

Trends in Catch Data and Estimated Static SPR Values
for Fifteen Species of Reef Fish Landed Along the
Southeastern United States

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METHODS

Council staff requested that the NMFS, Beaufort Laboratory's Reef Fish Team provide graphical and tabular data pertaining to trends in catches of fifteen species: black sea bass, white grunt, gray triggerfish, red porgy, vermillion snapper, red snapper, gag, scamp, red grouper, black grouper, speckled hind, snowy grouper, yellowedge grouper, and tilefish. Weight of landings (kg), mean fish size, catch per unit effort from headboat data and Spawning Stock Ratio data are presented for each species compiled for the entire southeastern United States fishing area, North Carolina through the east coast of Florida. Updated SPR is not included for tilefish due to inadequate information. Three data bases, each with a landings and fish size (bioprofiles) component, were utilized: Headboat, Commercial, and Marine Recreational Fisheries Statistical Survey (MRFSS).

Following are descriptions of the various data limitations and outputs:

Headboat - Landings were available for the entire region for 1981-1996; restricted to NC and SC for 1972-1975; NC through North Florida for 1976-1977, and partial coverage of South Florida for 1978-1980.

Mean weights were obtained from bioprofiles data for 1972-1996.

CPUE was calculated in terms of number of fish caught as well as kilograms of caught, all per angler day. CPUE trends were plotted in terms of one data point per year, combining all areas used for a given species. This gives an area-wide look at CPUE trends over time. For a given species, CPUE calculation were done only for those areas in which the species was a common and frequent occurrer. This was done to avoid negatively biasing the CPUE calculation (i.e., inclusion of areas of infrequent or rare occurrence would involve including both low landings data and high effort data, resulting in low CPUE values perhaps not reflecting reality).

Commercial - Landings were available from 1986-1996. 1986 was the first year that all fish were identified to species. Before 1992 greater amberjack were included in an unclassified category, which contained four species; most probably were greater amberjacks.

Mean weights were generated from intercept (TIP) lengths, which were then applied to Weight-Length relationships for each species, 1983-1996.

MRFSS - Landings data were available for 1981-1996. However, 1981-1985 data provide crude estimates because charter boats were combined with party boats (headboats) for those years. To adjust, we

used the intercept data to obtain the proportion of charter boat and headboat samples for each species. We then applied the proportion to the landings data, and discarded the party boat segment because it was already included in the headboat data.

Mean weights for each species were obtained from the intercept data. For the samples with no weight recorded, the length-weight relationship for each species was used to convert the lengths to weights.

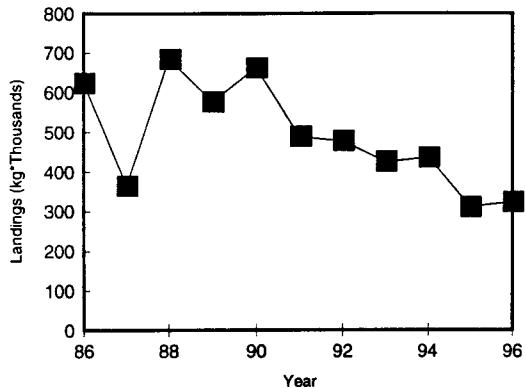
Estimates of SPR - Static spawning potential ratio (SPR) values are estimated for each species based on different estimates of natural mortality (M). The percent reduction in fishing mortality (F) and increase in fish minimum length needed to obtain 30% and 40% SPR are included by species. The species are listed in order of confidence that we place in the data used to derive the estimates.

- | | |
|-------------------------|--|
| Data Caveats -
bass) | *All SPR values (except vermillion snapper, red snapper, scamp, and black sea bass) are based on the VPA equation applied to 1996 fishing year and is subject to the equilibrium and constant recruitment assumptions.
*SPR values for white grunt and gray triggerfish are based on Headboat and MRFSS data only.
*SPR analysis for speckled hind uses only 28 fish measured from the commercial, Headboat, and MRFSS data bases.
* Size limit regulations in place as of 1992 as listed in Amendment 4 of the Grouper Plan.
*Commercial bag limit on warsaw grouper and speckled hind of one fish per trip and no sale of speckled hind implemented in June, 1994 (Amendment 6). |
| Snapper | |

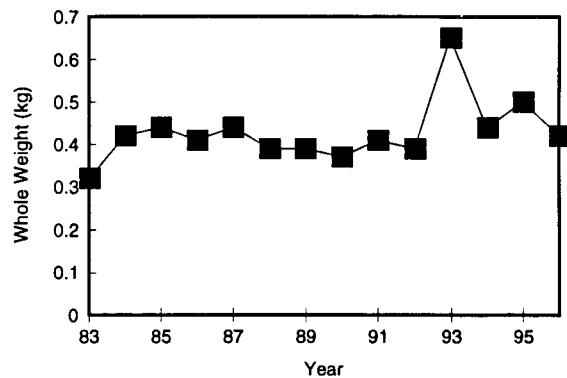
Black Sea Bass Data (Landings, mean weights, and CPUE-Wt are in kilograms).

Black Sea Bass

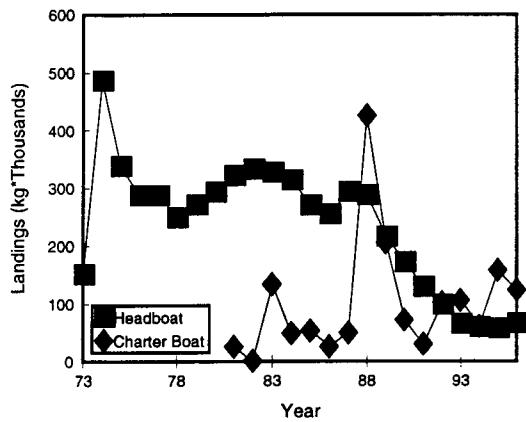
Commercial Landings



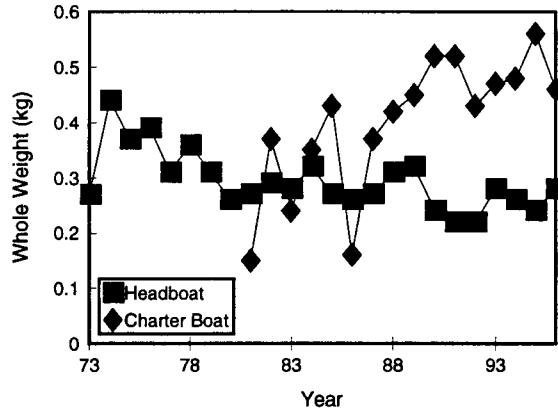
Commercial Mean Weight



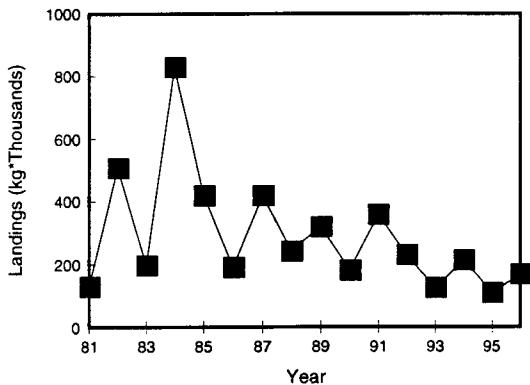
"For Hire" Recreational Landings



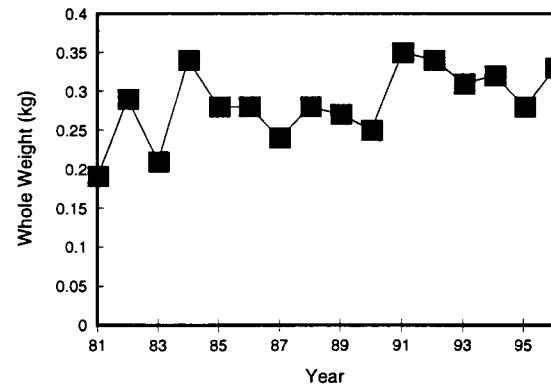
"For Hire" Recreational Mean Weights



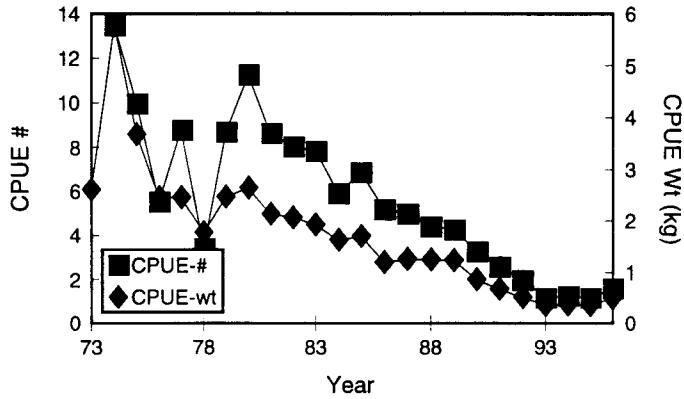
Other Recreational Landings



Other Recreational Mean Weights



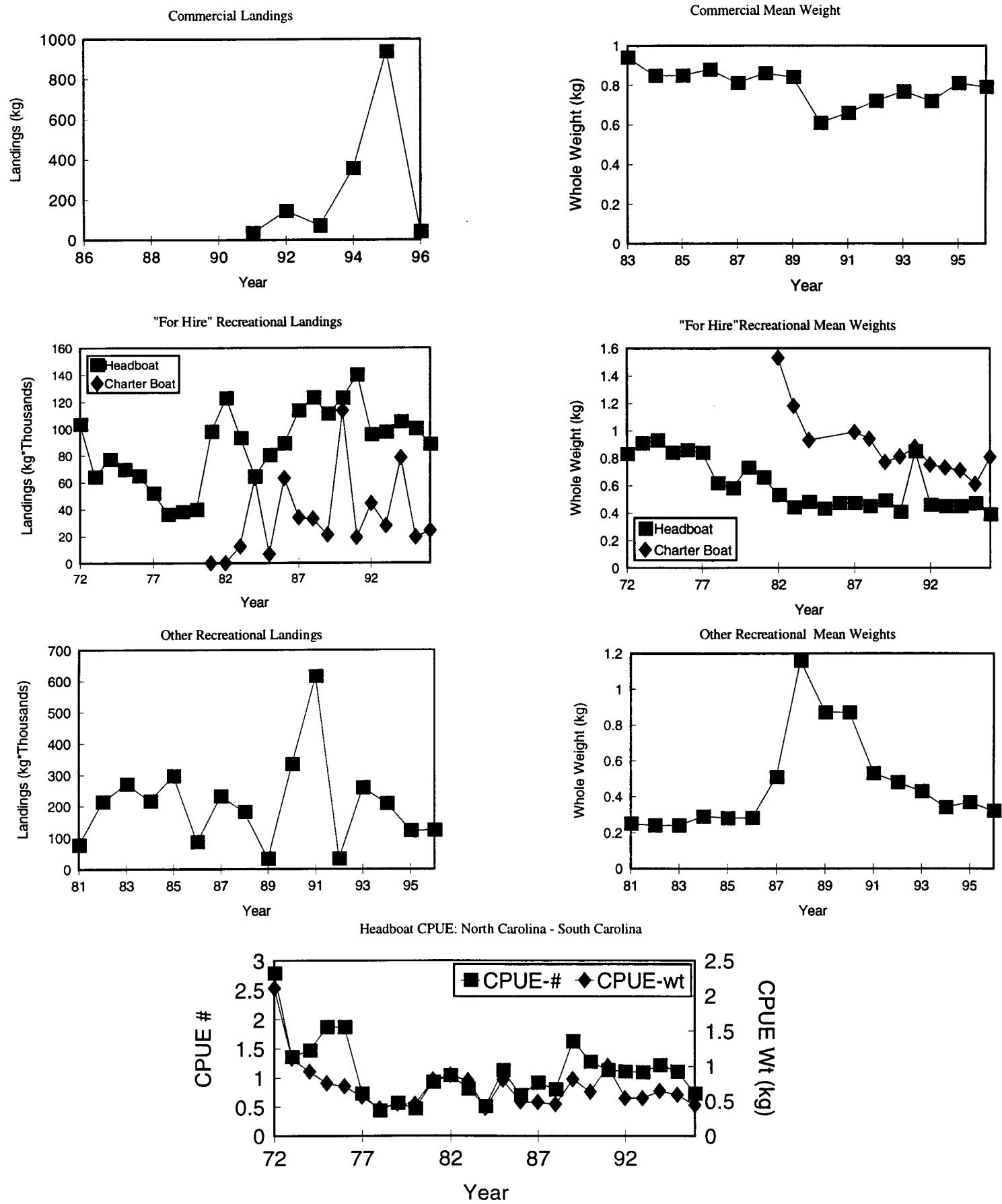
Headboat CPUE: North Carolina - North Florida



White Grunt Data (Landings, mean weights, and CPUE-Wt are in kg. Commercial landings do not include grunts unclassified.)

Year	Commercial			Headboat			Charter boat			Other Recreational		
	Landing s	Mean Wt	N	Landings	Mean Wt	N	CPUE-#	CPUE-Wt	Landings	Mean Wt	N	Mean Wt
72				103517	0.83	2109	2.78			2.11		
73				64235	0.91	1515	1.36			1.11		
74				77269	0.93	930	1.47			0.92		
75				69665	0.84	1053	1.87			0.75		
76				64852	0.86	1264	1.87			0.71		
77				52217	0.84	704	0.73			0.56		
78				36156	0.62	754	0.44			0.39		
79				38528	0.58	465	0.57			0.46		
80				39913	0.73	744	0.47			0.45		
81				98023	0.66	783	0.93			0.80		
82				123125	0.53	2306	1.04			0.87		
83				93426	0.44	3043	0.81			0.79		
84				64631	0.48	3151	0.51			0.40		
85				80687	0.43	3397	1.13			0.80		
86				89248	0.47	2761	0.70			0.49		
87				113641	0.47	3259	0.92			0.48		
88				123221	0.45	2611	0.80			0.45		
89				111116	0.49	2202	1.63			0.81		
90				122979	0.41	2234	1.28			0.63		
91	35	0.66	425	140284	0.85	2261	1.13	1.00	19174	0.88	4	232106
92	145	0.72	612	95762	0.46	1995	1.11	0.54	113438	0.81	57	181801
93	71	0.77	1132	97876	0.45	2608	1.09	0.54	32707	0.94	96	333243
94	358	0.72	541	105286	0.45	2512	1.22	0.64	27842	0.73	40	29650
95	939	0.81	477	100239	0.47	3398	1.11	0.59	19331	0.61	50	207984
96	40	0.79	641	88566	0.39	2633	0.73	0.44	14043	0.81	47	123752

White Grunt



Gray Triggerfish Data (Landings, mean weights, and CPUE-Wt are in kg. Commercial landings not included because of unclassified category.)

