

SEDAR 22 YEG RW

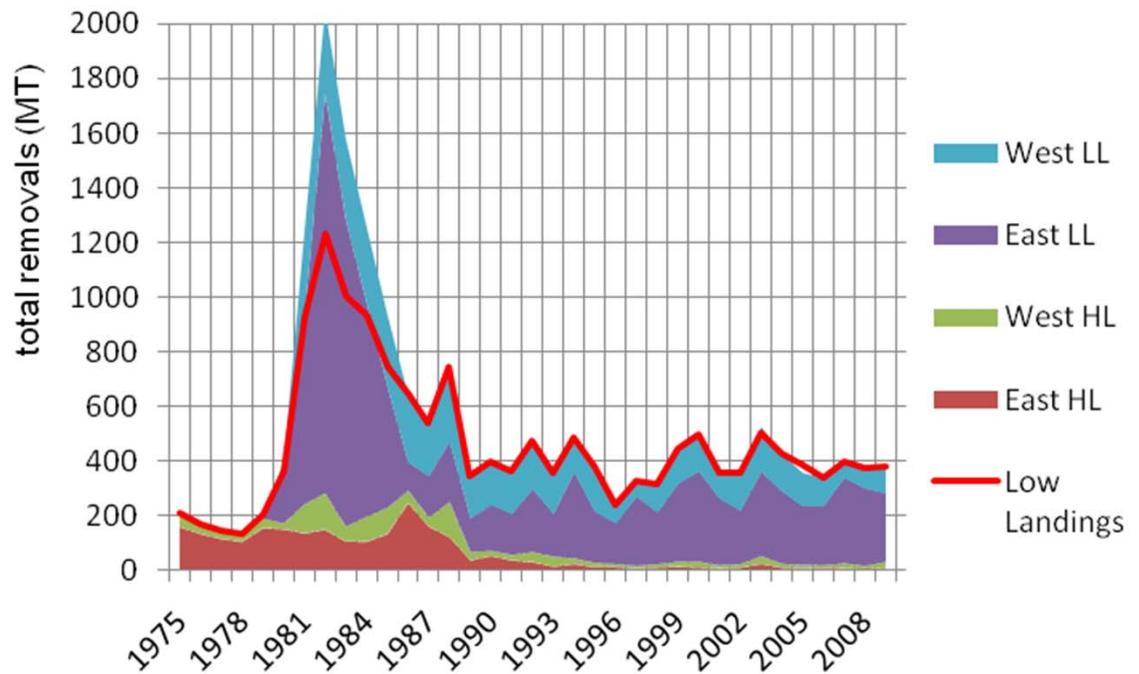
Assessment model results II: data inputs,
landings and indices, age and length
comps

February 14, 2011



2.1 Commercial landings data

- Commercial handline fishery
- Commercial longline fishery
- Recreational rod and reel (very small)



Historic fishery

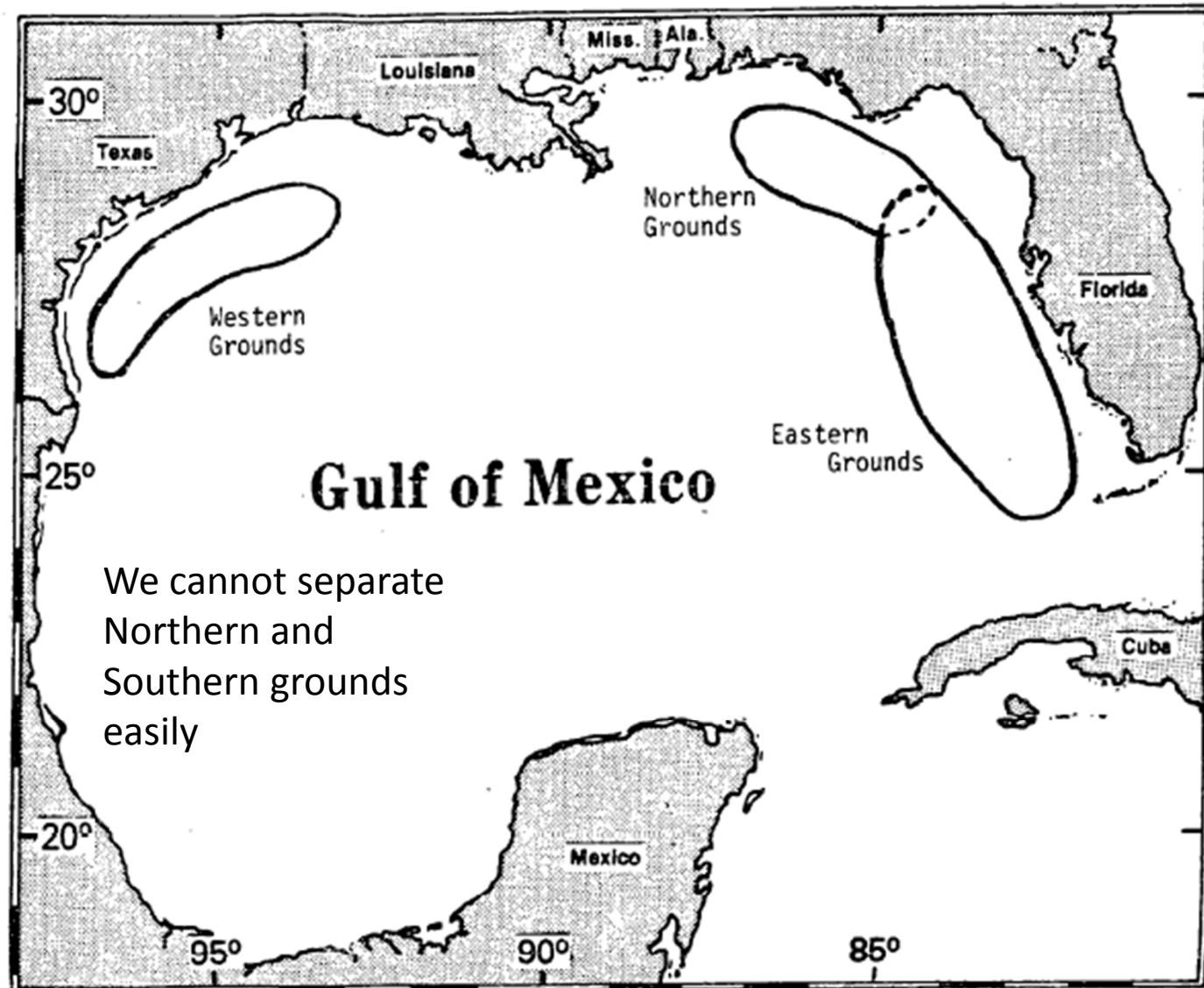


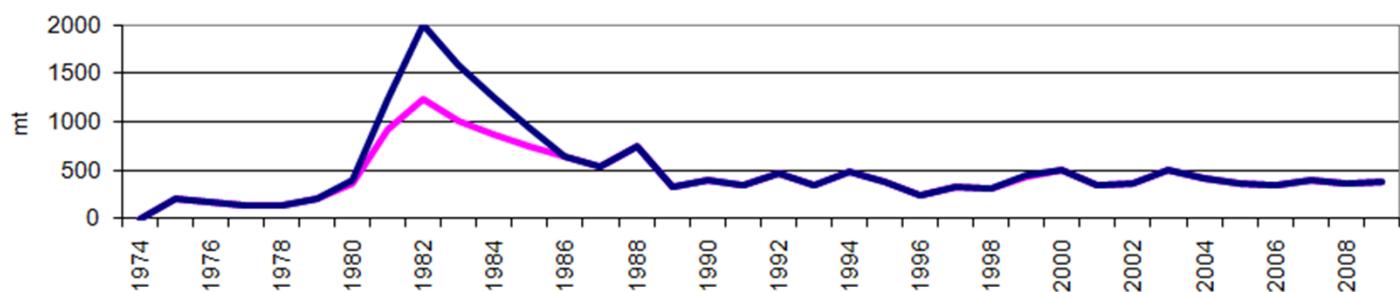
FIGURE 1

MAJOR BOTTOM LONGLINE FISHING GROUNDS

From Prytherch, 1983

YEG landings time line (gutted lbs)

Year	Western Gulf		Eastern Gulf		Total
	Vertical Line	Longline	Vertical Line	Longline	
Assumed start of fishery → 1974	-	-	-	-	-
1975	113,454	-	351,630	-	465,083
1976	74,084	-	296,289	-	370,374
1977	60,985	-	255,015	-	315,999
Start of longline fishery → 1978	67,082	-	231,954	-	299,036
1979	75,112	36,031	343,702	-	454,845
1980	44,176	46,681	333,638	446,729	871,224
Start of longline fishery → 1981	230,857	682,027	301,678	1,515,422	2,729,985
1982	225,393	680,796	264,745	3,224,942	4,395,875
1983	117,510	646,674	235,083	2,476,207	3,475,474
Longline fishery moves inshore → 1984	197,754	612,551	232,890	1,727,472	2,770,667
1985	210,188	578,428	294,541	978,737	2,061,894
Groupers id to species → 1986	98,119	544,306	544,942	230,002	1,417,369
1987	63,191	437,827	345,548	337,222	1,183,788
1988	281,401	606,346	269,219	489,354	1,646,320
1989	49,078	351,233	66,533	273,663	740,507
1990	39,015	345,943	117,818	373,245	876,022
1991	40,159	317,054	78,977	334,785	770,975



