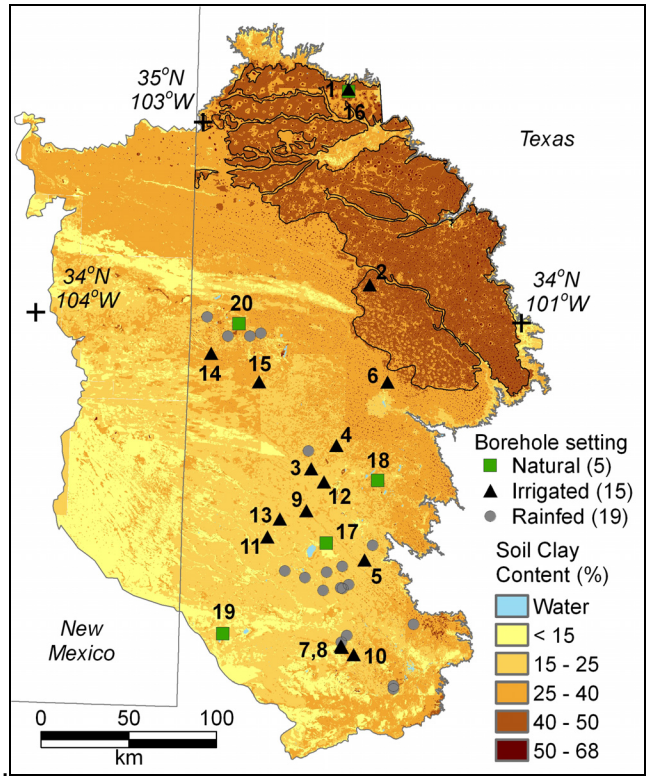

Figure A1. Soil clay content in the southern High Plains (SSURGO). The extent of the Pullman clay loam is outlined in the northern part of the region. Borehole map reference numbers are shown for natural and irrigated setting boreholes (Table 1). Rain-fed borehole locations from Scanlon et al. (2007) are shown for reference without number designations. Highest clay content category (50% – 68%) is restricted to playa floors.