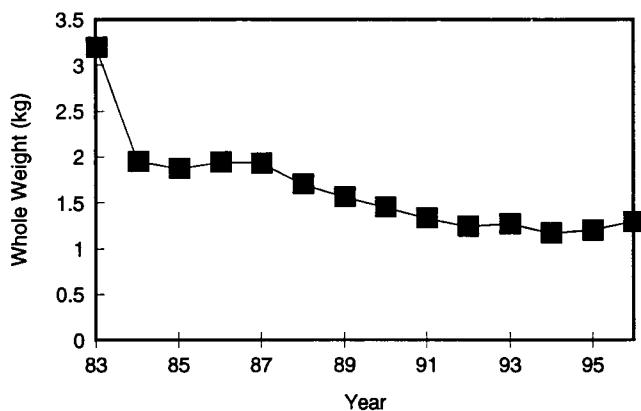
Year	Commercial			Headboat			Charter boat			Other Recreational				
	Landing s	Mean Wt	N	Landings	Mean Wt	N	CPUE-#	CPUE-Wt	Landings	Mean Wt	N	Landing s	Mean Wt	N
72				2.18	112									
73	29044	2.32	120	0.22	0.50									
74	52679	2.15	315	0.30	0.62									
75	44811	2.14	394	0.22	0.48									
76	33431	1.94	427	0.17	0.36									
77	37534	1.92	445	0.19	0.41									
78	29515	1.74	587	0.15	0.32									
79	32518	1.82	346	0.16	0.39									
80	26551	1.85	419	0.13	0.30									
81	37158	1.37	447	0.07	0.10								35343	1.46
82	44156	1.56	532	0.08	0.11								8814	1.21
83	3.20	10	37638	1.32	975	0.08	0.10	59	1.11	1	26387	0.41	8	
84	1.95	277	39676	1.41	849	0.07	0.10	2304	2.52	1	16966	0.50	10	
85	1.87	561	47437	1.32	961	0.11	0.14	148	0.87	1	25384	0.40	22	
86	1.94	230	36259	1.39	707	0.07	0.09	991	1.55	1	21071	0.92	18	
87	1.93	415	31874	1.41	549	0.07	0.07	317	1.55	2	13396	0.73	15	
88	1.70	239	31670	1.16	424	0.09	0.08	5648	1.61	4	35175	0.80	15	
89	1.56	328	38725	1.10	683	0.10	0.10	2285	1.46	17	114195	0.93	40	
90	1.45	653	52469	0.88	736	0.17	0.12	237811	1.20	14	95908	1.12	22	
91	1.33	644	72405	0.86	602	0.22	0.19	8745	1.26	11	98571	1.00	14	
92	1.24	500	77256	0.86	631	0.25	0.21	17557	1.18	30	107931	0.88	26	
93	1.27	1111	109479	0.95	752	0.31	0.32	263193	1.04	31	61517	0.72	52	
94	1.17	1474	86166	0.93	1018	0.26	0.25	340665	1.05	202	45636	1.01	42	
95	1.20	1345	82513	0.87	838	0.30	0.26	22103	0.89	88	24026	0.63	10	
96	1.29	258	74245	0.84	1013	0.31	0.26	28705	0.99	167	54710	0.92	61	

Gray Triggerfish

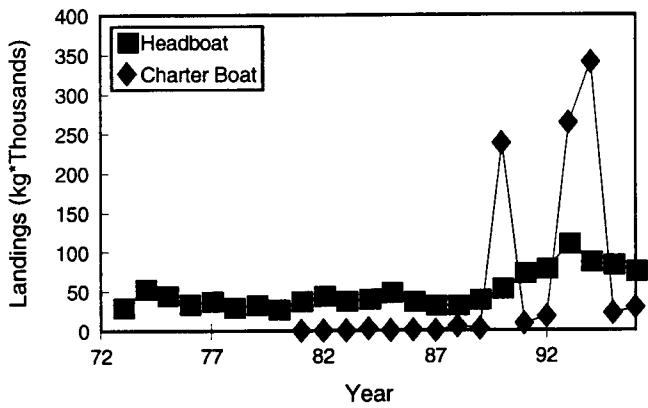
Commercial Landings

No data available

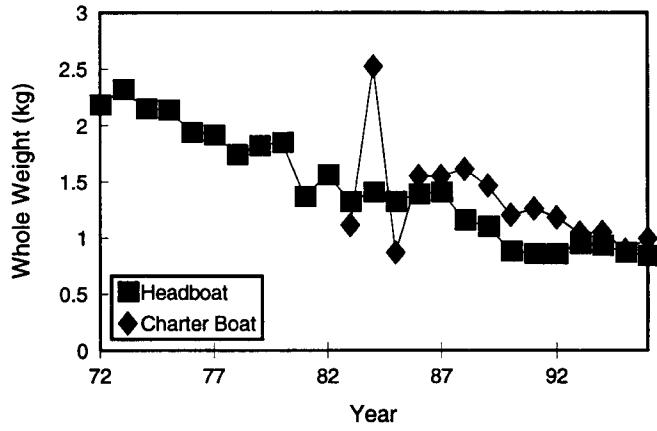
Commercial Mean Weight



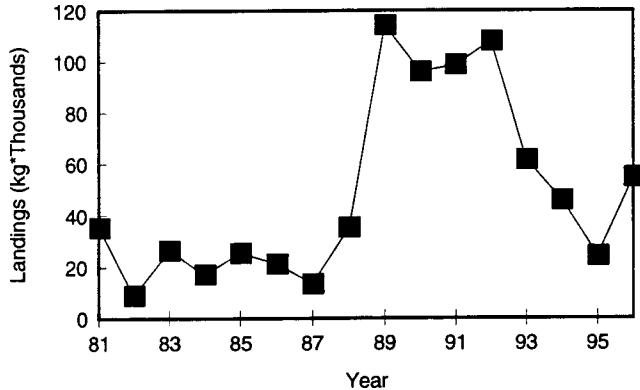
"For Hire" Recreational Landings



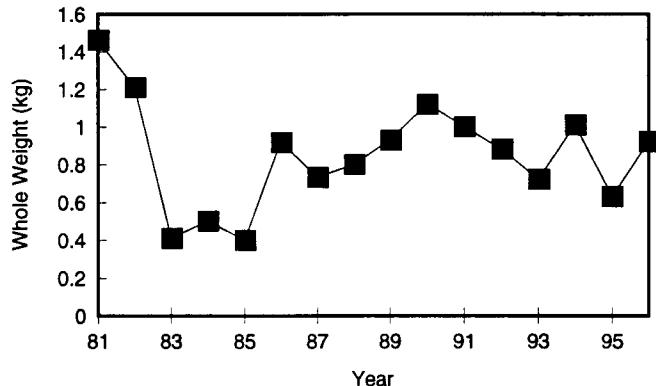
"For Hire" Recreational Mean Weights



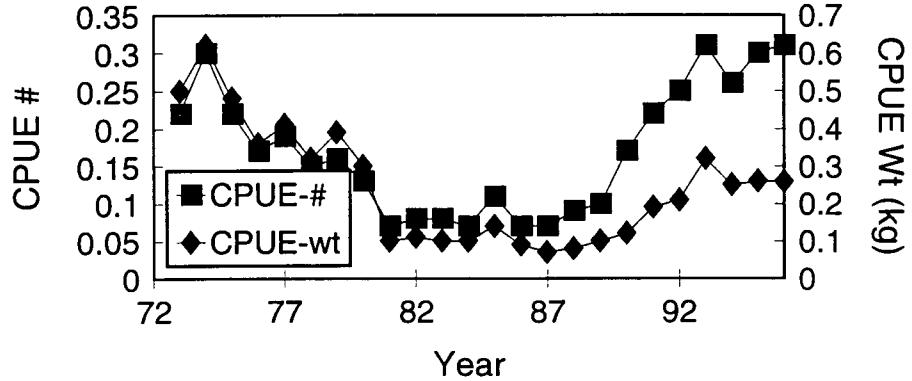
Other Recreational Landings



Other Recreational Mean Weights



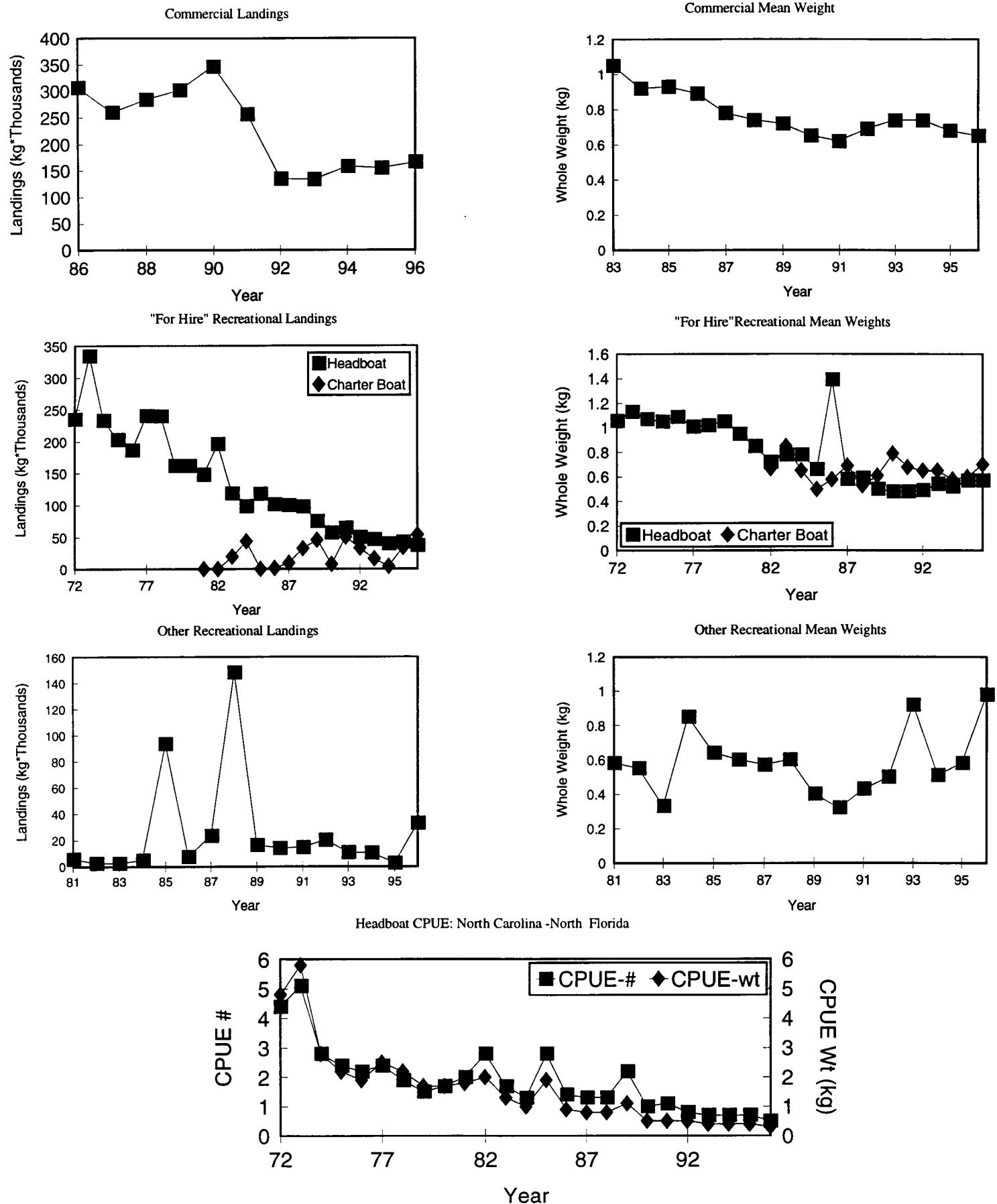
Headboat CPUE: North Carolina - South Florida



Red Porgy Data (Landings, mean weights, and CPUE-Wt are in kg.)

Year	Commercial			Headboat			Charter Boat			Other Recreational				
	Landings	Mean Wt	N	Landings	Mean Wt	N	CPUE #	CPUE-Wt	Landings	Mean Wt	N	Landing s	Mean Wt	N
72	235351	1.06	2115	4.4	4.8									
73	334125	1.13	2508	5.1	5.8									
74	233116	1.07	1798	2.8	2.8									
75	202542	1.05	1148	2.4	2.2									
76	186310	1.09	1240	2.2	1.9									
77	240348	1.01	1100	2.4	2.5									
78	239757	1.02	843	1.9	2.2									
79	162176	1.05	458	1.5	1.7									
80	161668	0.95	727	1.7	1.7									
81	147625	0.85	575	2.0	1.8	0						5789	0.58	8
82	195923	0.72	1246	2.8	2.0	0						2503	0.55	4
83	1.05	337	118592	0.78	1206	1.7	1.3	19158	0.85	19	2487	0.33	4	
84	0.92	3347	98446	0.78	1284	1.3	1.0	43250	0.65	24	4835	0.85	2	
85	0.93	3447	118106	0.66	967	2.8	1.9					93437	0.64	31
86	307283	0.89	3770	100737	1.39	1228	1.4	0.9	1284	0.58	8	7538	0.60	12
87	260159	0.78	3306	100006	0.58	1203	1.3	0.8	9574	0.69	23	23407	0.57	35
88	284672	0.74	1721	97764	0.59	811	1.3	0.8	32207	0.53	27	148055	0.60	27
89	302010	0.72	2035	74865	0.50	1511	2.2	1.1	45587	0.61	51	16277	0.40	29
90	347227	0.65	2463	56819	0.48	1312	1.0	0.5	7078	0.79	47	14016	0.32	10
91	2566559	0.62	2457	63874	0.48	649	1.1	0.5	50482	0.68	17	14741	0.43	28
92	134958	0.69	1384	49830	0.49	828	0.8	0.5	32513	0.65	77	20206	0.50	23
93	133897	0.74	1979	45824	0.54	1011	0.7	0.4	15797	0.65	43	10564	0.92	5
94	158678	0.74	1745	39721	0.52	780	0.7	0.4	4115	0.58	50	10503	0.51	8
95	155473	0.68	2260	42198	0.57	851	0.7	0.4	33755	0.60	54	2427	0.58	6
96	166084	0.65	2679	37294	0.57	868	0.5	0.3	53391	0.70	21	32952	0.98	11

Red Porgy

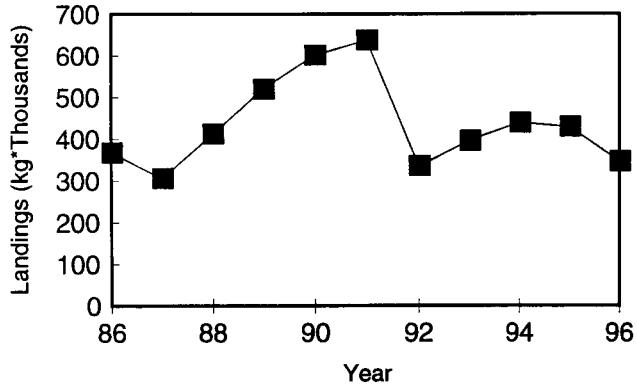


Vermilion Snapper Data (Landings, mean weights, and CPUE-Wt are in kg.)