Historic fishery and Prytherch survey of LL boats in 1982

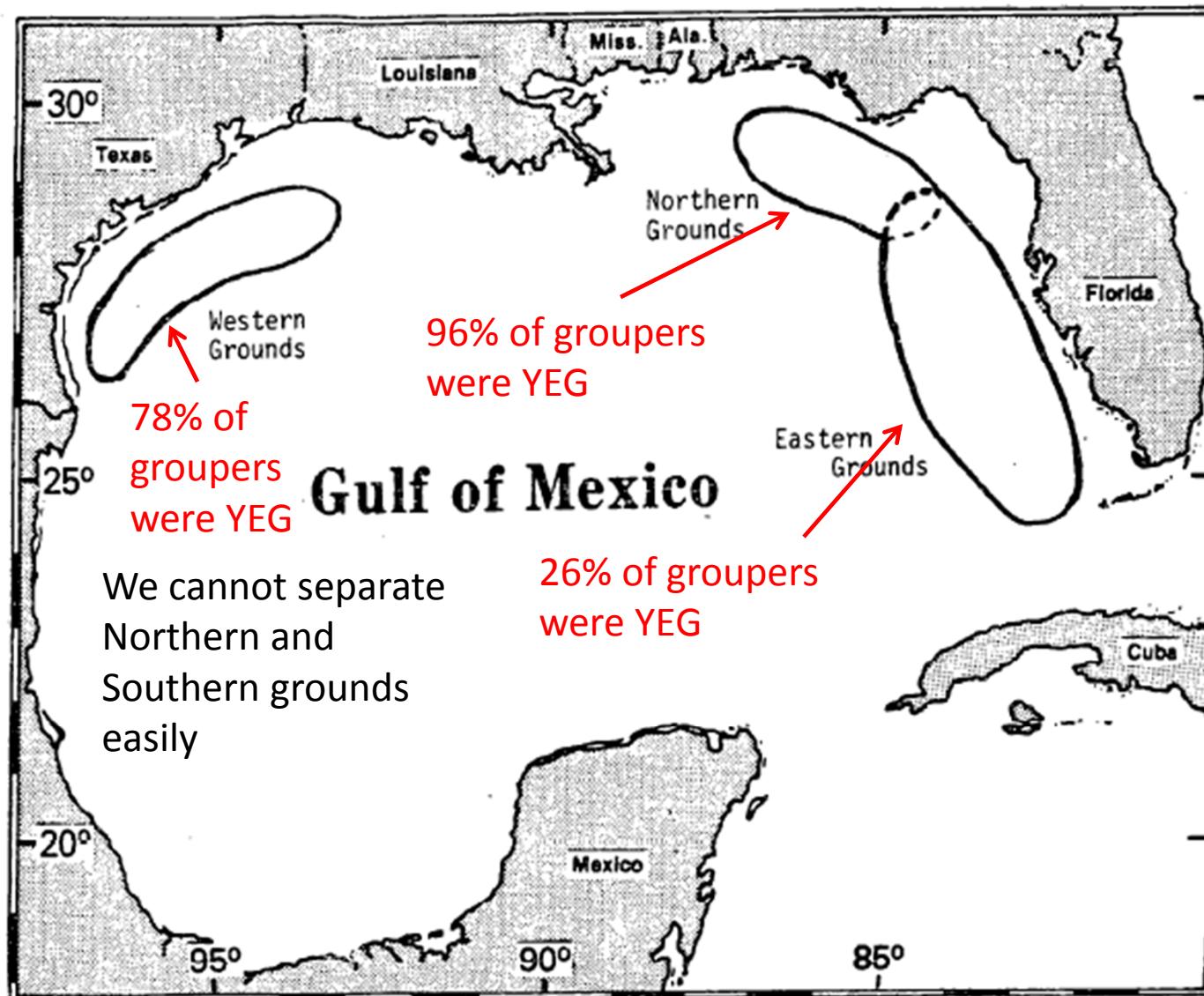


FIGURE 1

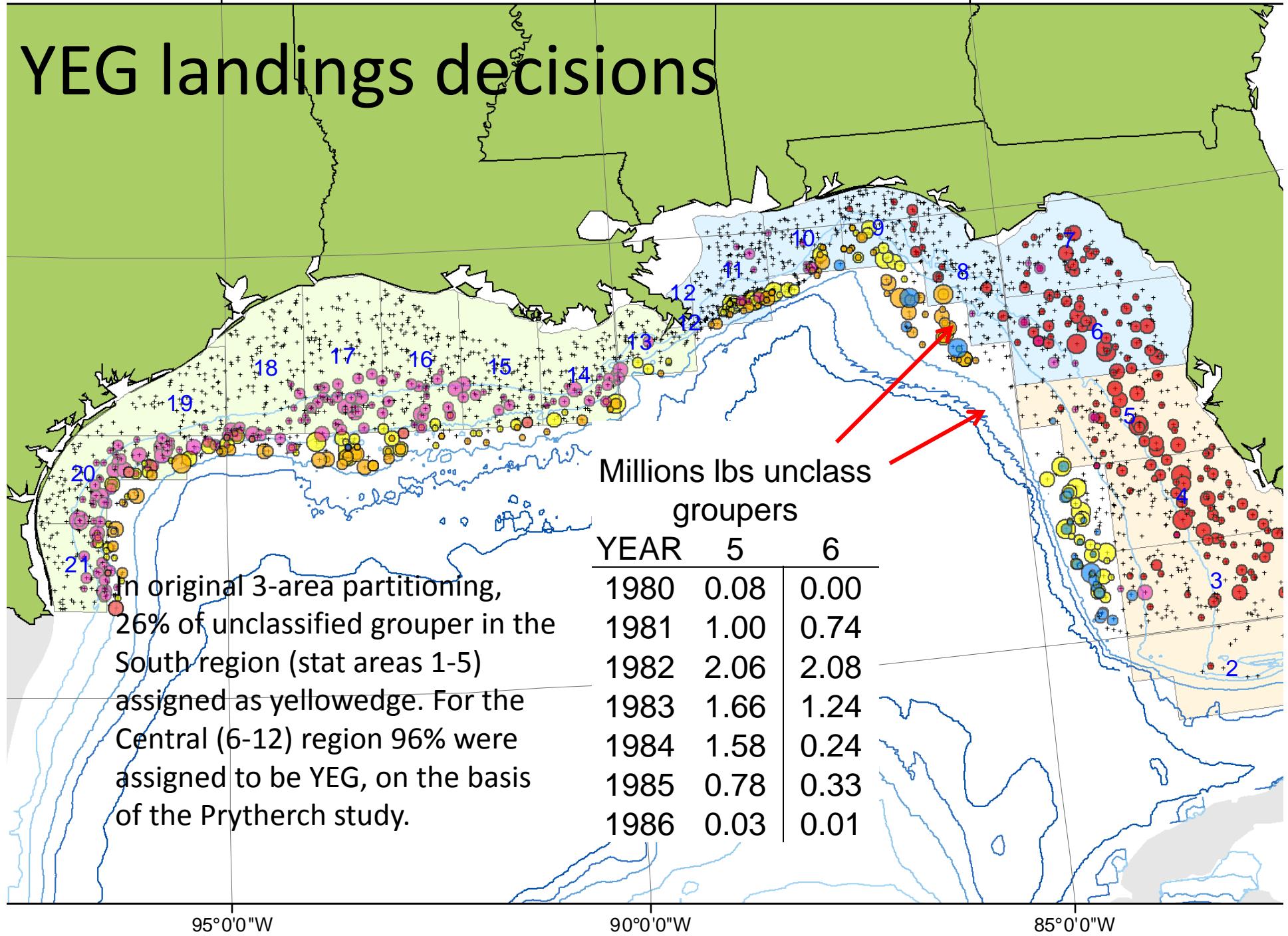
MAJOR BOTTOM LONGLINE FISHING GROUNDS

From Prytherch, 1983

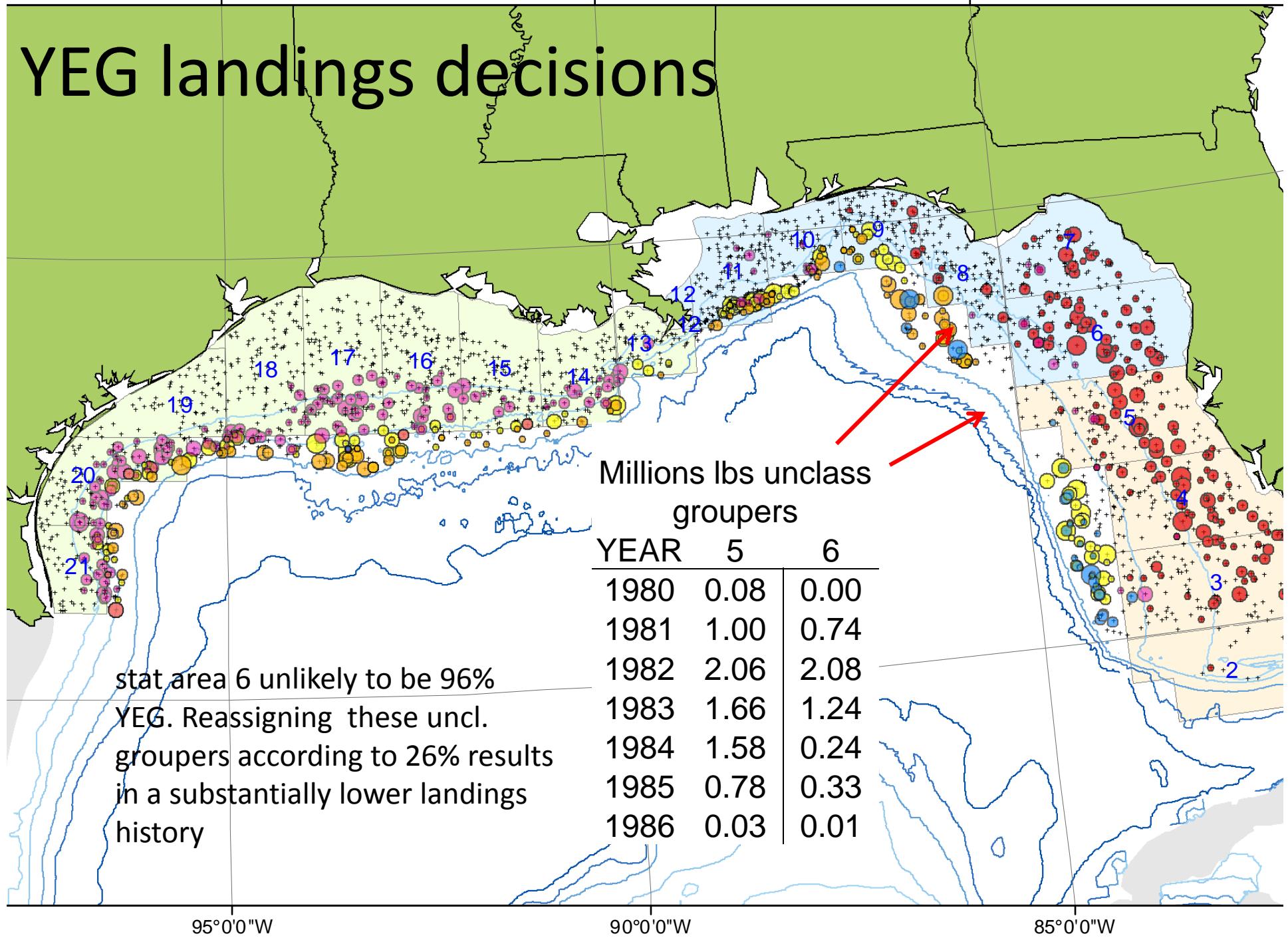
YEG landings decisions

Year	Western Gulf		Eastern Gulf		Total	
	Vertical Line	Longline	Vertical Line	Longline		
-HL landings from 1975 to 1985 (purple shading) estimated by fraction of YEG/total 1986 to 1989 (blue shading in Table 2.1).	1974	-	-	-	-	
	1975	113,454	-	351,630	-	465,083
- LL between 1983 and 1985 (green shading in Table 2.1) estimated by linearly interpolation	1976	74,084	-	296,289	-	370,374
	1977	60,985	-	255,015	-	315,999
	1978	67,082	-	231,954	-	299,036
- yellowfin landings from 1986 to 1990 reclassified as yellowedge (blue shaded region) based upon frac YEG/YFT	1979	75,112	36,031	343,702	-	454,845
	1980	44,176	46,681	333,638	446,729	871,224
	1981	230,857	682,027	301,678	1,515,422	2,729,985
	1982	225,393	680,796	264,745	3,224,942	4,395,875
	1983	117,510	646,674	235,083	2,476,207	3,475,474
-unclassified LL groupers 1979 and 1982 (orange shading) obtained from the fraction of YEG/total Prytherch (1983); 26% YEG in areas 1-5 and 96% in areas 6-12.	1984	197,754	612,551	232,890	1,727,472	2,770,667
	1985	210,188	578,428	294,541	978,737	2,061,894
	1986	98,119	544,306	544,942	230,002	1,417,369
	1987	63,191	437,827	345,548	337,222	1,183,788
	1988	281,401	606,346	269,219	489,354	1,646,320
	1989	49,078	351,233	66,533	273,663	740,507
	1990	39,015	345,943	117,818	373,245	876,022
	1991	40,159	317,054	78,977	334,785	770,975