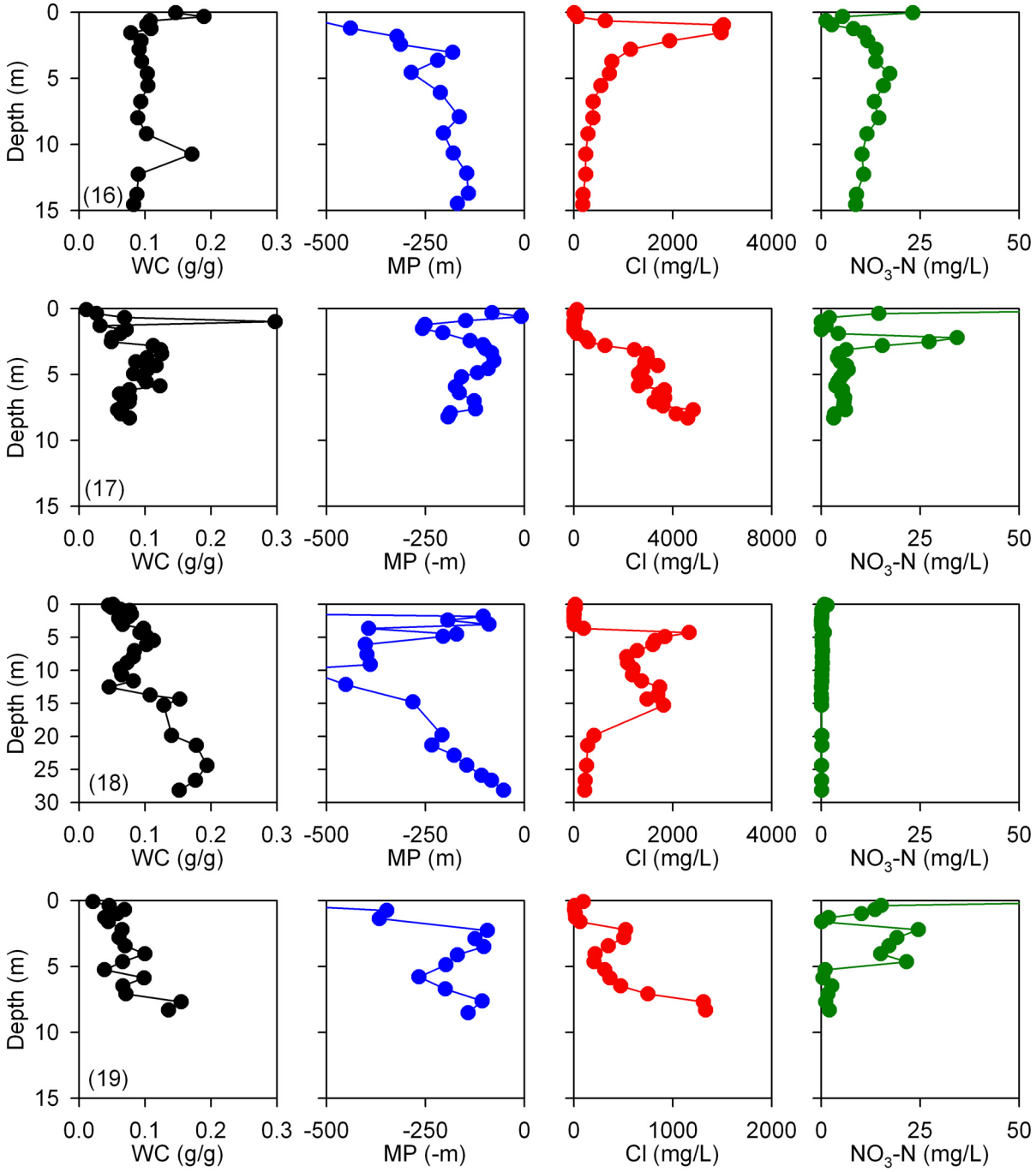

Figure A2. Profiles of water content (WC), matric potential (MP), and chloride and nitrate-N concentrations for boreholes located in natural settings.

