Updated Fishery-Dependent Indices of Abundance for Gulf of Mexico Gray Triggerfish (*Balistes capriscus*)

by

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INTRODUCTION

Several recommendations were made by the Southeast Data Assessment and Review (SEDAR) 9 Data Workshop Panel for ways to improve the fishery-dependent indices of abundance for the Gulf of Mexico gray triggerfish (*Balistes capriscus*) stock. Indices were updated based on these recommendations and a need to develop separate indices for the eastern and western Gulf (using the Mississippi as the boundary).

METHODS

Marine Recreational Fisheries Statistics Survey

The Marine Recreational Fisheries Statistics Survey (MRFSS) index was originally described in SEDAR9-DW28. The following changes were made:

- Unidentified triggerfish were included and assumed to be gray trigger, which made up over 98% of identified triggerfish.

NMFS Southeast Zone Headboat Survey

The NMFS Southeast zone headboat survey index was originally described in SEDAR9-DW29. The following changes were made:

- Data from 2004 were included.

Commercial Handline Logbook Entries

The commercial handline index was originally described in SEDAR9-DW30. The following changes were made:

- Unidentified triggerfish were included and assumed to be gray trigger, which made up over 96% of identified triggerfish.

- After examination of patterns in the data, line hours were chosen as a preferred measure of effort over hook hours. Both measures of effort led to catch per unit effort values that dropped off with increasing effort (Fig. 1). However, this drop off was much less extreme when the effort was measured in line hours.

RESULTS

Marine Recreational Fisheries Statistics Survey

Gulf-Wide

- Thirteenth most commonly caught species, in 6.9% of trips.

- 7,296 gray trigger trips selected with the species association approach, of which 4,327 (59.3%) caught gray trigger.

- Nominal CPUE showed build up to a large peak in 1990 and decline to much lower levels in recent years.

- Significant factors: Binomial—year, mode, State; Lognormal—year, season, State, red snapper season, year*State, year*season.

- Standardized CPUE values showed peaks in 1984, 1995, and especially 1990 (Table 1; Fig. 2). In more recent years, CPUE has been low.

East

- Eleventh most commonly caught species, in 7.3% of trips.

- 6,739 gray trigger trips selected with the species association approach, of which 4,092 (60.7%) caught gray trigger.

- Nominal CPUE showed several early peaks, the largest in 1990, and decline to much lower levels in recent years.

- Significant factors: Binomial—year, mode, State; Lognormal—year, season, red snapper season, year*season.

- Standardized CPUE values showed peaks in 1984, 1995, and especially 1990 (Table 1; Fig. 2). In more recent years, CPUE has been low.

West

- Sixteenth most commonly caught species, in 4.2% of trips.

- 598 gray trigger trips selected with the species association approach, of which 281 (47%) caught gray trigger.

- Nominal CPUE showed several peaks, with catch rates dropping to especially low levels around 2000 and building up to fairly high levels in 2004.

- Standardization was not possible due to limited sample sizes.

Headboat

Gulf-Wide

- Most commonly landed species, in 46.2% of trips.

- 66,701 gray trigger trips selected with the species association approach, but these trips were pared further by eliminating night trips (which were too rarely sampled) and those by vessels that did not commonly land gray triggerfish. This left 65,512 gray trigger trips, of which 49,081 (74.9%) landed gray trigger.

- Nominal CPUE peaked in 1990 and then dropped somewhat gradually, with an upturn in recent years.

- Significant factors: Binomial—year, vessel, year*vessel (but model would not converge, and when vessel effect was excluded, significant factors were year, State, and year*State); Lognormal—year, vessel, season, year*vessel, season*vessel, and year*season (but season*vessel term had to be removed to achieve convergence).

- Standardized CPUEs built up to peaks in 1990 and 1992 and have been in decline for the most part ever since, possibly with a slight recent recovery (Table 2; Fig. 3).

East

- Second most commonly landed species, in 50.2% of trips.