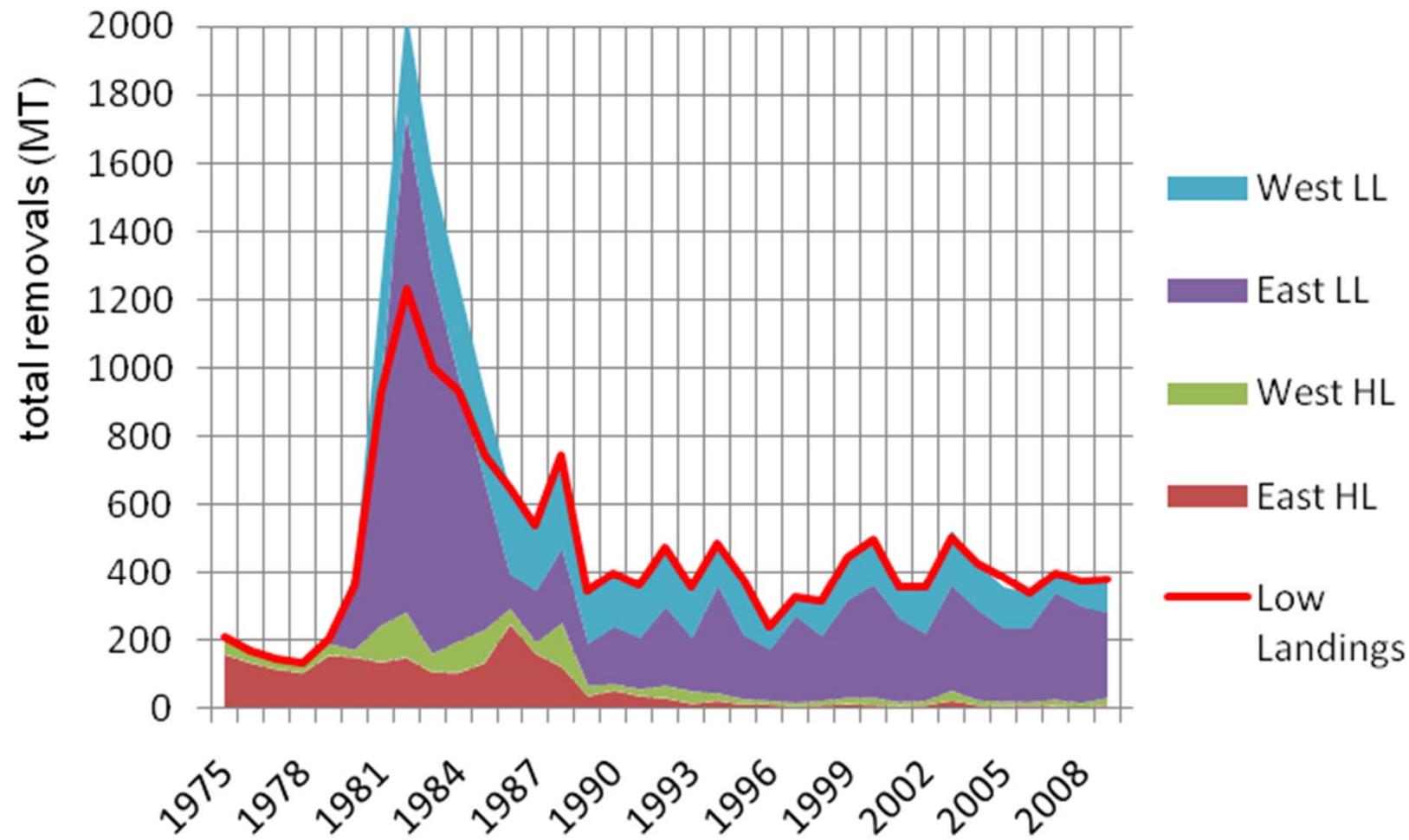
YEG landings decisions



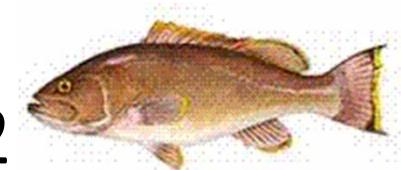
YEG landings decisions



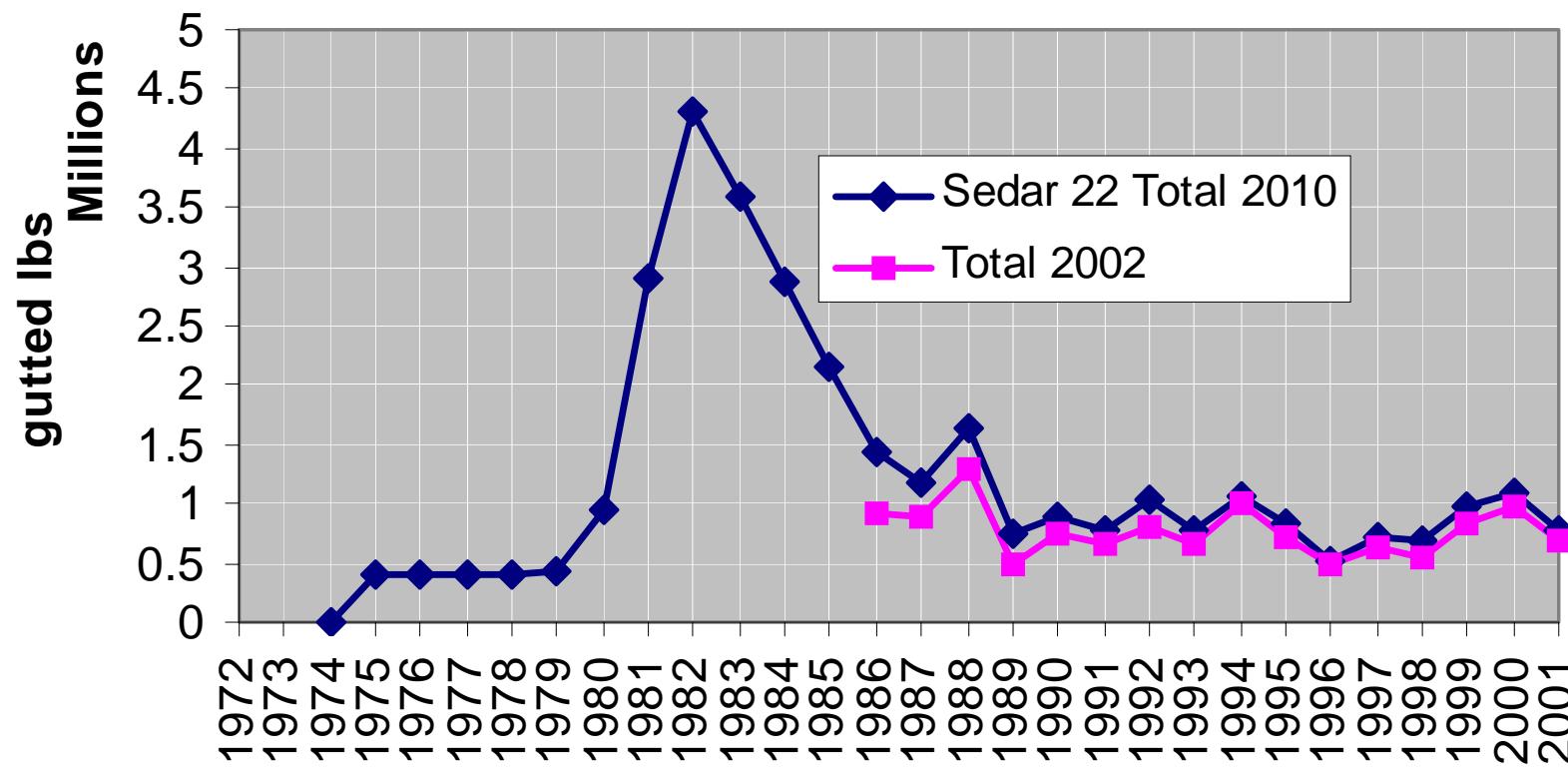
YEG landings, high and low trajectories



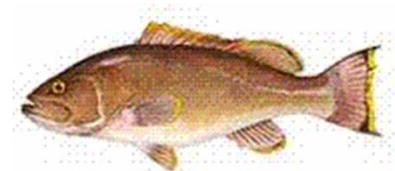
Comparison of YEG landings between 2002 assessment



Difference is adding a fraction of unclassified groupers (1974-2009) and adding in “yellowfin” likely mis-reported as YEG



YEG Commercial discards



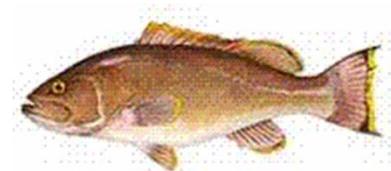
#could not be calculated

*confidential data, but very few
Discards

Discard mortality assumed to
be 100%

Year	Vertical Line Discards	Logline Discards
1990	219	#
1991	700	#
1992	776	#
1993	305	#
1994	357	#
1995	428	#
1996	383	#
1997	587	#
1998	562	#
1999	641	#
2000	619	#
2001	618	#
2002	0	0
2003	*	0
2004	426	4,163
2005	892	0
2006	619	0
2007	4,435	*
2008	197	0
2009	21	0

YEG recreational landings and discards



Added to comm handline

Year	Headboat (#)	MRFSS (#)	TWPD (#)	Headboat (lb)	MRFSS (lb)	TWPD (lb)
1982		13,146			130,570	
1984			21			209
1986	121		44	457		437
1987	497			1,103		
1988	949			2,178		
1989	325	1,668		734	16,570	
1990	599			1,643		
1991	364	0		1,331	0	
1992	130			489		
1993	84	311		333	3,090	
1994	57	0		423	0	
1995	101			605		
1996	26	0		180	0	
1997	73	92		369	1,226	
1998	63	346		445	7,483	
1999	6	125		53	624	
2000	6			37		
2001	6	222		50	1,373	
2002	4	415		29	3,808	
2003	11	32		91	299	
2004	10	126		69	1,143	
2005	32	6,160		142	56,460	
2006	21	223		207	2,568	
2007	43	25		202	250	
2008	43	62		202	613	
2009		567			4,944	

YEG recreational discards



Year	Headboat (#)	MRFSS (#)	TWPD (#)
1982			0
1984			
1986			
1987			
1988			
1989			0
1990			
1991		11,139	
1992			
1993			0
1994		322	
1995			
1996		876	
1997		1,144	
1998			0
1999		219	
2000			
2001			0
2002			0
2003			0
2004			0
2005			0
2006			0
2007			0
2008			0
2009			0

