Table S1. Expanding Square Search Pattern and Alternatives: Overview

Pattern	**Number of times finding the targets first**	**Percentage**	**Number of times finding the targets second**	**Percentage**
Expanding Square	882062	17%	1673627	37%
Spiral	2148058	42%	232050	5%
Pentagonal	312126	6%	509621	11%
Hexagonal	1092066	21%	904556	20%
Octagonal	708928	14%	1209647	27%
Total	5143240	100%	4529501	100%

Table S2. Parallel Search Pattern and Alternatives: Overview

Pattern	**Number of times finding the targets first**	**Percentage**	**Number of times finding the targets second**	**Percentage**
Parallel	258428	7%	253539	8%
Hilbert	1248807	34%	852108	27%
Moore	1380980	38%	214554	7%
Morton(Z Curve)	599564	17%	1597079	51%
V formation	135974	4%	240474	8%
Total	3623753	100%	3157754	100%

Table S3. Expanding Square Search Pattern and Alternatives Scenario AltEs_PIW_W3_C1

Area(km²)	**Pattern**	**Number of times finding the targets first**	**Percentage**	**Number of times finding the targets second**	**Percentage**
5	Expanding Square	40	62,5	24	37,5
5	Spiral	24	37,5	40	62,5
10	Expanding Square	36	56,25	28	43,75
10	Spiral	28	43,75	36	56,25
15	Expanding Square	36	56,25	28	43,75
15	Spiral	28	43,75	36	56,25
20	Expanding Square	290	50,35	262	47,46
20	Spiral	286	49,65	290	52,54
25	Expanding Square	304	52,78	272	47,22
25	Spiral	272	47,22	304	52,78
30	Expanding Square	304	52,78	272	47,22
30	Spiral	272	47,22	304	52,78
30	Expanding Square	300	52,08	198	34,38
30	Spiral	276	47,92	4	0,69
35	Octagonal	0	0	374	64,93
35	Hexagonal	292	50,69	132	22,92
35	Spiral	280	48,61	0	0

35	Expanding Square	4	0,69	444	77,08
40	Hexagonal	292	50,69	60	10,42
40	Spiral	280	48,61	0	0
40	Expanding Square	4	0,69	444	77,08
40	Pentagonal	0	0	72	12,5
45	Hexagonal	292	50,69	60	10,42
45	Spiral	280	48,61	0	0
45	Expanding Square	4	0,69	444	77,08
45	Pentagonal	0	0	72	12,5
50	Hexagonal	292	50,69	60	10,42
50	Spiral	280	48,61	0	0
50	Expanding Square	4	0,69	444	77,08
50	Pentagonal	0	0	72	12,5
60	Spiral	721	57,91	11	0,96
60	Hexagonal	347	27,87	224	19,58
60	Expanding Square	73	5,86	514	44,93
60	Pentagonal	61	4,9	151	13,2
70	Octagonal	43	3,45	244	21,33
70	Spiral	823	57,35	11	0,89
70	Hexagonal	350	24,39	228	18,42
70	Expanding Square	147	10,24	518	41,84
80	Pentagonal	64	4,46	154	12,44
80	Octagonal	51	3,55	327	26,41
80	Spiral	867	56,82	11	0,83
80	Hexagonal	349	22,87	241	18,29
90	Expanding Square	153	10,03	551	41,81
90	Octagonal	94	6,16	361	27,39
90	Pentagonal	63	4,13	154	11,68
90	Spiral	883	56,53	11	0,8
90	Hexagonal	359	22,98	256	18,63
100	Expanding Square	153	9,8	560	40,76
100	Octagonal	104	6,66	389	28,31
100	Pentagonal	63	4,03	158	11,5
100	Spiral	883	56,1	11	0,77
100	Hexagonal	371	23,57	263	18,37
110	Expanding Square	153	9,72	560	39,11
110	Octagonal	104	6,61	436	30,45
110	Pentagonal	63	4	162	11,31
110	Spiral	883	55,6	11	0,74
110	Hexagonal	381	23,99	272	18,32

120	Expanding Square	153	9,63	560	37,71
120	Octagonal	108	6,8	477	32,12
120	Pentagonal	63	3,97	165	11,11
120	Spiral	883	55,46	11	0,72
120	Hexagonal	381	23,93	276	18,13
130	Expanding Square	153	9,61	560	36,79
130	Octagonal	110	6,91	501	32,92
130	Pentagonal	65	4,08	174	11,43
130	Spiral	883	55,4	11	0,71
130	Hexagonal	381	23,9	276	17,88
140	Expanding Square	153	9,6	562	36,4
140	Octagonal	112	7,03	521	33,74
140	Pentagonal	65	4,08	174	11,27
140	Spiral	1034	42,15	20	0,84
140	Hexagonal	505	20,59	494	20,78
150	Octagonal	491	20,02	887	37,32
150	Expanding Square	317	12,92	713	30
150	Pentagonal	106	4,32	263	11,06
150	Spiral	1038	37,95	32	1,22
150	Hexagonal	529	19,34	566	21,54
200	Octagonal	527	19,27	1003	38,17
200	Expanding Square	501	18,32	739	28,12
200	Pentagonal	140	5,12	288	10,96
200	Spiral	1042	36,79	56	2,05
200	Octagonal	570	20,13	1012	37,03
250	Expanding Square	537	18,96	751	27,48
250	Hexagonal	534	18,86	607	22,21
250	Pentagonal	149	5,26	307	11,23
250	Spiral	1284	32,22	220	5,77
250	Octagonal	959	24,07	1352	35,43
300	Expanding Square	779	19,55	815	21,36
300	Hexagonal	683	17,14	974	25,52
300	Pentagonal	280	7,03	455	11,92
300	Spiral	1317	32,57	231	5,96
300	Octagonal	970	23,99	1372	35,42
350	Expanding Square	788	19,49	820	21,17
350	Hexagonal	686	16,96	993	25,63
350	Pentagonal	283	7	458	11,82
350	Octagonal	1553	30,2	1614	32,93
350	Spiral	1534	29,83	363	7,41

