

Report

California Biomass Residue Emissions Characterization (C-BREC) Model

Forest Biomass Residue Resource Cluster Analysis of Representative Forest Stands

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1. Introduction

All GNN stands were classified into species groups by basal area. Stands with greater than 80% basal area in a single species were classified by that species (i.e. "DF" for Douglas fir). Stands with less than 80% were classified as mixed (prepended with an "M"), followed by the species with the majority or plurality of basal area, followed by other species with at least 20% basal area in descending order (i.e. "MDF" for mixed Douglas fir with minor species, "MDFBO" for mixed Douglas fir with a significant black oak component (> 20% by basal area)). All species groups that made up at least 1% of forest area in California were identified. The remaining species groups were generalized by first keeping the majority/plurality species but lumping minor species into hardwoods or softwoods (i.e. "MDFOS" for mixed Douglas fir with other softwoods or "MDFOH" for mixed Douglas fir with other hardwoods). Finally, species groups that still didn't make up at least 1% of forest area were further generalized into "MOSOH" (mixed other softwoods with other hardwoods) or "MOHOS" (mixed other hardwoods with other softwoods).

Next, for each species group, k-means clustering was used to group stands with similar structural attributes. Centering and scaling was used to normalize TPA, QMD, stand height, snag tons per acre, and downed woody debris tons per acre. "Elbow" plots of within groups sums-of-squares were produced using 1 to 15 clusters, and the "optimal" number of clusters was identified for each species group.

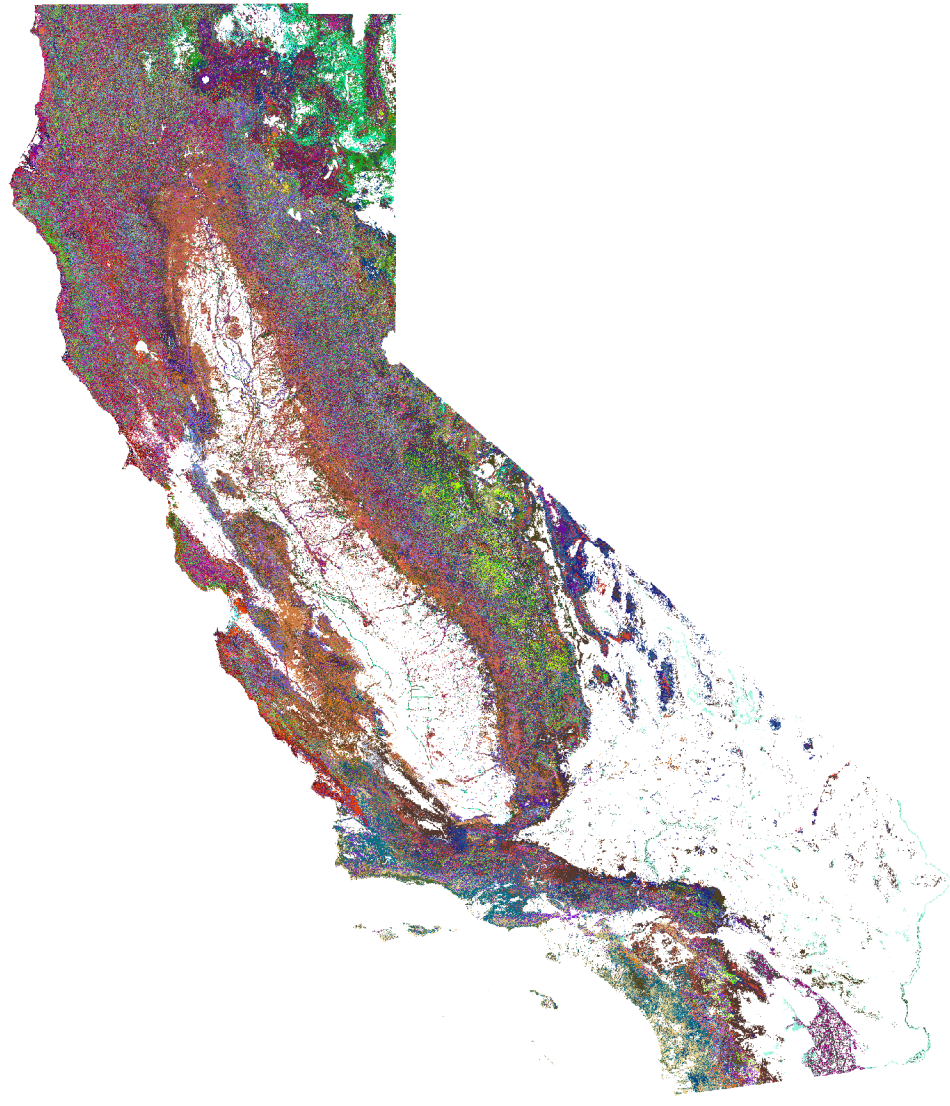
Finally, for each species-structure group, a representative stand was identified. This was the stand with the minimum Euclidean distance from the mean values in normalized space. A total of 177 groups/ representative stands were identified.

The following present graphs of the k-means clustering results for each representative stand.

For additional details, see the C-BREC Model Framework at schatzcenter.org/cbrec/.

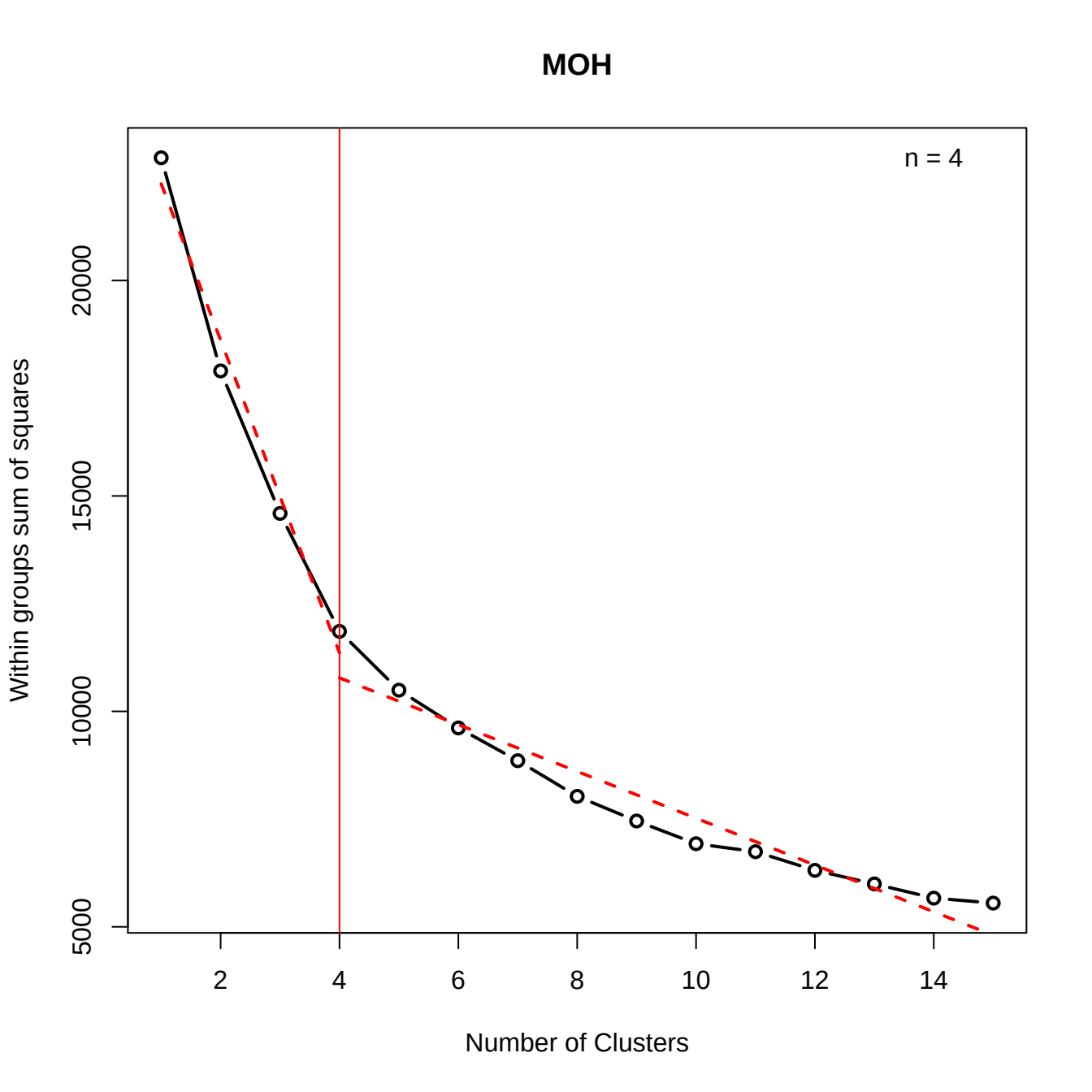
2. Plot of Unique Groups

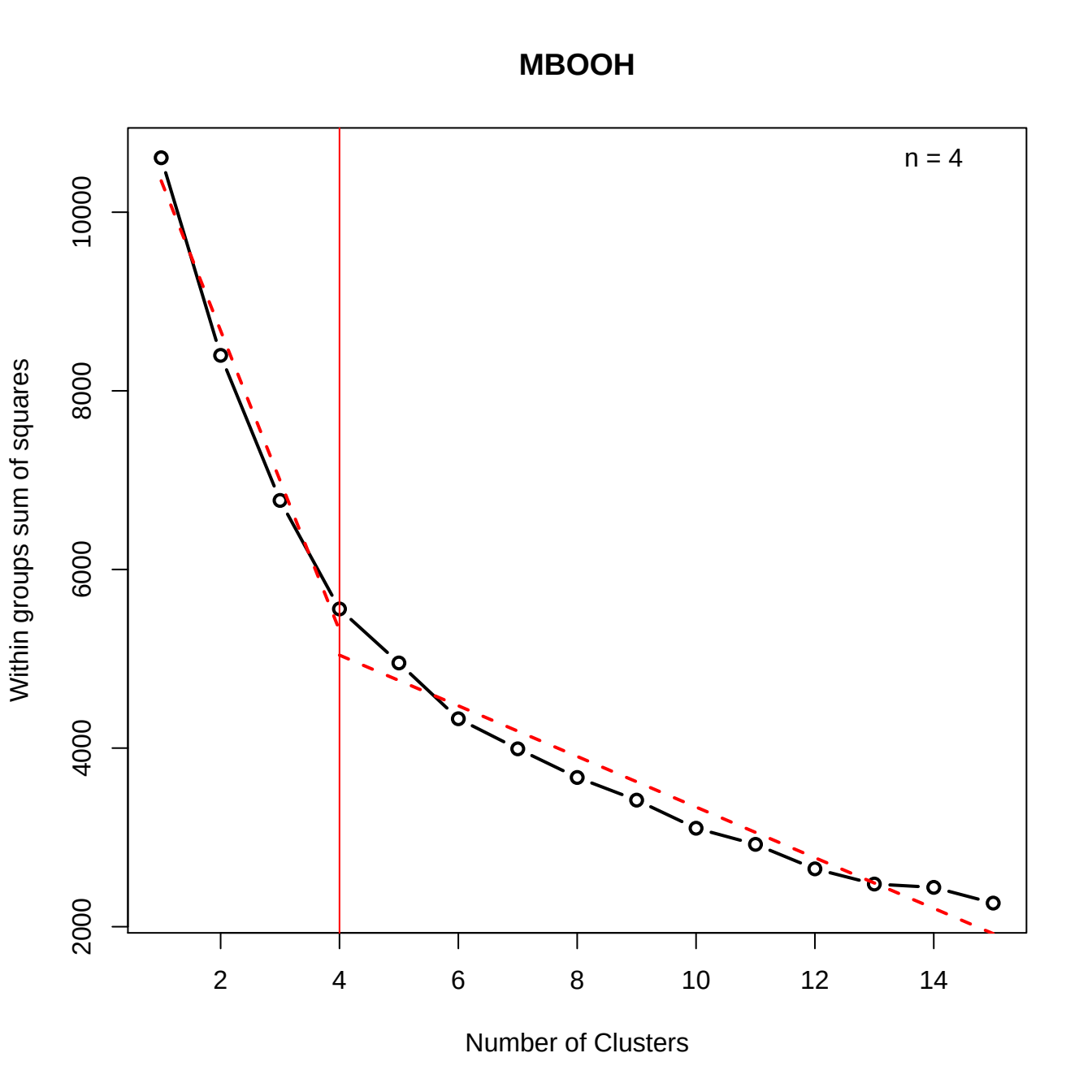
The following shows the spatial distribution of the 177 representative stands

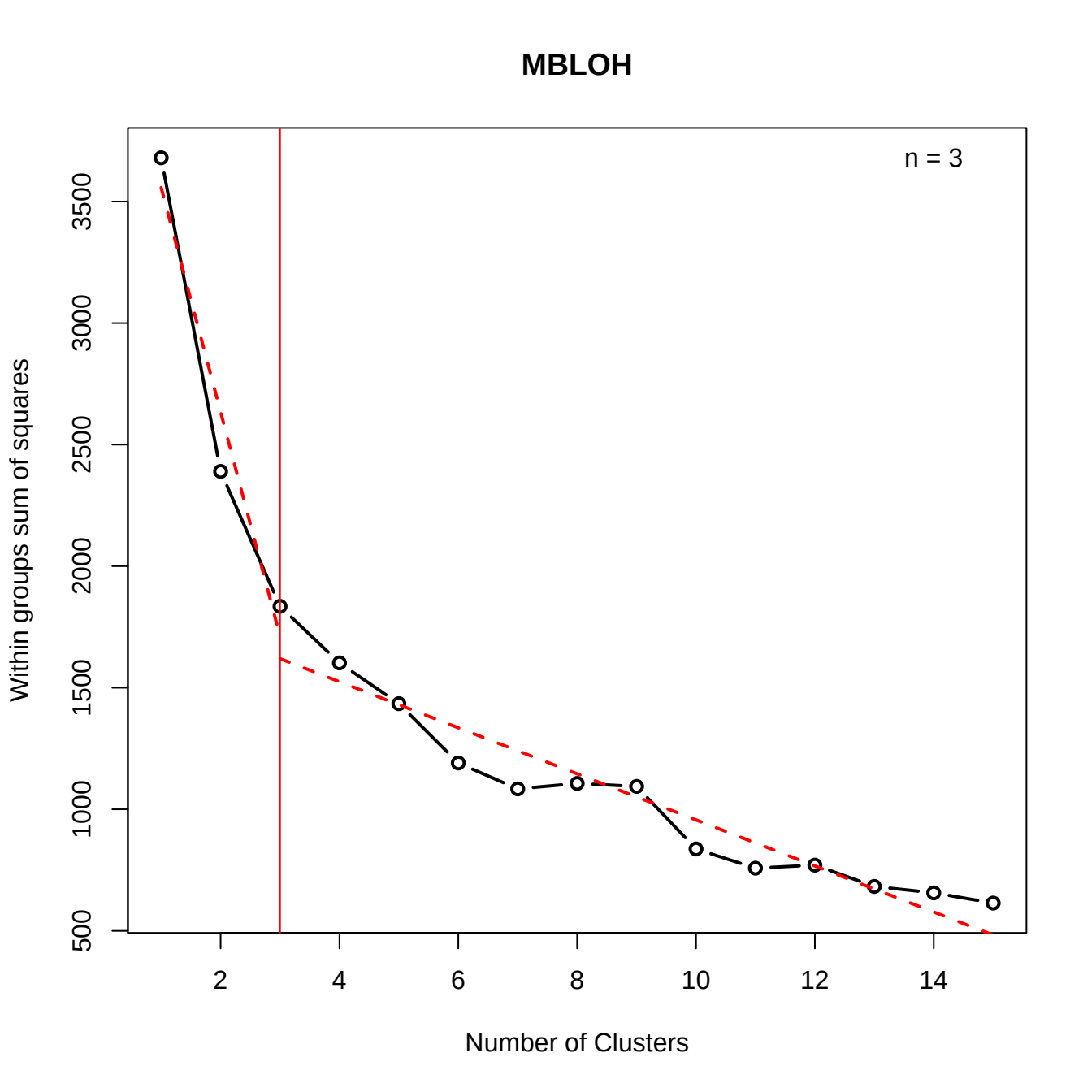


3. K-Means Clusters Elbow Plots

The following are the elbow plots of the 177 representative stands.


MOH
n = 4
Within groups sum of squares
5000
10000
15000
20000
2
4
6
8
10
12
14
Number of Clusters


MBOOH
n = 4
Within groups sum of squares
2000
4000
6000
8000
10000
2
4
6
8
10
12
14
Number of Clusters


MBLOH
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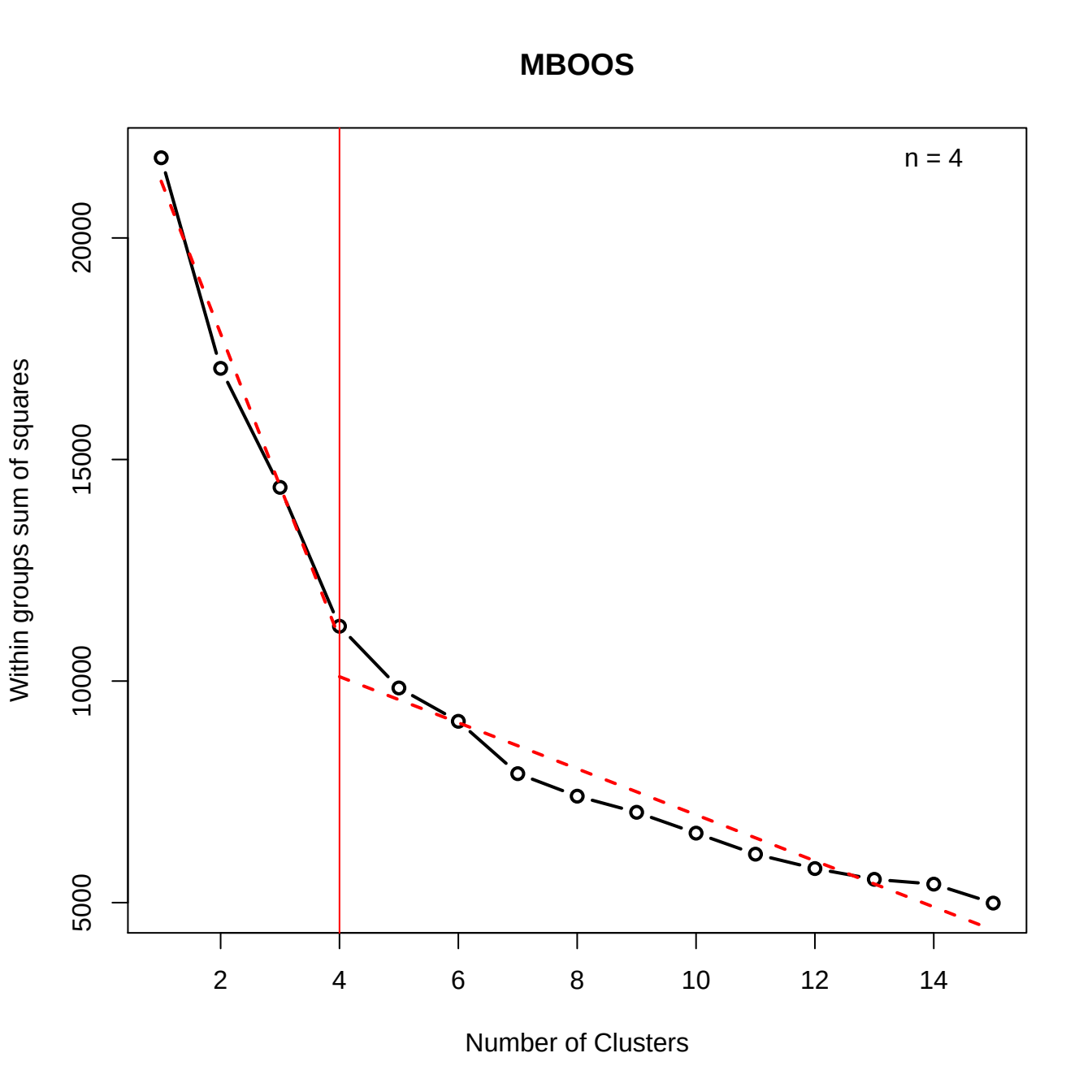
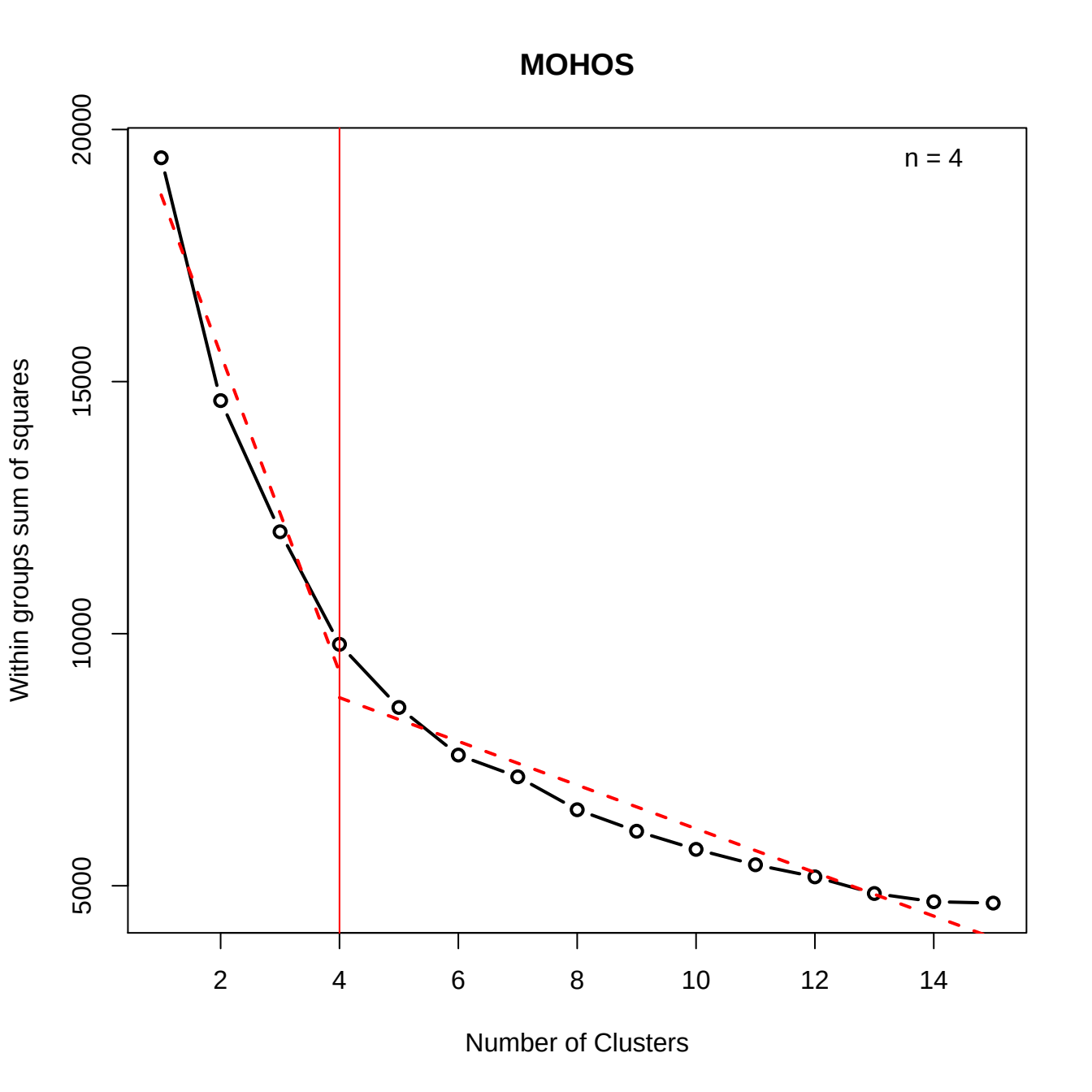
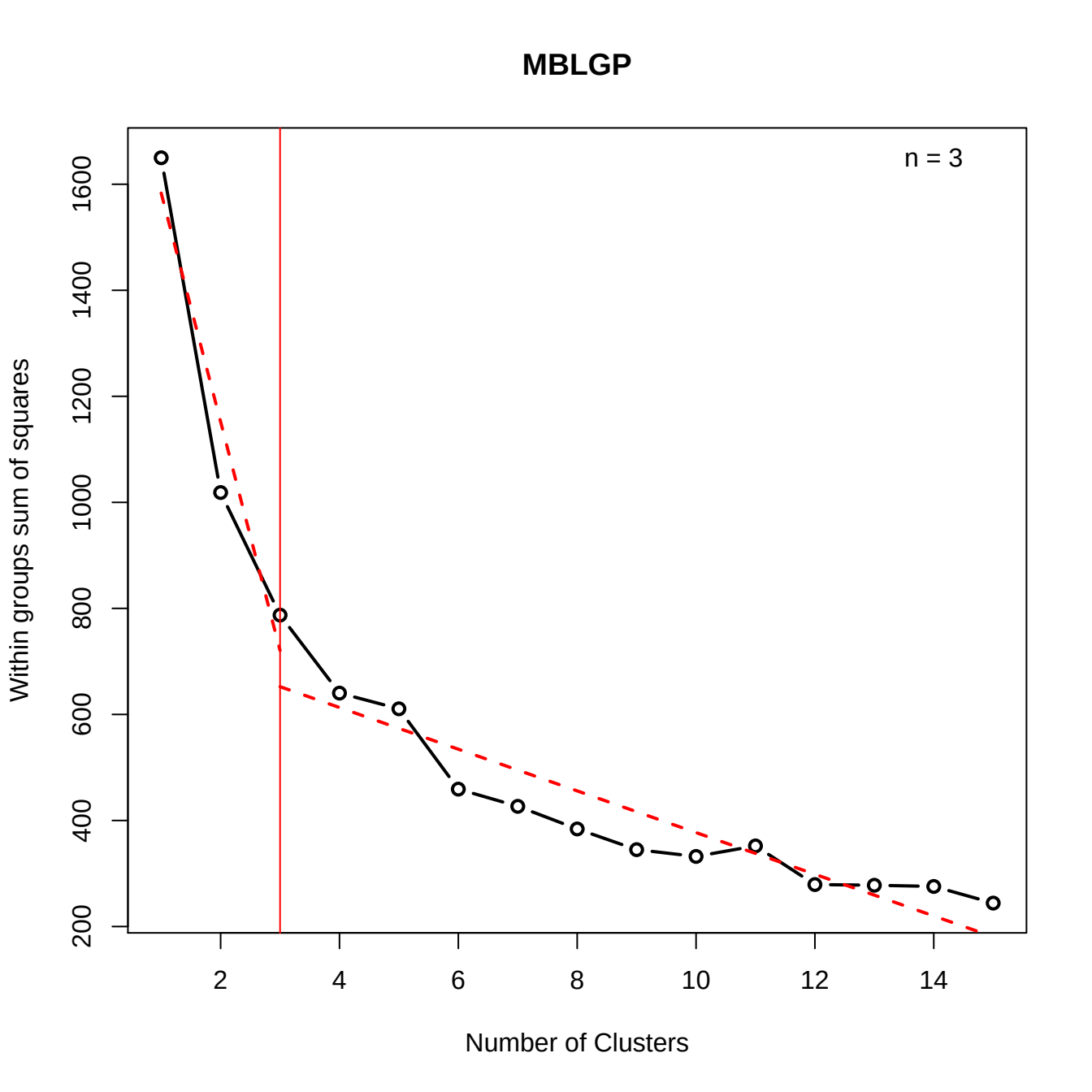
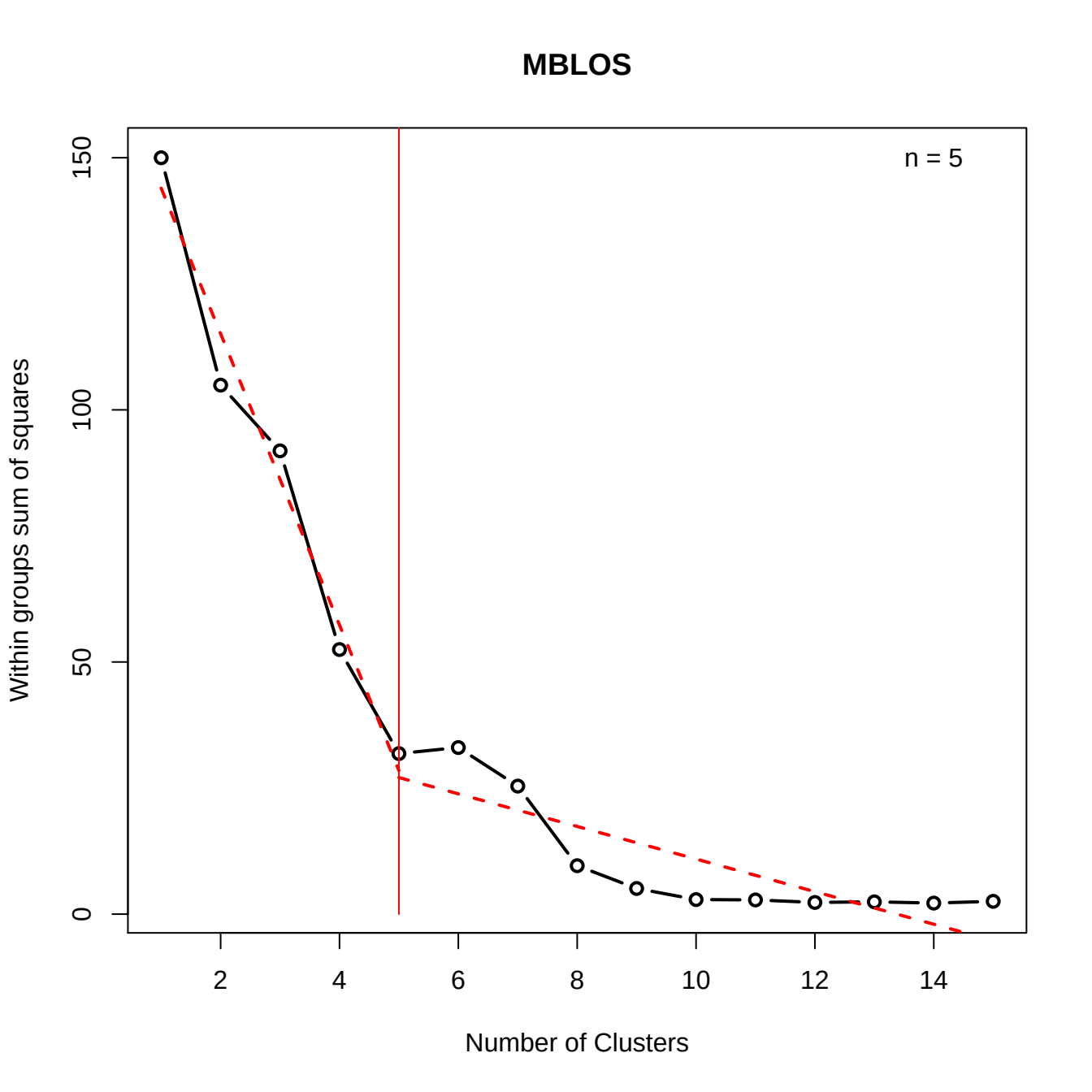
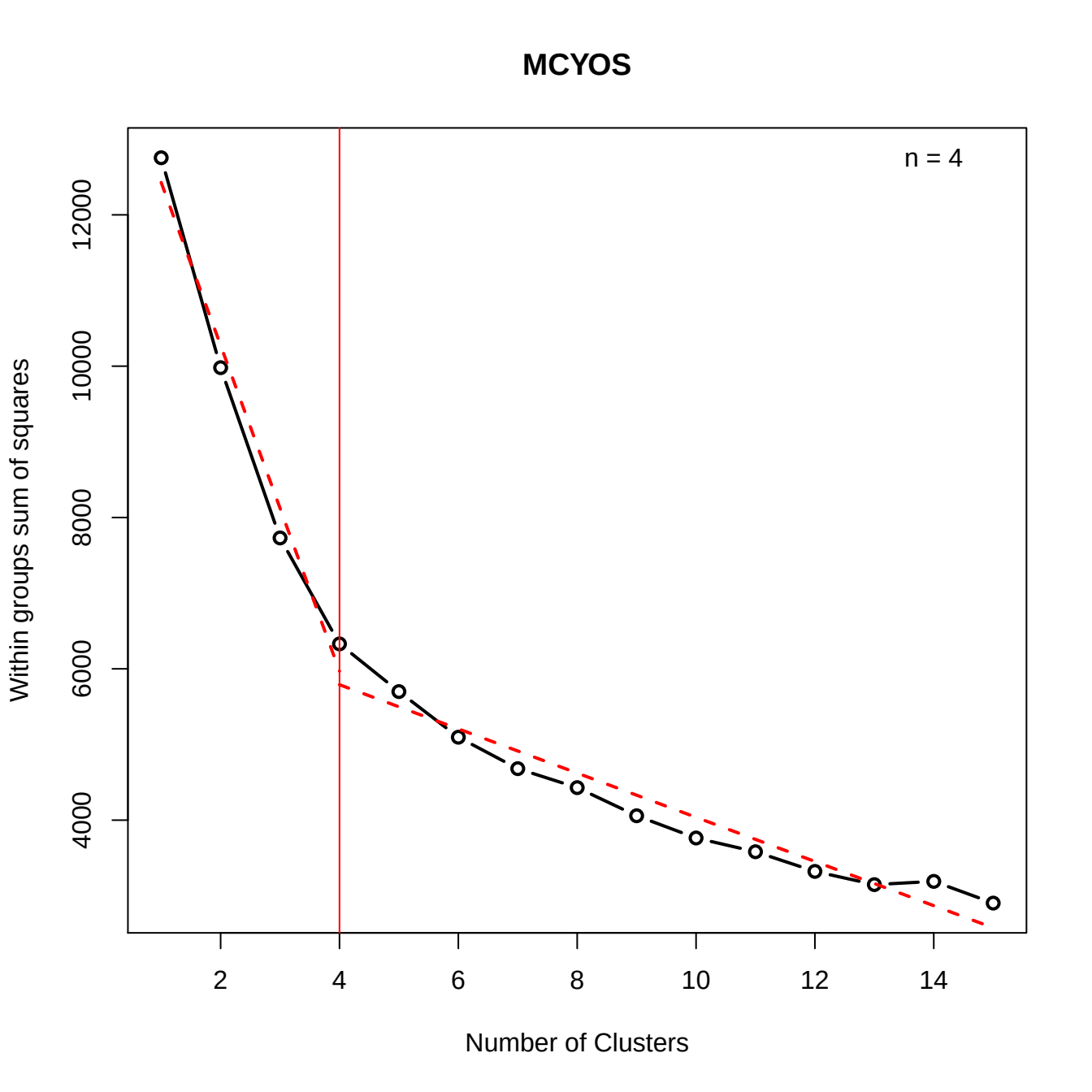
Within groups sum of squares
500
1000
1500
2000
2500
3000
3500
2
4
6
8
10
12
14
Number of Clusters

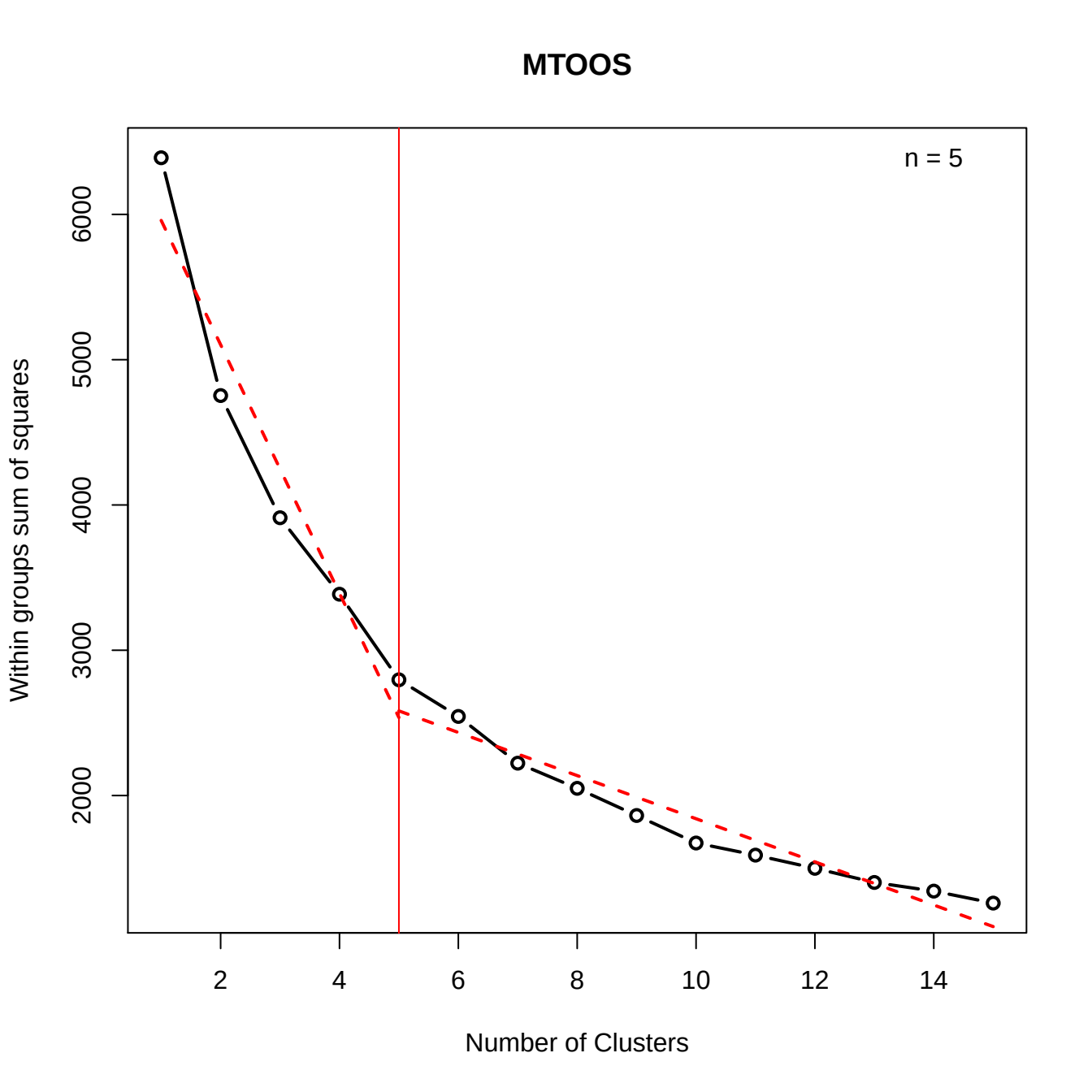

MBOOS
n = 4
Within groups sum of squares
5000
10000
15000
20000
2
4
6
8
10
12
14
Number of Clusters

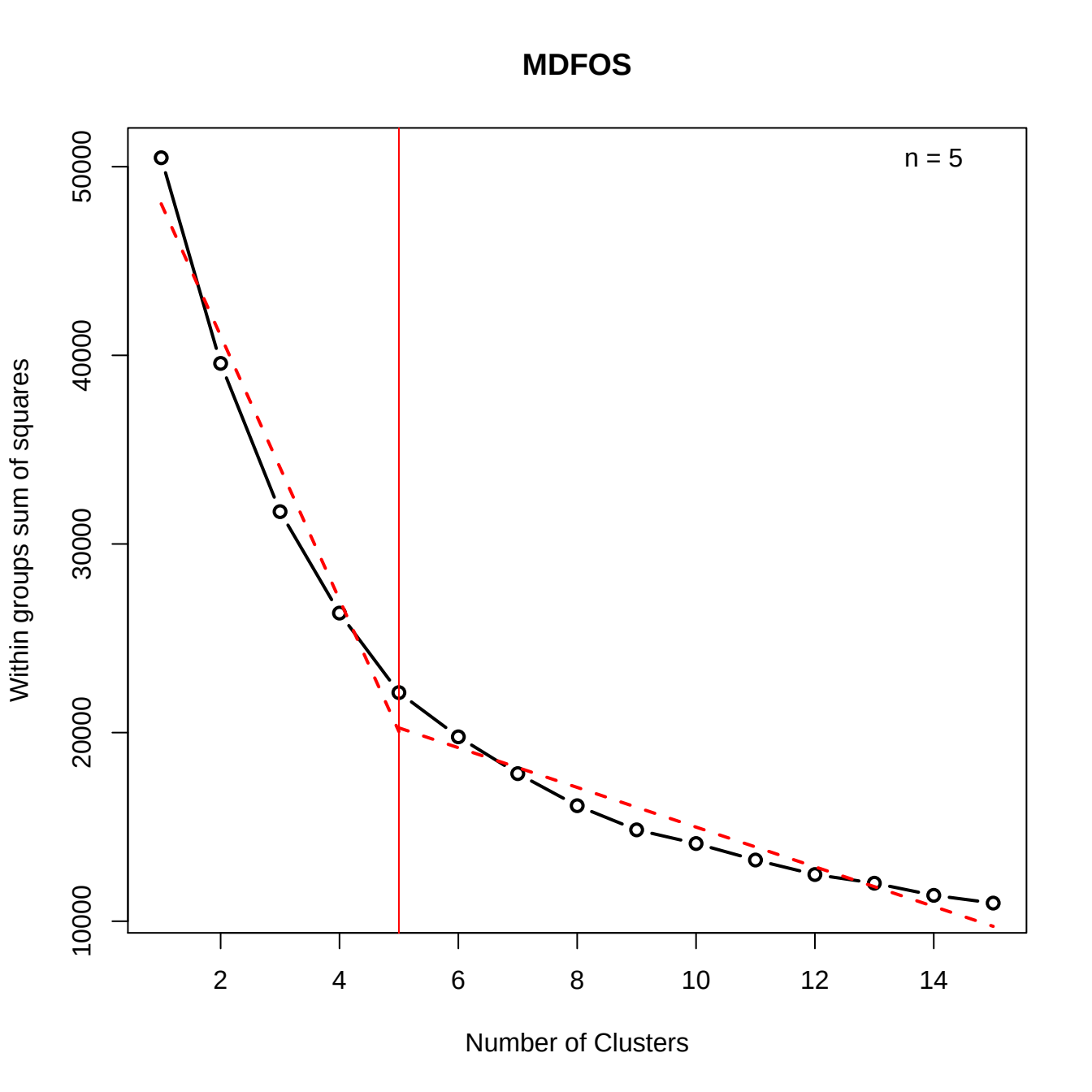

MOHOS
n = 4
Within groups sum of squares
Number of Clusters
20000
15000
10000
5000
2
4
6
8
10
12
14

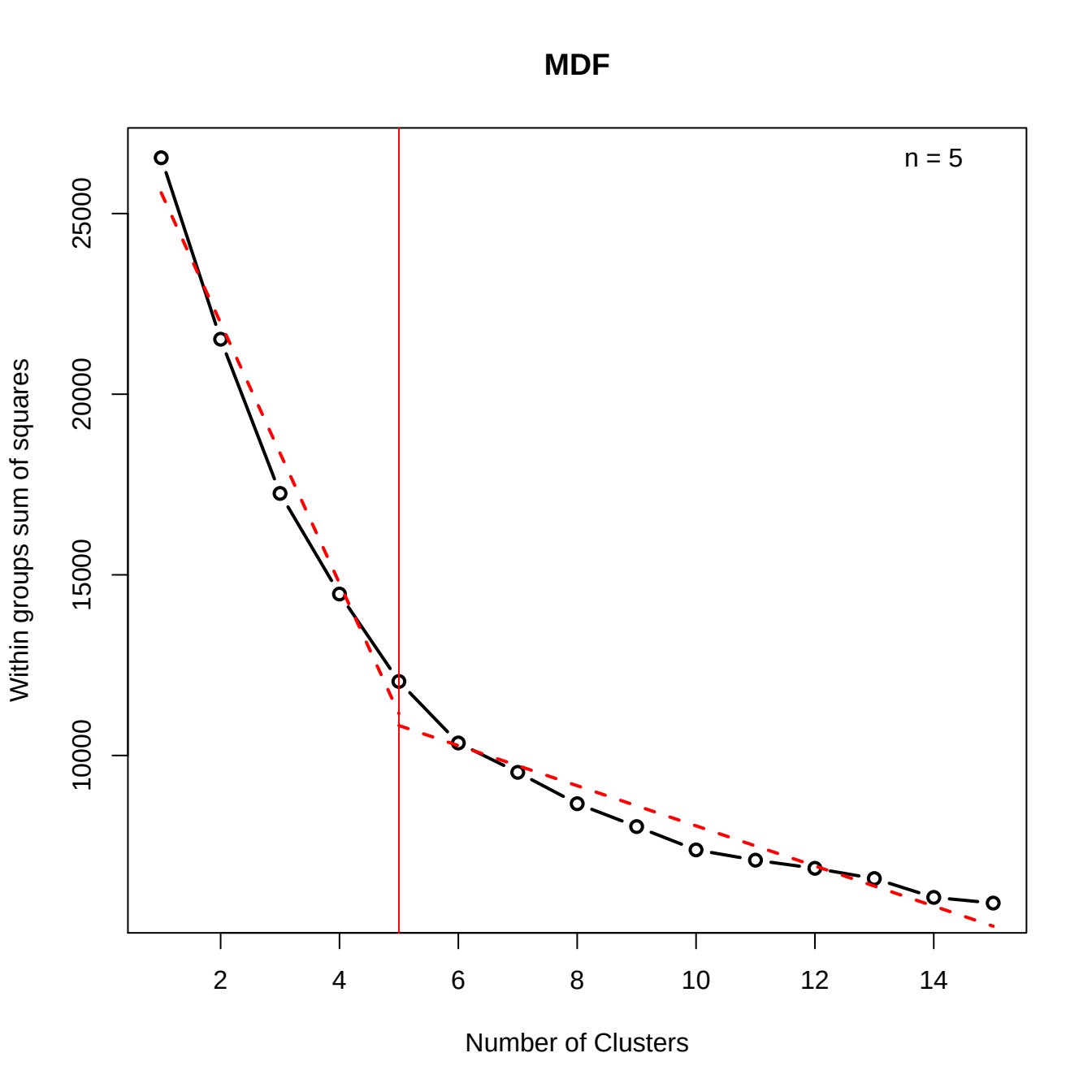

MBLGP
n = 3
Within groups sum of squares
200
400
600
800
1000
1200
1400
1600
2
4
6
8
10
12
14
Number of Clusters

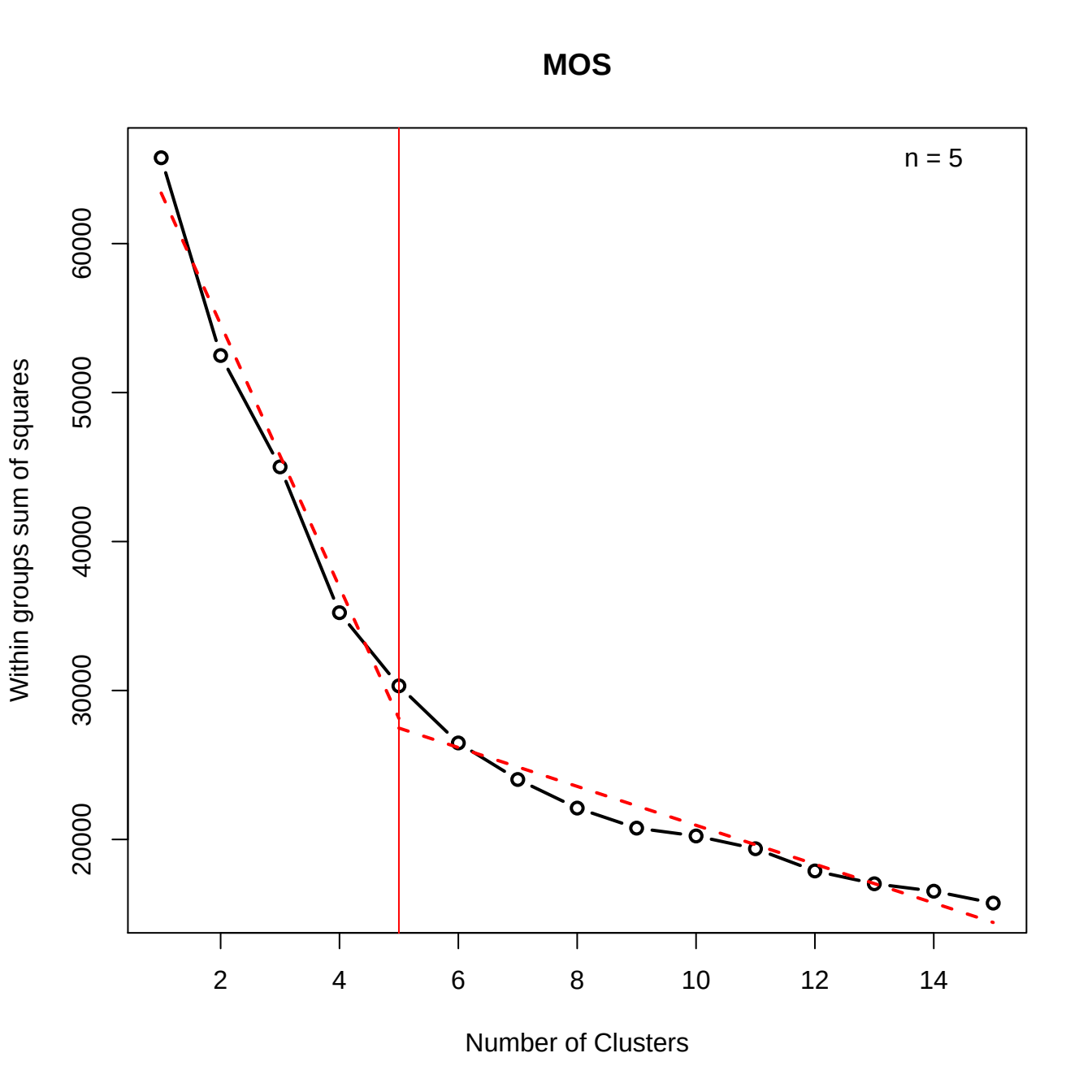

MBLOS
n = 5
Within groups sum of squares
0
50
100
150
2
4
6
8
10
12
14
Number of Clusters

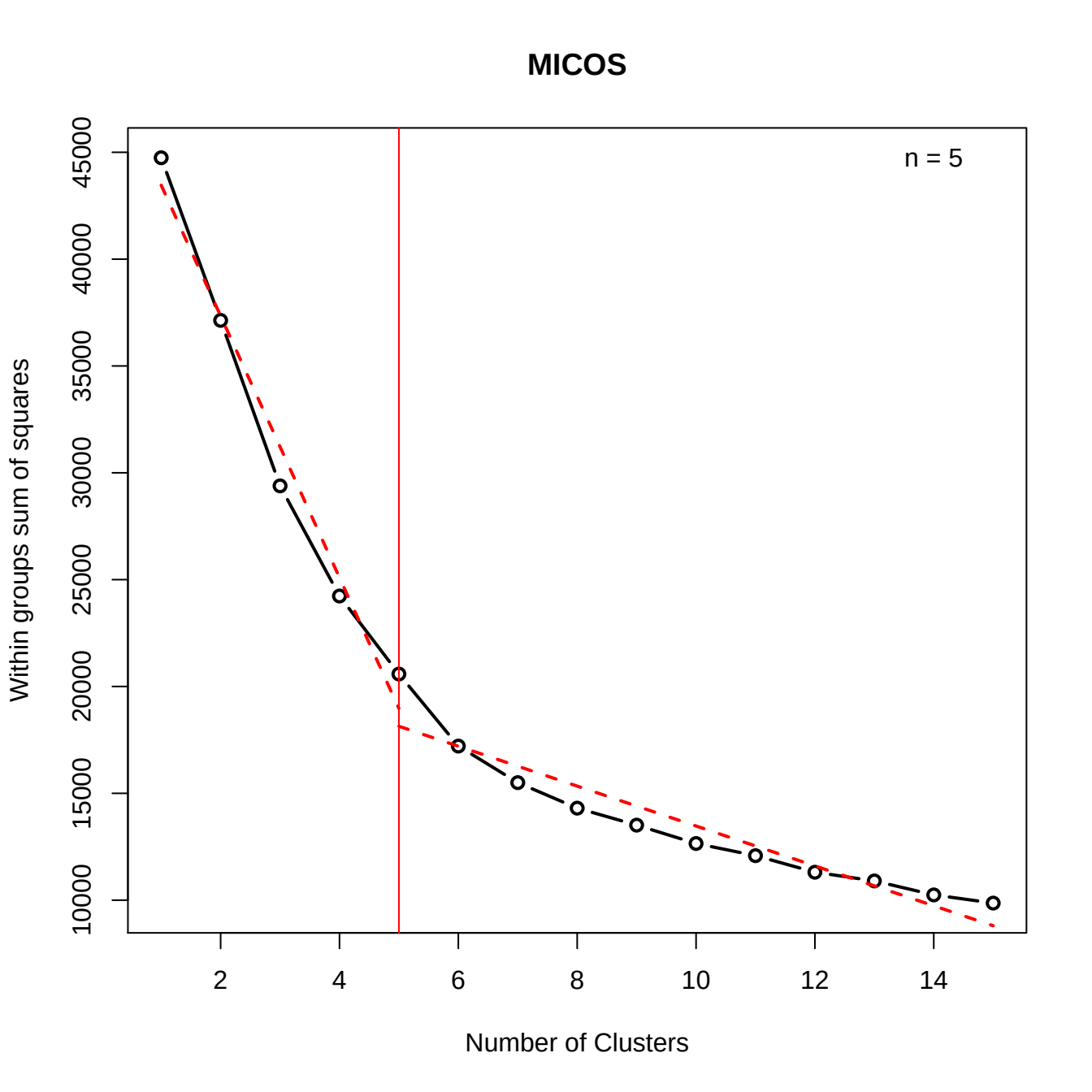

MCYOS
n = 4
Within groups sum of squares
4000
6000
8000
10000
12000
2
4
6
8
10
12
14
Number of Clusters

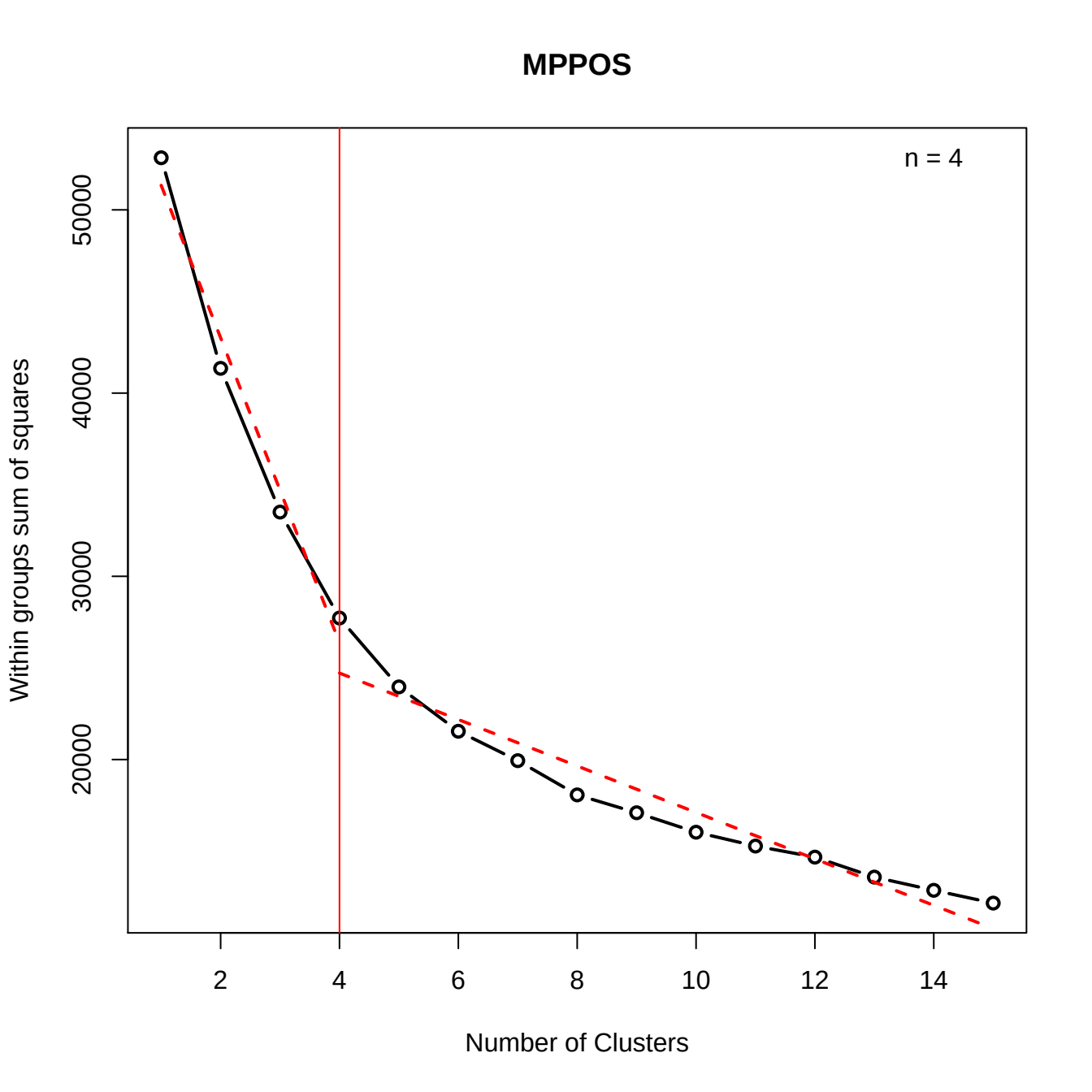

MTOOS
n = 5
Within groups sum of squares
2000
3000
4000
5000
6000
2
4
6
8
10
12
14
Number of Clusters

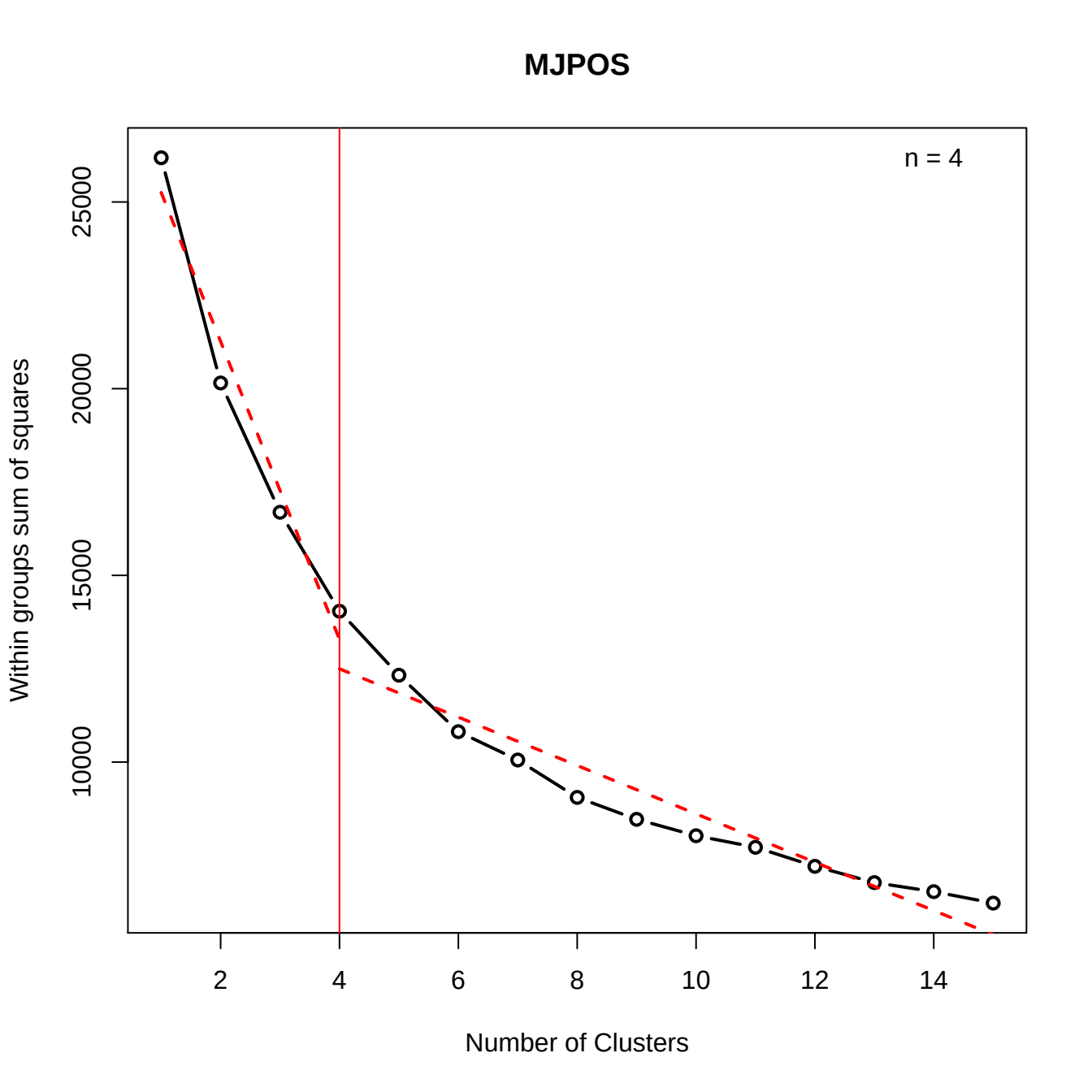

MDFOS
n = 5
Within groups sum of squares
10000
20000
30000
40000
50000
2
4
6
8
10
12
14
Number of Clusters

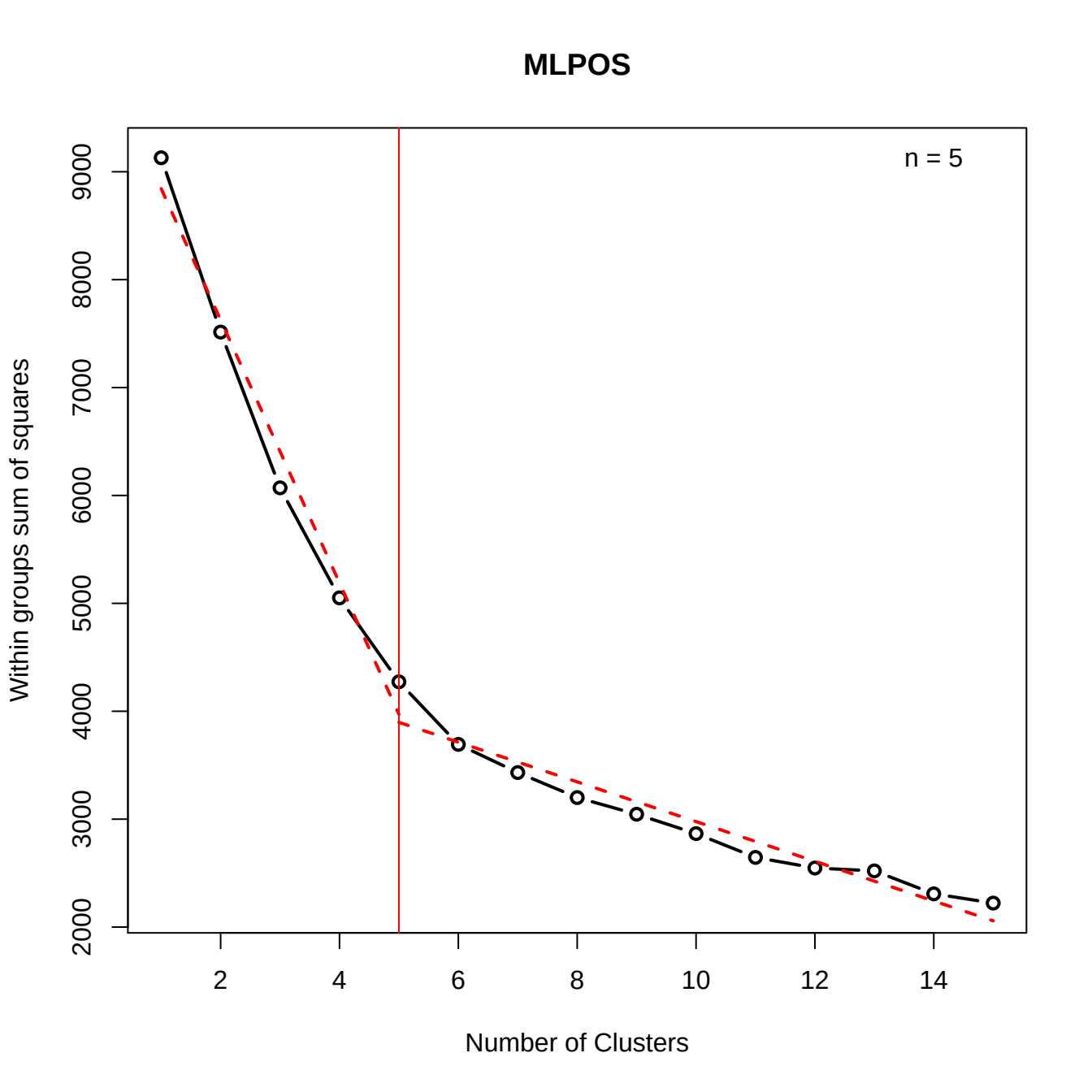

MDF
n = 5
Within groups sum of squares
10000
15000
20000
25000
2
4
6
8
10
12
14
Number of Clusters

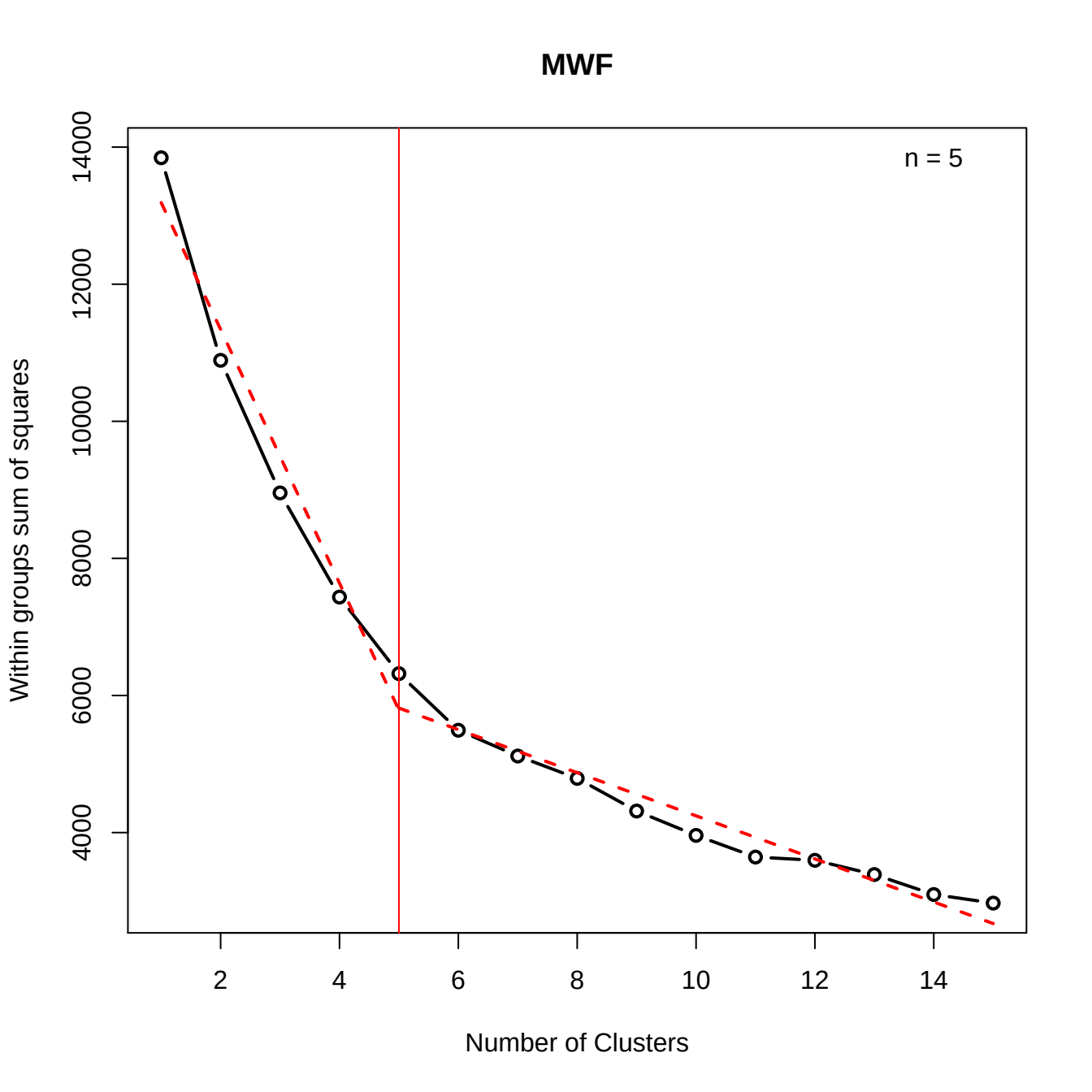

MOS
n = 5
Within groups sum of squares
20000
30000
40000
50000
60000
2
4
6
8
10
12
14
Number of Clusters

