

Potentiometric Surface of the Upper and Middle Floridan Aquifers in South Carolina, November–December 2024

by
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The Upper Floridan and Middle Floridan aquifers are the source of water for many public, industrial, and agricultural supplies in the southwestern portion of the South Carolina Coastal Plain. To help identify and assess existing or potential problems related to groundwater withdrawals from the aquifer, the South Carolina Department of Environmental Services (SCDES) routinely measures the static (nonpumping) water level in wells open to the aquifers. Water levels are measured in numerous wells located throughout the aquifers at about the same time, and those water-level measurements are converted to potentiometric elevations and used to produce a contoured potentiometric surface map, which shows the elevation where water would stand in tightly cased wells completed in the aquifer.

This map uses the boundaries of the Paleogene-age Upper and Middle Floridan aquifers as defined by Aadland and others (1995) and Gellici and Lautier (2010). In the updip areas (Aiken and Barnwell Counties), the Upper and Middle Floridan aquifers are generally hydraulically connected and were mapped at the Savannah River Site (SRS) as a single aquifer—the Upper Three Runs aquifer—which is the (unconfined) water table aquifer at SRS (Aadland and others 1995). For this map, the Upper Three Runs aquifer is treated as part of the Upper and Middle Floridan aquifers. The lowermost portion of the Upper Three Runs aquifer at SRS in Aiken County is mapped as the Steed Pond aquifer, and wells completed in the middle to upper portions of the Steed Pond are included in this map. On this map, the areas shaded in yellow and green represent the unconfined portions of the aquifers. A more thorough description of these updip regions can be found in Wachob and others (2017).

The November–December 2024 potentiometric surface map for the Upper and Middle Floridan aquifers were constructed from water levels collected at 109 wells. Of that total, 65 wells are open to or screened in the Upper Floridan, 39 are open to or screened in the Middle Floridan, 3 are open to both the Upper and Middle Floridan aquifers, one is open to the Middle Floridan and Gordon aquifers, and one is open to the Upper and Middle Floridan and Gordon aquifers. Water-level measurements from 14 Upper Floridan wells near the coast were corrected to account for groundwater-level fluctuations due to tide.

Potentiometric elevations ranged from a high of 282 feet in Barnwell County to a low of -38 feet in southern Jasper County. Groundwater flow is generally toward the southeast, and the potentiometric low near Savannah, Georgia continues to impact water levels and the groundwater flow direction in southern Beaufort and Jasper Counties. No significant changes were observed from the 2021 map (Czwartacki and Wachob, 2022).

In Beaufort County, potentiometric levels north of the Broad River were generally positive, while south of the Broad River levels were negative, decreasing steadily toward the southwest. In coastal wells having water levels at or below sea level, saltwater intrusion is a chronic problem.

