

HYDRO-ECOLOGISCHE RELATIES IN HET BEEKDAL VAN DE
DWINGELER- EN BEILERSTROOM

UKO VEGTER

BIJLAGEN

Hydrofyten

- Potamogeton polygonifolius
- Potamogeton pusillus
- Potamogeton alpinus
- Potamogeton trichoides
- Potamogeton perfoliatus

Freatofyten

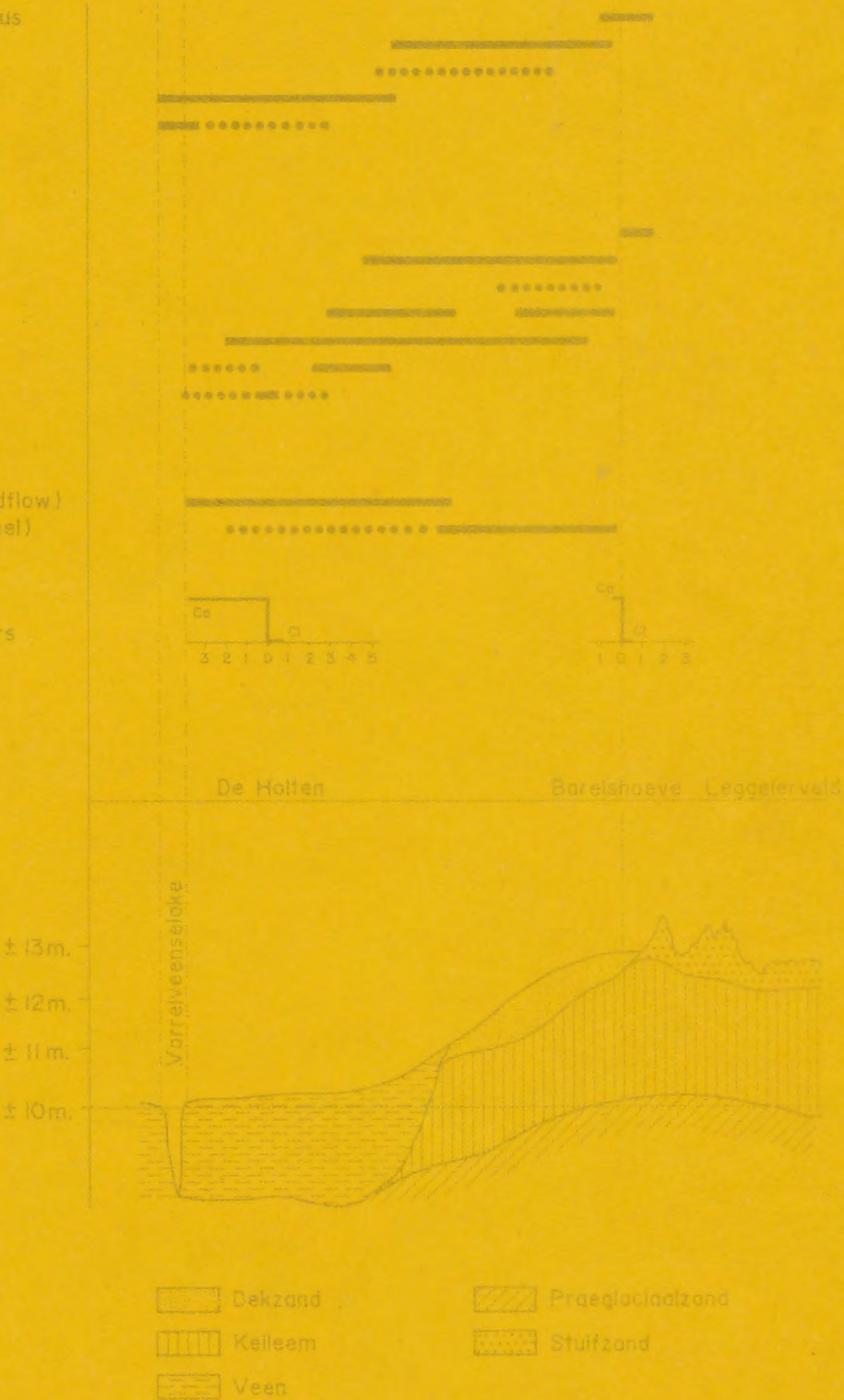
- Sphagnum sp
- Carex rostrata
- Nasturtium microphyllum
- Equisetum fluviatile
- Hottonia palustris
- Callitha palustris
- Senecio aquaticus

Hydrologie

- Kwel >= 2.5mm/dag (Modflow)
- Kwelverschijnselen (visueel)

- Waterkwaliteitsparameters meq/l

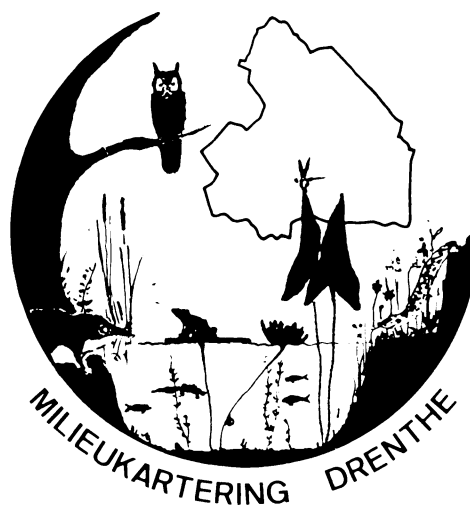
Topografie



HYDRO-ECOLOGISCHE RELATIES IN HET BEEKDAL VAN DE DWINGELER- EN
BEILERSTROOM

BIJLAGEN

Uko Vegter



Provincie Drenthe
Dienst Ruimte en Groen
Afdeling Natuur, Landschap en Recreatie
Assen, november 1990

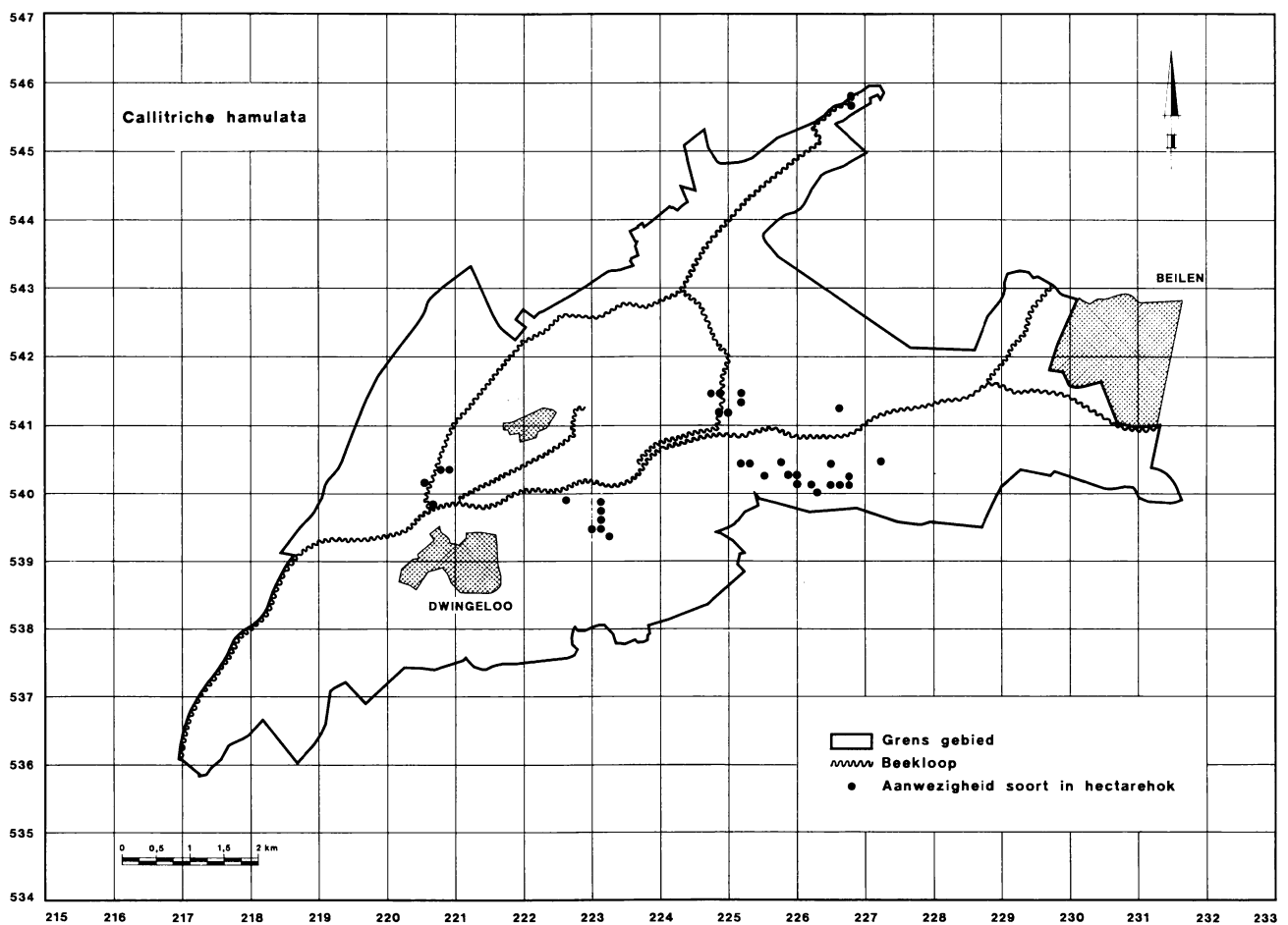
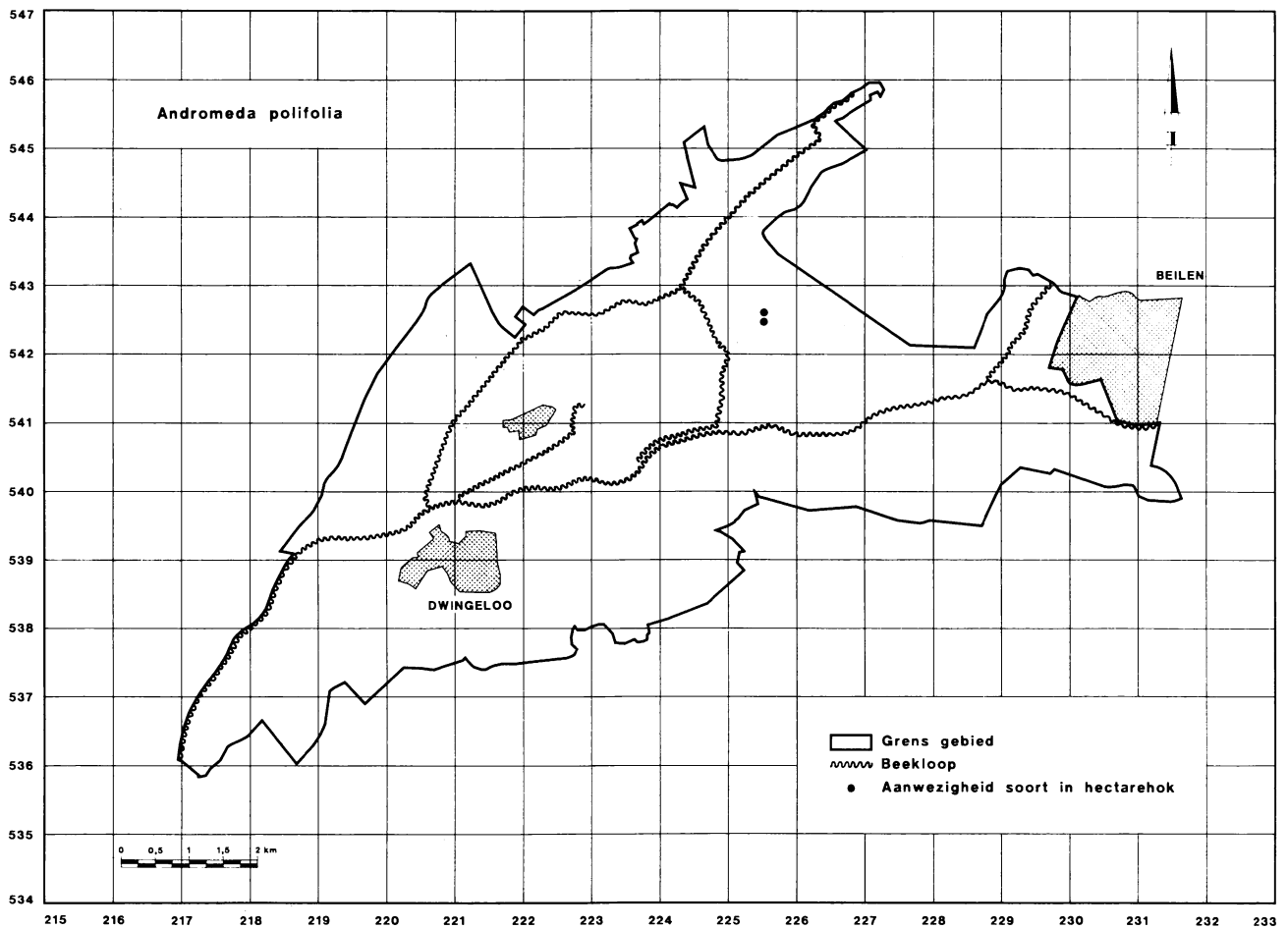
Bijl. 1 Verspreiding van indicatieve plantesoorten in het Dwingeler- en Beilerstroomgebied in 1985

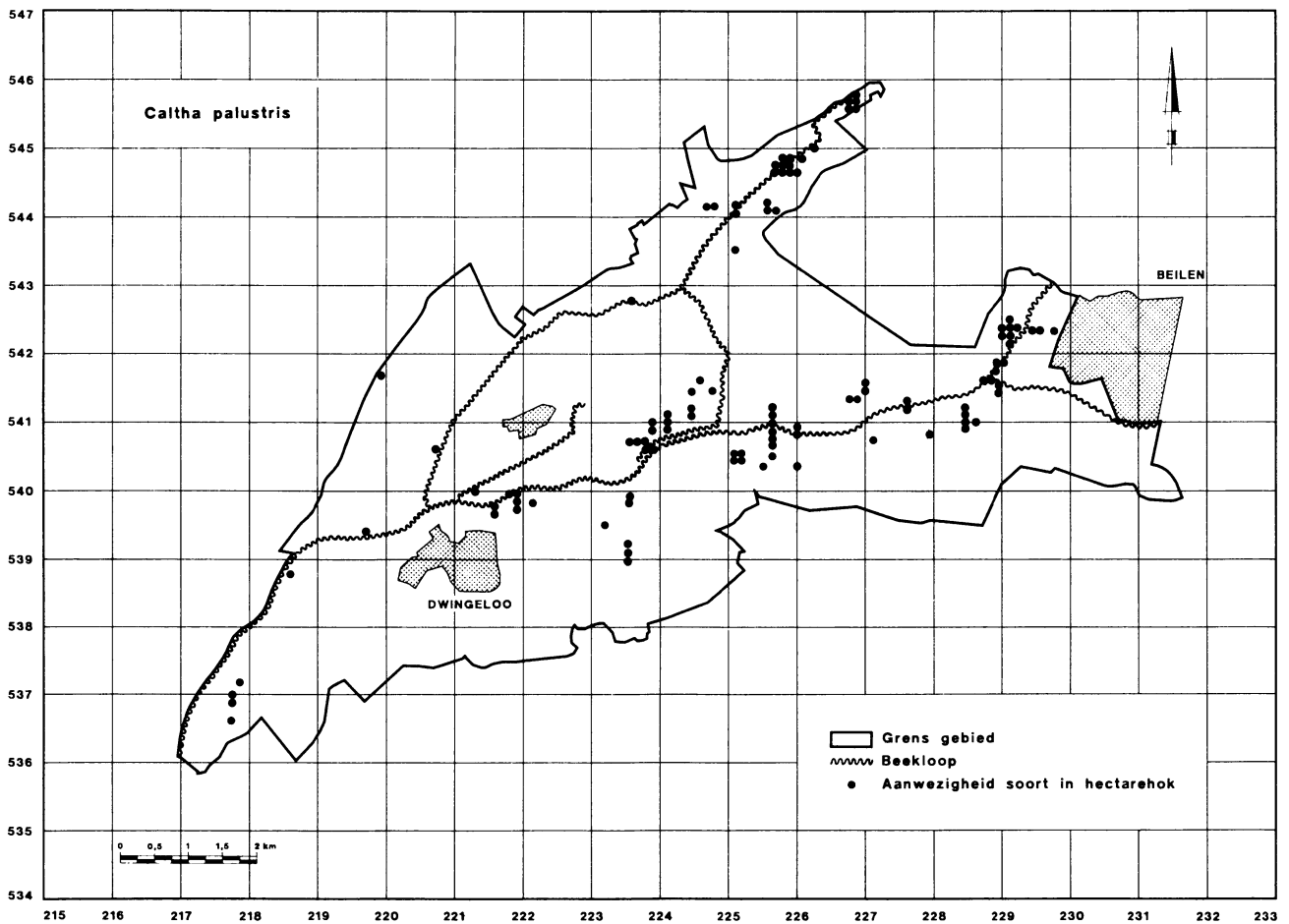
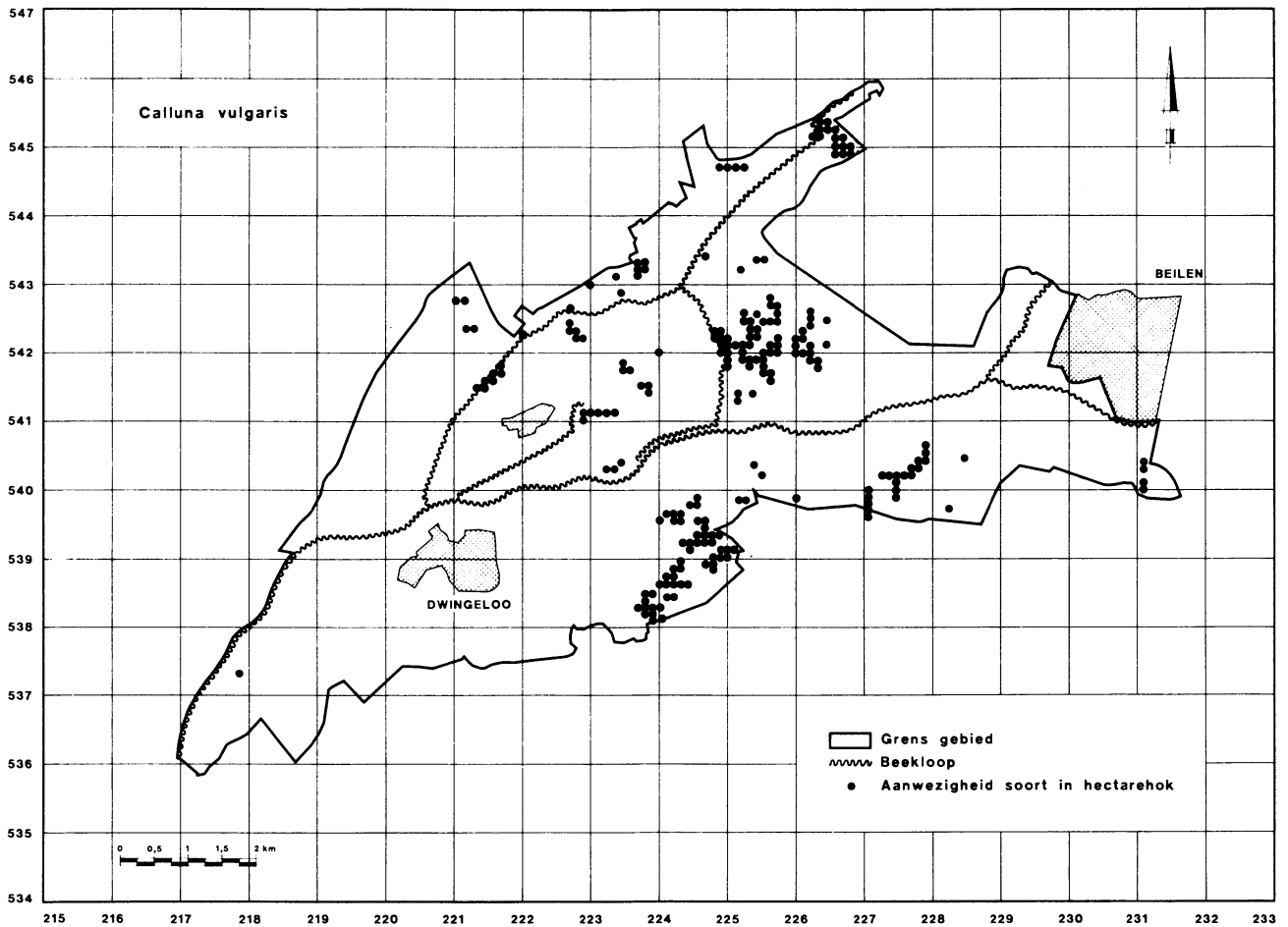
<i>Andromeda polifolia</i>	-	Lavendelheide	5
<i>Callitriche hamulata</i>	-	Haaksterrekroos	5
<i>Calluna vulgaris</i>	-	Struikheide	6
<i>Caltha palustris</i>	-	Dotterbloem	6
<i>Carex acuta</i>	-	Scherpe zegge	7
<i>Carex aquatilis</i>	-	Noordse zegge	7
<i>Carex curta</i>	-	Zompzegge	8
<i>Carex echinata</i>	-	Sterzegge	8
<i>Carex elata</i>	-	Stijve zegge	9
<i>Carex lasiocarpa</i>	-	Draadzegge	9
<i>Carex nigra</i>	-	Zwarte zegge	10
<i>Carex paniculata</i>	-	Pluimzegge	10
<i>Carex pseudocyperus</i>	-	Hoge cyperzegge	11
<i>Carex riparia</i>	-	Oeverzegge	11
<i>Carex rostrata</i>	-	Snavelzegge	12
<i>Carex tumidicarpa</i>	-	Lage zegge	12
<i>Ceratophyllum demersum</i>	-	Gedoornd hoornblad	13
<i>Eleocharis acicularis</i>	-	Naaldwaterbies	13
<i>Elodea canadensis</i>	-	Brede waterpest	14
<i>Equisetum fluviatile</i>	-	Holpijp	14
<i>Erica tetralix</i>	-	Dopheide	15
<i>Eriophorum vaginatum</i>	-	Eenarig wollegras	15
<i>Filipendula ulmaria</i>	-	Moerasspirea	16
<i>Glyceria declinata</i>	-	Getand vlotgras	16
<i>Hippuris vulgaris</i>	-	Lidsteng	17
<i>Hottonia palustris</i>	-	Waterviolier	17
<i>Hydrocotyle vulgaris</i>	-	Waternavel	18
<i>Hypericum tetrapterum</i>	-	Gevleugeld hertshooi	18
<i>Juncus acutiflorus</i>	-	Veldrus	19
<i>Juncus bulbosus</i>	-	Knolrus	19
<i>Lysimachia thyrsiflora</i>	-	Moeraswederik	20
<i>Lythrum portula</i>	-	Waterpostelein	20
<i>Montia fontana</i>	-	Bronkruid	21
<i>Myriophyllum spicatum</i>	-	Aarvederkruid	21
<i>Myriophyllum verticillatum</i>	-	Kransvederkruid	22
<i>Nasturtium spec.</i>	-	Witte waterkers s.l.	22
<i>Nuphar lutea</i>	-	Gele plomp	23
<i>Nymphoides peltata</i>	-	Watergentiaan	23
<i>Oxycoccus palustris</i>	-	Veenbes	24
<i>Potamogeton acutifolius</i>	-	Spitsbladig fonteinkruid	24
<i>Potamogeton alpinus</i>	-	Rossig fonteinkruid	25
<i>Potamogeton berchtoldii</i>	-	Klein fonteinkruid	25
<i>Potamogeton crispus</i>	-	Gekroesd fonteinkruid	26
<i>Potamogeton lucens</i>	-	Glanzig fonteinkruid	26
<i>Potamogeton pectinatus</i>	-	Schedefonteinkruid	27
<i>Potamogeton perfoliatus</i>	-	Doorgroeid fonteinkruid	27
<i>Potamogeton polygonifolius</i>	-	Duizenknoopfonteinkruid	28
<i>Potamogeton pusillus</i>	-	Tenger fonteinkruid	28
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<i>Ranunculus flammula</i>	-	Egelboterbloem	30
<i>Ranunculus hederaceus</i>	-	Klimopwaterranonkel	30
<i>Ranunculus peltatus</i>	-	Gewone waterranonkel	31
<i>Sagittaria sagittifolia</i>	-	Pijlkruid	31
<i>Scirpus setaceus</i>	-	Dwergbies	32

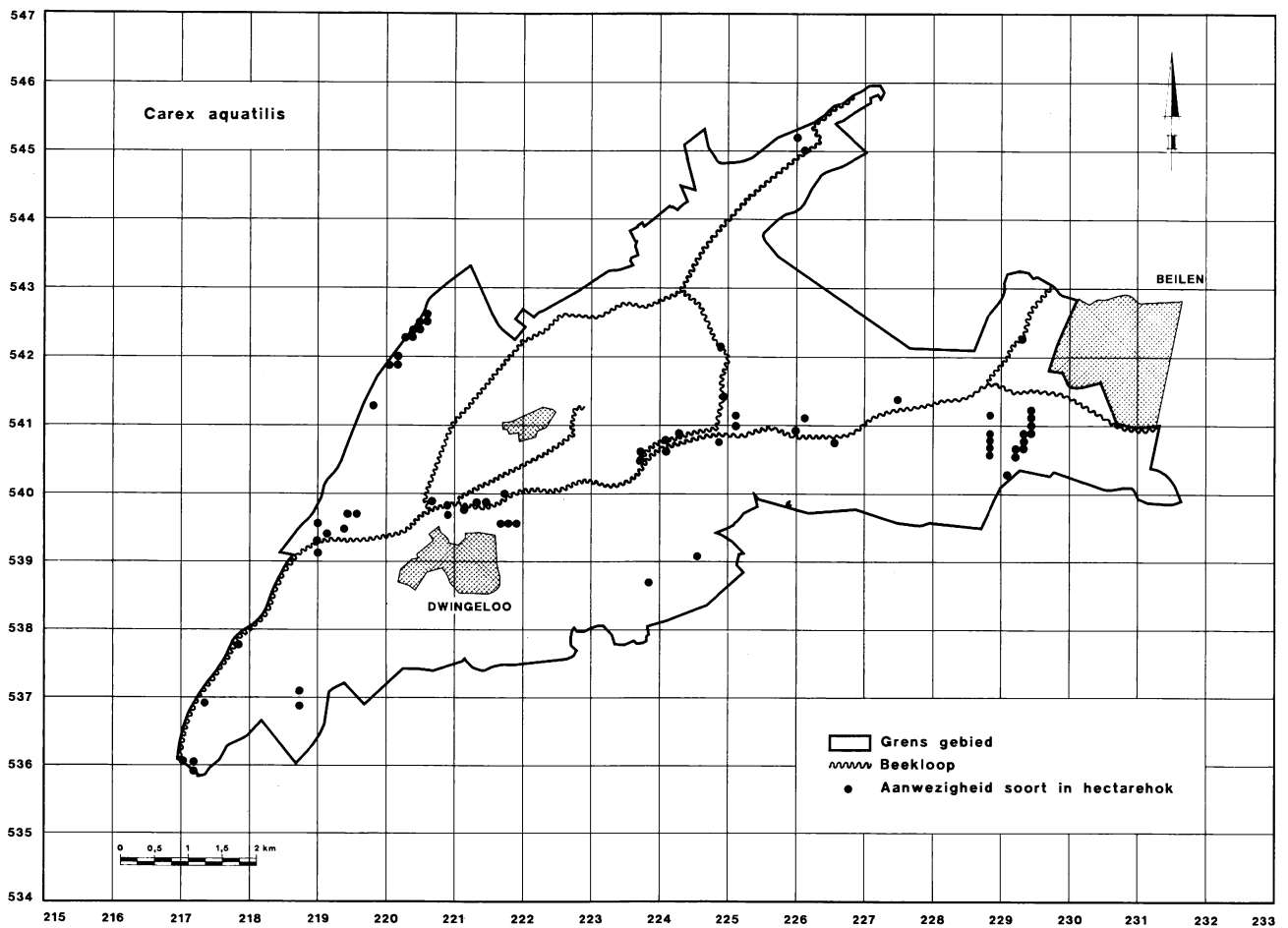
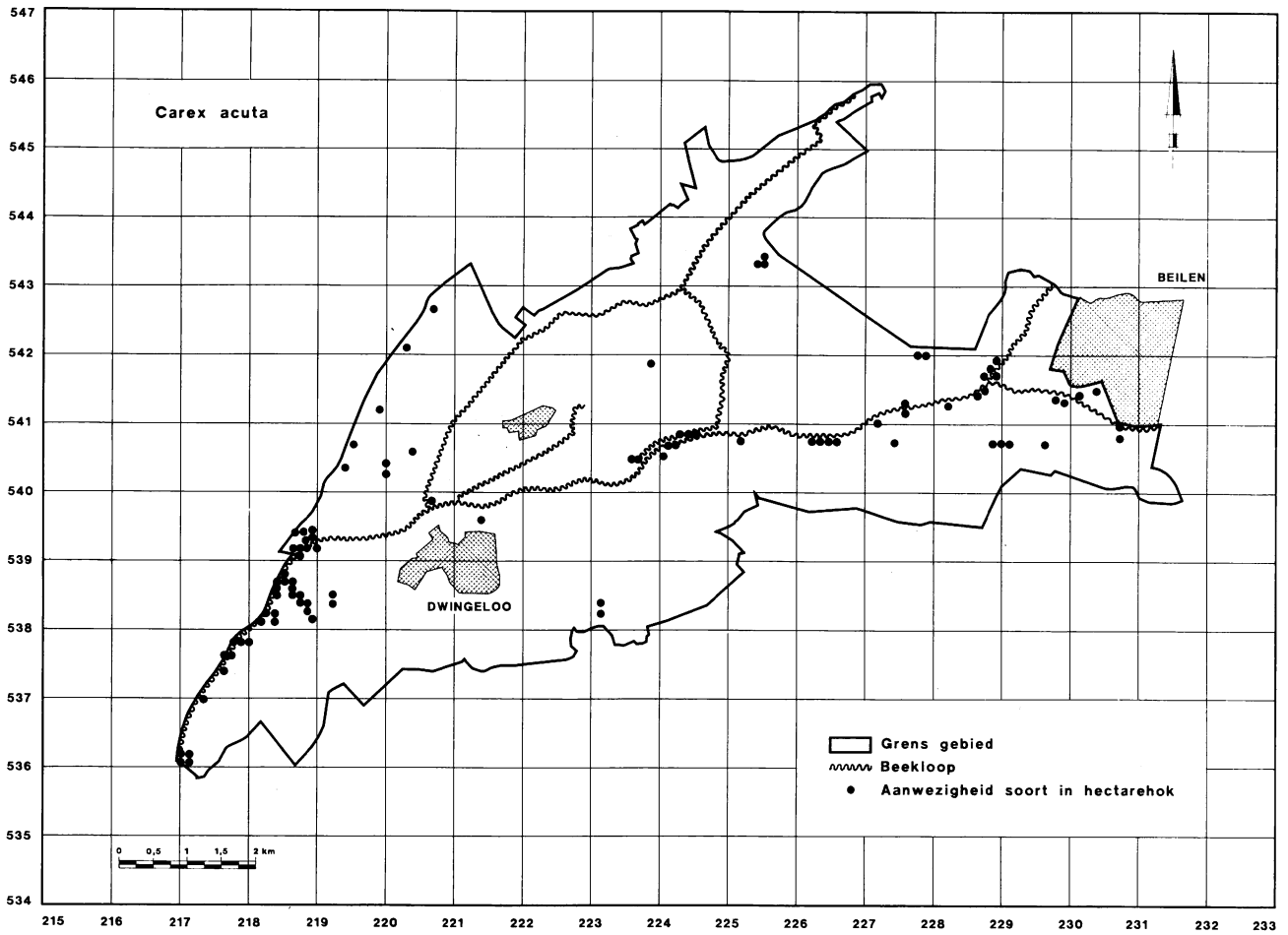
Scirpus sylvaticus	-	Bosbies	32
Sphagnum	-	Veenmos	33
Typha latifolia	-	Grote lisdodde	33
Utricularia vulgaris	-	Gewoon blaasjeskruid	34
Veronica beccabunga	-	Beekpunge	34
Veronica scutellata	-	Schildereprijs	35
Viola palustris	-	Moerasviooltje	35