400	Expanding Square	952	18,51	878	17,91
400	Hexagonal	766	14,9	1543	31,48
400	Pentagonal	337	6,55	503	10,26
400	Octagonal	1717	31,28	1648	31,7
400	Spiral	1542	28,09	367	7,06
450	Expanding Square	1051	19,15	935	17,99
450	Hexagonal	817	14,88	1719	33,07
450	Pentagonal	362	6,6	529	10,18
450	Octagonal	1745	31,23	1674	31,7
450	Spiral	1542	27,6	369	6,99
500	Expanding Square	1092	19,55	953	18,05
500	Hexagonal	843	15,09	1734	32,83
500	Pentagonal	365	6,53	551	10,43
500	Expanding Square	40	62,5	24	37,5
500	Spiral	24	37,5	40	62,5

Table S4. Expanding Square Search Pattern and Alternatives Scenario AltEs_PIW_W3_C3

Area (km²)	***Pattern***	***Number of times finding the targets first***	***Percentage***	***Number of times finding the targets second***	***Percentage***
5	Expanding Square	40	62,5	24	37,5
5	Spiral	24	37,5	40	62,5
10	Expanding Square	36	56,25	28	43,75
10	Spiral	28	43,75	36	56,25
15	Expanding Square	36	56,25	28	43,75
15	Spiral	28	43,75	36	56,25
20	Spiral	406	70,49	170	53,12
20	Expanding Square	170	29,51	150	46,88
25	Spiral	406	70,49	170	53,12
25	Expanding Square	170	29,51	150	46,88
30	Spiral	326	56,6	250	52,08
30	Expanding Square	250	43,4	230	47,92
30	Expanding Square	290	50,35	200	35,34
30	Spiral	286	49,65	62	10,95
35	Octagonal	0	0	304	53,71
35	Spiral	296	51,39	52	9,29
35	Hexagonal	226	39,24	112	20
35	Expanding Square	54	9,38	396	70,71
40	Spiral	296	51,39	32	5,71
40	Hexagonal	244	42,36	60	10,71
40	Expanding Square	36	6,25	396	70,71

40	Pentagonal	0	0	72	12,86
45	Spiral	296	51,39	32	5,71
45	Hexagonal	244	42,36	60	10,71
45	Expanding Square	36	6,25	396	70,71
45	Pentagonal	0	0	72	12,86
50	Spiral	311	53,99	17	3,12
50	Hexagonal	244	42,36	60	11,01
50	Expanding Square	21	3,65	396	72,66
50	Pentagonal	0	0	72	13,21
60	Spiral	611	52,67	17	1,67
60	Hexagonal	372	32,07	187	18,35
60	Expanding Square	93	8,02	558	54,76
60	Pentagonal	68	5,86	126	12,37
70	Octagonal	16	1,38	131	12,86
70	Spiral	639	53,79	17	1,66
70	Hexagonal	372	31,31	187	18,24
70	Expanding Square	93	7,83	564	55,02
80	Pentagonal	68	5,72	126	12,29
80	Octagonal	16	1,35	131	12,78
80	Spiral	677	55,22	17	1,65
80	Hexagonal	372	30,34	193	18,72
90	Expanding Square	93	7,59	564	54,7
90	Pentagonal	68	5,55	126	12,22
90	Octagonal	16	1,31	131	12,71
90	Spiral	702	53,38	17	1,54
90	Hexagonal	372	28,29	203	18,35
100	Expanding Square	157	11,94	564	50,99
100	Pentagonal	68	5,17	127	11,48
100	Octagonal	16	1,22	195	17,63
100	Spiral	742	53,81	17	1,5
100	Hexagonal	372	26,98	203	17,89
110	Expanding Square	181	13,13	564	49,69
110	Pentagonal	68	4,93	132	11,63
110	Octagonal	16	1,16	219	19,3
110	Spiral	756	54,04	17	1,49
110	Hexagonal	372	26,59	203	17,78
120	Expanding Square	181	12,94	564	49,39
120	Pentagonal	68	4,86	133	11,65
120	Octagonal	22	1,57	225	19,7
120	Spiral	764	53,31	17	1,45