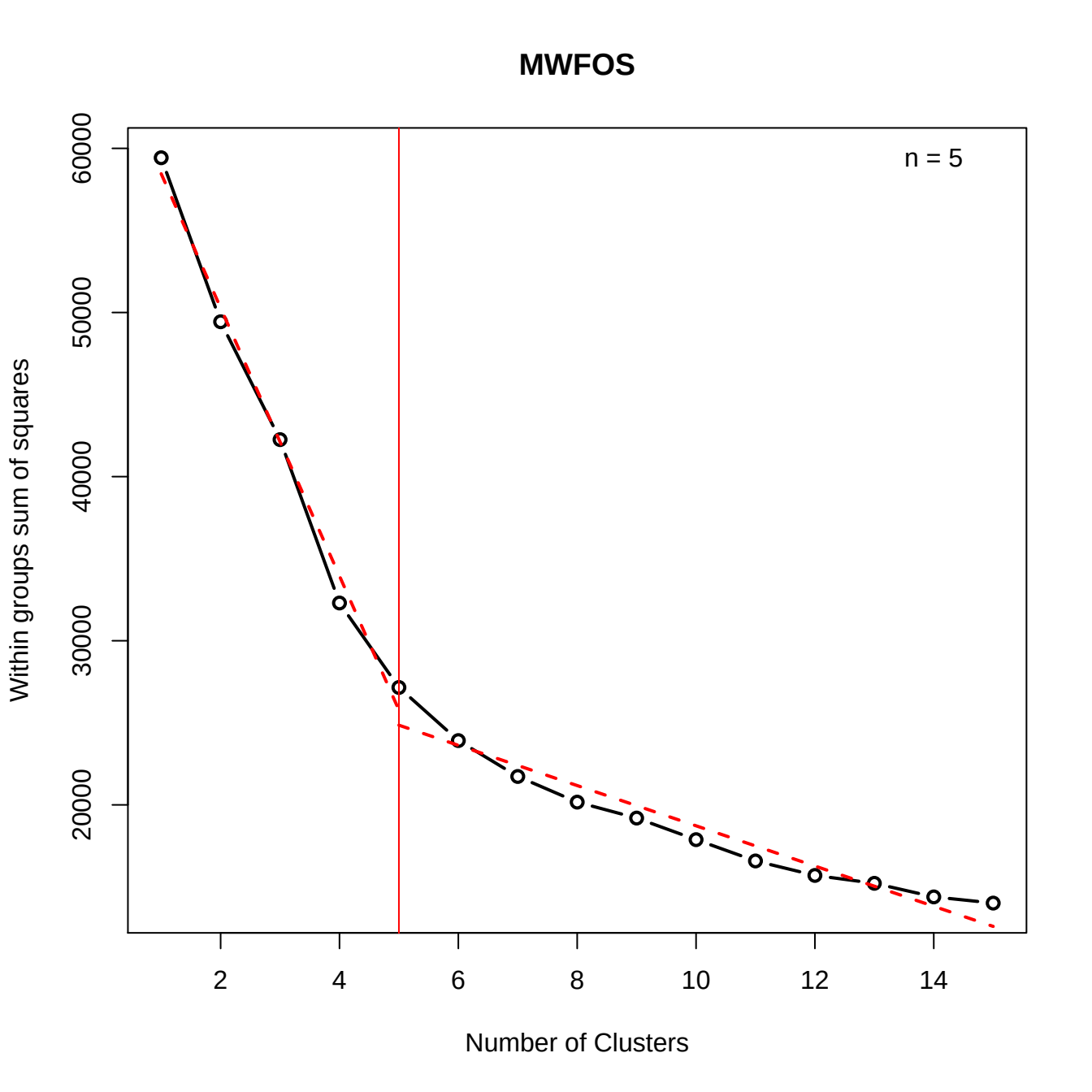

MICOS
n = 5
Within groups sum of squares
10000
15000
20000
25000
30000
35000
40000
45000
2
4
6
8
10
12
14
Number of Clusters


MPPOS
n = 4
Within groups sum of squares
50000
40000
30000
20000
2
4
6
8
10
12
14
Number of Clusters


MJPOS
n = 4
Within groups sum of squares
10000
15000
20000
25000
2
4
6
8
10
12
14
Number of Clusters


MLPOS
n = 5
Within groups sum of squares
2000
3000
4000
5000
6000
7000
8000
9000
2
4
6
8
10
12
14
Number of Clusters


MWF
n = 5
Within groups sum of squares
Number of Clusters
14000
12000
10000
8000
6000
4000
2
4
6
8
10
12
14


MWFOS
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Within groups sum of squares
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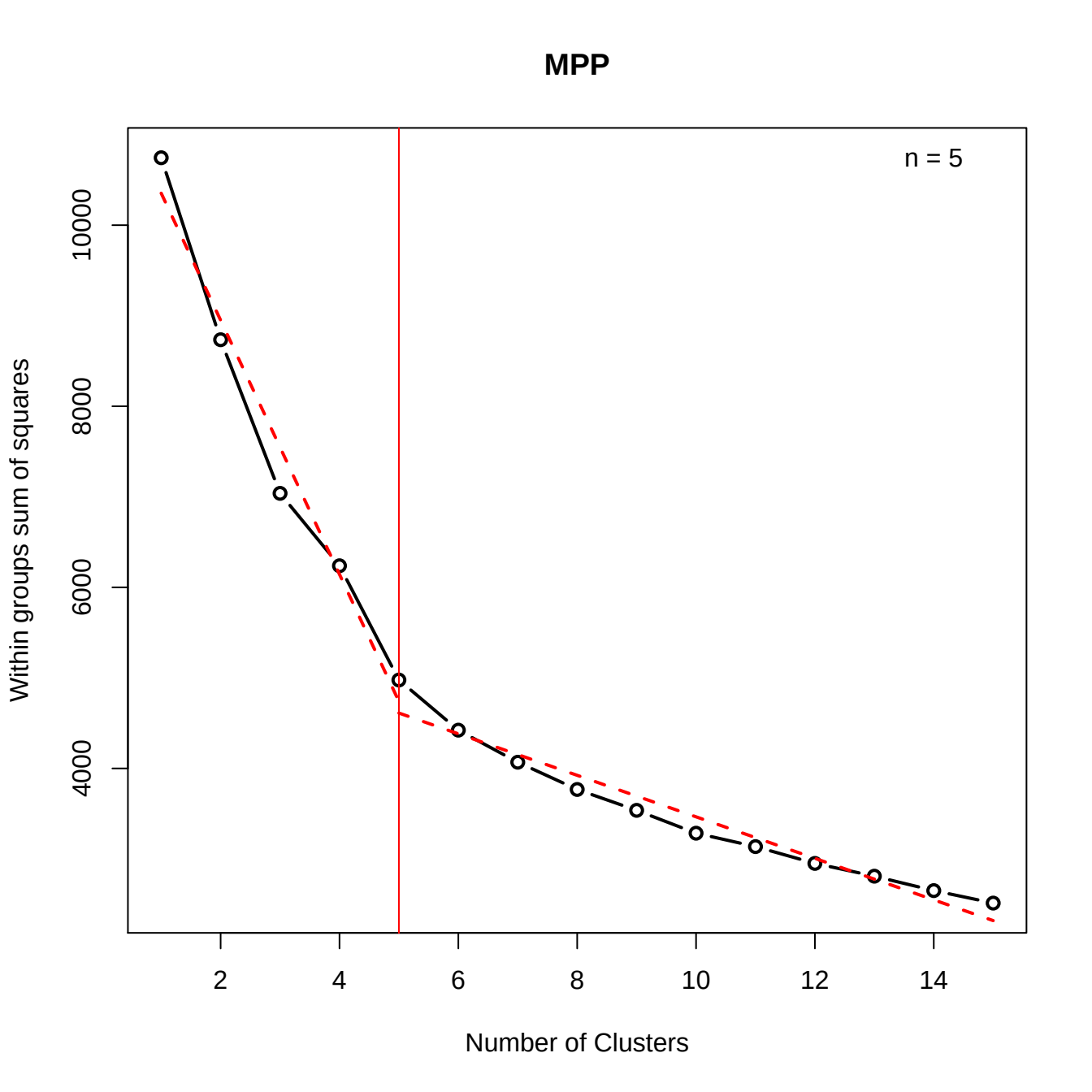
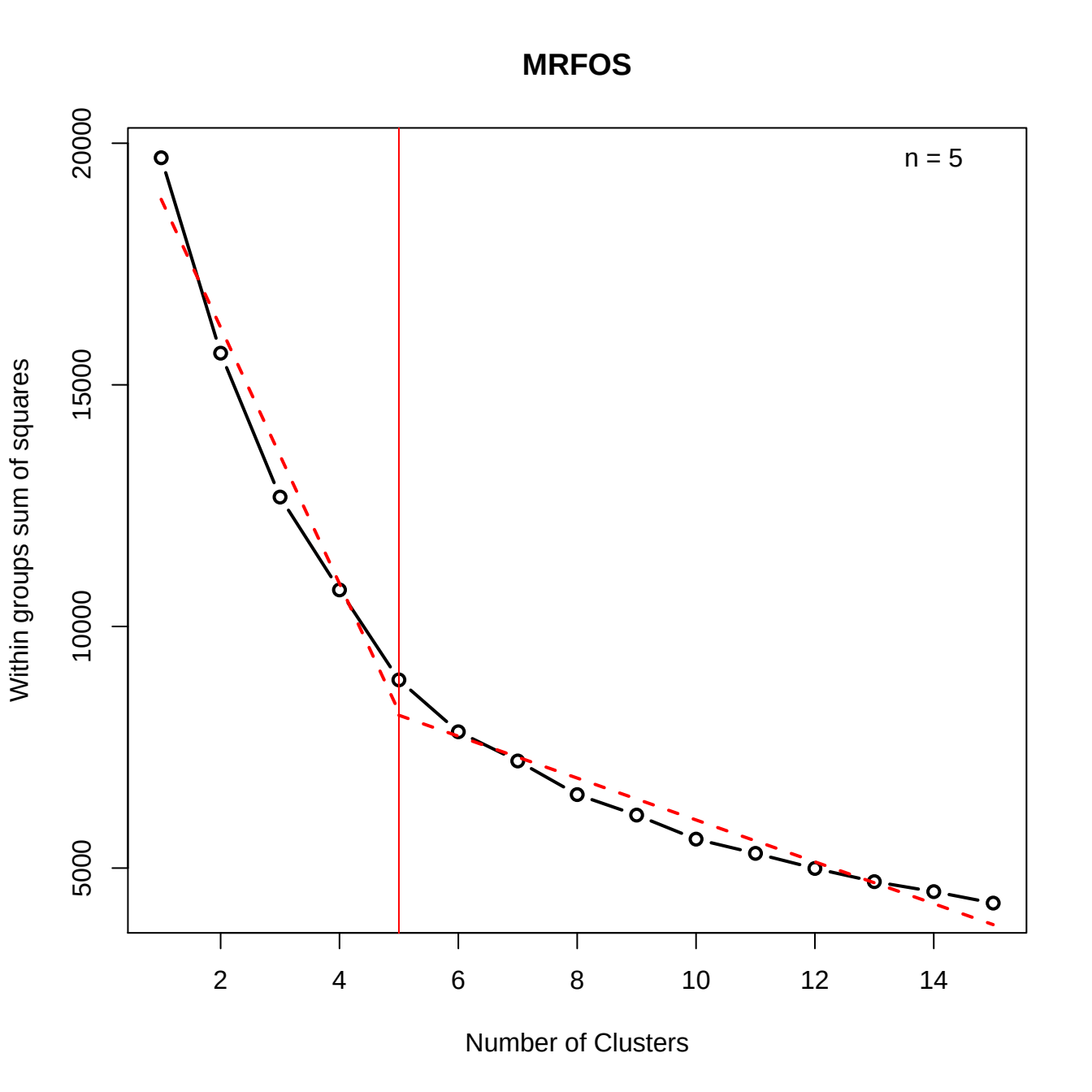
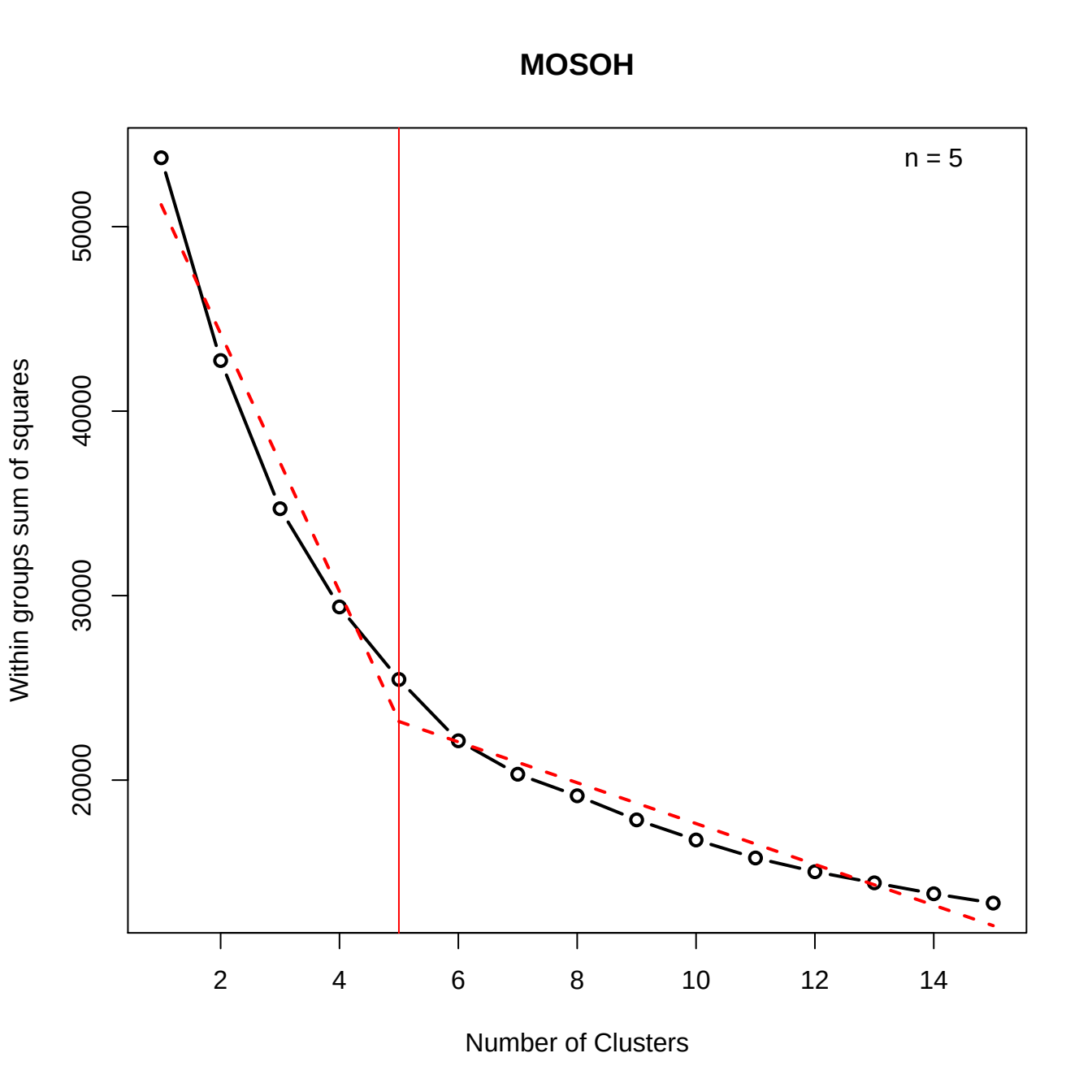
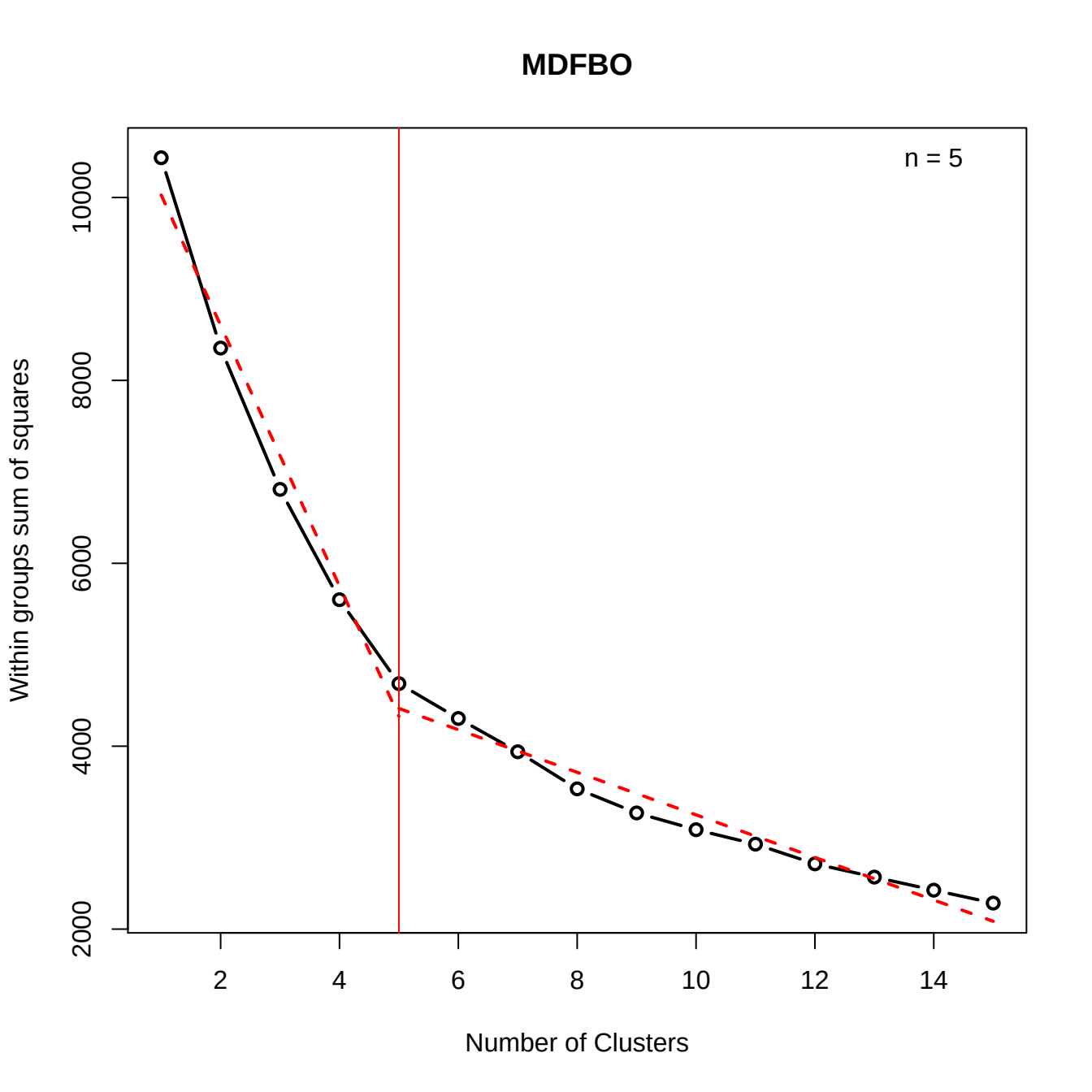
50000
40000
30000
20000
2
4
6
8
10
12
14
Number of Clusters


MPP
n = 5
Within groups sum of squares
10000
8000
6000
4000
2
4
6
8
10
12
14
Number of Clusters


MRFOS
n = 5
Within groups sum of squares
Number of Clusters
5000
10000
15000
20000
2
4
6
8
10
12
14


MOSOH
n = 5
Within groups sum of squares
20000
30000
40000
50000
2
4
6
8
10
12
14
Number of Clusters


MDFBO
n = 5
Within groups sum of squares
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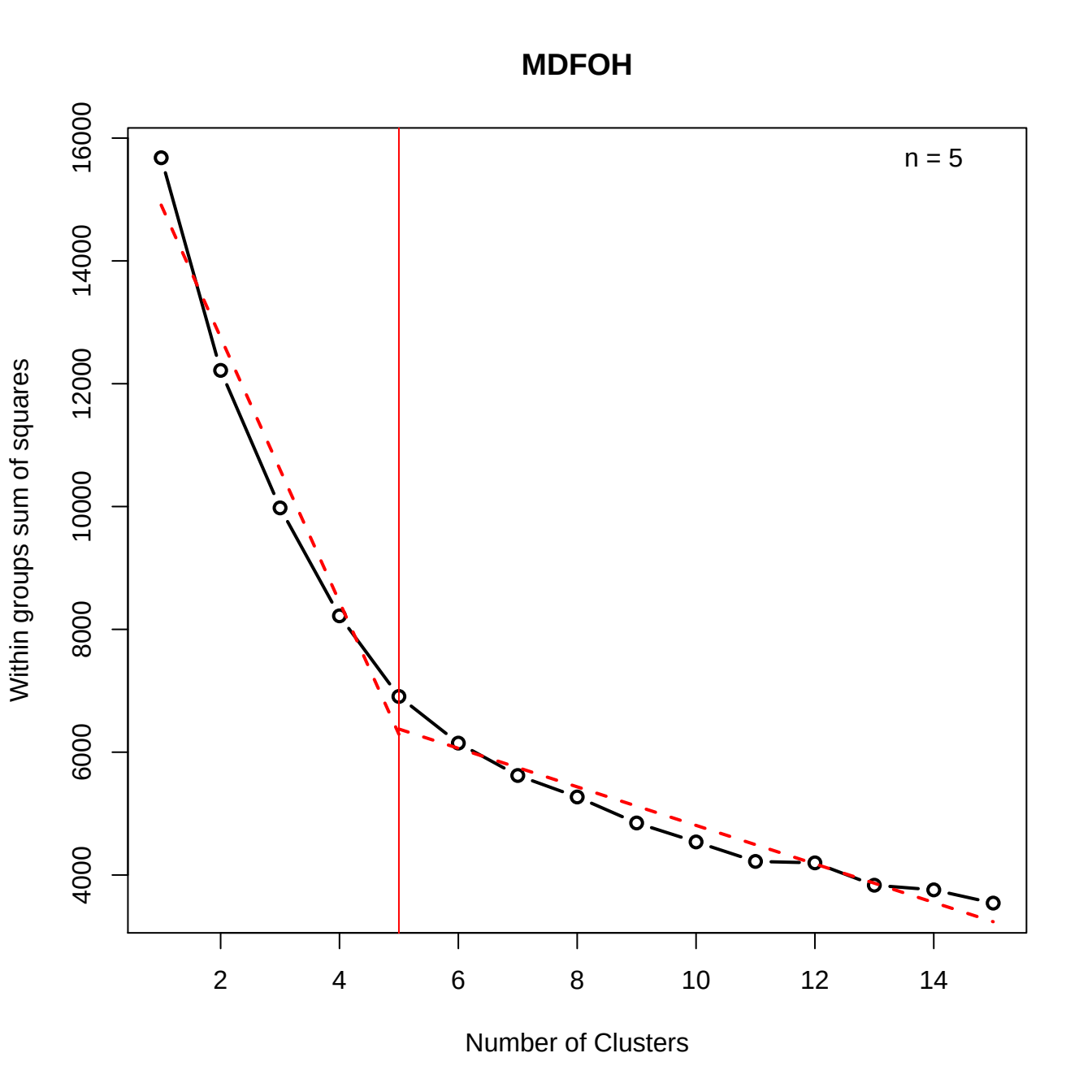
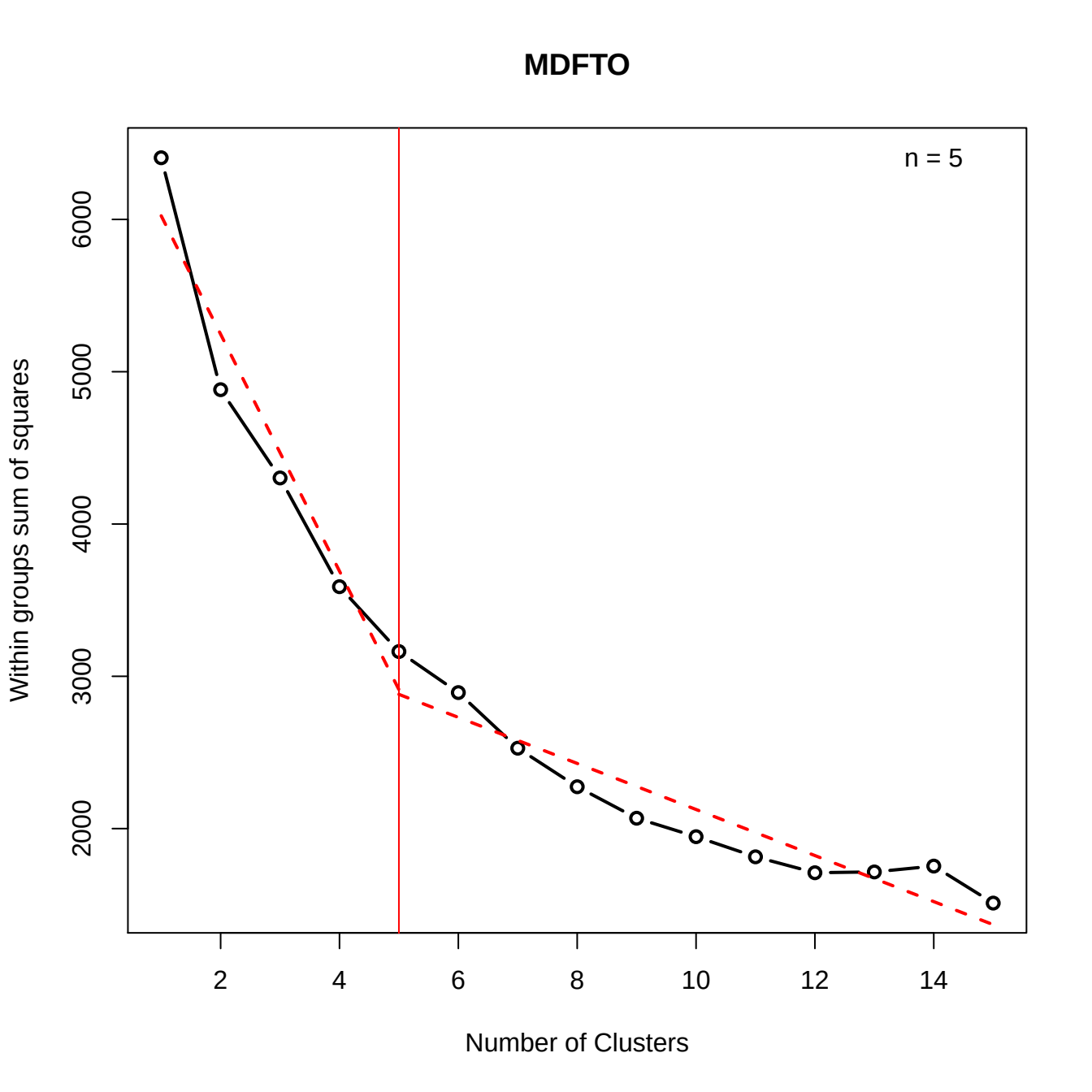
4000
6000
8000
10000
2
4
6
8
10
12
14
Number of Clusters


MDFOH
n = 5
Within groups sum of squares
16000
14000
12000
10000
8000
6000
4000
2
4
6
8
10
12
14
Number of Clusters


MDFTO
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Within groups sum of squares
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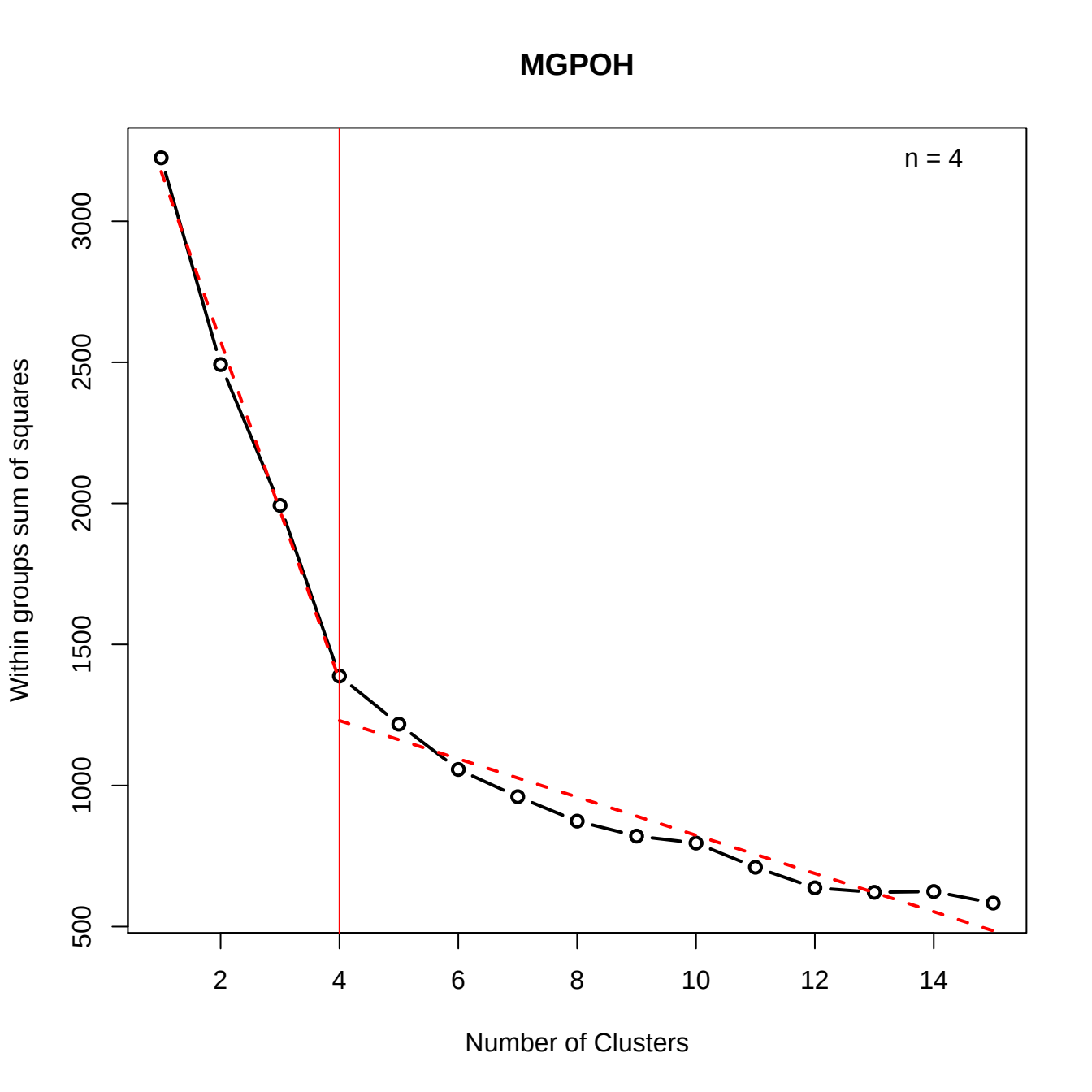
3000
4000
5000
6000
2
4
6
8
10
12
14
Number of Clusters


MGPOH
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Within groups sum of squares
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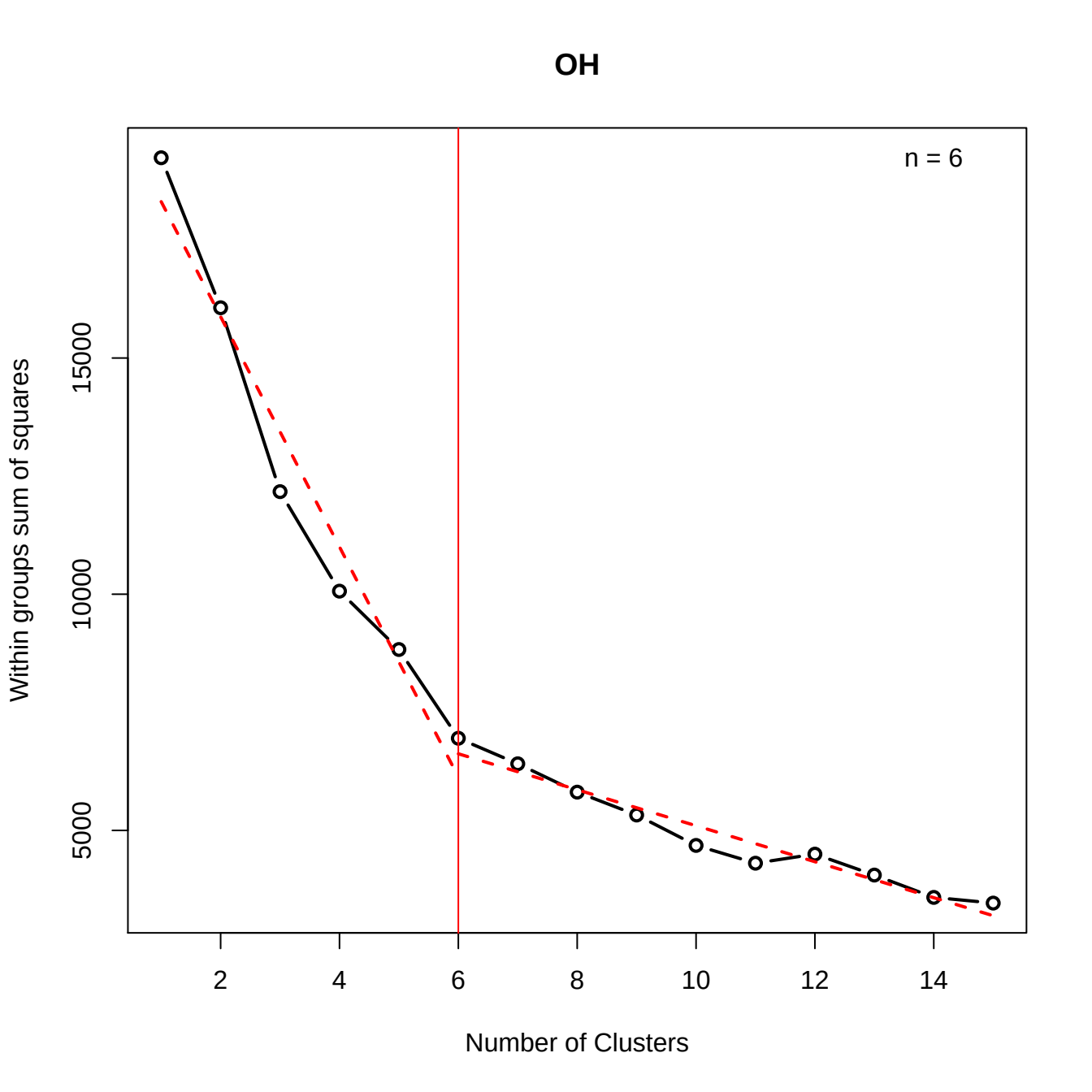
1000
1500
2000
2500
3000
2
4
6
8
10
12
14
Number of Clusters


OH
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Within groups sum of squares
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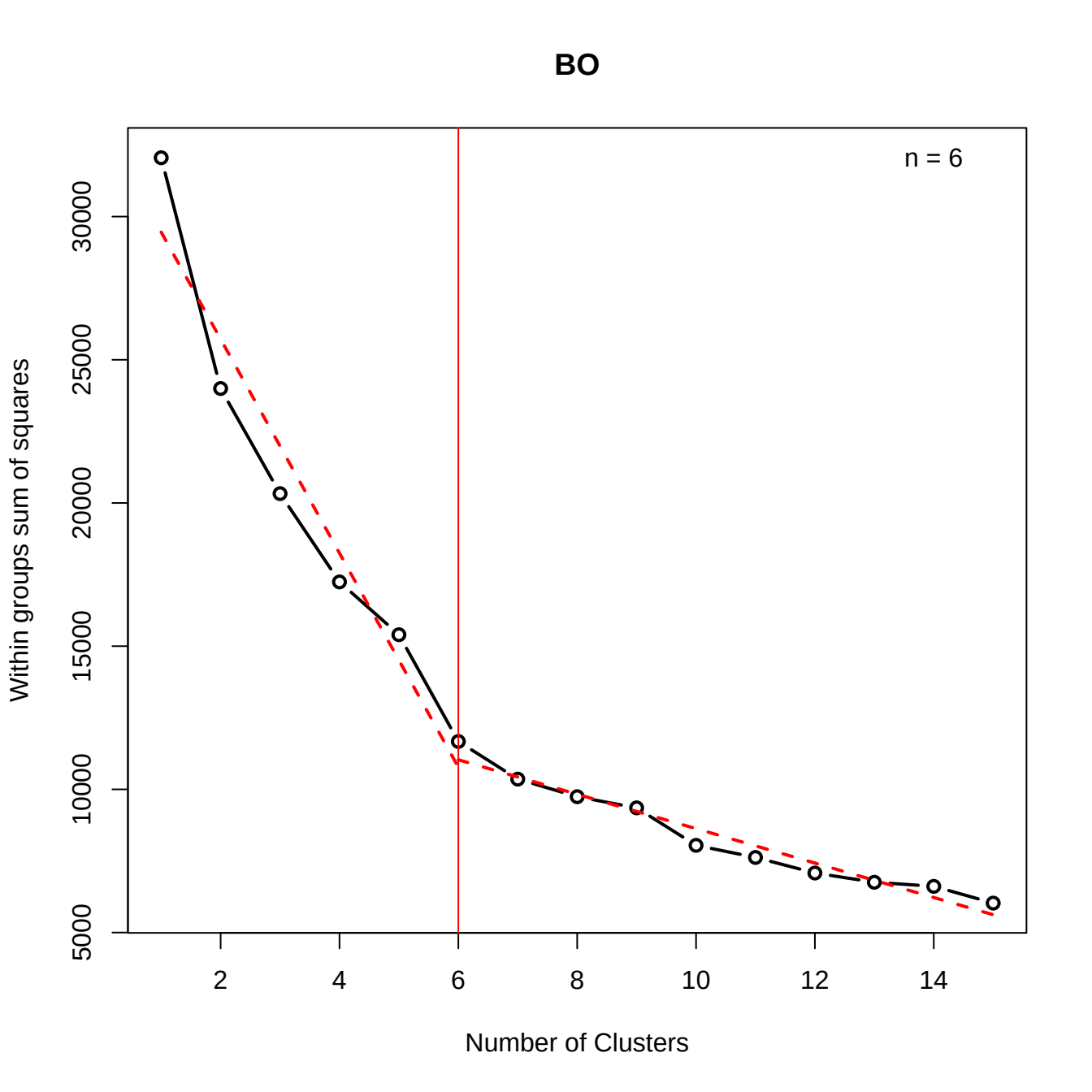
10000
15000
2
4
6
8
10
12
14
Number of Clusters


BO
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Within groups sum of squares
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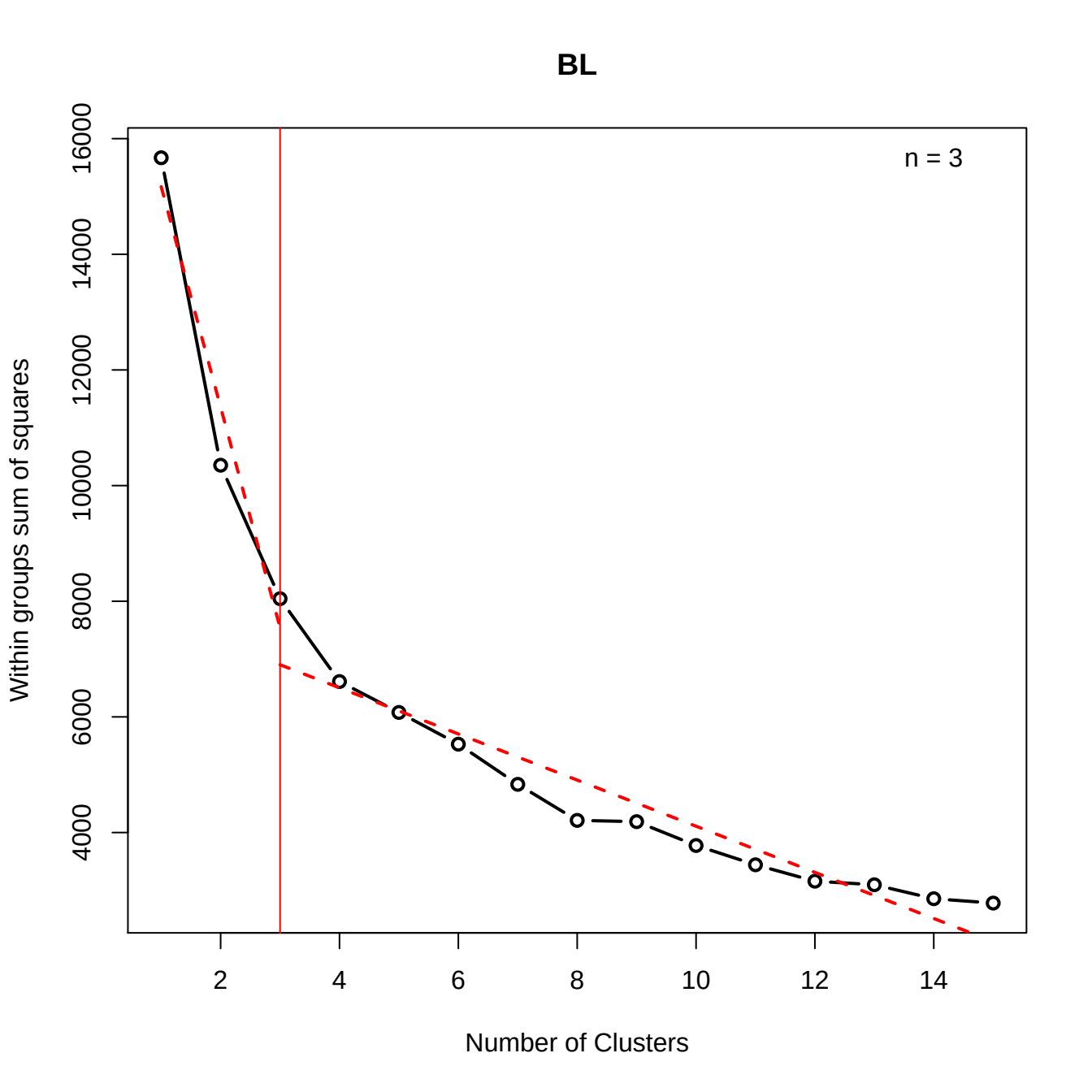
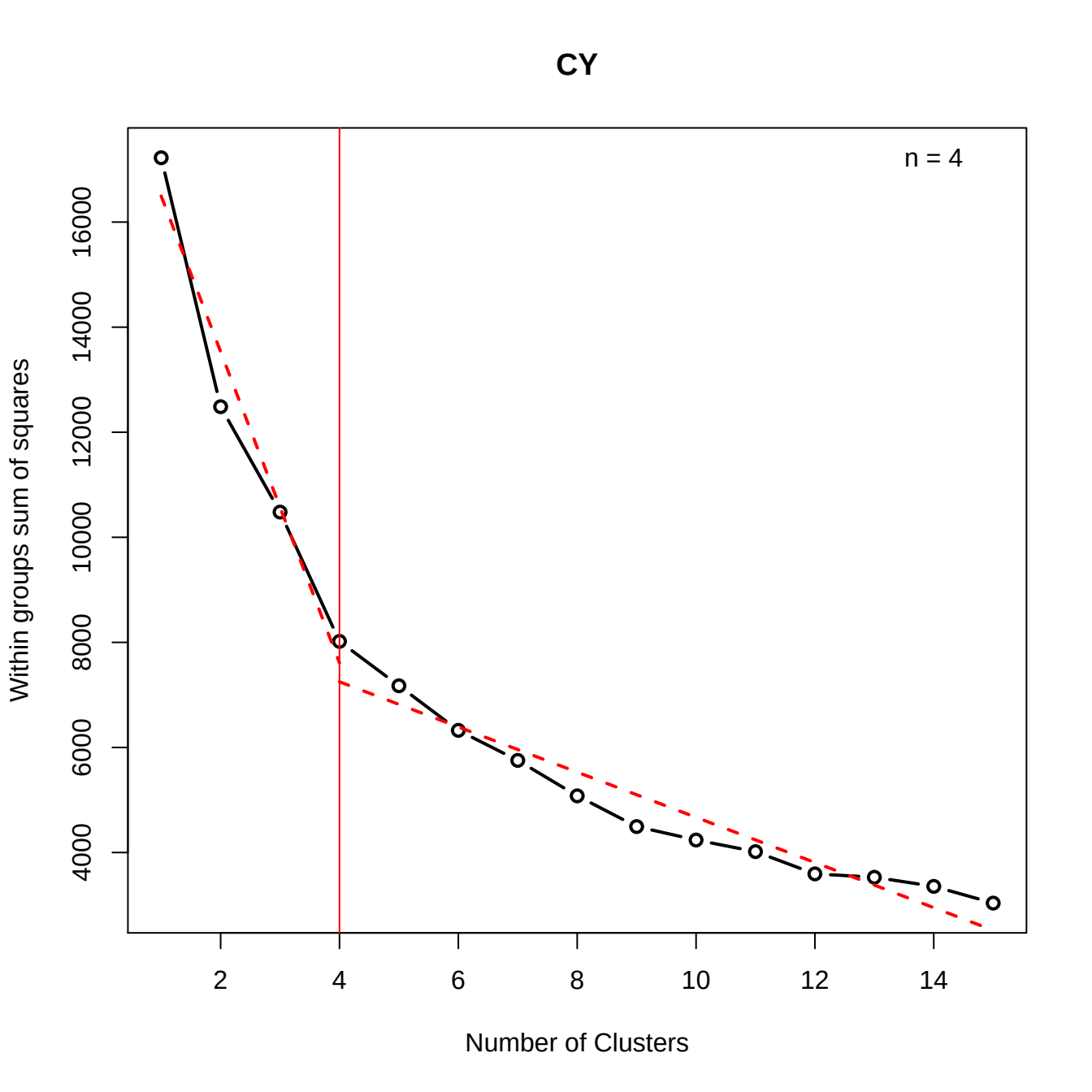
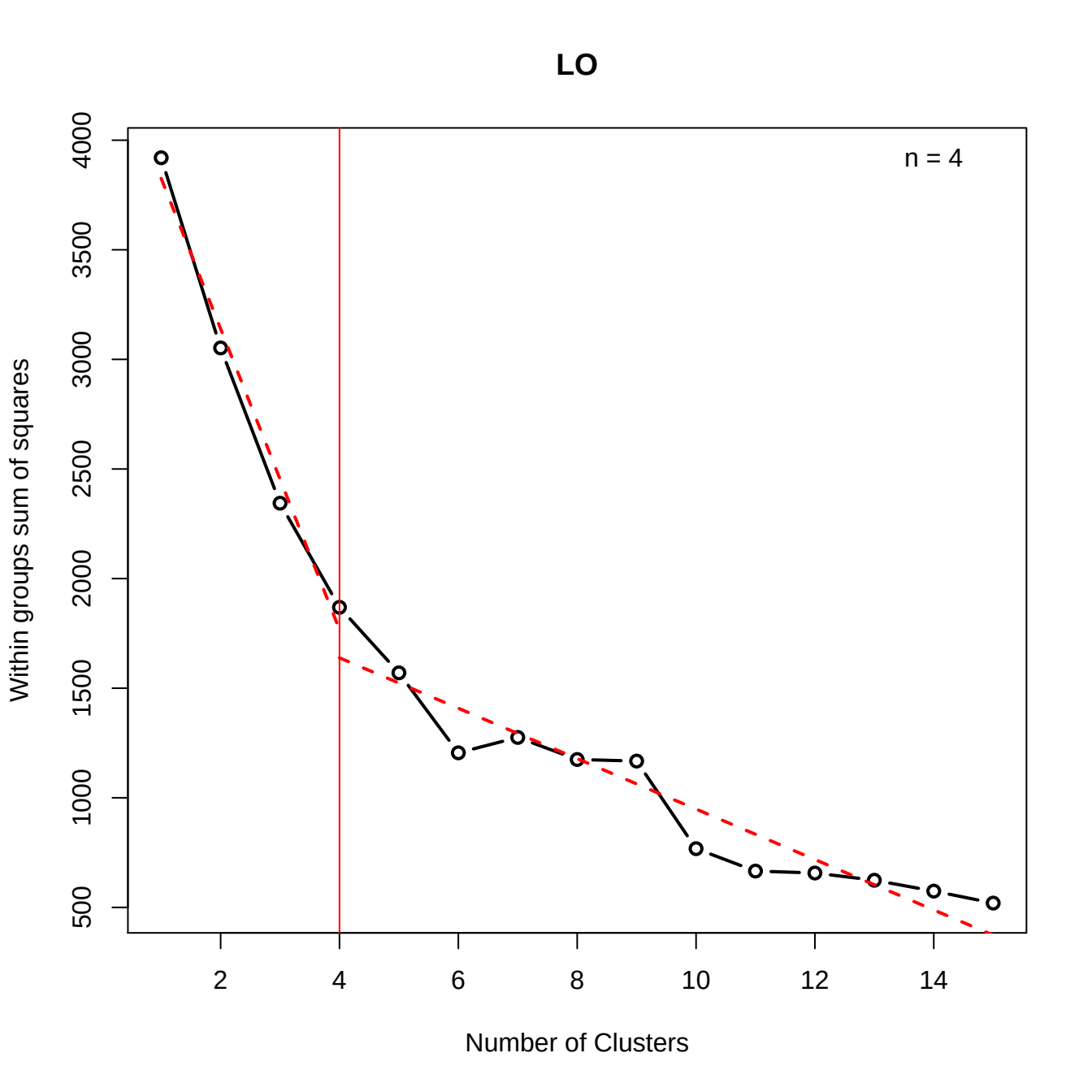
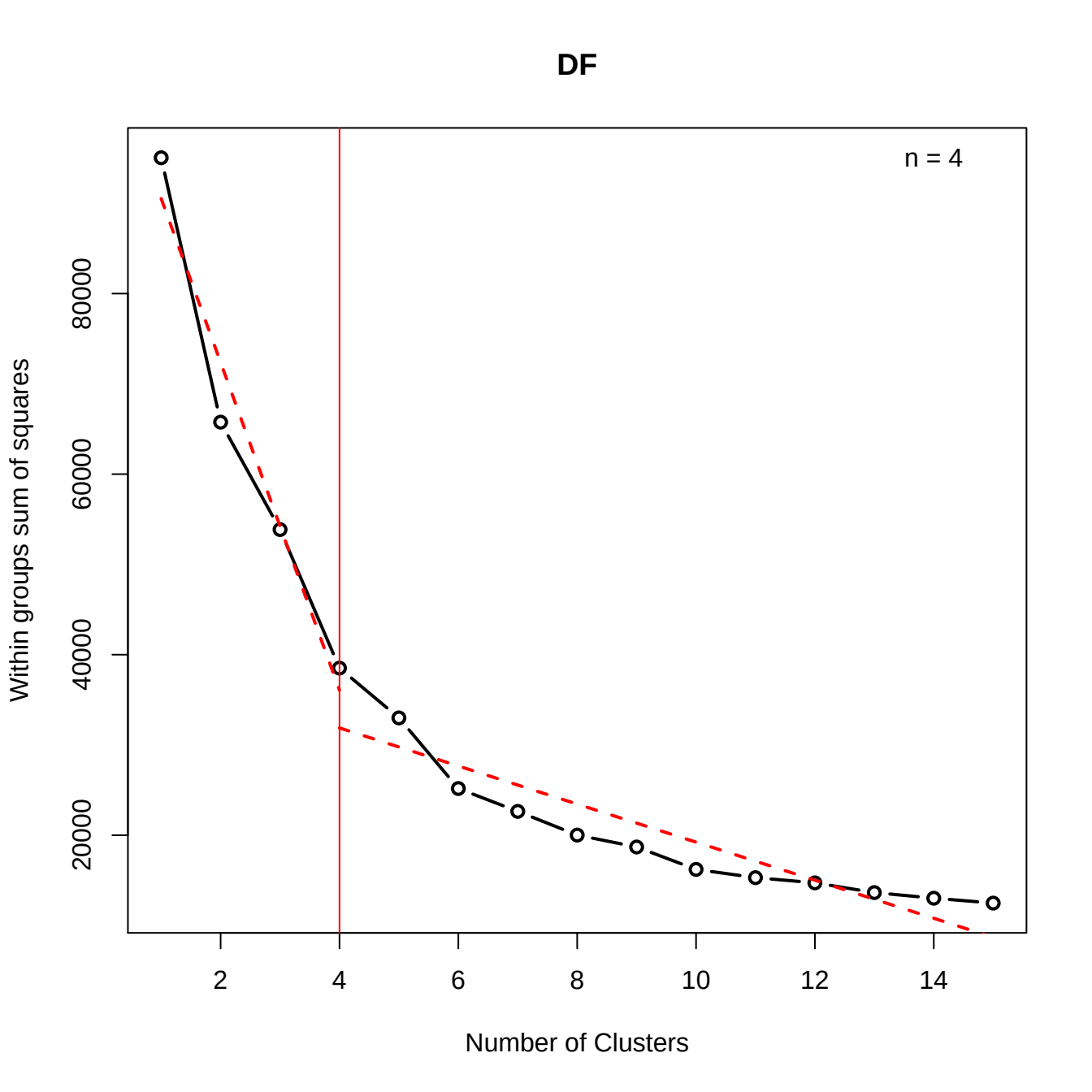
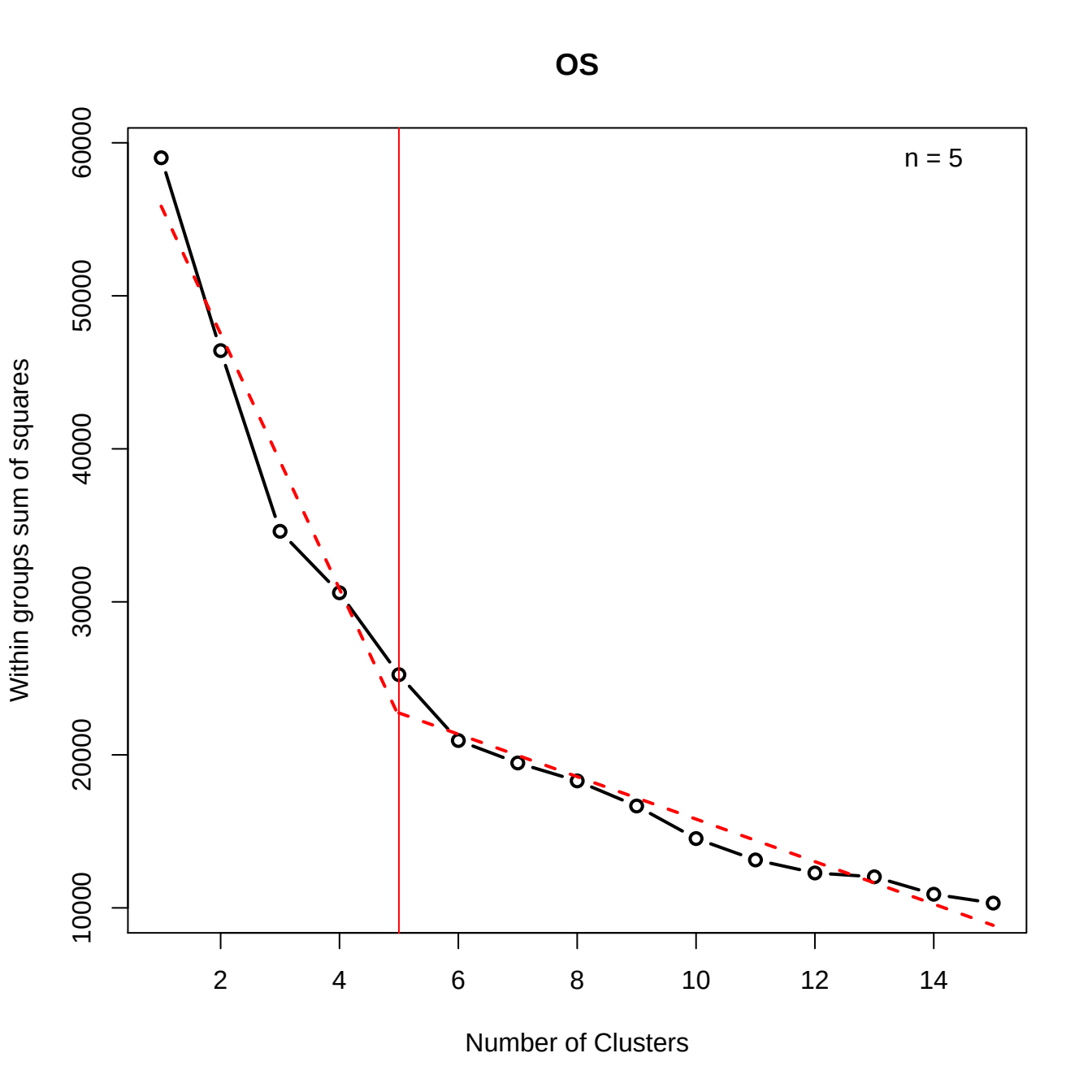
10000
15000
20000
25000
30000
2
4
6
8
10
12
14
Number of Clusters

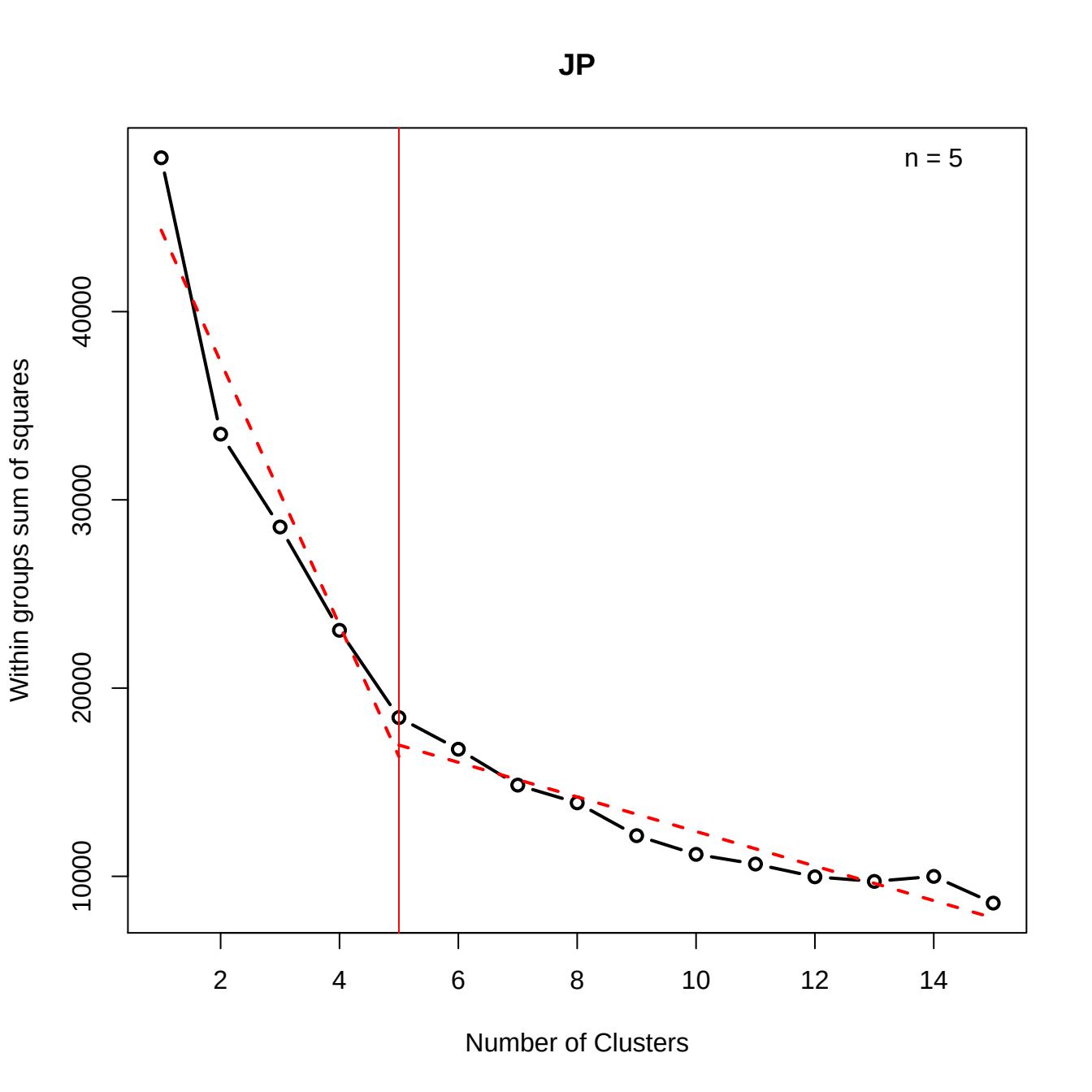

BL
n = 3
Within groups sum of squares
4000
6000
8000
10000
12000
14000
16000
2
4
6
8
10
12
14
Number of Clusters

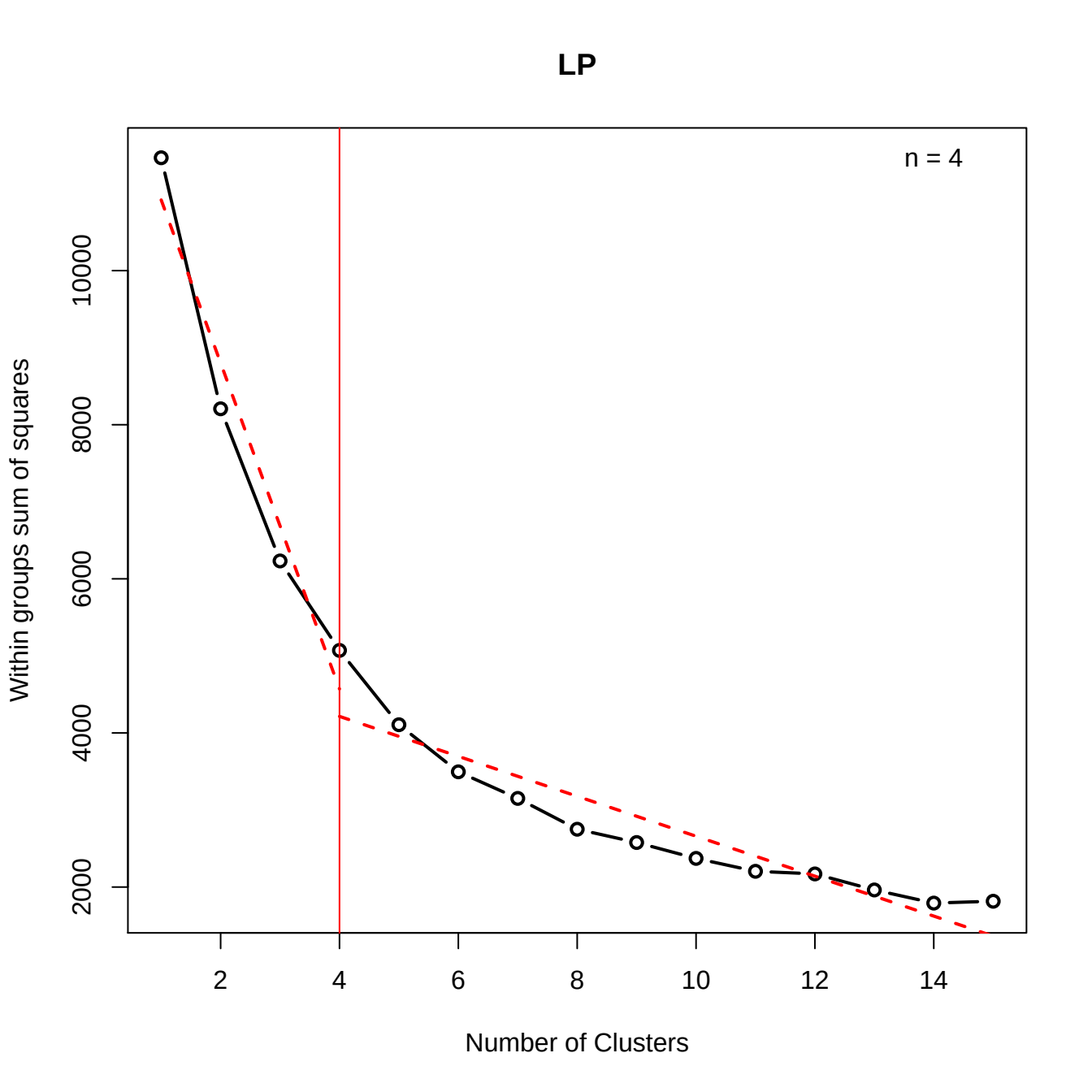

CY
n = 4
Within groups sum of squares
4000
6000
8000
10000
12000
14000
16000
2
4
6
8
10
12
14
Number of Clusters

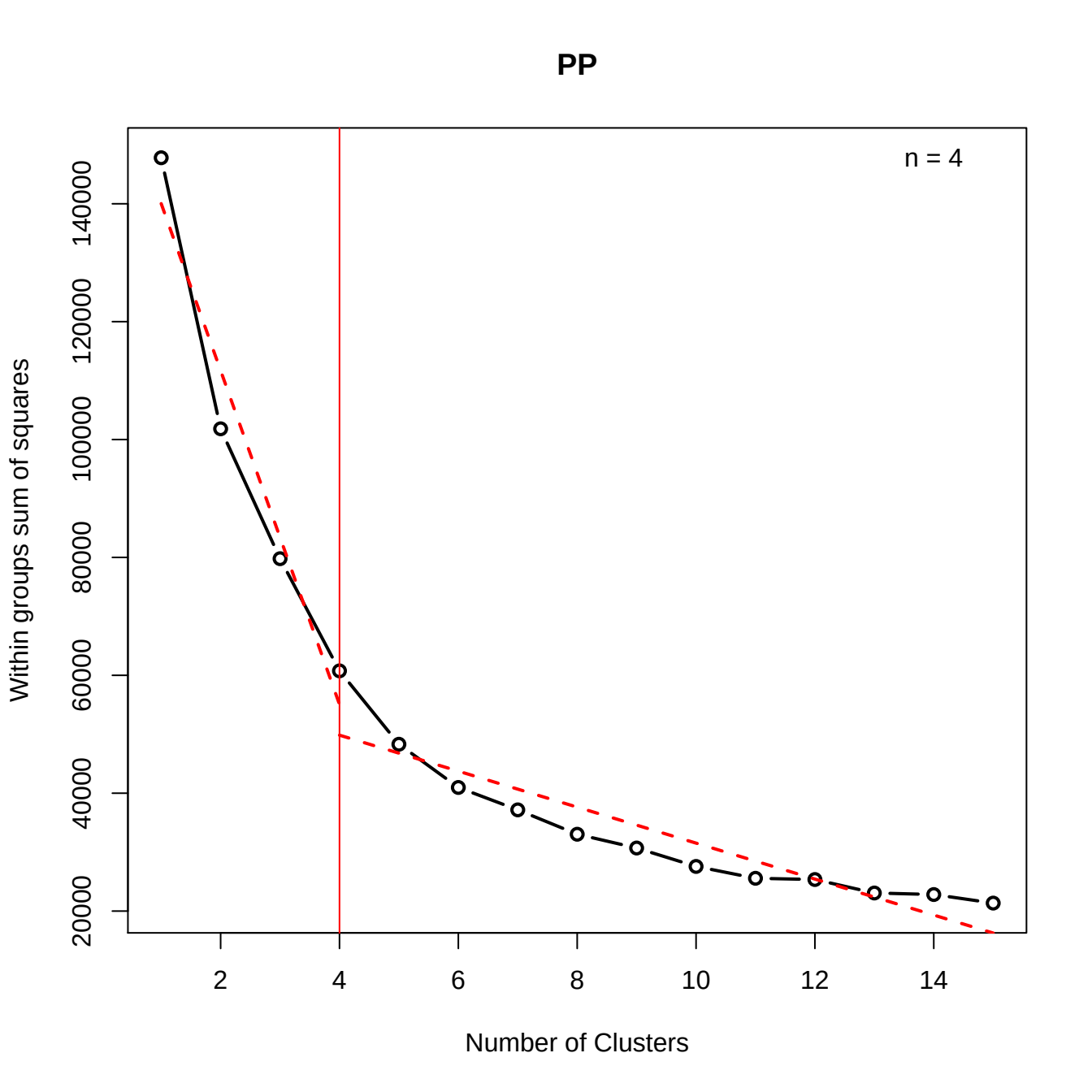

LO
n = 4
Within groups sum of squares
500
1000
1500
2000
2500
3000
3500
4000
2
4
6
8
10
12
14
Number of Clusters

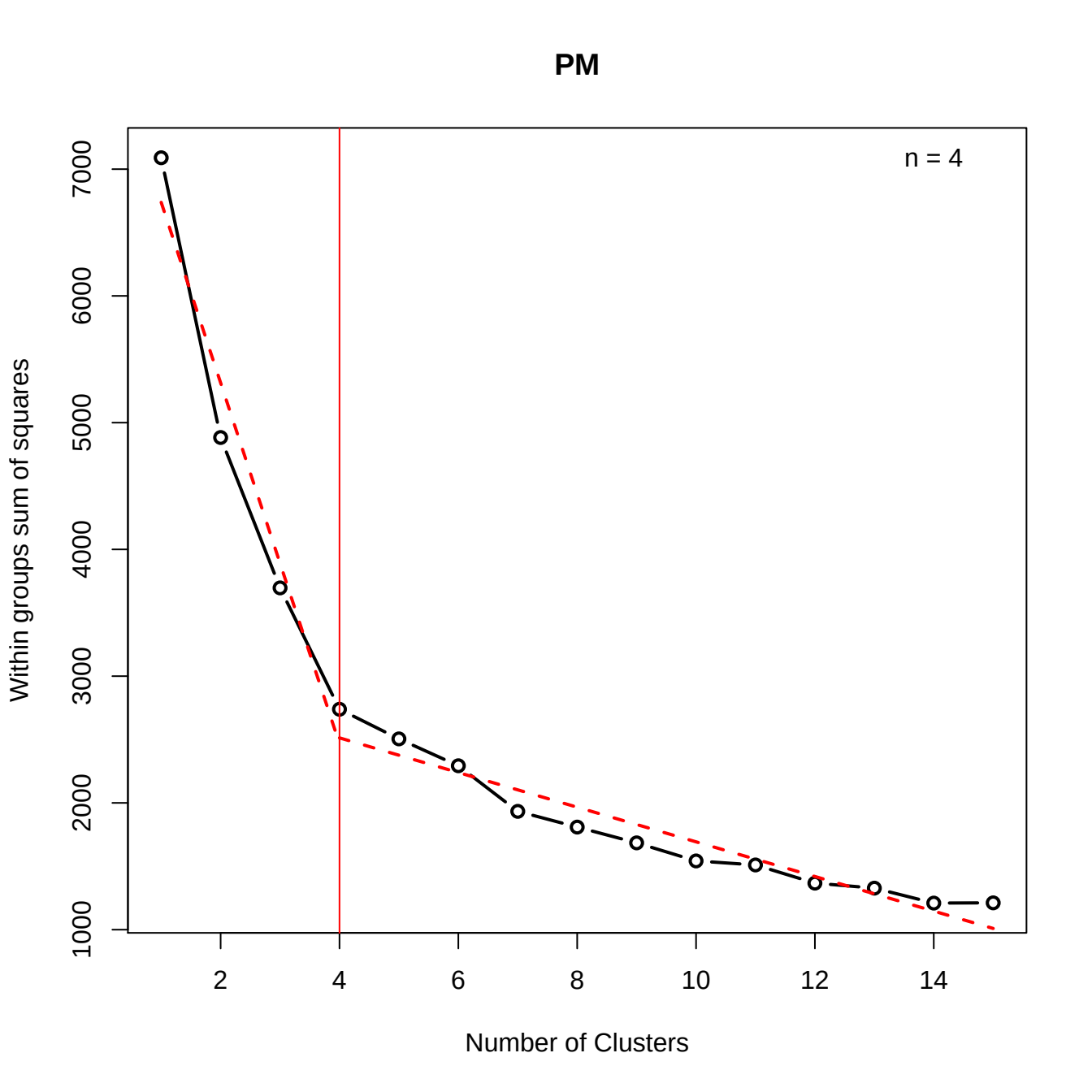

DF
n = 4
Within groups sum of squares
20000
40000
60000
80000
2
4
6
8
10
12
14
Number of Clusters

