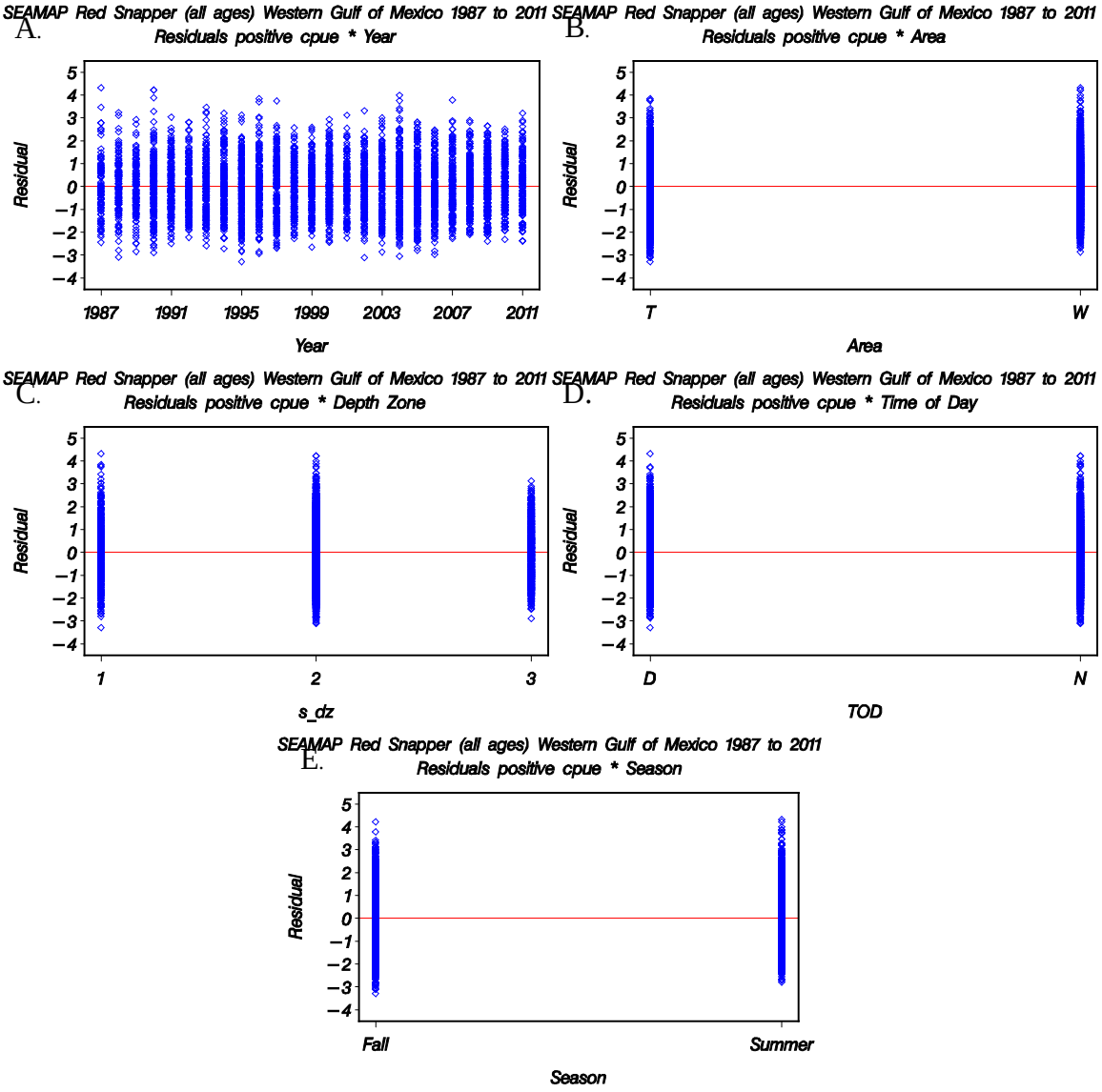


Figure 25. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / all ages) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone, **D**. the Chi-Square residuals by time of day and **E.** the Chi-Square residuals by season.

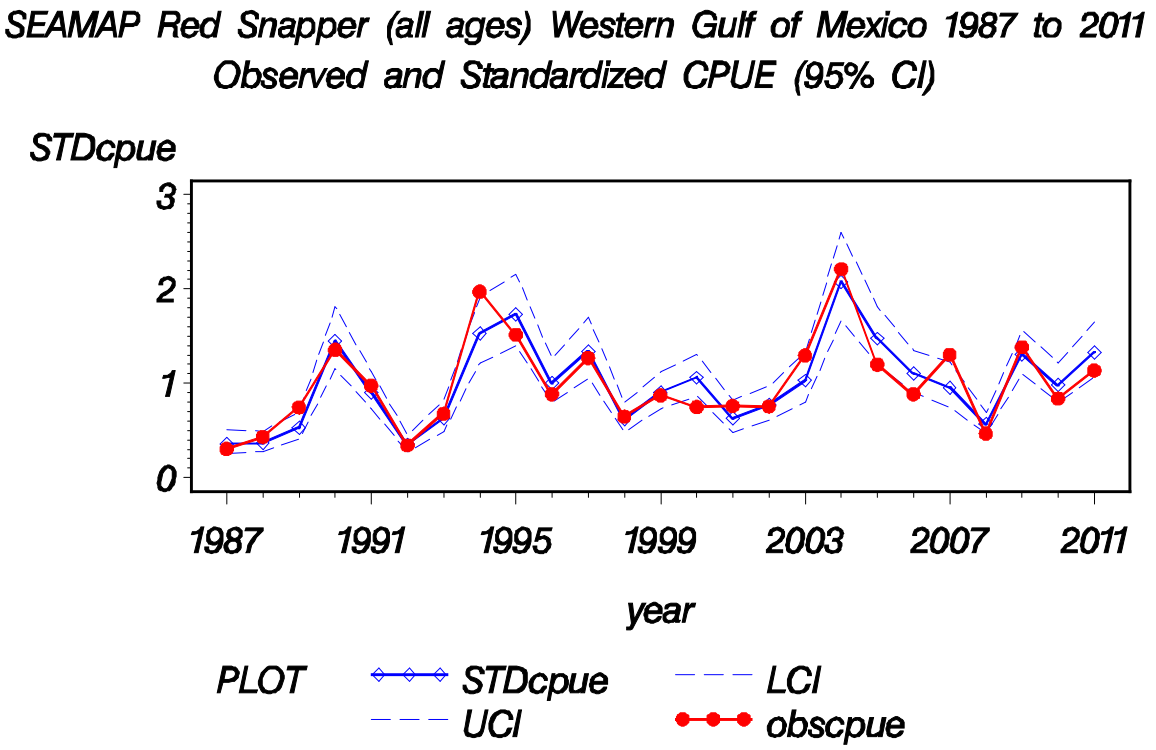


Figure 26. Annual index of abundance for red snapper (WGOM / all ages) from the SEAMAP Groundfish Survey from 1987 – 2011.

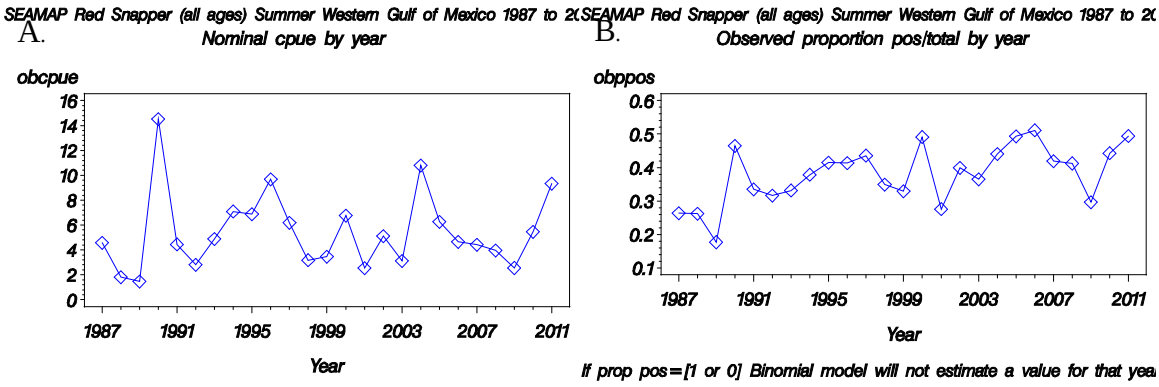


Figure 27. Annual trends for red snapper (WGOM / all ages / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

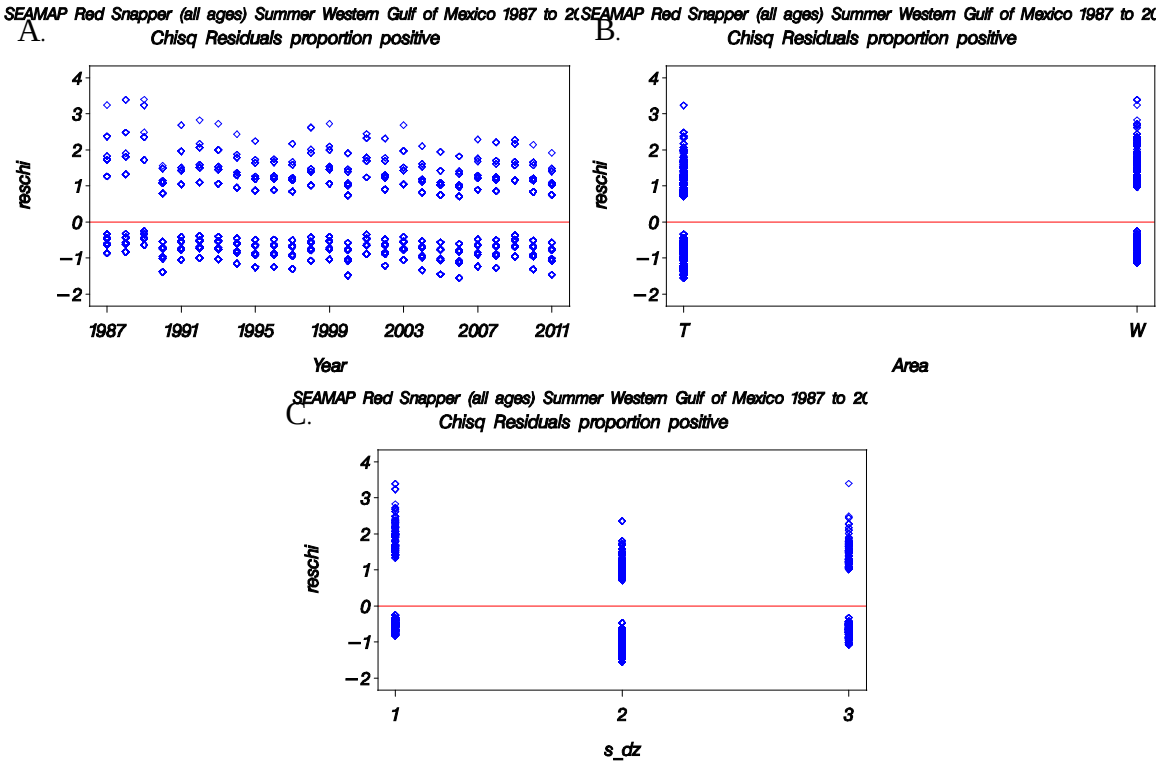


Figure 28. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / all ages / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area and **C.** the Chi-Square residuals by depth zone.

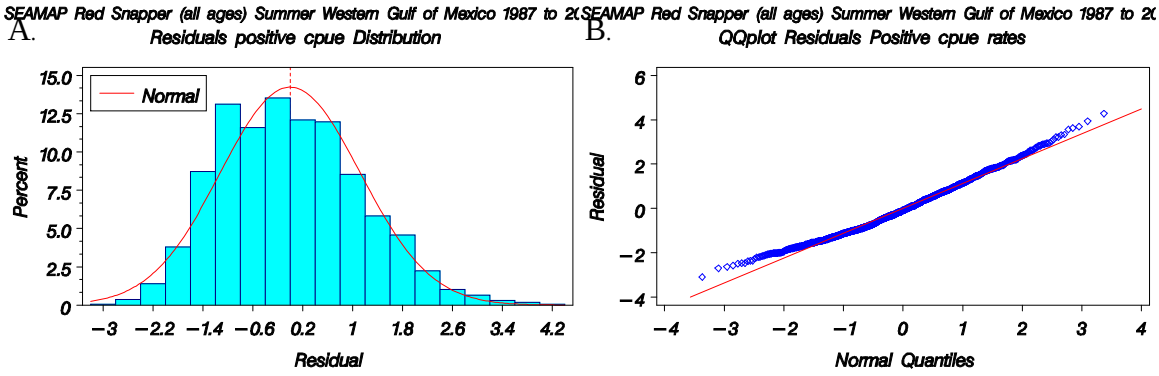


Figure 29. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / all ages / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

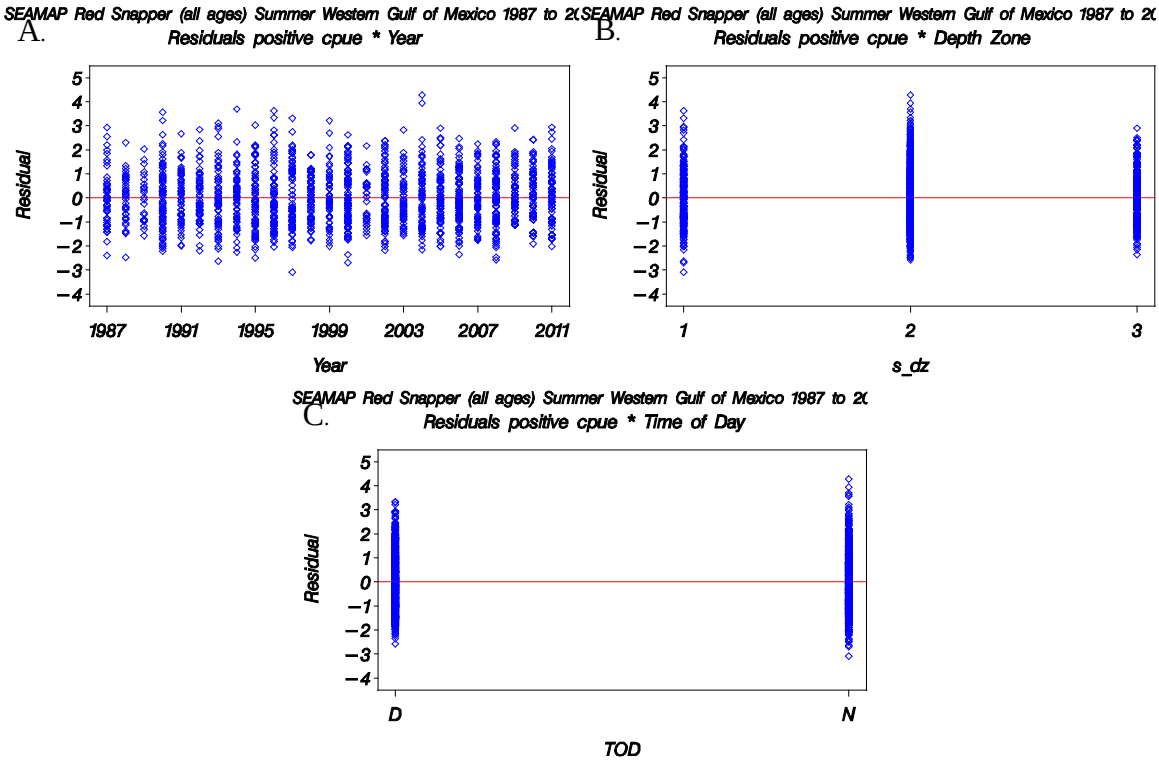


Figure 30. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / all ages / Summer) model: **A.** the Chi-Square residuals by year, B**.** the Chi-Square residuals by depth zone and **C**. the Chi-Square residuals by time of day.

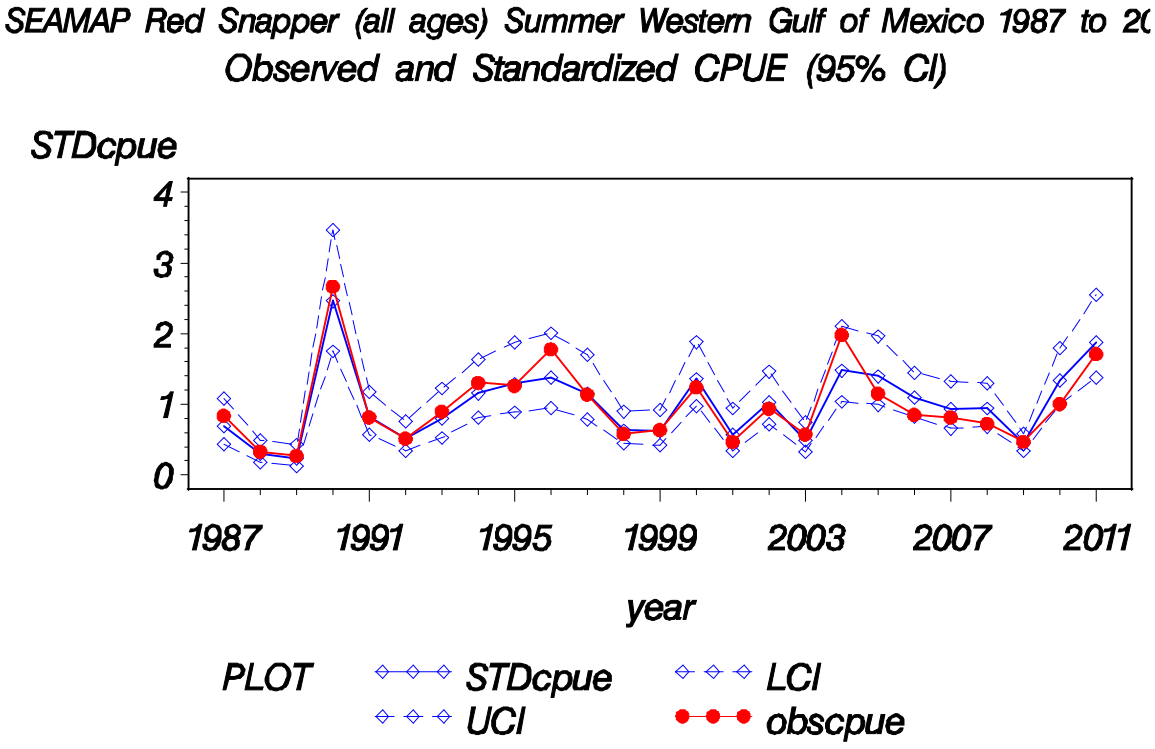


Figure 31. Annual index of abundance for red snapper (WGOM / all ages / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

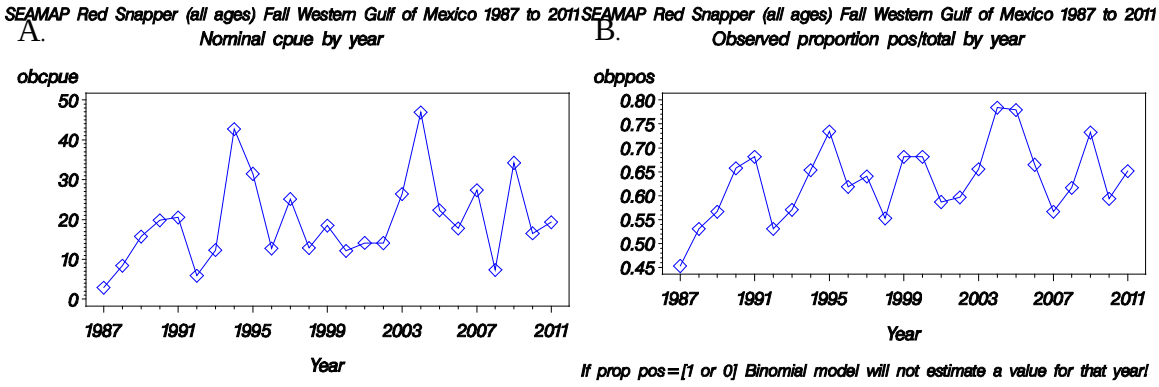


Figure 32. Annual trends for red snapper (WGOM / all ages / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

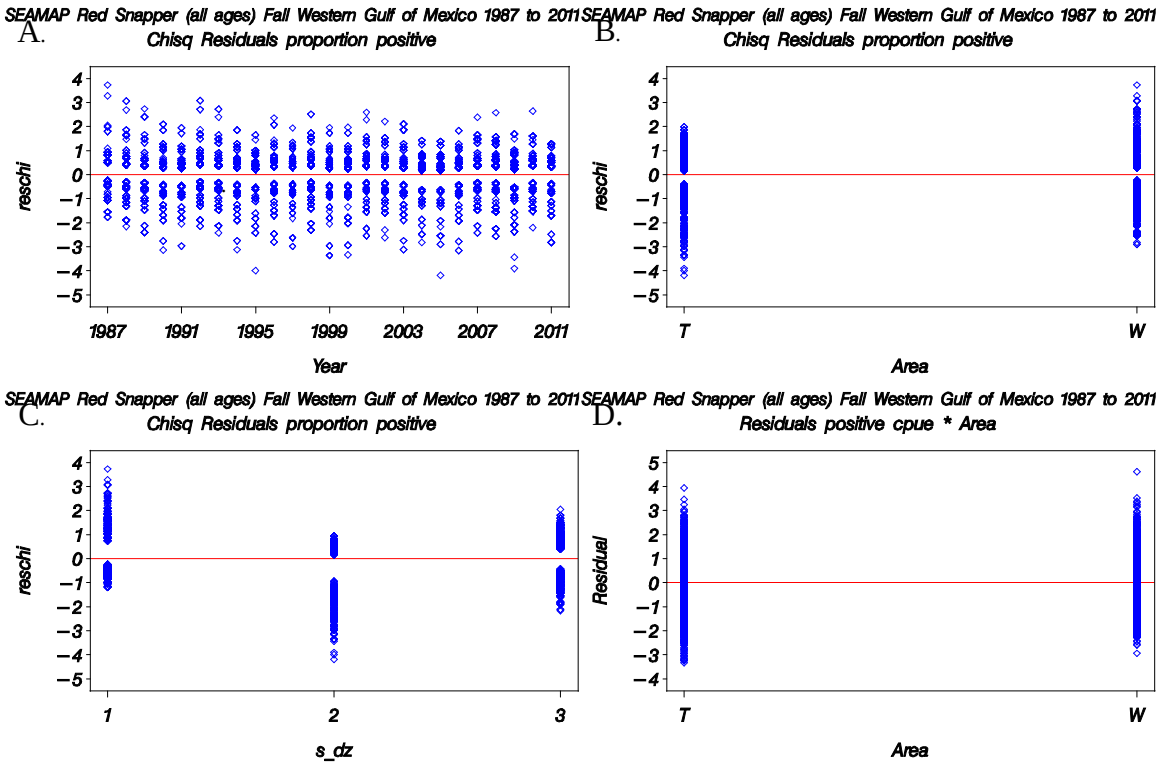


Figure 33. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / all ages / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.

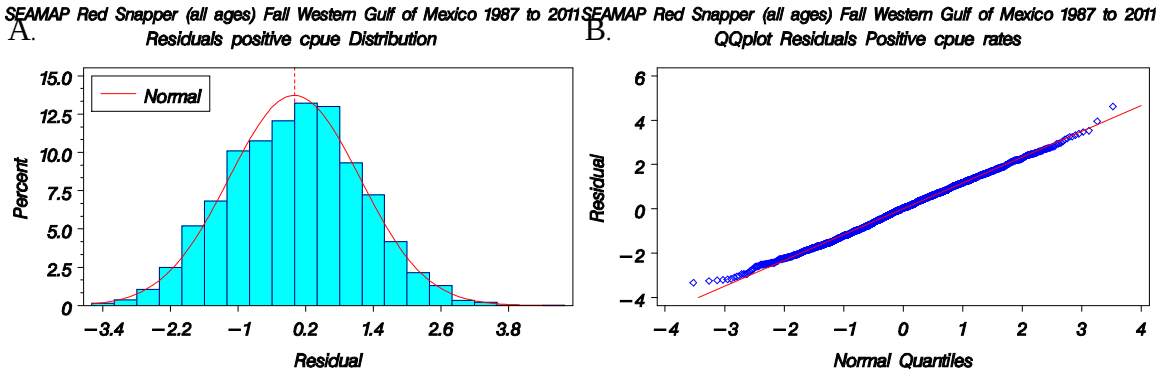


Figure 34. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / all ages / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

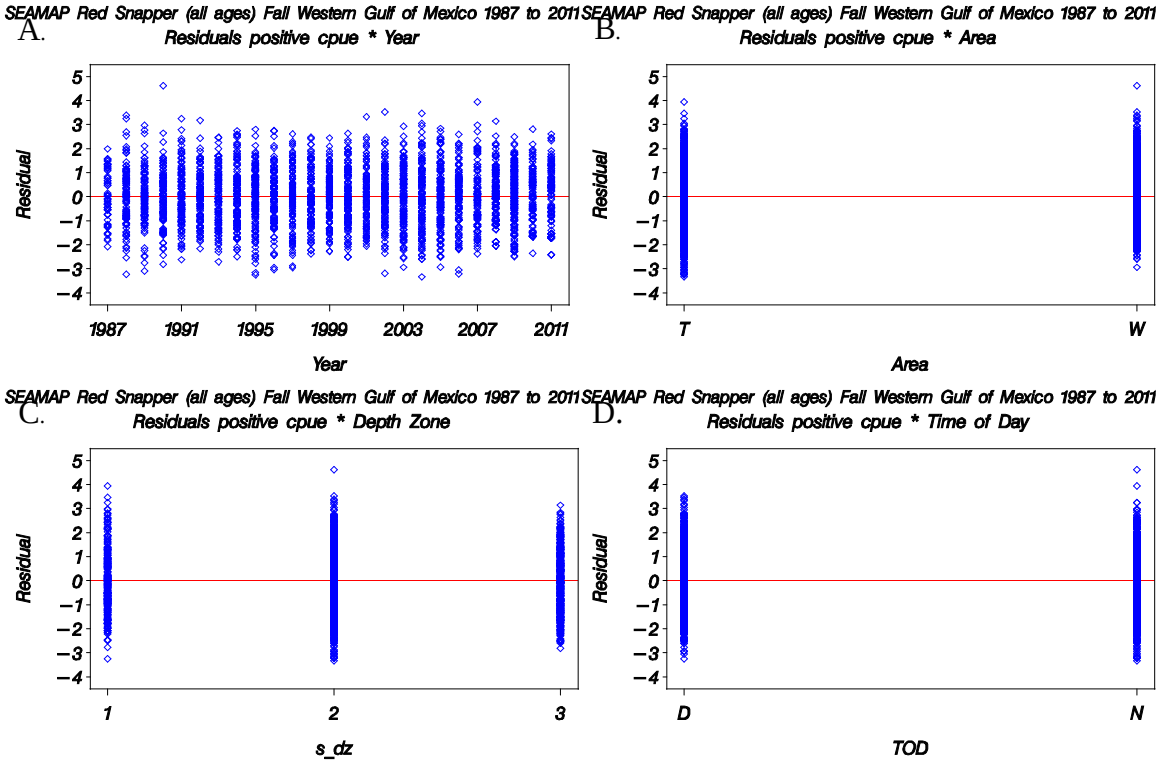


Figure 35. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / all ages / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D**. the Chi-Square residuals by time of day.

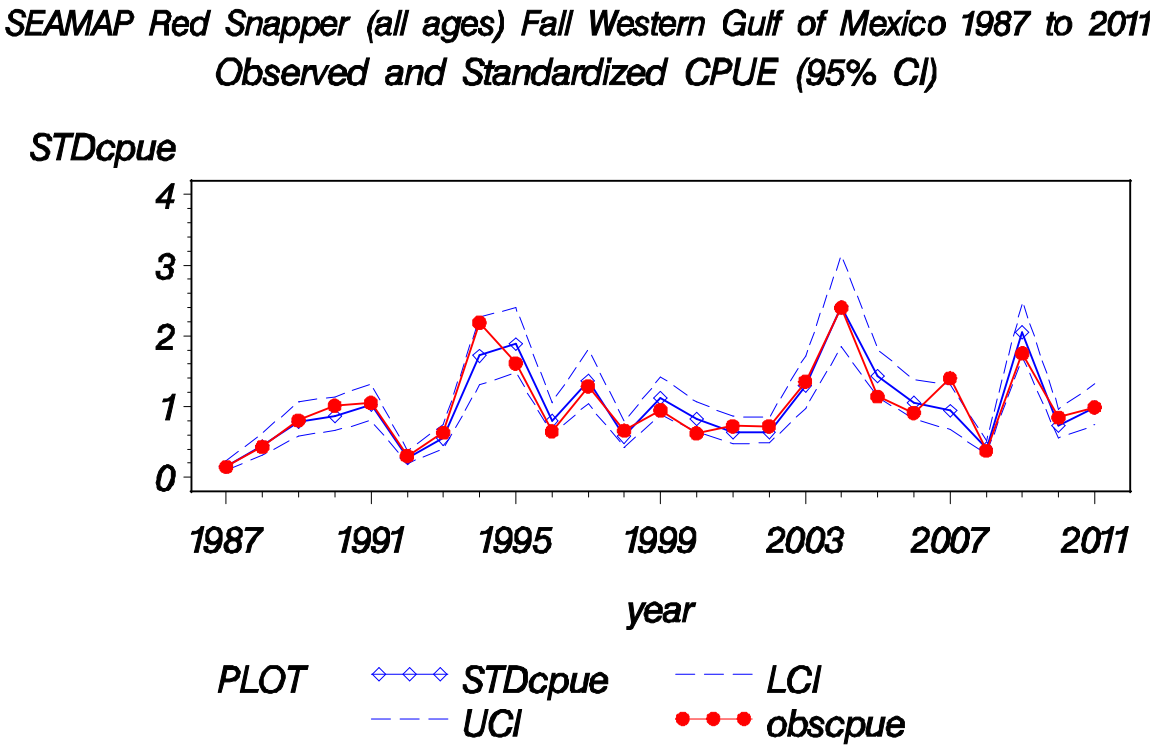


Figure 36. Annual index of abundance for red snapper (WGOM / all ages / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

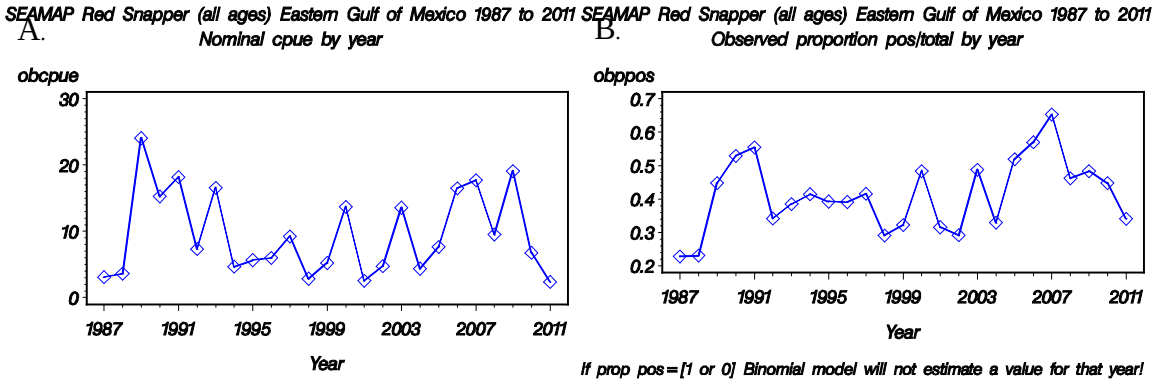


Figure 37. Annual trends for red snapper (EGOM / all ages) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

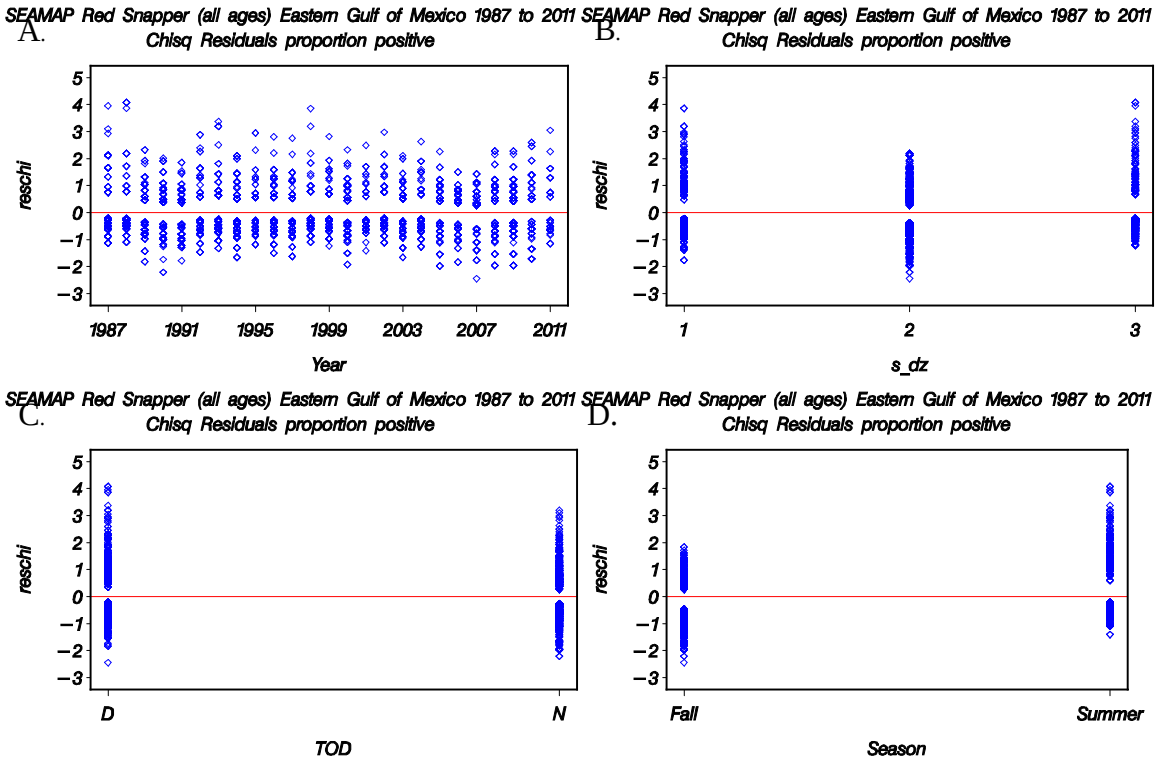


Figure 38. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / all ages) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone, **C.** the Chi-Square residuals by time of day and **D.** the Chi-Square residuals by season.

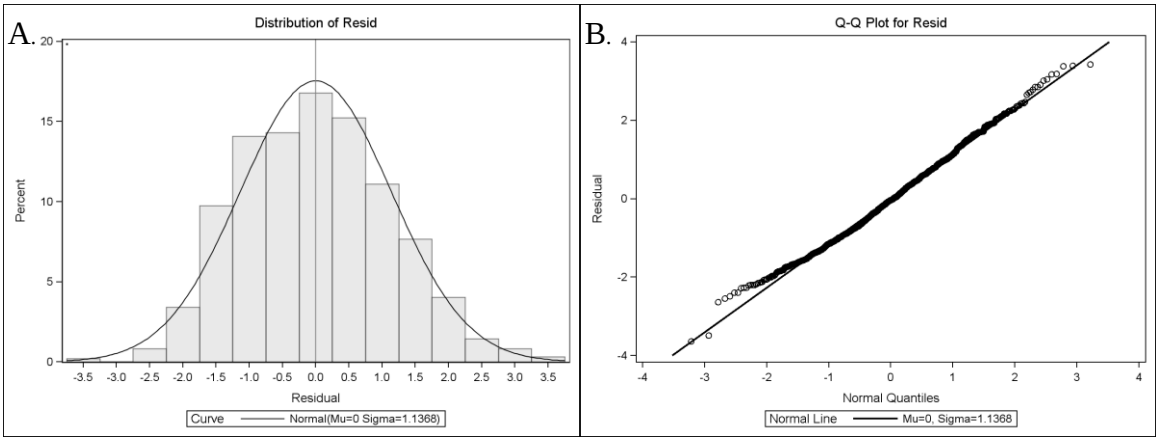


Figure 39. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / all ages) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

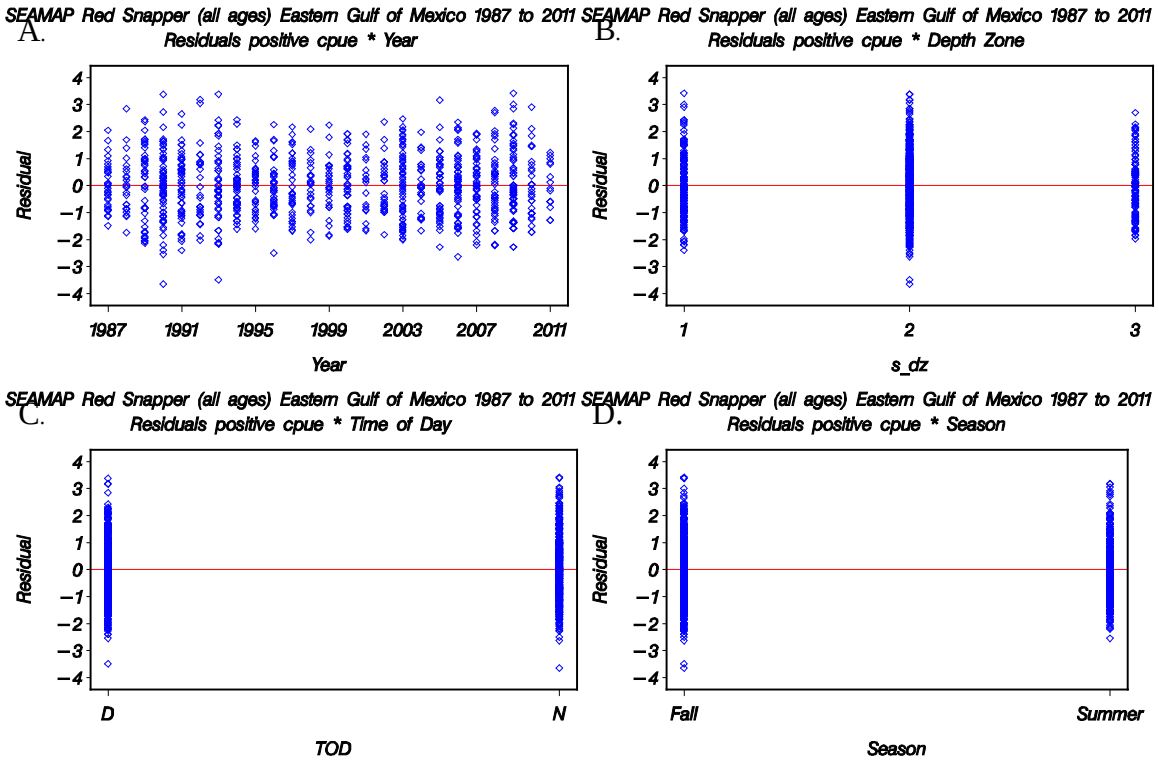


Figure 40. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / all ages) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone, **C.** the Chi-Square residuals by time of day and **D.** the Chi-Square residuals by season.

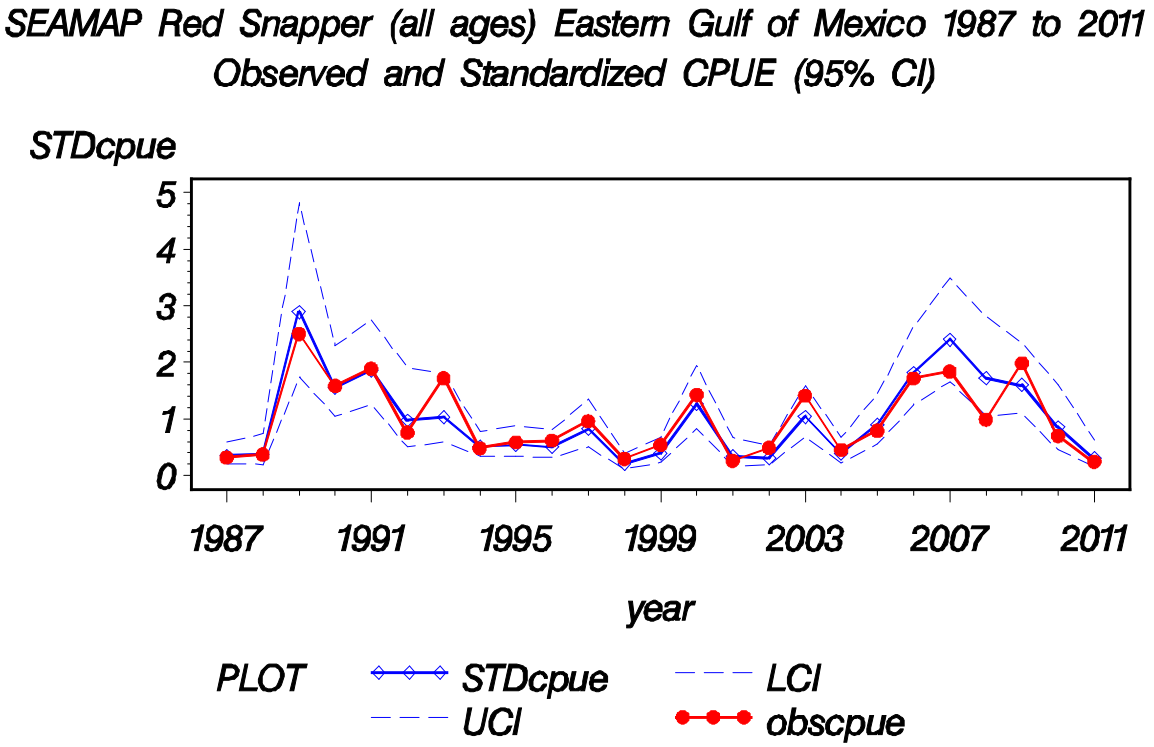


Figure 41. Annual index of abundance for red snapper (EGOM / all ages) from the SEAMAP Groundfish Survey from 1987 – 2011.

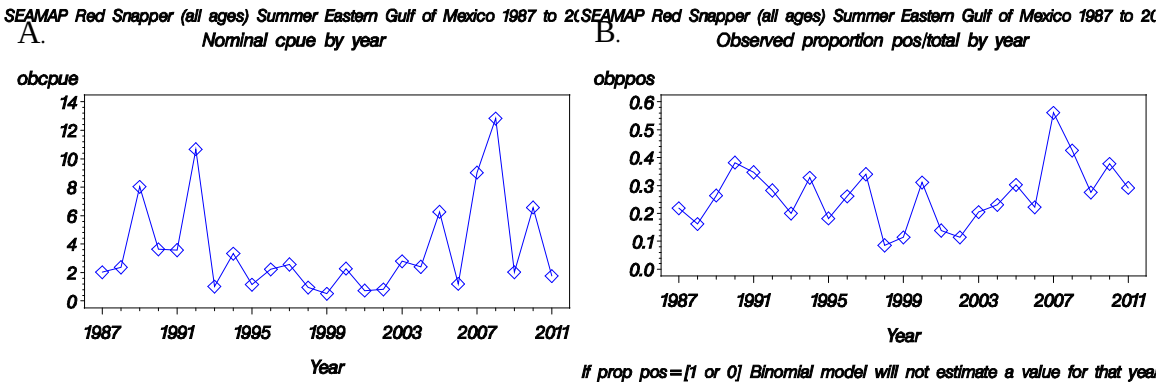


Figure 42. Annual trends for red snapper (EGOM / all ages / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

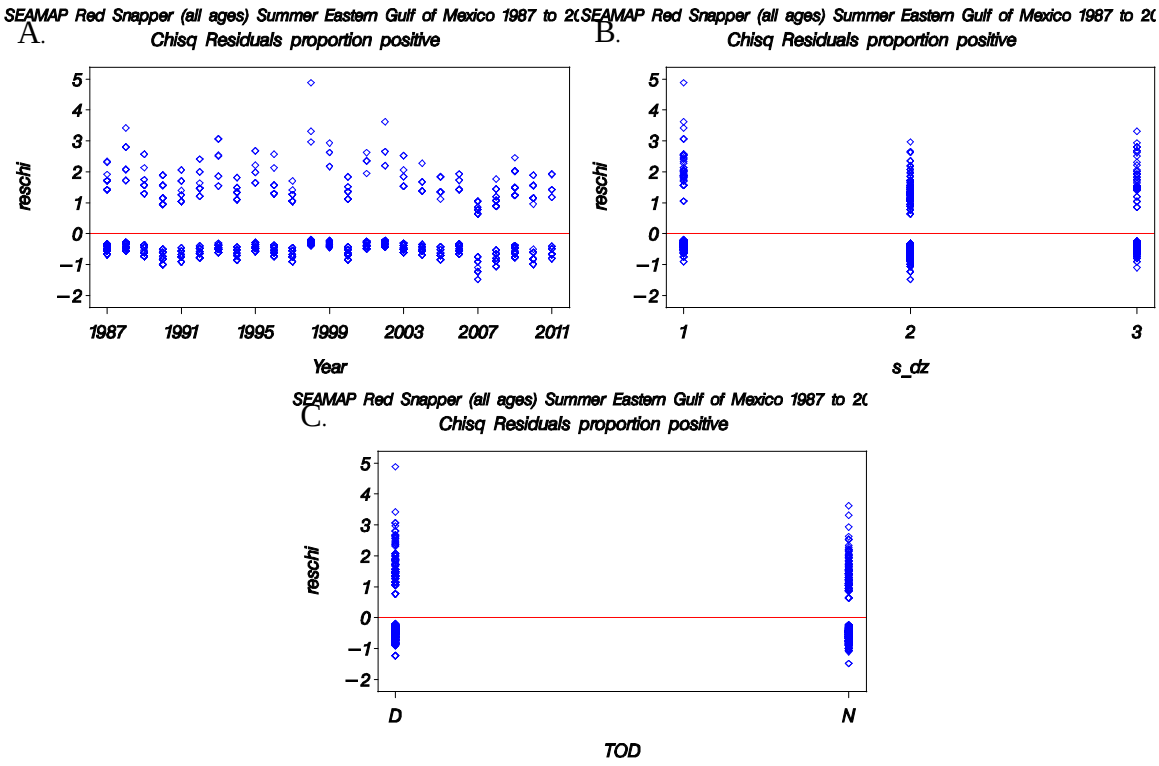


Figure 43. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / all ages / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

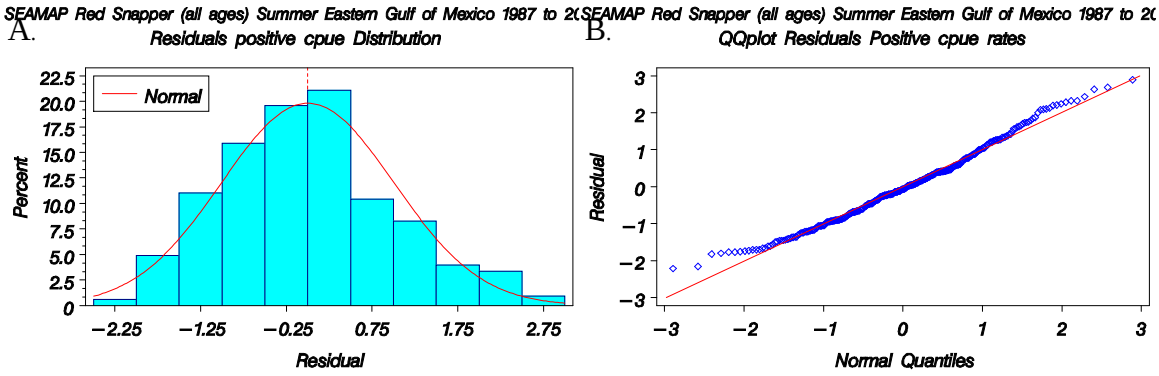


Figure 44. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / all ages / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

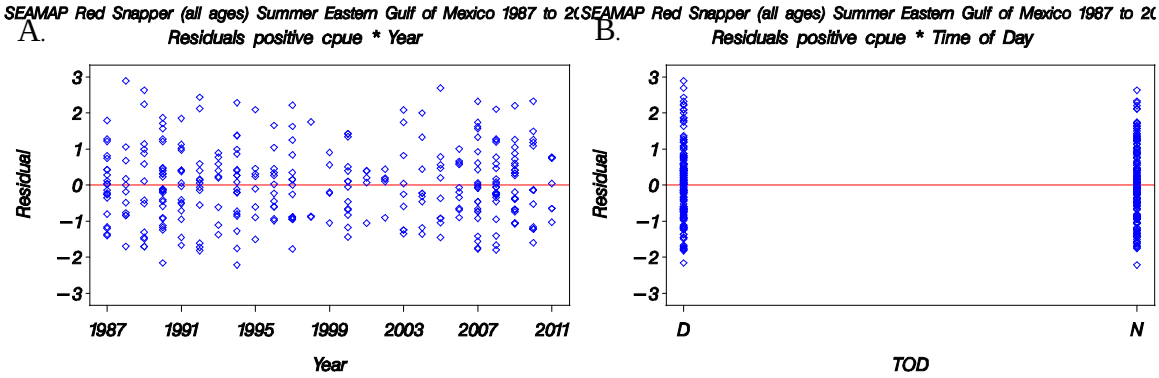


Figure 45. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / all ages / Summer) model: **A.** the Chi-Square residuals by year and **B.** the Chi-Square residuals by time of day.

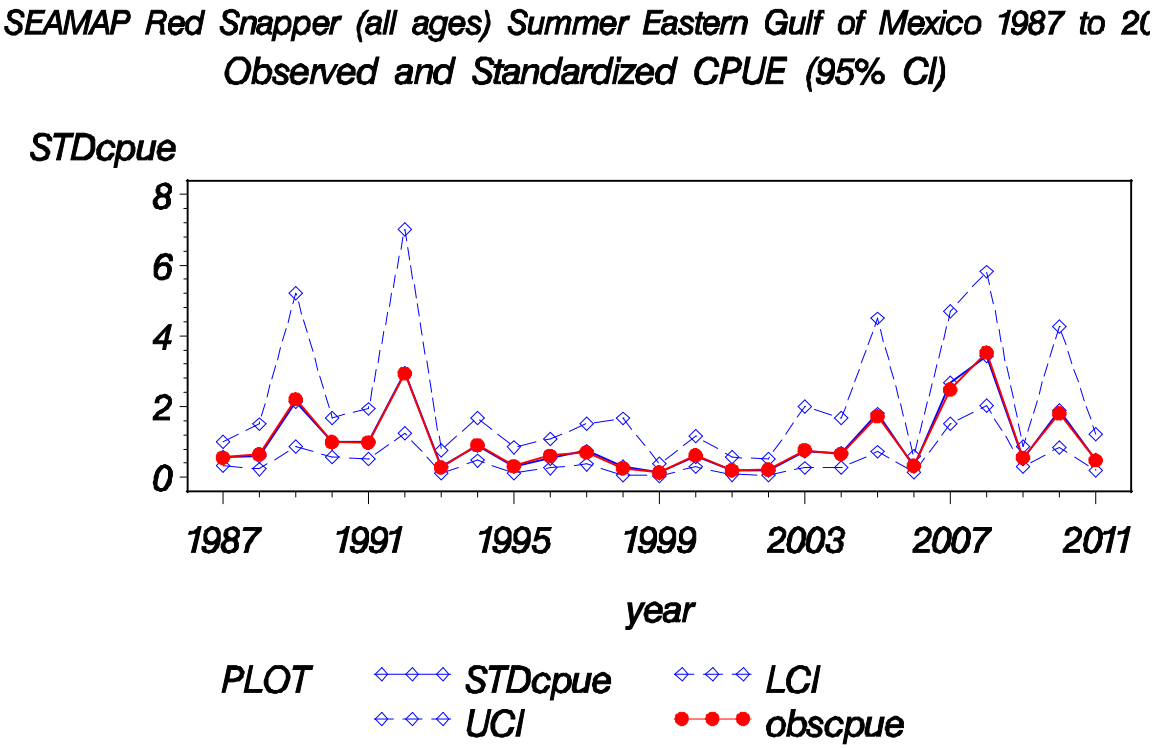


Figure 46. Annual index of abundance for red snapper (EGOM / all ages / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

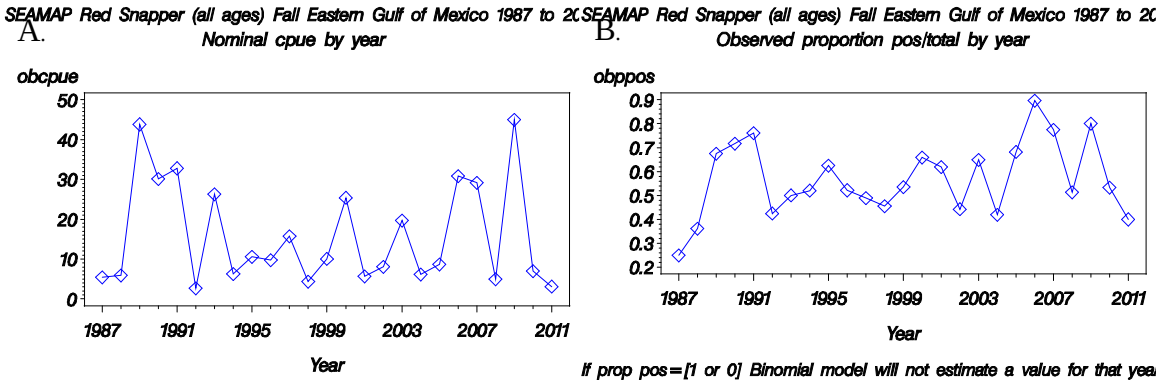


Figure 47. Annual trends for red snapper (EGOM / all ages / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

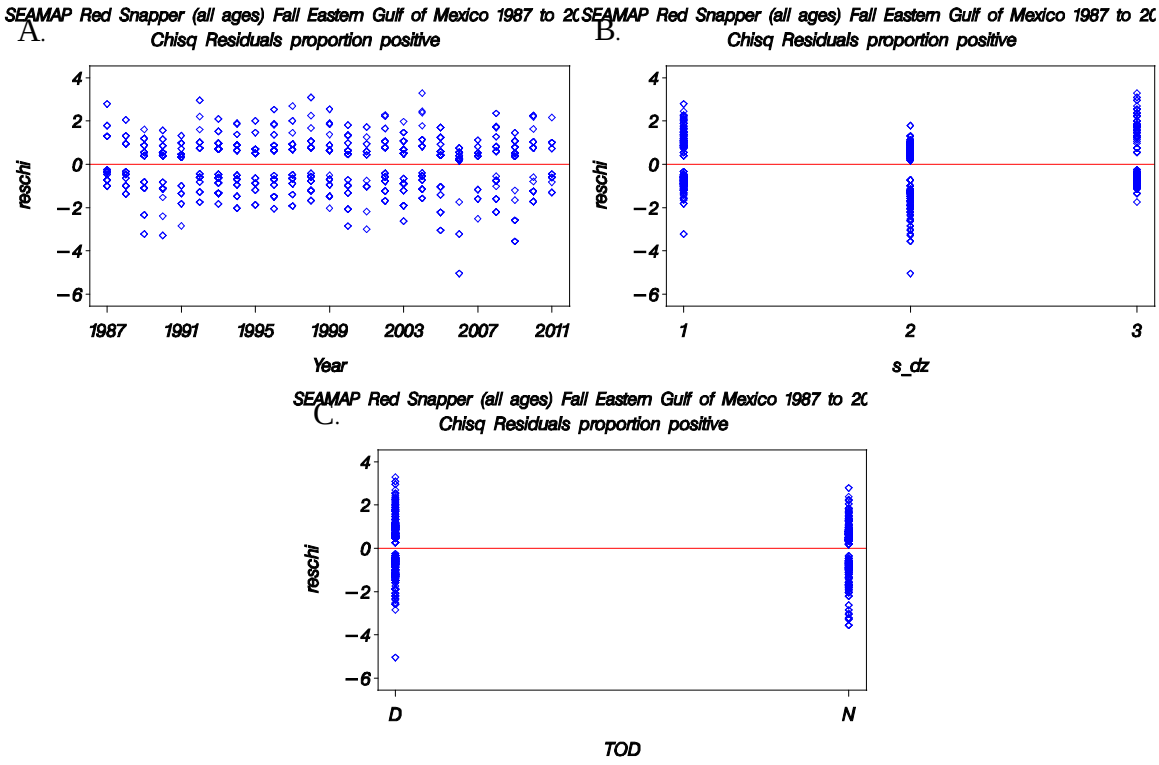


Figure 48. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / all ages / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

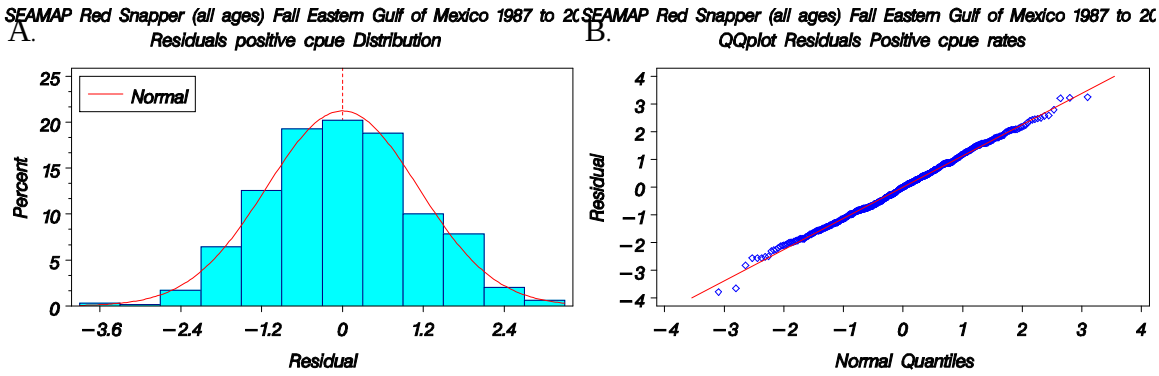


Figure 49. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / all ages / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

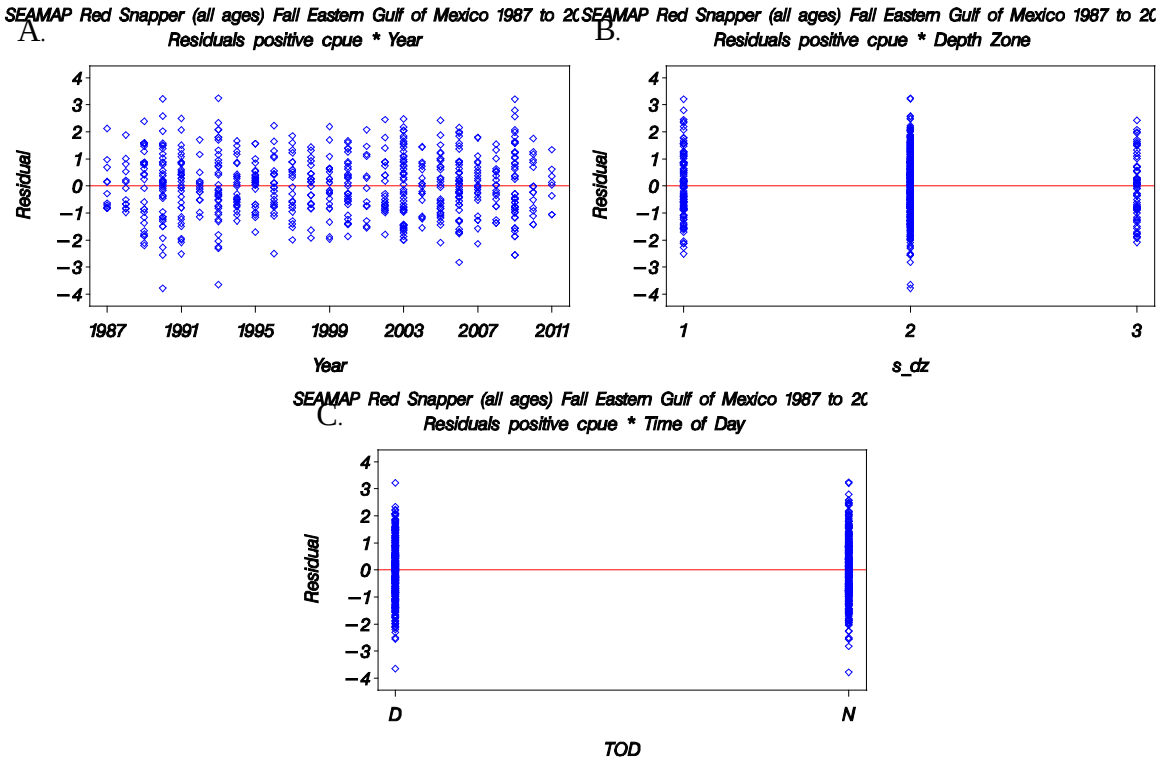


Figure 50. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / all ages / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

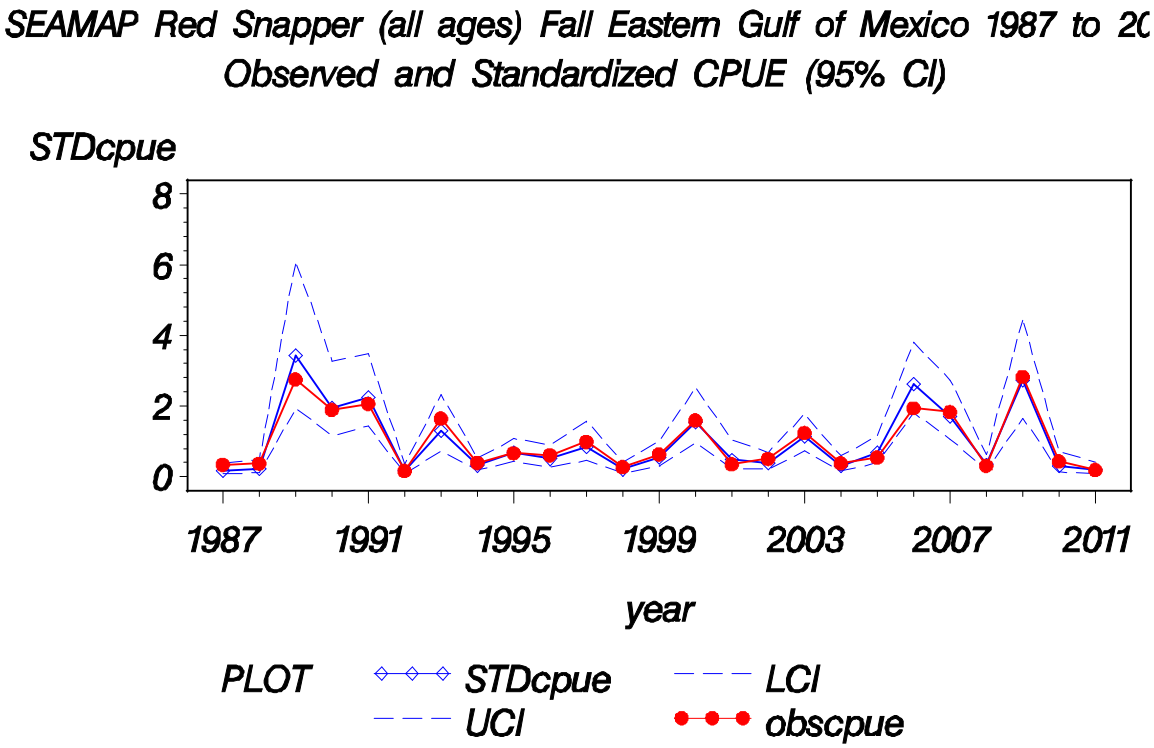


Figure 51. Annual index of abundance for red snapper (EGOM / all ages / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

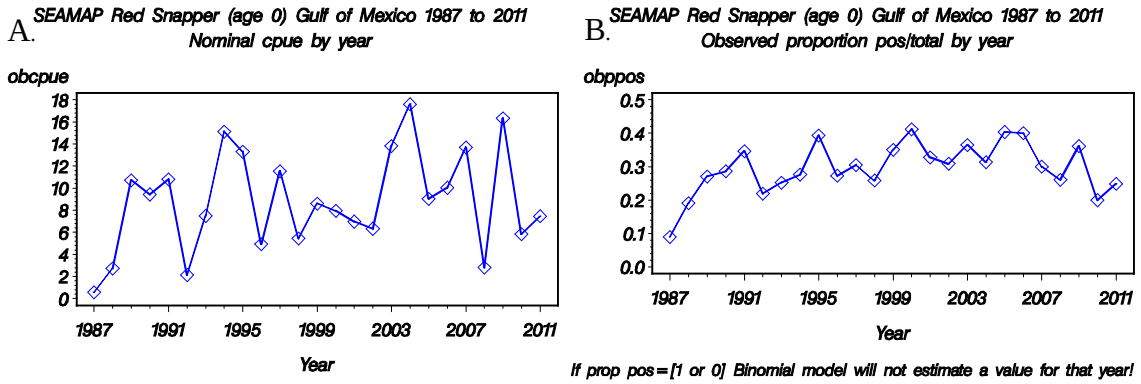


Figure 52. Annual trends for red snapper (GOM / age 0) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

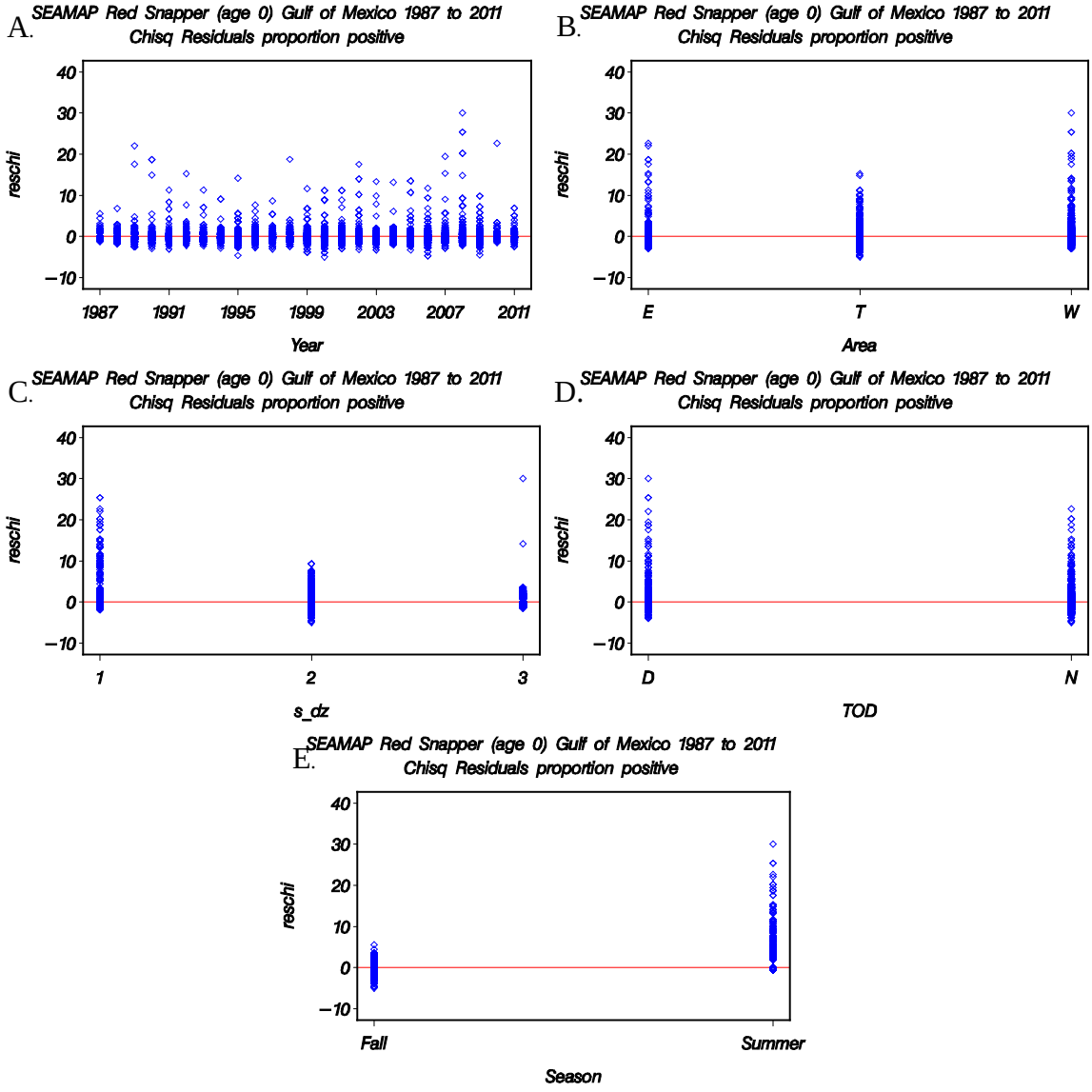


Figure 53. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / age 0) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone, **D.** the Chi-Square residuals by time of day and **E.** the Chi-Square residuals by season.

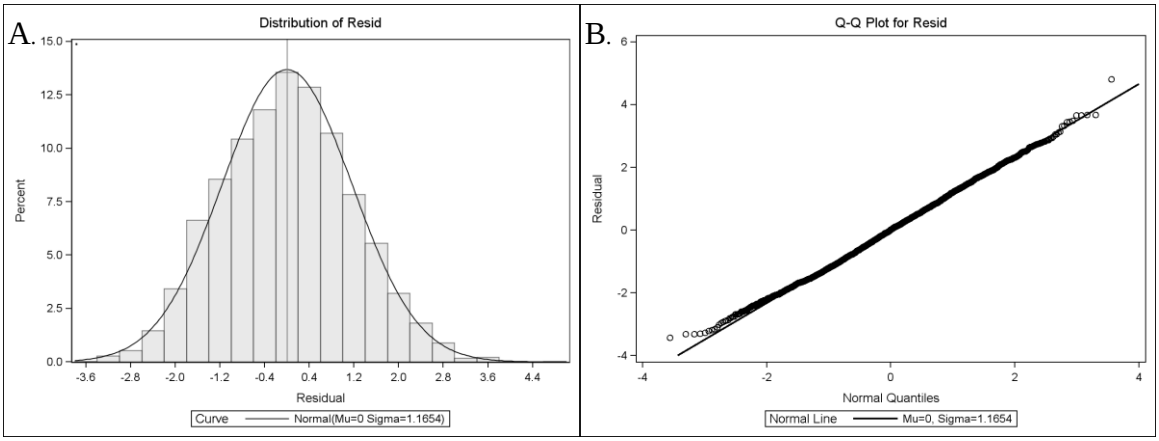


Figure 54. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 0) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

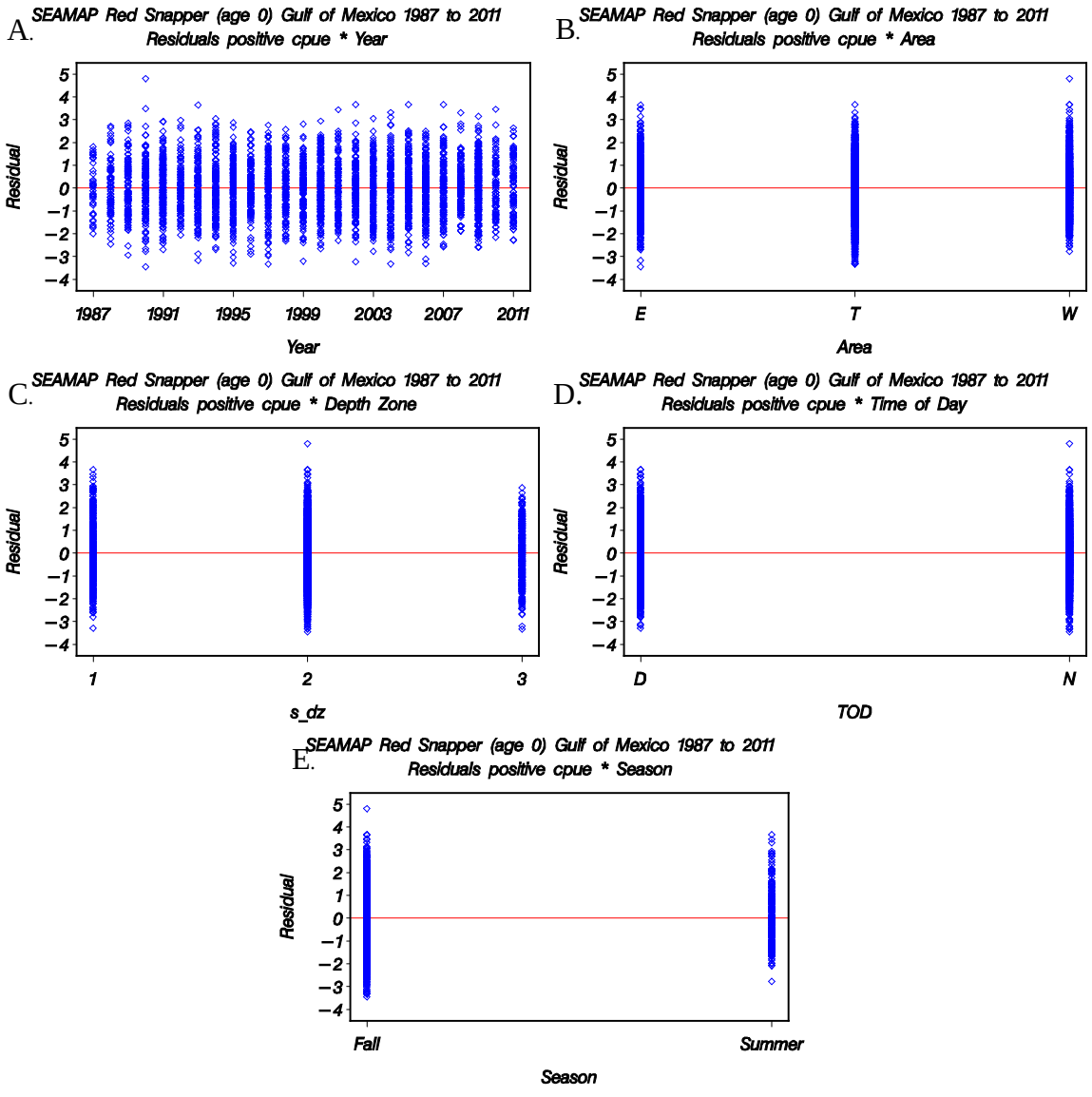


Figure 55. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 0) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone, **D**. the Chi-Square residuals by time of day and **E.** the Chi-Square residuals by season.