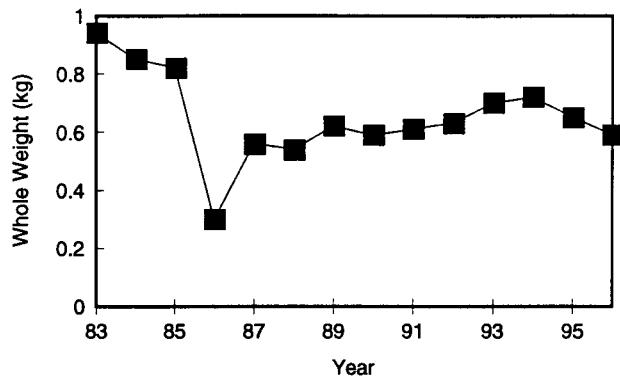
Year	Commercial			Headboat			Charter Boat			Other Recreational					
	Landings	Mean Wt	N	Landings	Mean Wt	N	CPUE-	CPUE-Wt	Landings	Mean Wt	N	Landings	Mean Wt	N	
72		48576	0.51	569	1.7	1.0									
73		67762	0.78	278	1.1	1.2									
74		47679	0.56	672	1.1	0.6									
75		74872	0.62	702	1.4	0.8									
76		115554	0.61	667	0.8	0.5									
77		69538	0.45	514	0.3	0.3									
78		131201	0.44	917	0.4	0.4									
79		97192	0.46	699	0.2	0.3									
80		90025	0.49	677	0.5	0.5									
81		104320	0.38	676	1.6	0.6					0				
82		154150	0.43	1397	2.0	0.9						8639	0.23	6	
83		0.94	391	133985	0.35	2280	1.8	0.7	96935	0.41	24	80523	0.48	13	
84		0.85	4921	111114	0.36	2316	1.5	0.5	5483	0.31	29	3466	0.10	1	
85		0.82	5996	168814	0.32	2994	2.8	0.9	4759	0.39	15	62931	0.40	6	
86		367342	0.63	8621	158448	0.31	3564	2.1	0.6	0		5109	0.18	20	
87		305520	0.56	8022	204999	0.29	3383	2.4	0.7	27891	0.41	15	26823	0.65	23
88		411435	0.54	6266	189892	0.29	2495	2.6	0.7	35048	0.55	83	26059	0.36	38
89		519911	0.62	5625	157189	0.24	4776	2.8	0.6	28586	0.26	33	19478	0.39	19
90		600253	0.59	6007	175439	0.23	5333	2.6	0.7	15828	0.63	38	38870	0.41	17
91		636444	0.61	10525	275691	0.53	4041	2.8	1.4	30213	0.49	24	34679	0.25	23
92		334510	0.63	6039	113216	0.29	2835	1.5	0.5	49421	0.83	117	6943	0.42	10
93		394686	0.70	8230	116665	0.32	3330	1.6	0.6	30585	0.39	60	11050	0.46	15
94		437910	0.72	7545	127754	0.31	5738	2.0	0.7	21354	0.56	75	7489	0.41	4
95		428182	0.65	9866	123314	0.33	4811	2.0	0.7	15506	0.37	75	4455	0.48	6
96		346217	0.59	5252	125332	0.35	3563	2.2	0.8	70871	0.53	16	594		

Vermilion Snapper

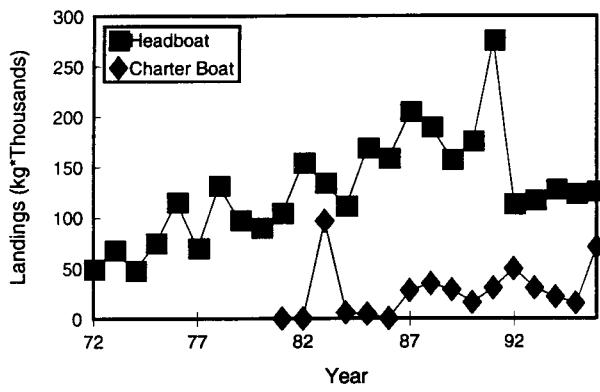
Commercial Landings



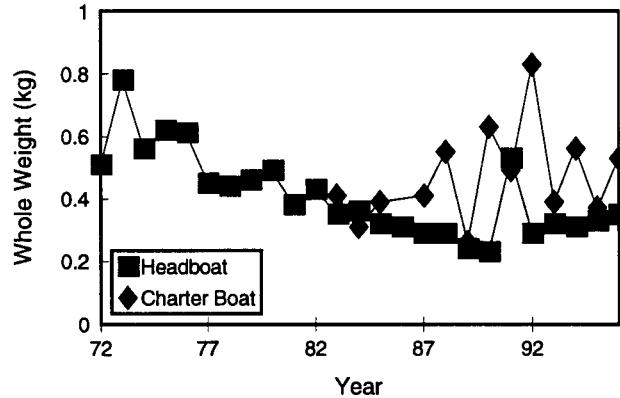
Commercial Mean Weight



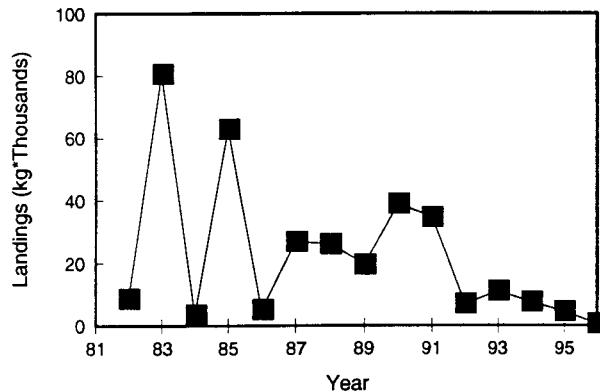
"For Hire" Recreational Landings



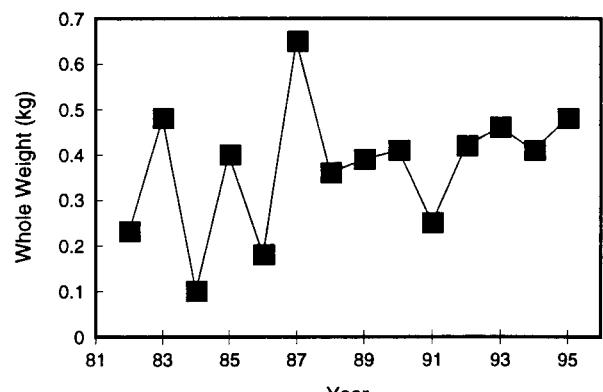
"For Hire" Recreational Mean Weights



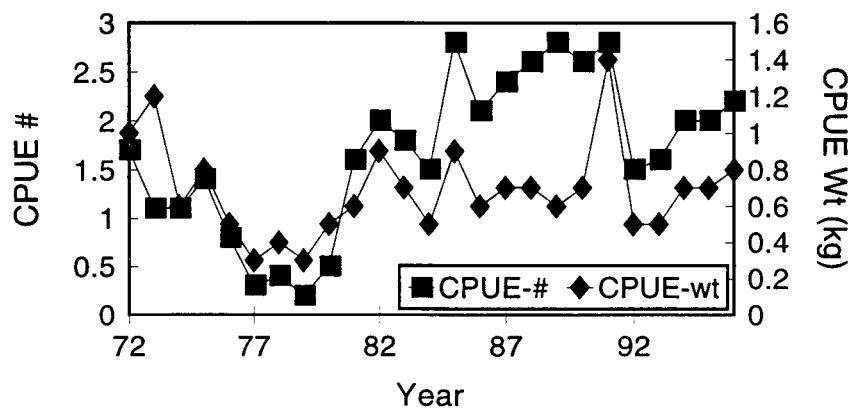
Other Recreational Landings



Other Recreational Mean Weights



Headboat CPUE: North Carolina - North Florida

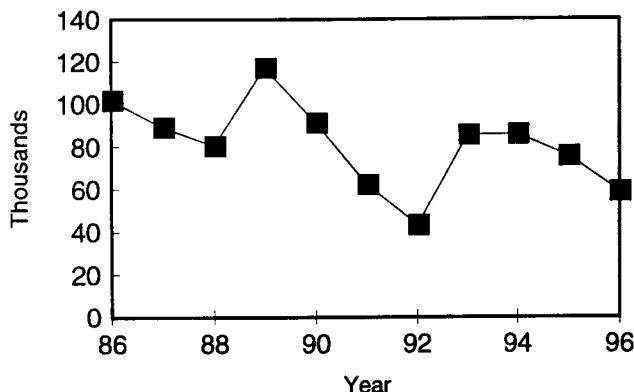


Red Snapper Data (Landings, mean weights, and CPUE-Wt are in kg.)

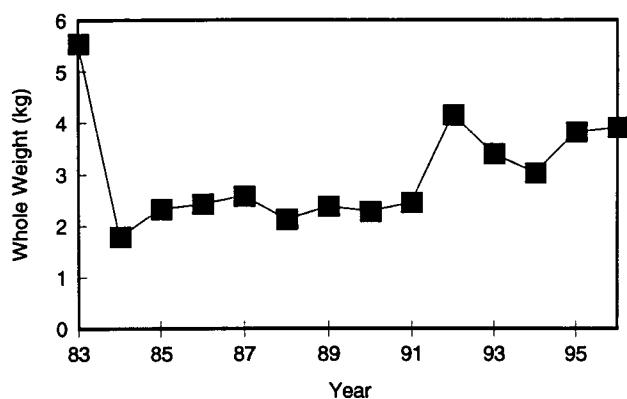
Year	Commercial			Headboat			Charter boat			Other Recreational				
	Landing s	Mean Wt	N	Landings	Mean Wt	N	CPUE#	CPUE-Wt	Landings	Mean Wt	N	Mean Wt	N	
72		18517	8.00	50	0.04	0.38								
73		26626	8.48	41	0.07	0.46								
74		13770	4.43	95	0.03	0.16								
75		15833	3.45	166	0.05	0.17								
76		102011	2.32	499	0.06	0.26								
77		85973	1.86	718	0.03	0.09								
78		75590	1.71	741	0.03	0.10								
79		81574	2.51	245	0.01	0.08								
80		32177	1.87	259	0.04	0.08								
81		52086	1.50	675	0.24	0.35								
82		44410	2.02	431	0.12	0.27	1018							
83	5.54	35	33527	1.23	947	0.17	0.19	1233	2.59	8	40038	1.10	13	
84	1.79	1073	36885	1.29	1261	0.16	0.19	32106	0.70	44	111714	0.76	41	
85	2.32	871	59840	1.17	1156	0.31	0.37	3830	1.91	5	460543	1.28	36	
86	101696	2.42	1124	24636	1.68	419	0.08	0.11	25451	0.18	206	83672	0.53	20
87	88984	2.58	1270	37076	1.39	303	0.11	0.16	28116	1.23	25	40615	0.83	39
88	80358	2.13	777	58928	1.66	196	0.12	0.20	42346	2.05	24	67085	0.50	67
89	117132	2.37	1201	32074	1.32	362	0.13	0.19	28186	1.62	21	93738	0.56	43
90	91254	2.28	847	29759	1.45	311	0.10	0.14	1419	0.61	14	60013	3.72	10
91	62198	2.45	971	32633	1.87	89	0.07	0.17	19954	2.03	14	44558	0.48	4
92	43130	4.15	543	13100	2.71	62	0.03	0.06	135325	2.10	10	145256	1.62	9
93	85352	3.40	1400	19352	2.60	194	0.04	0.10	21467	4.68	15	38857	2.06	8
94	85806	3.03	1191	19488	2.95	108	0.04	0.09	37991	3.43	35	37414	0.70	3
95	75364	3.82	1315	26039	3.09	131	0.05	0.15	24504	1.82	24	7604	4.83	3
96	88913	3.91	812	20972	3.36	78	0.04	0.15	11205	1.72	9	41958	2.22	6