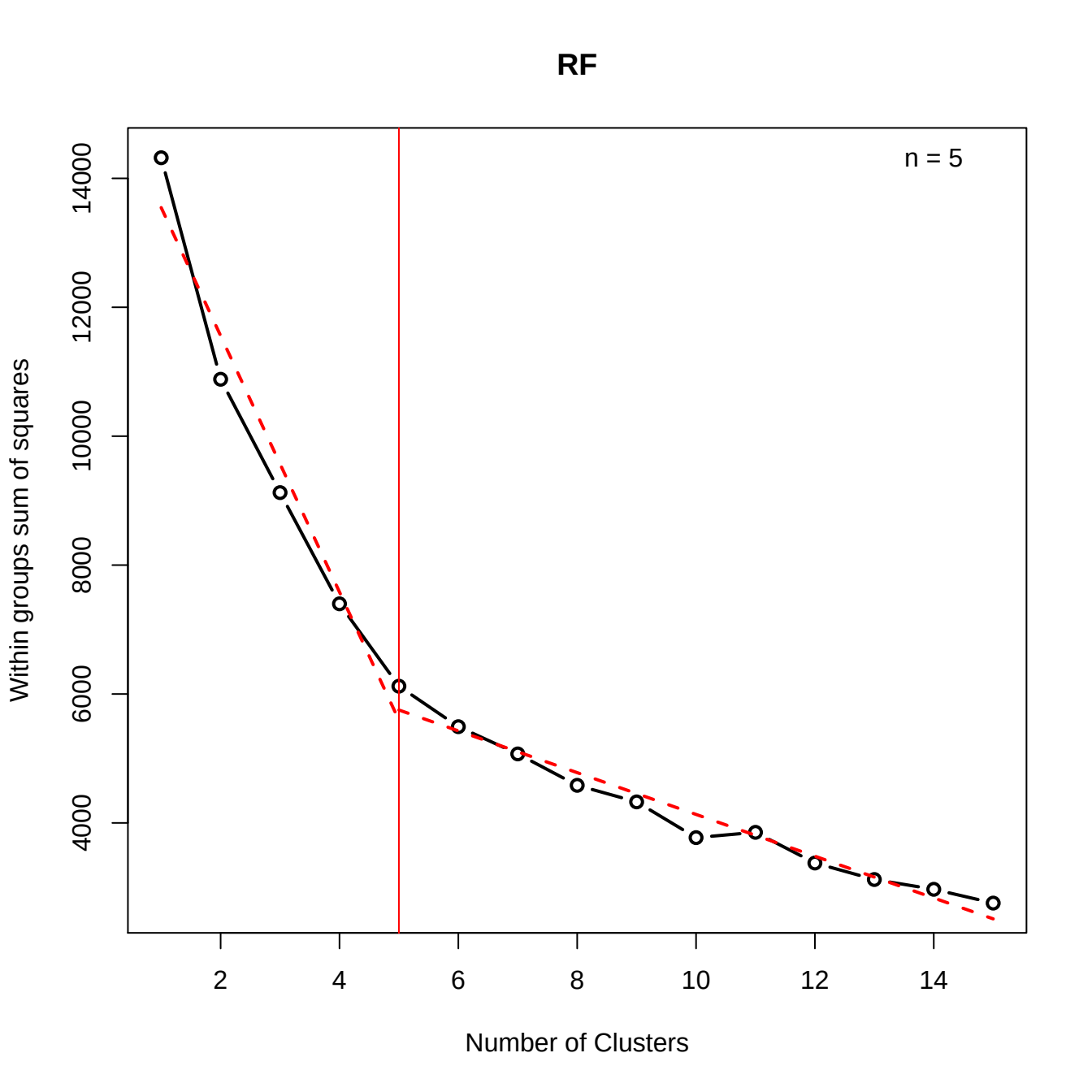

OS
n = 5
Within groups sum of squares
10000
20000
30000
40000
50000
60000
2
4
6
8
10
12
14
Number of Clusters

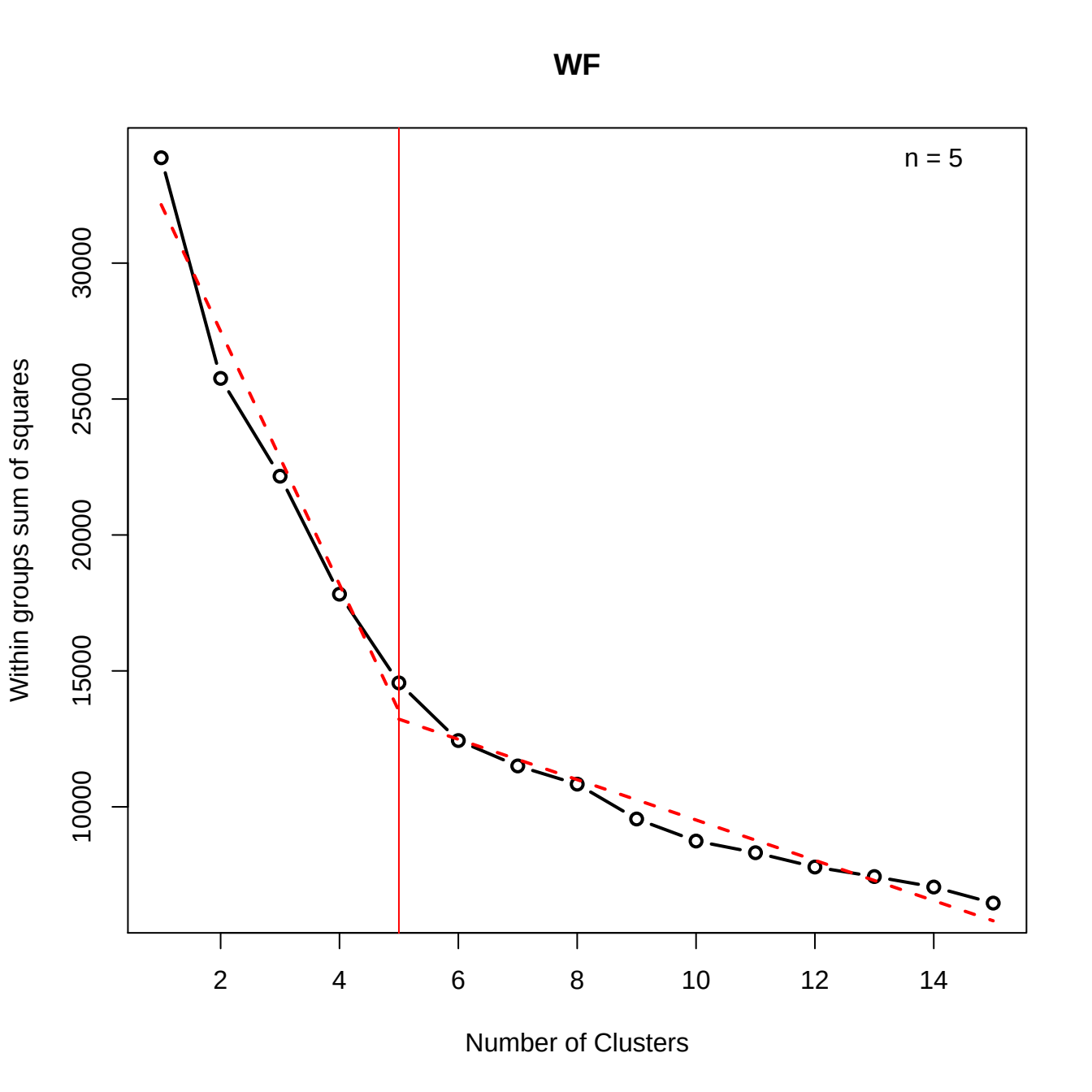

JP
n = 5
Within groups sum of squares
10000
20000
30000
40000
2
4
6
8
10
12
14
Number of Clusters

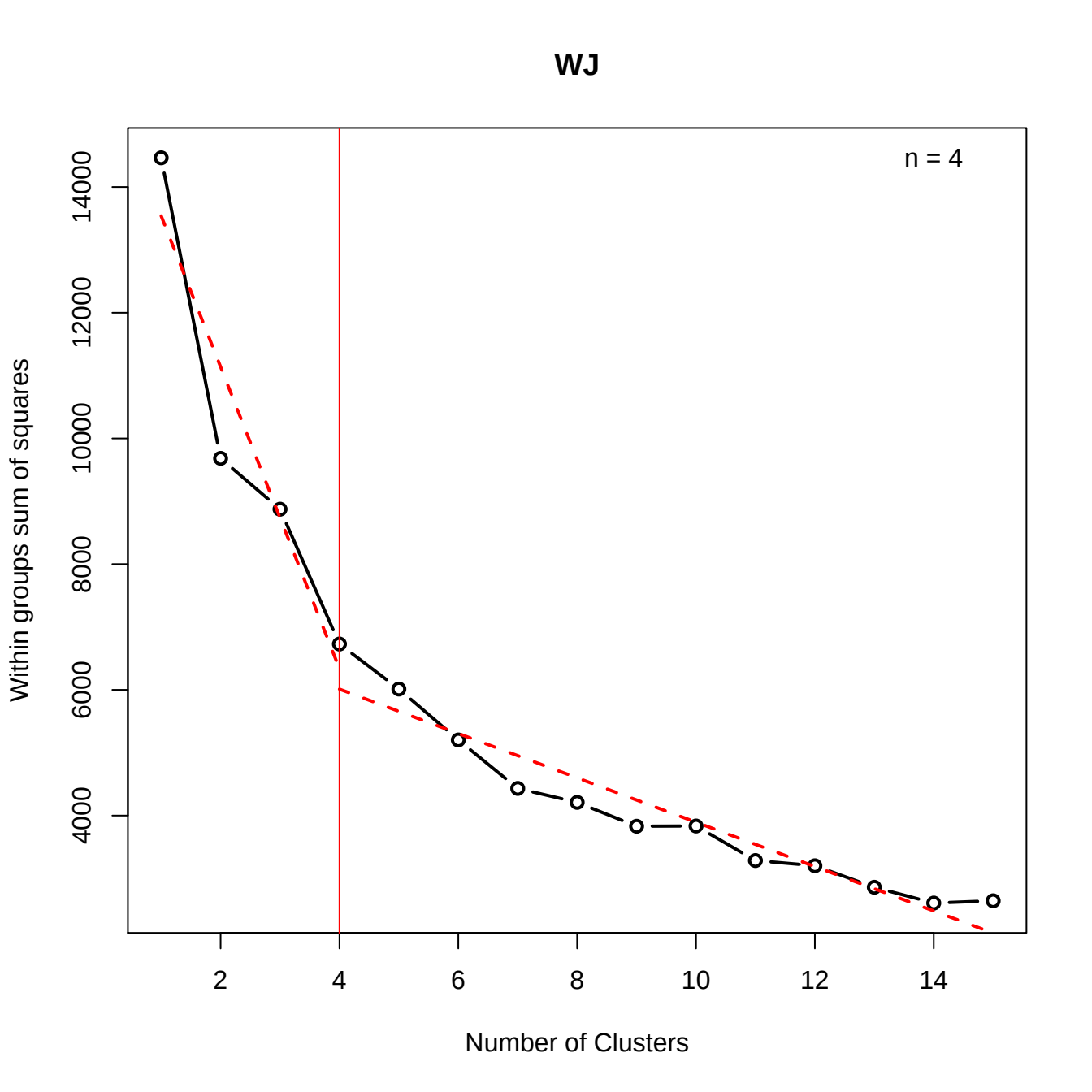

LP
n = 4
Within groups sum of squares
2000
4000
6000
8000
10000
2
4
6
8
10
12
14
Number of Clusters


PP
n = 4
Within groups sum of squares
20000
40000
60000
80000
100000
120000
140000
2
4
6
8
10
12
14
Number of Clusters


PM
n = 4
Within groups sum of squares
1000
2000
3000
4000
5000
6000
7000
2
4
6
8
10
12
14
Number of Clusters


RF
n = 5
Within groups sum of squares
4000
6000
8000
10000
12000
14000
2
4
6
8
10
12
14
Number of Clusters


WF
n = 5
Within groups sum of squares
10000
15000
20000
25000
30000
2
4
6
8
10
12
14
Number of Clusters

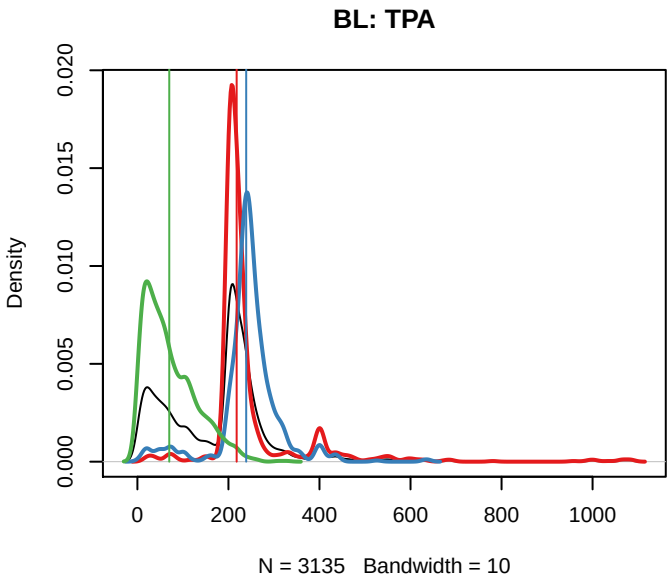

WJ
n = 4
Within groups sum of squares
4000
6000
8000
10000
12000
14000
2
4
6
8
10
12
14
Number of Clusters

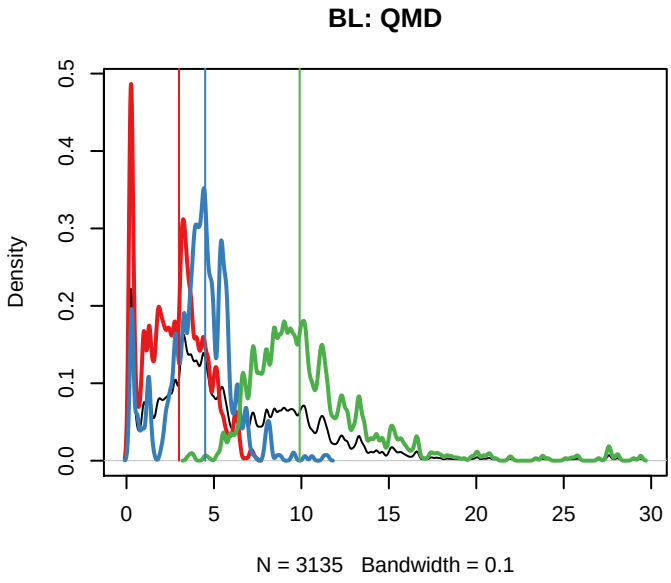
4. Grouping Density Plots

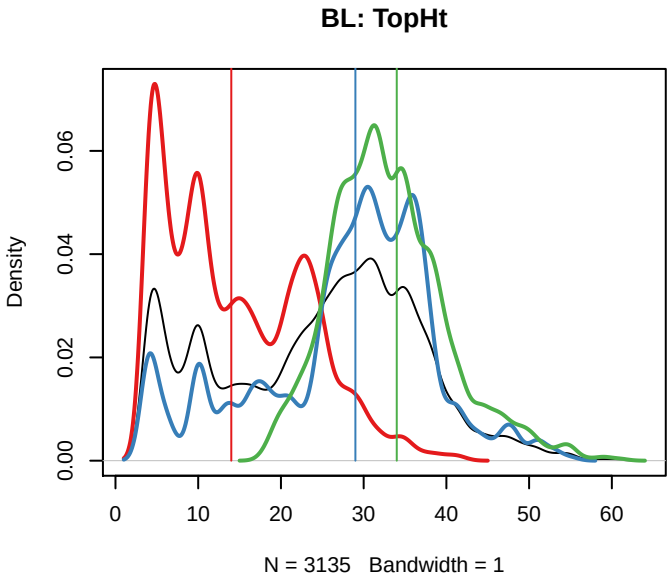
The following are the grouping density plots for the 177 representative stands.

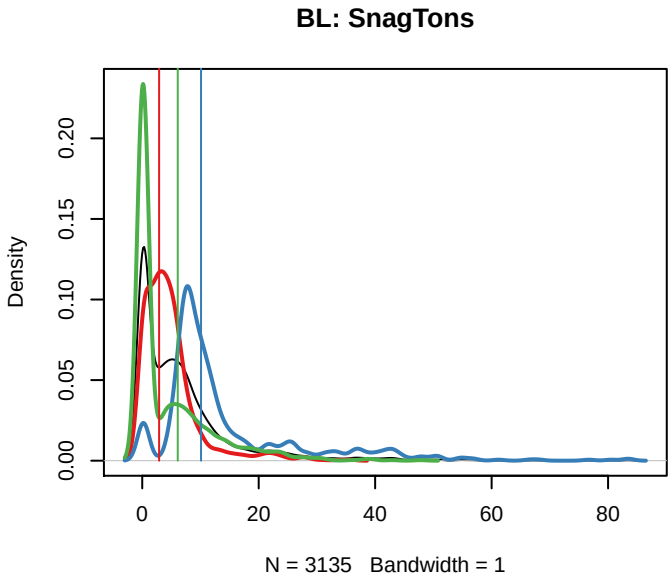


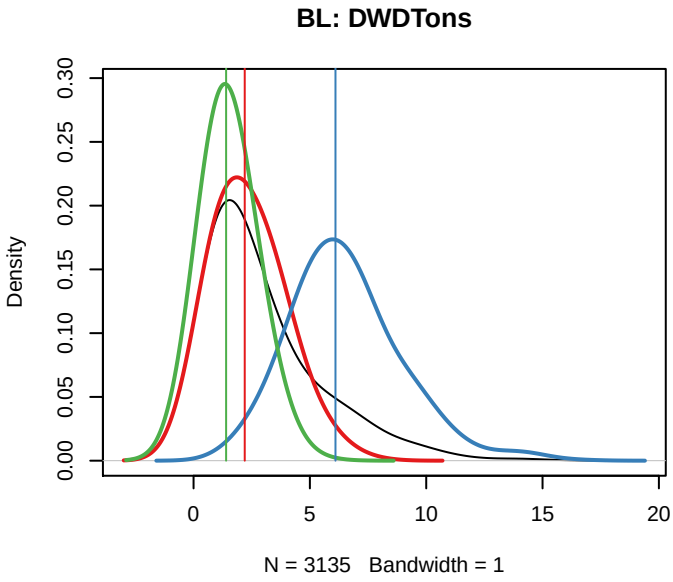
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	331948	247	2.7	15	5	2
2	39116	244	4.1	28	14	7
3	2366676	72	10.5	33	4	2
	2737740	(7.3%)				





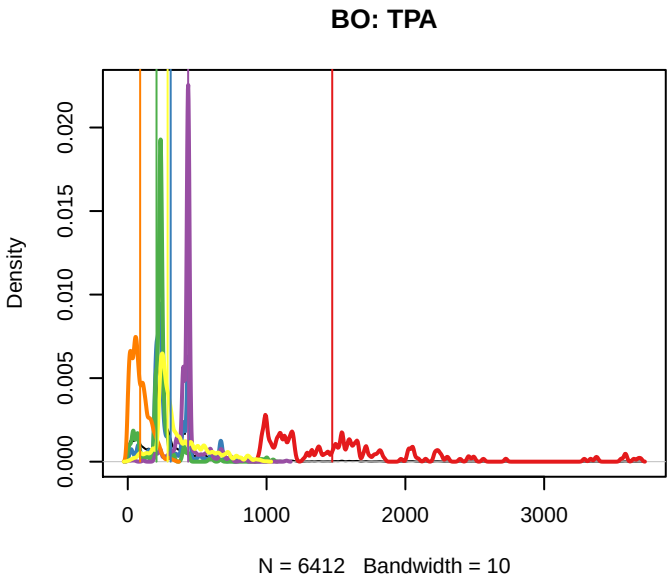


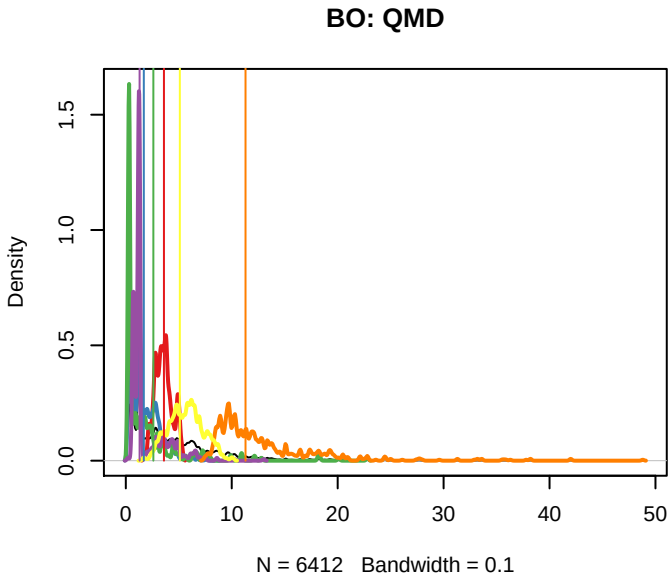


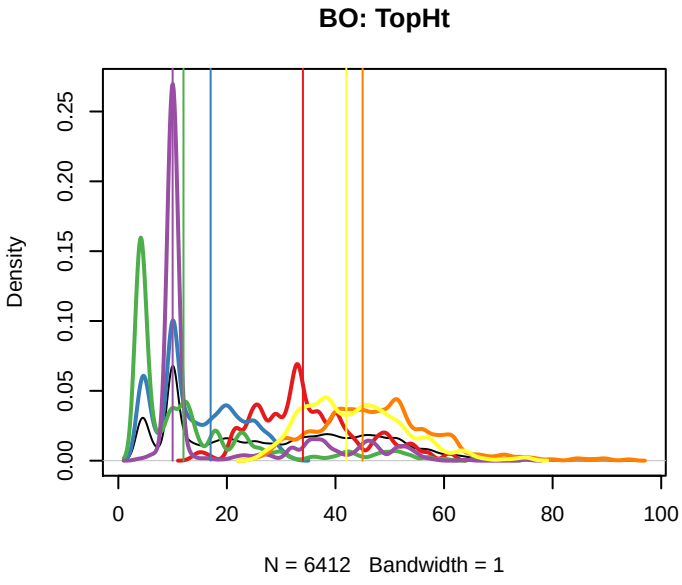


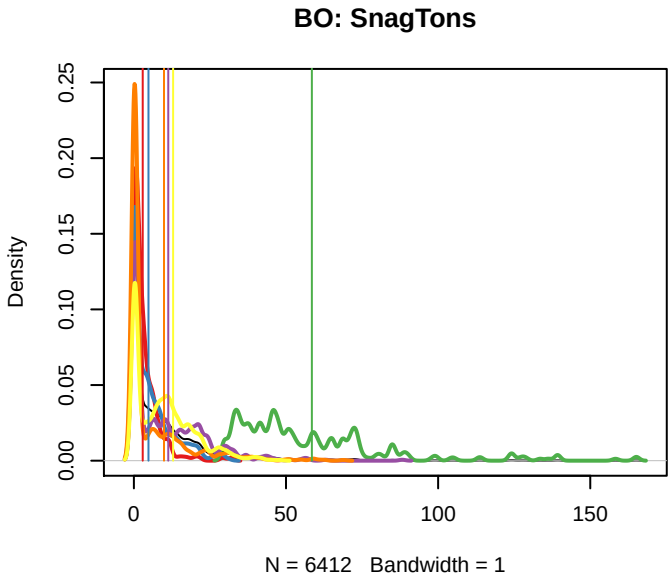


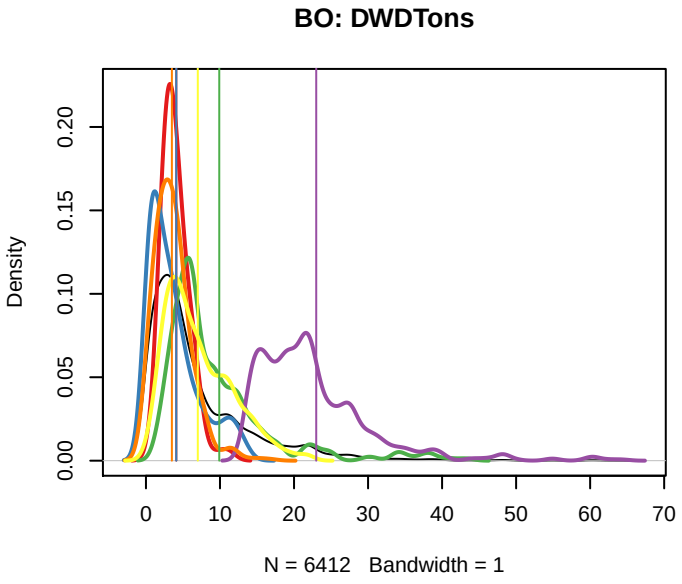
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	105885	1558	3.6	35	3	4
2	223812	308	1.8	14	5	4
3	7289	233	2.1	14	57	9
4	14997	435	2	19	11	23
5	814842	87	12.9	48	6	4
6	476716	359	5.7	44	10	7
	1643540	(4.4%)				





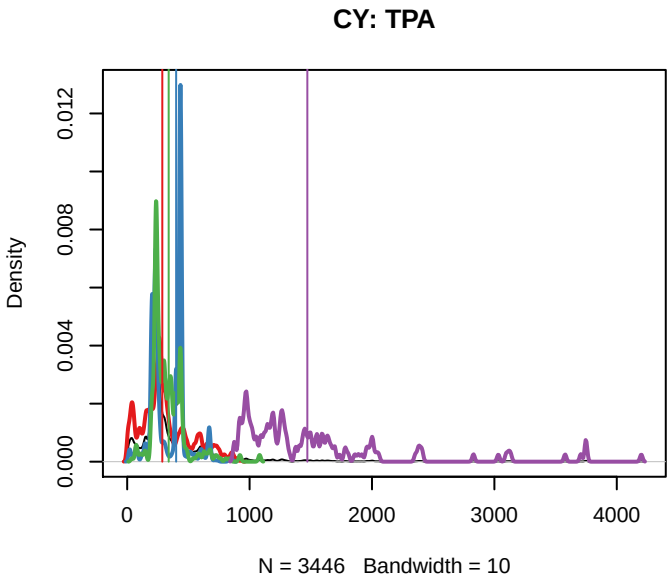


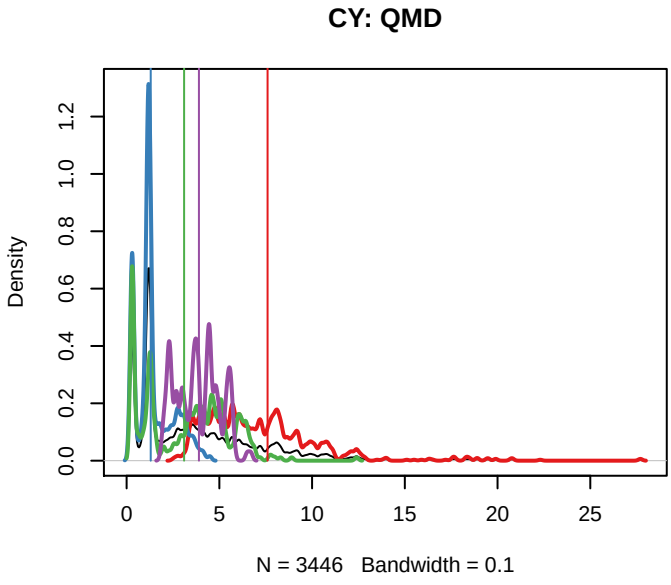


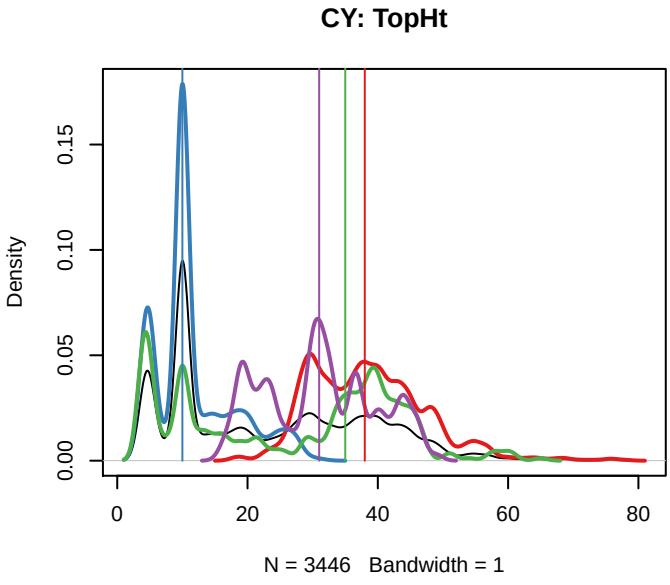


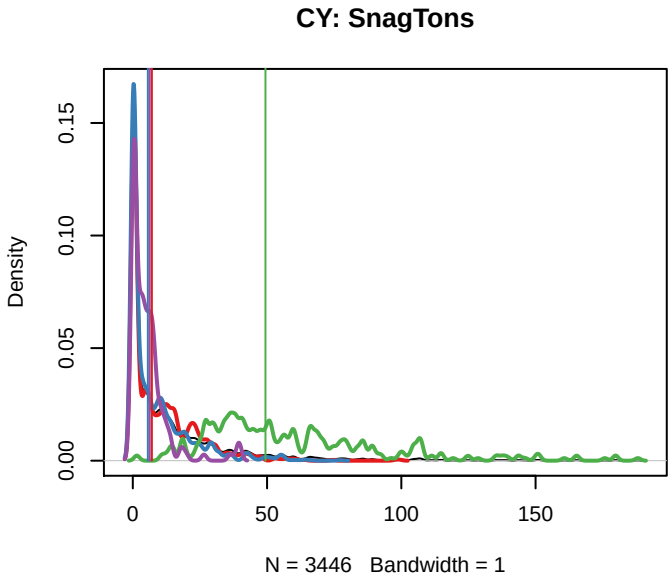


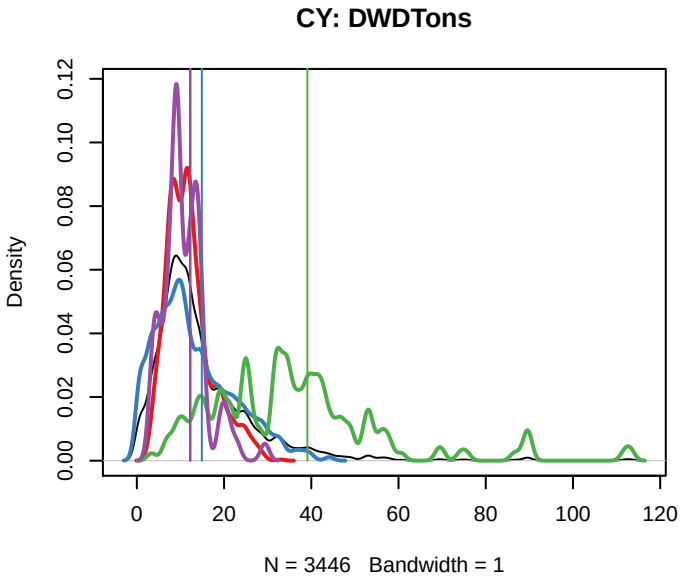
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	441509	313	7.1	38	10	12
2	73031	338	1.5	12	8	13
3	12049	330	3.2	26	60	36
4	67430	1508	3.9	31	5	11
	594020	(1.6%)				





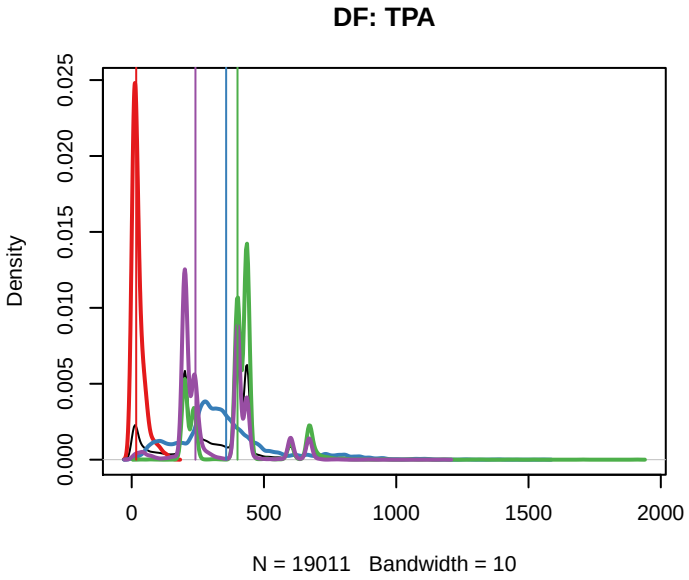


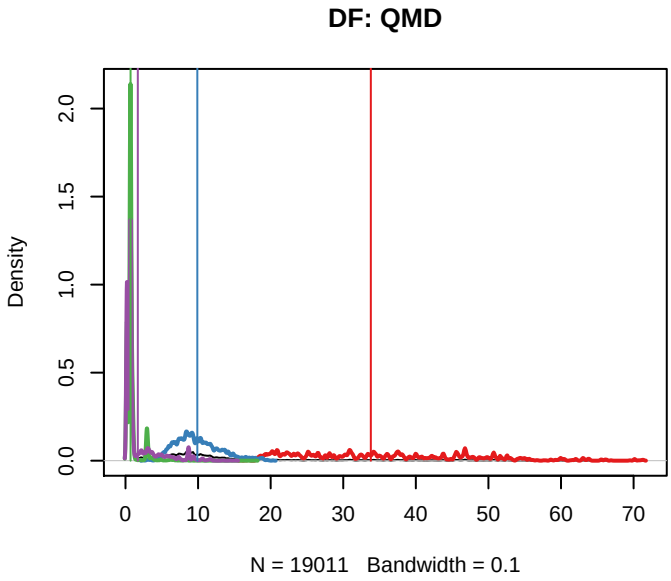


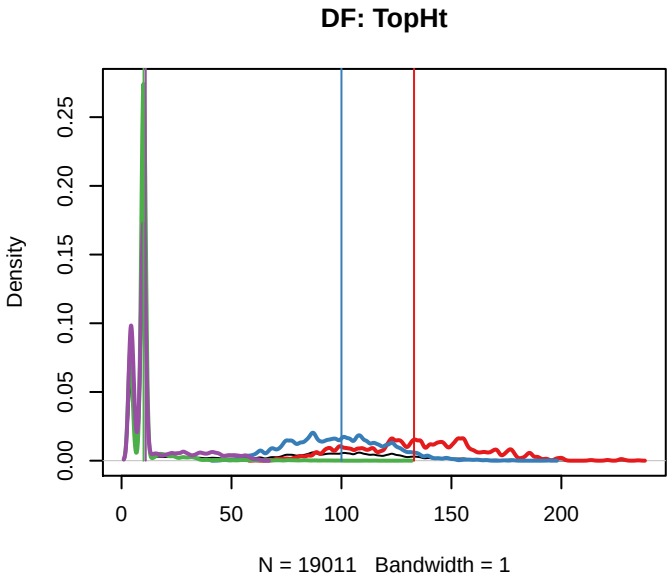


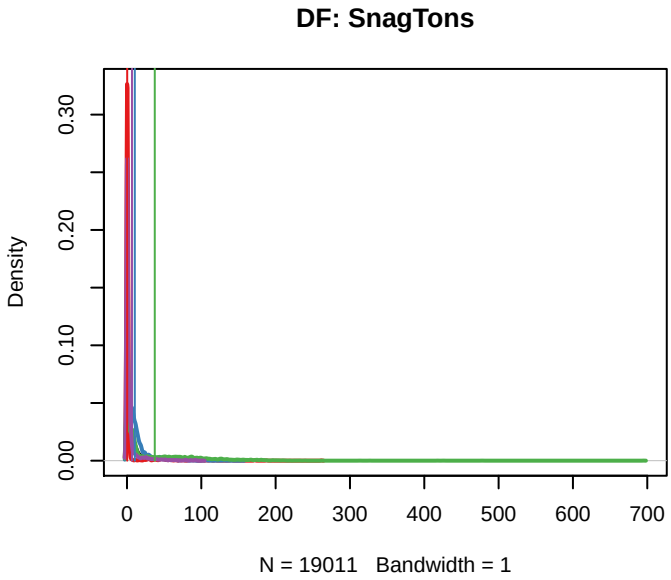


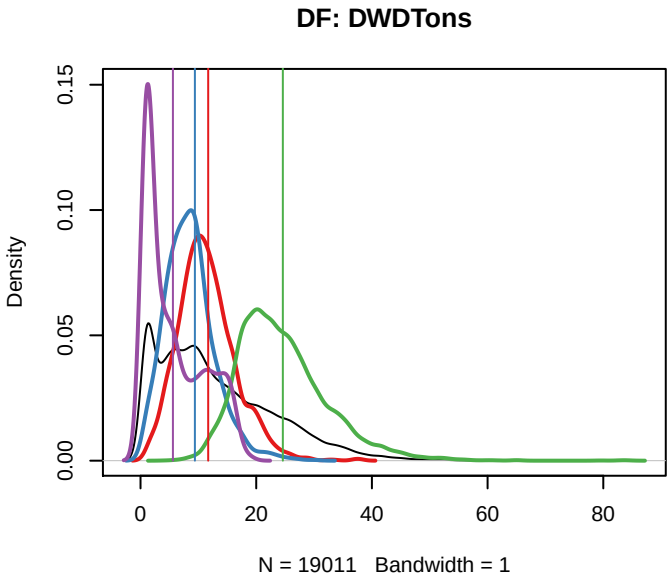
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	116087	24	35.5	134	4	11
2	579586	346	9.9	99	11	9
3	209956	405	0.9	11	31	25
4	193387	312	1.7	14	4	6
	1099015	(2.9%)				





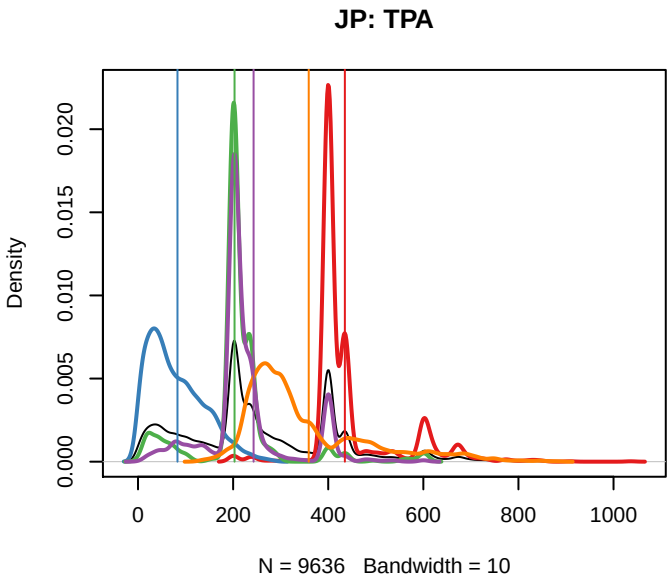


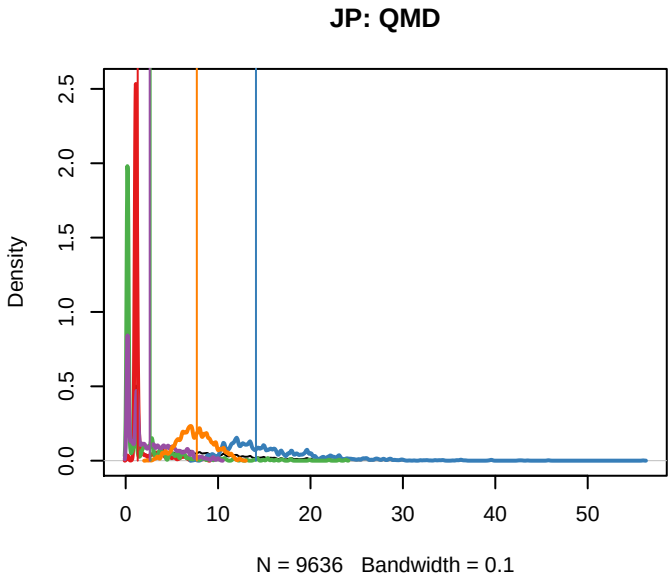


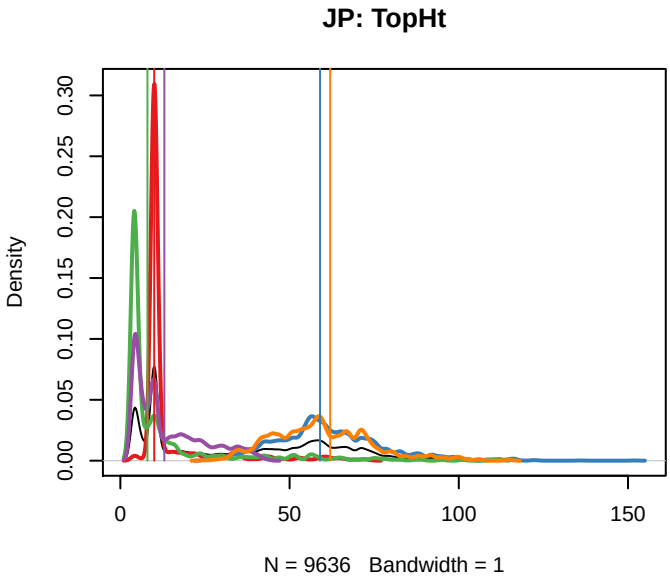


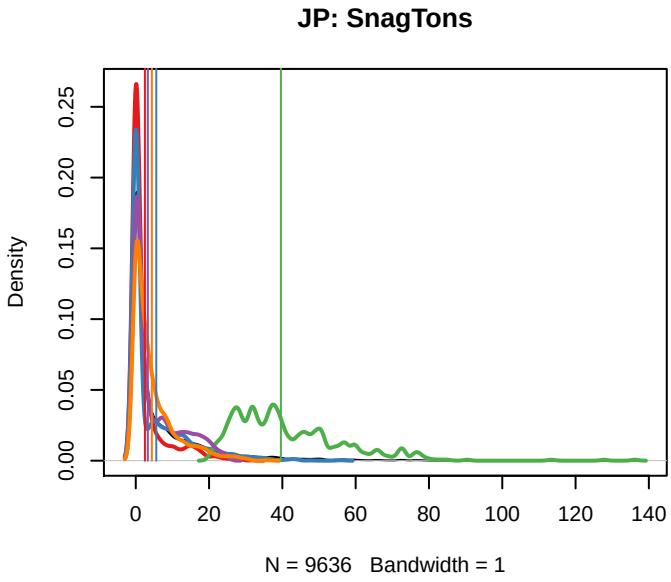


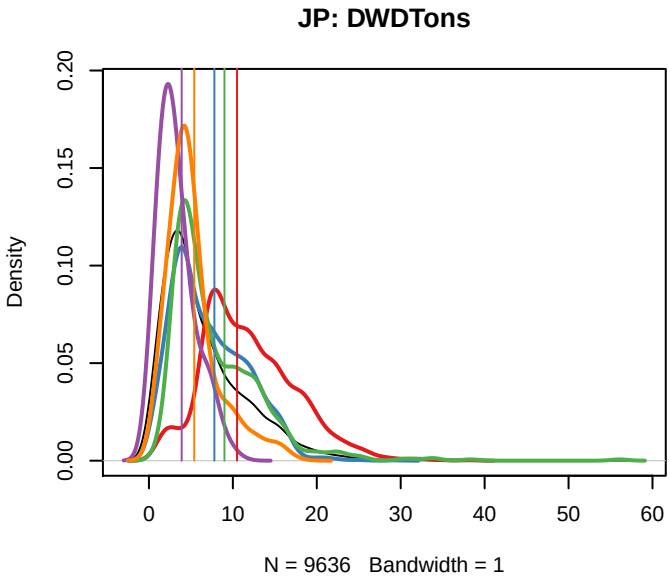
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	45475	445	1.7	14	3	12
2	727673	80	15.8	61	5	7
3	9431	207	2.3	14	42	8
4	143781	224	2.7	14	5	3
5	127000	349	7.6	59	5	5
	1053360	(2.8%)				





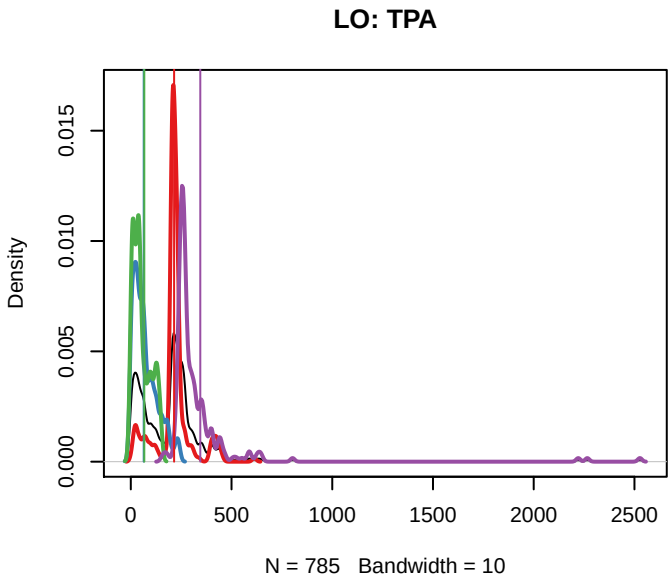


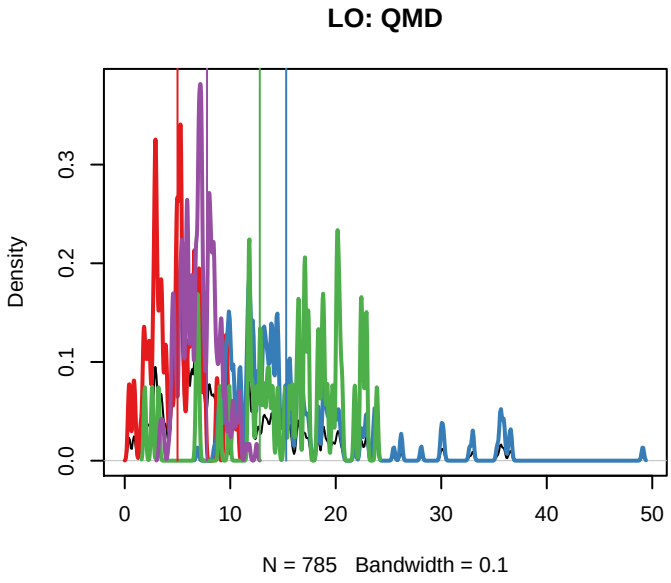


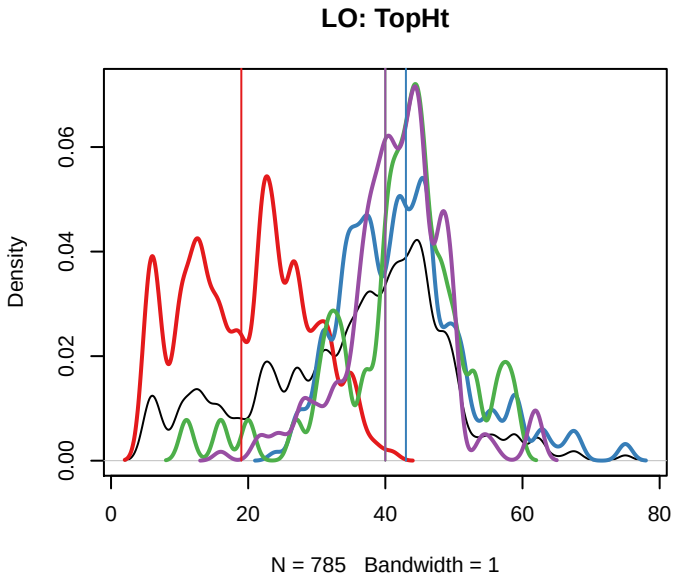


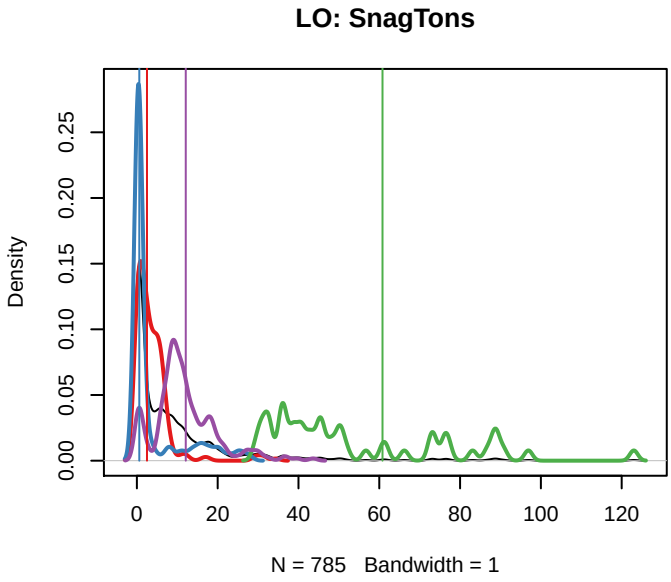


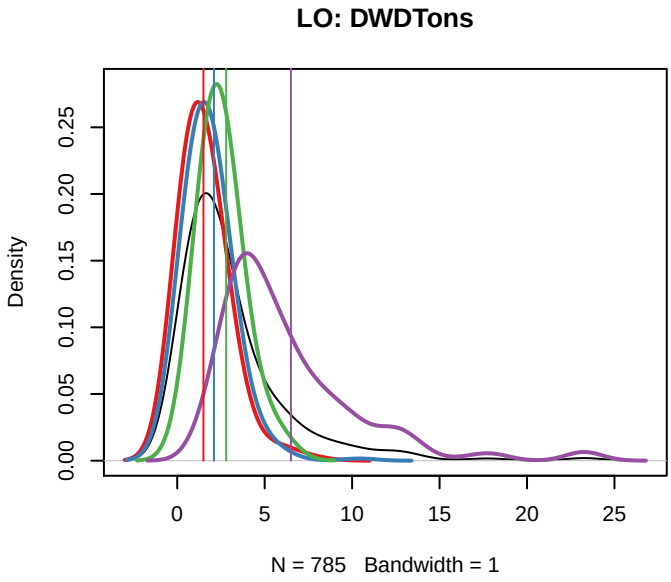
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	143100	213	4.9	20	4	2
2	587289	71	16.1	43	4	2
3	1309	55	15.6	42	54	3
4	71040	331	7.1	42	12	6
	802737	(2.1%)				





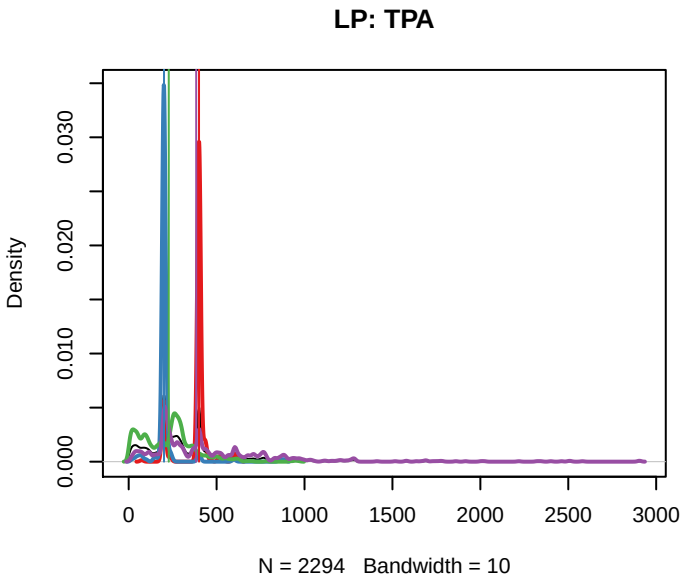


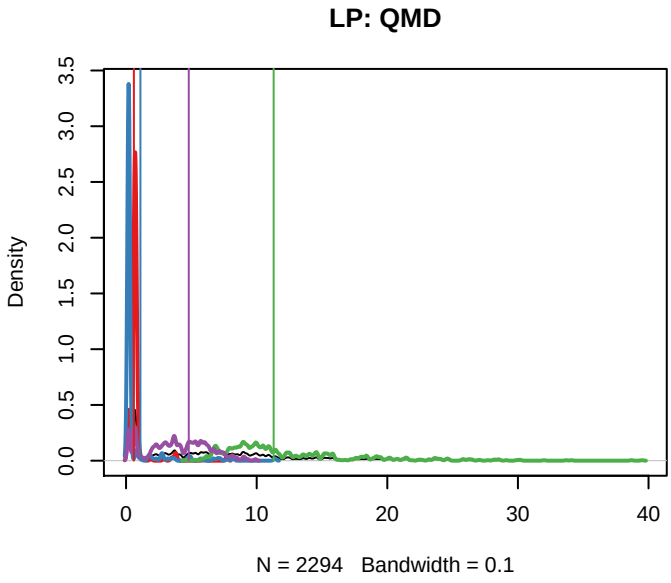


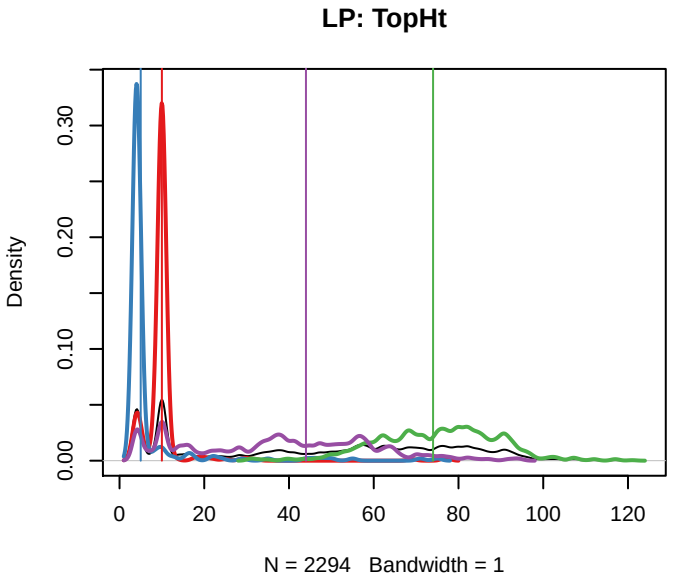


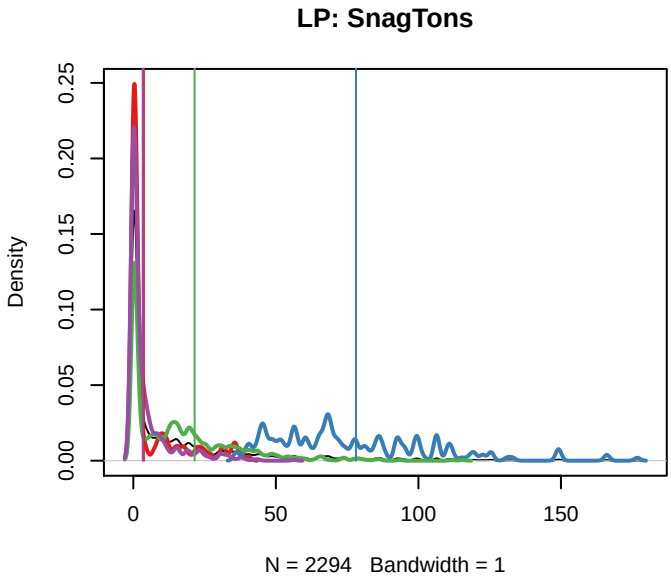


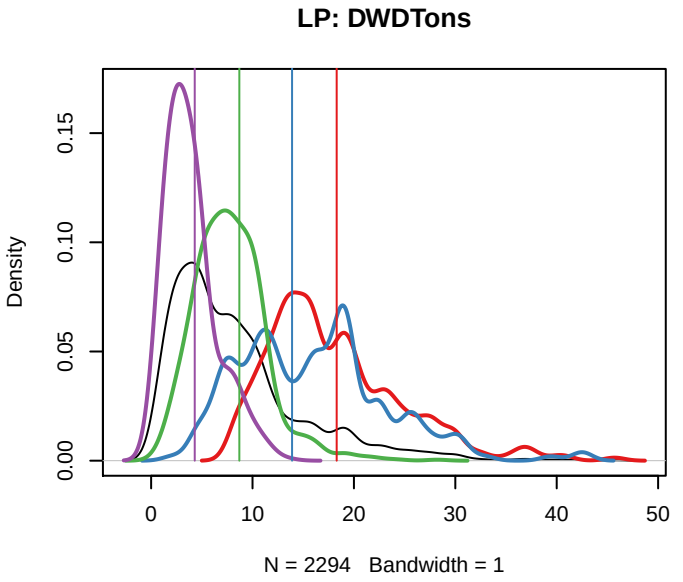
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	6749	379	0.8	10	6	18
2	2319	207	0.7	7	77	16
3	316696	225	12.2	75	16	8
4	75495	462	4	37	4	4
	401259	(1.1%)				





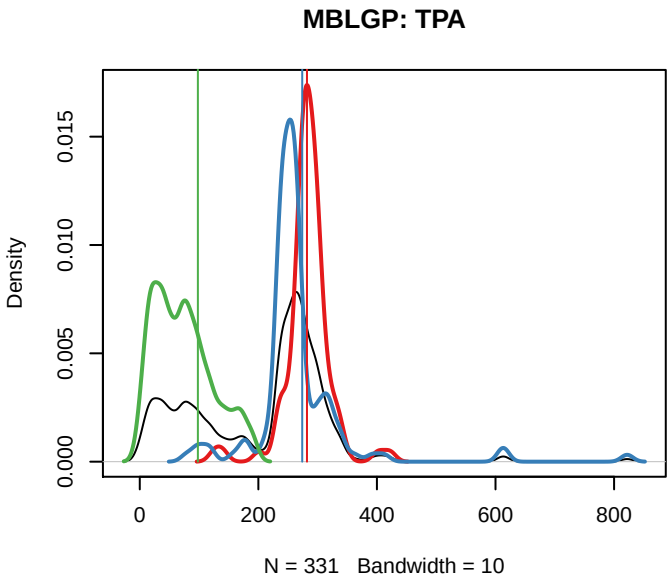


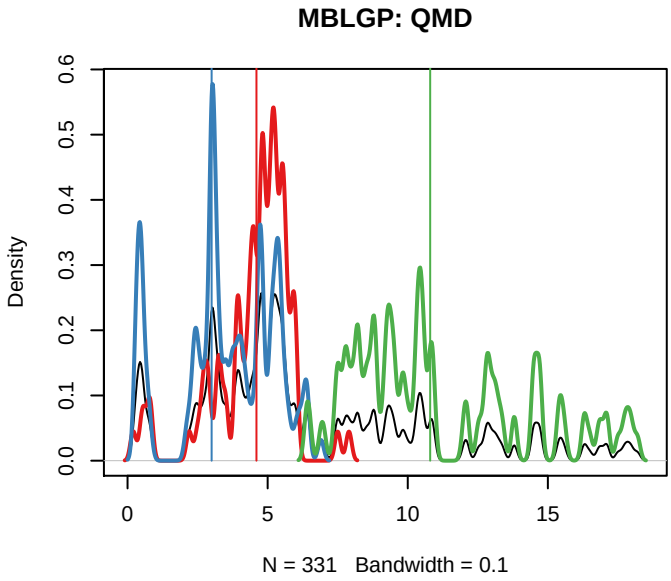


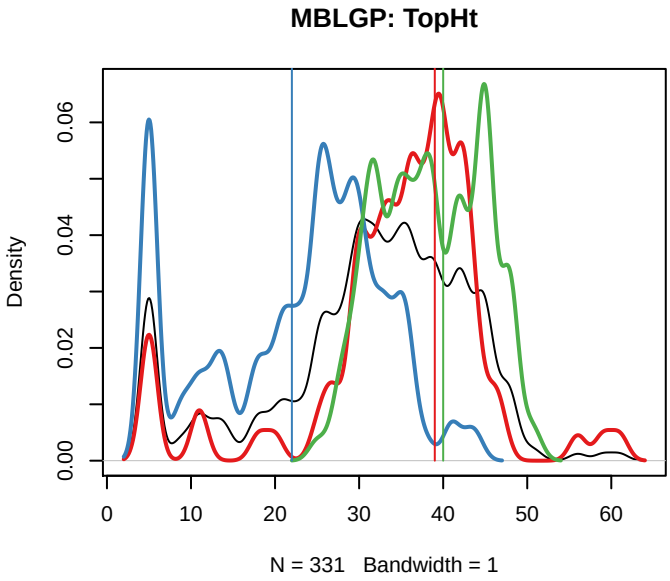


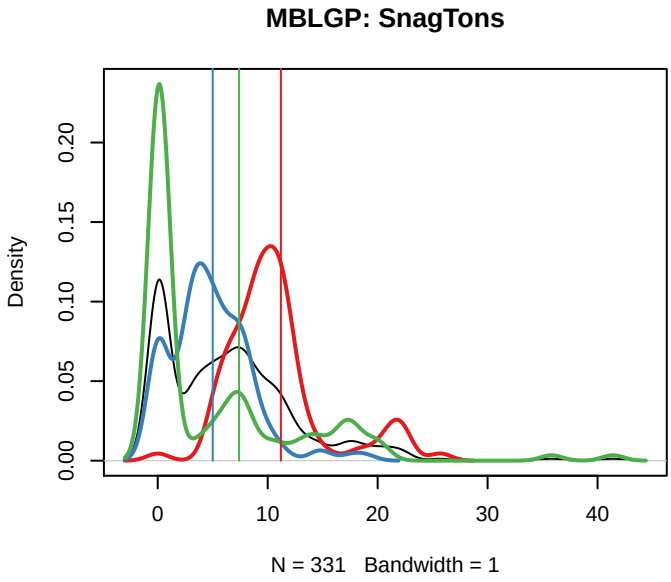


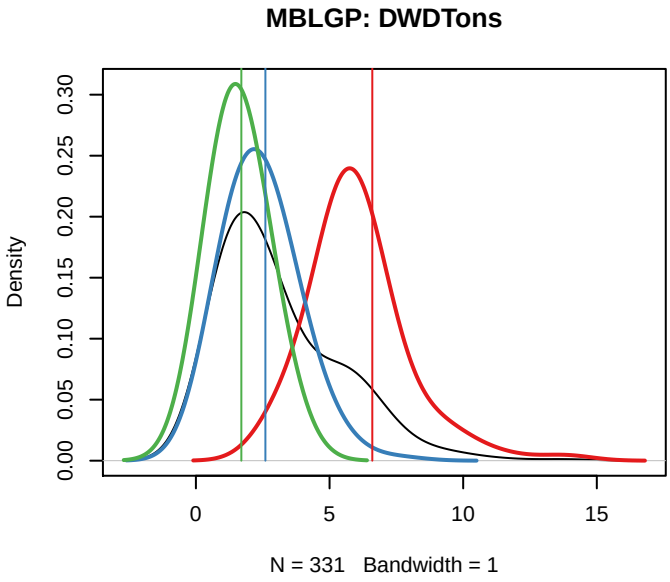
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	9084	283	4.5	35	11	6
2	103762	265	3.6	23	5	2
3	300640	74	11.1	39	5	2
	413487	(1.1%)				





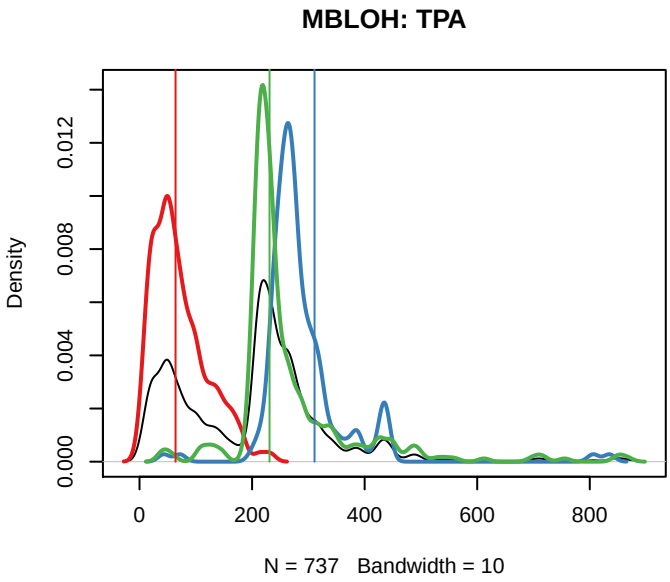


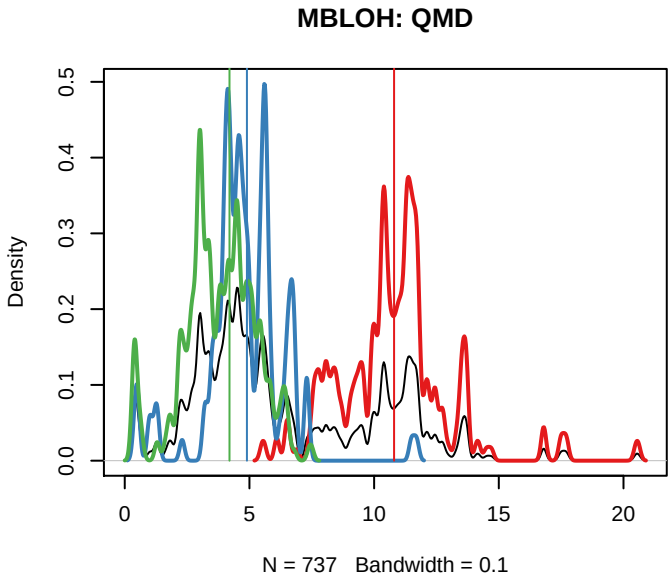


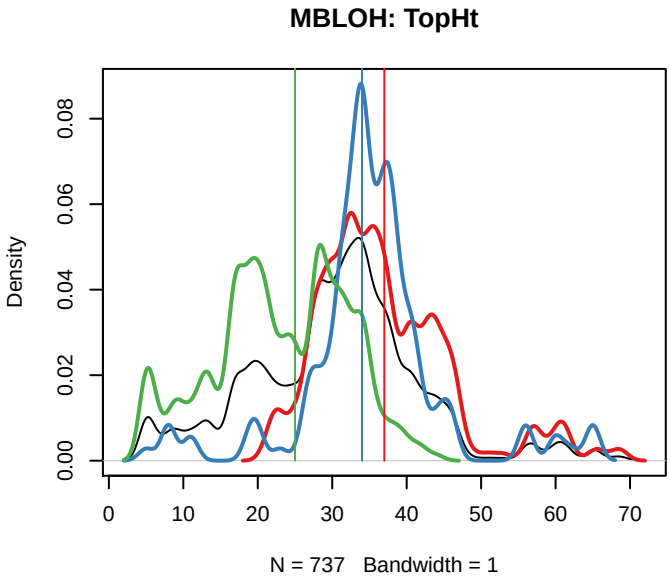


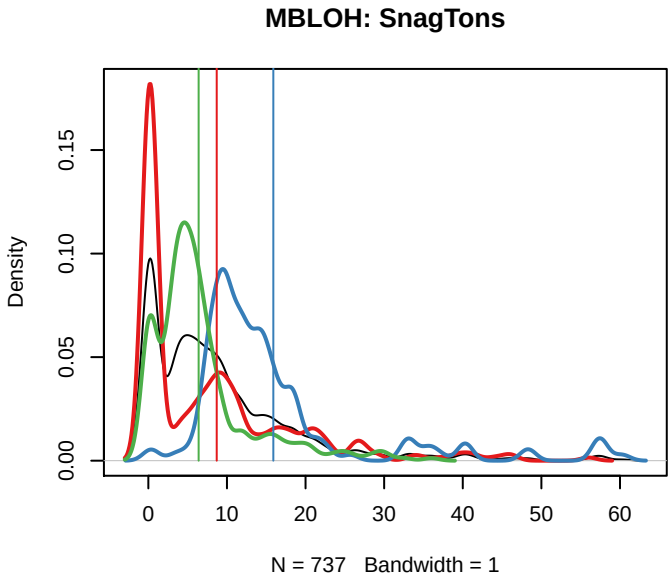


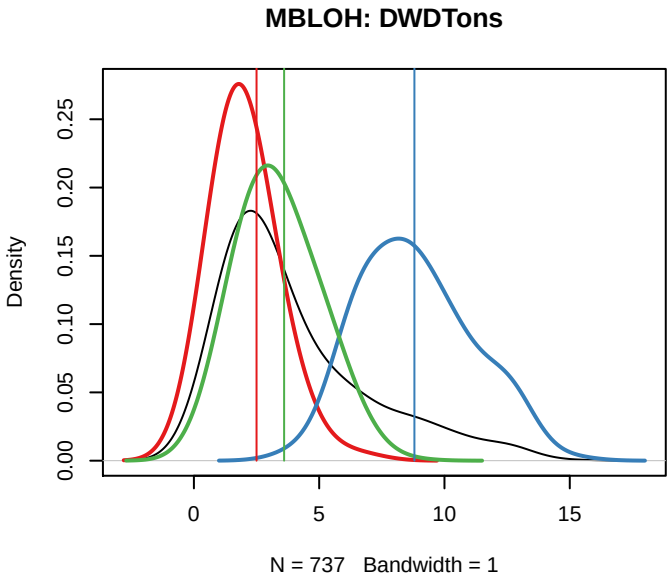
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	320582	71	10.8	37	8	2
2	7165	291	4.8	35	16	9
3	131753	266	3.8	23	7	3
	459500	(1.2%)				