Discard mortality
assumed to be 100%

Added to landings,
assuming an average
weight

2.6 INDICES

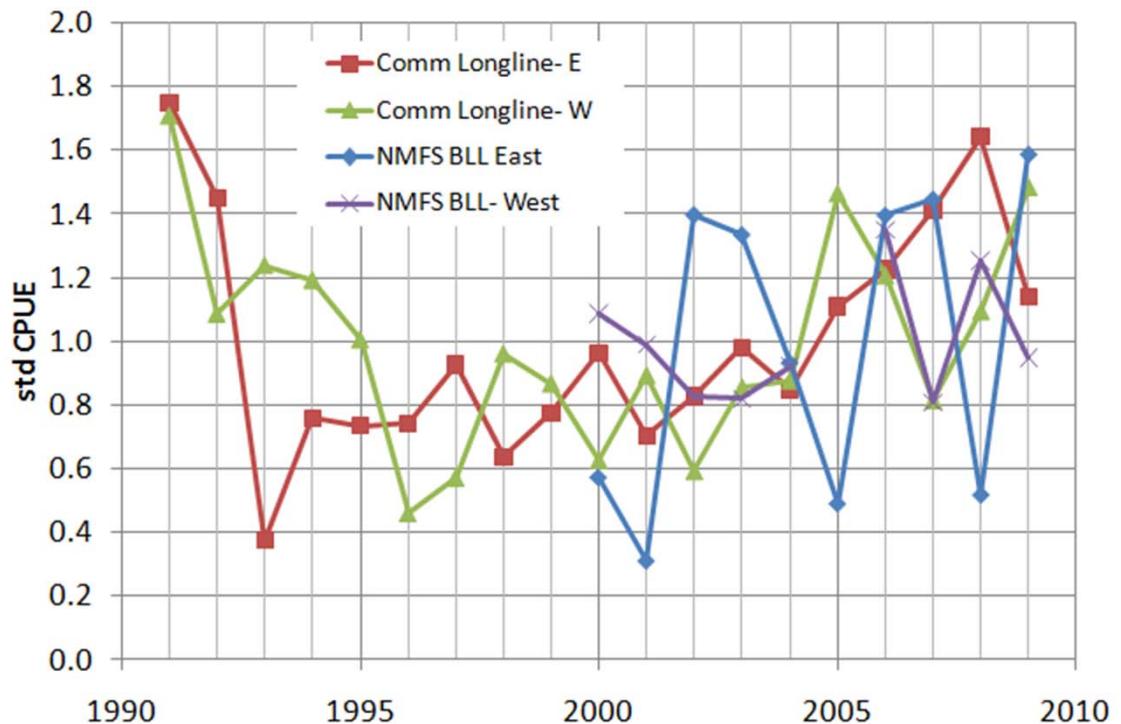
- 2 Fishery-dependent indices

Commercial longline east and west Gulf

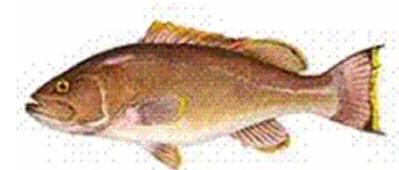
- 2 Fishery-independent indices

NMFS bottom longline survey – east, central and west Gulf

- Indices considered but not used
- NMFS groundfish trawl



2.6 INDICES. Commercial longline East

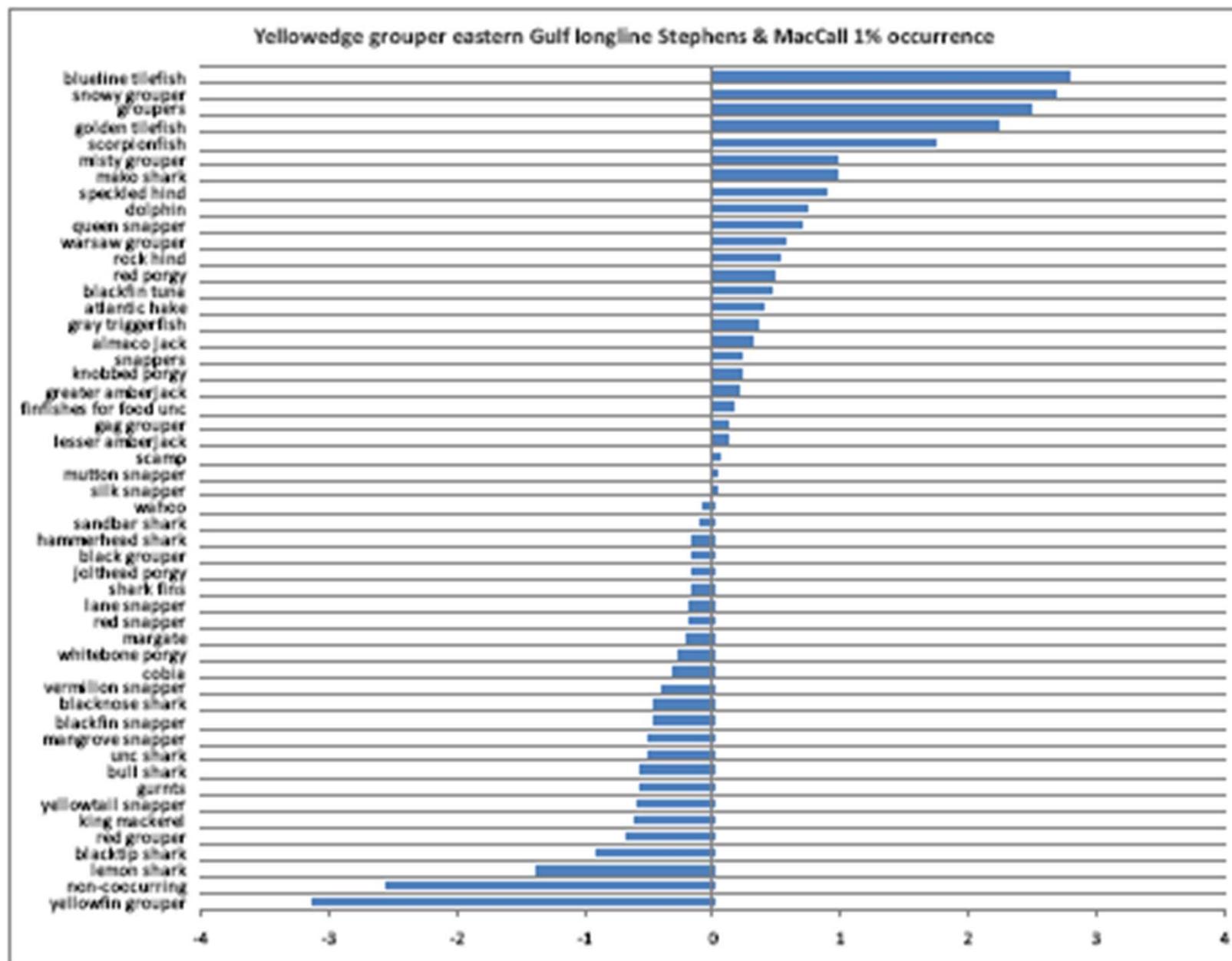


SEDAR 22-DW-02_v2

- From vessel logbooks (captain reported)
- Stephens & MacCall trip selection used to identify ‘targeted’ trips
- Delta-lognormal model
- Factors considered:

Factor	Levels	Value
Year	19	1991-2009
Area(<i>area_cat3</i>)*	7	Stat areas 2-3, 4, 5, 6-7, 8, 9, 10-11
Days at Sea (<i>away_cat</i>)*	3	1-7, 8-11, 12+ days
Distance between Hooks (<i>hook_cat</i>)*	2	1-25, 26+ feet
Number of Crew	3	1-2, 3, 4-6 crew members
Season	4	Jan-Mar, Apr-Jun, Jul-Sep, Oct-Dec
Total hooks fished ¹	3	<12,000; 12,000-27,000; 27,001+ hooks
Longline length	2	<5, 5+ miles

2.6 INDICES. Commercial longline East, trip selection



2.6 INDICES. Commercial longline East, model selection

Type 3 Tests of Fixed Effects							
Binomial model	Effect	Num	Den				
		DF	DF	Chi-Square	F Value	Pr > ChiSq	Pr > F
	YEAR	18	346	59.06	3.28	<.0001	<.0001
	AREA_CAT3	6	346	97.29	16.21	<.0001	<.0001
	AWAY_CAT	2	346	34.78	17.39	<.0001	<.0001

Type 3 Tests of Fixed Effects							
lognormal model	Effect	Num	Den				
		DF	DF	Chi-Square	F Value	Pr > ChiSq	Pr > F
	AREA_CAT3	6	108	87.01	14.50	<.0001	<.0001
	HOOK_CAT	1	3584	68.91	68.91	<.0001	<.0001