Red Snapper

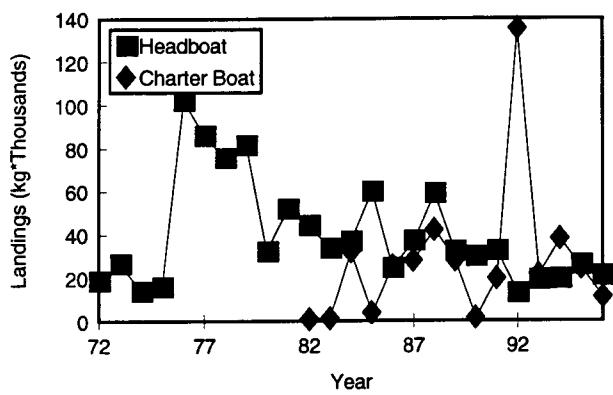
Commercial Landings



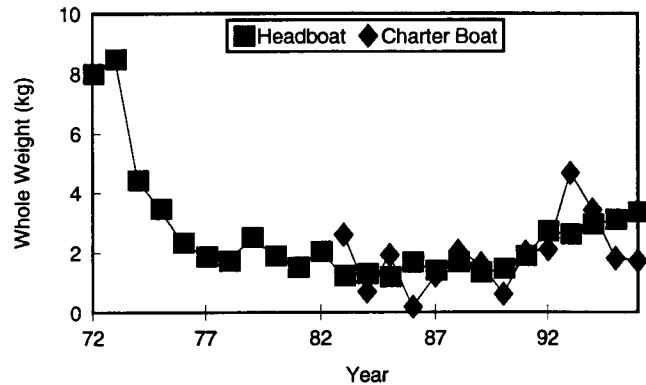
Commercial Mean Weight



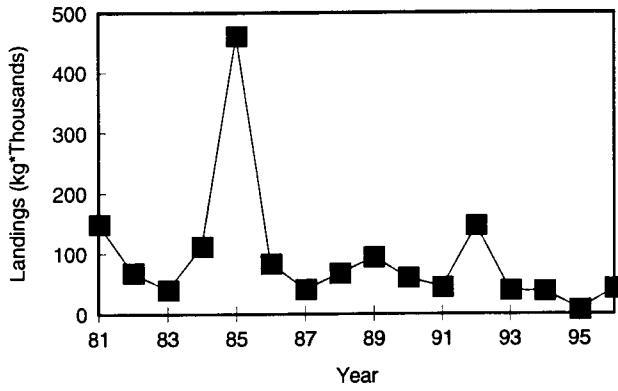
"For Hire" Recreational Landings



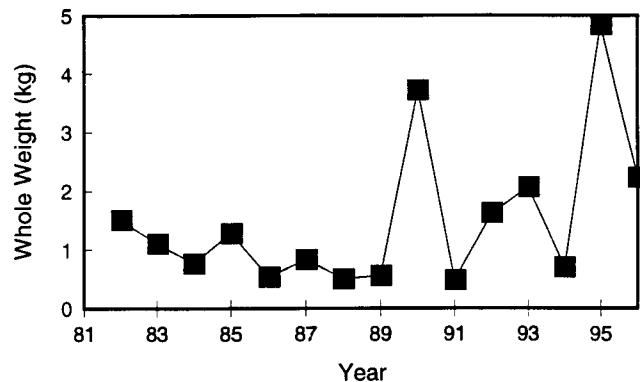
"For Hire" Recreational Mean Weights



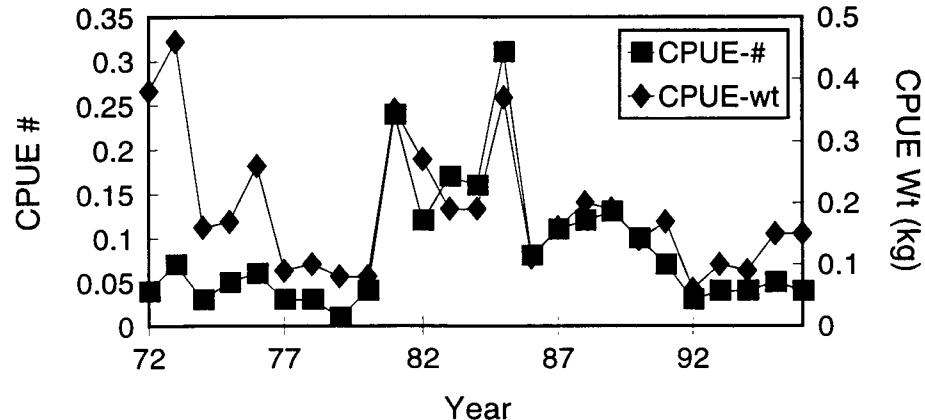
Other Recreational Landings



Other Recreational Mean Weights



Headboat CPUE: North Carolina - North Florida

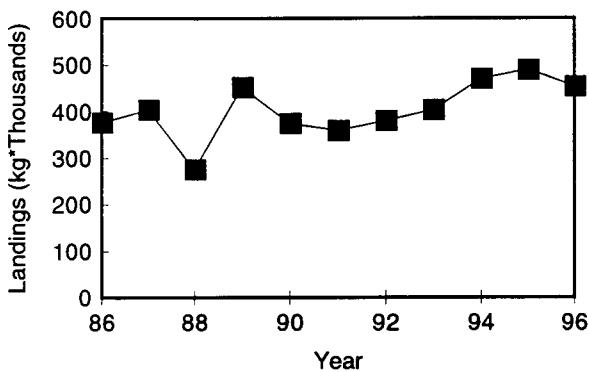


Gag Data (Landings, mean weights, and CPUE-Wt are in kg.)

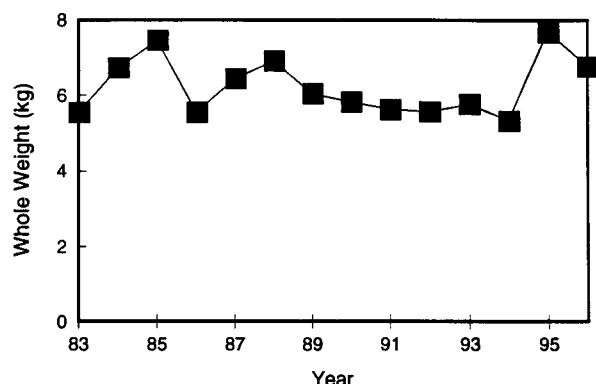
Year	Commercial			Headboat			Charter Boat			Other Recreational					
	Landings	Mean Wt	N	Landings	Mean Wt	N	CPUE-#	CPUE-Wt	s	Landing	Mean Wt	N	Landings	Mean Wt	N
72	54136	5.35	76	0.15	1.11										
73	85817	7.47	124	0.18	1.48										
74	65830	7.54	88	0.09	0.78										
75	33471	6.96	135	0.05	0.36										
76	26124	7.85	149	0.04	0.29										
77	26813	6.15	183	0.05	0.29										
78	18906	5.89	173	0.03	0.20										
79	30562	5.83	147	0.06	0.37										
80	19543	4.63	175	0.04	0.22										
81	67130	4.42	225	0.07	0.31	0							38724	0.83	9
82	58007	4.76	296	0.06	0.31	1063	1.10	1	10149	0.52	5				
83	5.55	116	59971	3.68	481	0.08	0.32	358219	2.20	2	46920	3.00	7		
84	6.72	3443	93522	4.93	713	0.09	0.43	30118	3.58	17	105841	3.12	12		
85	7.45	3738	71585	4.53	512	0.09	0.41	3739	3.00	5	58482	0.89	21		
86	375587	5.54	2412	60839	3.35	382	0.08	0.26	16611	4.75	2	3835	0.77	15	
87	403530	6.42	3463	84937	3.22	372	0.09	0.30	82972	2.63	24	170898	2.91	32	
88	275452	6.91	1932	91269	3.38	288	0.10	0.38	135881	3.33	33	76638	1.73	17	
89	452029	6.04	1794	78711	3.15	472	0.13	0.45	61410	3.46	30	133790	3.15	20	
90	374401	5.82	1329	62911	2.95	366	0.09	0.31	36969	2.88	65	130351	0.63	15	
91	359031	5.62	1780	51674	2.94	184	0.07	0.26	30385	3.92	21	72870	2.15	30	
92	380015	5.56	2354	56466	3.06	276	0.07	0.28	71019	4.13	75	146148	4.18	28	
93	403785	5.77	2430	55053	3.98	282	0.06	0.26	76530	4.07	44	147849	4.33	33	
94	469973	5.33	1741	43048	3.89	363	0.05	0.23	90232	4.47	65	141489	3.59	26	
95	489416	7.68	379	50439	5.29	2571	0.06	0.27	63730	3.98	52	82070	3.67	22	
96	452498	6.76	2097	30092	4.36	220	0.05	0.2	44465	7.32	29	96272	8.98	12	

Gag

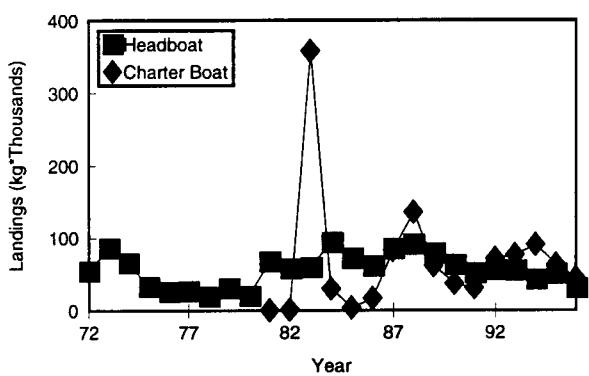
Commercial Landings



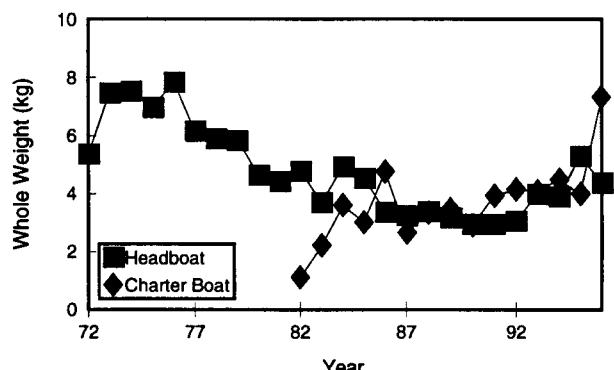
Commercial Mean Weight



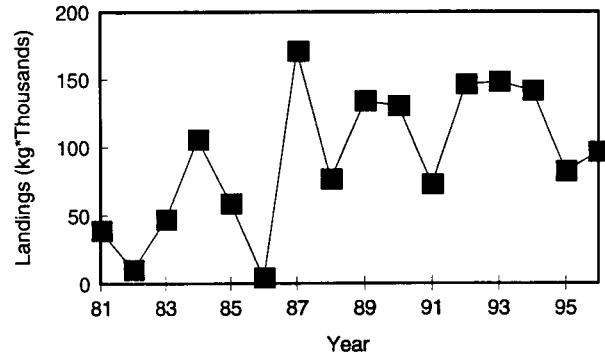
"For Hire" Recreational Landings



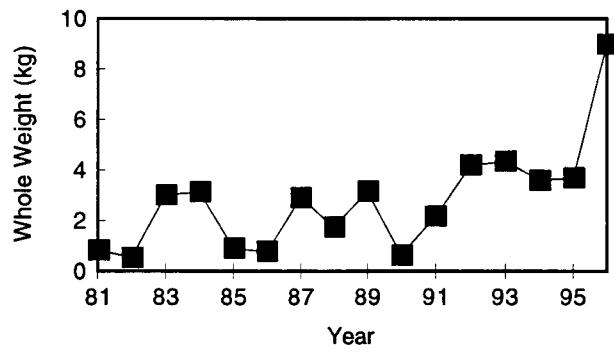
"For Hire" Recreational Mean Weights



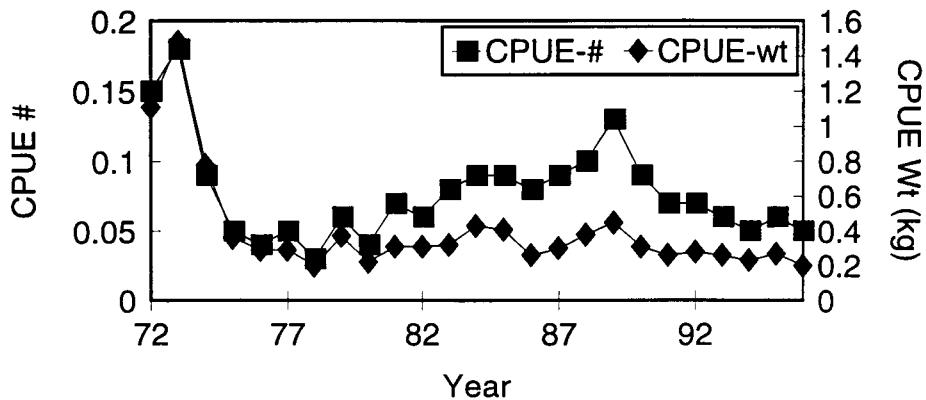
Other Recreational Landings



Other Recreational Mean Weights



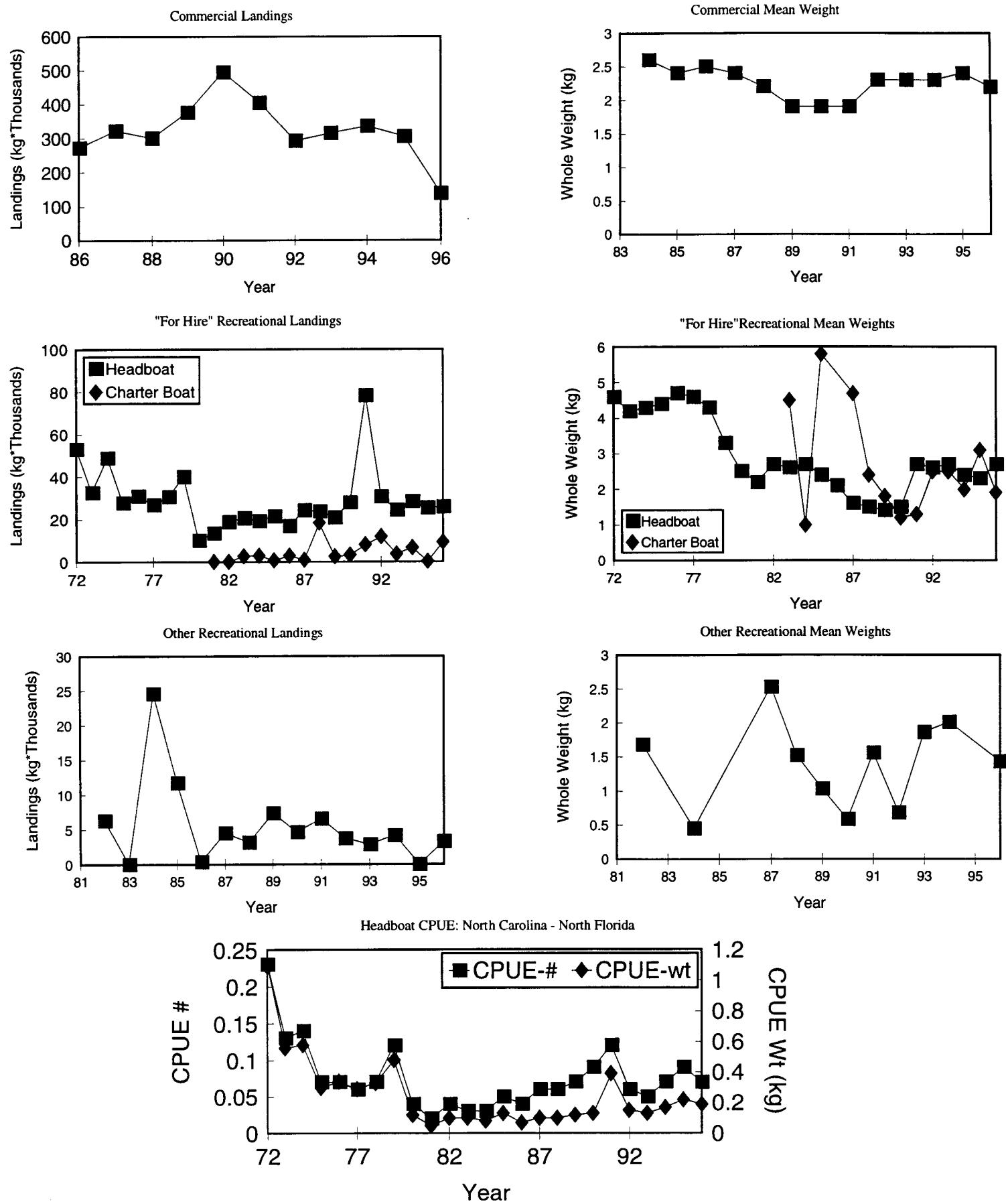
Headboat CPUE: North Carolina - North Florida



Scamp Data (Landings, mean weights, and CPUE-Wt are in kg.)

