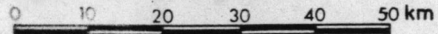
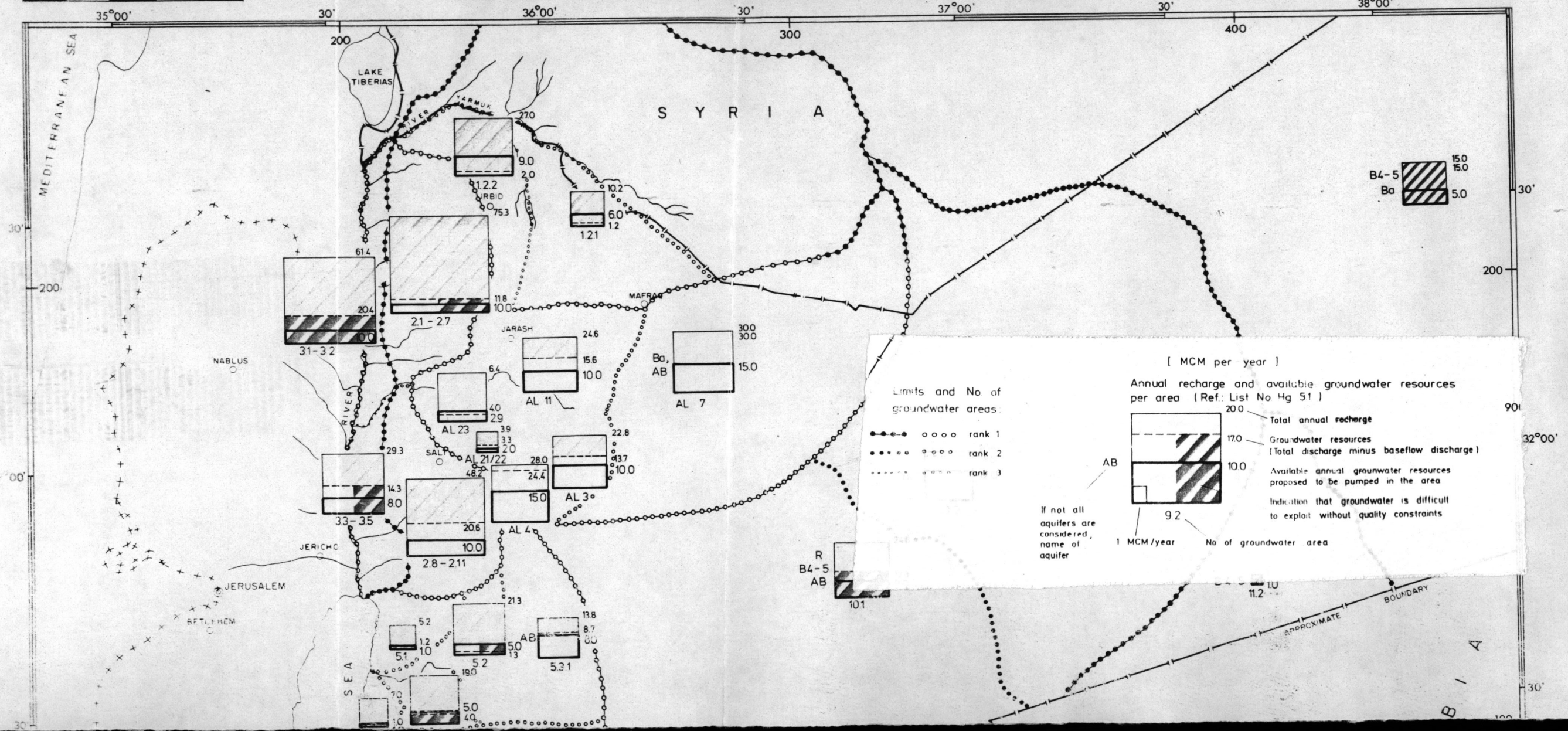


SCALE 1 : 1 000 000



# EXPLOITABLE ANNUAL GROUNDWATER QUANTITY

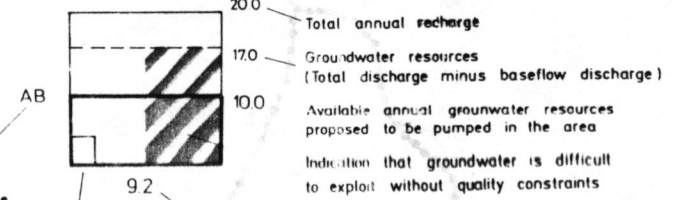
MAP HG-5.2



Limits and No of groundwater areas.

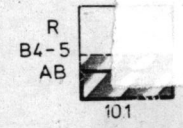
- rank 1
- rank 2
- rank 3

[ MCM per year ]  
Annual recharge and available groundwater resources per area (Ref: List No Hg 51)



