



Figure 2. Potentiometric surface of the Chicot equivalent aquifer system, February through March 1991.

INTRODUCTION

The Chicot equivalent aquifer system is an important source of water for the area of southeastern Louisiana known as the Florida Parishes. The area of investigation for this report covers the eastern part of the Florida Parishes in Livingston, St. Helena, St. Tammany, Tangipahoa, and Washington Parishes.

The Chicot equivalent aquifer system is the primary source of freshwater for domestic supply in the rural areas of southeastern Louisiana. In 1990, a total of 88 Mgal/d was withdrawn from the aquifer system in Louisiana. Within the study area, withdrawals from the aquifer system totaled 14 Mgal/d (Lovelace, 1991, p. 93).

Additional knowledge about ground-water flow and the effects of withdrawals on the Chicot equivalent aquifer system is needed for assessment of ground-water development potential and protection of the resource. To meet this need, the potentiometric surface of the aquifer system and water-level changes in that surface are being monitored as part of the U.S. Geological Survey's cooperative program with the Louisiana Department of Transportation and Development.

This report presents data and maps that illustrate the potentiometric surface (water level) during February and March 1991, and water-level changes during 1969-91 for the Chicot equivalent aquifer system. Hydrographs of water levels in selected wells completed in the aquifer system also are presented. Water-level data are on file at the U.S. Geological Survey in Baton Rouge, La.

The maps in this report can be used for determining direction of ground-water flow, hydraulic gradients, and the effects of withdrawals on the ground-water system. The rate of ground-water movement can be estimated from the gradient when the hydraulic conductivity of the aquifer is known.

HYDROGEOLOGY

The Chicot equivalent aquifer system consists of southerly dipping deposits of silt, sand, and gravel separated by discontinuous units of clay and sandy clay. These deposits crop out throughout the study area except in the floodplains of major streams where they are overlain by similar, younger alluvial deposits.

In the northern half of the study area, the Chicot equivalent aquifer system consists of upland terrace deposits of Pleistocene age and contains large amounts of sand and gravel. These deposits generally range from 100 to 400 feet in thickness and are present throughout most of the study area. This part of the Chicot equivalent aquifer system is referred to as the shallow aquifer in reports on this area by Nyman and Fayard (1978, p. 13-19) and Tomaszewski (1988, p. 8-16) (fig. 1). These deposits are hydraulically connected to the major streams in the study area and supply base flow to many of them. The aquifer is thickest beneath the flood plains of the major streams, and in many areas has the potential to yield large quantities of water (Nyman and Fayard, 1978, p. 13-19).

In the southern half of the study area, the upland terrace deposits dip beneath younger Coastal Plain deposits. The subsurface equivalents of the upland terrace deposits are the upper Ponchatoula aquifer in the east, and the "400-foot" and "600-foot" sands in the west (fig. 1). In the extreme southern part of the study area, these deposits become finer grained and more discontinuous, and locally contain salty water (Nyman and Fayard, 1978, p. 20-21).

Sand and gravel deposits in the terrace overlying the lower part of the Chicot equivalent aquifer system generally are less than 100 feet thick. These deposits generally are finer grained and less continuous than the upland terrace deposits, and are hydraulically connected to them in the central part of the study area (Nyman and Fayard, 1978, p. 19-20). These deposits are correlative with the Gonzales-New Orleans aquifer to the south (Tomaszewski, 1988, p. 6-8).

Recharge to the aquifer system occurs primarily in the northern half of the study area by percolation of rainfall into permeable sediments of the shallow aquifer. In the southern half of the study area, the aquifer system is overlain by an areally extensive clay layer that inhibits the movement of water into or out of the aquifer system (Buono, 1983, p. 17).

POTENTIOMETRIC SURFACE

The map of the potentiometric surface of the Chicot equivalent aquifer system (fig. 2) was constructed using water-level data from wells completed in aquifers in this system (table 1). During February and March of 1991, the water levels in the aquifer system ranged from just below sea level in St. Tammany Parish, in the extreme southern part of the study area, to more than 260 feet above sea level along the northern edge of the study area in St. Helena and Washington Parishes (table 1; fig. 2).

Ground water flows from areas of higher to lower head, and the direction of flow is perpendicular to the potentiometric surface. In the study area, ground-water flow is generally to the south along the dip of the sediments. In the northern part of the study area, however, ground-water discharge into surface drainage alters the direction of flow locally, most notably in the Amite, Bogue Chitto, and Pearl River Basins.