Year	Commercial			Headboat			Charter Boat			Other Recreational		
	Landing \$	Mean Wt	N	Landings	Mean Wt	N	CPUE #	CPUE-Wt	Landings	Mean Wt	N	Mean Wt
72		53140	4.6	375	0.23	1.09						
73		32671	4.2	363	0.13	0.56						
74		48966	4.3	373	0.14	0.58						
75		27807	4.4	483	0.07	0.30						
76		31130	4.7	863	0.07	0.34						
77		36832	4.6	426	0.06	0.29						
78		30622	4.3	302	0.07	0.33						
79		40022	3.3	170	0.12	0.48						
80		10231	2.5	158	0.04	0.12						
81		13485	2.2	109	0.02	0.05						
82		18838	2.7	253	0.04	0.10						
83		20566	2.6	434	0.03	0.10	2678	4.5	11			
84		2.6	1275	19240	2.7	454	0.03	0.08	2873	1.0	2	24610
85		2.4	1722	21515	2.4	433	0.05	0.13	619	5.8	1	11721
86		273057	2.5	2269	16733	2.1	411	0.04	0.07	2843		356
87		322152	2.4	4049	24189	1.6	521	0.06	0.10	803	4.7	6
88		301017	2.2	2887	23590	1.5	446	0.06	0.10	18263	2.4	40
89		377302	1.9	3462	20836	1.4	340	0.07	0.12	2335	1.8	23
90		495398	1.9	3424	27920	1.5	317	0.09	0.13	3155	1.2	45
91		406349	1.9	4142	78234	2.7	388	0.12	0.39	8039	1.3	15
92		293276	2.3	1798	30622	2.6	228	0.06	0.15	11780	2.5	40
93		316429	2.3	2409	24421	2.7	322	0.05	0.13	3686	2.5	30
94		336478	2.3	1957	28457	2.4	332	0.07	0.17	6545	2.0	40
95		305257	2.4	2990	35522	2.3	364	0.09	0.22	126	3.1	2
96		138231	2.2	2786	25746	2.7	265	0.07	0.19	9350	1.9	8
											3254	1.43

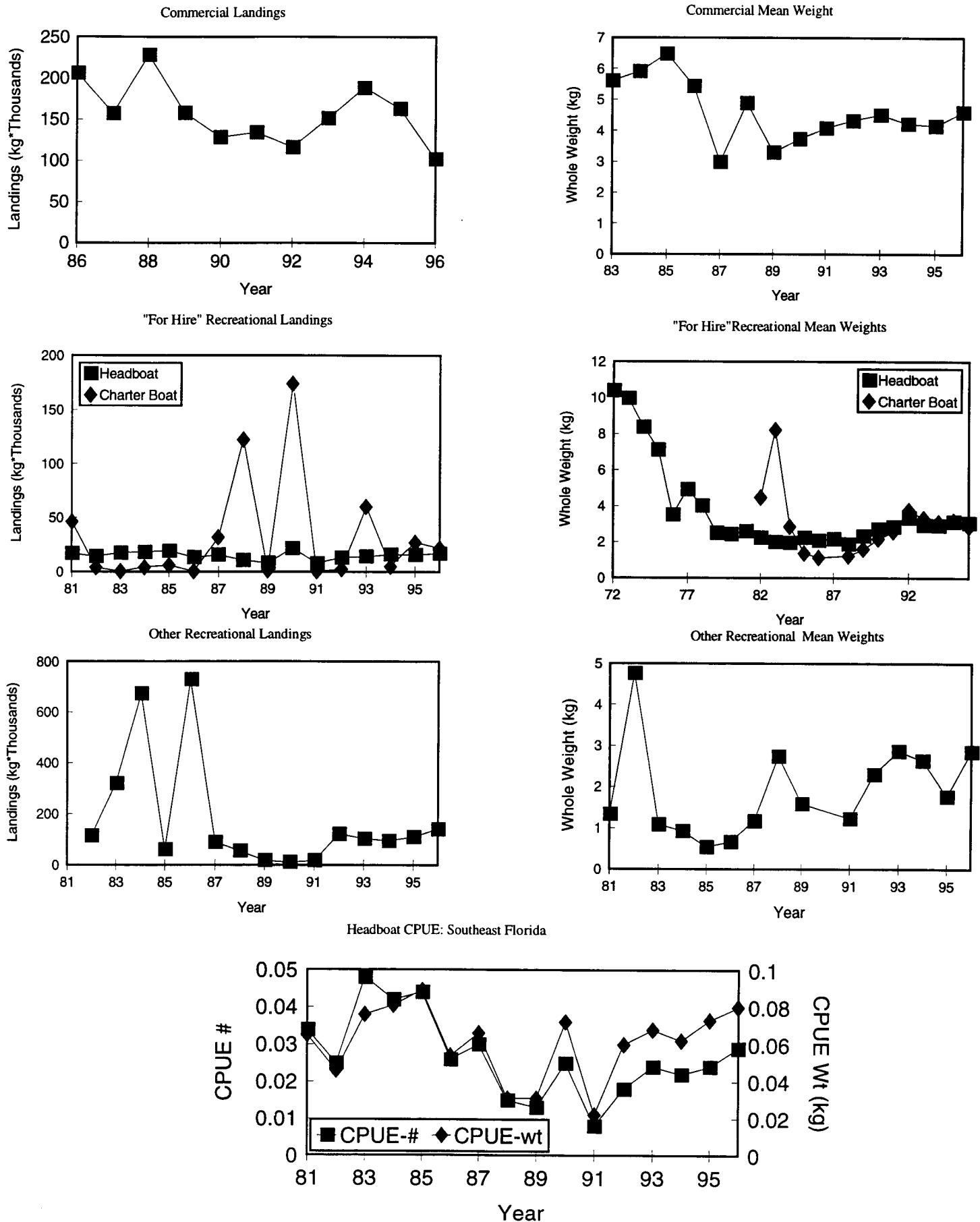
Scamp



Red Grouper Data (Landings, mean weights, and CPUE-Wt are in kg.)

Year	Commercial			Headboat			Charter boat			Other Recreational				
	Landing \$	Mean Wt	N	Landings	Mean Wt	N	CPUE-#	CPUE-Wt	Landings	Mean Wt	N	Landing \$	Mean Wt	N
72				10.40	12									
73				9.98	10									
74				8.39	15									
75				7.13	27									
76				3.51	64									
77				4.91	111									
78				4.01	96									
79				2.51	157									
80				2.45	175									
81	16880	2.60	223	0.034	0.065	46148						1.33	12	
82	14279	2.24	274	0.025	0.046	4061	4.45	1	114878	4.76	5			
83	5.60	79	17648	2.00	0.048	0.076	316	8.21	1	319477	1.08	6		
84	5.91	216	18361	1.95	0.042	0.081	4258	2.83	2	671848	0.92	12		
85	6.48	208	19627	2.25	0.044	0.089	5974	1.37	5	59453	0.54	1		
86	205849	5.43	119	13314	2.08	0.026	0.054	359	1.12	1	728030	0.66	13	
87	157218	2.98	465	15702	2.17	283	0.030	0.066	31673			88861	1.17	14
88	228058	4.89	446	10615	1.90	211	0.015	0.031	122332	1.22	9	54308	2.74	6
89	157754	3.29	525	8126	2.35	242	0.013	0.031	1264	1.59	15	17263	1.58	3
90	128126	3.72	987	21733	2.72	184	0.025	0.072	173953	2.18	4	10719		
91	134258	4.08	713	7777	2.85	64	0.008	0.022	388	2.57	3	17104	1.23	3
92	115960	4.32	322	13294	3.34	79	0.018	0.060	2330	3.74	8	121856	2.30	7
93	151537	4.51	687	14095	2.93	107	0.024	0.068	60205	3.29	11	102681	2.86	15
94	188432	4.21	500	16099	2.91	133	0.022	0.062	5006	3.09	17	94380	2.63	4
95	163022	4.15	497	16011	3.13	189	0.024	0.073	27249	3.17	7	109384	1.76	6
96	101660	4.59	347	16853	3.05	207	0.029	0.080	21796	2.84	8	140101	2.85	13

Red Grouper

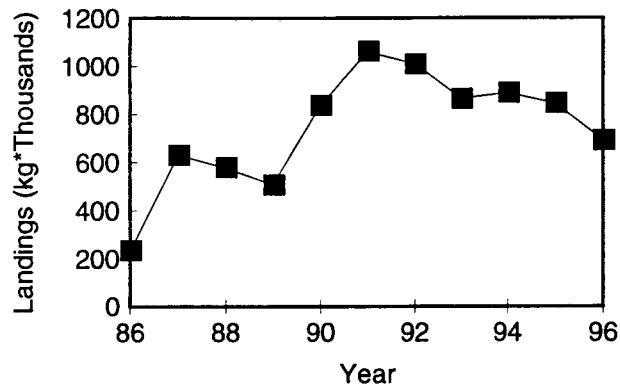


Greater Amberjack Data (Landings, meand weights, and CPUE-Wt are in kg).

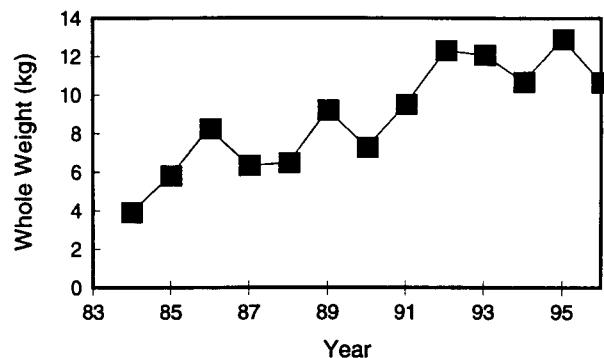
Year	Commercial			Headboat			Charter Boat			Other Recreational			
	Landings	Mean Wt	N	Landings	Mean Wt	N	CPUE-#	CPUE-Wt	Landings	Mean Wt	N	Mean Wt	
72				0.77	1								
73				7.96	16								
74				7.13	22								
75				9.58	19								
76				9.67	50								
77				5.21	39								
78				10.42	92								
79				4.97	115								
80				6.81	52								
81	71631	4.46	108	0.05	0.20	148667	15.63	.6	459631	7.10	2		
82	118594	5.32	48	0.07	0.31	3914	14.55	2	231962	10.91	13		
83	35.49	1	5423	3.34	161	0.05	0.15	35327	7.91	7	43979	8.70	
84	3.90	1	113345	6.45	151	0.05	0.30	181257	11.55	34	154952	14.66	
85	5.81	24	51398	3.95	165	0.03	0.15	179373	10.62	16	396966	7.77	
86	232878	8.26	22	53728	4.38	168	0.03	0.13	355806	10.97	34	899836	13.31
87	629073	6.35	50	94986	5.01	186	0.04	0.21	307662	12.78	48	224838	12.49
88	577291	6.47	61	76431	7.85	86	0.03	0.19	397668	10.54	30	445690	12.97
89	506944	9.21	29	44158	4.93	191	0.03	0.12	314312	13.20	62	423073	15.27
90	835765	7.28	53	47798	6.26	119	0.02	0.11	206767	8.64	27	282419	6.66
91	1060147	9.51	137	65088	7.13	74	0.02	0.17	413312	10.12	35	153309	4.63
92	1007593	12.31	244	71255	6.32	130	0.02	0.19	229485	10.43	38	315746	7.44
93	863930	12.07	812	71200	8.33	121	0.02	0.21	260519	11.60	59	130720	10.89
94	888360	10.69	412	54693	7.43	124	0.02	0.16	353272	10.24	93	159359	6.29
95	844016	12.91	319	35784	7.65	113	0.01	0.11	311588	11.36	48	83893	10.18
96	691348	10.65	181	42036	8.13	76	0.02	0.15	273664	12.65	67	226450	11.58