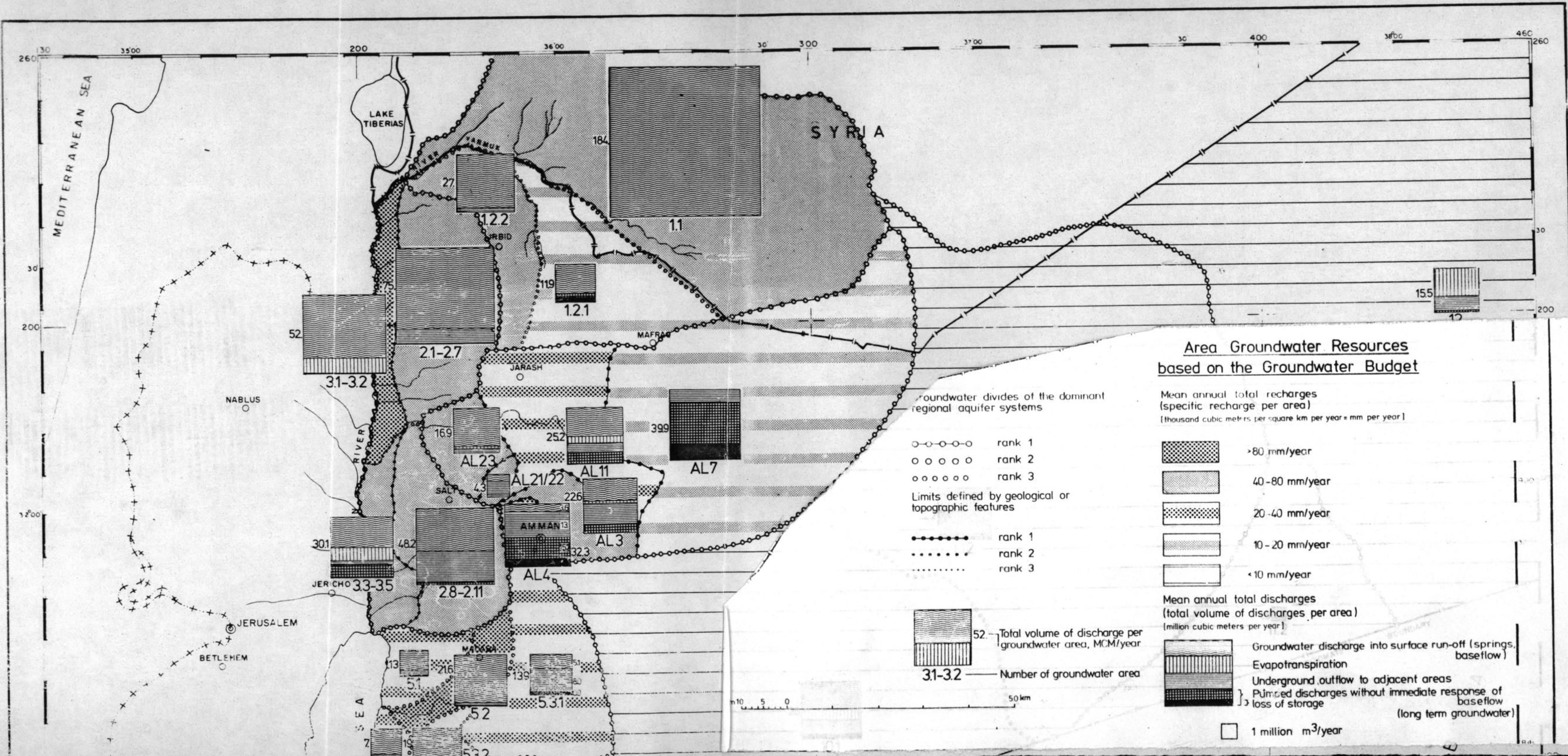
If not all aquifers are considered, name of aquifer

1 MCM/year No of groundwater area



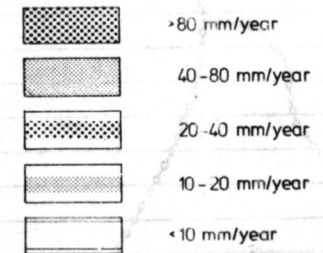
BOUNDARY  
APPROXIMATE

4

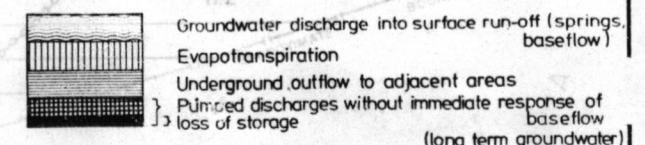


### Area Groundwater Resources based on the Groundwater Budget

Mean annual total recharges (specific recharge per area) [thousand cubic metres per square km per year = mm per year]

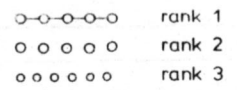


Mean annual total discharges (total volume of discharges per area) [million cubic meters per year]

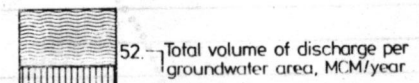
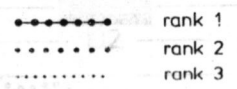


1 million m<sup>3</sup>/year

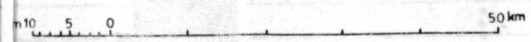
Groundwater divides of the dominant regional aquifer systems