- 50,709 gray trigger trips selected with the species association approach, but these trips were pared further by eliminating night trips (which were too rarely sampled) and those by vessels that did not commonly land gray triggerfish. This left 50,024 gray trigger trips, of which 38,662 (77.3%) landed gray trigger.

- Nominal CPUE peaked in 1990 and then dropped somewhat gradually, with an upturn in recent years.

- Significant factors: Binomial—year, vessel, year*vessel (interaction not included due to non-convergence); Lognormal—year, vessel, season, year*vessel, year*season, season*vessel (season*vessel term had to be removed to achieve convergence).

- Standardized CPUEs built up to peaks in 1990 and 1992 and have been in decline for the most part ever since, possibly with a slight recent recovery (Table 2; Fig. 3).

West

- Third most commonly landed species, in 37.1% of trips.
- 16,050 gray trigger trips selected with the species association approach, but these trips were pared further by eliminating night trips (which were too rarely sampled) and those by vessels that did not commonly land gray triggerfish. This left 15,534 gray trigger trips, of which 10,835 (69.8%) landed gray trigger.
- Nominal CPUE remained high through the mid-1990s, then dropped steeply, with a slight recovery in recent years.
- Significant factors: Binomial—year, vessel, year*vessel (interaction not included due to non-convergence); Lognormal—year, vessel, season, trip duration, year*vessel, season*vessel, year*season (season*vessel term had to be removed to achieve convergence).
- Standardized CPUEs built up to a peak in 1990 followed b a plateau through the mid-1990s (Table 2; Fig. 3). In more recent years, CPUE dropped dramatically and has been slowly building back up.

Commercial Handline

Gulf-Wide

- Sixth most commonly landed species, in 23.5% of trips.
- 36,058 gray trigger trips selected with the species association approach, of which 21,559 (59.8%) landed gray trigger.
- Nominal CPUE showed a steep drop from an initial peak with a much less pronounced peak in recent years.
- Significant factors: Binomial—year, State, red snapper permit; Lognormal—year.
- Standardized CPUEs declined fairly consistently from the beginning of the time series until the early 2000s, at which time they show evidence of a recovery (Table 3; Fig. 4).

East

- Seventh most commonly landed species, in 18.1% of trips.
- 20,166 gray trigger trips selected with the species association approach, of which 11,738 (58.2%) landed gray trigger.
- Nominal CPUE showed an initial steep drop with a recent peak at much lower than initial levels.

- Significant factors: Binomial—year; Lognormal—year, red snapper season.

- Standardized CPUEs dropped dramatically in the mid-1990s and have shown a recent partial recovery (Table 3; Fig. 4).

West

- Third most commonly landed species, in 40.2% of trips.

- 14,316 gray trigger trips selected with the species association approach, of which 9,574 (66.9%) landed gray trigger.

- With few exceptions, the nominal CPUE showed a consistent drop across the time series.

- Significant factors: Binomial—year, State, red snapper permit; Lognormal—year, red snapper permit, year*red snapper permit.

- Standardized CPUEs have shown peaks and troughs around a fairly stable tendency, with possible decline in most recent years (Table 3; Fig. 4).

TABLE 1—Standardized Marine Recreational Fisheries Statistics Survey Indices.