Greater Amberjack

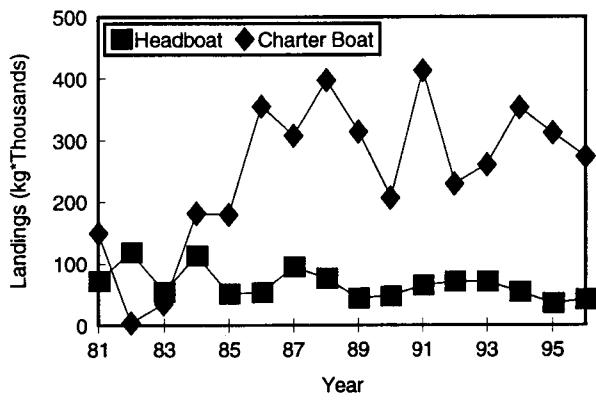
Commercial Landings



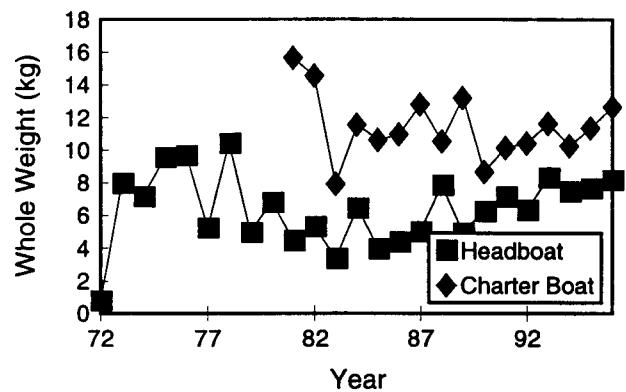
Commercial Mean Weight



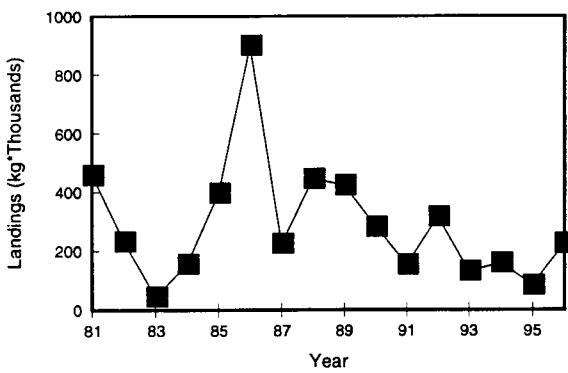
"For Hire" Recreational Landings



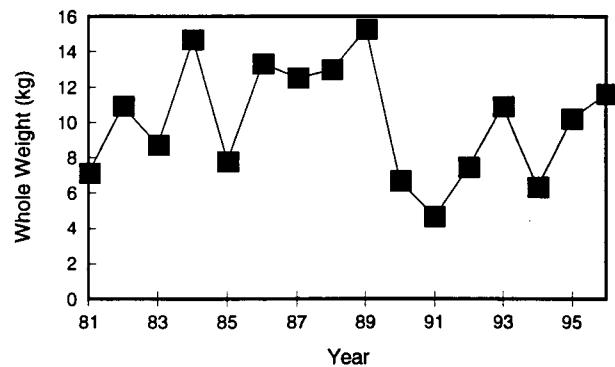
"For Hire" Recreational Mean Weights



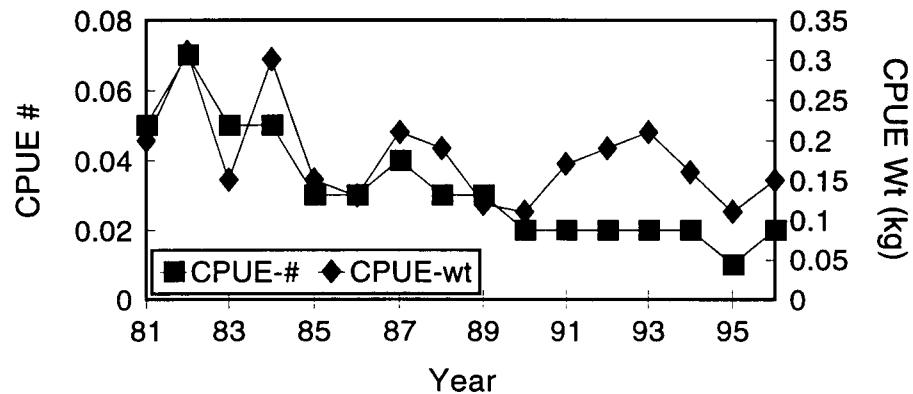
Other Recreational Landings



Other Recreational Mean Weights



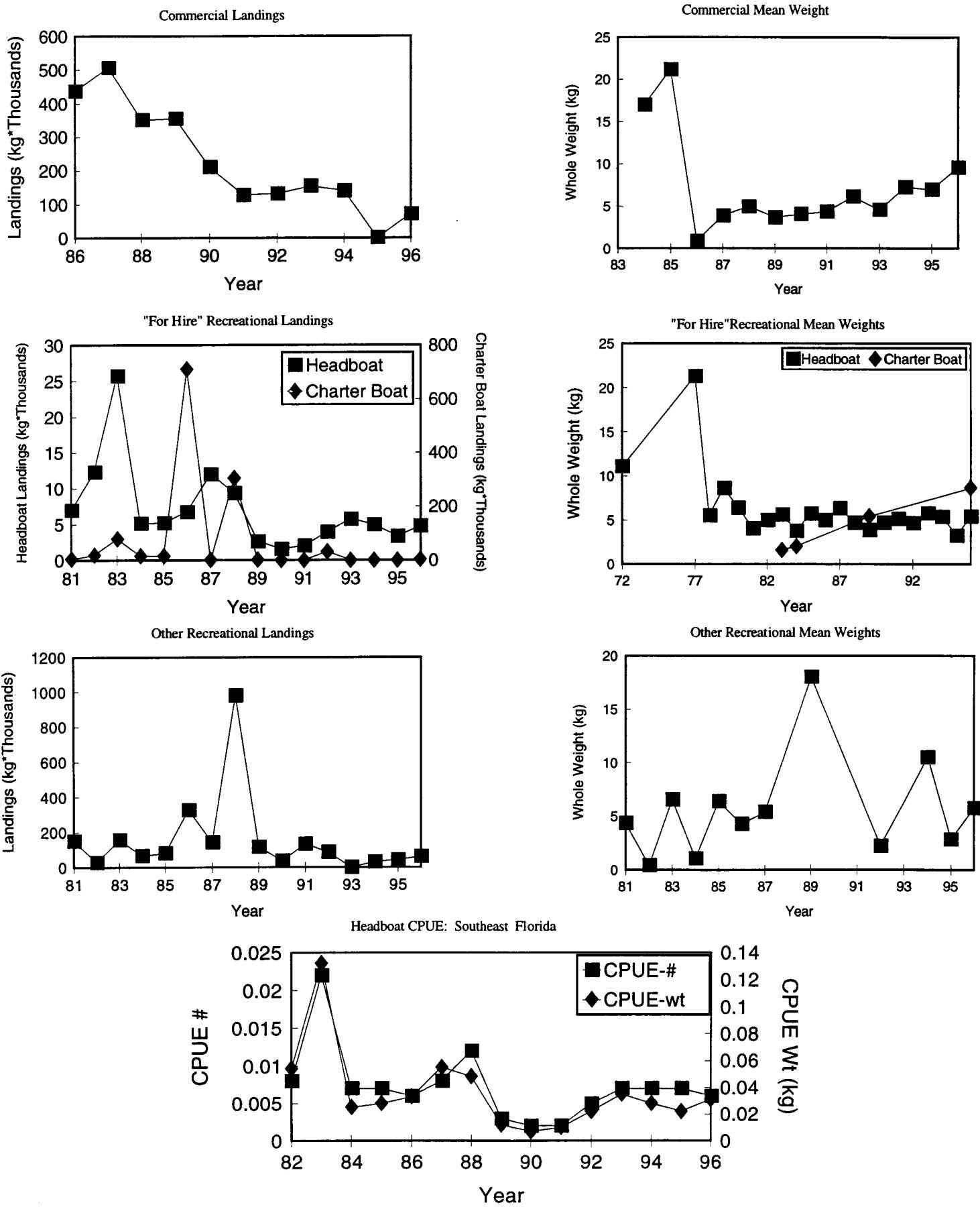
Headboat CPUE: North Carolina -South Florida



Black Grouper Data (Landings, mean weights, and CPUE-Wt are in kg.)

Year	Commercial			Headboat			Charter boat			Other Recreational				
	Landing s	Mean Wt	N	Landings	Mean Wt	N	CPUE#	CPUE-Wt	Landings	Mean Wt	N s	Landing Mean Wt	N	
72				11.07	4									
73														
74														
75														
76														
77	21.34	2												
78	5.55	6												
79	8.65	24												
80	6.43	43												
81	6981	4.09	67				3920			150254	4.35	10		
82	12295	5.01	42	0.008	0.054	18842				27056	.42	3		
83	25736	5.65	34	0.022	0.132	79444	1.59	8	156028	6.55	4			
84	17.01	1	5120	3.80	48	0.007	0.025	15427	2.02	6	65755	1.05	3	
85	21.17	4	5202	5.71	59	0.007	0.028	15318			79607	6.38	3	
86	436756	0.89	3	6774	4.98	54	0.006	0.033	711021			326505	4.26	8
87	505425	3.87	135	12018	6.37	28	0.008	0.055	803			141577	5.38	6
88	350125	4.96	274	9353	4.69	17	0.012	0.048	305090			980737		
89	354232	3.68	191	2659	3.91	20	0.003	0.012	940	5.40	2	115285	18.00	1
90	210440	4.06	312	1547	4.70	18	0.002	0.007	0			36833		
91	127947	4.36	77	2025	5.13	10	0.002	0.010	0			133037		
92	131724	6.16	89	3959	4.64	11	0.005	0.022	31203			84910	2.23	1
93	154386	4.57	127	5760	5.77	17	0.007	0.035	0			30072	10.49	1
94	140692	7.32	43	4966	5.41	20	0.007	0.028	0			42026	2.84	8
95	833	6.97	8	3362	3.25	14	0.007	0.022	0					
96	71455	9.62	17	4785	5.41	15	0.006	0.031	2746	8.65	2	61023	5.78	17

Black Grouper

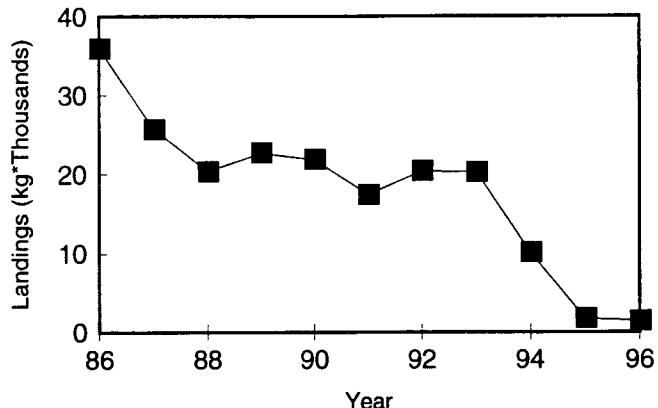


Speckled Hind Data (Landings, mean weights, and CPUE-Wt are in kg.)

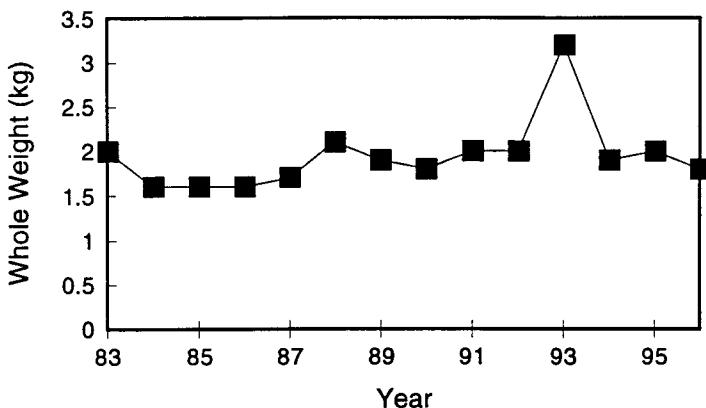
Year	Commercial			Headboat			Charter boat			Other Recreational				
	Landing \$	Mean Wt	N	Landings	Mean Wt	N	CPUE-#	CPUE-Wt	Landings	Mean Wt	N	Landings \$	Mean Wt	N
72		18330	4.28	141	0.090			0.374						
73		27618	3.59	271	0.141			0.477						
74		17980	3.78	183	0.058			0.213						
75		12022	3.60	199	0.033			0.130						
76		11195	4.10	111	0.028			0.122						
77		6722	2.69	149	0.027			0.073						
78		4104	2.34	125	0.019			0.044						
79		5843	2.77	28	0.020			0.070						
80		3099	2.61	30	0.012			0.035						
81		1265	1.49	14	0.006			0.010						
82		4963	2.07	41	0.022			0.049						
83		2.0	54	3820	1.87			0.024						
84		1.6	552	1660	1.05			0.014						
85		1.6	1023	4342	1.40			0.045						
86		35890	1.6	996	3312			0.024						
87		25674	1.7	1212	3088	1.31		0.017						
88		20342	2.1	980	3761	1.79		0.014						
89		22638	1.9	986	1475	1.67		0.012						
90		21814	1.8	578	520	0.80		0.006						
91		17384	2.0	481	735	0.50		0.003						
92		20385	2.0	350	570	0.87		0.003						
93		20272	3.2	248	254	0.75		0.002						
94		10042	1.9	157	226	0.95		0.002						
95		1691	2.0	15	406	1.92		0.004						
96		1417	1.8	10	182	0.97		0.001						
								2335	1.57	1	474	1.65	1	