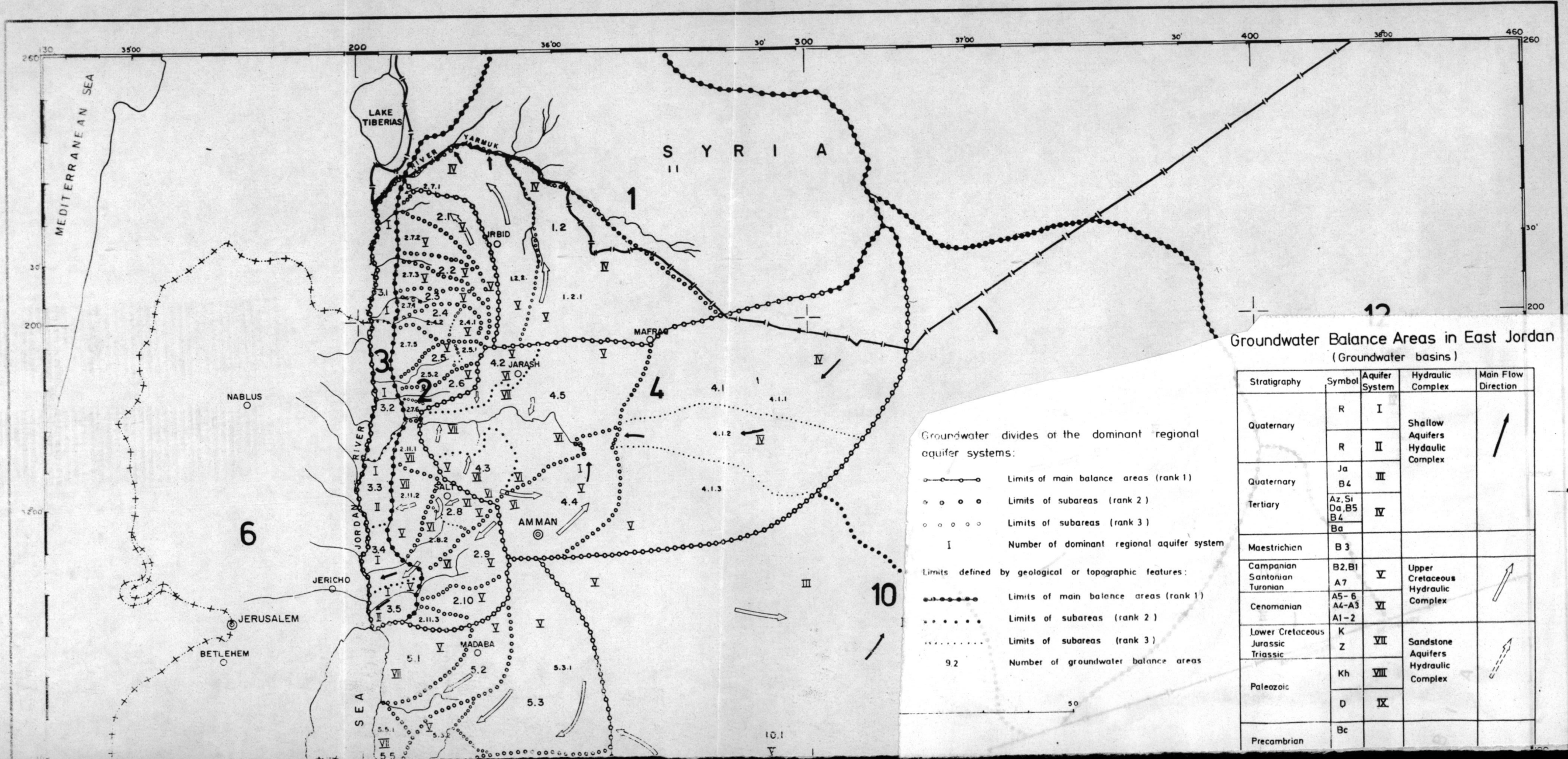
Limits defined by geological or topographic features