	YEAR	18	108	87.09	4.84	<.0001	<.0001

Catch Rates on Positive Trips	-2 REM Log likelihood	Akaike's Information Criterion	Schwartz's Bayesian Criterion	Likelihood Ratio Test	P
Year + Area + Hook_dist	12,612.4	12,614.4	12,620.6	-	-
Year + Area + Hook_dist + Year*Area	12,598.3	12,602.3	12,608.0	14.1	0.0002

2.6 INDICES. Commercial longline East, index table

PPT = Area + Days at Sea + Year

LOG(CPUE) = Area + Distance between Hooks + Year + Year*Area

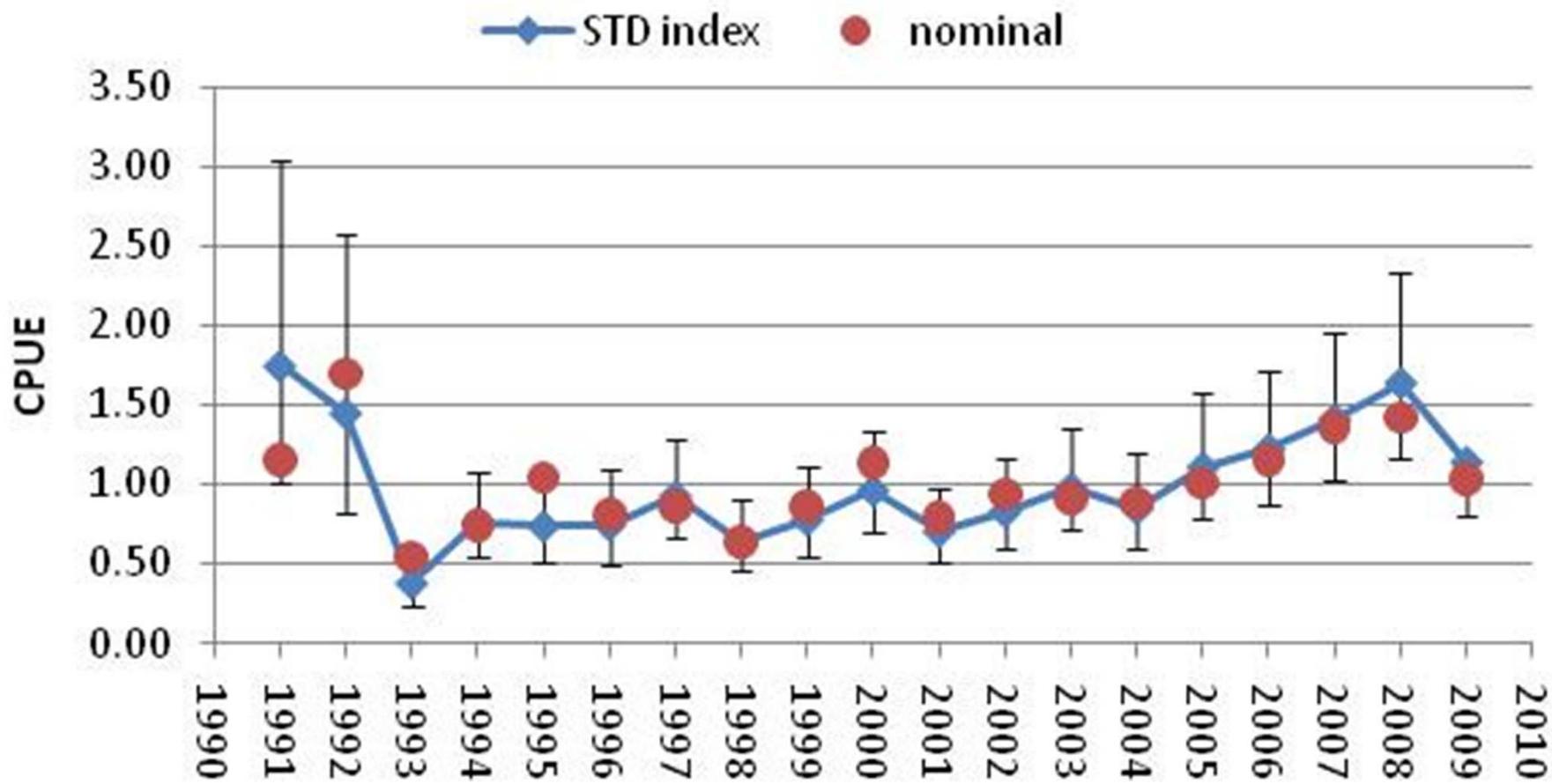
YEAR	CPUE	Trips	Proportion Successful Trips	Relative Index	Lower 95%	Upper 95%	CV (Index)
					CI (Index)	CI (Index)	
1991	1.16	40	0.90	1.75	1.01	3.04	0.28
1992	1.69	42	0.88	1.45	0.82	2.57	0.29
1993	0.55	92	0.80	0.37	0.24	0.59	0.23
1994	0.75	249	0.86	0.76	0.54	1.07	0.17
1995	1.05	223	0.80	0.74	0.51	1.06	0.18
1996	0.81	138	0.85	0.74	0.50	1.10	0.20
1997	0.86	313	0.91	0.93	0.67	1.28	0.16
1998	0.63	277	0.83	0.64	0.45	0.90	0.17
1999	0.86	258	0.81	0.78	0.54	1.10	0.18
2000	1.13	326	0.90	0.96	0.69	1.34	0.17
2001	0.79	336	0.89	0.70	0.51	0.98	0.17
2002	0.94	289	0.87	0.83	0.59	1.16	0.17
2003	0.92	340	0.93	0.98	0.71	1.35	0.16
2004	0.89	234	0.89	0.85	0.60	1.19	0.17
2005	1.01	210	0.87	1.11	0.78	1.57	0.18
2006	1.16	217	0.93	1.23	0.87	1.72	0.17
2007	1.36	233	0.98	1.41	1.02	1.96	0.16
2008	1.42	190	0.92	1.64	1.16	2.33	0.18
2009	1.03	197	0.93	1.14	0.81	1.62	0.18

2.6 INDICES. Commercial longline East, index plot

PPT = Area + Days at Sea + Year

LOG(CPUE) = Area + Distance between Hooks + Year + Year*Area

Comm LL East



2.6 INDICES. Commercial longline West, model selection

Only lognormal model run because 100% of the trips were positive.