EXPLANATION

- — — — — FAULT—Hachures on downthrown side. Dashed where approximately located
- — — — — POTENTIOMETRIC CONTOUR—Shows altitude at which water level would have stood in tightly cased wells. Dashed where approximately located. Contour interval 20 feet. Datum is sea level
- GENERAL DIRECTION OF GROUND-WATER MOVEMENT
- 879 CONTROL POINT AND WELL NUMBER



Table 1. Water-level data used to construct potentiometric-surface map of the Chicot equivalent aquifer system, February through March 1991
[+, water level is above land surface; -, water level is below sea level; --, information not available]

Well number	Well depth (in feet)	Aquifer	Water level (land surface datum, in feet)	Water level (sea level datum, in feet)	Date
Livingston Parish					
Li-121	300	Shallow	0.92	5.08	3-15
Li-143	114	Shallow	7.22	55.78	3-13
Li-148	51	Shallow	12.90	29.10	3-13
Li-164	315	Shallow	8.3	20.17	3-22
Li-169	260	Shallow	9.14	75.86	3-28
Li-172B	290	"400-foot"	6.57	26.43	3-25
Li-187	400	Shallow	+2.75	9.75	3-14
Li-197	300	Shallow	19.49	60.51	3-27
Li-202	347	Shallow	+5.60	20.60	3-14
Li-205	330	Shallow	12.73	7.27	3-15
Li-206	26	Shallow	1.37	63.63	3-26
Li-209	305	"400-foot"	21.44	37.56	3-27
Li-214	30	Shallow	18.41	20.59	3-28
Li-216	360	"400-foot"	3.00	26.00	3-25
Li-224	60	Shallow	6.28	25.72	3-14
Li-226	250	Shallow	19.78	46.22	3-21
Li-230	398	"400-foot"	16.13	3.87	3-25
Li-231	298	"400-foot"	8.86	28.14	3-21
Li-233	293	"400-foot"	19.72	50.28	3-26
Li-238	269	"400-foot"	21.72	43.28	3-21
Li-243	50	Shallow	9.19	72.81	3-13
Li-251	472	Shallow	6.58	.42	3-22
Li-255	300	Shallow	1.17	3.83	3-15
Li-259	260	"400-foot"	15.02	64.98	3-26
St. Helena Parish					
SH-25	118	Shallow	62.37	205.63	3-4
SH-28	116	Shallow	47.68	135.32	3-6
SH-37	175	Shallow	70.58	174.42	3-5
SH-42	150	Shallow	23.26	186.74	3-6
SH-46	120	Shallow	31.65	153.35	3-5
SH-48	--	Shallow	56.49	188.51	3-4
SH-50	210	Shallow	30.58	121.42	3-6
SH-52	100	Shallow	31.12	110.88	3-5
SH-53	25	Shallow	14.97	155.03	3-4
SH-54	100	Shallow	42.45	192.55	3-5
SH-56	160	Shallow	6.95	70.05	3-5
SH-58	130	Shallow	42.17	199.83	3-5
SH-60	100	Shallow	48.09	242.91	3-4
SH-61	50	Shallow	9.13	150.87	3-5
SH-63	20	Shallow	3.59	196.41	3-4
SH-74	100	Shallow	37.28	222.72	3-4
SH-75	40	Shallow	4.78	103.22	3-6
SH-76	80	Shallow	15.78	234.22	3-4
SH-77	170	Shallow	68.99	261.01	3-4
SH-78	125	Shallow	70.86	219.14	3-4
St. Tammany Parish					
ST-602	39	Shallow	14.31	23.69	2-8
ST-604	66	Shallow	7.44	57.56	2-8
ST-611	24	Shallow	.79	27.21	2-6
ST-615	34	Shallow	5.47	32.53	2-11
ST-620	100	Shallow	48.77	101.23	2-7
ST-626	66	Shallow	15.01	52.99	2-7
ST-628	162	Shallow	7.52	17.48	2-11
ST-634	80	Shallow	49.82	124.18	2-7
ST-640	90	Shallow	33.72	121.28	2-7
ST-642	110	Shallow	41.46	96.54	2-8
ST-680	24	Shallow	10.95	73.05	2-6
ST-684	630	Upper Ponchatoula	+11.25	29.25	2-7
ST-744	320	Upper Ponchatoula	4.60	.40	2-12
ST-793	608	Upper Ponchatoula	11.92	3.08	2-15
ST-802	722	Upper Ponchatoula	7.62	-2.62	2-12
ST-809	135	Shallow	7.06	22.94	2-11
ST-849	167	Shallow	17.57	22.43	2-7
ST-852	396	Upper Ponchatoula	+4.35	9.35	2-11
ST-853	75	Shallow	36.86	108.14	2-8
ST-856	145	Shallow	54.73	100.27	2-7
ST-873	590	Upper Ponchatoula	6.52	7.48	2-6