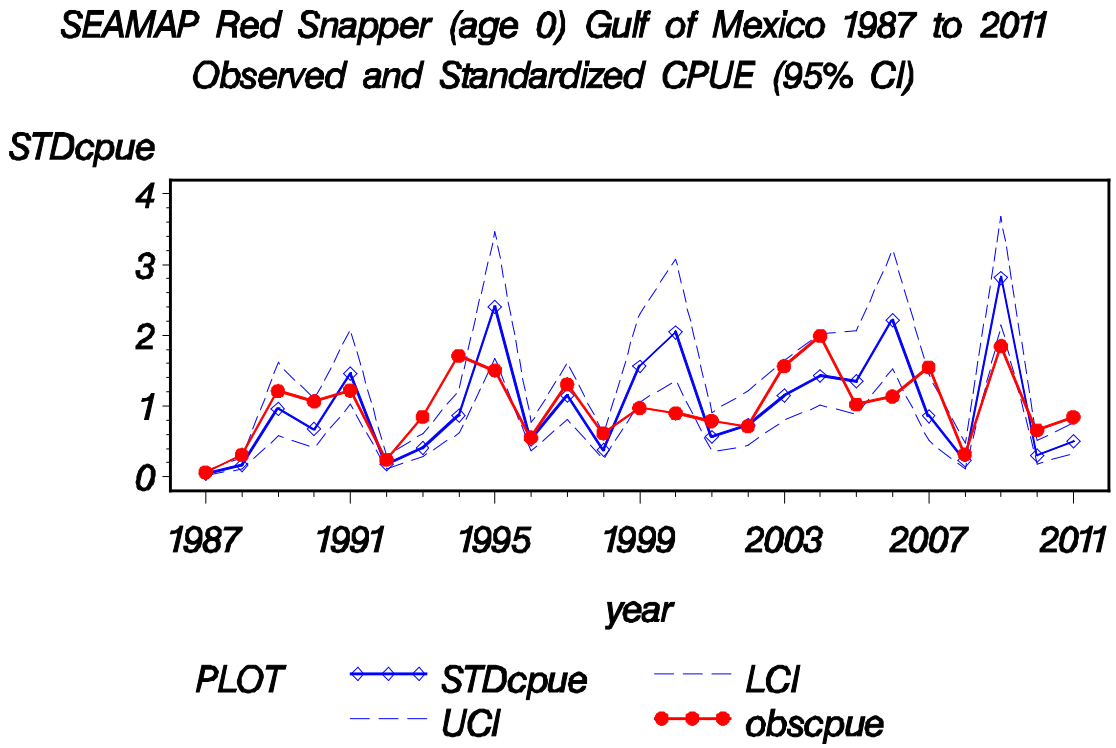


Figure 56. Annual index of abundance for red snapper (GOM / age 0) from the SEAMAP Groundfish Survey from 1987 – 2011.

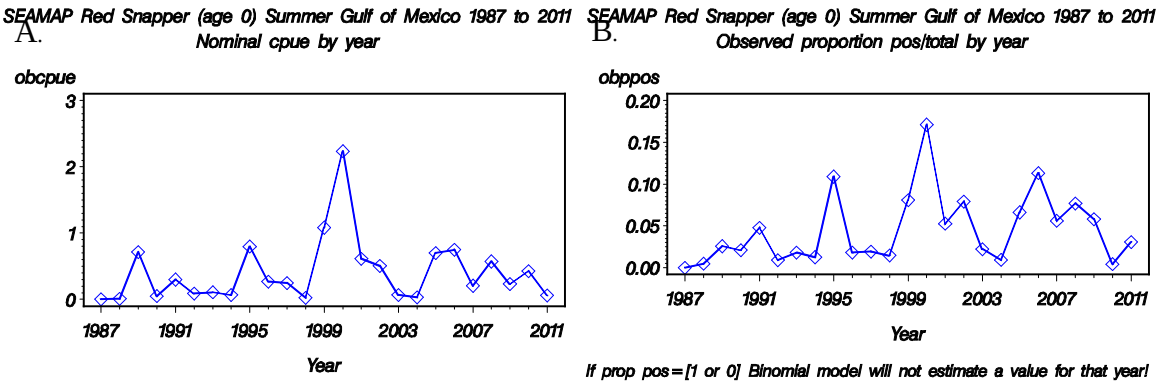


Figure 57. Annual trends for red snapper (GOM / age 0 / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

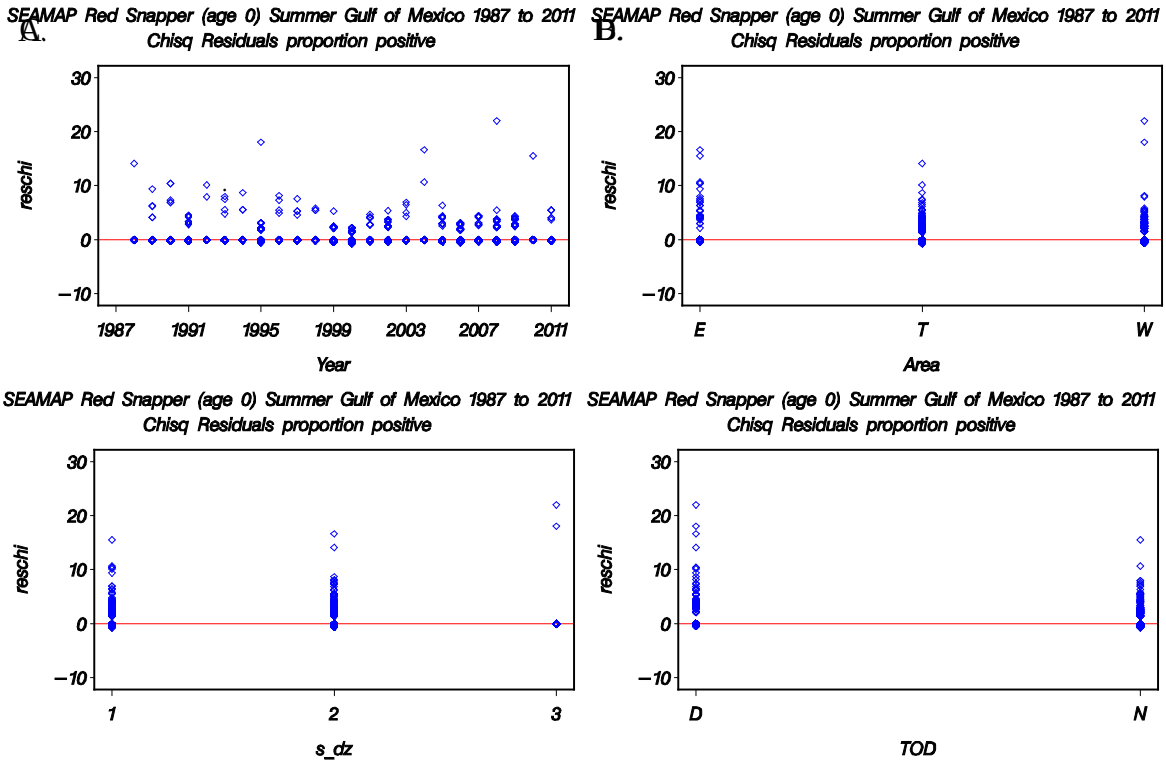


Figure 58. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.

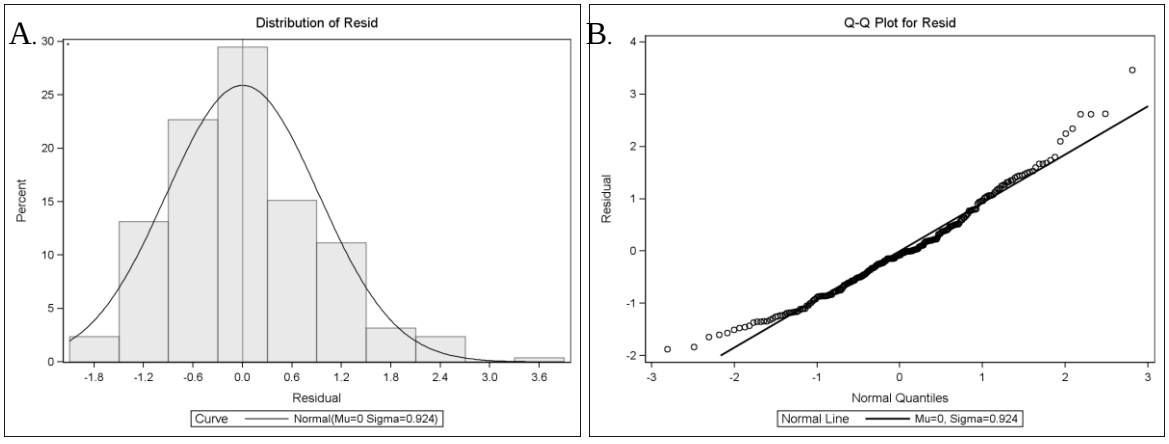


Figure 59. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

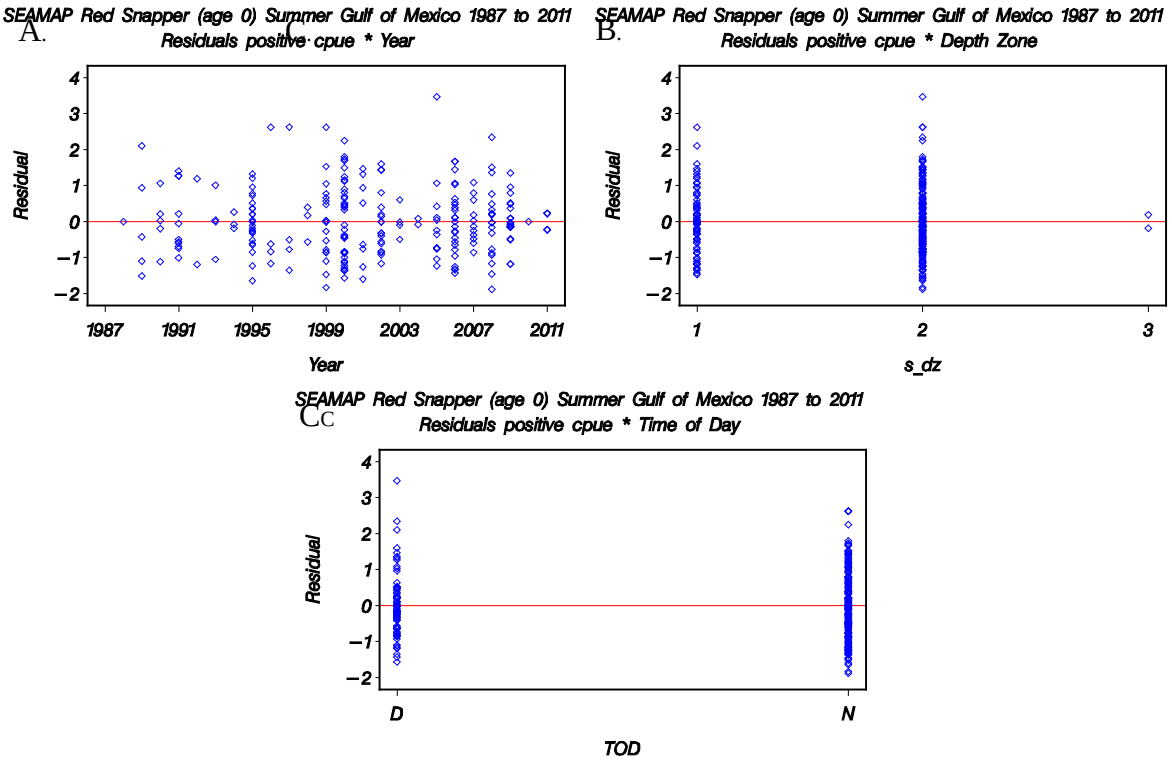


Figure 60. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

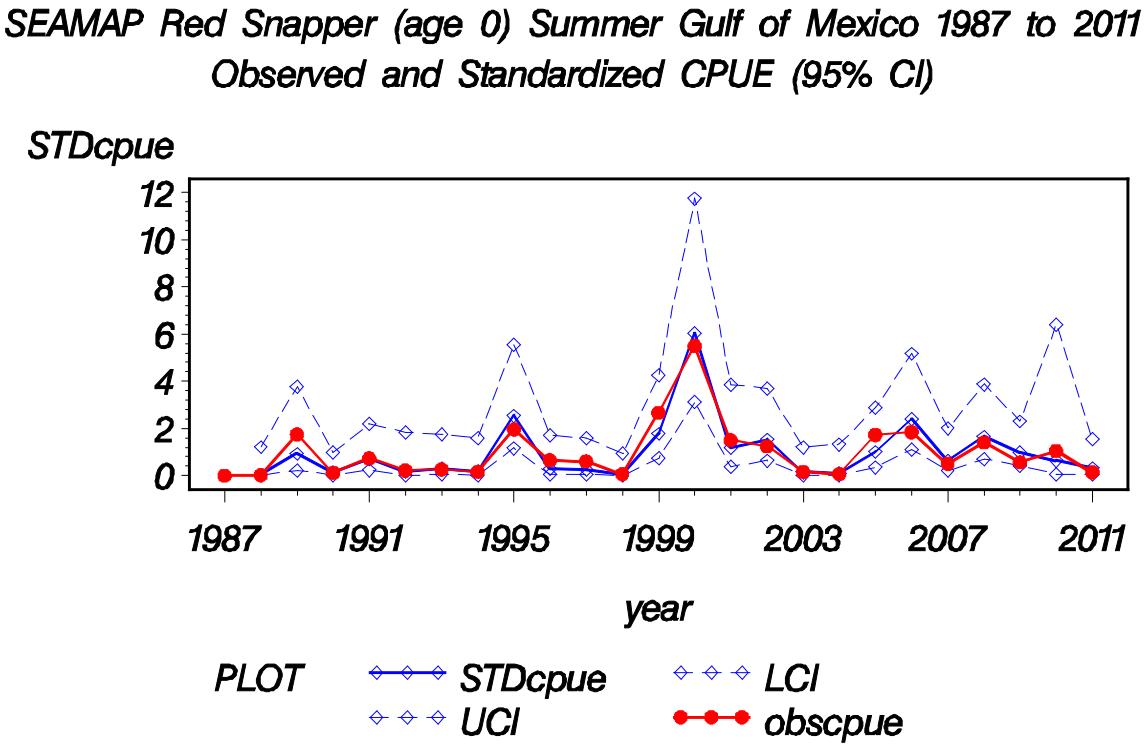


Figure 61. Annual index of abundance for red snapper (GOM / age 0 / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

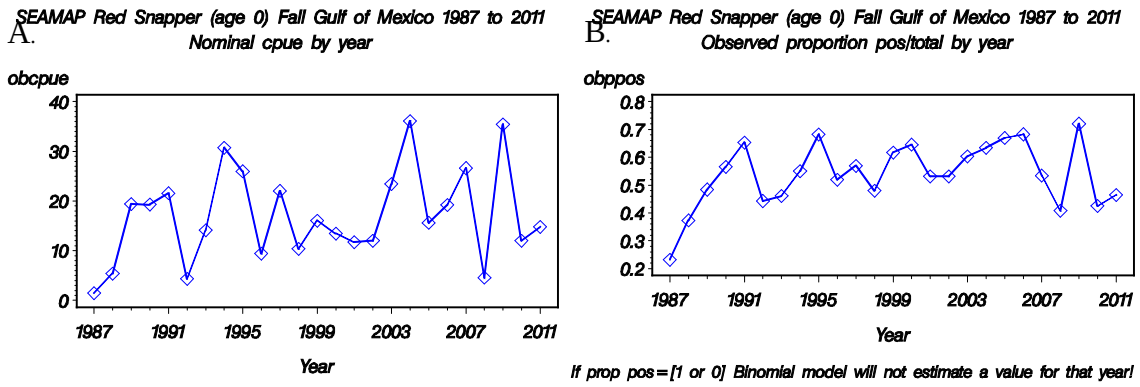


Figure 62. Annual trends for red snapper (GOM / age 0 / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

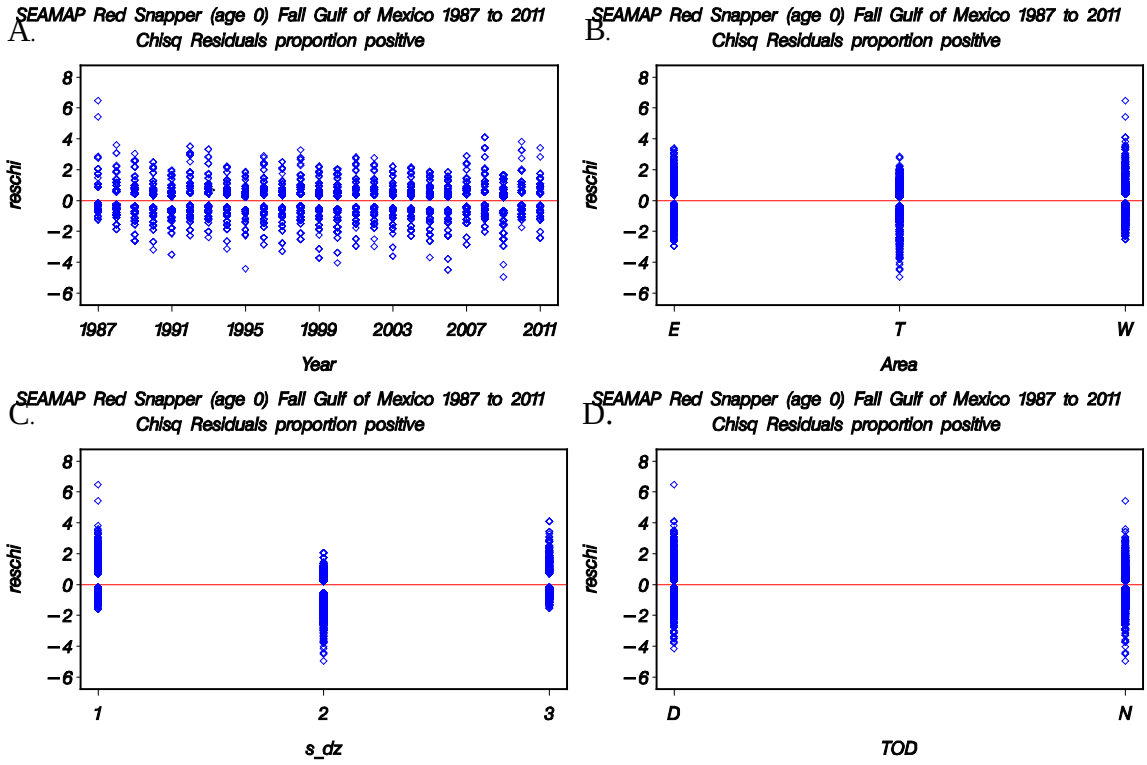


Figure 63. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.

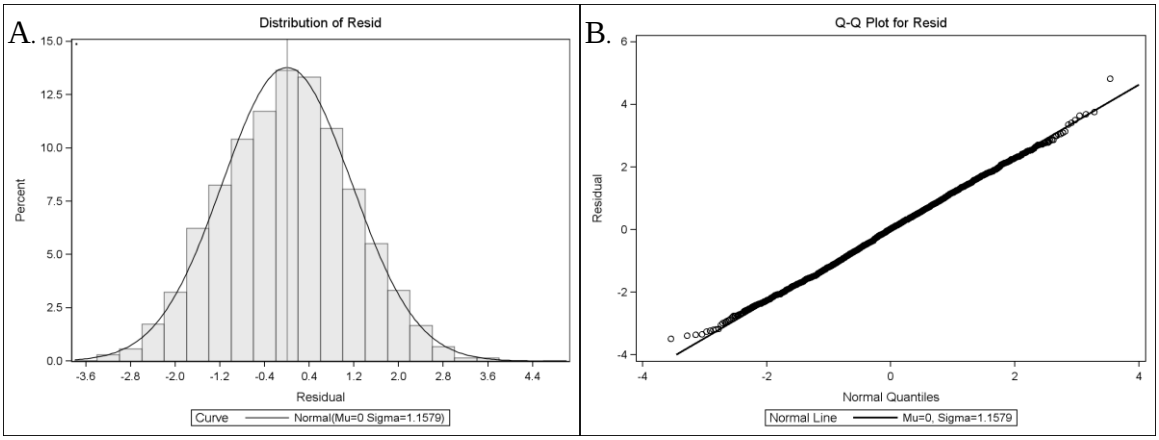


Figure 64. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

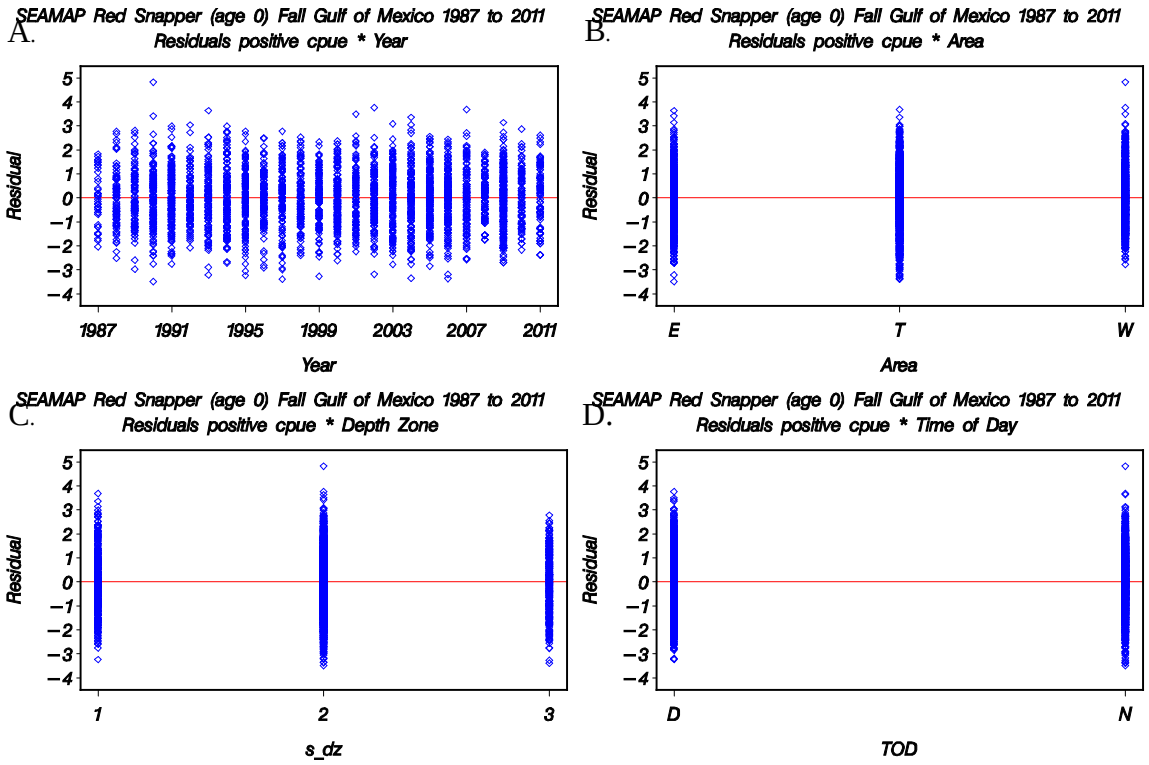


Figure 65. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D**. the Chi-Square residuals by time of day.

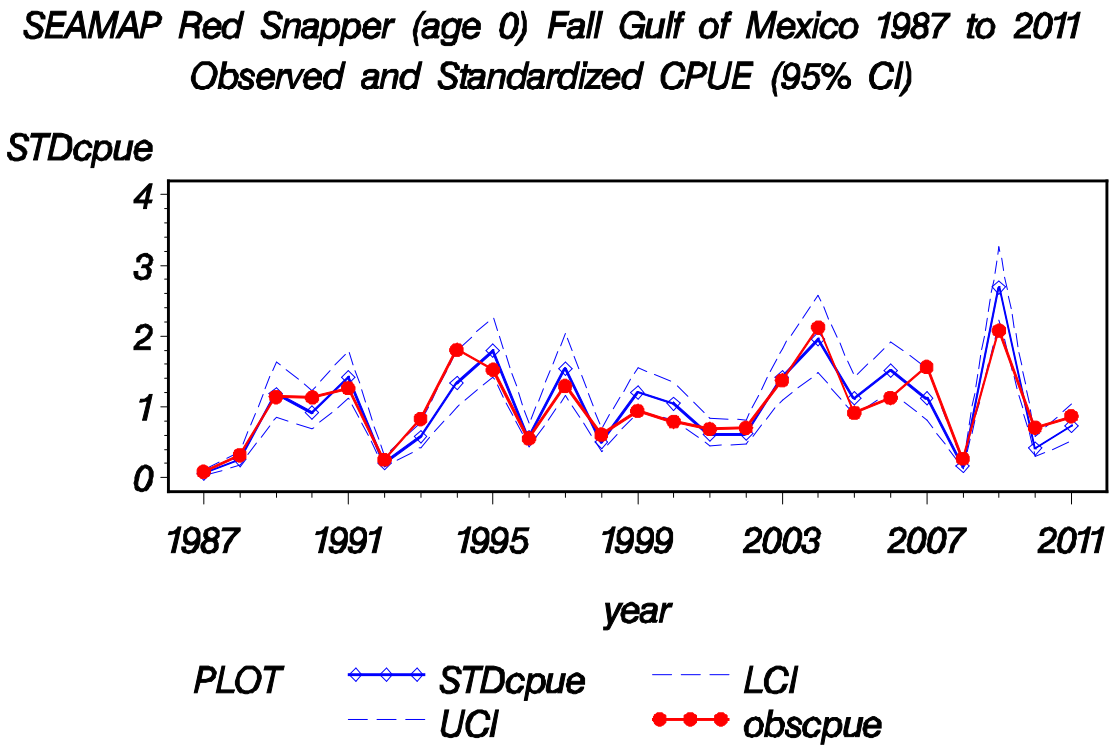


Figure 66. Annual index of abundance for red snapper (GOM / age 0 / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

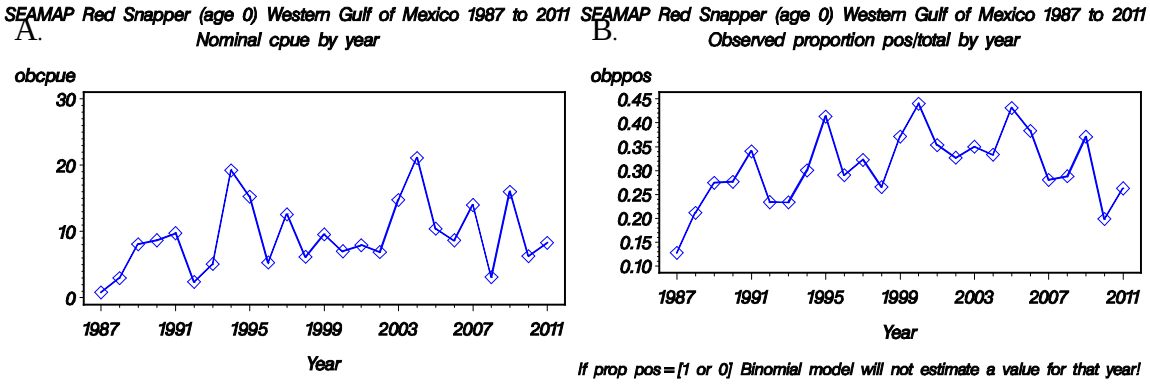


Figure 67. Annual trends for red snapper (WGOM / age 0) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

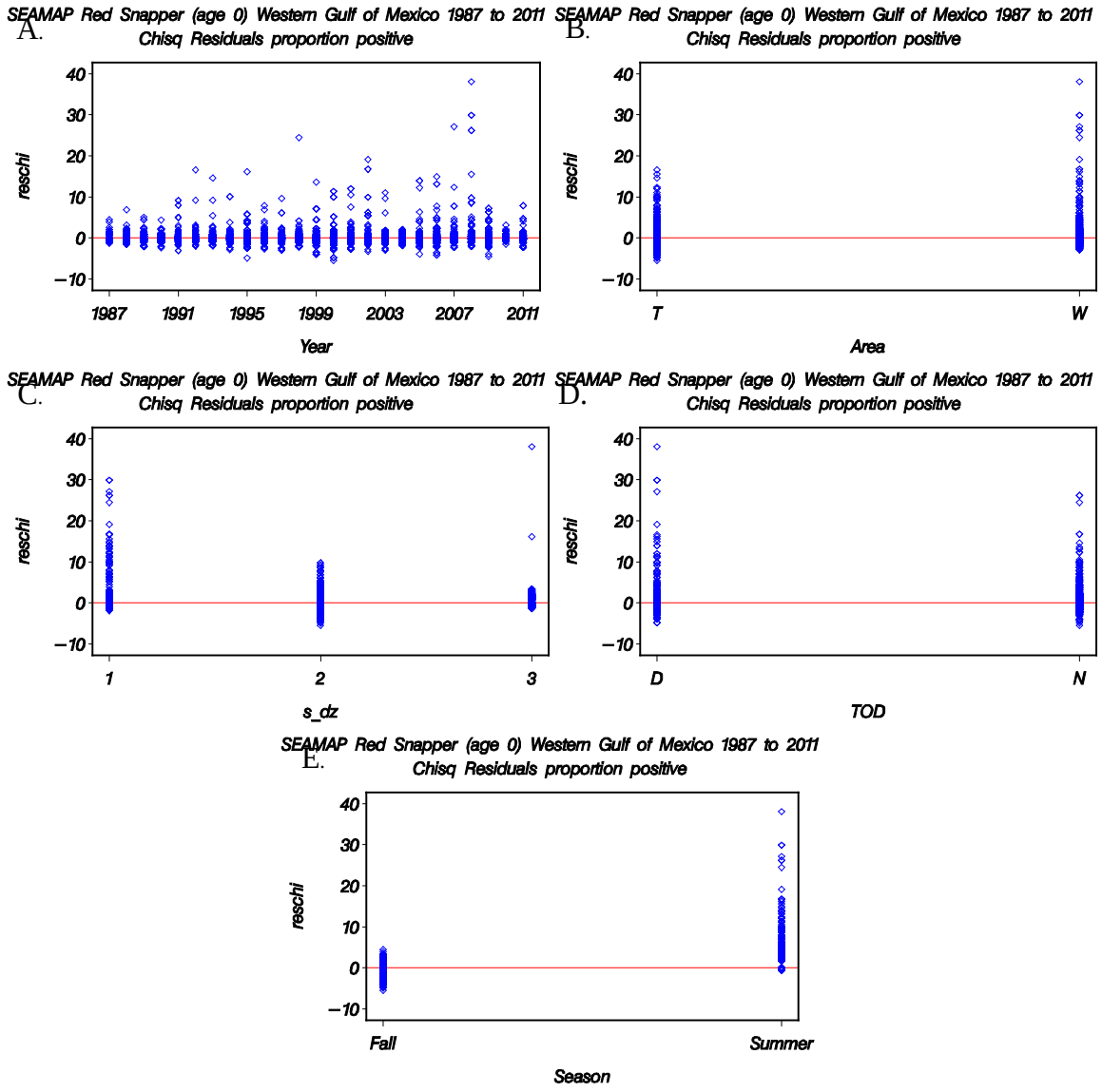


Figure 68. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone, **D.** the Chi-Square residuals by time of day and **E.** the Chi-Square residuals by season.

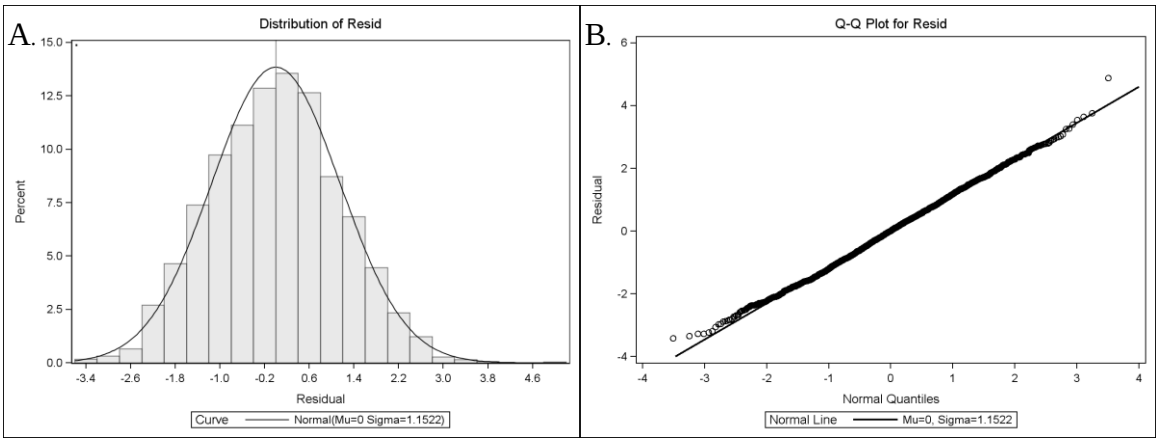


Figure 69. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

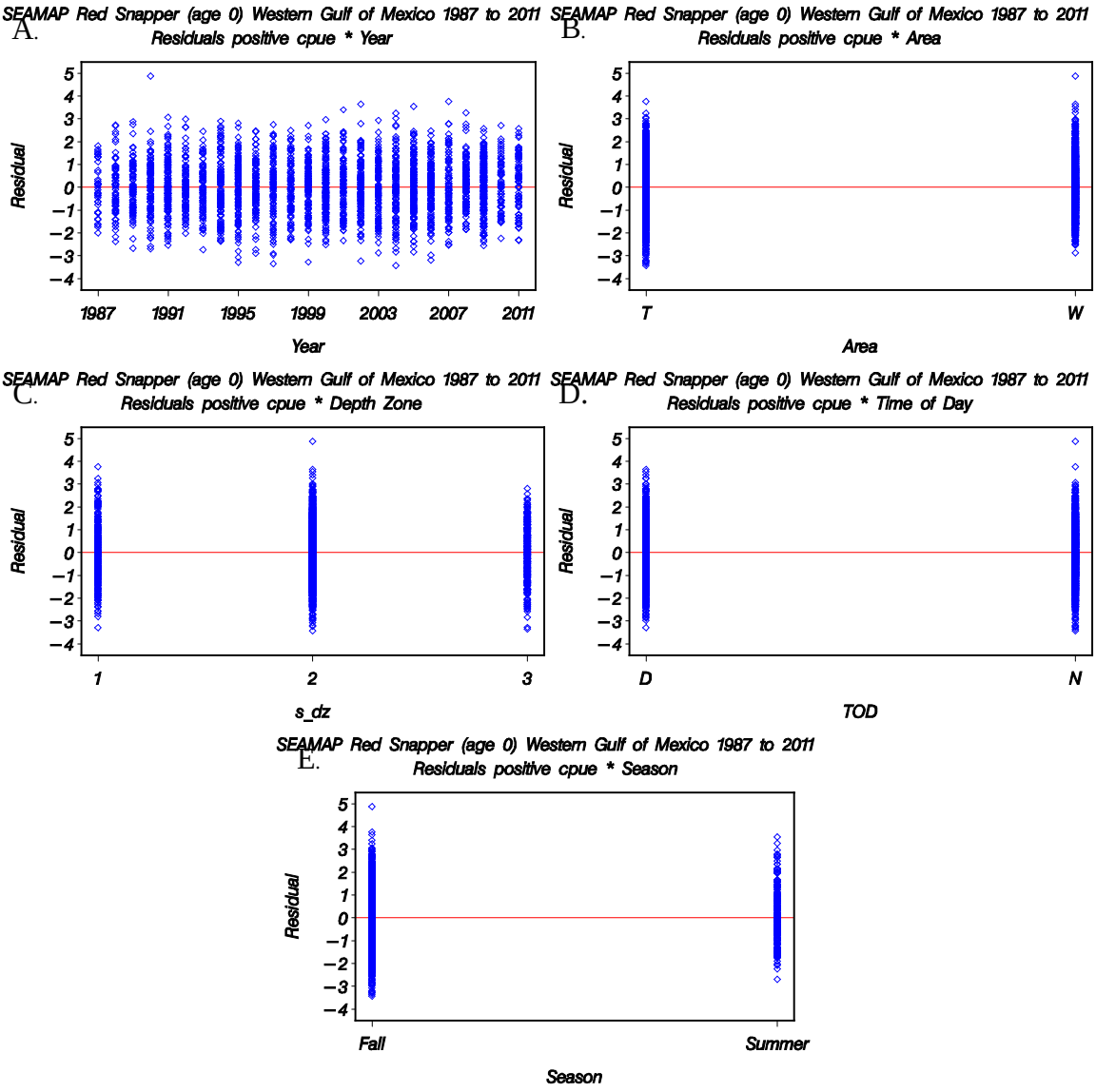


Figure 70. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone, **D**. the Chi-Square residuals by time of day and **E.** the Chi-Square residuals by season.

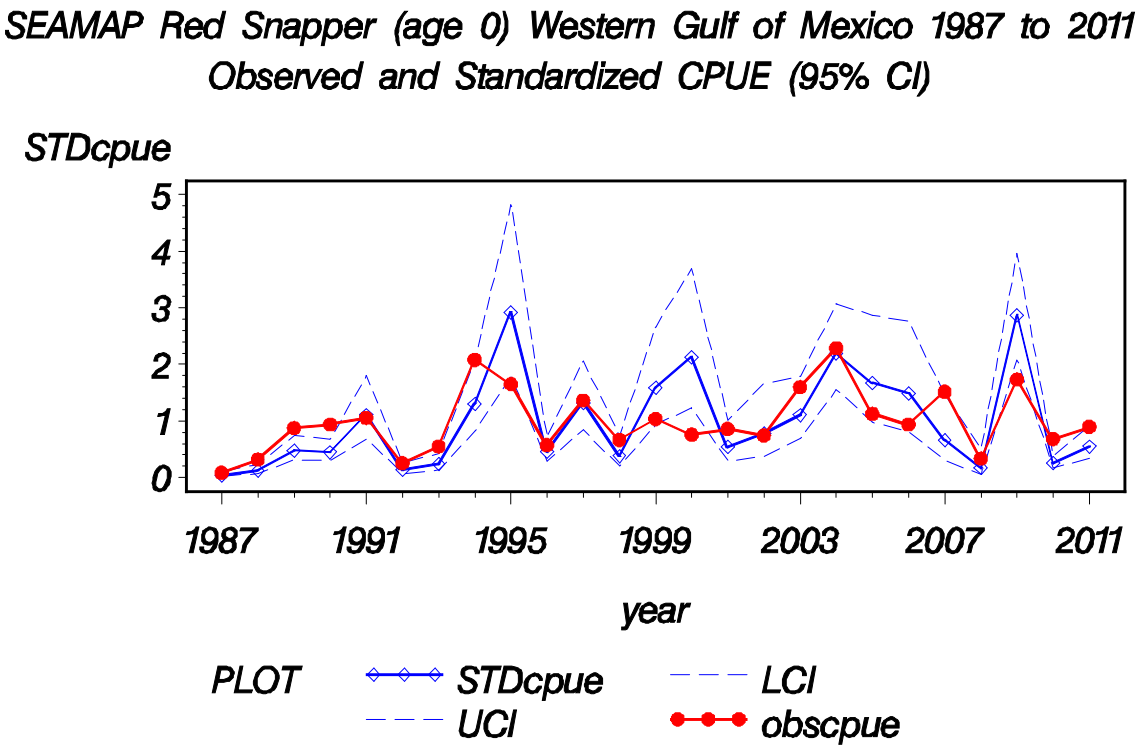


Figure 71. Annual index of abundance for red snapper (WGOM / age 0) from the SEAMAP Groundfish Survey from 1987 – 2011.

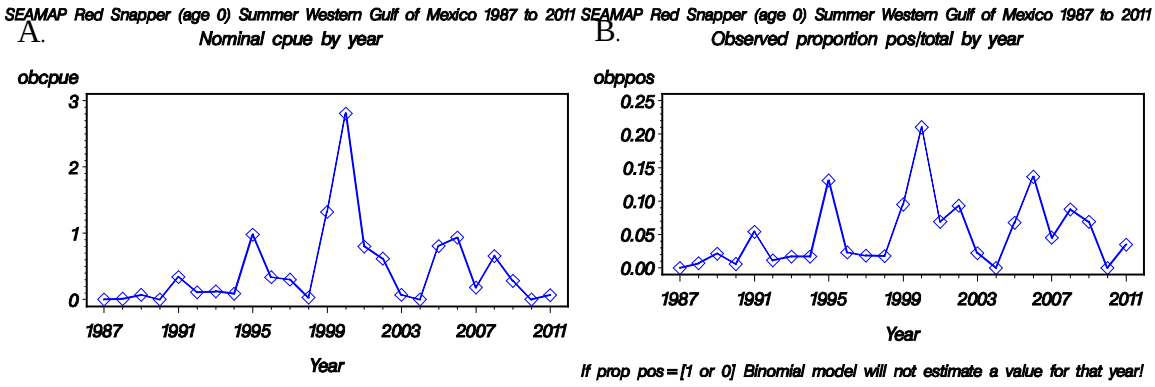


Figure 72. Annual trends for red snapper (WGOM / age 0 / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

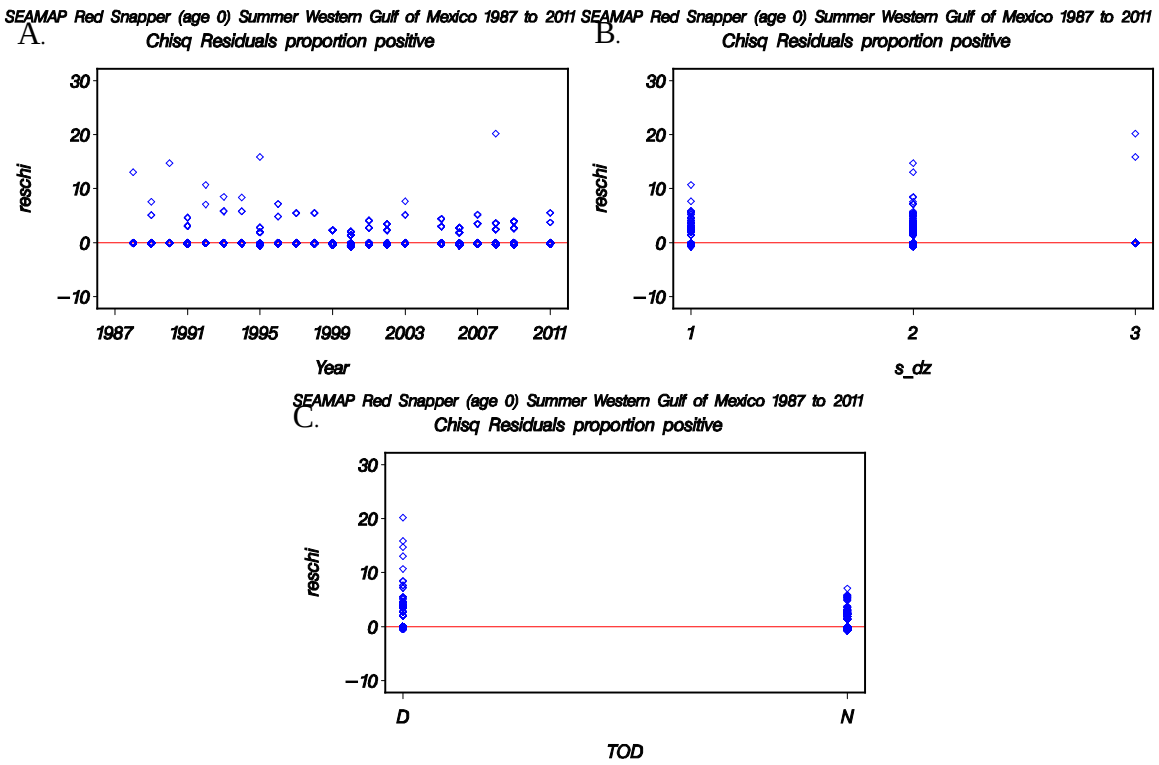


Figure 73. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

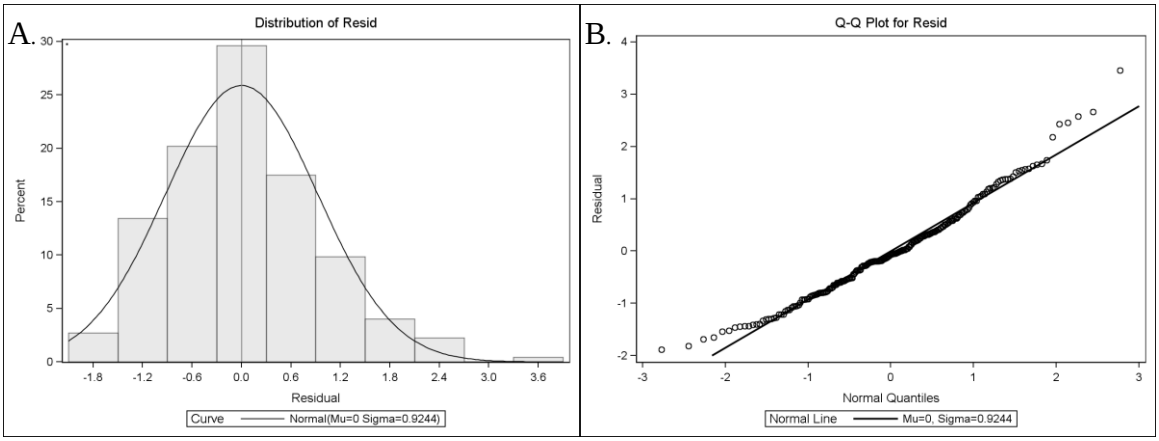


Figure 74. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

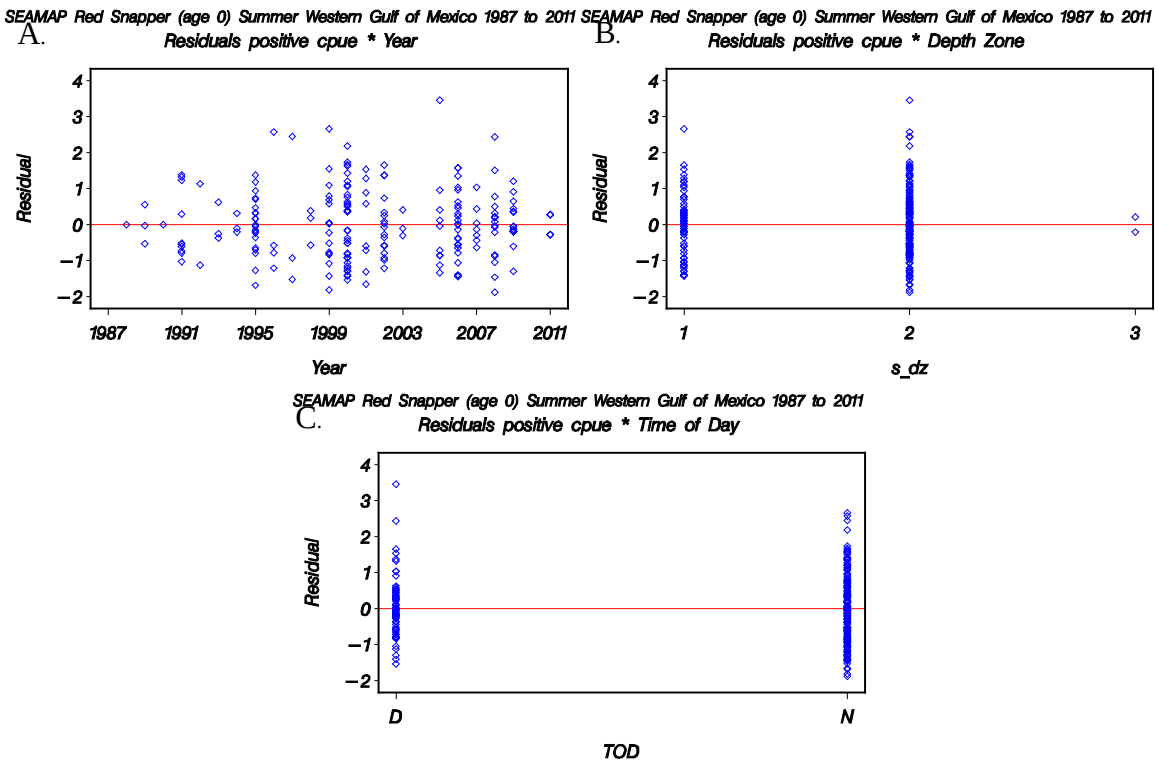


Figure 75. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

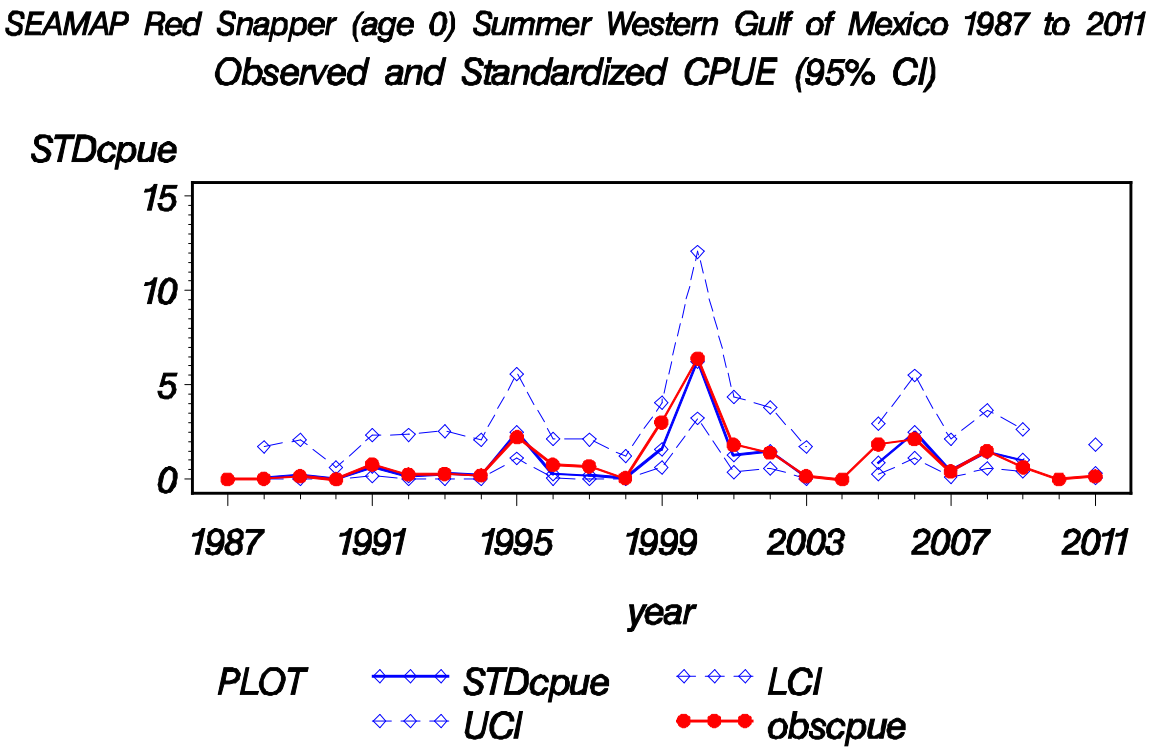


Figure 76. Annual index of abundance for red snapper (WGOM / age 0 / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

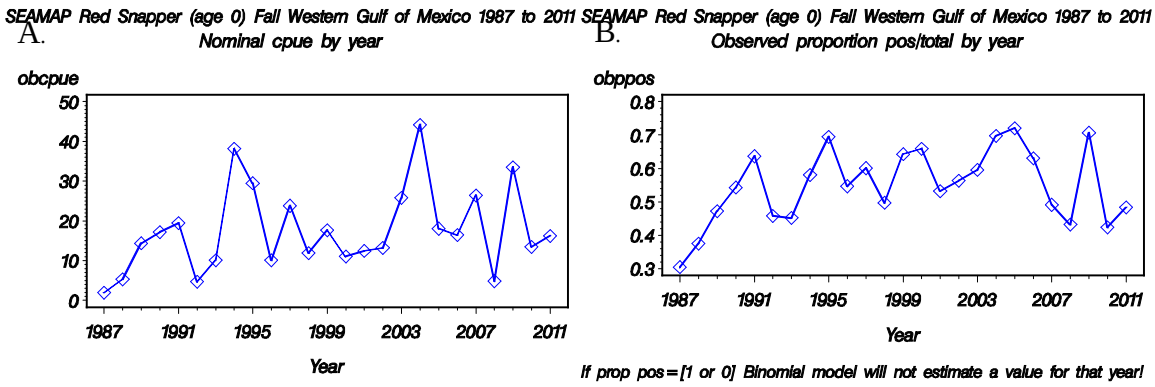


Figure 77. Annual trends for red snapper (WGOM / age 0 / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

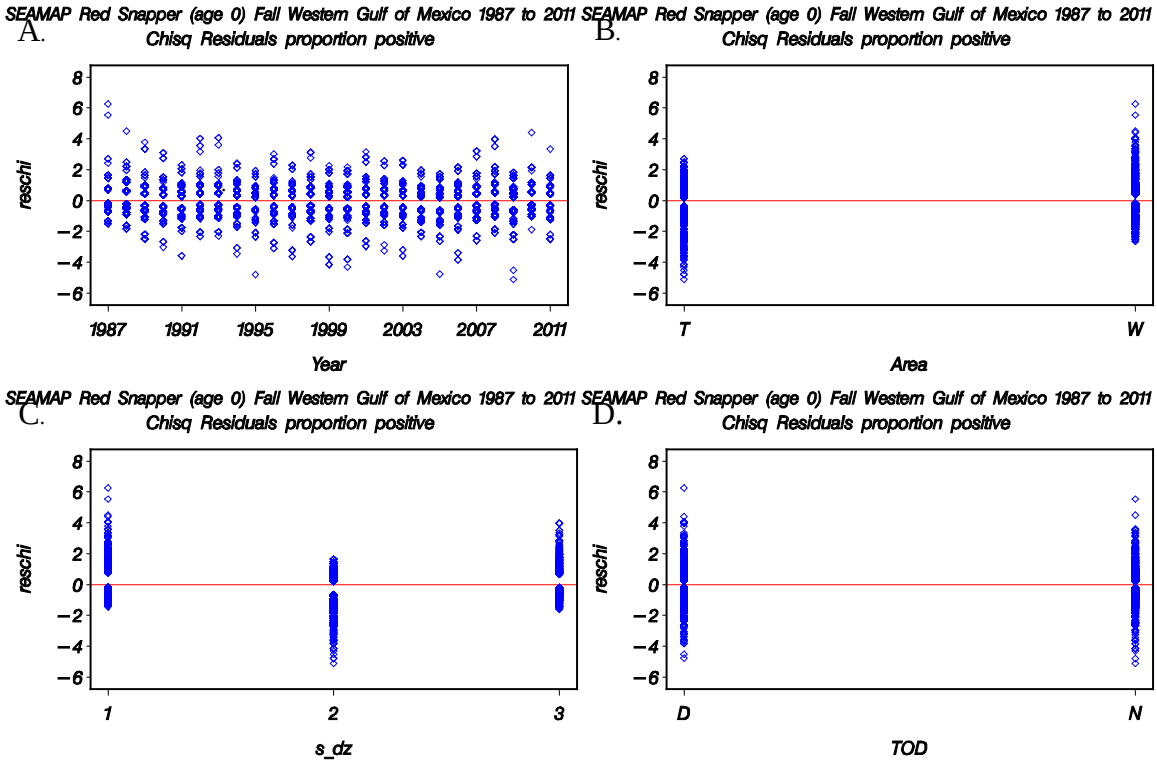


Figure 78. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.

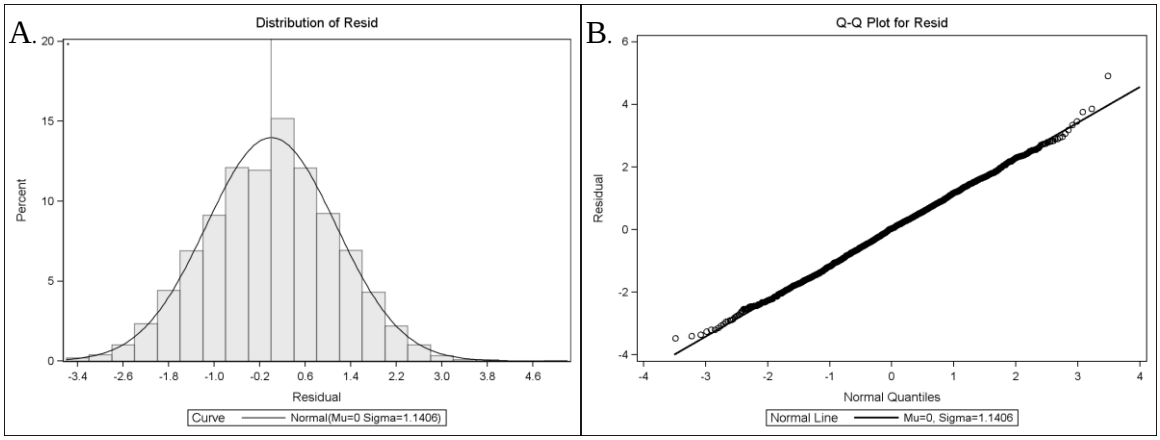


Figure 79. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

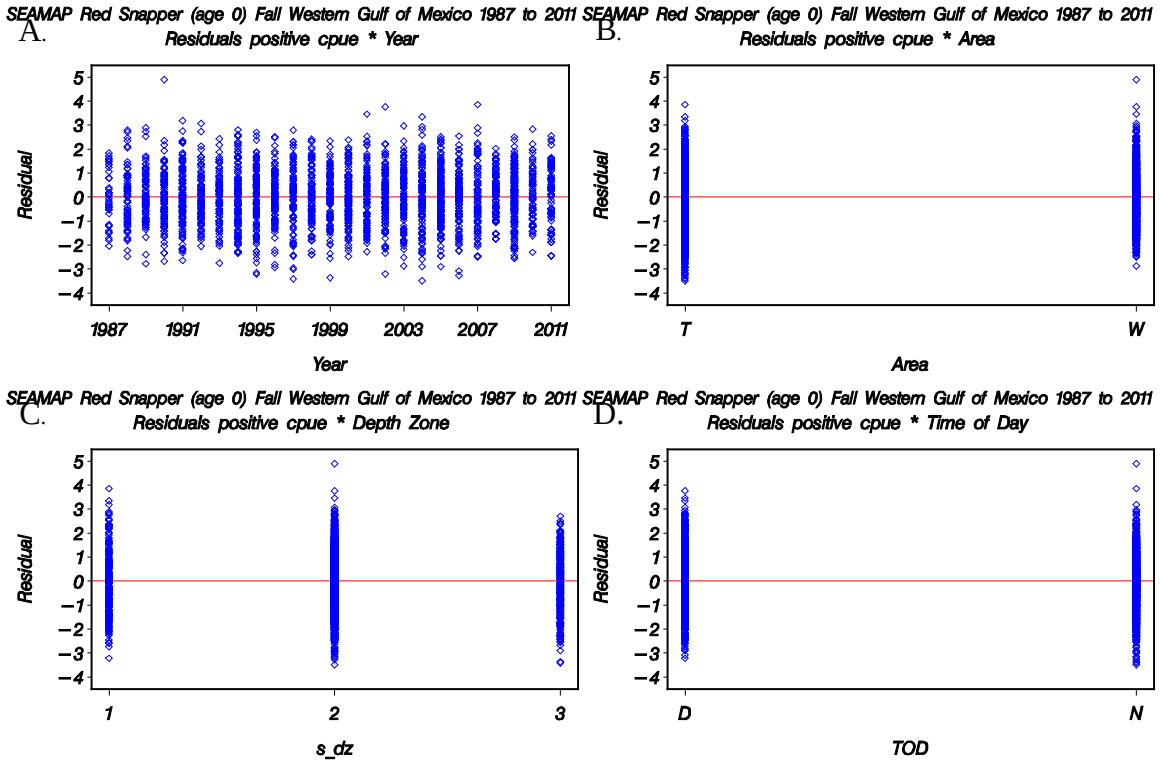


Figure 80. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D**. the Chi-Square residuals by time of day.

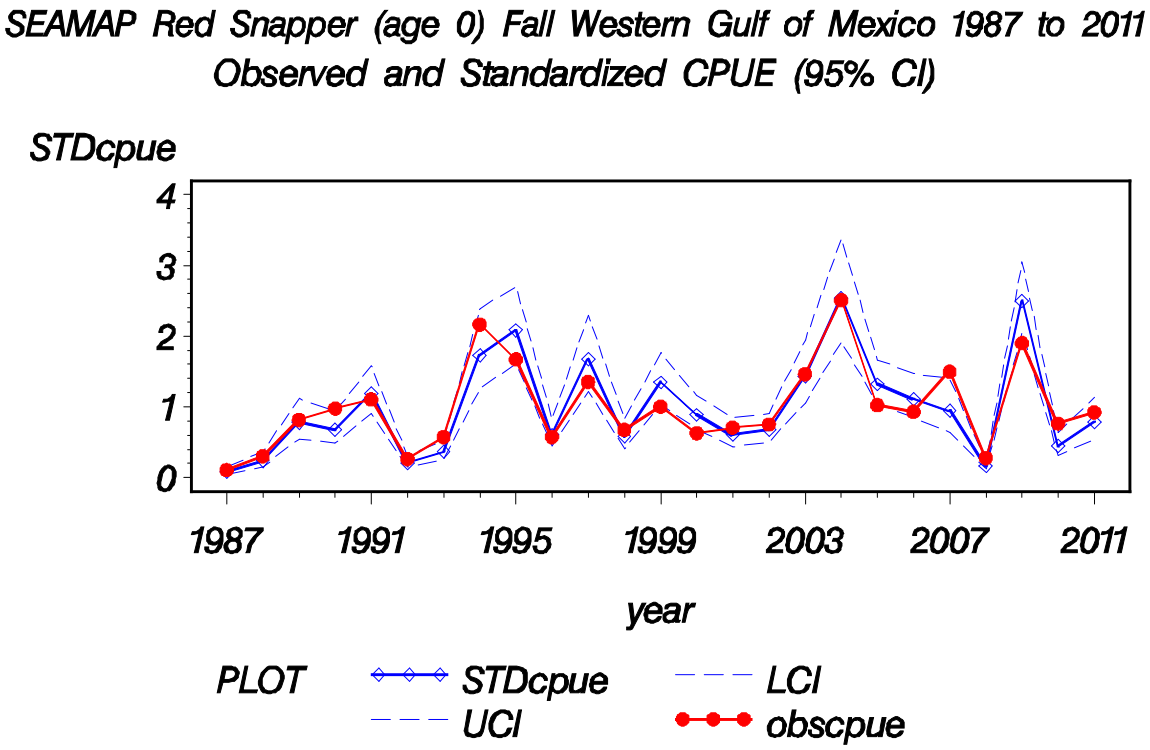


Figure 81. Annual index of abundance for red snapper (WGOM / age 0 / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

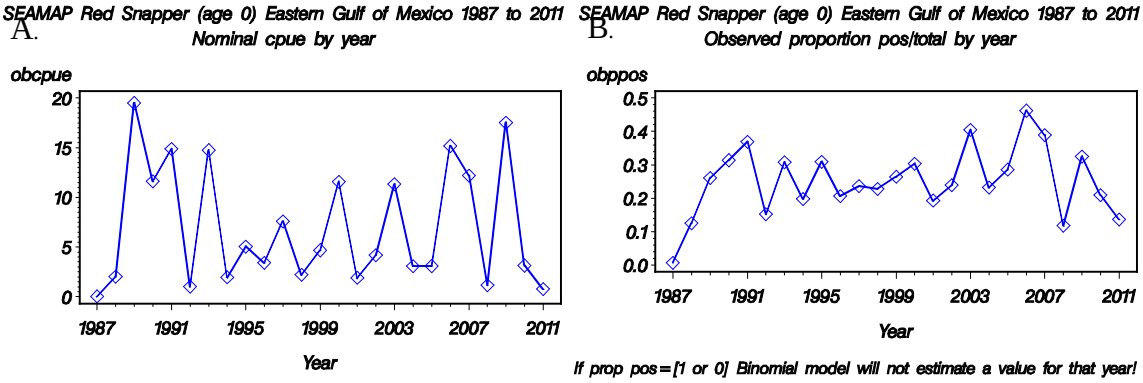


Figure 82. Annual trends for red snapper (EGOM / age 0) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

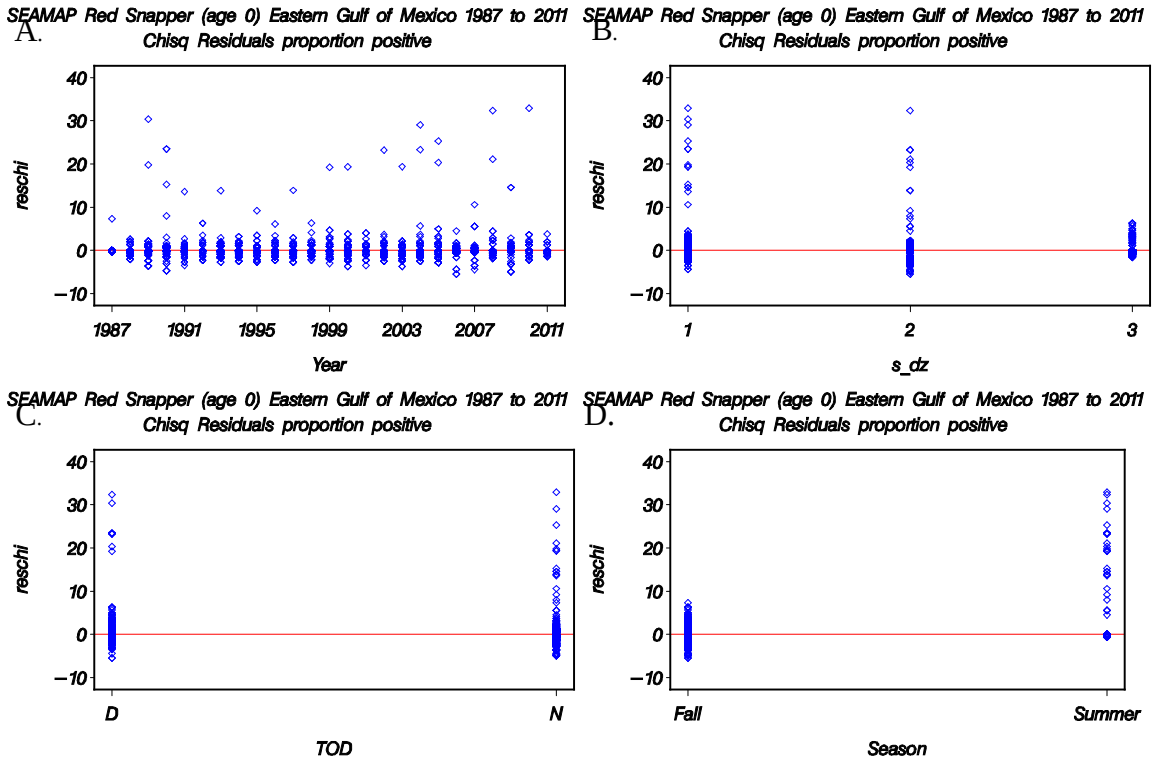


Figure 83. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone, **C.** the Chi-Square residuals by time of day and **D.** the Chi-Square residuals by season.

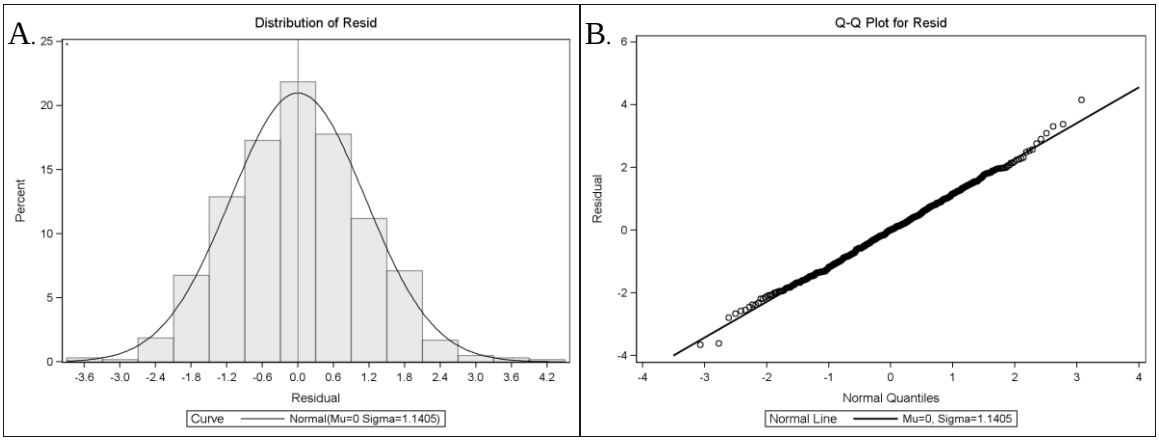


Figure 84. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

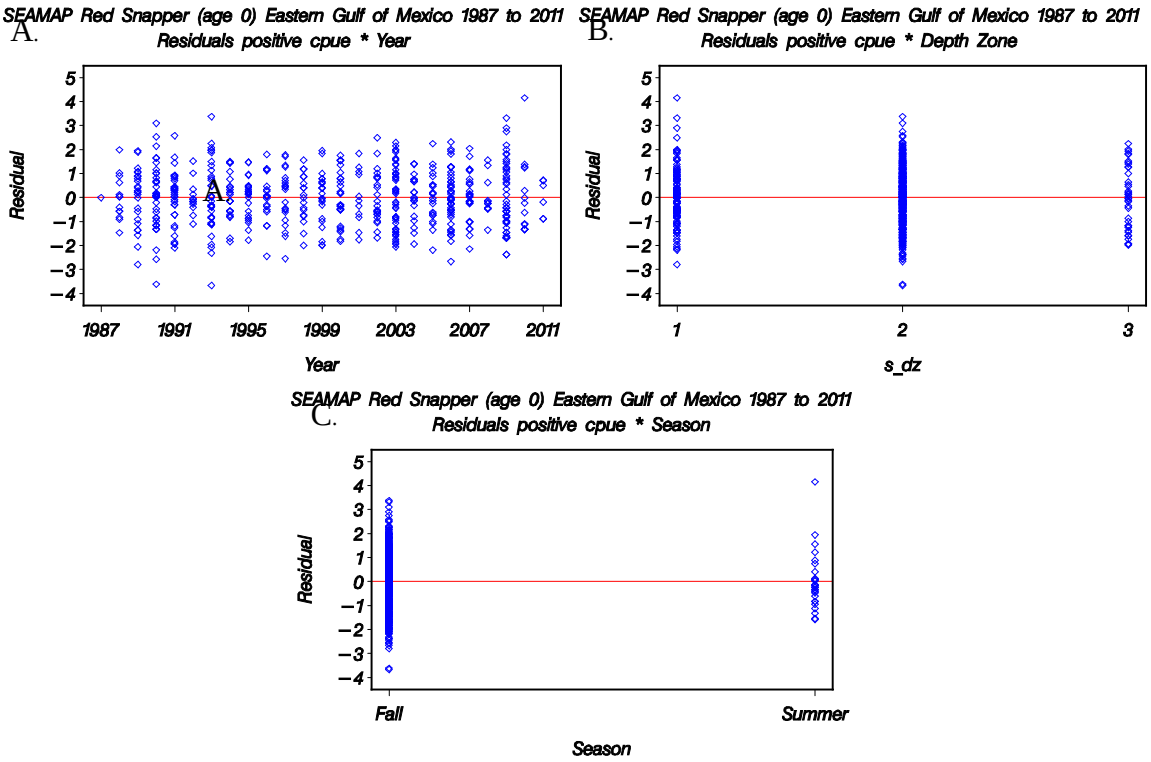


Figure 85. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by season.