31-32 — Number of groundwater area





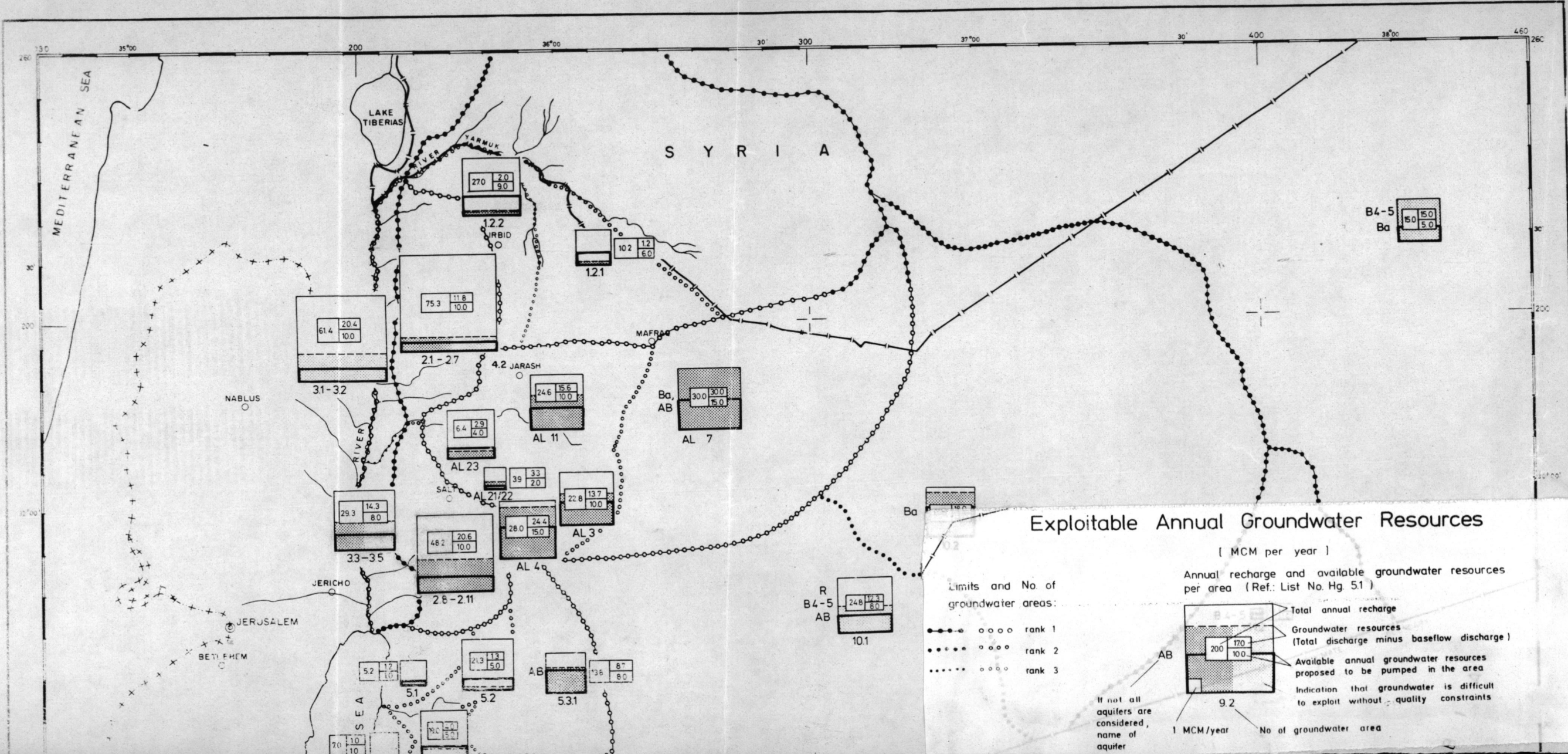


Groundwater Balance Areas in East Jordan  
(Groundwater basins)

Groundwater divides of the dominant regional aquifer systems:

- ○ ○ ○ Limits of main balance areas (rank 1)
- ○ ○ ○ Limits of subareas (rank 2)
- ○ ○ ○ Limits of subareas (rank 3)
- I Number of dominant regional aquifer system
- Limits defined by geological or topographic features:
- ● ● ● Limits of main balance areas (rank 1)
- ● ● ● Limits of subareas (rank 2)
- ● ● ● Limits of subareas (rank 3)
- 9.2 Number of groundwater balance areas

Stratigraphy	Symbol	Aquifer System	Hydraulic Complex	Main Flow Direction
Quaternary	R	I	Shallow Aquifers Hydraulic Complex	↗
	R	II		
Quaternary	Ja	III		
	B4			
	Az, Si			
Tertiary	Da, B5	IV		
	Ba			
Maestrichian	B3			
Campanian	B2, B1	V	Upper Cretaceous Hydraulic Complex	↗
		A7		
Cenomanian	A5-6 A4-A3 A1-2	VI		
Lower Cretaceous	K	VII	Sandstone Aquifers Hydraulic Complex	↗
	Z			
Paleozoic	Kh	VIII		
	D	IX		
Precambrian	Bc			