120	Hexagonal	372	25,96	203	17,31
130	Expanding Square	189	13,19	580	49,45
130	Pentagonal	68	4,75	133	11,34
130	Octagonal	40	2,79	240	20,46
130	Spiral	774	53,64	17	1,4
130	Hexagonal	372	25,78	229	18,91
140	Expanding Square	189	13,1	580	47,89
140	Pentagonal	68	4,71	133	10,98
140	Octagonal	40	2,77	252	20,81
140	Spiral	1017	46,46	25	1,31
140	Hexagonal	452	20,65	314	16,51
150	Expanding Square	322	14,71	734	38,59
150	Octagonal	261	11,92	645	33,91
150	Pentagonal	137	6,26	184	9,67
150	Spiral	1017	44,33	25	1,24
150	Hexagonal	461	20,1	337	16,67
200	Expanding Square	394	17,18	770	38,1
200	Octagonal	280	12,21	705	34,88
200	Pentagonal	142	6,19	184	9,1
200	Spiral	1017	43,55	25	1,19
200	Hexagonal	477	20,43	340	16,24
250	Expanding Square	409	17,52	786	37,55
250	Octagonal	290	12,42	729	34,83
250	Pentagonal	142	6,08	213	10,18
250	Spiral	1184	37,68	64	2,3
250	Hexagonal	610	19,41	556	19,99
300	Octagonal	584	18,59	1007	36,21
300	Expanding Square	522	16,61	873	31,39
300	Pentagonal	242	7,7	281	10,1
300	Spiral	1184	37,64	64	2,29
300	Hexagonal	610	19,39	564	20,19
350	Octagonal	588	18,69	1011	36,18
350	Expanding Square	522	16,59	874	31,28
350	Pentagonal	242	7,69	281	10,06
350	Spiral	1235	31,53	168	4,77
350	Octagonal	950	24,25	1121	31,8
400	Hexagonal	714	18,23	858	24,34
400	Expanding Square	705	18	962	27,29
400	Pentagonal	313	7,99	416	11,8
400	Spiral	1239	31,07	168	4,7

400	Octagonal	977	24,5	1127	31,55
450	Expanding Square	728	18,25	984	27,55
450	Hexagonal	727	18,23	877	24,55
450	Pentagonal	317	7,95	416	11,65
450	Spiral	1239	30,94	168	4,67
450	Octagonal	985	24,6	1135	31,55
500	Expanding Square	731	18,26	988	27,46
500	Hexagonal	731	18,26	889	24,71
500	Pentagonal	318	7,94	418	11,62
500	Expanding Square	40	62,5	24	37,5
500	Spiral	24	37,5	40	62,5

Table S5. Expanding Square Search Pattern and Alternatives Scenario AltEs_PIW_W3_C5

Area (km²)	***Pattern***	***Number of times finding the targets first***	***Percentage***	***Number of times finding the targets second***	***Percentage***
5	Expanding Square	40	62,5	24	37,5
5	Spiral	24	37,5	40	62,5
10	Expanding Square	36	56,25	28	43,75
10	Spiral	28	43,75	36	56,25
15	Expanding Square	36	56,25	28	43,75
15	Spiral	28	43,75	36	56,25
20	Spiral	406	70,49	170	53,12
20	Expanding Square	170	29,51	150	46,88
25	Spiral	406	70,49	170	53,12
25	Expanding Square	170	29,51	150	46,88
30	Spiral	406	70,49	170	53,12
30	Expanding Square	170	29,51	150	46,88
30	Spiral	385	66,84	36	11,25
30	Expanding Square	167	28,99	93	29,06
35	Octagonal	24	4,17	191	59,69
35	Spiral	324	56,25	73	15,73
35	Hexagonal	162	28,12	72	15,52
35	Expanding Square	90	15,62	280	60,34
40	Octagonal	0	0	39	8,41
40	Spiral	324	56,25	73	15,73
40	Hexagonal	162	28,12	40	8,62
40	Expanding Square	90	15,62	280	60,34
45	Pentagonal	0	0	56	12,07
45	Octagonal	0	0	15	3,23

45	Spiral	324	56,25	24	5,17
45	Hexagonal	186	32,29	52	11,21
50	Expanding Square	66	11,46	288	62,07
50	Pentagonal	0	0	56	12,07
50	Octagonal	0	0	44	9,48
50	Spiral	324	56,25	24	4,92
60	Hexagonal	194	33,68	40	8,2
60	Expanding Square	58	10,07	320	65,57
60	Pentagonal	0	0	72	14,75
60	Octagonal	0	0	32	6,56
70	Spiral	577	52,41	24	2,75
70	Hexagonal	334	30,34	144	16,51
70	Expanding Square	118	10,72	476	54,59
70	Pentagonal	64	5,81	133	15,25
80	Octagonal	8	0,73	95	10,89
80	Spiral	593	53,09	24	2,73
80	Hexagonal	334	29,9	150	17,08
80	Expanding Square	118	10,56	476	54,21
90	Pentagonal	64	5,73	133	15,15
90	Octagonal	8	0,72	95	10,82
90	Spiral	609	53,75	24	2,73
90	Hexagonal	334	29,48	152	17,27
90	Expanding Square	118	10,41	476	54,09
100	Pentagonal	64	5,65	133	15,11
100	Octagonal	8	0,71	95	10,8
100	Spiral	625	54,4	24	2,72
100	Hexagonal	334	29,07	155	17,55
100	Expanding Square	118	10,27	476	53,91
110	Pentagonal	64	5,57	133	15,06
110	Octagonal	8	0,7	95	10,76
110	Spiral	637	54,87	24	2,7
110	Hexagonal	334	28,77	160	18,02
110	Expanding Square	118	10,16	476	53,6
120	Pentagonal	64	5,51	133	14,98
120	Octagonal	8	0,69	95	10,7
120	Spiral	641	52,24	24	2,54
120	Hexagonal	334	27,22	160	16,95
120	Expanding Square	180	14,67	476	50,42
130	Pentagonal	64	5,22	133	14,09
130	Octagonal	8	0,65	151	16