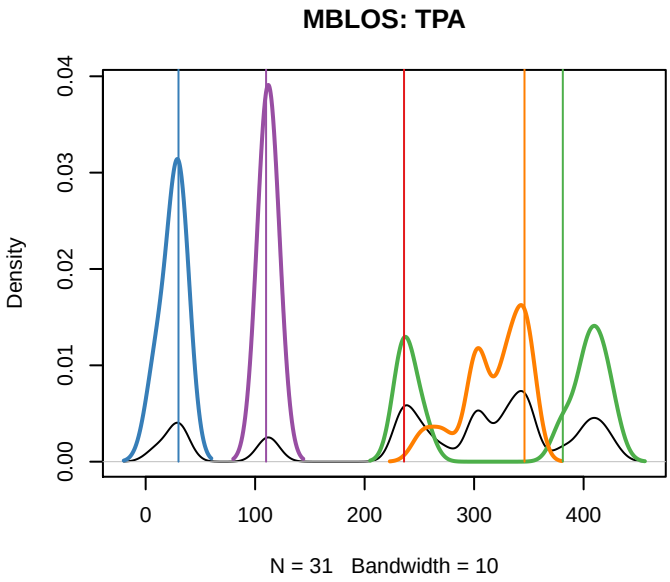


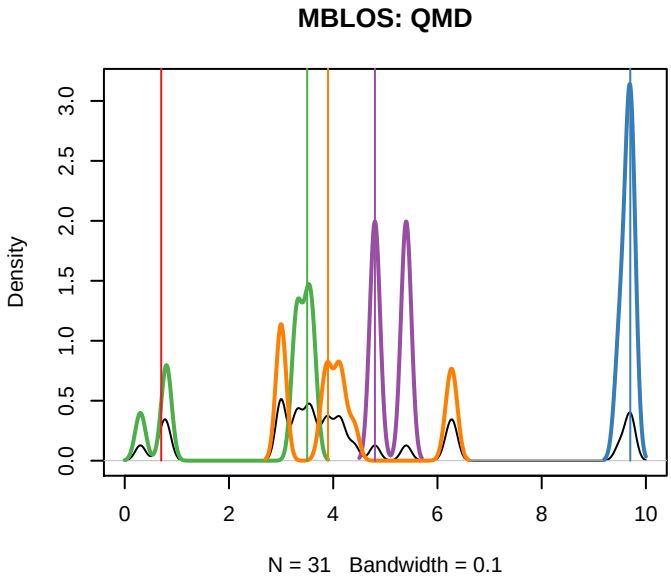


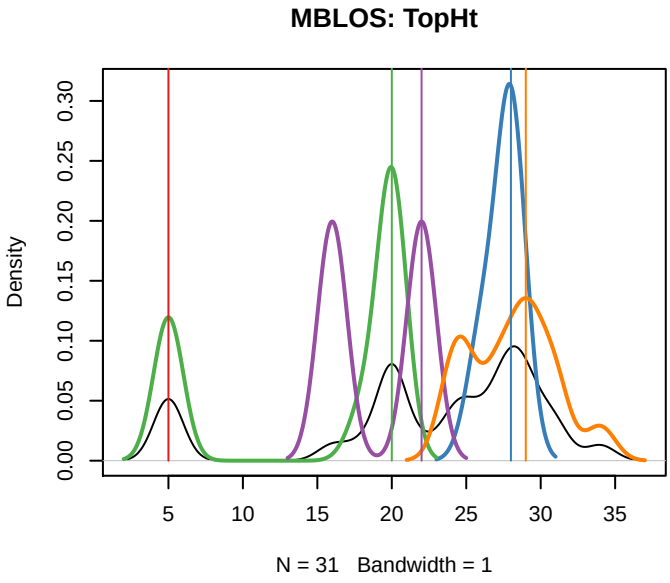


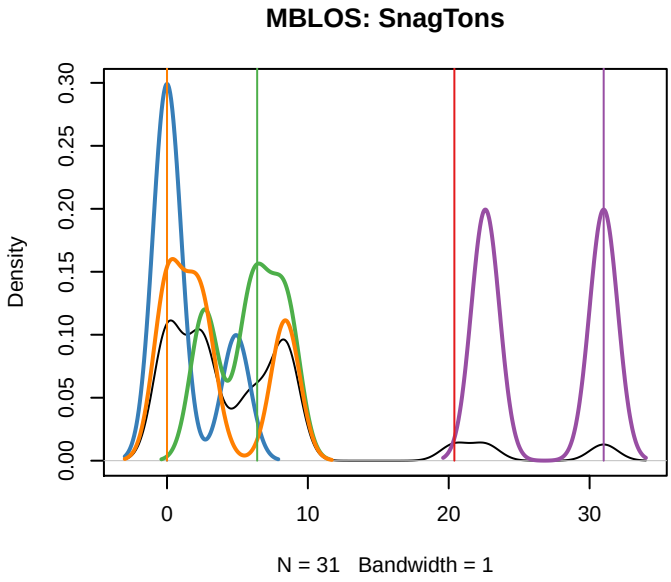


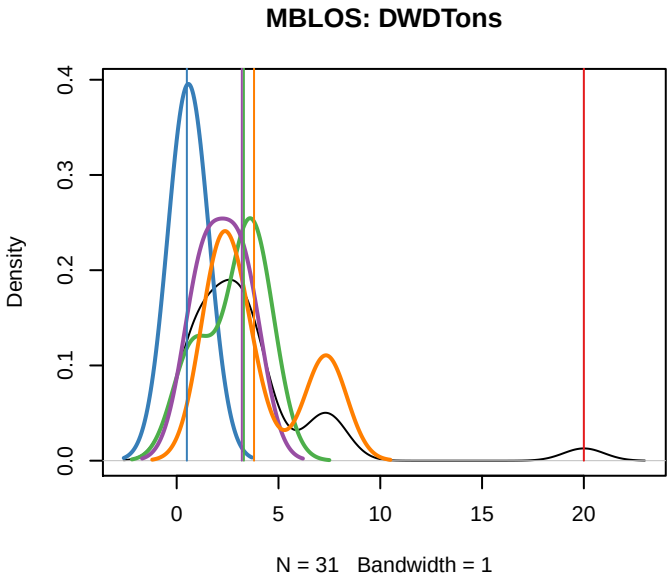
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	151	236	0.7	5	20	20
2	14400	25	9.6	28	1	1
3	455	340	2.6	15	6	3
4	15	112	5.1	19	27	2
5	31818	318	4.2	28	3	4
	46839	(0.1%)				





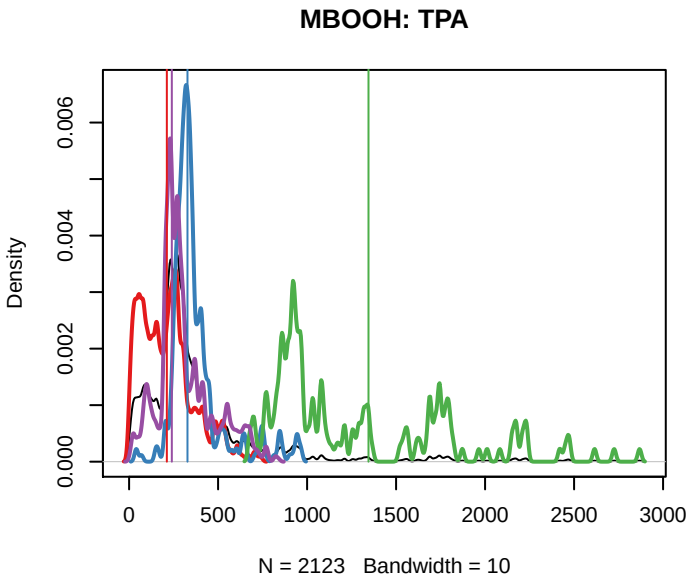


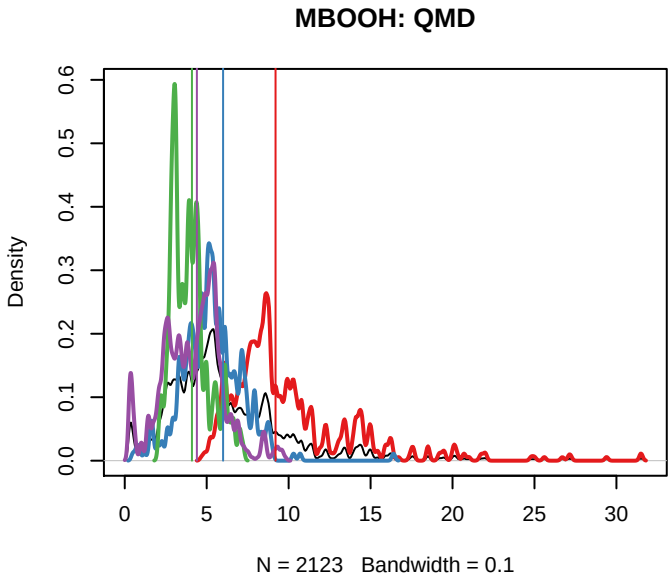


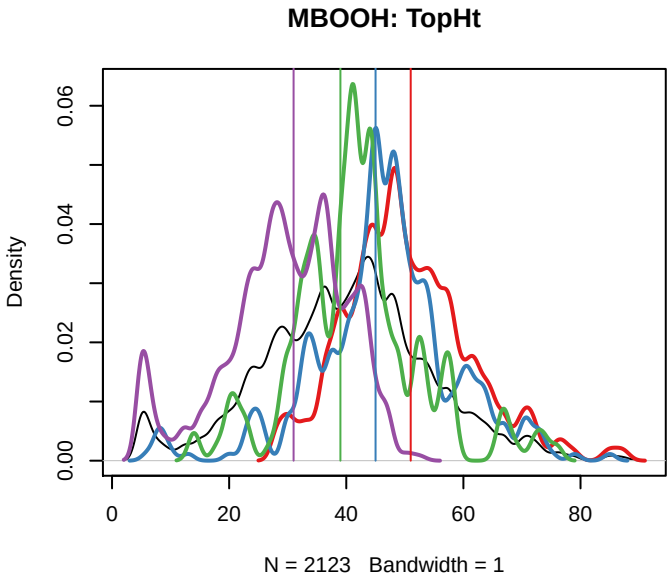


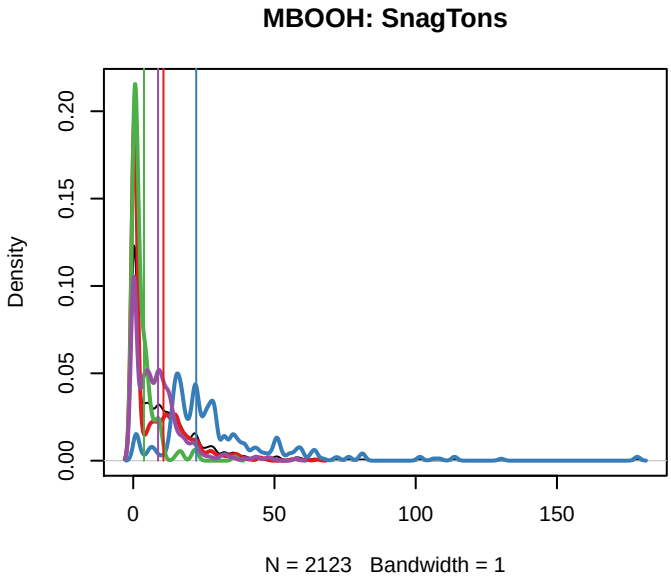


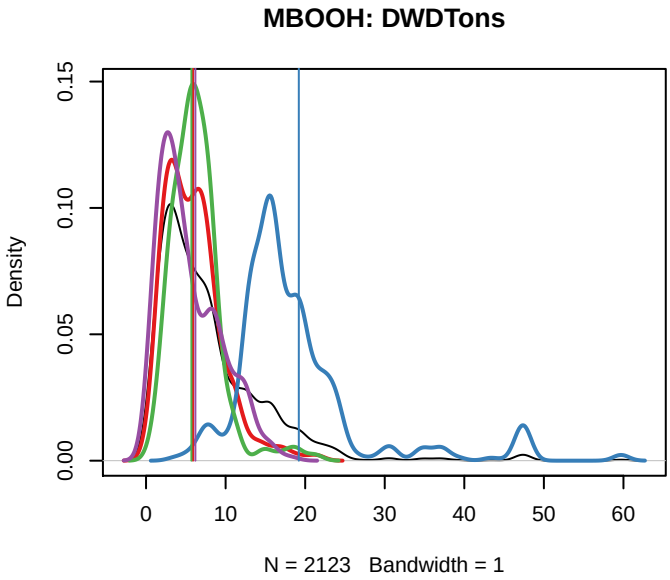
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	457226	215	10	50	8	6
2	29150	375	5.3	47	30	19
3	65682	1278	4	42	3	6
4	279177	312	4.2	30	8	5
	831236	(2.2%)				





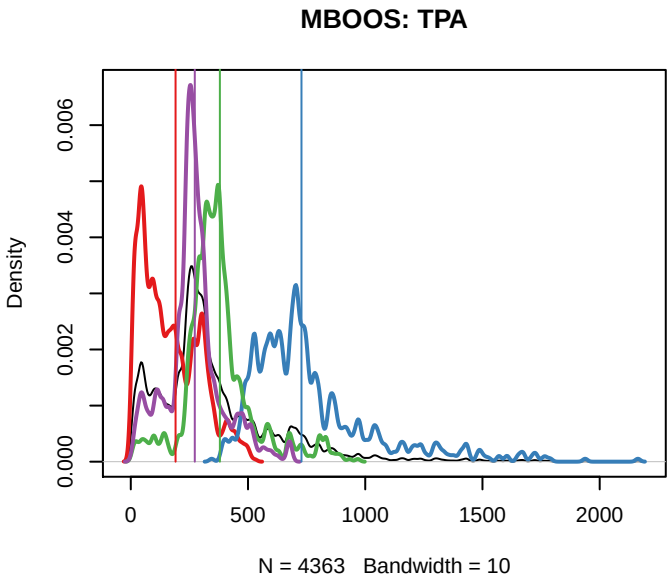


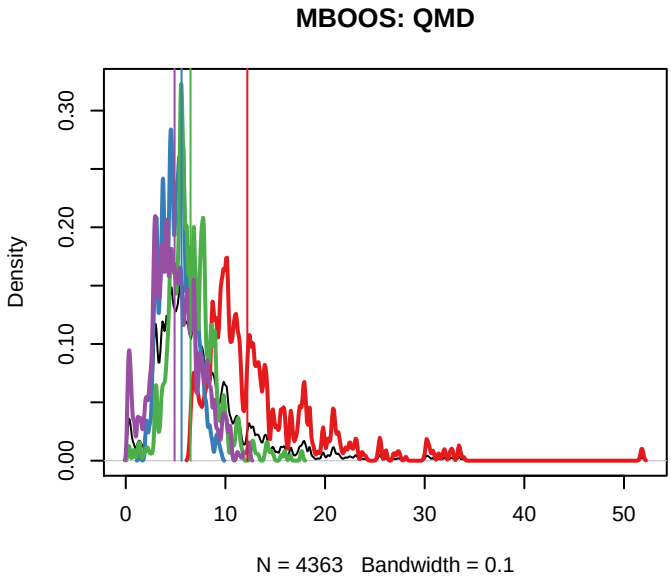


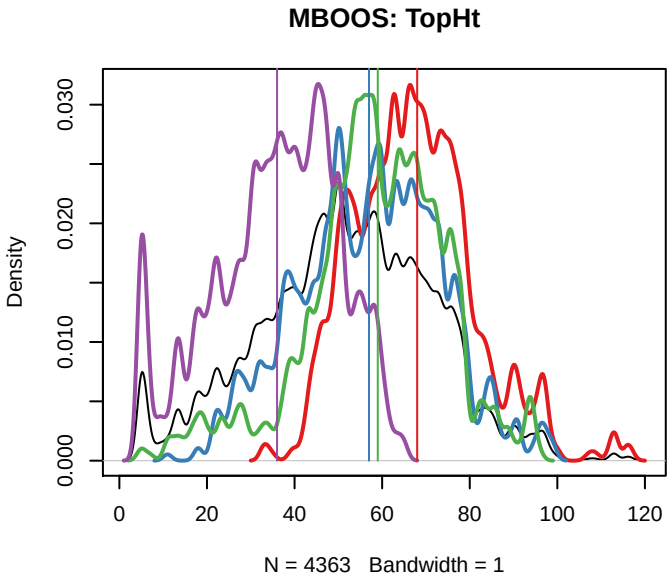


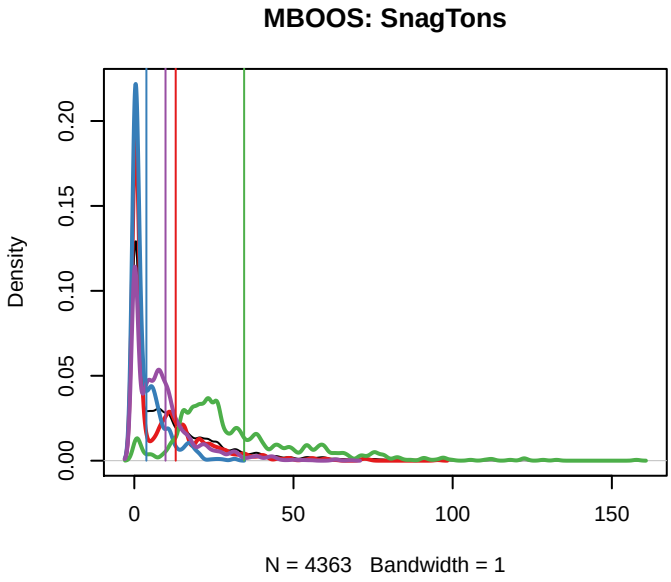


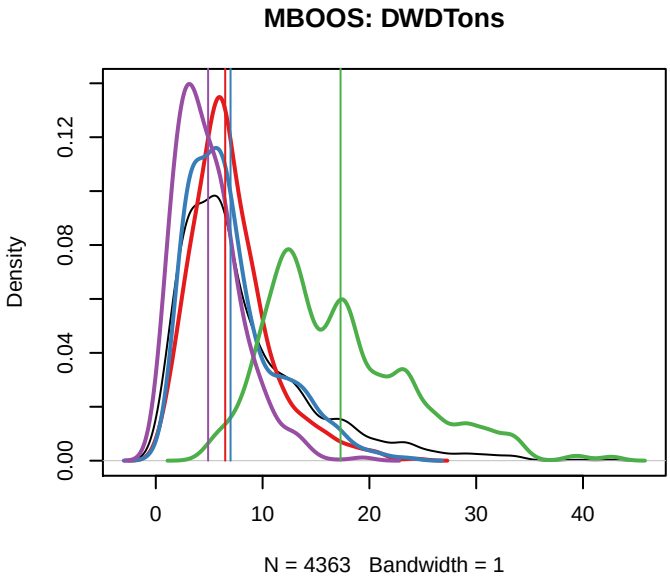
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	460619	169	13.2	67	9	7
2	182280	768	5.2	57	4	7
3	43198	374	6.6	58	33	17
4	301147	270	5	36	9	5
	987244	(2.6%)				





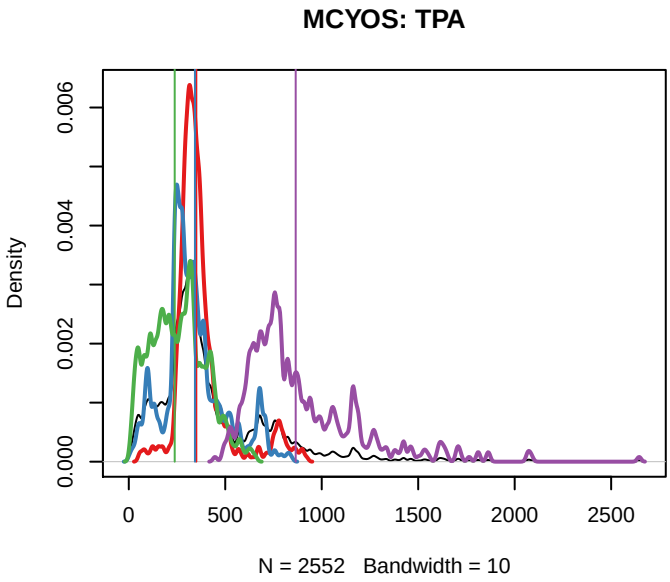


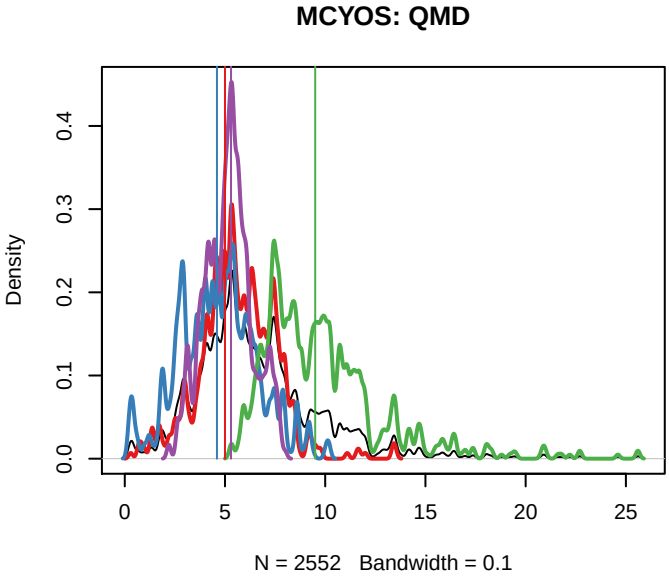


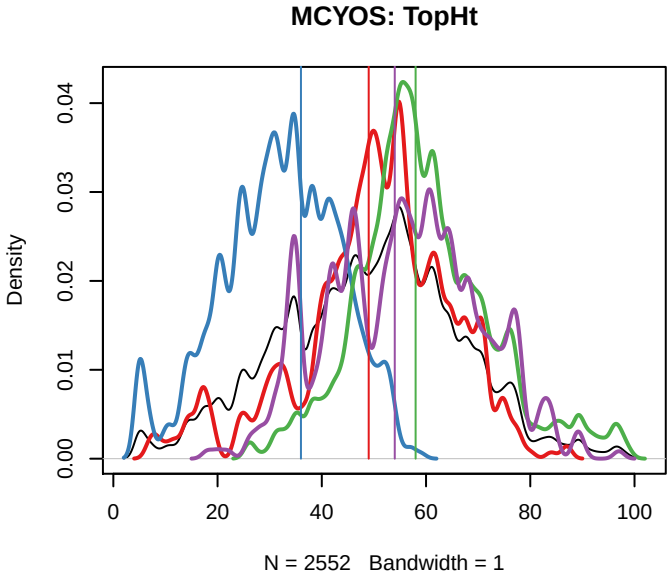


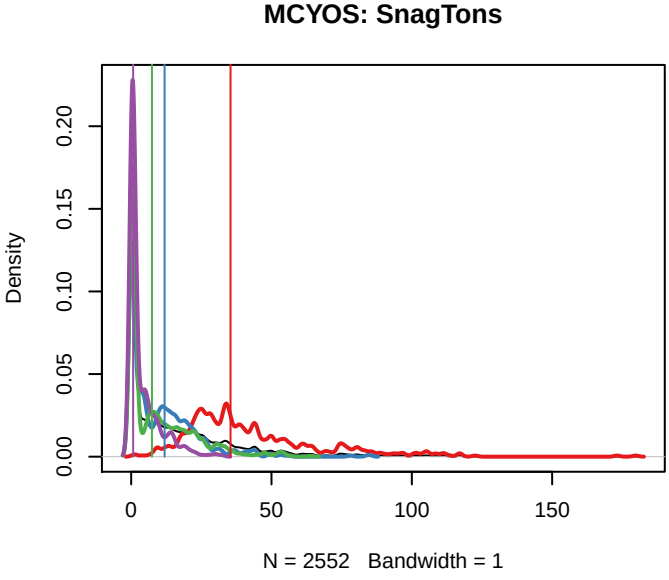


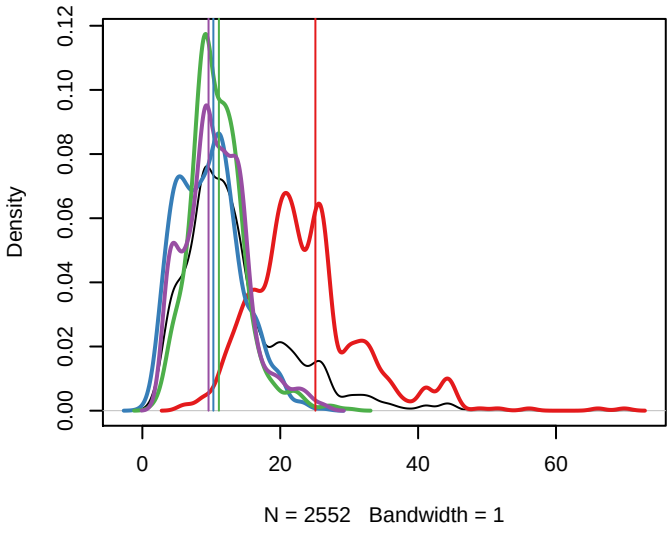
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	29213	373	5.6	50	43	24
2	123424	335	4.7	32	10	10
3	303774	258	9.8	60	9	11
4	120027	896	5.2	56	4	11
	576438	(1.5%)				





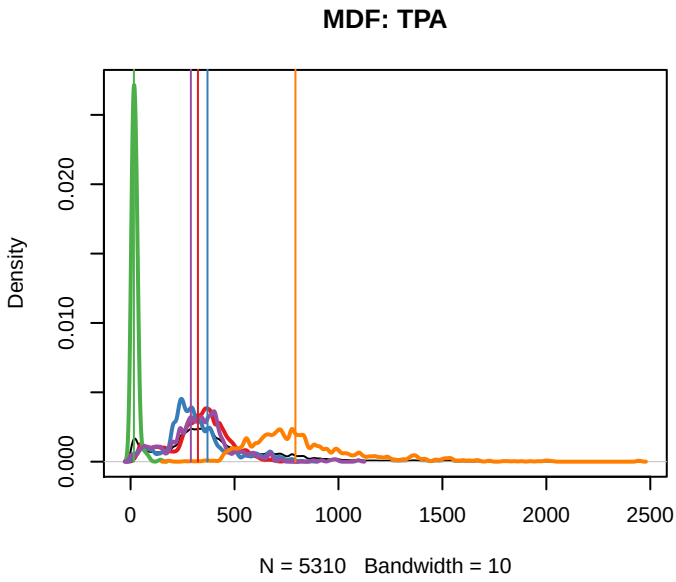


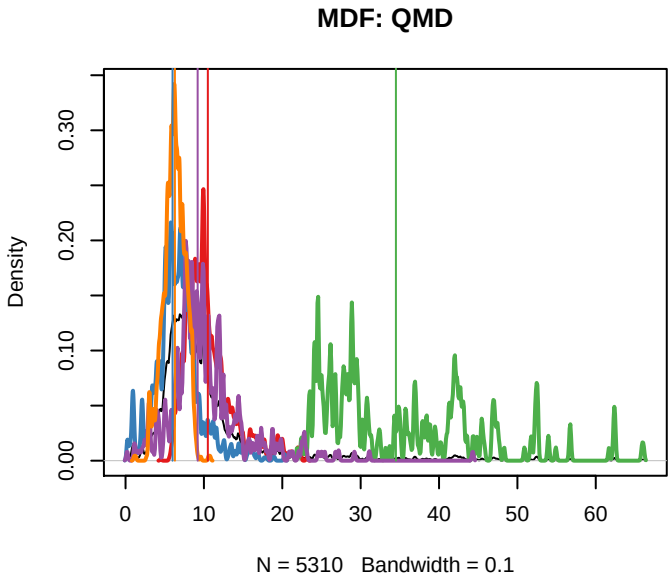


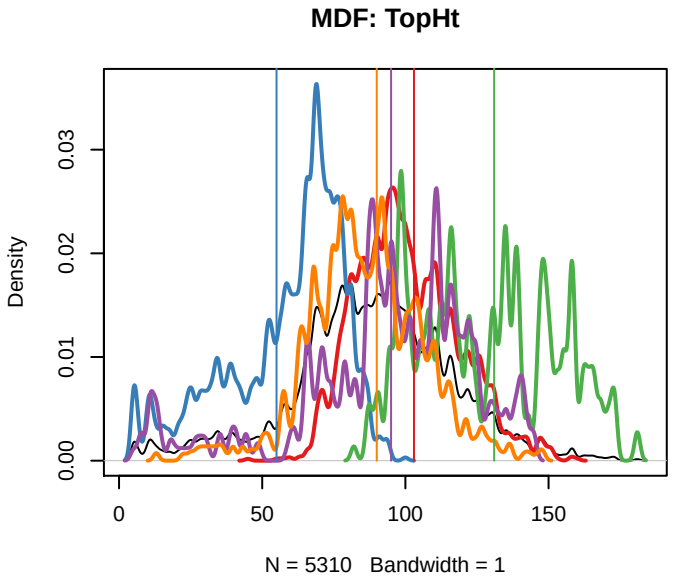


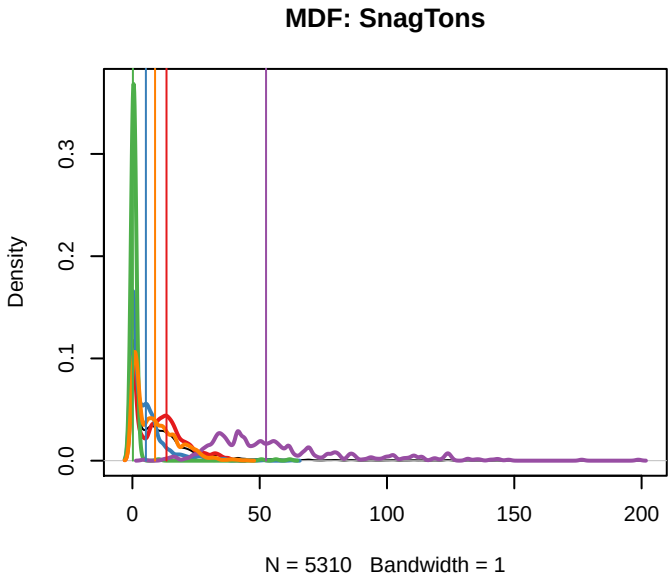


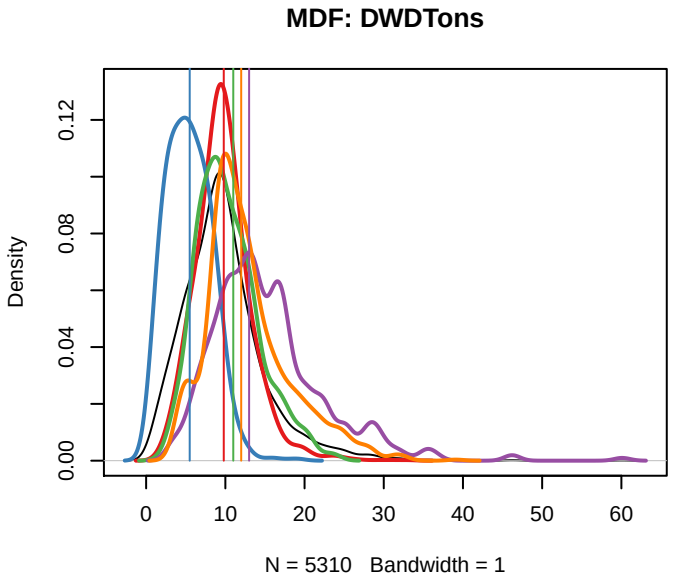
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	461854	333	10.7	101	11	10
2	114264	315	6.7	59	5	5
3	7611	20	35.1	128	1	10
4	42547	332	10.2	94	57	15
5	209996	829	6.2	86	9	13
	836272	(2.2%)				





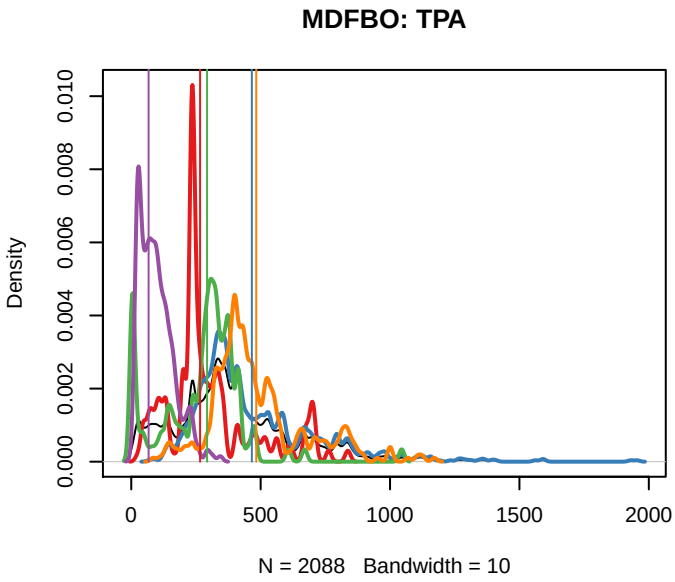


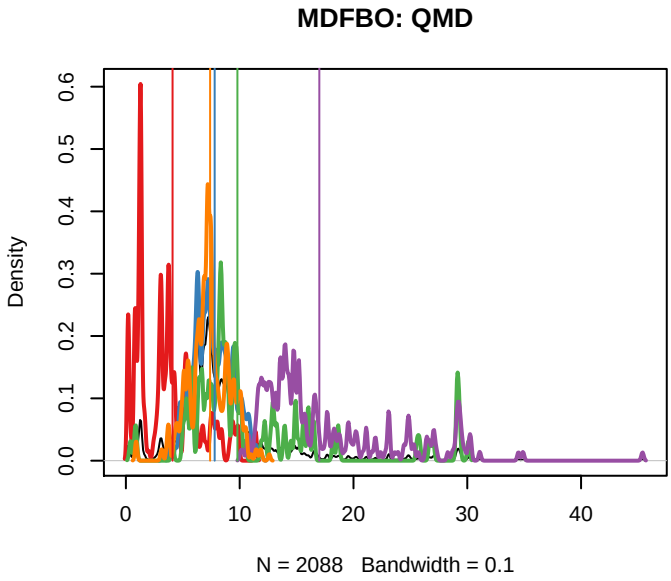


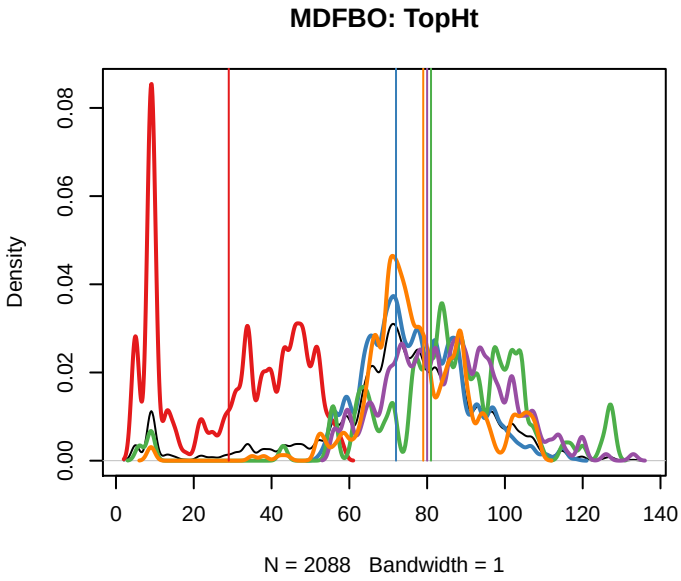


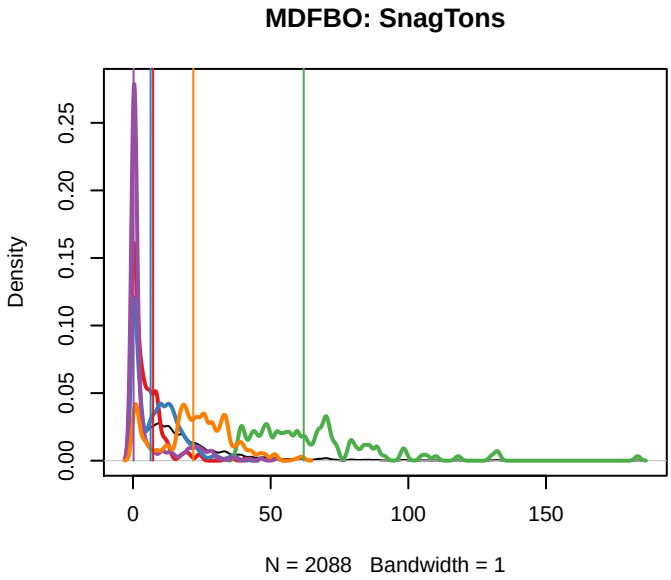


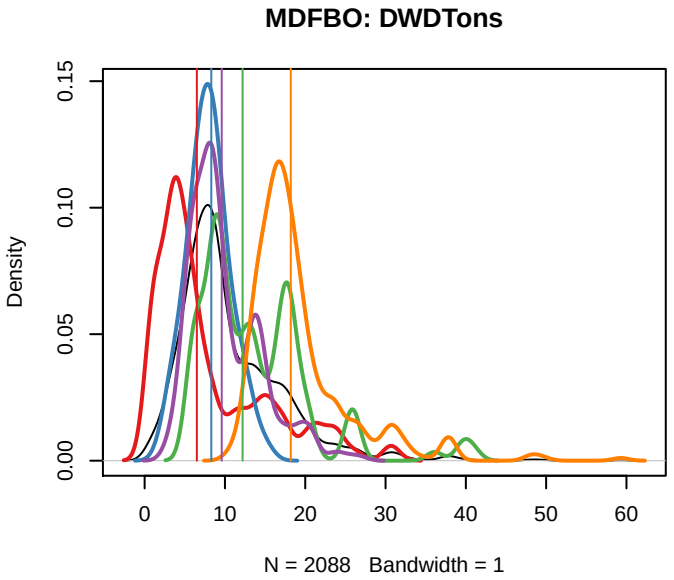
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	19786	301	3.7	30	5	8
2	350683	475	7.6	77	9	8
3	4414	272	11.1	86	66	14
4	96048	97	17.5	85	5	10
5	15085	483	7.3	78	22	19
	486017	(1.3%)				





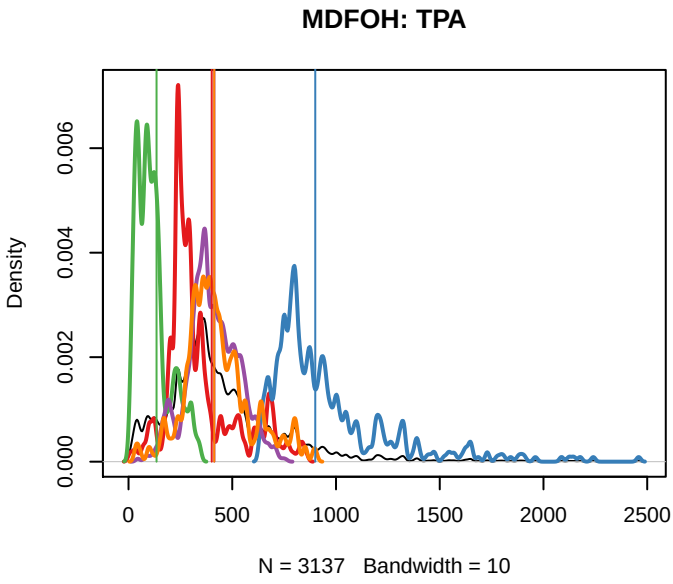


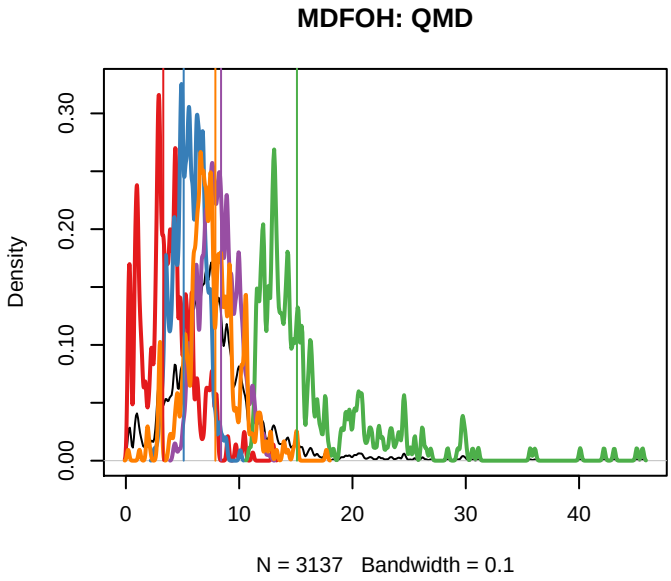


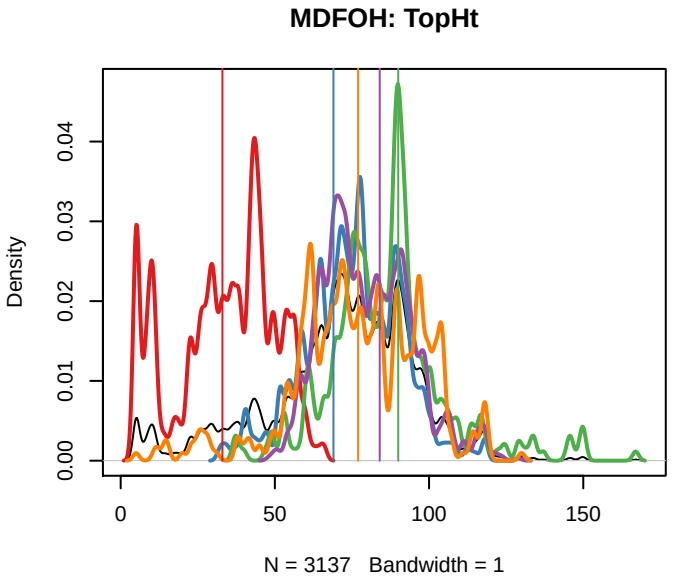


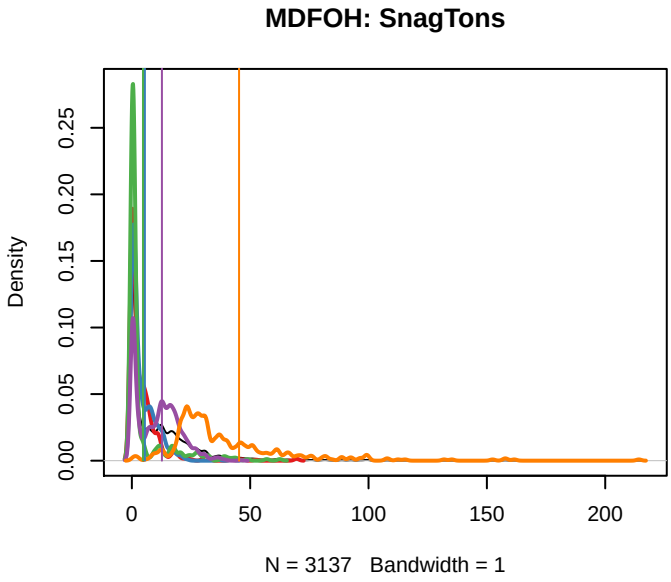
1 2 3 4
5 6 7 8

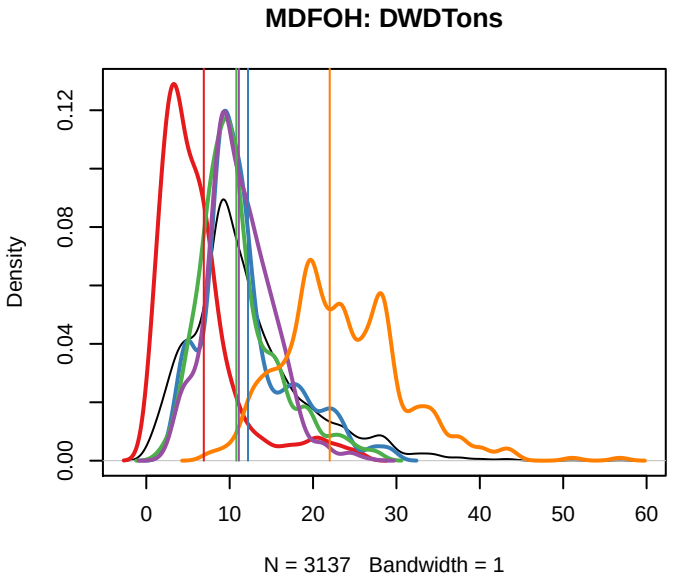
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	41441	342	3.8	34	4	6
2	128809	961	5.6	75	5	12
3	111730	116	16.5	86	5	11
4	329029	405	8.2	80	11	11
5	18590	428	7.6	77	39	23
	629598	(1.7%)				





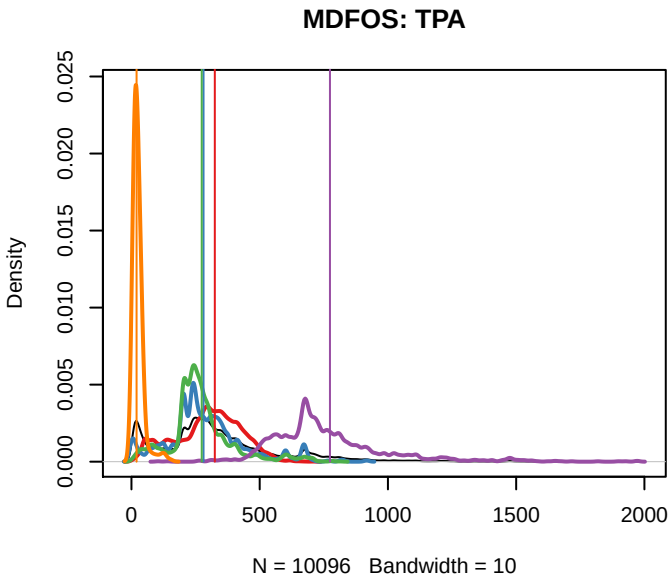


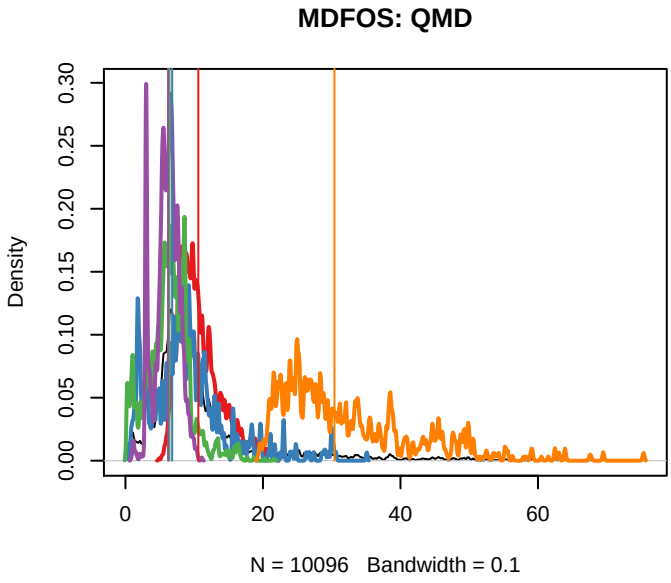


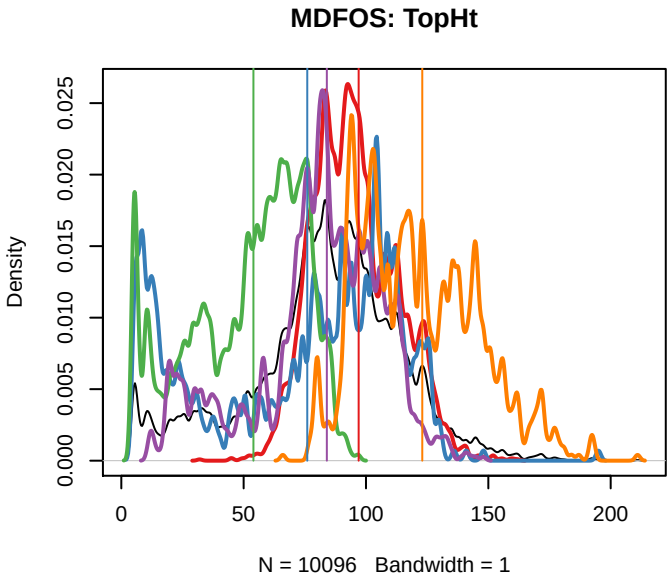


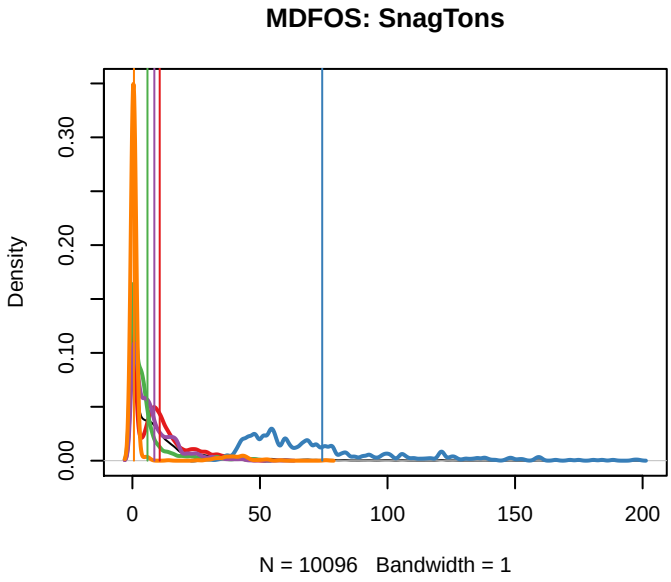


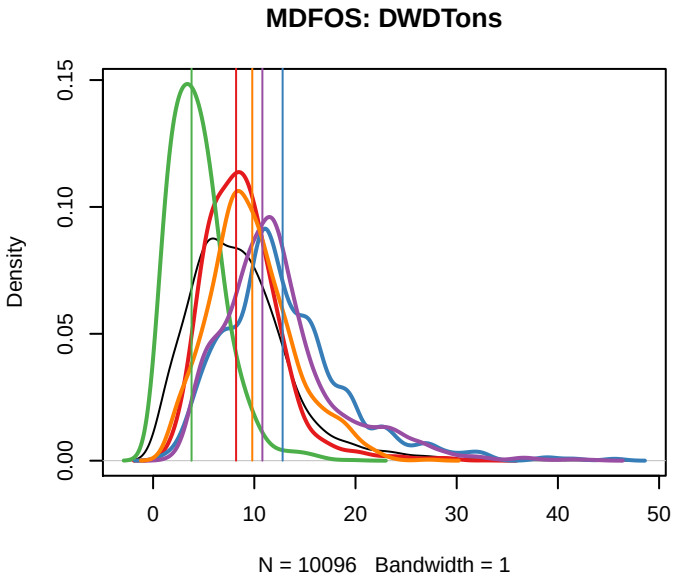
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	582918	298	10.7	95	10	9
2	22612	287	9.2	74	72	13
3	153091	271	6.3	52	5	4
4	207345	761	6	80	8	12
5	40077	25	32.3	121	3	10
	1006043	(2.7%)				





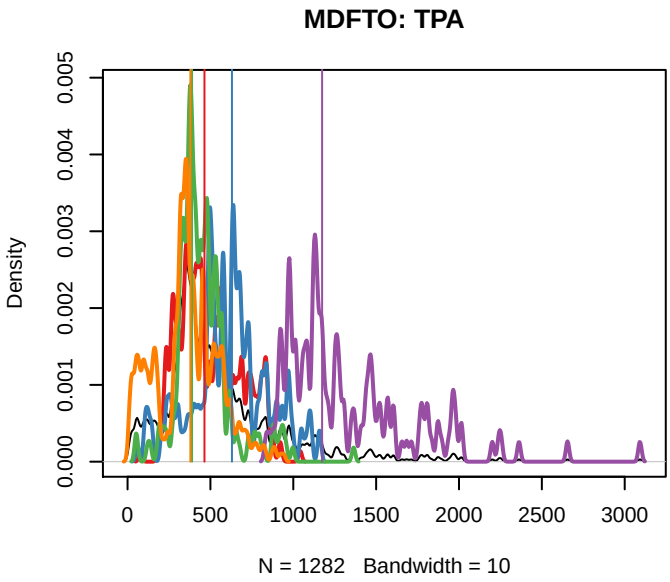


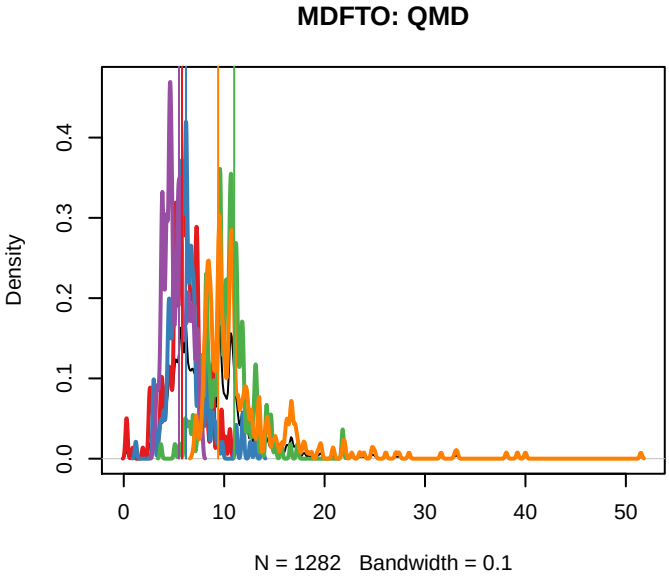


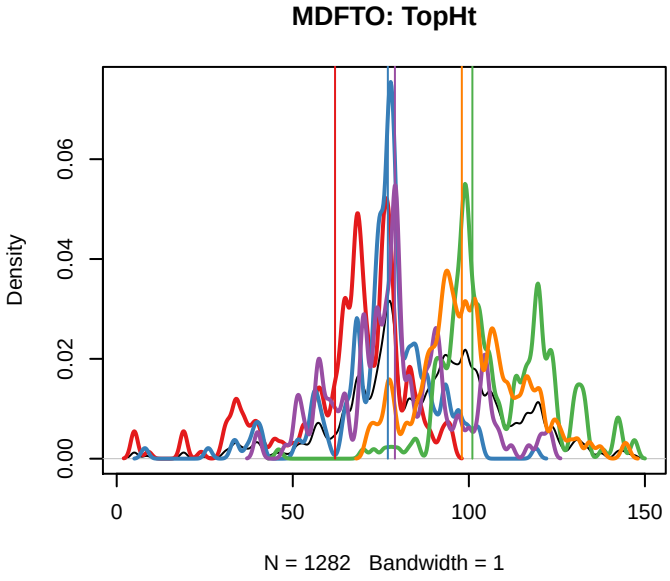


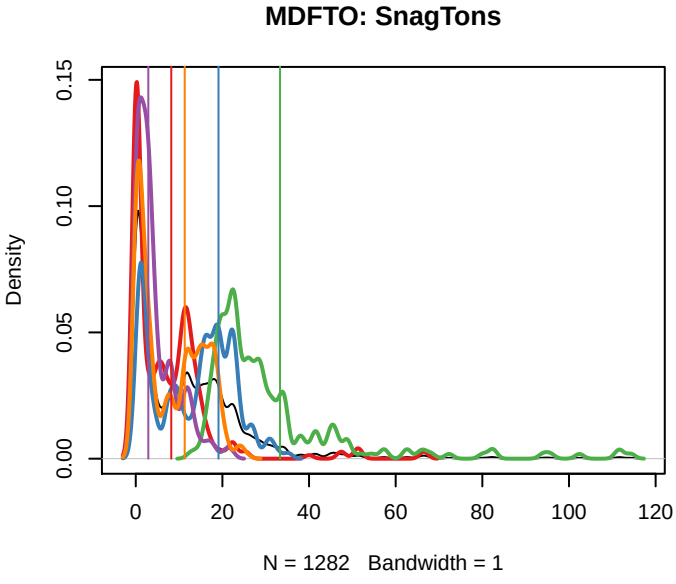


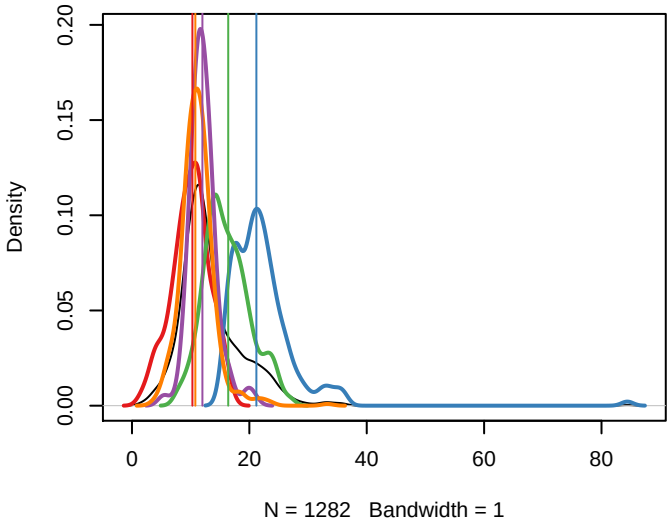
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	98727	496	6.1	66	7	10
2	5921	612	6.3	76	13	22
3	28840	458	10.4	108	31	16
4	96609	1329	5.3	80	4	12
5	199692	364	11.8	101	8	11
	429788	(1.2%)				





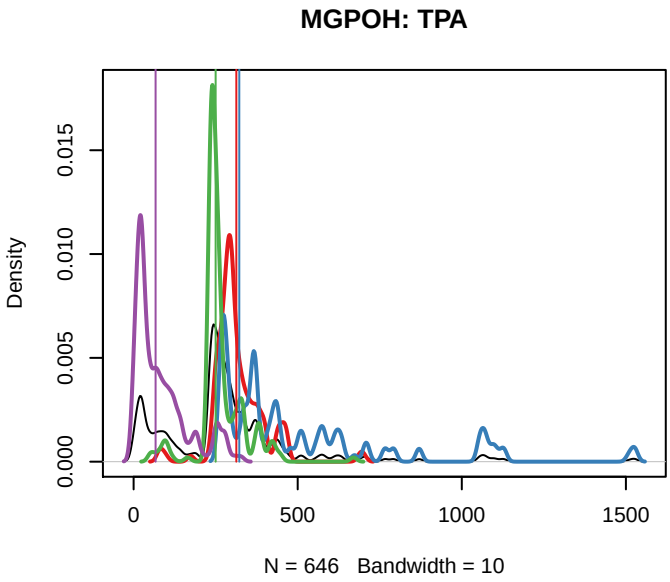


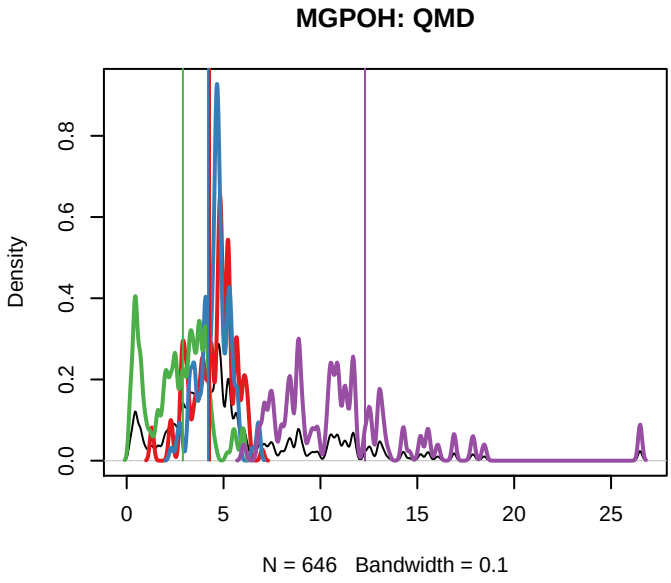


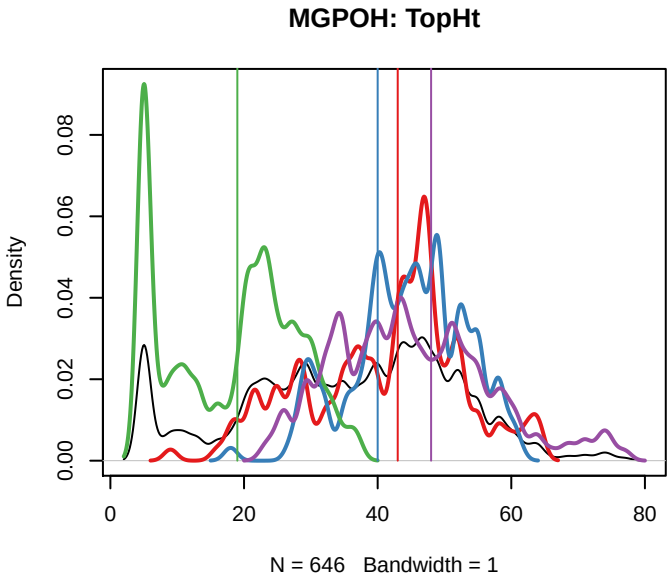


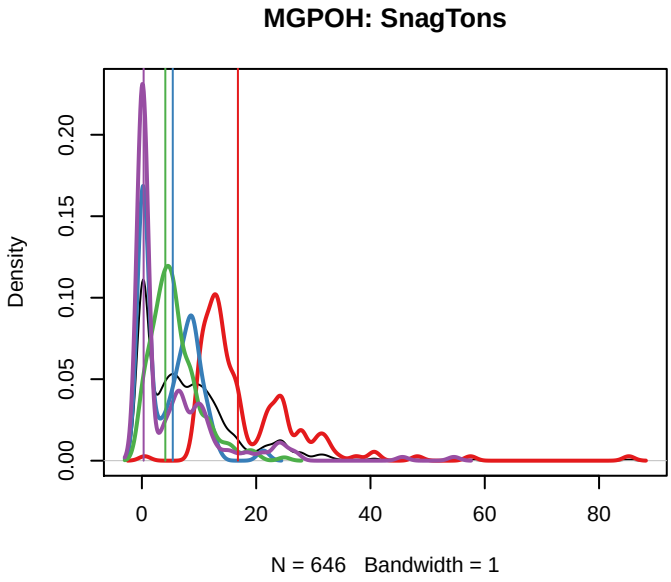


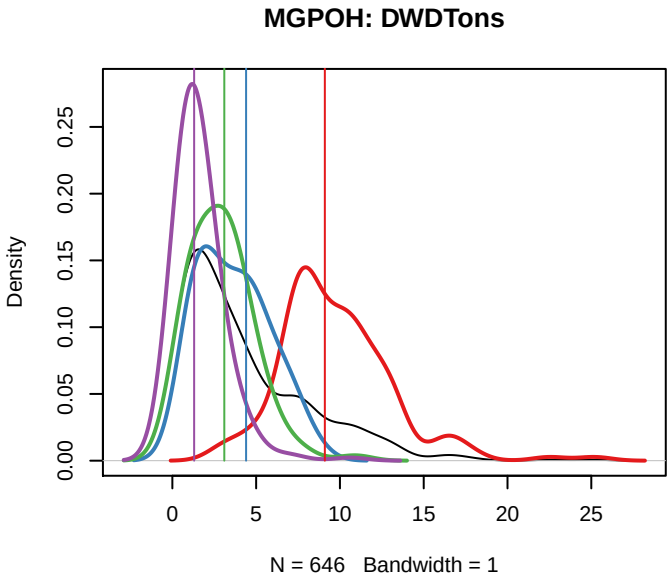
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	14120	317	4.5	41	18	10
2	44009	513	4.6	45	5	4
3	21941	264	2.6	18	6	3
4	299519	82	11.1	45	5	2
	379589	(1%)				





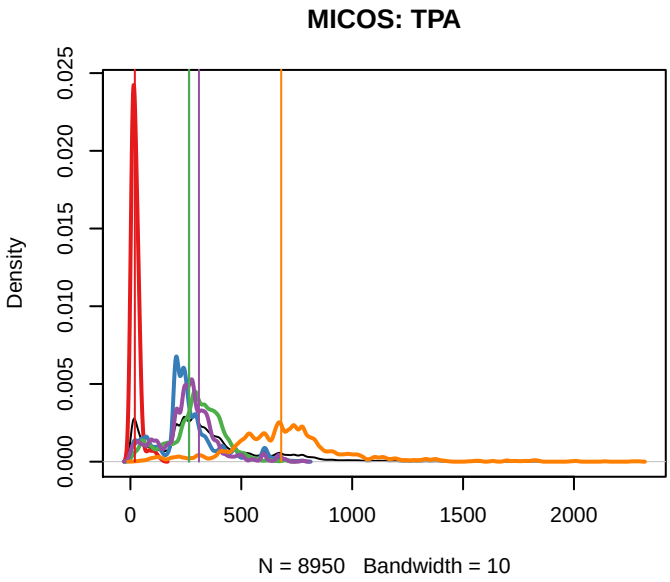


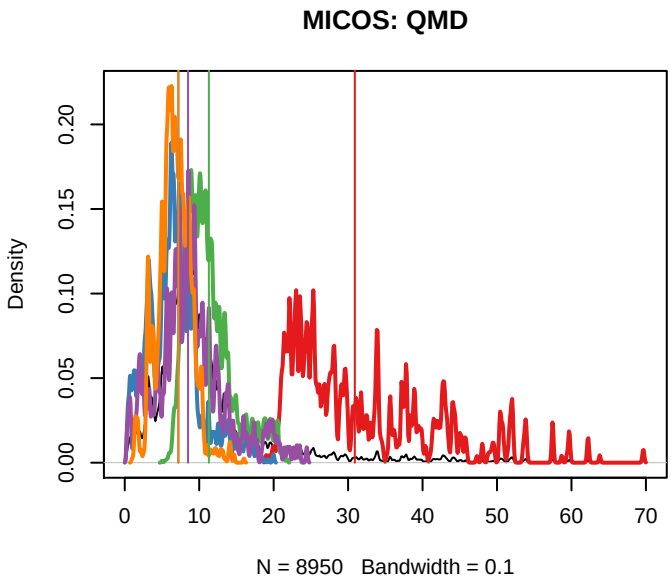


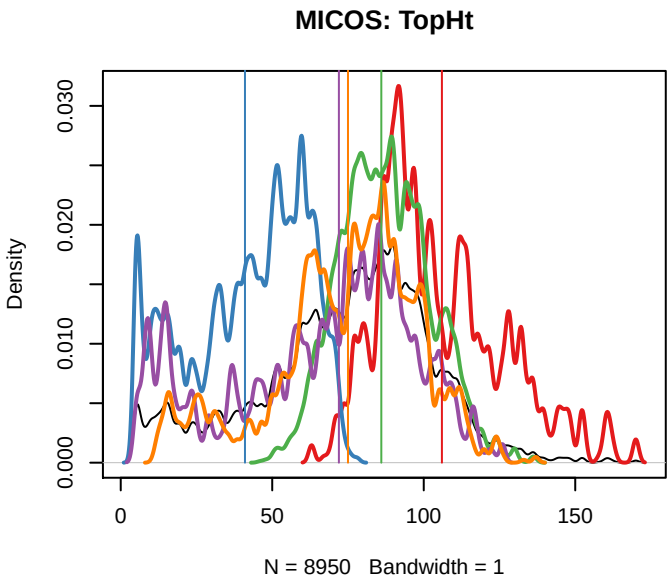


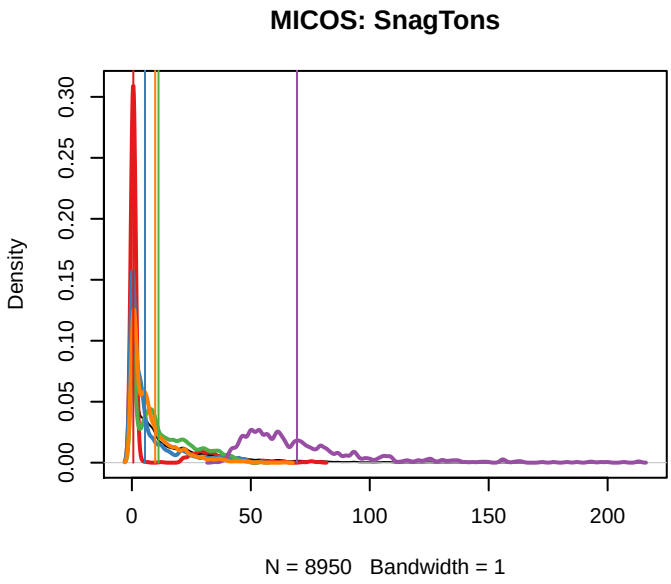


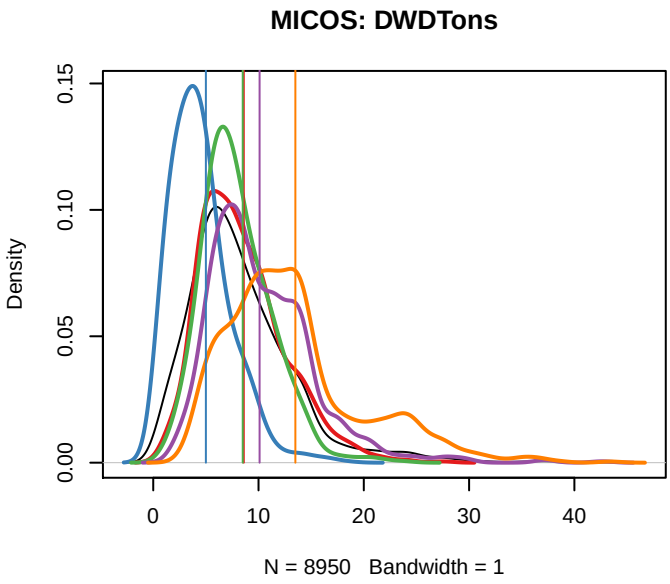
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	40617	23	32	105	7	8
2	127708	258	6.8	42	8	4
3	418206	296	11.2	87	13	8
4	38698	262	9	66	72	10
5	171894	700	6.7	74	8	13
	797123	(2.1%)				





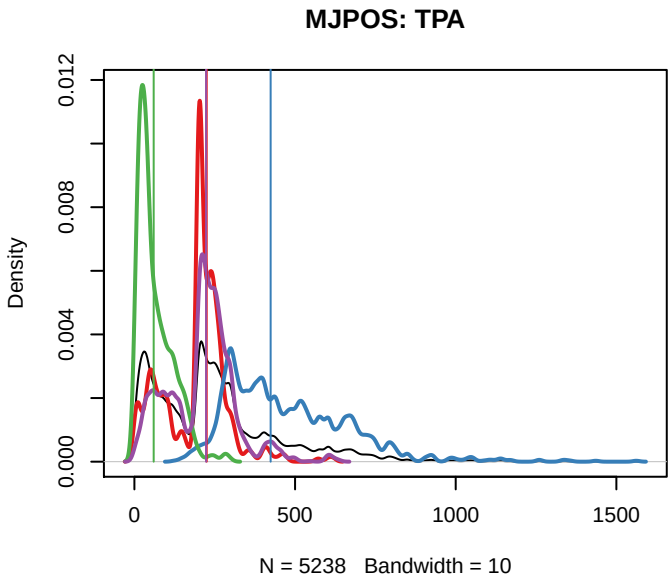


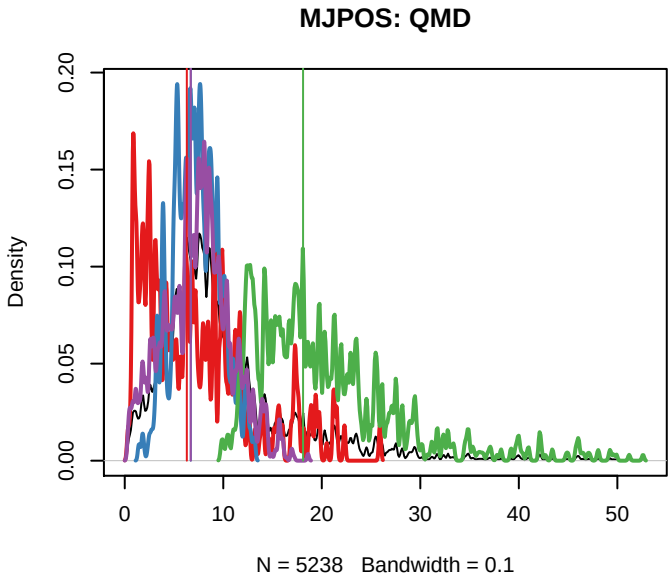


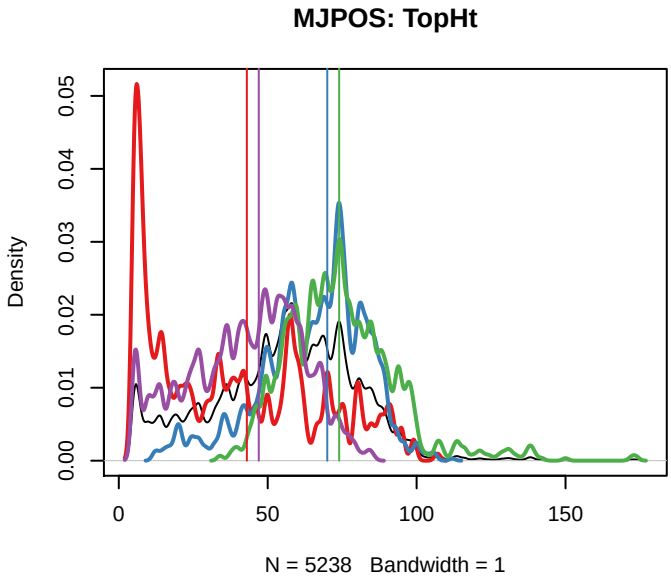


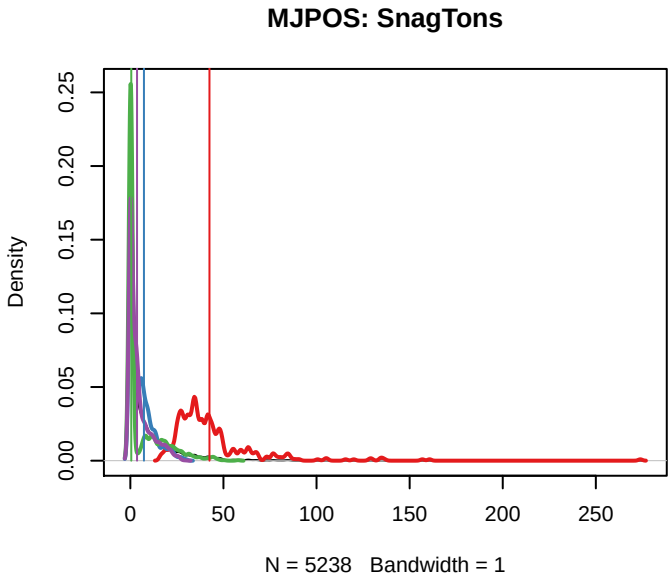


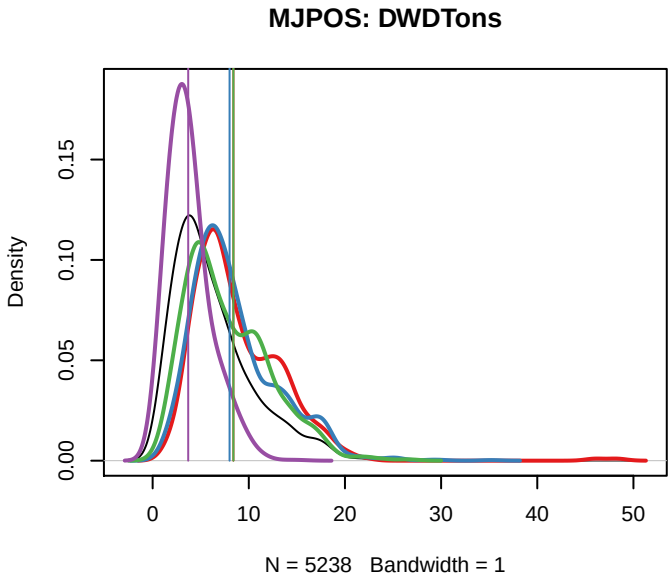
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	18662	192	7.4	38	43	9
2	157290	475	7.3	65	5	8
3	284768	65	20.1	75	6	8
4	197952	209	7.4	42	5	4
	658671	(1.8%)				