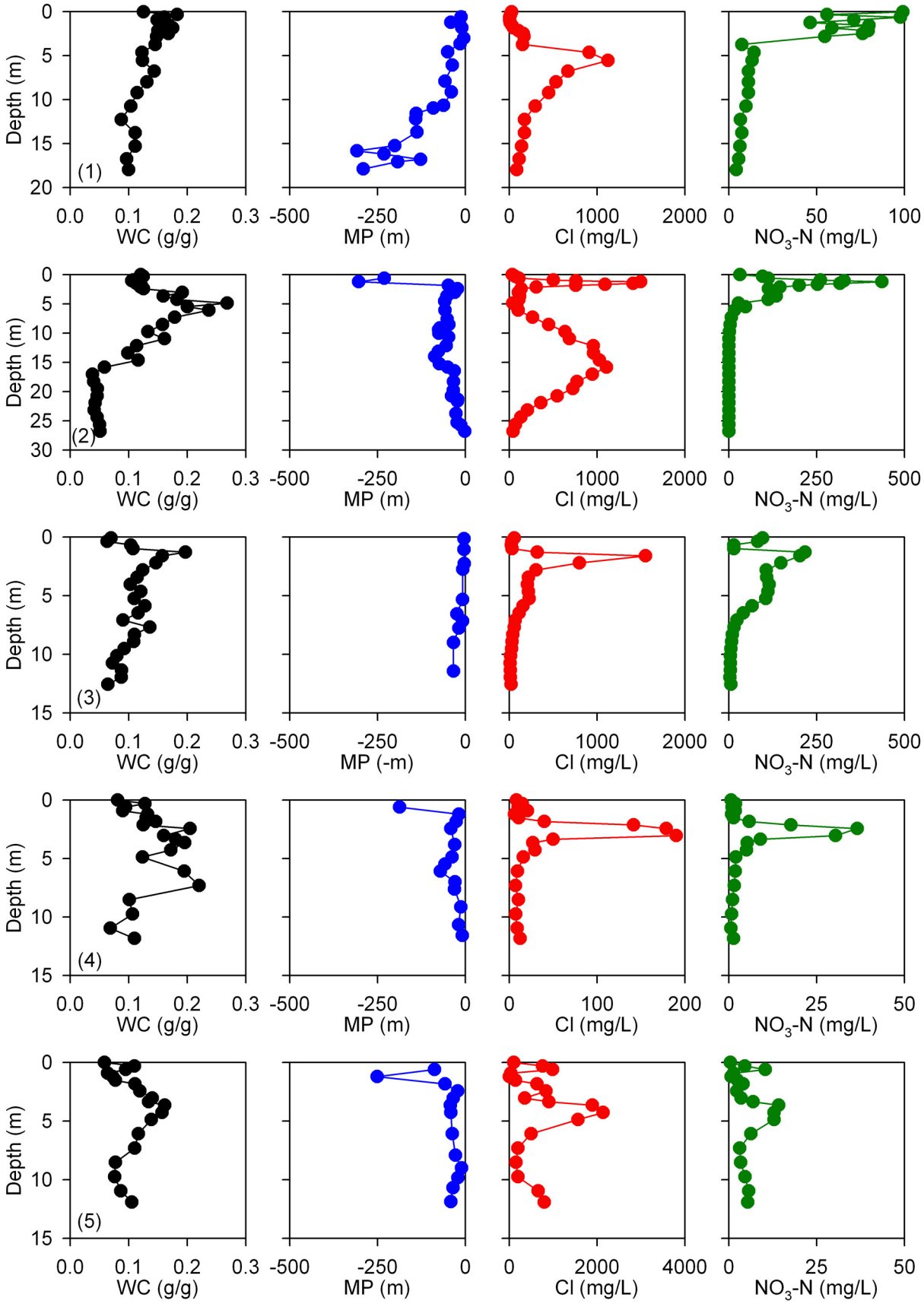

Figure A3. Profiles of water content (WC), matric potential (MP), and chloride and nitrate-N concentrations for boreholes located in irrigated settings.