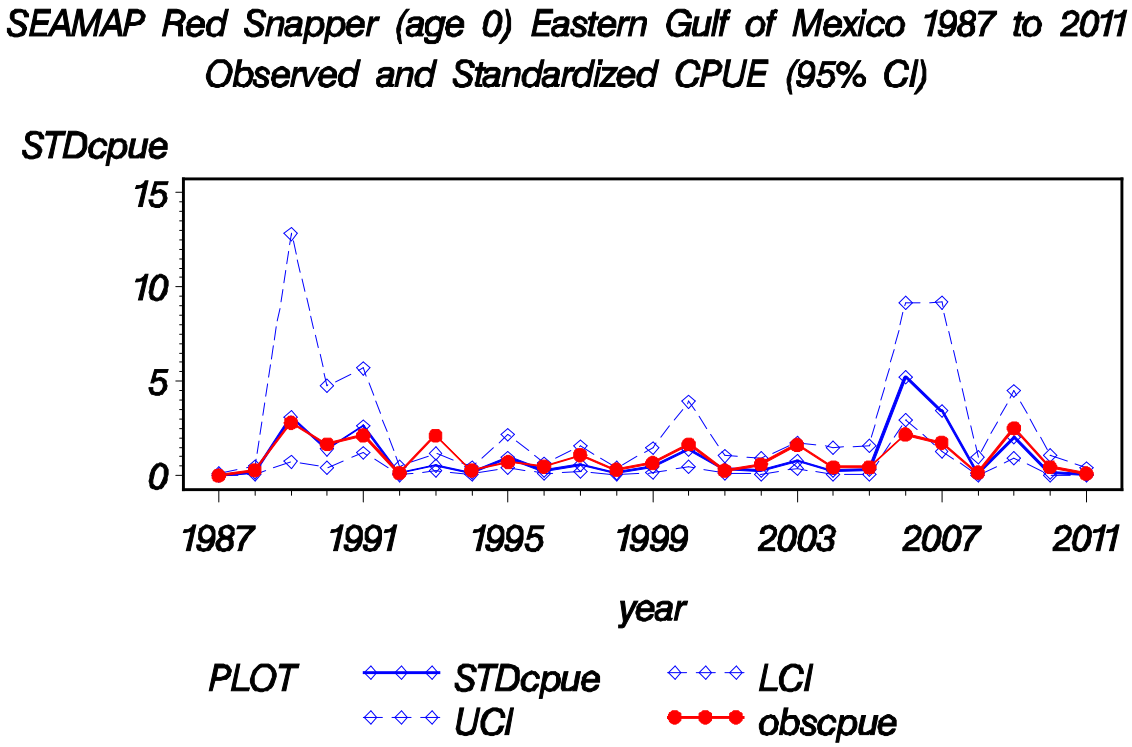


Figure 86. Annual index of abundance for red snapper (EGOM / age 0) from the SEAMAP Groundfish Survey from 1987 – 2011.

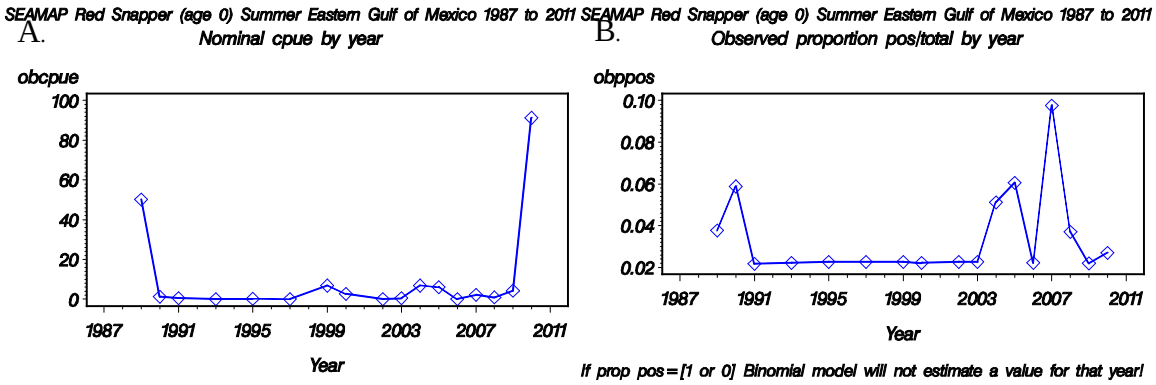


Figure 87. Annual trends for red snapper (EGOM / age 0 / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

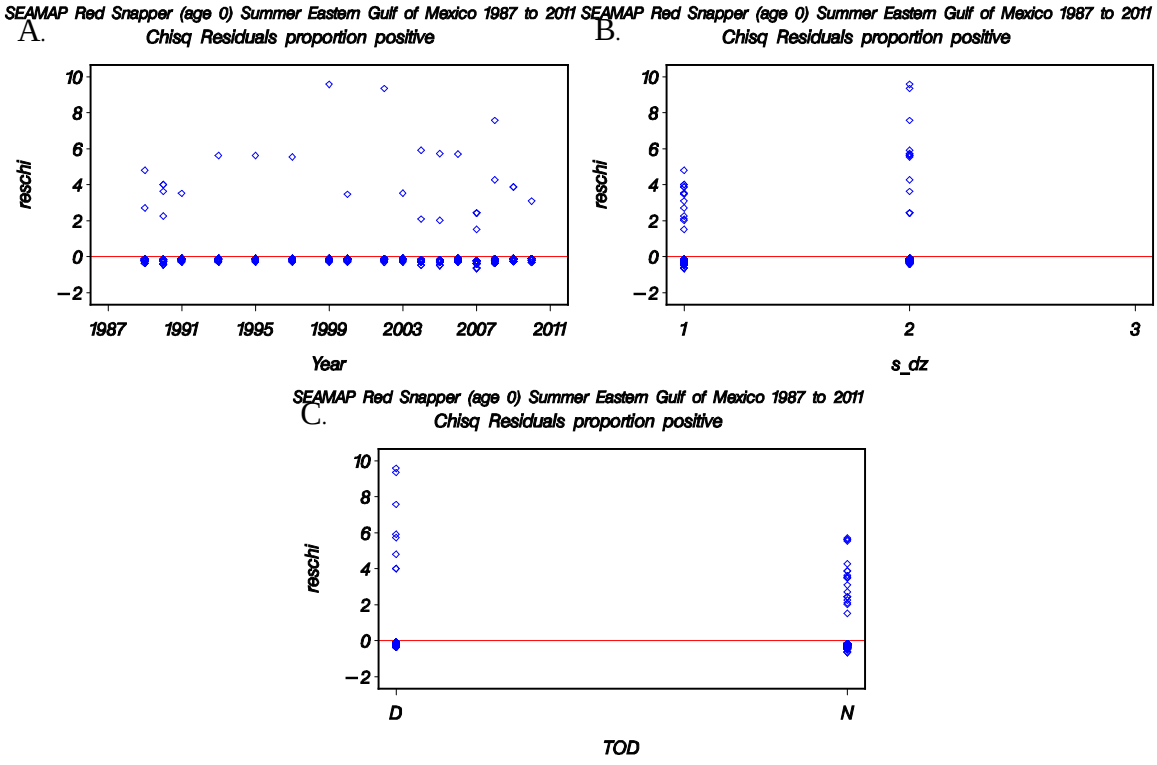


Figure 88. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

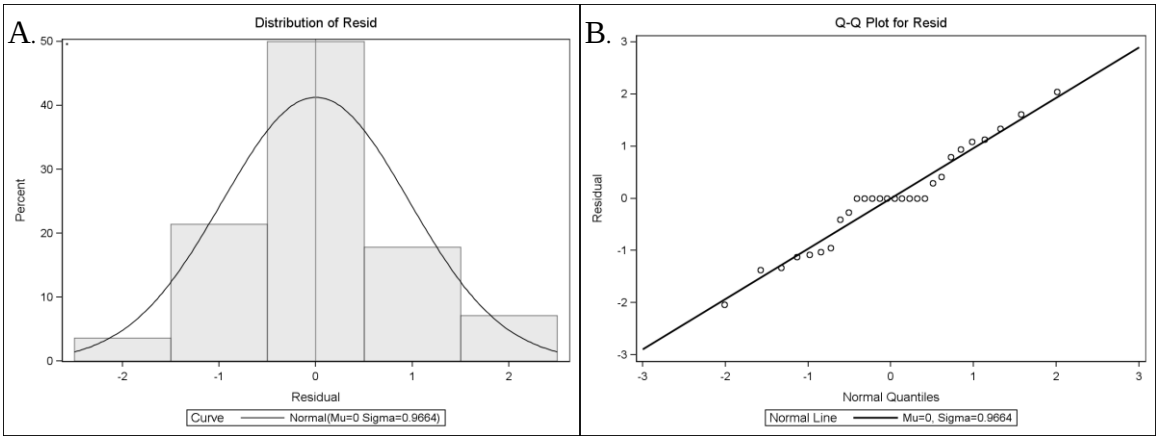


Figure 89. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

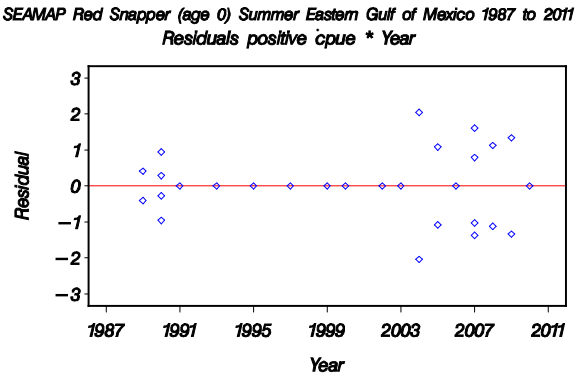


Figure 90. Diagnostic plot for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 / Summer) model: the Chi-Square residuals by year.

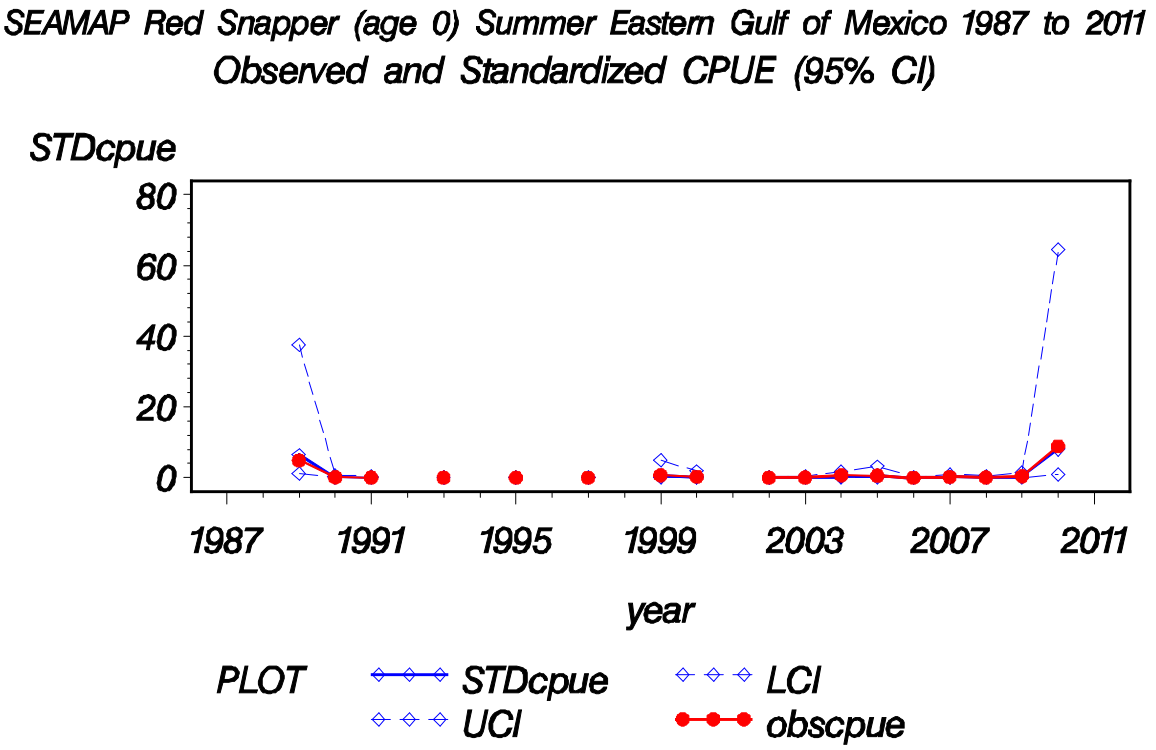


Figure 91. Annual index of abundance for red snapper (EGOM / age 0 / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

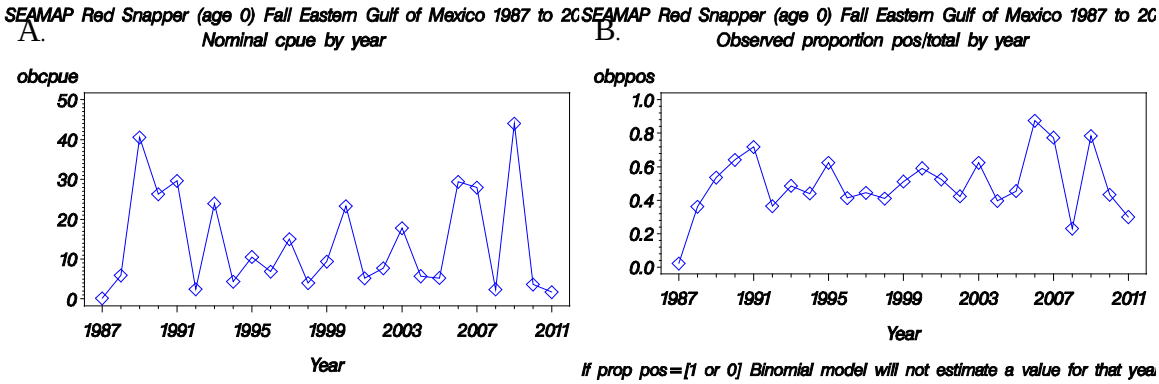


Figure 92. Annual trends for red snapper (EGOM / age 0 / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

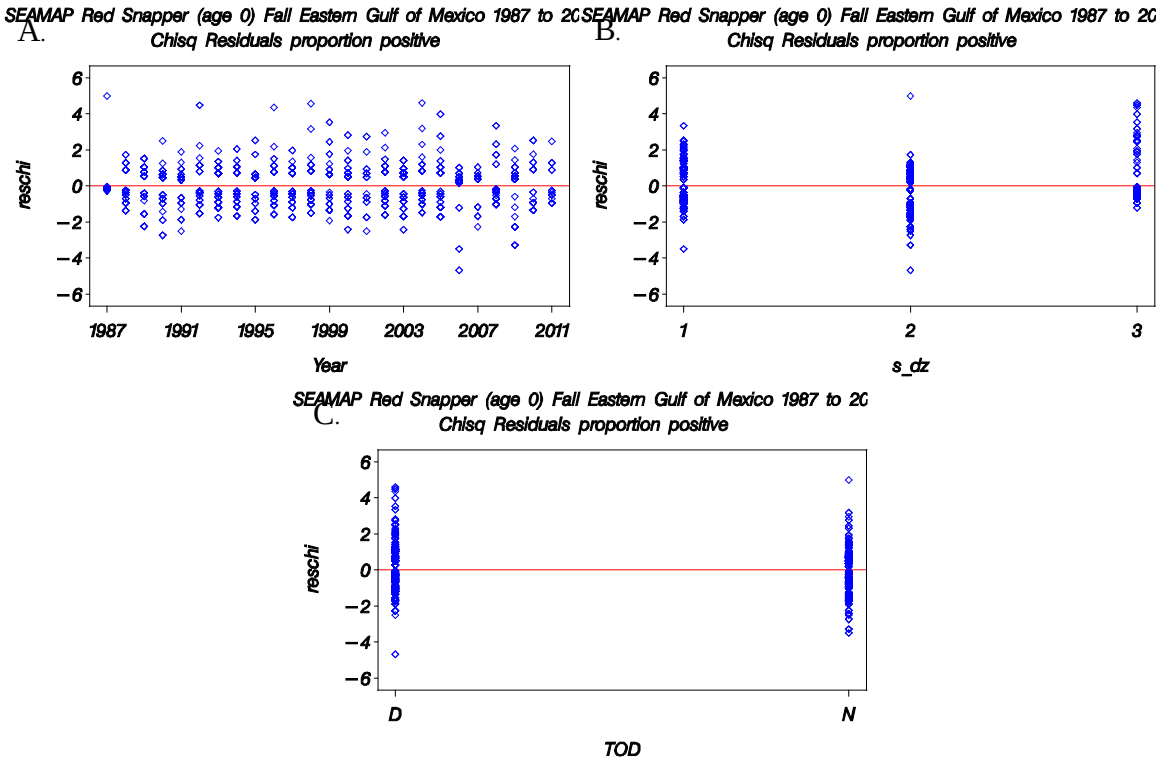


Figure 93. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

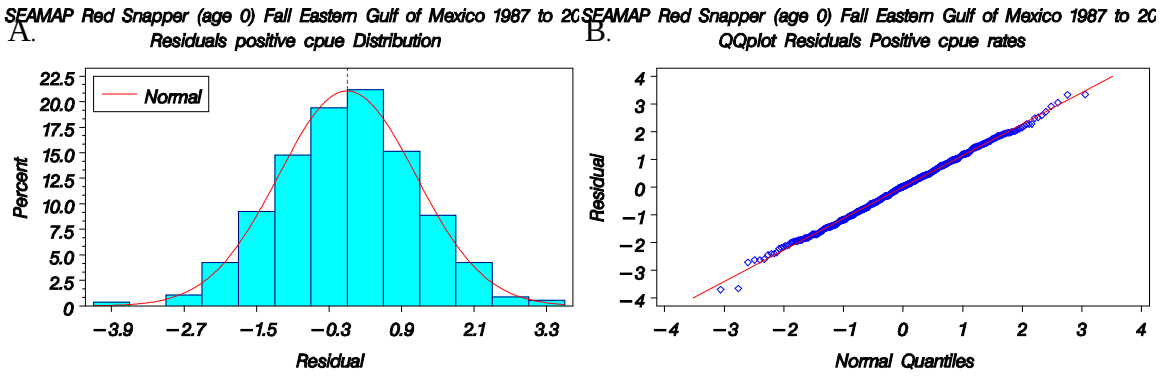


Figure 94. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

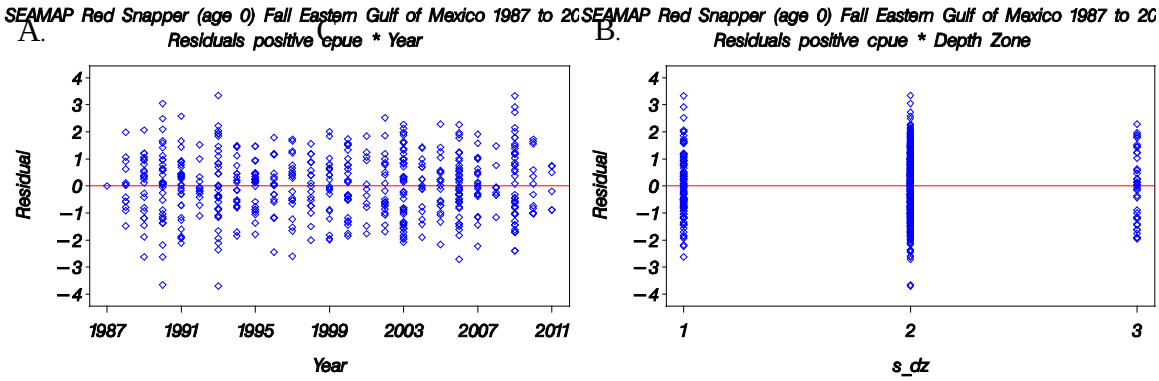


Figure 95. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 / Fall) model: **A.** the Chi-Square residuals by year and **B.** the Chi-Square residuals by depth zone.

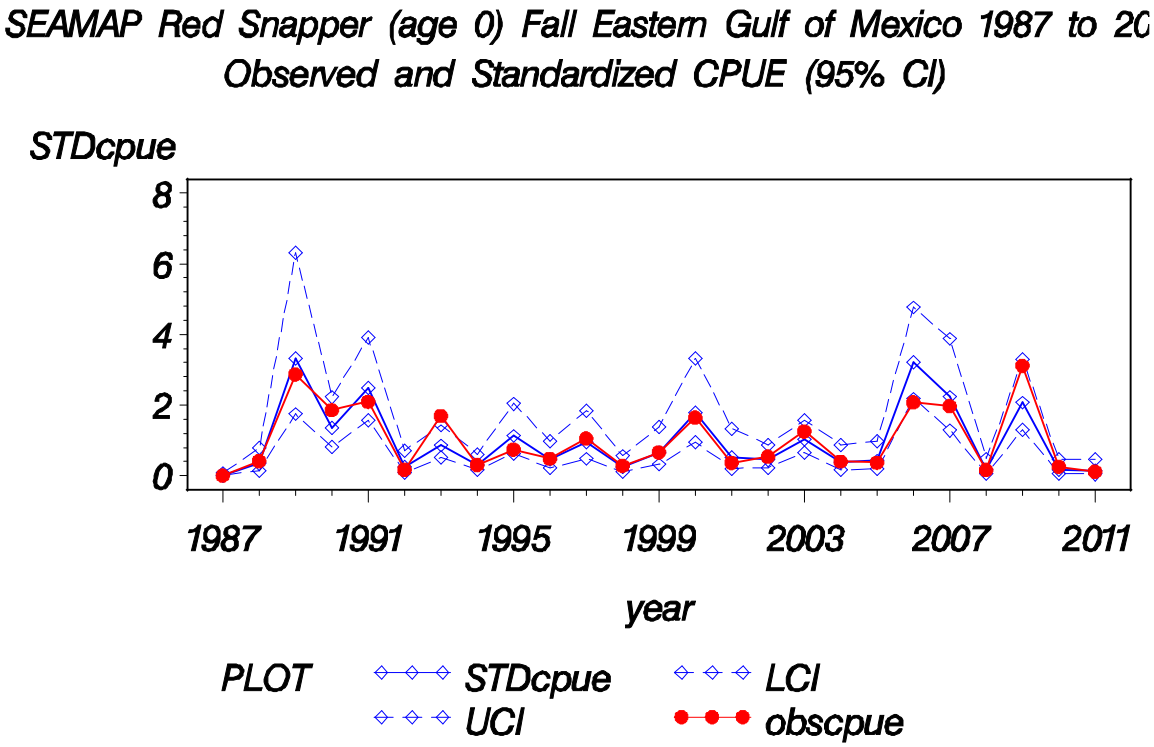


Figure 96. Annual index of abundance for red snapper (EGOM / age 0 / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

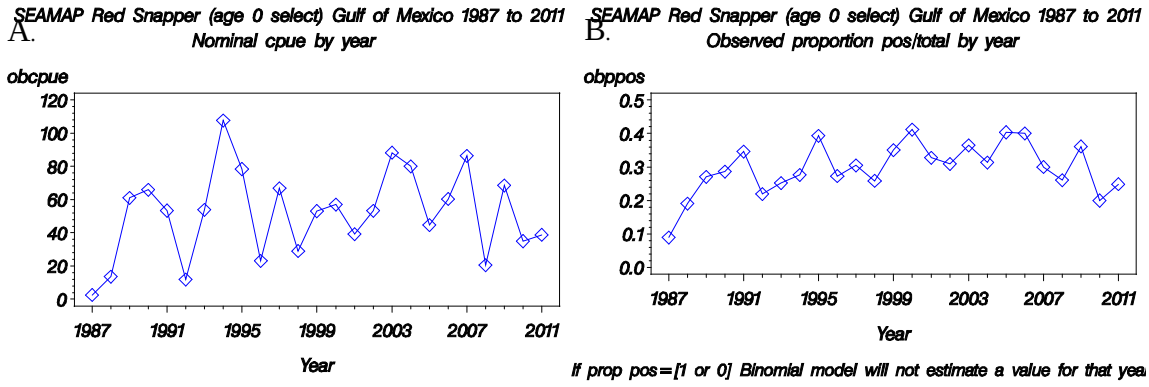


Figure 97. Annual trends for red snapper (GOM / age 0 selectivity) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

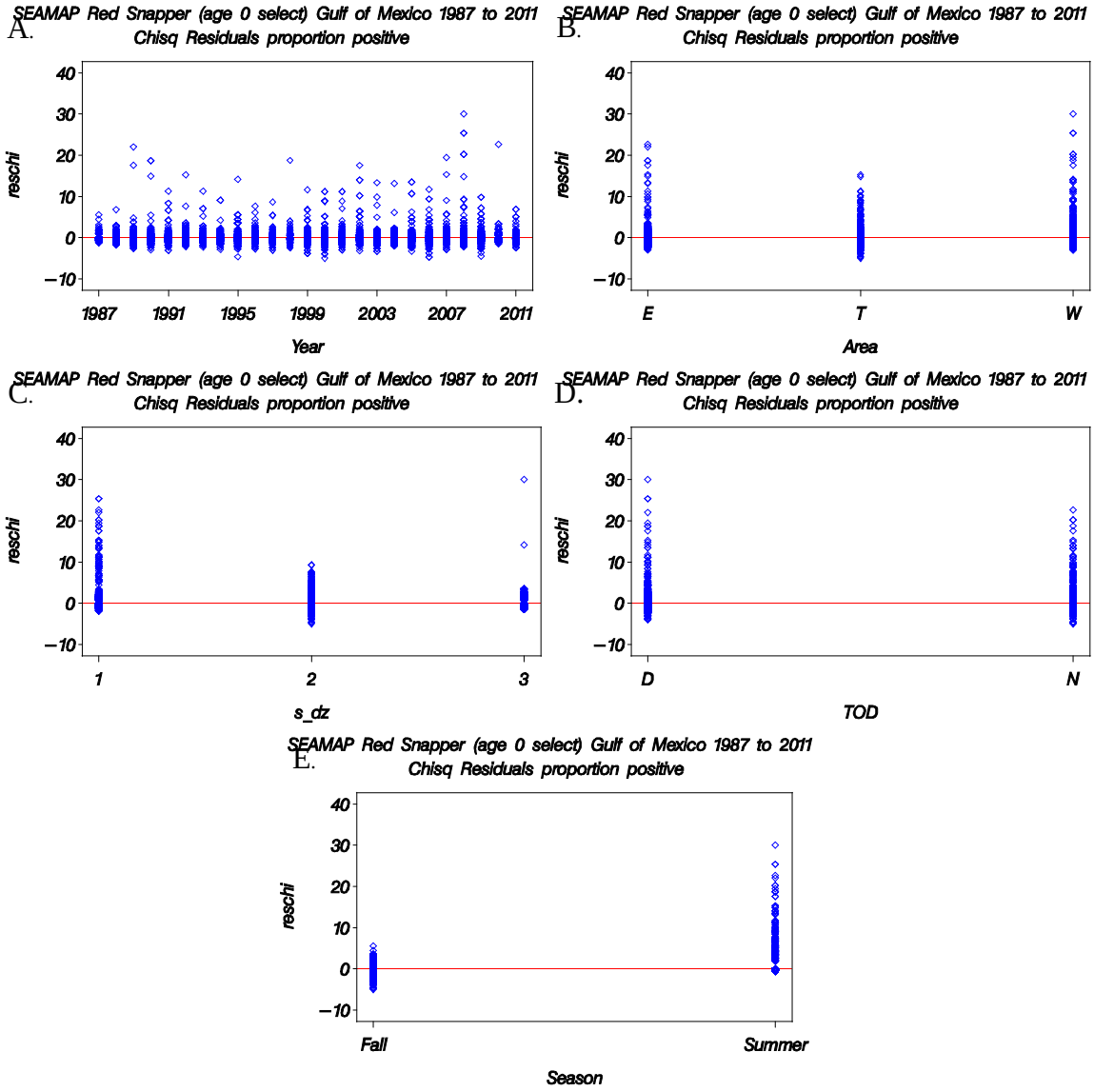


Figure 98. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 selectivity) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-

Square residuals by depth zone, **D.** the Chi-Square residuals by time of day and **E.** the Chi-Square residuals by season.

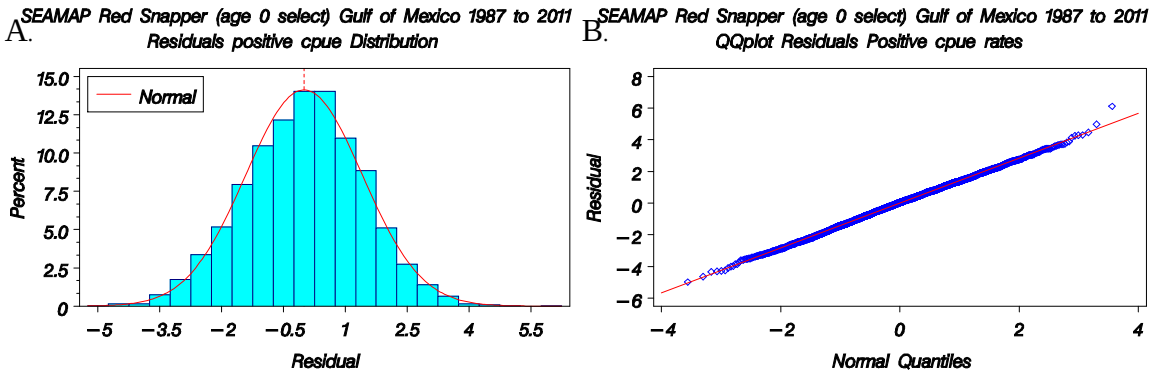


Figure 99. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 selectivity) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

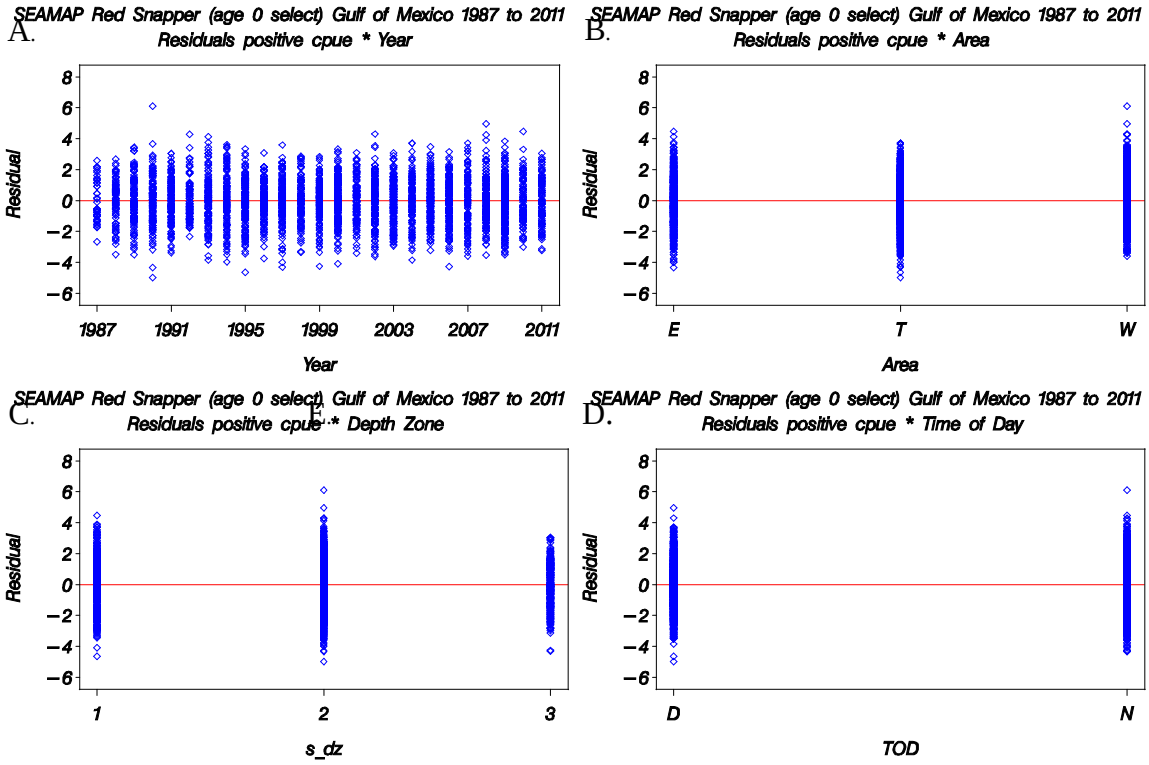


Figure 100. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 selectivity) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D**. the Chi-Square residuals by time of day.

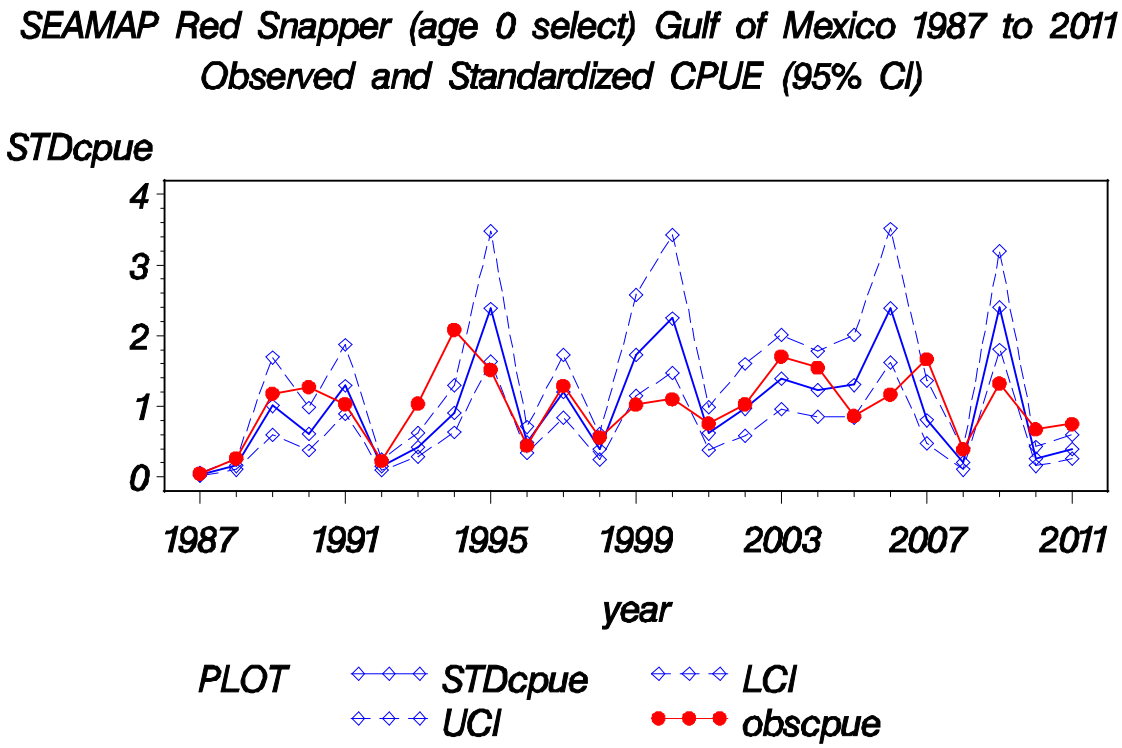


Figure 101. Annual index of abundance for red snapper (GOM / age 0 selectivity) from the SEAMAP Groundfish Survey from 1987 – 2011.

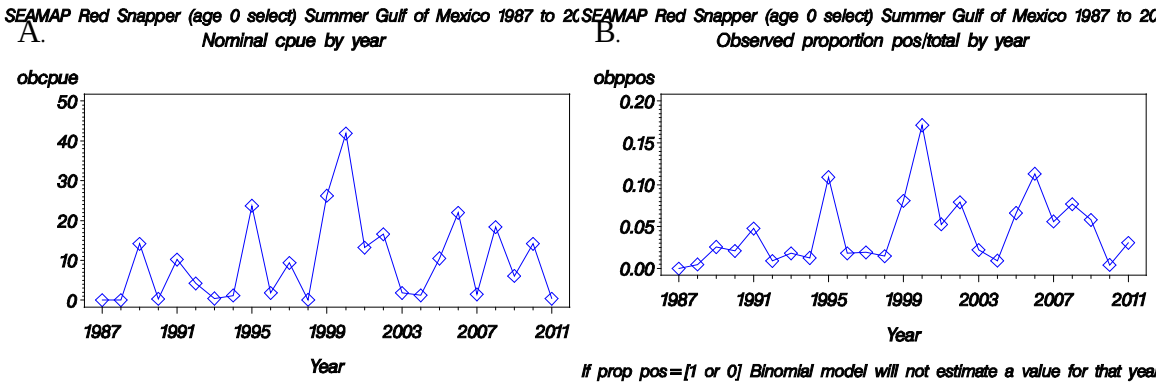


Figure 102. Annual trends for red snapper (GOM / age 0 selectivity / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

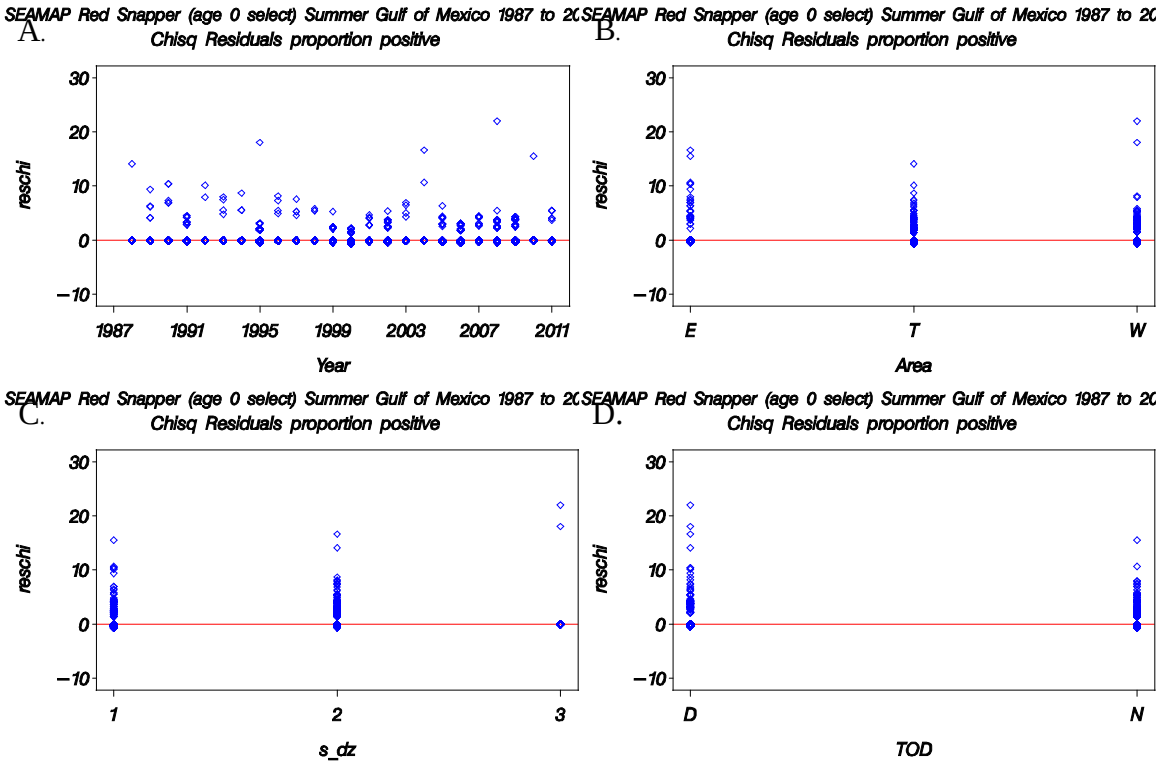


Figure 103. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 selectivity / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.

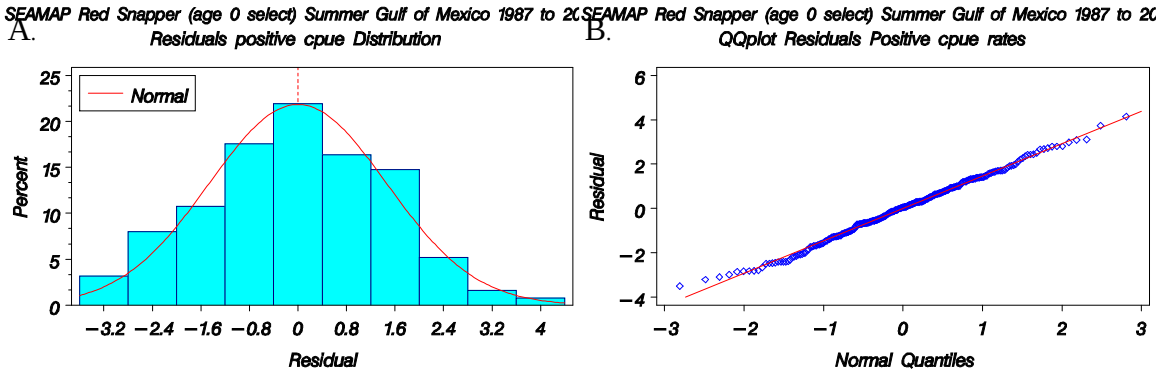


Figure 104. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 selectivity / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

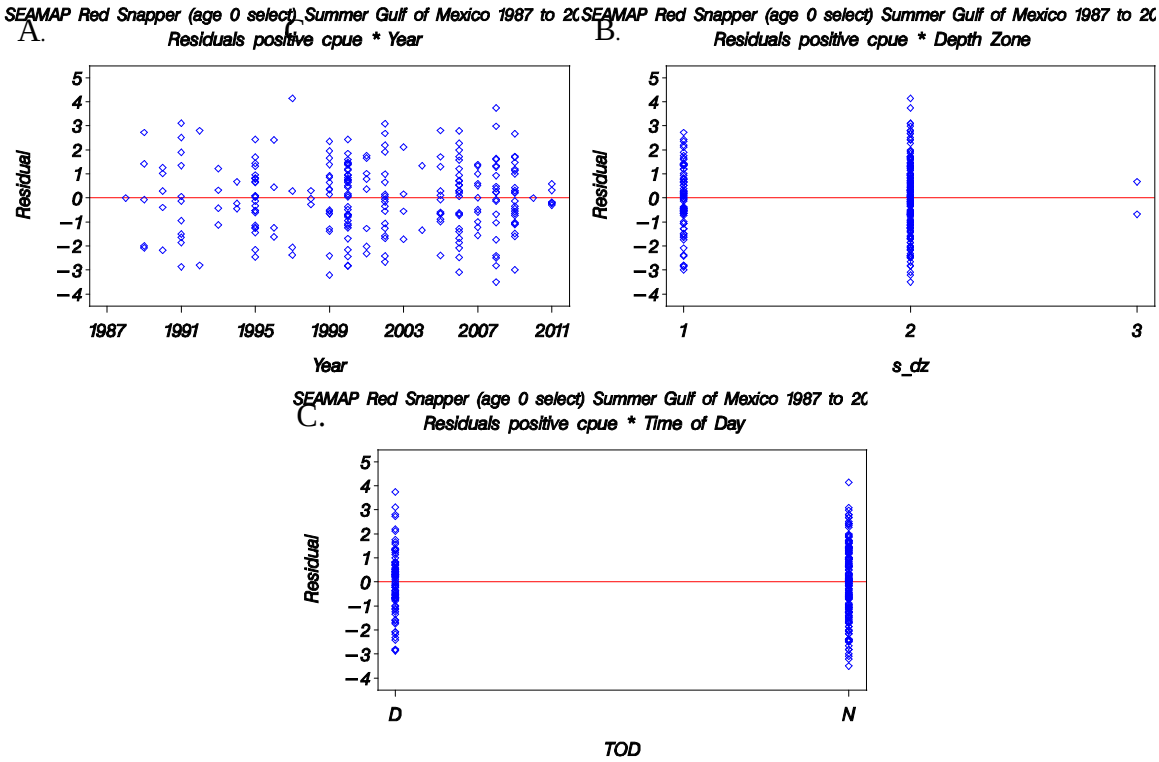


Figure 105. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 selectivity / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

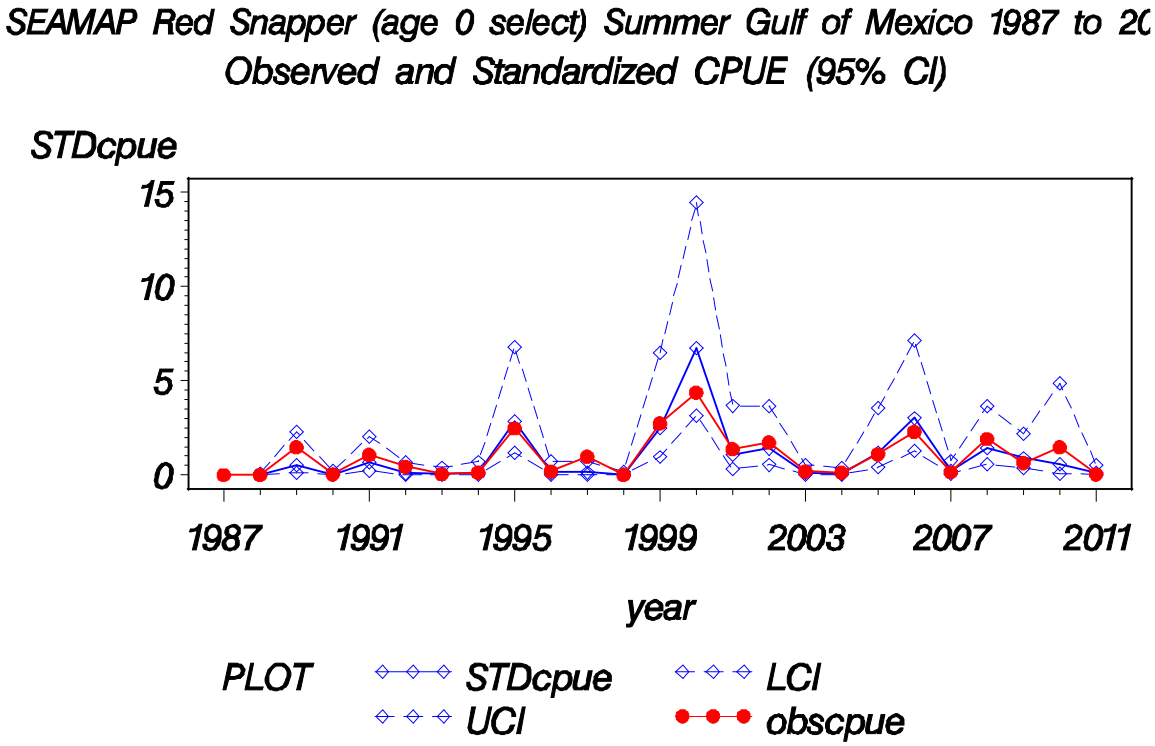


Figure 106. Annual index of abundance for red snapper (GOM / age 0 selectivity / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

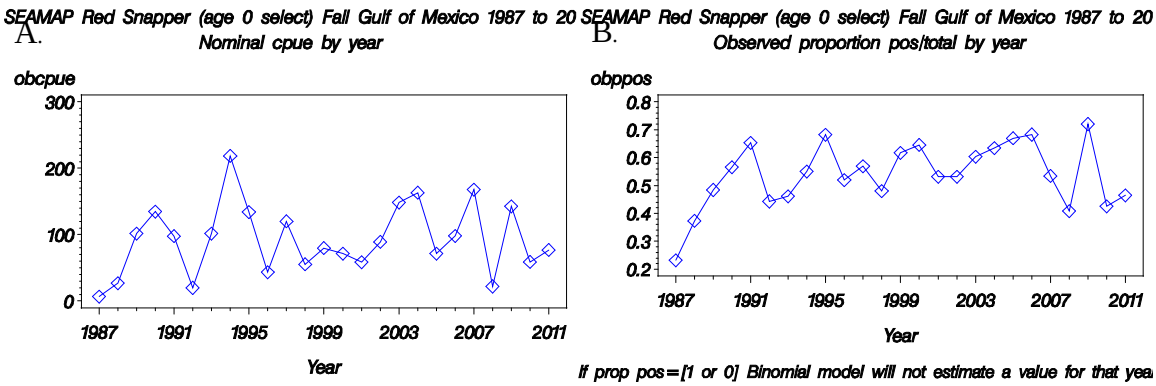


Figure 107. Annual trends for red snapper (GOM / age 0 selectivity / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

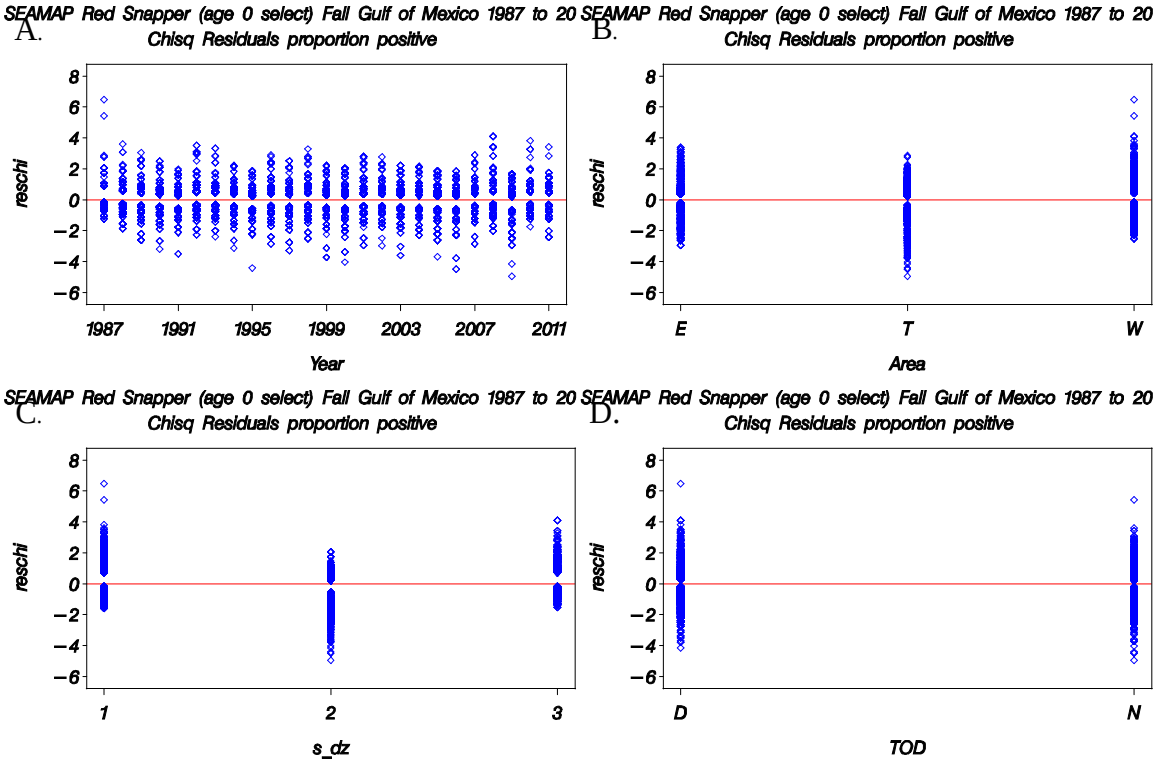


Figure 108. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 selectivity / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.

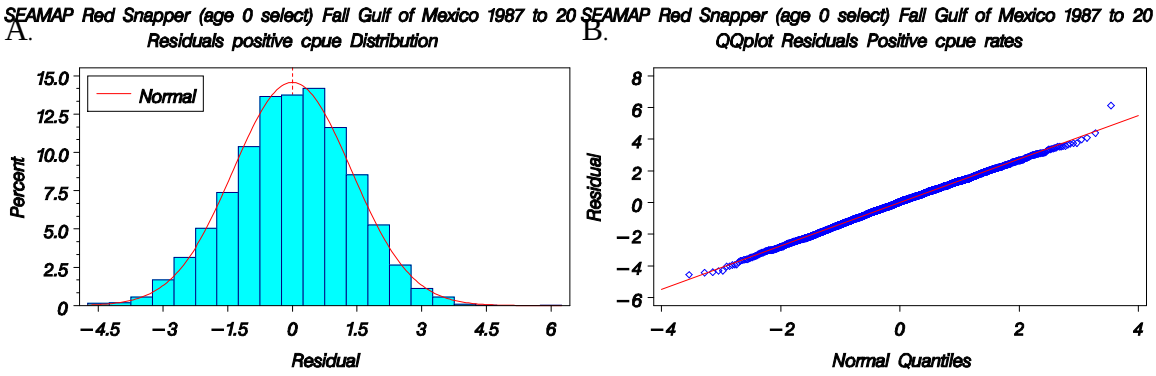


Figure 109. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 selectivity / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

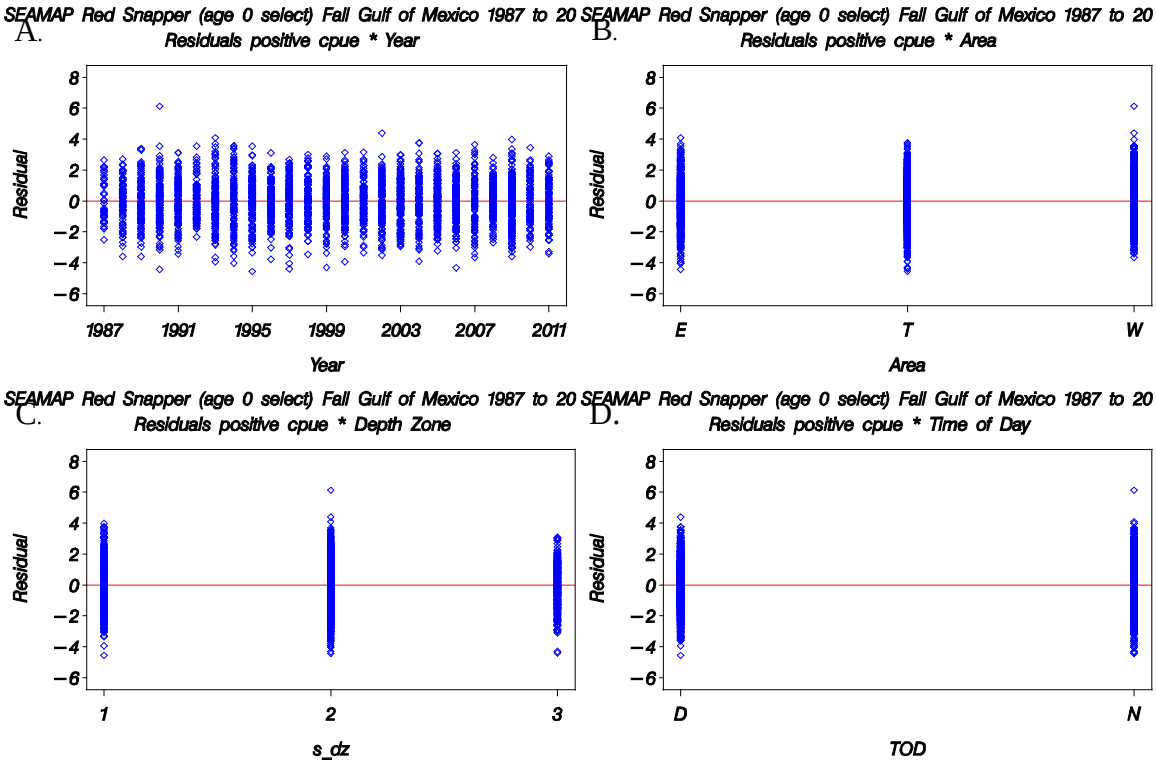


Figure 110. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 0 selectivity / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D**. the Chi-Square residuals by time of day.

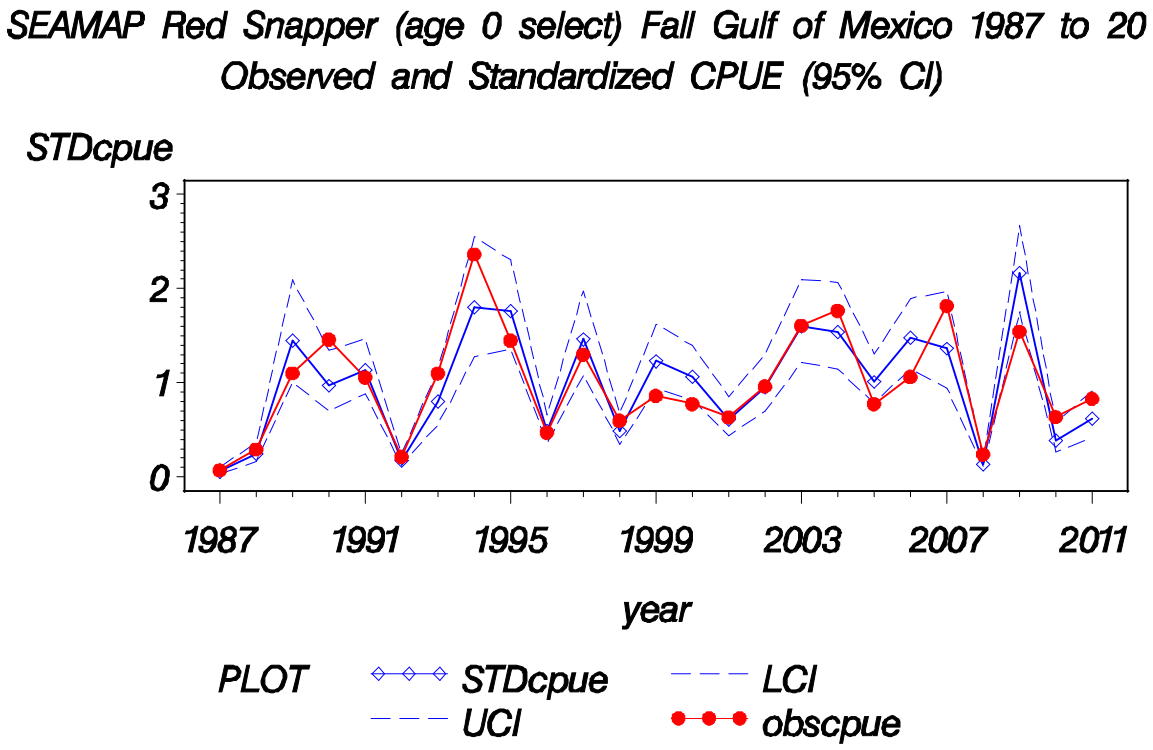


Figure 111. Annual index of abundance for red snapper (GOM / age 0 selectivity / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

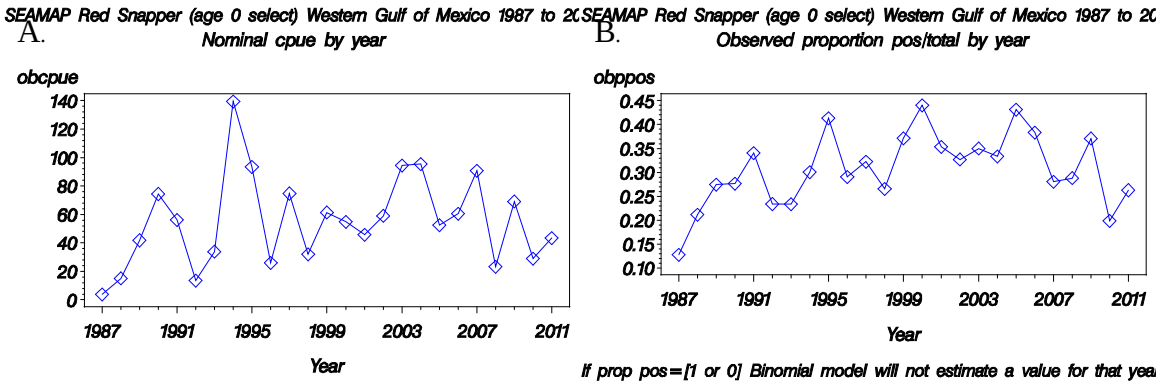


Figure 112. Annual trends for red snapper (WGOM / age 0 selectivity) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

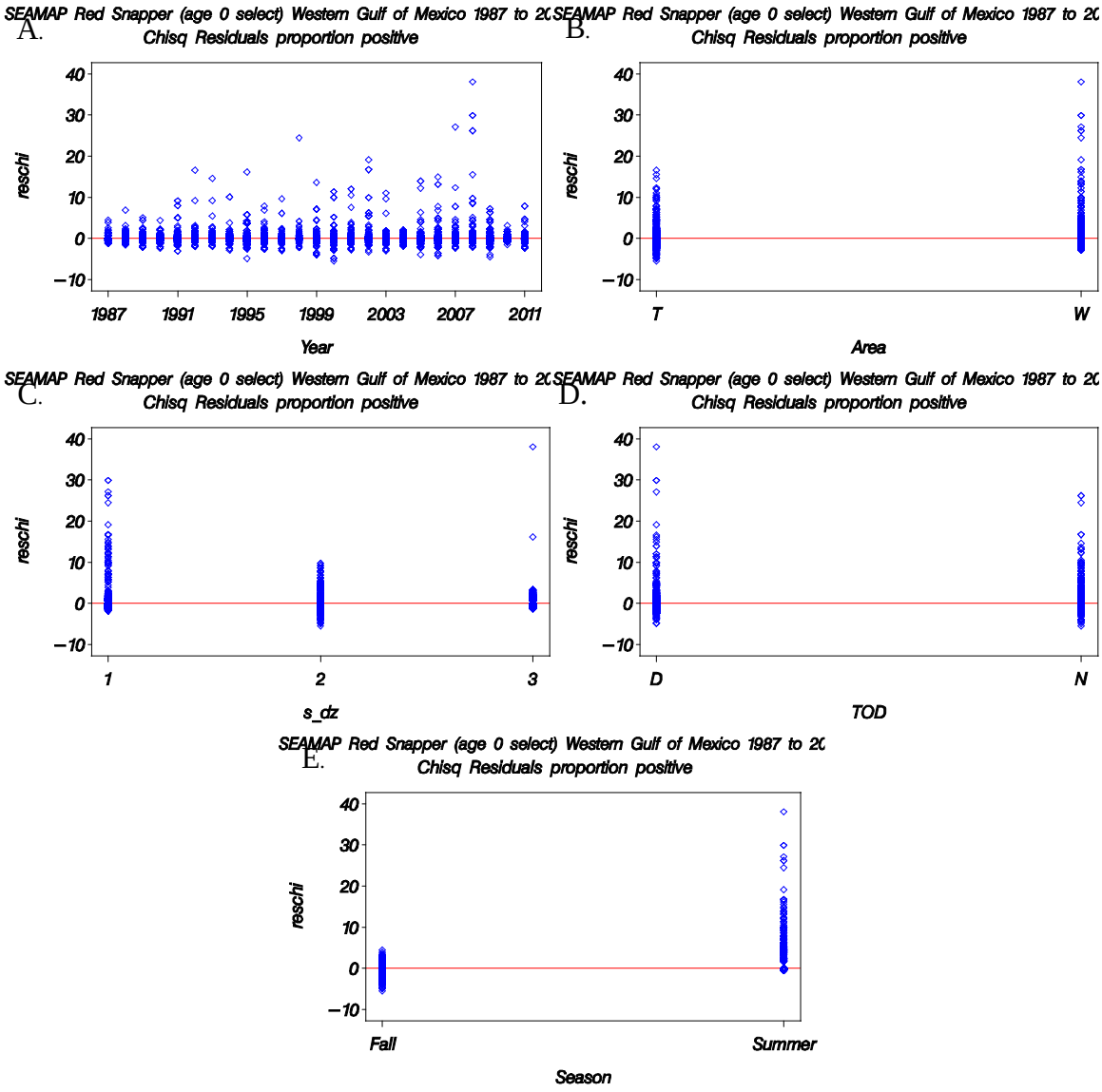


Figure 113. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 selectivity) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone, **D.** the Chi-Square residuals by time of day and **E.** the Chi-Square residuals by season.

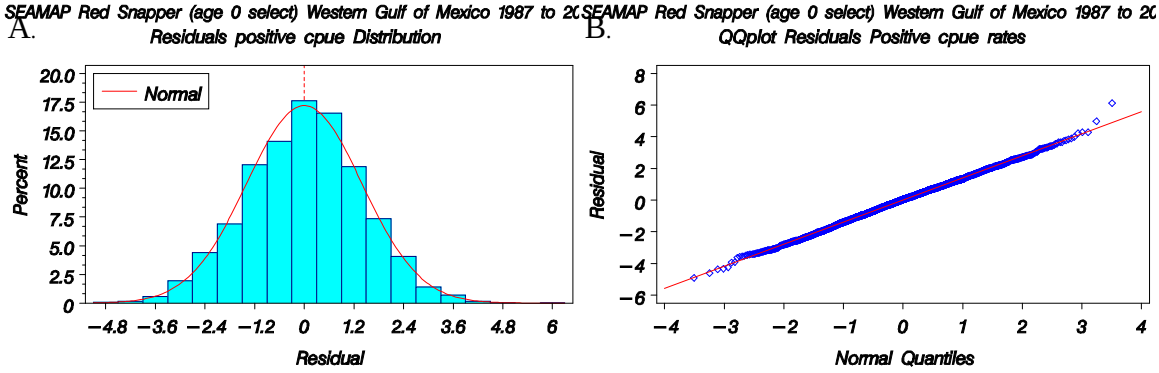


Figure 114. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 selectivity) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

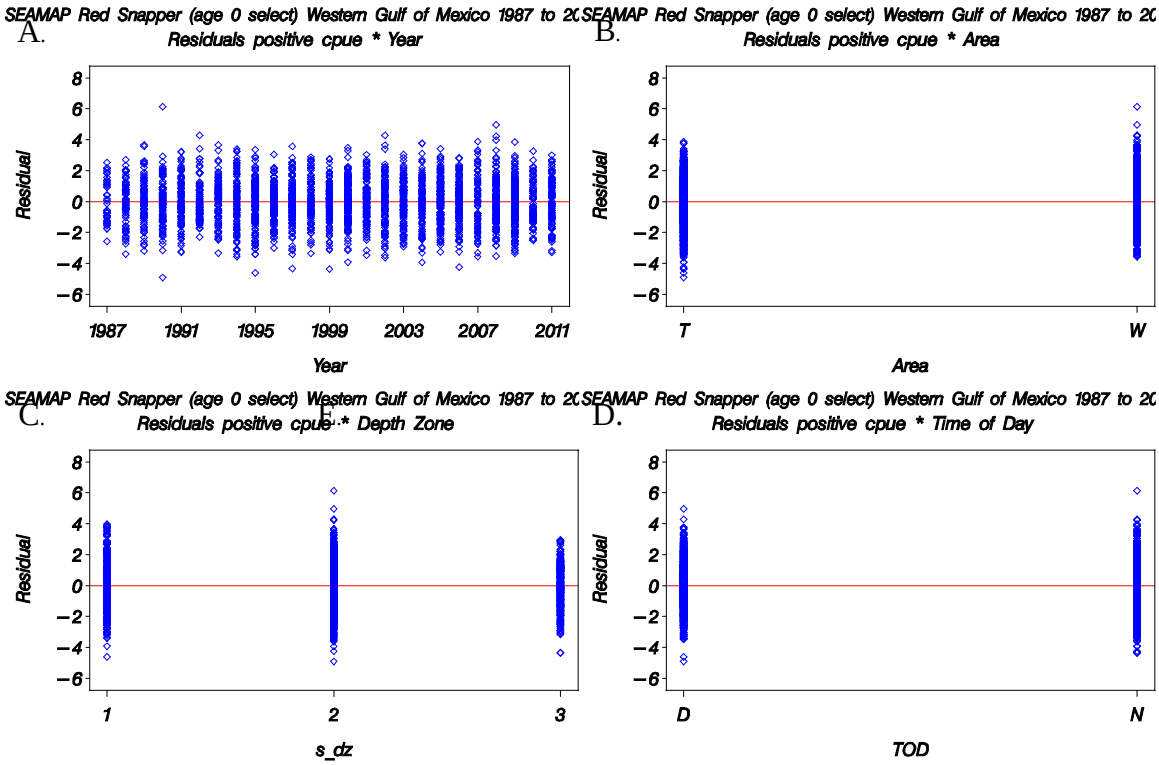


Figure 115. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 selectivity) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D**. the Chi-Square residuals by time of day.

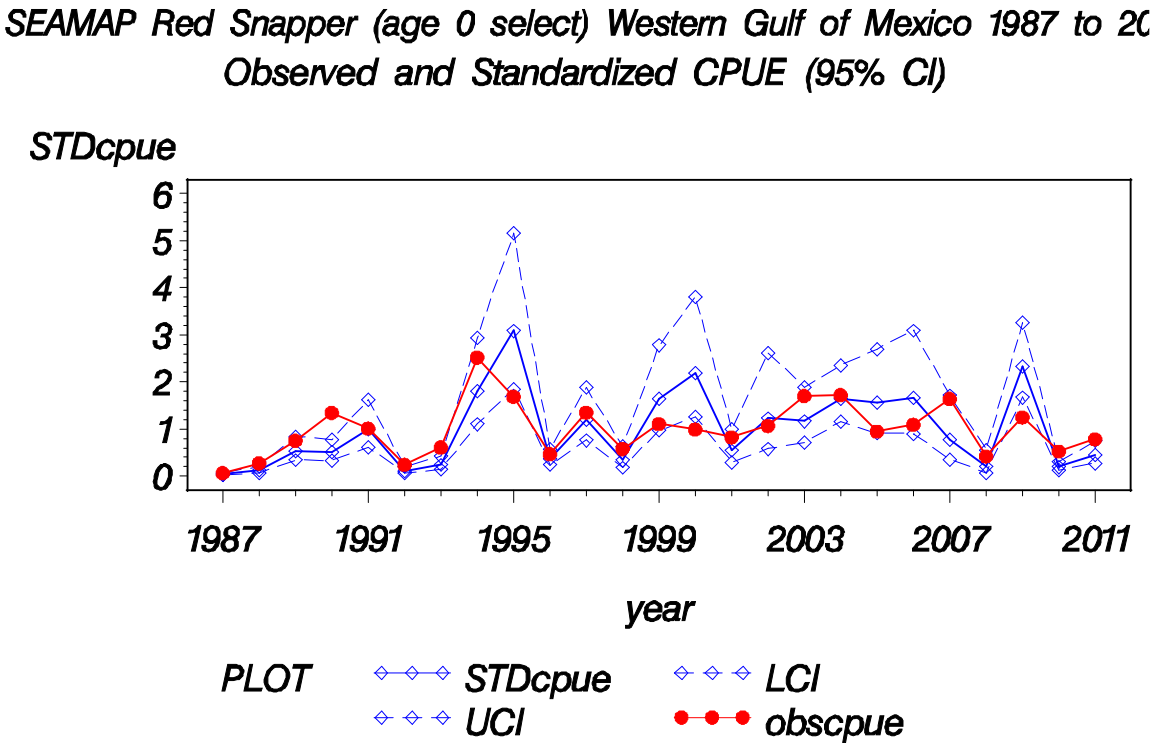


Figure 116. Annual index of abundance for red snapper (WGOM / age 0 selectivity) from the SEAMAP Groundfish Survey from 1987 – 2011.

