UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

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June 28, 2011

To All Concerned:

FORECAST FOR THE 2011 BROWN SHRIMP SEASON IN THE WESTERN GULF OF MEXICO, FROM THE MISSISSIPPI RIVER TO THE U.S. - MEXICO BORDER.

<u>Prediction Summary</u>

Scientists at the National Marine Fisheries Service (NOAA Fisheries) Southeast Fisheries Science Center's Galveston Laboratory have prepared the following information on prospects for the 2011 brown shrimp season (July 2011 – June 2012) in the western Gulf of Mexico. Data obtained from NOAA Fisheries Galveston Laboratory, NOAA port agents, National Climatic Data and Weather Centers, Louisiana Department of Wildlife and Fisheries, Texas Parks and Wildlife Department, and the commercial shrimp industry contribute to this forecast. Juvenile brown shrimp abundance and growth estimates are obtained by monitoring the inshore commercial shrimp fisheries in Texas and the inshore and nearshore fisheries in Louisiana. In addition, environmental variables are measured to assess the favorability of conditions in habitat for growth and survival of young shrimp. Collectively, these indices provide an estimate of inshore stock strength prior to shrimp movement into the offshore fishery.

The 2011 abundance indices are varied relative to offshore brown shrimp production estimates. The Galveston Bay bait index forecasts a below average year at 22.2 million pounds from offshore Texas waters; however, increasing catch rates in mid-June (the end of our monitoring surveys) indicate continued strong recruitment not reflected in our model. The 2011 Environmental Model showed favorable conditions in the bay system and predicts above average production for Texas offshore waters. Louisiana indices point to a slightly above average brown shrimp yield this season from west of the Mississippi River to the Texas-Louisiana border. Overall, the western Gulf of Mexico could expect an annual brown shrimp production of approximately 53.4 million pounds during the 2011-2012 season. This is slightly below the 1960-2009 historical average of 56.7 million pounds for the two-state area.

Postlarval brown shrimp begin entering estuaries in Texas and western Louisiana in mid-February and continue through July, depending on environmental conditions. Several waves of postlarve may enter; however, peak recruitment occurs from February through early April. A wide array of environmental and biological parameters affect the fate of young shrimp entering the estuaries. Three environmental variables, temperature, salinity and tidal height, have been correlated with subsequent shrimp production. Optimal shrimp growth has been documented in waters greater than 68° F.

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This year, above average air temperatures and record low rainfall in late winter and early spring were recorded in coastal areas for both Texas and western Louisiana (Tables 1).   Higher salinities (Table 2) and strong southerly winds that sustained tidal height levels (Table 3) were recorded during the peak recruitment period for brown shrimp. These three environmental factors, temperature, salinity and tidal height, increased available nursery area thus allowing for greater distribution of juvenile brown shrimp entering estuaries.

Galveston Bay Production/Baxter Bait Index

The Galveston Bay Bait Index, consistently our most reliable estimate of subsequent brown shrimp production off the Texas coast for the past 51 years, is derived from monitoring the Galveston Bay bait shrimp fishery during late April through mid-June (Baxter Bait Index; Table 5). Recruitment into the commercial bait fishery was observed at the onset of our monitoring period. Based on length frequency data, three growth waves of brown shrimp were documented. Strong recruitment continues to be observed with catch rates greater than 44 pounds per hour. This is expected to continue through the month of June. Unlike previous years, white shrimp have been present in the bay system throughout the season. High salinities and tides increased available nursery habitat allowing for a wider distribution of young brown shrimp. Using the period from 1981 through 2009 in the bait versus offshore landings modified regression model using a seven-week sampling season, a value of 22.2 million pounds of brown shrimp is forecast for 2011-2012 catch in Texas offshore waters. This value is 3.8 million pounds below the average catch of 26.0 million pounds for the 1960 - 2009 period.

Catch per Unit Effort (CPUE) in the Inshore Texas Fishery

Texas bay commercial brown shrimp catch rates and size composition data for May 2011 were obtained from NOAA Fisheries port agents. All Texas Bays experienced catch rates below the 1986-2010 historical average (Table 4). The May brown shrimp size composition in Matagorda and Galveston Bays was dominated by small shrimp (100+; 81-100 count/pound). Corpus Christi and Aransas Bays catches were primarily 71-100 count/pound shrimp, with San Antonio Bay comprised of 51-60 count/pound shrimp.