	Gulf-Wide		East	
YEAR	CPUE	CV	CPUE	CV
1981	0.3112	0.7984	0.5956	0.6019
1982	0.2787	0.7521	0.5087	0.5308
1983	0.3094	0.7013	0.3554	0.7078
1984	1.2290	0.8675	2.1394	1.7818
1985	0.1468	1.0230	0.0782	1.8462
1986	0.4088	0.3543	1.3105	0.2409
1987	0.2062	0.4328	0.4194	0.3101
1988	0.5911	0.3807	0.7432	0.2902
1989	0.7115	0.3931	1.2218	0.2954
1990	1.2919	0.3806	2.5647	0.2788
1991	0.7035	0.3407	1.0700	0.2696
1992	0.7328	0.3105	0.9473	0.2168
1993	0.3077	0.3634	0.5876	0.2569
1994	0.2852	0.3846	0.5330	0.2797
1995	0.6172	0.3748	0.8209	0.3010
1996	0.2603	0.4204	0.4763	0.3128
1997	0.1717	0.4100	0.2671	0.2754
1998	0.1308	0.4190	0.2024	0.2670
1999	0.1565	0.3572	0.2098	0.2317
2000	0.1377	0.3808	0.1646	0.2505
2001	0.1517	0.3852	0.2528	0.2301
2002	0.1853	0.3490	0.2618	0.2283
2003	0.1688	0.3554	0.2525	0.2317
2004	0.1989	0.3330	0.2905	0.2107

TABLE 2—Standardized NMFS Southeast Zone Headboat Survey Indices.

	Gulf-Wide		East		West	
YEAR	CPUE	CV	CPUE	CV	CPUE	CV
1986	0.0184	0.7163	0.0158	0.7580	0.0246	0.6454
1987	0.0157	0.7548	0.0104	1.0126	0.0243	0.5789
1988	0.0213	0.5937	0.0137	0.7104	0.0334	0.4854
1989	0.0317	0.4454	0.0313	0.3781	0.0308	0.5495
1990	0.0484	0.3393	0.0502	0.2466	0.0434	0.4105
1991	0.0451	0.3444	0.0396	0.3037	0.0513	0.3532
1992	0.0465	0.3232	0.0457	0.2657	0.0456	0.3808
1993	0.0401	0.3769	0.0359	0.3130	0.0459	0.3779
1994	0.0338	0.4239	0.0278	0.3945	0.0446	0.3584
1995	0.0288	0.4942	0.0242	0.4702	0.0410	0.3820
1996	0.0237	0.5663	0.0172	0.5819	0.0418	0.3863
1997	0.0229	0.5947	0.0182	0.5646	0.0377	0.4489
1998	0.0220	0.6025	0.0156	0.6151	0.0257	0.5925
1999	0.0159	0.7311	0.0165	0.5726	0.0114	1.1715
2000	0.0131	0.8476	0.0116	0.7600	0.0116	1.1149
2001	0.0140	0.8425	0.0130	0.7376	0.0137	0.9445
2002	0.0192	0.7342	0.0198	0.5657	0.0151	0.9434
2003	0.0190	0.6966	0.0201	0.5548	0.0186	0.7385
2004	0.0201	0.6703	0.0215	0.5004	0.0214	0.6800

TABLE 3—Standardized Commercial Handline Logbook Entries Indices.

	Gulf-Wide		East		West	
YEAR	CPUE	CV	CPUE	CV	CPUE	CV
1993	1.0010	0.0721	1.5557	0.0600	0.5592	0.3908
1994	0.9555	0.0664	1.4665	0.0547	0.7133	0.3835
1995	0.9363	0.0730	1.5196	0.0610	0.8053	0.3896
1996	0.5696	0.0674	0.6690	0.0570	0.5018	0.3860
1997	0.5621	0.0663	0.5595	0.0606	0.3995	0.3861
1998	0.5532	0.0703	0.5280	0.0627	0.5227	0.3826
1999	0.4748	0.0638	0.5081	0.0536	0.7079	0.3780
2000	0.4116	0.0739	0.3705	0.0607	0.5293	0.3807
2001	0.4397	0.0682	0.5492	0.0575	0.3657	0.3852
2002	0.6301	0.0577	0.9778	0.0513	0.3908	0.3811
2003	0.7095	0.0524	1.0907	0.0483	0.3509	0.3804
2004	0.6011	0.0578	0.8661	0.0518	0.3526	0.3808