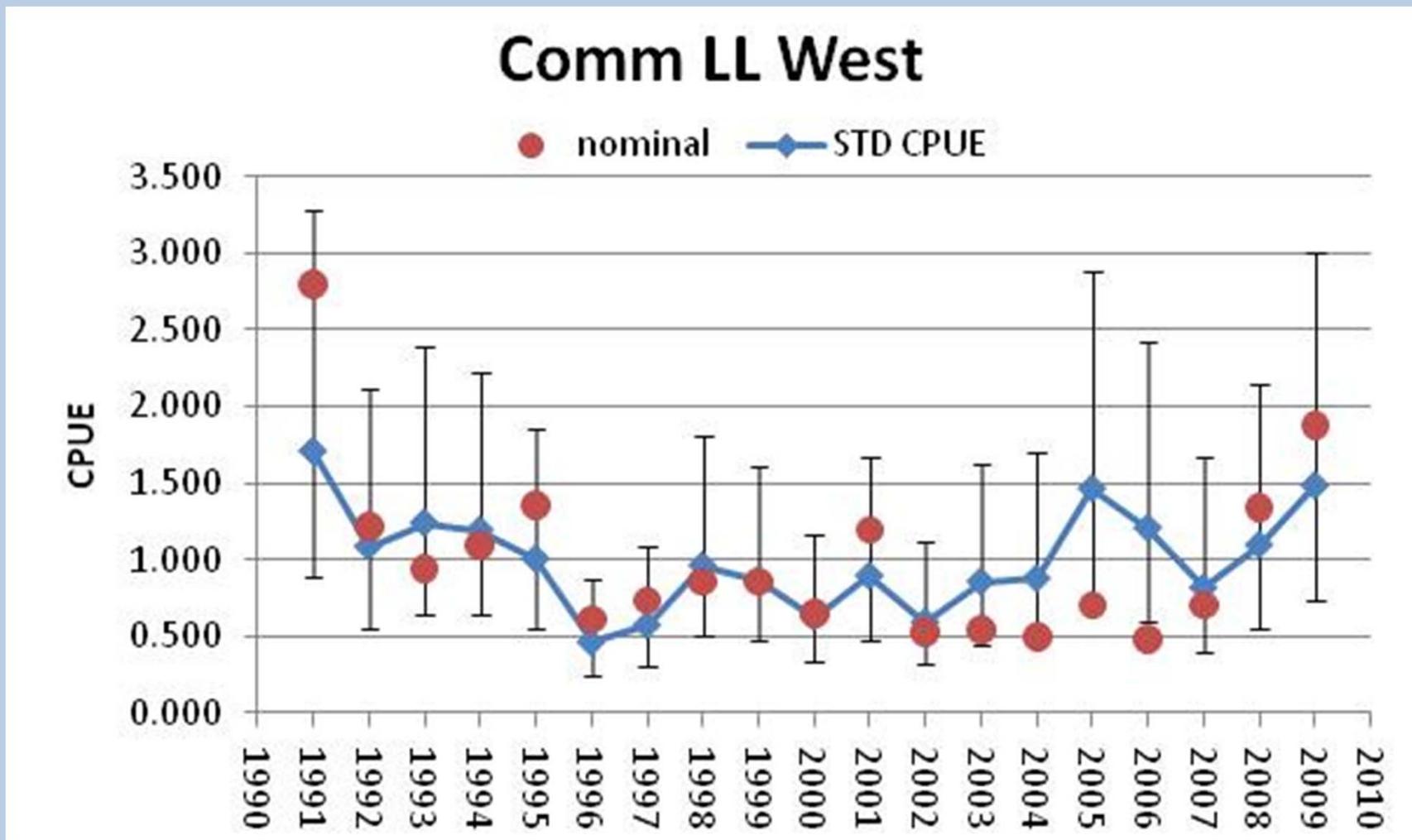
$$\text{LOG(CPUE)} = \text{Area} + \text{Distance between Hooks} + \\ \text{Year} + \text{Year} * \text{Area}$$

2.6 INDICES. Commercial longline West, index table

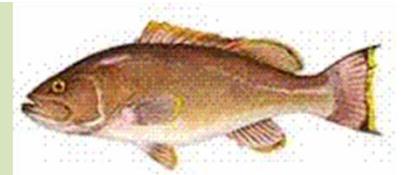
**LOG(CPUE) = Area + Distance between Hooks +
Year + Year*Area**

YEAR	Relative Nominal CPUE	Trips	% successful Trips	Relative Index	Lower 95%	Upper 95%	CV (Index)
	CPUE		Trips		CI (Index)	CI (Index)	
1991	2.793	70	100%	1.706	0.886	3.284	0.336
1992	1.217	80	100%	1.086	0.559	2.109	0.341
1993	0.941	80	100%	1.238	0.643	2.384	0.337
1994	1.098	75	100%	1.192	0.637	2.229	0.321
1995	1.352	122	100%	1.006	0.545	1.856	0.314
1996	0.613	62	100%	0.462	0.243	0.877	0.329
1997	0.738	57	100%	0.573	0.302	1.087	0.329
1998	0.859	60	100%	0.961	0.511	1.808	0.324
1999	0.858	136	100%	0.868	0.470	1.605	0.314
2000	0.654	99	100%	0.627	0.338	1.163	0.316
2001	1.196	78	100%	0.894	0.479	1.668	0.319
2002	0.526	78	100%	0.593	0.316	1.113	0.322
2003	0.543	96	100%	0.856	0.449	1.631	0.331
2004	0.501	73	100%	0.878	0.455	1.695	0.338
2005	0.703	69	100%	1.463	0.741	2.888	0.350
2006	0.485	50	100%	1.206	0.602	2.416	0.358
2007	0.707	29	100%	0.815	0.397	1.673	0.371
2008	1.342	39	100%	1.094	0.558	2.146	0.346
2009	1.874	28	100%	1.482	0.729	3.012	0.366

2.6 INDICES. Commercial longline West, index plot

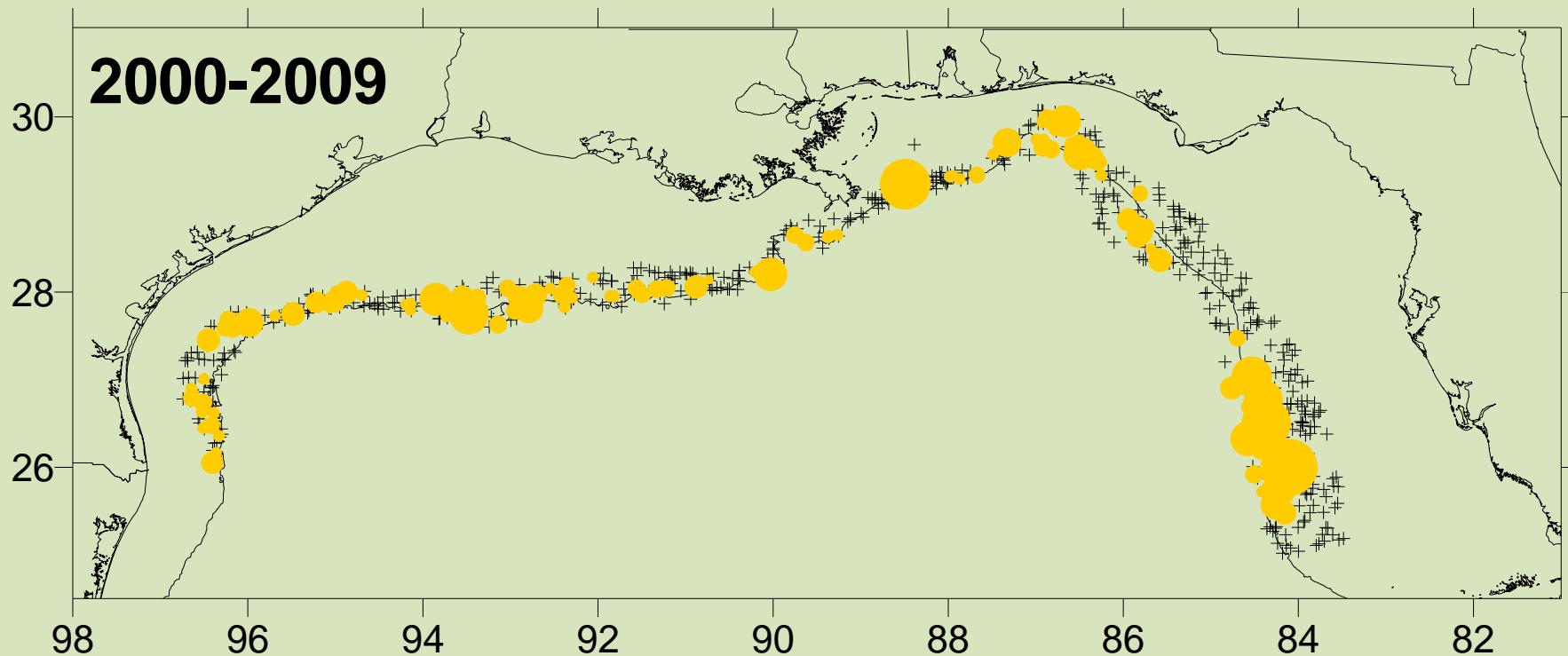


2.6 INDICES. NMFS bottom longline



SEDAR 22-DW-07-v2

- Stratified random longline survey 1995-2009
- 3 depth strata
- Delta-lognormal model
- Factors considered: depth, sediment characteristics, area
- Imbalance created by missing some strata in some years and low sample sizes in others