130	Spiral	641	51,57	24	2,48
130	Hexagonal	334	26,87	160	16,53
130	Expanding Square	180	14,48	484	50
140	Pentagonal	64	5,15	133	13,74
140	Octagonal	24	1,93	167	17,25
140	Spiral	641	50,59	24	2,44
140	Hexagonal	334	26,36	160	16,26
140	Expanding Square	204	16,1	492	50
150	Pentagonal	64	5,05	133	13,52
150	Octagonal	24	1,89	175	17,78
150	Spiral	843	44,02	30	1,95
150	Expanding Square	450	23,5	588	38,31
150	Hexagonal	361	18,85	270	17,59
200	Octagonal	149	7,78	442	28,79
200	Pentagonal	112	5,85	205	13,36
200	Spiral	843	43,34	30	1,88
200	Expanding Square	466	23,96	599	37,48
200	Hexagonal	367	18,87	308	19,27
250	Octagonal	157	8,07	456	28,54
250	Pentagonal	112	5,76	205	12,83
250	Spiral	843	42,36	30	1,81
250	Expanding Square	482	24,22	603	36,48
250	Hexagonal	374	18,79	315	19,06
300	Octagonal	175	8,79	482	29,16
300	Pentagonal	116	5,83	223	13,49
300	Spiral	966	36,8	48	2,22
300	Expanding Square	583	22,21	728	33,59
300	Hexagonal	479	18,25	407	18,78
350	Octagonal	384	14,63	671	30,96
350	Pentagonal	213	8,11	313	14,44
350	Spiral	966	36,77	48	2,2
350	Expanding Square	585	22,27	729	33,47
350	Hexagonal	479	18,23	408	18,73
400	Octagonal	384	14,62	680	31,22
400	Pentagonal	213	8,11	313	14,37
400	Spiral	1022	31,64	73	2,69
400	Expanding Square	706	21,86	786	28,92
400	Octagonal	617	19,1	864	31,79
450	Hexagonal	615	19,04	600	22,08
450	Pentagonal	270	8,36	395	14,53

450	Spiral	1022	31,64	73	2,68
450	Expanding Square	706	21,86	792	29,05
450	Octagonal	617	19,1	864	31,69
500	Hexagonal	615	19,04	602	22,08
500	Pentagonal	270	8,36	395	14,49
500	Spiral	1022	31,6	73	2,67
500	Expanding Square	706	21,83	796	29,14
500	Octagonal	621	19,2	864	31,63

Table S6. Parallel Search Pattern and Alternatives Scenario AltPar_PIW_W3_C1

Area (km²)	***Pattern***	***Number of times finding the targets first***	***Percentage***	***Number of times finding the targets second***	***Percentage***
5	Paralel	48	75	16	25
5	Moore	16	25	48	75
10	Paralel	40	62,5	24	37,5
10	Moore	24	37,5	40	62,5
15	Moore	64	100	0	0
15	Morton(Z Curve)	0	0	64	100
20	Moore	384	67,84	0	0
20	Morton(Z Curve)	182	32,16	370	67,03
20	Hilbert	0	0	182	32,97
25	Moore	344	59,72	0	0
25	Morton(Z Curve)	232	40,28	344	59,72
25	Hilbert	0	0	232	40,28
30	Moore	323	56,08	0	0
30	Morton(Z Curve)	250	43,4	320	55,56
30	Hilbert	3	0,52	253	43,92
30	V Formation	0	0	3	0,52
35	Moore	343	59,55	2	0,35
35	Morton(Z Curve)	204	35,42	347	60,24
35	Hilbert	29	5,03	219	38,02
35	V Formation	0	0	8	1,39
40	Moore	349	60,59	3	0,52
40	Morton(Z Curve)	184	31,94	373	64,76
40	Hilbert	43	7,47	200	34,72
45	Moore	330	57,29	14	2,43
45	Morton(Z Curve)	192	33,33	360	62,5
45	Hilbert	54	9,38	194	33,68
45	V Formation	0	0	8	1,39
50	Moore	292	50,69	16	2,78

50	Morton(Z Curve)	210	36,46	334	57,99
50	Hilbert	74	12,85	222	38,54
50	Paralel	0	0	4	0,69
60	Moore	344	59,72	24	4,21
60	Hilbert	192	33,33	109	19,12
60	Paralel	18	3,12	10	1,75
60	V Formation	14	2,43	13	2,28
60	Morton(Z Curve)	8	1,39	414	72,63
70	Moore	718	54,56	97	7,85
70	Hilbert	401	30,47	369	29,85
70	Paralel	114	8,66	68	5,5
70	Morton(Z Curve)	51	3,88	656	53,07
70	V Formation	32	2,43	46	3,72
80	Moore	720	53,93	113	8,64
80	Hilbert	417	31,24	331	25,31
80	Paralel	96	7,19	78	5,96
80	Morton(Z Curve)	64	4,79	736	56,27
80	V Formation	38	2,85	50	3,82
90	Moore	688	49,57	144	10,65
90	Hilbert	478	34,44	418	30,92
90	Paralel	132	9,51	86	6,36
90	Morton(Z Curve)	49	3,53	660	48,82
90	V Formation	41	2,95	44	3,25
100	Moore	636	45,07	141	10,21
100	Hilbert	549	38,91	398	28,82
100	Paralel	131	9,28	103	7,46
100	V Formation	51	3,61	44	3,19
100	Morton(Z Curve)	44	3,12	695	50,33
110	Hilbert	600	41,75	363	25,91
110	Moore	596	41,48	152	10,85
110	Paralel	141	9,81	99	7,07
110	V Formation	52	3,62	42	3
110	Morton(Z Curve)	48	3,34	745	53,18
120	Hilbert	644	44,72	357	25,46
120	Moore	585	40,62	149	10,63
120	Paralel	133	9,24	104	7,42
120	V Formation	47	3,26	35	2,5
120	Morton(Z Curve)	31	2,15	757	53,99
130	Hilbert	684	47,3	333	23,79
130	Moore	572	39,56	128	9,14