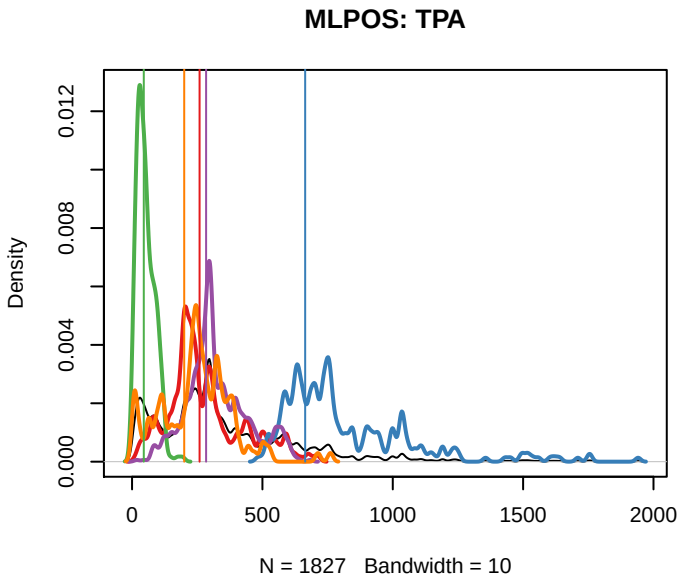


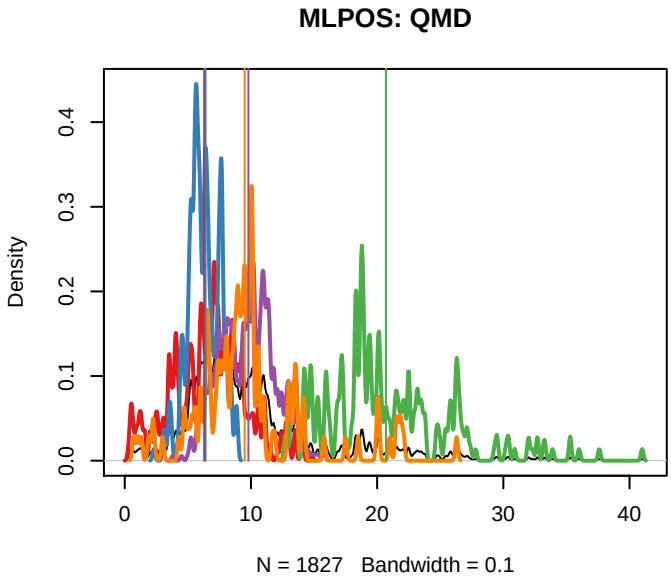


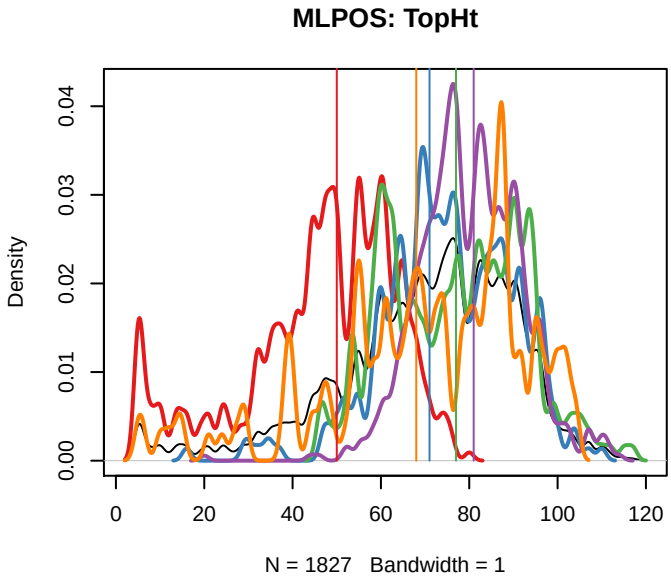


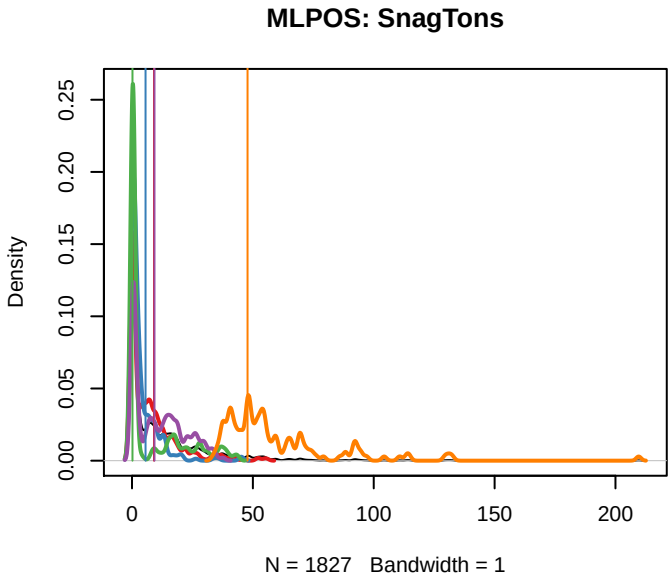


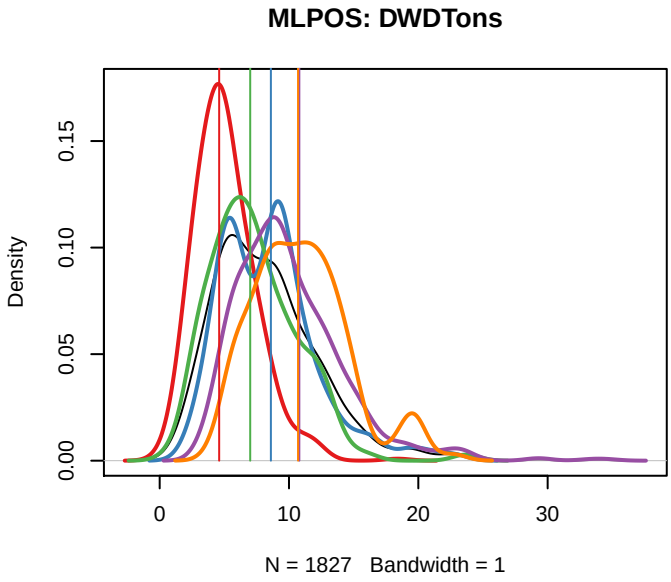
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	60890	282	6.7	47	8	5
2	49609	820	6.2	75	4	8
3	89769	52	20.6	77	8	7
4	190680	326	9.7	80	11	10
5	6236	248	9.8	70	60	11
	397184	(1.1%)				





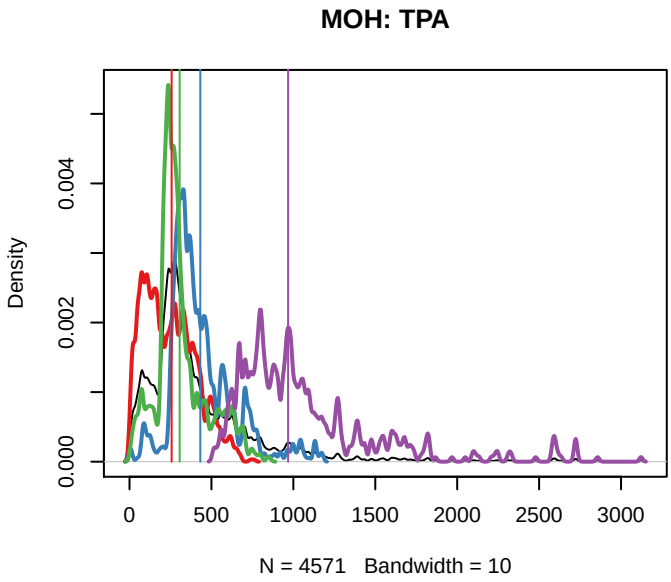


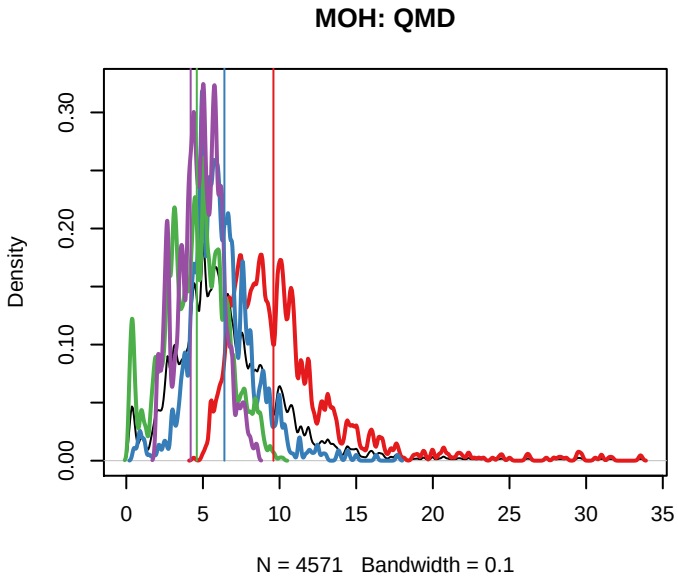


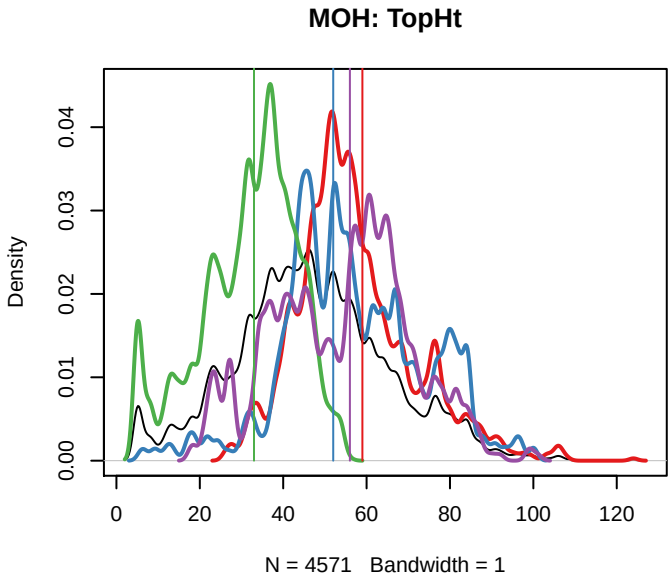


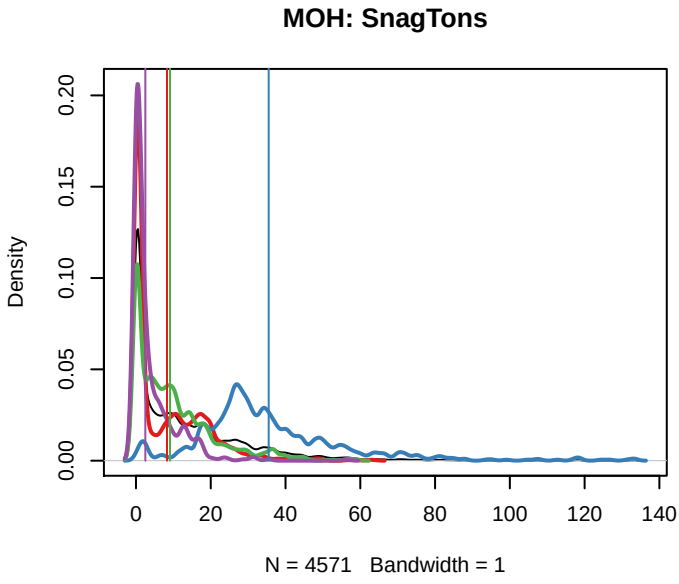


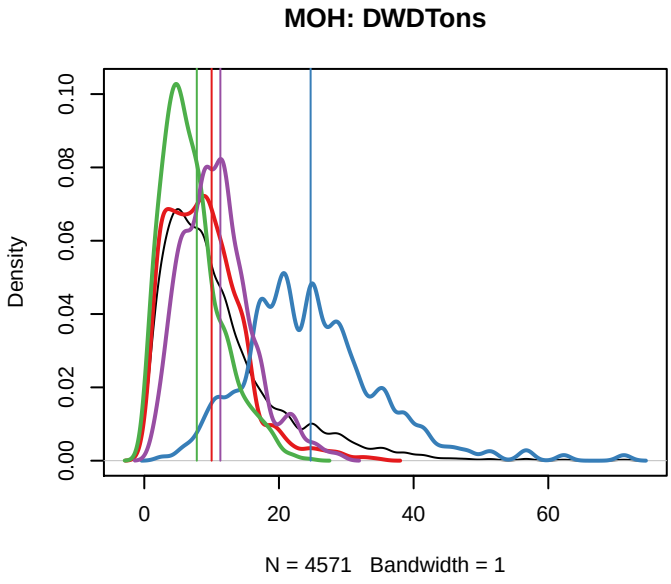
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	832100	246	10.2	57	8	9
2	48212	438	6.2	57	36	25
3	376314	312	4.5	32	10	7
4	286302	1064	4.8	54	4	11
	1542928	(4.1%)				







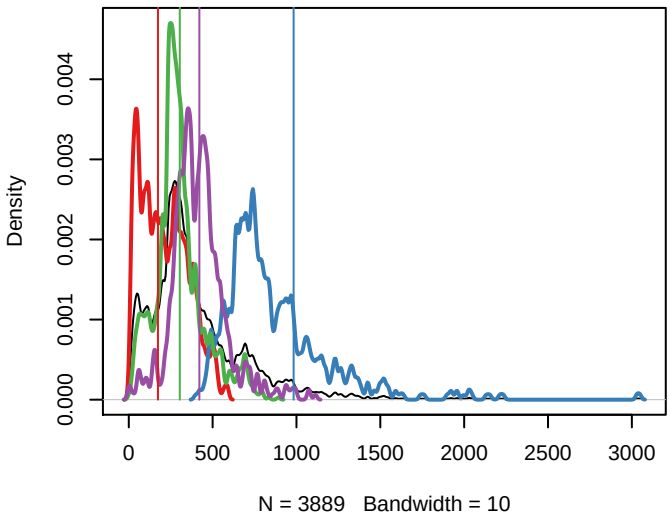




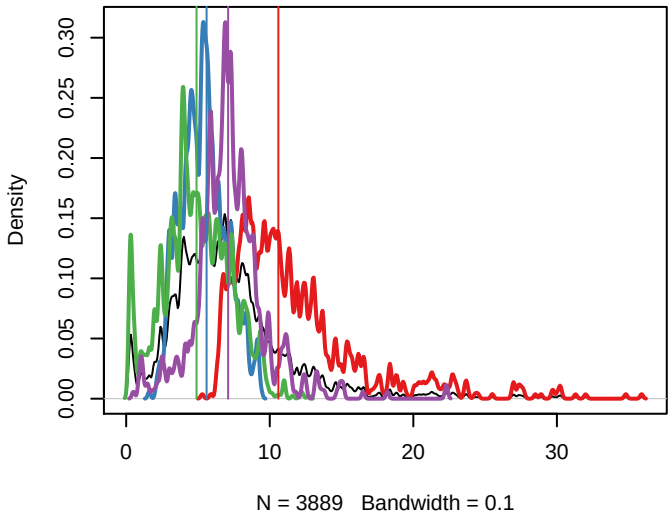
1 2 3 4
5 6 7 8

Group	Acres	TPA	QMD	Ht	Snags	DWD
1	489805	213	11.7	66	6	9
2	294795	866	5.4	61	4	11
3	407009	303	4.9	32	6	6
4	47617	416	7.2	66	35	20
	1239226	(3.3%)				

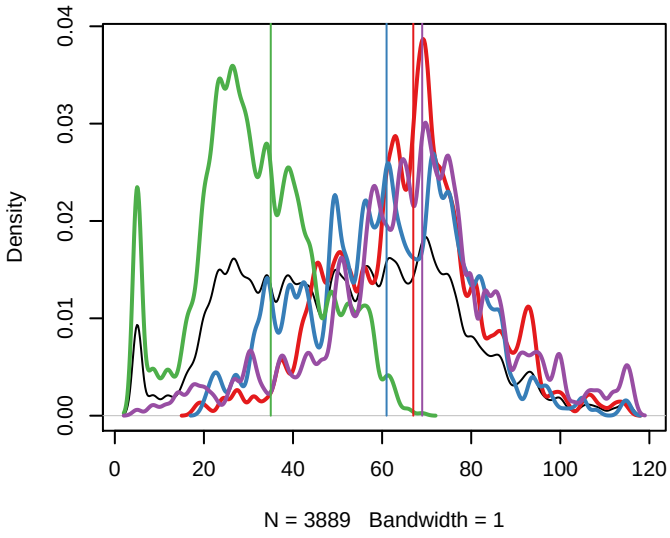
MOHOS: TPA



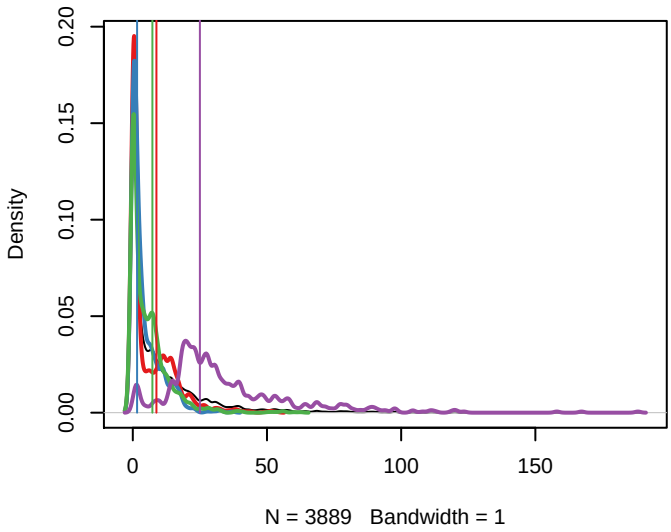
MOHOS: QMD



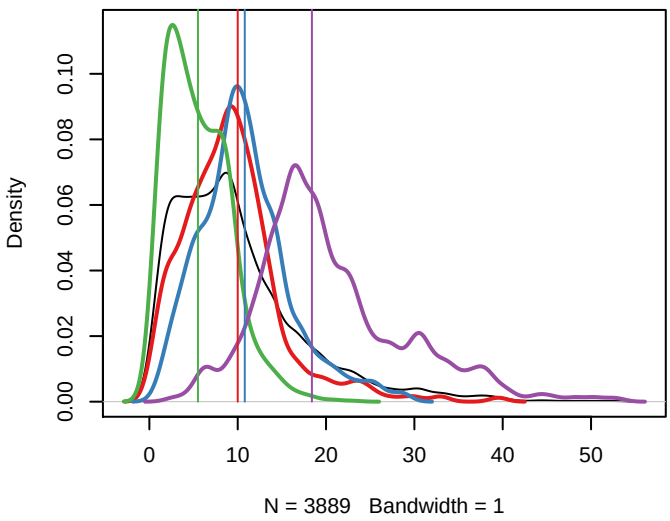
MOHOS: TopHt



MOHOS: SnagTons

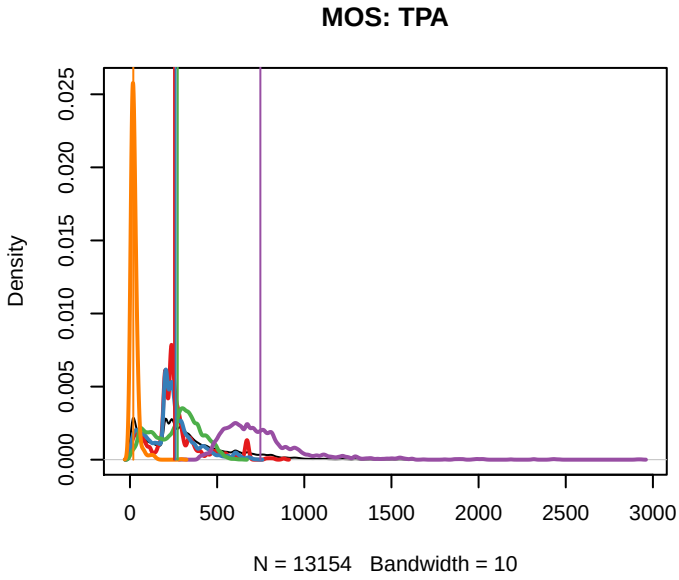


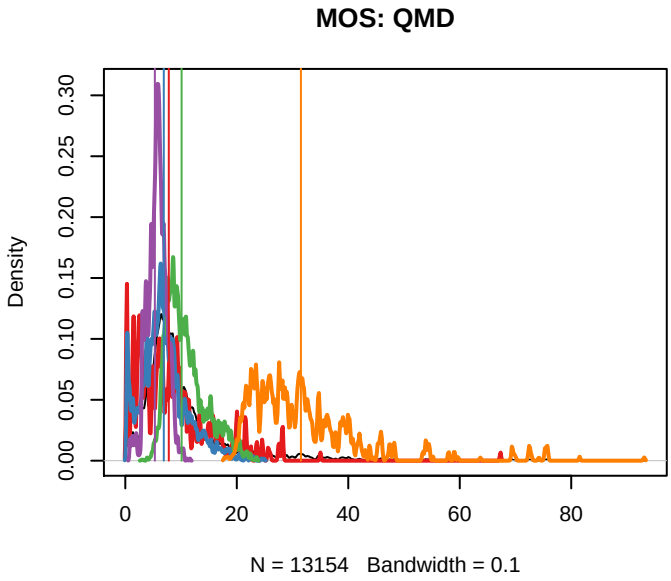
MOHOS: DWDTons

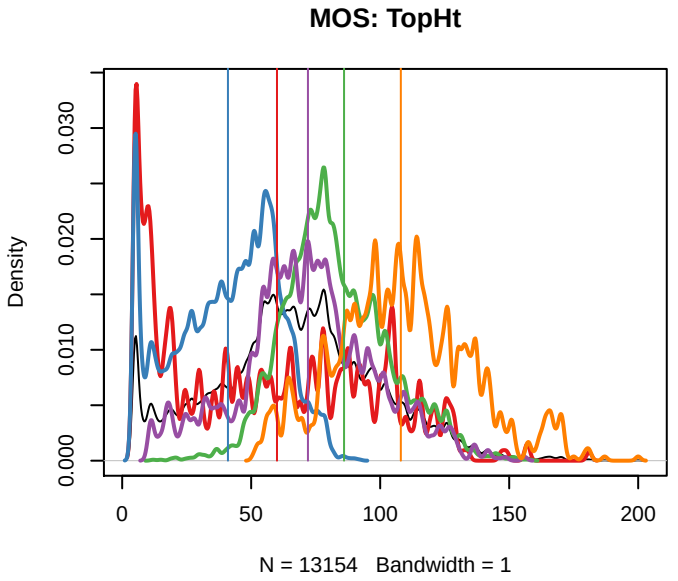


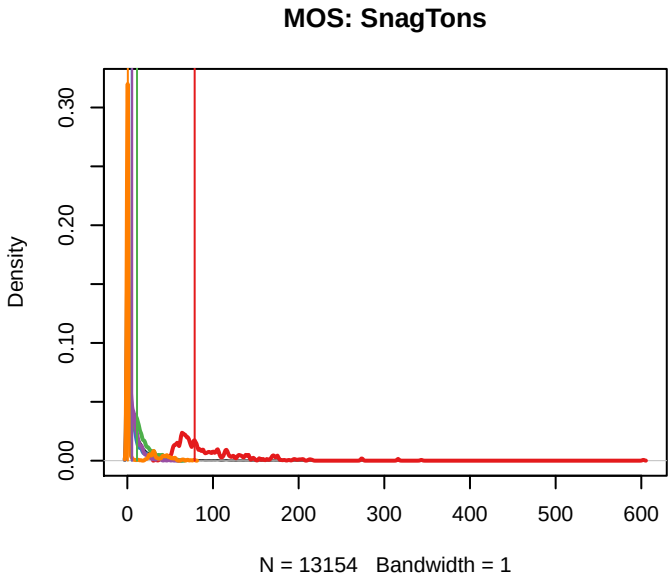


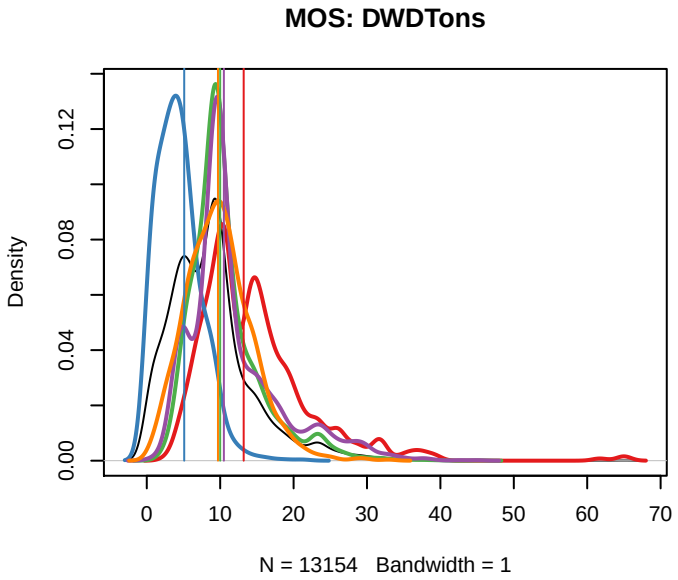
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	56889	257	8.5	56	94	15
2	828190	239	7.1	40	6	4
3	1111696	272	10.8	83	12	11
4	342594	752	5.7	72	6	12
5	88888	23	31.7	108	6	10
	2428256	(6.5%)				





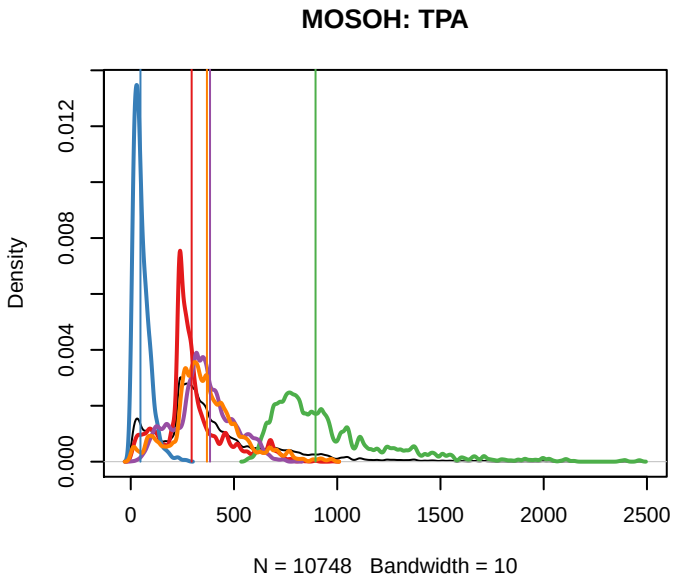


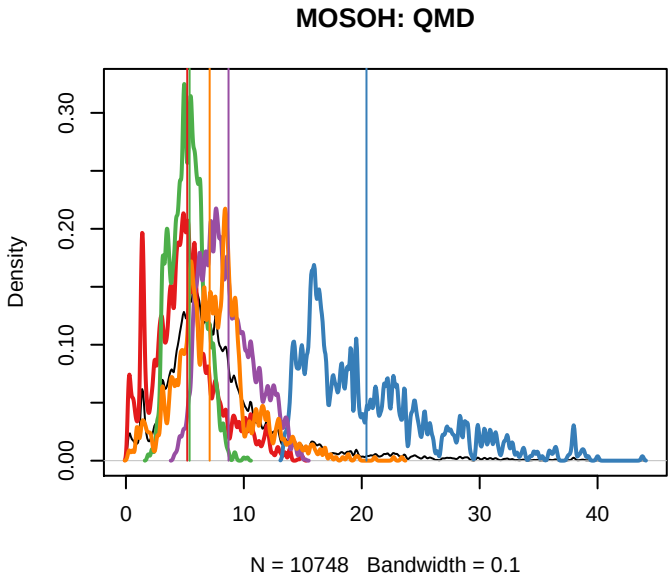


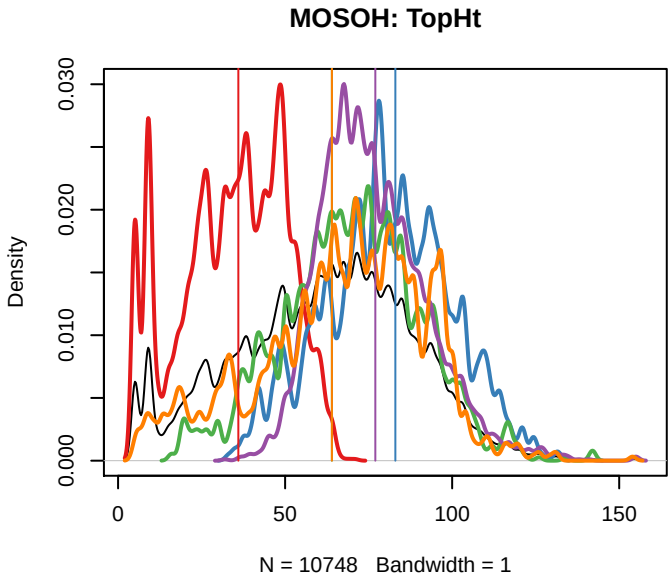


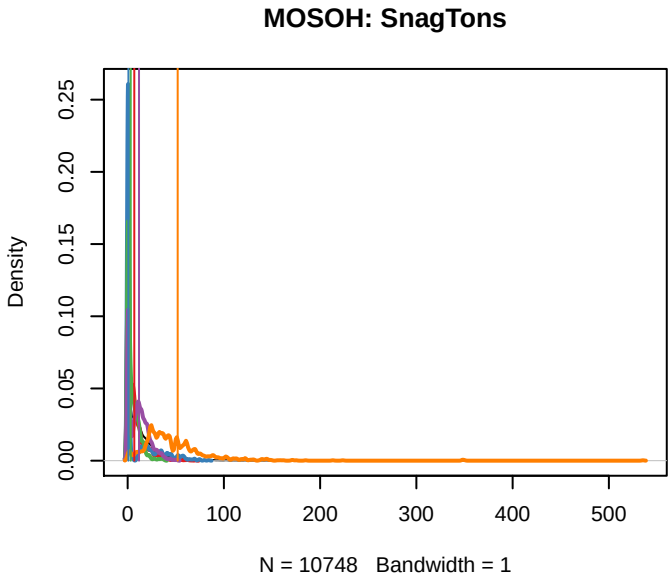


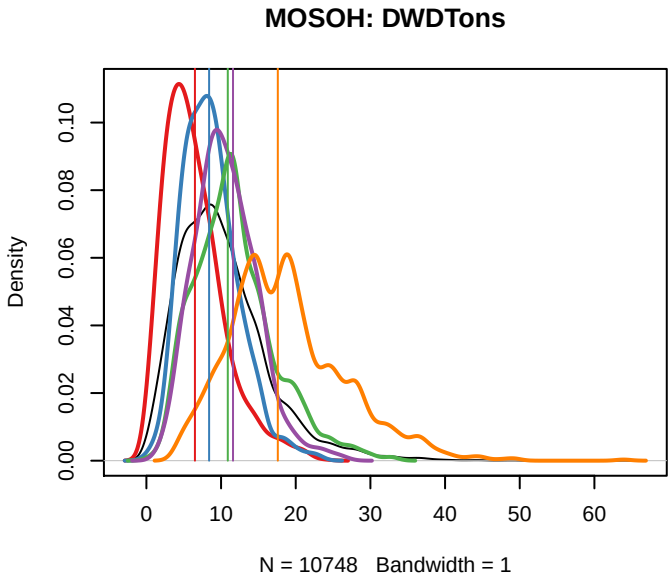
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	536584	296	5	34	8	6
2	178915	52	20.7	80	10	9
3	421269	966	5.2	70	5	12
4	926324	352	8.6	76	11	11
5	72880	364	7.5	67	47	19
	2135972	(5.7%)				





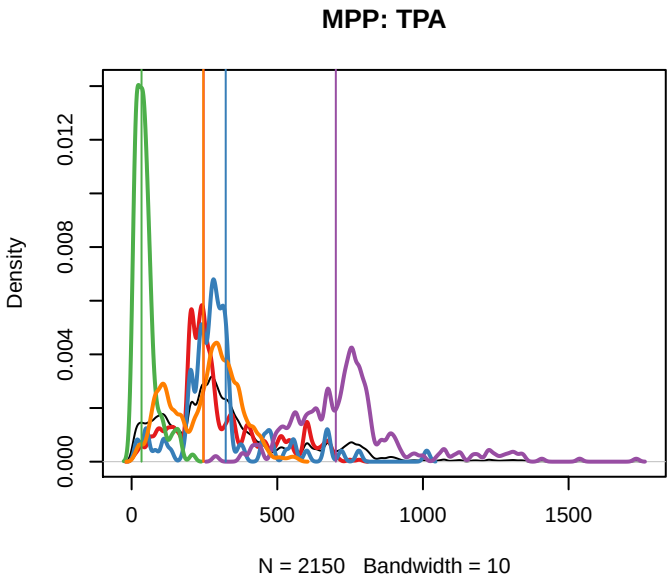


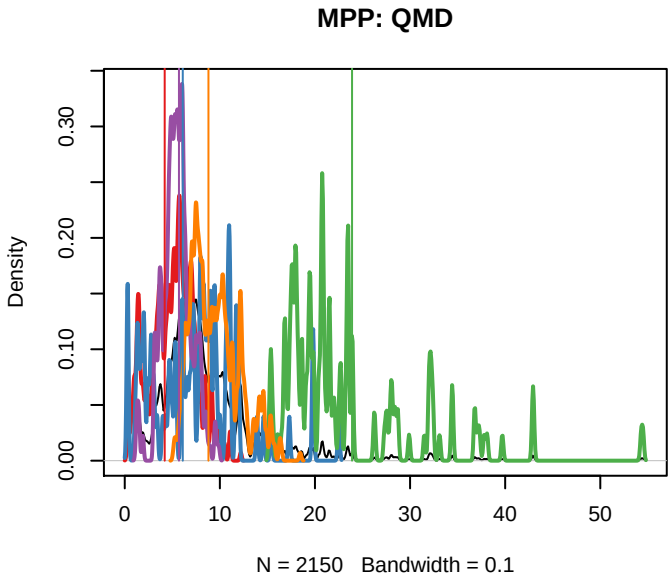


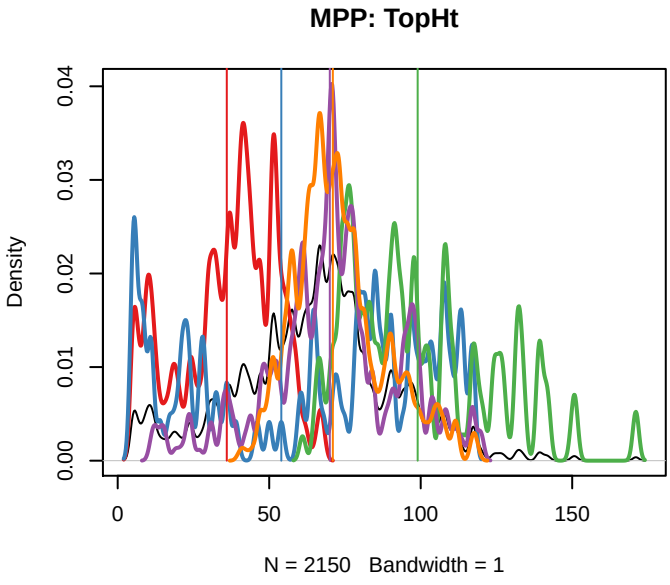


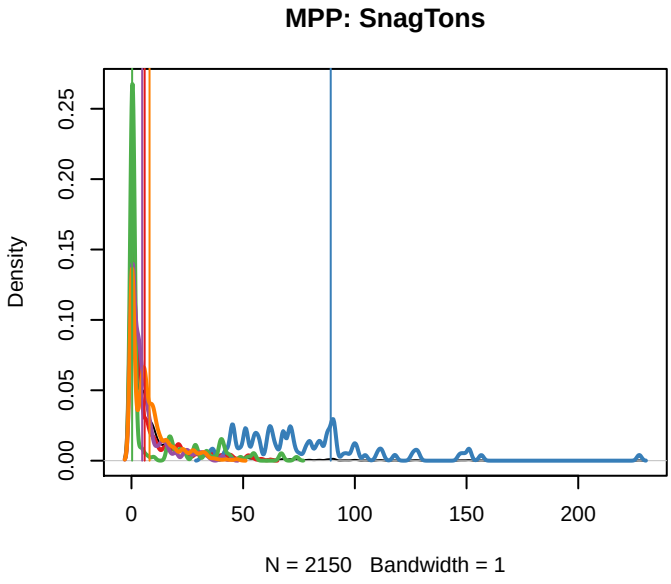
1 2 3 4
5 6 7 8

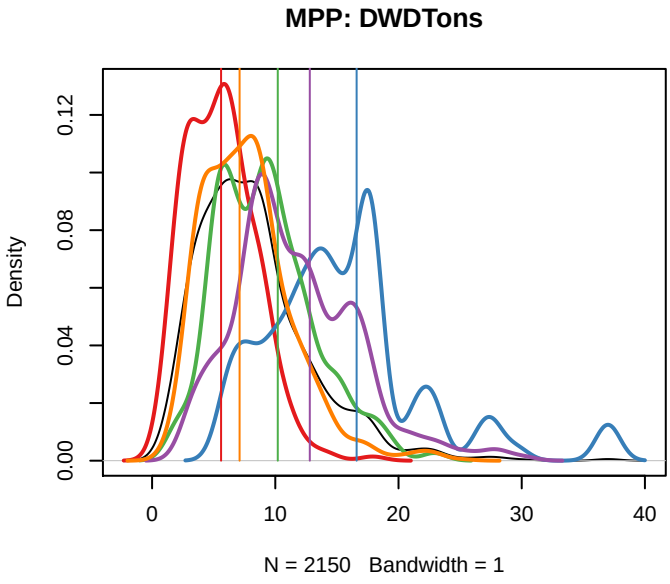
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	30782	297	5.1	37	8	6
2	6378	307	7.6	65	78	16
3	15227	46	23.4	99	9	9
4	29351	745	5.5	71	6	12
5	132084	254	9.5	73	8	8
	213822	(0.6%)				





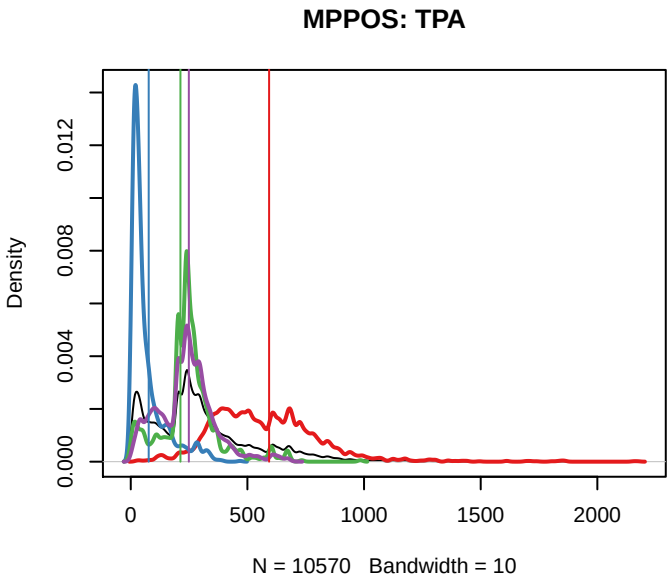


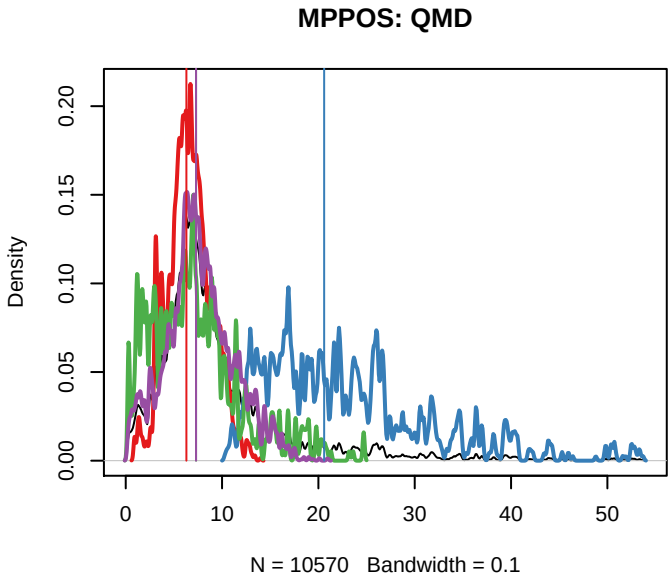


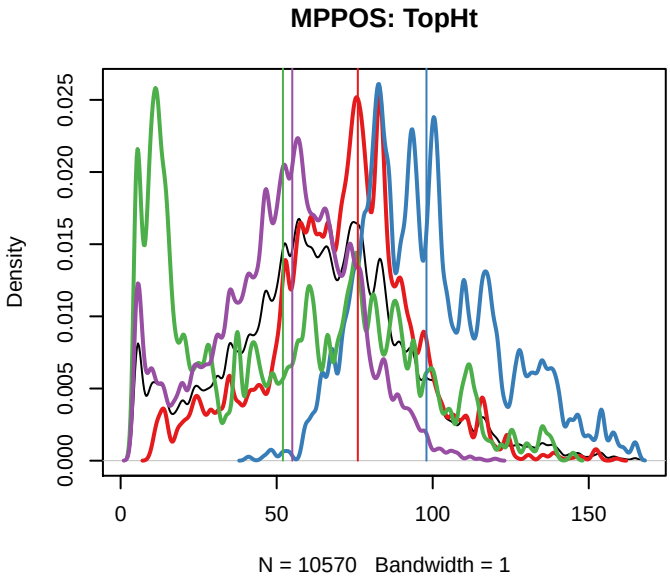


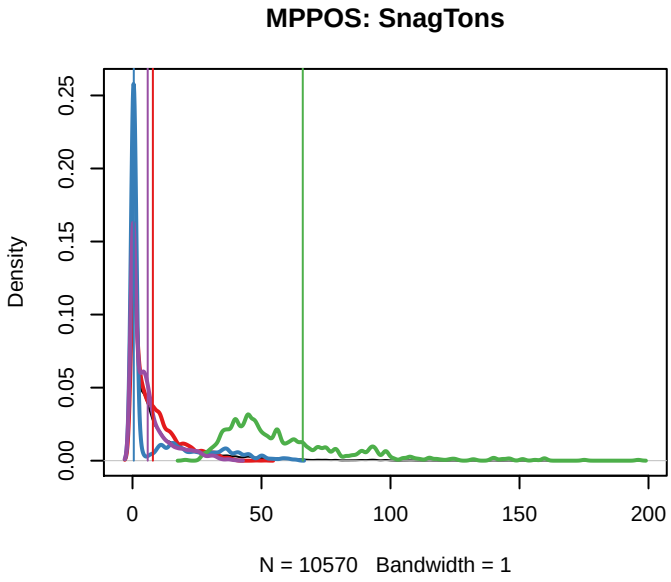


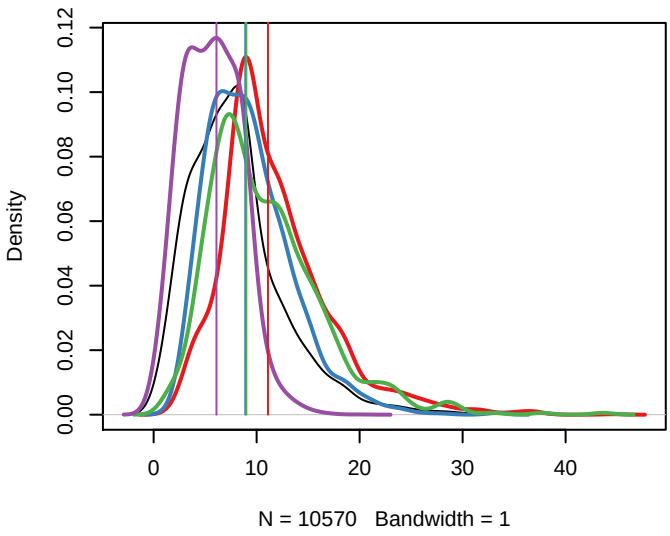
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	325317	574	6.6	71	8	12
2	130277	67	22.8	99	9	9
3	26934	250	7.2	54	59	11
4	512383	239	7.7	52	6	6
	994912	(2.7%)				





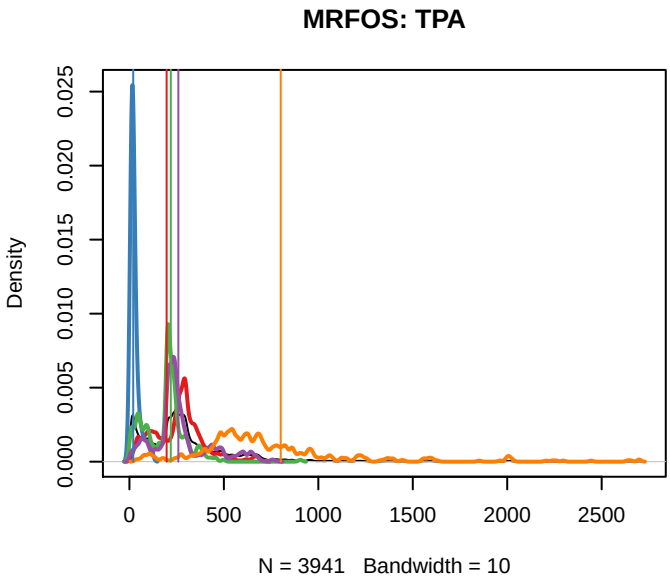


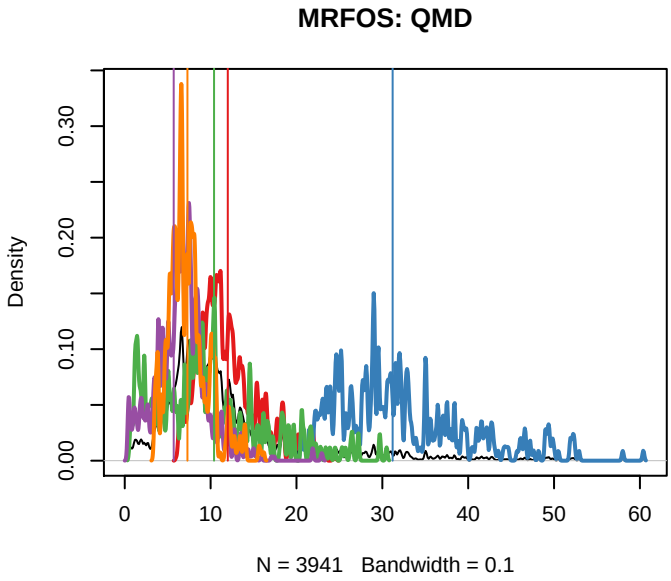


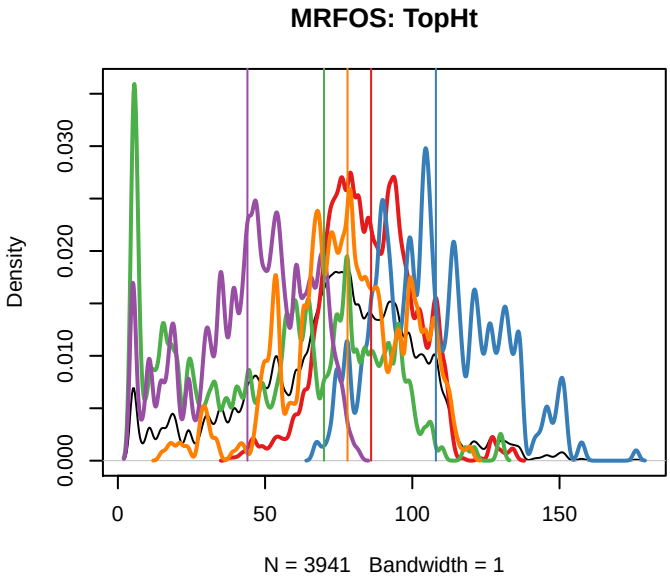


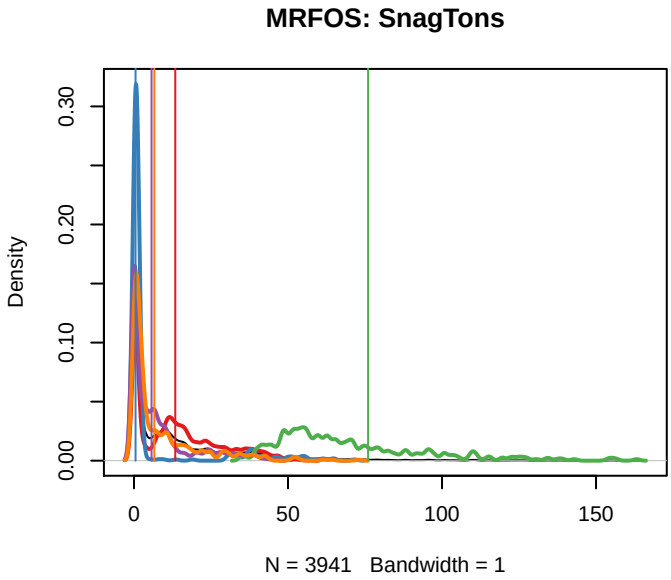


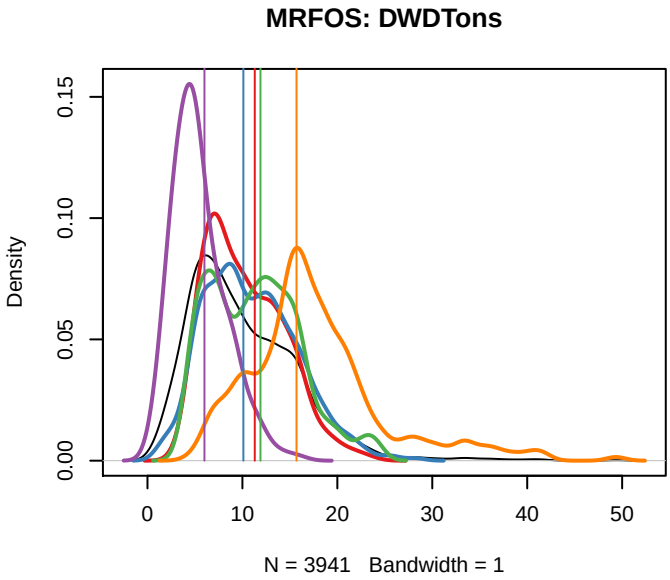
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	313419	259	12.1	86	14	10
2	75429	26	32.2	108	6	11
3	17239	189	9.8	54	70	11
4	80559	270	6.6	46	7	5
5	126219	720	7.4	78	9	18
	612865	(1.6%)				





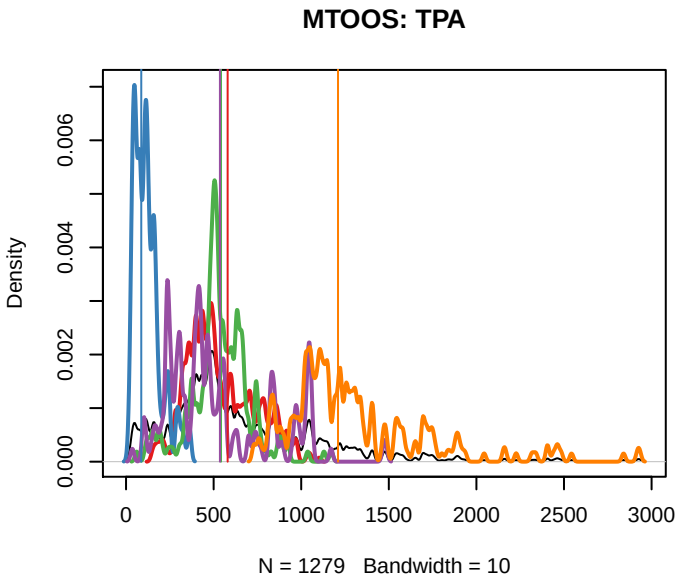


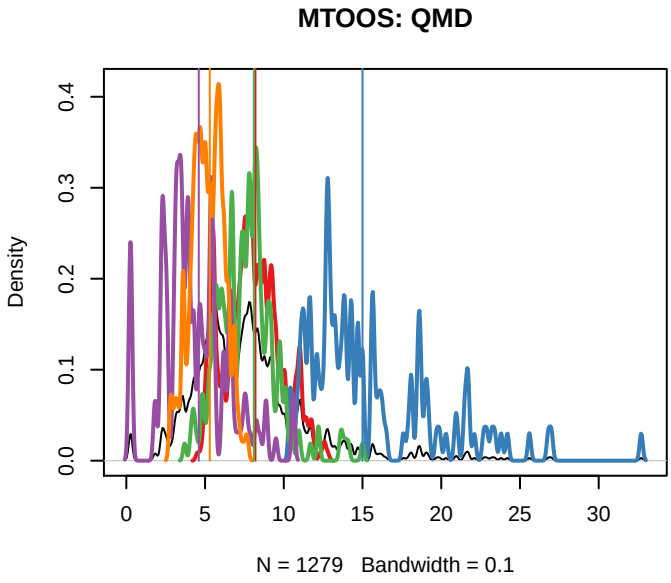


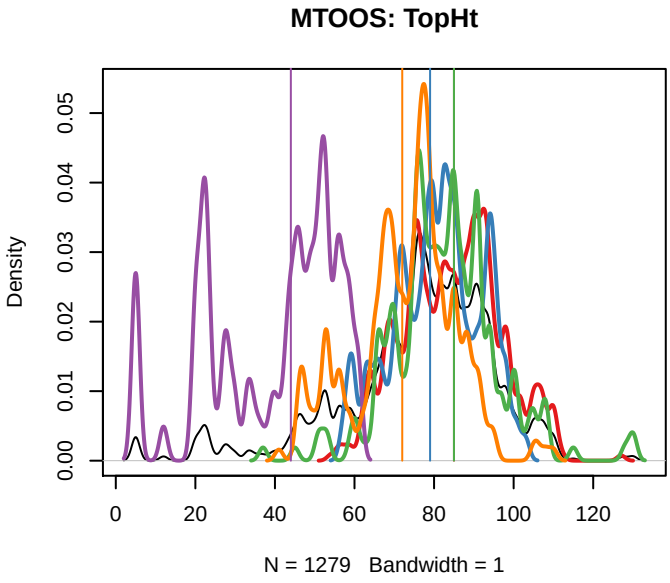


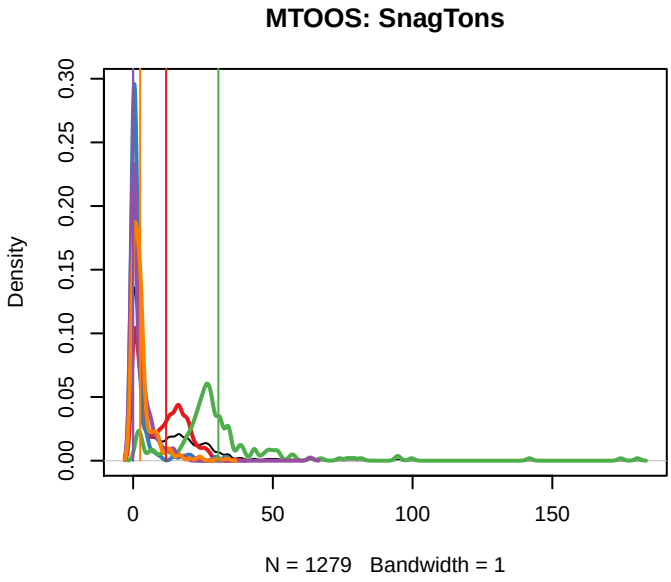


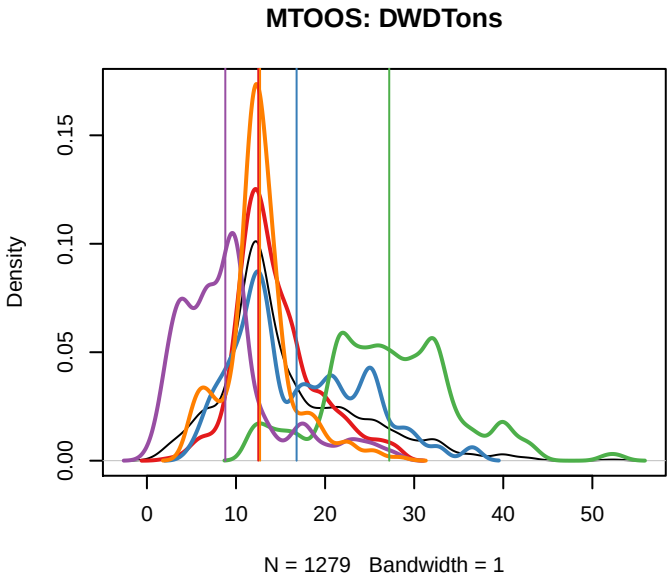
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	341076	537	8	85	9	14
2	27883	121	15.5	81	2	17
3	9852	536	7.7	83	31	27
4	44475	523	4.3	40	3	9
5	150969	1302	5.2	73	3	13
	574255	(1.5%)				





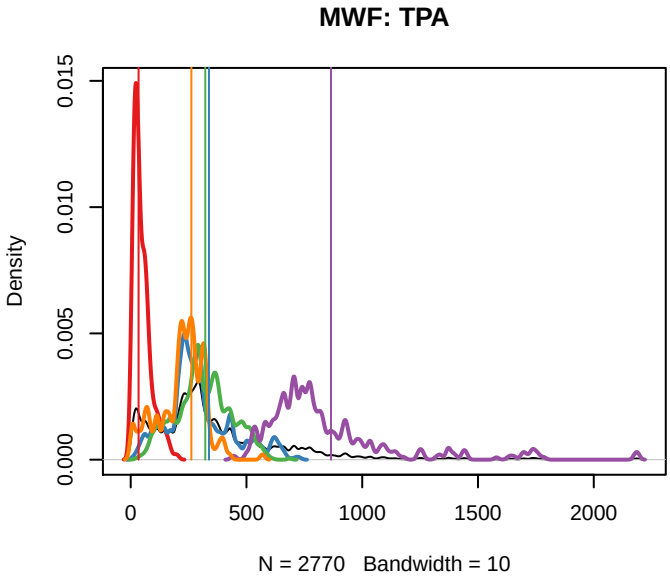


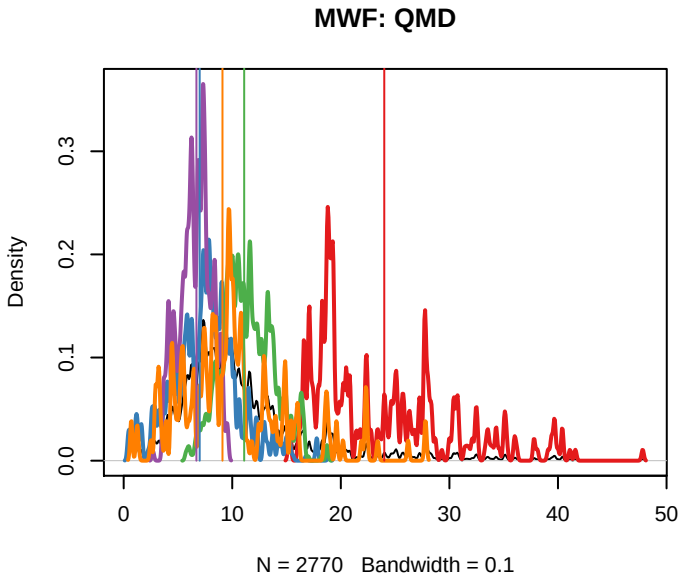


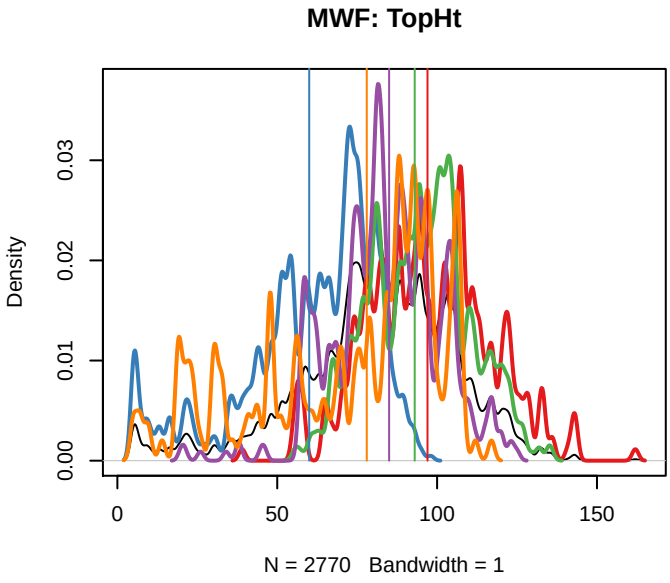


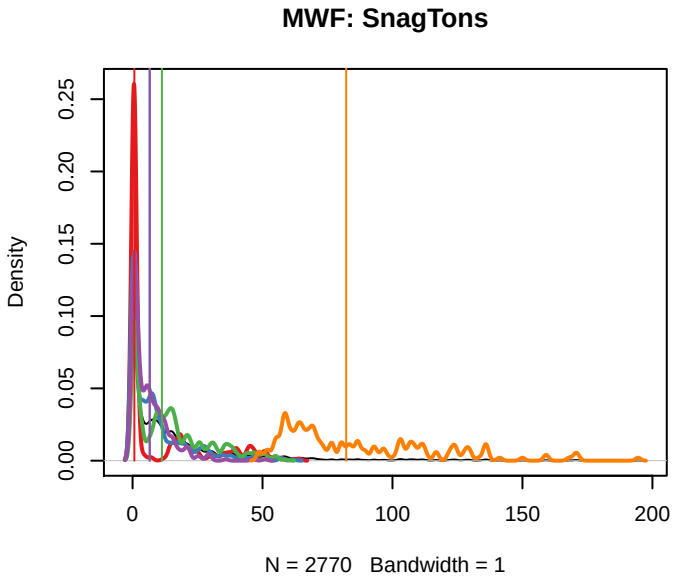


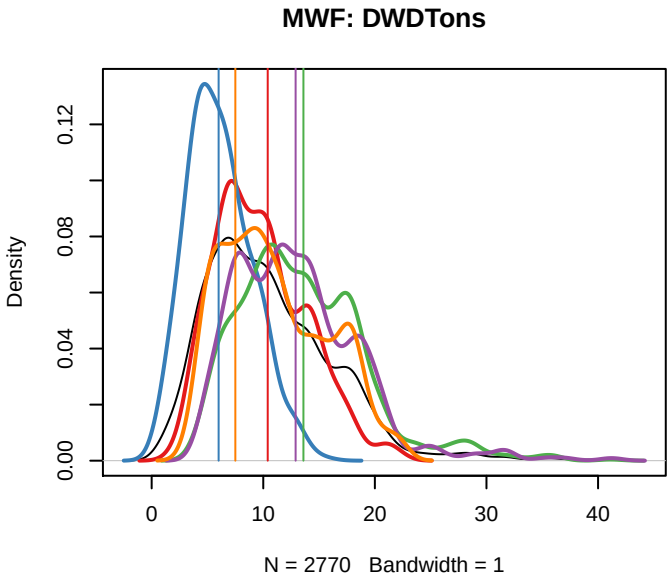
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	38156	49	23.7	97	10	10
2	51390	296	7.5	60	9	6
3	159721	314	11.4	95	15	13
4	87923	845	6.6	84	6	13
5	13585	221	10	73	87	11
	350775	(0.9%)				





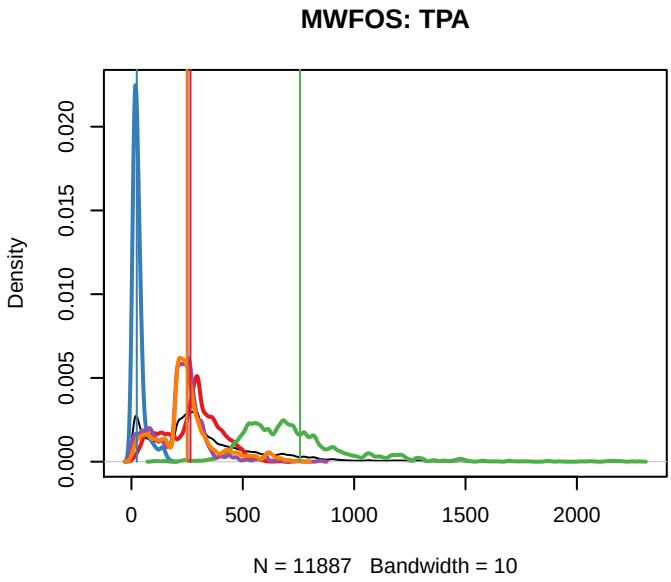


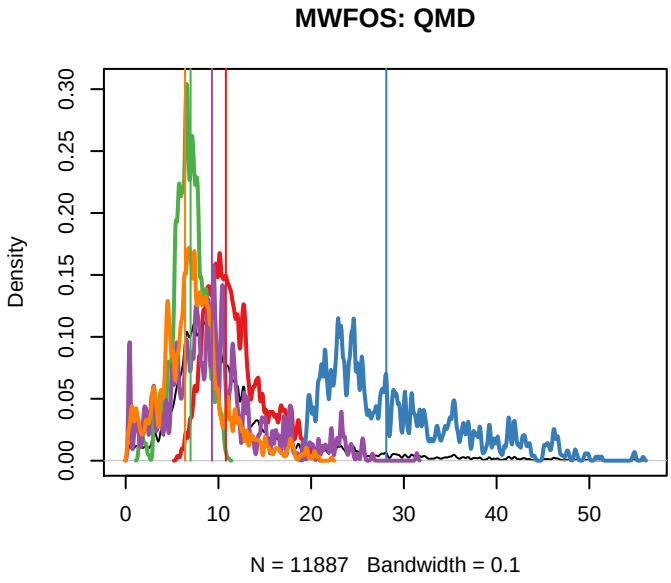


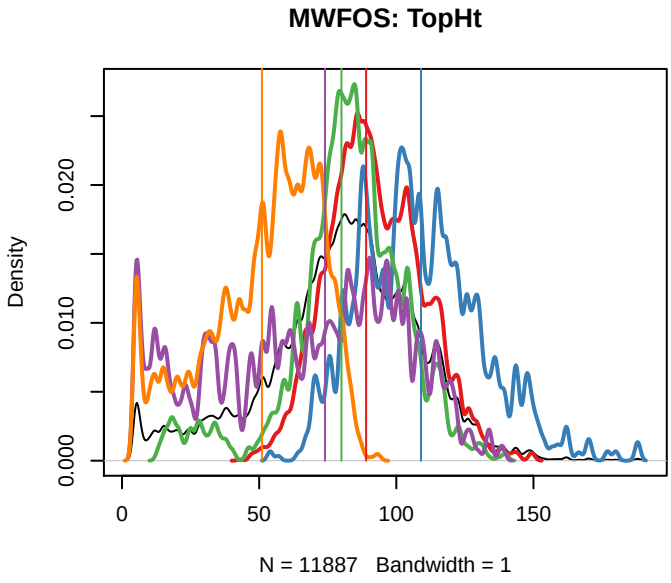


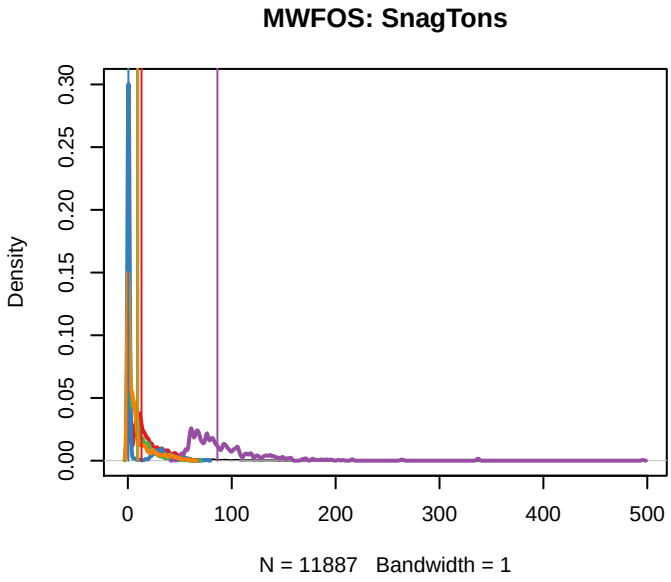


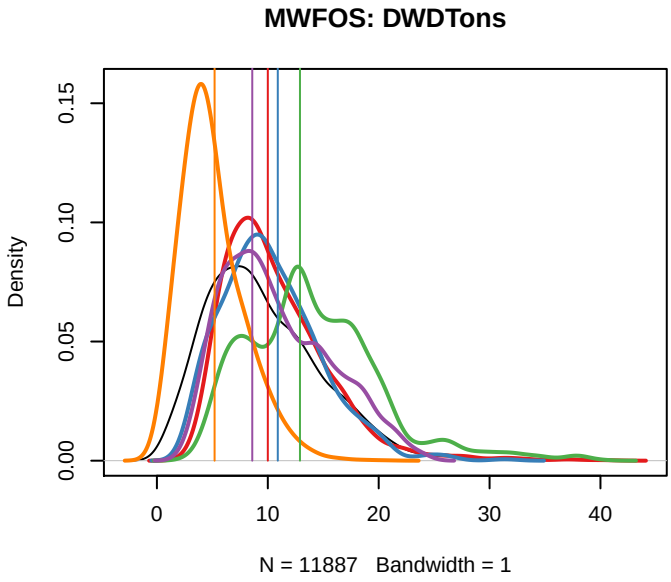
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	742945	275	11.6	92	14	11
2	94351	31	29.1	108	7	10
3	293264	735	6.8	83	8	14
4	35178	222	9.6	68	92	11
5	200783	248	7.5	52	9	5
	1366521	(3.7%)				