Speckled Hind

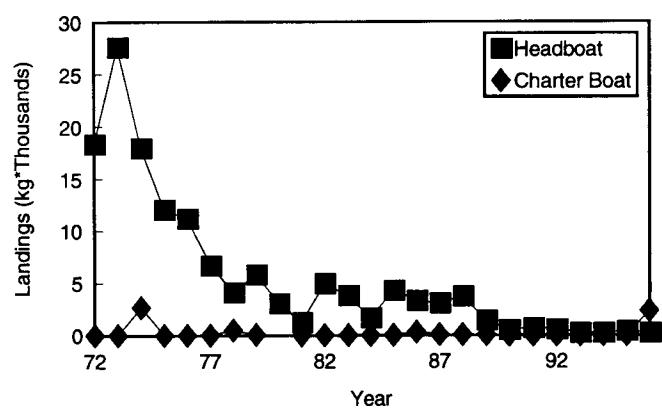
Commercial Landings



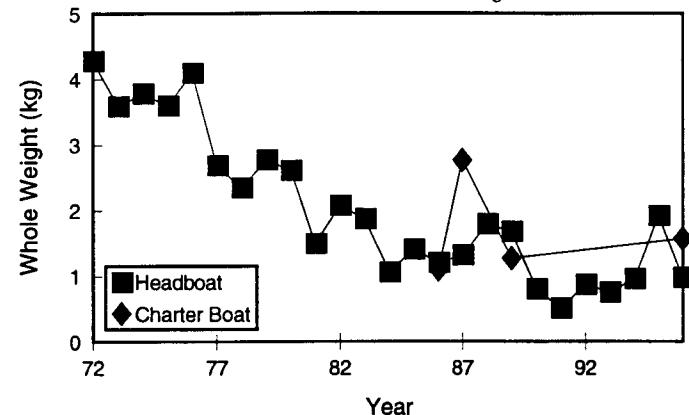
Commercial Mean Weight



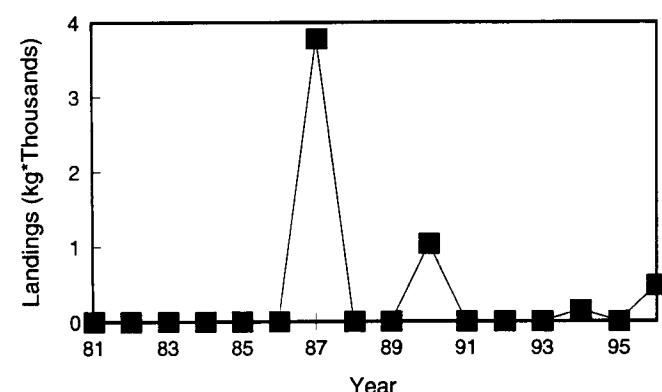
"For Hire" Recreational Landings



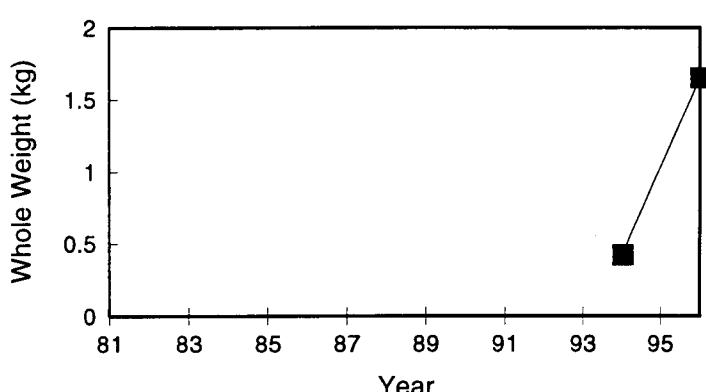
"For Hire" Recreational Mean Weights



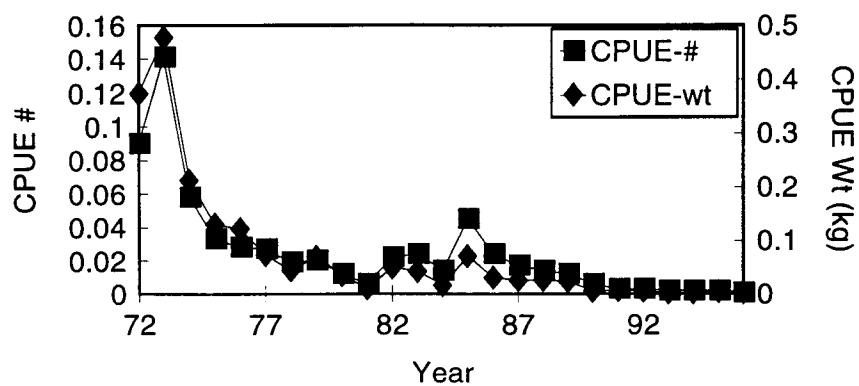
Other Recreational Landings



Other Recreational Mean Weights



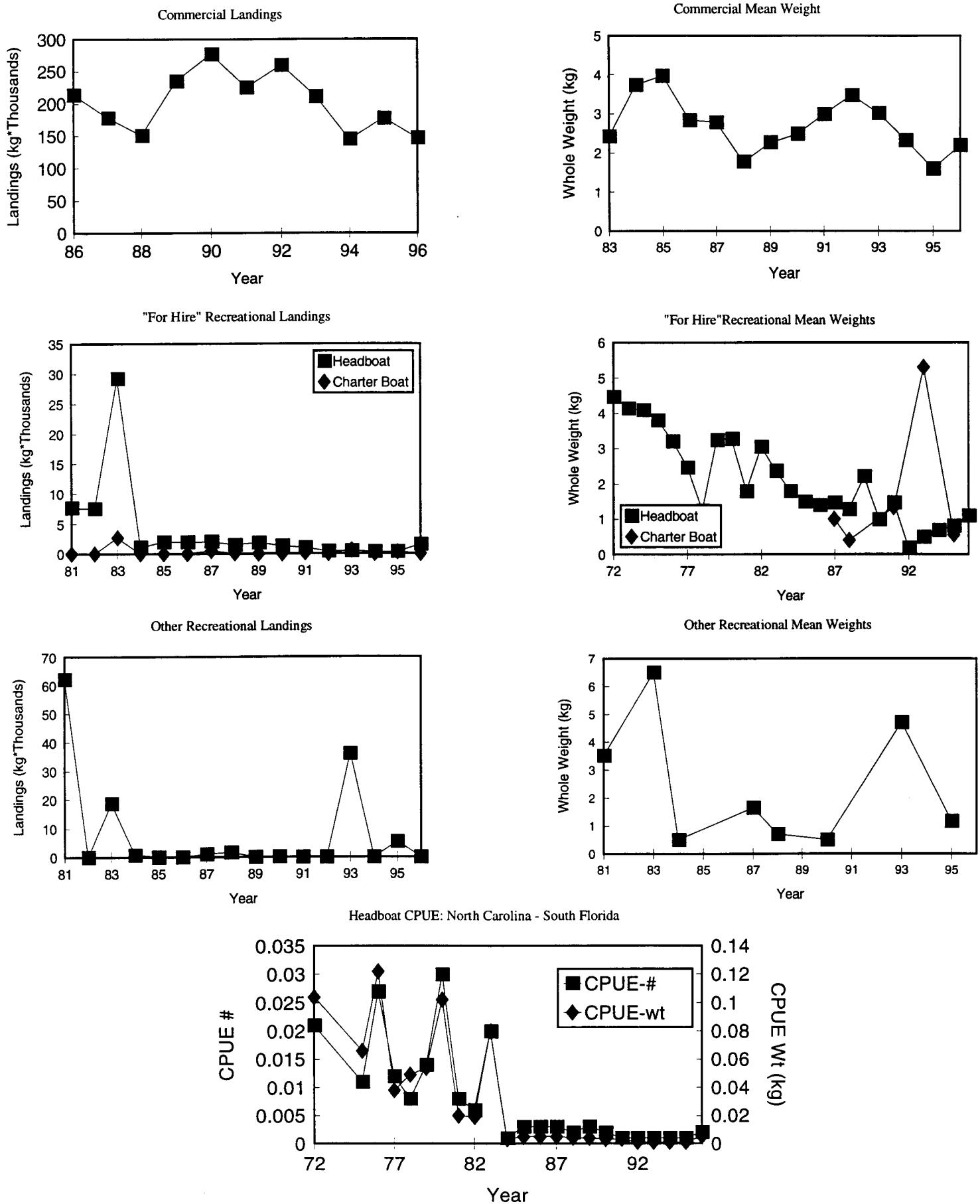
Headboat CPUE: North Carolina - South Carolina



Snowy Grouper Data (Landings, mean weights, and CPUE-Wt are in kg.)

Year	Commercial			Headboat			Charter boat			Other Recreational			
	Landing s	Mean Wt	N	Landings	Mean Wt	N	CPUE-#	CPUE-Wt	Landings	Mean Wt	N	Mean Wt	N
72				4.47	38	0.021		0.104					
73				4.14	27								
74				4.09	116								
75				3.81	104	0.011		0.066					
76				3.20	115	0.027		0.122					
77				2.46	62	0.012		0.038					
78				1.24	25	0.008		0.049					
79				3.24	25	0.014		0.054					
80				3.28	29	0.030		0.102					
81				7647	1.79	32	0.008	0.020	0			62117	3.52
82				7520	3.05	11	0.006	0.019	0			0	
83				2.42	95	29147	2.37	33	0.024	0.080			
84				3.73	1735	1100	1.79	6	0.001	0.003			
85				3.97	3058	1962	1.49	38	0.003	0.005			
86				2.84	2863	1919	1.39	46	0.003	0.005			
87				177876	2.78	1807	2002	1.47	20	0.003	0.005	497	1.00
88				151069	1.77	1209	1487	1.27	23	0.002	0.004	45	0.40
89				234473	2.26	1605	1827	2.21	51	0.003	0.004	0	
90				276645	2.48	2394	1291	0.99	6	0.002	0.003	0	
91				224907	2.99	2715	991	1.46	3	0.001	0.003	129	1.33
92				259678	3.47	4628	397	0.18	2	0.001	0.001	0	
93				210905	3.01	7110	493	0.50	7	0.001	0.001	652	5.30
94				144504	2.32	2689	331	0.69	16	0.001	0.001	0	0
95				177039	1.59	5558	330	0.81	11	0.001	0.001	289	0.55
96				146572	2.19	2050	1552	1.09	18	0.002	0.005	0	0

Snowy Grouper

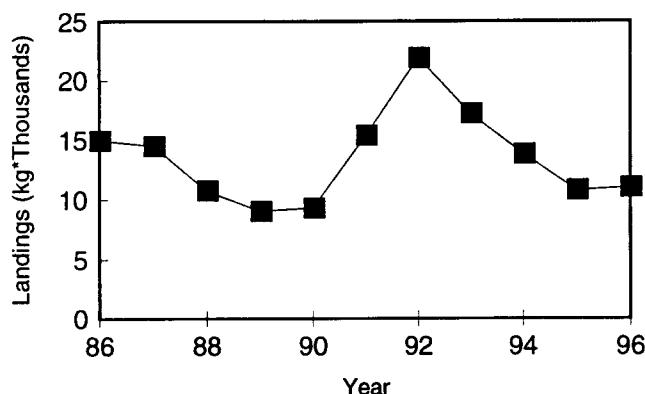


Yellowedge Grouper Data (Landings, mean weights, and CPUE-Wt are in kg.)

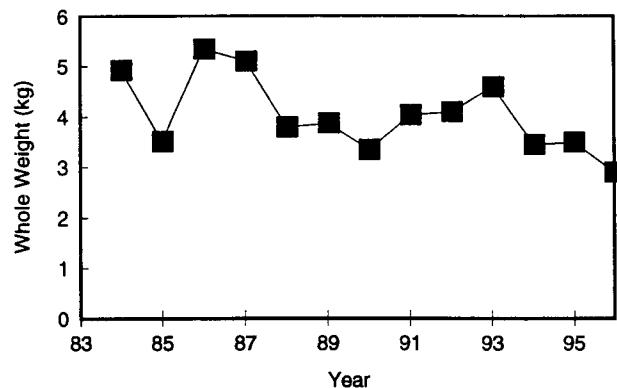
Year	Commercial			Headboat			Charter Boat			Other Recreational		
	Landings	Mean Wt	N	Landings	Mean Wt	N	Landings	Mean Wt	N	Landings	Mean Wt	N
72				7.89	7							
73				4.99	2							
74				7.08	5							
75				4.14	17							
76				1.95	18							
77				2.71	3							
78				7.95	3							
79				8.63	5							
80				3.08	2							
81				957	0.75	3		0			0	
82				599	1.75	1		0			0	
83				1381	3.11	5		0			0	
84				4.92	47	282	1.02	5		0	0	
85				3.51	102	12		0			0	
86	14982	5.34	387		43							
87	14461	5.10	102		436	4.50	1		0			
88	10707	3.79	97		16	1.20	1		0			
89	9028	3.86	43		43	3.34	2		0			
90	9287	3.34	107		37				0		0	
91	15379	4.03	192		42				0		0	
92	21920	4.09	787		19				0		0	
93	17190	4.59	756		52				0		0	
94	13806	3.45	135		118				0		0	
95	10775	3.49	94		113	1.29	1		0		0	
96	11045	2.90	98		233				0		0	

Yellowedge Grouper

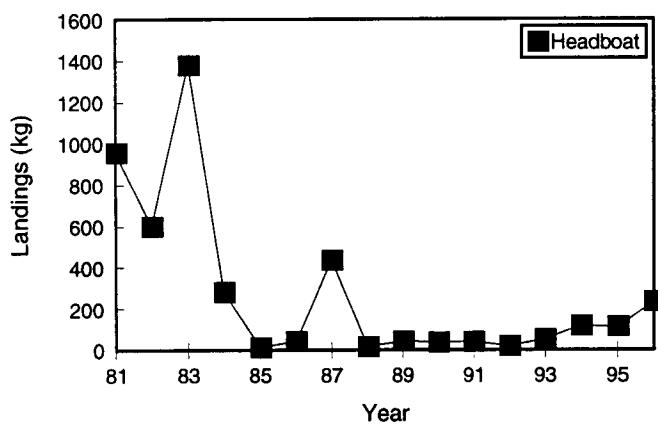
Commercial Landings



Commercial Mean Weight



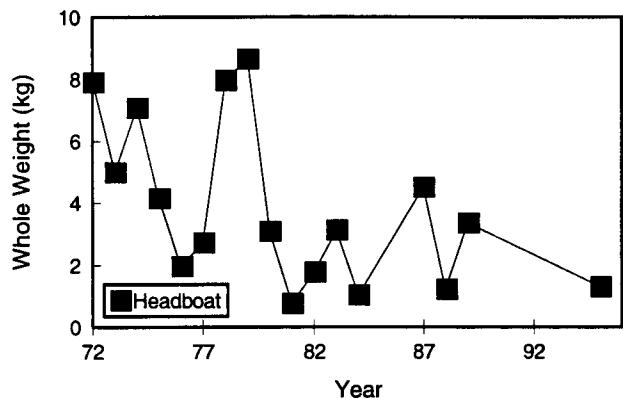
"For Hire" Recreational Landings



Other Recreational Landings

No data available

"For Hire" Recreational Mean Weights



Other Recreational Mean Weights

No data available

Headboat CPUE: North Carolina - North Florida

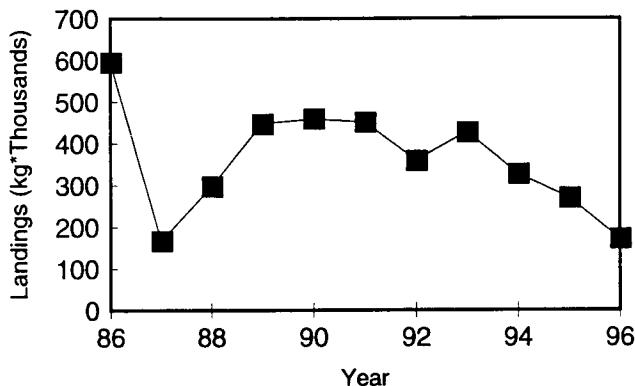
No data available

Tilefish Data (Landings, mean weights, and CPUE-Wt are in kg.)

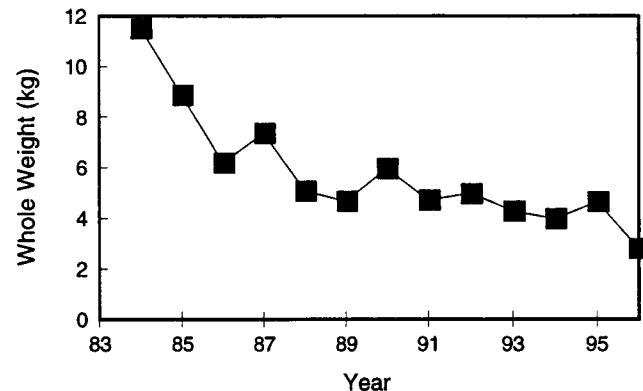
Year	Commercial			Headboat			Charter Boat			Other Recreational		
	Landings	Mean Wt	N	Landings	Mean Wt	N	Landings	Mean Wt	N	Landings	Mean Wt	N
72												
73												
74												
75												
76												
77												
78												
79												
80												
81				187	1.99	1	0			0		
82				8			0			0		
83							0			0		
84	11.49	291					0					
85	8.86	109					0					
86	593073	6.19	4053				114	2.50	1	0		
87	166697	7.35	542	36			2142	1.30	2	0		
88	296643	5.07	1060				0					
89	446986	4.67	834	6	0.77	17	0			0		
90	458372	5.95	755	3	0.23	14	62	1.30	1	0		
91	451465	4.72	6344				81	1.25	2	0		
92	359937	4.98	11667	12	0.22	1	0			0		
93	427224	4.29	29265				0			0		
94	326257	3.97	9536	5			6998	2.83	3	0		
95	269377	4.64	9604				0			0		
96	170572	2.78	2317				0			0		

Tilefish

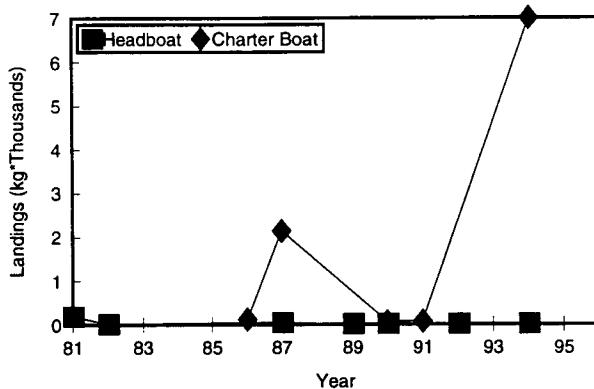
Commercial Landings



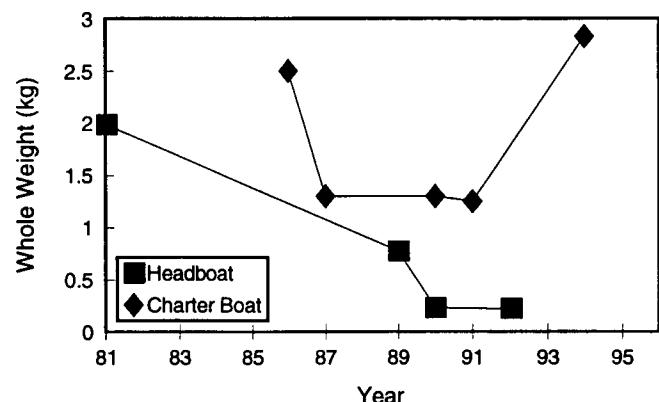
Commercial Mean Weight



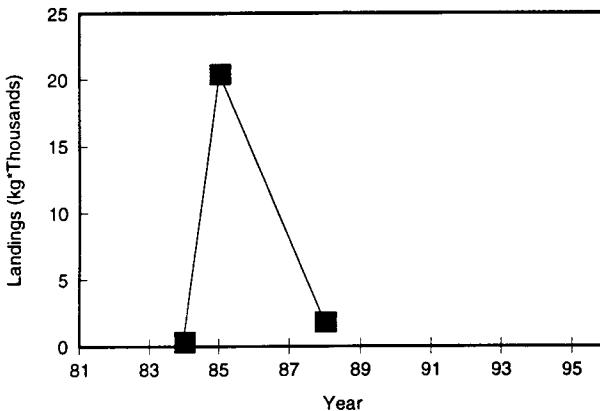
"For Hire" Recreational Landings



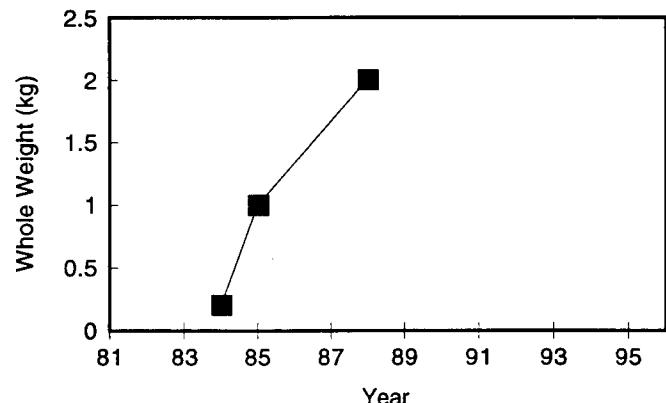
"For Hire" Recreational Mean Weights



Other Recreational Landings



Other Recreational Mean Weights



No CPUE data available

Table 16. Population status for 15 species of reef fish from the southeastern United States. Blocked = Most appropriate range of M;
Bold = most appropriate M.