130	Paralel	104	7,19	112	8
130	V Formation	49	3,39	26	1,86
130	Morton(Z Curve)	37	2,56	801	57,21
140	Hilbert	711	48,63	326	23,22
140	Moore	551	37,69	113	8,05
140	Paralel	97	6,63	117	8,33
140	V Formation	57	3,9	39	2,78
140	Morton(Z Curve)	46	3,15	809	57,62
150	Hilbert	1010	43,53	572	26,27
150	Moore	860	37,07	165	7,58
150	Paralel	231	9,96	253	11,62
150	Morton(Z Curve)	132	5,69	1085	49,84
150	V Formation	87	3,75	102	4,69
200	Hilbert	1231	46,56	679	27,17
200	Moore	948	35,85	220	8,8
200	Morton(Z Curve)	200	7,56	1270	50,82
200	Paralel	193	7,3	227	9,08
200	V Formation	72	2,72	103	4,12
250	Hilbert	924	37,05	584	24,8
250	Moore	670	26,86	211	8,96
250	Paralel	404	16,2	336	14,27
250	Morton(Z Curve)	306	12,27	900	38,22
250	V Formation	190	7,62	324	13,76
300	Hilbert	1431	38,01	829	23,59
300	Moore	962	25,55	345	9,82
300	Paralel	626	16,63	598	17,02
300	Morton(Z Curve)	549	14,58	1280	36,43
300	V Formation	197	5,23	462	13,15
350	Hilbert	1705	44,47	765	21,4
350	Moore	863	22,51	411	11,5
350	Paralel	551	14,37	648	18,13
350	Morton(Z Curve)	532	13,88	1278	35,76
350	V Formation	183	4,77	472	13,21
400	Hilbert	2102	42,77	1027	22,24
400	Moore	1055	21,46	585	12,67
400	Paralel	778	15,83	858	18,58
400	Morton(Z Curve)	720	14,65	1471	31,86
400	V Formation	260	5,29	676	14,64
450	Hilbert	2278	42,1	1158	23,16
450	Moore	1234	22,81	615	12,3

450	Morton(Z Curve)	895	16,54	1609	32,19
450	Paralel	698	12,9	966	19,32
450	V Formation	306	5,66	651	13,02
500	Hilbert	2595	47,32	1067	21,17
500	Moore	1165	21,24	653	12,96
500	Morton(Z Curve)	830	15,13	1727	34,27
500	Paralel	660	12,04	954	18,93
500	V Formation	234	4,27	638	12,66

Table S7. Parallel Search Pattern and Alternatives Scenario AltPar_PIW_W3_C3

Area (km²)	*Pattern*	*Number of times finding the targets first*	*Percentage*	*Number of times finding the targets second*	*Percentage*
5	Paralel	48	75	16	25
5	Moore	16	25	48	75
10	Paralel	40	62,5	24	37,5
10	Moore	24	37,5	40	62,5
15	Moore	64	100	0	0
15	Morton(Z Curve)	0	0	64	100
20	Moore	224	70	0	0
20	Morton(Z Curve)	96	30	224	70
20	Hilbert	0	0	96	30
25	Moore	320	75,47	0	0
25	Morton(Z Curve)	104	24,53	216	67,5
25	Hilbert	0	0	104	32,5
30	Moore	344	71,67	0	0
30	Morton(Z Curve)	136	28,33	296	68,52
30	Hilbert	0	0	136	31,48
35	Moore	324	66,39	0	0
35	Morton(Z Curve)	164	33,61	324	66,39
35	Hilbert	0	0	164	33,61
40	Moore	280	57,38	0	0
40	Morton(Z Curve)	208	42,62	280	57,38
40	Hilbert	0	0	208	42,62
45	Morton(Z Curve)	249	50,51	239	48,98
45	Moore	244	49,49	0	0
45	Hilbert	0	0	249	51,02
50	Moore	260	49,81	4	0,82
50	Morton(Z Curve)	224	42,91	248	50,82
50	Hilbert	38	7,28	236	48,36
60	Moore	344	67,72	0	0