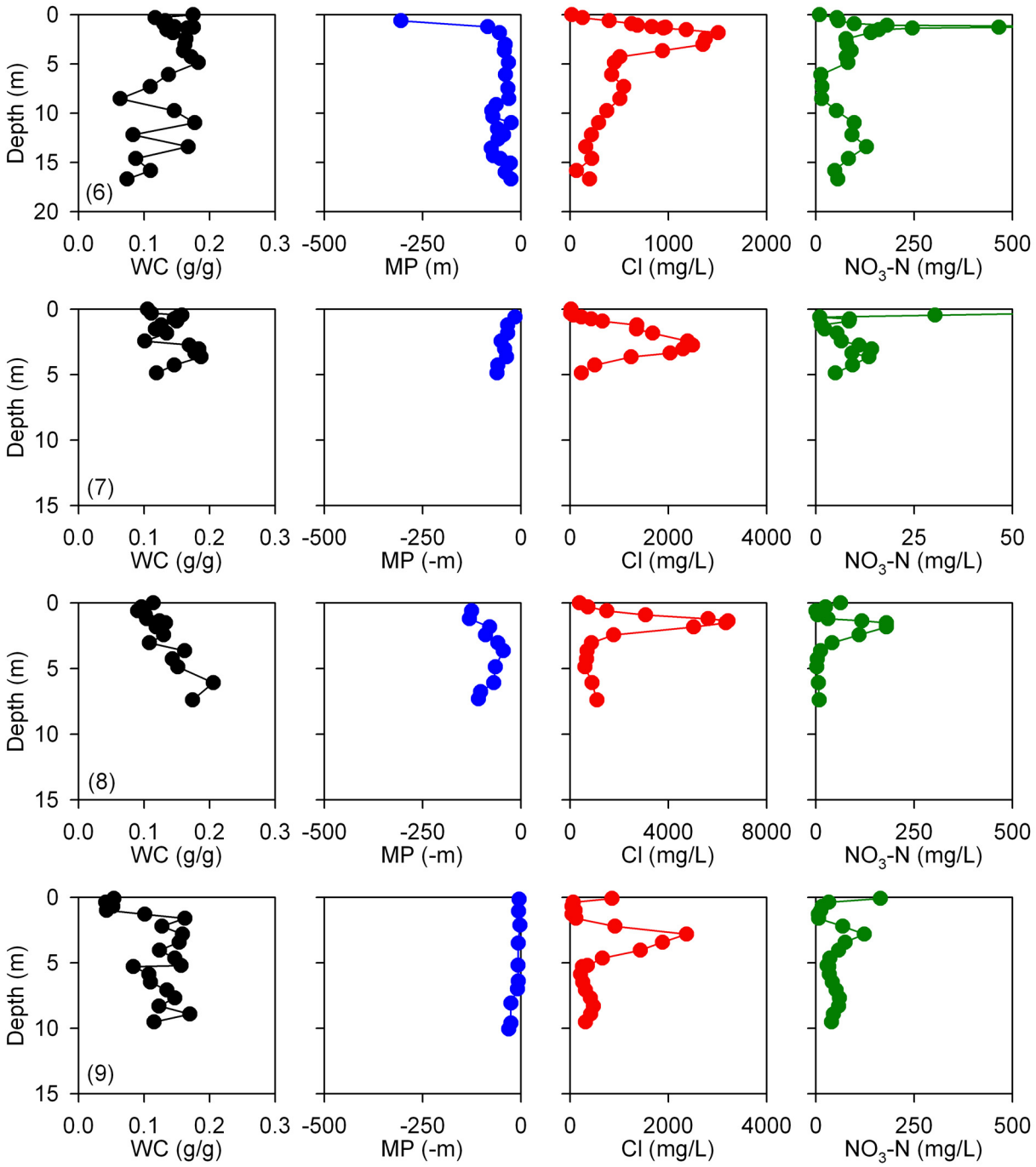

Figure A4. Profiles of water content (WC), matric potential (MP), and chloride and nitrate-N concentrations for boreholes located in irrigated settings.