2.6 INDICES. bottom longline East and West factors considered

Binomial
model

Year Depth LcritShearStress Carbonate

lognormal
model

Year Depth LcritShearStress Carbonate

Final models

Binomial
model

PPT= YEAR + Depth

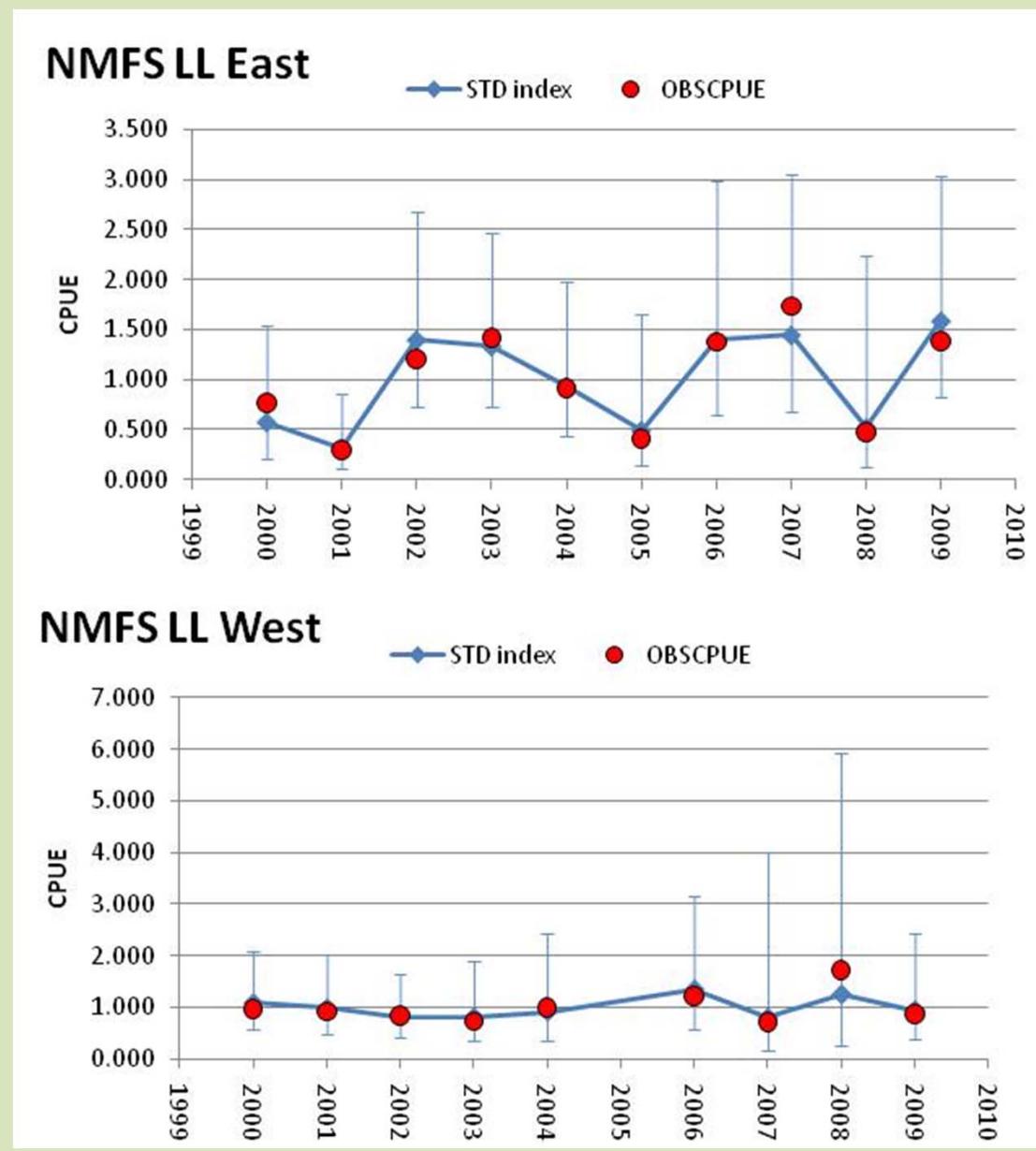
lognormal
model

LOG(CPUE) = YEAR + depth

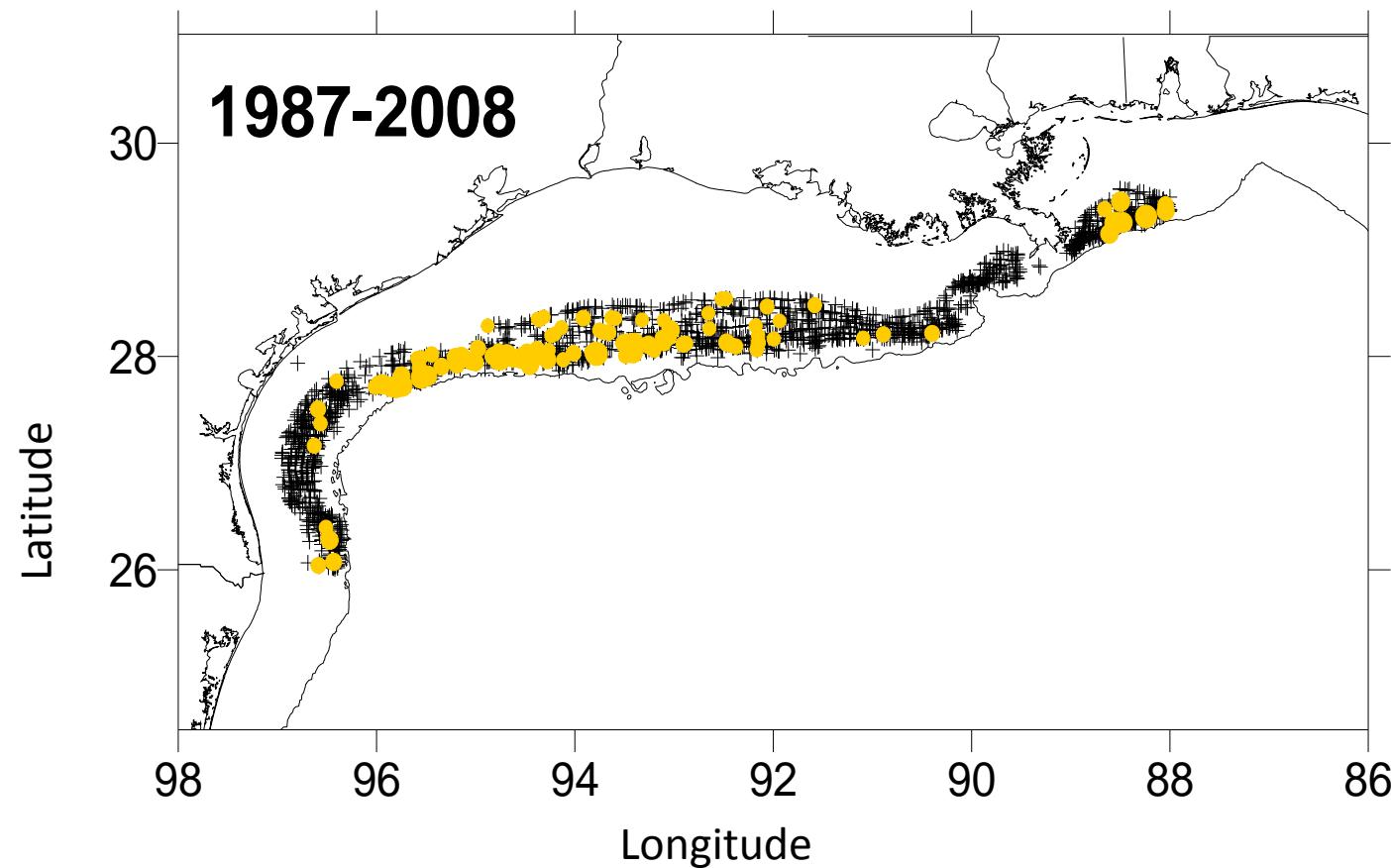
2.6 INDICES. . bottom longline East and west, index tables

	Survey	StdInde							
		Year	Freque	N	LoIndex	x	CV	LCL	UCL
East	2000	0.147	34	0.244	0.574	0.526	0.214	1.544	
	2001	0.098	51	0.133	0.312	0.540	0.113	0.858	
	2002	0.357	28	0.596	1.399	0.334	0.730	2.680	
	2003	0.219	64	0.569	1.336	0.314	0.723	2.469	
	2004	0.167	53	0.398	0.934	0.390	0.440	1.982	
	2005	0.136	22	0.209	0.492	0.668	0.146	1.656	
	2006	0.286	28	0.595	1.397	0.394	0.654	2.986	
	2007	0.250	36	0.616	1.448	0.387	0.686	3.055	
	2008	0.087	23	0.221	0.519	0.839	0.121	2.236	
	2009	0.282	39	0.676	1.589	0.333	0.831	3.039	
West	Survey	Year	Frequency	N	LoIndex	StdIndex	CV	LCL	UCL
	2000	0.333	39	0.519	1.086	0.338	0.563	2.096	
	2001	0.279	43	0.473	0.989	0.367	0.486	2.013	
	2002	0.236	55	0.394	0.825	0.360	0.410	1.657	
	2003	0.286	28	0.391	0.819	0.440	0.353	1.899	
	2004	0.241	29	0.440	0.921	0.517	0.348	2.435	
	2006	0.296	27	0.645	1.350	0.445	0.577	3.159	
	2007	0.105	19	0.386	0.809	0.948	0.163	4.011	
	2008	0.250	8	0.599	1.253	0.910	0.265	5.921	
	2009	0.226	31	0.454	0.949	0.496	0.371	2.426	