60	Hilbert	147	28,94	85	18,32
60	V Formation	12	2,36	0	0
60	Paralel	5	0,98	11	2,37
60	Morton(Z Curve)	0	0	368	79,31
70	Moore	532	54,96	56	6,14
70	Hilbert	255	26,34	278	30,48
70	Morton(Z Curve)	102	10,54	519	56,91
70	Paralel	59	6,1	38	4,17
70	V Formation	20	2,07	21	2,3
80	Moore	613	56,29	54	5,61
80	Hilbert	296	27,18	252	26,17
80	Morton(Z Curve)	107	9,83	593	61,58
80	Paralel	49	4,5	43	4,47
80	V Formation	24	2,2	21	2,18
90	Moore	570	50,18	52	5,01
90	Hilbert	372	32,75	282	27,17
90	Morton(Z Curve)	124	10,92	641	61,75
90	Paralel	53	4,67	39	3,76
90	V Formation	17	1,5	24	2,31
100	Moore	557	48,77	69	6,58
100	Hilbert	388	33,98	266	25,38
100	Morton(Z Curve)	114	9,98	643	61,35
100	Paralel	54	4,73	50	4,77
100	V Formation	29	2,54	20	1,91
110	Moore	530	46,37	52	5
110	Hilbert	403	35,26	219	21,04
110	Morton(Z Curve)	133	11,64	686	65,9
110	Paralel	46	4,02	78	7,49
110	V Formation	31	2,71	6	0,58
120	Moore	518	45,64	45	4,29
120	Hilbert	413	36,39	251	23,93
120	Morton(Z Curve)	119	10,48	674	64,25
120	Paralel	55	4,85	63	6,01
120	V Formation	30	2,64	16	1,53
130	Moore	482	43,04	40	3,89
130	Hilbert	432	38,57	257	25,02
130	Morton(Z Curve)	132	11,79	656	63,88
130	Paralel	46	4,11	62	6,04
130	V Formation	28	2,5	12	1,17
140	Moore	472	42,41	60	5,88

140	Hilbert	460	41,33	246	24,09
140	Morton(Z Curve)	110	9,88	646	63,27
140	Paralel	51	4,58	61	5,97
140	V Formation	20	1,8	8	0,78
150	Hilbert	717	40,44	417	25,84
150	Moore	695	39,2	108	6,69
150	Morton(Z Curve)	223	12,58	902	55,89
150	Paralel	103	5,81	110	6,82
150	V Formation	35	1,97	77	4,77
200	Hilbert	857	43,46	383	22,95
200	Moore	705	35,75	105	6,29
200	Morton(Z Curve)	256	12,98	985	59,02
200	Paralel	106	5,38	93	5,57
200	V Formation	48	2,43	103	6,17
250	Hilbert	703	39,52	390	26,99
250	Moore	608	34,18	62	4,29
250	Morton(Z Curve)	249	14	687	47,54
250	Paralel	117	6,58	113	7,82
250	V Formation	102	5,73	193	13,36
300	Hilbert	965	35,49	626	27,66
300	Moore	830	30,53	133	5,88
300	Morton(Z Curve)	527	19,38	1025	45,29
300	Paralel	242	8,9	168	7,42
300	V Formation	155	5,7	311	13,74
350	Hilbert	963	35,96	676	31,46
350	Moore	866	32,34	91	4,23
350	Morton(Z Curve)	527	19,68	904	42,07
350	Paralel	198	7,39	212	9,87
350	V Formation	124	4,63	266	12,38
400	Hilbert	1282	37,68	821	29,52
400	Moore	887	26,07	192	6,9
400	Morton(Z Curve)	761	22,37	1148	41,28
400	Paralel	242	7,11	231	8,31
400	V Formation	230	6,76	389	13,99
450	Hilbert	1434	37,96	869	28,54
450	Moore	1027	27,18	198	6,5
450	Morton(Z Curve)	773	20,46	1259	41,35
450	Paralel	289	7,65	264	8,67
450	V Formation	255	6,75	455	14,94
500	Hilbert	1488	39,4	867	28,56

500	Moore	1001	26,5	154	5,07
500	Morton(Z Curve)	757	20,04	1302	42,89
500	Paralel	285	7,55	284	9,35
500	V Formation	246	6,51	429	14,13

Table S8. Parallel Search Pattern and Alternatives Scenario AltPar_PIW_W3_C5

Area (km²)	*Pattern*	*Number of times finding the targets first*	*Percentage*	*Number of times finding the targets second*	*Percentage*
5	Paralel	36	72	12	26,09
5	Moore	14	28	34	73,91
10	Paralel	31	62	17	36,96
10	Moore	19	38	29	63,04
15	Moore	64	100	0	0
15	Morton(Z Curve)	0	0	64	100
20	Moore	244	76,25	0	0
20	Morton(Z Curve)	76	23,75	244	76,25
20	Hilbert	0	0	76	23,75
25	Moore	224	70	0	0
25	Morton(Z Curve)	96	30	224	70
25	Hilbert	0	0	96	30
30	Moore	272	69,39	0	0
30	Morton(Z Curve)	120	30,61	200	62,5
30	Hilbert	0	0	120	37,5
35	Moore	262	67,18	0	0
35	Morton(Z Curve)	128	32,82	192	60
35	Hilbert	0	0	128	40
40	Moore	242	51,27	0	0
40	Morton(Z Curve)	230	48,73	202	46,76
40	Hilbert	0	0	230	53,24
45	Moore	240	50,85	0	0
45	Morton(Z Curve)	232	49,15	200	46,3
45	Hilbert	0	0	232	53,7
50	Moore	254	54,27	2	0,48
50	Morton(Z Curve)	200	42,74	208	50
50	Hilbert	14	2,99	206	49,52
60	Moore	344	75,44	30	7,08
60	Hilbert	112	24,56	78	18,4
60	Morton(Z Curve)	0	0	310	73,11
60	Paralel	0	0	6	1,42
70	Moore	526	59,44	10	1,22