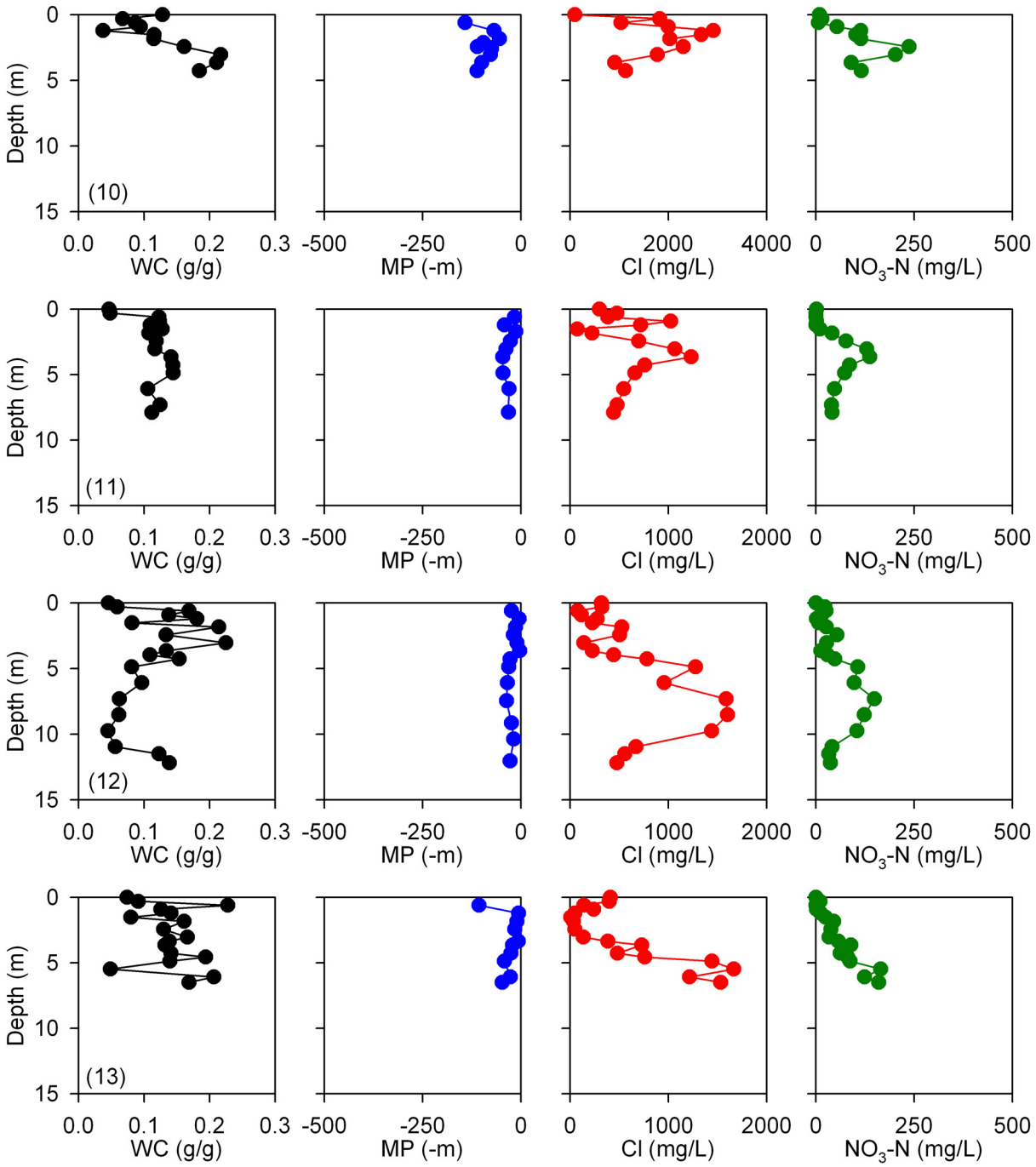

Figure A5. Profiles of water content (WC), matric potential (MP), and chloride and nitrate-N concentrations for boreholes located in irrigated settings.

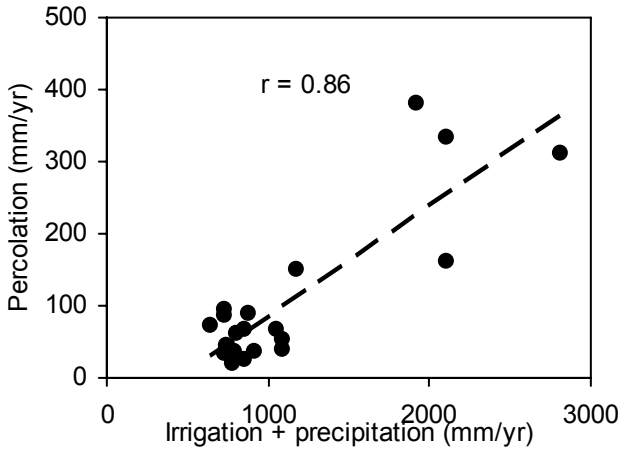

Figure A6. Relationship between irrigation + precipitation and percolation or recharge, including data from this study, McMahon et al. (2006), Stonestrom et al. (2003), and Roark and Healy (1998).