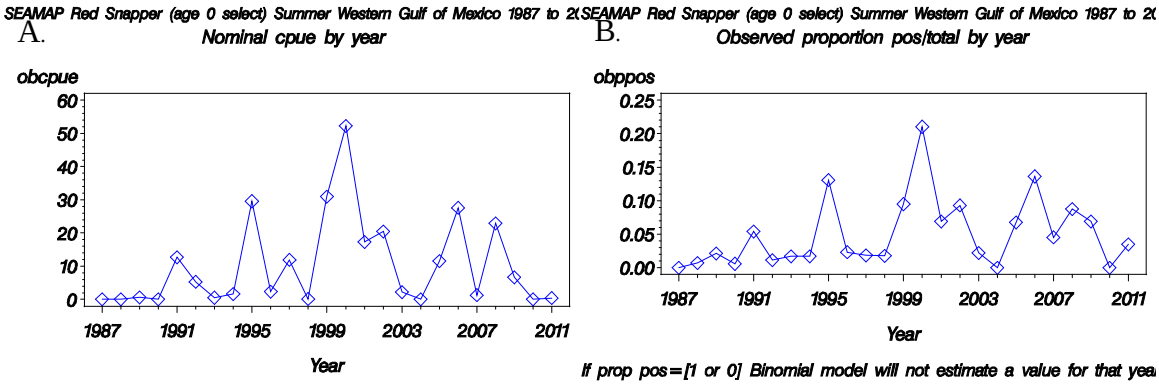


Figure 117. Annual trends for red snapper (WGOM / age 0 selectivity / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

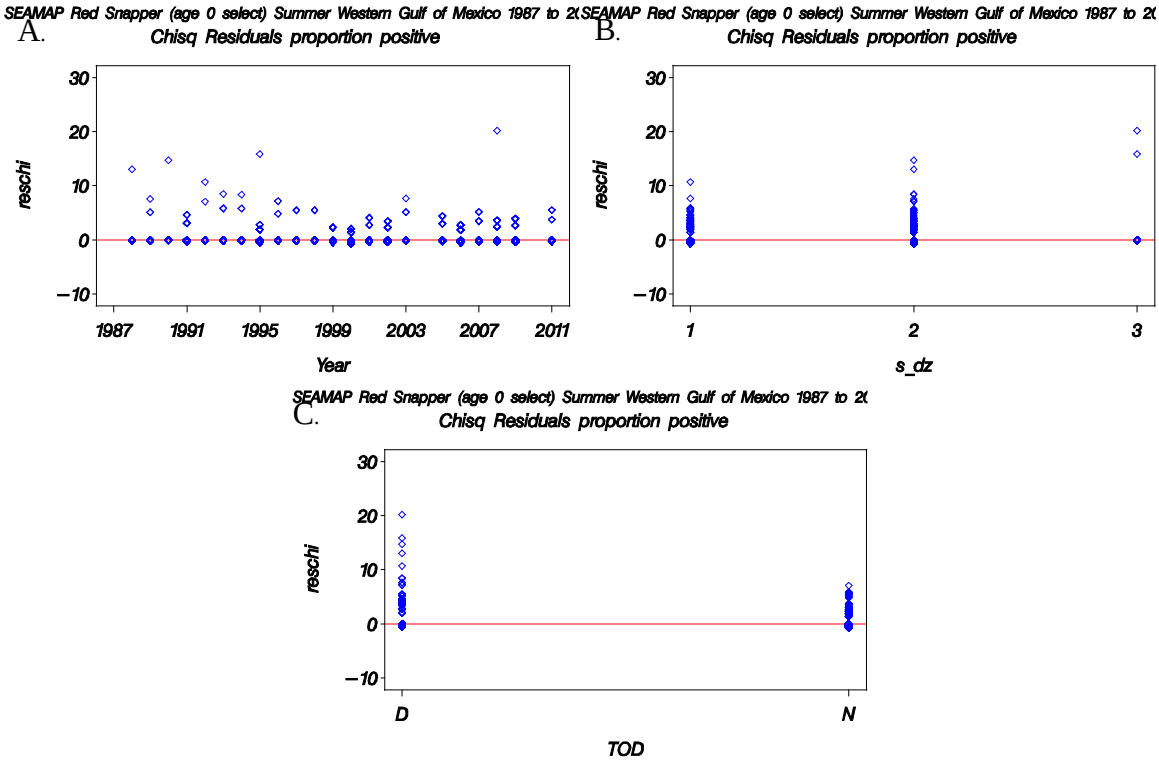


Figure 118. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 selectivity / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

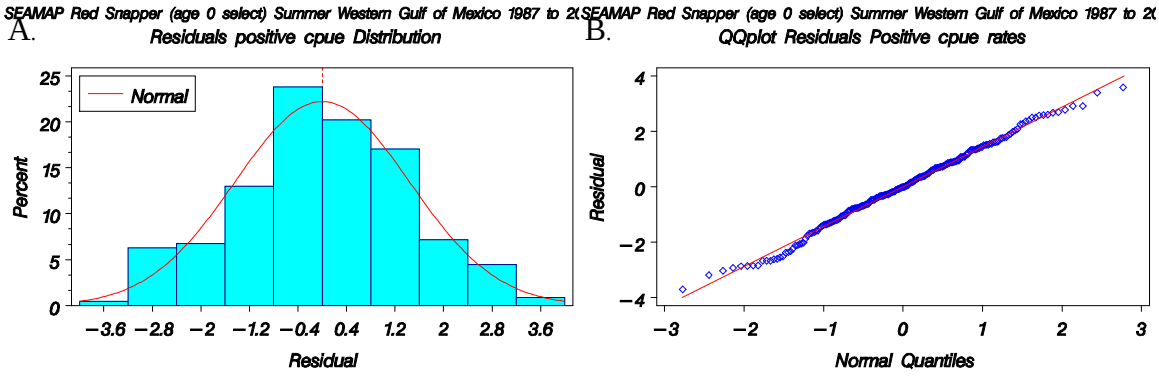


Figure 119. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 selectivity / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

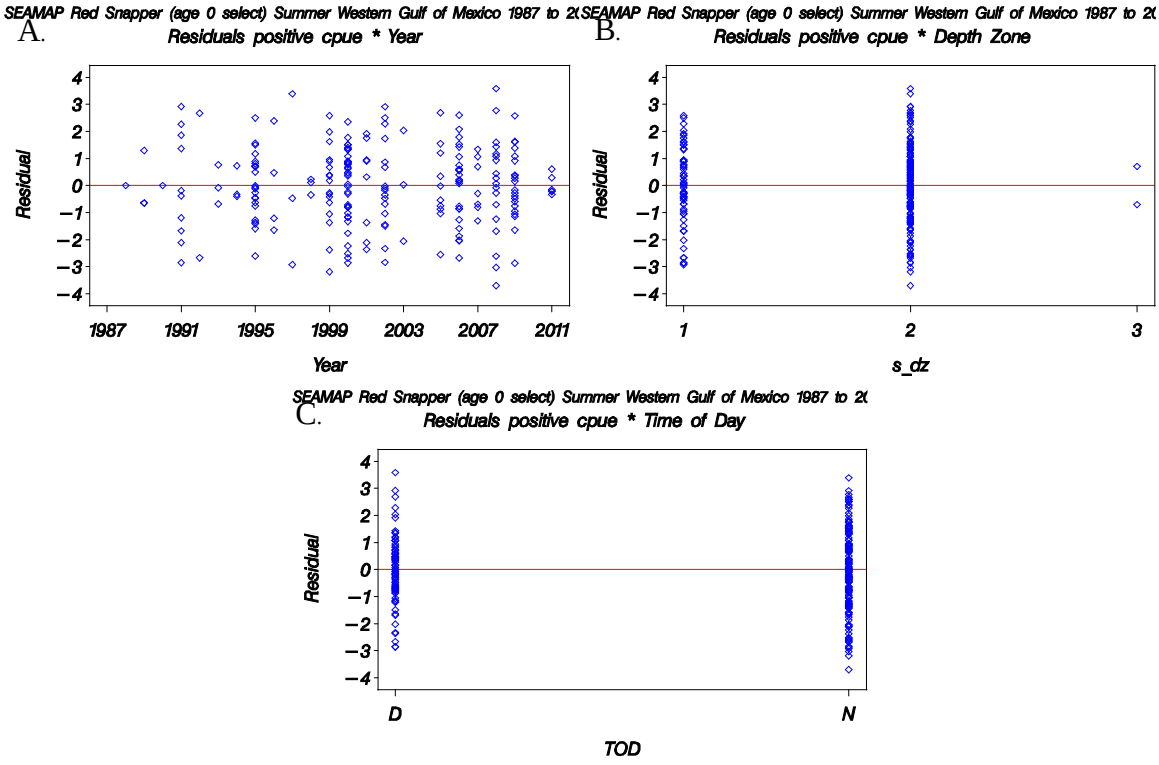


Figure 120. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 selectivity / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

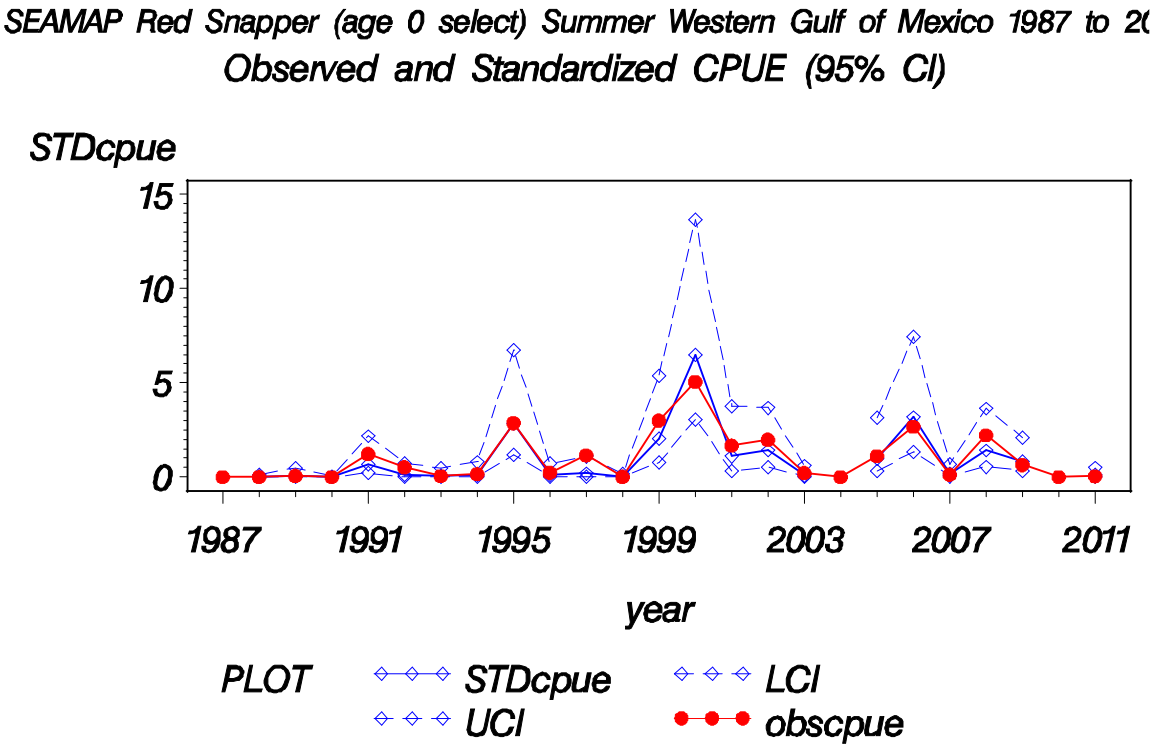


Figure 121. Annual index of abundance for red snapper (WGOM / age 0 selectivity / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

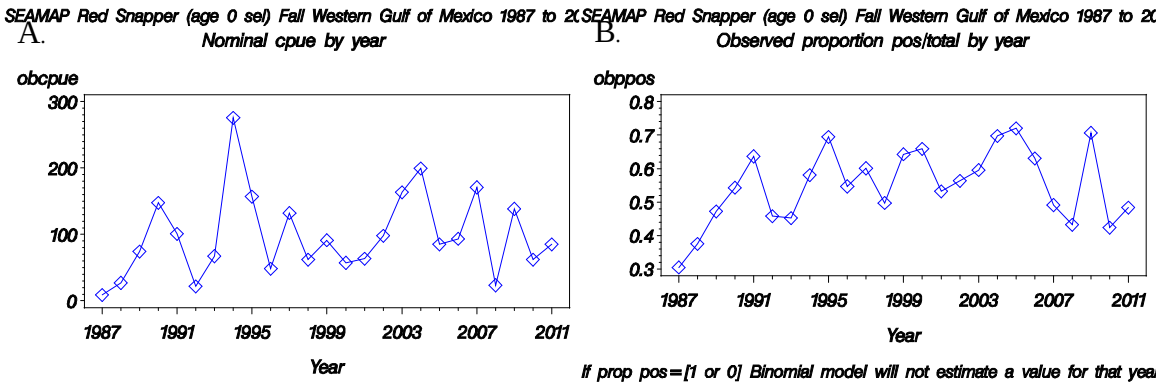


Figure 122. Annual trends for red snapper (WGOM / age 0 selectivity / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

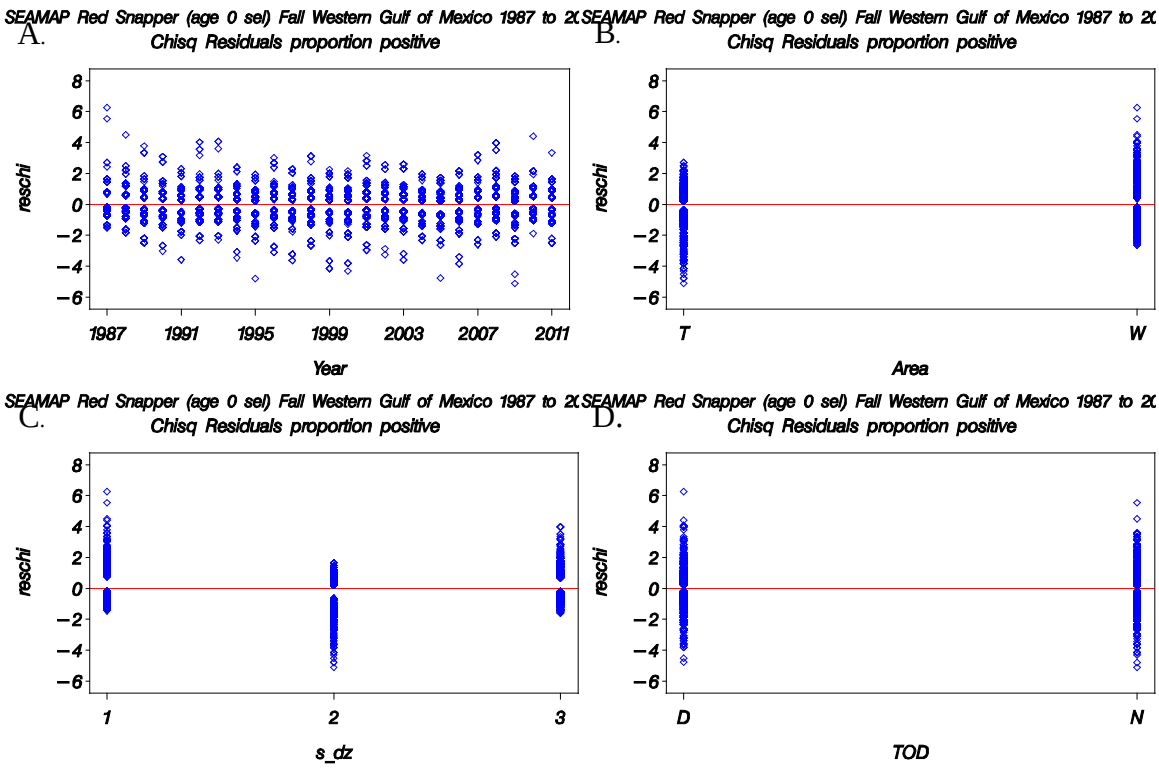


Figure 123. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 selectivity / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.

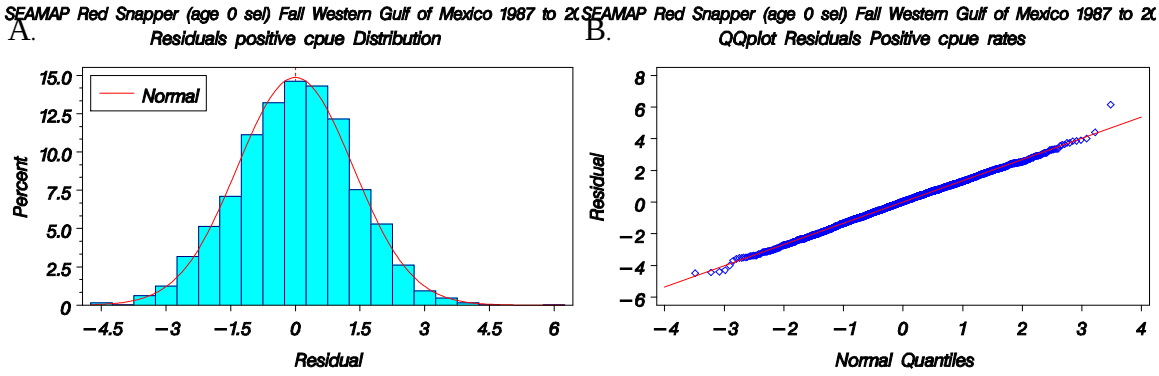


Figure 124. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 selectivity / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

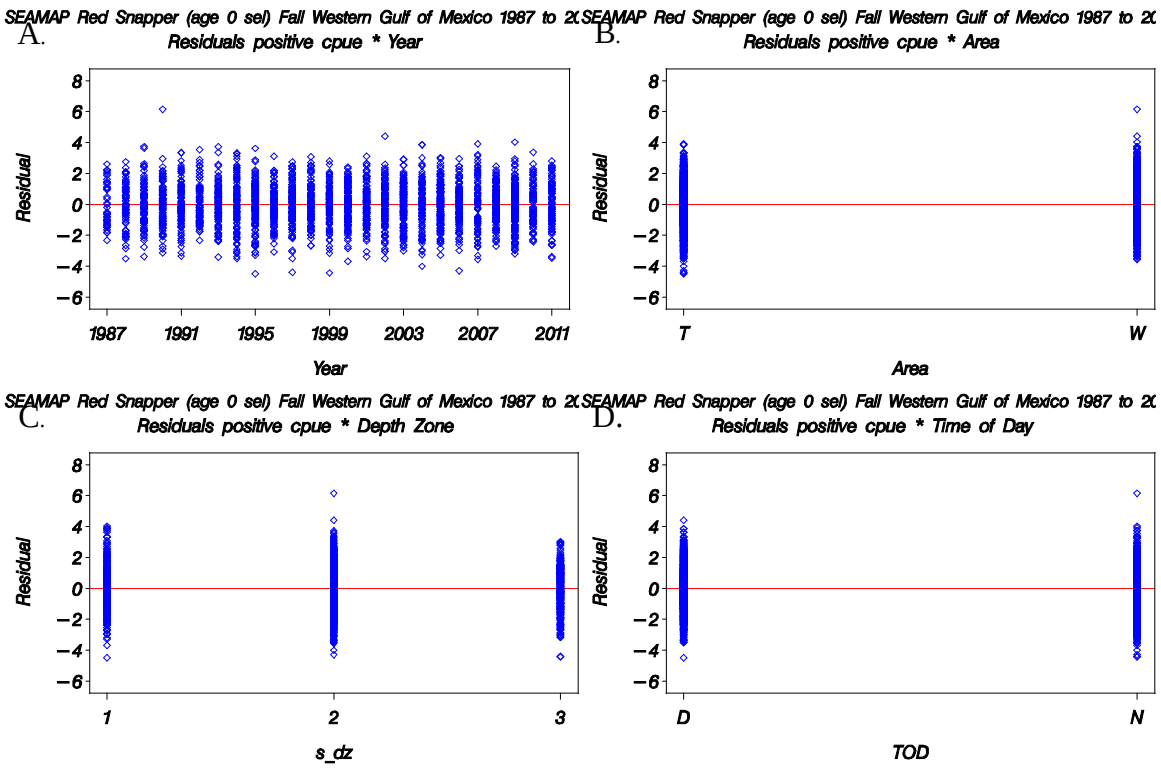


Figure 125. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 0 selectivity / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D**. the Chi-Square residuals by time of day.

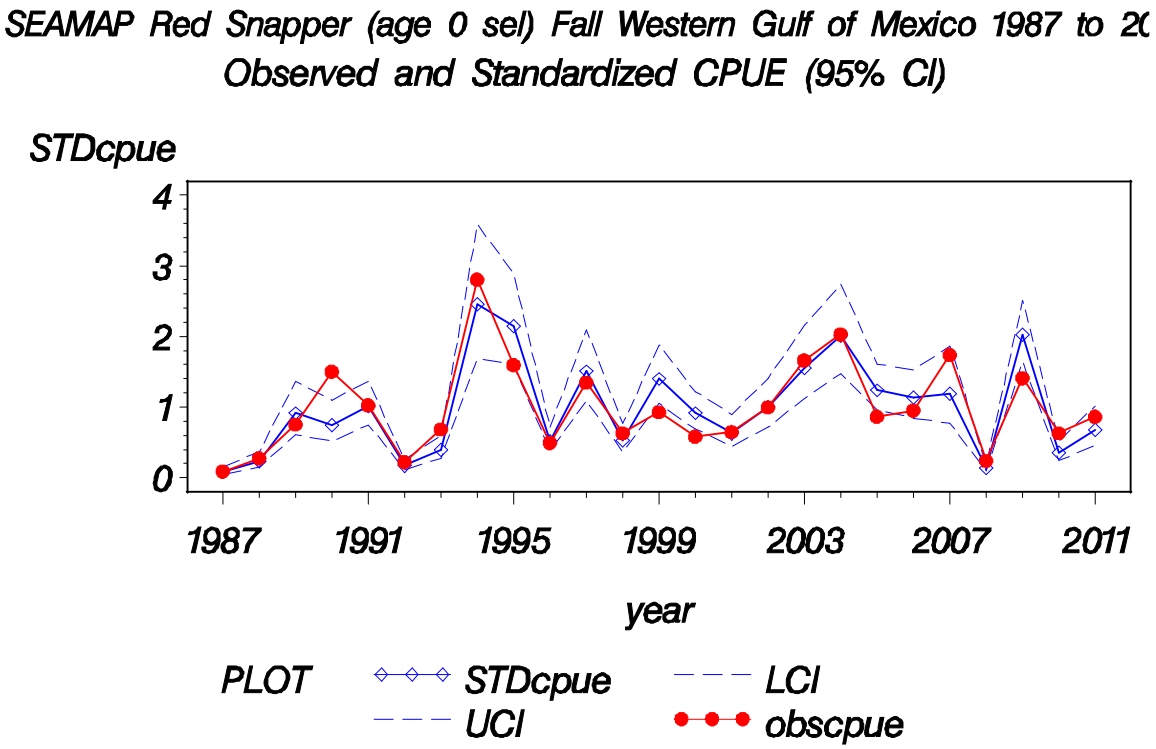


Figure 126. Annual index of abundance for red snapper (WGOM / age 0 selectivity / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

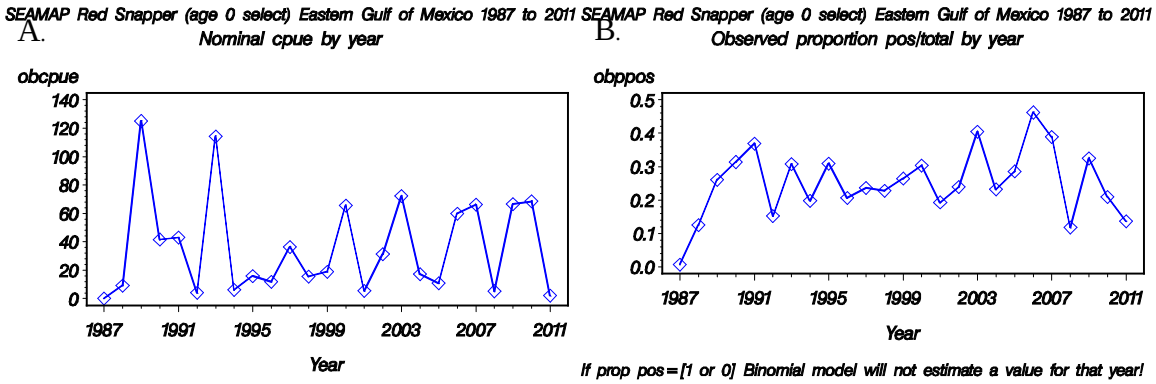


Figure 127. Annual trends for red snapper (EGOM / age 0 selectivity) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

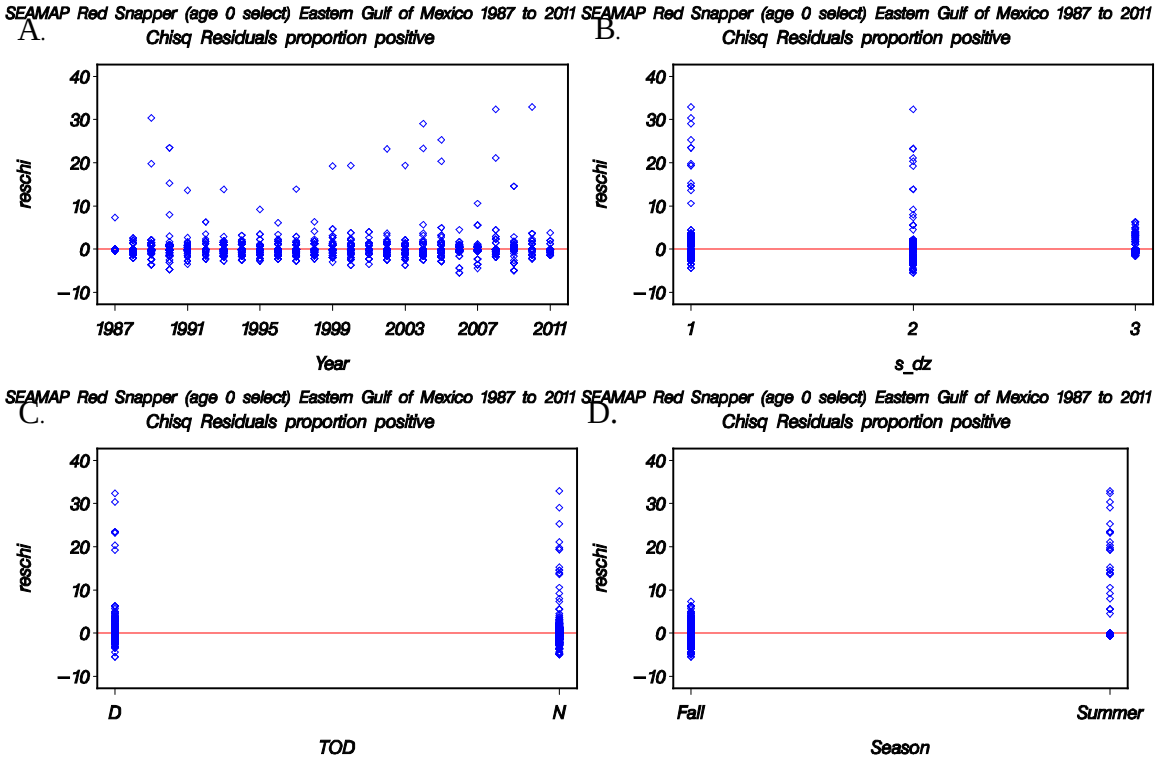


Figure 128. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 selectivity) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone, **C.** the Chi-Square residuals by time of day and **D.** the Chi-Square residuals by season.

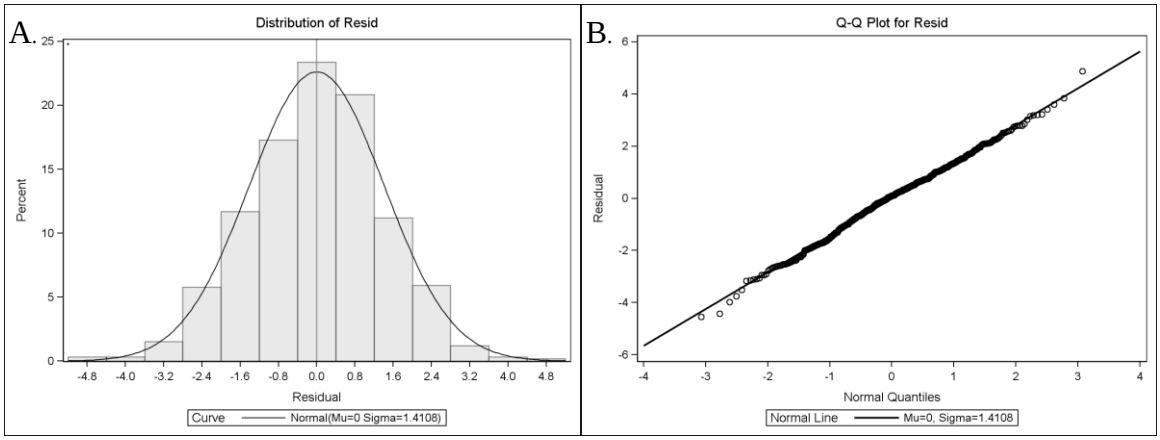


Figure 129. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 selectivity) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

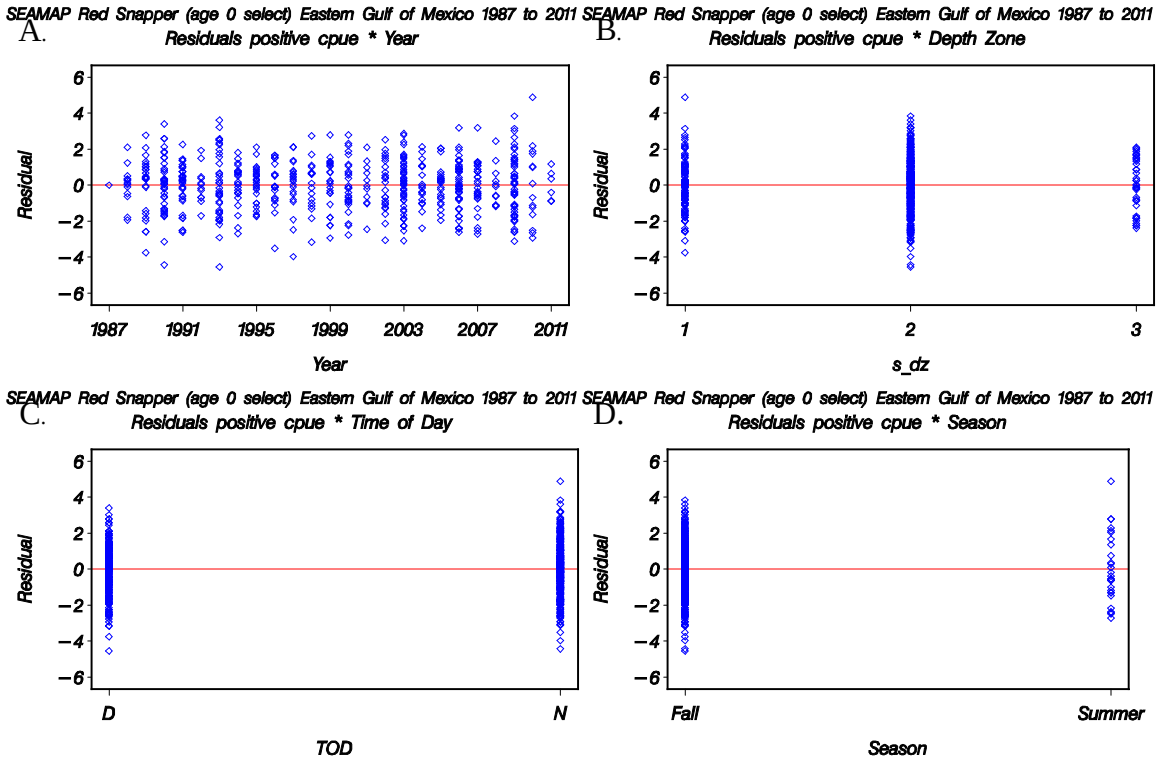


Figure 130. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 selectivity) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone, **C.** the Chi-Square residuals by time of day and **D.** the Chi-Square residuals by season.

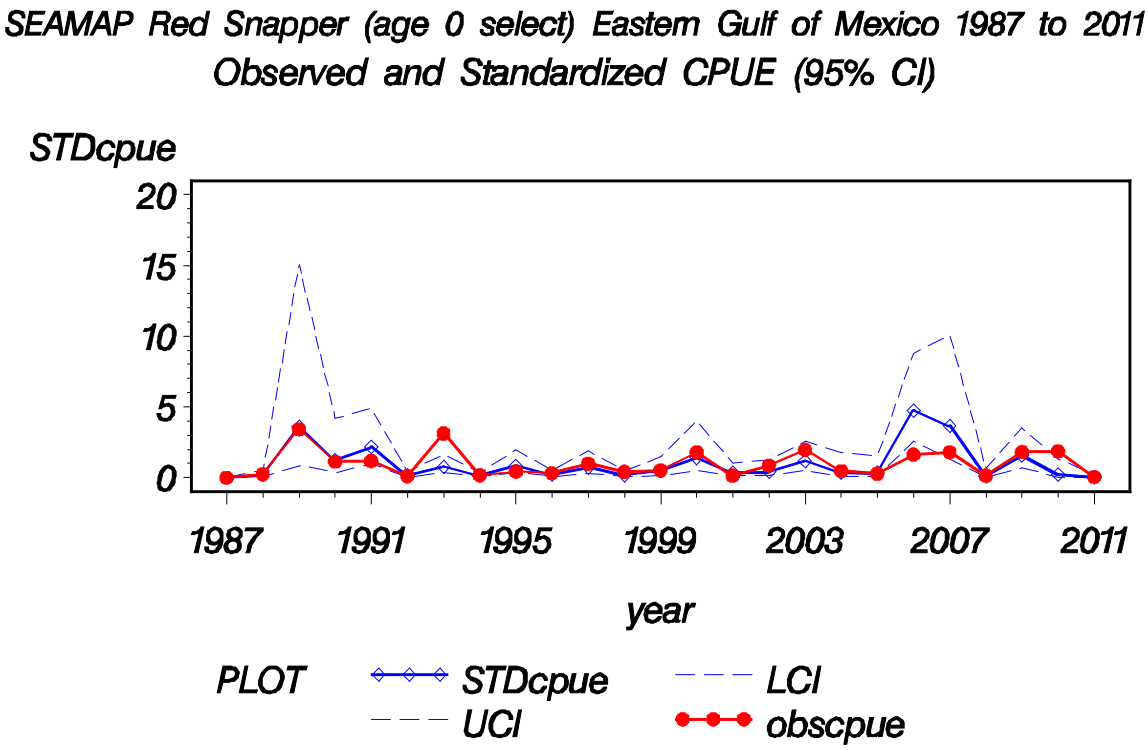


Figure 131. Annual index of abundance for red snapper (EGOM / age 0 selectivity) from the SEAMAP Groundfish Survey from 1987 – 2011.

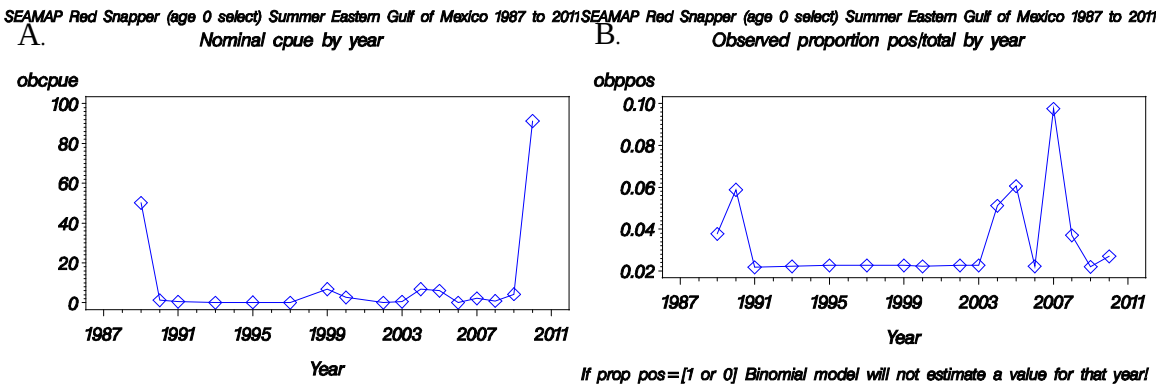


Figure 132. Annual trends for red snapper (EGOM / age 0 selectivity / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

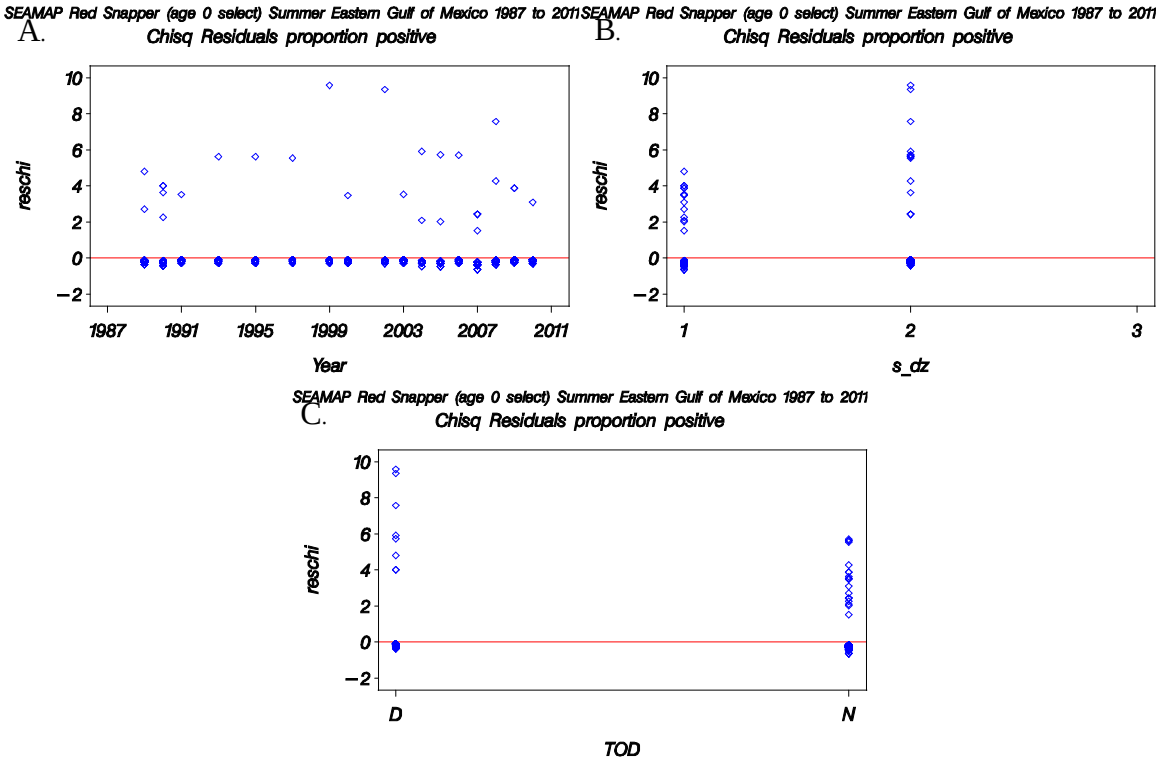


Figure 133. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 selectivity / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

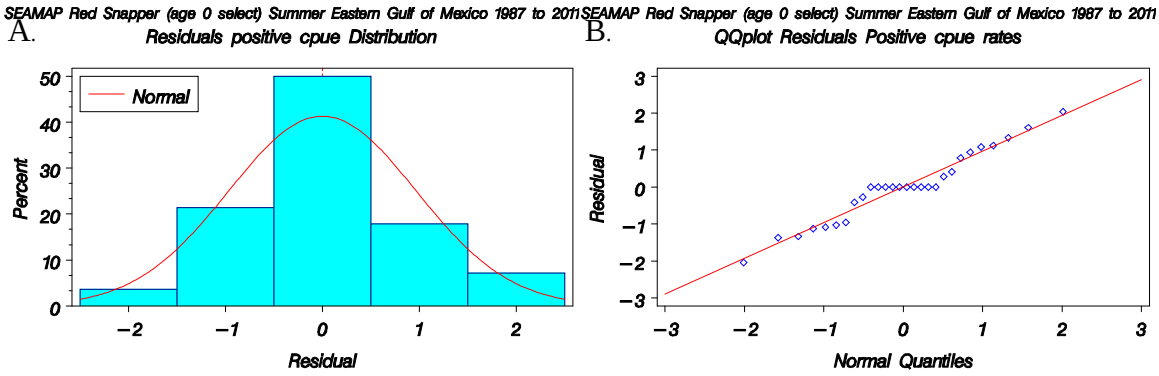


Figure 134. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 selectivity / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

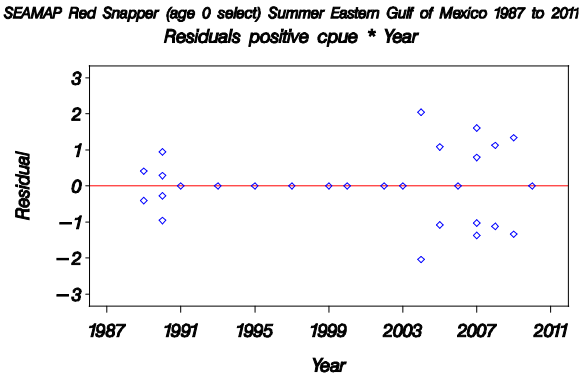


Figure 135. Diagnostic plot for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 selectivity / Summer) model: the Chi-Square residuals by year.

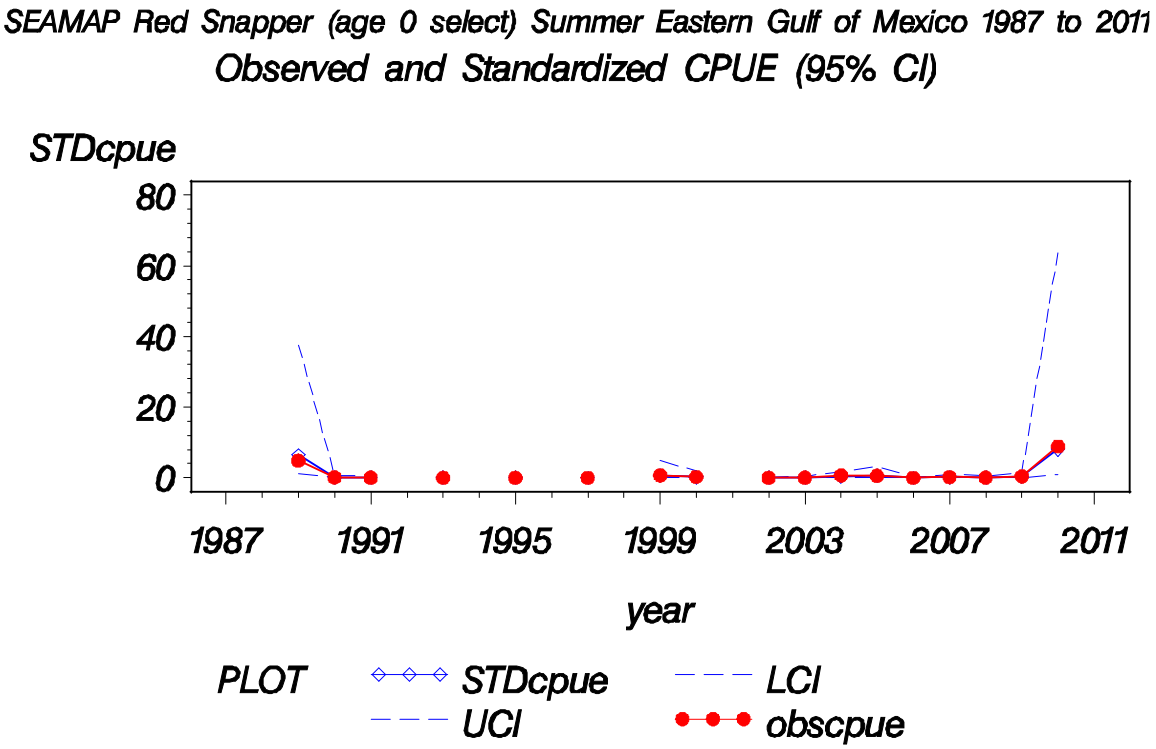


Figure 136. Annual index of abundance for red snapper (EGOM / age 0 selectivity / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

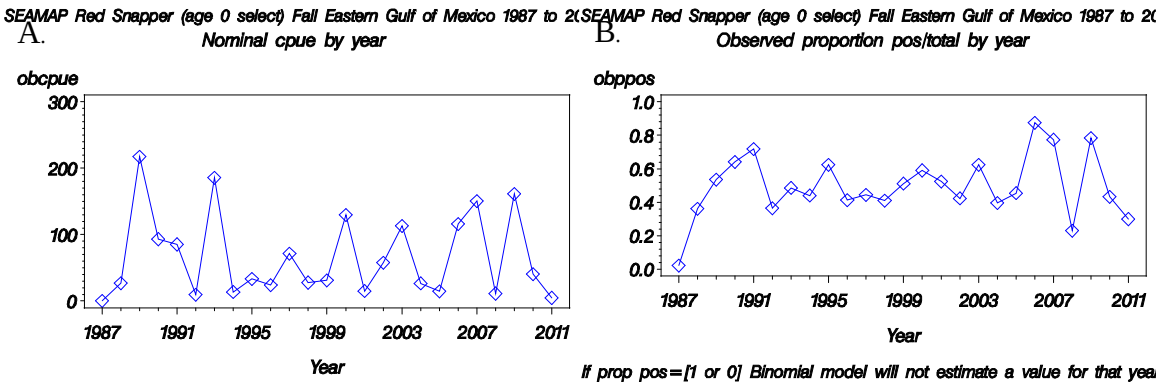


Figure 137. Annual trends for red snapper (EGOM / age 0 selectivity / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

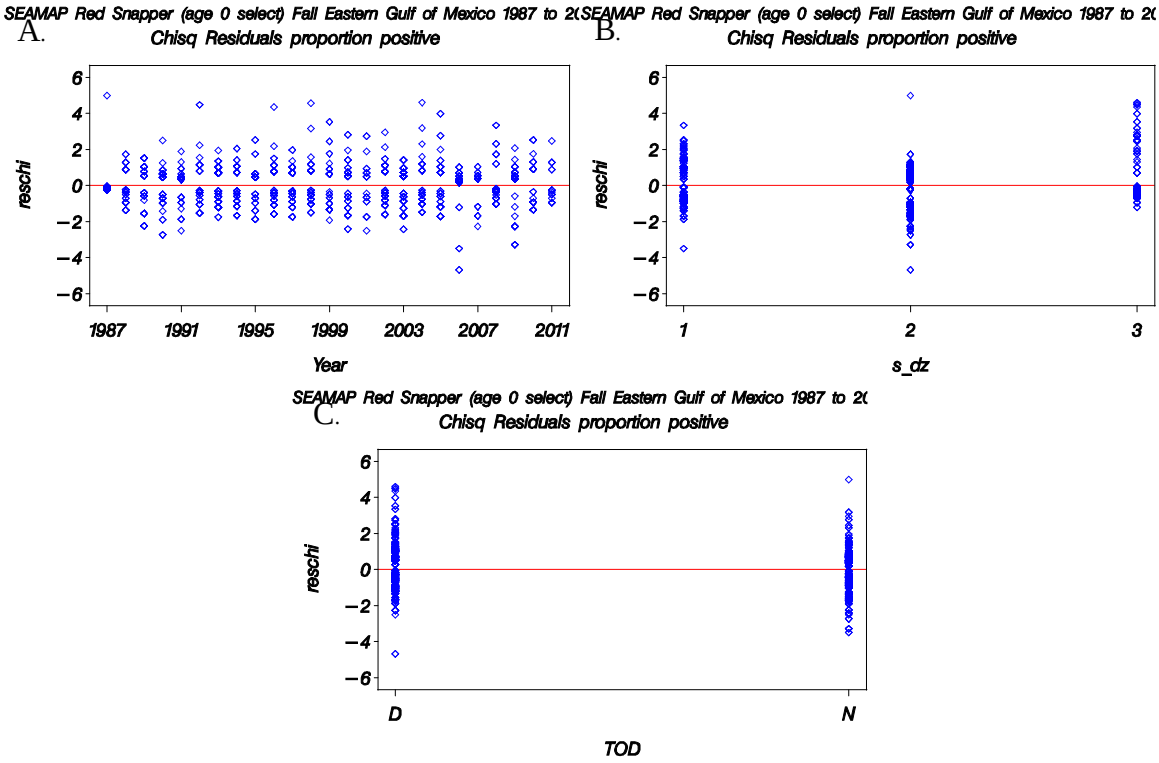


Figure 138. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 selectivity / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

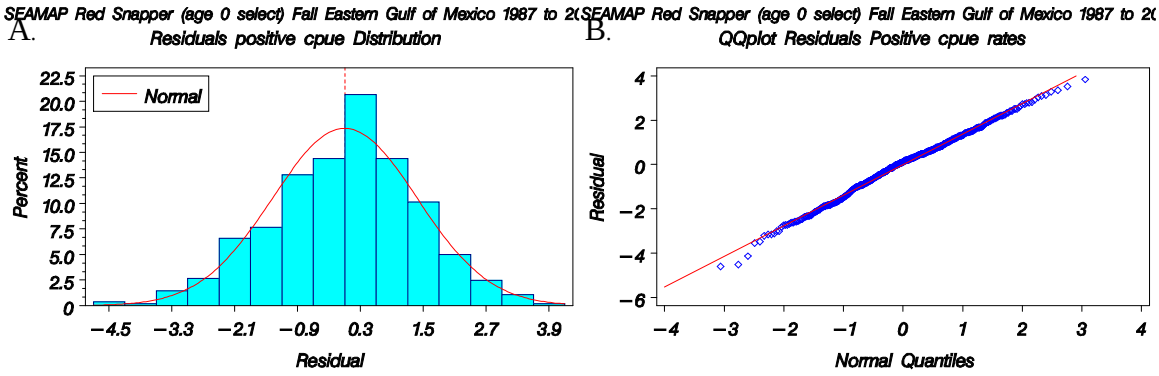


Figure 139. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 selectivity / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

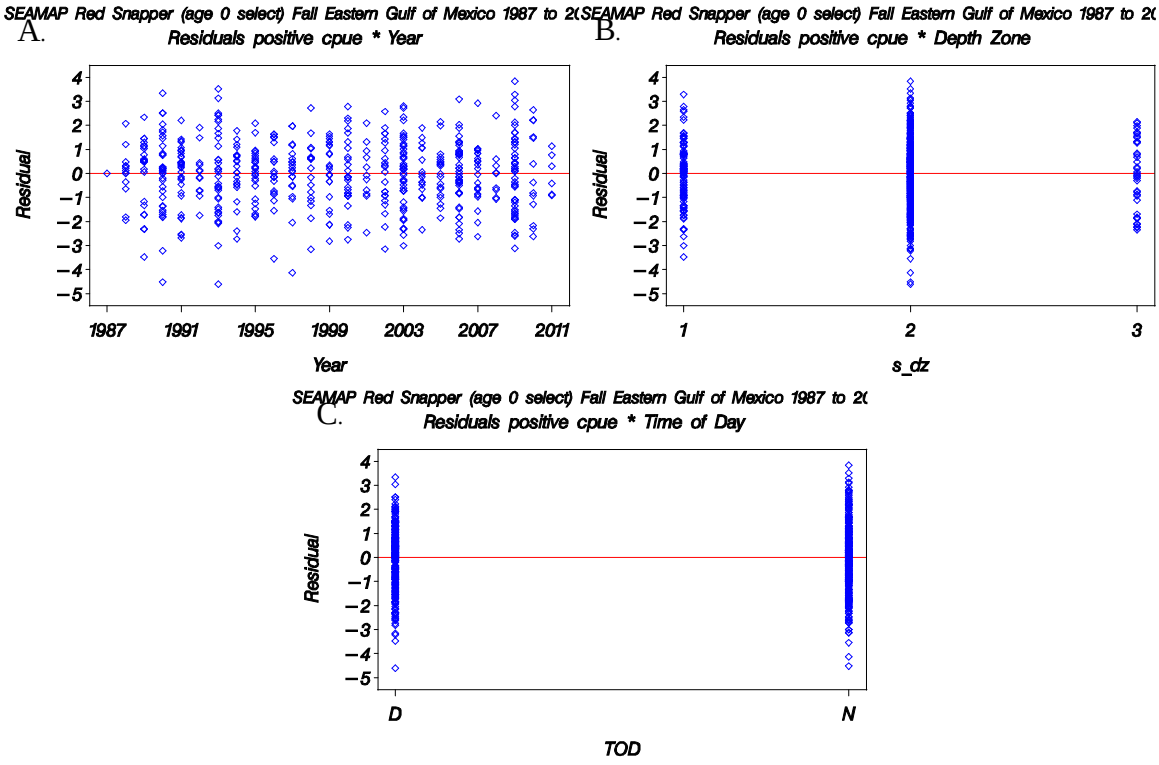


Figure 140. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 0 selectivity / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

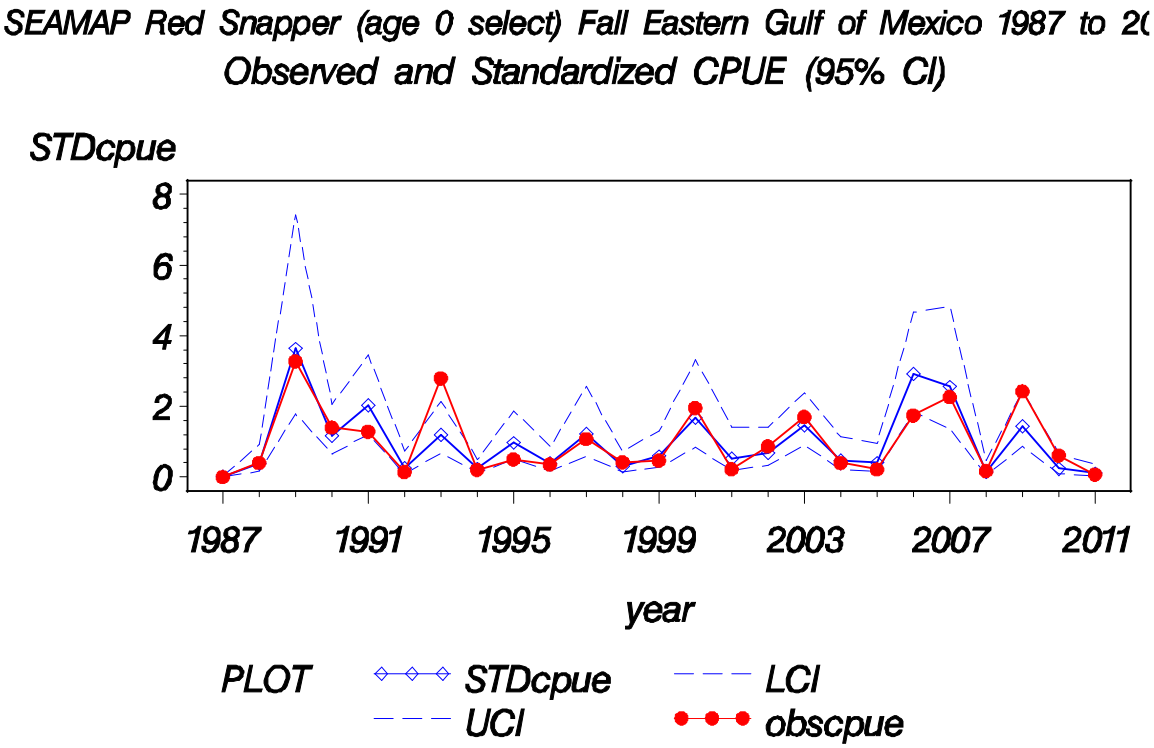


Figure 141. Annual index of abundance for red snapper (EGOM / age 0 selectivity / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

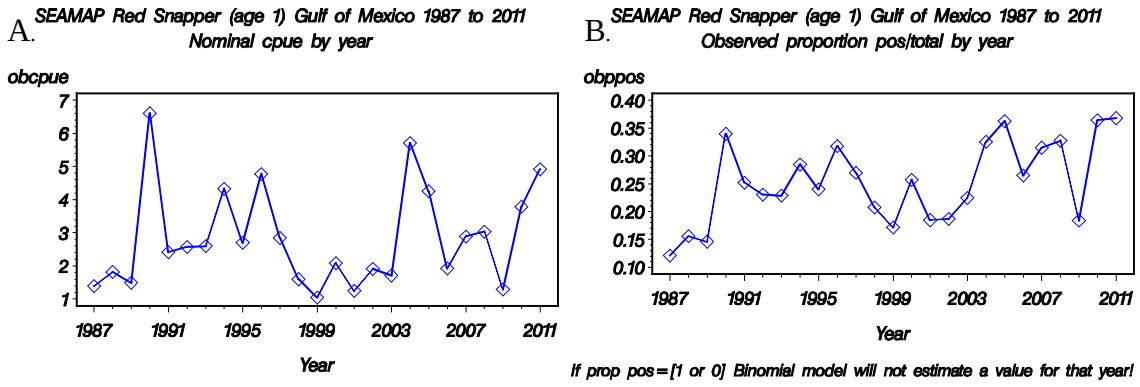


Figure 142. Annual trends for red snapper (GOM / age 1) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

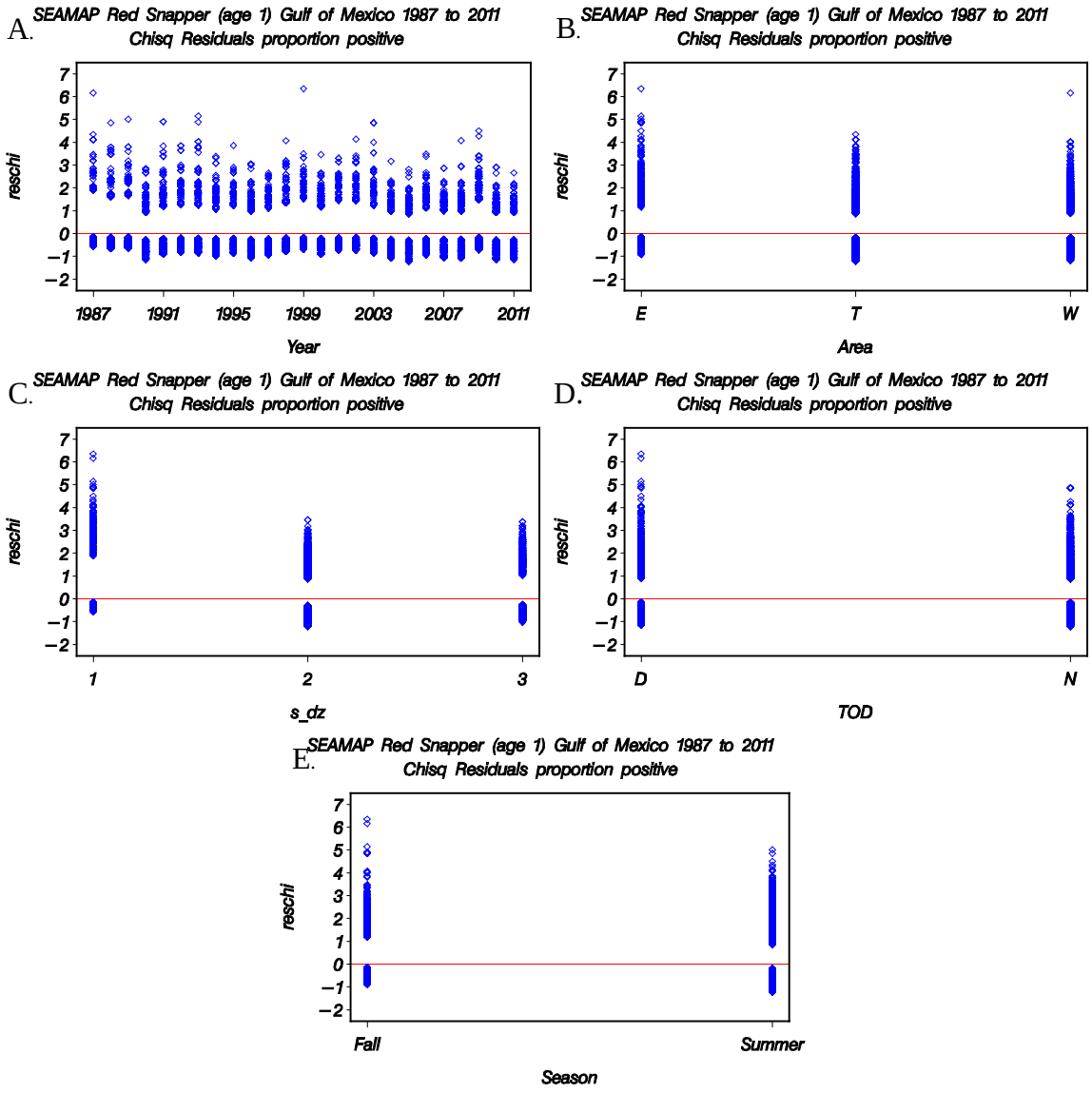


Figure 143. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / age 1) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone, **D.** the Chi-Square residuals by time of day and **E.** the Chi-Square residuals by season.

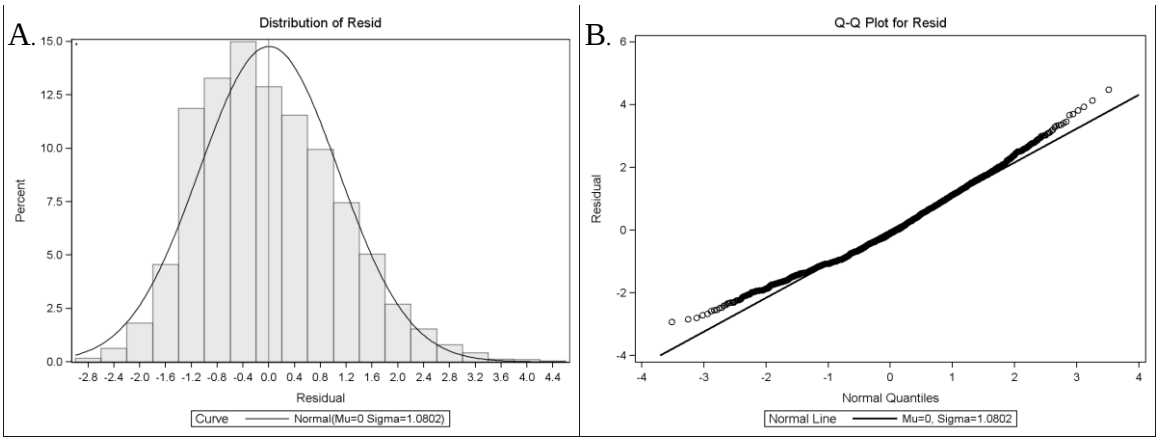


Figure 144. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 1) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

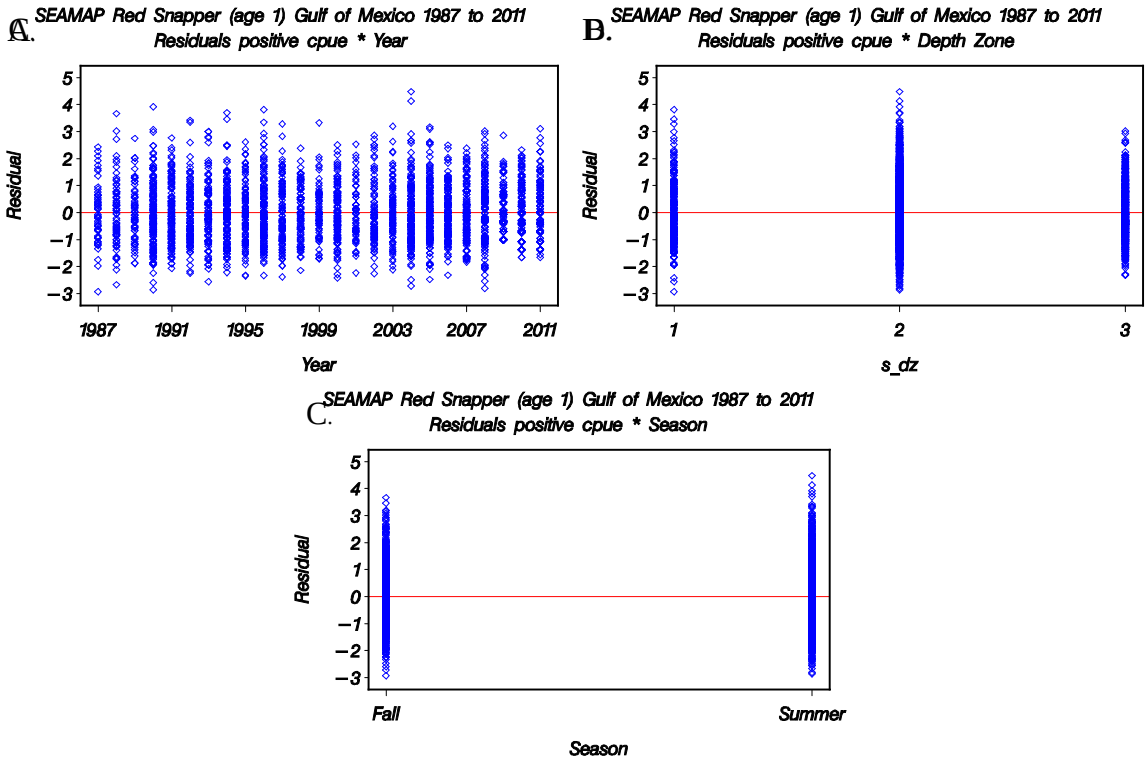


Figure 145. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 1) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by season.

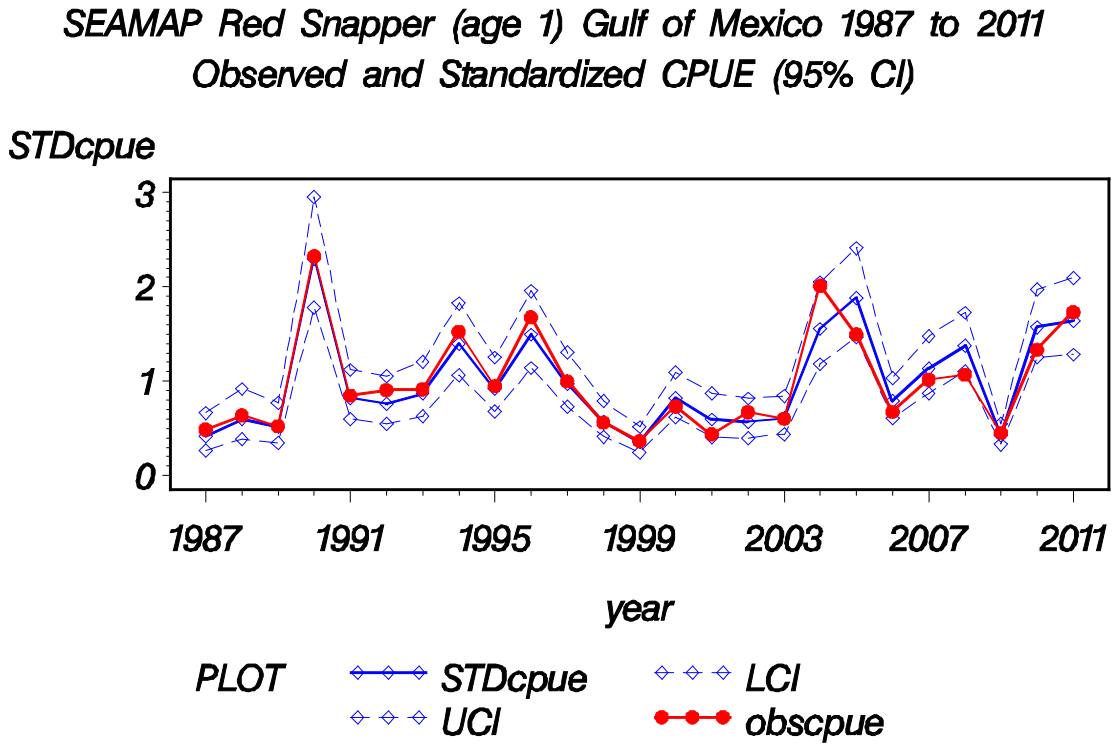


Figure 146. Annual index of abundance for red snapper (GOM / age 1) from the SEAMAP Groundfish Survey from 1987 – 2011.

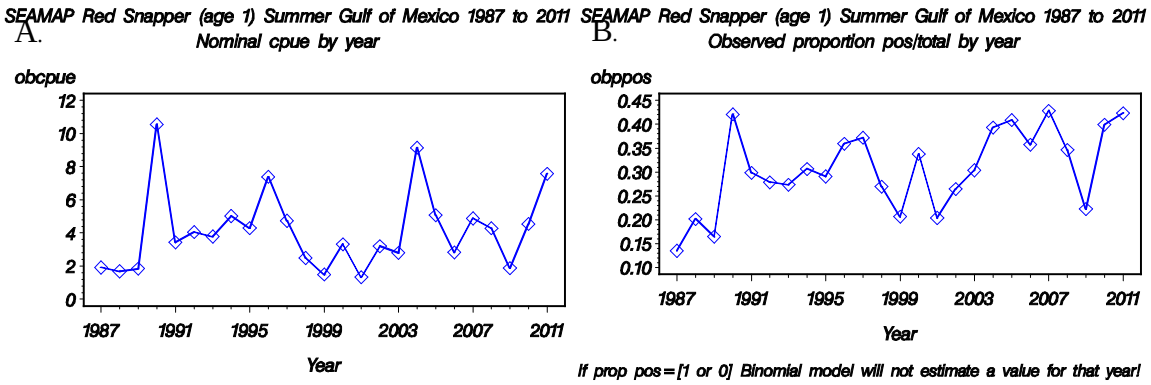


Figure 147. Annual trends for red snapper (GOM / age 1 / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

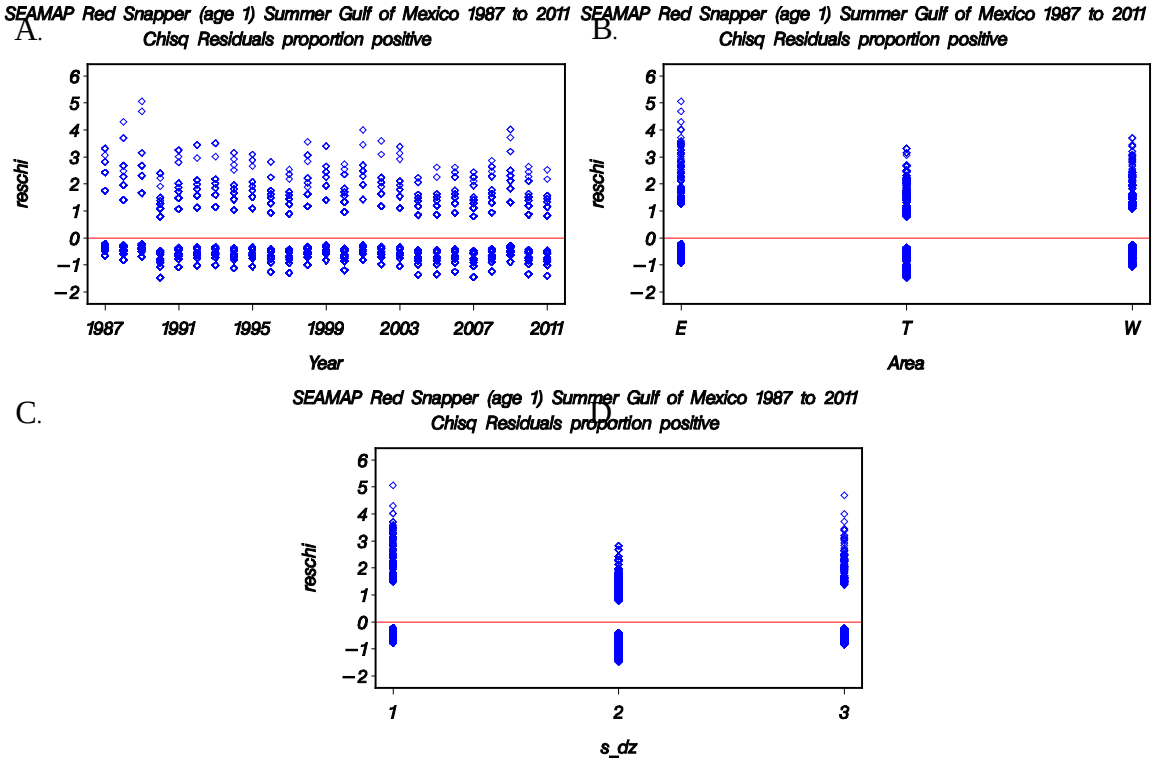


Figure 148. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area and **C.** the Chi-Square residuals by depth zone.