Environmental Model

The Environmental Model is used to predict the annual harvest related to the historical production. The model uses Galveston air temperature during mid-April (the key component), rainfall during early March, and bay water height during late April and early May. These components are additive in the model, thus higher values indicate higher catch. The heaviest contributing factor, temperature during mid-April, was above average this year (75.6ºF). Drought conditions have been prevalent in Texas for several months; however, due to a single significant rainfall event on March 5, 2011, rainfall in March was higher than average (2.55"). Relatively high tidal heights during late April and early May were recorded at approximately 5.61 feet. Using these environmental parameters in our model suggest above average production of brown shrimp from Texas as related to environmental conditions conducive for optimal shrimp growth and survival.

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Louisiana Inshore - Offshore Production

Catch information from Louisiana inshore and offshore fisheries in May is used to estimate total production for the biological year from May through April (Table 6). Using 2011 brown shrimp catch data (8.5 million pounds) in our Louisiana Model, we predict a harvest of 31.2 million pounds for Louisiana west of the Mississippi River for the 2011-2012 season. This is above the historical average of 30.7 million pounds. Environmental variables in Louisiana during April including temperature and rainfall suggested favorable conditions for above average production. Mississippi River discharge was approximately 845 thousand cubic feet per second in April, slightly higher than recorded in 2010, and similar to that of years of above average production. However, historic Mississippi River flows during May evidenced by record flood stages reported at all monitoring stations along the Mississippi and Atchafalaya Rivers could potentially affect (e.g., by contributing to hypoxia) brown shrimp catch this year.

Summary

The 2011 indices of juvenile shrimp abundance and catch are mixed. We predict a slightly below average harvest for the western Gulf of Mexico during the July 2011 - June 2012 season. However, environmental factors (notably salinity, tidal height in marshes, and temperature) are favorable for continued recruitment and stock growth. If you would like more information regarding this forecast, or for other marine fishery information, please contact us at 409-766-3500, or visit our web site at <http://galveston.ssp.nmfs.gov/>.

Sincerely,

Roger Zimmerman, Ph.D.
Laboratory Director

attachments

Table 1. Rainfall and air temperature during 2011 for selected areas. Source: NOAA, National Climatic Data Center and National Weather Service, June 20, 2011.

	Year-to-Date Rainfall (Inches)	Rainfall (Inches Above/ Below Historical)	Departure: Above or Below Historical Monthly Average Air Temperature (°F) and Precipitation (inches)							
			JAN		FEB		MAR		APR	
			Temp	Rainfall	Temp	Rainfall	Temp	Rainfall	Temp	Rainfall
TEXAS										
Brownsville	3	-7	3	1	0	-1	4	-1	7	-2
Corpus Christi	6	-7	0	2	-1	-2	3	-1	5	-2
Houston	7	-15	0	1	0	-2	4	-3	7	-3
Port Arthur	7	-20	-2	-3	-2	-3	3	-2	4	-4
LOUISIANA										
Lake Charles	15	-11	-1	0	-1	-2	4	2	6	-2
New Orleans	19	-12	-2	-2	1	-4	4	5	6	-5

Table 2. Salinities and water temperatures in West Galveston Bay during April and May, 1982-2011. Source for salinity and temperature data 1997-2011: Texas Parks and Wildlife Department.

Year	Offshore Catch (Millions of Pounds)		Salinity (PPT)			Water Temperature (°F)	
			APR	MAY		APR	MAY
1982	21.6		24	20		76	77
1983	18.1		24	28		66	74
1984	24.1		28	32		78	82
1985	30.3		21	25		79	82
1986	27.1		27	28		75	78
1987	27.2		32	31		84	79
1988	22.5		25	25		78	79
1989	30.3		26	25		77	83
1990	33.3		15	18		NA	84
1991	32.9		15	15		74	81
1992	24.7		15	21		73	82
1993	21.1		20	19		73	74
1994	25.5		21	20		78	79
1995	23.5		18	19		70	78
1996	22.3		30	29		77	81
1997	17.0		13	16		70	78
1998	27.0		22	30		71	86
1999	22.0		28	28		82	86
2000	31.1		31	29		81	82
2001	24.6		17	24		74	81
2002	21.2		21	24		75	82
2003	23.2		23	21		71	80
2004	20.0		14	10		72	77
2005	19.2		23	28		73	75
2006	33.5		29	30		77	79
2007	20.0		23	19		70	80
2008	21.2		24	24		75	81
2009	31.7		29	21		72	76
2010	18.1*		23	25		68	81
2011			31	28		78	79

*Estimated

Table 3. Environmental Model prediction of the trend in catch of Texas brown shrimp offshore production (July-June).