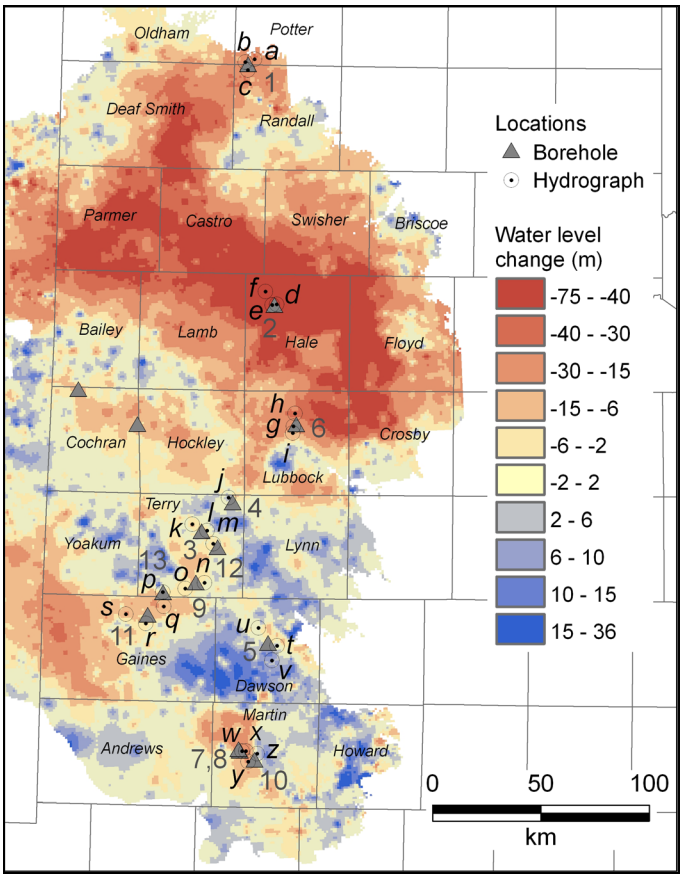

Figure A7. Borehole and well hydrograph locations superimposed on estimated water level changes from predevelopment to 2002 in the study area. Hydrographs for locations a-z are shown in Figure A8 and water table elevation changes are summarized in Table A1.

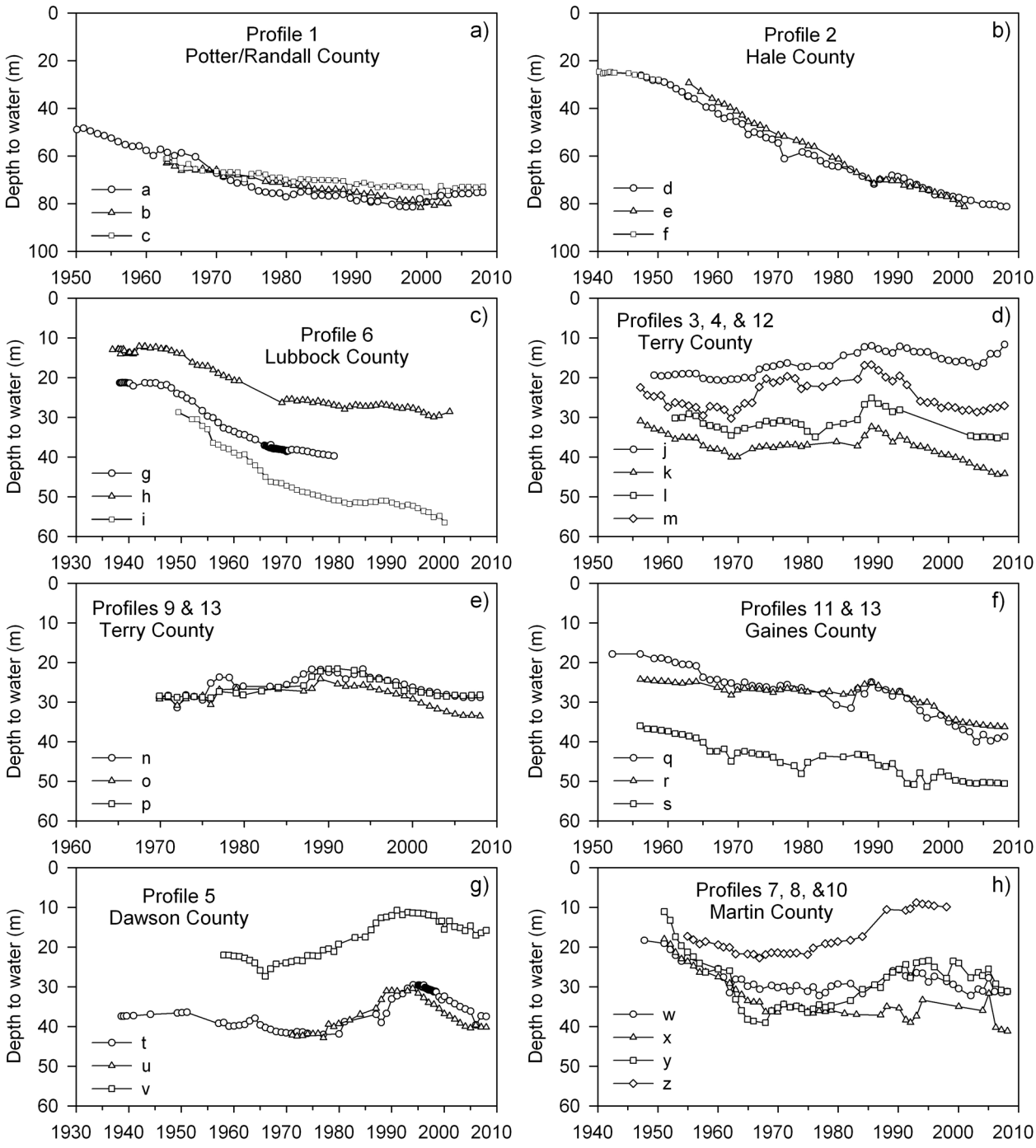

Figure A8. Example hydrographs for wells located near the profile locations. Well locations are shown in Figure A7. Analysis of depth to water changes are given in Table A1.