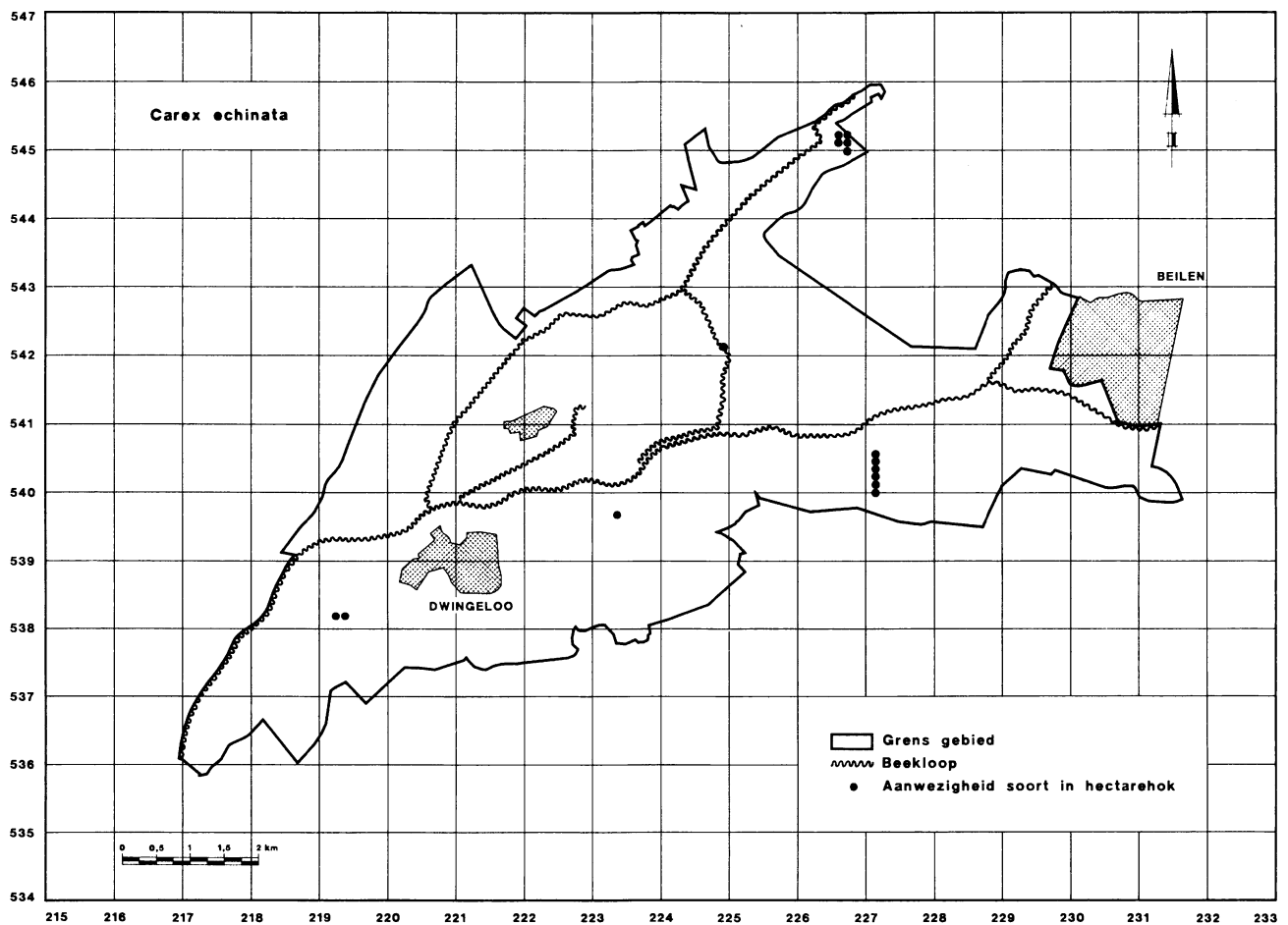
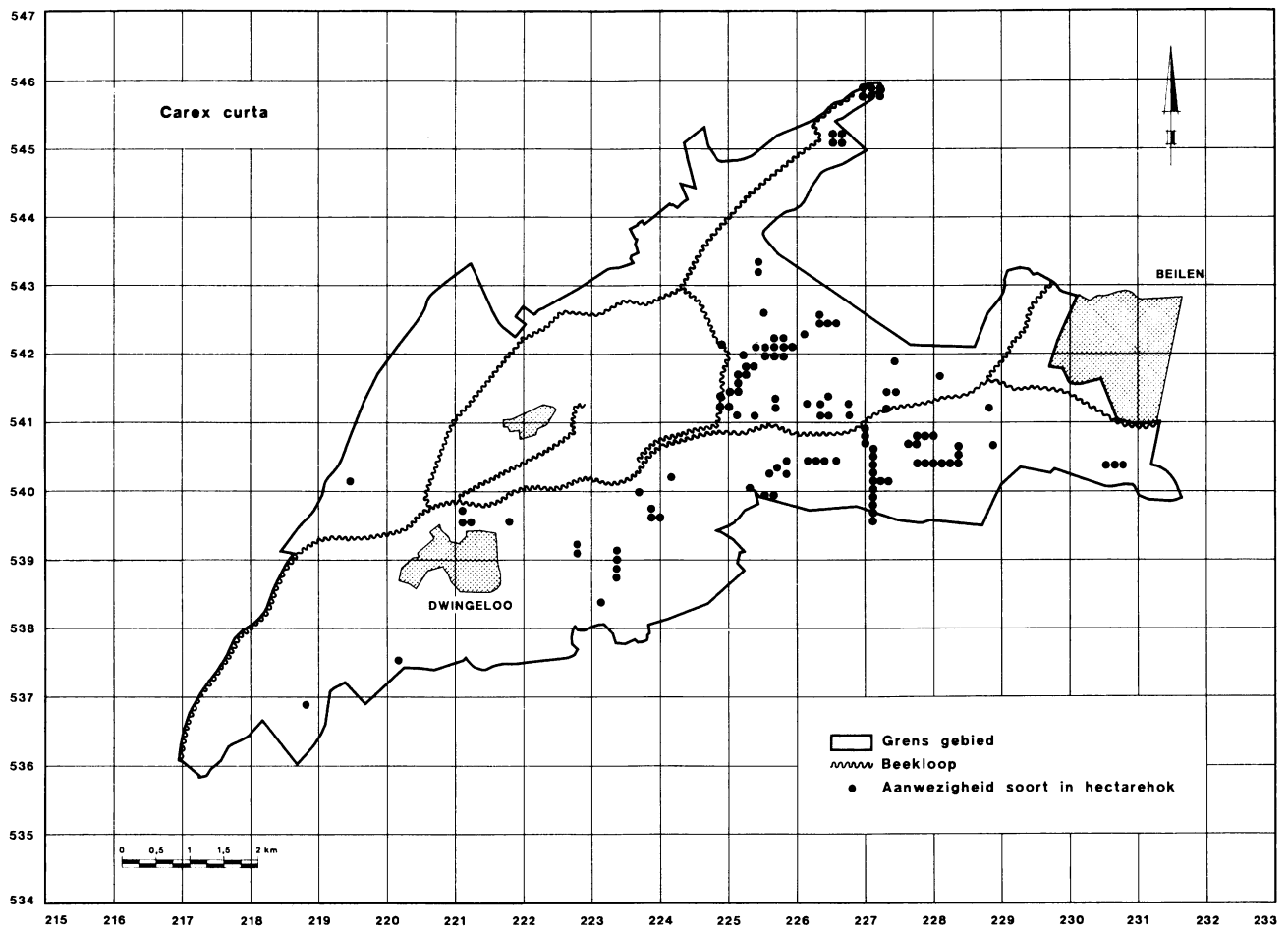
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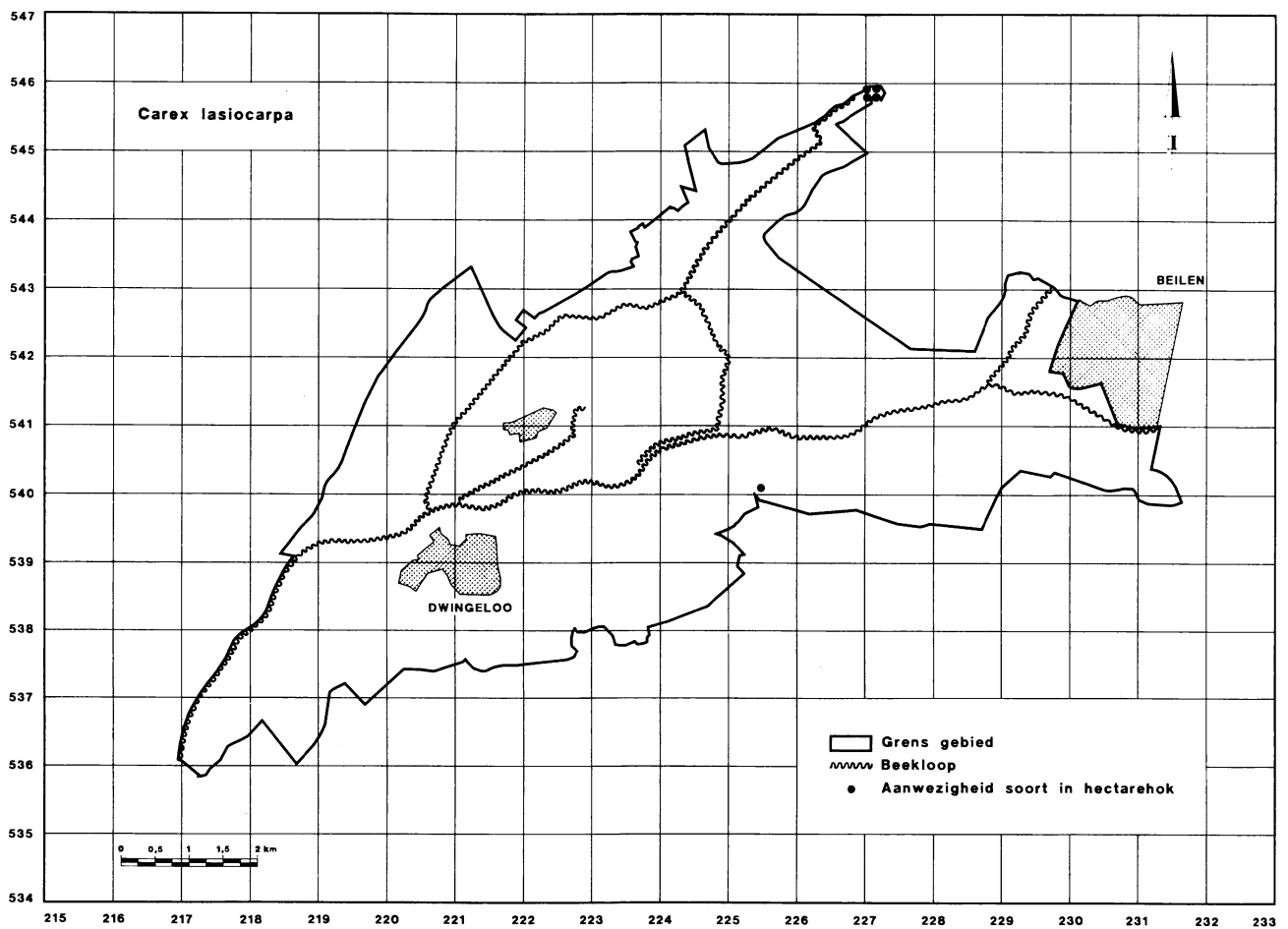
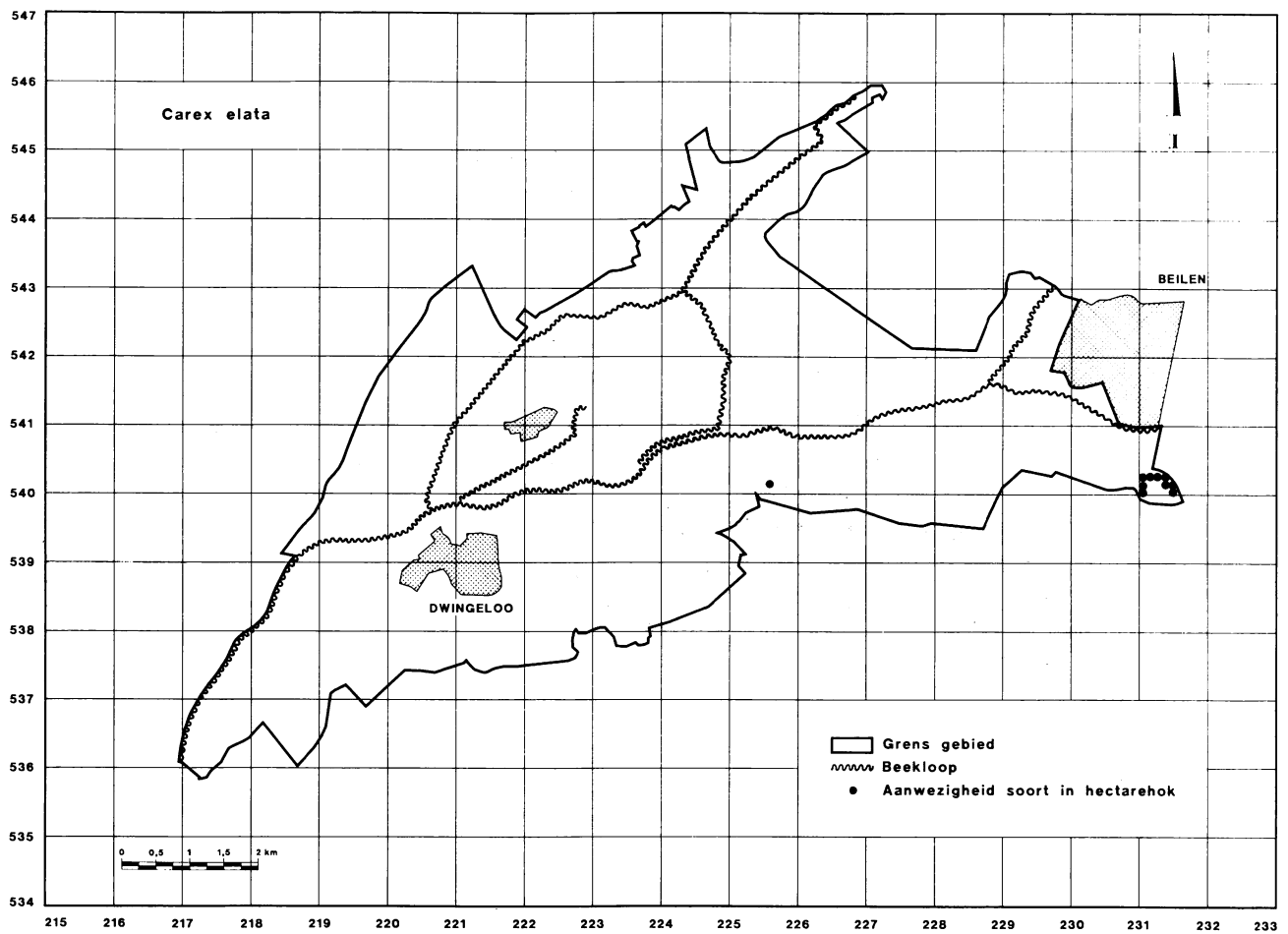
Bijl. 1 Verspreiding van indicatieve soorten in het Dwingeler- en Beiler-
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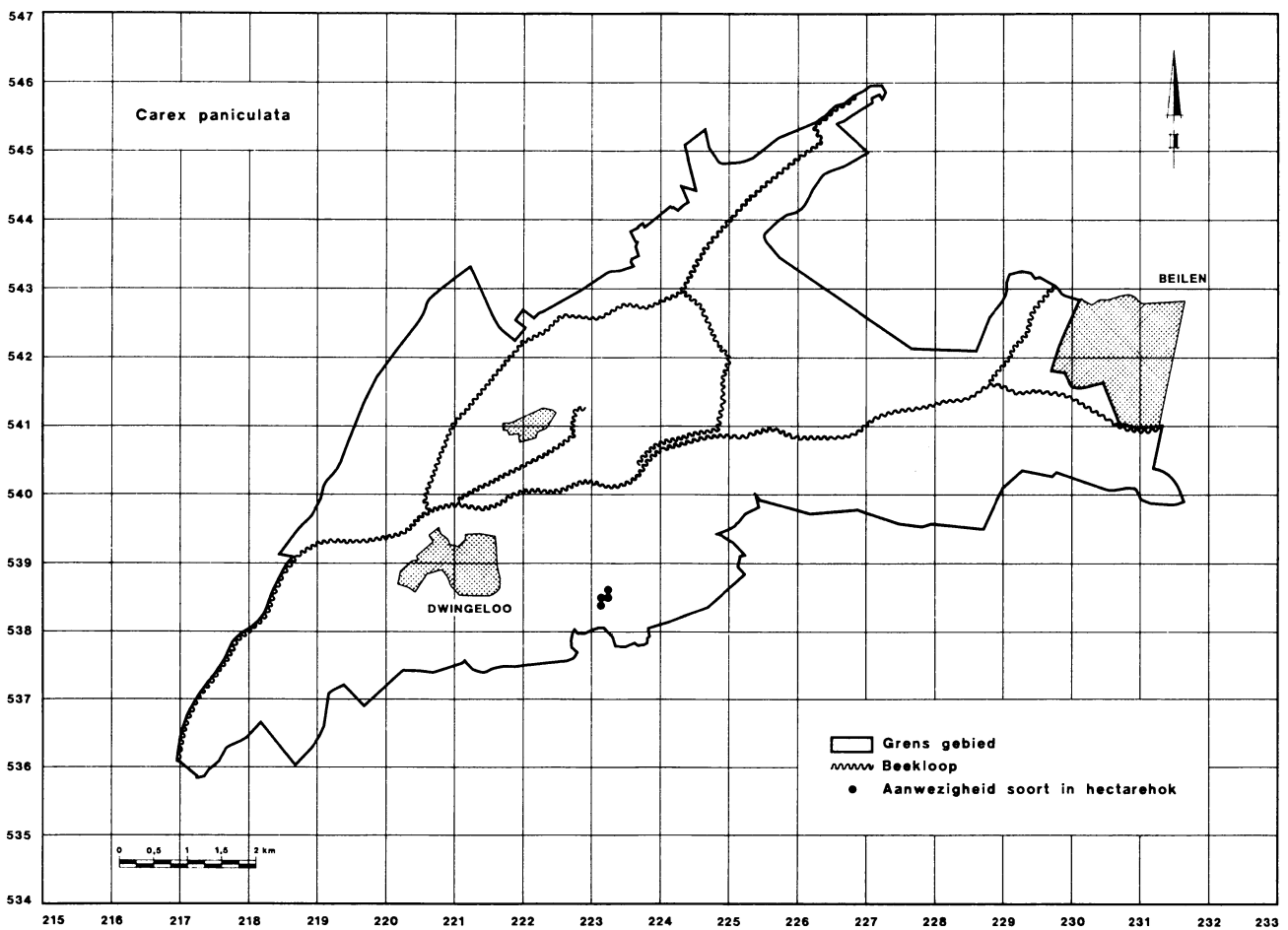
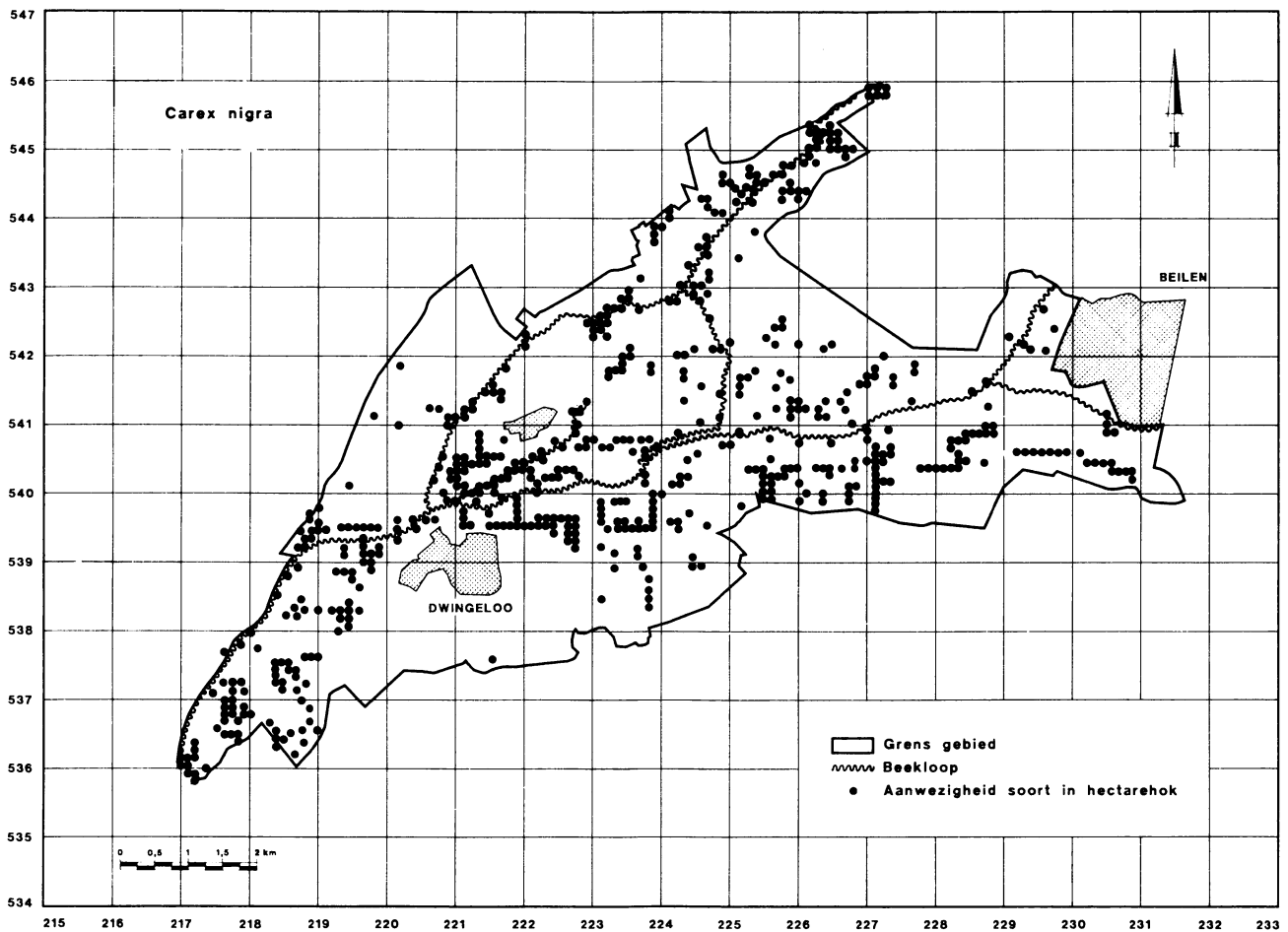


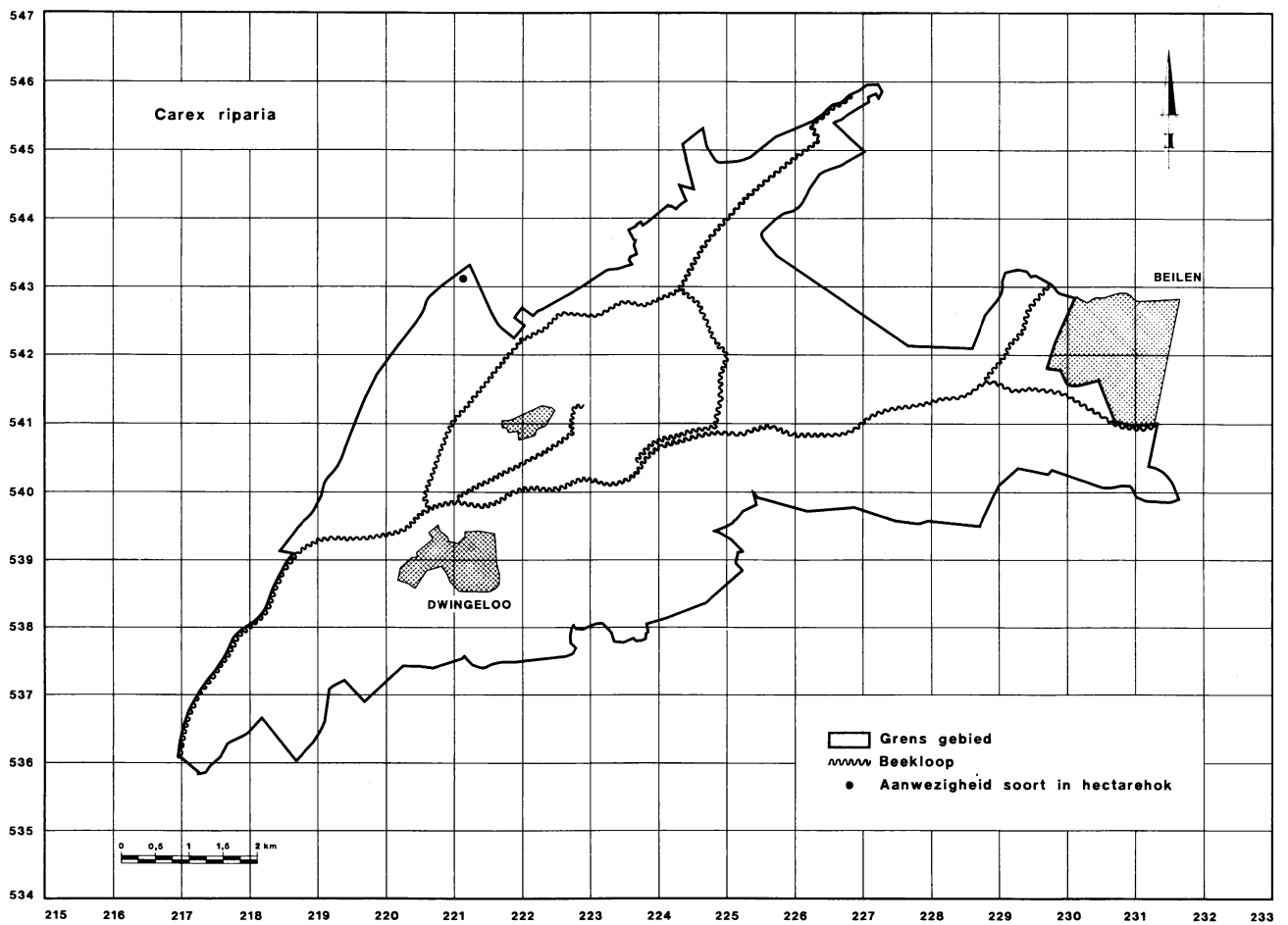
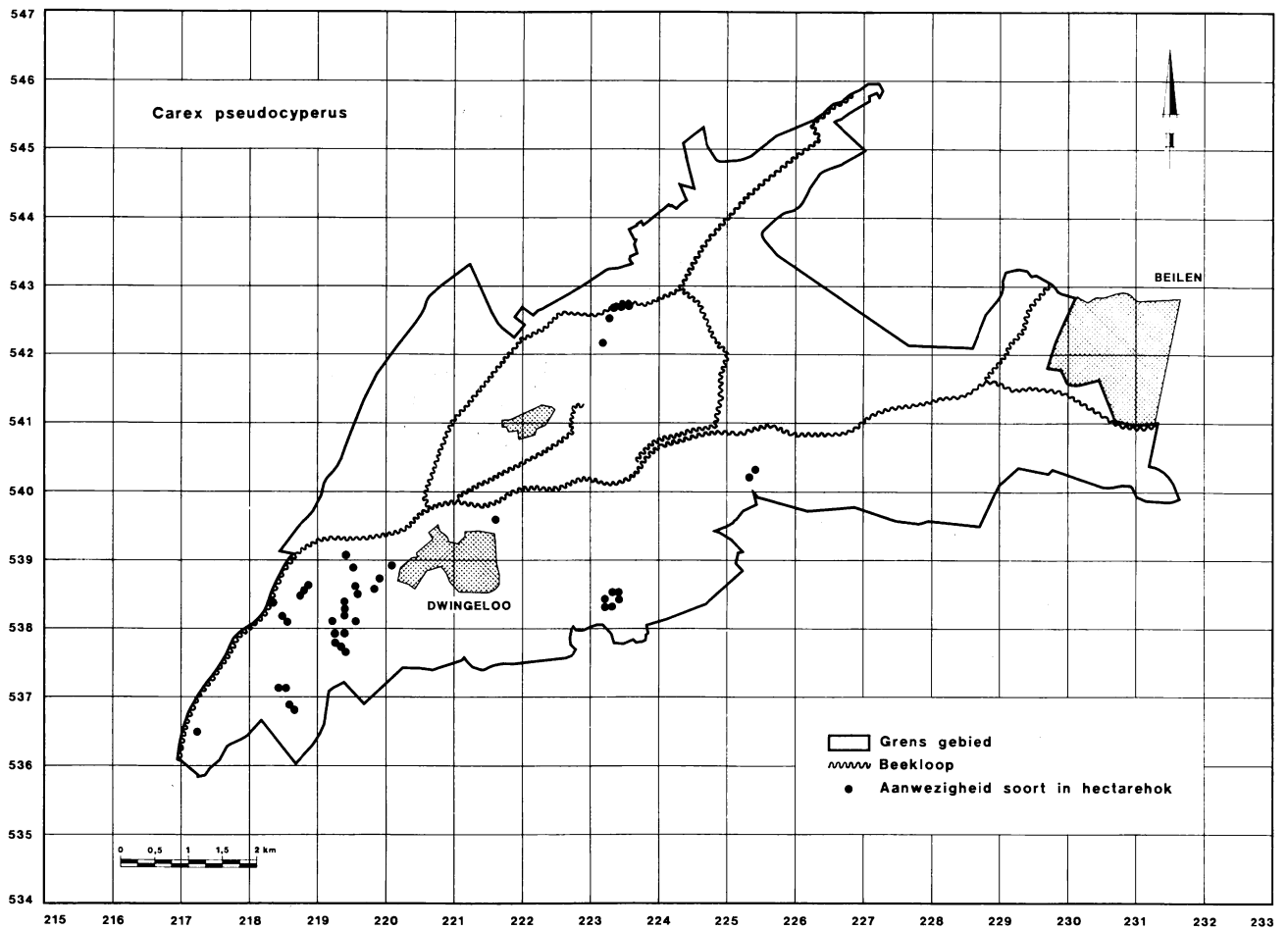


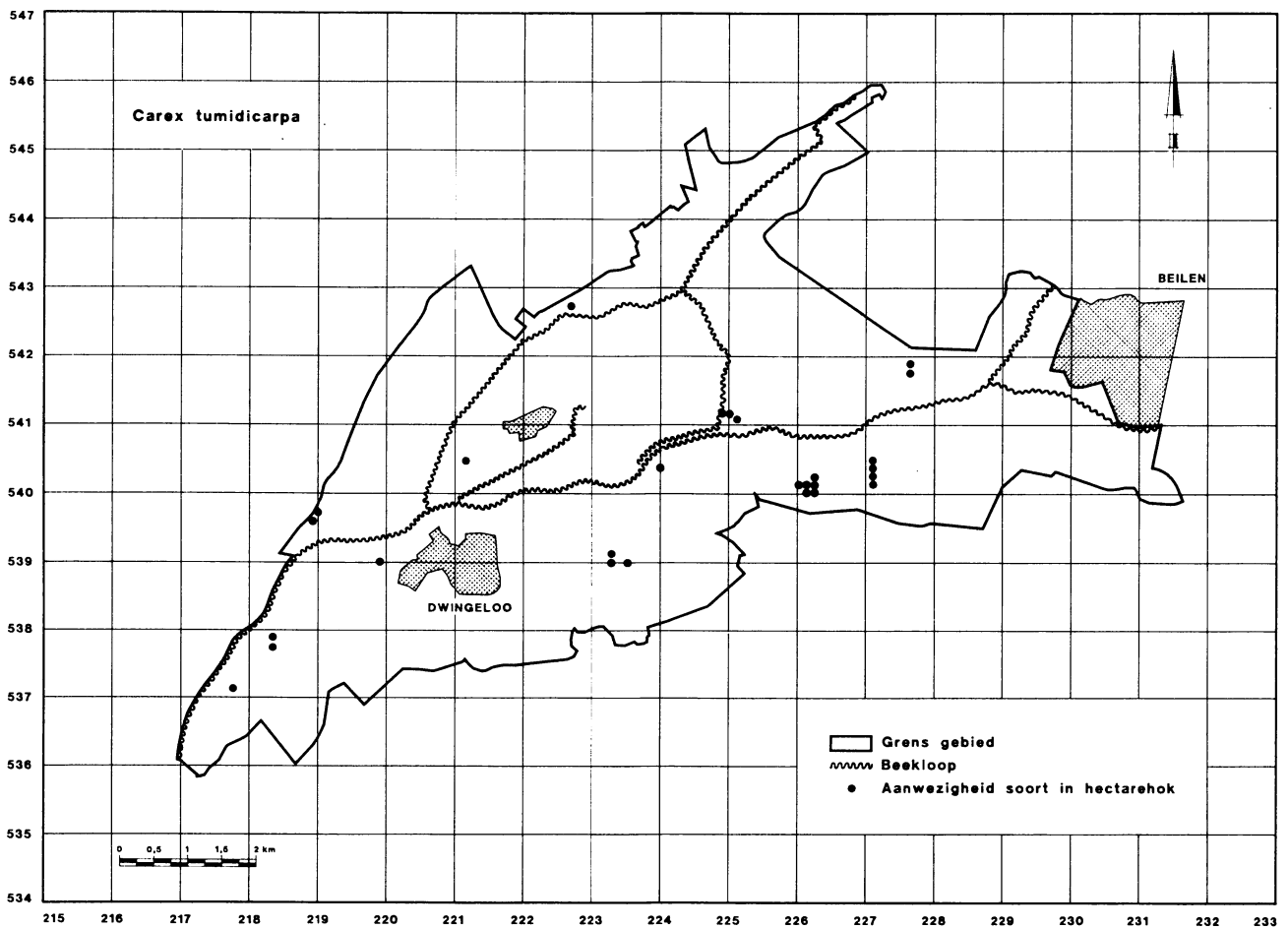
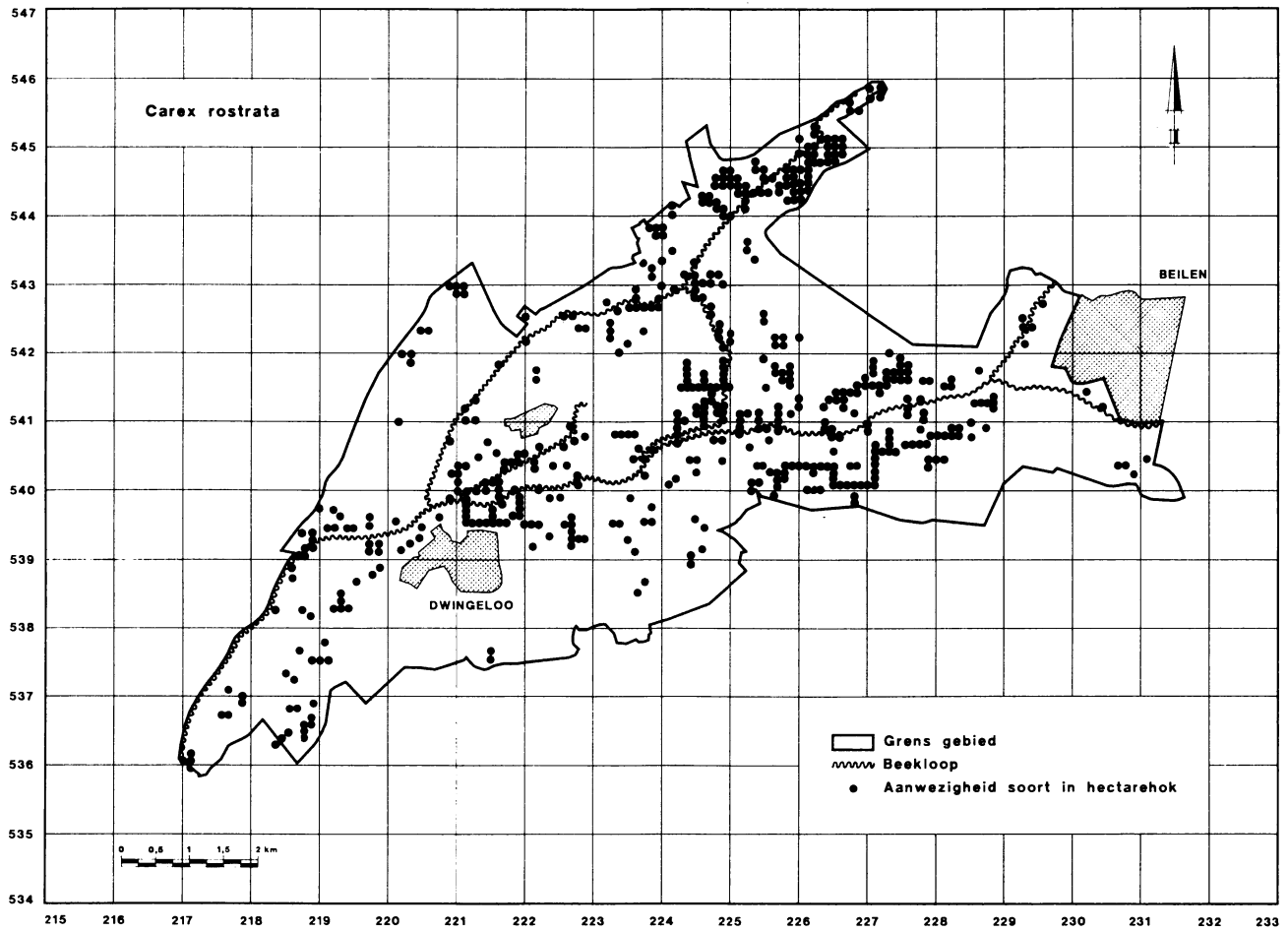