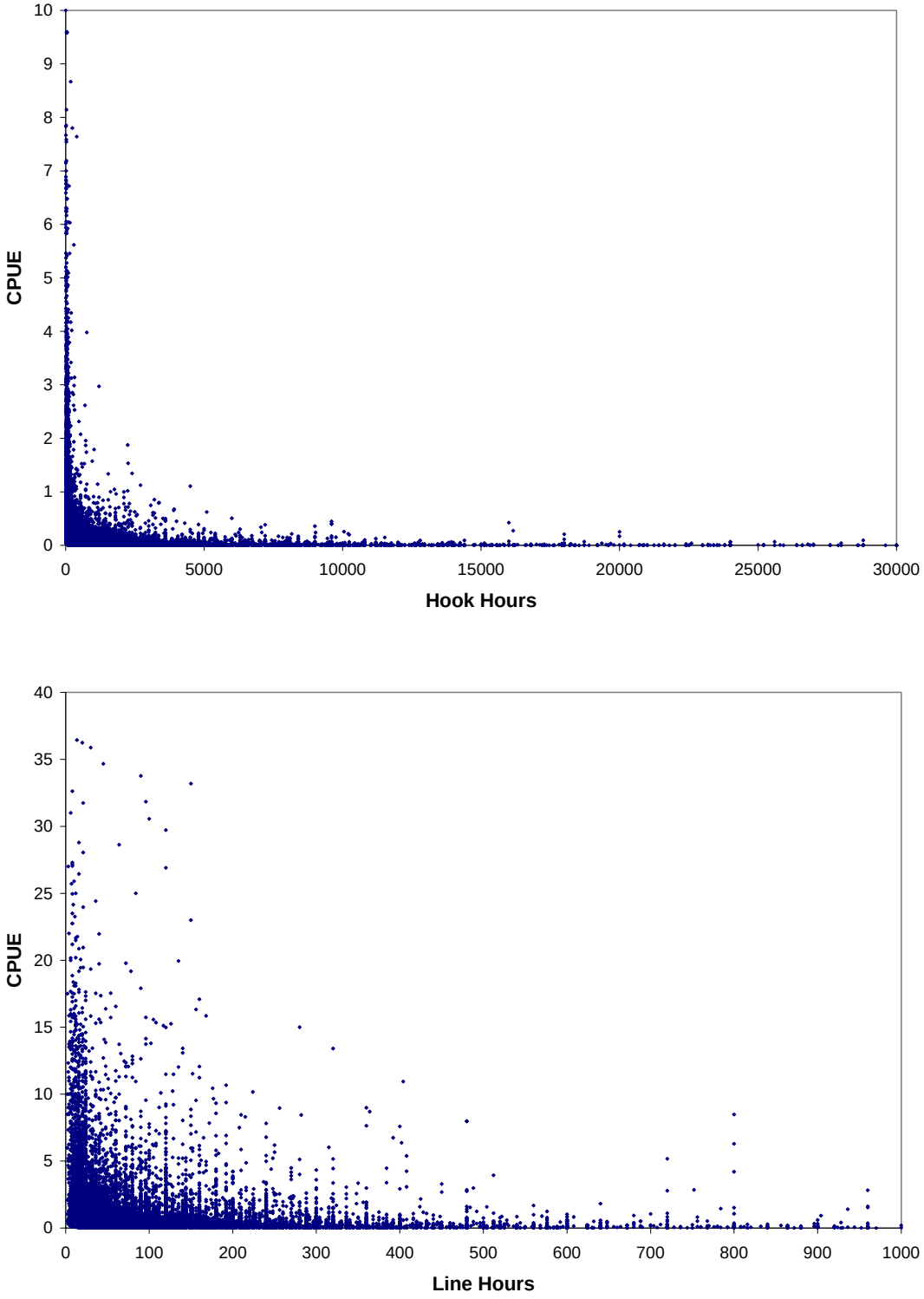

FIG. 1—CPUE Patterns Under Different Effort Measures
(A) Hook Hours, (B) Line Hours. Note that in each figure, the lower range of both variables are shown to maintain a focus on the bulk of the range of data points rather than the extremes.