Table A1. Hydrograph information for wells located near profile locations. Rates associated with periods of increasing water table elevations are shown in bold.

Region	*Figure*	*County*	*Ref.*	*Well ID*	*DTB (m)*	*Period of Record*	*ΔDTW (m)*	*Period*	*Rate (m/a)*	*Period*	*Rate (m/a)*	*Period*	*Rate (m/a)*	*Period*	*Rate (m/a)*	*R mm/a*
SHP-N	a	Potter	a	756702	102	1949-2008	-27	1949-1952	-0.27	1952-1979	-1.02	1979-2008	0.01	-	-	-
			b	756401	109	1962-2003	-17	1962-1984	-0.50	1984-2003	-0.32	-	-	-	-	-
		Randall	c	756501	91	1962-2008	-12	1962-1982	-0.42	1982-1993	-0.31	1993-2008	0.02	-	-	-
	b	Hale	d	1149101	96	1947-2008	-55	1947-1985	-1.20	1988-2008	-0.66	-	-	-	-	-
			e	1149502	97	1955-2001	-52	1955-1985	-1.41	1986-2001	-0.77	-	-	-	-	-
			f	1149504	98	1937-1950	-4	1937-1945	-0.14	1945-1950	-0.55	-	-	-	-	-
SHP-S	c	Lubbock	g	2318403	51	1938-1979	-18	1938-1947	-0.05	1947-1958	-0.99	1958-1970	-0.50	1970-1979	-0.13	-
			h	2318701	39	1936-2001	-16	1936-1945	**0.07**	1945-1961	-0.53	1970-2001	-0.10	-	-	10
			i	2318201	54	1949-2000	-28	1949-1967	-0.97	1967-1982	-0.37	1989-2000	-0.50	-	-	-
	d	Terry	j	2439904	40	1958-2008	8	1958-1993	**0.21**	1993-2004	-0.46	-	-	-	-	31
			k	2446801	54	1956-2008	-13	1956-1969	-0.70	1972-1989	**0.32**	1989-2008	-0.62	-	-	49
			l	2454301	42	1961-2008	-5	1961-1987	-0.02	1989-2003	-0.68	-	-	-	-	-
			m	2455401	37	1956-2008	-5	1956-1969	-0.43	1969-1989	**0.56**	1989-1994	-1.01	1994-2008	-0.38	85
	e	Terry	n	2462901	40	1969-2008	0	1969-1988	**0.38**	1988-2008	-0.36	-	-	-	-	57
			o	2706101	48	1969-2008	-4	1969-1989	**0.26**	1989-2008	-0.49	-	-	-	-	38
			p	2705101	49	1969-2008	0	1969-1991	**0.31**	1991-2008	-0.39	-	-	-	-	47
	f	Gaines	q	2705401	45	1952-2008	-21	1952-1956	-0.01	1956-1986	-0.46	1989-2008	-0.72	-	-	-
			r	2712201	43	1956-2008	-12	1956-1986	-0.12	1989-2008	-0.59	-	-	-	-	-
			s	2703901	60	1956-2008	-15	1956-1978	-0.46	1978-1988	**0.28**	1988-2001	-0.49	2001-2008	-0.12	41
	g	Dawson	t	2809901	46	1938-2008	0	1951-1980	-0.19	1980-1995	**0.81**	1995-2008	-0.60	-	-	122
			u	2809101	52	1971-2008	2	1971-1989	**0.62**	1994-2008	-0.69	-	-	-	-	93
			v	2817501	48	1958-2008	6	1958-1966	-0.67	1966-1988	**0.67**	1998-2008	-0.37	-	-	100
	h	Martin	w	2748501	47	1947-2008	-13	1947-1964	-0.68	1964-1984	-0.09	1989-2008	-0.27	-	-	-
			x	2748504	59	1951-2008	-23	1951-1967	-1.14	1967-2008	-0.12	-	-	-	-	-
			y	2748904	46	1951-2008	-20	1951-1965	-1.97	1965-1995	**0.51**	1995-2008	-0.60	-	-	76
			z	2841402	51	1954-1998	7	1954-1974	-0.23	1974-1998	**0.50**	-	-	-	-	75