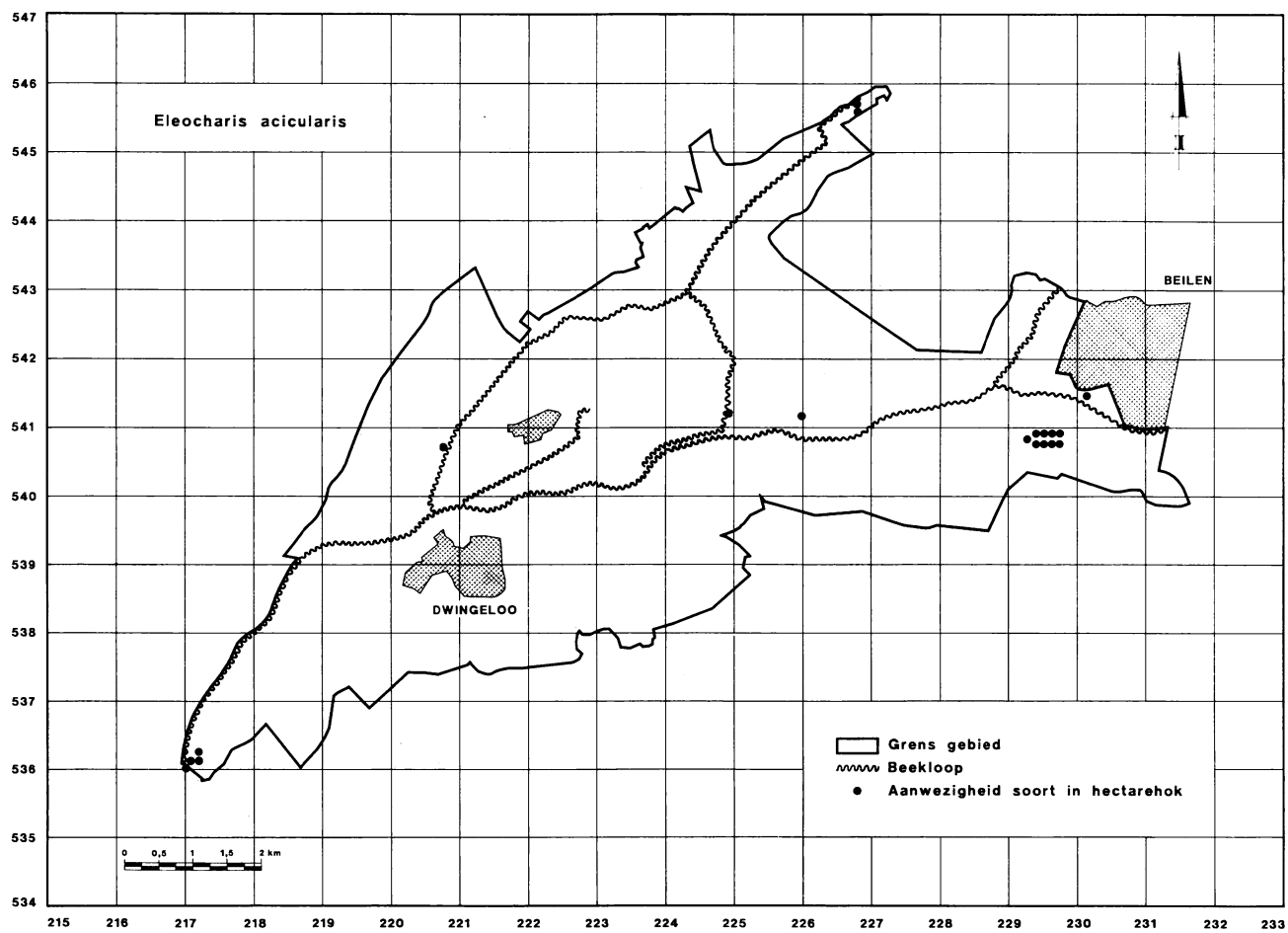
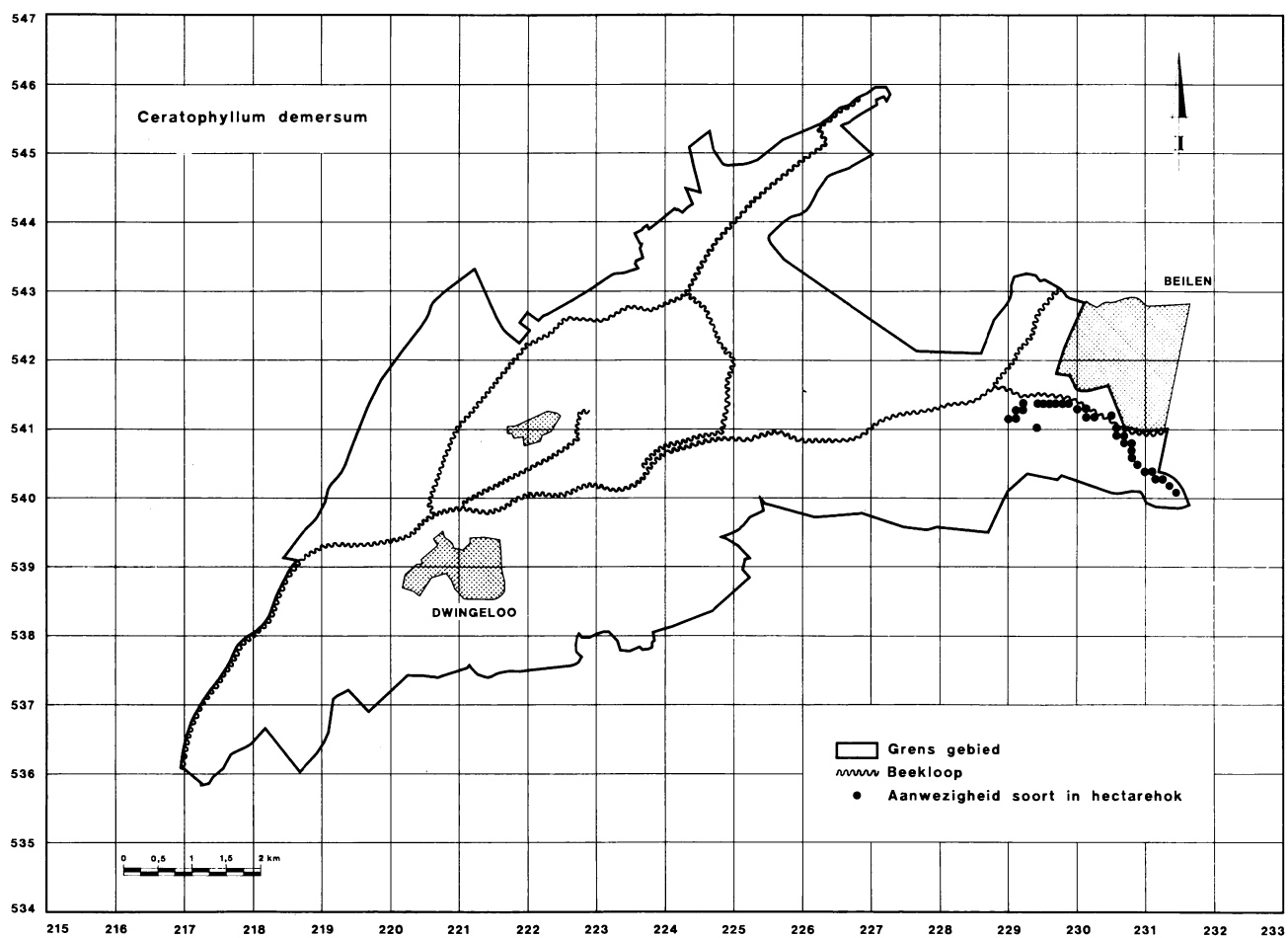


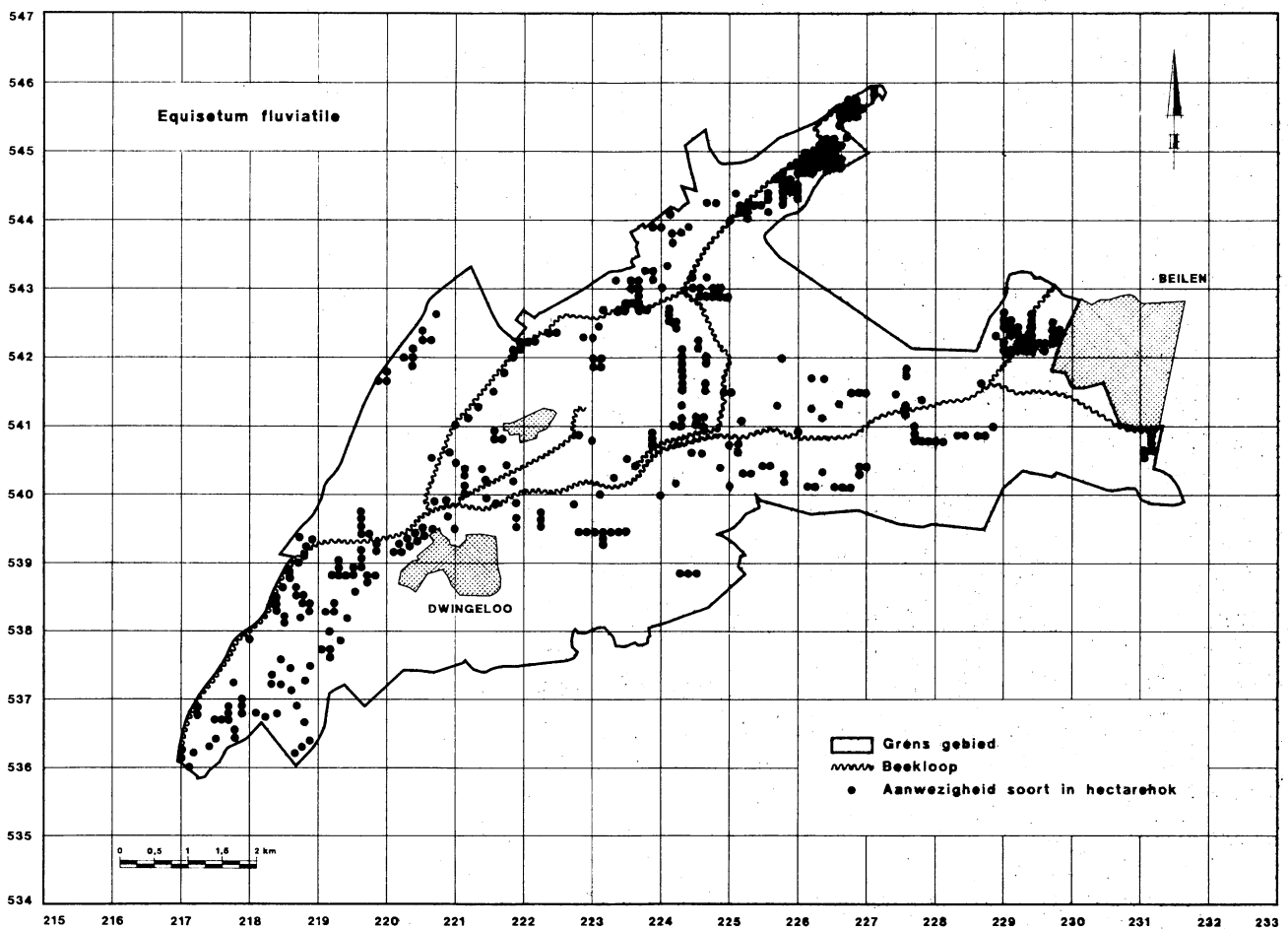
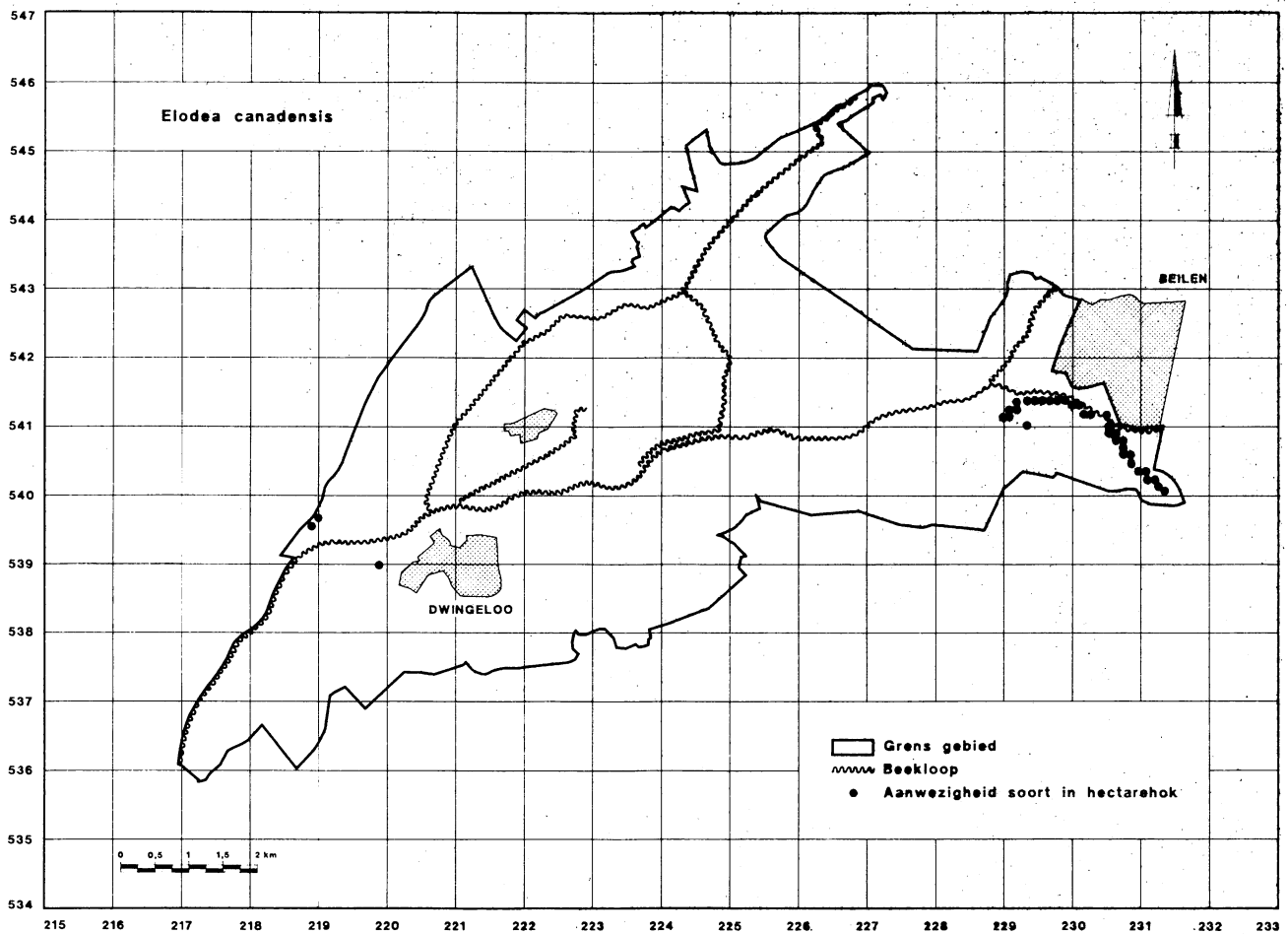


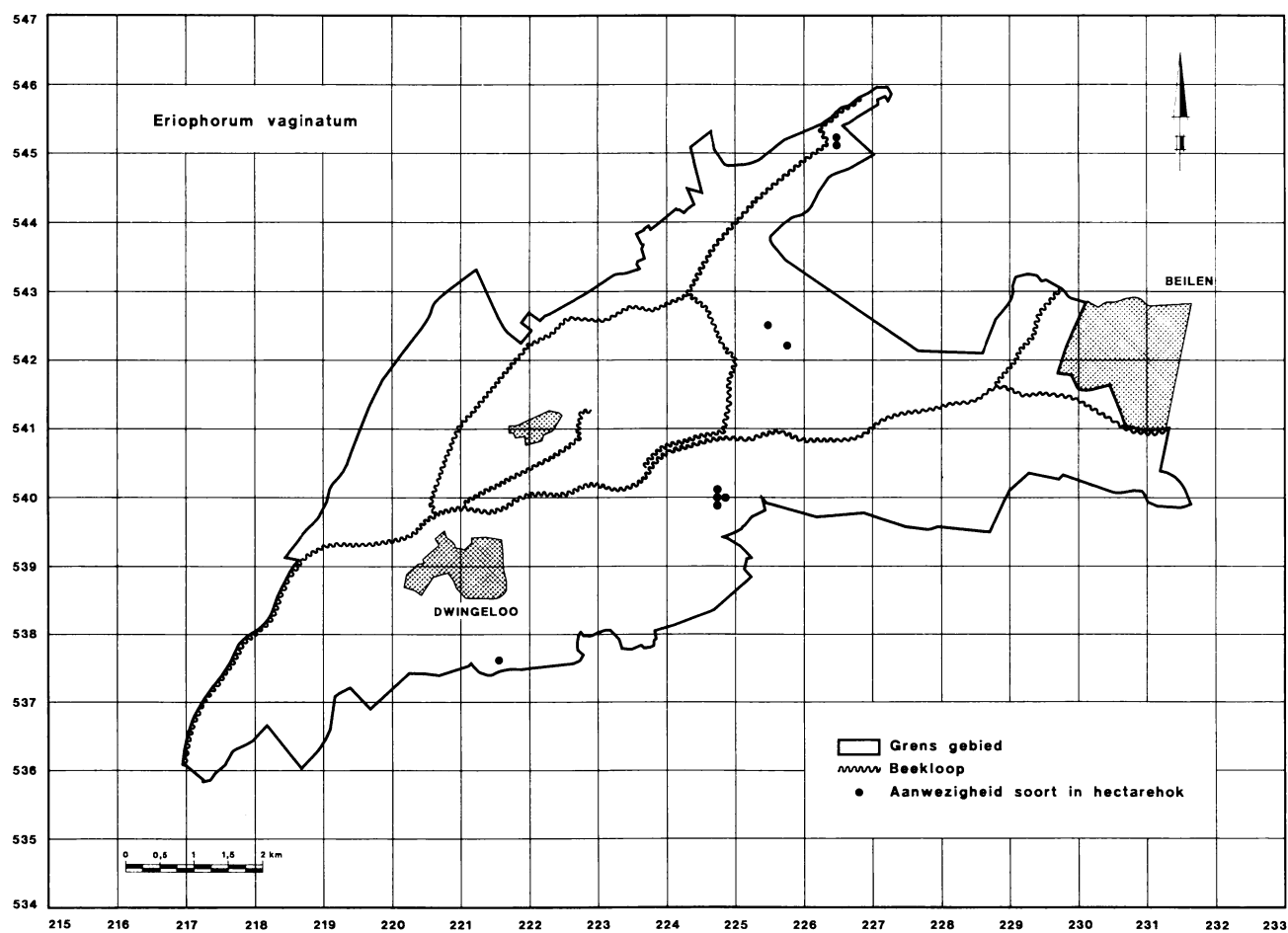
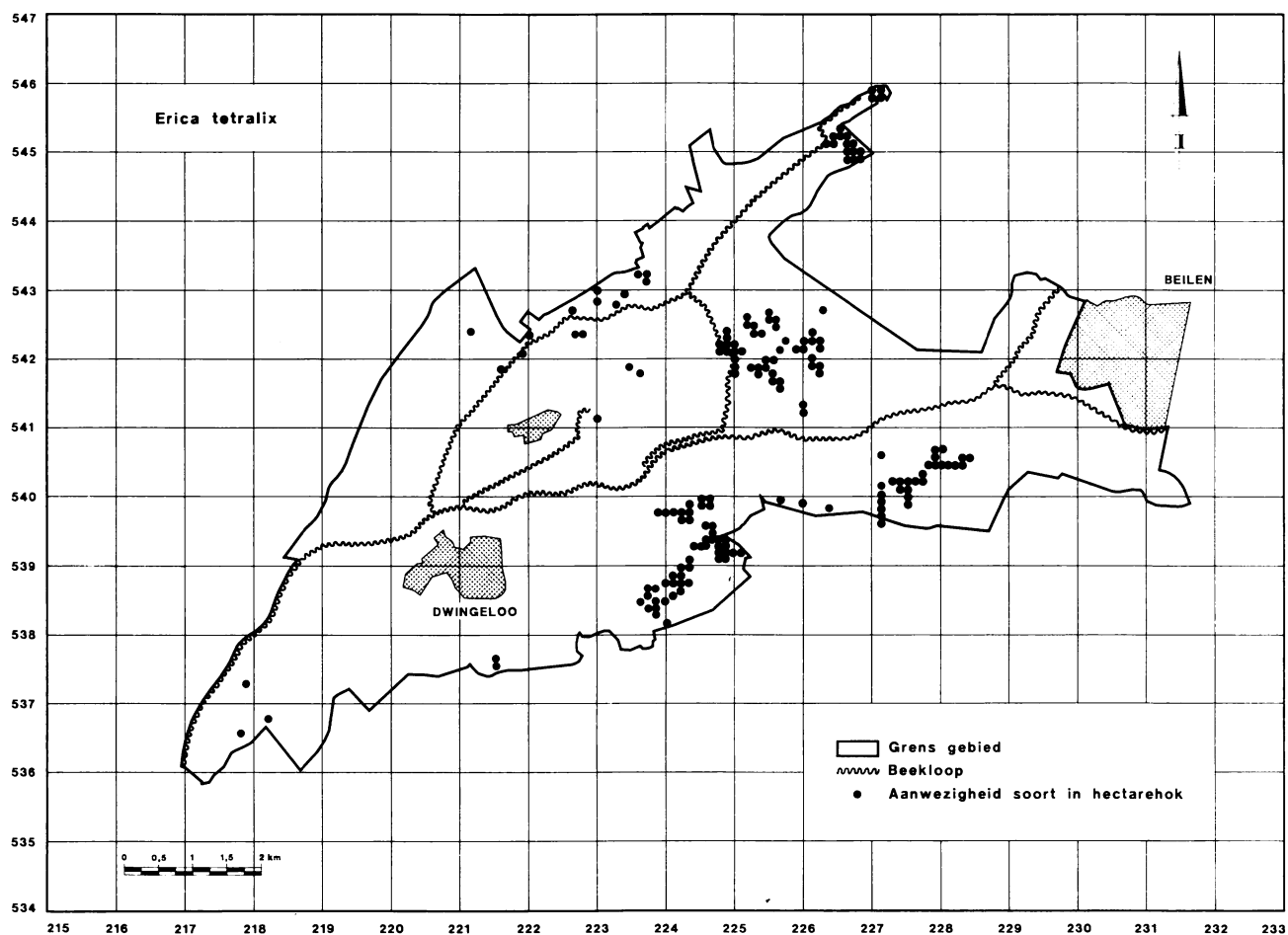


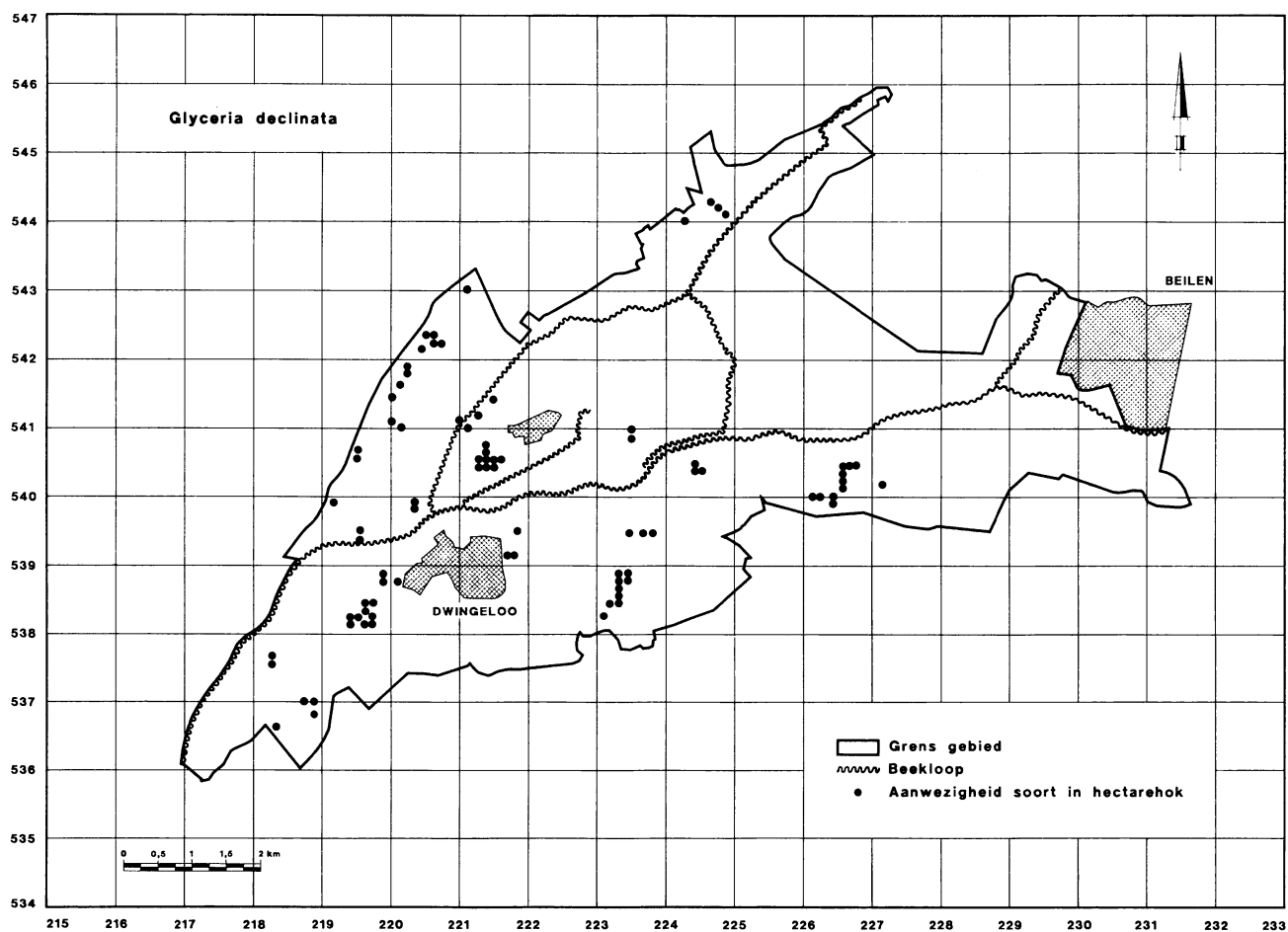
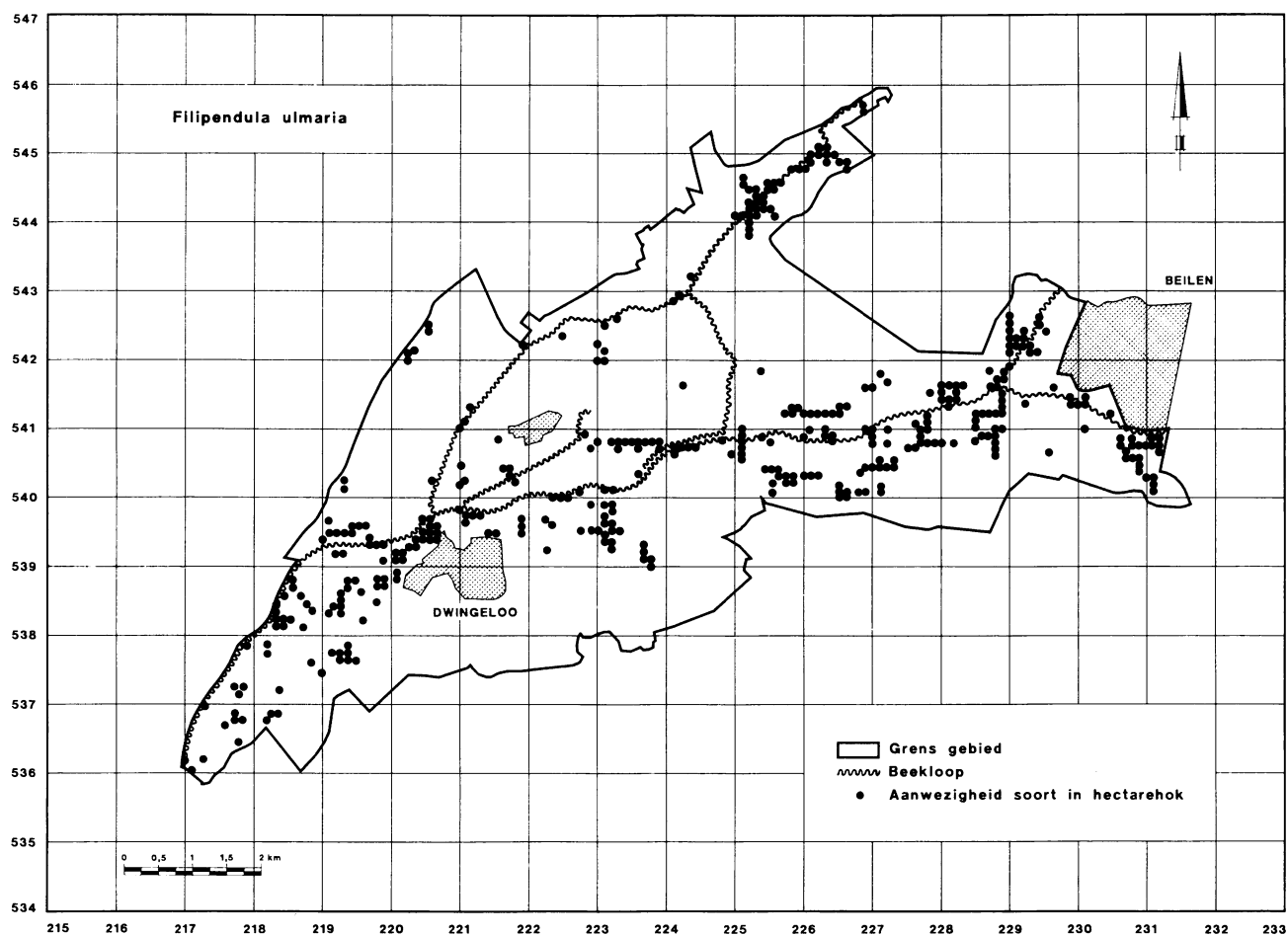