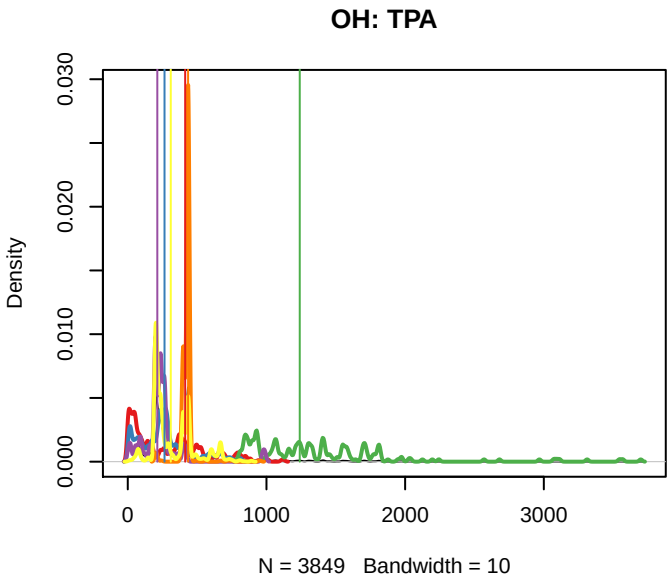


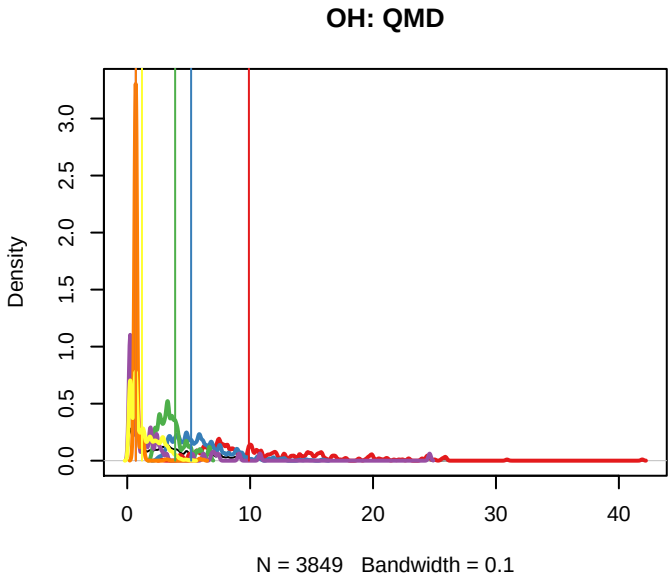


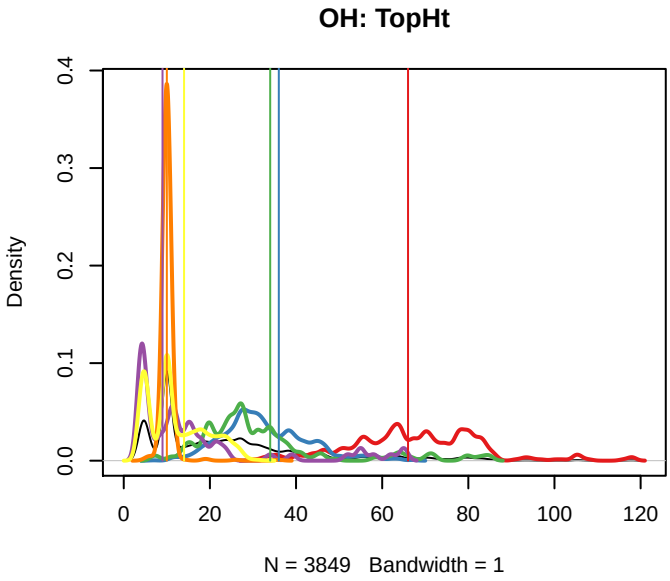


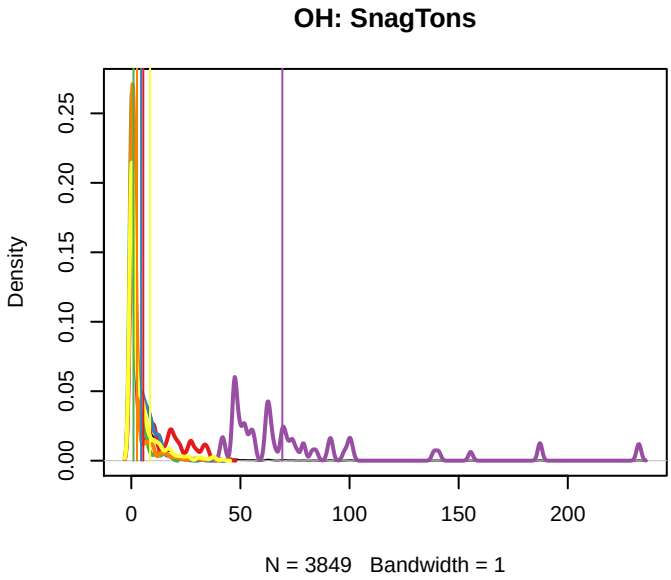


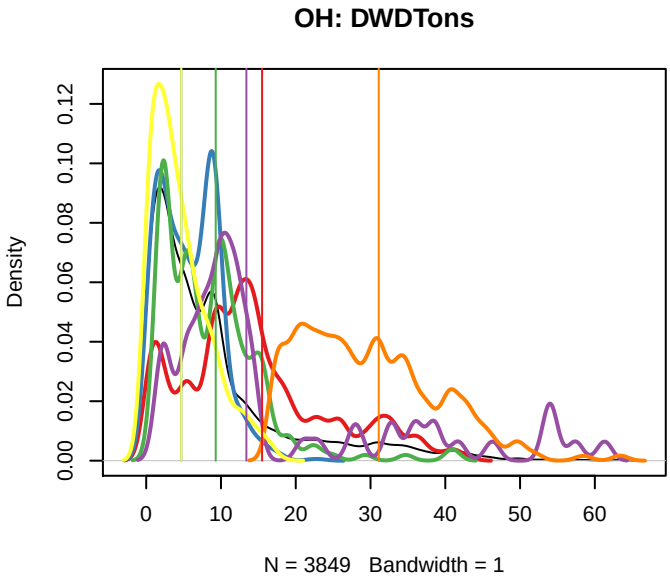
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	201528	296	11.2	68	8	14
2	378281	269	6	33	4	6
3	78636	1368	3.7	32	2	9
4	1483	238	2.1	17	77	17
5	20405	426	0.8	10	3	30
6	119182	321	1.4	12	4	5
	799515	(2.1%)				





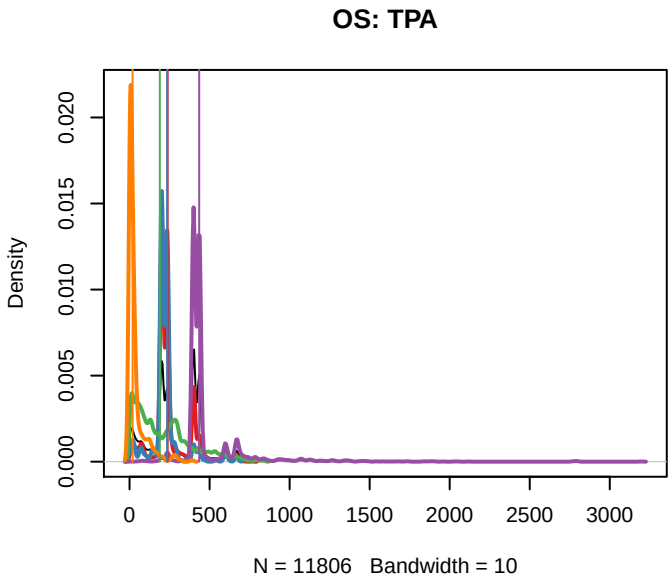


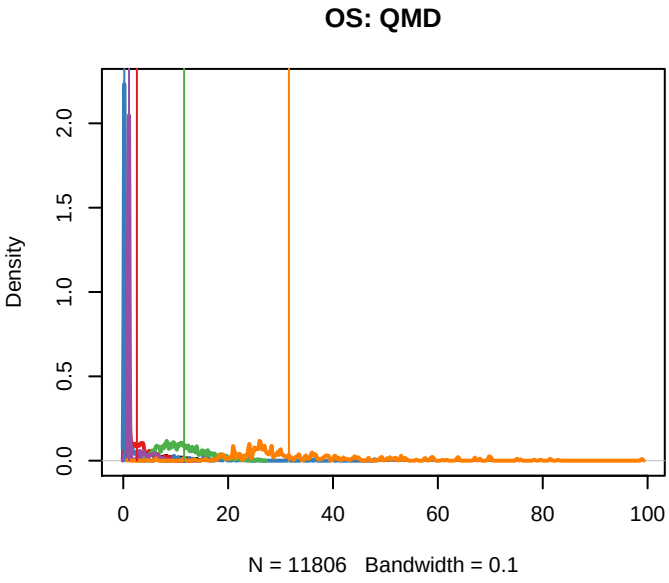


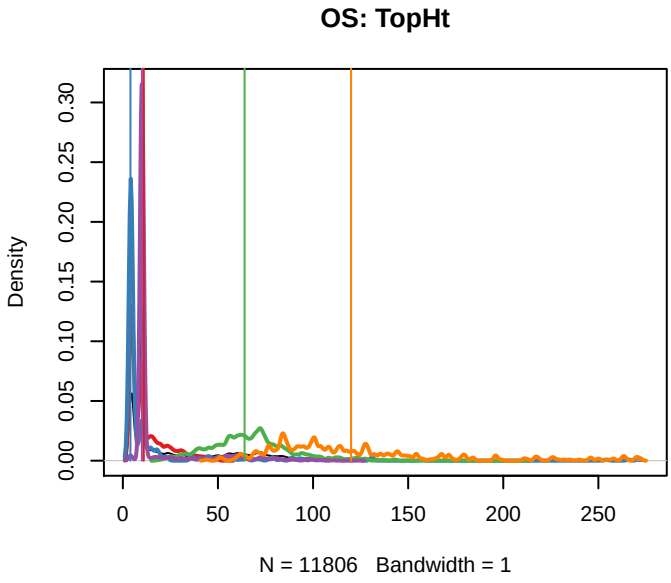


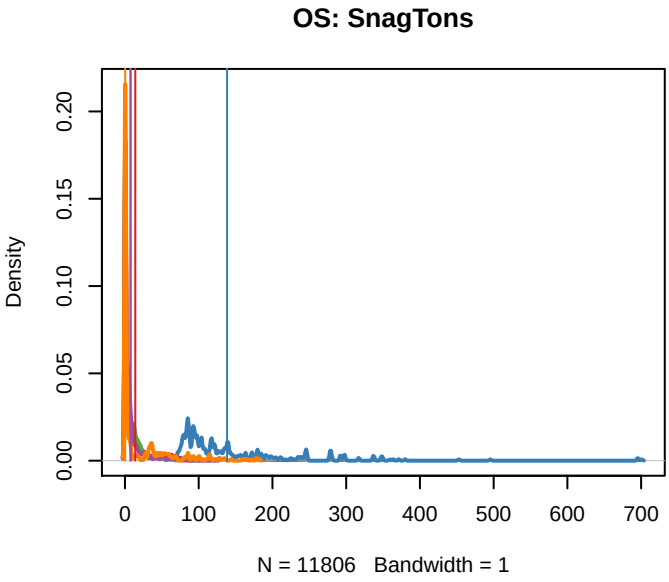


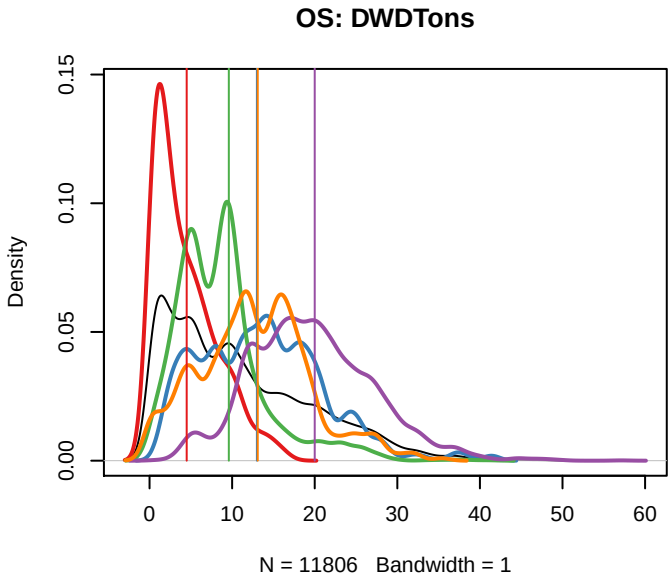
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	594935	255	2.1	12	12	4
2	18072	223	3.2	16	143	14
3	789796	215	11.7	67	8	9
4	223537	487	1.7	17	8	20
5	188471	35	33.6	120	20	13
	1814811	(4.9%)				





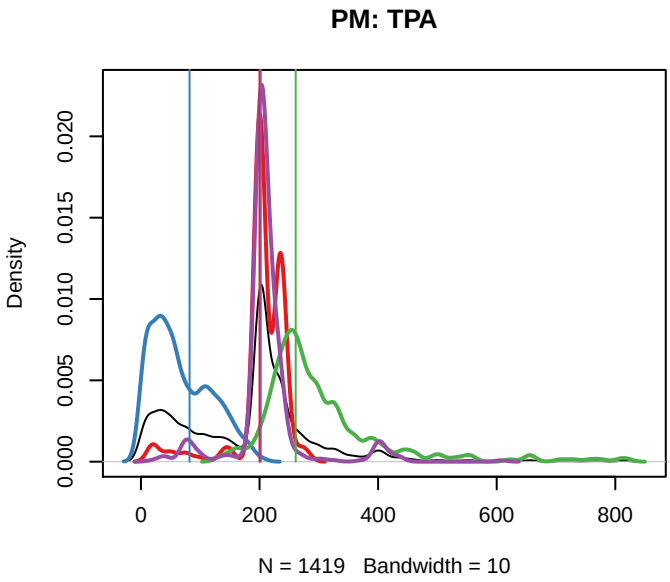


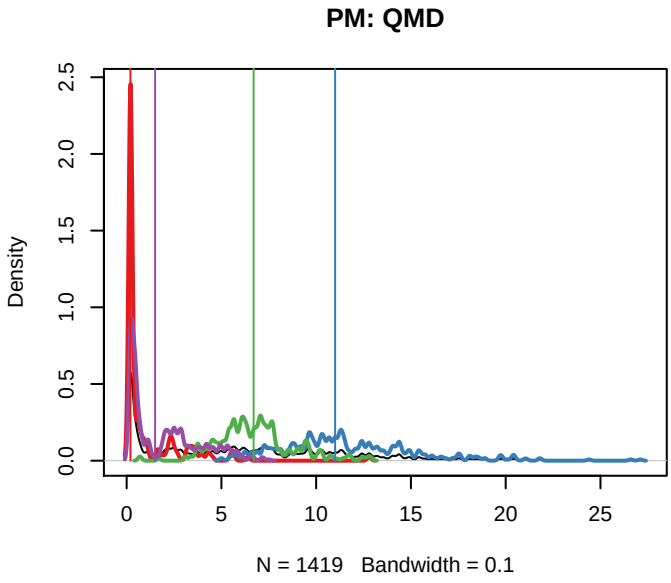


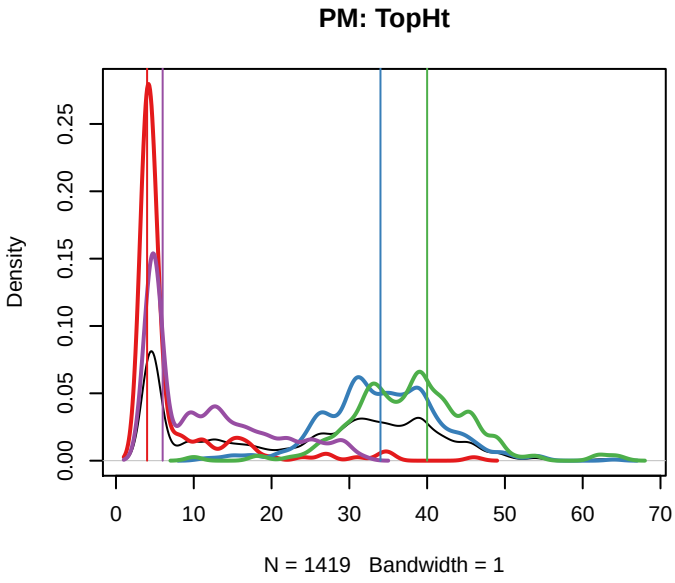


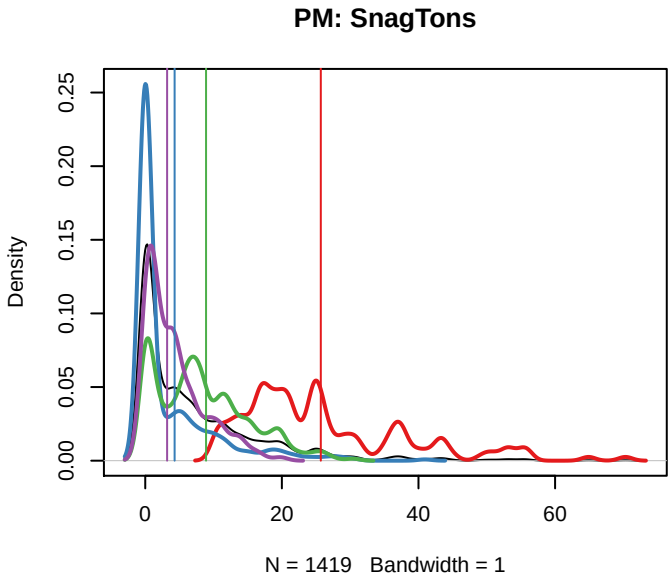


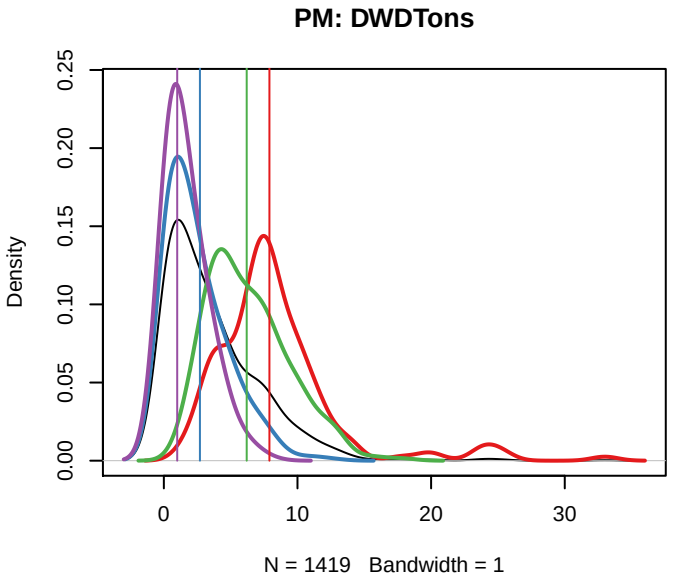
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	6897	203	1	7	26	8
2	719869	68	11.6	34	3	2
3	175751	302	6.8	38	8	6
4	83786	212	2	11	4	2
	986304	(2.6%)				





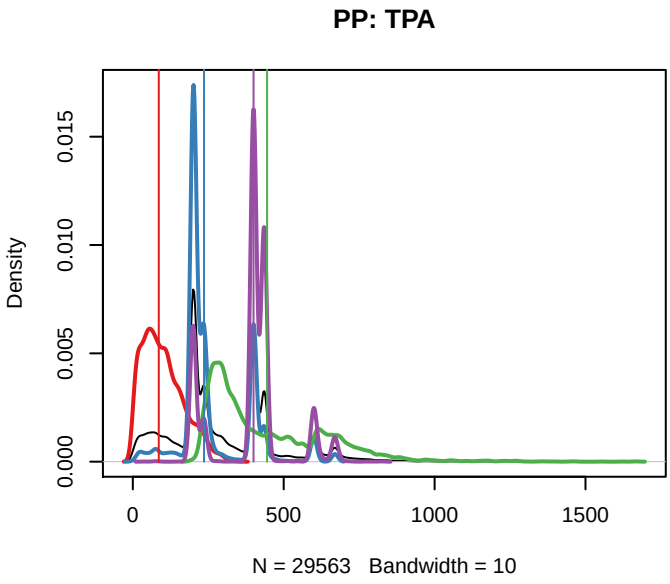


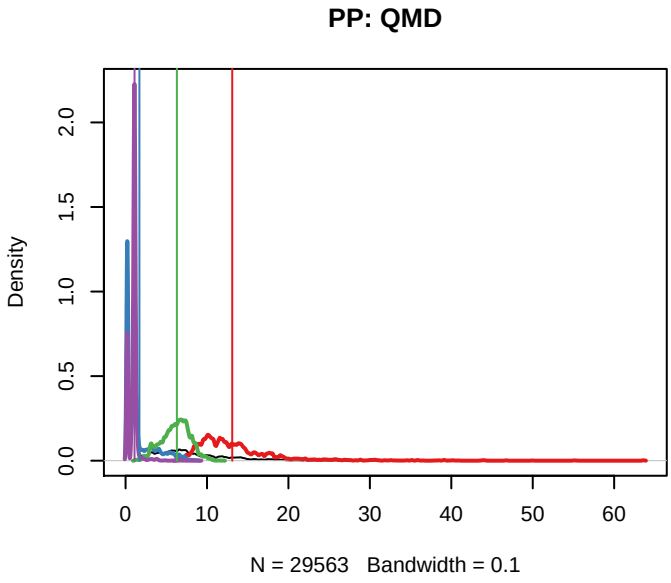


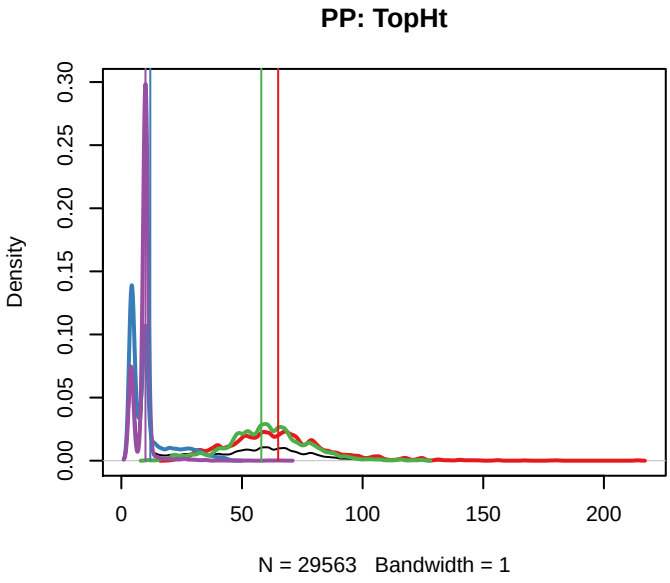


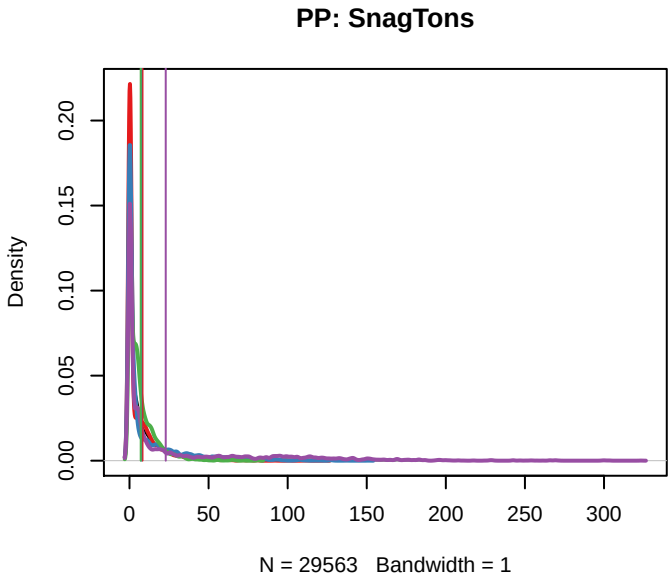
1 2 3 4
5 6 7 8

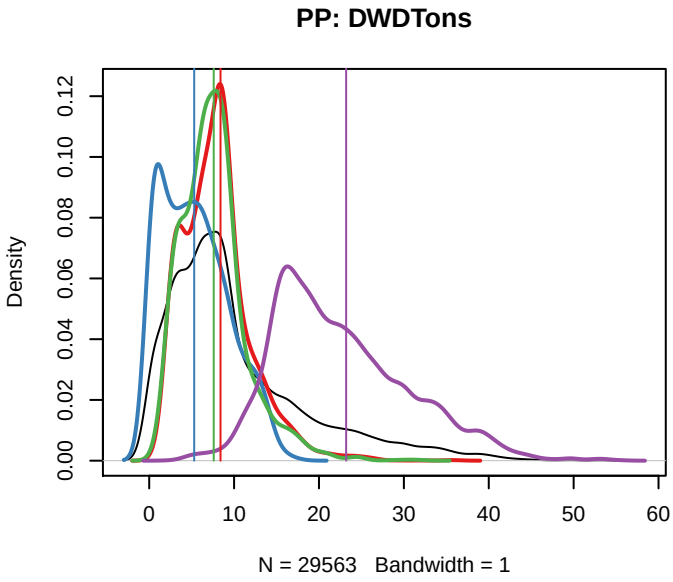
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	1093475	100	13.5	65	6	8
2	356962	262	1.7	11	11	5
3	393030	443	6.2	60	7	8
4	101877	392	1	9	29	23
	1945344	(5.2%)				





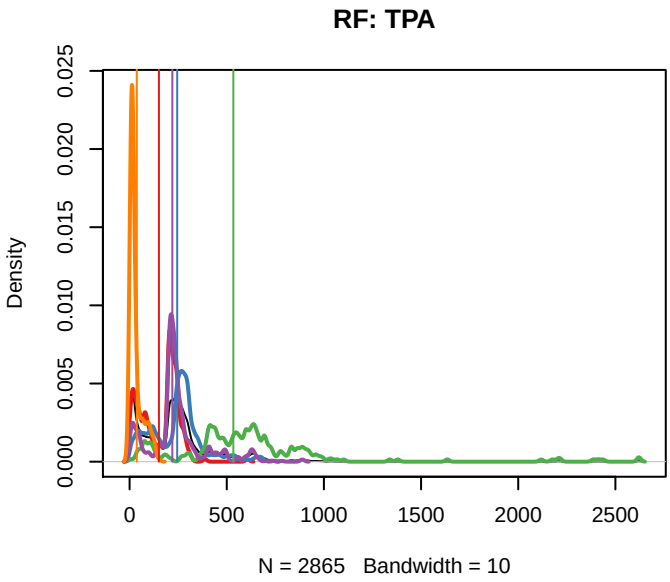


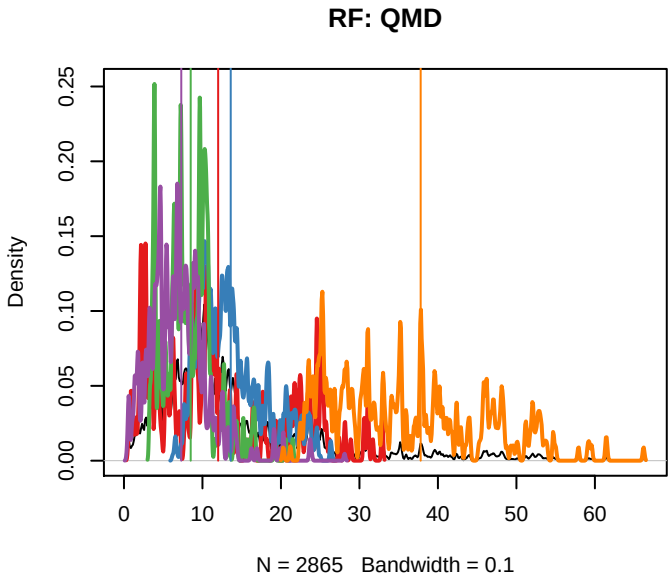


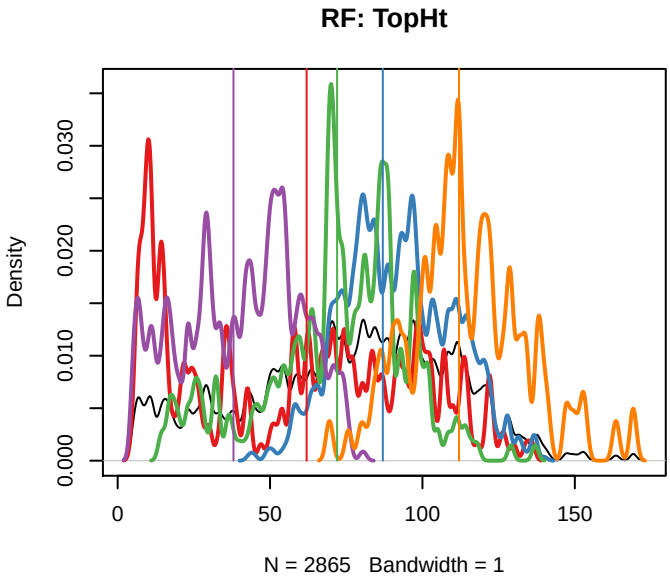


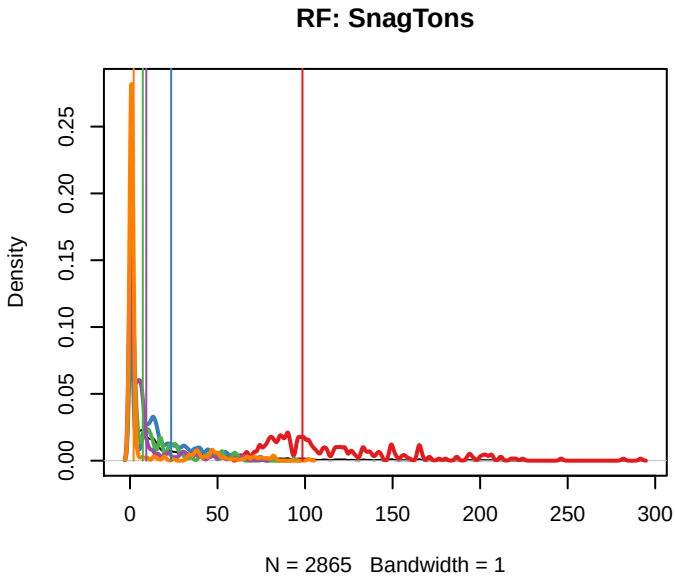


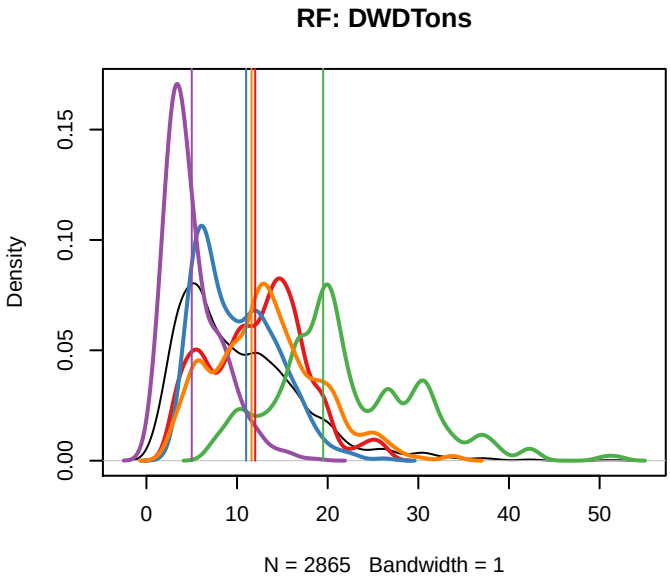
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	26979	156	12.1	59	117	12
2	236835	242	13.7	92	19	10
3	60952	608	8.3	72	11	22
4	51446	241	6.9	40	9	5
5	75018	30	35.8	114	10	13
	451230	(1.2%)				





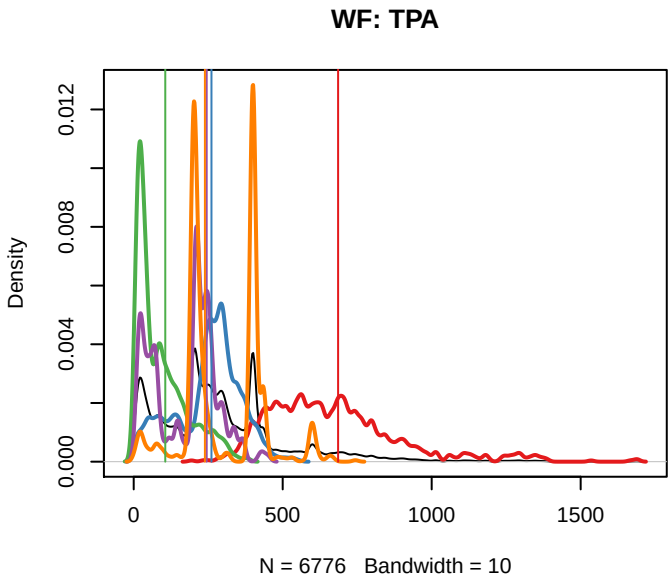


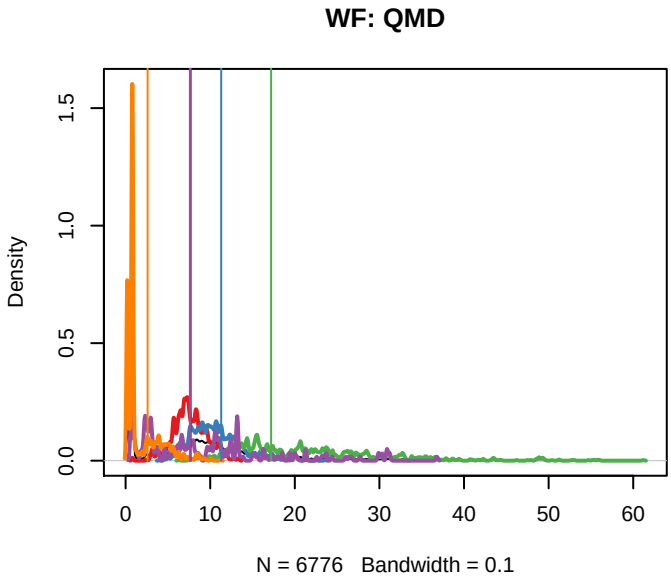


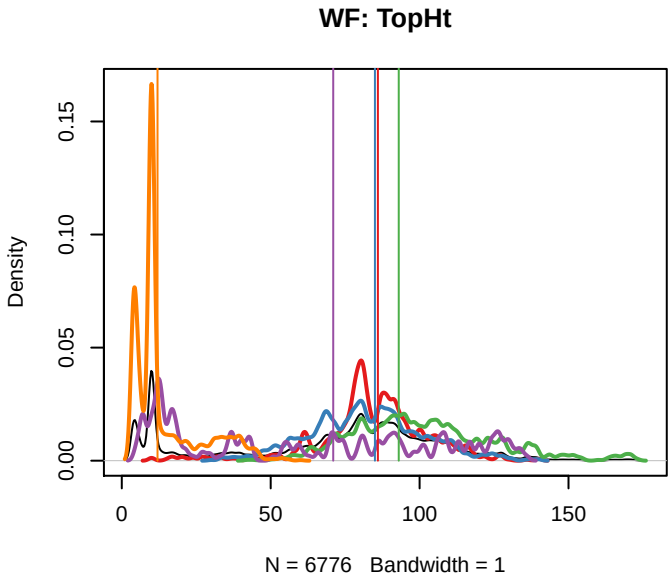


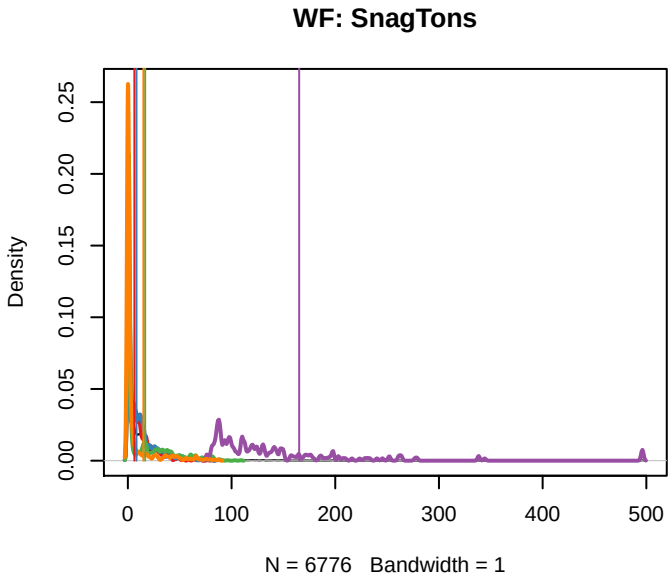


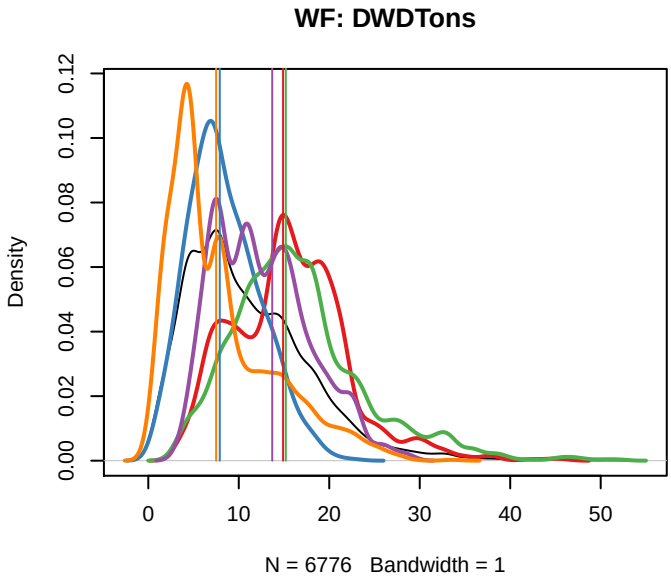
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	148044	667	7.6	84	9	16
2	256180	251	10.7	82	12	8
3	211711	92	21.6	101	14	16
4	14878	174	9.6	62	141	13
5	50145	299	1.9	14	7	8
	680957	(1.8%)				





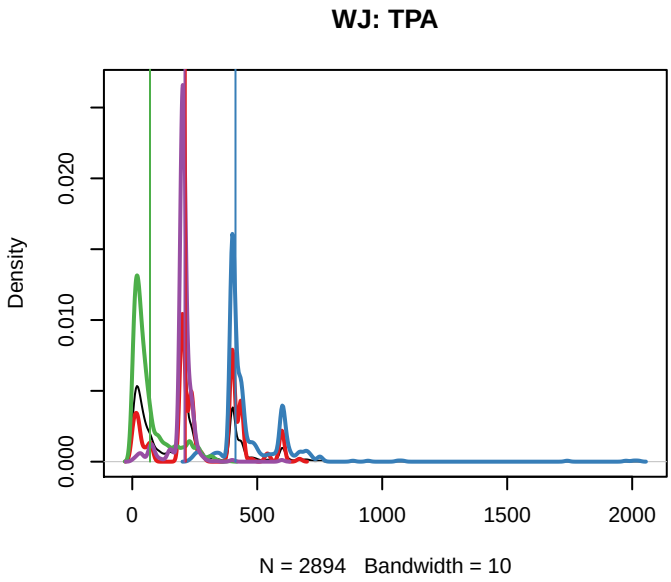


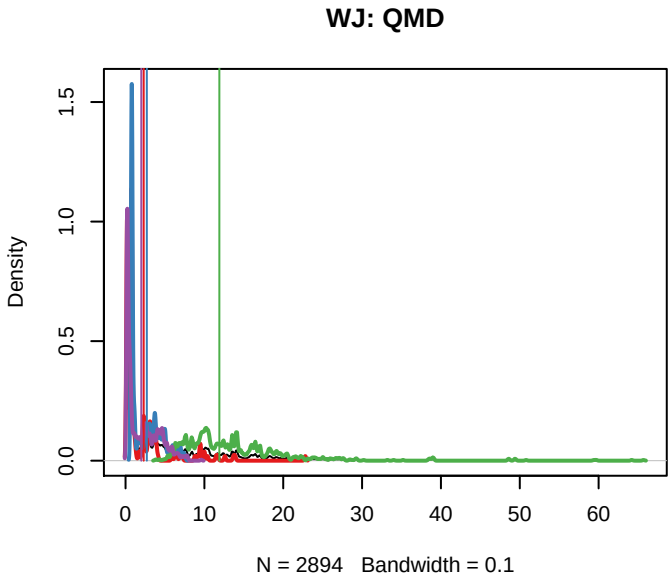


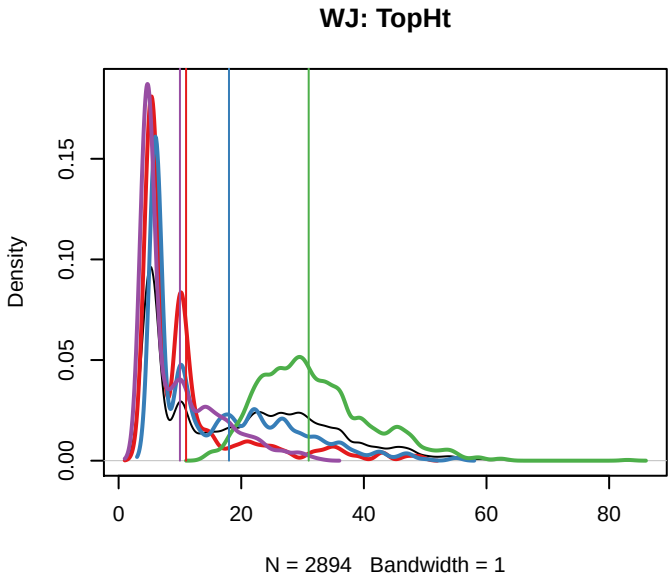


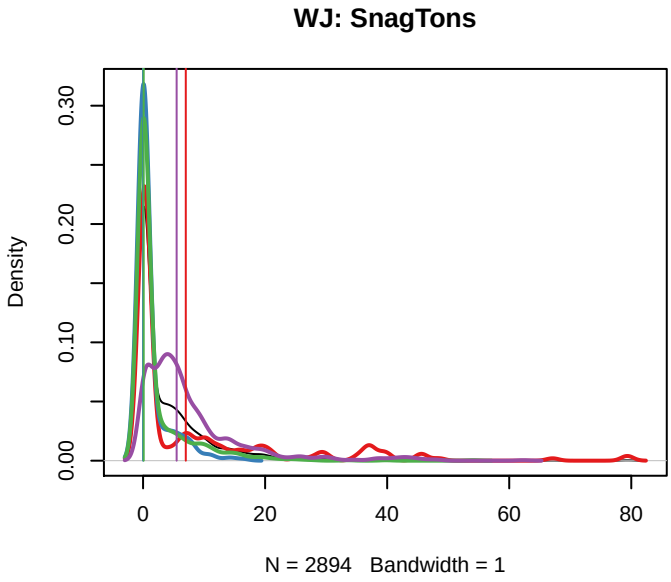


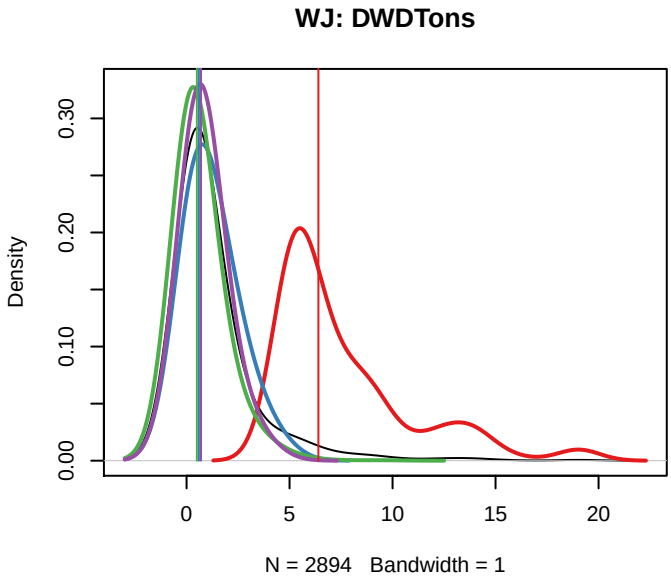
Group	Acres	TPA	QMD	Ht	Snags	DWD
1	3157	273	2.1	11	8	8
2	73727	470	2.4	15	1	1
3	634968	70	13.6	32	2	1
4	65988	200	2.1	9	8	1
	777840	(2.1%)				





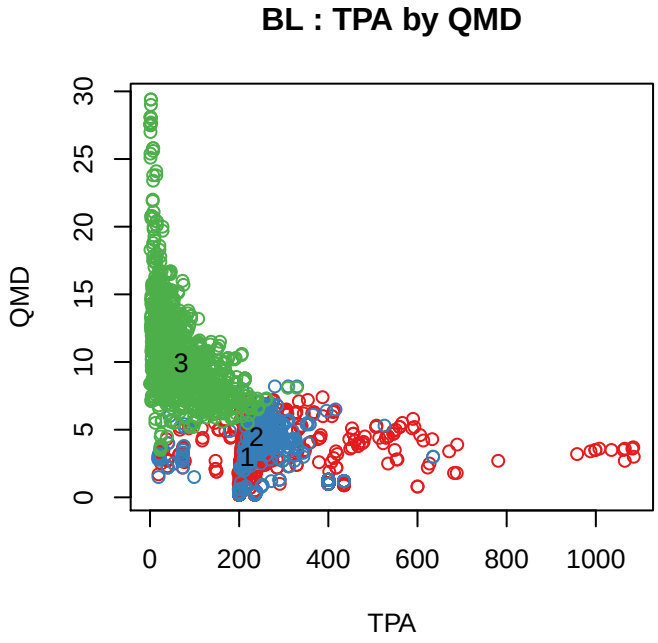






5. Grouping Variable Pairs Graphs

The following are the grouping variable pairs graphs which show the derivation of grouping density plots.


BL : TPA by QMD
QMD
TPA
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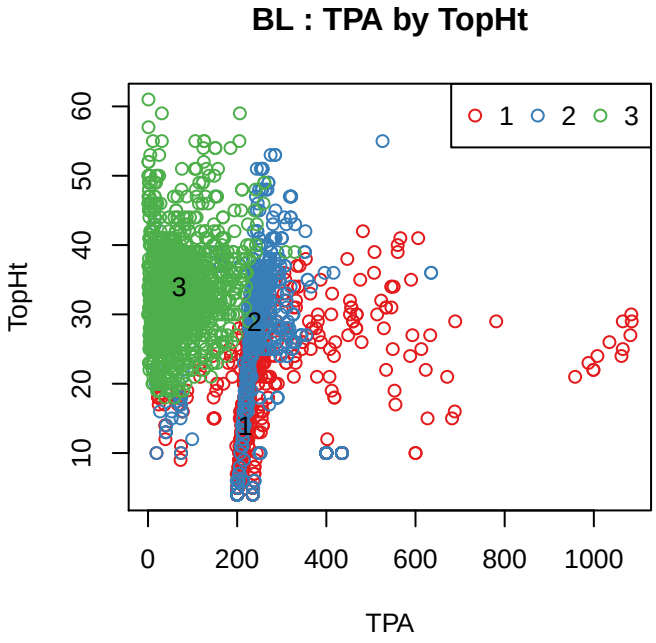
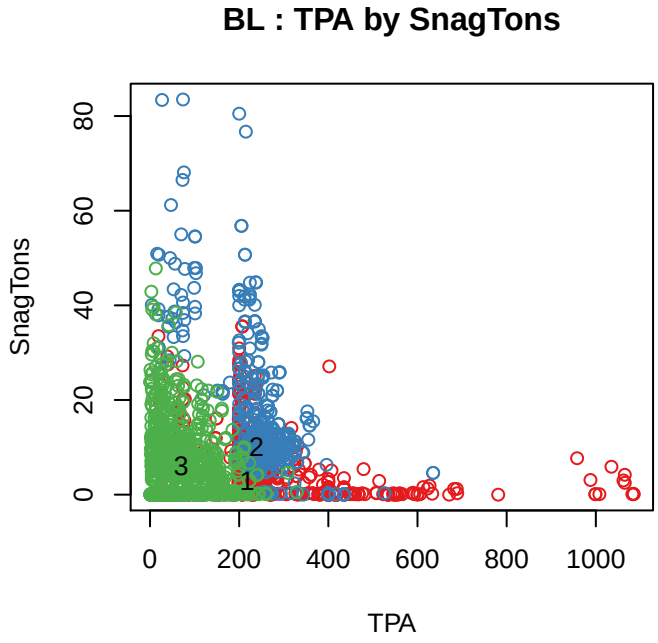
5
10
15
20
25
30
0
200
400
600
800
1000
1
2
3


BL : TPA by TopHt
TopHt
TPA
10
20
30
40
50
60
0
200
400
600
800
1000
1
2
3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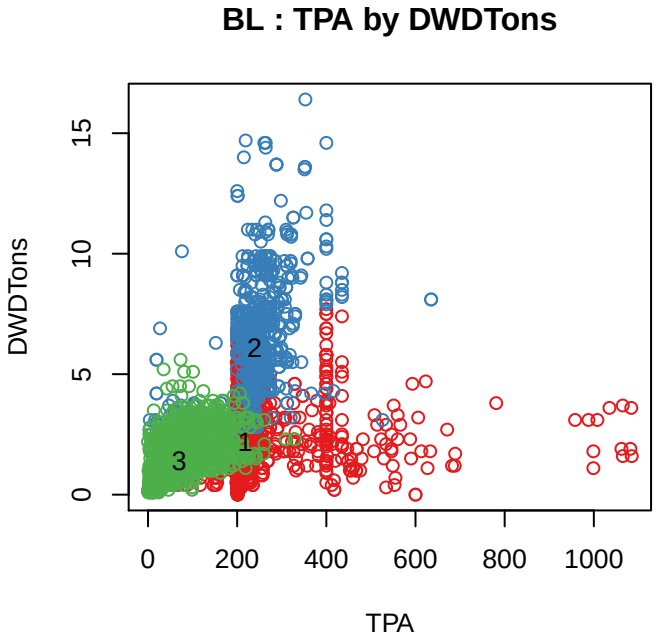
SnagTons
TPA
0
20
40
60
80
0
200
400
600
800
1000
1
2
3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DWDTons
TPA
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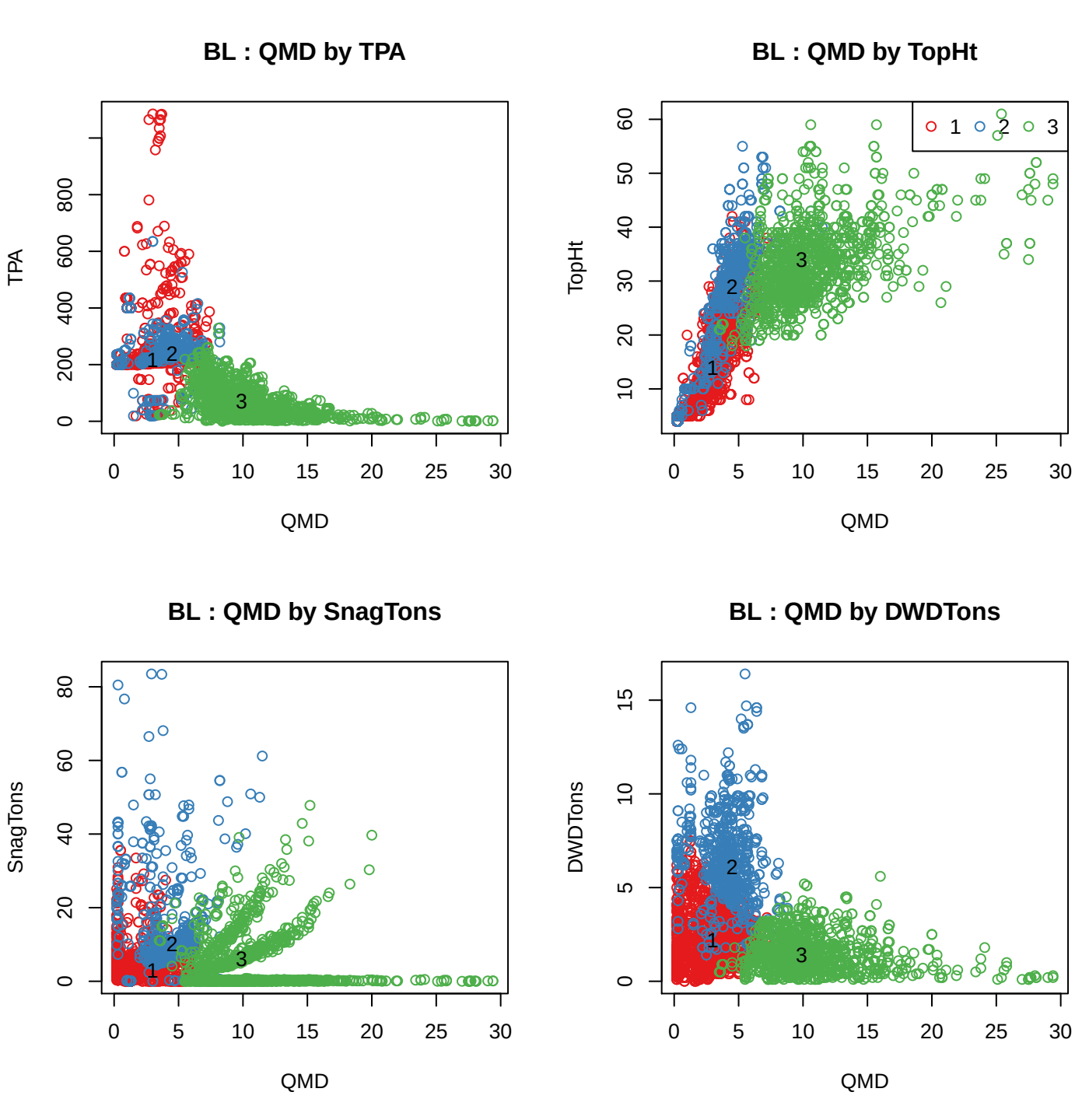
5
10
15
0
200
400
600
800
1000
1
2
3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TPA
QMD
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600
800
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5
10
15
20
25
30
1
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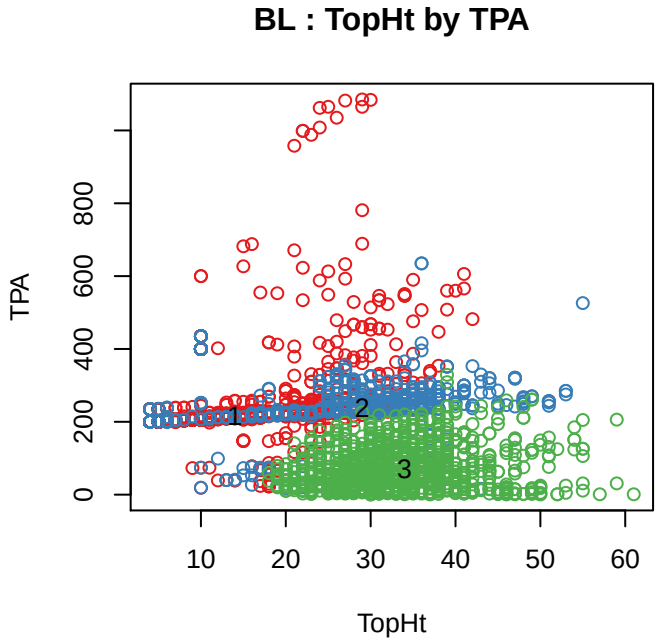
3
BL : QMD by TopHt
TopHt
QMD
10
20
30
40
50
60
1
2
3
BL : QMD by SnagTons
SnagTons
QMD
0
20
40
60
80
BL : QMD by DWDTons
DWDTons
QMD
0
5
10
15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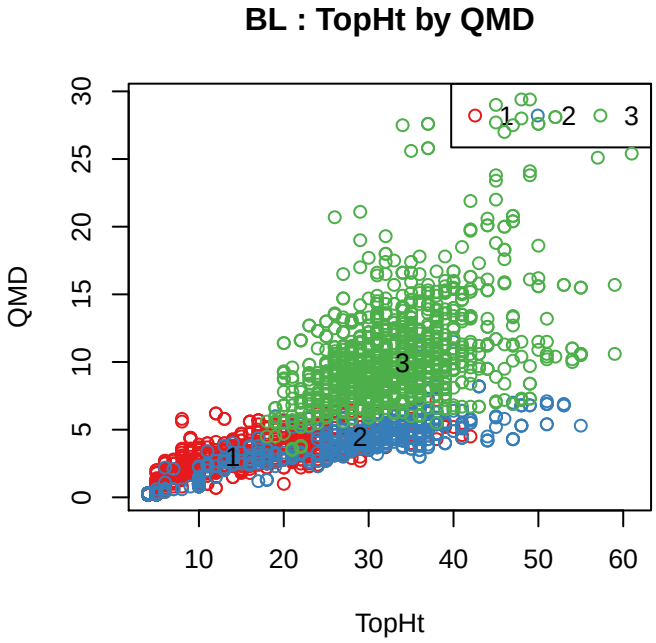
200
400
600
800
10
20
30
40
50
60
TopHt
1
2
3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QMD
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10
15
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25
30
10
20
30
40
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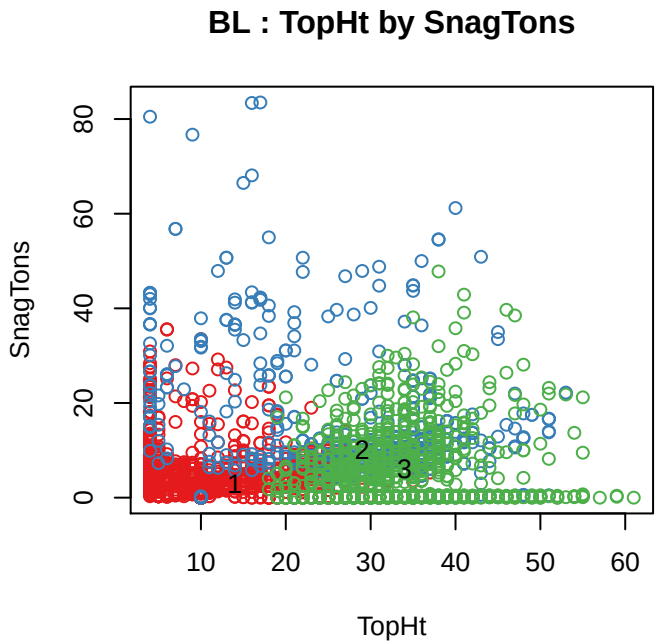
60
TopHt
1
2
3
1
2
3


BL : TopHt by SnagTons
SnagTons
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20
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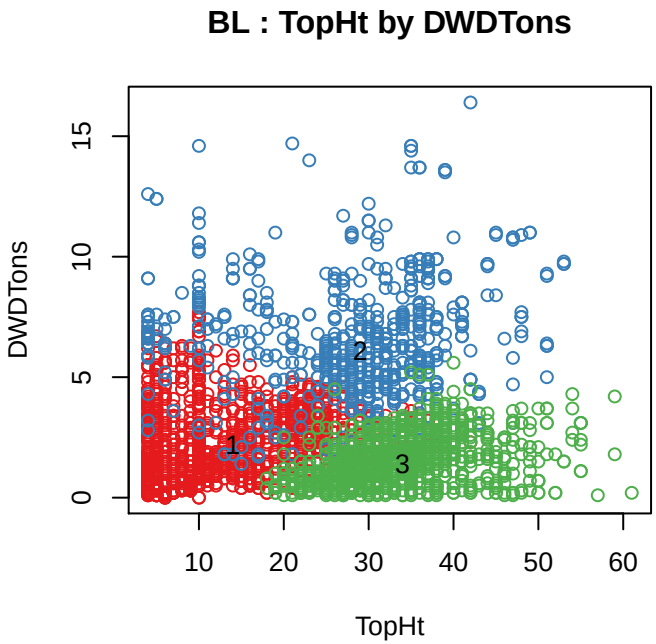
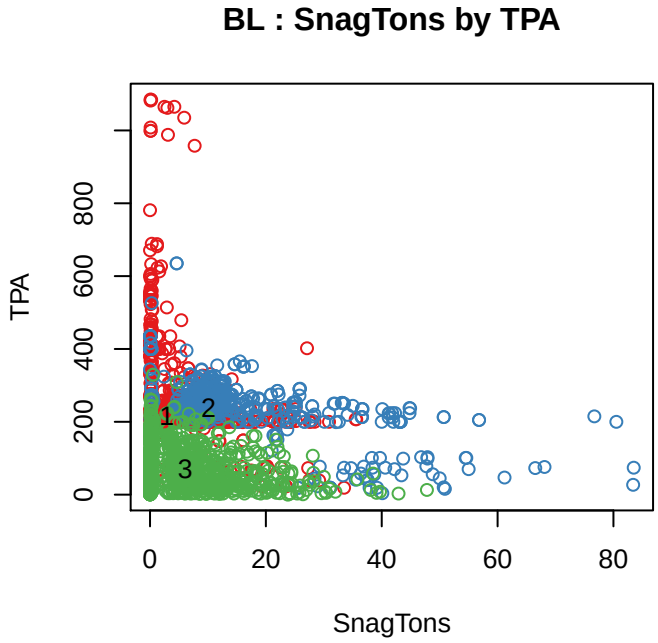
60
80
10
20
30
40
50
60
TopHt
1
2
3