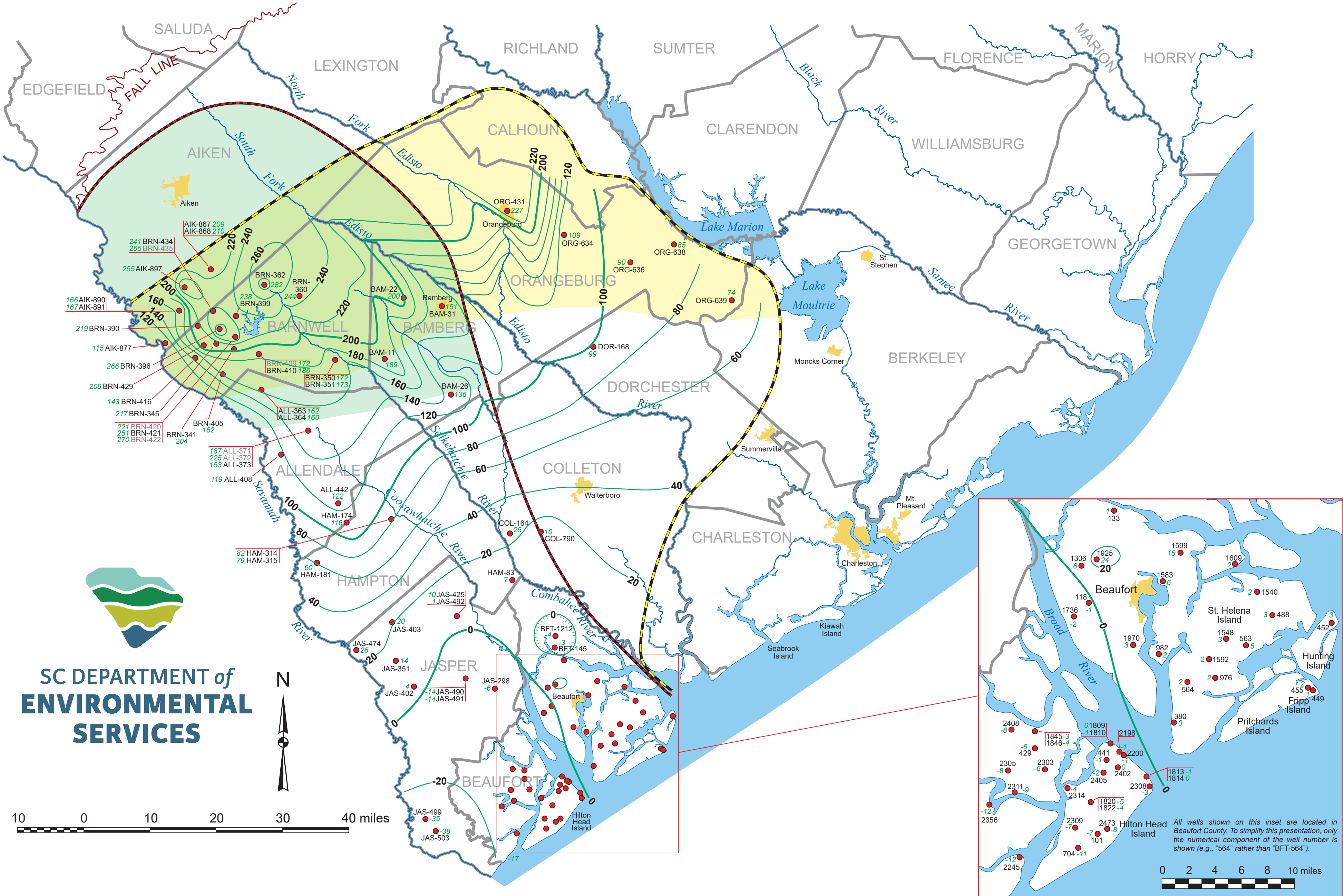
At SRS, in Aiken and Barnwell Counties, a potentiometric high creates a local groundwater divide. West of the divide, groundwater flow is directed toward the Savannah River; east of the divide, flow is directed towards the Edisto River. This groundwater flow pattern likely results from the absence of a confining layer above the aquifer, allowing groundwater to flow as an unconfined water table. There is likely some connection between groundwater and surface water systems in this area.

Acknowledgements

Water level measurements were collected by SCDES and the Savannah River National Laboratory. The authors are grateful for the cooperation of the many well owners who provided the access to their wells needed to obtain the water level measurements used for this map.

References

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- Gellici, J.A., and Lautier, J.C., 2010, Hydrogeologic framework of the Atlantic Coastal Plain, North and South Carolina, in Campbell, B.G., and Coes, A.L., eds., Groundwater availability in the Atlantic Coastal Plain of North and South Carolina: U.S. Geological Survey Professional Paper 1773, p. 49–162.
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Well ID	Aquifer*	2024 potentiometric elevation (ft NAVD88)	2024 water level (ft)**	Change in water level (ft) since 2021****
AIK-867	UF	209	53	-3
AIK-868	MF	210	51	2
AIK-877	MF	115	36	6
AIK-890	MF	166	101	4
AIK-891	UF	167	99	4
AIK-897	MF	255	100	0
ALL-363	UF	162	83	-3
ALL-364	MF	160	84	-2
ALL-371	MF	187	94	-1
ALL-372	UF	225	57	-4
ALL-373	MF	153	126	-1
ALL-408	UF/MF	119	21	1
ALL-442	UF	122	17	3
BAM-11	UF/MF	189	21	7
BAM-22	MF/G	200	29	3
BAM-26	MF	136	5	4
BAM-31	MF	151	8	4
BFT-101	UF	-7	20	2
BFT-118	UF	-1	23	-3
BFT-133	UF	1	10	-1
BFT-145	UF	-3	24	-2
BFT-380	UF	0 †	6	0
BFT-429	UF	-6	25	0
BFT-441	UF	-1 †	11	-1
BFT-449	UF	1 †	4	0
BFT-452	UF	3	3	-1
BFT-455	UF	2	4	0
BFT-488	UF	3	9	-2
BFT-563	UF	5	14	-1
BFT-564	UF	2	15	-1
BFT-704	UF	-11	19	0
BFT-976	UF	2	5	2
BFT-982	UF	2 †	9	2
BFT-1212	UF	-4	28	-3
BFT-1306	UF	6	29	-2
BFT-1540	UF	2	10	-2
BFT-1548	UF	3	22	-1
BFT-1583	UF	6	11	-1
BFT-1592	UF	2	21	-1
BFT-1599	UF	15	5	-1
BFT-1609	UF	2	4	0
BFT-1736	UF	-2	23	-1
BFT-1809	MF	0	12	1
BFT-1810	UF	-1	13	0
BFT-1813	MF	-1	11	1
BFT-1814	UF	0	11	0
BFT-1820	MF	-5	15	0
BFT-1822	UF	-4	14	0
BFT-1845	MF	-3	17	0
BFT-1846	UF	-4	18	0
BFT-1925	UF	24	14	-2
BFT-1970	UF	3 †	6	4
BFT-2198	UF	-1 †	18	0
BFT-2200	UF	-1 †	19	0
BFT-2245	UF	-12	23	-1