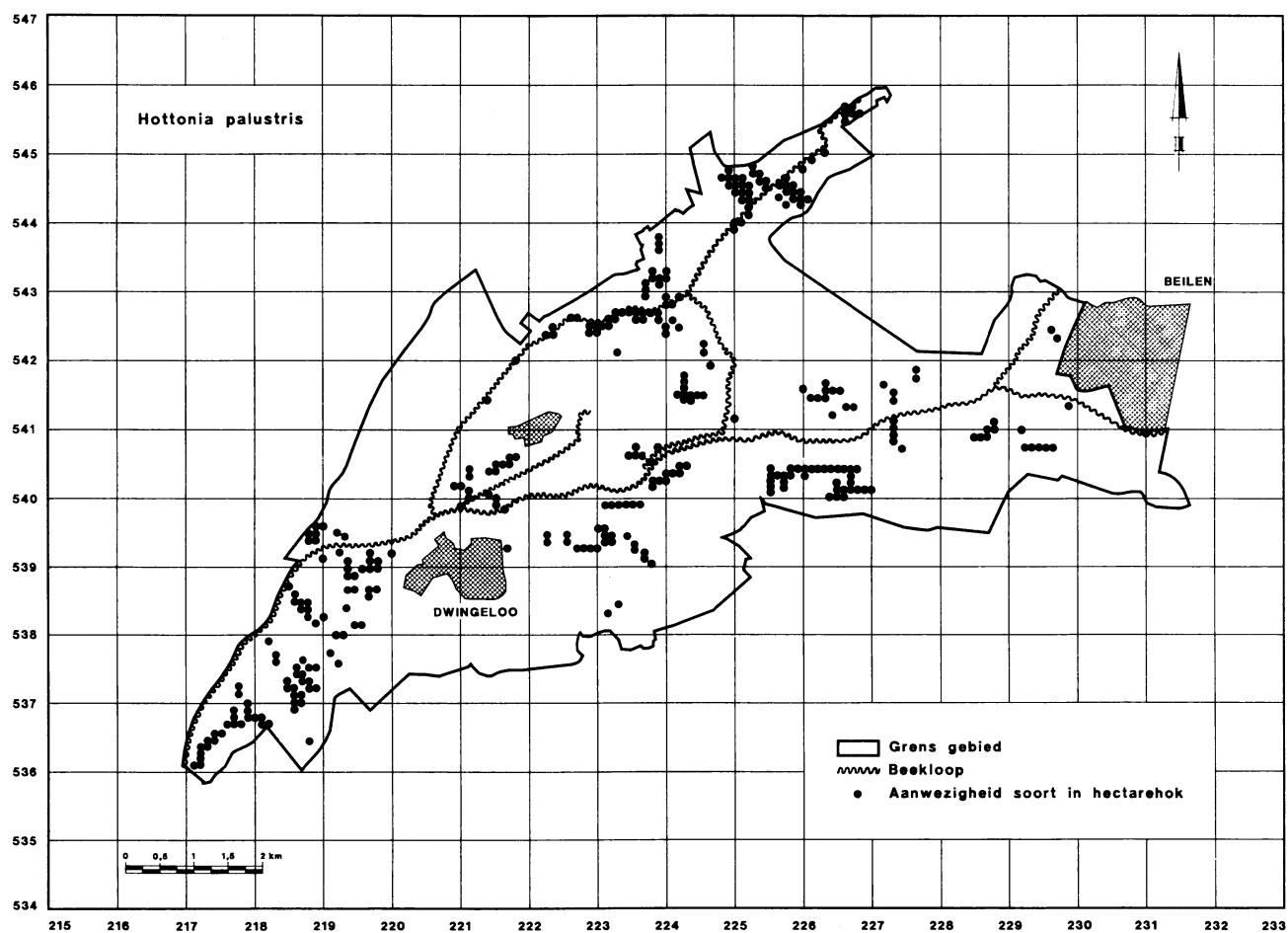
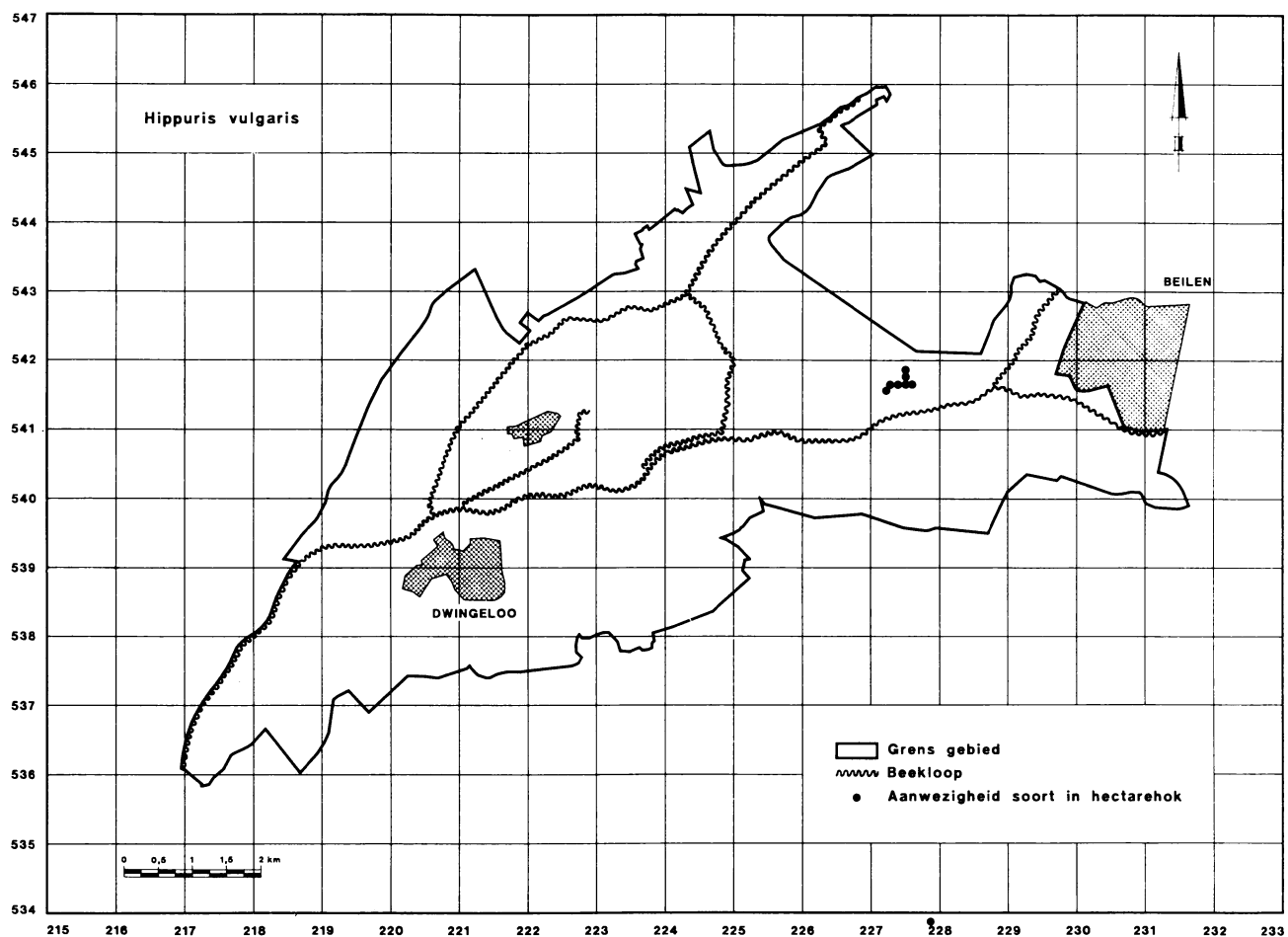


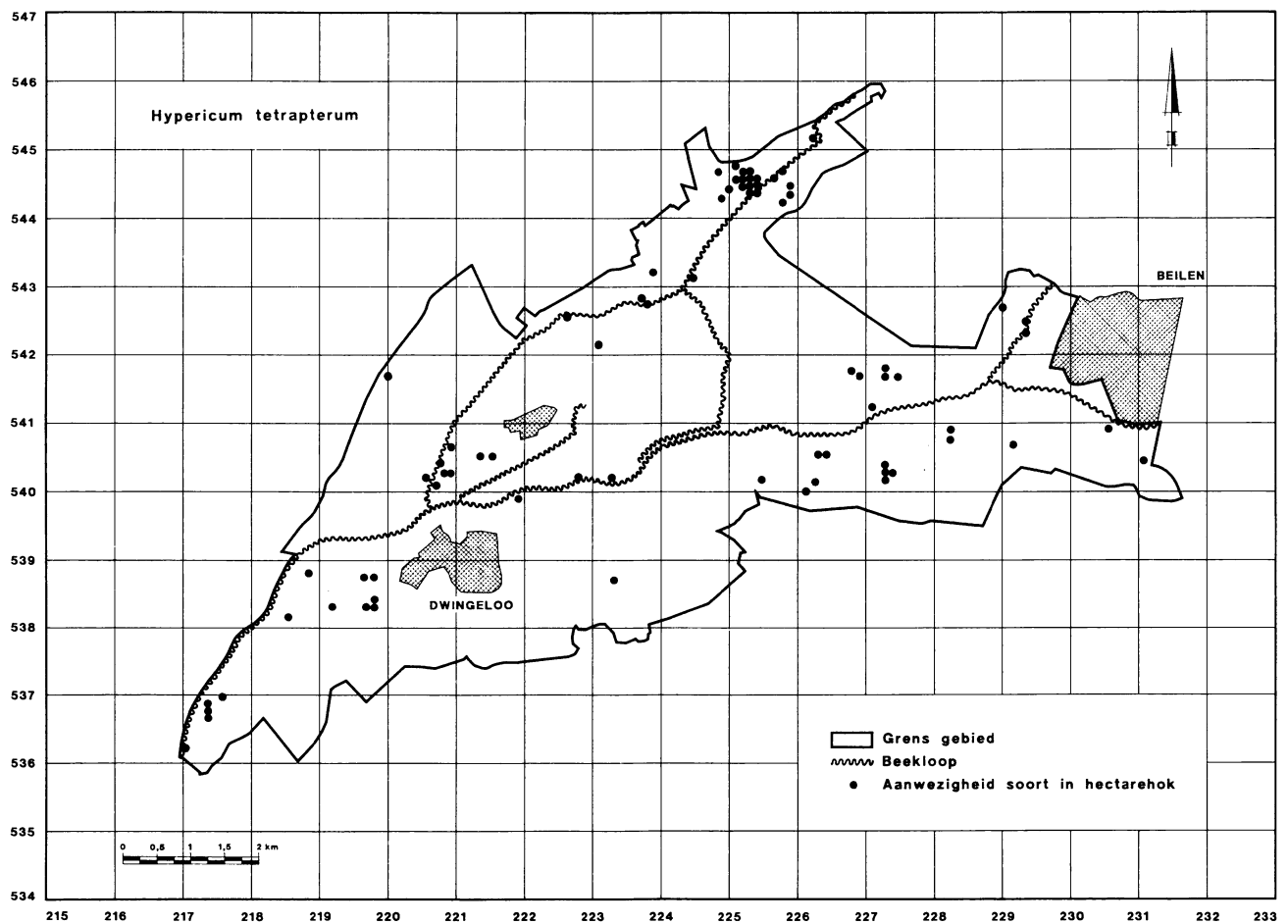
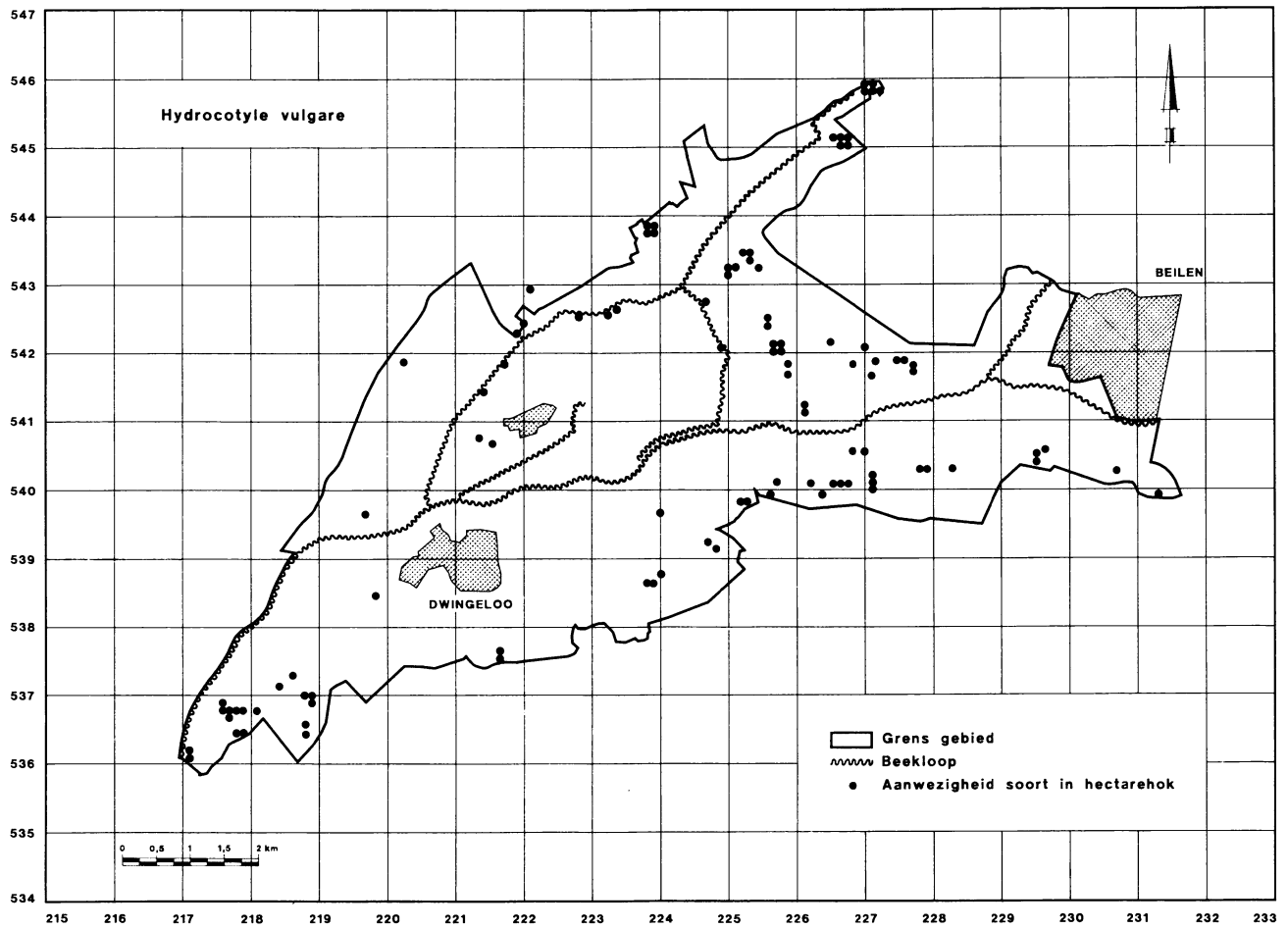


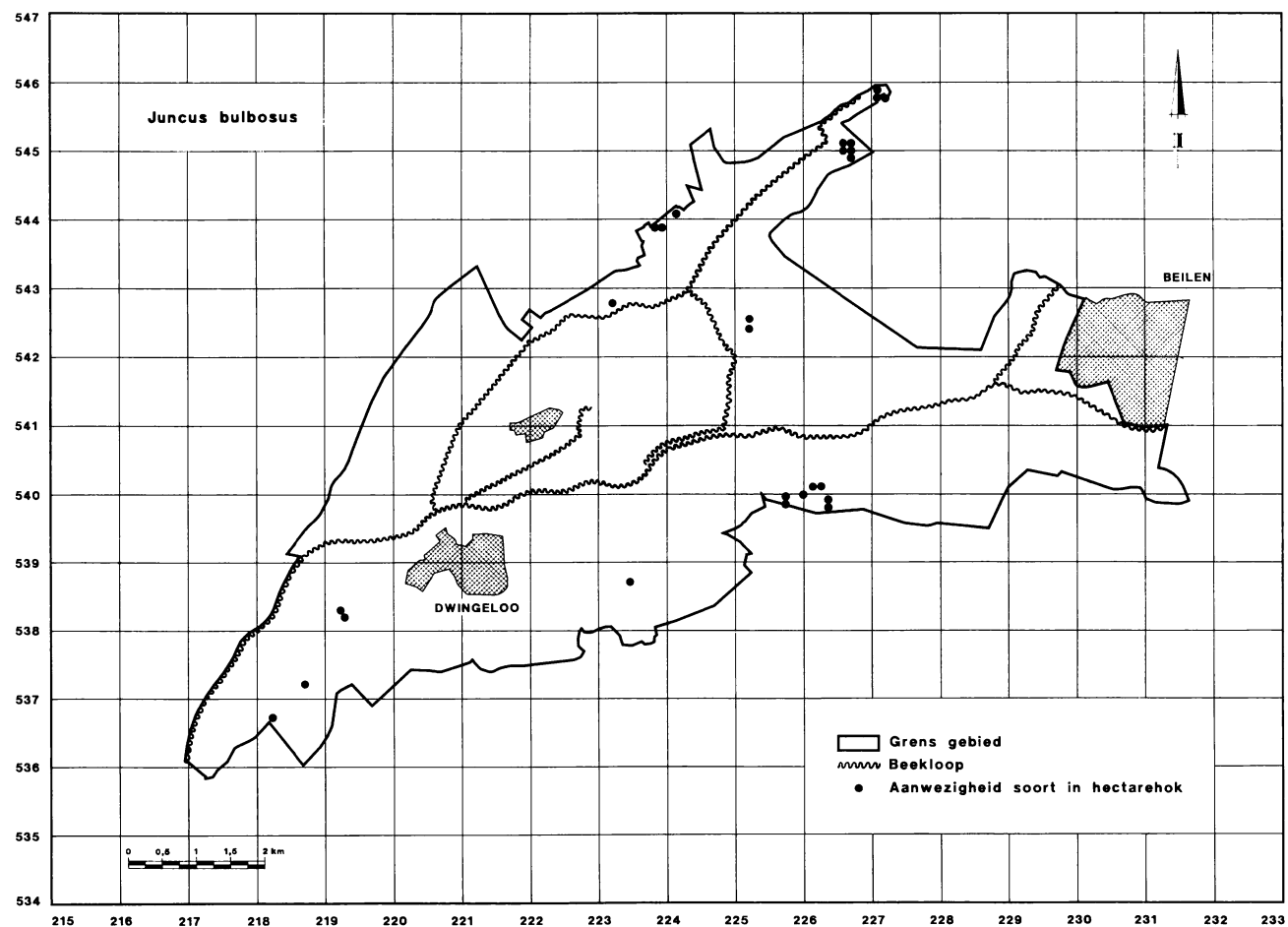
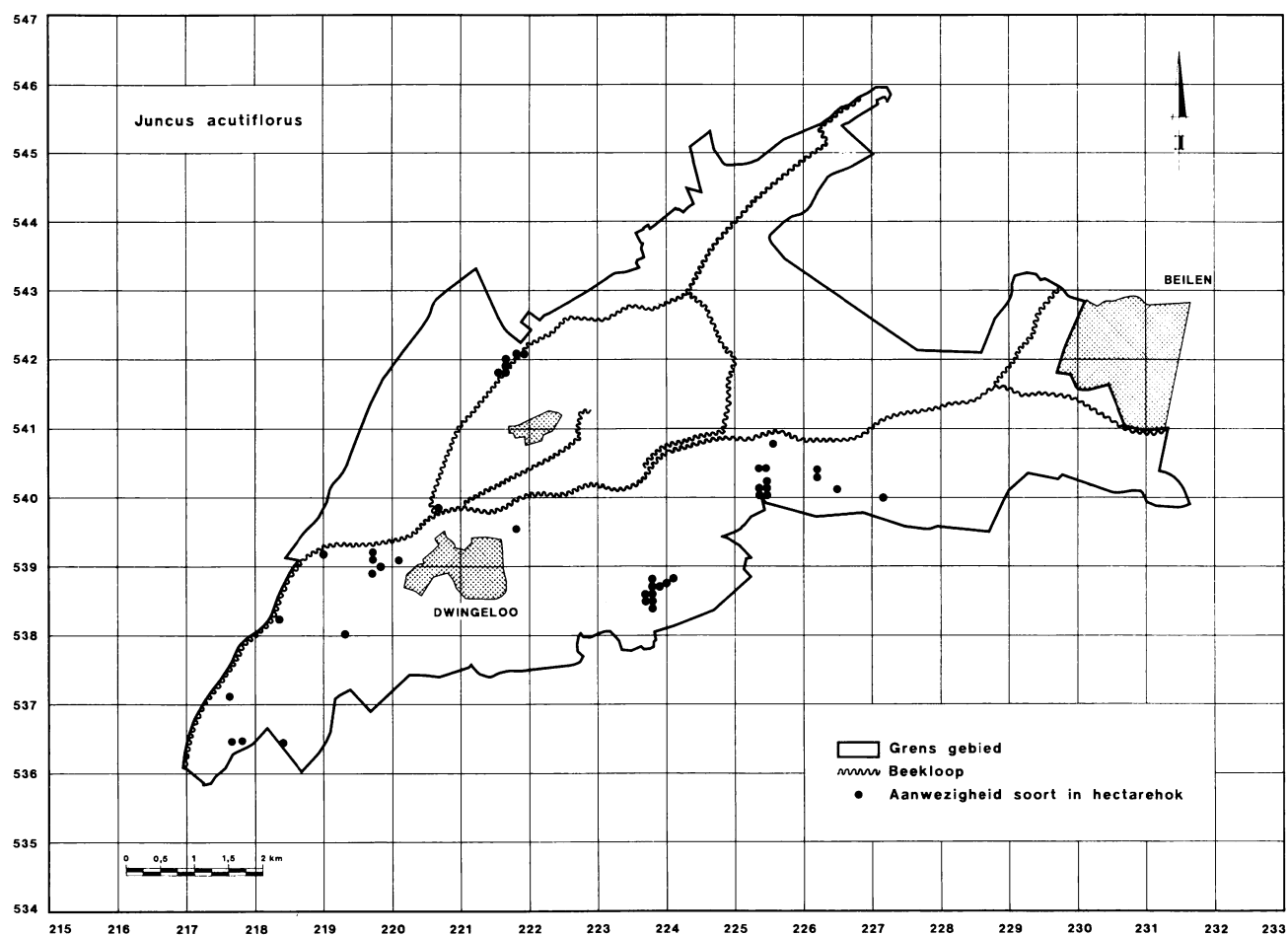


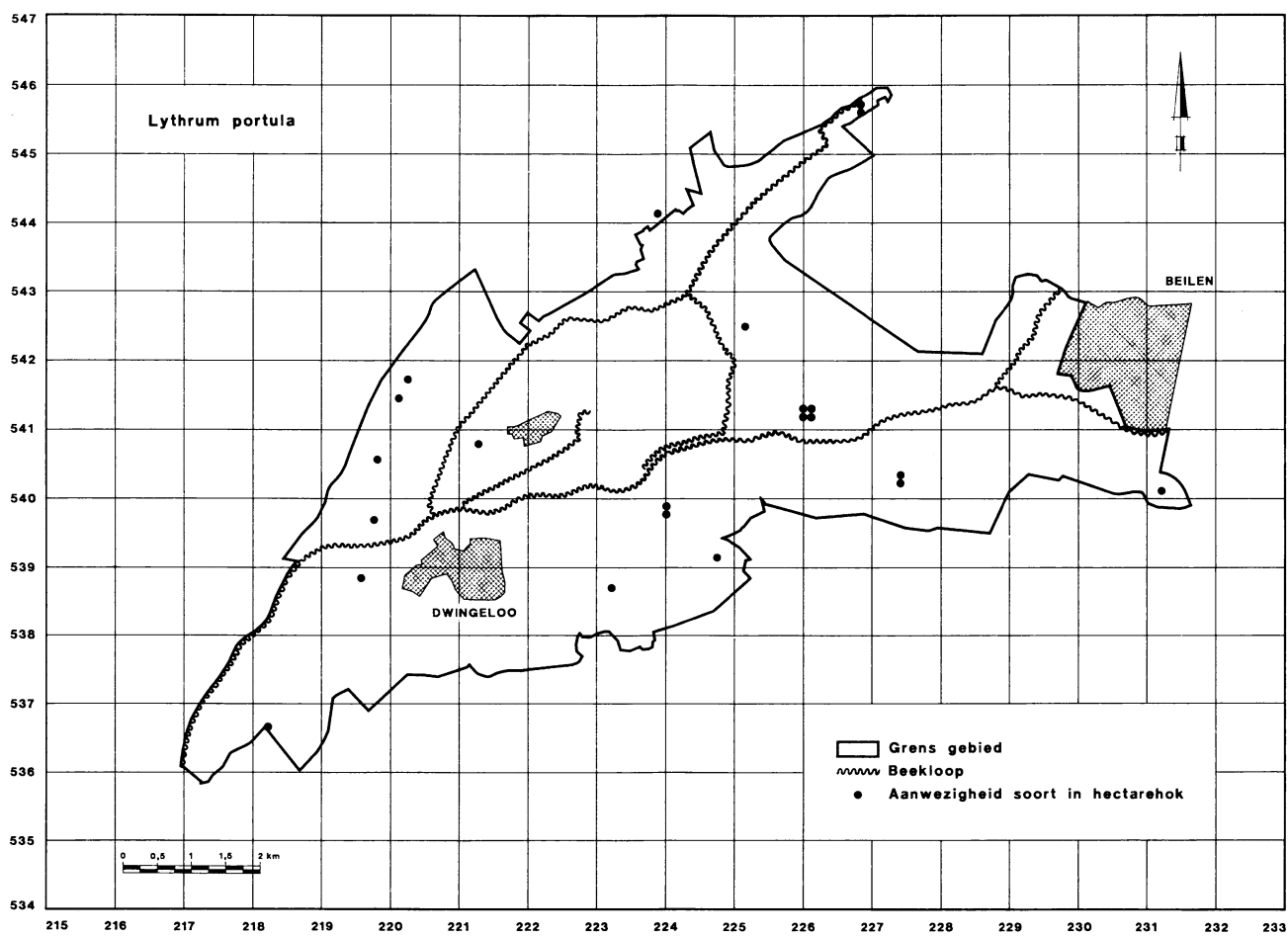
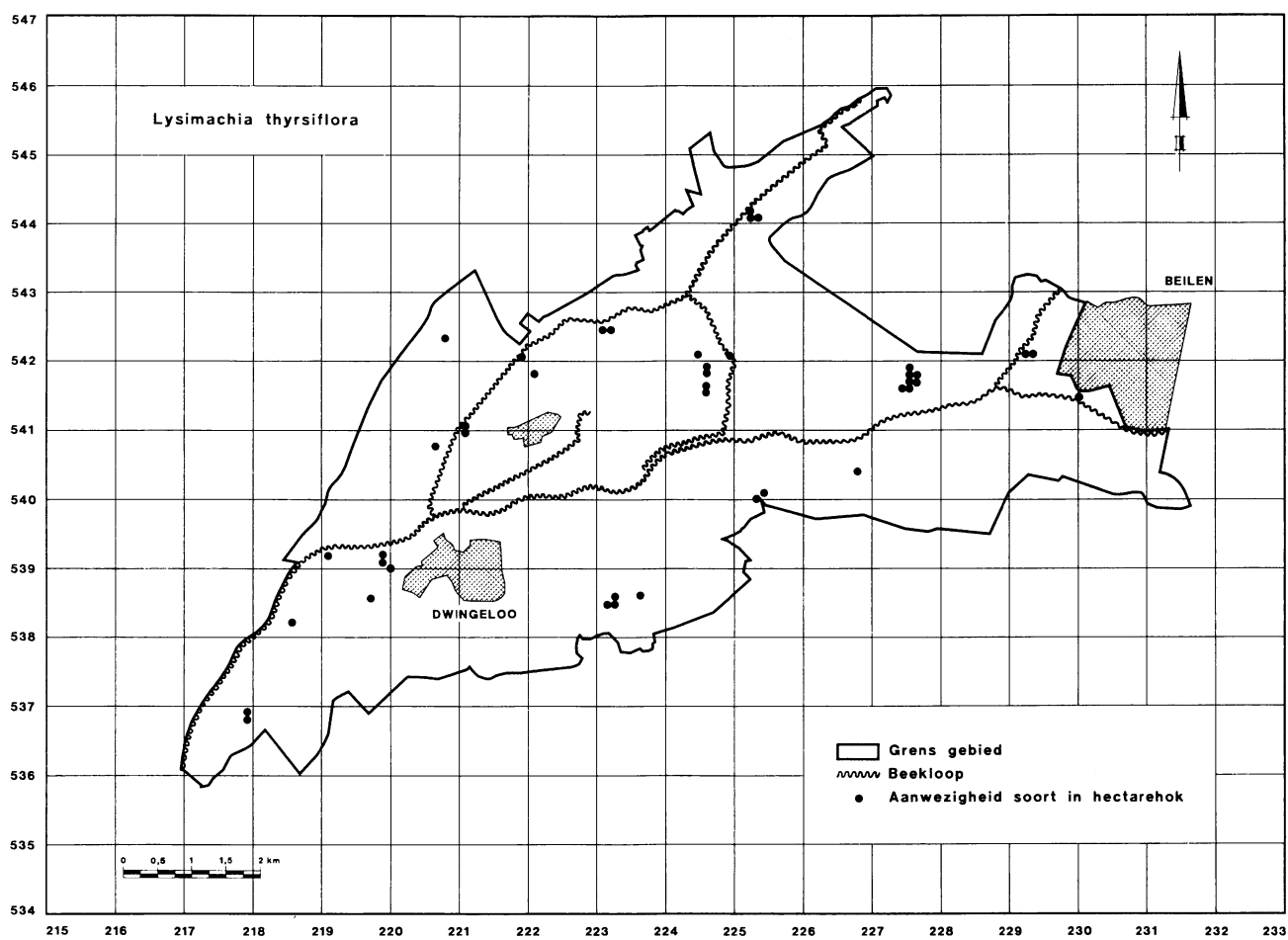