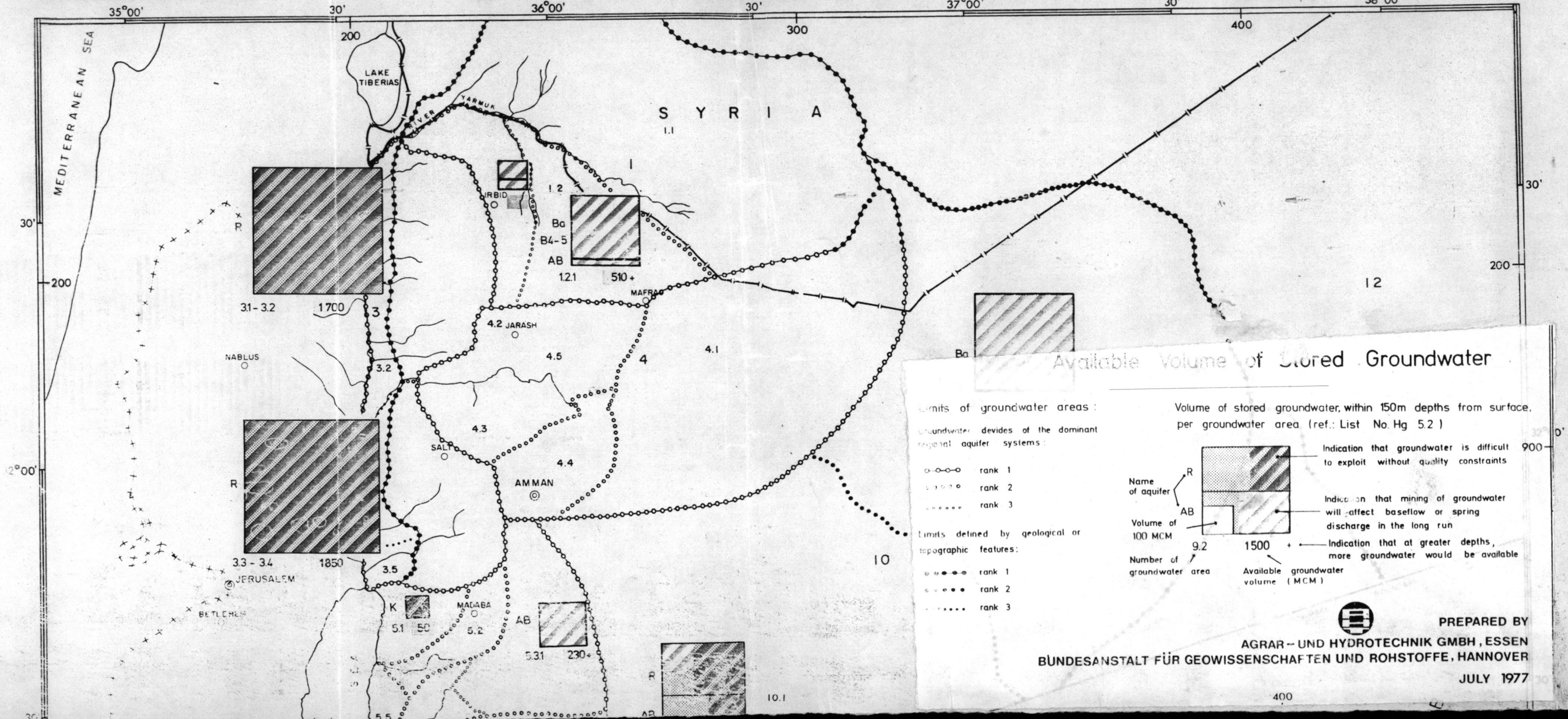


SCALE 1 : 1 000 000

0 10 20 30 40 50 km

# AVAILABLE VOLUME OF STORED GROUNDWATER

MAP HG-5.4



Limits of groundwater areas :

Groundwater divides of the dominant regional aquifer systems :

- rank 1
- rank 2
- ..... rank 3

Limits defined by geological or topographic features :

- rank 1
- rank 2
- ..... rank 3

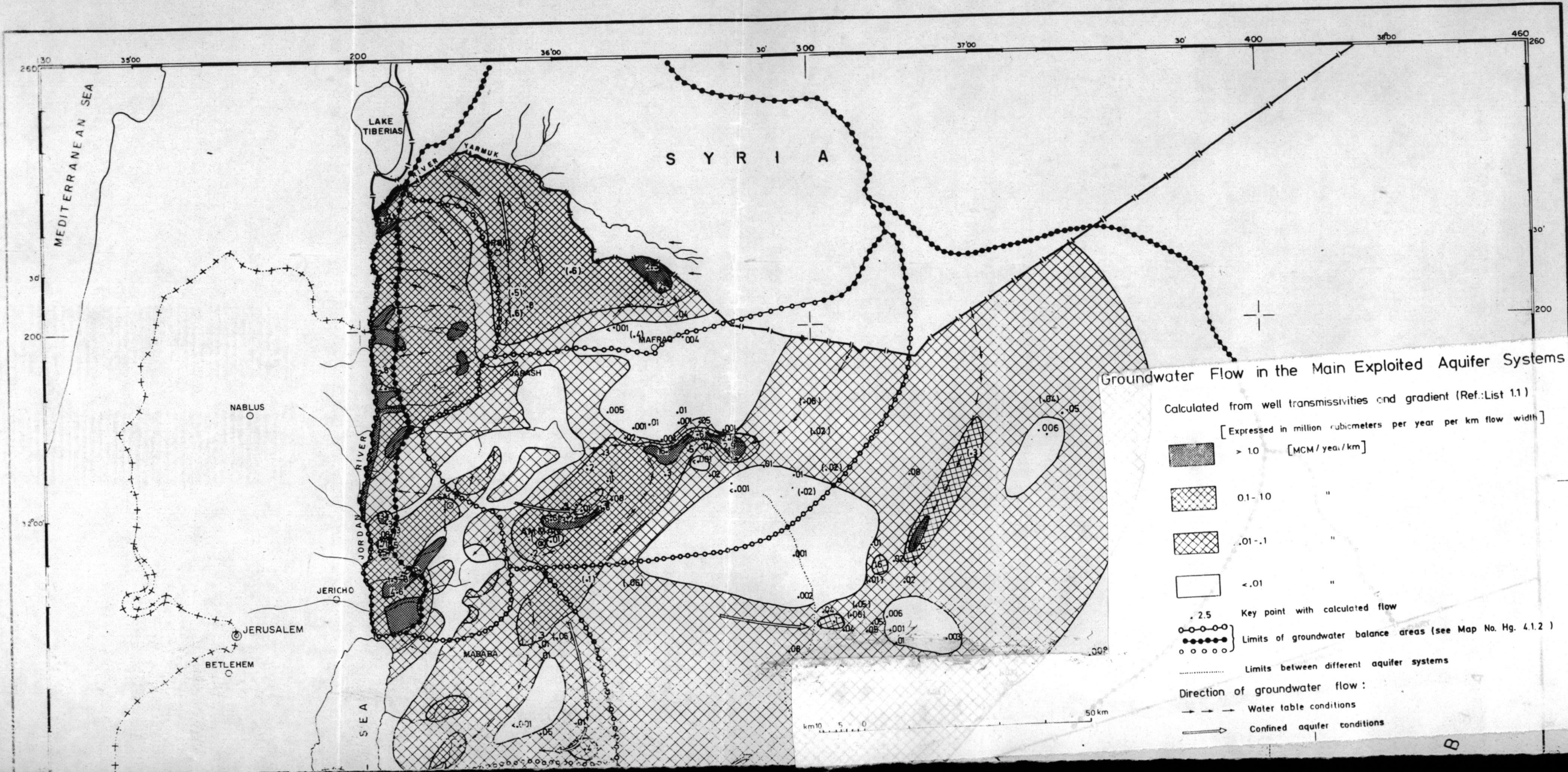
## Available Volume of Stored Groundwater