Species	M	Full F	Most Recent Static SPR	Analysis Type	F to obtain 30% SPR	F to obtain 40% SPR	Minimum size for 30% SPR	Minimum size for 40% SPR
Vermilion	0.20	0.61	12%	VPA	0.24 (-60%)	0.18 (-70%)	14"	16"
Snapper	0.25	0.55	16%		0.25 (-55%)	0.21 (-68%)	13"	14"
	0.30	0.51	21%		0.35 (-31%)	0.25 (-51%)	13"	14"
	0.35	0.46	27%		0.41 (-11%)	0.28 (-39%)	11"	13"
Red	0.15	0.69	11%	VPA	0.23 (-67%)	0.14 (-80%)	26"	28"
Snapper	0.20	0.63	11%		0.24 (-63%)	0.20 (-68%)	23"	26"
	0.25	0.57	24%		0.40 (-30%)	0.26 (-55%)	20"	23"
	0.30	0.50	32%		0.34 (-33%)		21"	
Scamp	0.10	0.24	22%	VPA	0.17 (-30%)	0.11 (-55%)	22"	25"
	0.15	0.18	35%		0.14 (-20%)		21"	
	0.20	0.13	52%					
	0.25	0.07	69%					
Black Sea Bass	0.20	1.03	15%	VPA				
	0.30	0.96	26%					
	0.40	0.89	39%					

Species	M	Full F	Most Recent Static SPR	Analysis Type	F to obtain 30% SPR	F to obtain 40% SPR	Minimum size for 30% SPR	Minimum size for 40% SPR	
Gag	0.10	0.28	16%	Catch Curve	0.14 (-51%)	0.10 (-64%)	34"	37"	
	0.15	0.22	27%		0.20 (-10%)	0.13 (-40%)	25"	31"	
	0.20	0.17	43%						
	0.25	0.13	55%						
Greater Amberjack	0.20	0.20	58%	Catch Curve					
	0.25	0.16	71%						
	0.30	0.12	81%						
	0.35	0.07	90%						
Snowy Grouper	0.10	0.53	3%	Catch Curve	0.05 (-90%)	0.0 (-100%)	33"	36"	
	0.15	0.48	5%		0.14 (-70%)	0.10 (-80%)	29"	32"	
	0.20	0.42	9%		0.16 (-61%)	0.13 (-70%)	26"	29"	
	0.25	0.37	14%		0.20 (-47%)	0.14 (-62%)	24"	26"	
Triggerfish	Gray	0.20	0.89	17%	Catch Curve	0.36 (-60%)	0.27 (-70%)	15"	17"
		0.25	0.84	23%		0.50 (-40%)	0.32 (-62%)	14"	16"
	0.30	0.80	29%		0.72 (-10%)	0.42 (-48%)	11"	14"	
	0.35	0.76	35%			0.58 (-24%)		13"	

Species	M	Full F	Most Recent Static SPR	Analysis Type	F to obtain 30% SPR	F to obtain 40% SPR	Minimum size for 30% SPR	Minimum size for 40% SPR
Red Porgy	0.15	0.37	27%	Catch Curve	0.33 (-10%)	0.21 (-44%)	12"	13"
(Harris & McGovern)	0.20	0.33	37%			0.27 (-18%)	12"	12"
	0.25	0.29	46%					
	0.30	0.25	55%					
	0.15	0.69	9%	Catch Curve	0.21 (-70%)	0.10 (-85%)	17"	19"
(Manooch)	0.20	0.64	14%		0.26 (-60%)	0.18 (-72%)	15"	17"
	0.25	0.60	19%		0.34 (-44%)	0.21 (-65%)	13"	16"
	0.30	0.55	26%		0.44 (-20%)	0.28 (-50%)	12"	14"
	0.20	0.31	21%	Catch Curve	0.21 (-32%)	0.13 (-57%)	11"	13"
Grunt	0.25	0.28	29%		0.26 (- 7%)	0.18 (-35%)	9"	11"
	0.30	0.24	39%			0.23 (- 5%)		9"
	0.35	0.21	48%					
Red Grouper	0.15	0.38	10%	Catch Curve	0.15 (-60%)	0.08 (-70%)	25"	27"
	0.20	0.26	21%		0.19 (-28%)	0.12 (-52%)	20"	31"

Species	M	Full F	Most Recent Static SPR	Analysis Type	F to obtain 30% SPR	F to obtain 40% SPR	Minimum size for 30% SPR	Minimum size for 40% SPR
Black Grouper	0.10	0.40	9%	Catch Curve	0.14 (-64%)	0.10 (-76%)	40"	43"
(Bullock & (Manooch)	0.15	0.35	15%		0.18 (-50%)	0.13 (-64%)	34"	38"
Crabtree)	0.20	0.29	25%		0.23 (-20%)	0.16 (-44%)	29"	34"
	0.25	0.24	35%			0.19 (-20%)	29"	
	0.10	0.71	9%	Catch Curve	0.16 (-77%)	0.0 (100%)	40"	43"
	0.15	0.64	16%		0.26 (-60%)	0.17 (-73%)	35"	38"
	0.20	0.58	25%		0.41 (-30%)	0.24 (-58%)	29"	34"
	0.25	0.51	33%			0.15 (-30%)	29"	
Speckled Hind	0.10	0.48	5%	Catch Curve	0.11 (-77%)	0.05 (-90%)	26"	29"
	0.15	0.43	8%		0.15 (-66%)	0.12 (-73%)	24"	26"
	0.20	0.38	13%		0.19 (-49%)	0.13 (-65%)	21"	24"
	0.25	0.33	19%		0.22 (-33%)	0.16 (-52%)	18"	21"
Yellowedg e Grouper					Inadequate information			
Tilefish					Inadequate information			

Table 17. Estimates of M for selected South Atlantic reef fishes.

Species	Vermilion Snapper	Red Snapper	Scamp	Black Sea Bass
Citation	Manooch et al.	Manooch et al.	Manooch et al.	Vaughan et al.
<u>Input Parameters</u>				
Asymptotic Length Linf *	670	955	878	
Brody Growth Coefficient - K	0.117	0.146	0.116	
Maximum age - Tmax	14	25	27	
First age in catches - Tc	1	2	1	
Length at Maturity - LT	189	350	400	
Age at 50% Maturity - Tm	1	2	3	
Sample Size - N	1170	470	2029	
<u>Methods of Estimating M</u>				
1. Hoenig	0.3	0.17	0.15	
2. Hoenig-Adj. for sample size	0.60	0.3	0.32	
3. Pauly	0.31	0.33	0.16	
4. Alverson and Carney	0.41	0.15	0.15	
5. Roff	0.90**	0.43	0.28	
6. Rikhter and Evanov	0.53	0.32	0.53	
7. Ralston		0.32	0.26	
8. Alagaraja -S(tlambda)=0.05 S(tlambda)=0.02	0.21 0.28	0.12 0.16	0.11 0.15	
Mean: Overall	0.36	0.26	0.23	
Mean: 1,3, & 8	0.28	0.20	0.14	

* Lengths are mm TL unless otherwise noted.

** Estimates of M not used in computation of overall means.

Species	Gag	Greater Amberjack	Snowy Grouper	Gray Triggerfish
Citation	Hood & Schlieder	Potts & Manooch	Matheson	Escorriola
<u>Input Parameters</u>				
Asymptotic Length Linf *	1190	1514	1201	672
Brody Growth Coefficient - K	0.17	0.12	0.1	0.15
Maximum age - Tmax	26	17	22	12
First age in catches - Tc	1	1	1	2
Length at Maturity - LT	510	597	501	72
Age at 50% Maturity - Tm	3	3	6	1
Sample Size - N	1765	323	1658	2481
<u>Methods of Estimating M</u>				
1. Hoenig	0.16	0.25	0.19	0.35
2. Hoenig-Adj. for sample size	0.33	0.40	0.39	0.85**
3. Pauly	0.18	0.14	0.13	0.20
4. Alverson and Carney	0.12	0.31	0.23	0.46
5. Roff	0.68	0.55	0.42	3.75**
6. Rikhter and Evanov	0.53	0.53	0.26	1.37**
7. Ralston	0.37	0.27	0.22	0.33
8. Alagaraja -S(tlambda)=0.05 S(tlambda)=0.02	0.11 0.15	0.18 0.23	0.14 0.18	0.25 0.33
Mean: Overall	0.29	0.32	0.24	0.32
Mean: 1,3, & 8	0.15	0.20	0.16	0.28

* Lengths are mm TL unless otherwise noted.

** Estimates of M not used in computation of overall means.

Species	Red Porgy	White Grunt	Red Grouper	Black Grouper
Citation	Harris & McGovern	Padgett	Stiles & Burton	Crabtree & Bullock
<u>Input Parameters</u>				
Asymptotic Length Linf *	356	353	938	1306
Brody Growth Coefficient - K	0.28	0.29	0.15	0.17
Maximum age - Tmax	13	27	16	33
First age in catches - Tc	1	1	3	1
Length at Maturity - LT	176	130-169	501	816
Age at 50% Maturity - Tm	2	1	5	5
Sample Size - N	1843	677	461	927
<u>Methods of Estimating M</u>				
1. Hoenig	0.32	0.15	0.26	0.13
2. Hoenig-Adj. for sample size	0.68	0.28	0.53	0.24
3. Pauly	0.36	0.37	0.18	0.18
4. Alverson and Carney	0.28	0.05**	0.30	0.07
5. Roff	0.65	0.95**	0.39	0.31
6. Rikhter and Evanov	0.77	1.37**	0.32	0.32
7. Ralston	0.60	0.62	0.33	0.37
8. Alagaraja -S(tlambda)=0.05 S(tlambda)=0.02	0.23 0.30	0.11 0.14	0.19 0.24	0.09 0.12
Mean: Overall	0.46	0.28	0.30	0.20
Mean: 1,3, & 8	0.30	0.19	0.22	0.13

* Lengths are mm TL unless otherwise noted.

** Estimates of M not used in computation of overall means.

Species	Speckled Hind	Yellowedge Grouper	Tilefish
Citation	Matheson & Huntsman	Godcharles & Bullock	Harris & Grossman
Input Parameters			
Asymptotic Length Linf *	967	831	907mm SL
Brody Growth Coefficient - K	0.13	0.19	0.08
Maximum age - Tmax	15	26	33
First age in catches - Tc	2	1	2
Length at Maturity - LT	463	487	400 mm FL
Age at 50% Maturity - Tm	4	4.5	6
Sample Size - N	463	781	1668
Methods of Estimating M			
1. Hoenig	0.28	0.16	0.13
2. Hoenig-Adj. for sample size	0.53	0.29	0.26
3. Pauly	0.16	0.22	0.12
4. Alverson and Carney	0.36	0.10	0.14
5. Roff	0.42	0.40	0.30
6. Rikhter and Evanov	0.04	0.32	0.26
7. Ralston	0.29	0.41	0.18
8. Alagaraja -S(tlambda)=0.05 S(tlambda)=0.02	0.20 0.26	0.12 0.15	0.09 0.12
Mean: Overall		0.28	0.24
Mean: 1,3, & 8		0.23	0.16
Mean: 1,3, & 8			

* Lengths are mm TL unless otherwise noted.

** Estimates of M not used in computation of overall means.

Data Sources Used to Derive SPR Values (by species)

Vermilion Snapper:

Manooch, C.S., III, J.C. Potts, D.S. Vaughan, and M.L. Burton 1997. Population assessment of the vermillion snapper, *Rhomboplites aurorubens*, from the southeastern United States. Report to the South Atlantic Fishery Management Council. September, 1997.

Potts, J.C., C.S. Manooch III, and D.S. Vaughan. 1998. Age and growth of vermillion snapper from the southeastern United States. Transactions of the American Fisheries Society. Not yet assigned.

Red Snapper:

Manooch, C.S., III, J.C. Potts, D.S. Vaughan, and M.L. Burton 1997. Population assessment of the red snapper, *Lutjanus campechanus*, from the southeastern United States. Report to the South Atlantic Fishery Management Council, April 7, 1997.

Manooch, C.S., III and J.C. Potts. 1997. Age and growth of red snapper, *Lutjanus campechanus*, from North Carolina through the east coast of Florida. Journal of the Elisha Mitchell Society, 113(3):111-122.

Scamp:

Manooch, C.S., III, J.C. Potts, M.L. Burton, and P.J. Harris. 1997. Population assessment of the scamp, *Mycteroperca phenax*, from the southeastern United States. Report to the South Atlantic Fishery Management Council, December, 1997.

Black Sea Bass:

Vaughan, D.S., M.R. Collins, B. Zhao, and H.S. Meister. 1996. Population characteristics of the black sea bass *Centropristes striata* from the U.S. southern Atlantic coast. Report to the South Atlantic Fishery Management Council, October 29, 1996.

Gag:

Harris, P.J., and M.R. Collins. In prep. Age and growth of gag, *Mycteroperca microlepis*, off

the southeastern coast of the United States. Fishery Bulletin. (SCDNR, MARMAP, Charleston, SC).

Hood, P.B., and R.A. Schlieder. 1992. Age, growth, and reproduction of gag, *Mycteroperca microlepis*, (Pisces: Serranidae), in the eastern Gulf of Mexico. Bulletin of Marine Science, 51(3):337-352.

McGovern, J.C., D.M. Wyanski, O. Pashuk, C.S. Manooch, III, and G.R. Sedberry. In press. Changes in the sex ratio and size at maturity of gag, *Mycteroperca microlepis*, from the Atlantic coast of the United States during 1976-1995, Fishery Bulletin 96(4):.

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