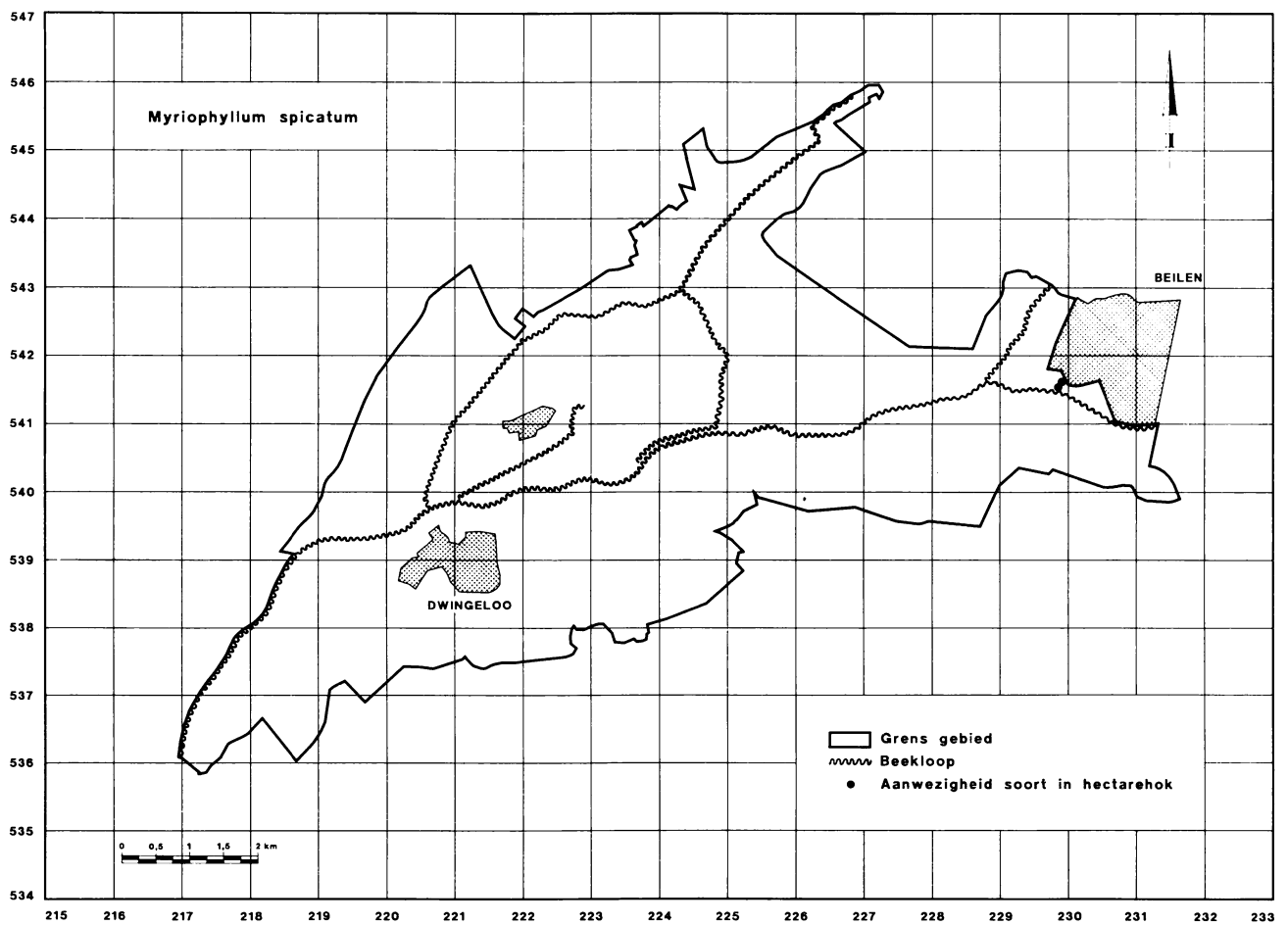
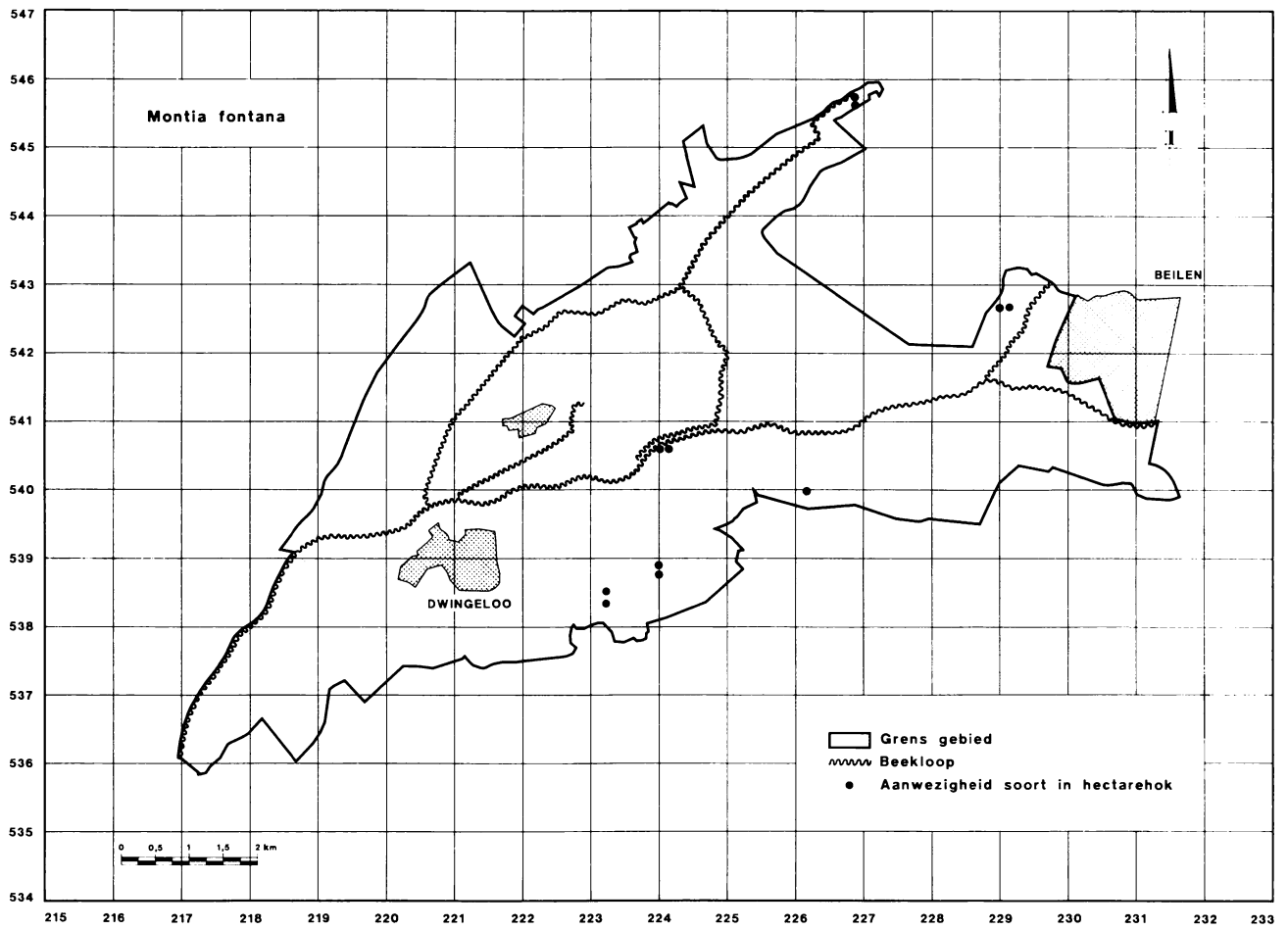


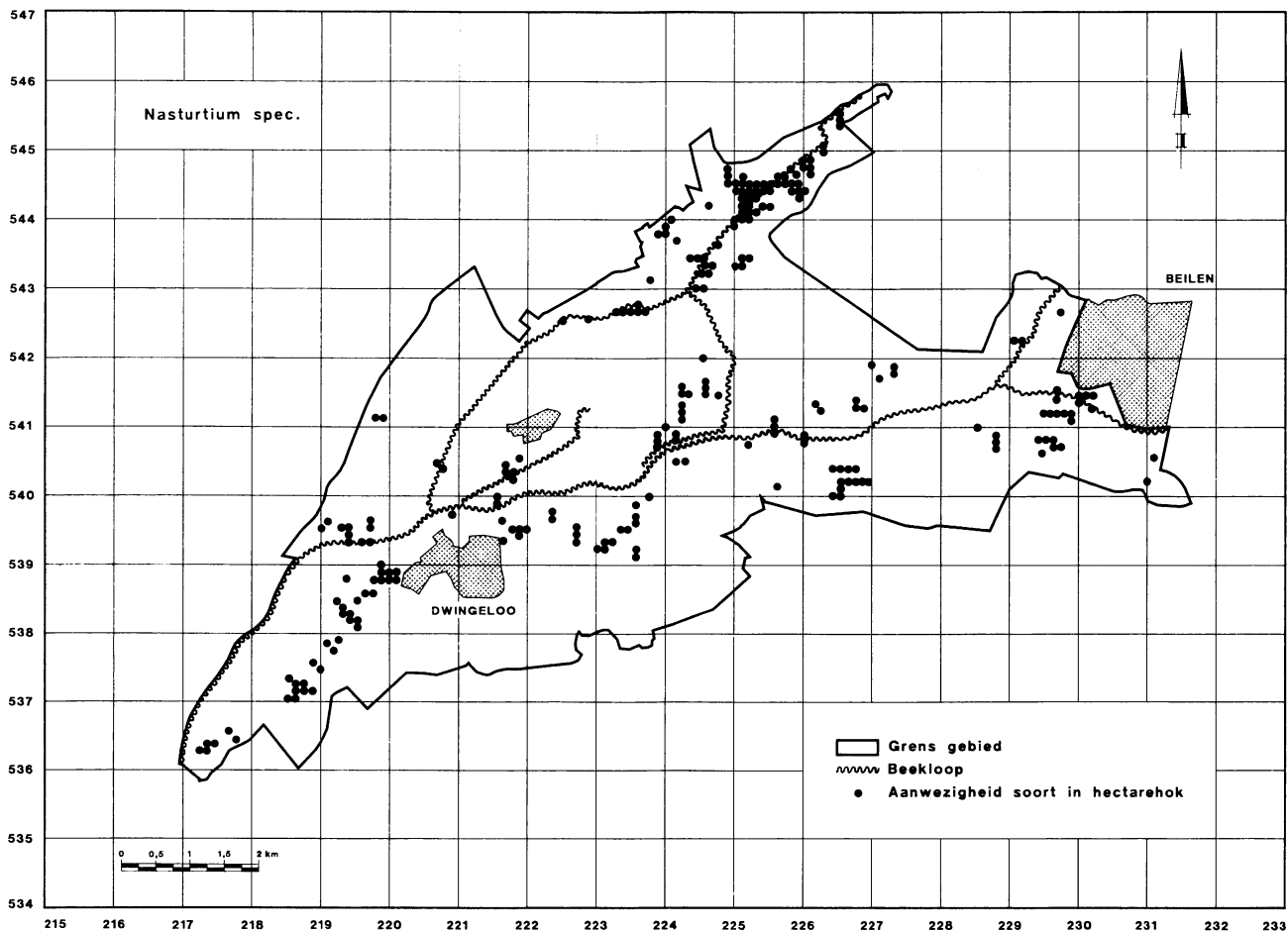
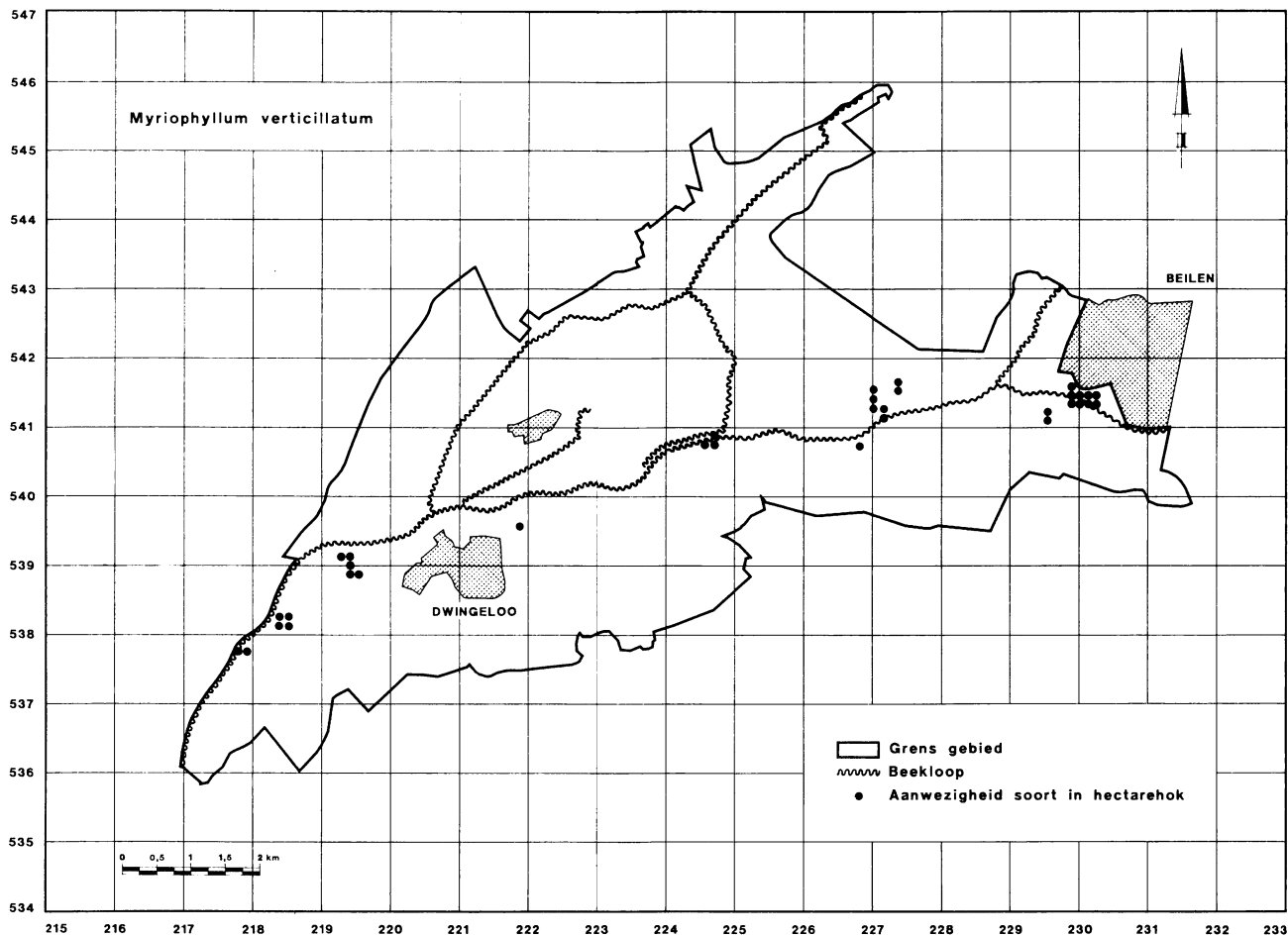


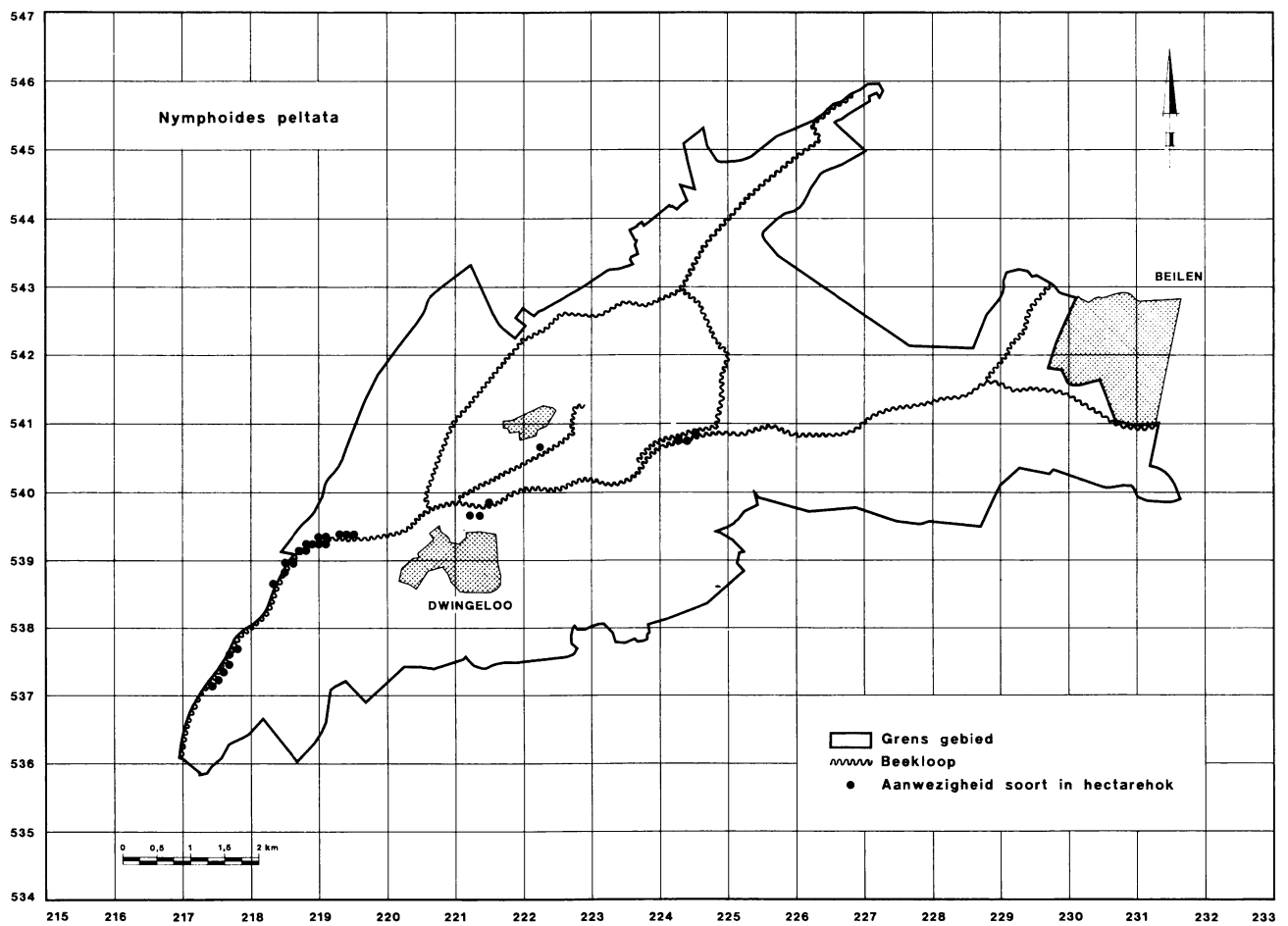
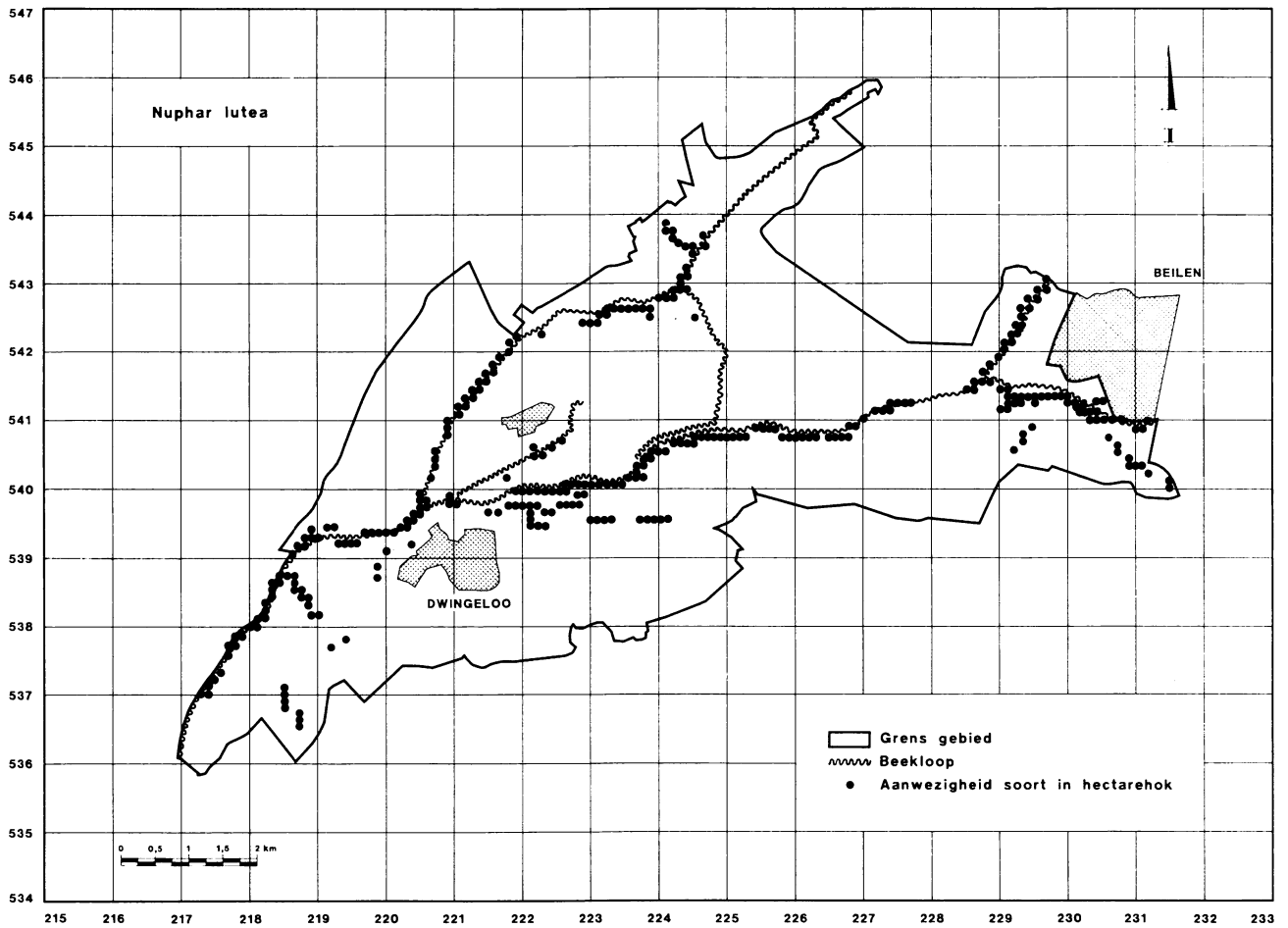


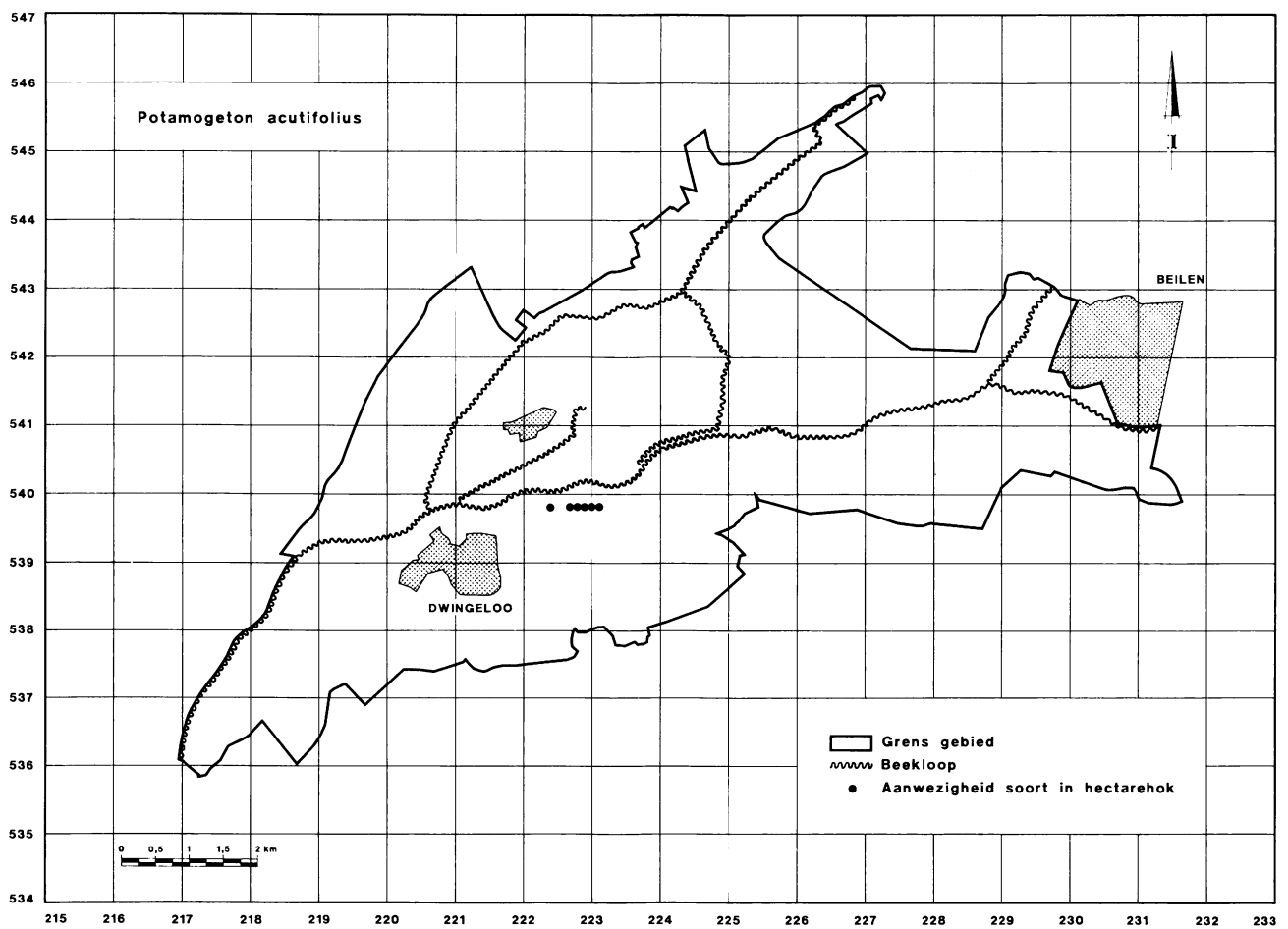
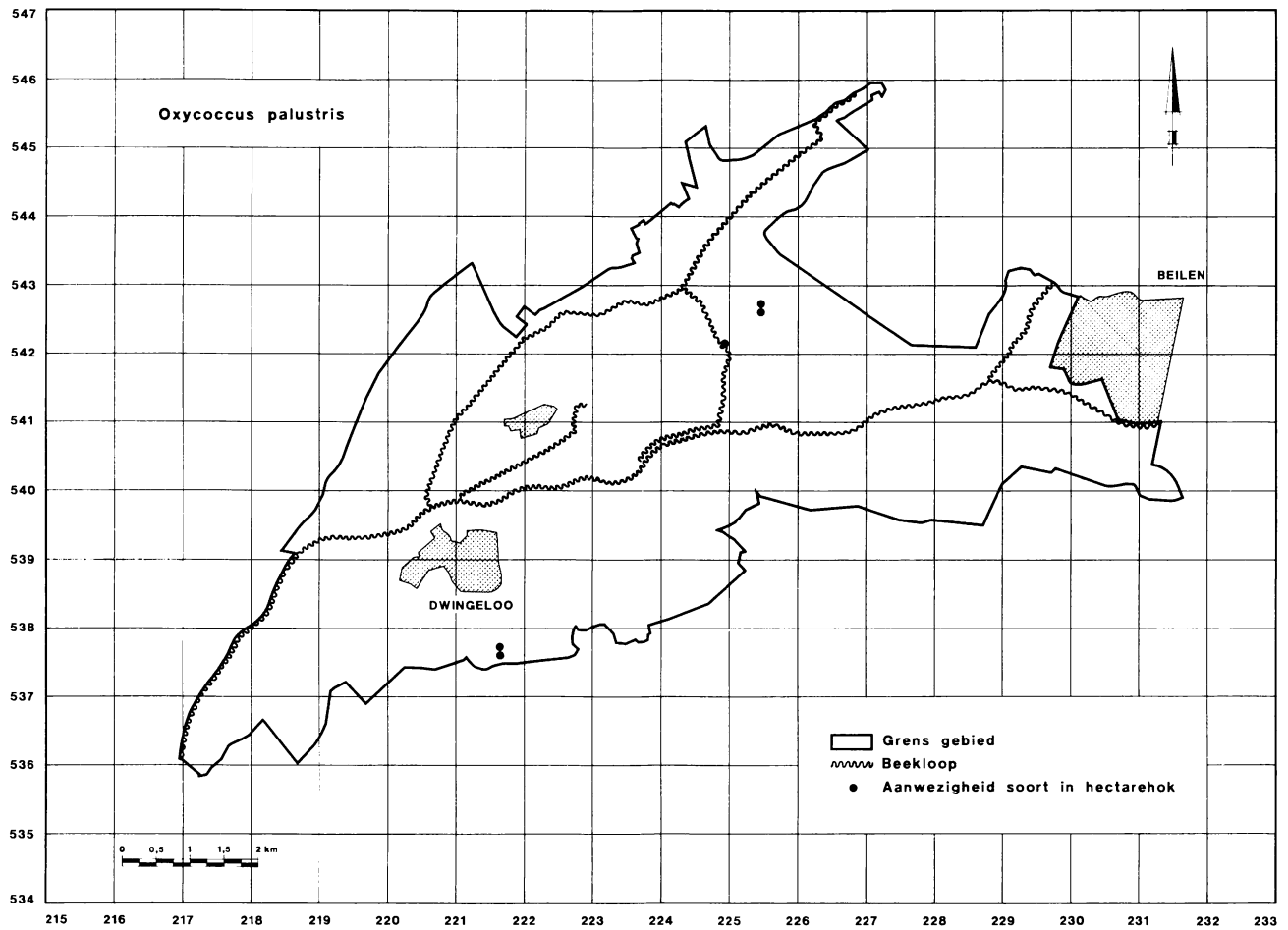


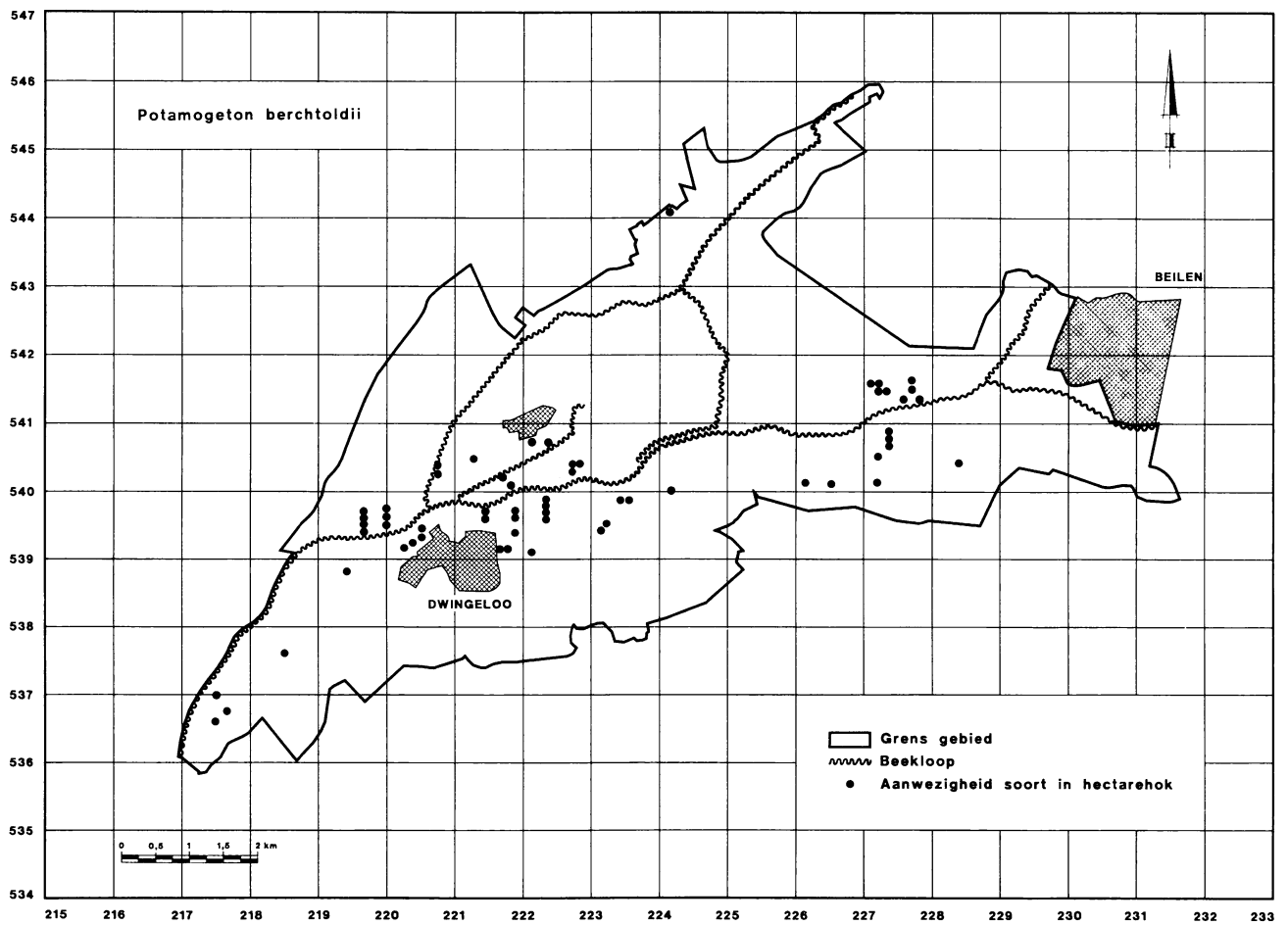
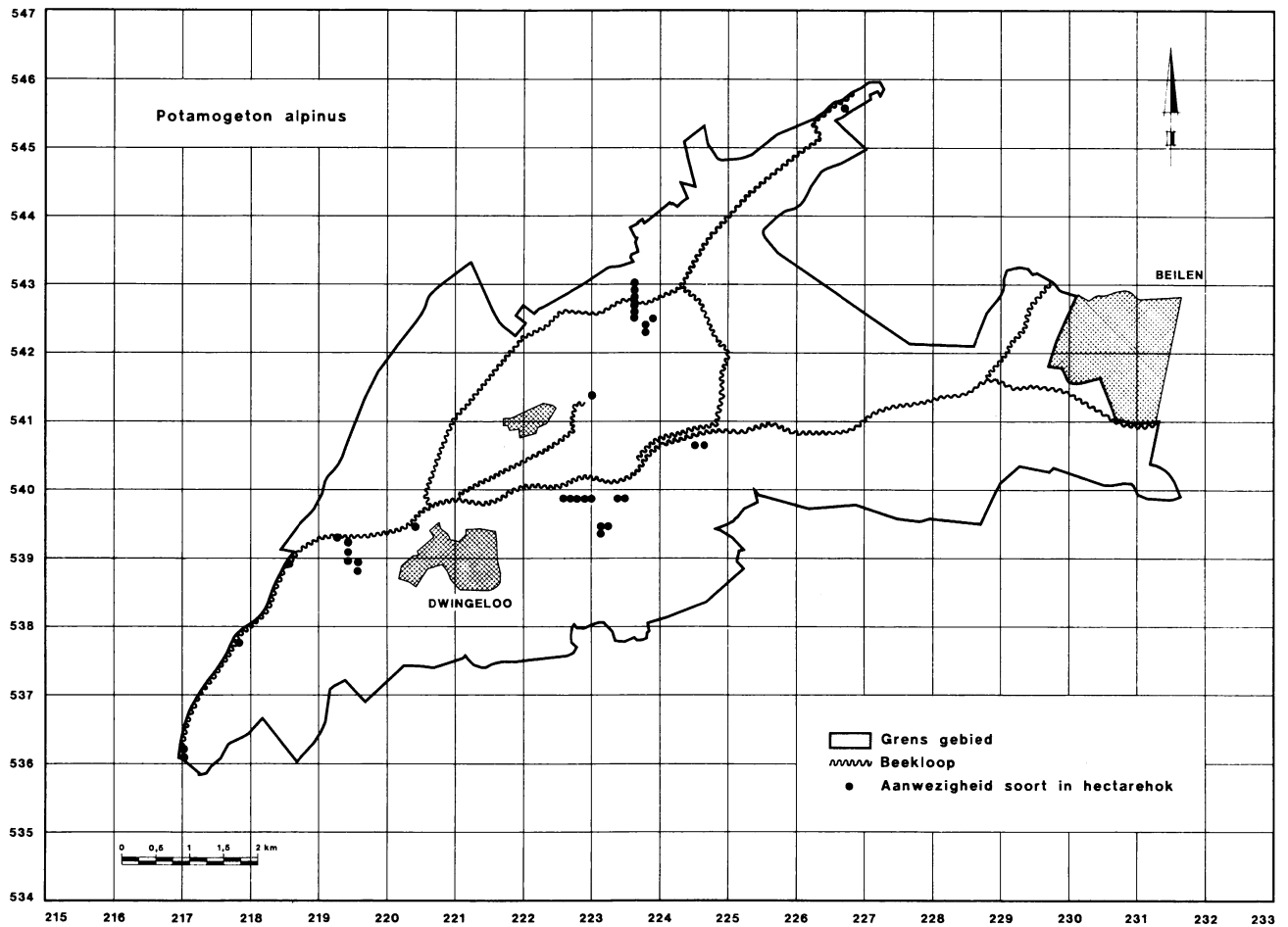