BL : TopHt by DWDTons
DWDTons
0
5
10
15
10
20
30
40
50
60
TopHt
1
2
3


BL : SnagTons by TPA
TPA
SnagTons
0
200
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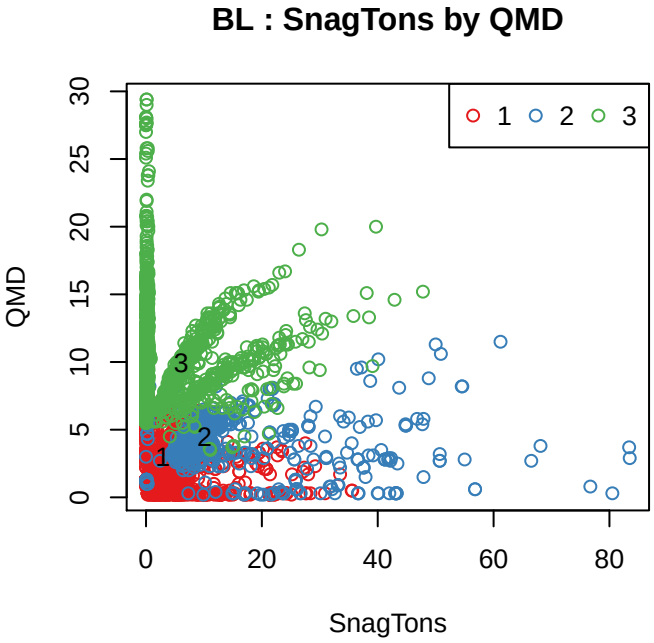
BL : SnagTons by QMD
QMD
SnagTons
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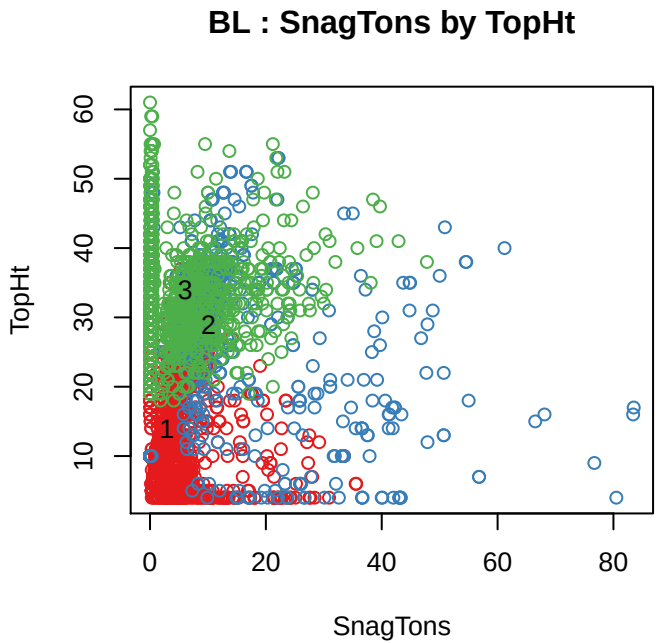
BL : SnagTons by TopHt
TopHt
SnagTons
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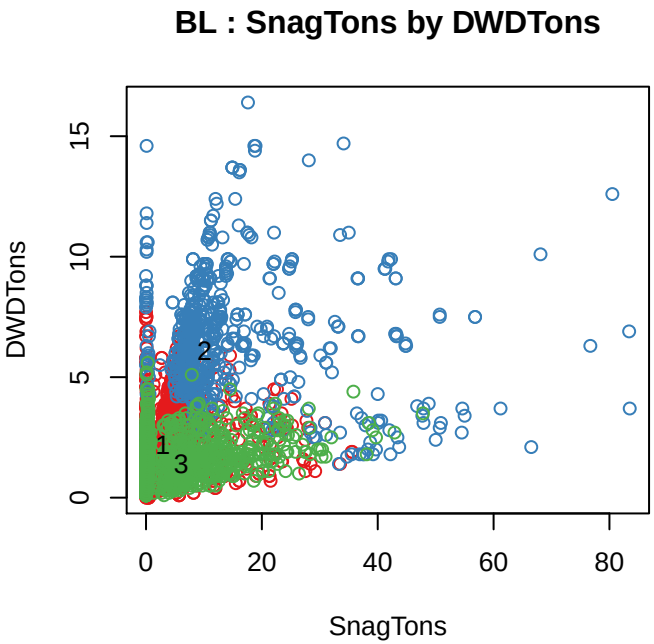
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DWDTons
SnagTons
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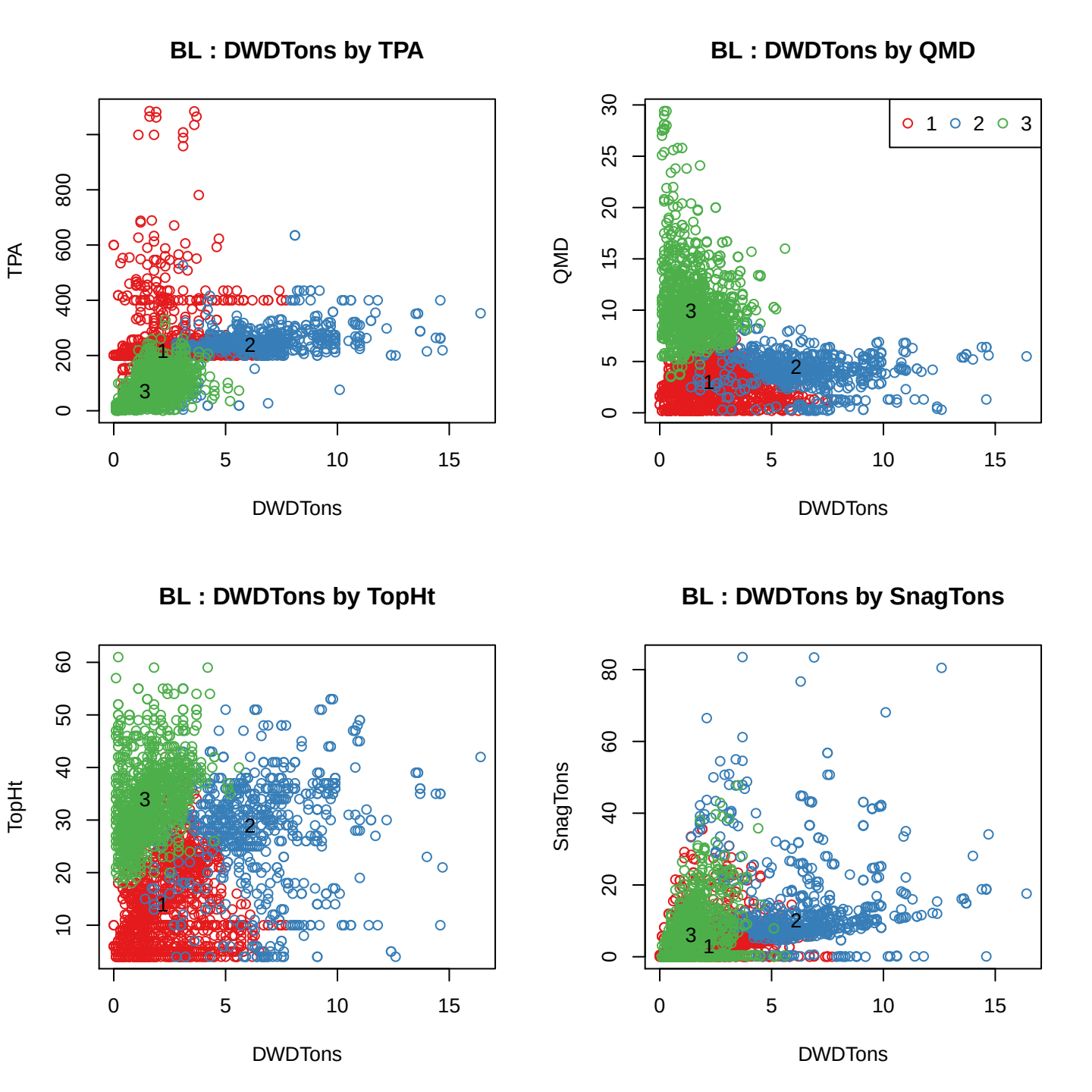
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TPA
DWDTons
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BL : DWDTons by QMD
QMD
DWDTons
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BL : DWDTons by TopHt
TopHt
DWDTons
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BL : DWDTons by SnagTons
SnagTons
DWDTons
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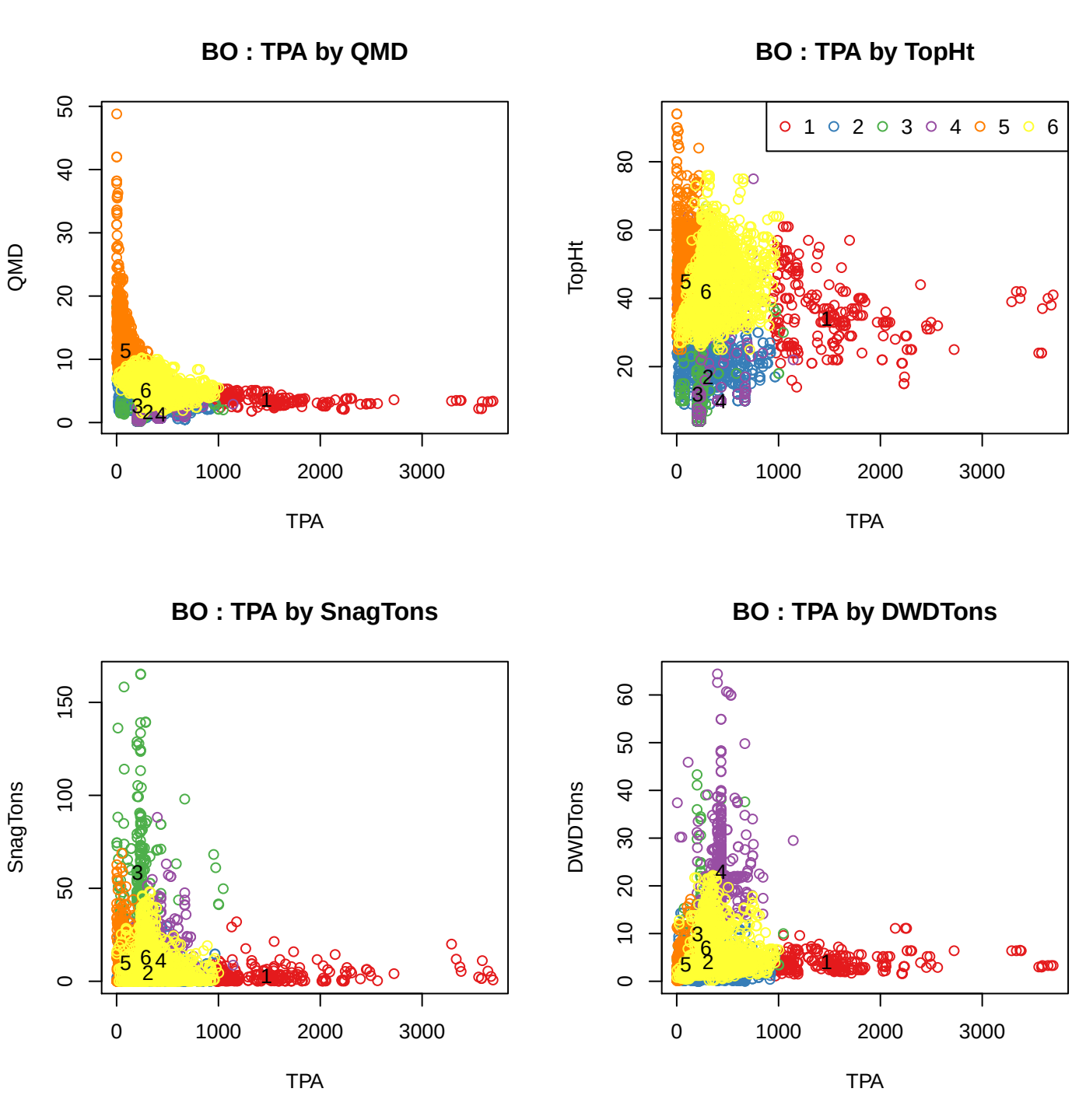
BO : TPA by QMD
QMD
TPA
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BO : TPA by TopHt
TopHt
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BO : TPA by SnagTons
SnagTons
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BO : TPA by DWDTons
DWDTons
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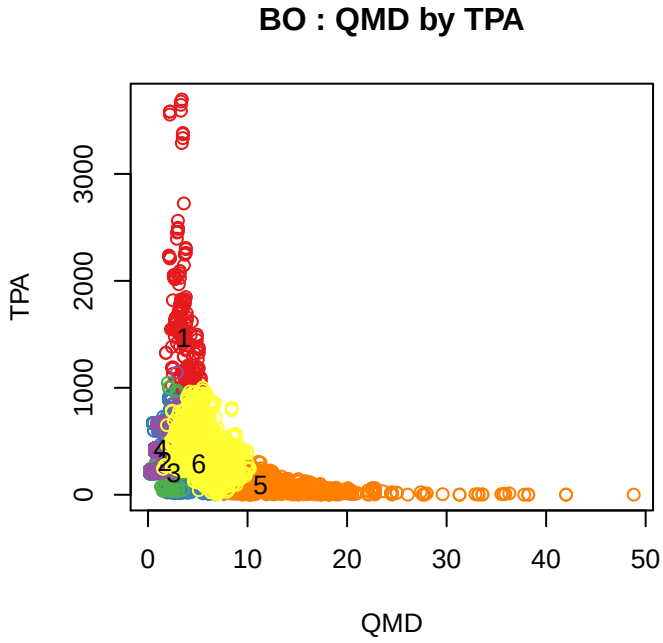
BO : QMD by TPA
TPA
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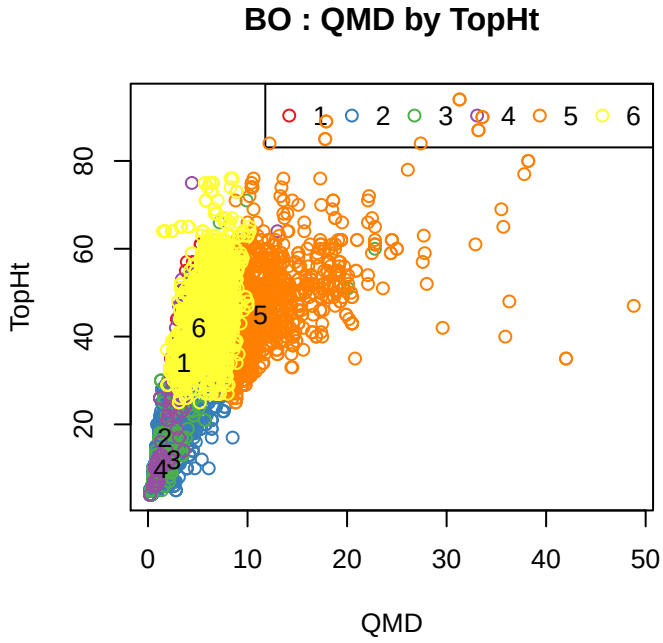
BO : QMD by TopHt
TopHt
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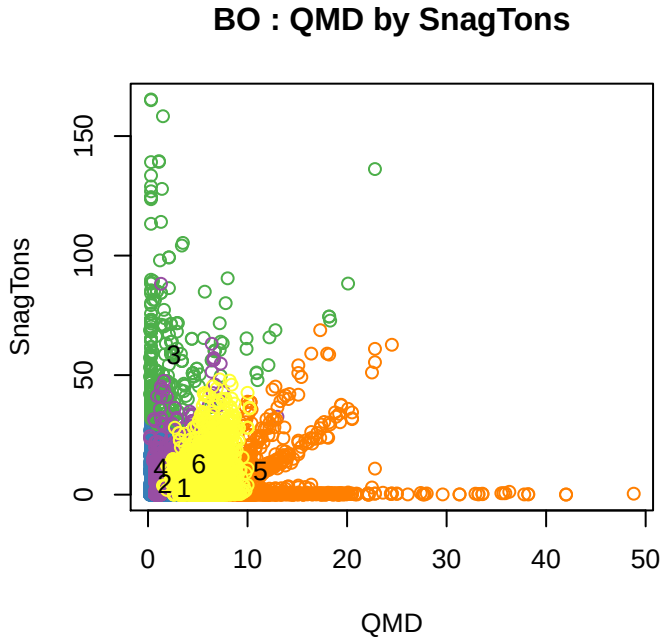
BO : QMD by SnagTons
SnagTons
QMD
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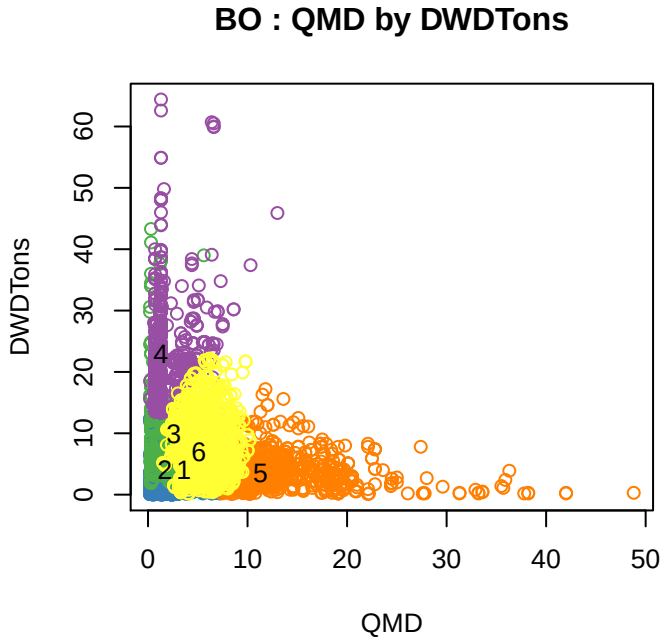
BO : QMD by DWDTons
DWDTons
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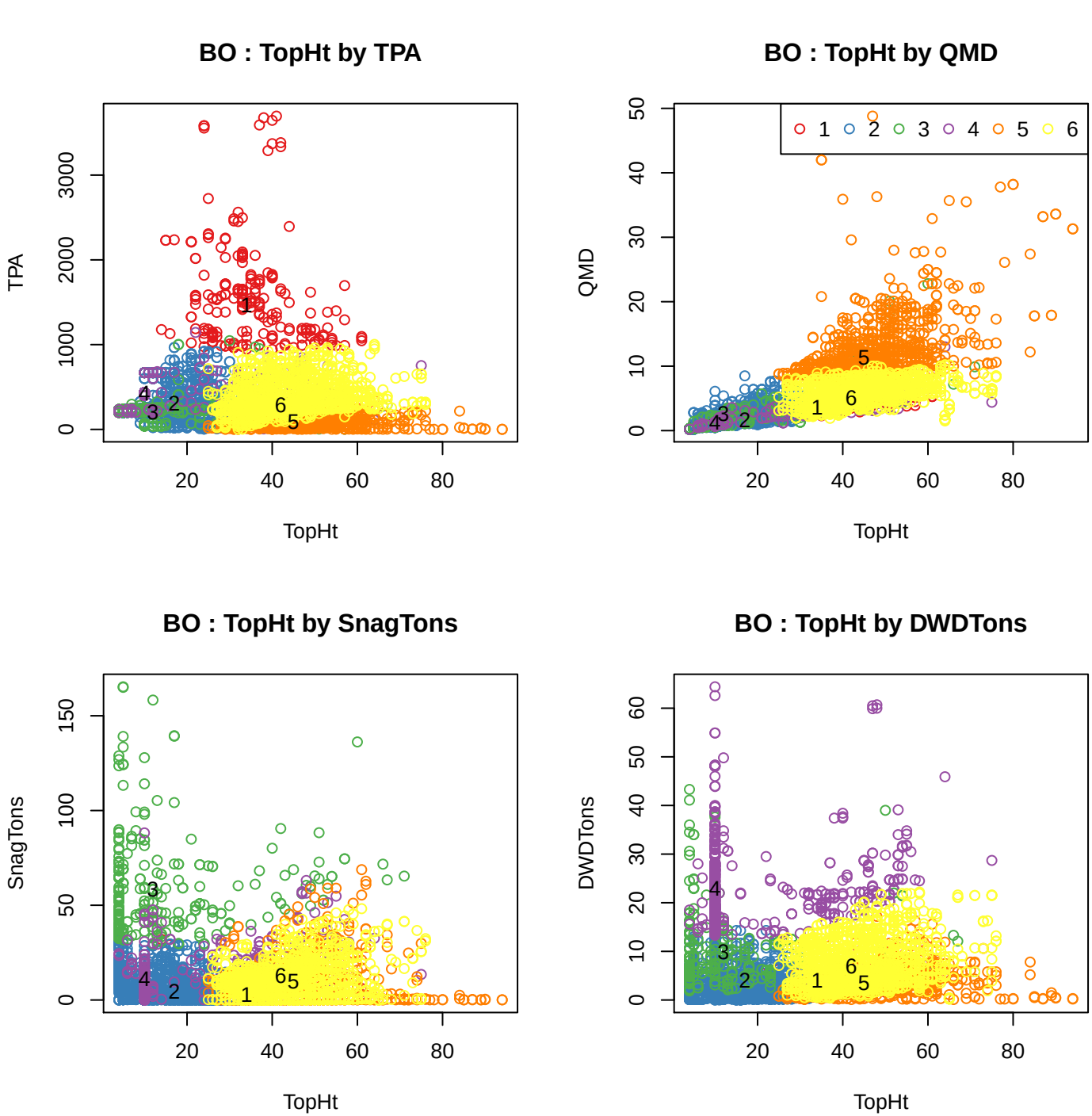
BO : TopHt by TPA
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BO : TopHt by QMD
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TopHt
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BO : TopHt by SnagTons
SnagTons
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BO : TopHt by DWDTons
DWDTons
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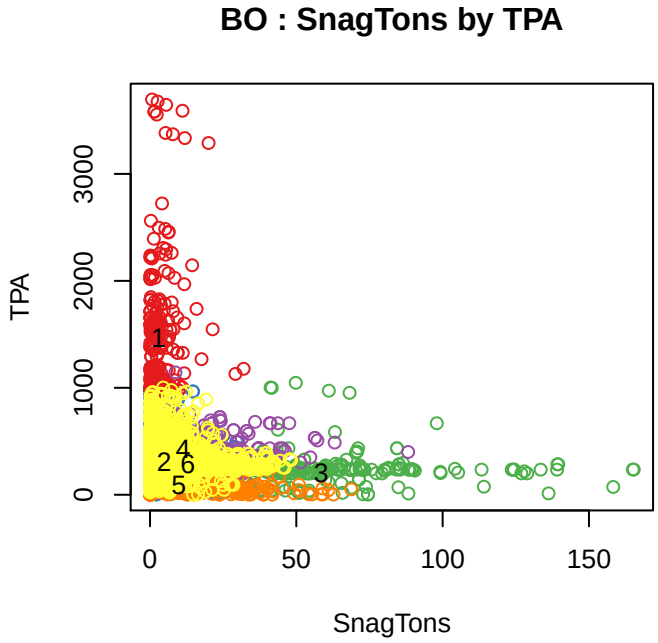
BO : SnagTons by TPA
TPA
SnagTons
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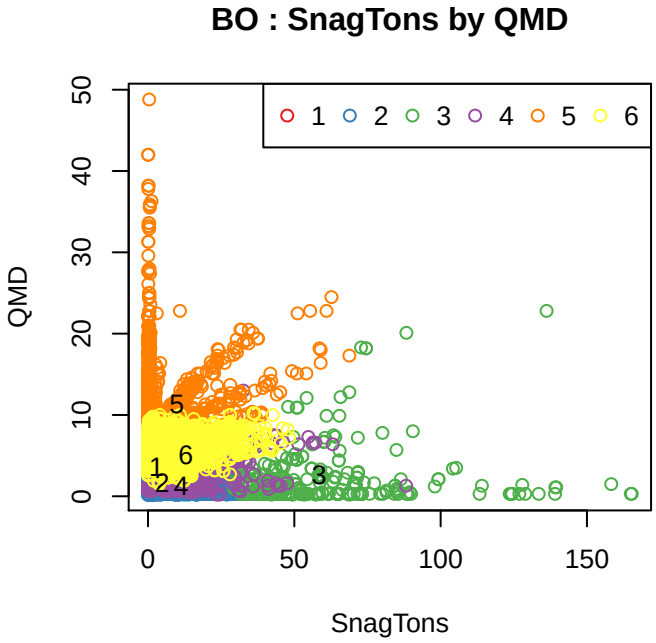
BO : SnagTons by QMD
QMD
SnagTons
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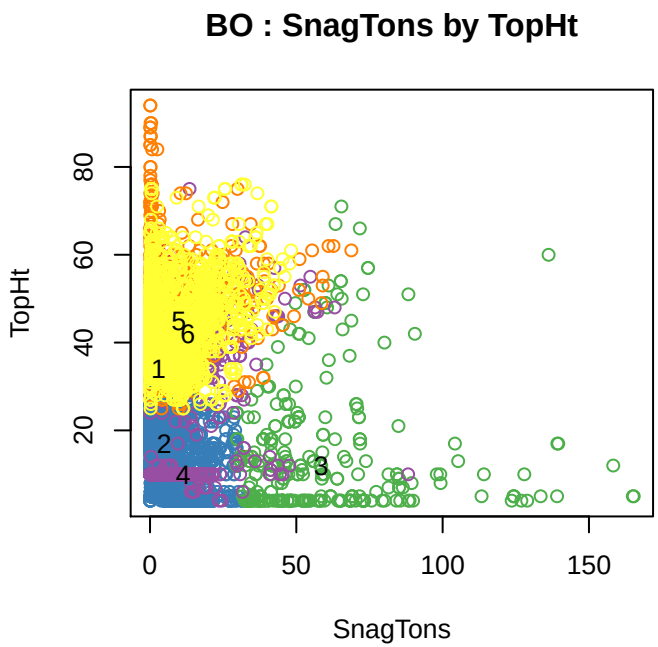
BO : SnagTons by TopHt
TopHt
SnagTons
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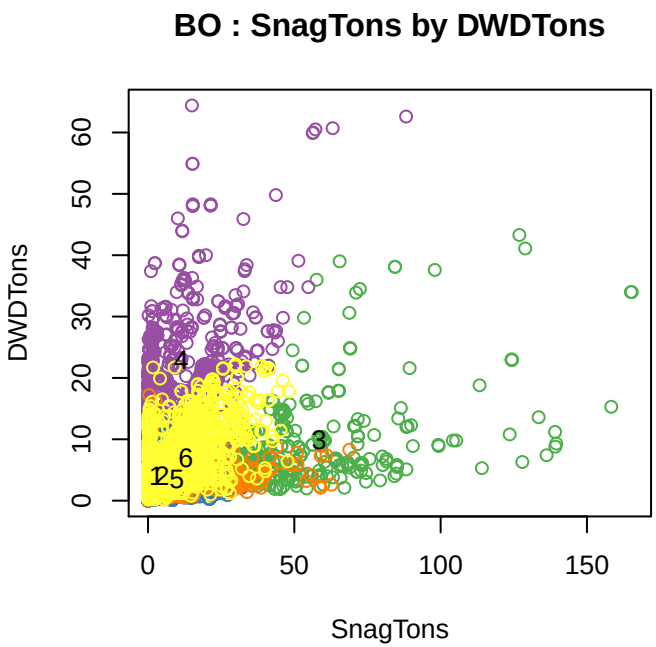
BO : SnagTons by DWDTons
DWDTons
SnagTons
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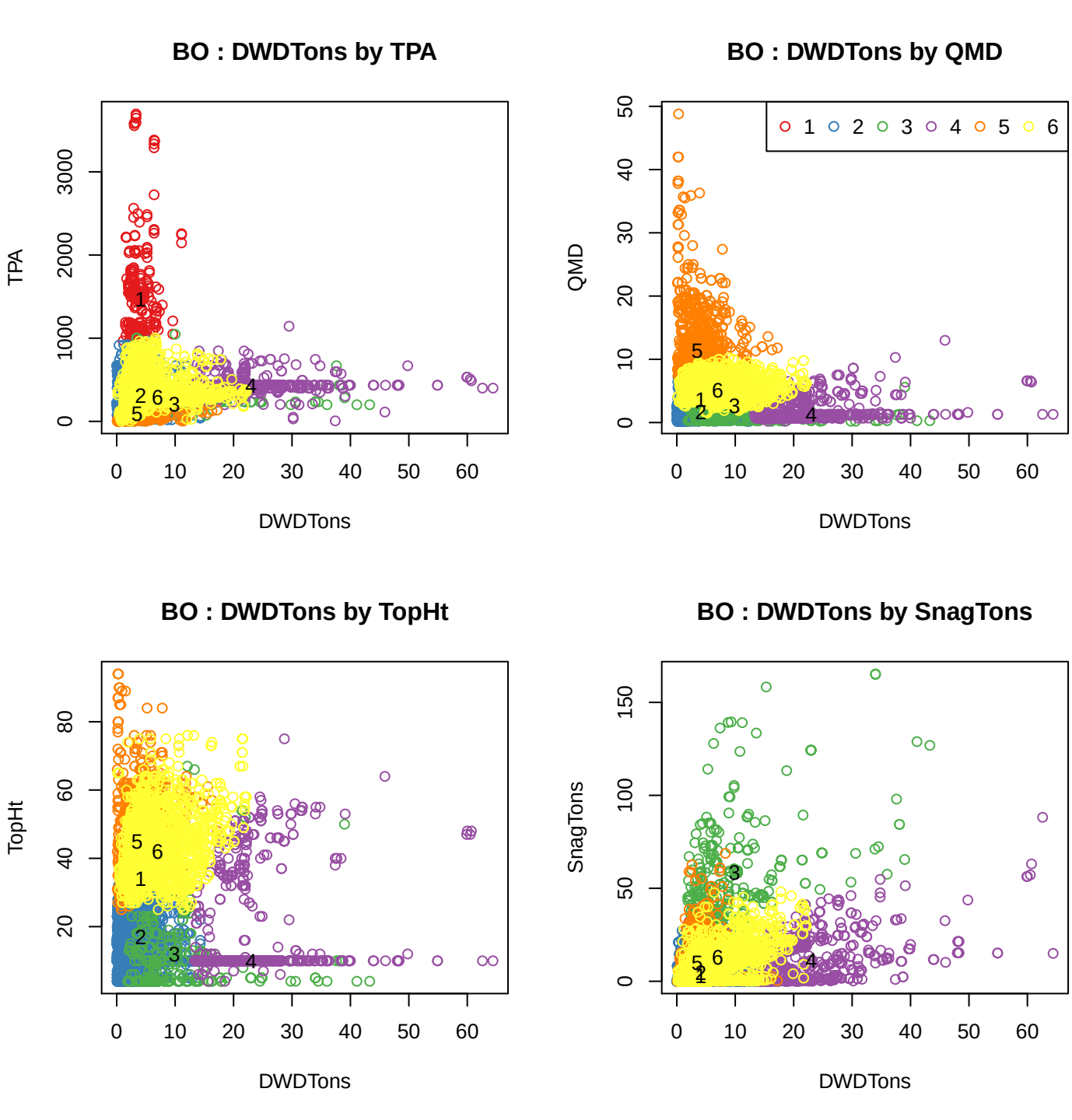
BO : DWDTons by TPA
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BO : DWDTons by QMD
QMD
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BO : DWDTons by TopHt
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BO : DWDTons by SnagTons
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DWDTons
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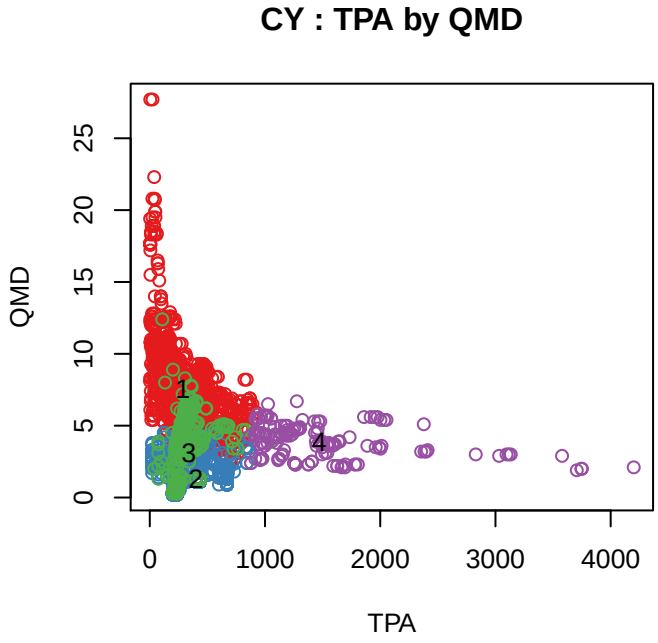
CY : TPA by QMD
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TPA
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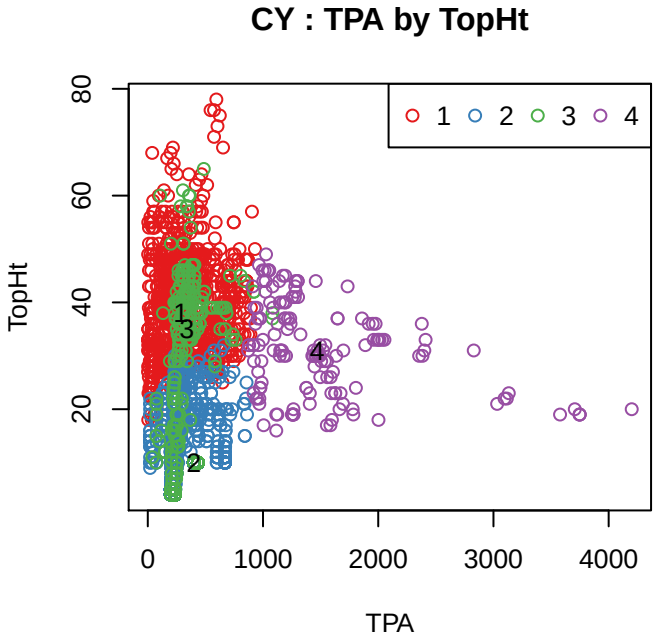
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TopHt
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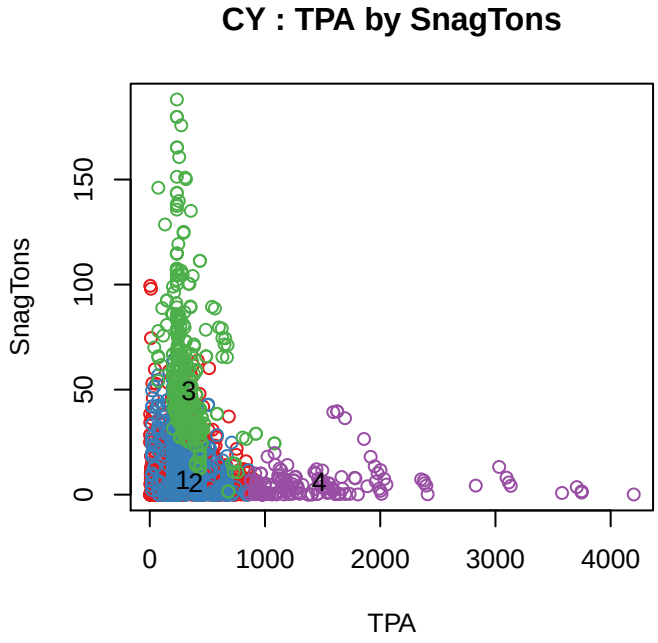
CY : TPA by SnagTons
SnagTons
TPA
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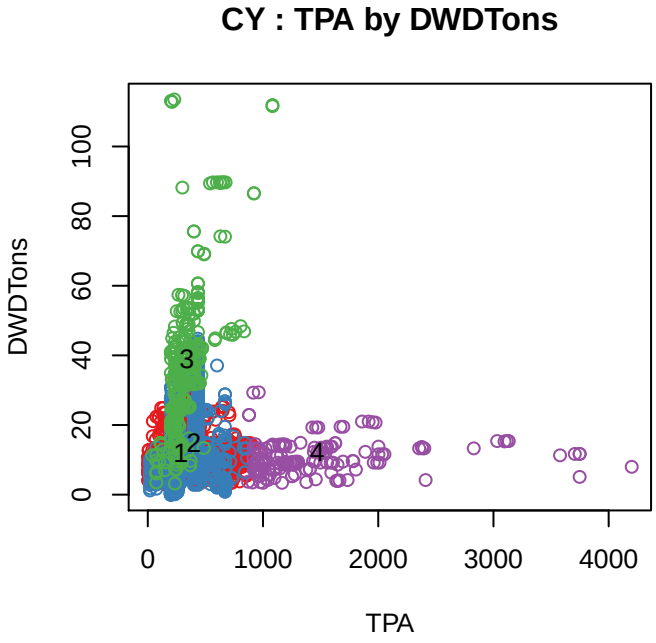
CY : TPA by DWDTons
DWDTons
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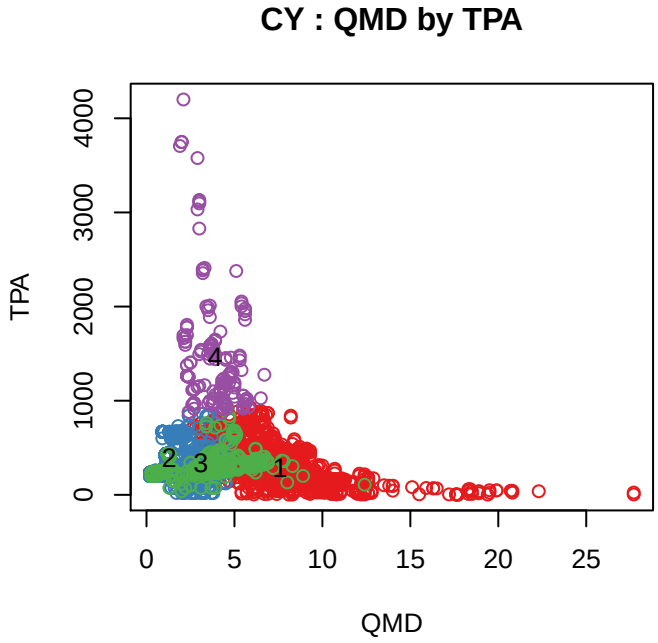
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QMD
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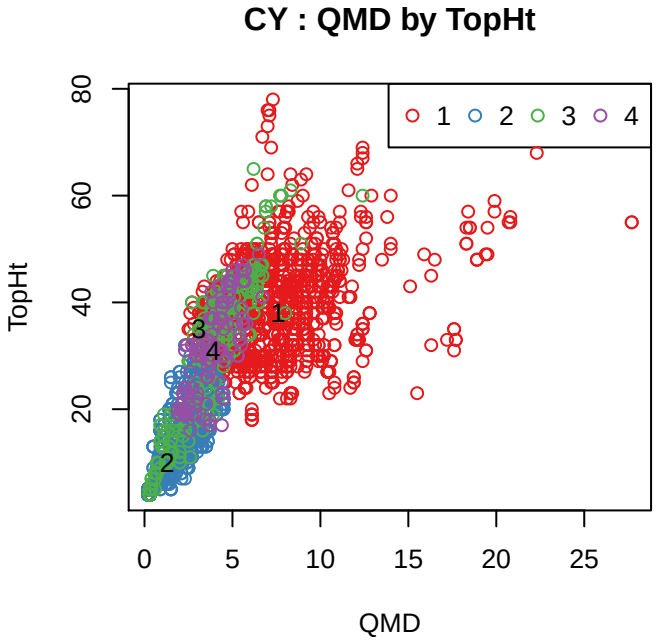
CY : QMD by TopHt
TopHt
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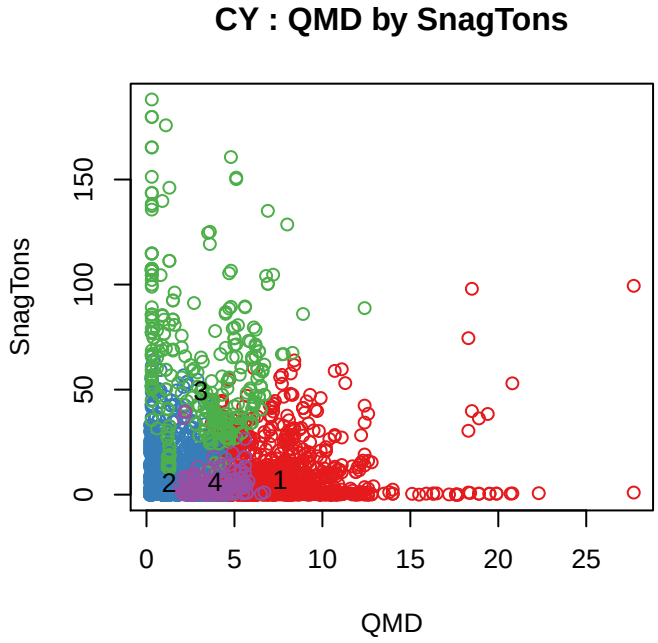
CY : QMD by SnagTons
SnagTons
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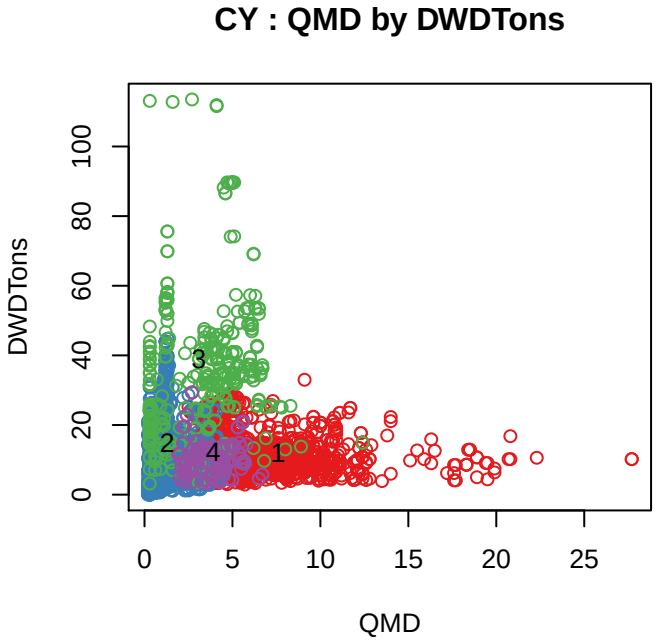
CY : QMD by DWDTons
DWDTons
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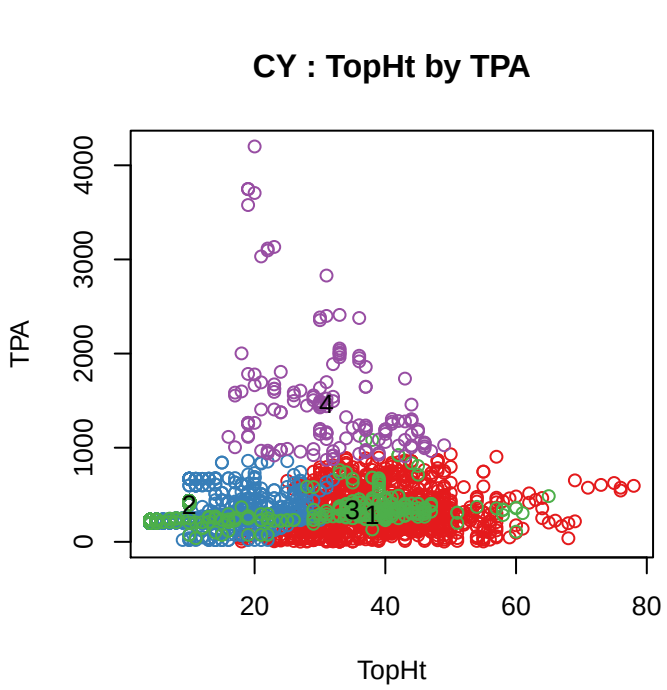
CY : TopHt by TPA
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TopHt
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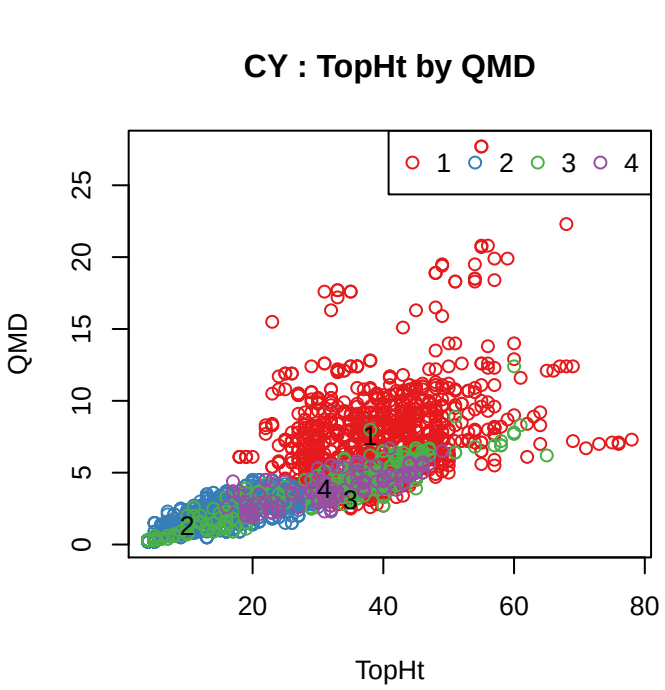
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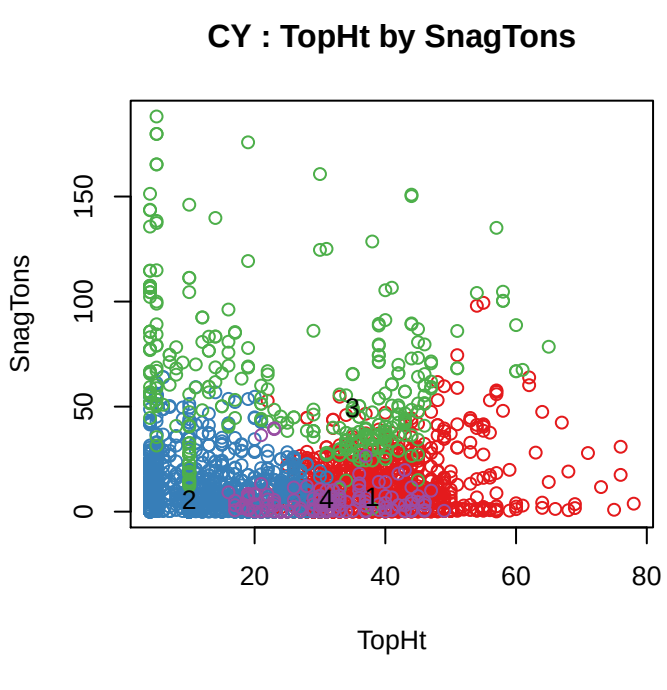
CY : TopHt by SnagTons
SnagTons
TopHt
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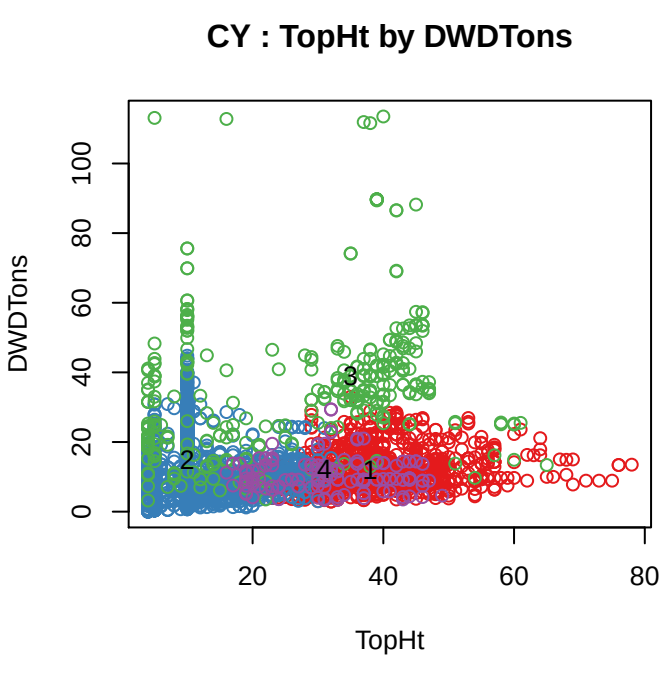
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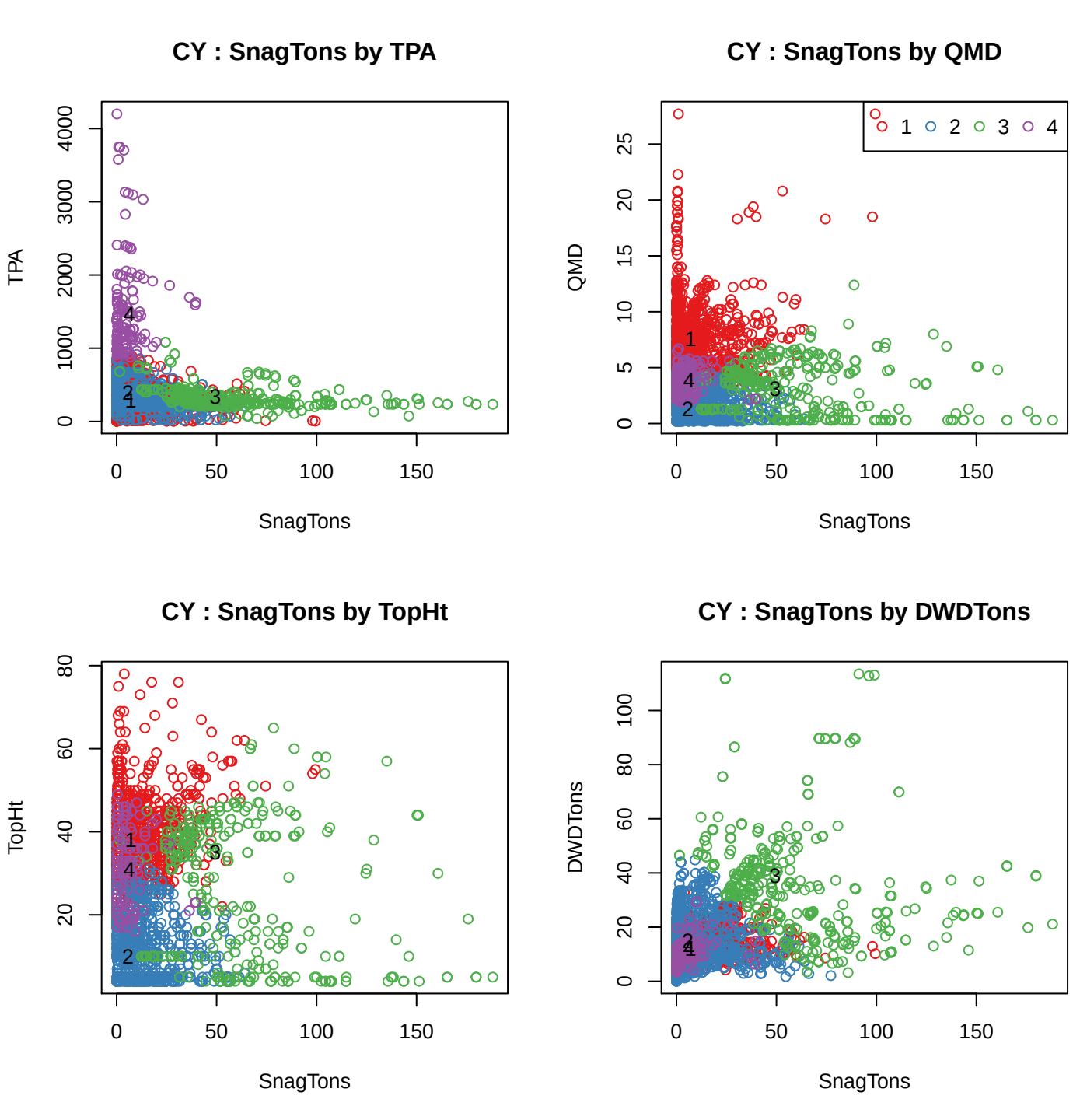
CY : SnagTons by TPA
TPA
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CY : SnagTons by QMD
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CY : SnagTons by TopHt
TopHt
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CY : SnagTons by DWDTons
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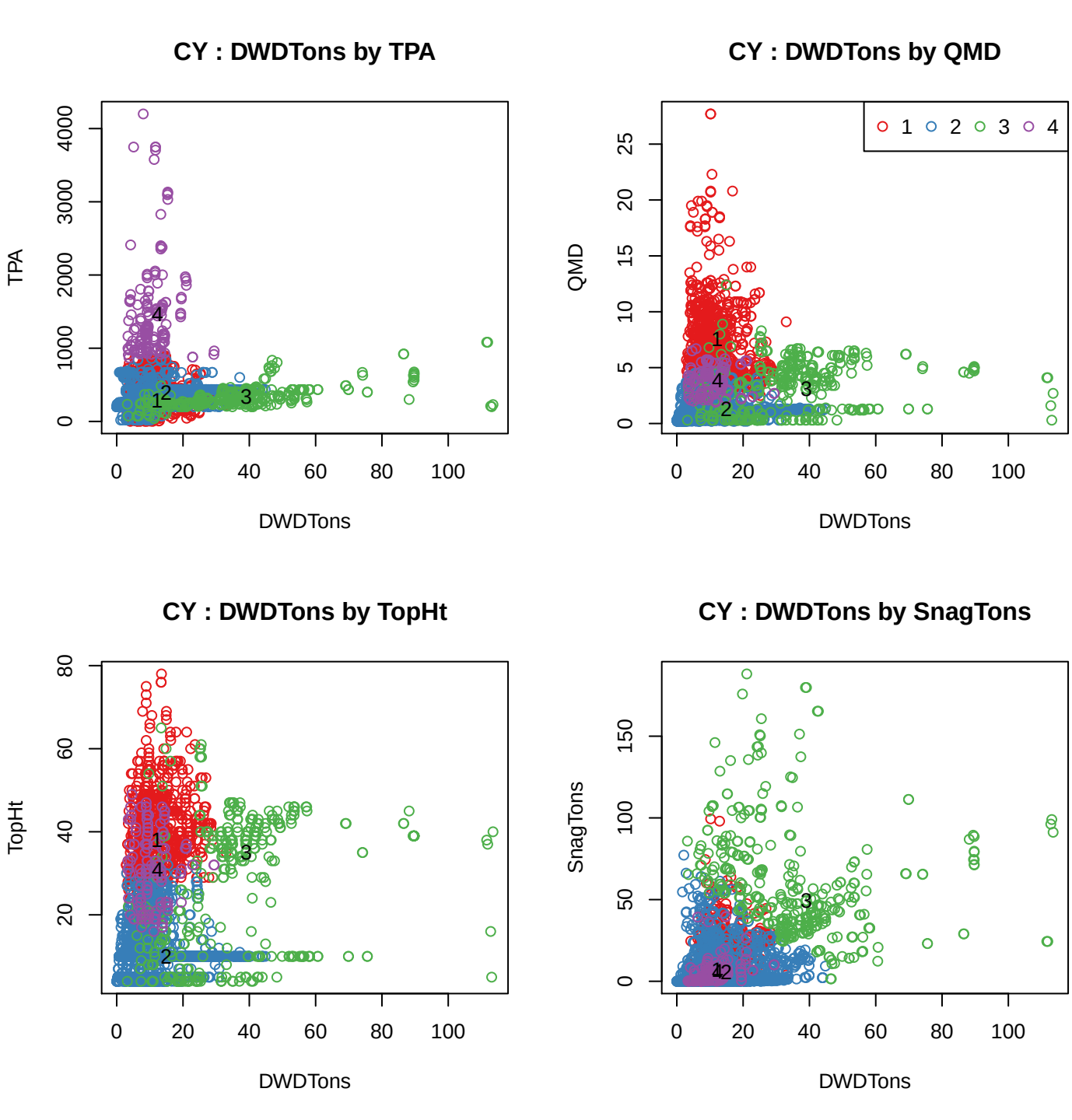
CY : DWDTons by TPA
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CY : DWDTons by QMD
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CY : DWDTons by TopHt
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CY : DWDTons by SnagTons
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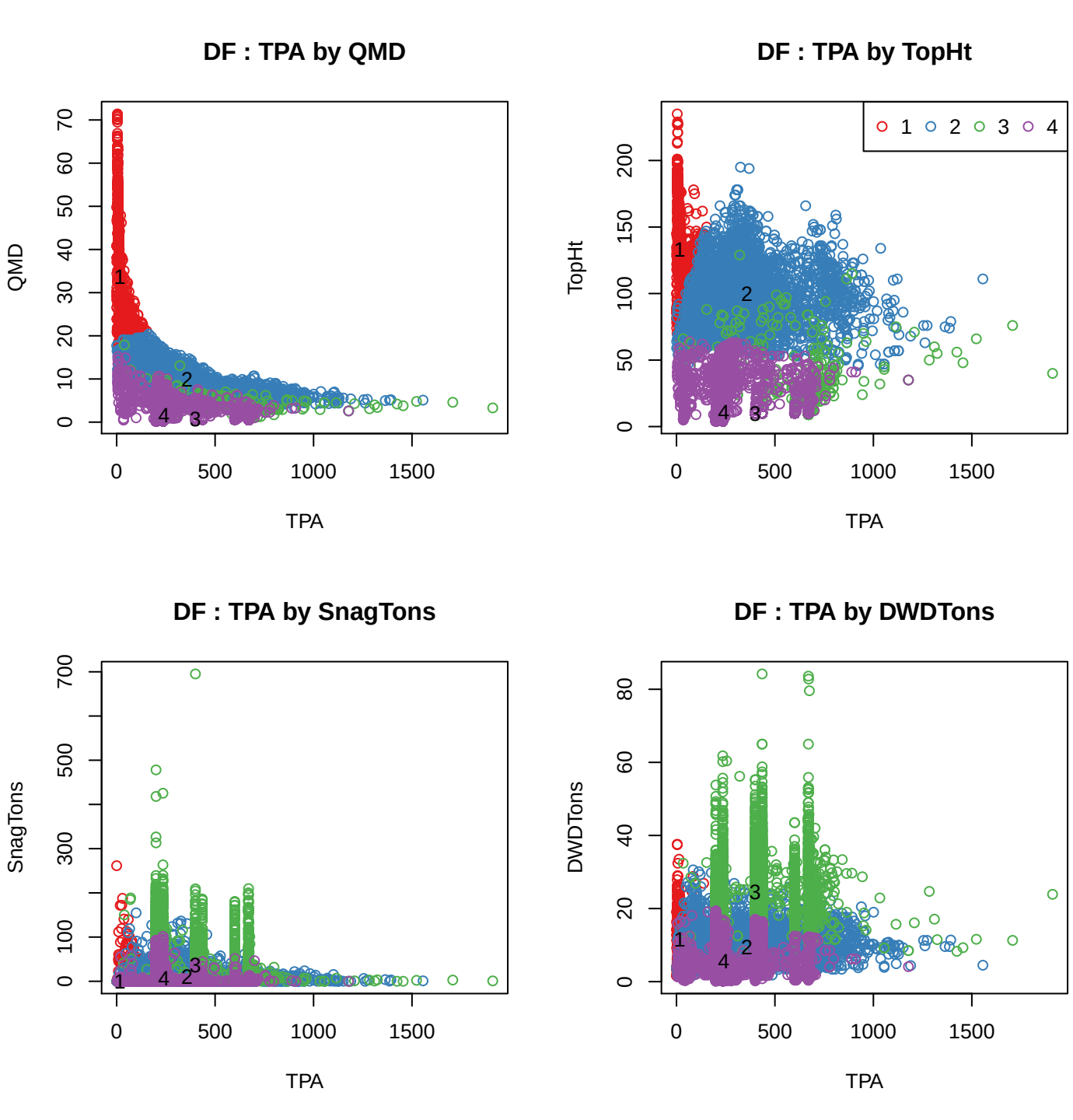
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QMD
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DF : TPA by TopHt
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DF : TPA by SnagTons
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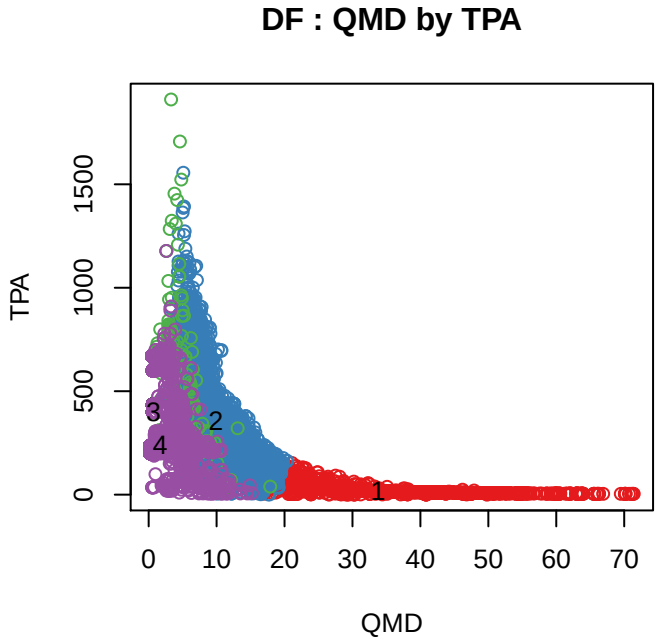
DF : QMD by TPA
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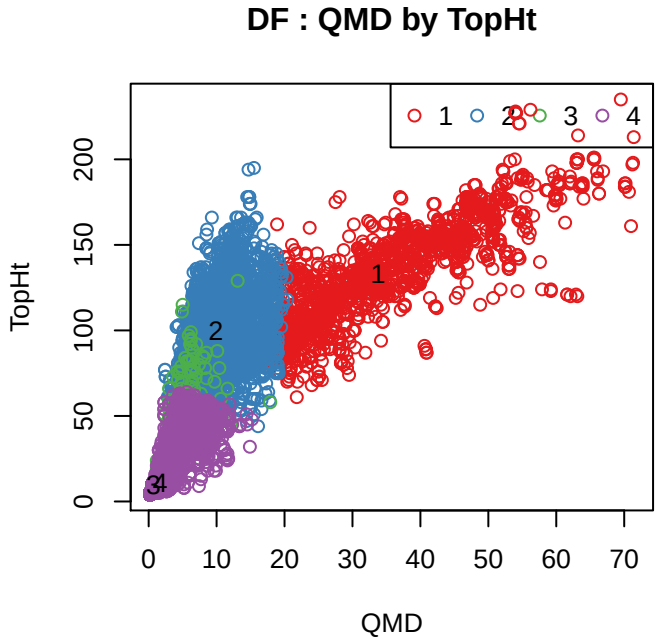
DF : QMD by TopHt
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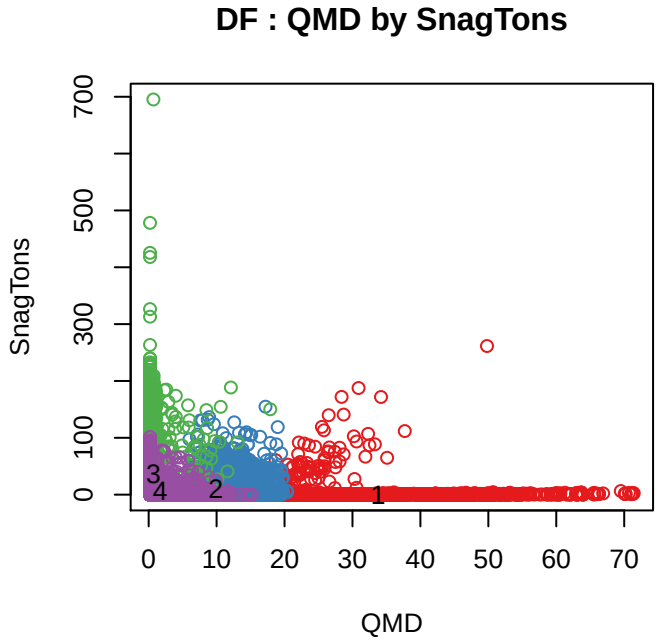
DF : QMD by SnagTons
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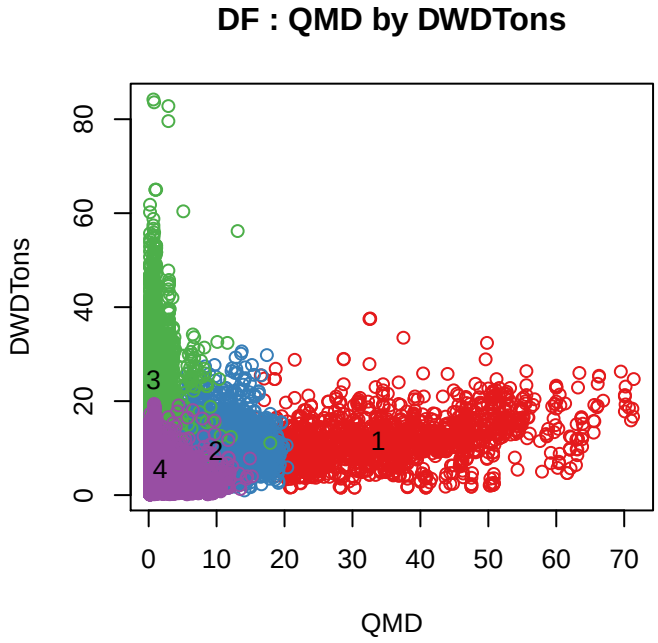
DF : QMD by DWDTons
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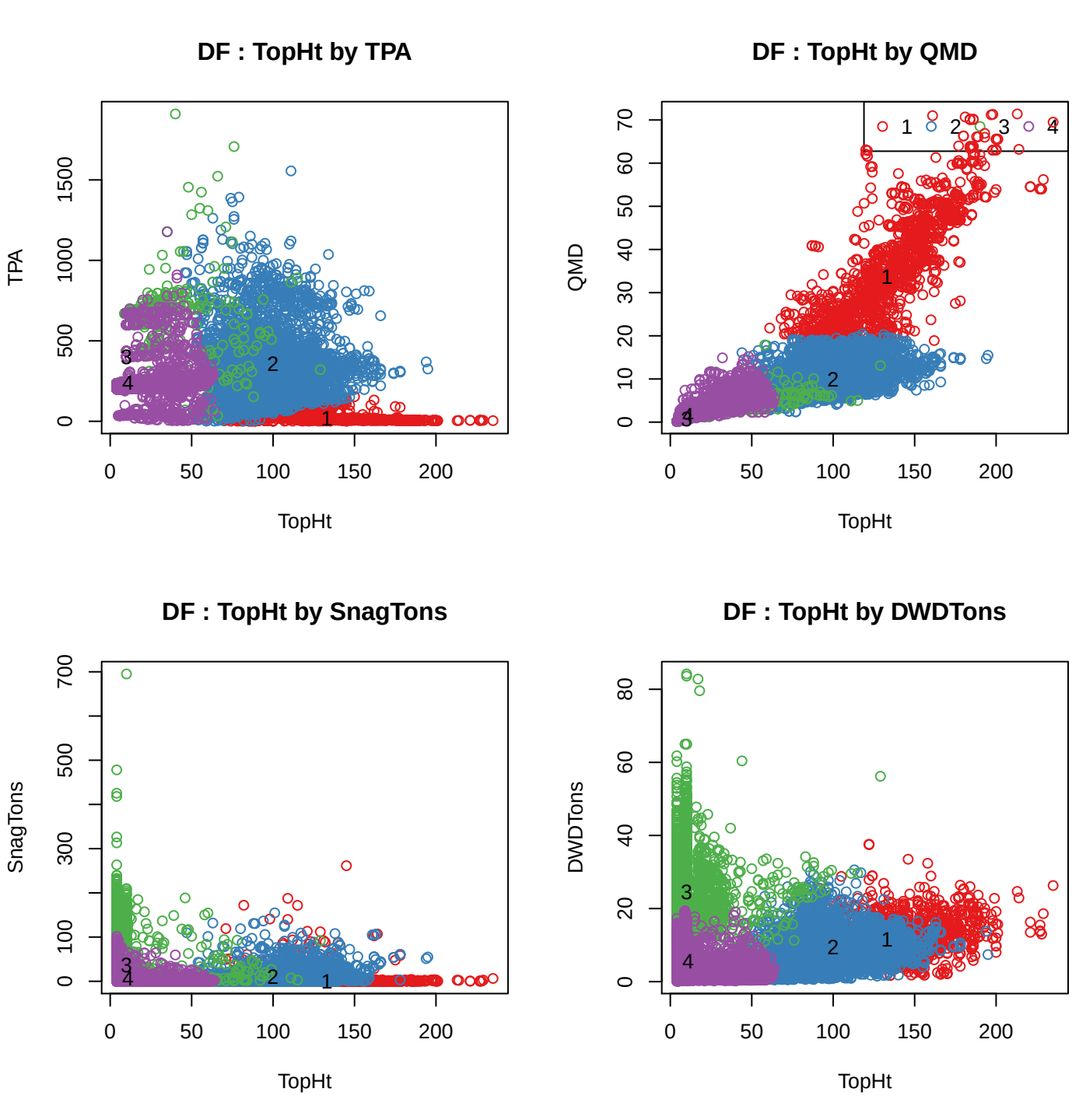
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DF : TopHt by QMD
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DF : TopHt by SnagTons
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DF : TopHt by DWDTons