Year	Direction of Prediction Relative to Average	Air Temperature (°F)	Rainfall (inches)	Water Height (feet)	Offshore Catch (Millions of Pounds)	
1990	+	68.3	0.83	5.69	33.3	
1991	+	73.2	0.11	5.87	32.9	
1992	-	66.6	0.48	4.90	24.7	
1993	-	66.9	0.86	5.41	21.1	
1994	+	71.2	1.26	5.57	25.5	
1995	+	72.7	1.07	5.38	23.5	
1996	-	70.3	0.70	4.88	22.3	
1997	+	68.3	0.37	5.47	17.0	
1998	-	68.5	0.48	5.14	27.0	
1999	+	70.8	0.24	5.34	22.0	
2000	+	70.3	0.07	5.42	31.1	
2001	+	74.3	0.49	5.19	24.6	
2002	+	74.1	1.24	6.18	23.3	
2003	+	68.9	0.17	5.55	25.3	
2004	+	69.1	0.16	5.07	21.5	
2005	+	72.9	1.67	6.10	20.3	
2006	-	67.0	0.01	5.22	25.2	
2007	+	68.8	0.00	5.60	19.1	
2008	+	68.9	0.89	5.61	21.2	
2009	+	69.9	0.01	5.61	31.7	
2010	+	68.9	0.50	5.37	18.1*	*Preliminary
2011	+	75.6	2.55	5.61		

Table 4. Estimated average May inshore commercial shrimp catch in pounds per hour (heads-on) for selected Texas Bays, 1986-2011.

Year	Selected Texas Bay Systems Pounds/Hour (heads-on)					Offshore Catch (Millions of Pounds)
	San Antonio	Corpus Christi	Aransas	Matagorda	Galveston	
1986	40	20	40	40	48	27.1
1987	45	20	41	45	50	27.2
1988	75	38	46	33	45	22.5
1989	29	25	26	18	31	30.3
1990	64	54	62	55	63	33.3
1991	41	38	56	31	23	32.9
1992	14	25	19	12	23	24.7
1993	44	32	28	32	28	21.1
1994	53	50	54	51	32	25.5
1995	38	45	38	ND	22	23.5
1996	40	32	43	30	18	22.3
1997	35	48	52	25	31	17.0
1998	56	48	37	37	26	27.0
1999	47	32	35	34	33	22.0
2000	45	32	29	32	42	31.1
2001	60	45	35	60	34	24.6
2002	44	35	38	19	16	23.3
2003	43	35	53	32	26	25.3
2004	NE	31	9	45	19	21.5
2005	53	36	30	33	9	20.3
2006	41	ND	ND	19	27	25.2
2007	47	ND	ND	47	14	19.1
2008	21	ID	21	NE	18	21.2
2009	74	<50	62	61	16	31.7
2010	59	75	105	46	25	18.1*
Historical Average	**46**	**38**	**42**	**36**	**29**	
2011	45	33	33	16	21	
Dominant Count	51-60	71-100	71-100	100+; 81-100	81-100	

*Preliminary   NE - No effort.   ID - Insufficient data.   ND - No data.

Table 5. Texas offshore brown shrimp catch predictions (millions of pounds) based on Galveston Bay bait index values. Average catch (July-June) from 1960-2009 was 26.0 million pounds.

| Year	Predicted Catch	Actual Catch	Difference
1960	29.1	34.0	4.9
1961	20.0	13.2	-6.8
1962	21.5	17.3	-4.2
1963	29.0	24.6	-4.4
1964	22.6	18.6	-4.0
1965	25.6	26.4	0.8
1966	-	31.1	-
1967	39.0	42.7	3.7
1968	22.0	27.9	5.9
1969	26.3	24.7	-1.6
1970	33.7	30.7	-3.0
1971	37.1	34.4	-2.7
1972	38.0	35.4	-2.6
1973	19.4	23.2	3.8
1974	23.8	25.8	2.0
1975	-	23.7	-
1976	23.8	25.7	1.9
1977	30.5	34.4	3.9
1978	25.5	27.7	2.2
1979	-	16.5	-
1980	26.7	26.6	-0.1
1981	29.3	41.3	12.0
1982	21.5	21.6	0.1
1983	17.8	18.1	0.3
1984	22.9	24.1	1.2
1985	29.0	30.3	1.3
1986	25.3	27.1	1.8
1987	25.7	27.2	1.5
1988	25.9	22.5	-3.4
1989	23.1	30.3	7.2
1990	-	33.3	-
1991	23.1	32.9	9.8
1992	24.1	24.7	0.6
1993	26.8	21.1	-5.7
1994	27.1	25.5	-1.6
1995	29.1	23.5	-5.6
1996	25.1	22.3	-2.8
1997	28.2	17.0	-11.2
1998	25.8	27.0	1.2
1999	24.5	22.0	-2.5
2000	30.0	31.1	1.1
2001	23.7	24.6	0.9
2002	26.6	23.3	-3.3
2003	21.6	25.3	3.7
2004	22.5	21.5	-1.0
2005	23.3	20.3	-3.0
2006	23.8	25.2	1.4
2007	25.9	19.1	-6.8
2008	21.8	21.2	-0.6
2009	24.7	31.7	7.0
2010	23.2	18.1*	-5.1
2011	22.2		