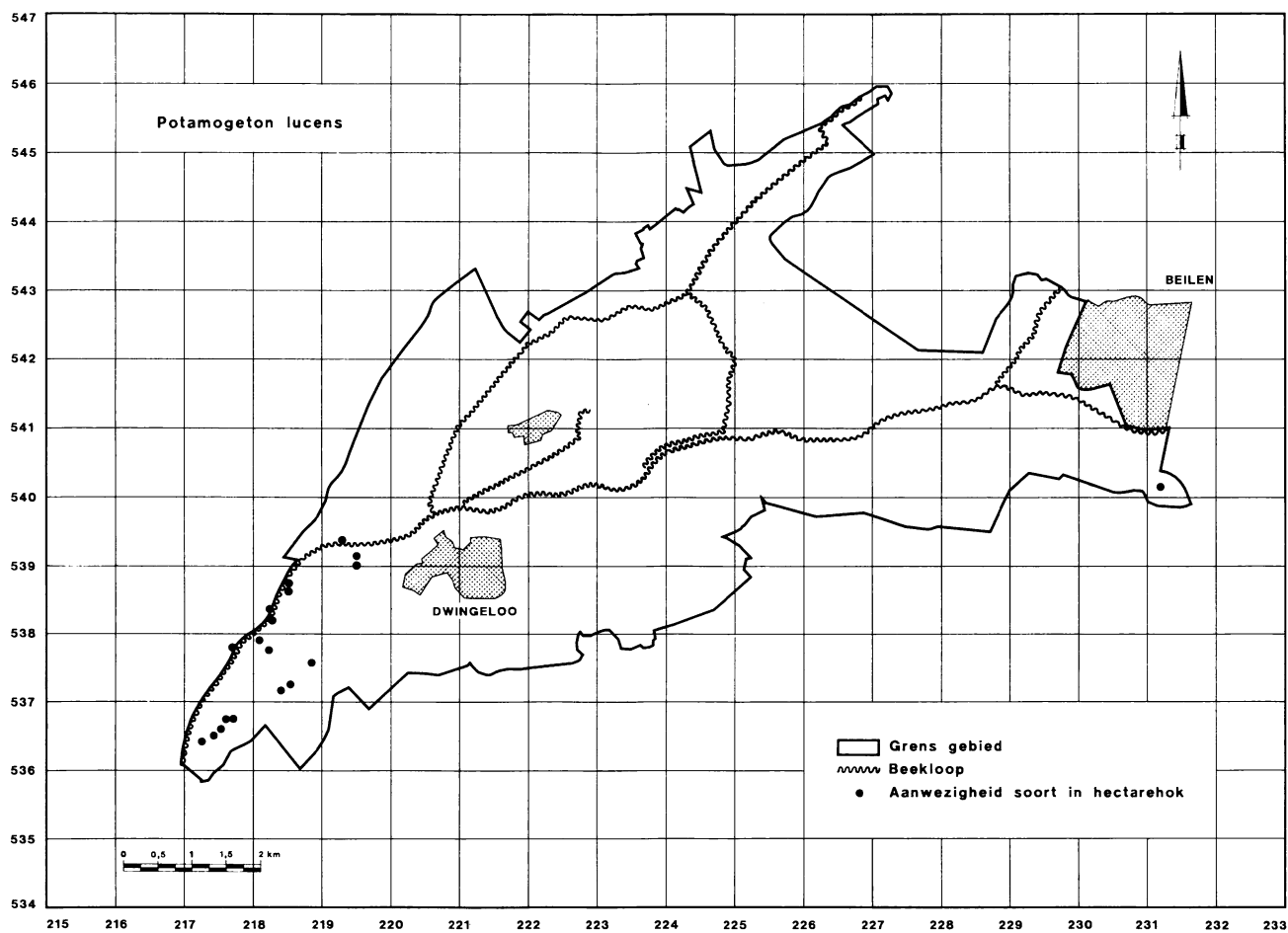
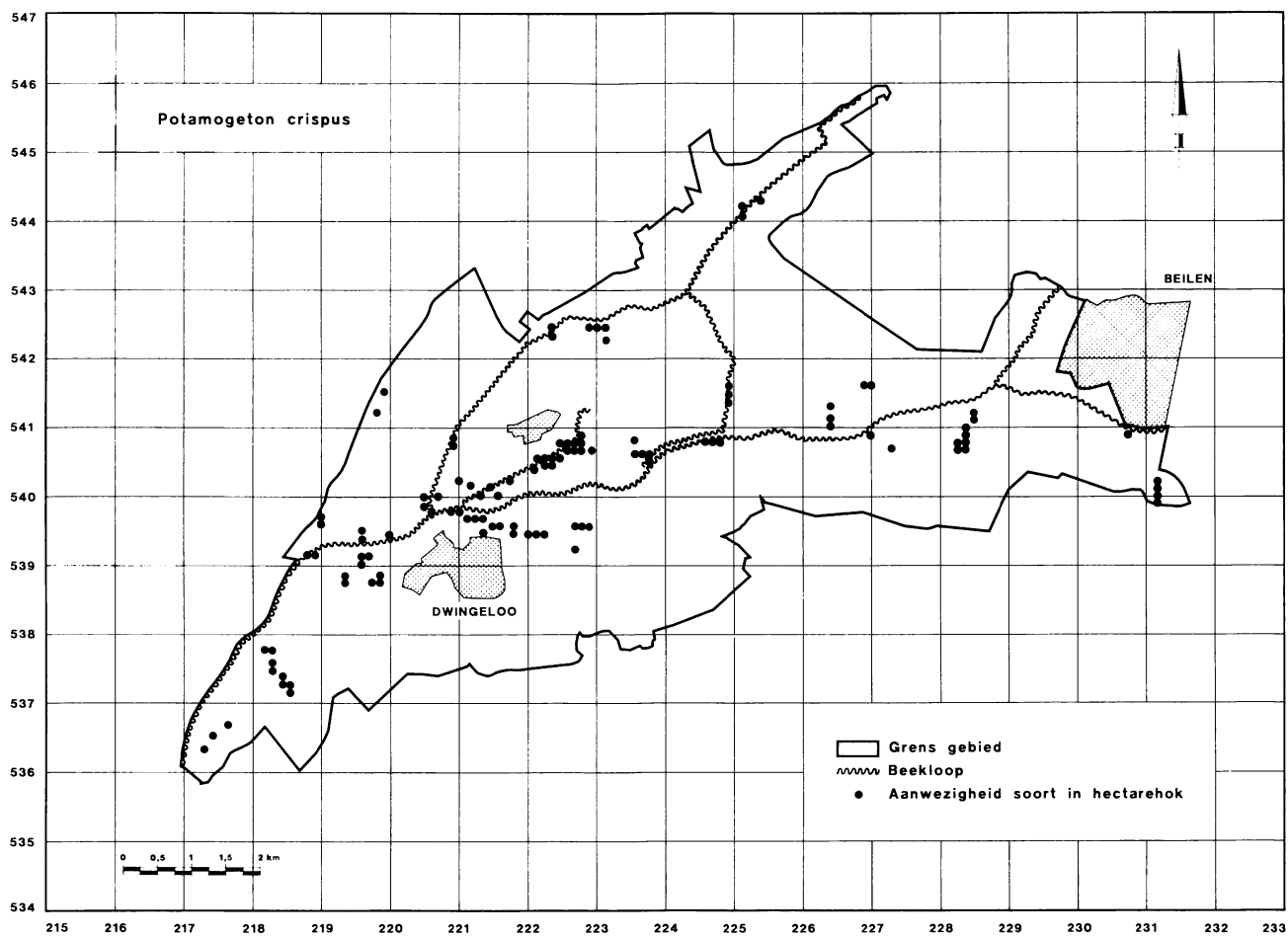


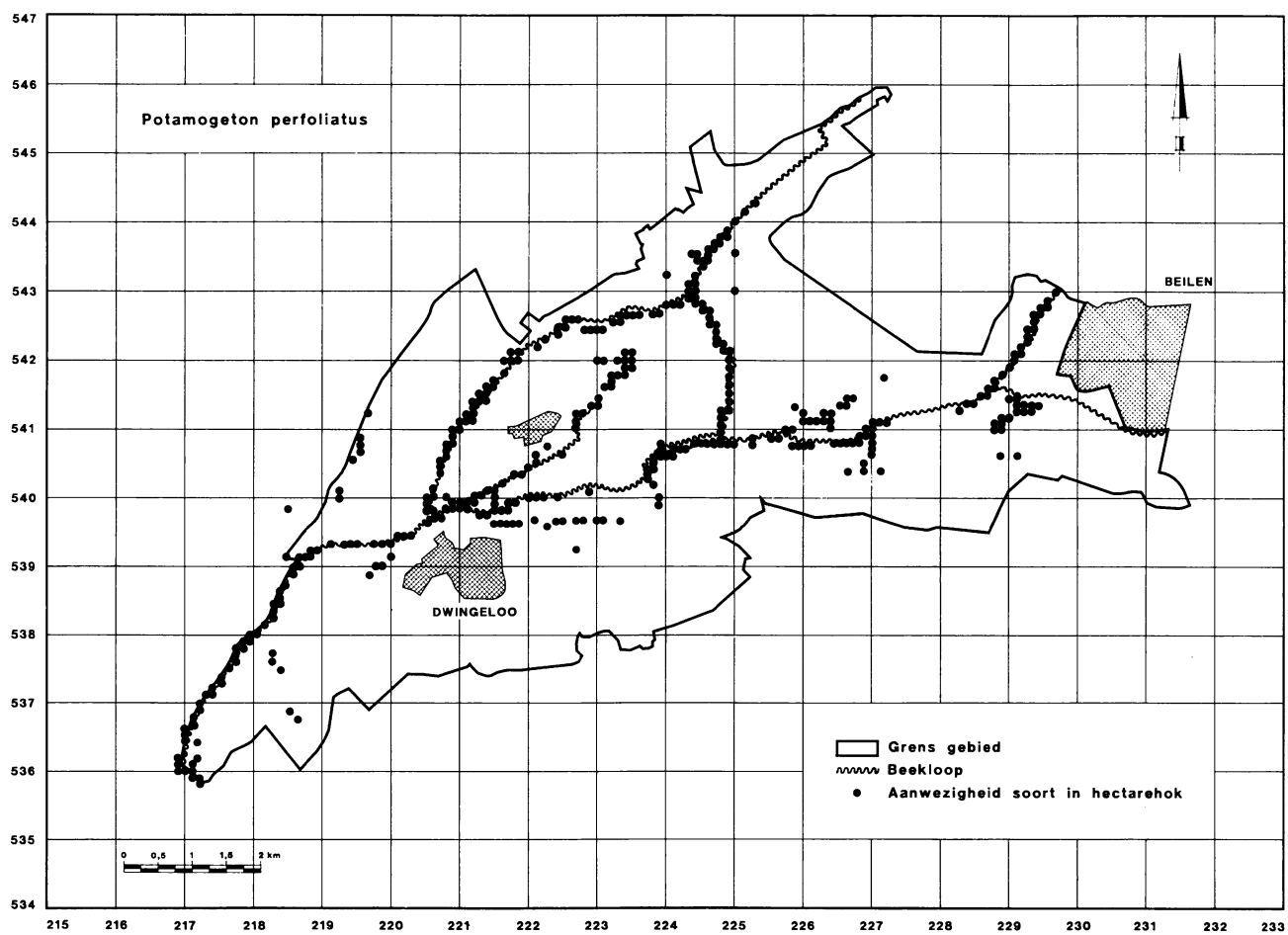
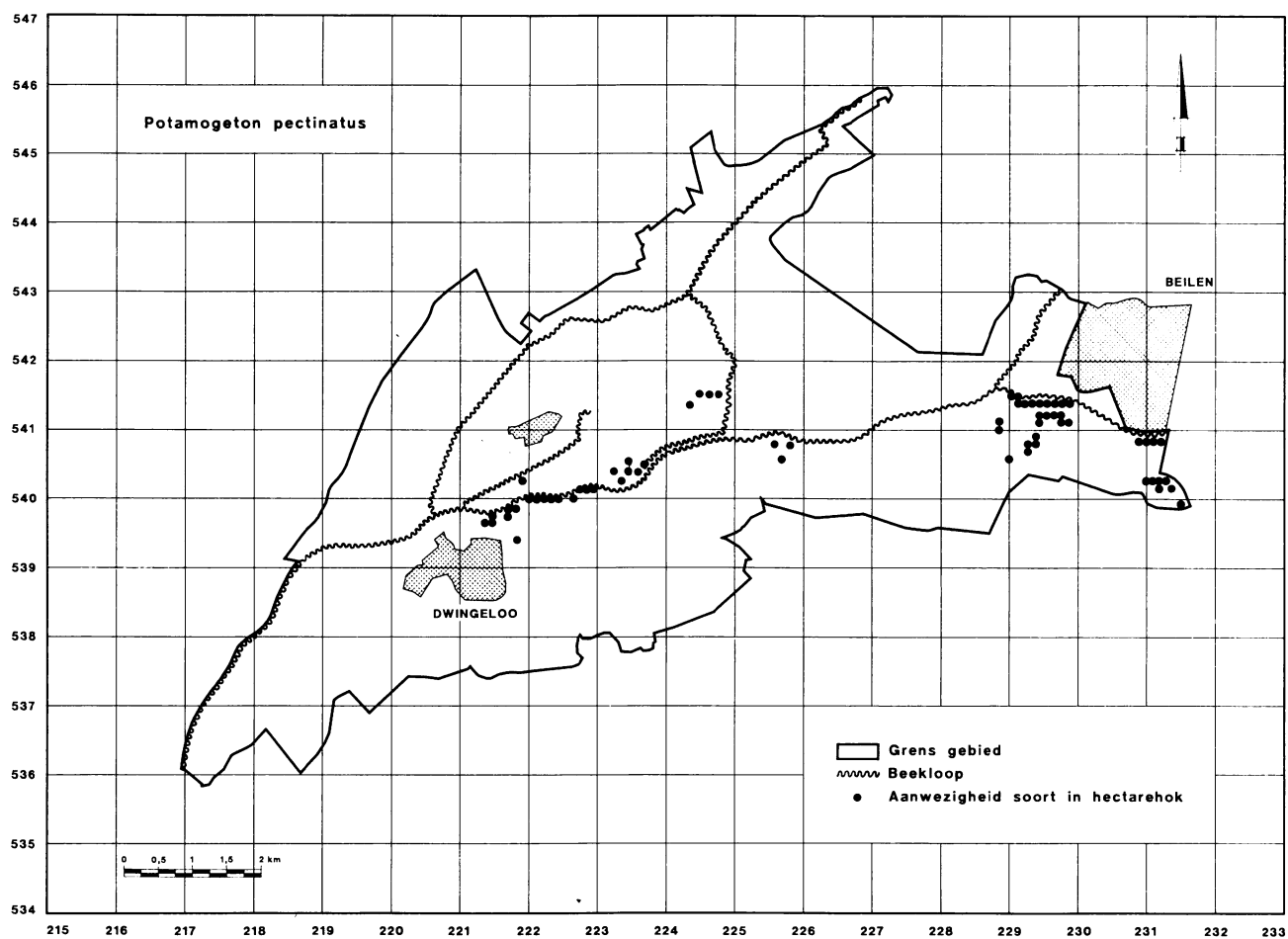


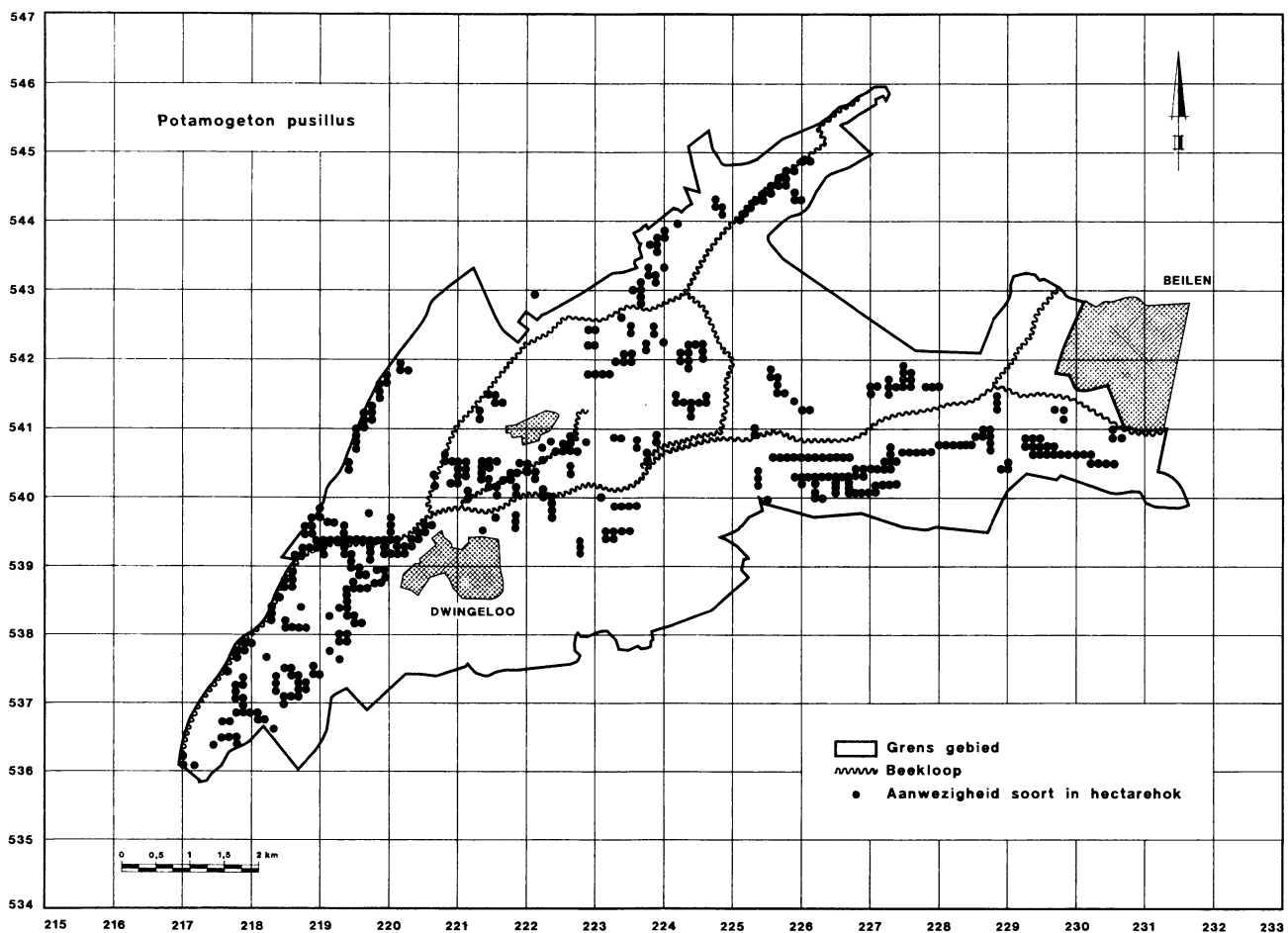
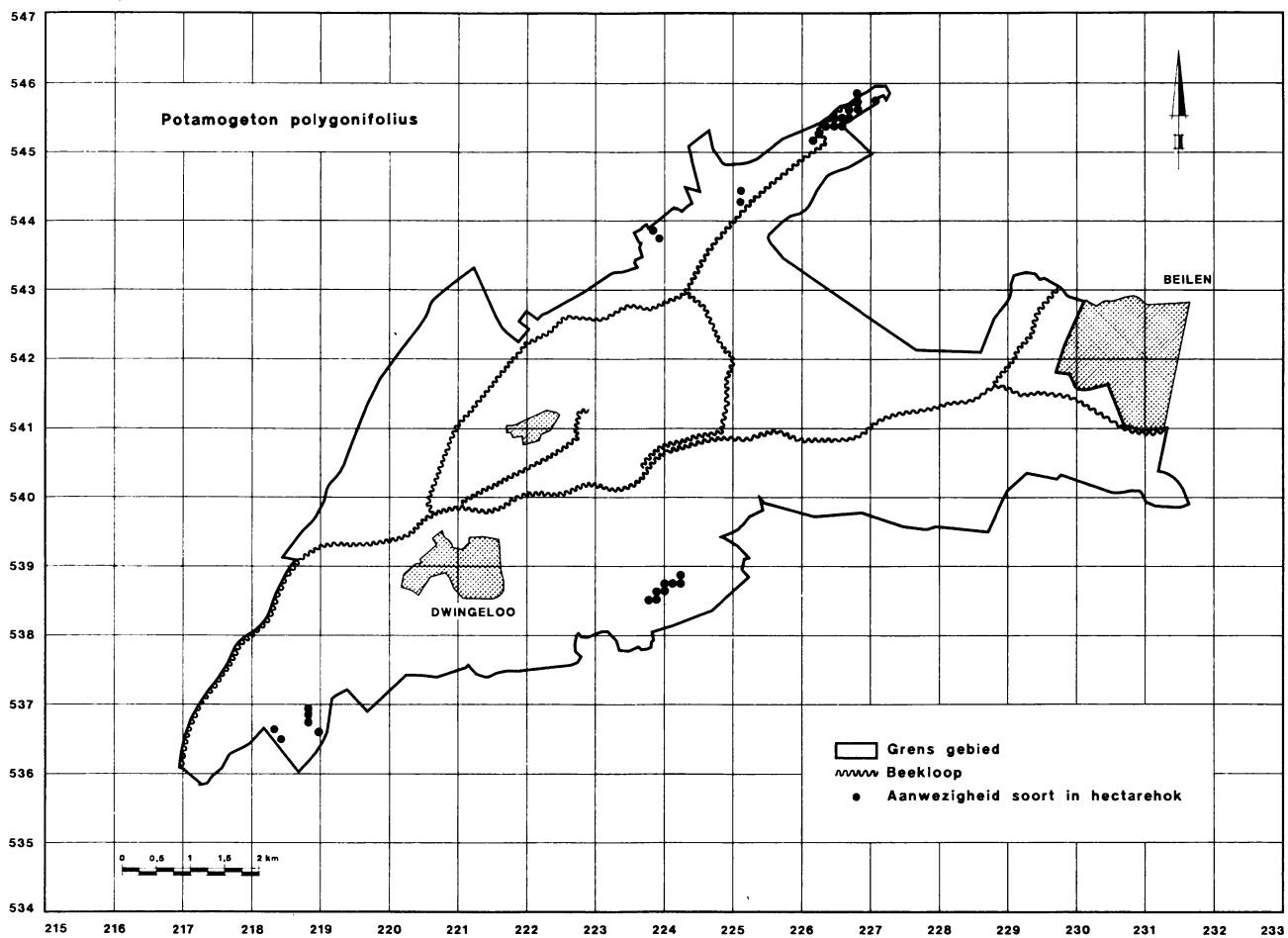


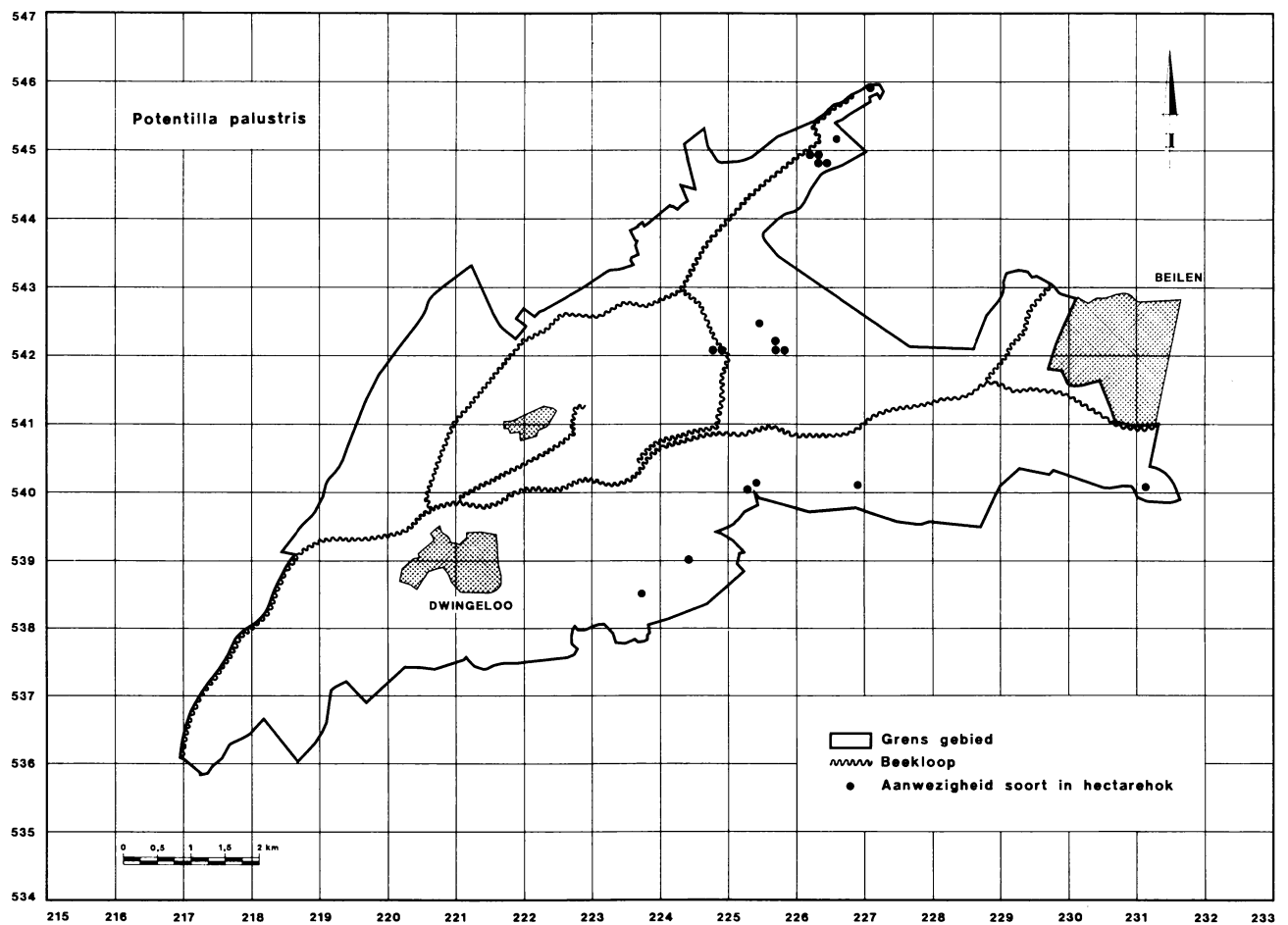
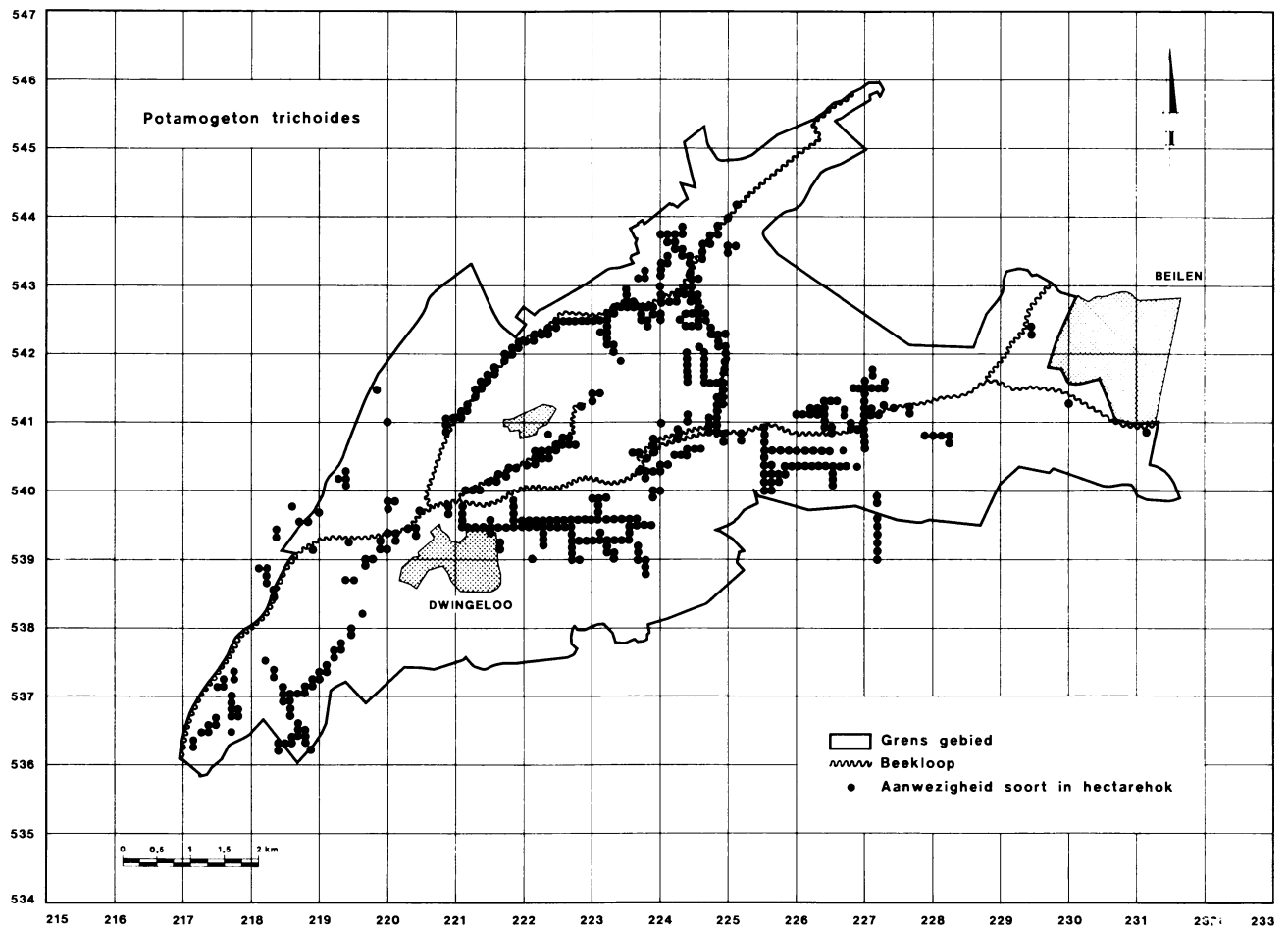