Volume of stored groundwater, within 150m depths from surface, per groundwater area (ref.: List No. Hg 5.2)

Name of aquifer	R	Indication that groundwater is difficult to exploit without quality constraints
Volume of 100 MCM	9.2	Indication that mining of groundwater will affect baseflow or spring discharge in the long run
Number of groundwater area	1500 +	Indication that at greater depths, more groundwater would be available
Available groundwater volume (MCM)	1500 +	

PREPARED BY  
 AGRAR- UND HYDROTECHNIK GMBH, ESSEN  
 BUNDESANSTALT FÜR GEOWISSENSCHAFTEN UND ROHSTOFFE, HANNOVER  
 JULY 1977





Groundwater Flow in the Main Exploited Aquifer Systems

Calculated from well transmissivities and gradient (Ref.: List 1.1)

[Expressed in million cubic meters per year per km flow width]

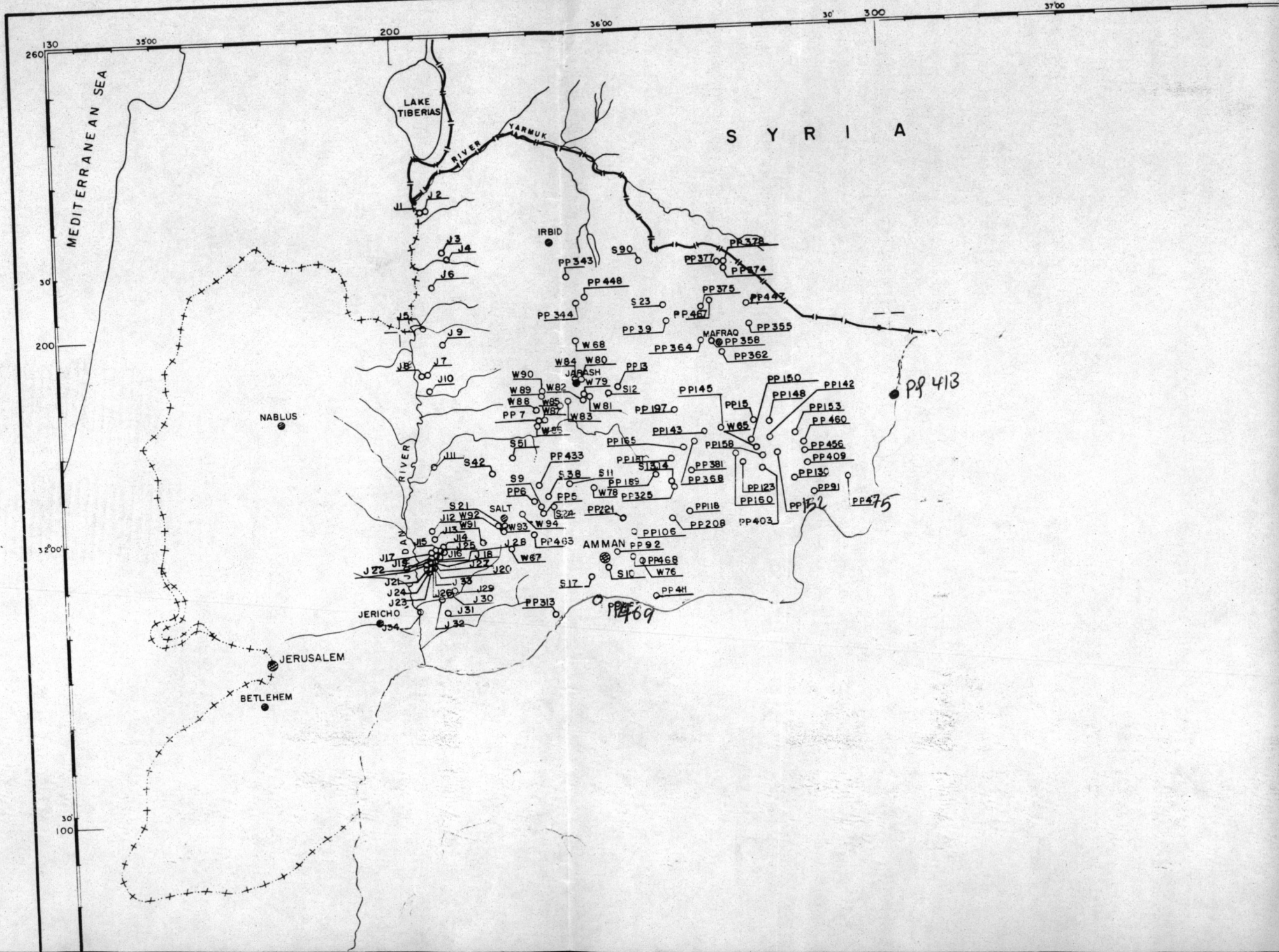
- > 10 [MCM/yea./km]
- 0.1 - 10 "
- .01 - .1 "
- < .01 "

- 2.5 Key point with calculated flow
- Limits of groundwater balance areas (see Map No. Hg. 4.1.2)
- Limits between different aquifer systems

- Direction of groundwater flow:
- Water table conditions
  - Confined aquifer conditions