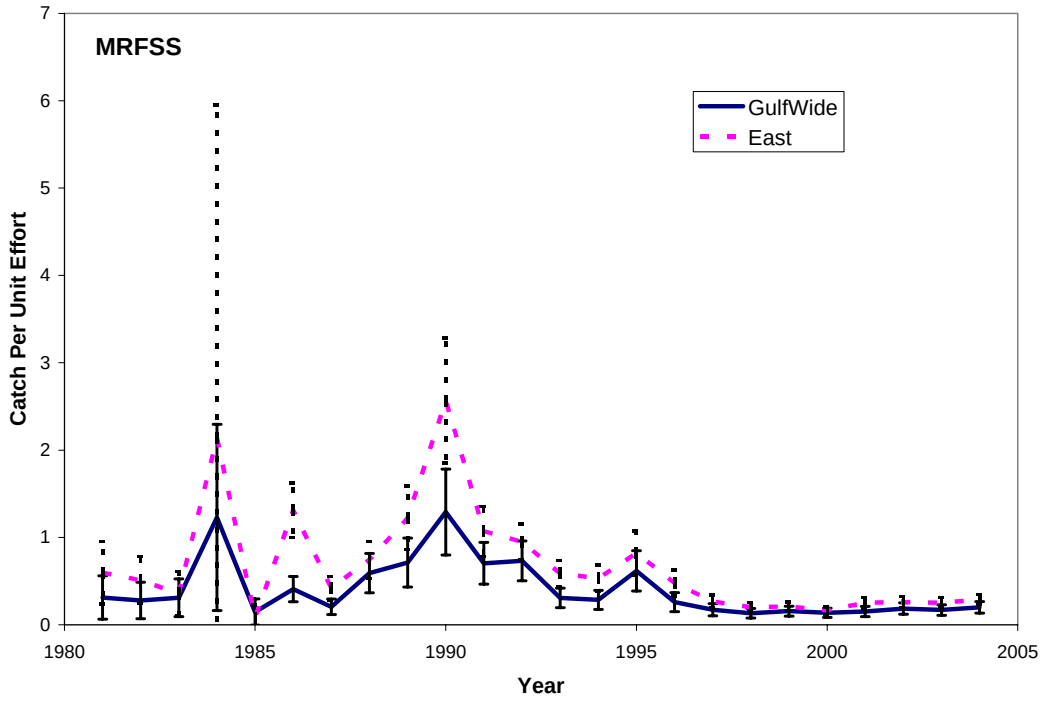

FIG. 2—Standardized Marine Recreational Fisheries Statistics Survey Indices.
Error bars represent one standard deviation.