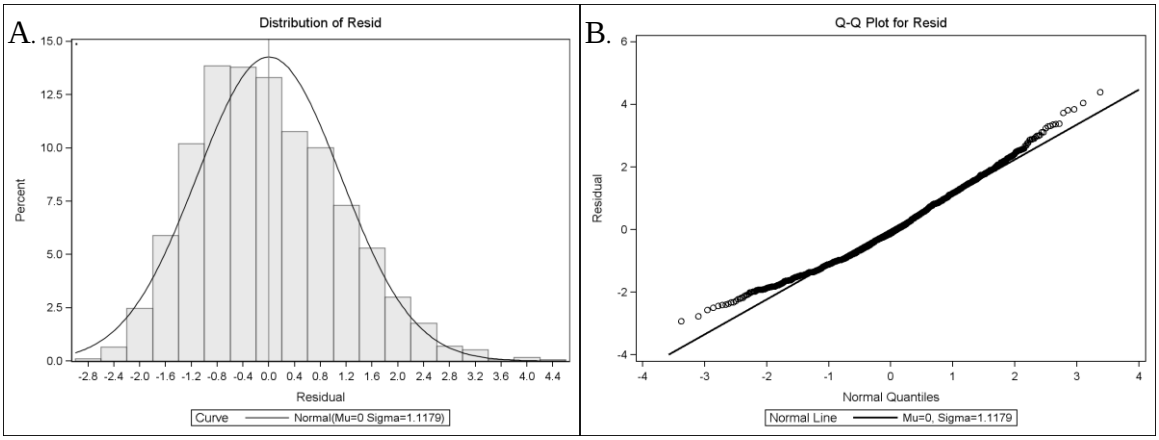


Figure 149. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

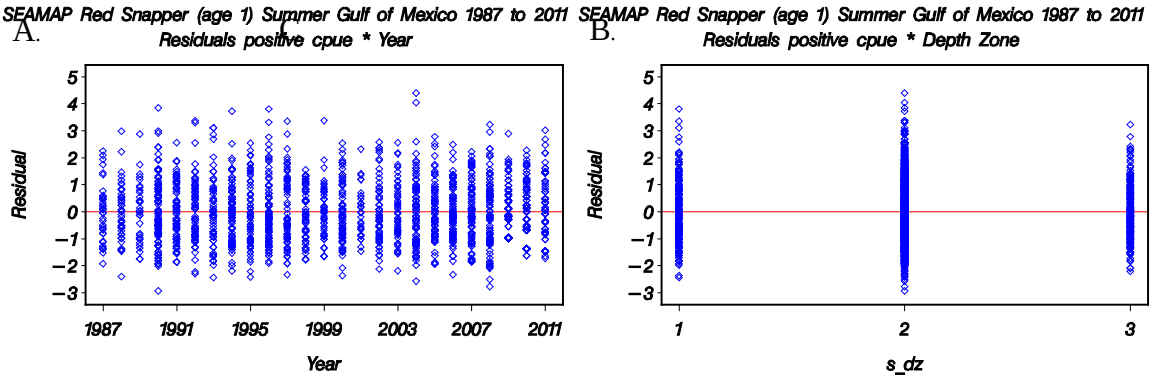


Figure 150. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 / Summer) model: **A.** the Chi-Square residuals by year and **B.** the Chi-Square residuals by depth zone.

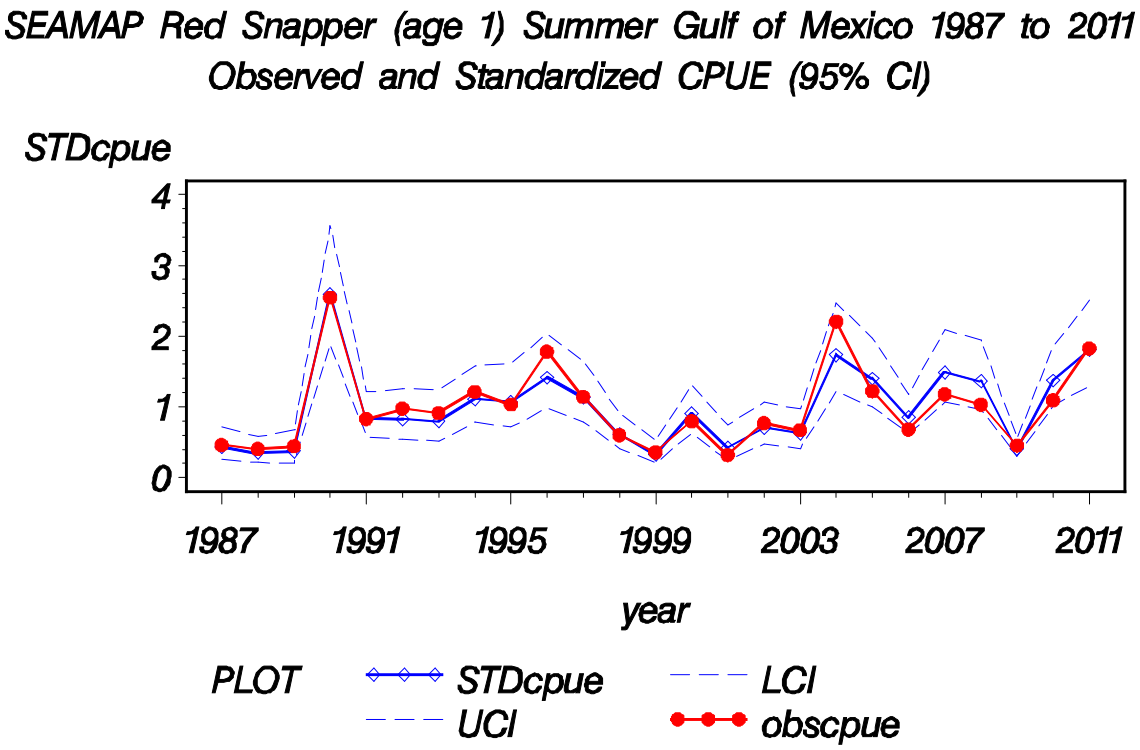


Figure 151. Annual index of abundance for red snapper (GOM / age 1 / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

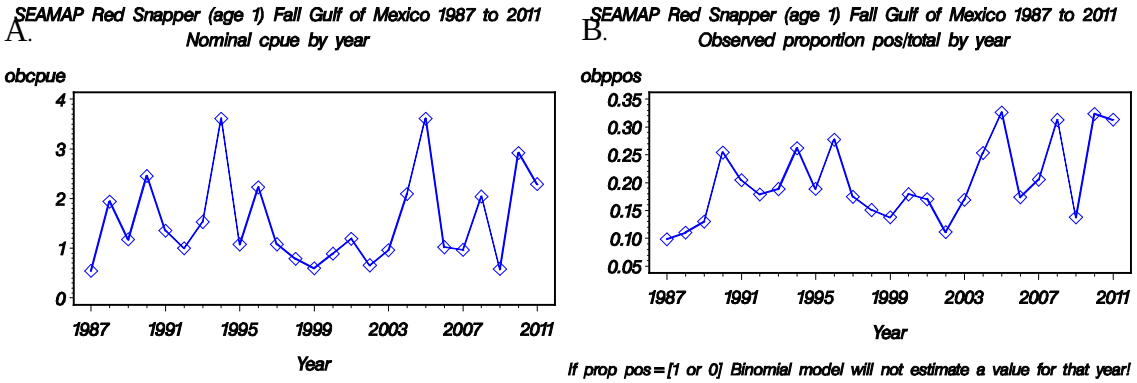


Figure 152. Annual trends for red snapper (GOM / age 1 / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

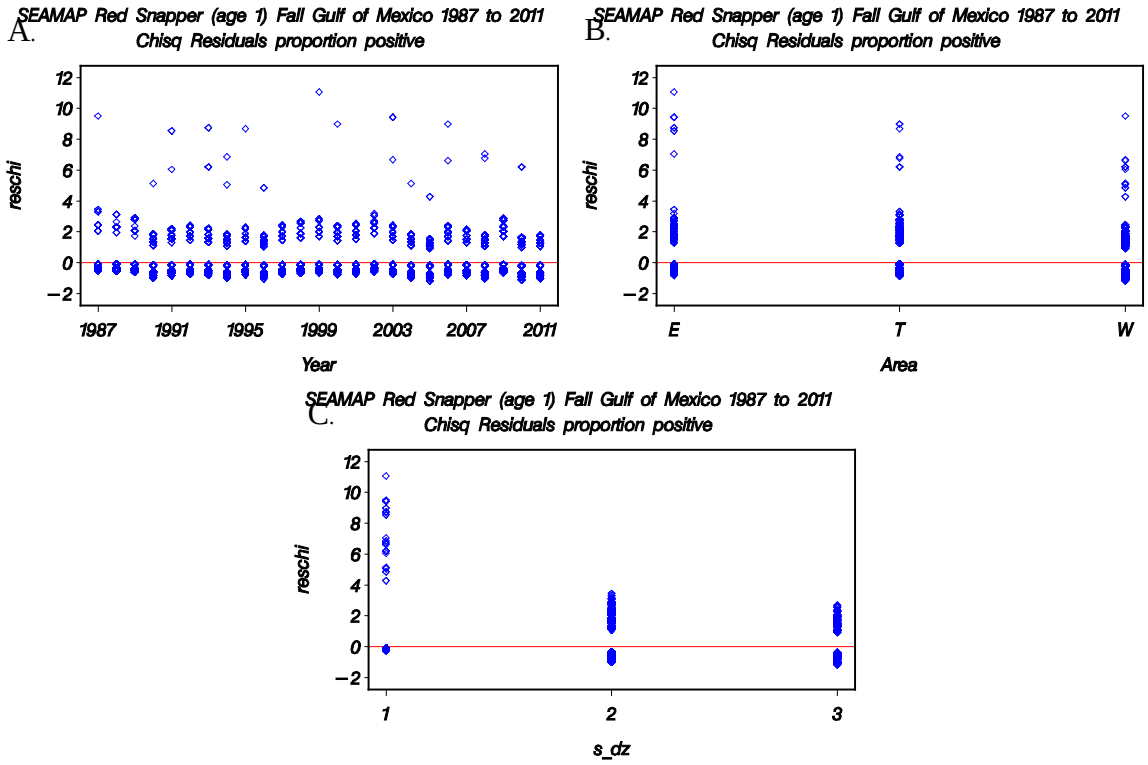


Figure 153. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area and **C.** the Chi-Square residuals by depth zone.

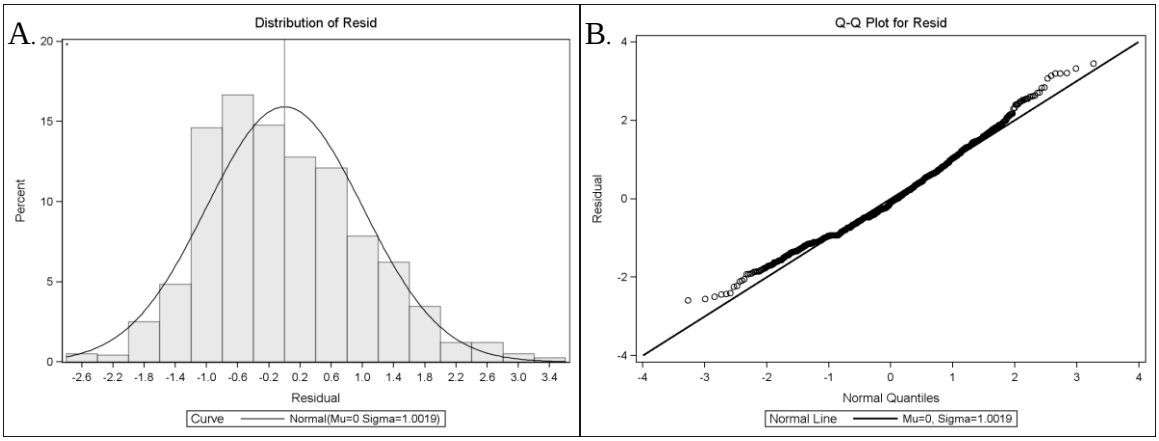


Figure 154. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

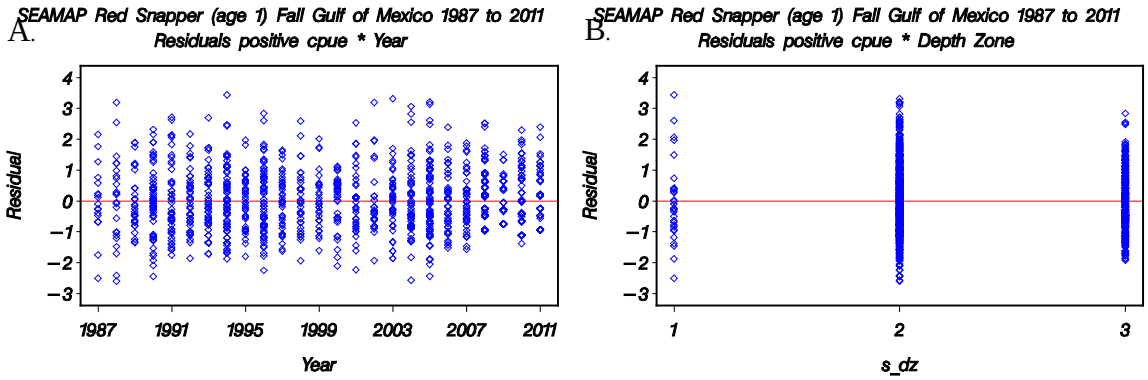


Figure 155. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 / Fall) model: **A.** the Chi-Square residuals by year and **B.** the Chi-Square residuals by depth zone.

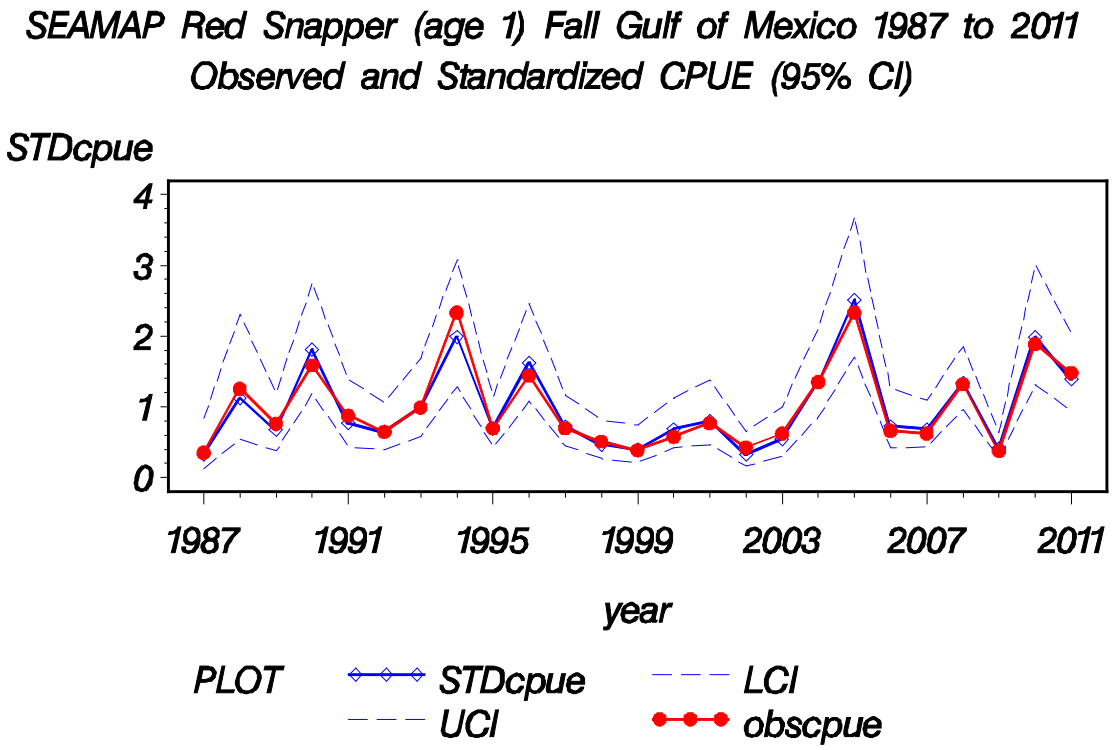


Figure 156. Annual index of abundance for red snapper (GOM / age 1 / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

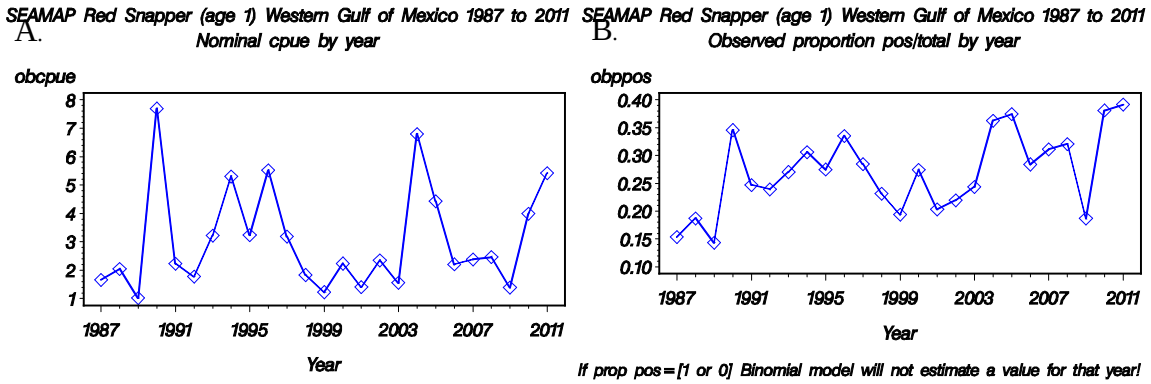


Figure 157. Annual trends for red snapper (WGOM / age 1) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

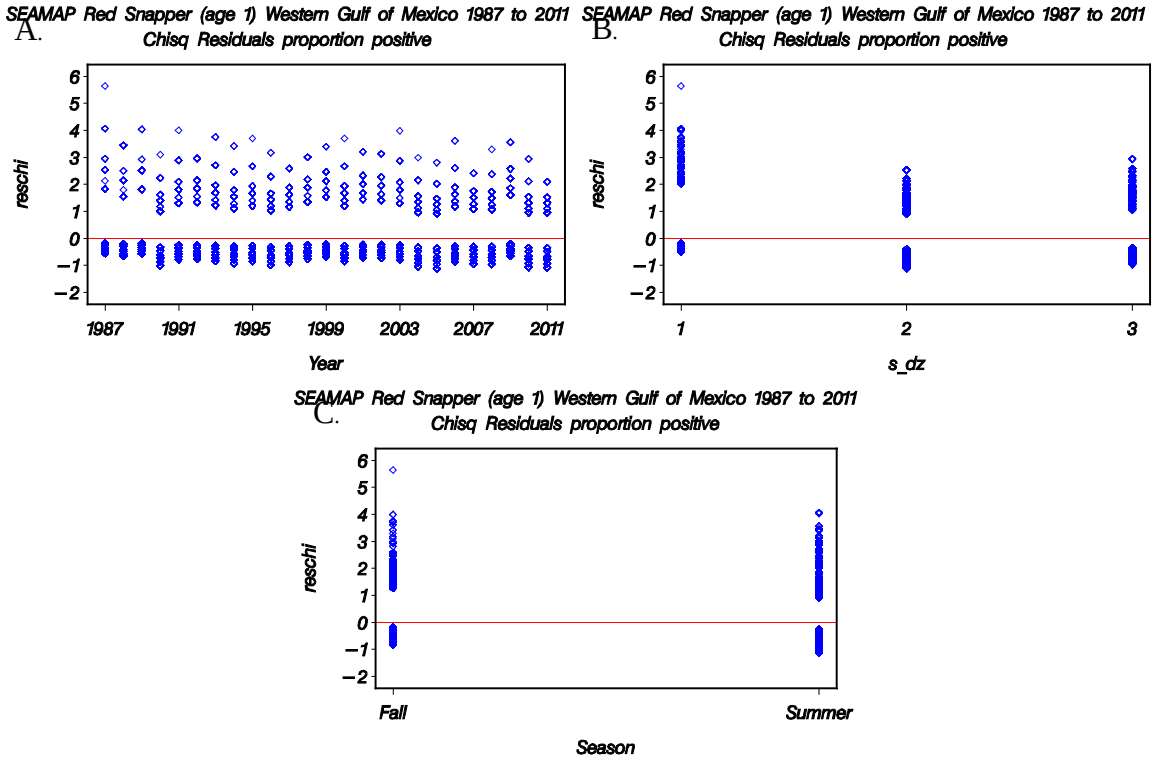


Figure 158. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by season.

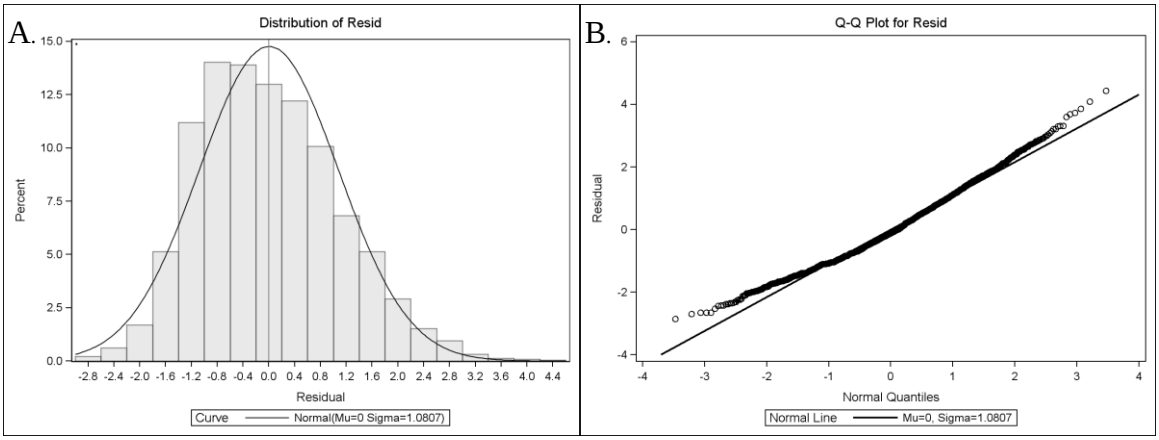


Figure 159. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

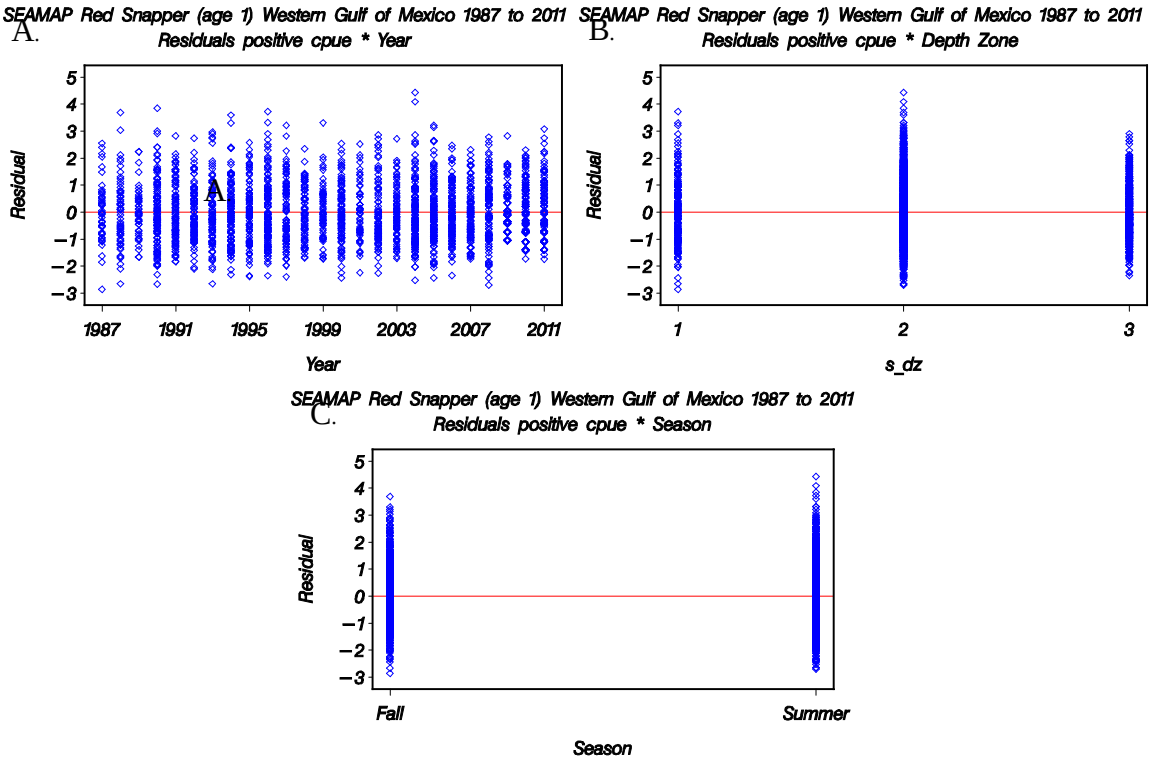


Figure 160. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by season.

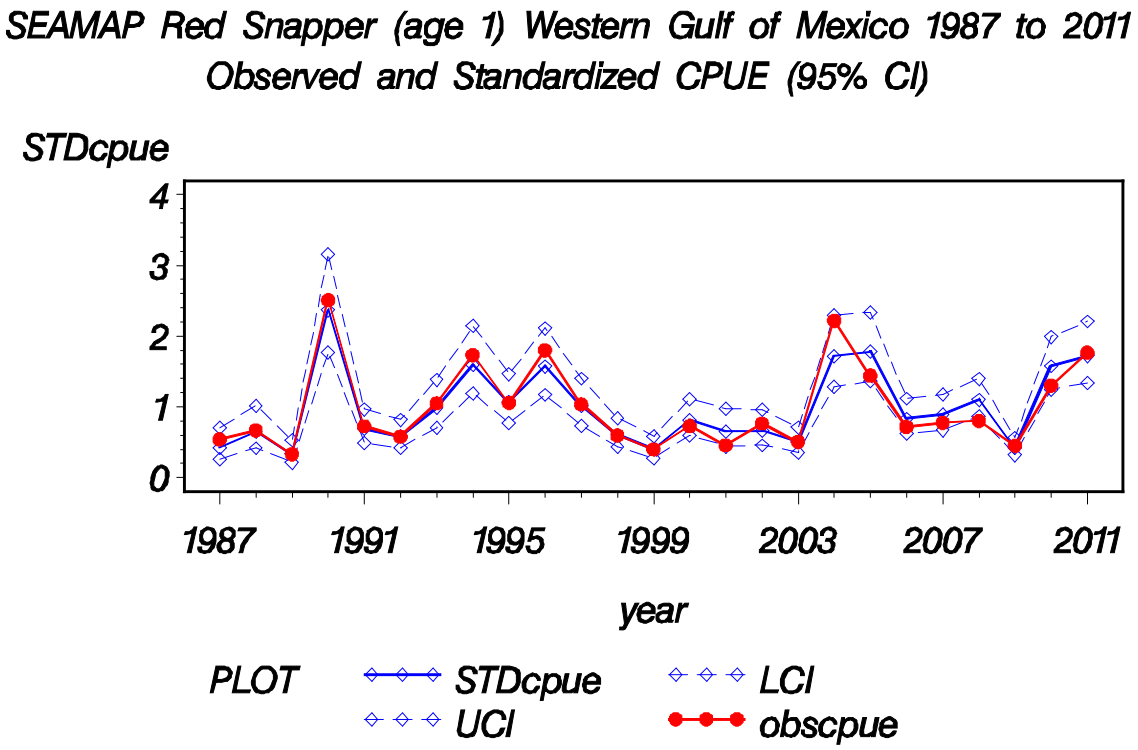


Figure 161. Annual index of abundance for red snapper (WGOM / age 1) from the SEAMAP Groundfish Survey from 1987 – 2011.

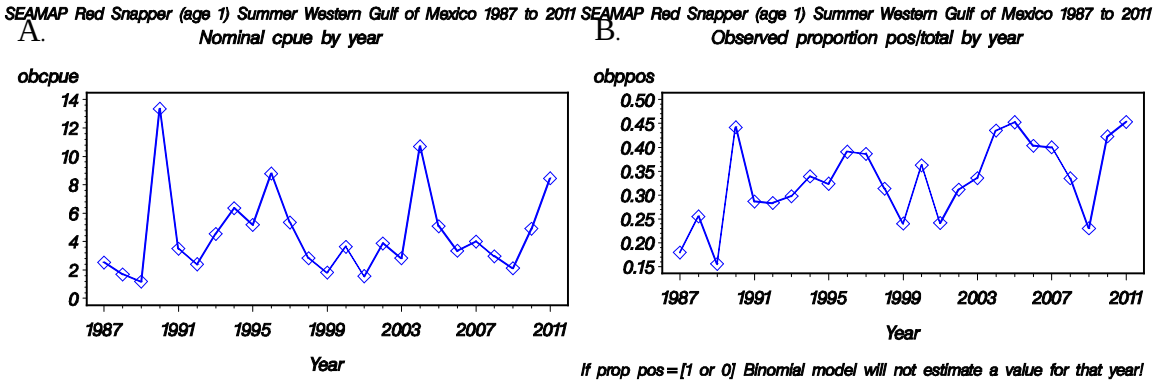


Figure 162. Annual trends for red snapper (WGOM / age 1 / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

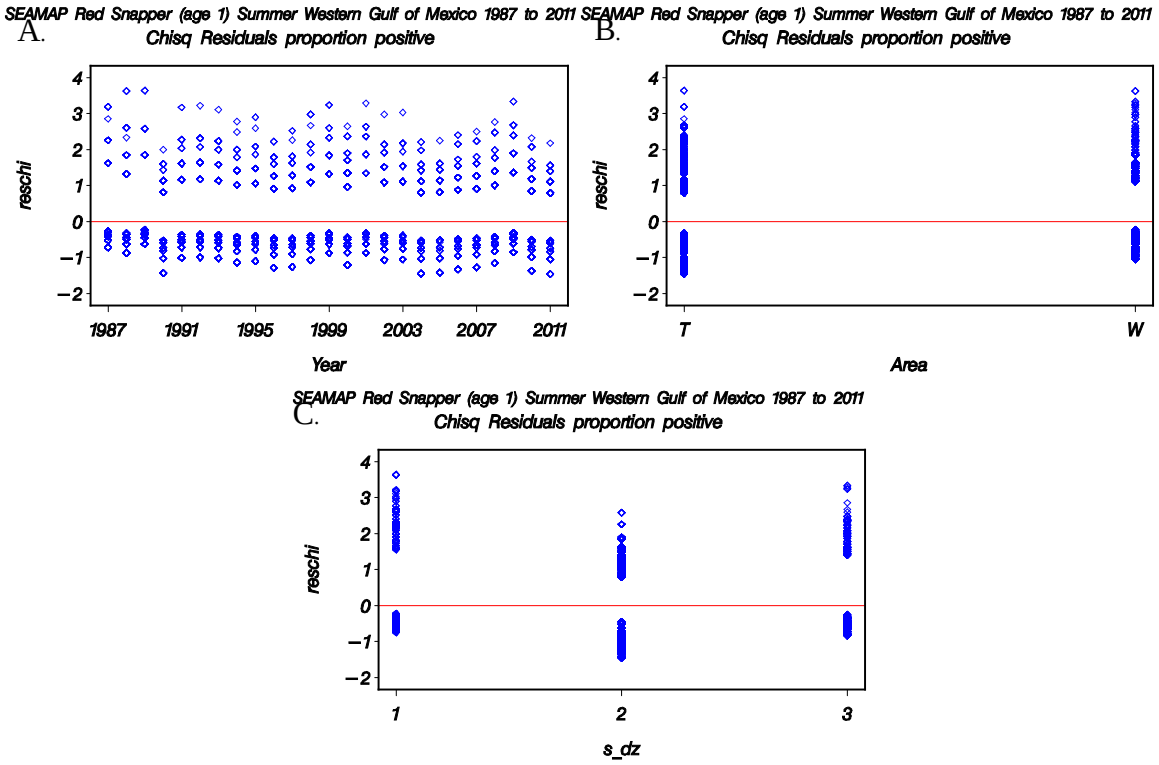


Figure 163. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area and **C.** the Chi-Square residuals by depth zone.

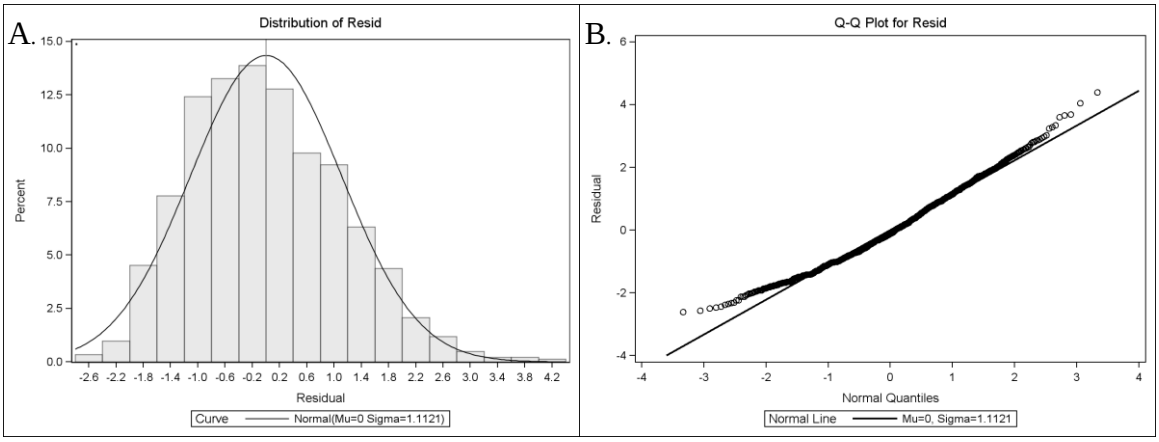


Figure 164. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

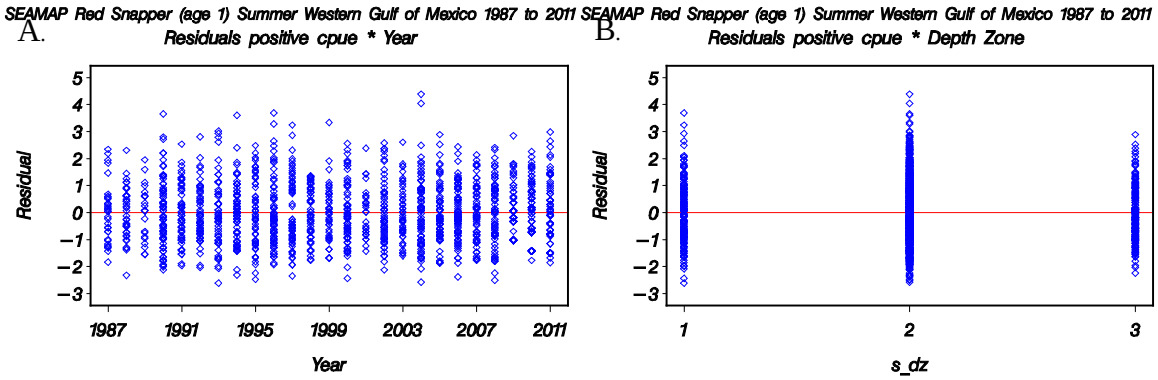


Figure 165. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 / Summer) model: **A.** the Chi-Square residuals by year and **B.** the Chi-Square residuals by depth zone.

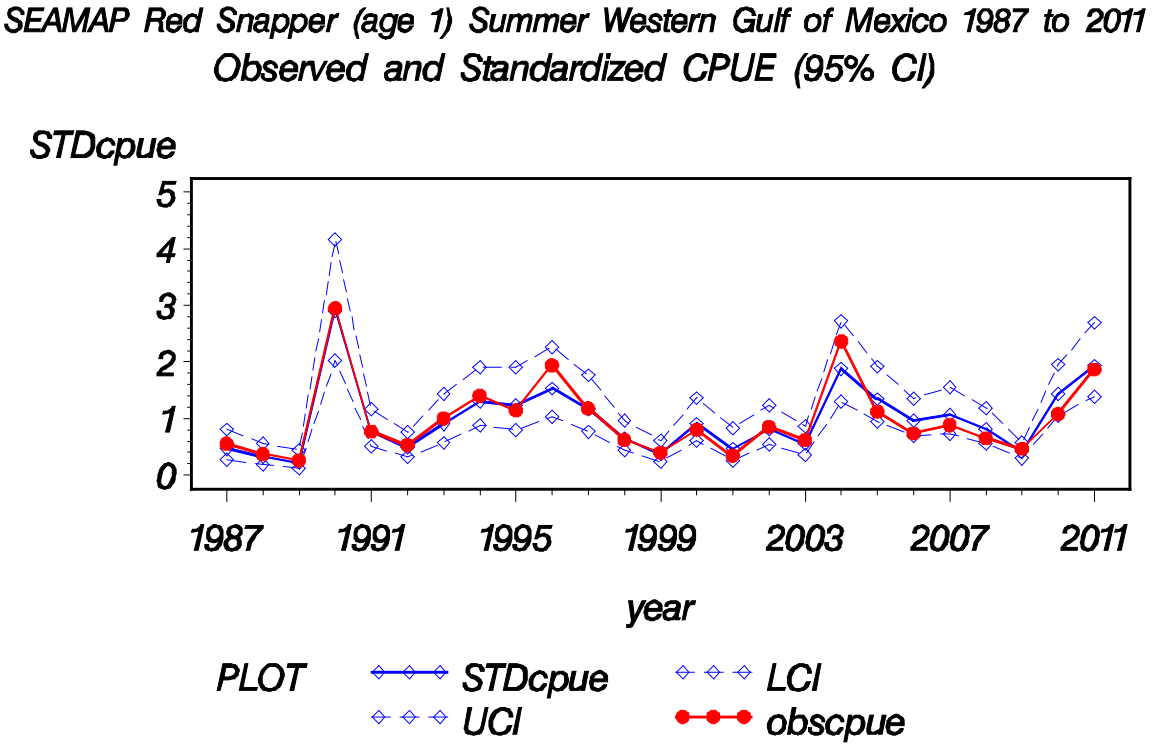


Figure 166. Annual index of abundance for red snapper (WGOM / age 1 / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

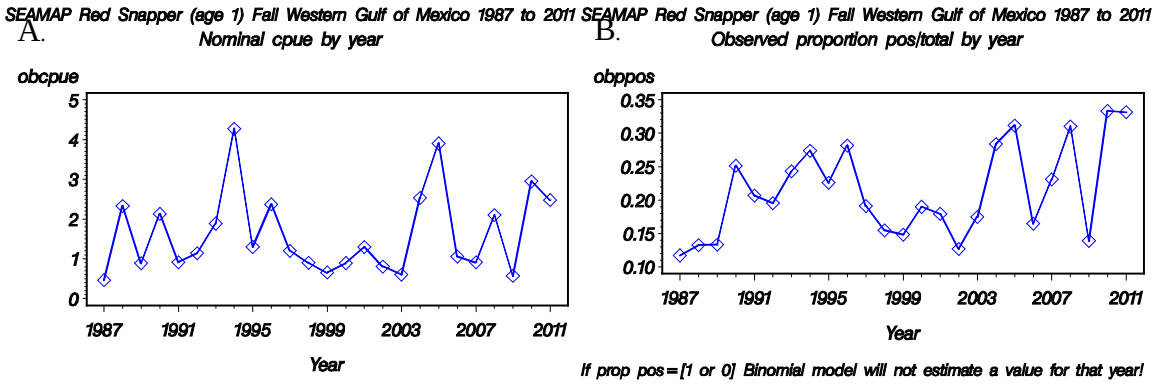


Figure 167. Annual trends for red snapper (WGOM / age 1 / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

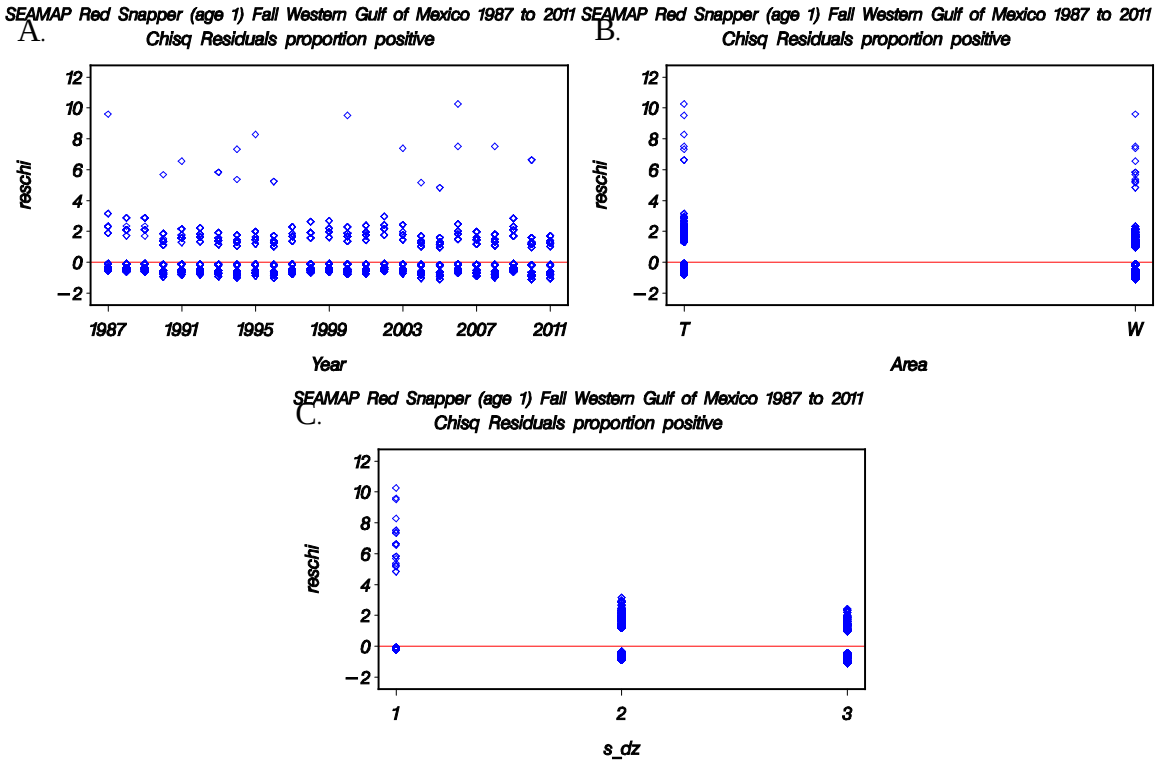


Figure 168. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area and **C.** the Chi-Square residuals by depth zone.

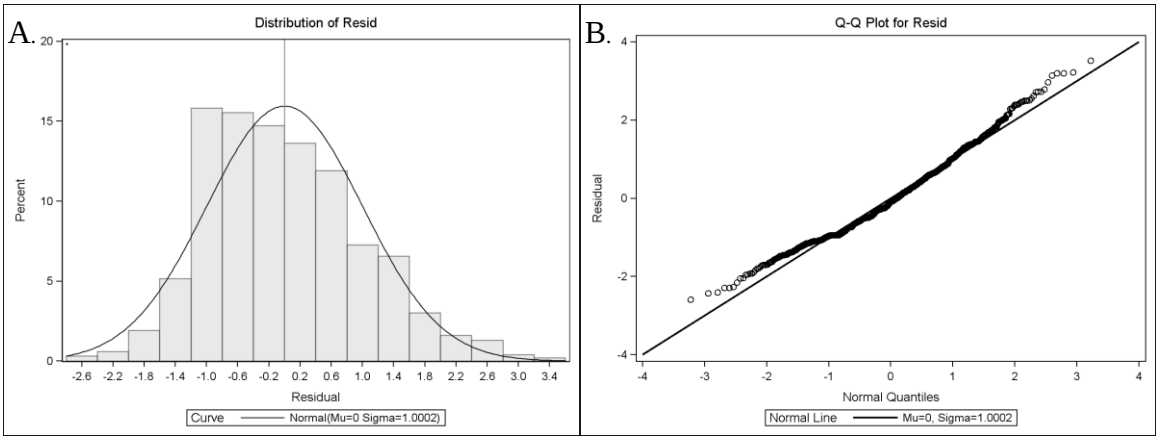


Figure 169. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

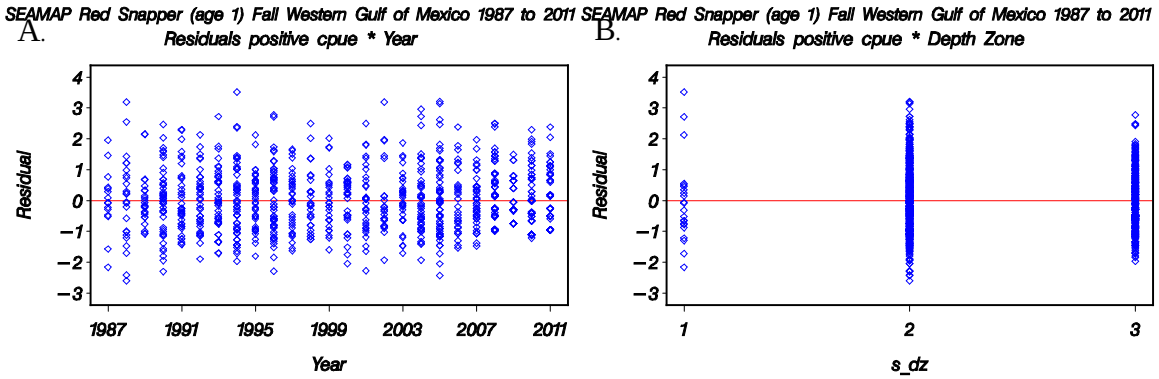


Figure 170. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 / Fall) model: **A.** the Chi-Square residuals by year and **B.** the Chi-Square residuals by depth zone.

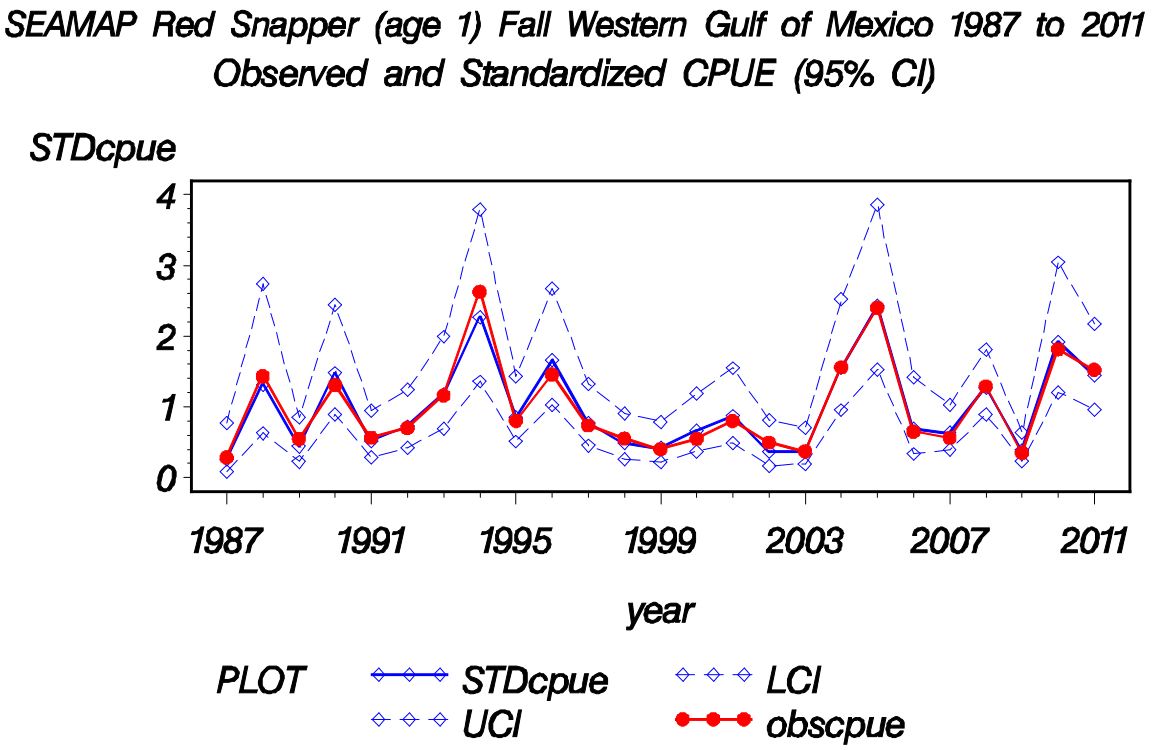


Figure 171. Annual index of abundance for red snapper (WGOM / age 1 / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

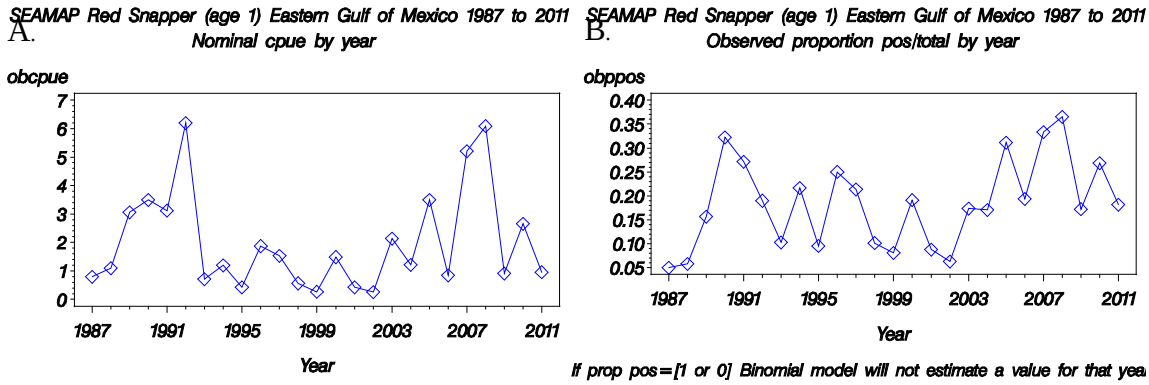


Figure 172. Annual trends for red snapper (EGOM / age 1) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

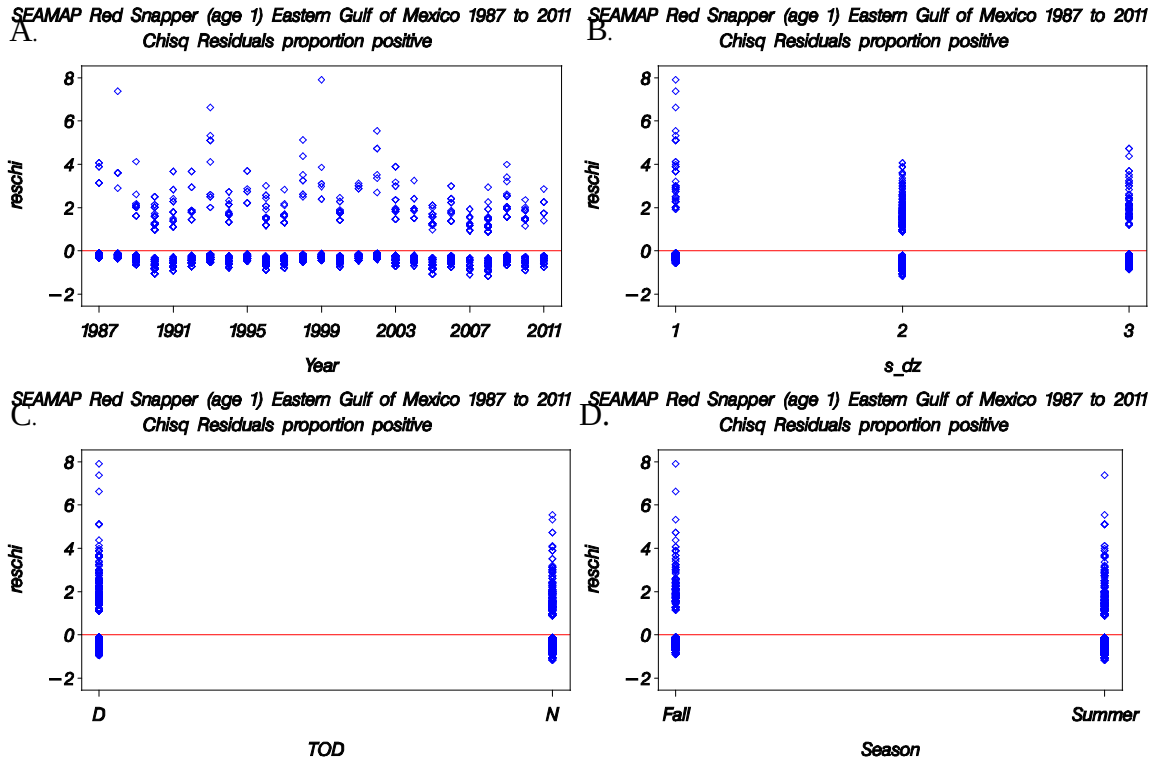


Figure 173. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone, **C.** the Chi-Square residuals by time of day and **D.** the Chi-Square residuals by season.

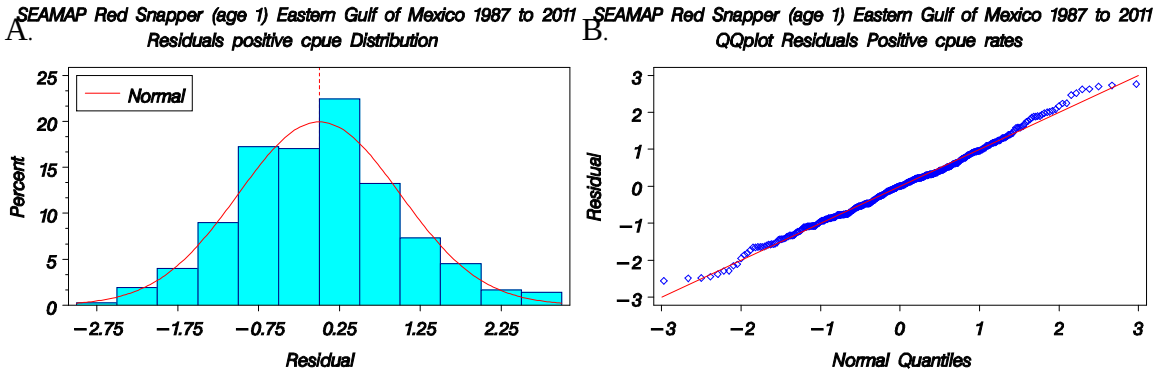


Figure 174. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

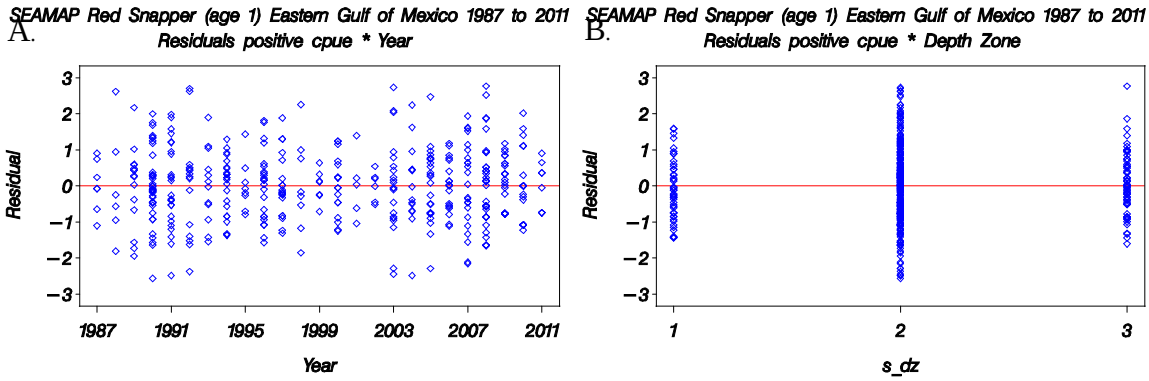


Figure 175. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1) model: **A.** the Chi-Square residuals by year and **B.** the Chi-Square residuals by depth zone.

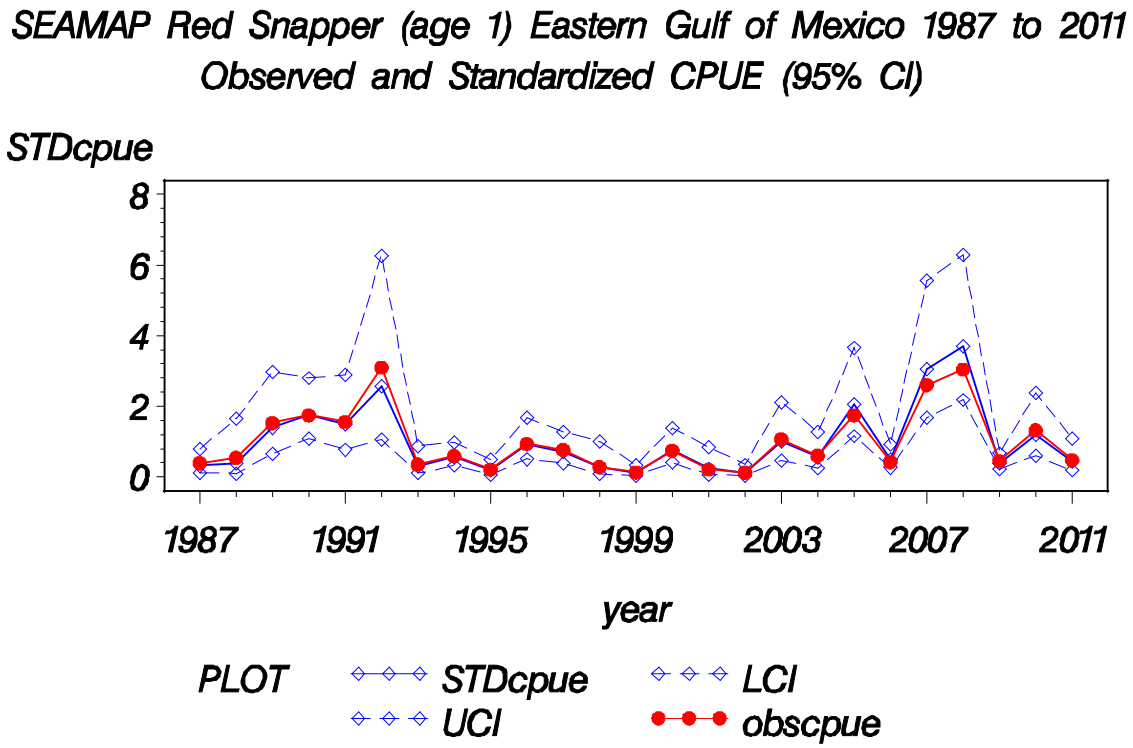


Figure 176. Annual index of abundance for red snapper (EGOM / age 1) from the SEAMAP Groundfish Survey from 1987 – 2011.

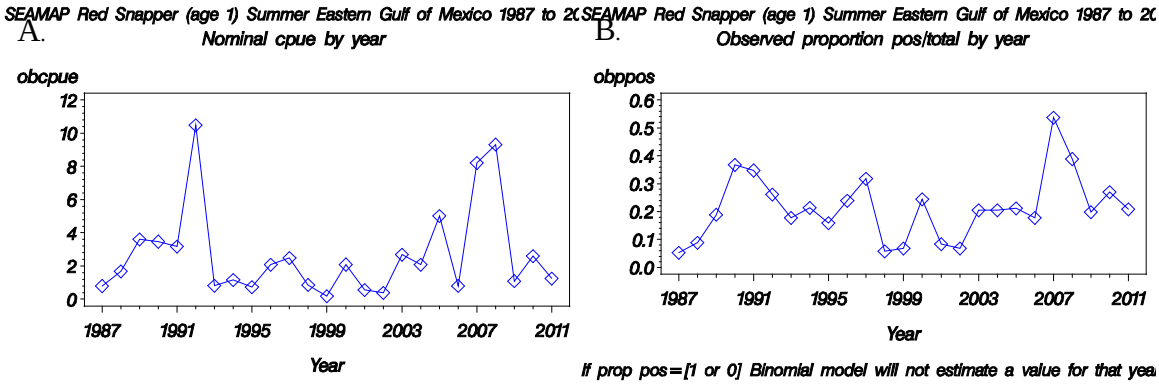


Figure 177. Annual trends for red snapper (EGOM / age 1 / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

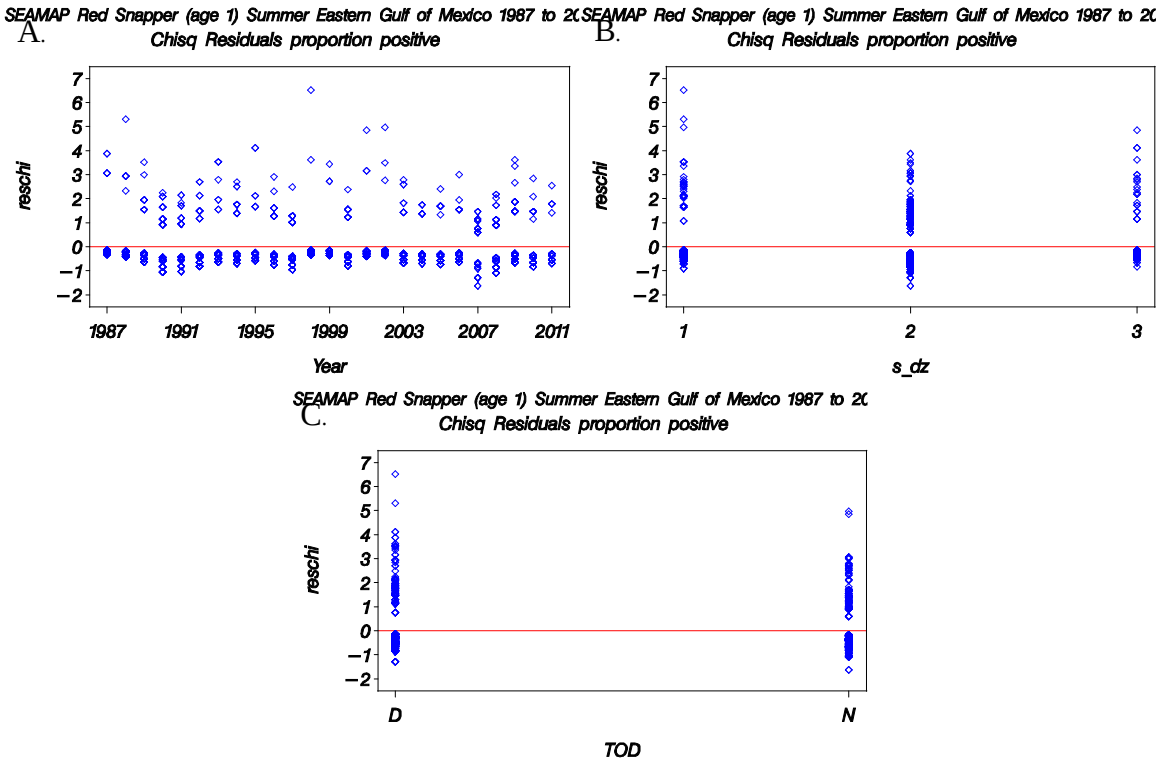


Figure 178. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

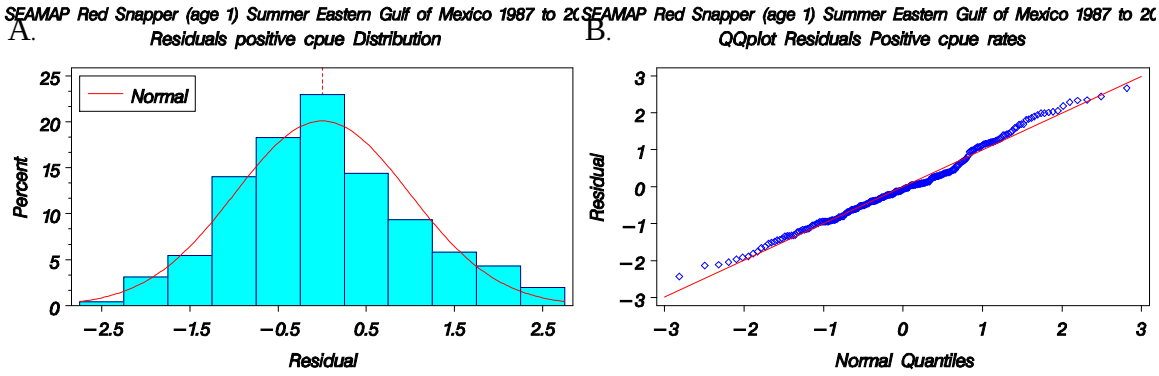


Figure 179. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

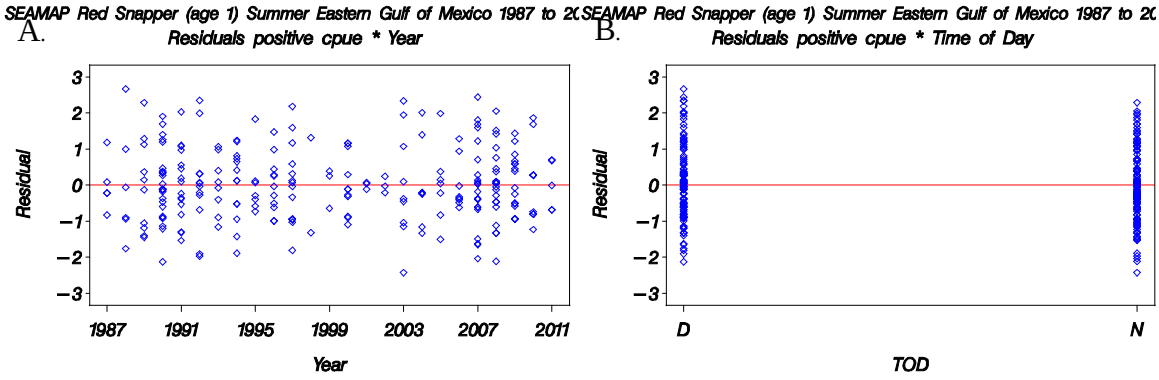


Figure 180. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 / Summer) model: **A.** the Chi-Square residuals by year and **B.** the Chi-Square residuals by time of day.