No of well	Coordinate		Name of well	Surface elevation	Name of aquifer	Depth of aquifer	Thick-ness of aquifer	Depth of water "m"	Water Level A.S.L	Yield tested m <sup>3</sup> /h	spec cap m <sup>2</sup> /h EXP.	Trans-misivity m <sup>2</sup> /d EXP	Permeability m <sup>2</sup> /d EXP	Calculated Flow m <sup>3</sup> /a	Electrical Conductivity $\mu$ s
	E	N													
PP 23	262.900	976.200													
PP 92	239.850	151.470	M.2 Amman	729	AB	63	181	25	704	32	6.5-1	2.2+1		80	770
PP 91	282.550	163.520	Azrag 2	600	AB	W-72	91	92	528	48	<1-1	<.3		<.1	1800
S 10	240.350	150.600	W. Rimah	805	A-1	292	285	111	694	22	2.-1	6.8			
S 17	237.240	149.320	W. Nawr	815	A-4	168	50	22	793	79	9.5-1	4.3+1	8-1	160	160
PP 313	230.300	141.600	A. Jaber	910	A-4	150	75	111	809		<.1-1	<.3			
PP 411	245.000	142.850	Sehab 1	858	B-3	7171		7171	<687					1000	
PP 468	247.800	156.050	Rutheim	693	A-4	307	711	+38	731	31	8.2-1	2.5+1	1.9		625
PP 208	253.160	158.950	Zerga	630	AB	W-48		48	582	110	4.4+2	1.5+4		78000	610
PP 118	256.660	160.060	Ruban	638	AB			97	541	12	8.6-1	2.9+1		70	750
PP 130	279.320	165.870	Hammam 2	585	AB			59	526	10	1.1	3.8+1		18	360
PP 409	281.540	169.300	Hallabat 2	580	Ba	W-61	715	61	519	138	1.42	3+3		600	
PP 456	281.260	171.300	Sahem 2	595	Ba	W-67	733	67	528	143	4.8+2	1.6+4		2900	490
PP 460	281.260	172.075	Dhuleil	603	Ba	W-76	724	76	527	292	4.4+2	1.5+4		2700	700
PP 153	279.700	175.500	Dhuleil 13	610	AB	W-84	741	84	526	<.1-1	<.3		<.1		
PP 142	274.200	174.800	Dhuleil 2	578	Ba	W-54	49	54	524	215	3.1+3	1.1+5		26000	500
PP 148	273.800	177.700	Dhuleil 8	611	Ba	W-91	7	91	520	21	3.4	1.1+2		54	
PP 152	278.400	172.400	= 11	591	Ba	W-66	44	66	525	28	1.6	5.4+1			550
PP 150	270.600	174.850	= 10	583	Ba	W-59	145	59	524	16	3.7-1	1.2+1		4.4	520
PP 123	268.800	169.200	Muashar 1	588	AB			76	512	158	1.6+2	5.4+3		3300	700
PP 158	272.400	171.500	Tur. 6	568	AB	W-50	7105	50	518	39	7.7-1	2.6		.9	
W 65	272.000	174.800	Khalida	605	AL-6		<430								
PP 160	267.100	171.500	Tur 15	558	AB	W-47	23	47	511	43	1.1	3.7+1		18	520
PP 15	263.000	969.000	Jafv 9	870	B-4	W-13	41	13	857	177	2.+2	1.8+3	5.0+2		870
PP 145	263.800	177.2	Dhuleil 5	570	Ba	W-68	132	68	502	38	6.2-1	2+1		9.7	590
PP 197	254.600	181.25	Balama 1	628	AB	W-114	72	114	514	8	1.2-1	4.2		5	
PP 143	280.750	176.350	Dhuleil 3	559	Ba	W-58	47	58	501		<.1-1	<.3		<.1	
PP 403	272.315	169.100	Ahmad	580	AB	W-69	731	69	511		<.1-1	<.3		<.1	
<del>PP 381</del>															
PP 368	257.850	174.500	ASHanab	522	AB			25	497	55					
PP 165	256.100	173.300	Barakat	509	Ba	W-26	69	69	483	40	8.5-1	2.8+1		10	600
PP 181	255.05	171.250	Zerga R. 2	518	AB	W-30	760	30	4800	43	1.3+1	4.4+2		320	480
PP 325	254.330	165.170	Zerga A.	584	AB	W-52	84	52	532					(120)	