*Preliminary
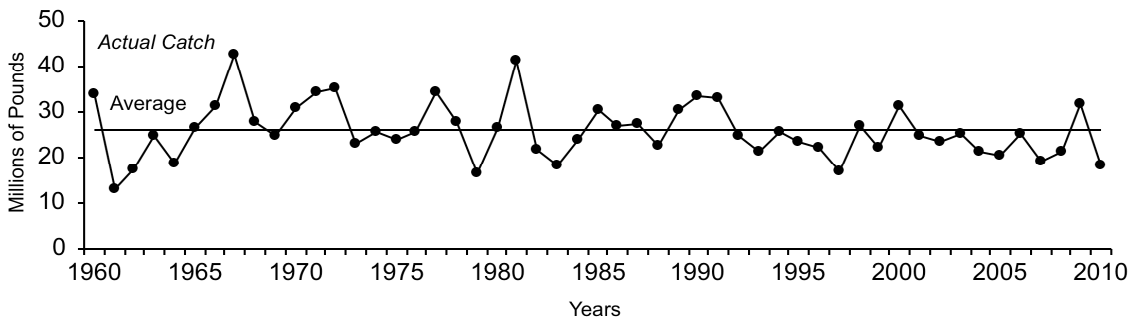
Table 6. Louisiana inshore and offshore brown shrimp prediction (millions of pounds) based on May catch index values. Average catch (May - April) from 1960-2009 was 30.7 million pounds. Acreage with salinities greater than 10 ppt is in millions of acres. Mississippi River discharge is thousand cubic feet per second in April (TCFS).
*Source: Louisiana Department of Wildlife and Fisheries.

Year	Predicted Catch	Actual Catch	Difference	*Acreage > 10 ppt	*Discharge (TCFS)
1960		15.6			
1961		9.2			
1962		7.3			
1963		16.9			
1964		9.6			
1965		17.7			
1966		18.7			
1967		29.5		2.3	
1968		25.4		1.9	
1969		25.2		1.6	
1970		28.1		2.1	
1971		30.7		1.9	
1972		32.2		1.8	
1973		17.9		1.0	
1974		20.6		1.2	
1975		18.1		1.3	
1976		37.5		1.6	510
1977		49.1		1.8	665
1978		45.9		1.5	856
1979		36.7		1.2	1288
1980		23.8		0.5	1002
1981		44.3		2.8	313
1982		33.0		1.5	779
1983		24.9		0.9	955
1984		33.3		1.6	1048
1985	40.3	33.7	-6.6	1.8	924
1986	50.0	44.1	-5.9	2.5	546
1987	32.9	40.0	7.1	1.5	694
1988	30.2	34.3	4.1	1.4	681
1989	43.7	37.6	-6.1	1.8	893
1990	60.0	45.9	-14.1	1.2	809
1991	35.4	32.0	-3.4	1.0	936
1992	26.3	28.2	1.9	1.6	555
1993	-	27.7	-	0.8	1098
1994	31.7	24.6	-7.1	1.2	958
1995	36.5	31.7	-4.8	1.6	505
1996	31.8	35.3	3.5	1.9	592
1997	25.5	29.3	3.8	1.0	1155
1998	40.3	34.2	-6.1	1.4	926
1999	45.0	42.7	-2.3	1.8	683
2000	47.1	43.9	-3.2	2.5	590
2001	62.4	42.1	-20.3	1.7	692
2002	39.0	36.2	-2.8	1.5	985
2003	42.0	44.7	2.7	1.4	507
2004	41.2	37.5	-3.7	0.7	552
2005	21.0	31.0	10.0	0.9	664
2006	37.8	40.3	2.5	2.3	427
2007	32.9	36.1	3.2	1.9	636
2008	29.2	21.9	-7.3	1.5	1363
2009	29.2	30.3	1.1	NA	767
2010	22.0	18.2*	-3.8	NA	~800
2011	31.2			NA	845

*Preliminary