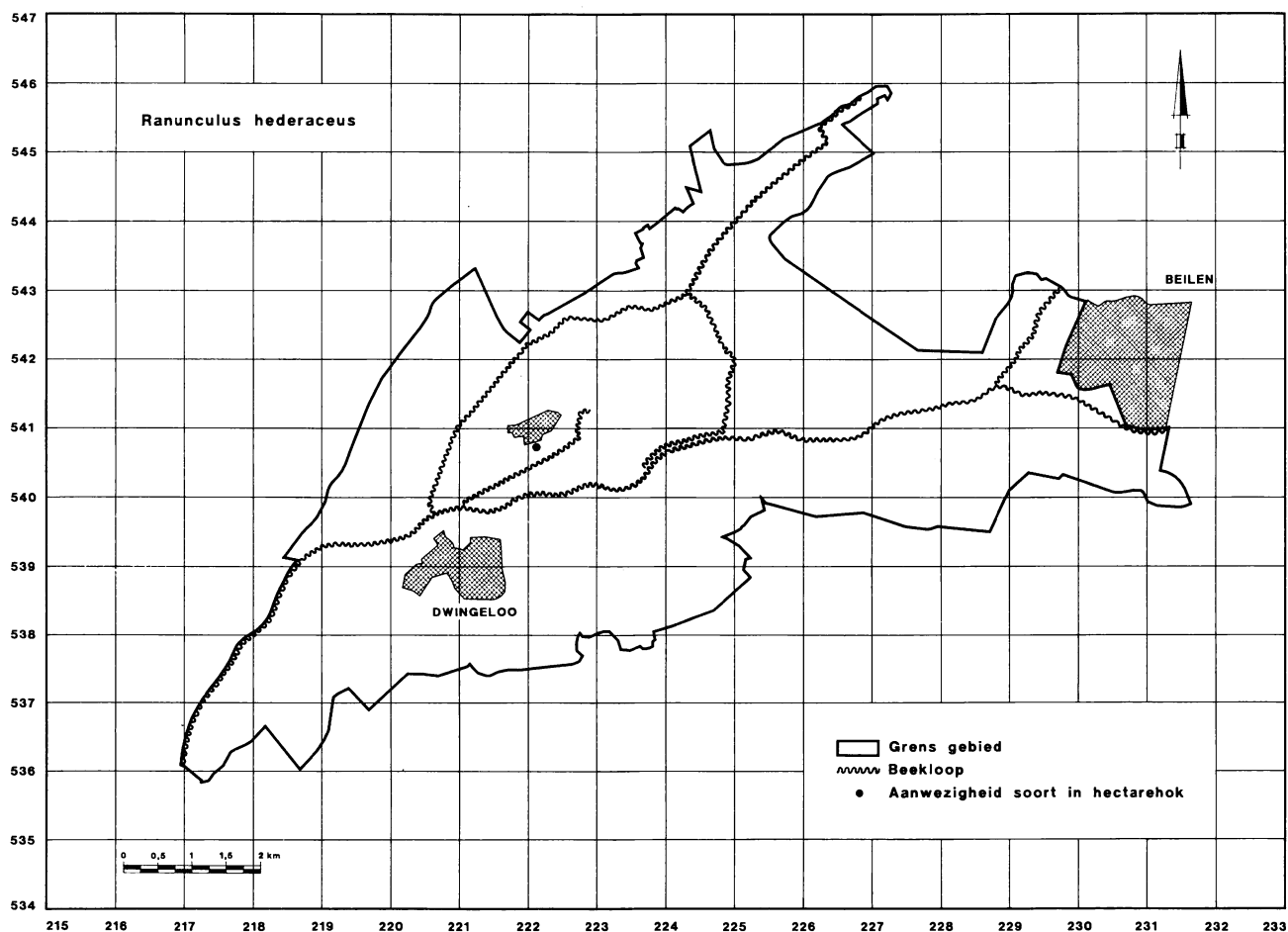
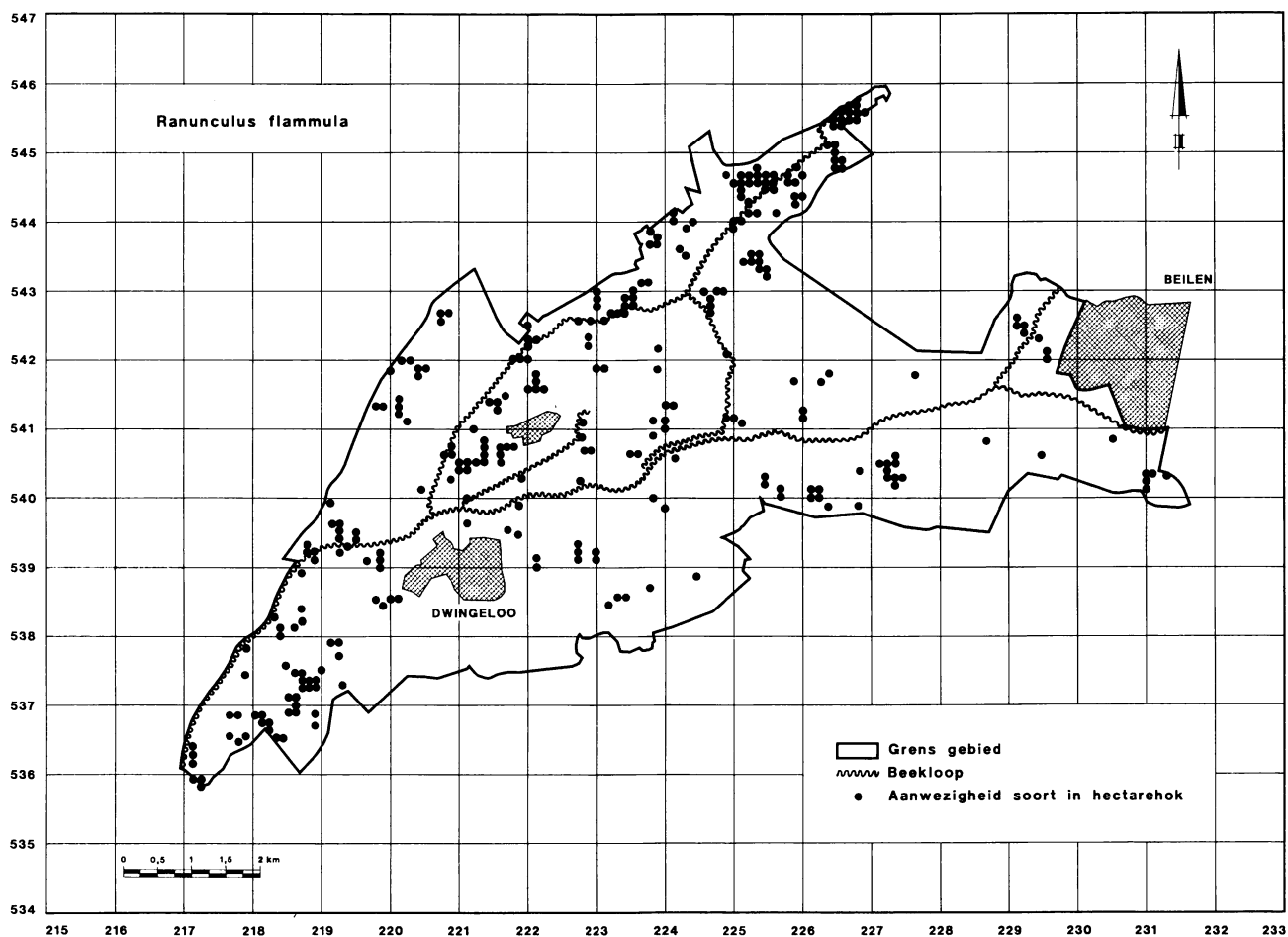


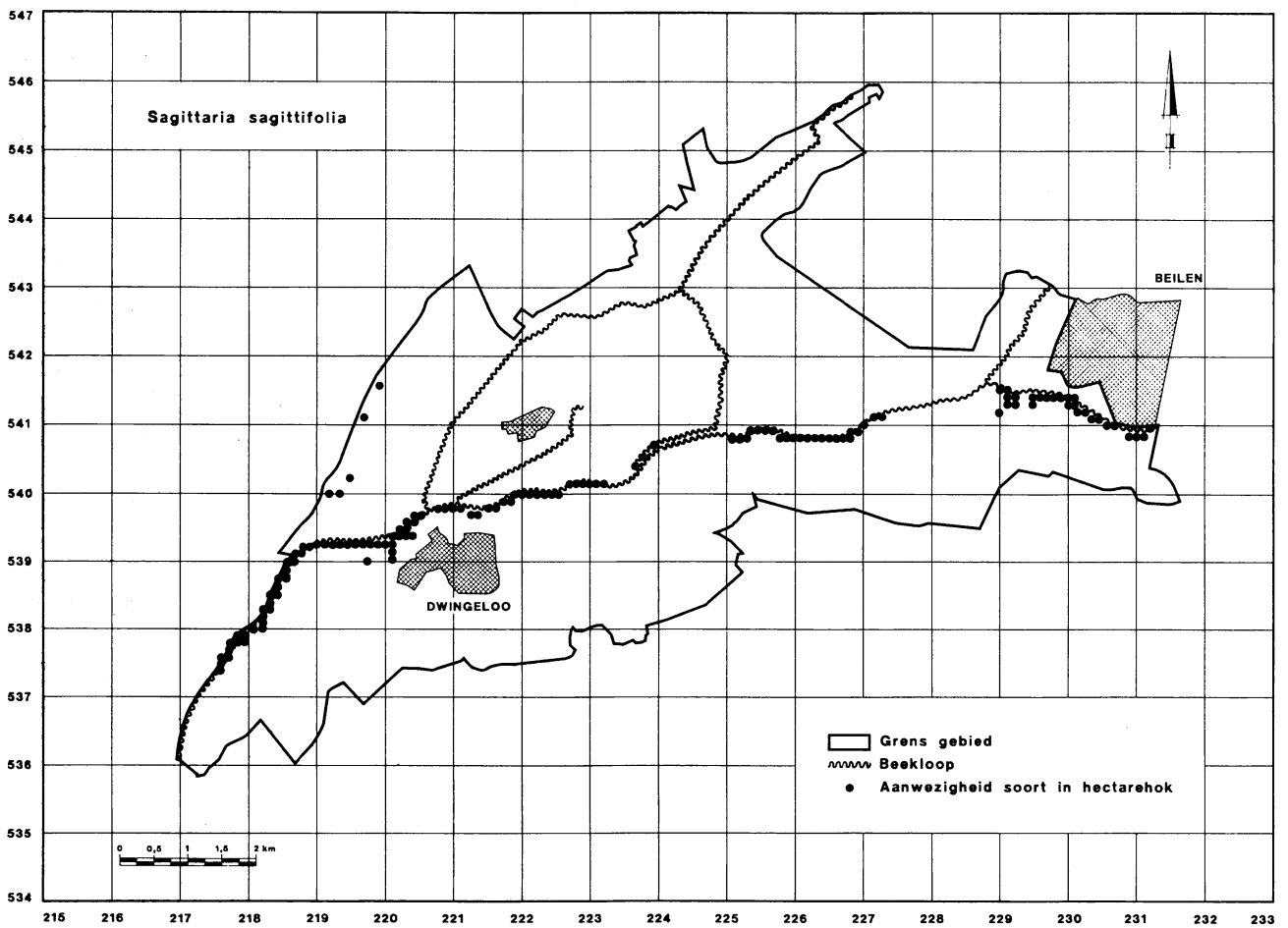
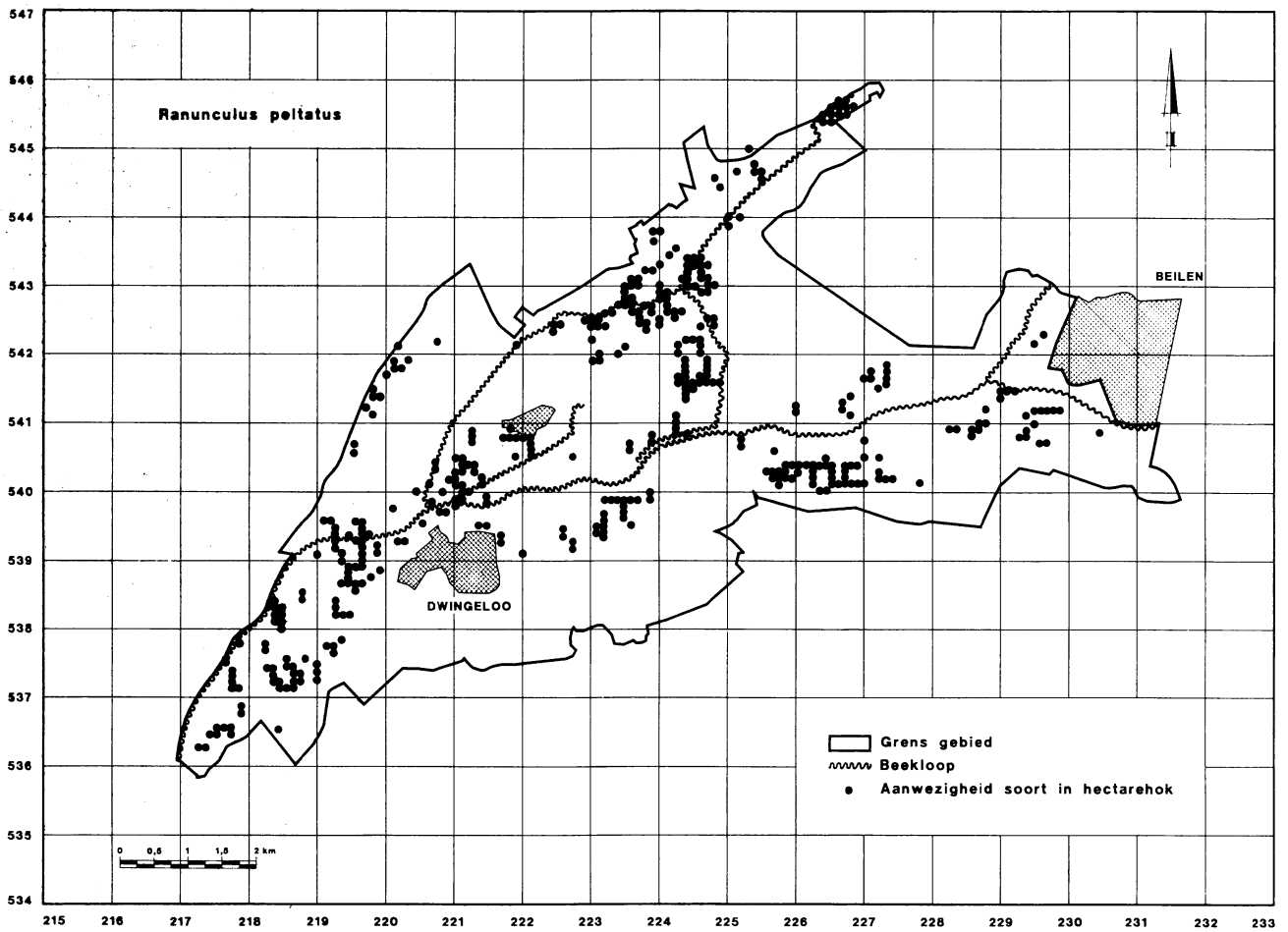


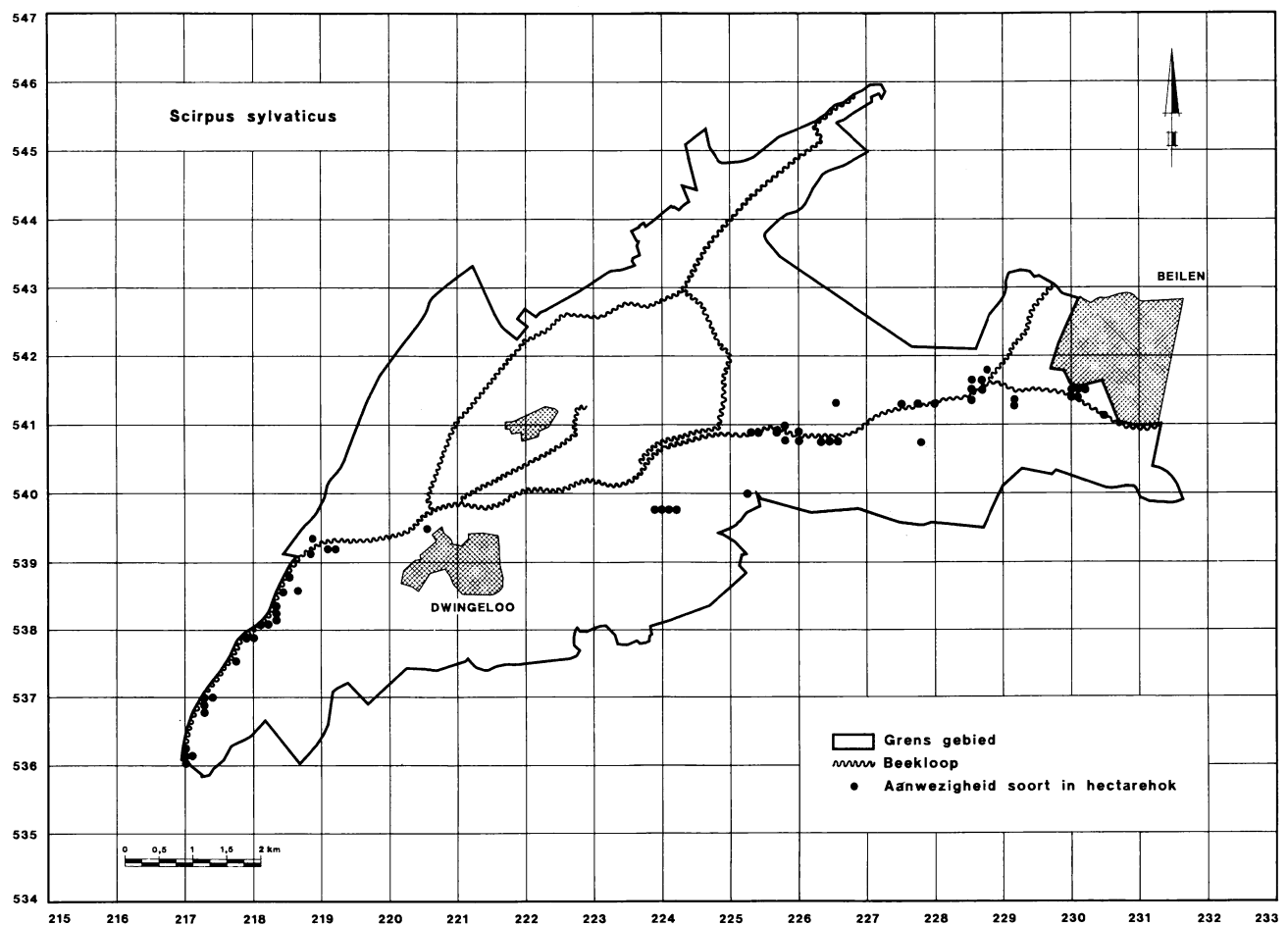
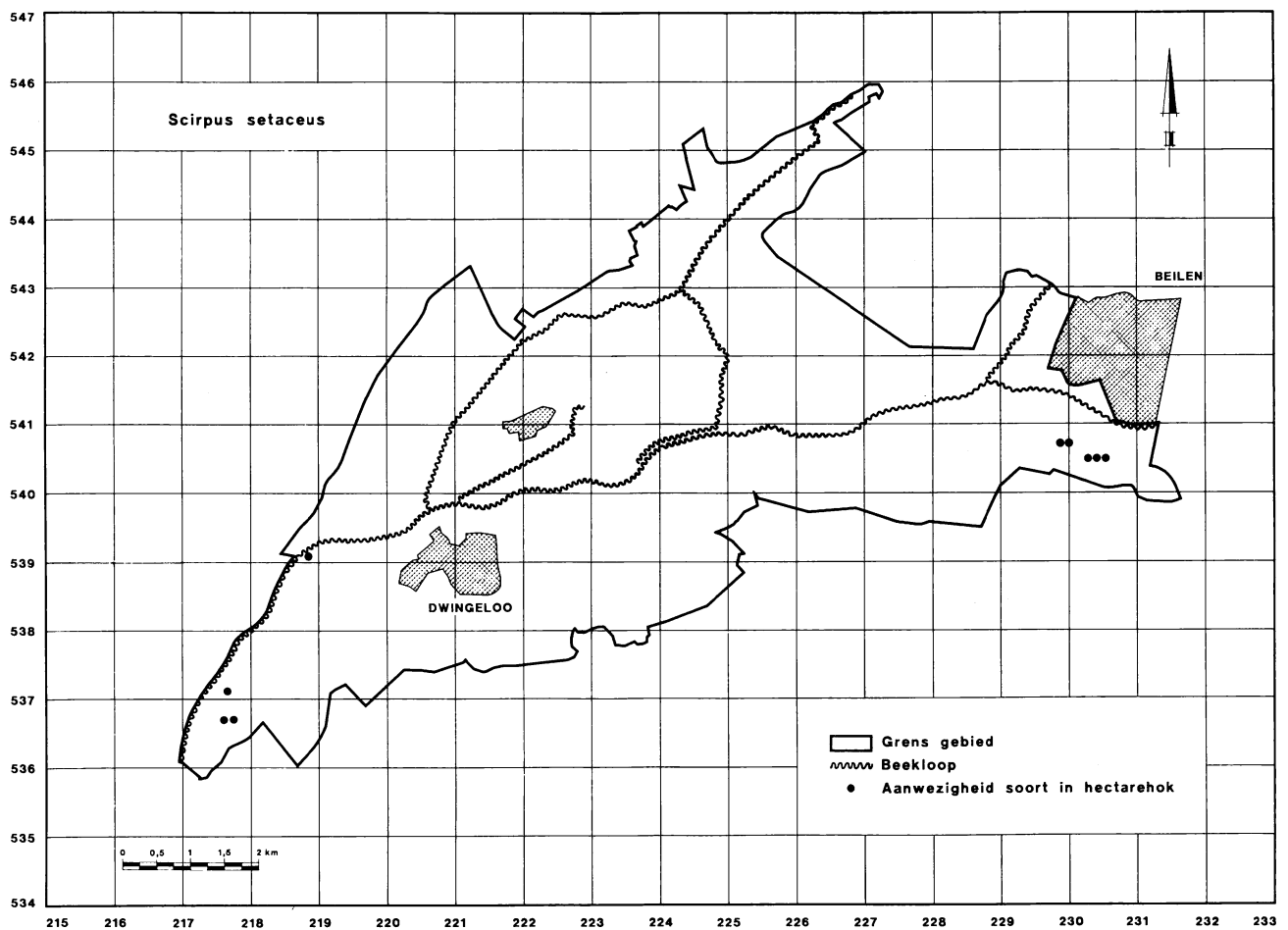


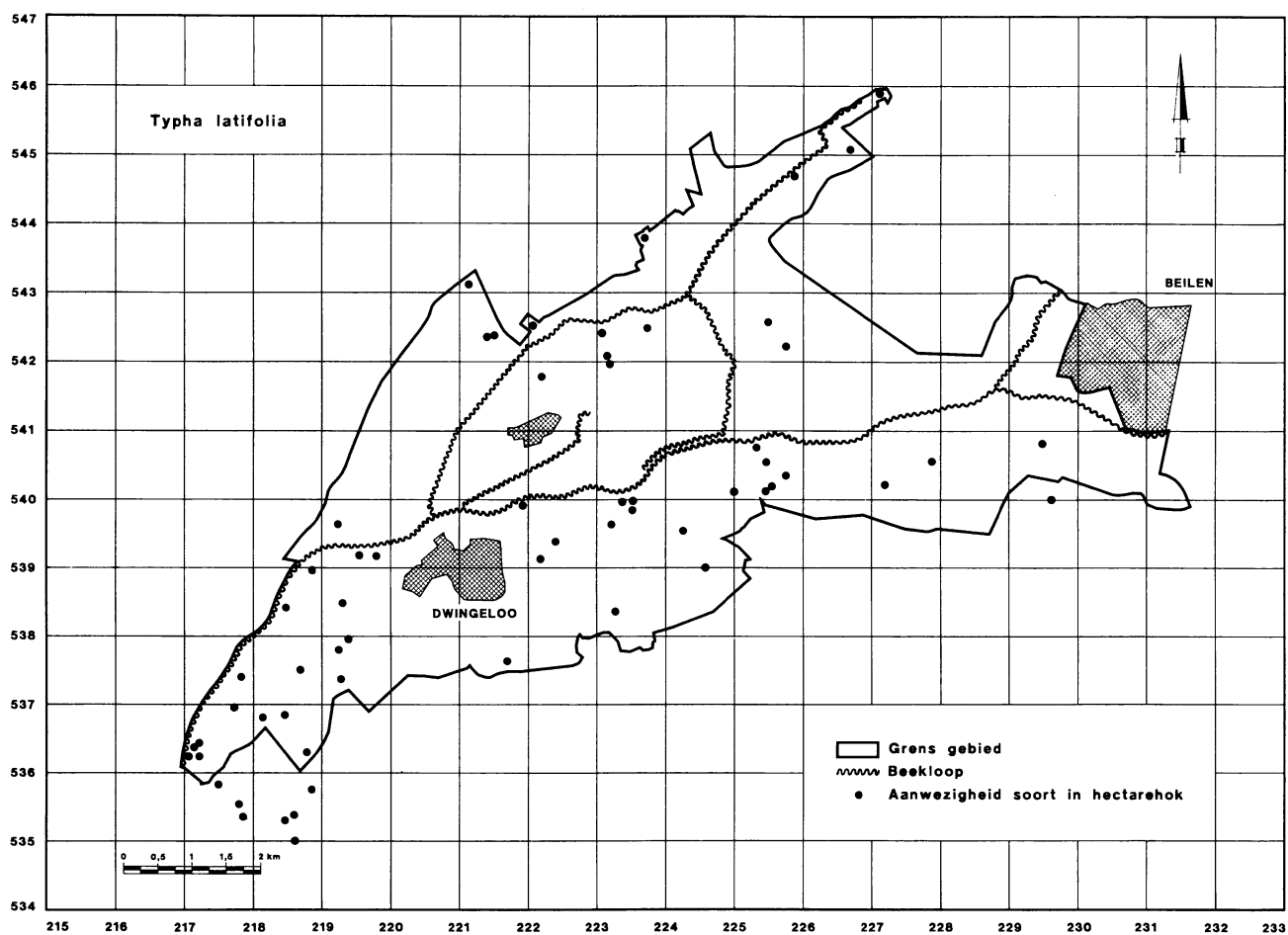
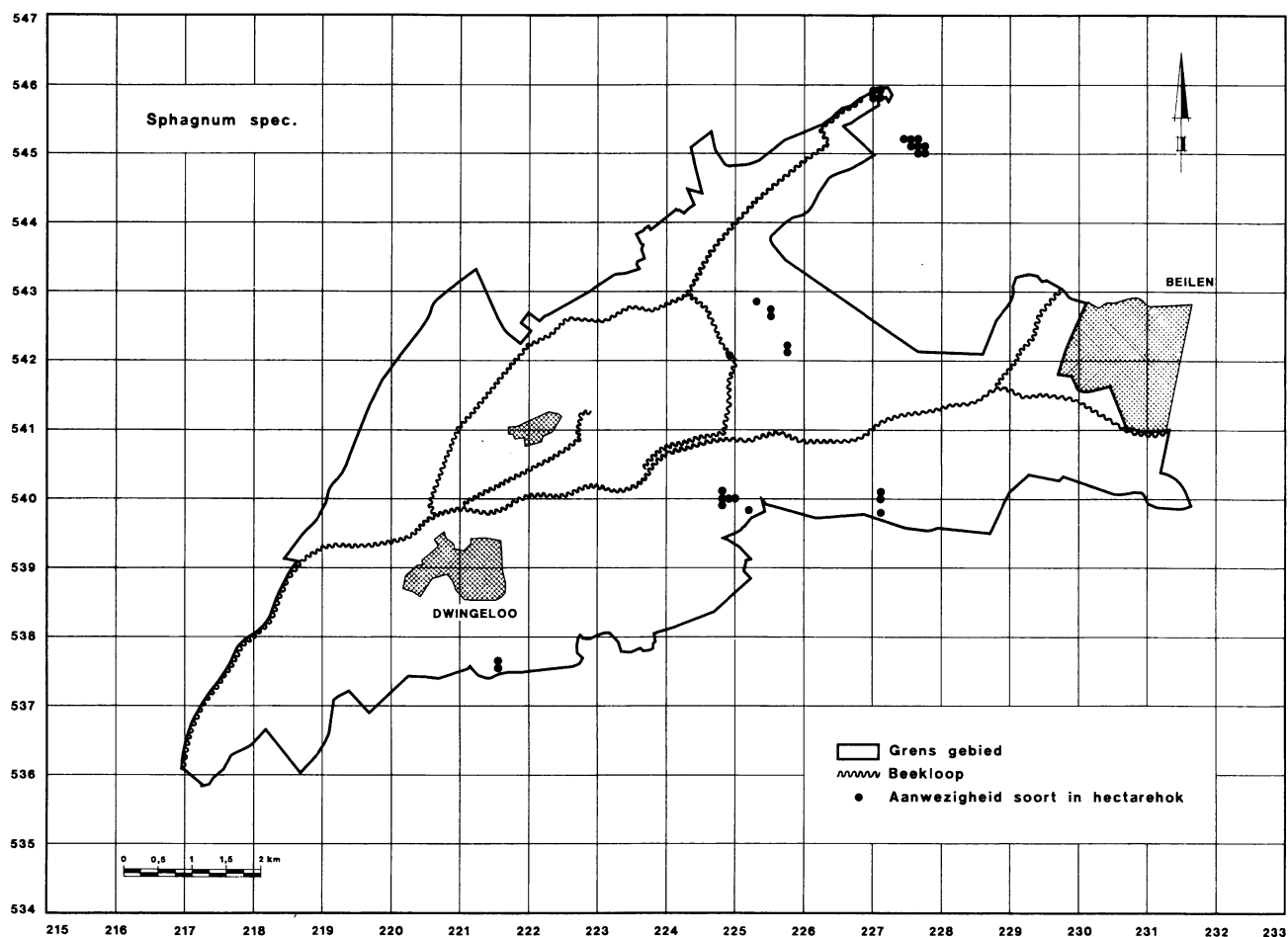


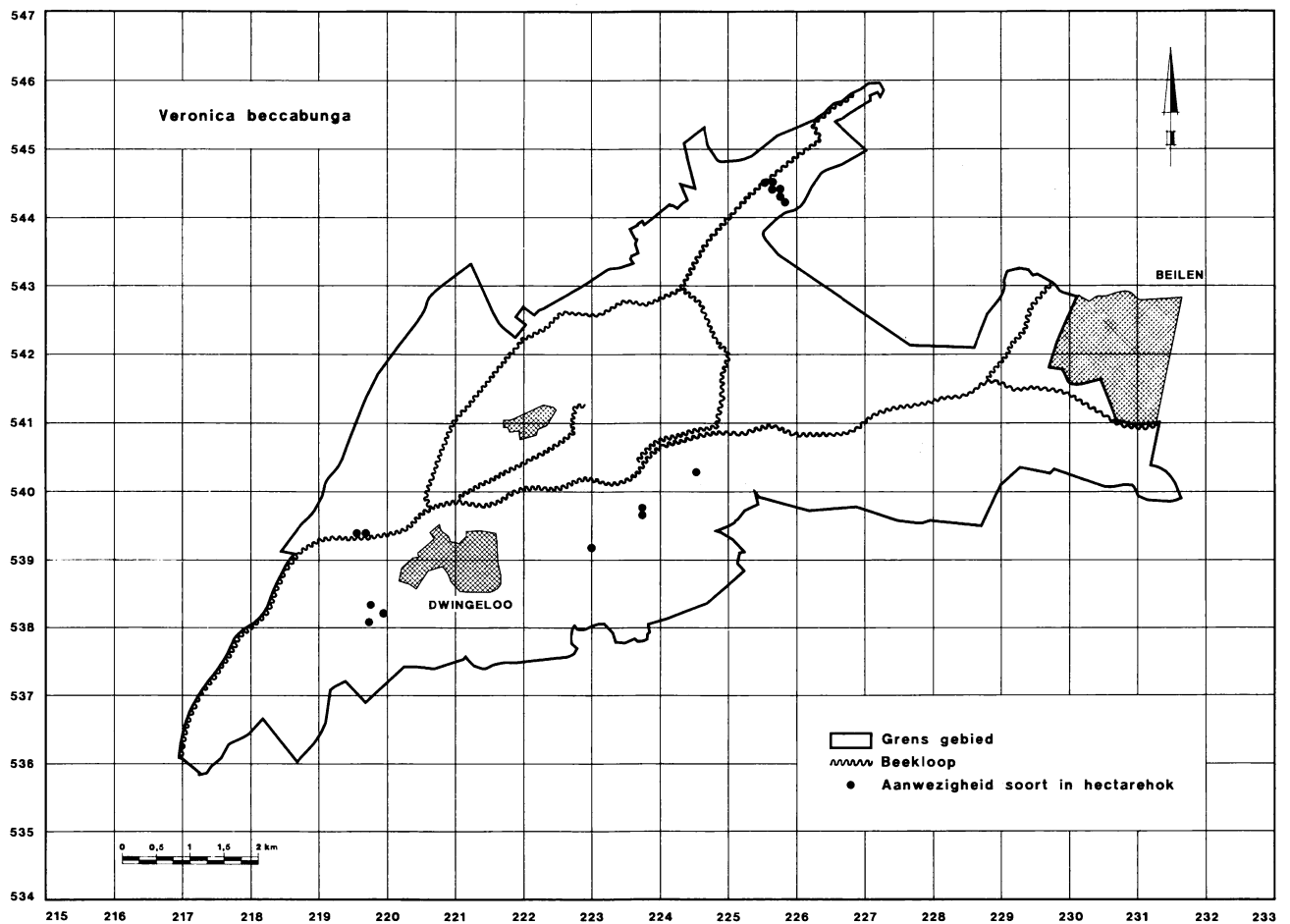
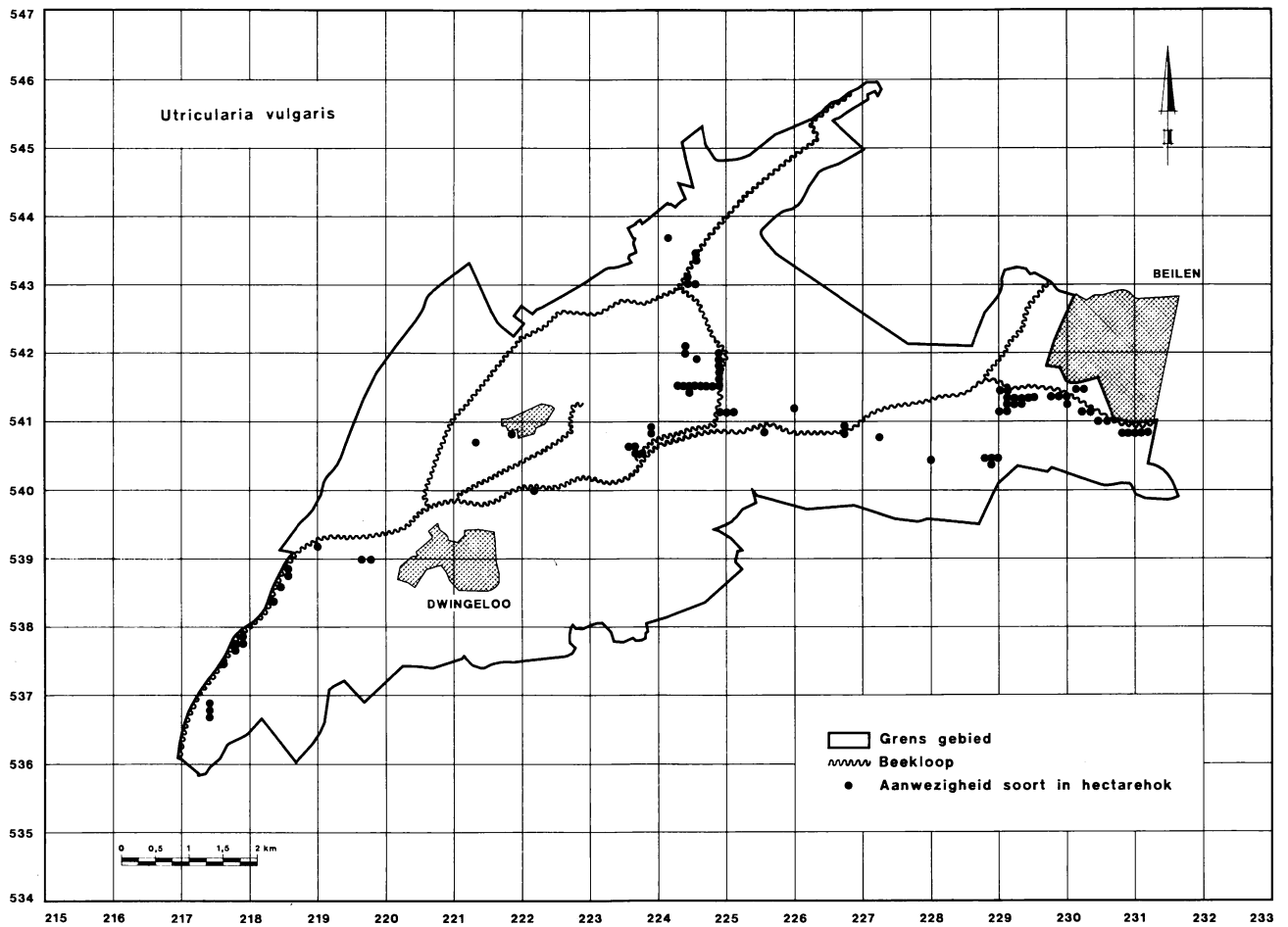