No. of well	Coordinate		Name of well	Surface elevation -n	Name of aquifer	Depth of aquifer	Thickness of aquifer	Depth of water "m"	Water Level A.S.L.	Yield tested m <sup>3</sup> /h	Spe. Cap. m <sup>2</sup> /h EXP.	Trans. missing m <sup>2</sup> /d EXP.	Permeability m/d EXP.	Calculated flow m <sup>3</sup> /a	Electrical Conductivity $\mu$ s.
	E	N													
PP 221	243.050	159.800	A. Adwan	780	A-4	170	33	+52	832	145	2.8	8.8 +1	2.6	320	580
PP 189	250.500	167.800	Jaradaly	509	AB	W-11	<del>11</del>	11	489	-	-	-	-	-	-
PP 463	227.090	158.690	Hummar <sup>2</sup>	952	A-1	W-91	791	91	861	6	4. -1	1.3 +1	-	-	-
PP 5.	229.300	163.350	Ain Basha	595	K	W-59	784	59	536	14	.6	-	-	-	490
PP 6	229.812	165.407	Suweilih	634	Z	<del>W-115</del>	738	115	488	70	2.0 +1	-	-	-	600
S 9	228.350	163.100	Ain Basha	599	K	W-95	731	90	509	18	1.4 -1	1.4 +3	4.5 +1	-	450
S 24	229.200	163.350	=	594	Z	W-119	743	157	473	100	5.	-	-	-	760
S 11	233.400	166.950	Mubis	675	K	<del>W-229</del>	-	229	446	-	-	-	-	-	960
PP 433	228.750	181.200	Majdal	485	K	<del>W-18</del>	730	18	467	3.6	5.5 +1	2.8	-	-	840
S 51	222.150	173.550	Elagman	484	Z	111	755	106	342	<.1 -1	3.0 +1	8.0 -1	-	-	920
S 38	229.500	165.500	Nursay	625	Z	W-170	761	130	495	8	6.4	1.5 +1	5.0	-	750
S 42	228.600	170.900	Daffali	453	Z	W-48	750	75	378	18	1.6	5.0 +1	1.5	-	780
S 21	219.500	160.500	Salt	780	A-4	98	42	11.2	680	20	1.2	2.8 +1	6.6 -1	-	900
S 12	212.240	186.480	El-Madhar	619	A-1	57	7140	10	609	<del>&lt;.1 -1</del>	<.1 -1	<.3	-	-	-
PP 13	215.250	188.450	Hamama	706	A-2	176	41	13	693	10	<.1 -1	3.	7. -2	-	-
W. 80	236.600	188.710	No. 2 Haddad	645	A-1/2	66	25	55	27	1.5	-	-	-	-	666
W. 84	236.630	185.650	Haddad No. 1 Aqweel	575	A-1/2	W-37	20	37	538	12	6. -1	-	-	-	950
W 79	237.280	185.080	Gharaiib No. 1	550	A-1/2	W-16	25	16	534	130	2.3 +1	-	-	-	759
W. 81	238.200	185.150	Abu - Alawi	600	A-1/2	139	10	104	496	48	2.5	-	-	-	800
W. 82	237.450	185.320	Haddad No. 1 Ayoub	560	A-1/2	W-39	30	39	521	25	1.	9.6	-	-	700
W. 83	233.570	186.350	Haddad No. 3	535	K	W-23	27	23	512	35	2.	-	-	-	777
W. 85	232.620	184.035	A. Qattay	480	K	152	20	31	449	45	3.9 -1	-	-	-	1250
W. 89	282.200	180.570	Shamane No. 1	500	K	W-36	33	36	464	40	-	-	-	-	500
W. 90	228.800	181.600	E. Mah moudal	480	K	40	30	30	450	30	-	-	-	-	825







No of well	Coordinate		Name of well	Surface elevation	Name of Aquifer	Depth of Aquifer	Thickness of Aquifer	Depth of TO water (m)	Water level A.S.L	Yield tested m <sup>3</sup> /h	SPE capa m <sup>2</sup> /h ESD	Transmissivity m <sup>2</sup> /h exp.	Permeability m/d Exp.	Calculation m <sup>3</sup> /a	Electrical Conductivity $\mu$ S
	E	N													
10 90	248.700	211.470	Inbid XE	579	A-7 K Z	W-284 900	<del>113</del> 113	248 7300	295	—	—	—	—	600	1500
23	253.370	202.140	um El- Luh	712	A-4	241	54	236	476	12	<1-1	6.0	1.1-1	—	750
PP 343	234.860	208.860	El- Husn	670	AB	W-208	62	208	462	2	—	—	—	(450)	—
PP 344	235.770	203.520	Muayme h	731	AB	—	—	169	562	28	—	—	—	(600)	—
PP 448	237.100	204.700	Ramha 8	680	AB	W-183	95	183	497	30	2.5	8.5+1	—	780	400
PP 374	265.850	209.750	A. Tlouhi	580	AB	—	—	103	477	70	2.3+1	7.8+2	—	—	—
PP 377	209.300	210.100	K. shafi N01	595	AB	110	74	97	498	100	1.2+1	4.1+2	—	2500	—
<del>PP 377</del>	<del>268.900</del>	<del>169.350</del>	<del>Muasher 7</del>	<del>610</del>	<del>AB</del>	<del>W-81</del>	<del>755</del>	<del>81</del>	<del>529</del>	<del>83</del>	—	—	—	—	—
PP 477	27.850	202.080	um Sarab	662	AB	W-141	159	141	521	21	3.8-1	1.3+1	—	43	—
PP 467	264.900	205.550	Mughayr	615	AB	W-127	113	127	488	105	2.3	7.8+1	—	170	850
PP 355	270.760	198.20	Mafraq	675	AB	—	—	168	507	—	0.1-1	2	—	—	—
PP 358	263.890	195.350	Mafraq A 3	675	AB	—	—	157	518	5	—	—	—	(380)	—
PP 362	265.350	192.800	Mafraq A 2	690	AB	—	—	143	547	—	—	—	—	—	—
PP 364	260.800	195.700	Mafraq A 4	723	AB	—	—	160	563	—	—	—	—	(380) <del>500</del>	880
PP 39	254.100 <del>205</del>	198.820	M. B Hassan	768	AB	—	—	132	636	—	<1-1	<.3	—	<1	—
W 68	236.150	196.900	Kufr Khal	850	A-4 A-7	212	34	68 791	782 759	4	—	—	—	—	550

related to Yarmouk River Basin