ST-879	95	Shallow	7.61	82.39	2-7
ST-903	250	Shallow	20.65	.65	2-12
ST-911	300	Shallow	12.49	82.51	2-6
ST-917	100	Shallow	22.83	35.17	2-8
ST-921	620	Upper Ponchatoula	9.18	32.82	2-7
St. Tammany Parish--Continued					
ST-926	105	Shallow	4.16	25.84	2-8
ST-928	260	Shallow	15.00	2.00	2-4
ST-933	560	Upper Ponchatoula	13.43	1.57	2-5
ST-940	100	Shallow	13.93	91.07	2-8
ST-942	145	Shallow	19.33	6.67	2-12
ST-943	330	Shallow	6.82	10.18	2-13
ST-954	120	Shallow	61.59	93.41	2-8
ST-956	400	Shallow	14.46	2.54	2-11
ST-969	360	Shallow	4.68	.32	2-12
Tangipahoa Parish					
Ta-19	535	Upper Ponchatoula	+12.20	17.20	2-14
Ta-320	80	Shallow	24.28	155.72	2-26
Ta-328	505	Upper Ponchatoula	3.77	28.23	2-15
Ta-330	95	Shallow	7.04	127.96	2-28
Ta-346	94	Shallow	9.02	40.98	2-15
Ta-348	180	Shallow	23.38	109.62	2-28
Ta-351	127	Shallow	67.95	132.05	2-26
Ta-358	65	Shallow	28.32	101.68	2-26
Ta-362	43	Shallow	19.47	245.53	2-27
Ta-364	95	Shallow	61.13	238.87	2-27
Ta-372	130	Shallow	81.51	80.49	2-25
Ta-373	109	Shallow	49.26	155.74	2-26
Ta-385	100	Shallow	55.04	97.96	2-26
Ta-395	110	Shallow	36.52	193.48	2-28
Ta-406	92	Shallow	18.12	201.88	2-28
Ta-413	120	Shallow	38.60	58.40	2-25
Ta-427	88	Shallow	18.75	221.25	2-27
Ta-478	366	Shallow	75.35	194.65	2-28
Ta-481	535	Upper Ponchatoula	1.92	24.08	2-14
Ta-496	55	Shallow	10.57	82.43	3-1
Ta-502	215	Shallow	11.96	54.04	2-15
Ta-515	160	Shallow	11.38	46.22	2-25
Ta-518	217	Shallow	62.24	158.76	2-26
Ta-529	53	Shallow	10.77	66.23	3-1
Ta-533	435	Upper Ponchatoula	4.48	23.68	2-14
Ta-536	100	Shallow	36.78	225.22	2-27
Ta-543	200	Shallow	20.32	44.68	2-25
Ta-549	90	Shallow	37.93	242.07	2-27
Ta-550	210	Shallow	4.10	28.90	2-13
Ta-556	135	Shallow	15.49	88.51	3-1
Ta-557	200	Shallow	4.88	23.68	2-13
Ta-567	120	Shallow	32.62	82.38	2-25
Ta-574	145	Shallow	59.37	180.63	2-26
ST-922	100	Shallow	10.00	48.00	2-25
Washington Parish					
Wa-13	156	Shallow	7.43	87.57	3-8
Wa-67	107	Shallow	38.54	176.46	3-12
Wa-70	90	Shallow	32.56	229.44	3-12
Wa-73	75	Shallow	26.92	133.08	2-27
Wa-74	66	Shallow	56.18	158.82	2-27
Wa-76	127	Shallow	60.70	200.30	3-12
Wa-79	310	Shallow	42.50	215.50	3-12
Wa-94	100	Shallow	14.56	110.44	3-8
Wa-114	168	Shallow	47.66	212.34	2-28
Wa-115	198	Shallow	134.04	165.96	2-28
Wa-116	172	Shallow	17.07	162.93	3-5
Wa-161	60	Shallow	42.75	261.25	2-28
Wa-162	270	Shallow	4.90	110.90	2-27
Wa-163	120	Shallow	65.99	134.01	3-7
Wa-164	95	Shallow	45.63	199.37	3-12
Wa-165	100	Shallow	64.66	267.34	3-6
Wa-166	185	Shallow	77.49	191.51	3-6
Wa-167	140	Shallow	57.27	148.73	3-6
Wa-168	253	Shallow	1.30	110.70	3-5
Wa-169	90	Shallow	45.47	254.53	3-11
Wa-170	120	Shallow	48.26	151.74	3-5
Wa-171	165	Shallow	3.87	131.13	3-7
Wa-172	75	Shallow	39.03	206.97	3-11
Wa-173	80	Shallow	3.28	146.72	3-7
Wa-174	232	Shallow	11.68	88.32	3-4
Wa-175	100	Shallow	31.20	188.80	3-7
Wa-176	132	Shallow	55.83	109.17	3-8

System	Series	Aquifer or aquifer system			
		Southeastern Louisiana ¹		Southwestern Louisiana ²	Louisiana
		West	East		
Quaternary	Holocene and Pleistocene	Chicot equivalent aquifer system	Upland terrace aquifer	Upland terrace aquifer	Chicot aquifer system
			Shallow sands	Shallow sands	
			"400-foot" sand	Upper Ponchatoula aquifer	