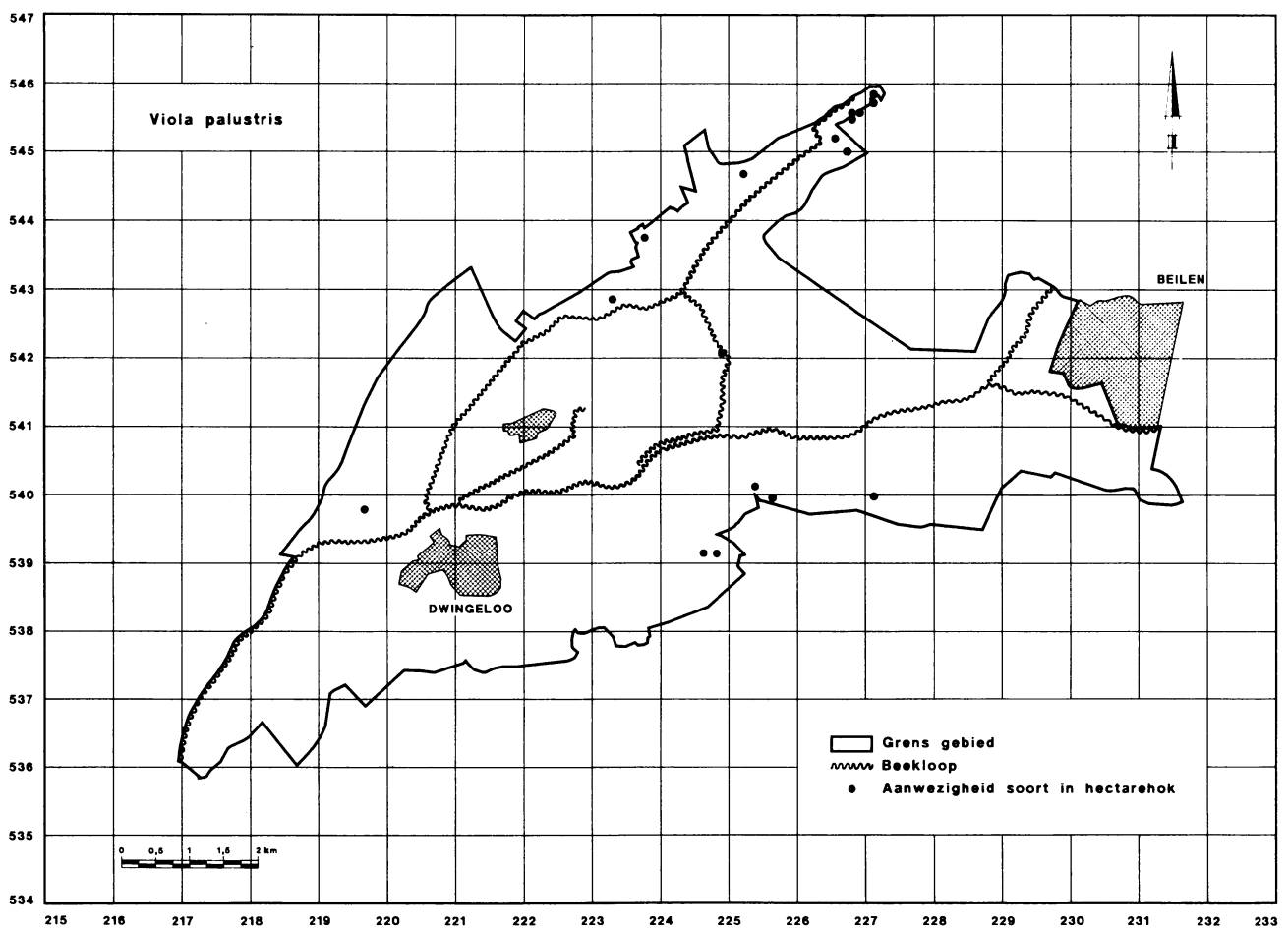
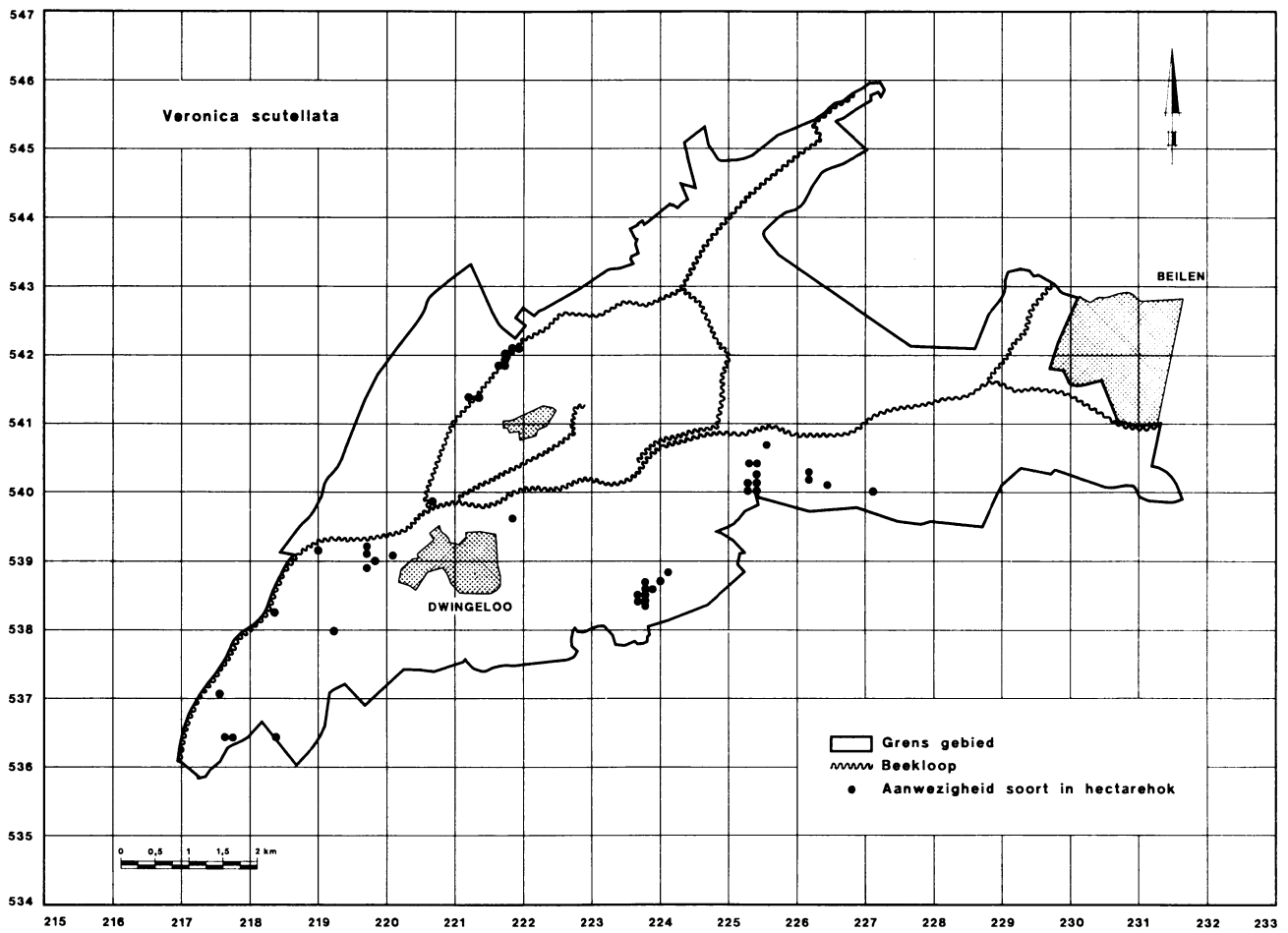












Bijl. 2. Waterkwaliteitsparameters van enkele Drentse kanalen

		Beilervaat				Linthorst-Homankanaal			
		1984		1986		1984		1986	
		1	2	1	2	1	2	1	2
Biochemisch zuur-	mg/l	8	()	8	()	7	()	8	()
stof									
Zuurstof	mg/l	5.6	(4.6)	6.7	(7.4)	6.8	(4.4)	7.2	(4.9)
Zuurstofverz. %	%	50	(46)	61	(77)	60	(42)	66	(54)
Kjehdahl stikstof	mg/l	8.9	(9.2)	10	(30)	4.4	(6.0)	5.9	(11)
Nitriet stikstof	mg/l	0.27	(1.12)	0.12	(0.40)	0.10	(0.250)	0.11	(0.34)
Nitraat stikstof	mg/l	3.1	(4.6)	1.0	(1.0)	2.3	(3.6)	1.2	(1.0)
Ortho. fosfaat	mg/l	4.3	(7)	4.9	(12)	1.1	(1.7)	2.2	(8)
Totaal fosfaat	mg/l	4.8	(8)	5	(13)	1.6	(2.5)	2.7	(9)
Zuurgraad		7.7	(8.5)	7.9	(8.5)	7.6	(8.7)	7.6	(8.9)
Chloride	mg/l	130	(250)	163	(380)	83	(129)	118	(169)
Geleidbaarheid	mu.s	787	(1323)	937	(1990)	529	(705)	715	(988)
Chlorophyl-A	mg/m3	100	(440)	105	(215)	120	(330)	150	(230)
% Chlorophyl-A	%	61	(77)	84	(100)	74	(100)	83	(100)

Bronnen: 1. Zuiveringsschap Drenthe
 2. De Vries en Van Gijzen (1987)

*Bijl. 3A Waterkwaliteitsgegevens van enkele watergangen in het Dwingeler-
en Beilerstroomgebied*

Voor ligging van de monsterpunten zie Bijlage 3B

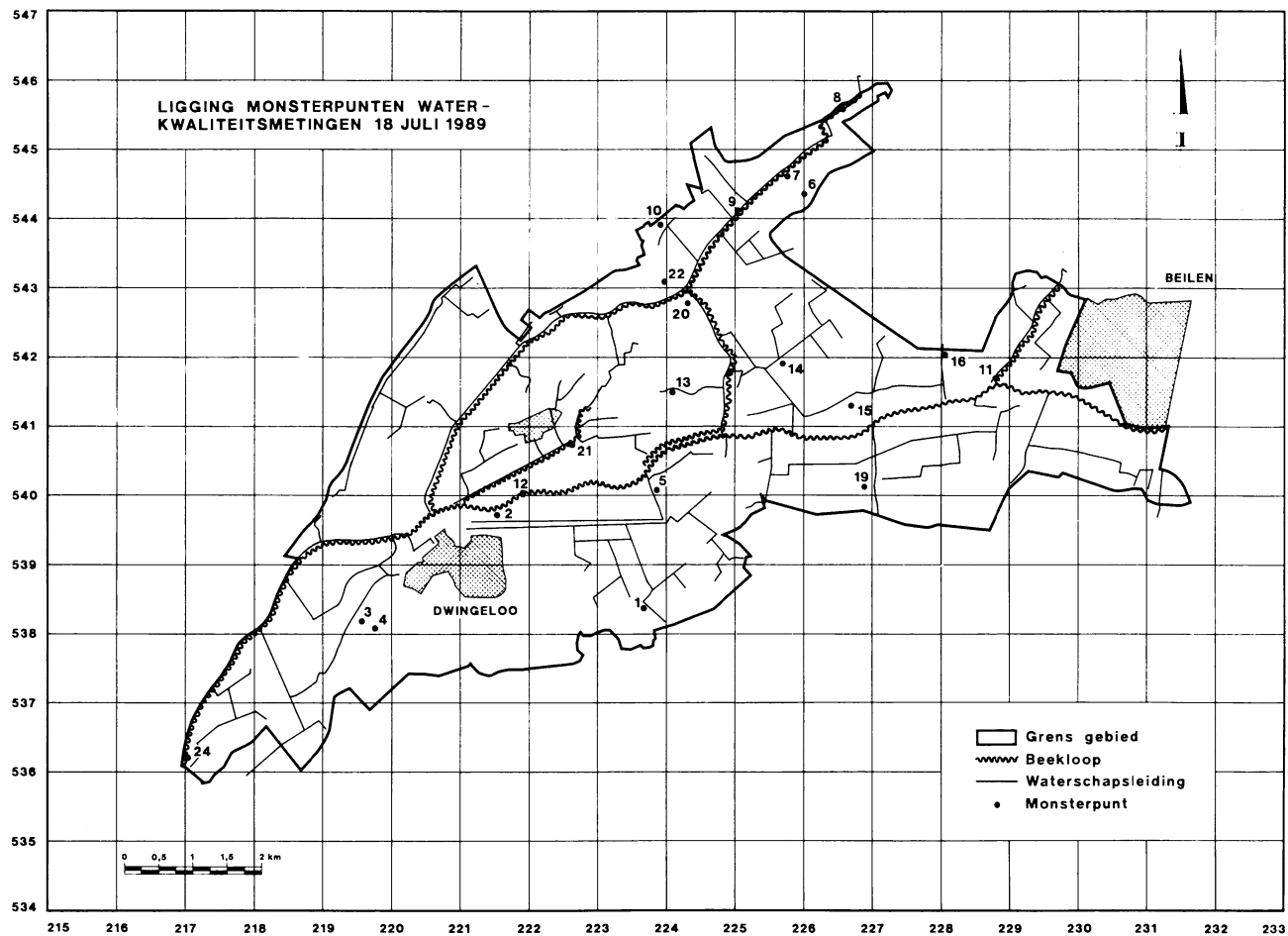
De Romeinse cijfers corresponderen met die in figuur 10, pag. 30

Watermonsters geanalyseerd door Zuiveringsschap Drenthe

Datum bemonstering: 18 juli 1989

Flesnum- mer	Monster- punt	Kjeldahl	Ammonium	Nitriet	Nitraat	Orthofos- faat	Totaal fosfaat	pH	EGV	Chloride	IJzer	Calcium
I.D.		Kjd.-N	NH4-N	NO2-N	NO3-N	o-P04-P	t-P04-P			Cl	Fe	Ca
		Mg/l	Mg/l	Mg/l	Mg/l	Mg/l	Mg/l		mS/m	Mg/l	Mg/l	Mg/l
2054	1-I	3.1	0.5	0.03	0.9	0.01	0.22	5.3	60	19	0.88	90
2055	2-II	1.6	0.4	0.03	0.1	0.01	0.05	6.9	45	20	3.13	94
2056	3-III	2.7	0.3	0.14	2.3	0.07	0.19	6.9	47	51	0.62	47
2057	4-IV	0.8	0.4	0.02	0.1	0.01	0.05	6.8	36	24	1.63	69
2058	5-V	0.8	0.2	0.02	<0.1	0.01	0.04	7.6	33	32	0.72	54
2059	6-VI	1.8	0.2	0.02	<0.1	0.06	0.25	7.0	20	18	3.03	30
2060	7-VII	1.6	0.1	0.02	<0.1	0.10	0.25	7.0	30	20	3.86	51
2061	8-VIII	0.7	0.2	0.02	<0.1	0.02	0.05	7.2	25	22	2.26	30
2062	9-IX	3.3	0.6	0.22	1.3	0.28	0.46	8.2	50	61	0.22	57
2063	10-X	0.7	0.3	0.02	0.3	0.01	0.02	5.1	13	16	2.07	5.5
2064	11-XI	0.8	0.2	0.02	<0.1	0.02	0.04	7.6	30	25	2.08	49
2065	12-XII	0.4	0.2	0.02	<0.1	0.01	0.04	7.8	38	29	0.78	66
2066	13-XIII	1.3	0.1	0.02	<0.1	0.04	0.11	7.2	24	39	3.07	24
2067	14-XIV	2.9	0.2	0.02	<0.1	1.6	2.0	7.2	52	76	0.46	41
2068	15-XV	3.6	0.2	0.02	<0.1	0.13	0.29	7.7	50	40	3.35	79
2069	16-XVI	5.6	1.4	0.02	<0.1	0.14	0.6	6.6	66	142	6.12	39
2070	19-IXX	1.6	0.1	0.02	<0.1	0.02	0.06	6.9	21	16	3.74	27
2071	20-XX	1.4	0.1	0.02	<0.1	0.03	0.08	7.9	33	19	2.24	70
2072	22-XXII	0.7	0.1	0.02	<0.1	0.02	0.04	7.7	31	30	0.78	43
2073	23-XXIII	1.3	0.1	0.02	<0.1	0.09	0.18	7.5	29	17	6.54	53
2074	24-	1.0	0.1	0.03	<0.1	0.03	0.07	7.3	29	26	1.71	42

Bijl. 3B Ligging van monsterpunten waterkwaliteitsonderzoek in Dwingeler- en Beilerstroom, 18 mei 1989



Bijl. 4 Waterkwaliteitsparameters in relatie tot enkele in het Dwingeler- en Beilerstroomgebied indicatieve plantesoorten
Bron: De Lyon en Roelofs, 1986

waterl. = waterlaag

mate van correlatie met betreffende parameter:

* = zwak

** = sterk

*** = zeer sterk

Soortnaam	Alkal. waterl. mg/l	Calcium waterl. mmol/l	Ph waterl.	Salinit. waterl. mmol/l	Chlorin. waterl. mmol/l	Relatieve anionen dominantie	Fosfaat waterl. mmol/l	Ammoniak waterl. m.10-3mol	Redoxpotentiaal bodem m.volt
Sphagnum sp.	0.0 *	0.12 ***	4.1 ***	1.6 ***	0.29 ***	sulfaat ***	0.6 **	0.0 ***	182.5 **
Littorella uniflora	0.4 **	0.30 ***	5.8 **		1.18 **	sulfaat ***	1.1 *	0.1 **	167.4 **
Juncus bulbosus	0.3 **	0.25 **	4.8 **	3.1 ***	0.56 **	sulfaat ***	0.7 **	0.0 **	110.3 *
Pot. polygonifolius	0.7 ***	0.41 *	6.4 **	3.6 **	1.08 **	sulfaat ***	0.8 **	0.0 **	45.9 **
Lythrum portula	0.4 **	0.33 **	6.2 **	6.2 **	0.71 ***	sulfaat ***	0.5 ***	0.1 **	153.3 **
Ranunculus peltatus		0.43 *	6.8 **	3.1 **	0.80 ***	sulfaat ***	0.7 *	0.1	139.3 **
Nasturtium microph.	3.9 **	1.12 **		10.0 *		bicarb. ***		1.2	
Hottonia palustris	1.8 *	0.61 *	7.1 **	6.7 **	1.45 *		1.9	0.1 *	- 68.2 *
Myriophyllum vert.	2.5 **	0.73 *	7.6 **	8.1 **	1.76 **		1.6 *	0.2 *	-155.0 **
Pot. pusillus	3.0 **	0.77 *	8.0 **	11.1 *	3.27		6.0	0.8	-133.0
Pot. berchtoldii	3.4 **	0.79 **	7.8 **	7.5 **	1.47 *	bicarb. ***	4.2 *	0.4 *	-136.7 ***
Pot. alpinus	2.6 **	0.66 **	7.6 *	6.9 ***	1.52 **	bicarb. **	2.2 *	0.2 **	-134.2 **
Pot. natans	1.3 *	0.56 *	6.9 *	6.3 **	1.43 *		1.8	0.1	- 73.2 *
Nuphar lutea	2.4 *	1.07 *	7.1 *	8.1 *	1.74 *	bicarb. **	2.8	0.1 *	-153.5 *
Nymphoides peltata	3.2 **	1.23 *	7.8 **	10.6 **	2.61 **	bicarb. ***	5.9	0.1 *	-170.3 *
Pot. perfoliatus	2.9 **	0.75 **	8.0 **	7.8 **	1.69 **	bicarb. ***	2.4	0.2 *	-102.8 *
Pot. trichoides	3.2 **	0.83 *	7.7 *	9.2 **	2.22 **	bicarb. ***	2.1 *	0.2 *	-143.1 **
Sagittaria sag.	2.6 **	0.80 *	7.7 **	7.7 **	1.66 **	bicarb. ***	2.9	0.1 *	-115.2
Pot. crispus	3.5 *	1.07 *	7.7 *	8.7 **	1.76 *	bicarb. ***	4.3	0.3 *	-109.1 **
Elodea nuttallii	2.8 *	0.82 *	7.6 *	10.1 *	2.73 *	bicarb. ***	4.9	0.3	-136.7
Utricularia vulg.	2.5 **	0.60 **	7.5 **	6.9 **	1.66 **	bicarb. ***	3.8	0.1 **	-167.6 *
Ceratophyllum dem.	3.4 **	1.03 *	7.8 *	13.8 **	3.99 *	chloride ***	10.1 *	0.6 *	-199.1 **
Pot. pectinatus	4.3 **	1.12 *	8.3 **	25.0 **	6.60 *	chloride **	8.7	0.8 *	-176.0 *
Hippuris vulgaris	5.3 **	0.73 *	7.8 *	26.0 **	6.28 **	chloride **	18.4 *	0.9 **	-128.5 **
Pot. lucens	3.0 ***	0.72 *	7.7 **	8.2 **	1.96 **	bicarb. ***	3.6	0.1 *	-156.1 **

I O N E N B A L A N S B E R E K E N I N G

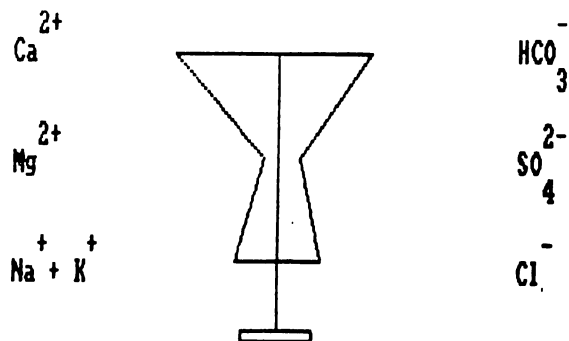
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 MONSTERPUNTNUMMER : 302434
 PUNT OMSCHRIJVING : SLOOT DWINGELER STROOM, DE VENNEN (223.20-539.50)

OPPERVLAKTEWATER

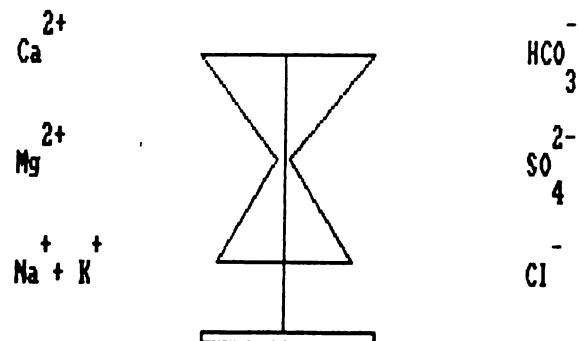
NR.	DATUM	gehaltenes in mg/l								mili-equivalenten per liter								percentage							
		POSITIEF				NEGATIEF				POSITIEF				NEGATIEF				POSITIEF				NEGATIEF			
		K	Na	Mg	Ca	Cl	SO ₄	HCO ₃		K/Na	Mg	Ca	tot.	Cl	SO ₄	HCO ₃	tot.	K/Na	Mg	Ca		Cl	SO ₄	HCO ₃	
1	27 1 87	16.0	45.0	6.6	66.0	87	55	145		2.4	0.5	3.3	6.2	2.5	1.1	2.4	6.0	38	9	53		41	19	40	
2	24 3 87	2.8	23.0	4.7	66.0	43	30	132		1.1	0.4	3.3	4.8	1.2	0.6	2.2	4.0	23	8	69		30	16	54	
3	21 4 87	2.1	25.0	5.1	66.0	16	30	164		1.1	0.4	3.3	4.9	0.5	0.6	2.7	3.8	24	9	68		12	17	71	
4	25 5 87	1.2	17.0	4.3	62.0	27	26	166		0.8	0.4	3.1	4.2	0.8	0.5	2.7	4.0	18	8	73		19	13	68	
5	23 6 87	0.7	24.0	3.7	47.0	35	22	136		1.1	0.3	2.3	3.7	1.0	0.5	2.2	3.7	29	8	63		27	12	61	
6	21 7 87	1.6	20.0	4.5	44.0	31	24	170		0.9	0.4	2.2	3.5	0.9	0.5	2.8	4.2	26	11	63		21	12	67	
7	1 9 87	4.0	24.0	5.0	63.0	39	16	187		1.1	0.4	3.1	4.7	1.1	0.3	3.1	4.5	24	9	67		24	7	68	
8	29 9 87	1.4	29.0	4.6	62.0	44	29	156		1.3	0.4	3.1	4.8	1.2	0.6	2.6	4.4	27	8	65		28	14	58	
9	24 11 87	3.0	31.0	4.7	63.0	49	39	157		1.4	0.4	3.1	5.0	1.4	0.8	2.6	4.8	29	8	63		29	17	54	

BODEMWATER

NR.	DATUM	gehaltenes in mg/l								mili-equivalenten per liter								percentage							
		POSITIEF				NEGATIEF				POSITIEF				NEGATIEF				POSITIEF				NEGATIEF			
		K	Na	Mg	Ca	Cl	SO ₄	HCO ₃		K/Na	Mg	Ca	tot.	Cl	SO ₄	HCO ₃	tot.	K/Na	Mg	Ca		Cl	SO ₄	HCO ₃	
1	16 7 87	3.6	96.0	6.6	108.0	168	14	384		4.3	0.5	5.4	10.2	4.7	0.3	6.3	11.3	42	5	53		42	3	56	

STIFFDIAGRAMMEN
OPPERVLAKTEWATER
(gemiddeld)totaal positieve
ionen in meq/ltotaal negatieve
ionen in meq/l

BODEMWATER

totaal positieve
ionen in meq/ltotaal negatieve
ionen in meq/l

ZUIVERINGSSCHAP DRENTHE Technische Dienst - Laboratorium

I O N E N B A L A N S B E R E K E N I N G

ROUTE : 4
 MONSTERPUNTNUMMER : 302432
 PUNT OMSCHRIJVING : SLOOT DWINGELERSTROOM, NOTTINGER MADEN (227.50-541.58)

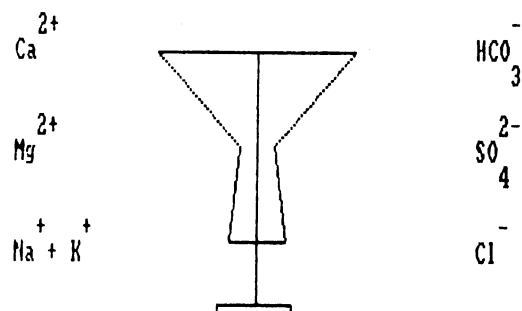
OPPERVLAKTEWATER

NR.	DATUM	gehalten in mg/l							mili-equivalenten per liter							percentage						
		POSITIEF				NEGATIEF			POSITIEF				NEGATIEF			POSITIEF				NEGATIEF		
		K	Na	Mg	Ca	Cl	SO ₄	HCO ₃	K/Na	Mg	Ca	tot.	Cl	SO ₄	HCO ₃	tot.	K/Na	Mg	Ca	Cl	SO ₄	HCO ₃
1	27 1 87	4.9	19.0	8.0	75.0	32	39	193	1.0	0.7	3.7	5.4	0.9	0.8	3.2	4.9	18	12	70	19	17	65
2	24 3 87	8.1	22.0	7.7	63.0	40	42	140	1.2	0.6	3.1	4.9	1.1	0.9	2.3	4.3	24	13	64	26	20	53
3	21 4 87	3.9	20.0	7.9	79.0	42	16	219	1.0	0.7	3.9	5.6	1.2	0.3	3.6	5.1	17	12	71	23	7	70
4	25 5 87	4.1	20.0	8.5	78.0	36	24	220	1.0	0.7	3.9	5.6	1.0	0.5	3.6	5.1	18	13	70	20	10	70
5	23 6 87	3.5	19.0	7.2	74.0	30	22	216	0.9	0.6	3.7	5.2	0.8	0.5	3.5	4.8	18	11	71	17	9	73
6	21 7 87	4.4	17.0	7.1	76.0	29	24	216	0.9	0.6	3.8	5.2	0.8	0.5	3.5	4.9	16	11	73	17	10	73
7	1 9 87	5.6	21.0	7.2	75.0	36	23	200	1.1	0.6	3.7	5.4	1.0	0.5	3.3	4.8	20	11	69	21	10	69
8	29 9 87	4.4	20.0	7.1	75.0	32	27	207	1.0	0.6	3.7	5.3	0.9	0.6	3.4	4.9	19	11	70	19	12	70
9	24 11 87	6.3	24.0	7.7	68.0	40	37	189	1.2	0.6	3.4	5.2	1.1	0.8	3.1	5.0	23	12	65	23	15	62

BODEMWATER

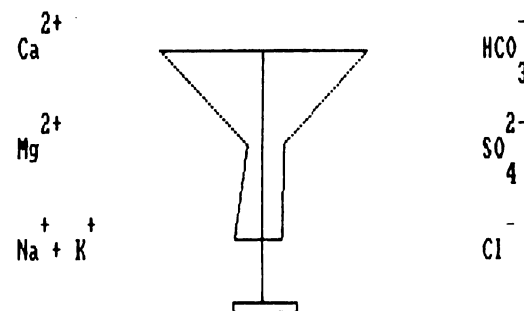
NR.	DATUM	gehalten in mg/l							mili-equivalenten per liter							percentage						
		POSITIEF				NEGATIEF			POSITIEF				NEGATIEF			POSITIEF				NEGATIEF		
		K	Na	Mg	Ca	Cl	SO ₄	HCO ₃	K/Na	Mg	Ca	tot.	Cl	SO ₄	HCO ₃	tot.	K/Na	Mg	Ca	Cl	SO ₄	HCO ₃
1	16 7 87	3.5	16.0	5.1	58.0	23	33	207	0.8	0.4	2.9	4.1	0.6	0.7	3.4	4.7	19	10	71	14	15	72

STIFFDIAGRAMMEN OPPERVLAKTEWATER (gemiddeld)



totaal positieve ionen in meq/l totaal negatieve ionen in meq/l

BODEMWATER



totaal positieve ionen in meq/l totaal negatieve ionen in meq/l