70	Hilbert	283	31,98	234	28,54
70	Morton(Z Curve)	44	4,97	556	67,8
70	V Formation	24	2,71	0	0
70	Paralel	8	0,9	20	2,44
80	Moore	544	58,31	8	1,02
80	Hilbert	303	32,48	187	23,76
80	Morton(Z Curve)	54	5,79	564	71,66
80	V Formation	24	2,57	0	0
80	Paralel	8	0,86	28	3,56
90	Moore	568	59,66	10	1,3
90	Hilbert	315	33,09	192	24,9
90	Morton(Z Curve)	44	4,62	547	70,95
90	V Formation	14	1,47	0	0
90	Paralel	11	1,16	22	2,85
100	Moore	533	54,33	21	2,51
100	Hilbert	373	38,02	199	23,8
100	Morton(Z Curve)	54	5,5	593	70,93
100	Paralel	11	1,12	23	2,75
100	V Formation	10	1,02	0	0
110	Moore	511	52,46	8	0,97
110	Hilbert	383	39,32	166	20,05
110	Morton(Z Curve)	56	5,75	626	75,6
110	Paralel	16	1,64	23	2,78
110	V Formation	8	0,82	5	0,6
120	Moore	496	49,65	8	0,92
120	Hilbert	426	42,64	223	25,6
120	Morton(Z Curve)	63	6,31	608	69,8
120	Paralel	10	1	28	3,21
120	V Formation	4	0,4	4	0,46
130	Moore	477	48,62	8	0,93
130	Hilbert	420	42,81	230	26,74
130	Morton(Z Curve)	72	7,34	585	68,02
130	Paralel	10	1,02	28	3,26
130	V Formation	2	0,2	9	1,05
140	Moore	469	48,75	2	0,24
140	Hilbert	411	42,72	227	26,71
140	Morton(Z Curve)	72	7,48	579	68,12
140	Paralel	10	1,04	29	3,41
140	V Formation	0	0	13	1,53
150	Hilbert	631	41,38	374	27,54

150	Moore	592	38,82	54	3,98
150	Morton(Z Curve)	251	16,46	832	61,27
150	Paralel	43	2,82	58	4,27
150	V Formation	8	0,52	40	2,95
200	Moore	624	40,76	74	6,02
200	Hilbert	598	39,06	325	26,42
200	Morton(Z Curve)	222	14,5	743	60,41
200	Paralel	66	4,31	46	3,74
200	V Formation	21	1,37	42	3,41
250	Moore	673	43,84	80	7,01
250	Hilbert	463	30,16	365	31,96
250	Morton(Z Curve)	249	16,22	543	47,55
250	Paralel	78	5,08	84	7,36
250	V Formation	72	4,69	70	6,13
300	Moore	898	39,73	119	7,22
300	Hilbert	735	32,52	502	30,46
300	Morton(Z Curve)	413	18,27	803	48,73
300	Paralel	118	5,22	109	6,61
300	V Formation	96	4,25	115	6,98
350	Moore	889	39,16	100	6,24
350	Hilbert	733	32,29	548	34,21
350	Morton(Z Curve)	452	19,91	722	45,07
350	Paralel	106	4,67	126	7,87
350	V Formation	90	3,96	106	6,62
400	Hilbert	1027	36,21	658	31,18
400	Moore	961	33,89	165	7,82
400	Morton(Z Curve)	619	21,83	969	45,92
400	Paralel	124	4,37	150	7,11
400	V Formation	105	3,7	168	7,96
450	Moore	1061	35,66	175	8,17
450	Hilbert	1034	34,76	678	31,64
450	Morton(Z Curve)	645	21,68	964	44,98
450	Paralel	148	4,97	152	7,09
450	V Formation	87	2,92	174	8,12
500	Moore	1097	35,88	154	7,15
500	Hilbert	1045	34,18	725	33,67
500	Morton(Z Curve)	670	21,92	962	44,68
500	Paralel	150	4,91	154	7,15
500	V Formation	95	3,11	158	7,34

Table S9. Expanding Square Search Pattern and Alternatives Scenario AltEs_PIW_W3_C1 Detection Results

Area (km²)	**Pattern**	**Total Target**	**Number of failures to detect**	**Number of detections**	**Success Rate**
5	Expanding Square	64	0	64	100
5	Spiral	64	0	64	100
5	Pentagonal	64	64	0	0
5	Hexagonal	64	64	0	0
5	Octagonal	64	64	0	0
10	Expanding Square	64	0	64	100
10	Spiral	64	0	64	100
10	Pentagonal	64	64	0	0
10	Hexagonal	64	64	0	0
10	Octagonal	64	64	0	0
15	Expanding Square	64	0	64	100
15	Spiral	64	0	64	100
15	Pentagonal	64	64	0	0
15	Hexagonal	64	64	0	0
15	Octagonal	64	64	0	0
20	Spiral	576	0	576	100
20	Expanding Square	576	24	552	95,83
20	Pentagonal	576	576	0	0
20	Hexagonal	576	576	0	0
20	Octagonal	576	576	0	0
25	Expanding Square	576	0	576	100
25	Spiral	576	0	576	100
25	Pentagonal	576	576	0	0
25	Hexagonal	576	576	0	0
25	Octagonal	576	576	0	0
30	Expanding Square	576	0	576	100
30	Spiral	576	0	576	100
30	Pentagonal	576	576	0	0
30	Hexagonal	576	576	0	0
30	Octagonal	576	576	0	0
35	Octagonal	576	0	576	100
35	Expanding Square	576	0	576	100
35	Spiral	576	0	576	100
35	Pentagonal	576	576	0	0
35	Hexagonal	576	576	0	0
40	Hexagonal	576	0	576	100