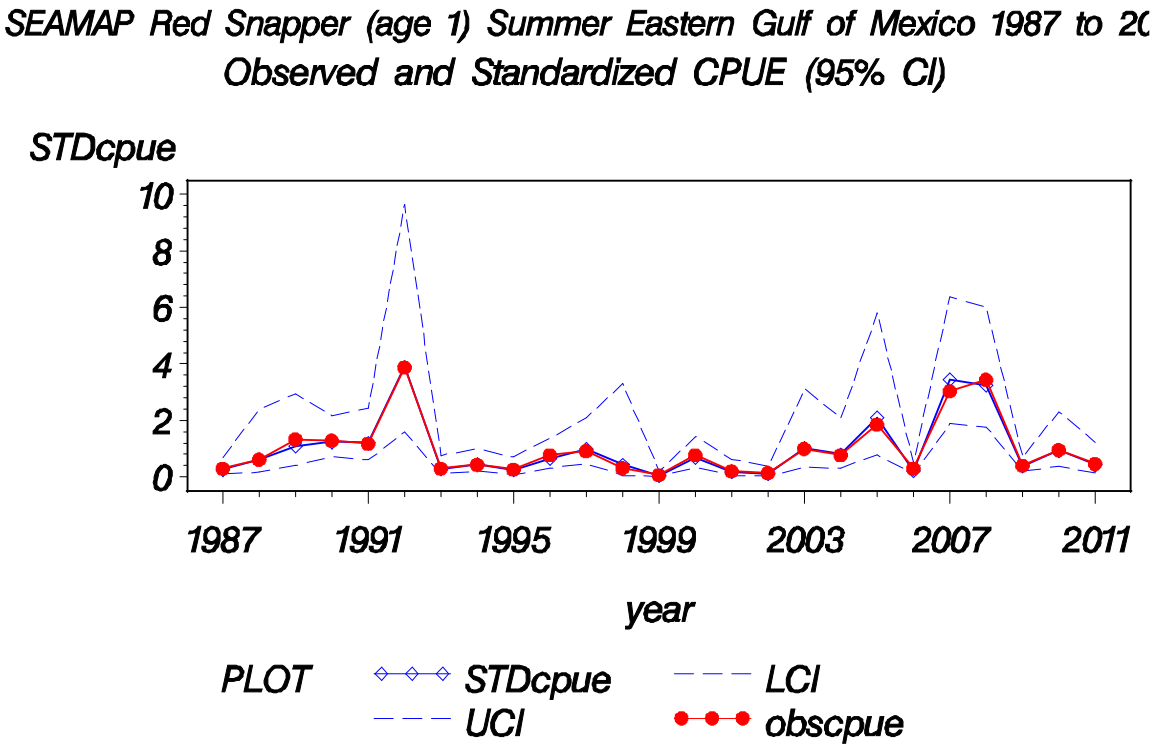


Figure 181. Annual index of abundance for red snapper (EGOM / age 1 / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

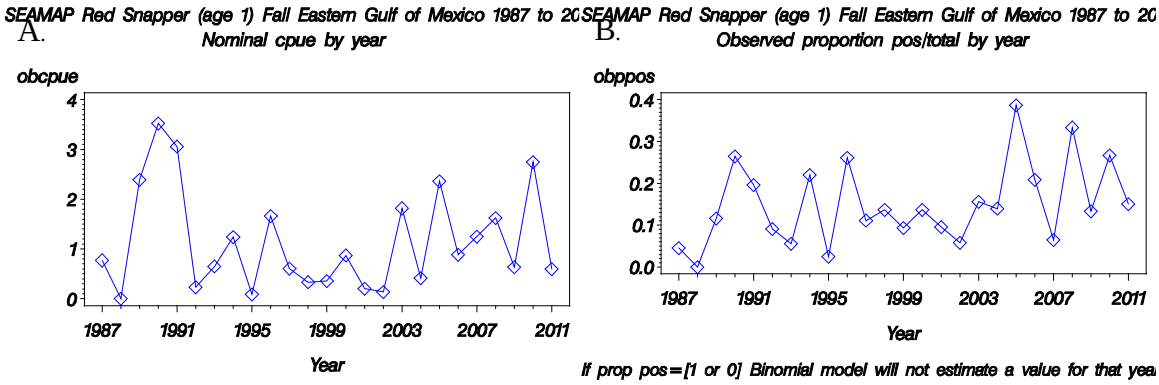


Figure 182. Annual trends for red snapper (EGOM / age 1 / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

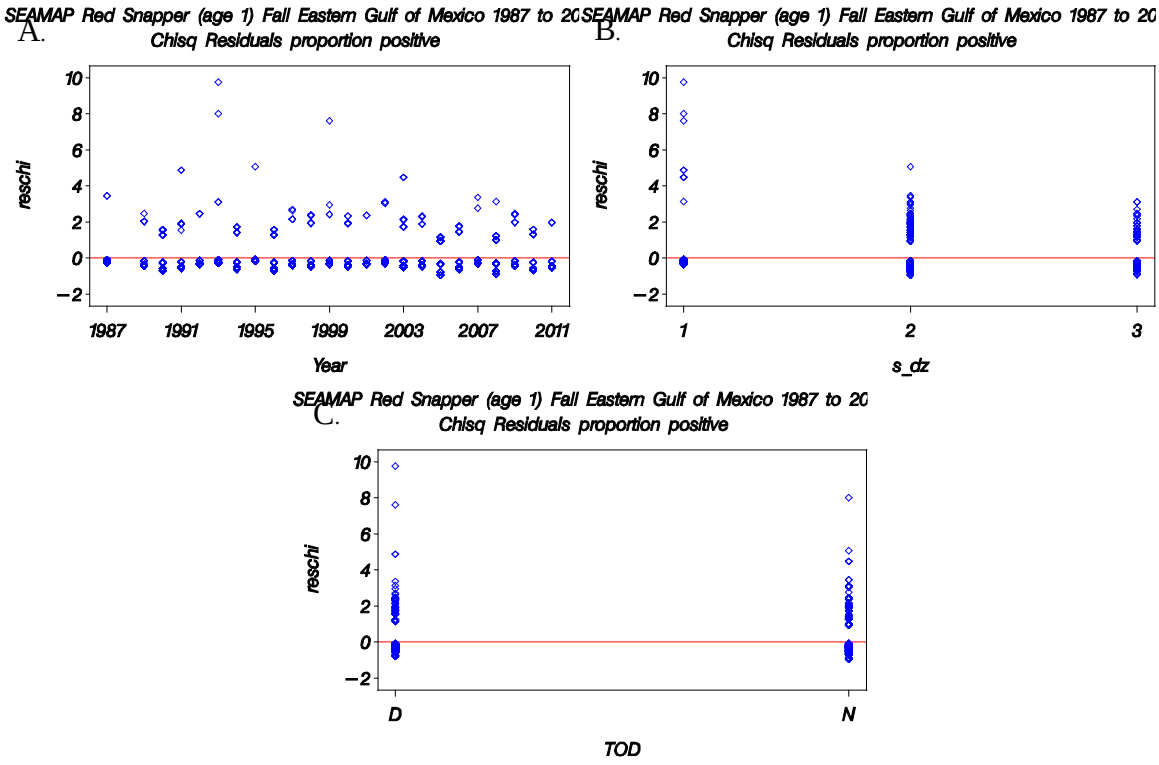


Figure 183. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

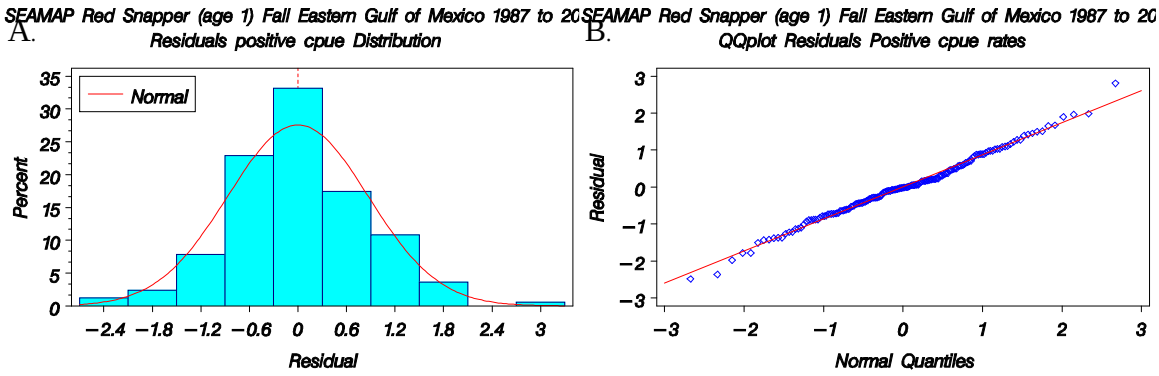


Figure 184. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

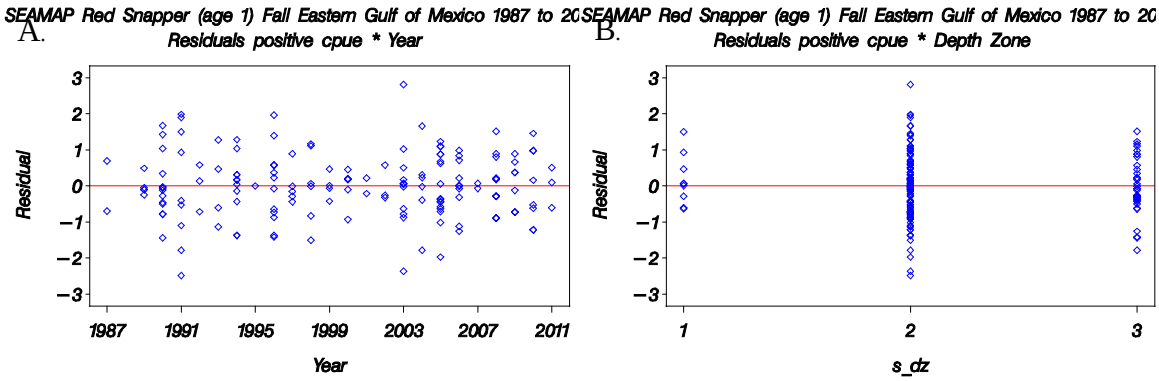


Figure 185. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 / Fall) model: **A.** the Chi-Square residuals by year and **B.** the Chi-Square residuals by depth zone.

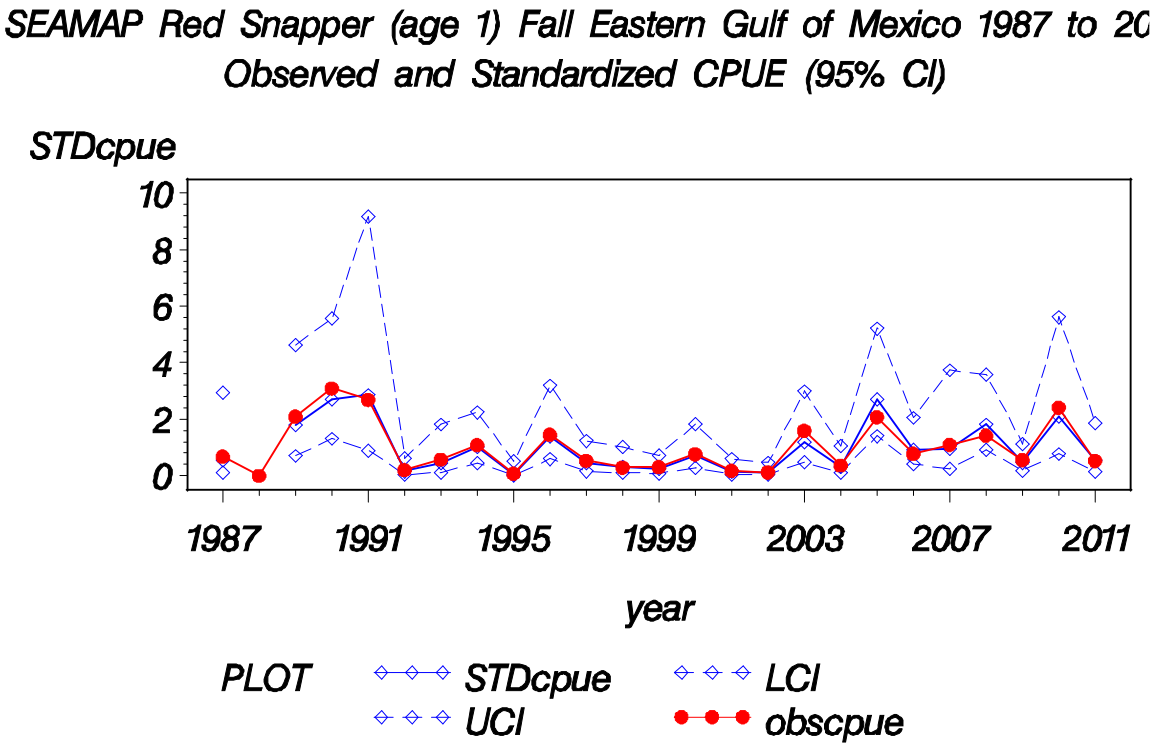


Figure 186. Annual index of abundance for red snapper (EGOM / age 1 / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

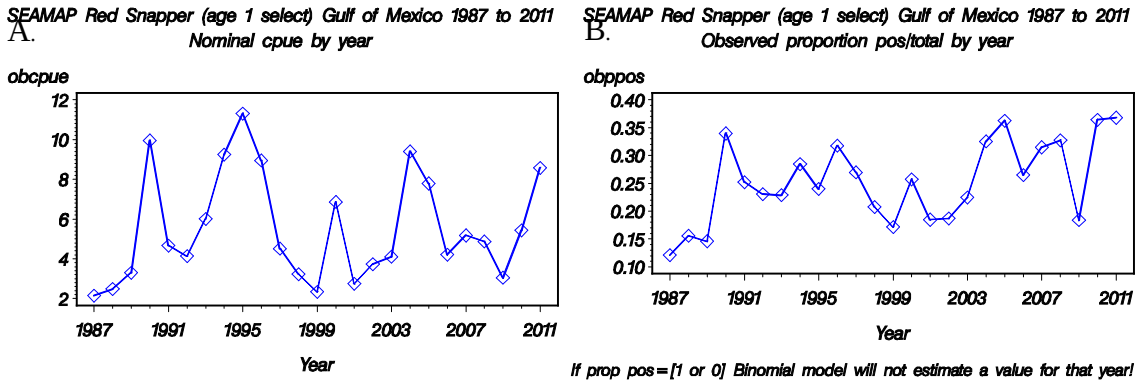


Figure 187. Annual trends for red snapper (GOM / age 1 selectivity) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

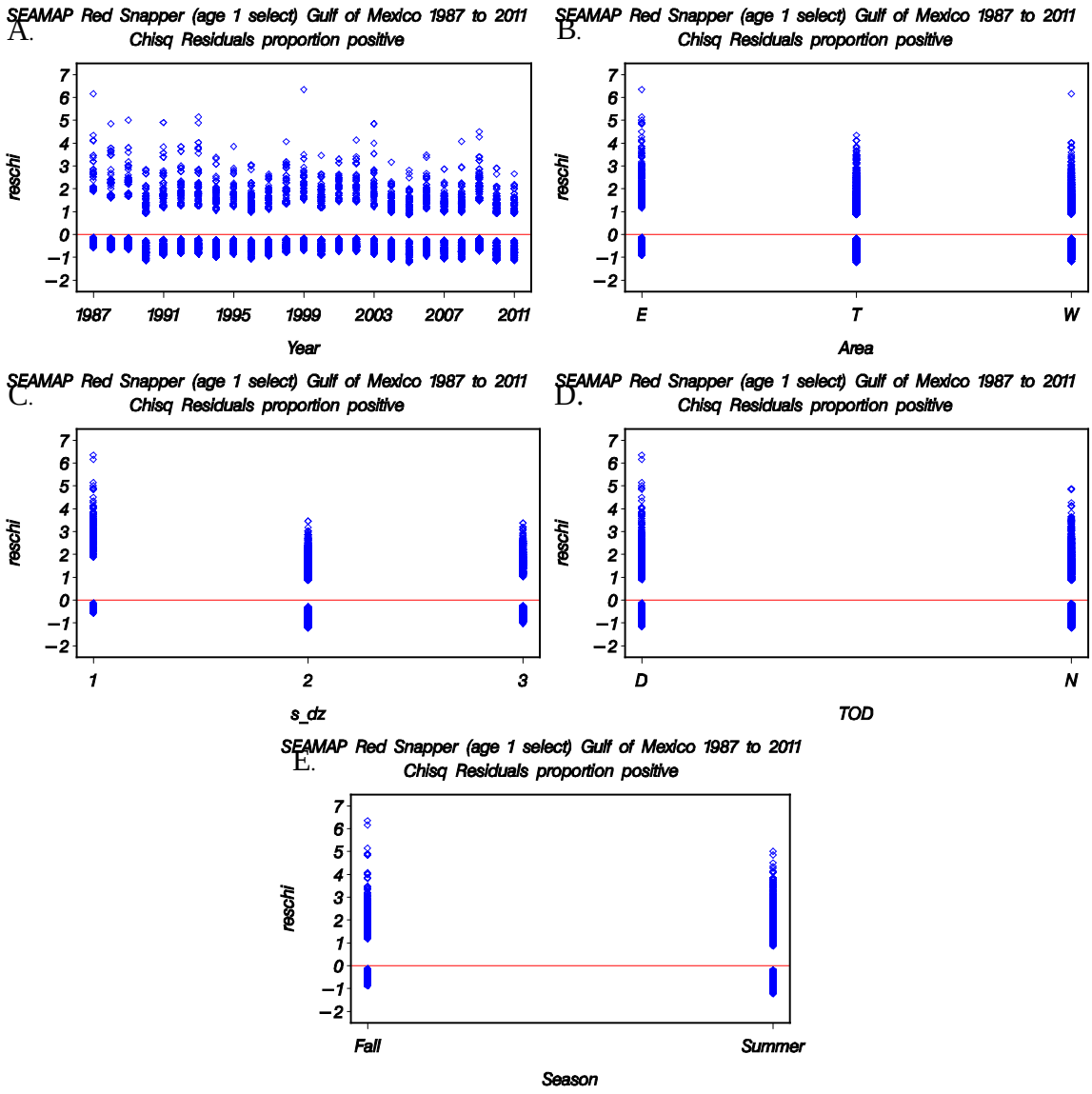


Figure 188. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 selectivity) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-

Square residuals by depth zone, **D.** the Chi-Square residuals by time of day and **E.** the Chi-Square residuals by season.

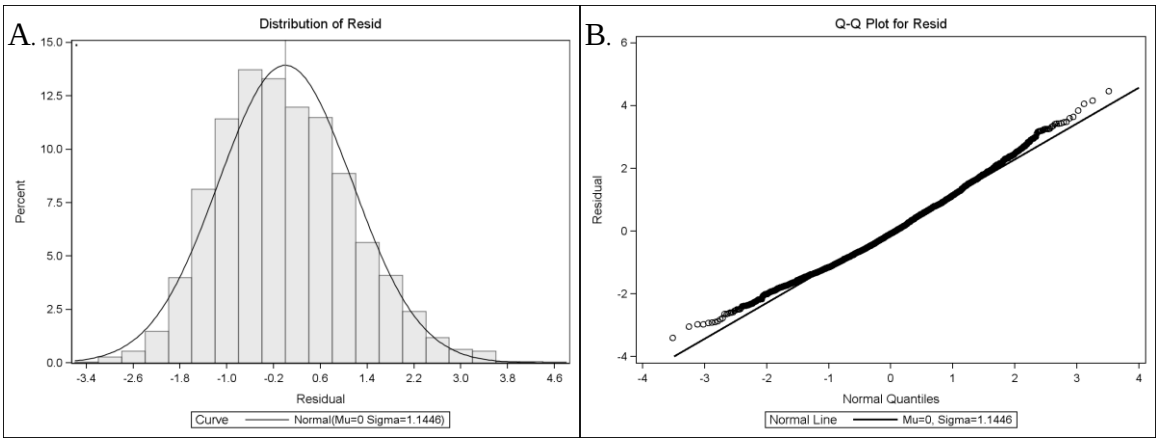


Figure 189. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 selectivity) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

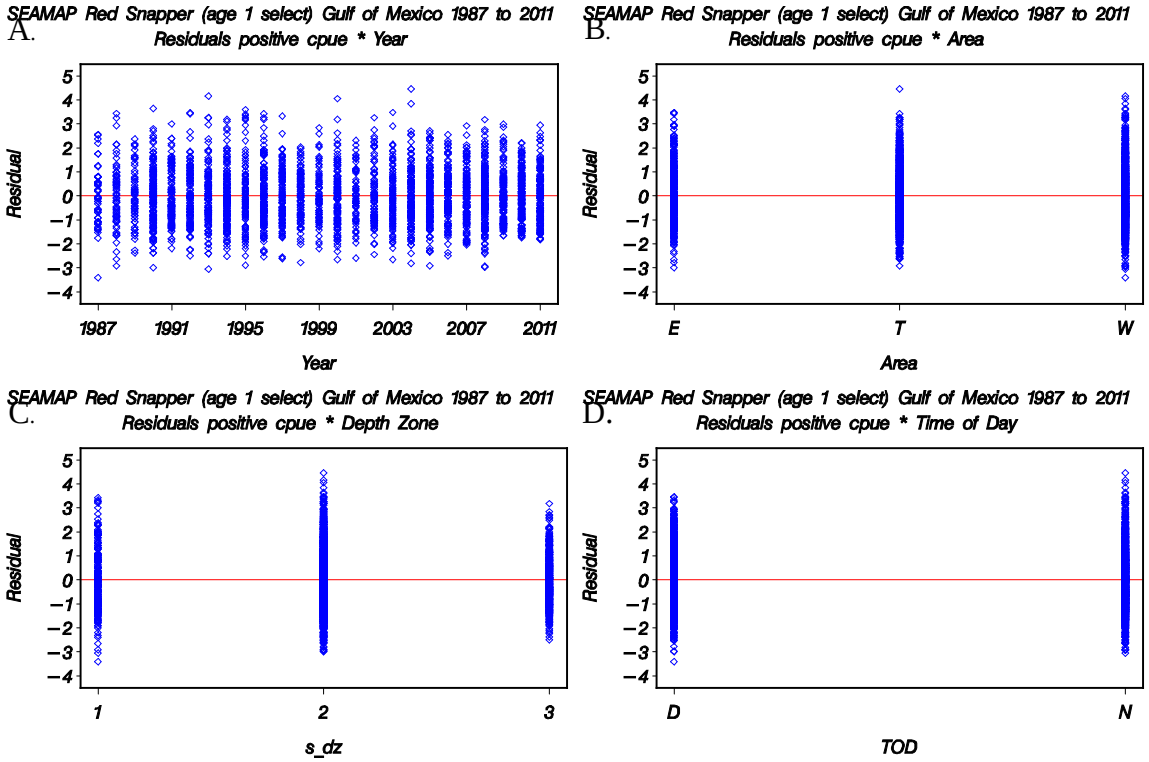


Figure 190. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 selectivity) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.

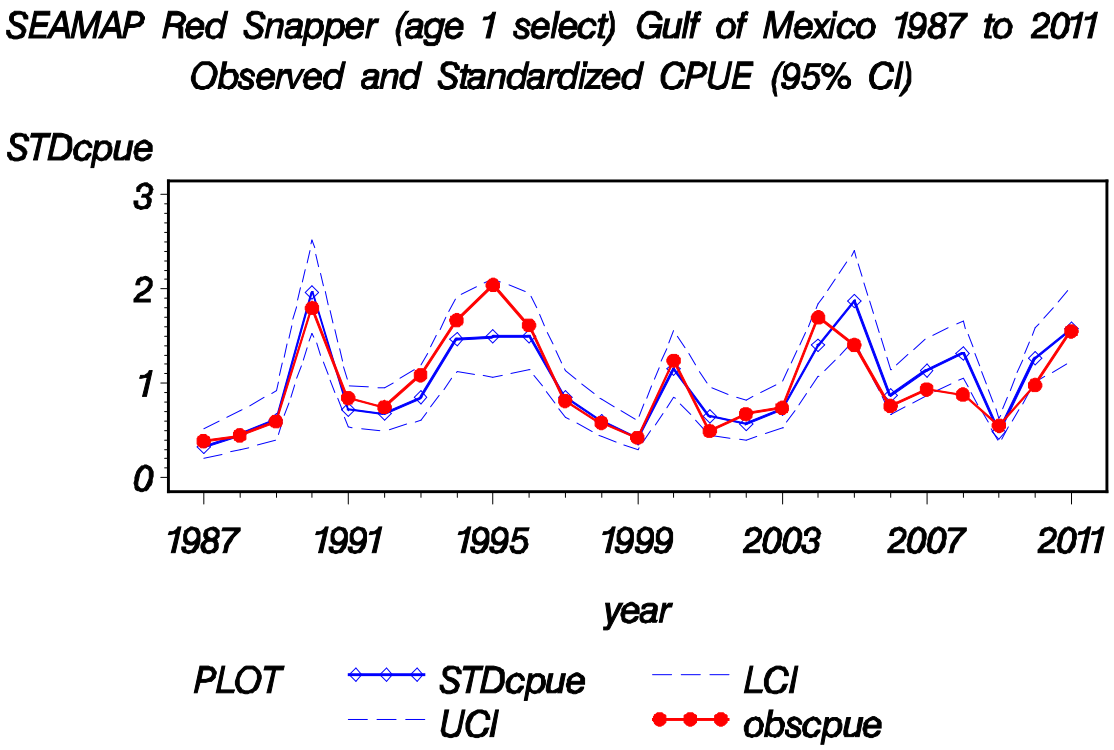


Figure 191. Annual index of abundance for red snapper (GOM / age 1 selectivity) from the SEAMAP Groundfish Survey from 1987 – 2011.

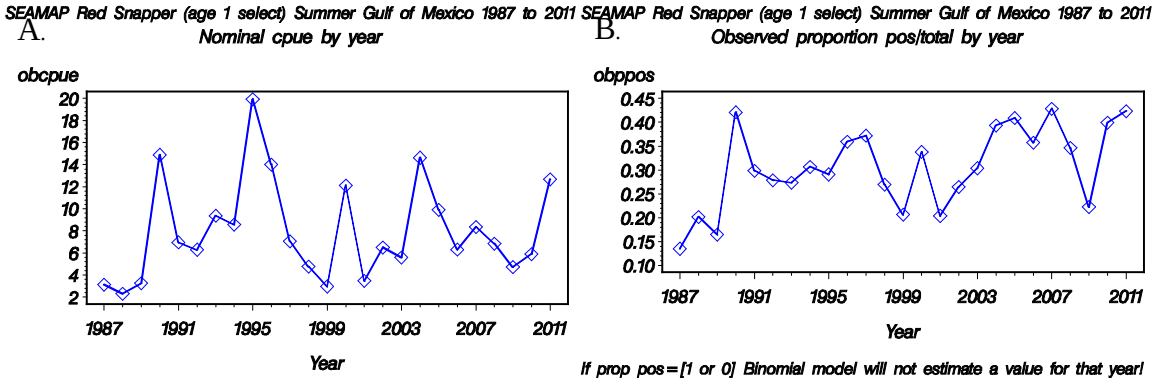


Figure 192. Annual trends for red snapper (GOM / age 1 selectivity / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

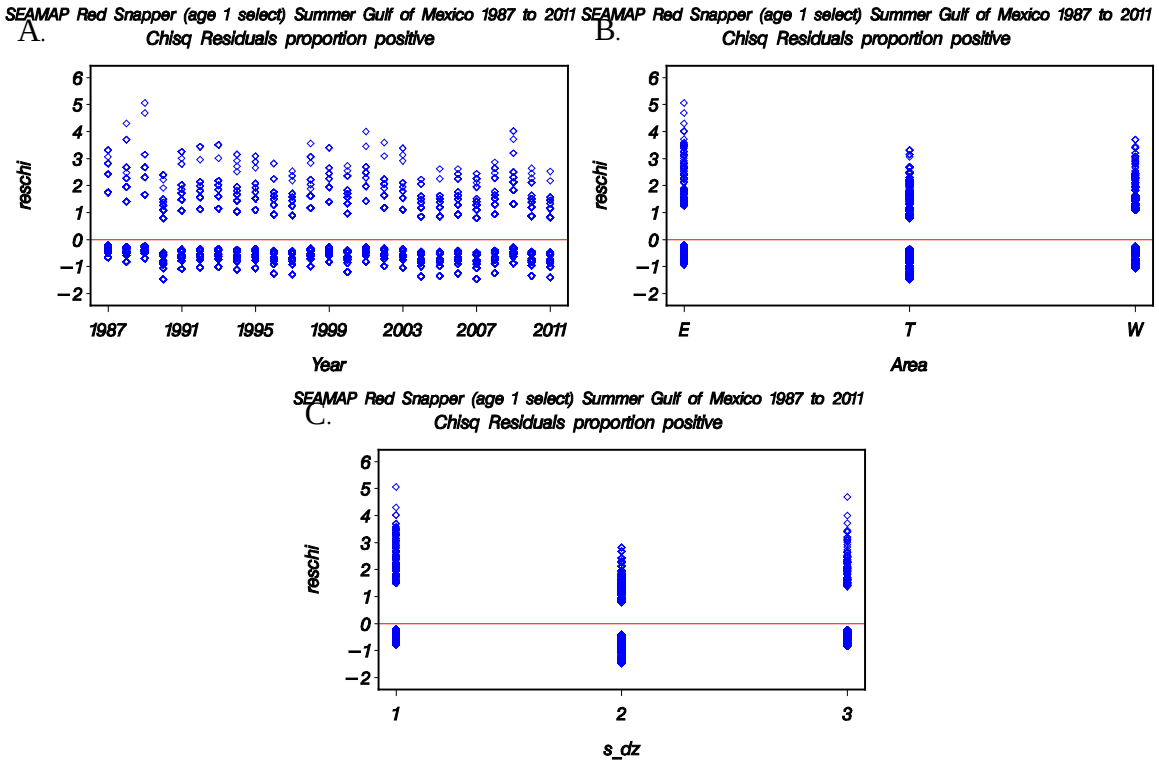


Figure 193. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 selectivity / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area and **C.** the Chi-Square residuals by depth zone.

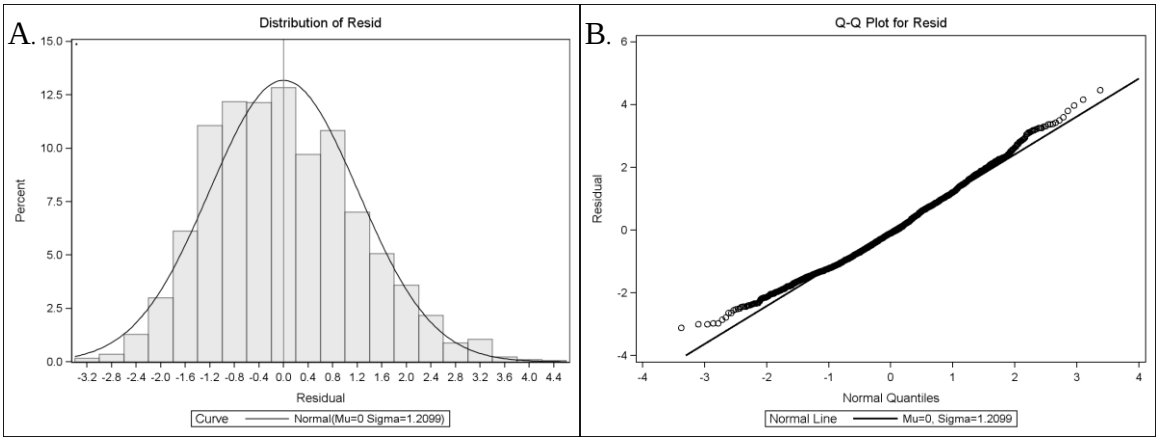


Figure 194. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 selectivity / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

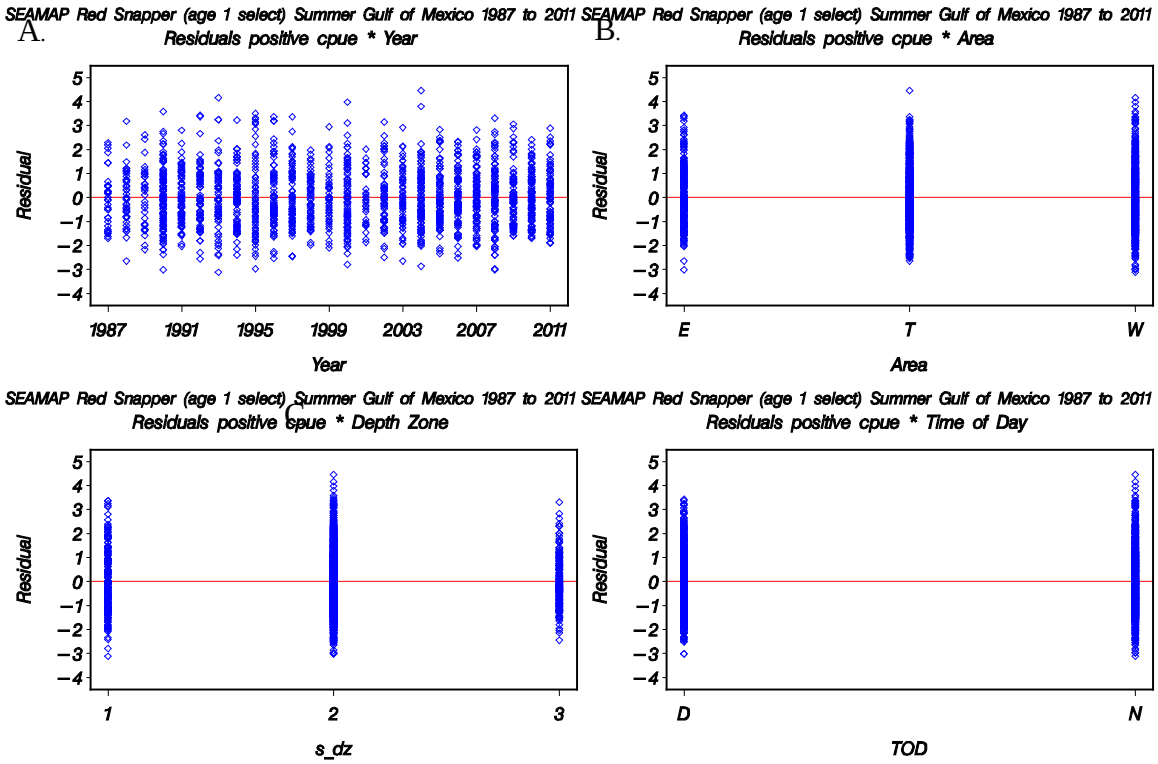


Figure 195. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 selectivity / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.

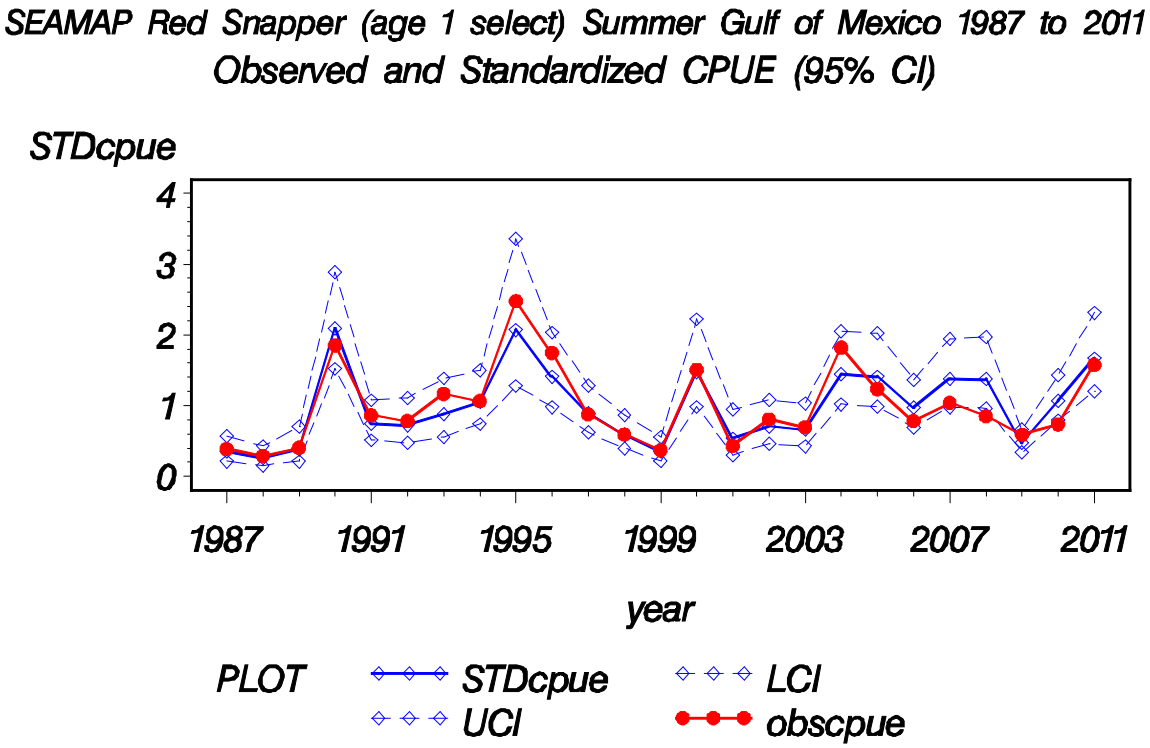


Figure 196. Annual index of abundance for red snapper (GOM / age 1 selectivity / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

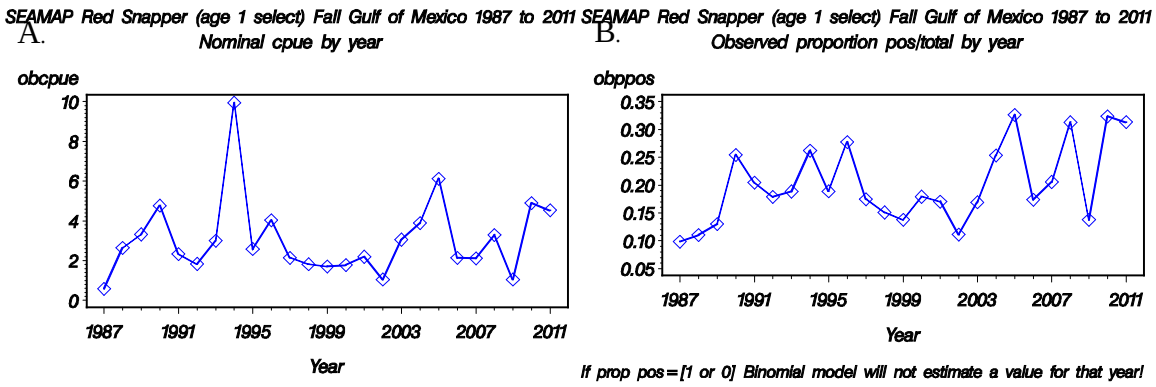


Figure 197. Annual trends for red snapper (GOM / age 1 selectivity / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

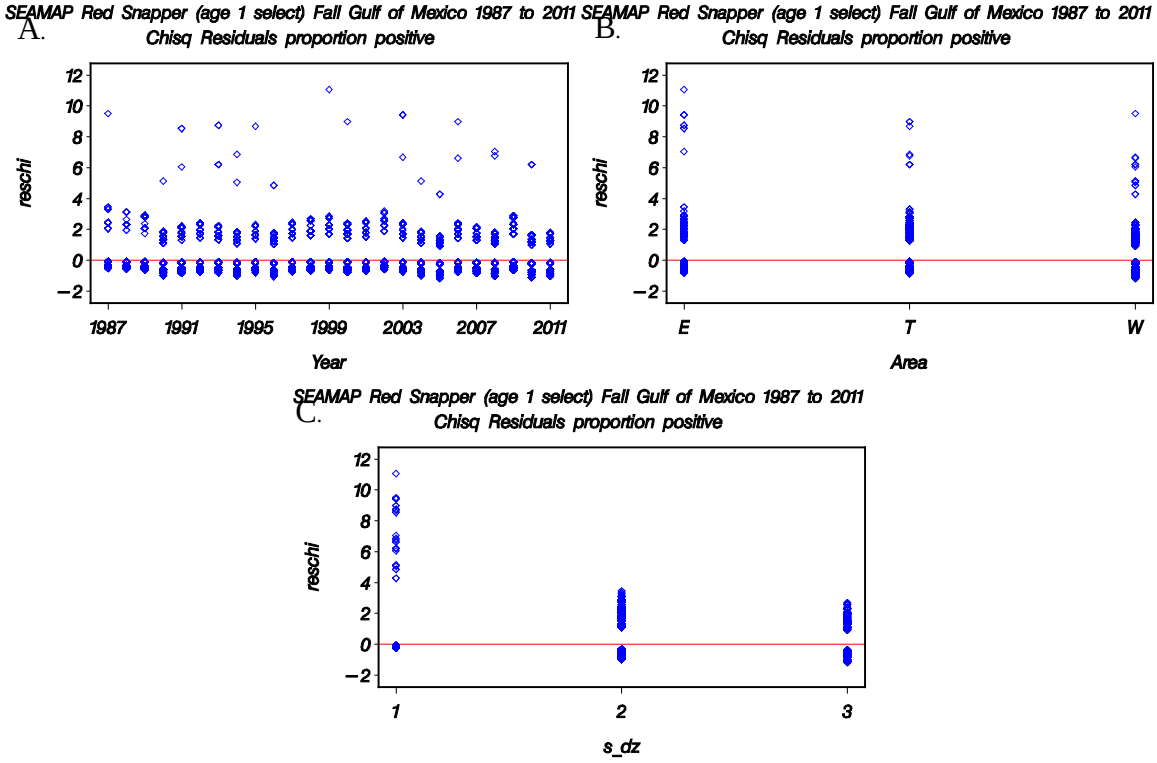


Figure 198. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 selectivity / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area and **C.** the Chi-Square residuals by depth zone.

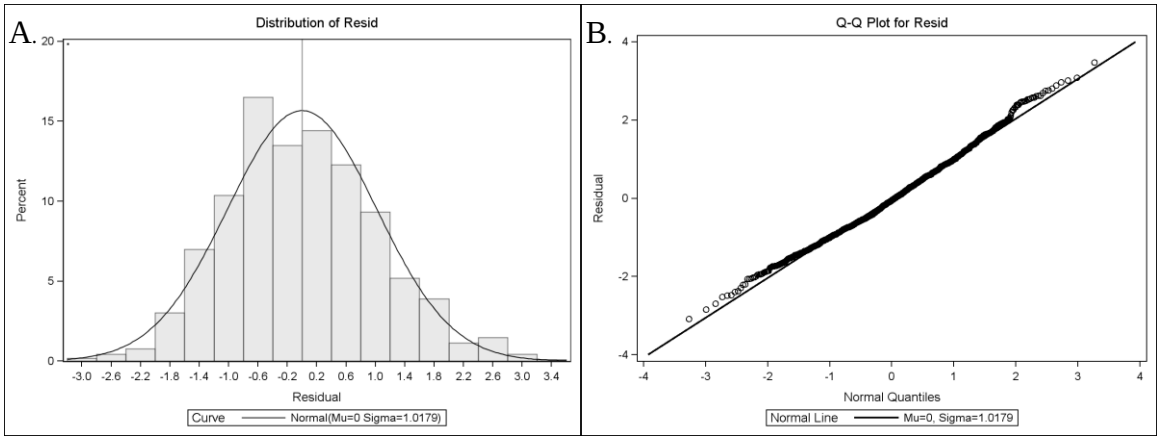


Figure 199. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 selectivity / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

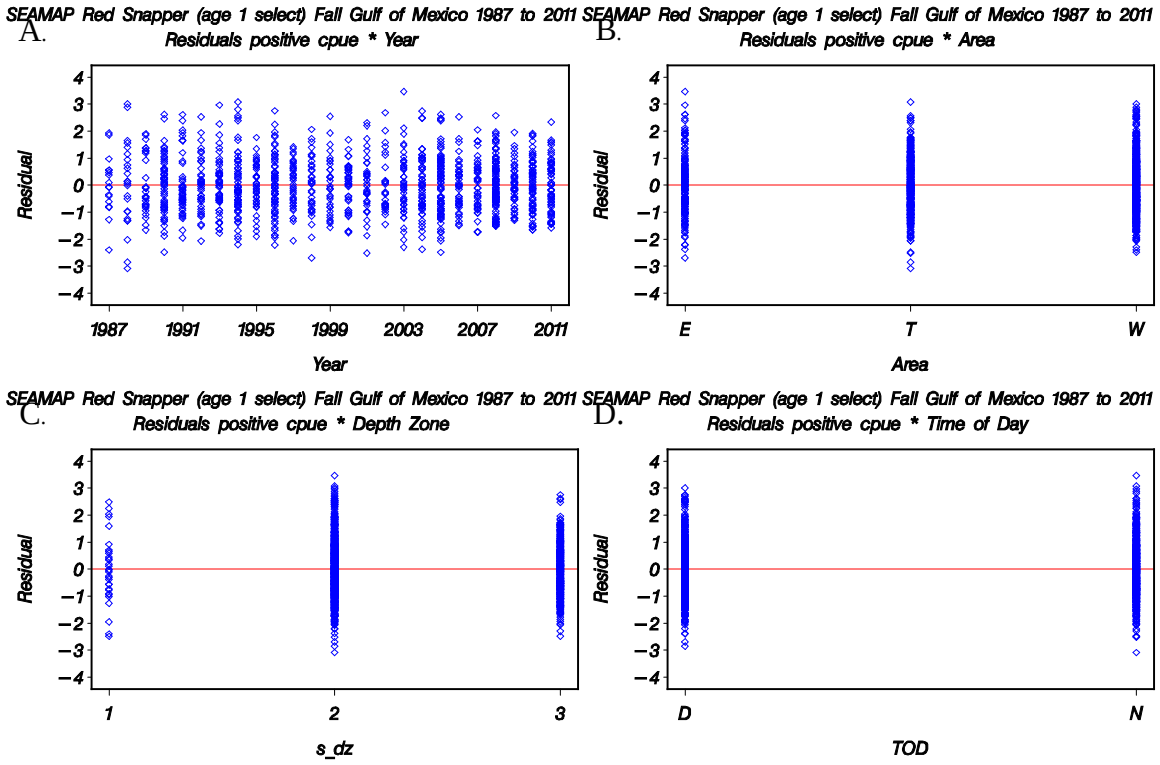


Figure 200. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (GOM / age 1 selectivity / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D**. the Chi-Square residuals by time of day.

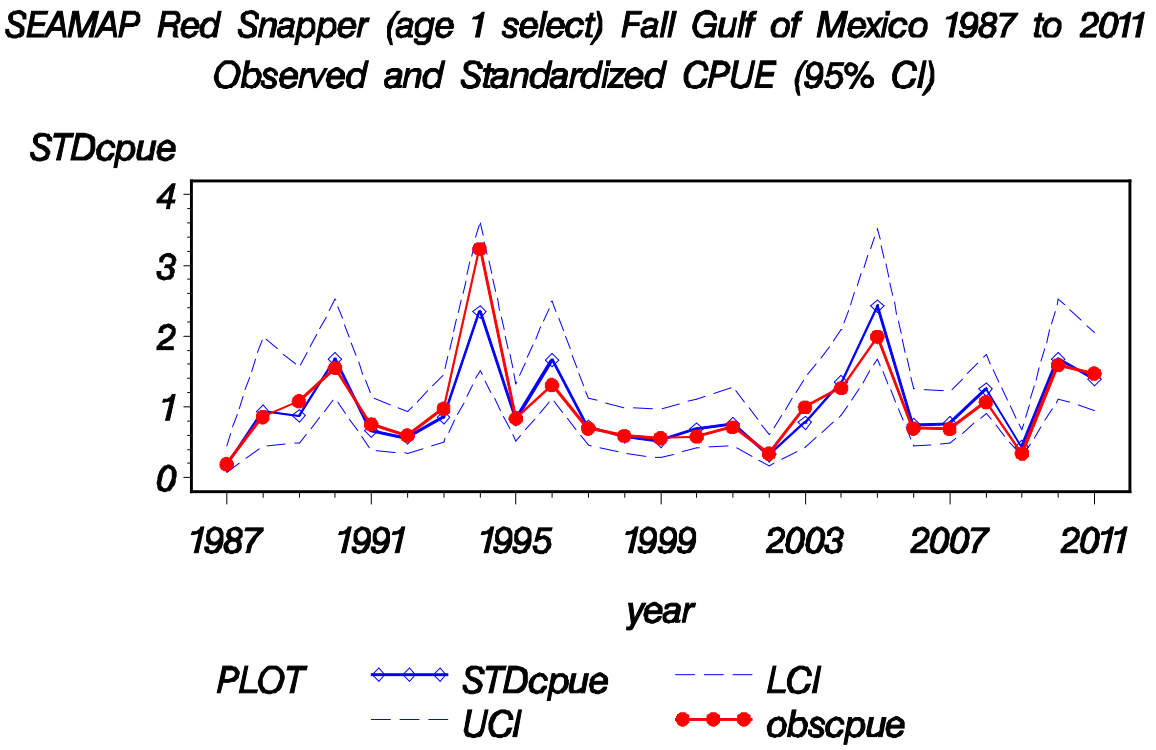


Figure 201. Annual index of abundance for red snapper (GOM / age 1 selectivity / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

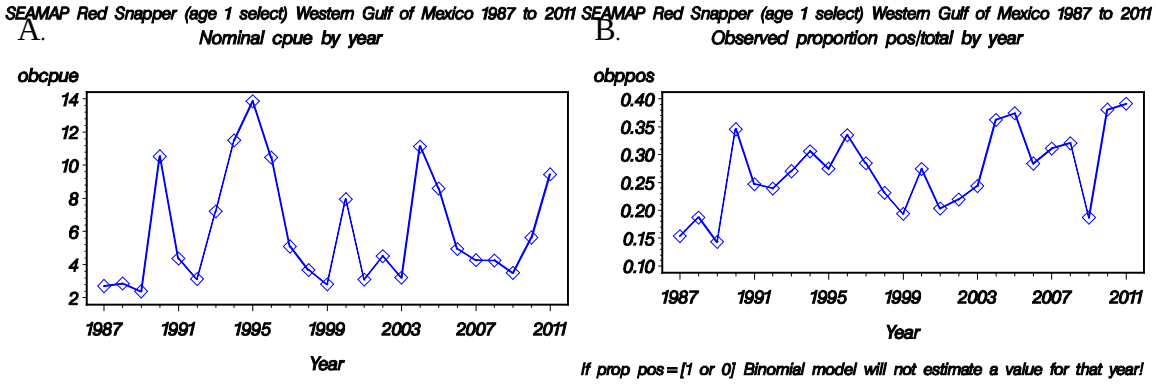


Figure 202. Annual trends for red snapper (WGOM / age 1 selectivity) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

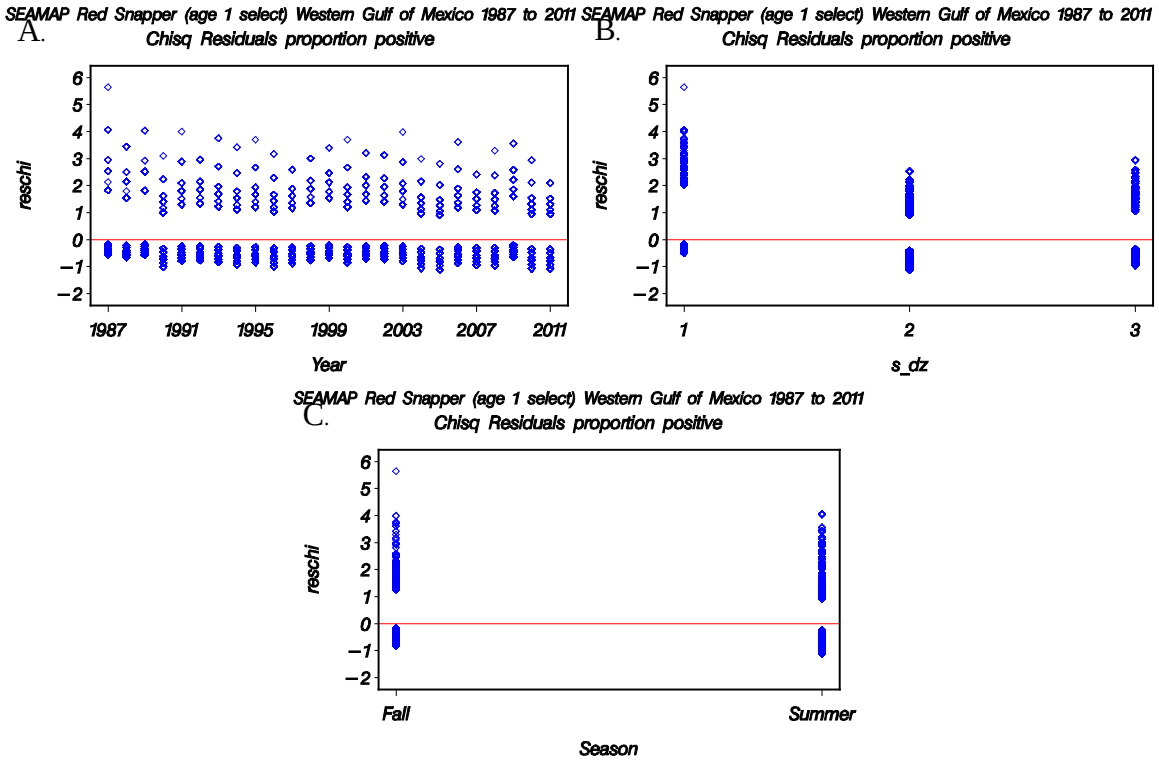


Figure 203. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 selectivity) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by season.

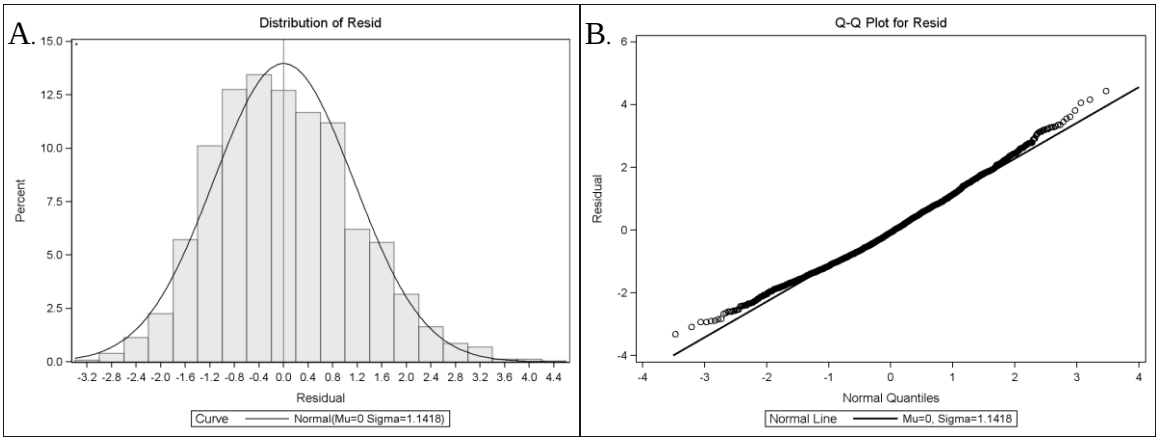


Figure 204. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 selectivity) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

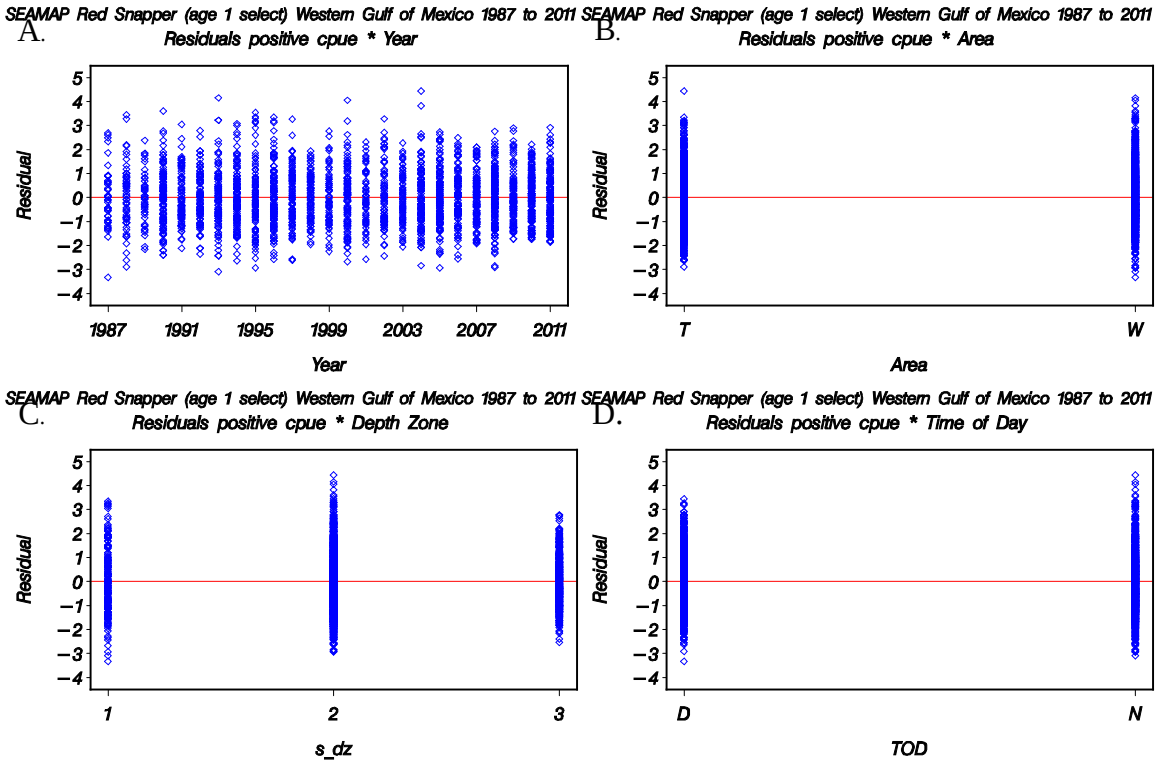


Figure 205. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 selectivity) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.

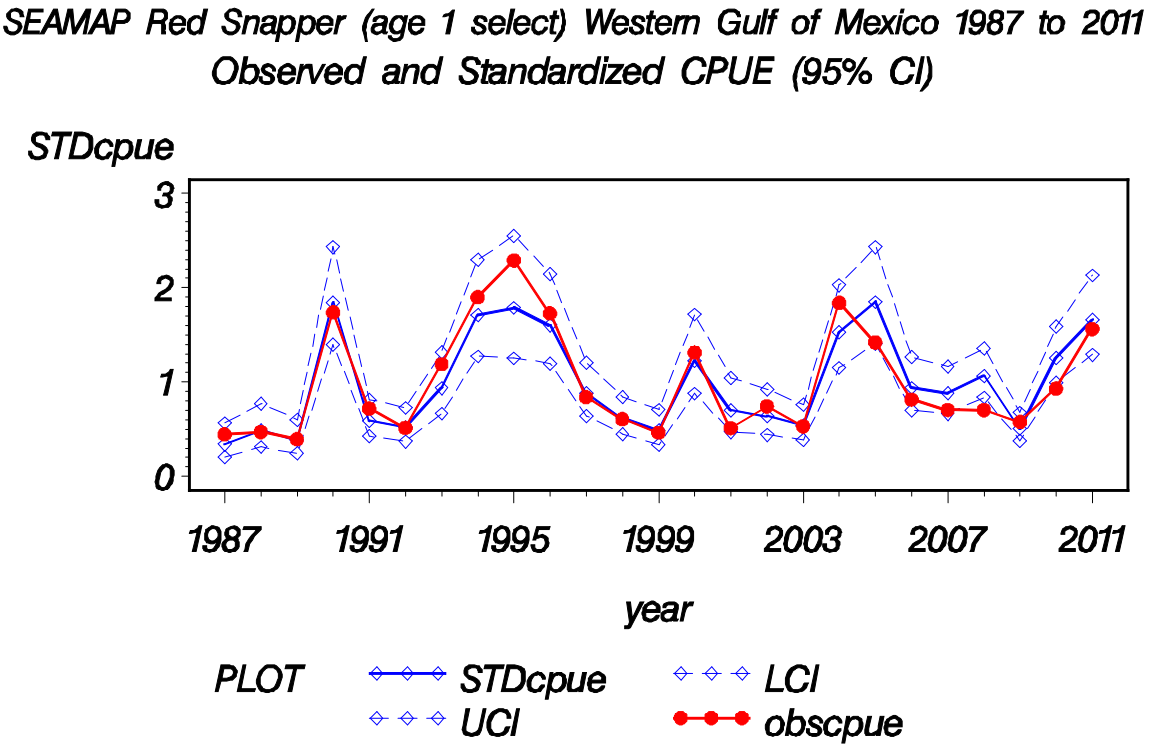


Figure 206. Annual index of abundance for red snapper (WGOM / age 1 selectivity) from the SEAMAP Groundfish Survey from 1987 – 2011.

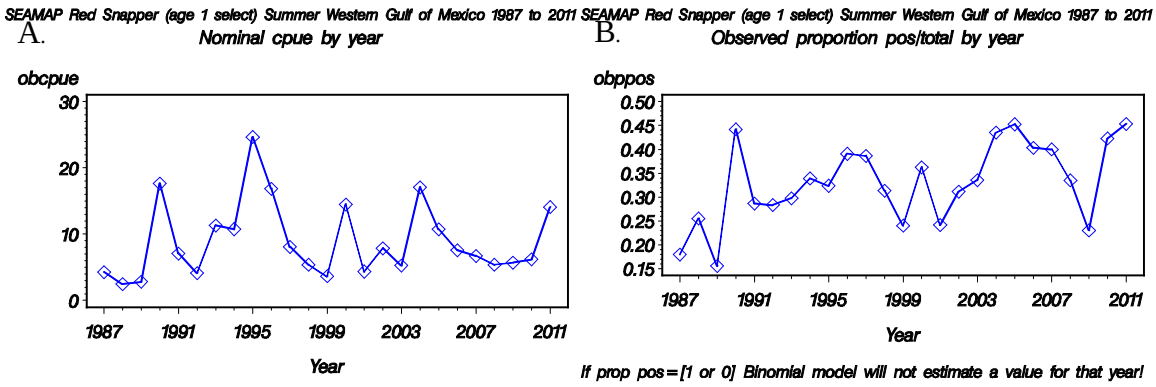


Figure 207. Annual trends for red snapper (WGOM / age 1 selectivity / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

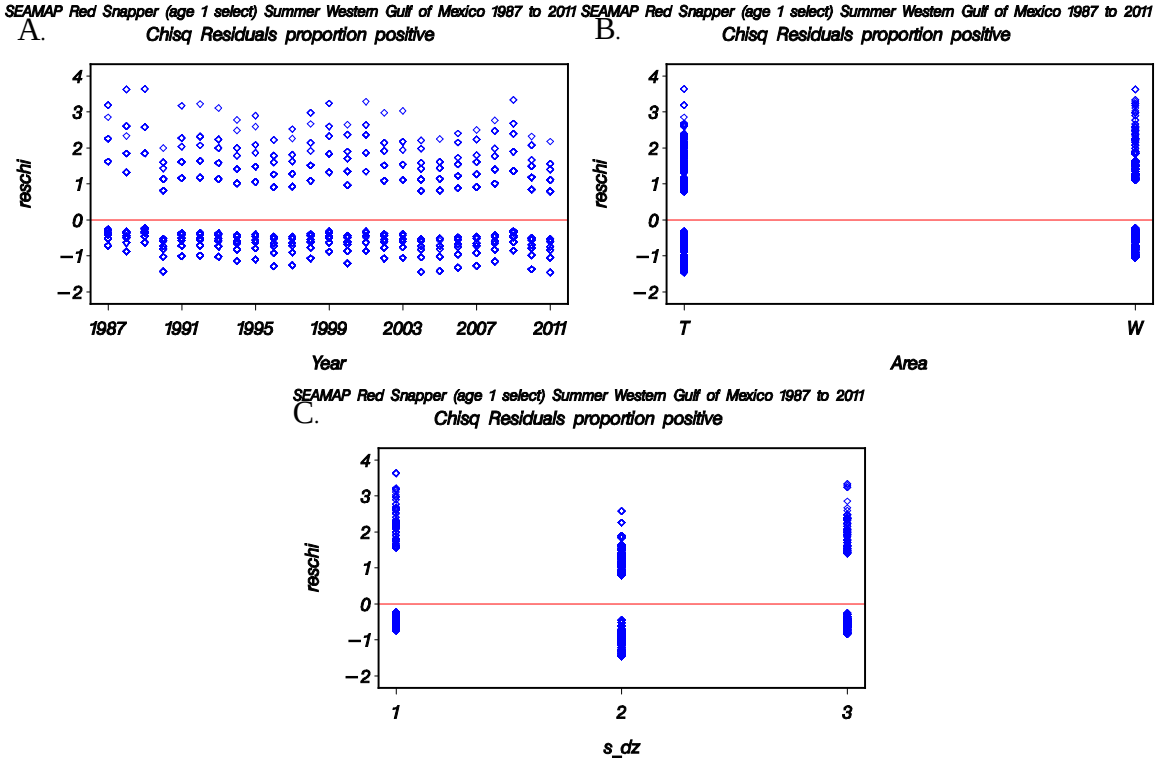


Figure 208. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 selectivity / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area and **C.** the Chi-Square residuals by depth zone.

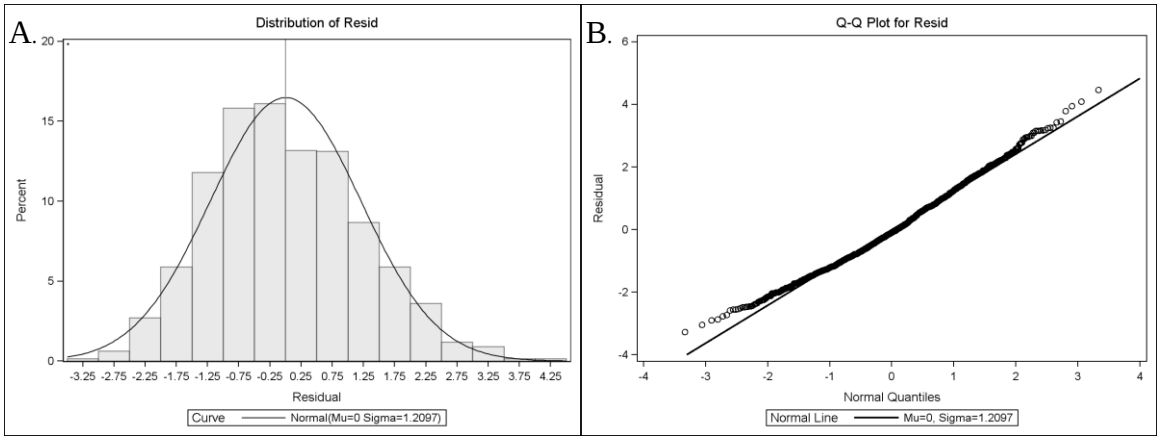


Figure 209. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 selectivity / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

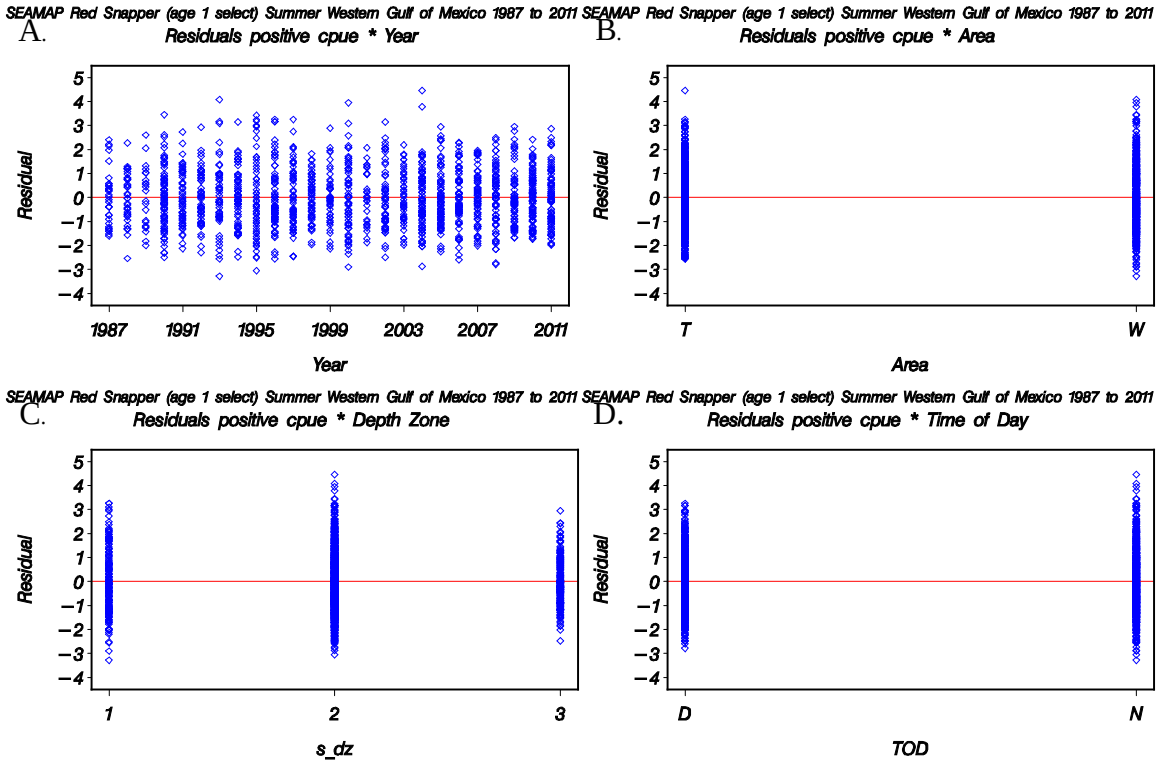


Figure 210. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 selectivity / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D**. the Chi-Square residuals by time of day.

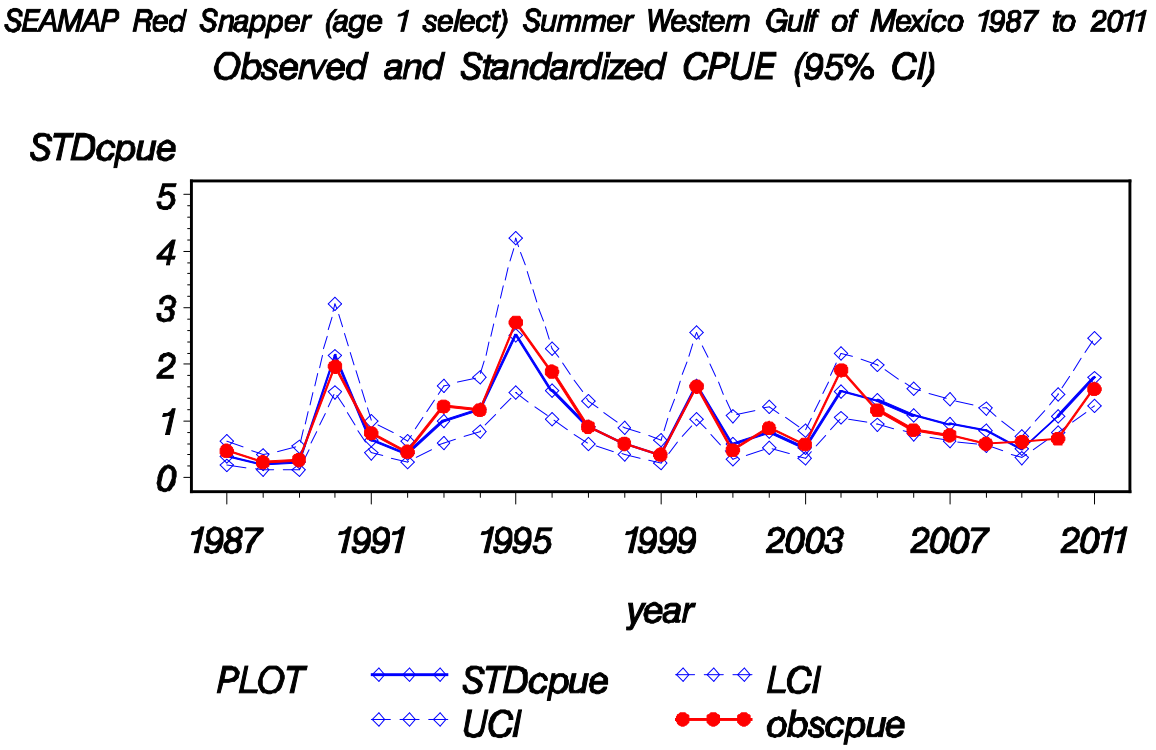


Figure 211. Annual index of abundance for red snapper (WGOM / age 1 selectivity / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

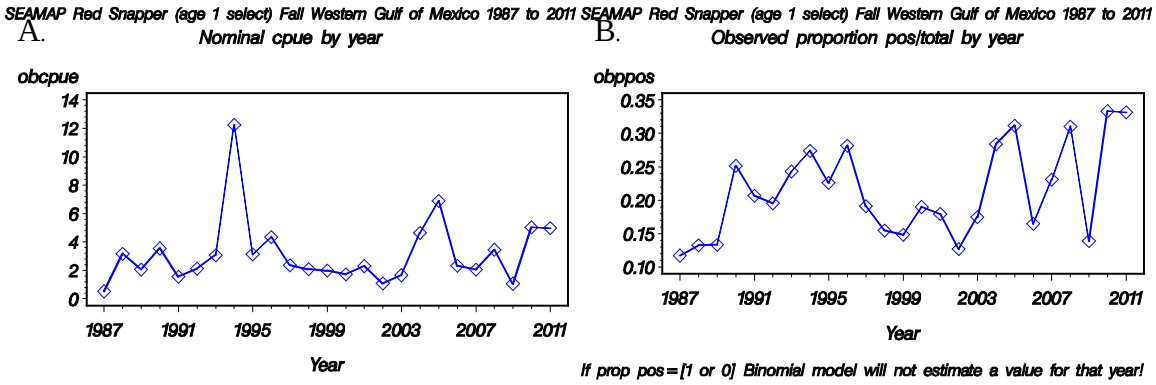


Figure 212. Annual trends for red snapper (WGOM / age 1 selectivity / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

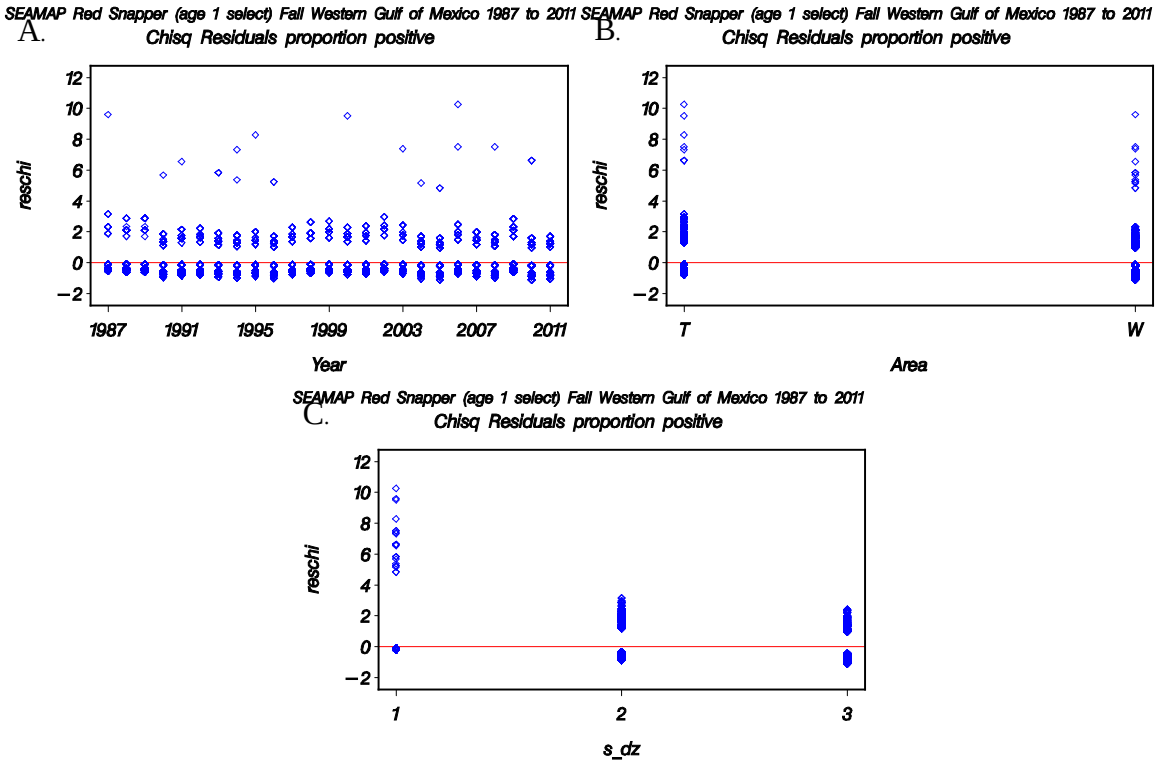


Figure 213. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 selectivity / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area and **C.** the Chi-Square residuals by depth zone.