* UF: Upper Floridan; MF: Middle Floridan; G: Gordon.
** Depth to water from land surface. Negative value indicates flowing well.
*** Change in water level from measurement made for 2021 potentiometric map. Positive number indicates higher water level in 2024.
† Water level has been corrected for tidal influences.
‡ Water level is an average calculated from hourly measurements recorded in monitoring well.

Well ID	Aquifer*	2024 potentiometric elevation (ft NAVD88)	2024 water level (ft)**	Change in water level (ft) since 2021****
BFT-2303	UF	-6	21	-1
BFT-2305	UF	-8 †	30	0
BFT-2308	UF	-3 †	11	-2
BFT-2309	UF	-7 †	15	0
BFT-2311	UF	-9 †	14	0
BFT-2314	UF	-4 †	12	1
BFT-2356	UF	-12	27	1
BFT-2402	UF	0 †	15	0
BFT-2405	UF	-2 †	16	0
BFT-2408	UF	-8	28	0
BFT-2473	UF/MF/G	-8	26	1
BRN-341	MF	204	32	7
BRN-345	MF	217	36	7
BRN-350	MF	172	34	-3
BRN-351	UF	173	34	-3
BRN-360	MF	244	20	-1
BRN-362	MF	282	50	3
BRN-390	MF	219	78	1
BRN-396	MF	266	32	5
BRN-399	MF	238	50	5
BRN-405	UF	162	45	5
BRN-409	MF	172	44	4
BRN-410	UF	186	30	5
BRN-416	UF	143	39	4
BRN-420	MF	221	92	4
BRN-421	MF	251	63	5
BRN-422	UF	270	43	5
BRN-429	UF/MF	209	56	1
BRN-434	MF	241	34	3
BRN-435	UF	265	9	5
COL-164	MF	25	44	1
COL-790	MF	10	82	1
DOR-168	MF	99	2	4
HAM-83	UF	7	38	1
HAM-174	MF	116	29	2
HAM-181	MF	60	26	4
HAM-314	UF	82	24	0
HAM-315	MF	79	26	0
JAS-298	UF	-6	22	-2
JAS-351	UF	14	42	0
JAS-402	UF	4	50	-1
JAS-403	UF	20	50	1
JAS-425	UF	10	55	n/a
JAS-474	MF	26	10	0
JAS-490	MF	-14	44	-4
JAS-491	UF	-14	44	-4
JAS-492	MF	1	61	-3
JAS-499	UF	-35	45	-1
JAS-503	UF	-38	47	0
ORG-431	MF	227 ‡	29	-1
ORG-634	MF	109 ‡	53	-2
ORG-636	MF	90	22	3
ORG-638	MF	85	43	0
ORG-639	MF	74	15	-2

EXPLANATION

Potentiometric contour for the Upper Floridan and Middle Floridan aquifers, in feet above vertical datum (NAVD88); dashed where inferred

Measured well, with county well number and potentiometric elevation. For sites having multiple wells screened in different zones, a gray well number indicates the measurement was not used for contouring.

Approximate updip limit of Upper Floridan aquifer

Approximate area in which Upper Floridan aquifer is unconfined

Approximate updip limit of Middle Floridan aquifer

Approximate area in which Middle Floridan aquifer is unconfined