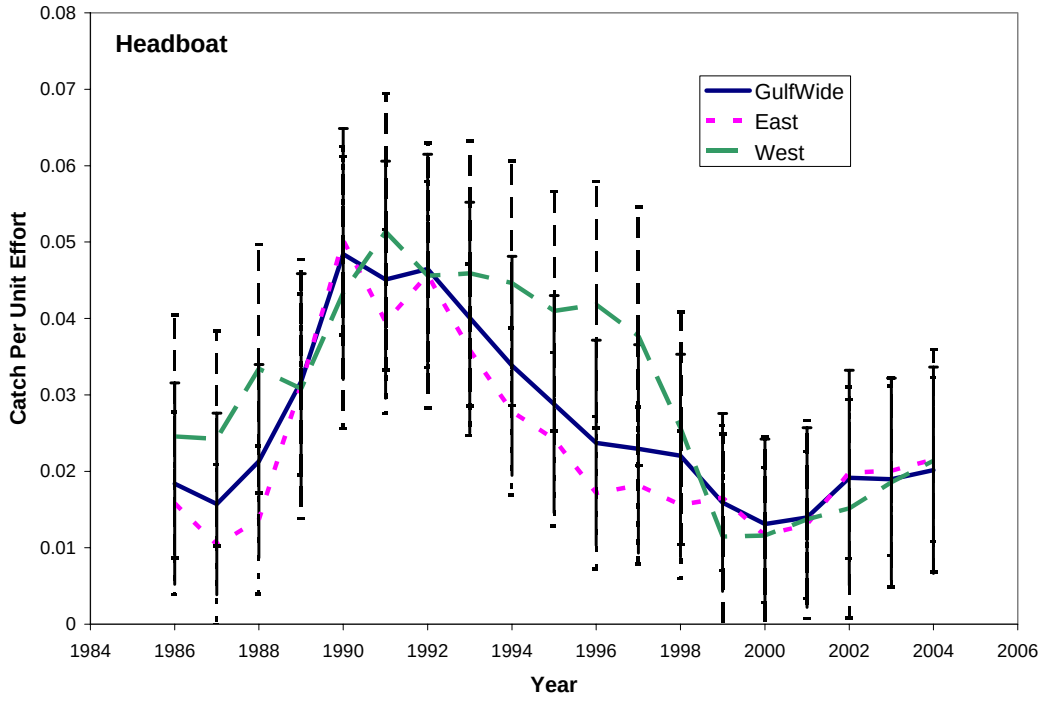

FIG. 3—Standardized NMFS Southeast Zone Headboat Survey Indices.
Error bars represent one standard deviation.

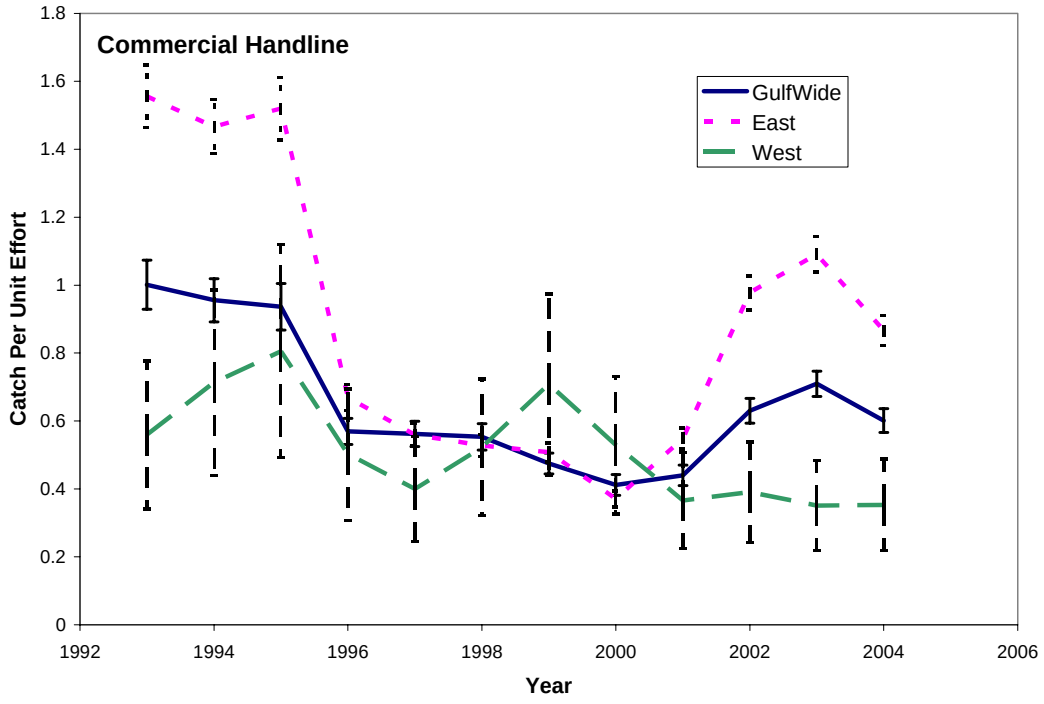

FIG. 4—Standardized Commercial Handline Logbook Entries Indices.
Error bars represent one standard deviation.