Figure: figure panel reference (Figure A8*), County*: well location county name, *Ref.*: hydrograph reference, *Well ID*: well identification number, *DTB*: estimated depth to base of aquifer, *Period of Record*: hydrograph period of record, *ΔDTW*: change in depth to water during the period of record, *Period*: analysis period, *Rate*: mean rate of change in depth to water during the period of record, *R*: estimated recharge rate for periods of rising water tables (assumes specific yield = 0.15).

Land Use History Southern High Plains

USDA Research Operations

(1) Pot07-03
First cultivated in 1917 for 2 yr (rainfed), subsequently returned to natural vegetation. Returned to rain-fed cultivation in 1927. Cropped to continuous wheat or wheat-fallow through 1968, then in annual wheat from 1969 through 1988. Irrigation began in 1989 and continued through 2007 using overhead sprinkler system. Lysimeter records indicate average annual irrigation of 440 mm/yr. Detailed records of irrigation application rates are available for this site.

(2) Hal08-01
First cultivation date is unknown. Estimate 1920. Furrow irrigation began in 1940 and continued through 1982 (average 540 mm/a from 1940 through 1971, 150 mm/a from 1972 through 1982), followed by a rainfed period from 1983 through 1989. A center pivot LEPA system was installed in 1990 and irrigation continued through 2008 (average 280 mm/a). Cropping history includes wheat and/or cotton from 1940 to 1960, cotton or sorghum from 1960 to 1971, and continuous cotton starting in 1982. Overall average annual irrigation estimated to be 380 mm/a.

(5) Daw08-01
First cultivation date is unknown. Estimate 1920. Side-roll sprinkler irrigation began in 1970 and continued through 1979 (380 mm/a), followed by rainfed conditions from 1980 through 1989. A center pivot LEPA irrigation system was installed in 1990 and continued through 2008 (320 mm/a).

(6) Lub08-01
First cultivation date is unknown. Estimate 1920. Furrow irrigation began in about 1955 and continued through 2008 (380 mm/a)

Private Ownership Operations

(3) Ter05-03
First cultivated in 1928 and removed from cultivation from ~ 1963 to 1971. Irrigation began in 1972 and continued to 2005. Cropping history was continuous cotton prior to 1998, with cotton-sorghum-wheat rotation since.

(4) Ter08-03
First cultivated in 1940. Furrow irrigation began in 1961 (200 mm/yr), following by side-roll sprinkler irrigation beginning in 1973 (230 mm/a), followed by center pivot irrigation beginning in 1987 (150 mm/a). Cropping includes cotton-milo-wheat rotation.

(7) Mar08-01
First cultivated in about 1915 for 5 yr and subsequently allowed to return to native vegetation. Center pivot irrigation began about 1985 (350 mm/a). Crops include cotton-wheat-fallow rotation.

(8) Mar08-02
First cultivation date is unknown. Center pivot irrigation began about 1975 (300 mm/a). Crops include cotton-wheat-fallow rotation.

(9) Ter05-04
First cultivation date is unknown, but occurred prior to 1934. Irrigation began in 1960 and continued through 2005. Cropping history is milo or milo-wheat rotation.

(10) Mar08-03
First cultivation date is unknown. Furrow irrigation began in 1956 (200 mm/a) and continued through 2004 when a center pivot system was installed. Crop has been continuous cotton.

(11) Gai08-01
First cultivation date is unknown. Irrigation began in about 1978.

(12) Ter08-01
First cultivated about 1945. Furrow irrigation began about 1955 at an average rate of 510 mm/yr, followed by center pivot irrigation beginning in 1975 at an average rate of about 250 mm/yr (200-300 mm/a).

(13) Ter08-02
First cultivation date is unknown. Furrow irrigation began about 1955 and continued through about 1965, followed by rainfed until 1975 when a center pivot system was installed. Cropping includes cotton and wheat rotation and peanuts