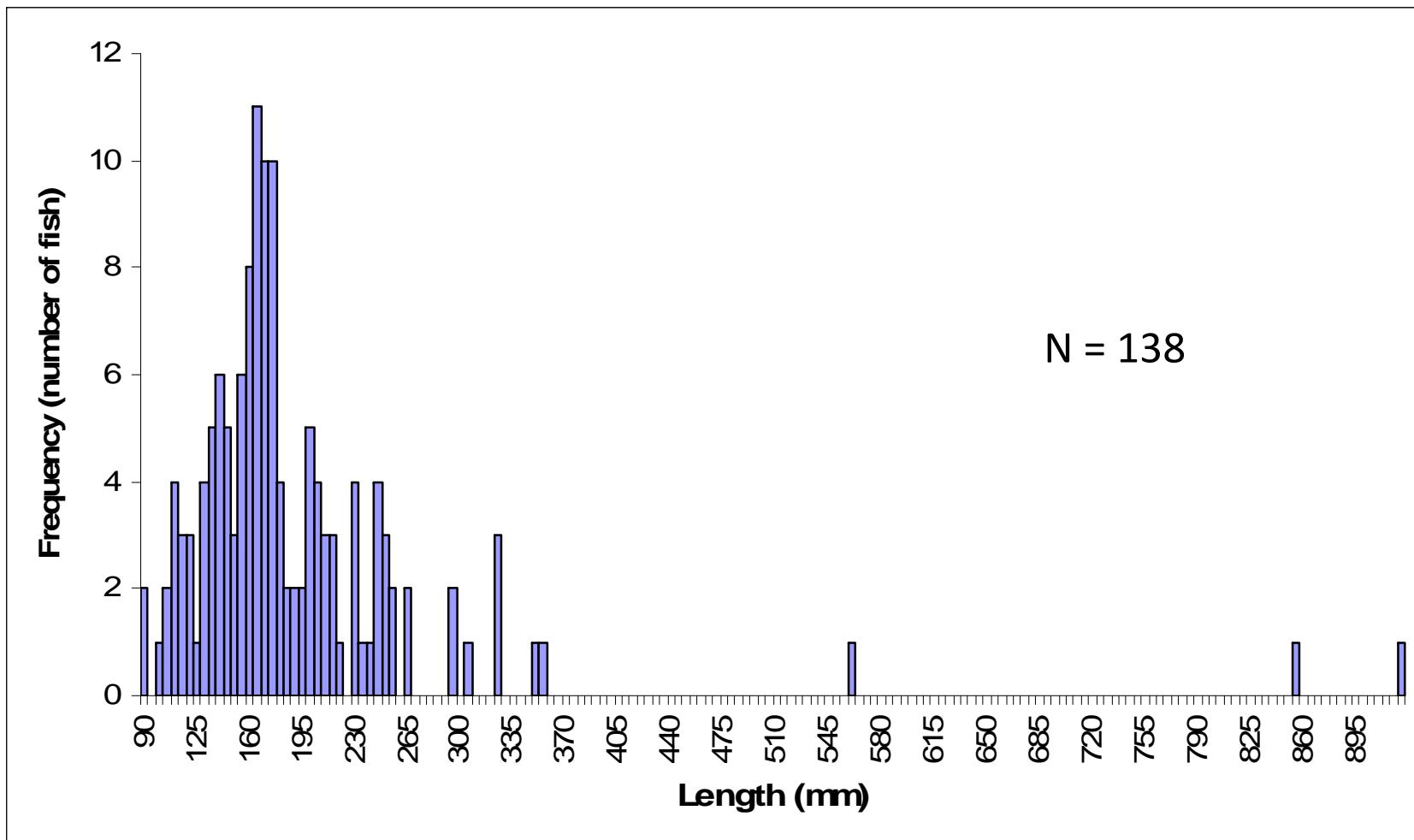
2.6 INDICES. Commercial longline indices East and west



YEG SEAMAP Groundfish Survey – Entire Area



Length Frequency Histogram YEG from SEAMAP trawl



SEAMAP Groundfish trawl Survey

Indices - Issues



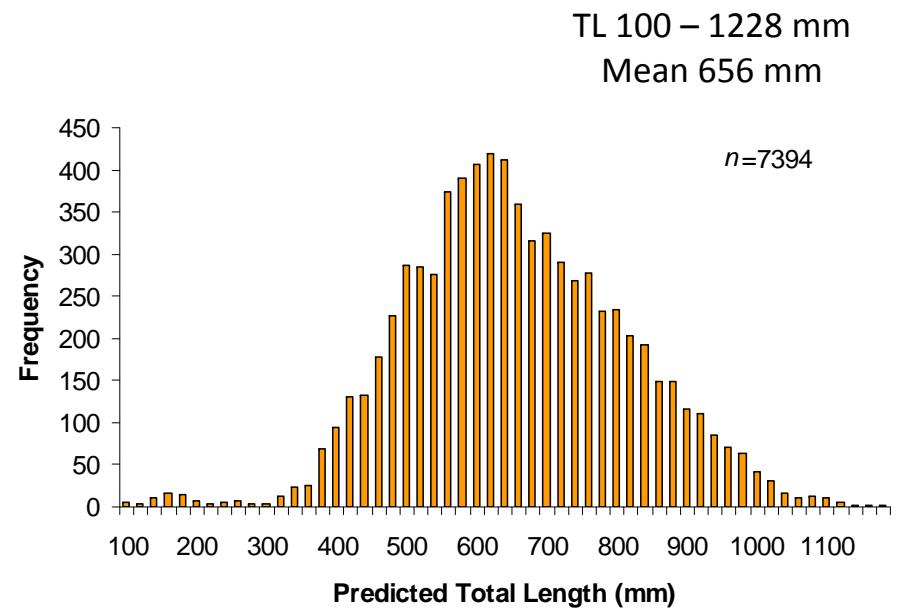
- Often based on sample sizes of ≤ 5 fish per year
- Likely does not index recruitment well
- AW recommendation was to drop it as an index
- Age and length comp still useful, but rec devs not estimated post 2000, when these sparse length and age samples become the only recruitment signals

Age composition data Yellowedge Grouper



SEDAR22-DW-08
SEDAR22-DW-LH

- 2.6 Age
 - 10,417 otoliths (1979-2009)
 - 8,197 subsampled, 90% aged
 - 94% collected (1998-2009)
 - 63% Florida federal waters
 - 76% Commercial longline
- Indices of Precision
 - APE 9%
 - % Agreement $92\% \pm 5$ years
- Validation: bomb radiocarbon (^{14}C)



Length samples

year	HL	LL	SSLL	SS TRW	HL	LL	SSLL	SS TRW	total
1977	3	0	0	0	0	0	0	0	3
1978	107	0	0	0	7	0	0	0	114
1979	181	2	6	0	2	0	0	0	191
1980	67	63	0	0	0	0	0	0	130
1982	0	683	13	0	0	0	0	0	696
1983	0	169	0	0	0	0	25	0	194
1984	71	552	0	0	95	519	29	0	1266
1985	19	469	8	0	578	1525	0	0	2599
1986	4	598	0	0	370	509	0	0	1481
1987	39	617	0	0	62	197	0	0	915
1988	25	192	0	0	114	31	0	0	362
1989	4	214	0	0	86	28	0	0	332
1990	37	658	0	0	364	263	0	0	1322
1991	31	758	0	0	744	725	0	0	2258
1992	87	896	0	0	839	695	0	0	2517
1993	132	465	0	0	176	530	0	0	1303
1994	315	1362	0	0	367	330	0	0	2374
1995	343	1429	0	0	180	158	0	0	2110
1996	506	608	0	0	97	117	0	0	1328
1997	243	1387	0	0	169	20	0	0	1819
1998	227	2693	0	0	56	101	0	0	3077
1999	188	3088	41	0	49	162	0	0	3528
2000	113	5271	9	0	2	335	20	6	5756
2001	67	2771	7	3	20	24	21	5	2918
2002	63	1554	18	5	31	3	22	1	1697
2003	50	2512	44	2	24	18	11	5	2666
2004	63	2007	22	1	24	43	15	9	2184
2005	55	1634	9	0	84	60	1	11	1854
2006	64	576	17	1	53	115	17	13	856
2007	25	1472	24	1	112	273	7	0	1914
2008	103	760	5	0	190	483	4	7	1552
2009	24	1344	23	0	317	567	13	3	2291
total	3256	36804	246	13	5212	7831	185	60	53607

Age samples

year	East				West				total
	HL	LL	SSLL	SS TRW	HL	LL	SSLL	SS TRW	
1977	4	0	0	0	0	0	0	0	4
1978	107	0	0	0	7	0	0	0	114
1979	181	2	6	0	2	0	0	0	191
1980	67	63	0	0	0	0	0	0	130
1981	0	0	0	0	0	0	0	0	0
1982	0	683	13	0	0	0	0	0	696
1983	0	169	0	0	0	0	50	0	219
1984	0	4	0	0	0	0	58	0	62
1985	0	0	8	0	0	0	0	0	8
1986	4	0	0	0	21	0	0	0	25
1987	0	0	0	0	3	0	0	0	3
1988	0	0	0	0	9	0	0	0	9
1989	0	0	0	0	5	0	0	0	5
1990	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	237	12	0	0	249
1992	0	11	0	0	31	27	0	0	69
1993	0	0	0	0	6	3	0	0	9
1994	0	0	0	0	2	0	0	0	2
No data 1995-1997									
1998	0	5	0	0	0	0	0	0	5
1999	1	55	41	0	0	0	0	0	97
2000	13	85	9	0	0	5	40	6	158
2001	36	350	7	3	16	0	42	5	459
2002	20	150	18	5	19	2	44	1	259
2003	37	692	44	2	10	11	22	5	823
2004	22	452	22	0	19	41	30	9	595
2005	7	522	9	0	71	49	2	11	671
2006	8	277	17	1	46	99	34	13	495
2007	21	484	24	1	95	230	14	0	869
2008	50	597	5	0	193	412	8	7	1272
2009	6	535	23	0	275	475	26	3	1343
total	584	5136	246	13	1067	1366	370	60	8842