40	Octagonal	576	0	576	100
40	Expanding Square	576	0	576	100
40	Spiral	576	0	576	100
40	Pentagonal	576	576	0	0
45	Pentagonal	576	0	576	100
45	Hexagonal	576	0	576	100
45	Octagonal	576	0	576	100
45	Expanding Square	576	0	576	100
45	Spiral	576	0	576	100
50	Pentagonal	576	0	576	100
50	Hexagonal	576	0	576	100
50	Octagonal	576	0	576	100
50	Expanding Square	576	0	576	100
50	Spiral	576	0	576	100
60	Pentagonal	576	0	576	100
60	Hexagonal	576	0	576	100
60	Octagonal	576	0	576	100
60	Expanding Square	576	0	576	100
60	Spiral	576	0	576	100
70	Spiral	1600	355	1245	77,81
70	Octagonal	1600	456	1144	71,5
70	Pentagonal	1600	468	1132	70,75
70	Hexagonal	1600	468	1132	70,75
70	Expanding Square	1600	471	1129	70,56
80	Spiral	1600	253	1347	84,19
80	Octagonal	1600	364	1236	77,25
80	Expanding Square	1600	372	1228	76,75
80	Hexagonal	1600	374	1226	76,62
80	Pentagonal	1600	376	1224	76,5
90	Spiral	1600	169	1431	89,44
90	Octagonal	1600	279	1321	82,56
90	Hexagonal	1600	307	1293	80,81
90	Expanding Square	1600	316	1284	80,25
90	Pentagonal	1600	322	1278	79,88
100	Spiral	1600	107	1493	93,31
100	Octagonal	1600	224	1376	86
100	Hexagonal	1600	244	1356	84,75
100	Pentagonal	1600	272	1328	83
100	Expanding Square	1600	285	1315	82,19
110	Spiral	1600	76	1524	95,25

110	Octagonal	1600	169	1431	89,44
110	Hexagonal	1600	196	1404	87,75
110	Pentagonal	1600	208	1392	87
110	Expanding Square	1600	226	1374	85,88
120	Spiral	1600	50	1550	96,88
120	Octagonal	1600	116	1484	92,75
120	Hexagonal	1600	130	1470	91,88
120	Pentagonal	1600	170	1430	89,38
120	Expanding Square	1600	189	1411	88,19
130	Spiral	1600	33	1567	97,94
130	Octagonal	1600	82	1518	94,88
130	Hexagonal	1600	96	1504	94
130	Pentagonal	1600	104	1496	93,5
130	Expanding Square	1600	135	1465	91,56
140	Spiral	1600	30	1570	98,12
140	Octagonal	1600	56	1544	96,5
140	Hexagonal	1600	76	1524	95,25
140	Pentagonal	1600	94	1506	94,12
140	Expanding Square	1600	117	1483	92,69
150	Octagonal	3136	766	2370	75,57
150	Spiral	3136	784	2352	75
150	Hexagonal	3136	800	2336	74,49
150	Pentagonal	3136	810	2326	74,17
150	Expanding Square	3136	814	2322	74,04
200	Expanding Square	3136	472	2664	84,95
200	Pentagonal	3136	556	2580	82,27
200	Hexagonal	3136	567	2569	81,92
200	Octagonal	3136	569	2567	81,86
200	Spiral	3136	635	2501	79,75
250	Expanding Square	3136	389	2747	87,6
250	Spiral	3136	477	2659	84,79
250	Hexagonal	3136	500	2636	84,06
250	Pentagonal	3136	508	2628	83,8
250	Octagonal	3136	513	2623	83,64
300	Spiral	5184	1404	3780	72,92
300	Expanding Square	5184	1411	3773	72,78
300	Octagonal	5184	1526	3658	70,56
300	Hexagonal	5184	1536	3648	70,37
300	Pentagonal	5184	1556	3628	69,98
350	Spiral	5184	1316	3868	74,61

350	Expanding Square	5184	1358	3826	73,8
350	Octagonal	5184	1457	3727	71,89
350	Hexagonal	5184	1480	3704	71,45
350	Pentagonal	5184	1504	3680	70,99
400	Spiral	7744	2874	4870	62,89
400	Expanding Square	7744	2902	4842	62,53
400	Octagonal	7744	3010	4734	61,13
400	Hexagonal	7744	3042	4702	60,72
400	Pentagonal	7744	3105	4639	59,9
450	Expanding Square	7744	2606	5138	66,35
450	Spiral	7744	2691	5053	65,25
450	Hexagonal	7744	2767	4977	64,27
450	Octagonal	7744	2776	4968	64,15
450	Pentagonal	7744	2830	4914	63,46
500	Expanding Square	7744	2472	5272	68,08
500	Spiral	7744	2632	5112	66,01
500	Hexagonal	7744	2701	5043	65,12
500	Octagonal	7744	2701	5043	65,12
500	Pentagonal	7744	2742	5002	64,59