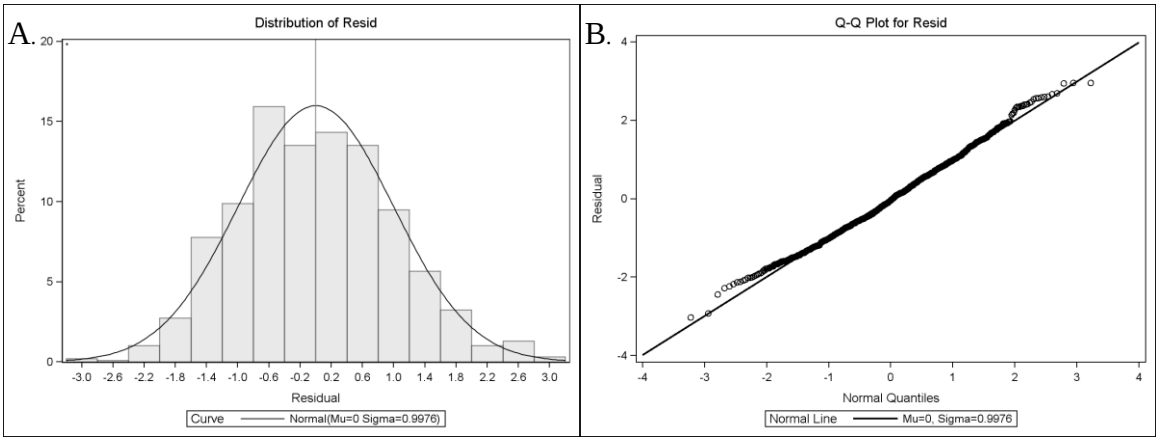


Figure 214. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 selectivity / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

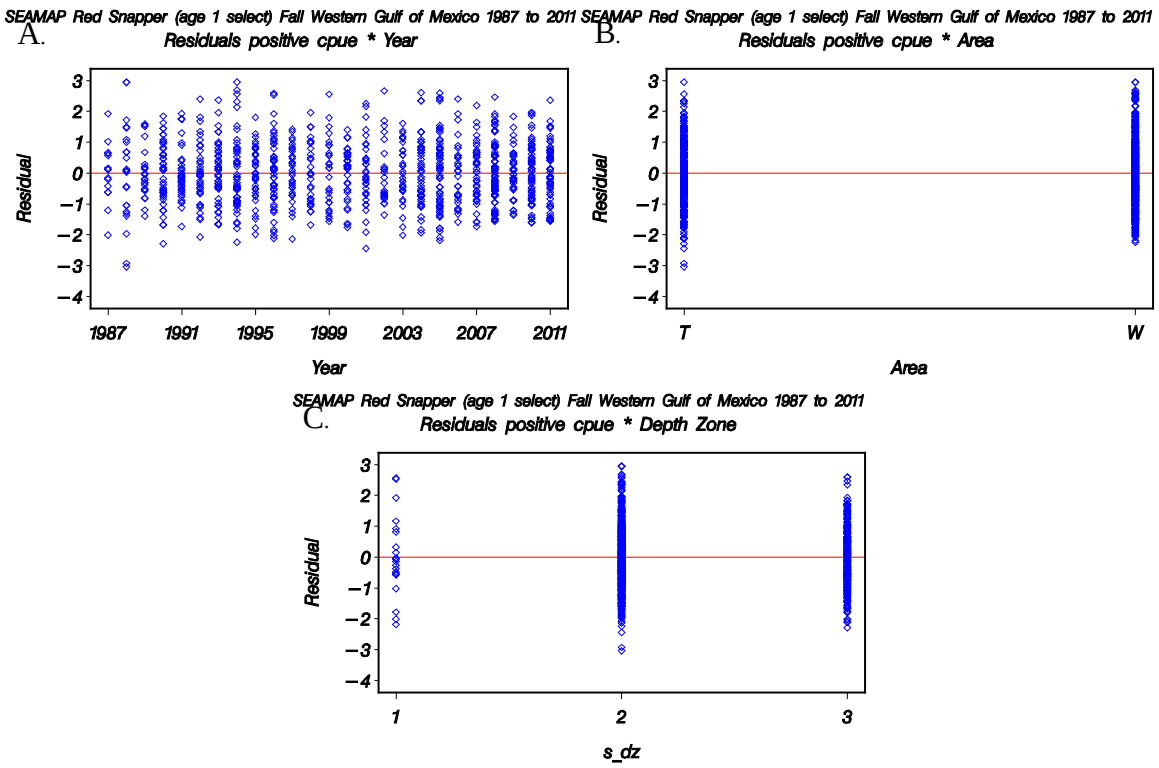


Figure 215. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / age 1 selectivity / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area and **C.** the Chi-Square residuals by depth zone.

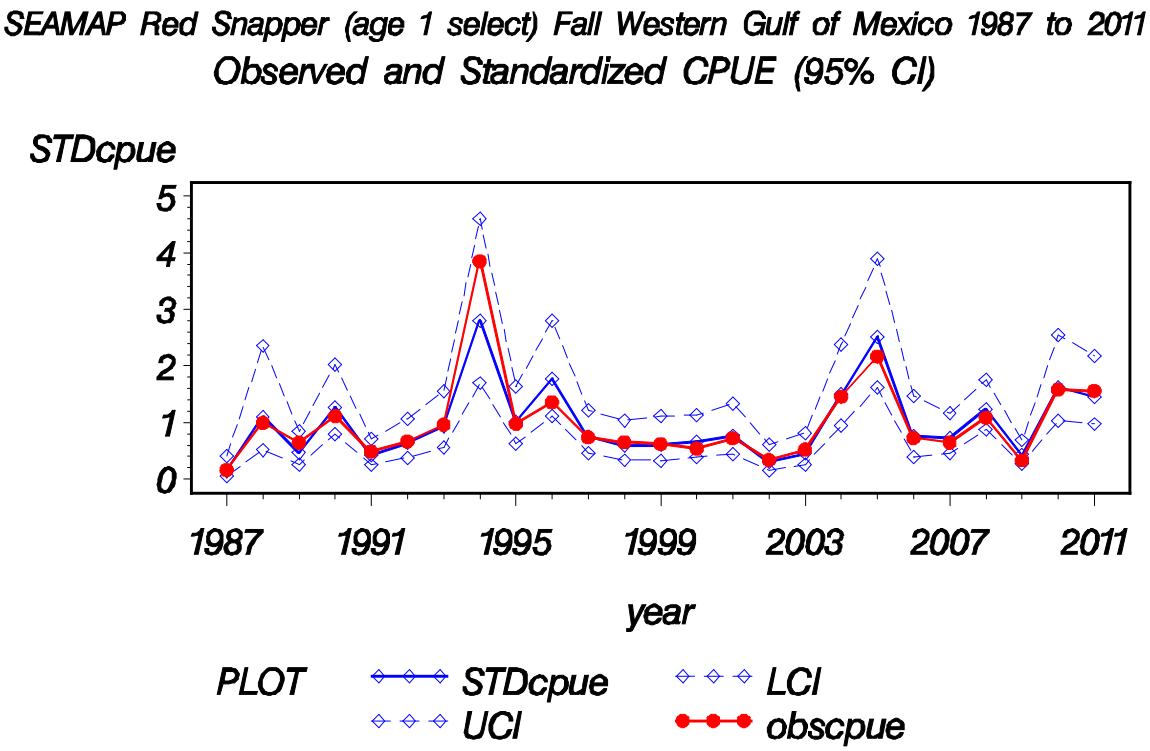


Figure 216. Annual index of abundance for red snapper (WGOM / age 1 selectivity / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

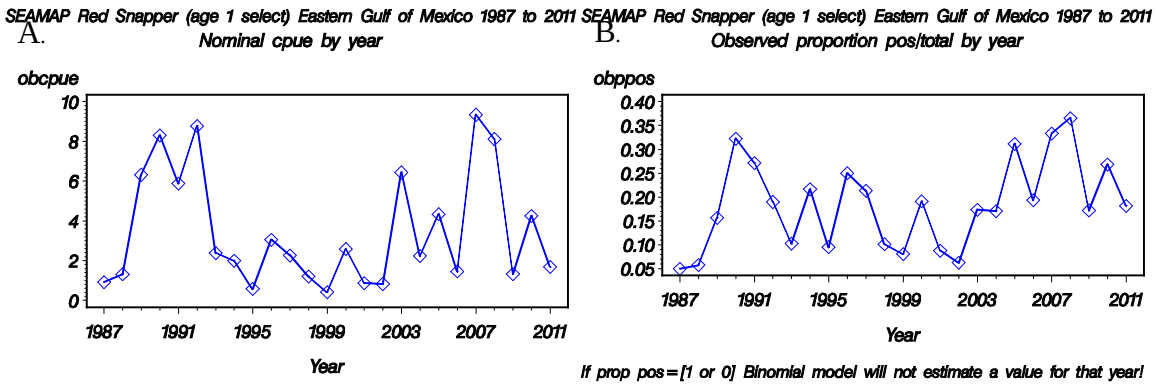


Figure 217. Annual trends for red snapper (EGOM / age 1 selectivity) captured during Summer and Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

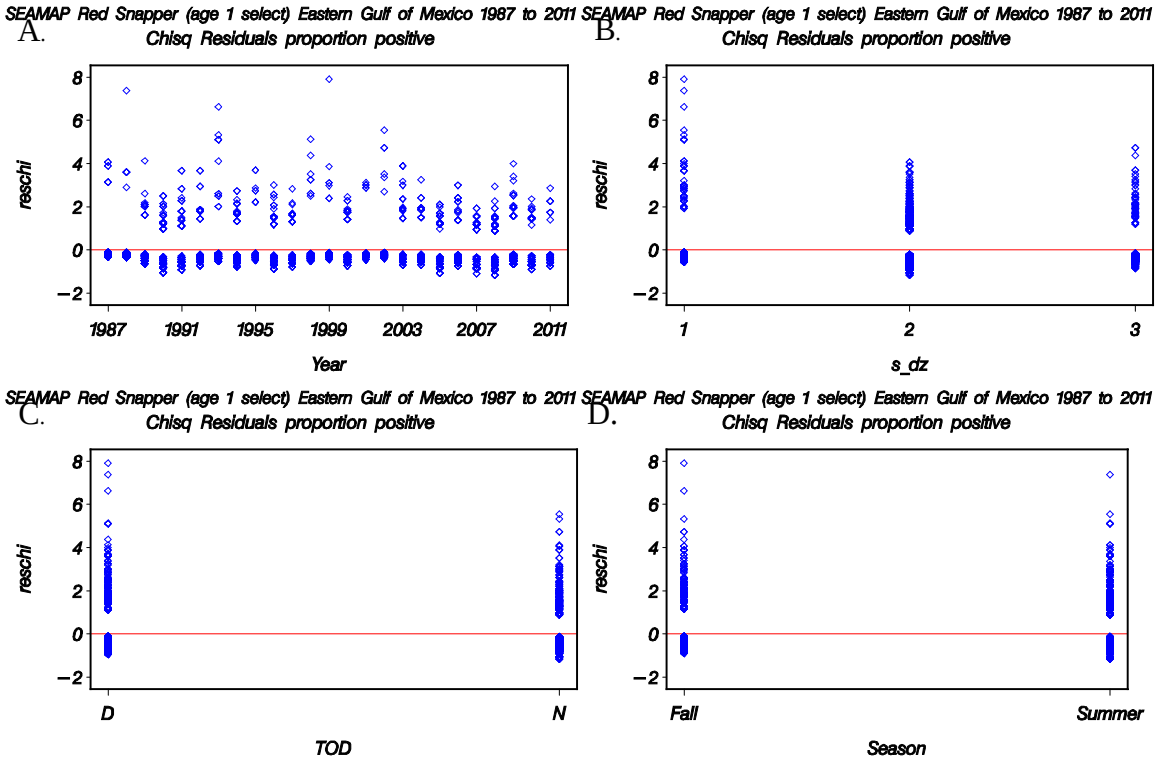


Figure 218. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 selectivity) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone, **C.** the Chi-Square residuals by time of day and **D.** the Chi-Square residuals by season.

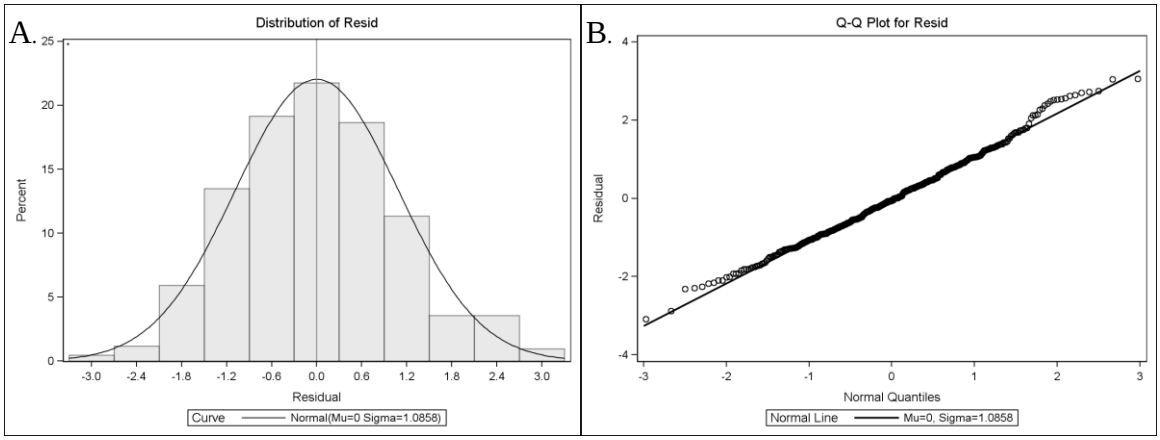


Figure 219. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 selectivity) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

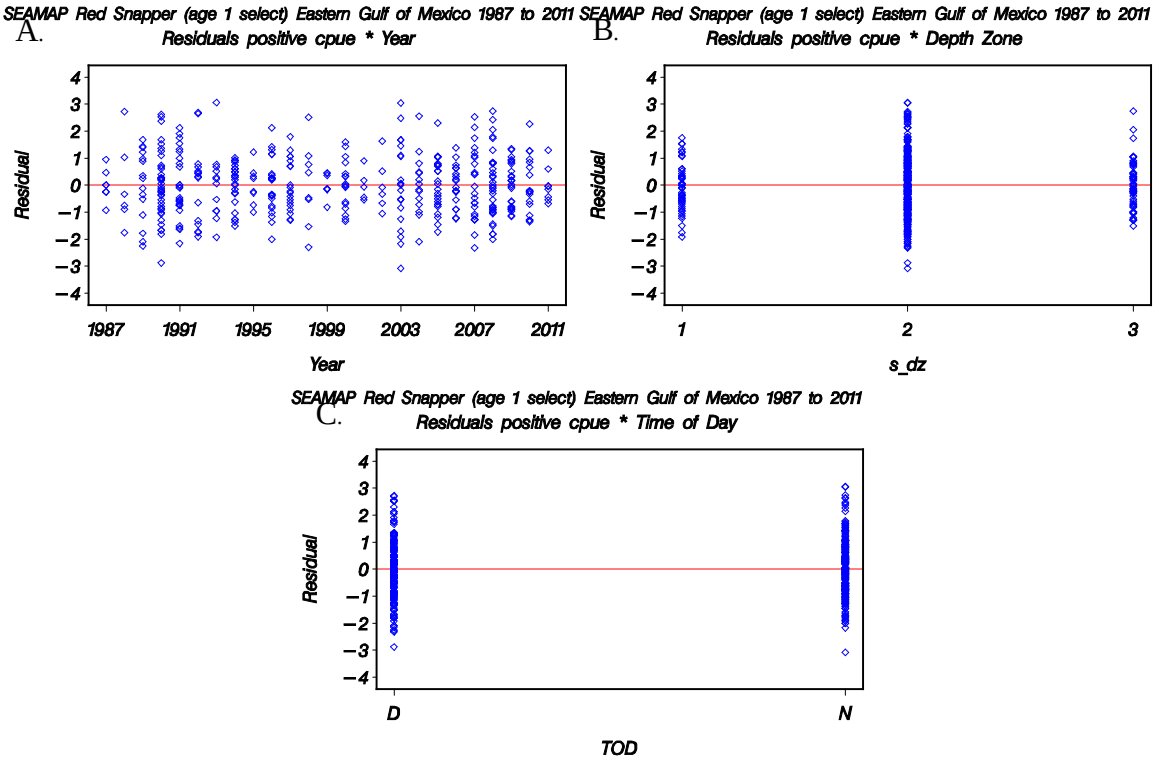


Figure 220. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 selectivity) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

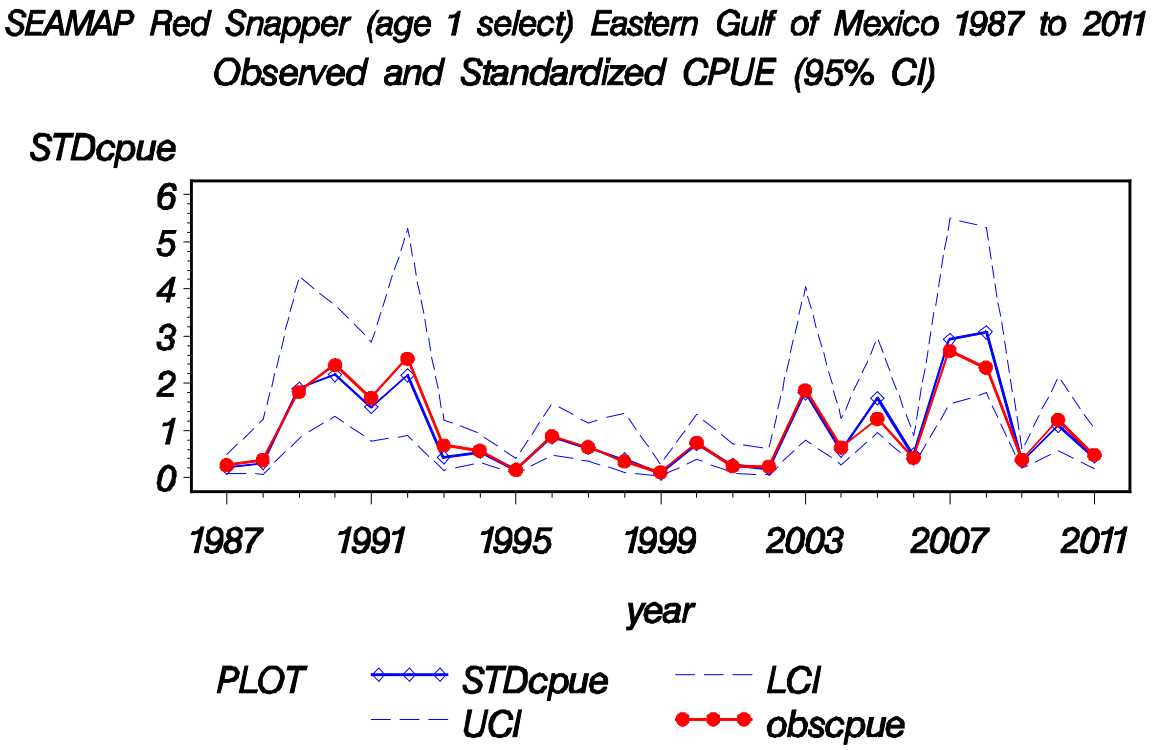


Figure 221. Annual index of abundance for red snapper (EGOM / age 1 selectivity) from the SEAMAP Groundfish Survey from 1987 – 2011.

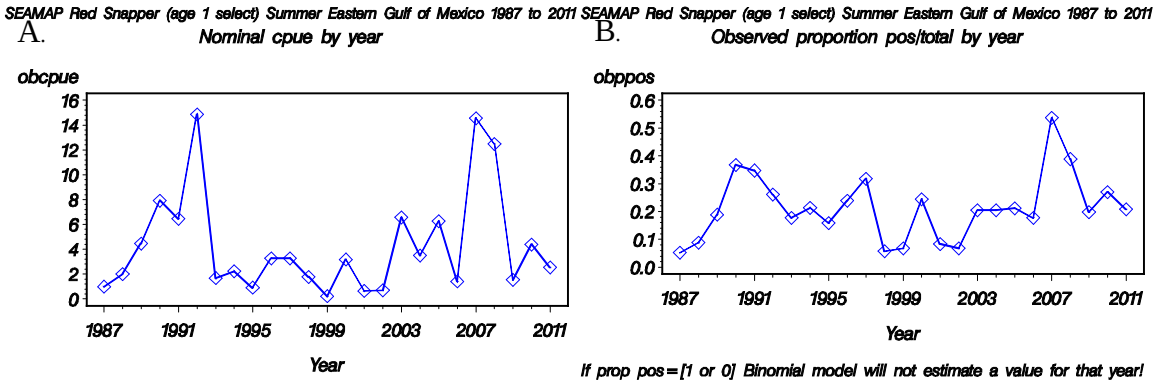


Figure 222. Annual trends for red snapper (EGOM / age 1 selectivity / Summer) captured during Summer SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

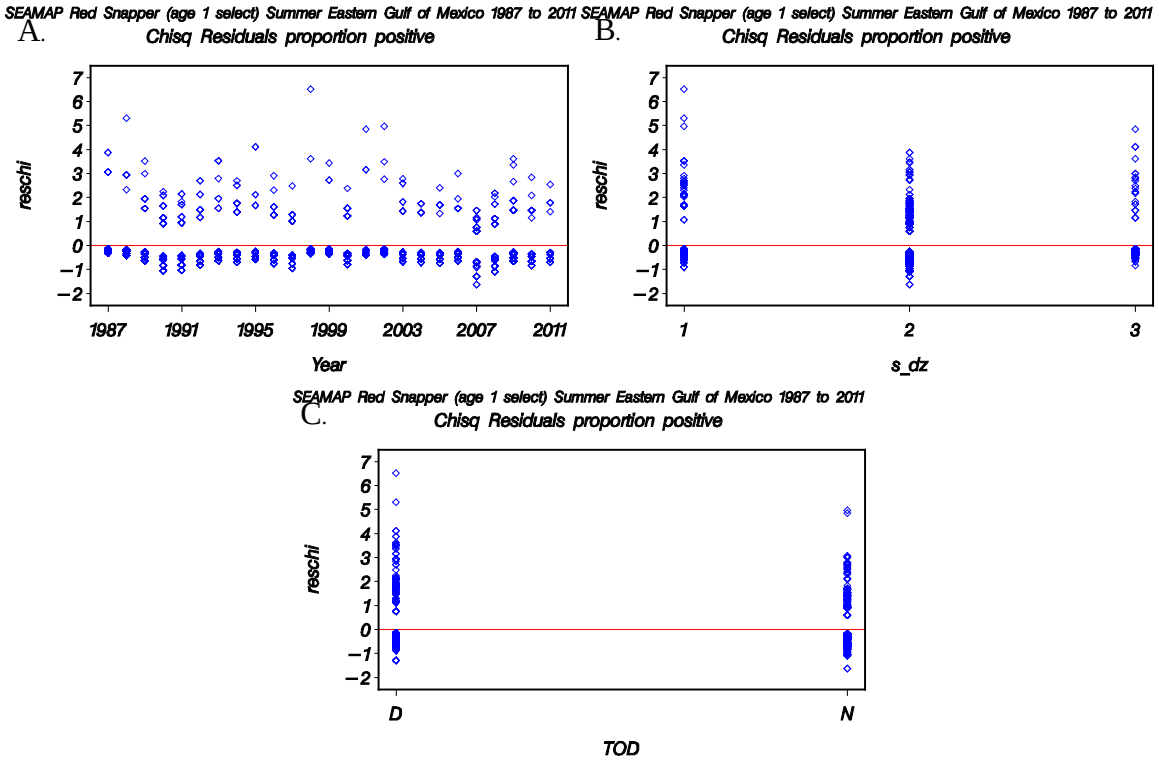


Figure 223. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 selectivity / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

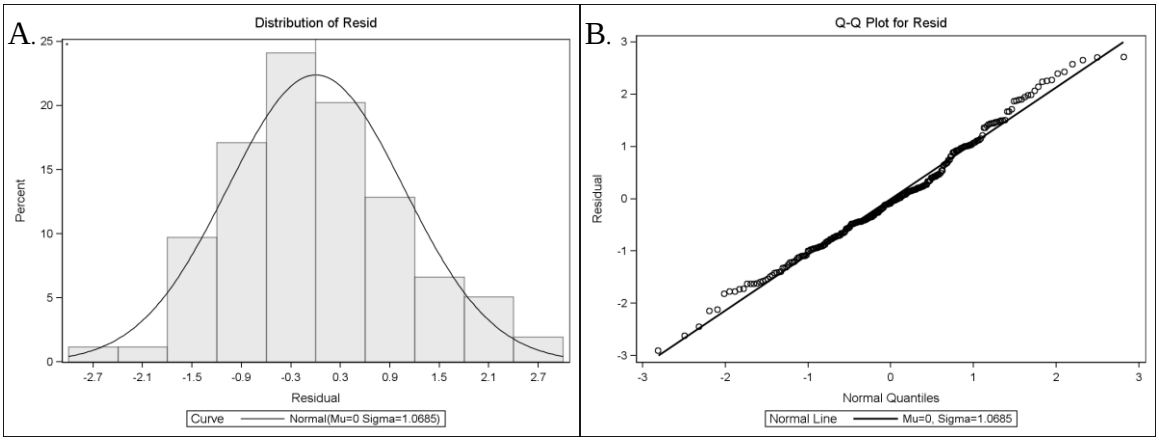


Figure 224. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 selectivity / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

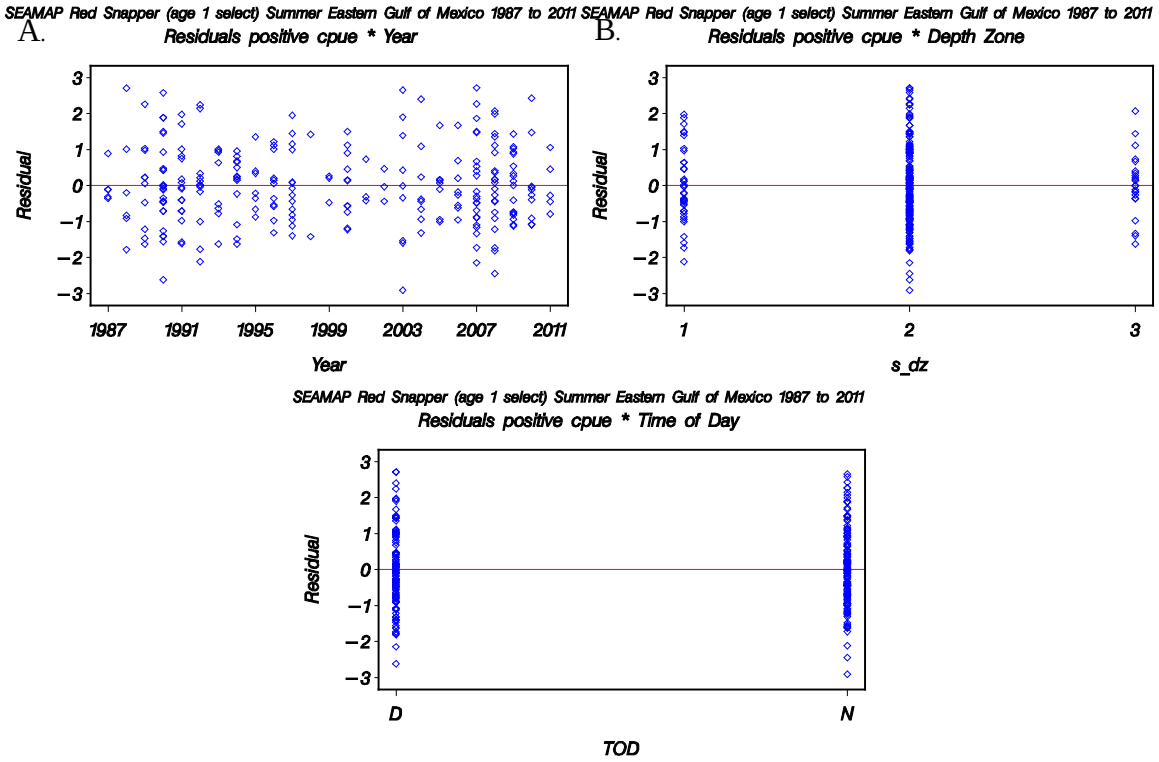


Figure 225. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 selectivity / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

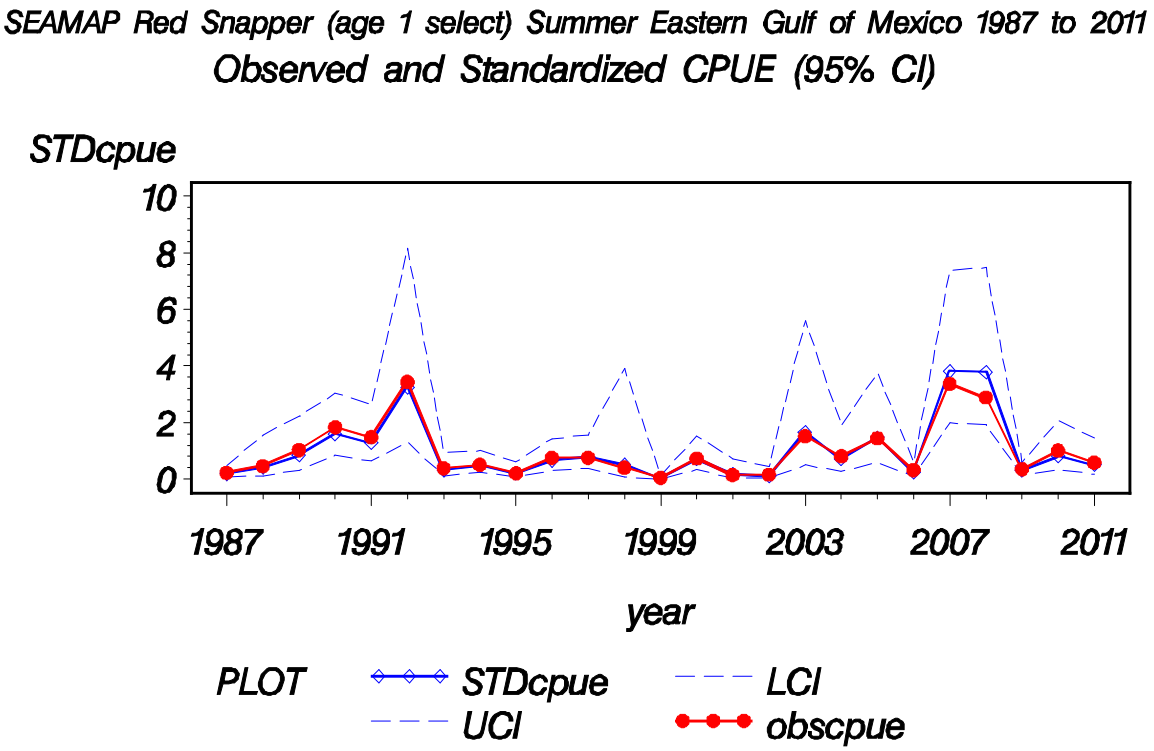


Figure 226. Annual index of abundance for red snapper (EGOM / age 1 selectivity / Summer) from the SEAMAP Groundfish Survey from 1987 – 2011.

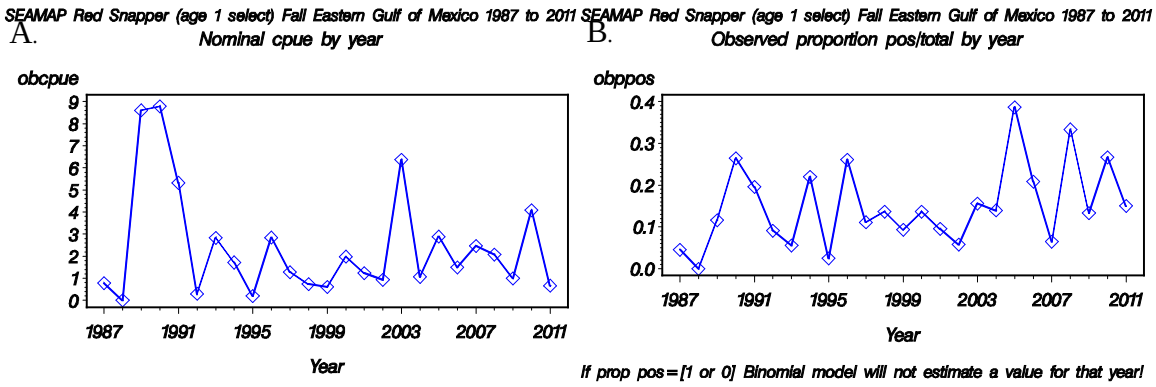


Figure 227. Annual trends for red snapper (EGOM / age 1 selectivity / Fall) captured during Fall SEAMAP Groundfish Surveys from 1987 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.

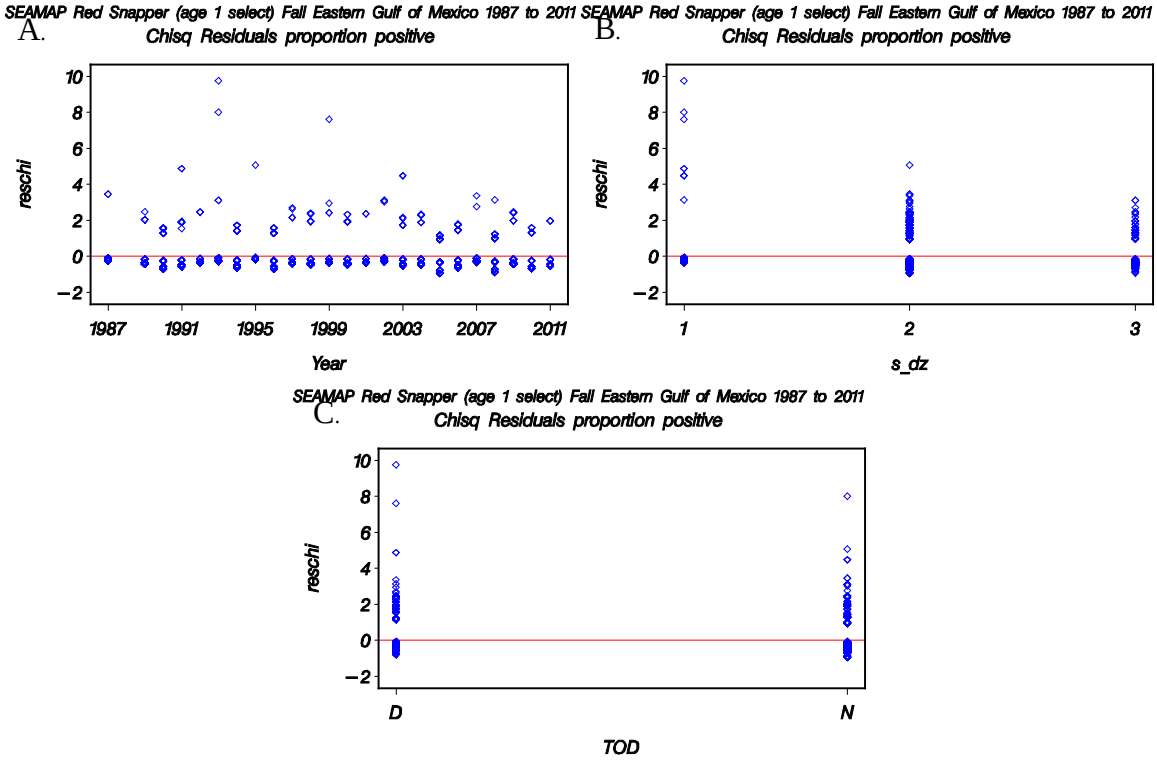


Figure 228. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 selectivity / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and **C.** the Chi-Square residuals by time of day.

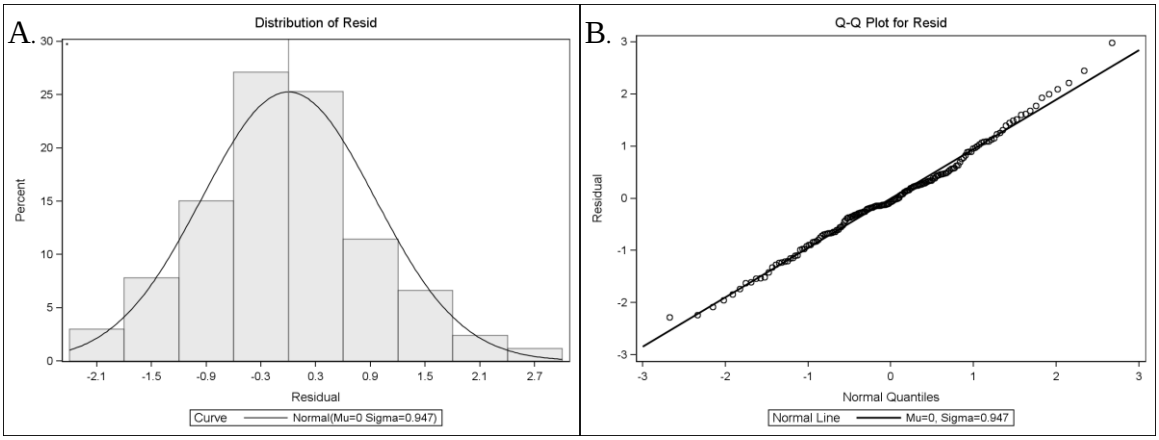


Figure 229. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 selectivity / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).

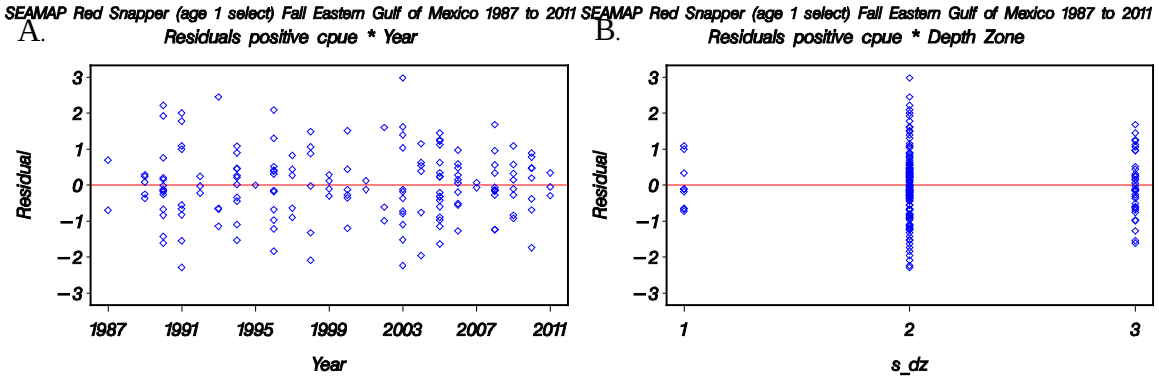


Figure 230. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / age 1 selectivity / Fall) model: **A.** the Chi-Square residuals by year and **B.** the Chi-Square residuals by depth zone.

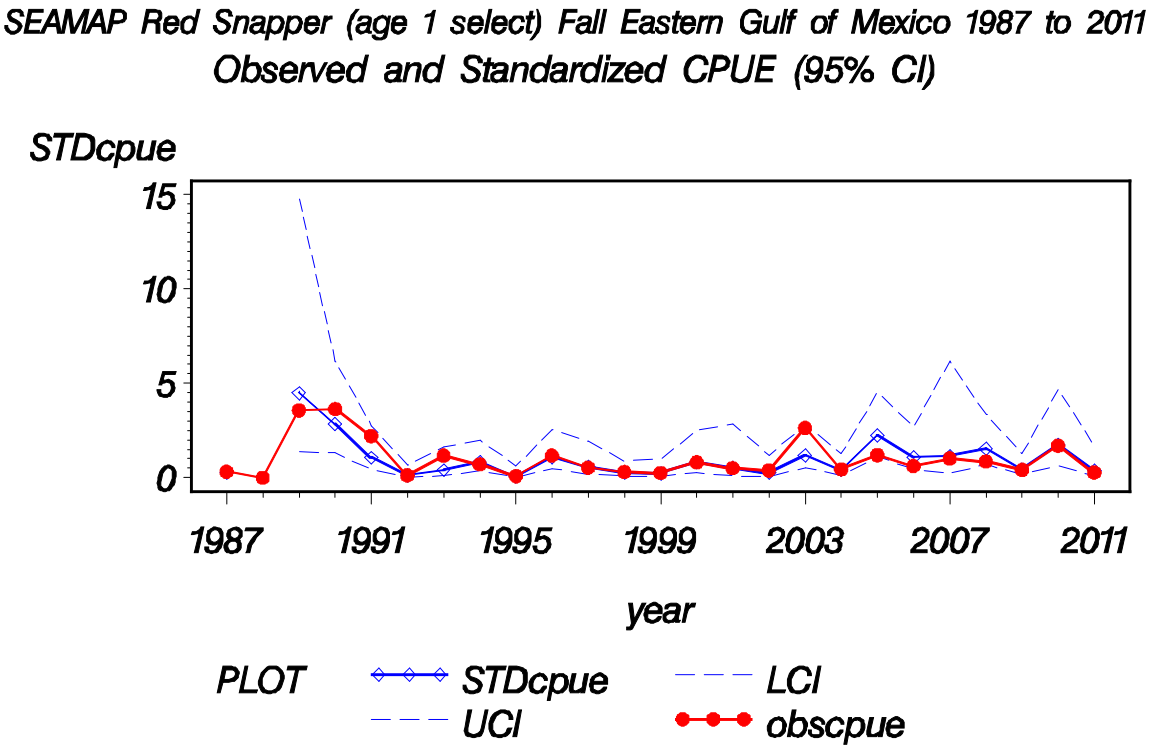
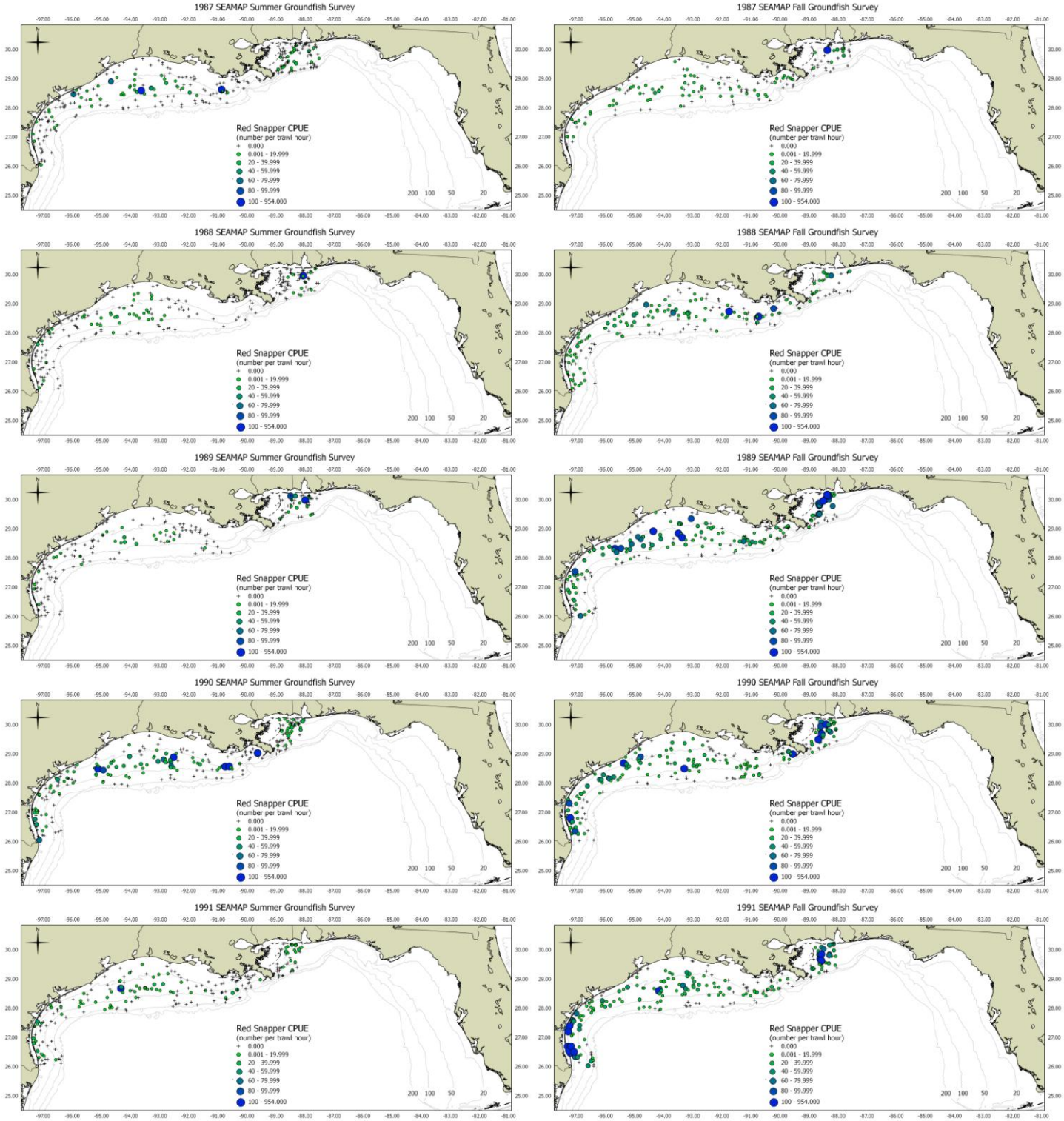


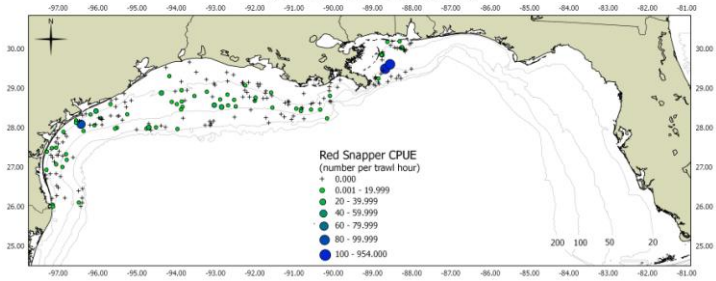
Figure 231. Annual index of abundance for red snapper (EGOM / age 1 selectivity / Fall) from the SEAMAP Groundfish Survey from 1987 – 2011.

Appendix

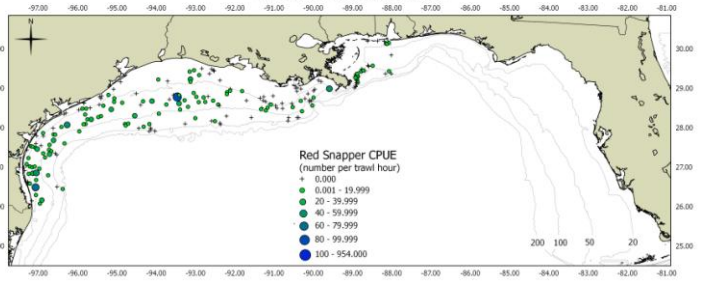
Appendix Figure 1. Annual survey effort and catch of red snapper from the SEAMAP groundfish survey during the summer and fall of 1987-2011.



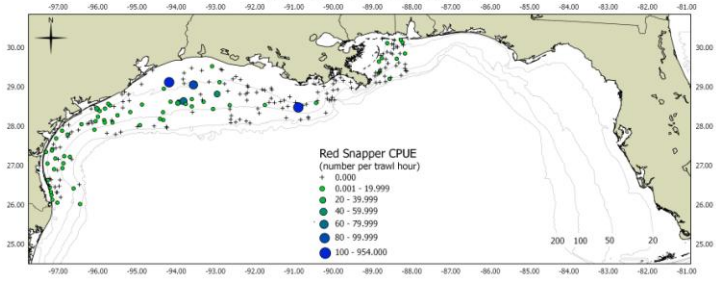
1992 SEAMAP Summer Groundfish Survey



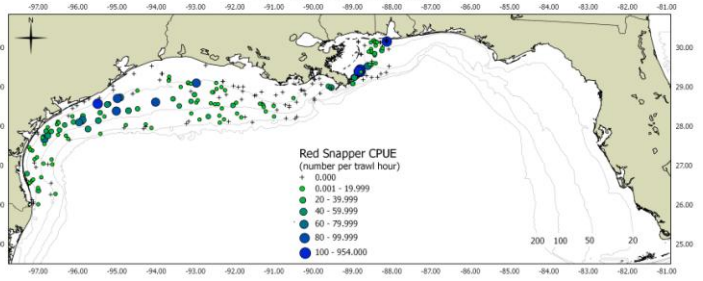
1992 SEAMAP Fall Groundfish Survey



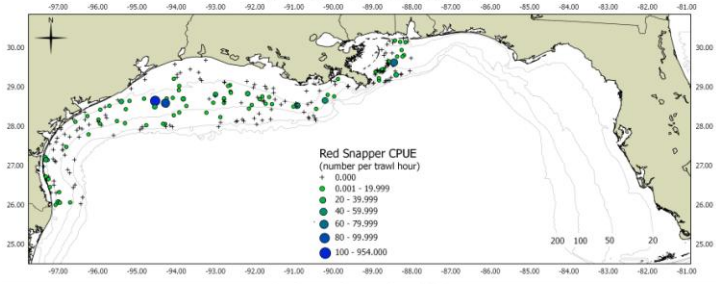
1993 SEAMAP Summer Groundfish Survey



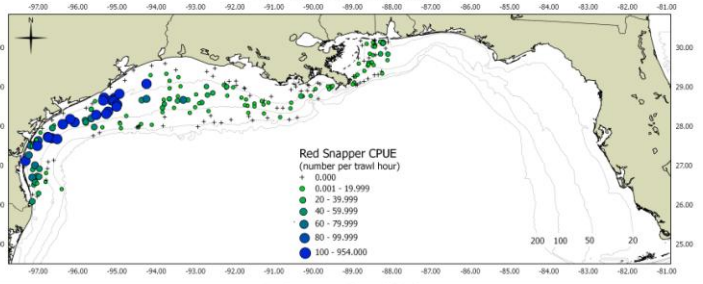
1993 SEAMAP Fall Groundfish Survey



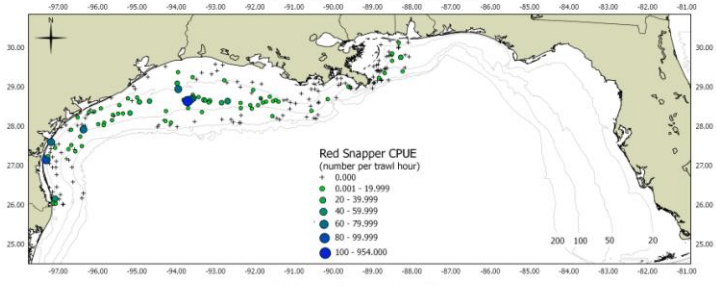
1994 SEAMAP Summer Groundfish Survey



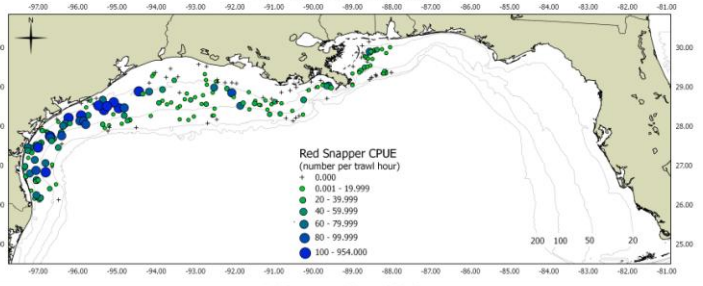
1994 SEAMAP Fall Groundfish Survey



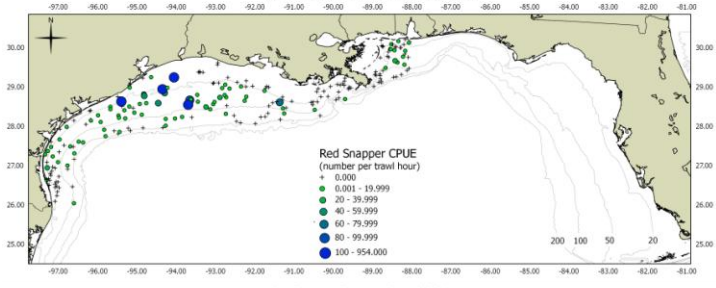
1995 SEAMAP Summer Groundfish Survey



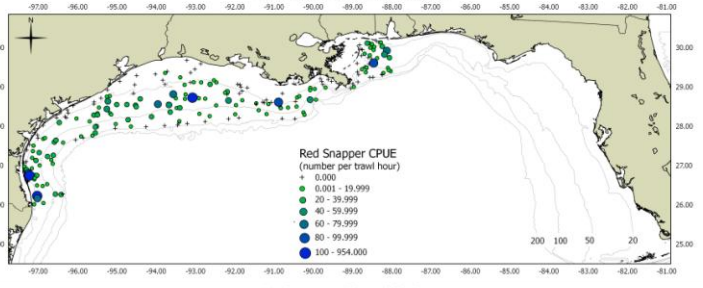
1995 SEAMAP Fall Groundfish Survey



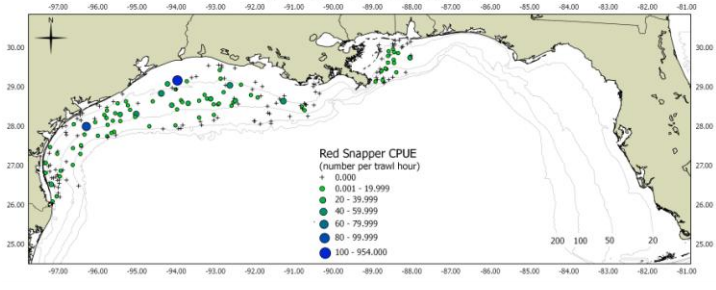
1996 SEAMAP Summer Groundfish Survey



1996 SEAMAP Fall Groundfish Survey



1997 SEAMAP Summer Groundfish Survey



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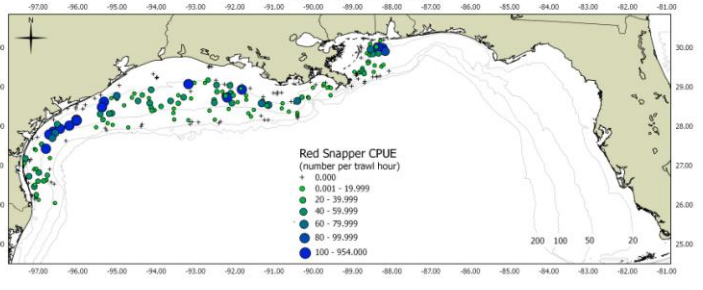

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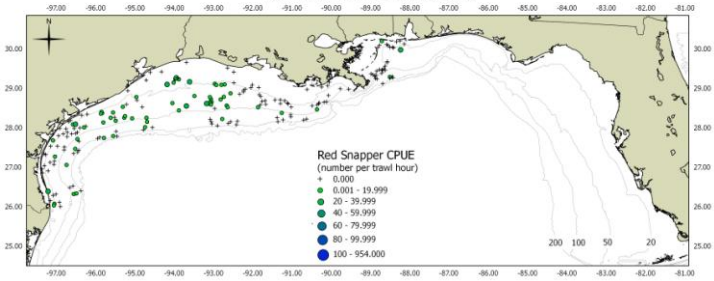

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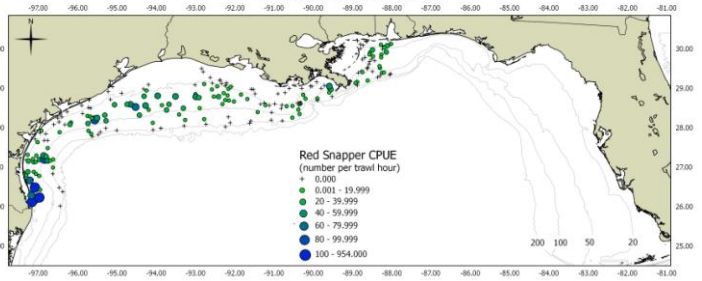

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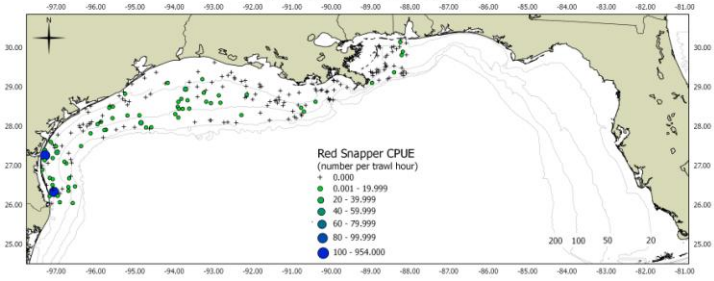

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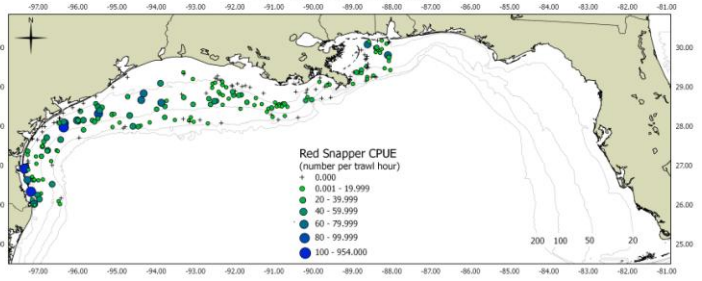

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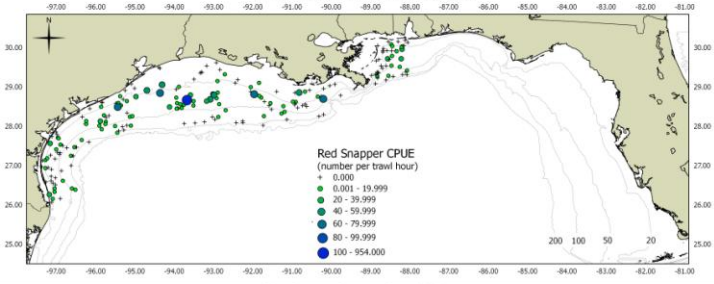

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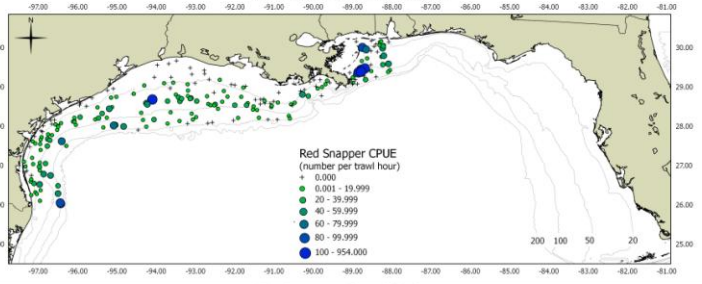

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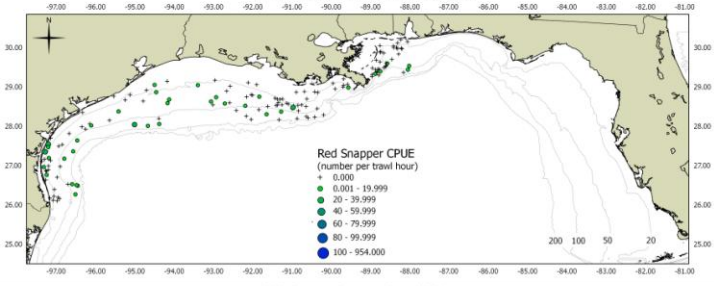

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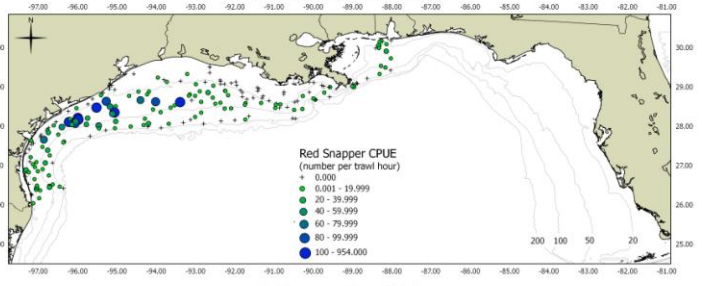

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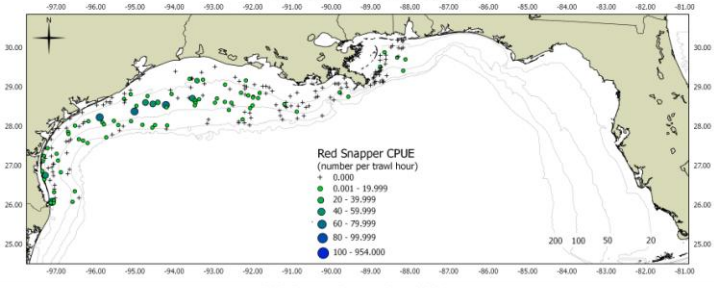

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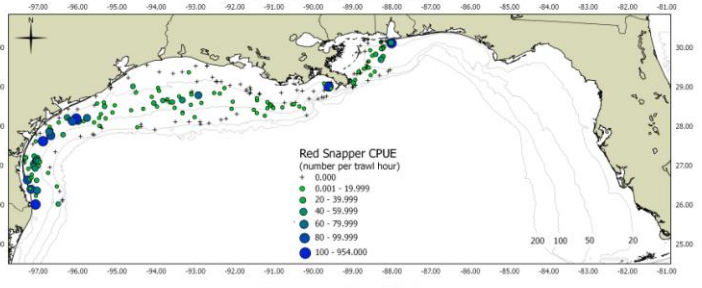

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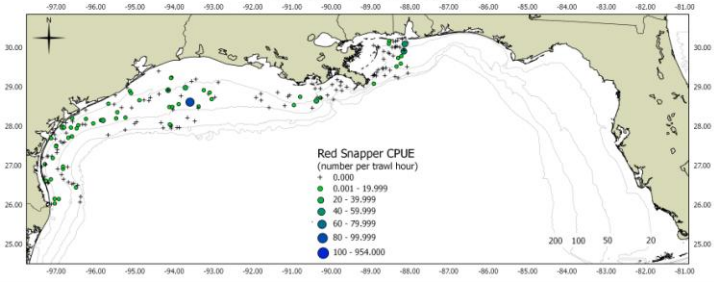

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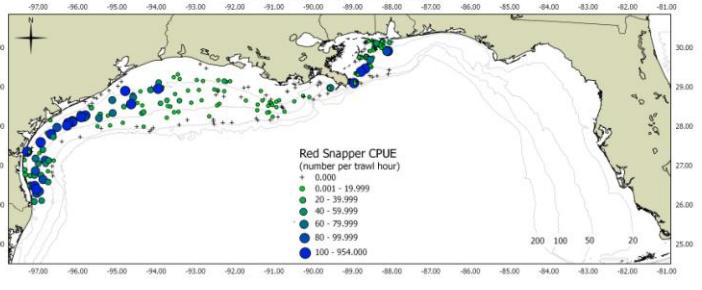
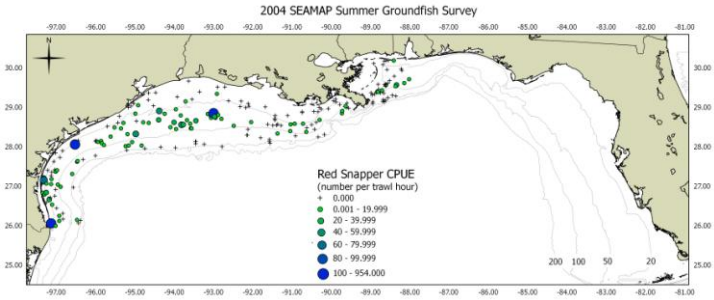
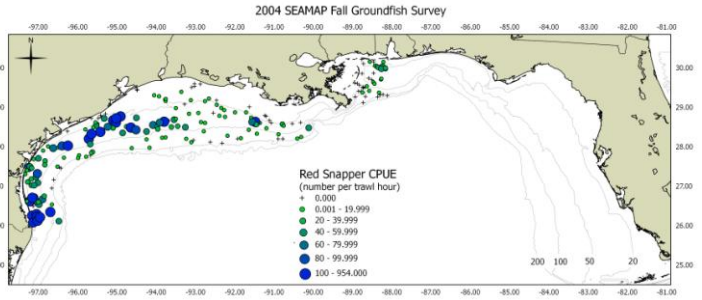



2004 SEAMAP Summer Groundfish Survey
Red Snapper CPUE
(number per trawl hour)
0.000
0.001 - 19.999
20 - 39.999
40 - 59.999
60 - 79.999
80 - 99.999
100 - 954.000
200 100 50 20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Red Snapper CPUE
(number per trawl hour)
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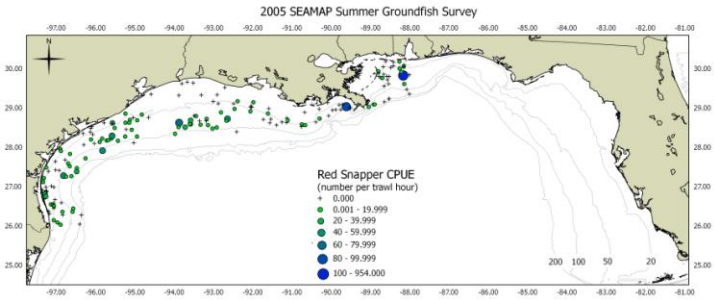
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Red Snapper CPUE
(number per trawl hour)
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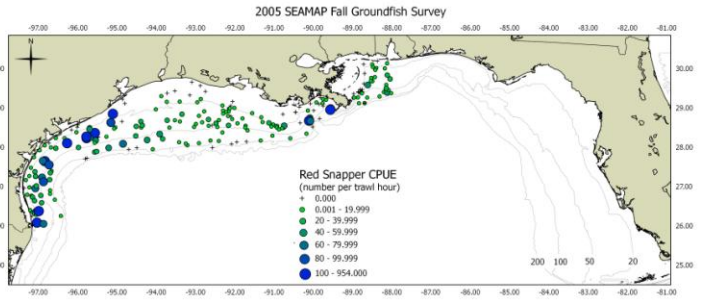
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Red Snapper CPUE
(number per trawl hour)
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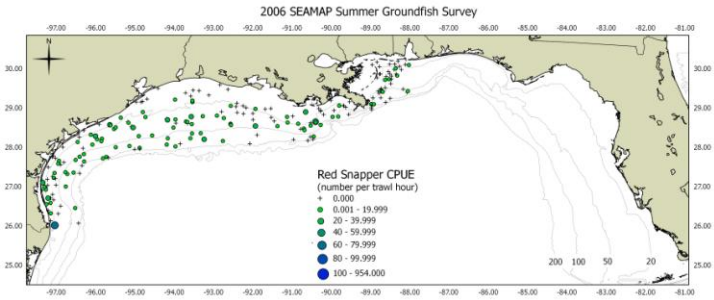
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Red Snapper CPUE
(number per trawl hour)
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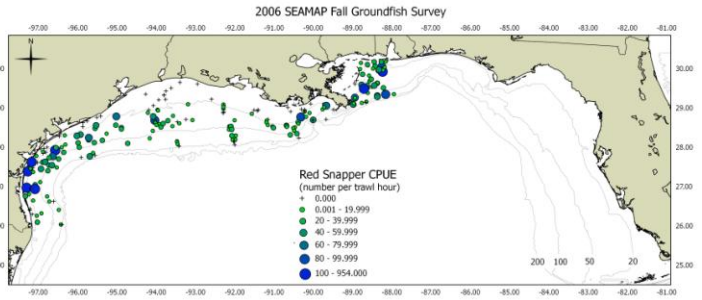
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Red Snapper CPUE
(number per trawl hour)
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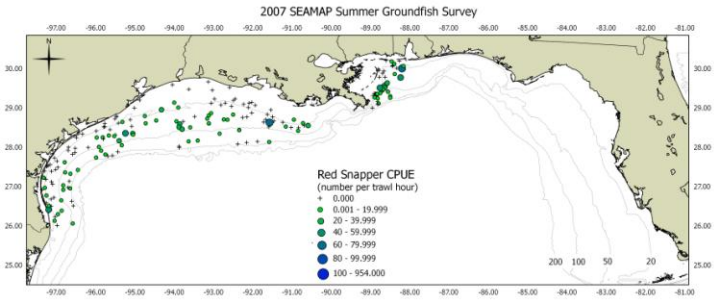
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Red Snapper CPUE
(number per trawl hour)
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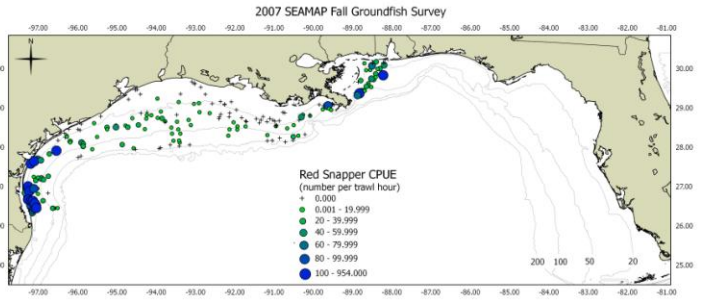
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Red Snapper CPUE
(number per trawl hour)
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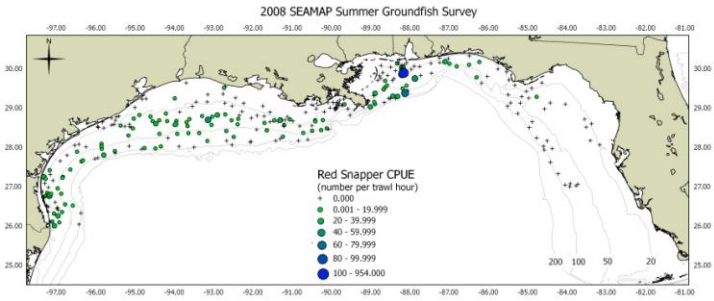
2008 SEAMAP Summer Groundfish Survey
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(number per trawl hour)
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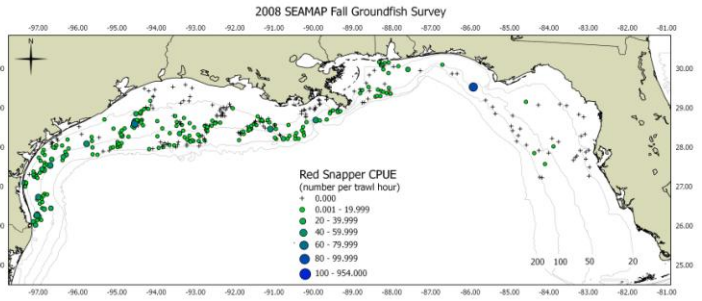
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Red Snapper CPUE
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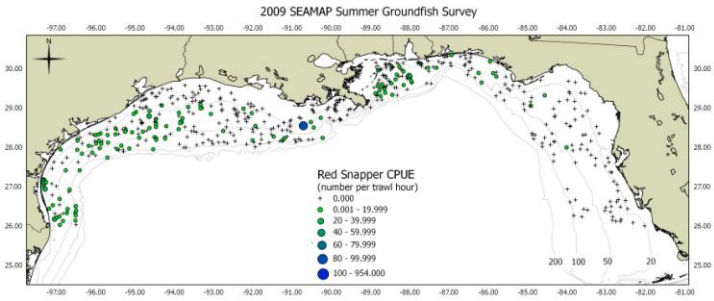
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Red Snapper CPUE
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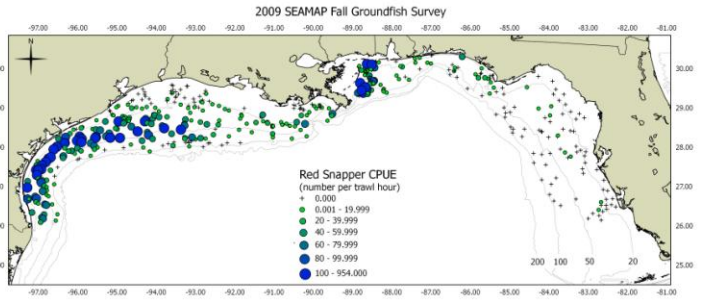
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Red Snapper CPUE
(number per trawl hour)
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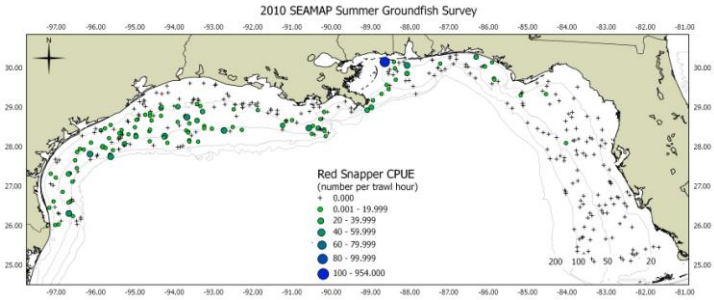
2010 SEAMAP Summer Groundfish Survey
Red Snapper CPUE
(number per trawl hour)
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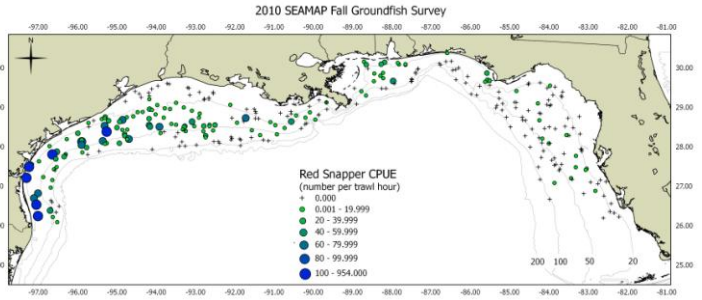
2010 SEAMAP Fall Groundfish Survey
Red Snapper CPUE
(number per trawl hour)
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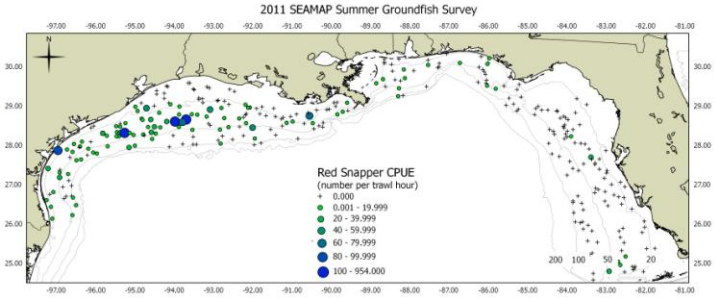
2011 SEAMAP Summer Groundfish Survey
Red Snapper CPUE
(number per trawl hour)
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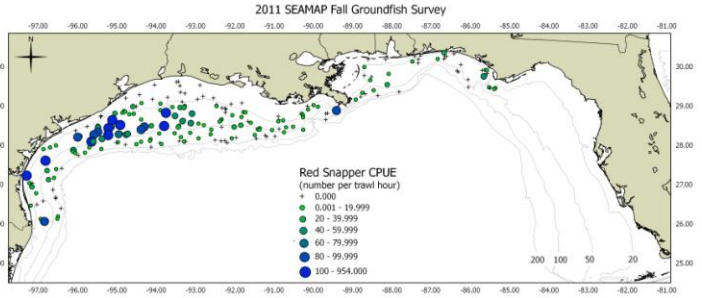
2011 SEAMAP Fall Groundfish Survey
Red Snapper CPUE
(number per trawl hour)
0.000
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200 100 50 20

Addendum to SEDAR31-DW20

During the Data Workshop, concerns were raised about the lack of the index for the eastern and western Gulf of Mexico (GOM) dating back to 1972, as was completed for previous assessments. This early data (1972-1986) represents early years of the groundfish survey which followed a different sampling design and protocol, with the major focus on the central GOM. It wasn't until later in time series (1980s – present) that sampling was expanded into the entire western GOM. A full review of these early surveys was presented by Nichols (2004). The summer time series also does not date back as far as the fall time series, 1972 and 1982 respectively, as start years for the summer and fall surveys. In this early data, there was also a lack of lengths for the individual fish caught. This fact eliminates the ability to accuratelydivide the catch into individual ages as was done in the main section of this document for the 1987-2011 time series. From examining previous assessment reports, Nichols (2004) was able to divide the catch into age 0 and age 1 fish, but it was unclear how he accomplished this and therefore not presented in this section.

The indices are constructed following the methodology outlined in the main section of this document. The only difference in the methodology is the area variable was replaced in the extended time series with a variable the represented the primary area (-89° W to -93° W) sampled and the secondary area (-93° W and westward).

For the WGOM abundance index for red snapper (summer survey), the nominal CPUE and number of stations with a positive catch are presented in Addendum Figure1. Year, area and depth zone were retained in the binomial submodel, while year, time of day, area and depth were retained in the lognormal submodel. Addendum Table1 summarizes backward selection procedure used to select the final set of variables used in the submodels and their significance. The AIC for the binomial and lognormal submodels were 22239.1and 5574.8, respectively. The diagnostic plots for the binomial and lognormal submodels are shown in Addendum Figures 2-4, and indicated the distribution of the residuals is approximately normal. Annual abundance indices are presented in Addendum Table2 and Addendum Figure5.

For the WGOM abundance index for red snapper (fall survey), the nominal CPUE and number of stations with a positive catch are presented in Addendum Figure6. Year time of day, area and depth zone were retained in both the binomial and the lognormal submodels. Addendum Table 3 summarizes backward selection procedure used to select the final set of variables used in the submodels and their significance. The AIC for the binomial and lognormal submodels were 32539.5and 12410.8, respectively. The diagnostic plots for the binomial and lognormal submodels are shown in Addendum Figures 7-9, and indicated the distribution of the residuals is approximately normal. Annual abundance indices are presented in Addendum Table2 and Addendum Figure 10.

For the EGOM abundance index for red snapper (summer survey), the nominal CPUE and number of stations with a positive catch are presented in Addendum Figure11. Year, time of day and depth zone were retained in both the binomial and lognormal submodels. Addendum Table5 summarizes backward selection procedure used to select the final set of variables used in the submodels and their significance. The AIC for the binomial and lognormal submodels were 6477.5and 1018.4, respectively. The diagnostic plots for the binomial and lognormal submodels are shown in Addendum Figures 12-14, and indicated the distribution of the residuals is

approximately normal. Annual abundance indices are presented in Addendum Table6 and Addendum Figure15.

For the EGOM abundance index for red snapper (fall survey), the nominal CPUE and number of stations with a positive catch are presented in Addendum Figure16. Year, time of day and depth zone were retained in both the binomial and lognormal submodels. Addendum Table7 summarizes backward selection procedure used to select the final set of variables used in the submodels and their significance. The AIC for the binomial and lognormal submodels were 11674.6 and 4108.1, respectively. The diagnostic plots for the binomial and lognormal submodels are shown in Addendum Figures 17-19, and indicated the distribution of the residuals is approximately normal. Annual abundance indices are presented in Addendum Table8 and Addendum Figure20.

Literature Cited

Nichols, S. 2004. Derivation of red snapper time series from SEAMAP and groundfish trawl surveys.SEDAR-DW1.

Addendum Table1. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / Summer) index of relative abundance from 1982 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 22249.6)*						*Lognormal Submodel Type 3 Tests (AIC 5574.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	29	4915	203.87	7.03	<.0001	<.0001	29	1770	5.22	<.0001
Area	1	4915	236.95	236.95	<.0001	<.0001	2	5526	136.45	<.0001
Depth Zone	2	4915	234.61	117.31	<.0001	<.0001	2	5526	213.09	<.0001
Time of Day	1	4915	3.12	3.12	0.0772	0.0773	1	1770	5.22	0.0224
Model Run #2	*Binomial Submodel Type 3 Tests (AIC 22239.1)*						*Lognormal Submodel Type 3 Tests (AIC 5574.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	29	4916	201.26	6.94	<.0001	<.0001	29	1770	5.22	<.0001
Area	1	4916	236.73	236.73	<.0001	<.0001	1	1770	14.10	0.0002
Depth Zone	2	4916	235.39	117.69	<.0001	<.0001	2	1770	78.31	<.0001
Time of Day				dropped			1	1770	5.22	0.0224

Addendum Table2.Indices of red snapper(WGOM / Summer) abundance developed using the delta-lognormal model for 1982-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1982	0.34559	136	9.68293	2.76042	0.22061	1.78495	4.26899
1983	0.21805	133	2.61778	0.74628	0.28670	0.42538	1.30926
1984	0.18012	161	2.60053	0.74136	0.28423	0.42455	1.29457
1985	0.31169	77	3.52033	1.00358	0.30842	0.54919	1.83391
1986	0.15190	79	0.96477	0.27504	0.44280	0.11800	0.64109
1987	0.26404	178	2.26203	0.64486	0.22291	0.41514	1.00171
1988	0.26207	145	1.07137	0.30543	0.25298	0.18560	0.50263
1989	0.17730	141	0.92607	0.26401	0.31031	0.14396	0.48414
1990	0.46512	172	7.95389	2.26750	0.16406	1.63679	3.14125
1991	0.33514	185	3.12870	0.89193	0.19231	0.60927	1.30574
1992	0.31667	180	1.94602	0.55477	0.20208	0.37183	0.82772
1993	0.33146	178	2.22018	0.63293	0.19775	0.42780	0.93642
1994	0.37853	177	4.47239	1.27499	0.18215	0.88836	1.82990
1995	0.41477	176	3.72633	1.06230	0.17465	0.75109	1.50247
1996	0.41379	174	4.01042	1.14329	0.17530	0.80733	1.61907
1997	0.43558	163	3.11888	0.88913	0.17733	0.62536	1.26416
1998	0.34911	169	2.72386	0.77652	0.19625	0.52638	1.14552
1999	0.32961	179	2.12056	0.60453	0.19842	0.40807	0.89559
2000	0.49123	171	4.46720	1.27351	0.16076	0.92526	1.75285
2001	0.27586	116	2.50799	0.71498	0.26630	0.42358	1.20684
2002	0.39891	183	3.44222	0.98131	0.17436	0.69421	1.38714
2003	0.36496	137	1.75783	0.50112	0.21809	0.32562	0.77122
2004	0.44068	177	4.30779	1.22807	0.16742	0.88066	1.71253
2005	0.49324	148	4.80496	1.36980	0.17343	0.97081	1.93278
2006	0.51136	176	4.51050	1.28586	0.15285	0.94885	1.74256
2007	0.41935	155	3.51267	1.00140	0.18718	0.69091	1.45141
2008	0.41262	206	3.45699	0.98552	0.16042	0.71650	1.35556
2009	0.29605	304	1.94707	0.55507	0.16259	0.40183	0.76675
2010	0.44279	201	4.92609	1.40433	0.16030	1.02122	1.93117
2011	0.49419	172	6.52496	1.86014	0.15891	1.35636	2.55103

Addendum Table3. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (WGOM / Fall) index of relative abundance from 1972 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 32539.5)*						*Lognormal Submodel Type 3 Tests (AIC 12410.8)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	39	2357	386.15	9.80	<.0001	<.0001	39	3897	13.64	<.0001
Area	1	5008	227.71	227.71	<.0001	<.0001	1	3897	373.23	<.0001
Depth Zone	2	6377	1135.44	567.71	<.0001	<.0001	2	3897	178.39	<.0001
Time of Day	1	6872	9.68	9.68	0.0019	0.0019	1	3897	19.85	<.0001

Addendum Table4.Indices of red snapper(WGOM / Fall) abundance developed using the delta-lognormal model for 1972-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1972	0.61345	119	47.4707	3.51592	0.15792	2.56869	4.81245
1973	0.52740	146	25.0846	1.85789	0.16533	1.33776	2.58024
1974	0.38129	139	7.9569	0.58932	0.20911	0.38964	0.89135
1975	0.33690	187	11.4657	0.84921	0.19477	0.57731	1.24916
1976	0.37186	199	10.8937	0.80684	0.18064	0.56383	1.15460
1977	0.42069	145	11.6182	0.86050	0.18419	0.59718	1.23994
1978	0.25275	182	8.8133	0.65276	0.24733	0.40096	1.06268
1979	0.39024	164	13.3094	0.98576	0.18418	0.68412	1.42041
1980	0.70161	124	50.6640	3.75243	0.14446	2.81506	5.00193
1981	0.50289	173	18.2883	1.35452	0.16175	0.98220	1.86799
1982	0.50000	150	12.1770	0.90189	0.17042	0.64296	1.26508
1983	0.36585	123	10.3043	0.76319	0.23672	0.47842	1.21744
1984	0.34028	144	4.0200	0.29774	0.22518	0.19083	0.46453
1985	0.33023	215	6.0595	0.44880	0.19678	0.30391	0.66275
1986	0.45789	190	5.6679	0.41980	0.17552	0.29630	0.59476
1987	0.45313	128	2.0813	0.15415	0.21132	0.10148	0.23415
1988	0.53039	181	4.7575	0.35236	0.16542	0.25367	0.48945
1989	0.56667	180	10.0273	0.74267	0.15299	0.54788	1.00672
1990	0.65714	175	11.1991	0.82946	0.13710	0.63135	1.08975
1991	0.68156	179	12.5597	0.93024	0.12582	0.72399	1.19523
1992	0.53073	179	3.6303	0.26888	0.16068	0.19538	0.37003
1993	0.57062	177	6.7122	0.49714	0.14943	0.36932	0.66920
1994	0.65363	179	19.4755	1.44245	0.13080	1.11166	1.87168
1995	0.73446	177	23.2818	1.72437	0.11811	1.36269	2.18204
1996	0.61878	181	9.7908	0.72515	0.14138	0.54732	0.96078
1997	0.64045	178	16.3524	1.21114	0.13438	0.92683	1.58267
1998	0.55249	181	7.6931	0.56979	0.15470	0.41892	0.77499
1999	0.68132	182	16.6575	1.23374	0.12875	0.95468	1.59438
2000	0.68156	179	10.4400	0.77324	0.12927	0.59772	1.00029
2001	0.58696	184	8.0699	0.59770	0.14481	0.44808	0.79728
2002	0.59669	181	7.6371	0.56564	0.13997	0.42810	0.74736
2003	0.65574	183	13.7058	1.01512	0.13468	0.77636	1.32731
2004	0.78395	162	22.0336	1.63192	0.11631	1.29423	2.05772
2005	0.77957	186	16.5295	1.22426	0.10863	0.98582	1.52037

2006	0.66477	176	12.9572	0.95967	0.13277	0.73672	1.25010
2007	0.56647	173	9.3984	0.69610	0.15516	0.51132	0.94764
2008	0.61672	287	5.9126	0.43792	0.12049	0.34444	0.55676
2009	0.73260	273	25.5069	1.88917	0.10018	1.54693	2.30713
2010	0.59322	177	9.1741	0.67948	0.14864	0.50556	0.91322
2011	0.65169	178	10.6889	0.79168	0.14083	0.59817	1.04778

Addendum Table5. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / Summer) index of relative abundance from 1982 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 6477.5)*						*Lognormal Submodel Type 3 Tests (AIC 1018.4)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	29	1353	74.48	2.57	<.0001	<.0001	29	321	2.20	0.0005
Depth Zone	2	1353	27.68	13.84	<.0001	<.0001	2	321	3.46	0.0325
Time of Day	1	1353	4.86	4.86	0.0275	0.0276	1	321	6.48	0.0114

Addendum Table6.Indices of red snapper(EGOM / Summer) abundance developed using the delta-lognormal model for 1982-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1982	0.19444	36	2.8888	1.09250	0.54008	0.39718	3.00503
1983	0.28571	21	2.1433	0.81056	0.58033	0.27594	2.38097
1984	0.06897	29	0.2171	0.08210	1.16402	0.01290	0.52262
1985	0.27778	36	1.4967	0.56601	0.46155	0.23503	1.36310
1986	0.05714	35	0.1757	0.06645	1.20597	0.00999	0.44213
1987	0.21875	96	2.0033	0.75761	0.31616	0.40865	1.40459
1988	0.16176	68	1.5787	0.59705	0.44054	0.25716	1.38619
1989	0.26415	53	4.1722	1.57783	0.37850	0.75899	3.28007
1990	0.38235	68	3.2224	1.21863	0.27355	0.71210	2.08546
1991	0.34783	46	3.3646	1.27244	0.34726	0.64797	2.49872
1992	0.28261	46	7.0297	2.65851	0.38679	1.25984	5.60995
1993	0.20000	45	1.1508	0.43519	0.48819	0.17262	1.09715
1994	0.32787	61	2.6490	1.00182	0.31533	0.54120	1.85445
1995	0.18182	44	1.0238	0.38718	0.51995	0.14555	1.02992
1996	0.26087	46	1.9485	0.73688	0.41160	0.33403	1.62560
1997	0.34091	44	2.0989	0.79375	0.36108	0.39411	1.59867
1998	0.08571	35	0.6920	0.26170	0.85004	0.05988	1.14377
1999	0.11364	44	0.5000	0.18907	0.68469	0.05471	0.65341
2000	0.31111	45	2.0417	0.77212	0.37570	0.37331	1.59700
2001	0.13889	36	0.8554	0.32350	0.65950	0.09725	1.07606
2002	0.11364	44	0.8130	0.30746	0.66342	0.09188	1.02885
2003	0.20455	44	1.8220	0.68906	0.47948	0.27742	1.71150
2004	0.23077	39	1.9260	0.72836	0.47421	0.29591	1.79280
2005	0.30303	33	4.5320	1.71392	0.43577	0.74441	3.94612
2006	0.22222	45	1.2538	0.47415	0.45943	0.19761	1.13769
2007	0.56098	41	7.5152	2.84208	0.26799	1.67837	4.81268
2008	0.42593	54	11.7878	4.45790	0.28388	2.55457	7.77933
2009	0.27473	91	1.8817	0.71162	0.28979	0.40327	1.25575
2010	0.37838	37	4.6645	1.76404	0.36729	0.86601	3.59328
2011	0.29167	24	1.8788	0.71051	0.52792	0.26357	1.91531

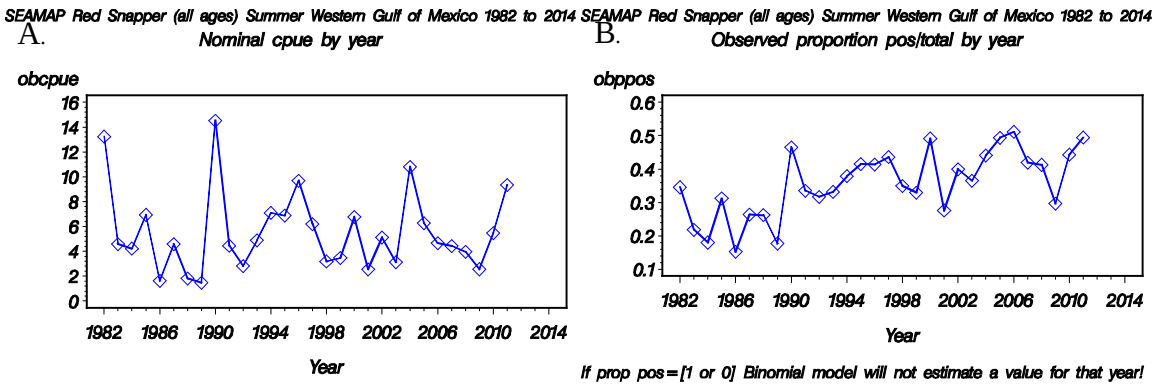
Addendum Table7. Summary of backward selection procedure for building delta-lognormal submodels for red snapper (EGOM / Fall) index of relative abundance from 1972 to 2011.

Model Run #1	*Binomial Submodel Type 3 Tests (AIC 11674.6)*						*Lognormal Submodel Type 3 Tests (AIC 4108.1)*			
Effect	*Num DF*	*Den DF*	*Chi-Square*	*F Value*	*Pr > ChiSq*	*Pr > F*	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Year	210.54	5.40	<.0001	<.0001	210.54	5.40	39	1285	6.61	<.0001
Depth Zone	2	2537	301.14	150.57	<.0001	<.0001	2	1285	41.92	<.0001
Time of Day	1	2537	24.40	24.40	<.0001	<.0001	1	1285	20.81	<.0001

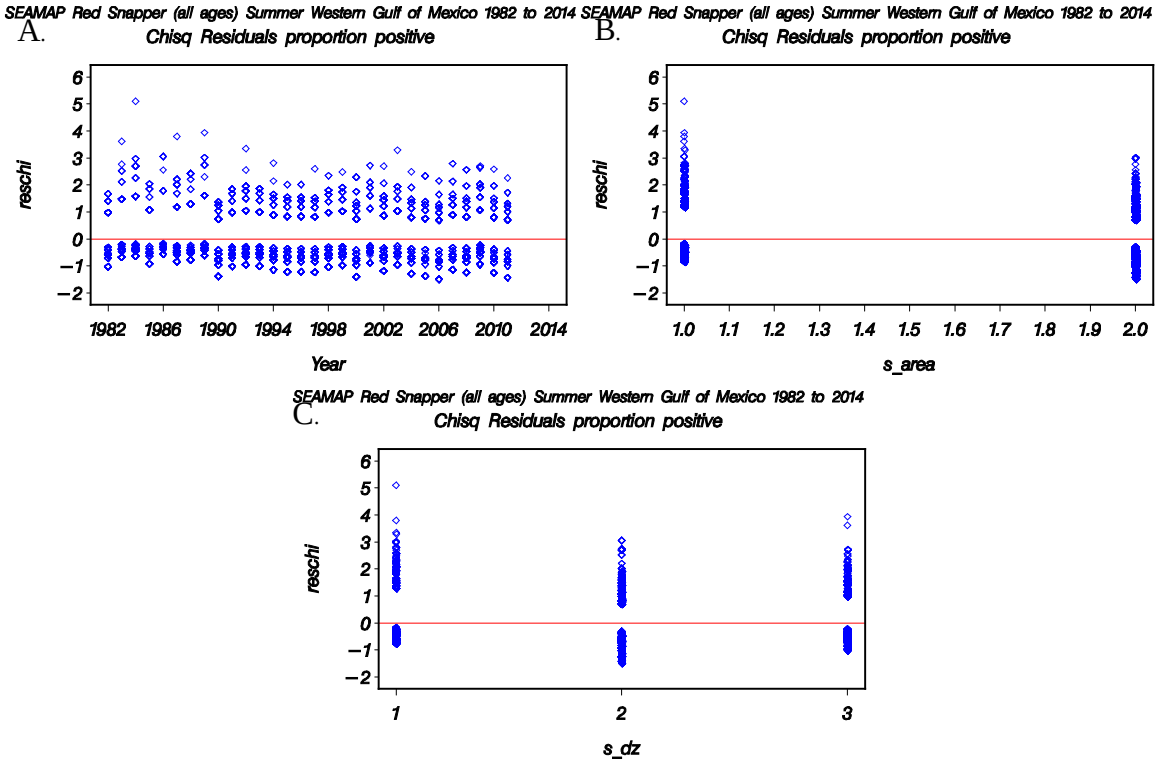
Addendum Table8.Indices of red snapper(EGOM / Fall) abundance developed using the delta-lognormal model for 1972-2011. The nominal frequency of occurrence, the number of samples (*N*), the DL Index (number per trawl-hour), the DL indices scaled to a mean of one for the time series, the coefficient of variation on the mean (CV), and lower and upper confidence limits (LCL and UCL) for the scaled index are listed.

Survey Year	Frequency	*N*	DL Index	Scaled Index	CV	LCL	UCL
1972	0.67692	65	43.6574	3.27439	0.22927	2.08227	5.14903
1973	0.51304	115	7.1767	0.53826	0.18783	0.37090	0.78114
1974	0.40385	104	8.4347	0.63262	0.24490	0.39040	1.02512
1975	0.44086	93	6.9768	0.52328	0.22225	0.33729	0.81181
1976	0.45370	108	8.4324	0.63245	0.20645	0.42032	0.95164
1977	0.43299	97	11.6354	0.87268	0.24406	0.53942	1.41182
1978	0.45985	137	5.2682	0.39512	0.18587	0.27331	0.57123
1979	0.39450	109	4.1681	0.31261	0.21558	0.20412	0.47878
1980	0.49541	109	7.7914	0.58437	0.19938	0.39373	0.86733
1981	0.59434	106	26.9305	2.01984	0.19221	1.38000	2.95634
1982	0.71545	123	29.9358	2.24525	0.15134	1.66170	3.03372
1983	0.50505	99	4.3068	0.32302	0.19694	0.21867	0.47716
1984	0.34146	82	3.5334	0.26501	0.29985	0.14737	0.47657
1985	0.21348	89	1.6241	0.12181	0.30546	0.06703	0.22137
1986	0.12500	40	1.5295	0.11472	0.66374	0.03427	0.38407
1987	0.25000	44	2.5507	0.19130	0.43068	0.08384	0.43653
1988	0.36111	36	3.3413	0.25060	0.37730	0.12081	0.51983
1989	0.67442	43	49.8205	3.73664	0.28304	2.14463	6.51041
1990	0.71698	53	27.7674	2.08261	0.26237	1.24307	3.48916
1991	0.76087	46	31.7855	2.38397	0.22842	1.51852	3.74269
1992	0.42424	33	2.5964	0.19473	0.33867	0.10074	0.37641
1993	0.50000	72	18.8373	1.41283	0.29898	0.78693	2.53656
1994	0.52000	50	4.6211	0.34659	0.24565	0.21358	0.56242
1995	0.62500	40	9.6240	0.72182	0.24339	0.44675	1.16627
1996	0.52174	46	7.3109	0.54834	0.28379	0.31427	0.95672
1997	0.48889	45	12.2807	0.92108	0.30546	0.50684	1.67387
1998	0.45455	44	2.9987	0.22491	0.30515	0.12383	0.40848
1999	0.53488	43	7.9702	0.59778	0.28922	0.33912	1.05372
2000	0.65909	44	21.8594	1.63950	0.23221	1.03672	2.59275
2001	0.61905	21	6.8914	0.51687	0.38283	0.24669	1.08292
2002	0.44231	52	5.6057	0.42044	0.30216	0.23279	0.75935
2003	0.64935	77	16.4241	1.23184	0.22272	0.79331	1.91280
2004	0.41860	43	4.4729	0.33548	0.31992	0.17969	0.62634
2005	0.68182	44	9.7321	0.72993	0.24780	0.44796	1.18938

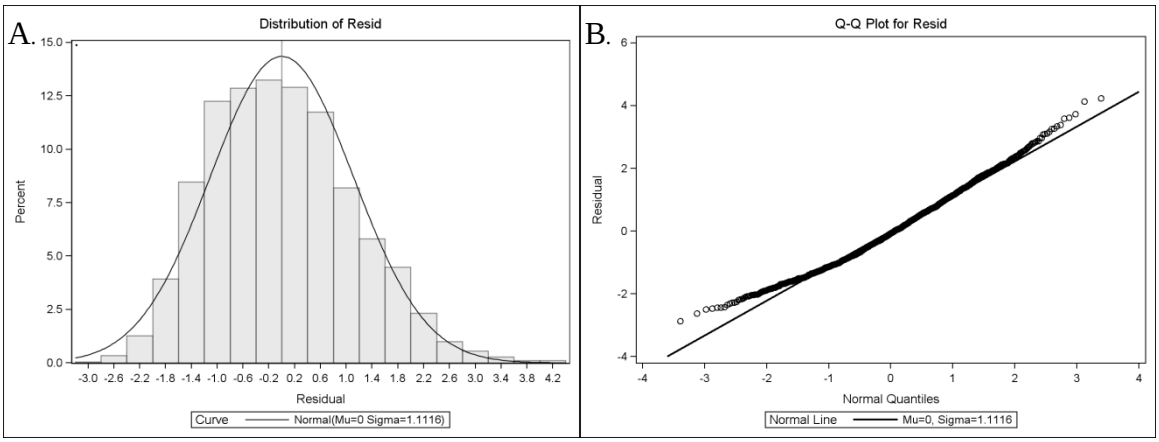
2006	0.89583	48	37.8969	2.84234	0.18441	1.97167	4.09750
2007	0.77419	31	24.5363	1.84027	0.24935	1.12604	3.00753
2008	0.51282	39	4.9821	0.37367	0.27418	0.21809	0.64023
2009	0.80000	60	40.5835	3.04384	0.23536	1.91311	4.84287
2010	0.53333	30	4.7111	0.35335	0.36541	0.17406	0.71730
2011	0.40000	20	2.7178	0.20384	0.44724	0.08677	0.47884



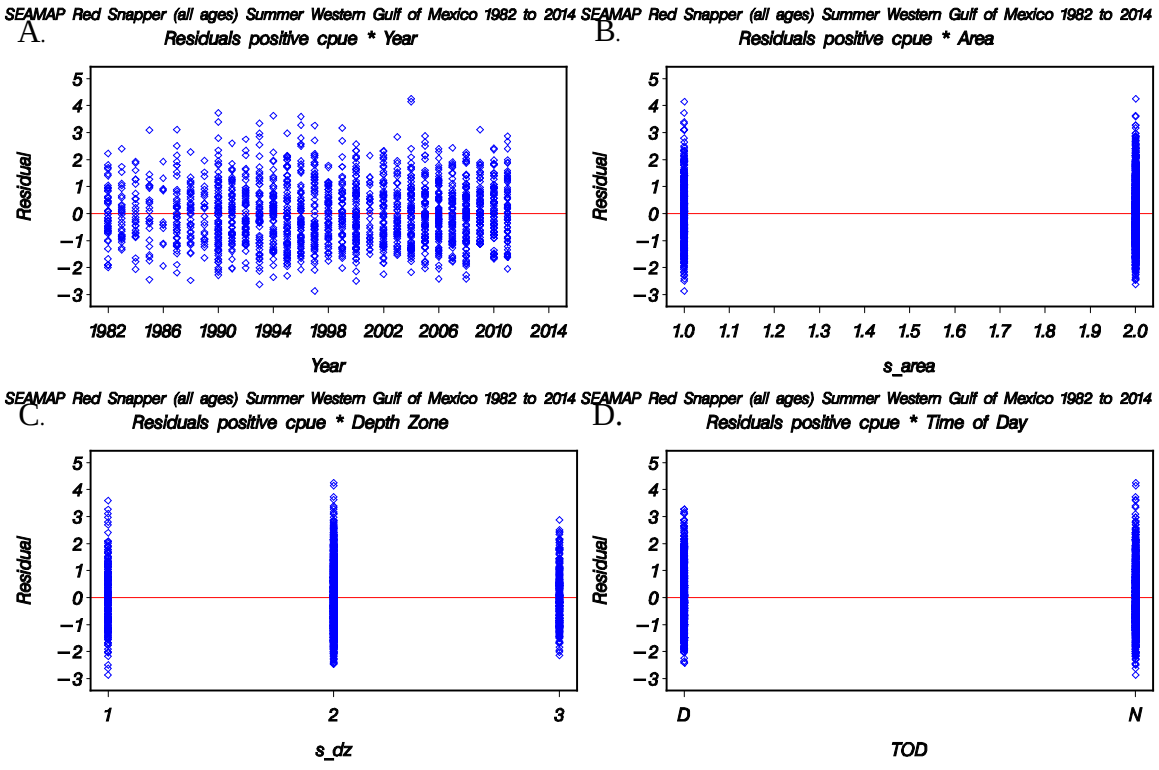
Addendum Figure1. Annual trends for red snapper (WGOM /Summer) captured during Summer SEAMAP Groundfish Surveys from 1982 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.



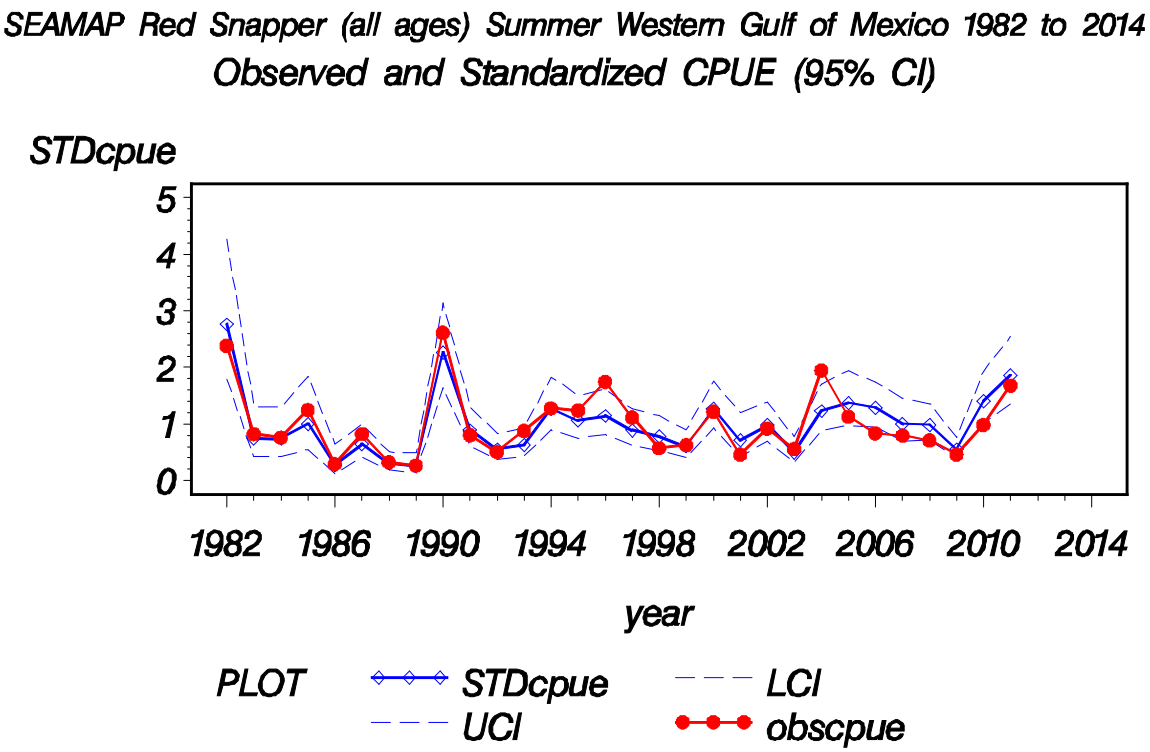
Addendum Figure2. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area and**C.** the Chi-Square residuals by depth zone.



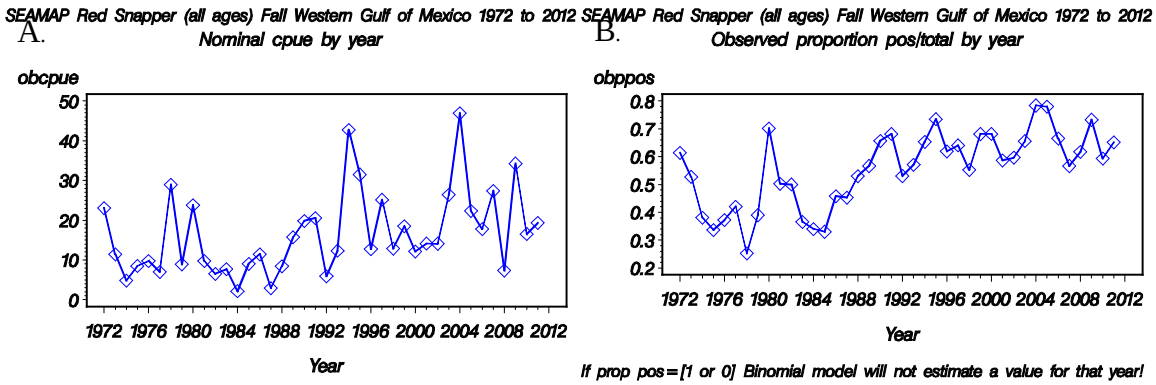
Addendum Figure3. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).



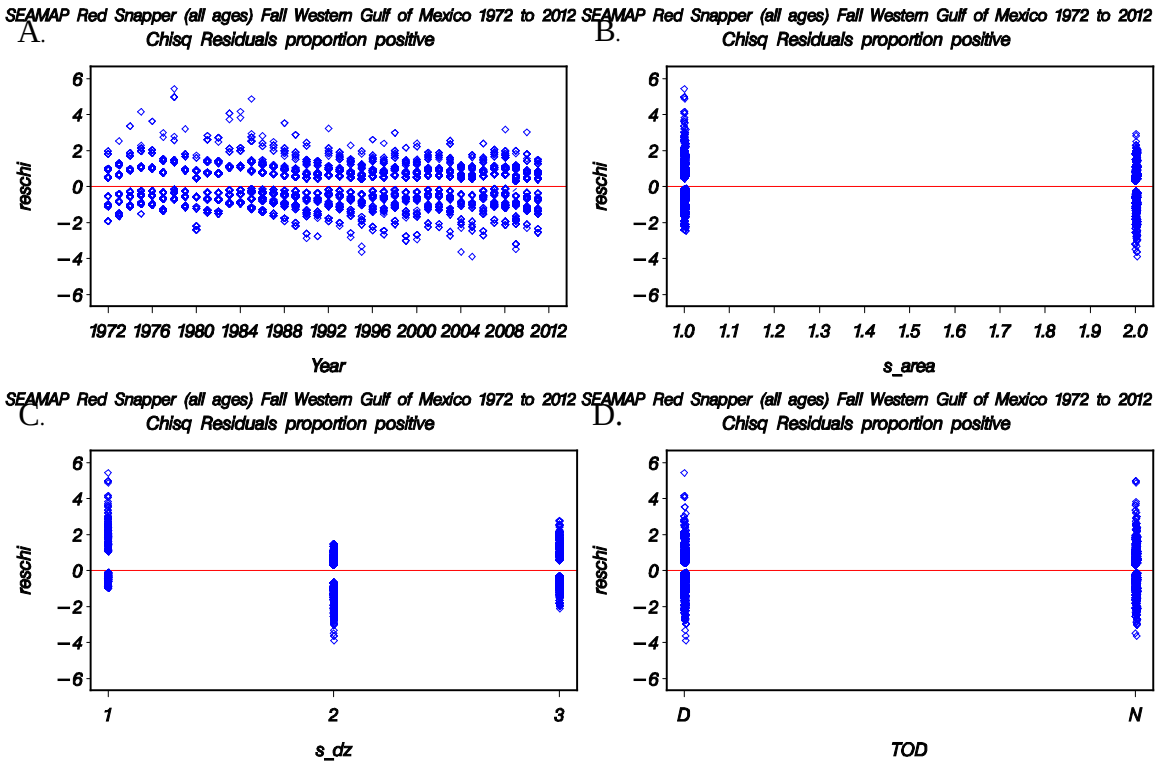
Addendum Figure4. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D**. the Chi-Square residuals by time of day.



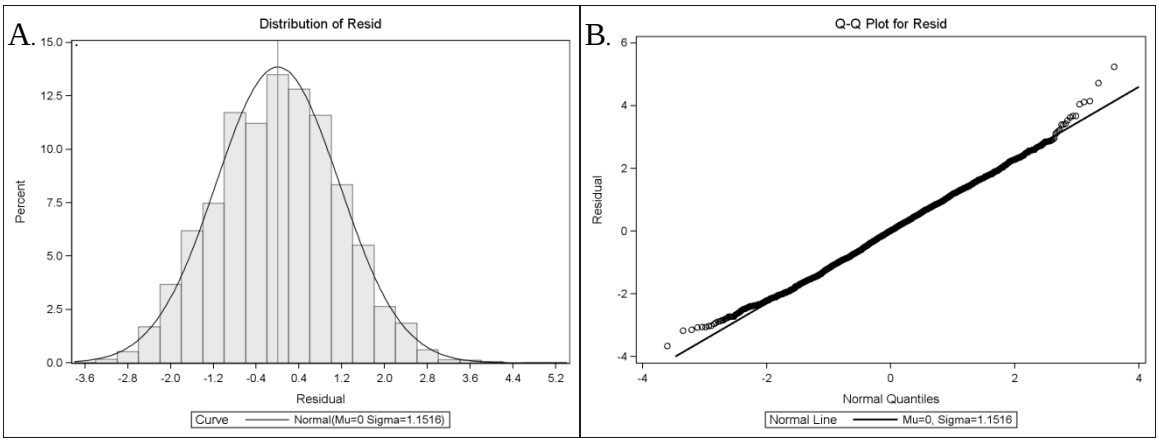
Addendum Figure5. Annual index of abundance for red snapper (WGOM / Summer) from the SEAMAP Groundfish Survey from 1982 – 2011.



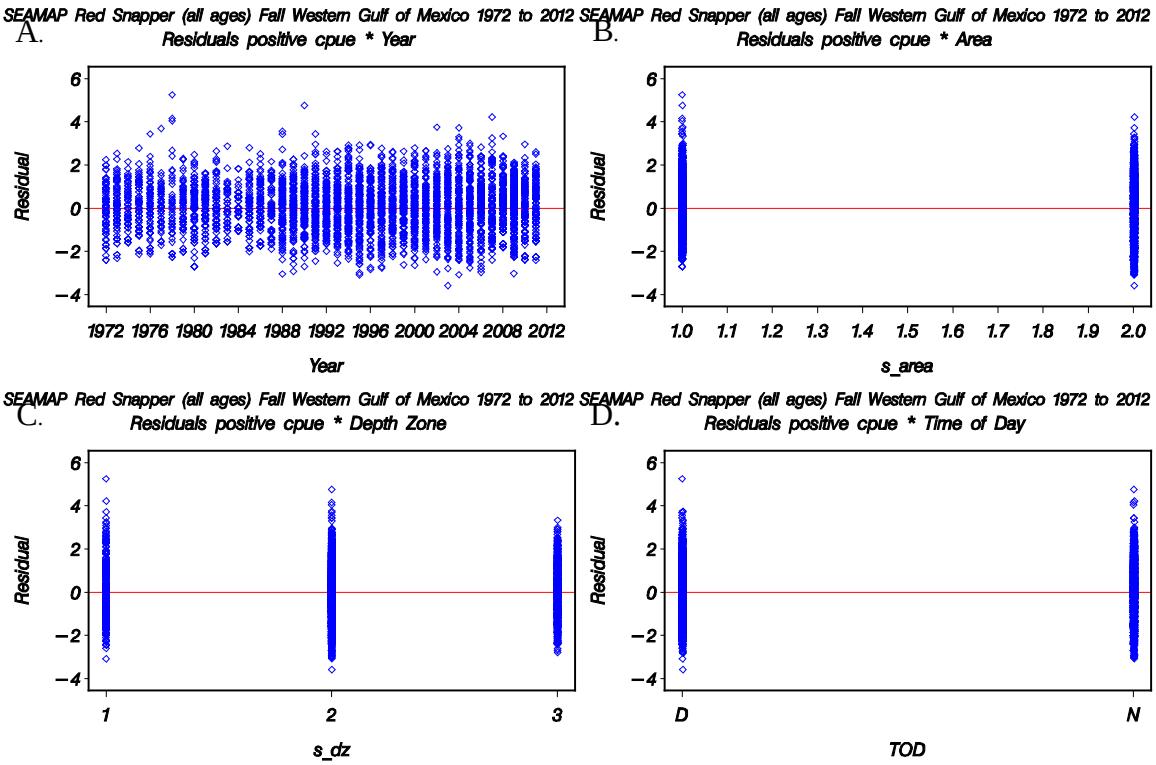
Addendum Figure6. Annual trends for red snapper (WGOM / Fall) captured during Fall SEAMAP Groundfish Surveys from 1972to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.



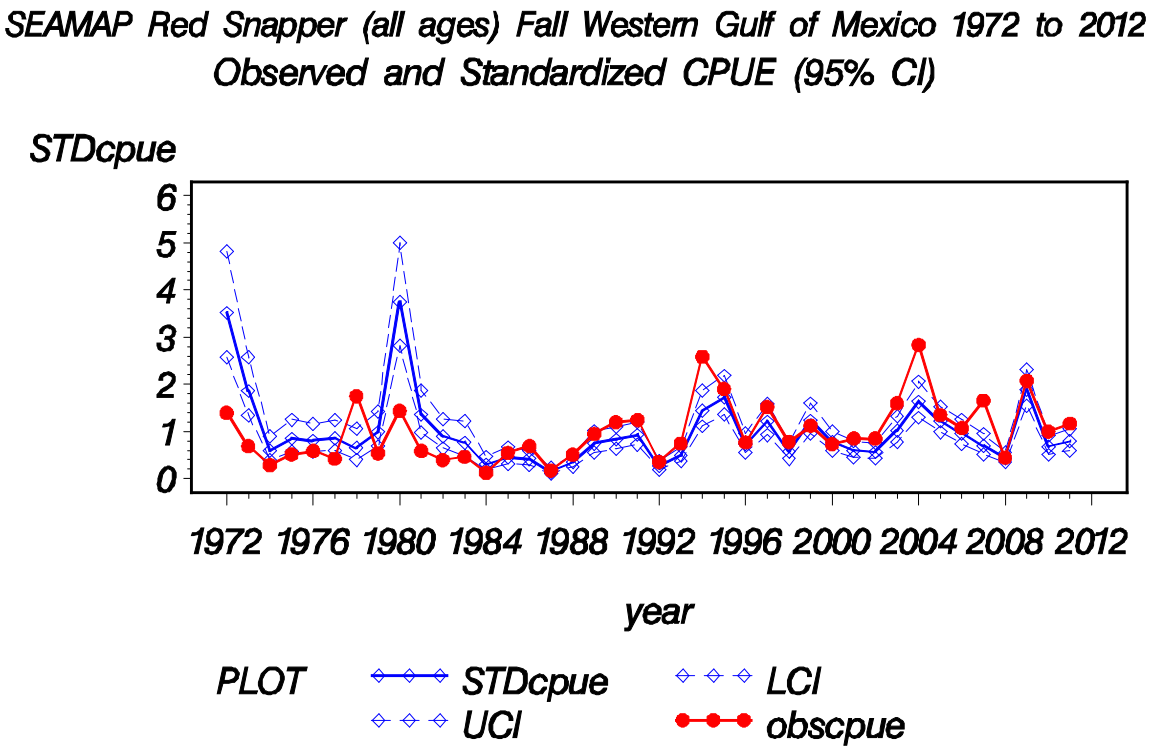
Addendum Figure7. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (WGOM / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D.** the Chi-Square residuals by time of day.



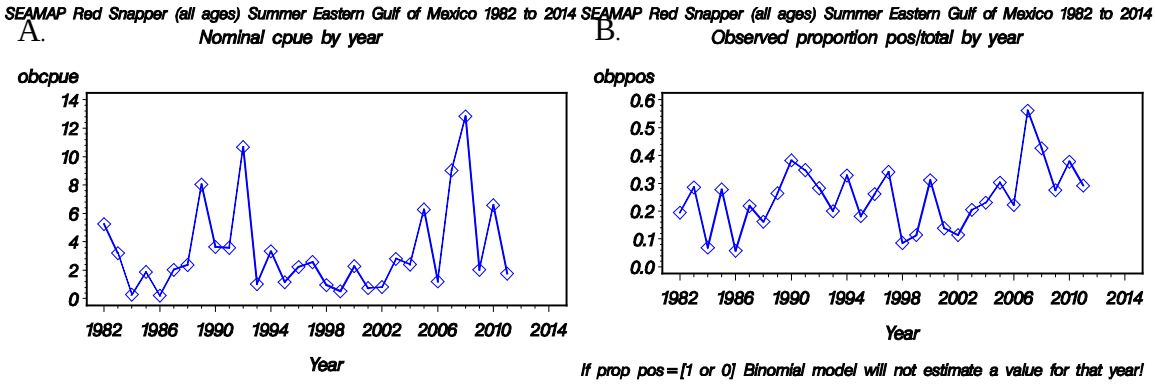
Addendum Figure8. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).



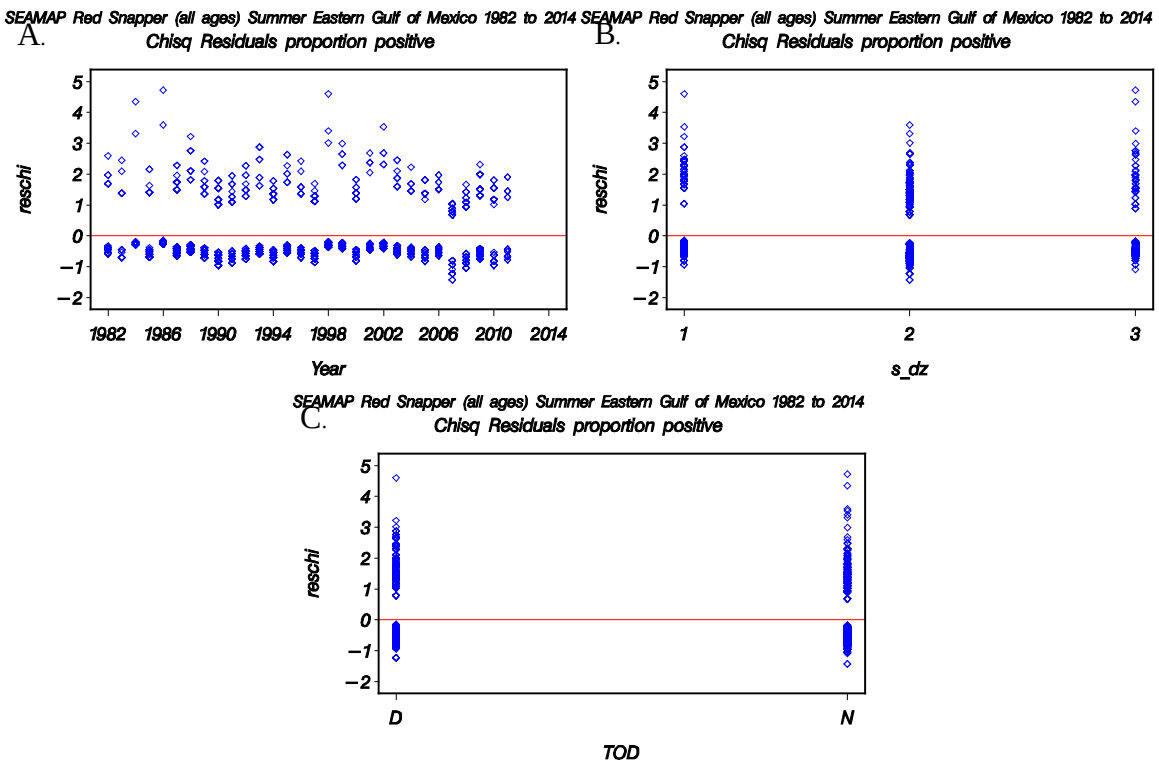
Addendum Figure9. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (WGOM / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by area, **C.** the Chi-Square residuals by depth zone and **D**. the Chi-Square residuals by time of day.



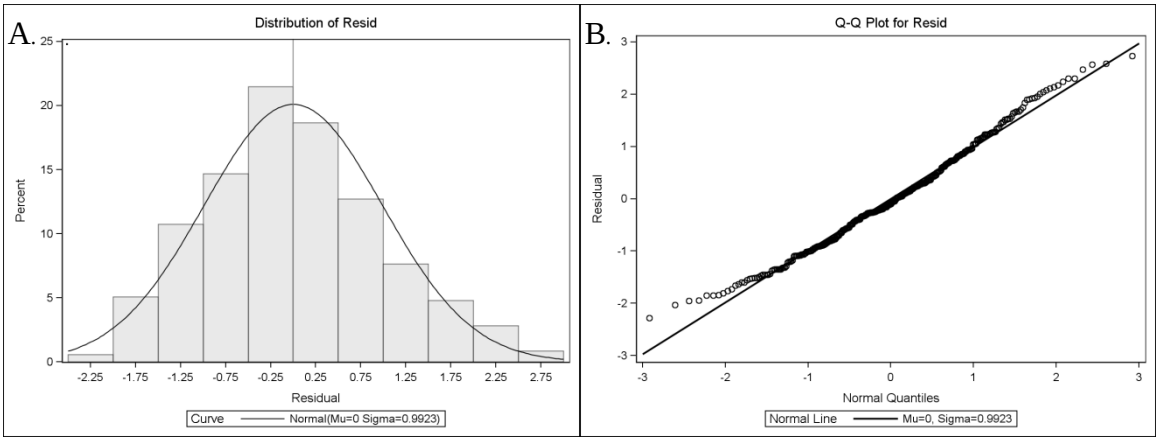
Addendum Figure10. Annual index of abundance for red snapper (WGOM / Fall) from the SEAMAP Groundfish Survey from 1972 – 2011.



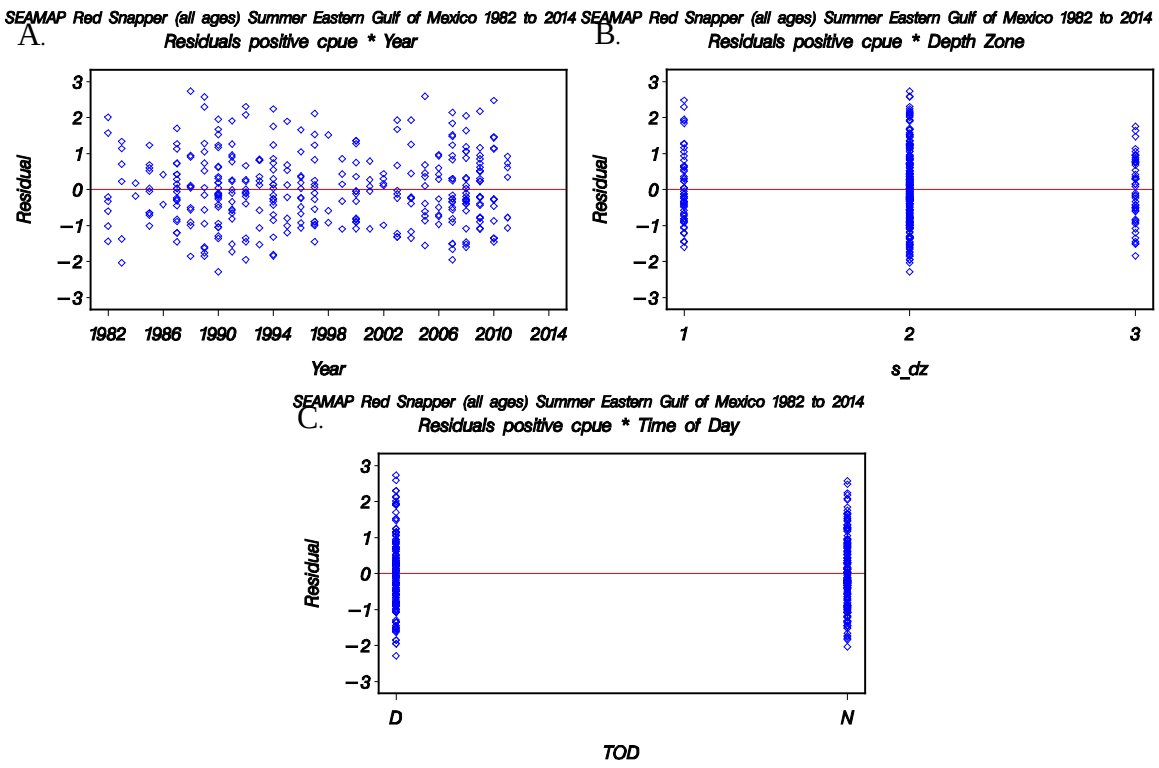
Addendum Figure11. Annual trends for red snapper (EGOM / Summer) captured during Summer SEAMAP Groundfish Surveys from 1982 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.



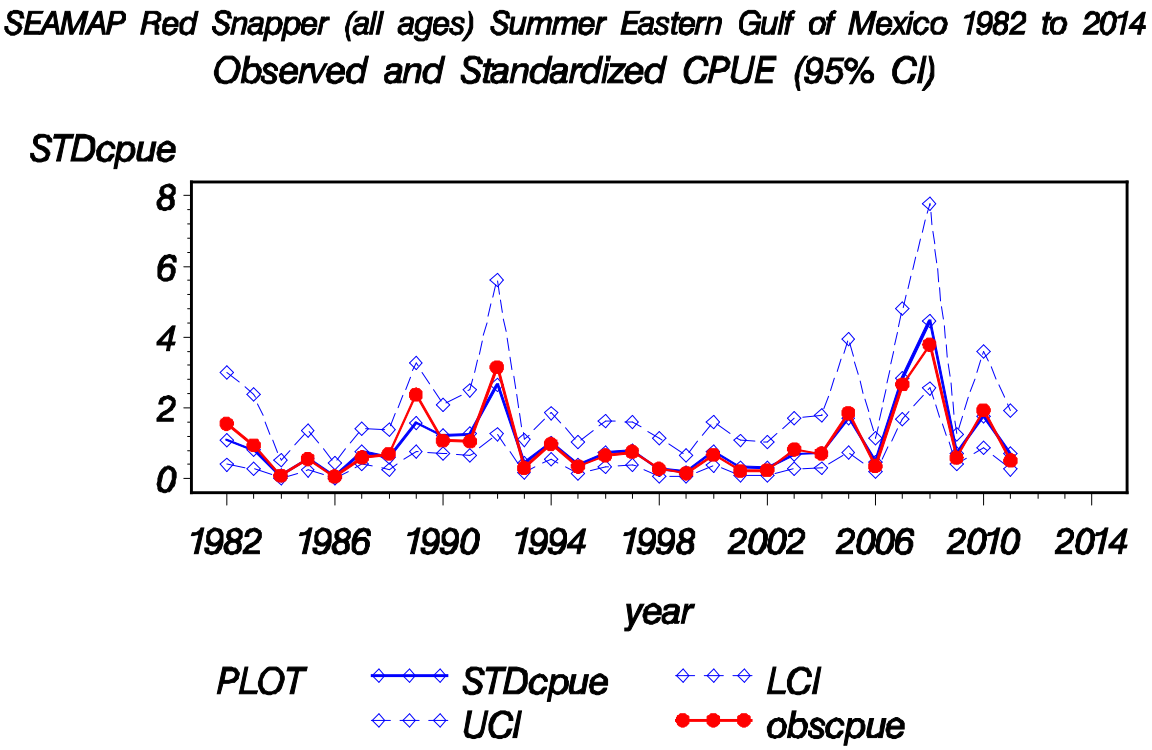
Addendum Figure12. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and**C.** the Chi-Square residuals by time of day.



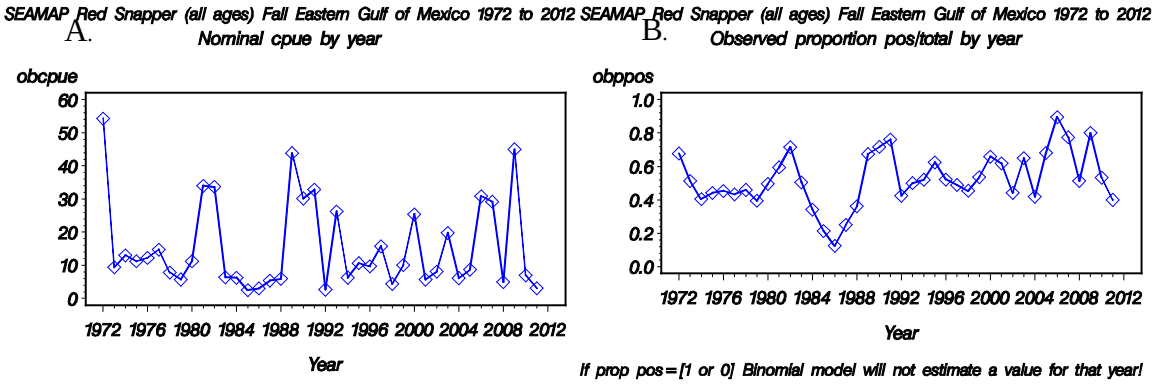
Addendum Figure13. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / Summer) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).



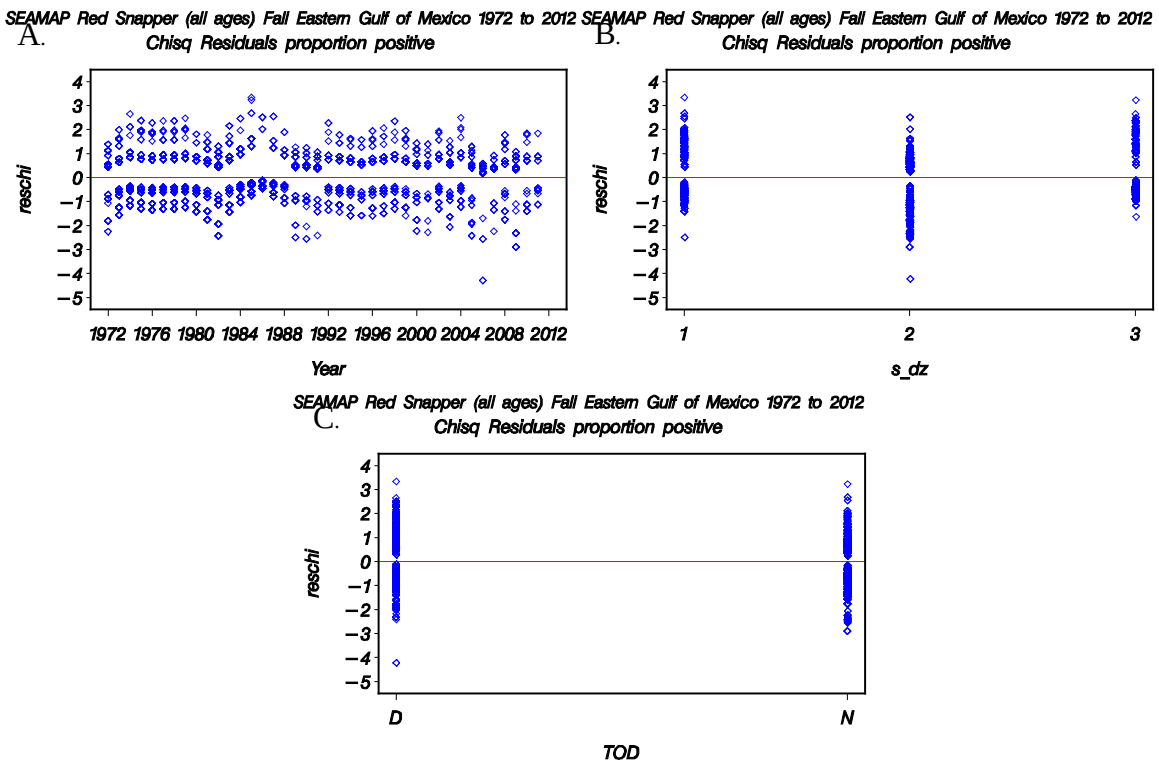
Addendum Figure14. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / Summer) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and**C.** the Chi-Square residuals by time of day.



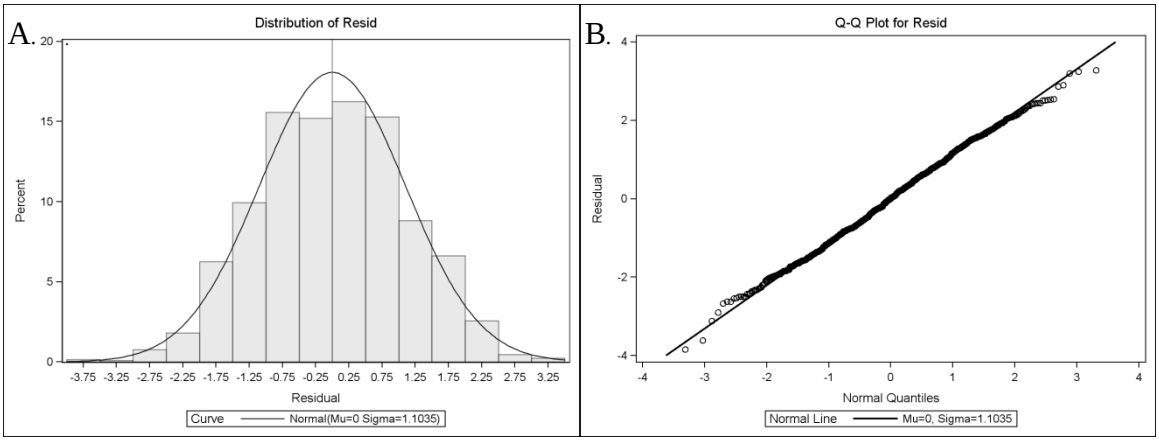
Addendum Figure15. Annual index of abundance for red snapper (EGOM / Summer) from the SEAMAP Groundfish Survey from 1982 – 2011.



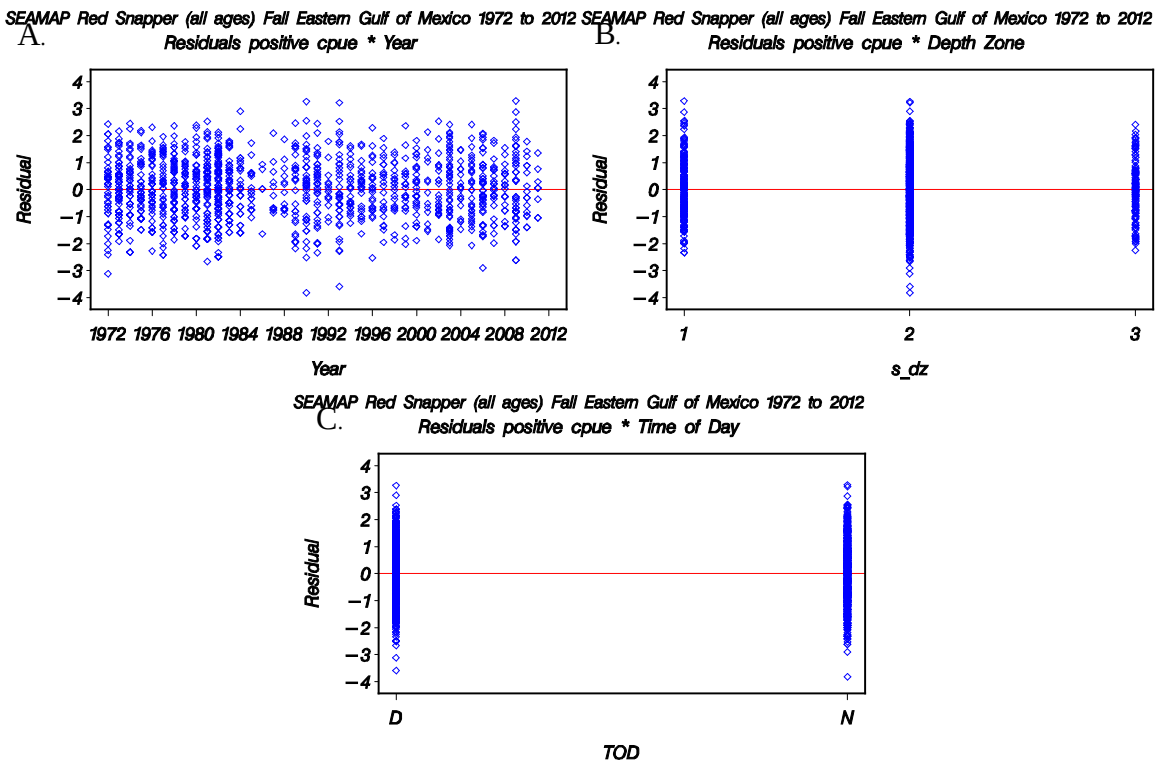
Addendum Figure16. Annual trends for red snapper (EGOM / Fall) captured during Fall SEAMAP Groundfish Surveys from 1972 to 2011 in **A.** nominal CPUE and **B.** proportion of positive stations.



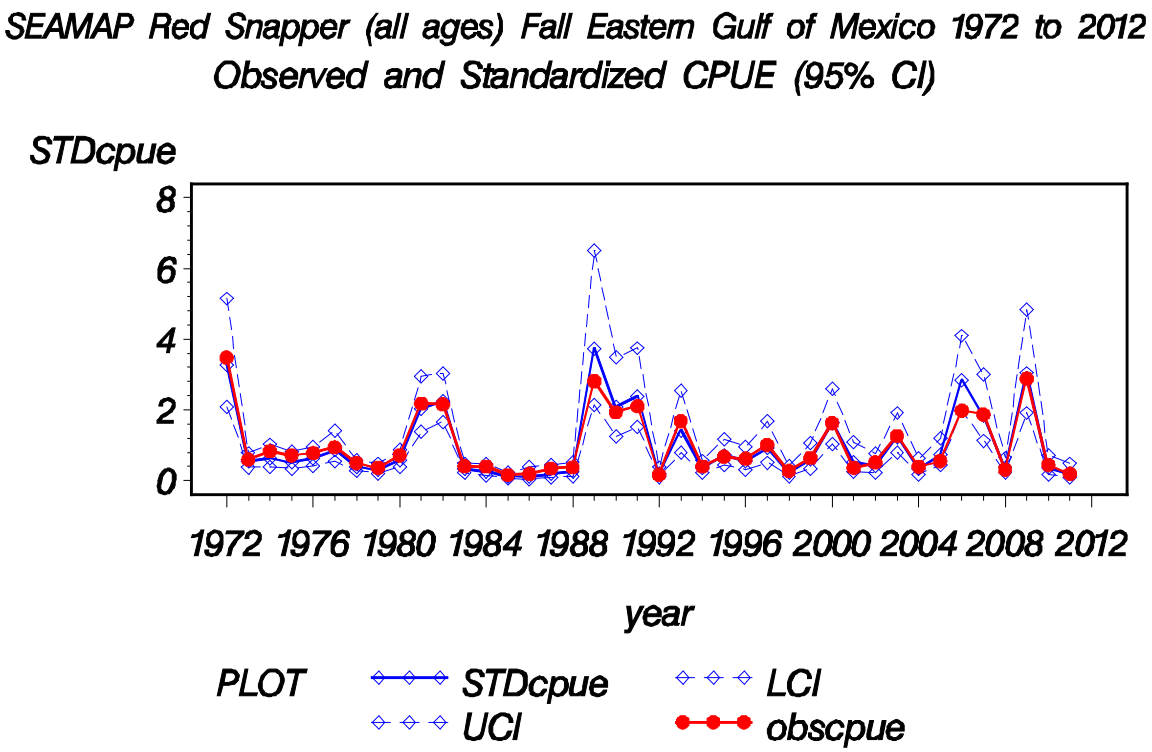
Addendum Figure17. Diagnostic plots for binomial component of the red snapper SEAMAP Groundfish Survey (EGOM / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and**C.** the Chi-Square residuals by time of day.



Addendum Figure18. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / Fall) model: **A.** the frequency distribution of log(CPUE) on positive stations and **B.** the cumulative normalized residuals (QQ plot).



Addendum Figure19. Diagnostic plots for lognormal component of the red snapper SEAMAP Groundfish Survey (EGOM / Fall) model: **A.** the Chi-Square residuals by year, **B.** the Chi-Square residuals by depth zone and**C.** the Chi-Square residuals by time of day.



Addendum Figure20. Annual index of abundance for red snapper (EGOM / Fall) from the SEAMAP Groundfish Survey from 1972 – 2011.