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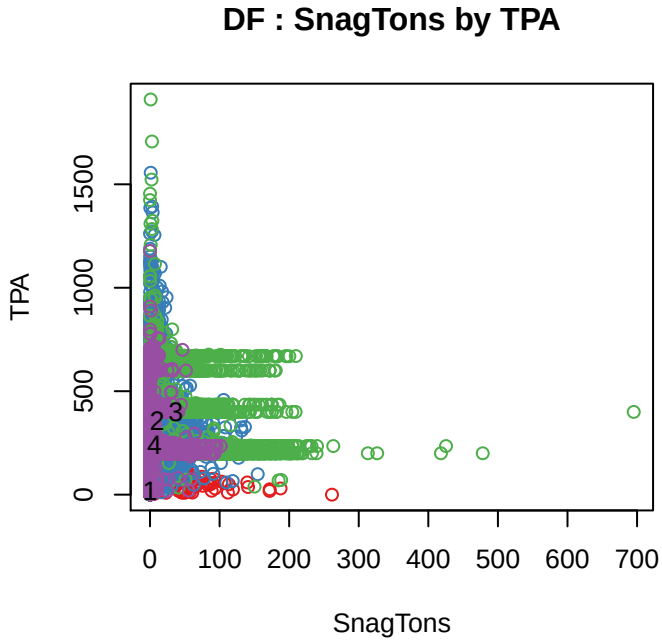
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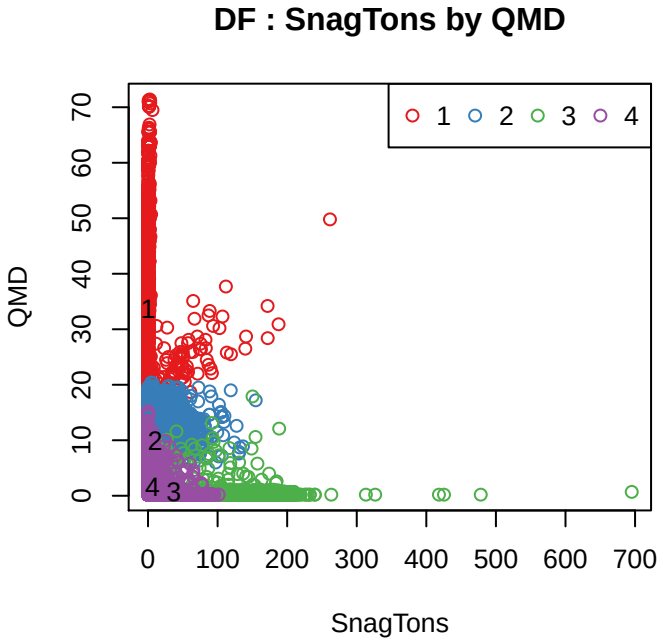
DF : SnagTons by QMD
QMD
SnagTons
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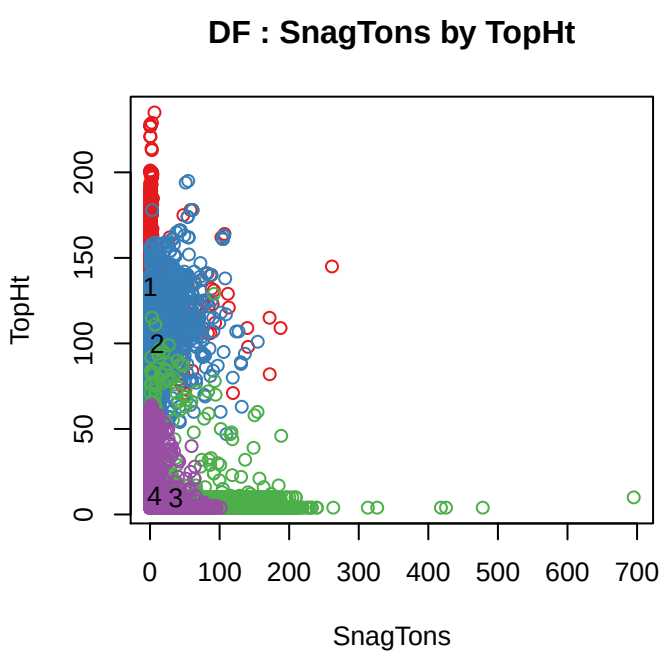
DF : SnagTons by TopHt
TopHt
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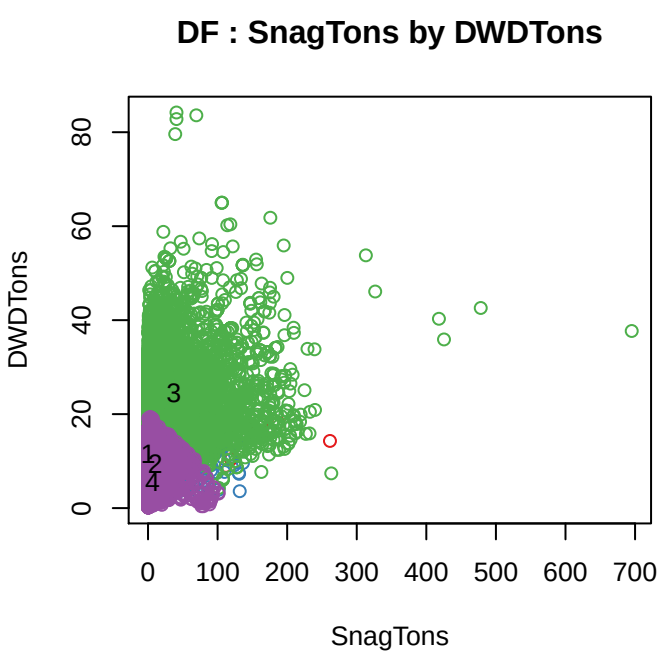
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DWDTons
SnagTons
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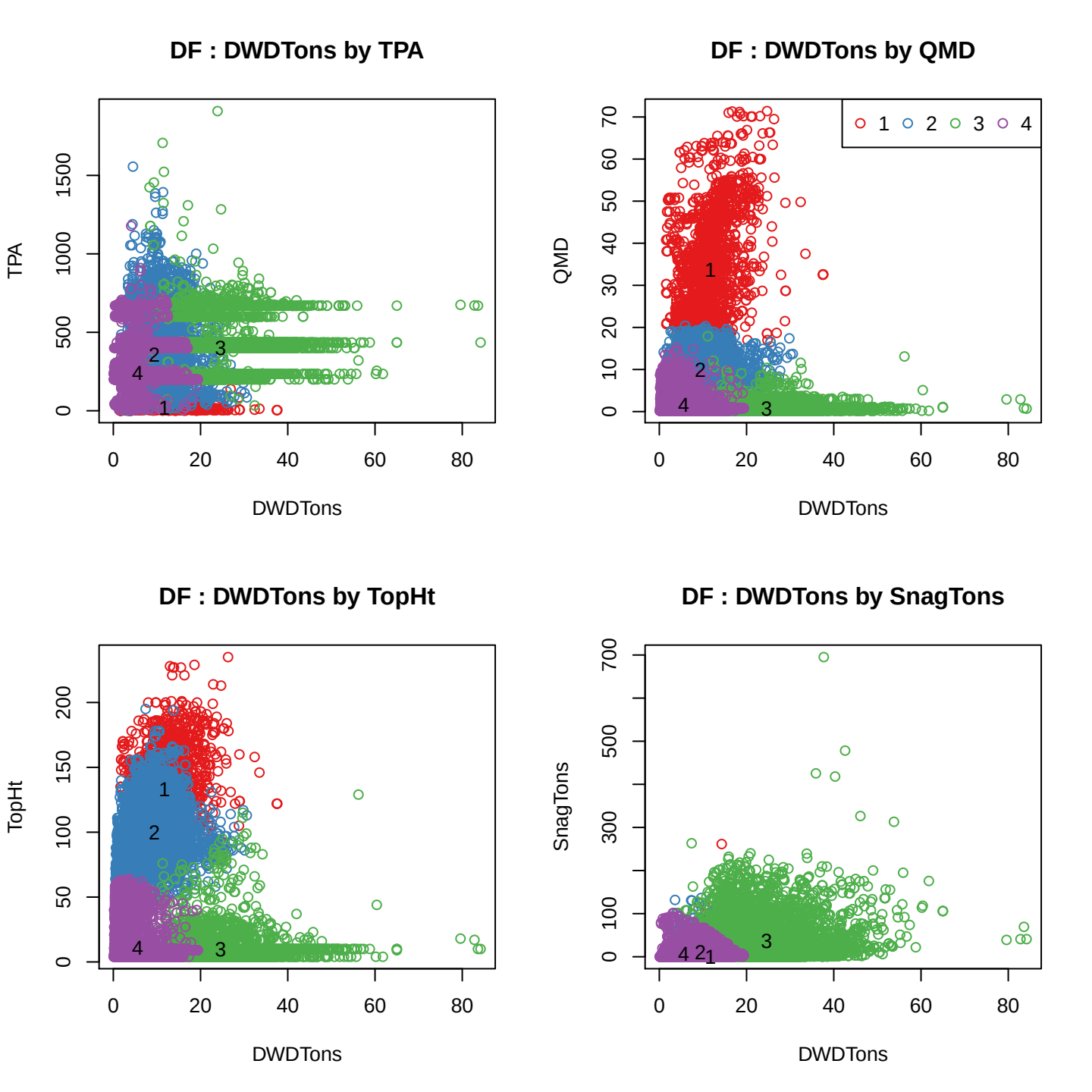
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TPA
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DF : DWDTons by QMD
QMD
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DWDTons
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DF : DWDTons by TopHt
TopHt
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DWDTons
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DF : DWDTons by SnagTons
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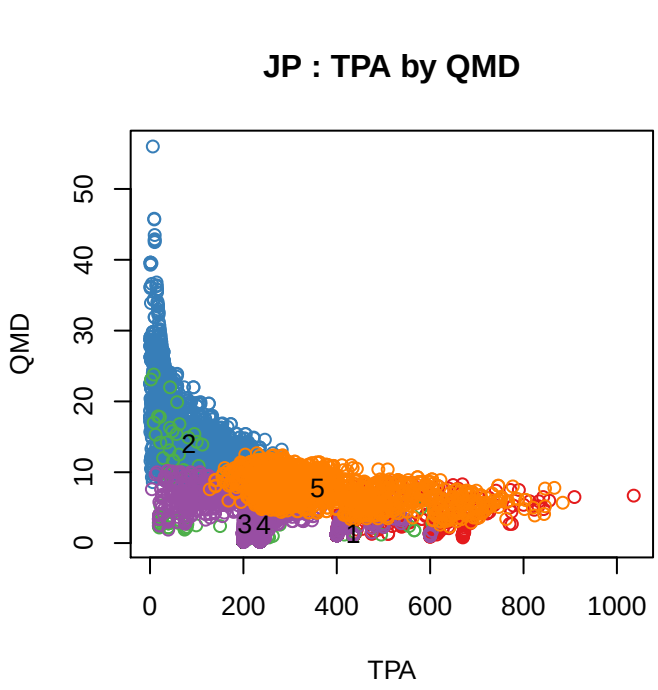
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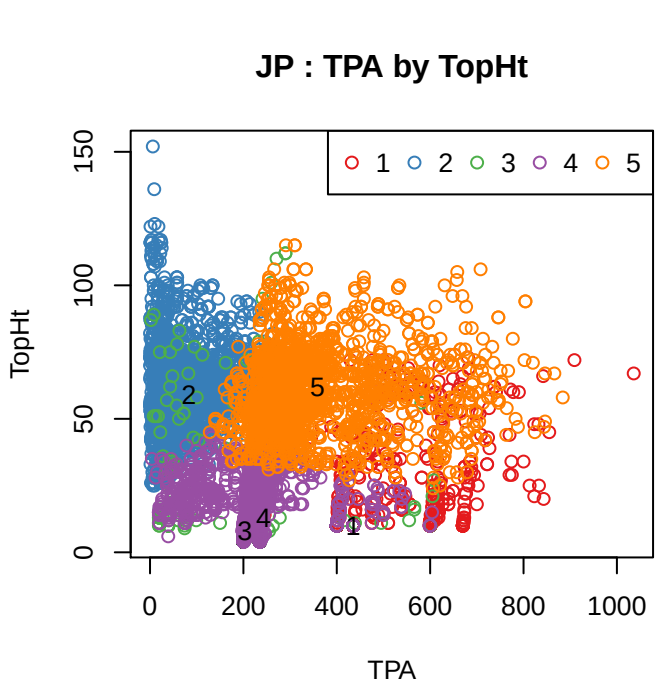
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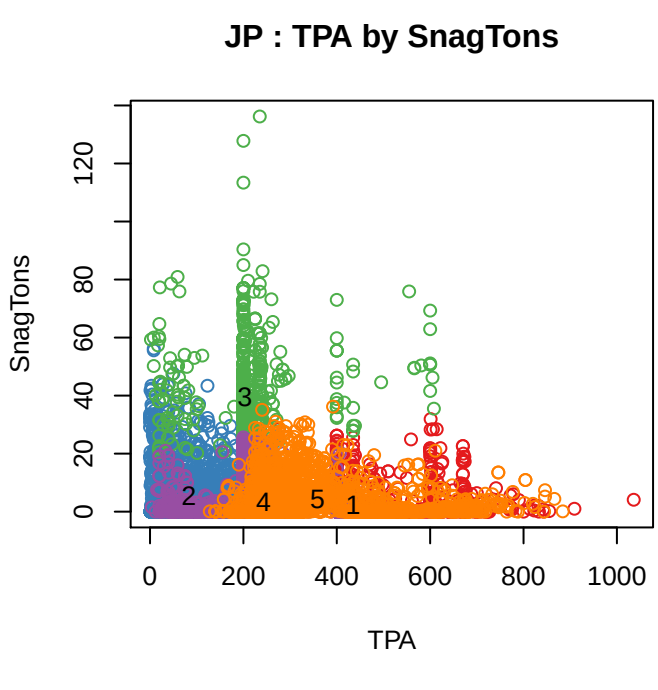
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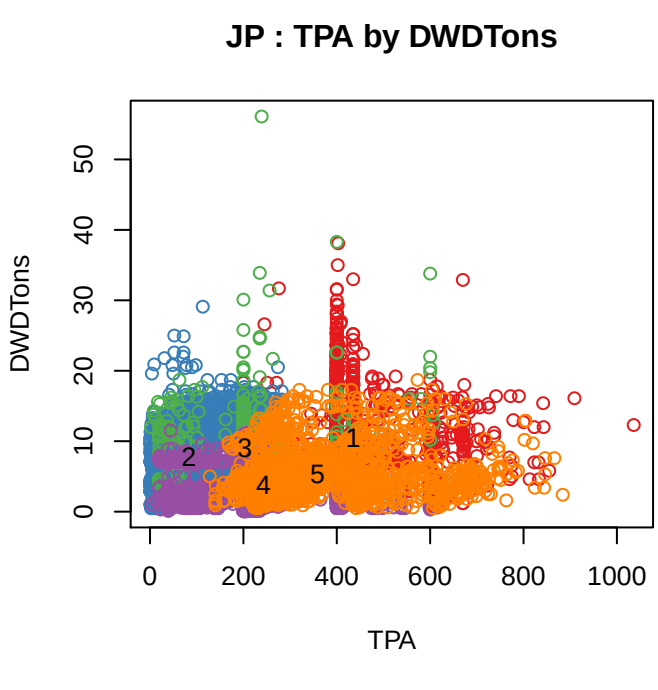
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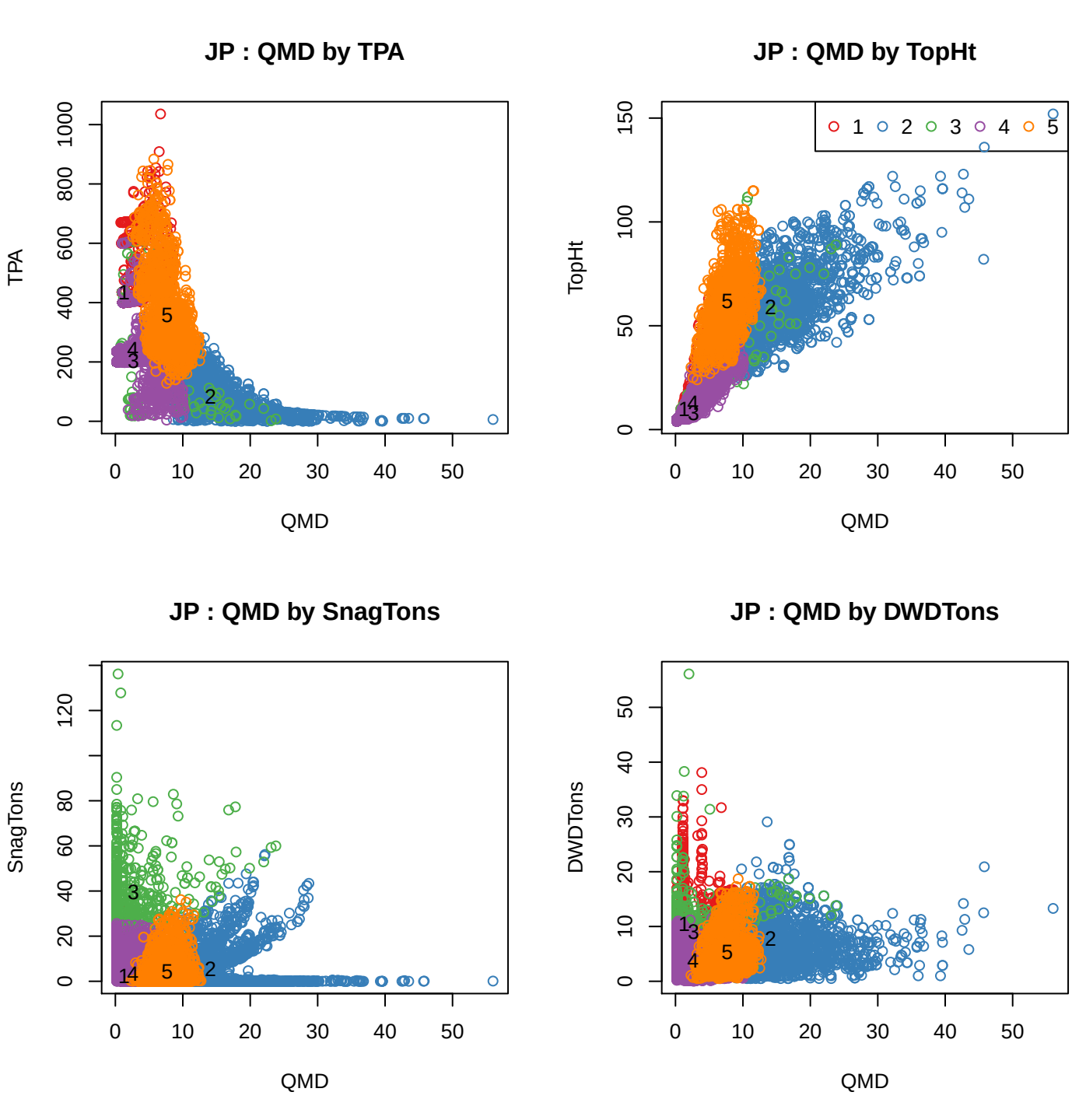
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JP : QMD by TopHt
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JP : QMD by SnagTons
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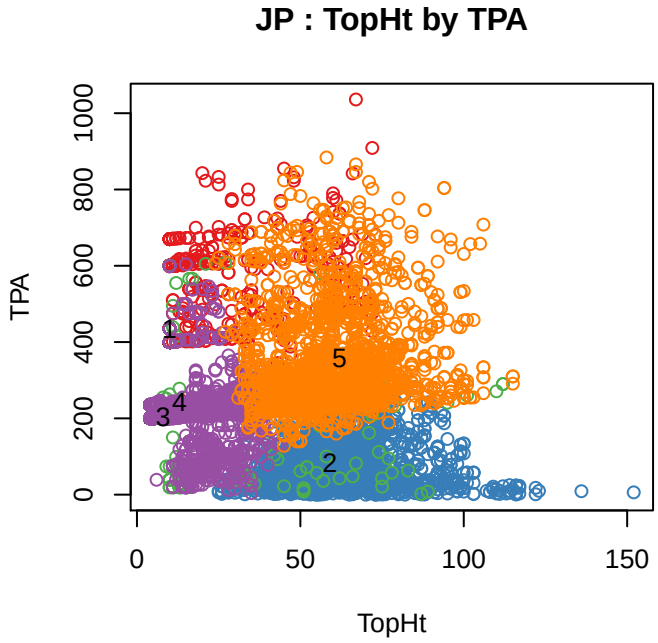
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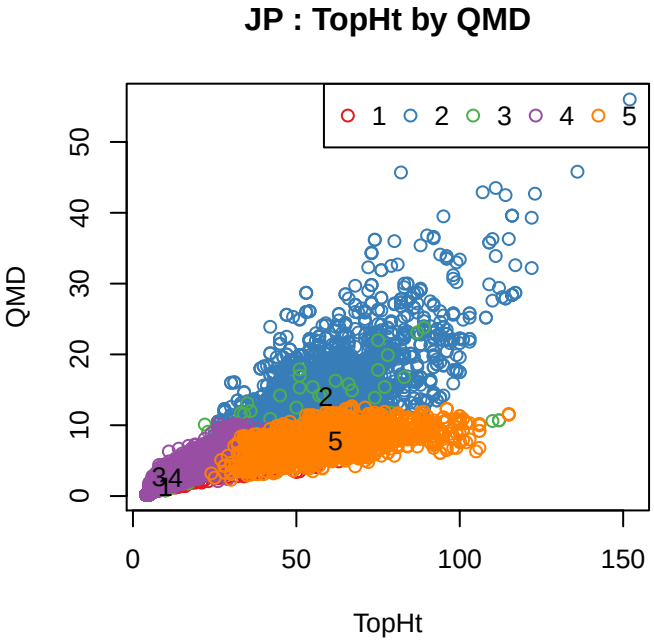
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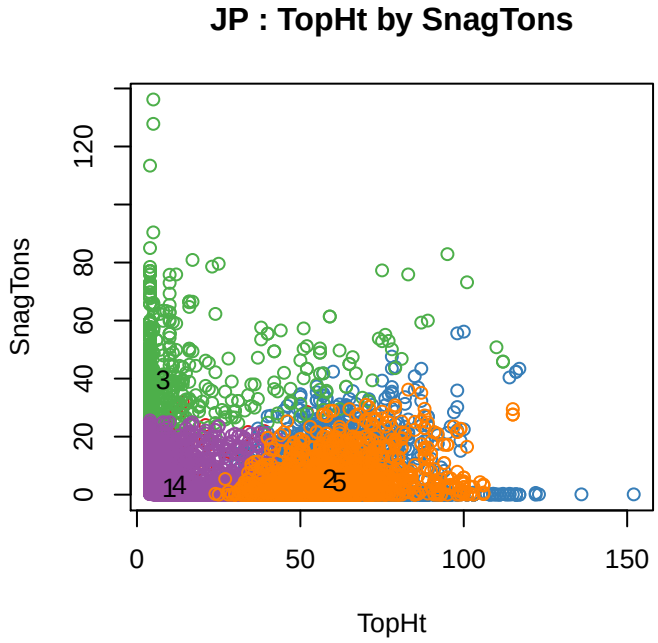
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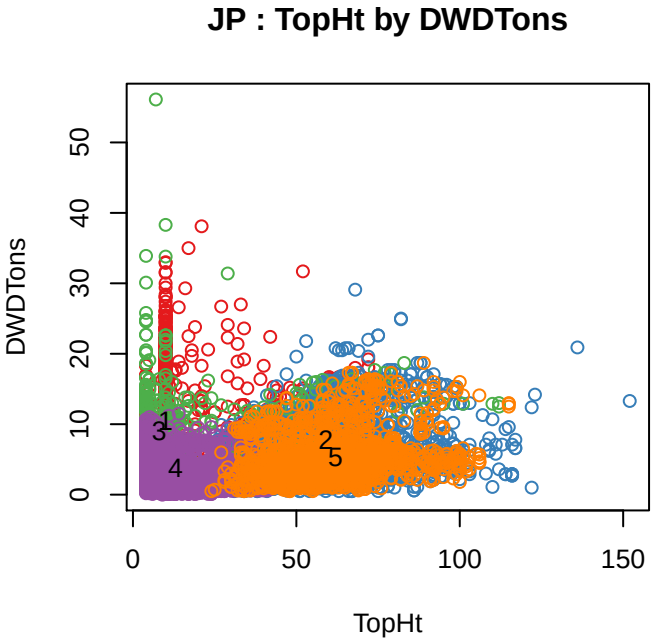
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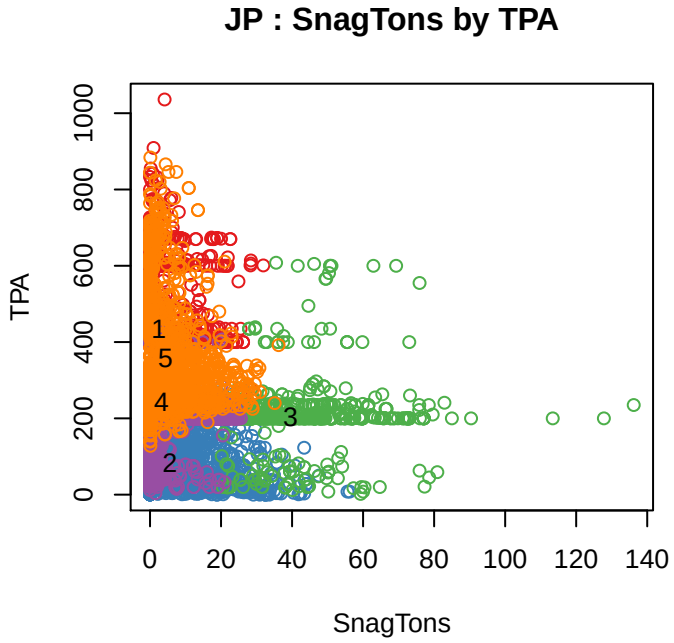
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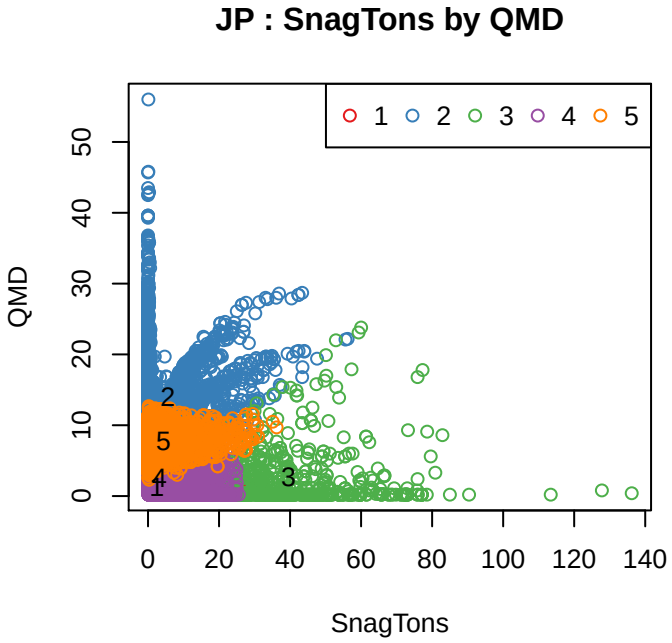
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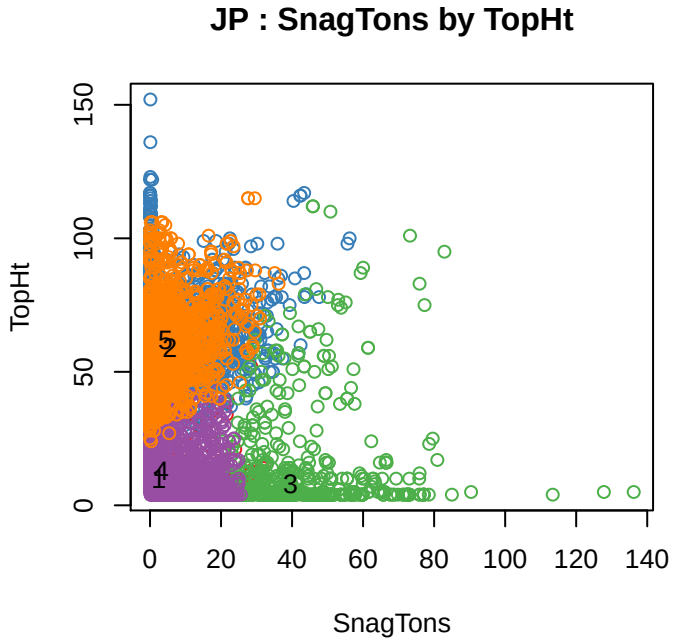
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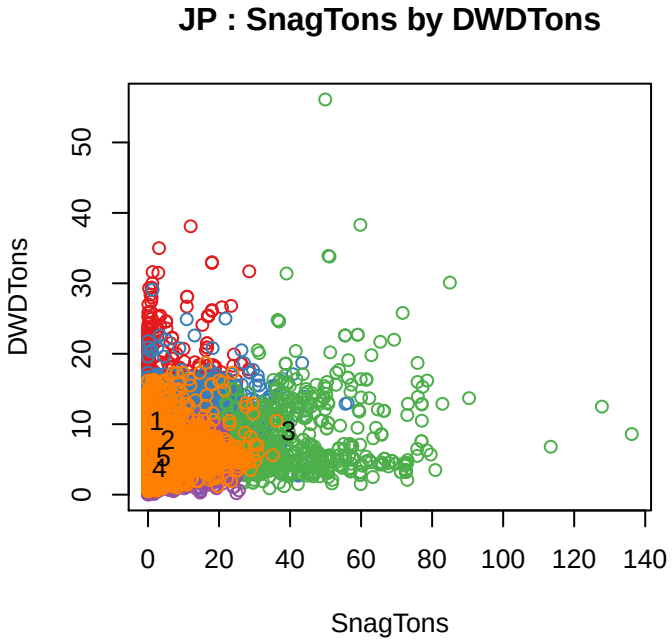
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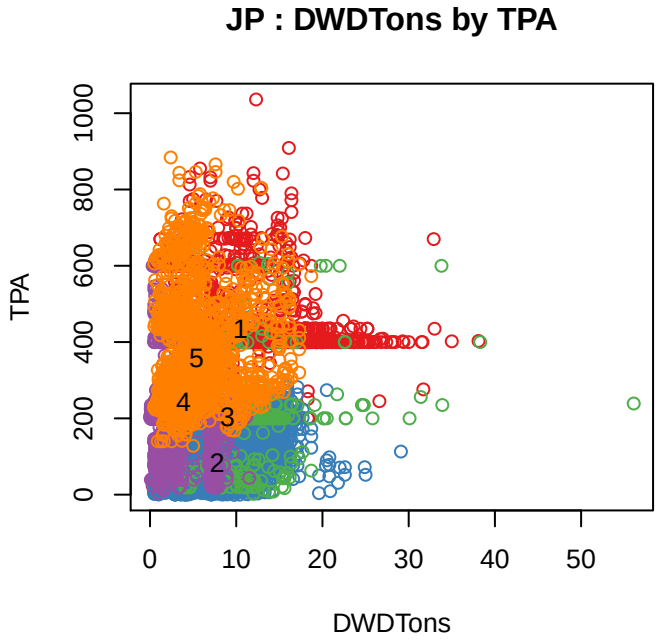
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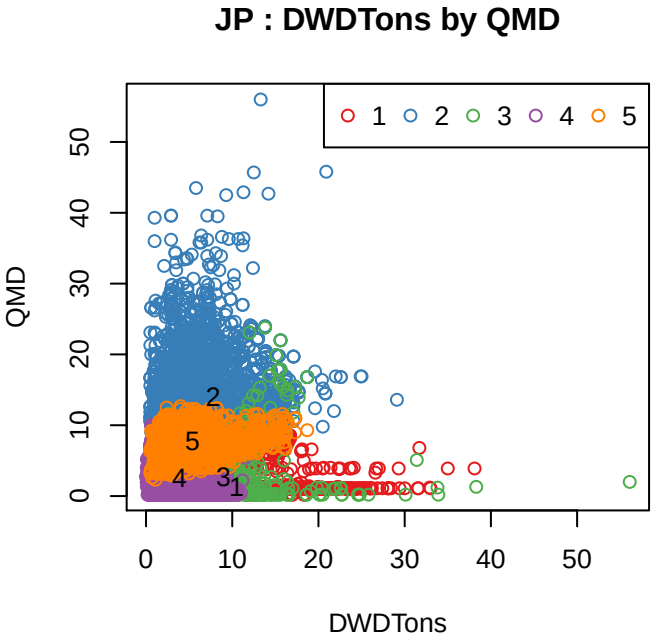
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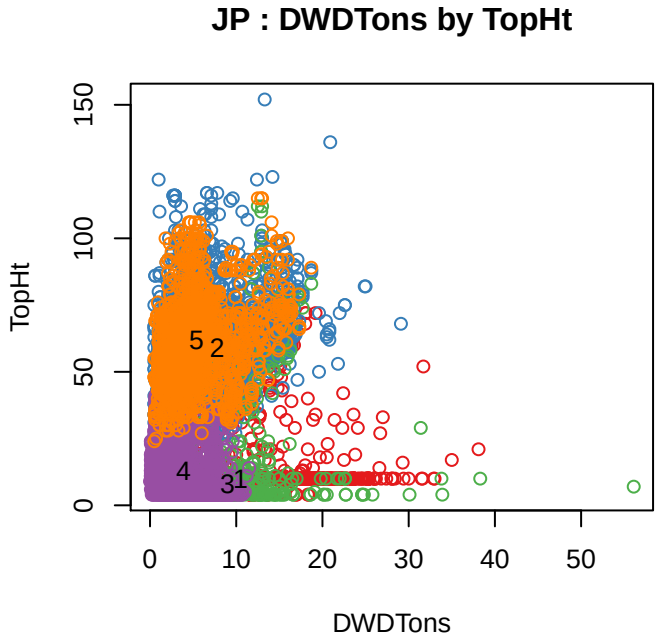
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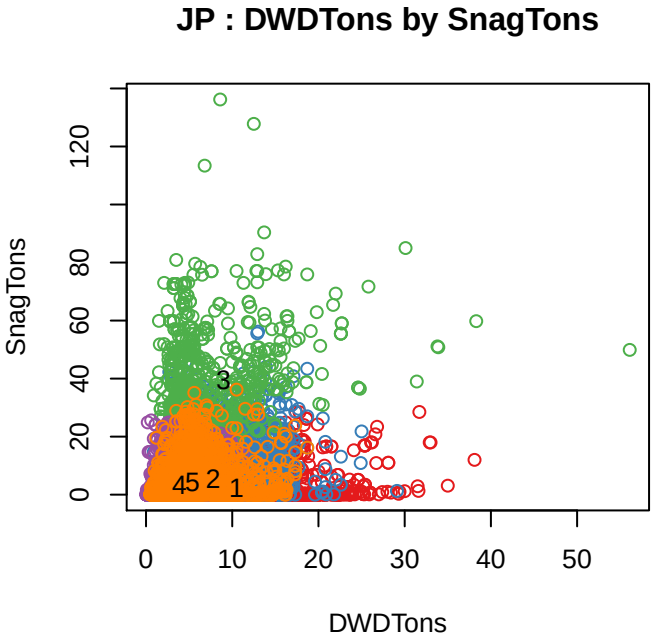
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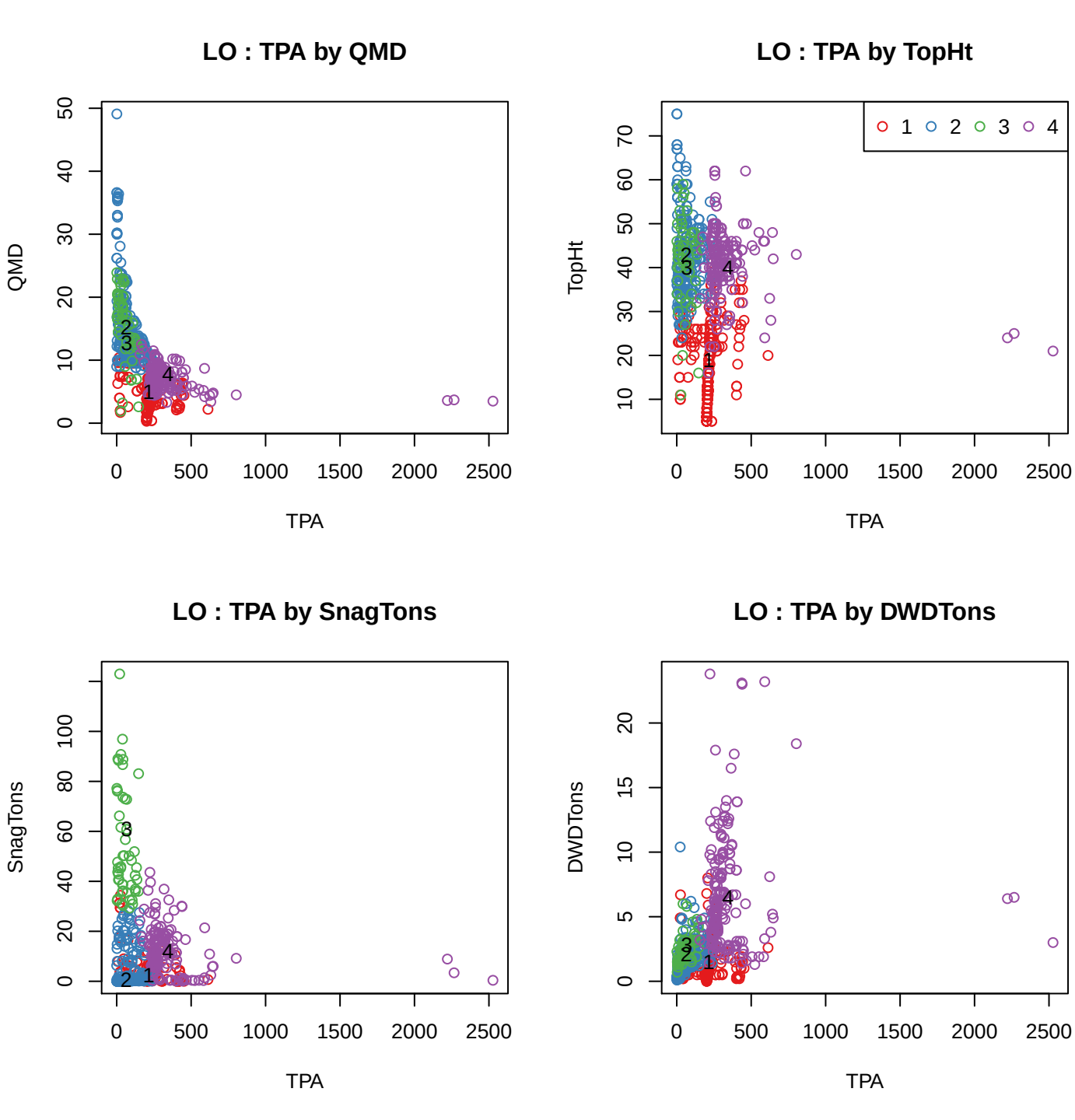
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LO : TPA by TopHt
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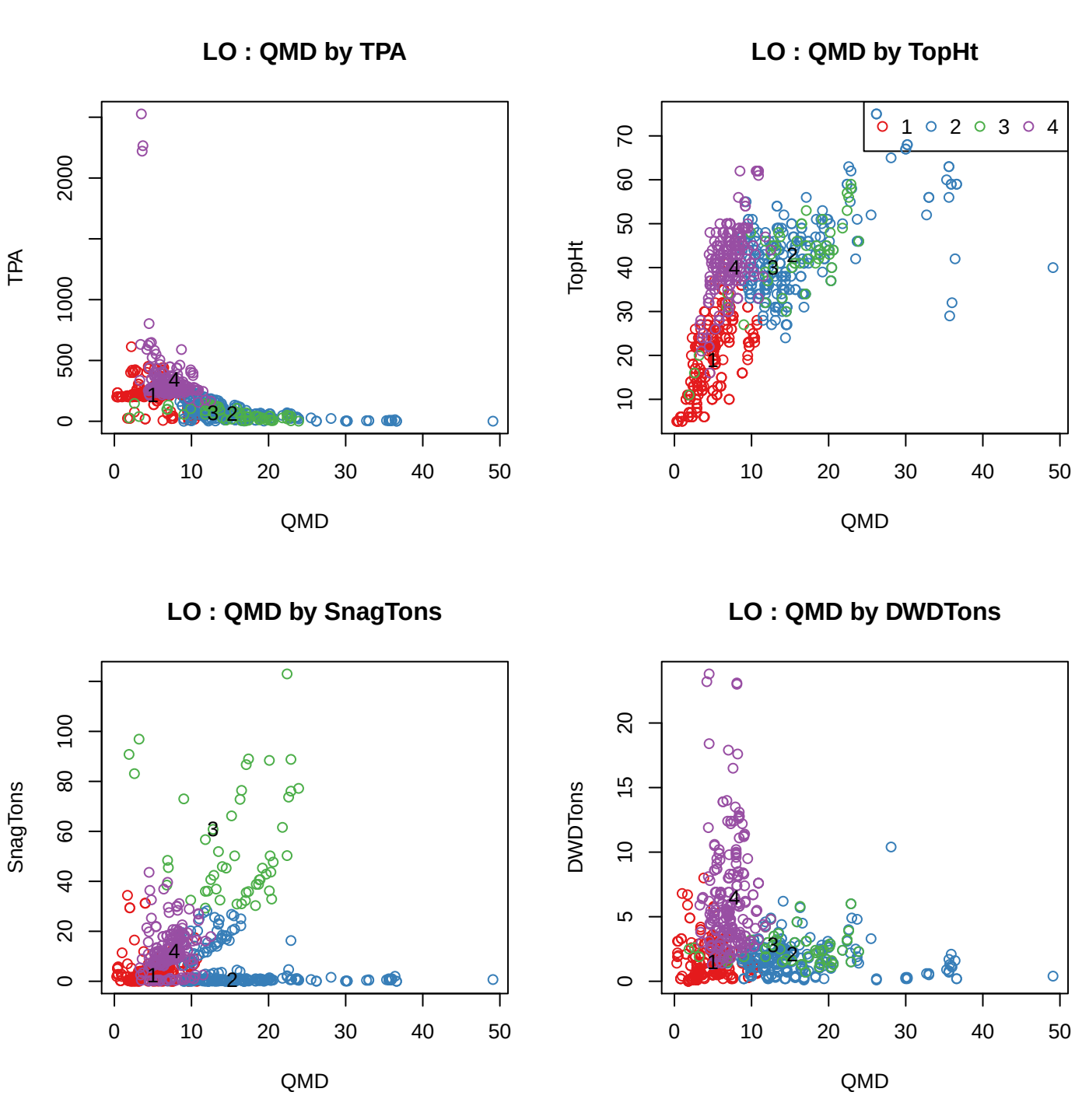
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LO : QMD by TopHt
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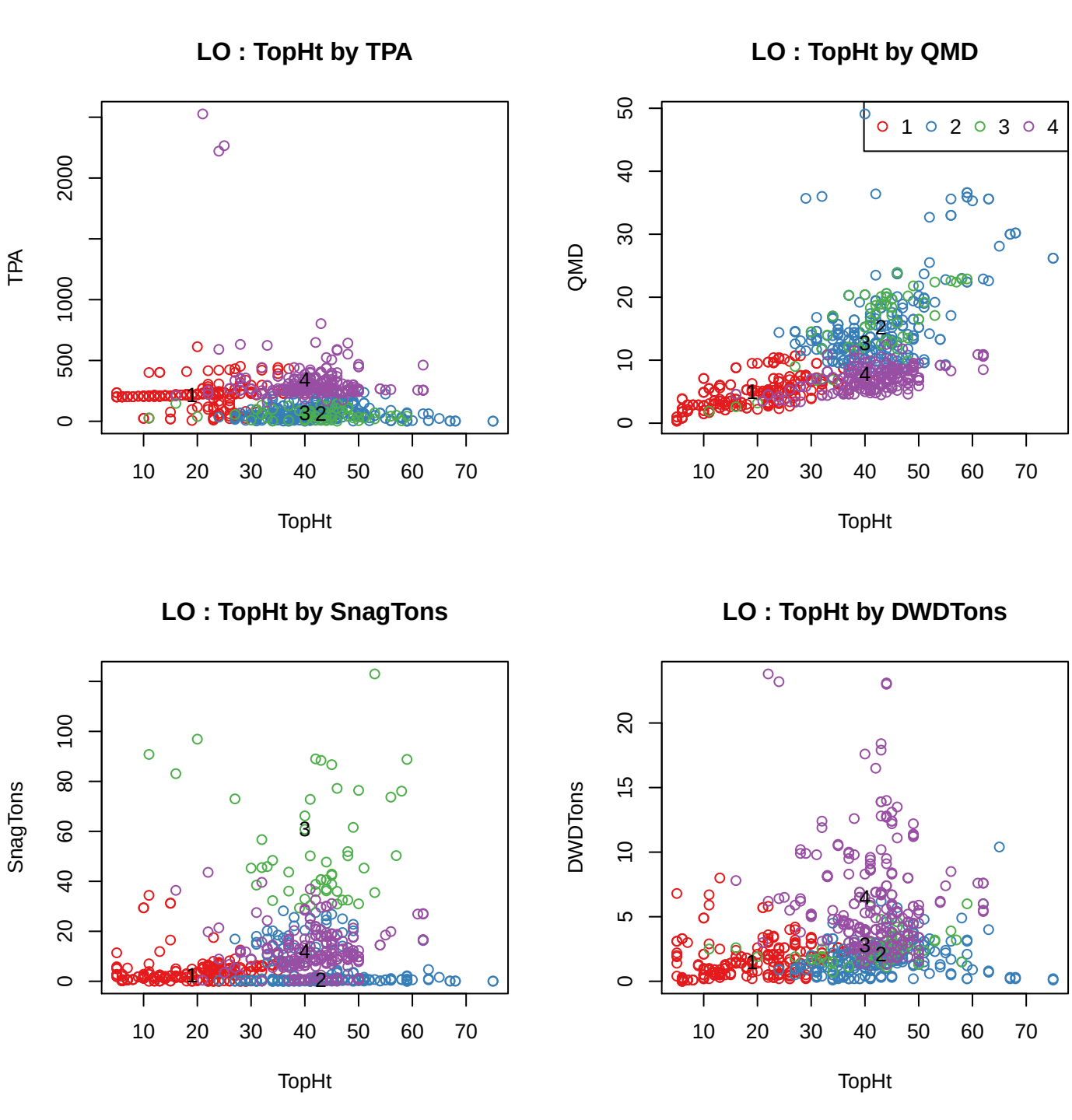
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LO : TopHt by SnagTons
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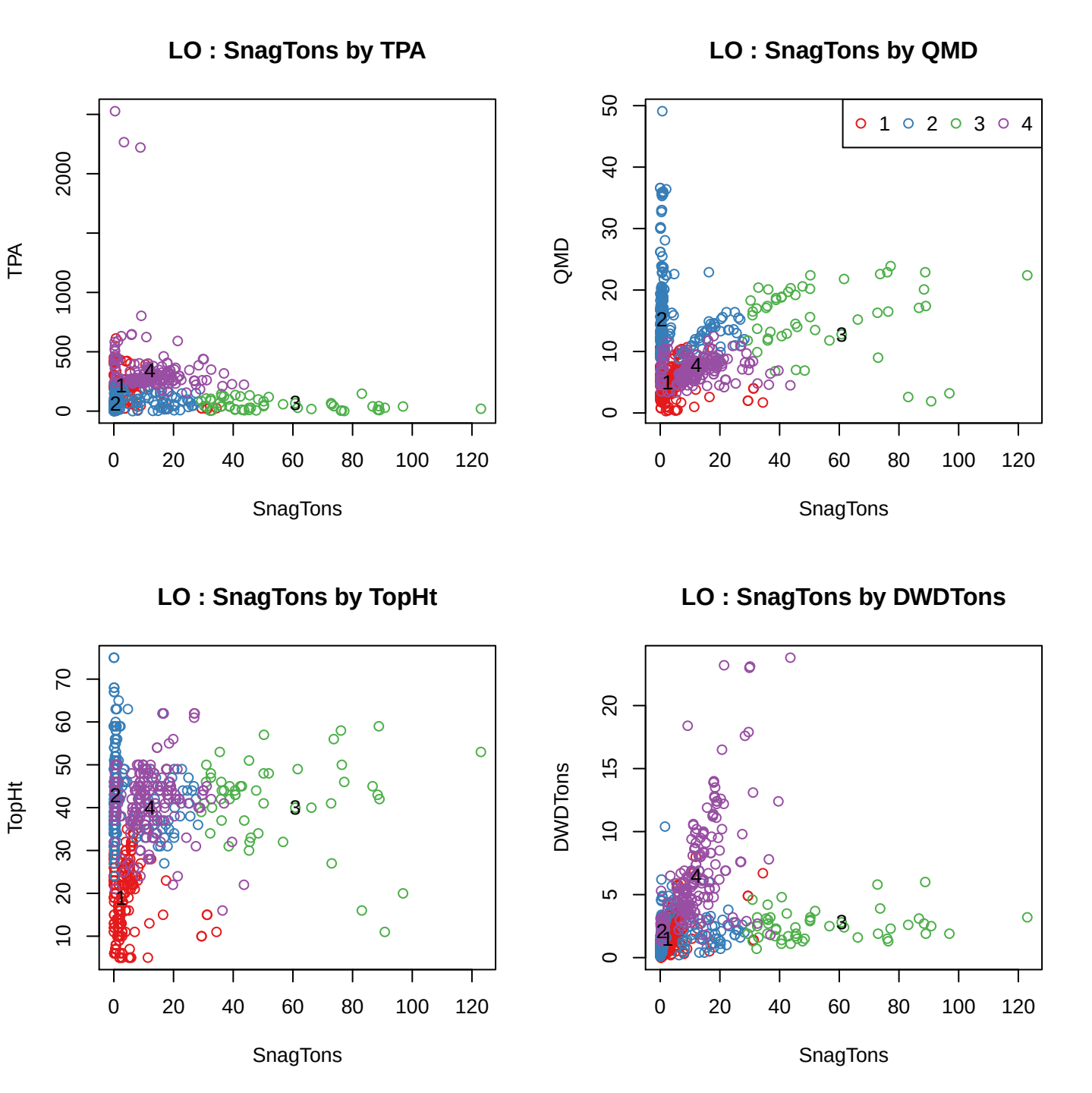
LO : TopHt by DWDTons
DWDTons
TopHt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LO : SnagTons by QMD
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LO : SnagTons by TopHt
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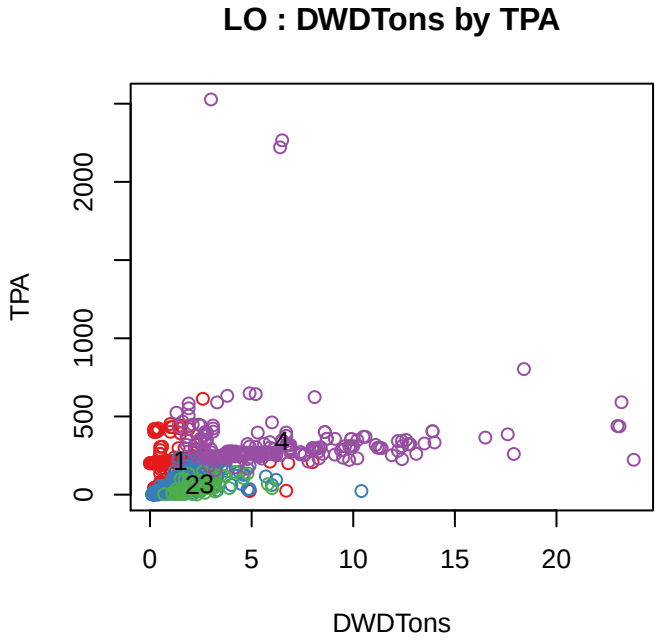
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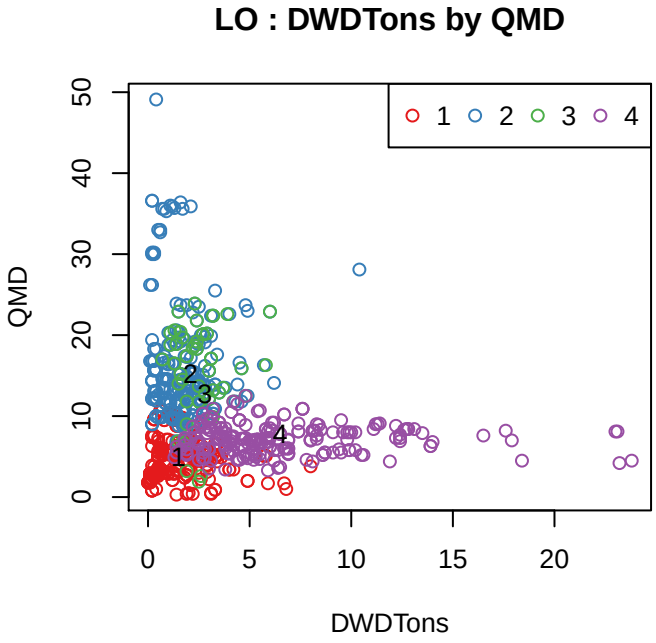
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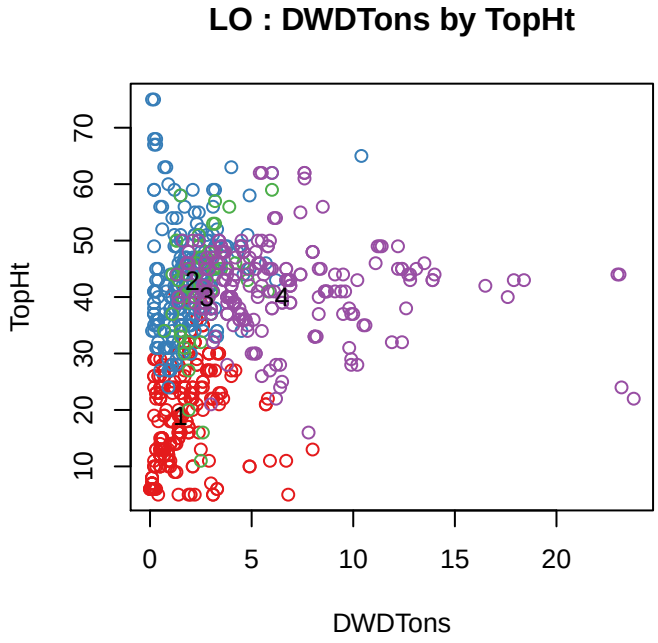
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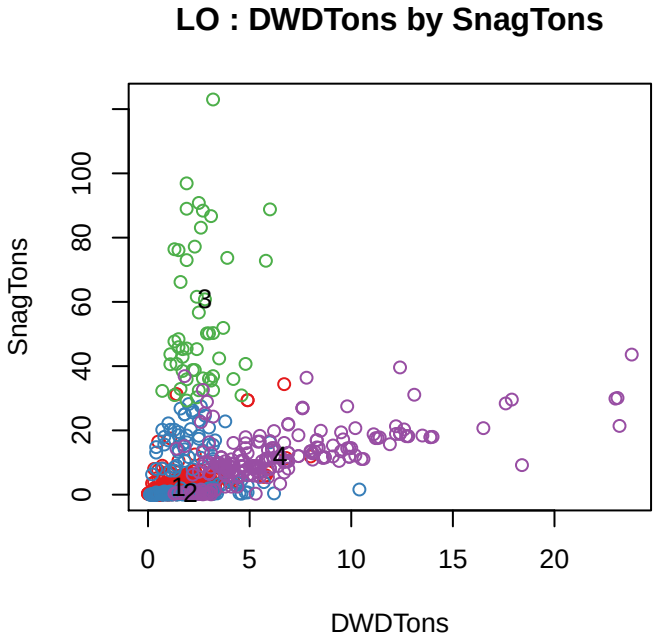
LO : DWDTons by SnagTons
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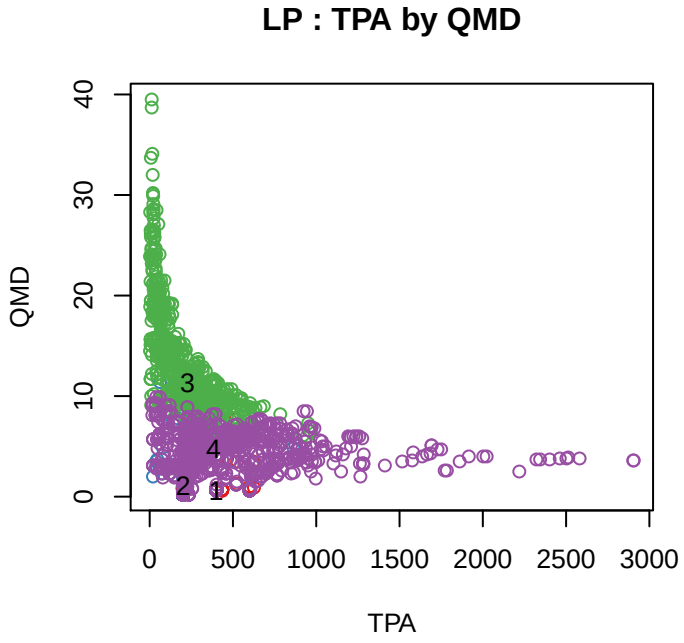
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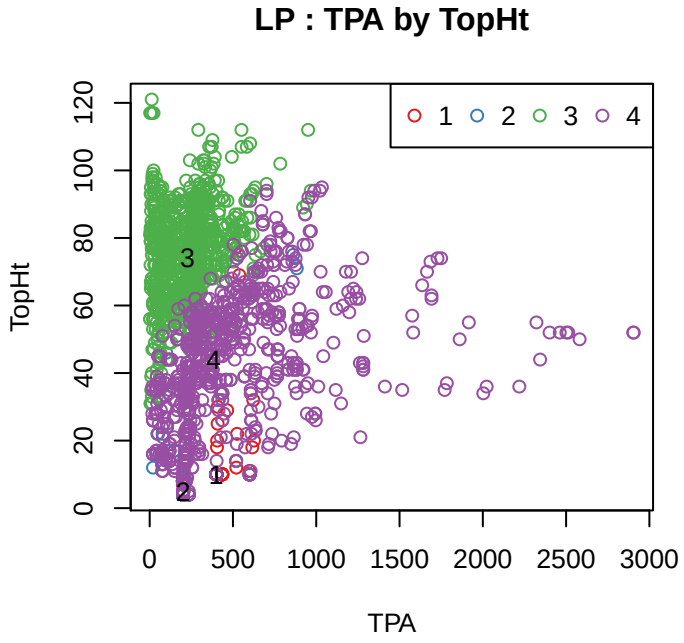
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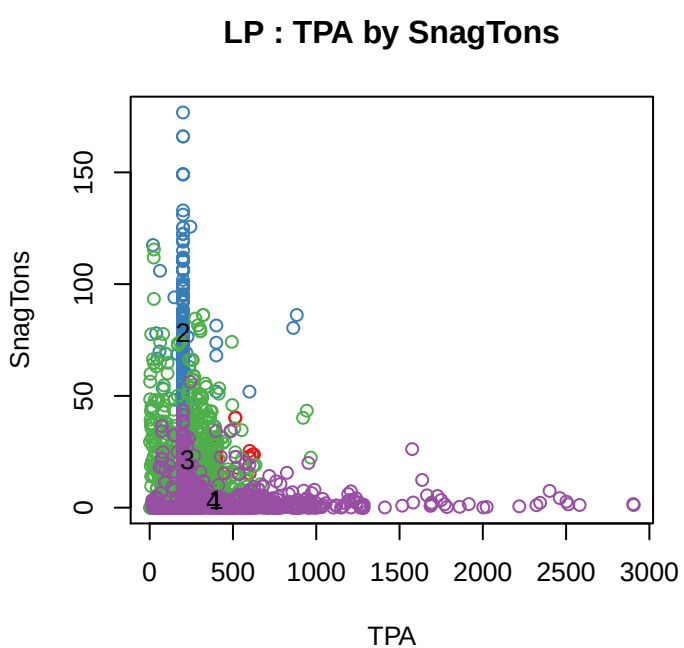
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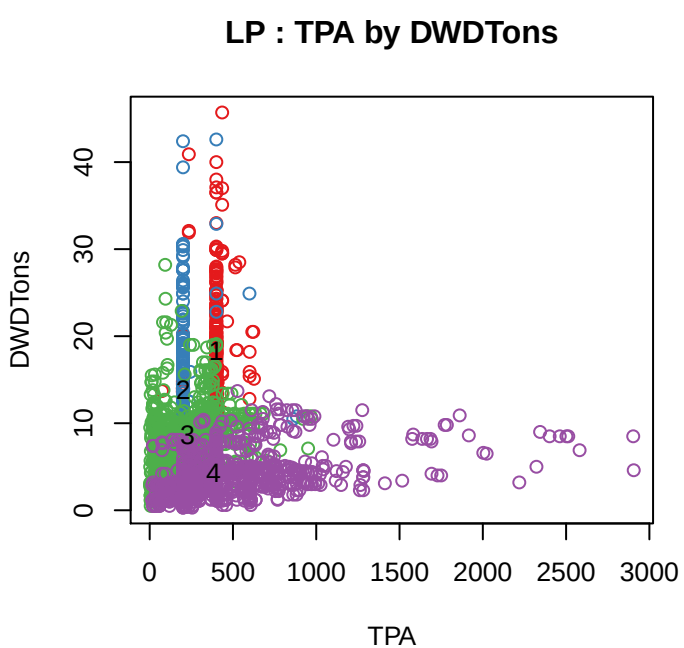
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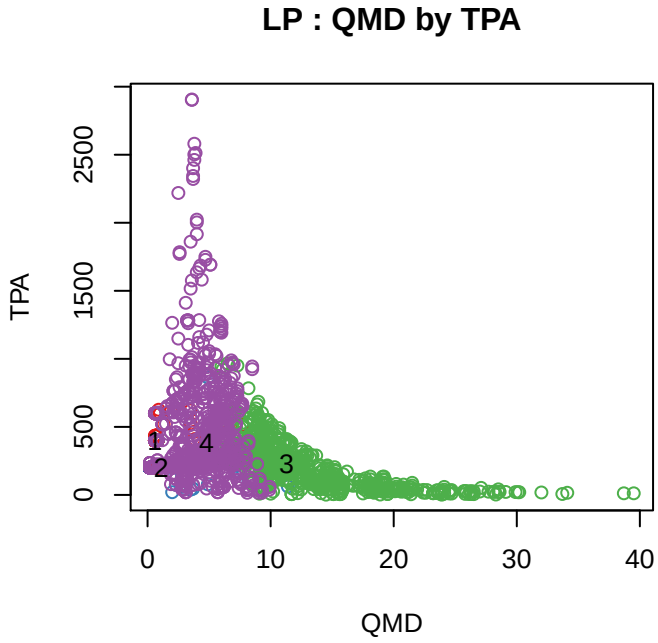
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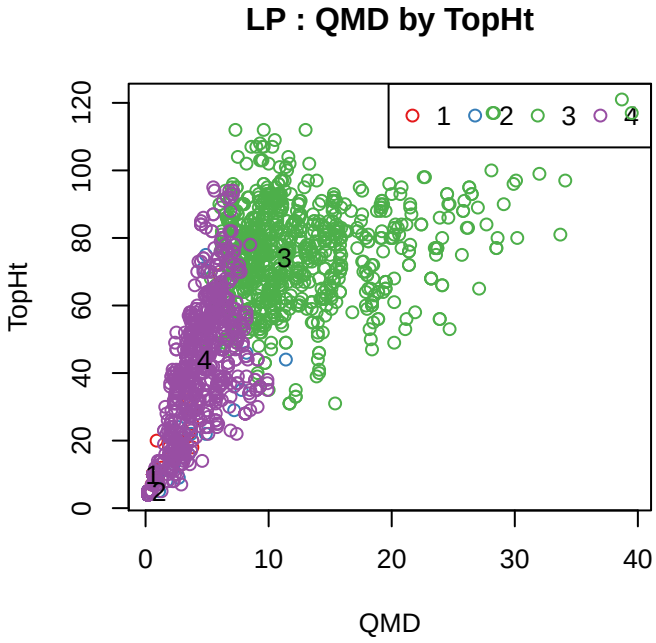
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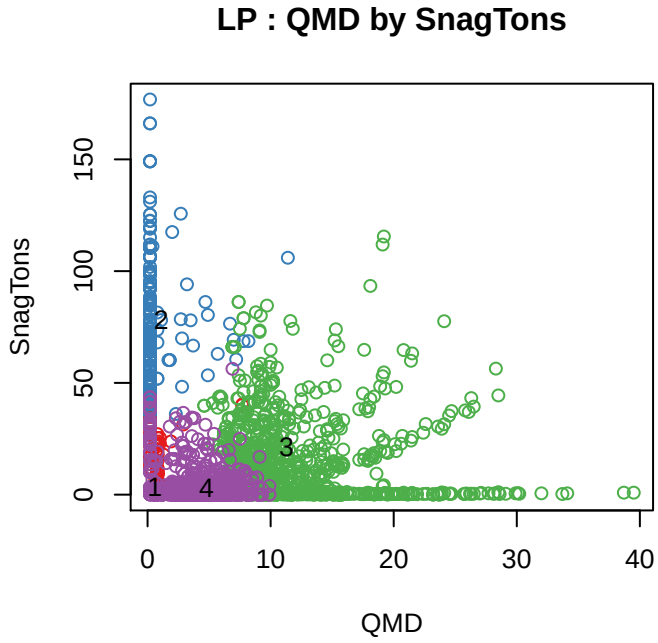
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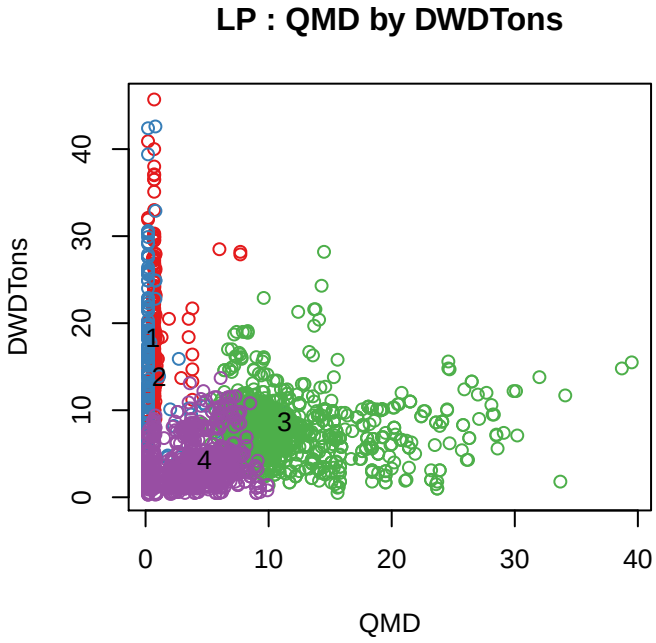
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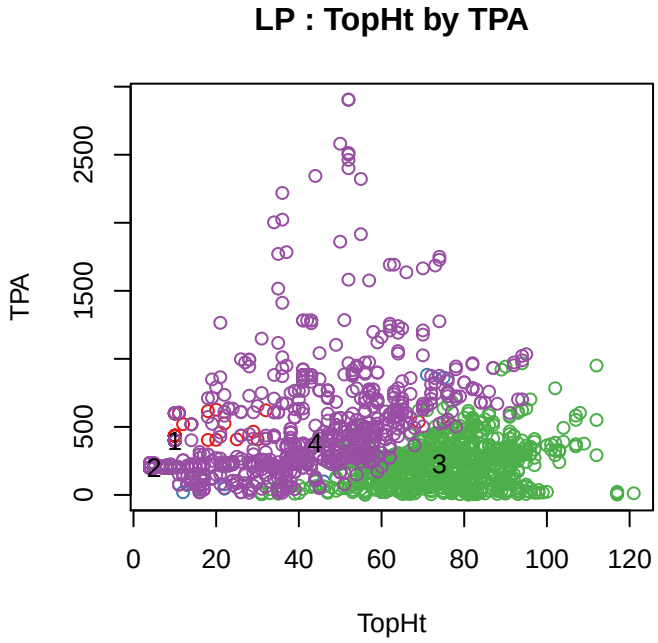
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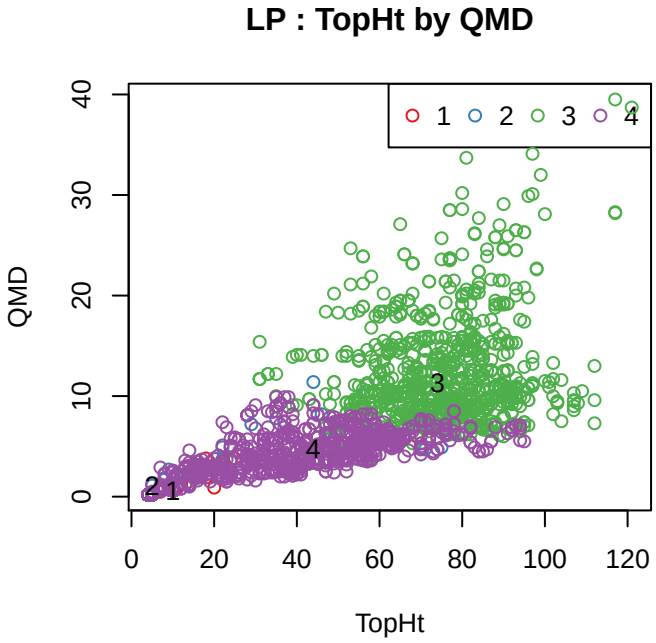
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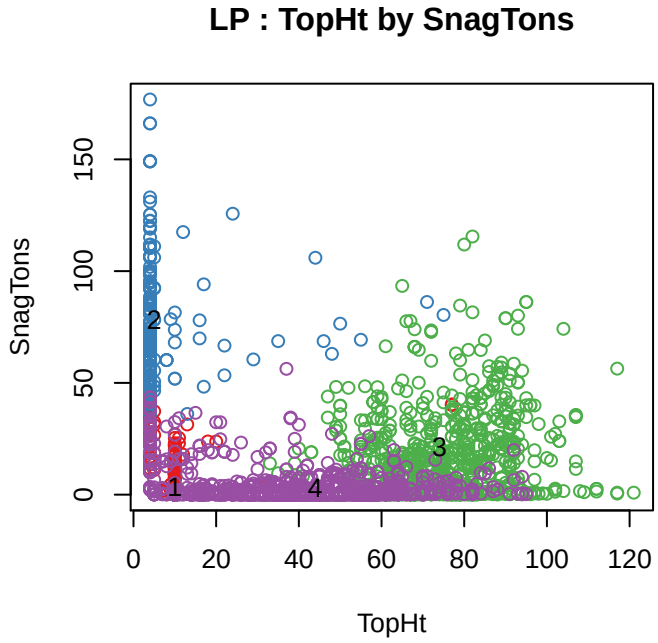
LP : TopHt by SnagTons
SnagTons
TopHt
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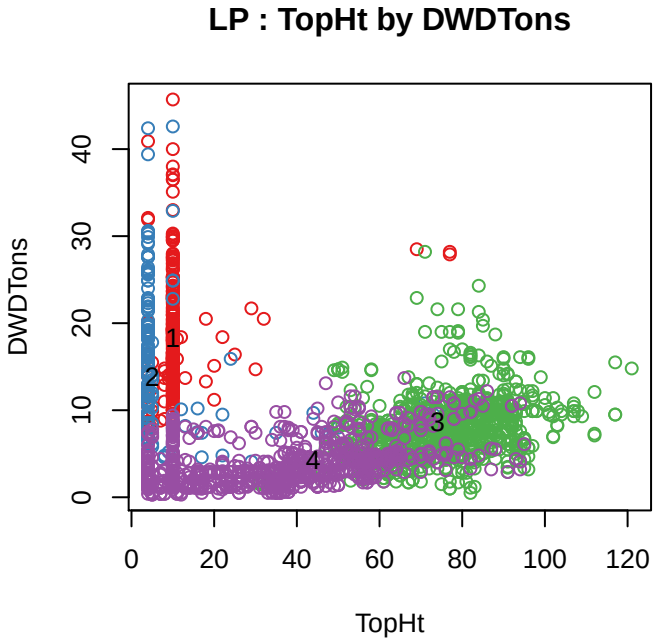
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DWDTons
TopHt
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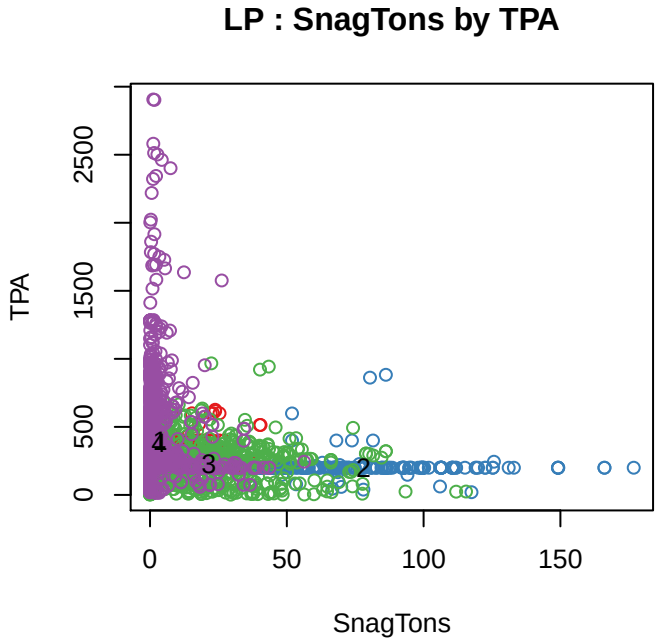
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TPA
SnagTons
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2500
0
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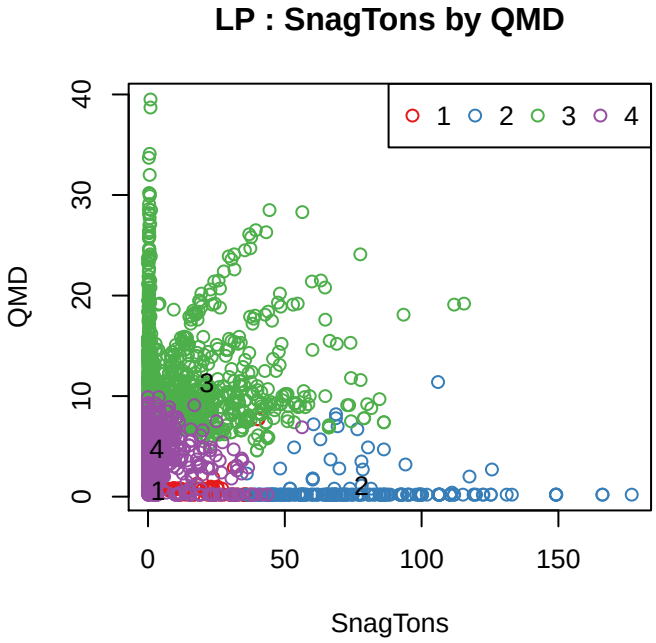
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SnagTons
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0
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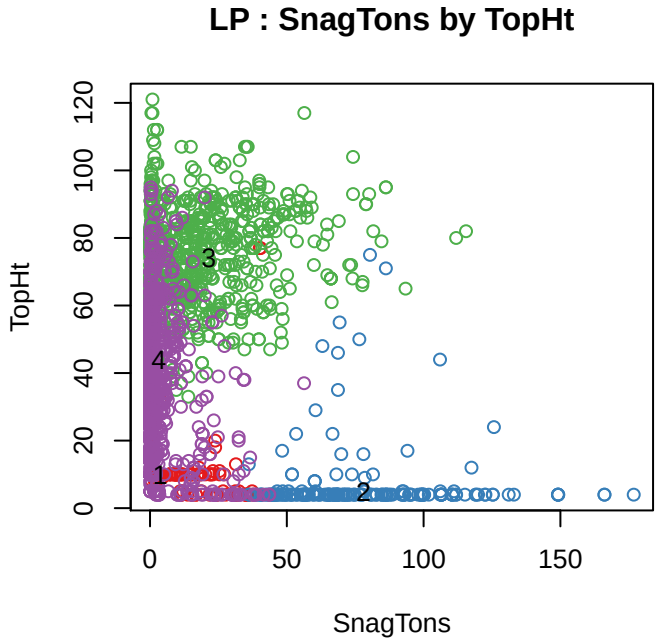
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TopHt
SnagTons
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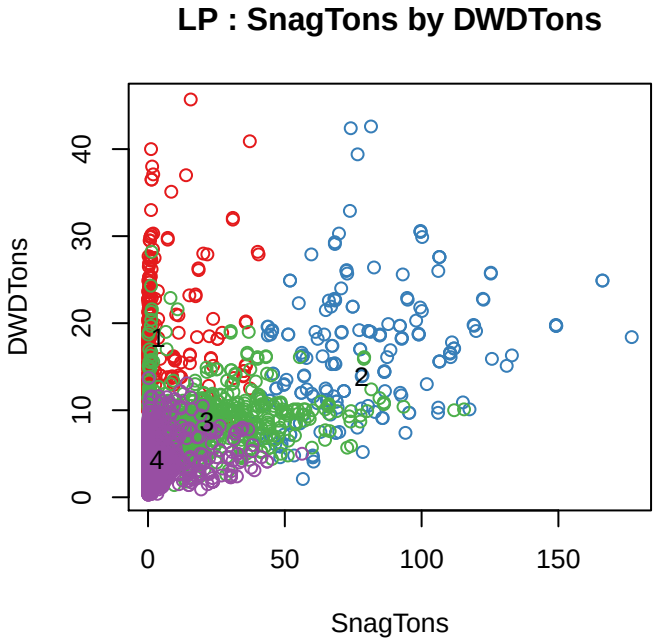
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DWDTons
SnagTons
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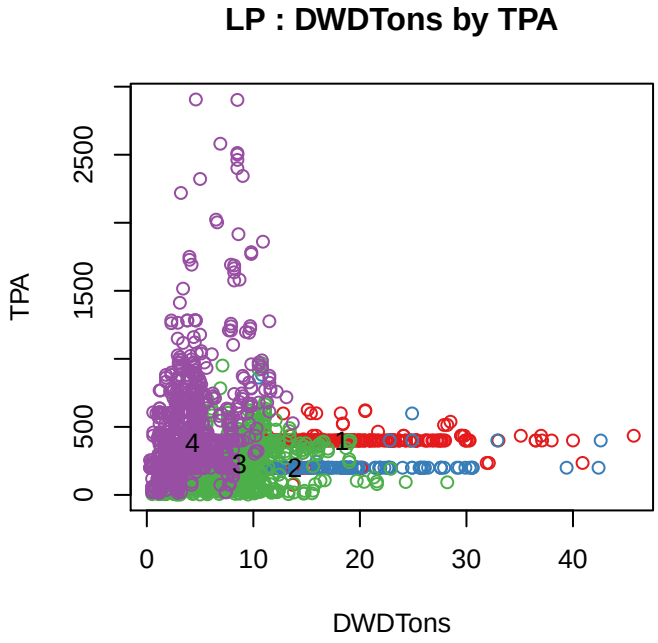
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TPA
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2500
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DWDTons
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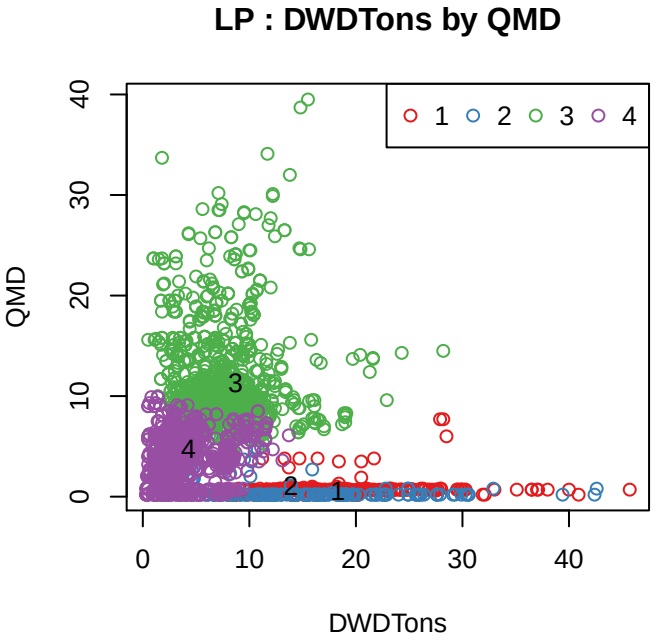
LP : DWDTons by QMD
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DWDTons
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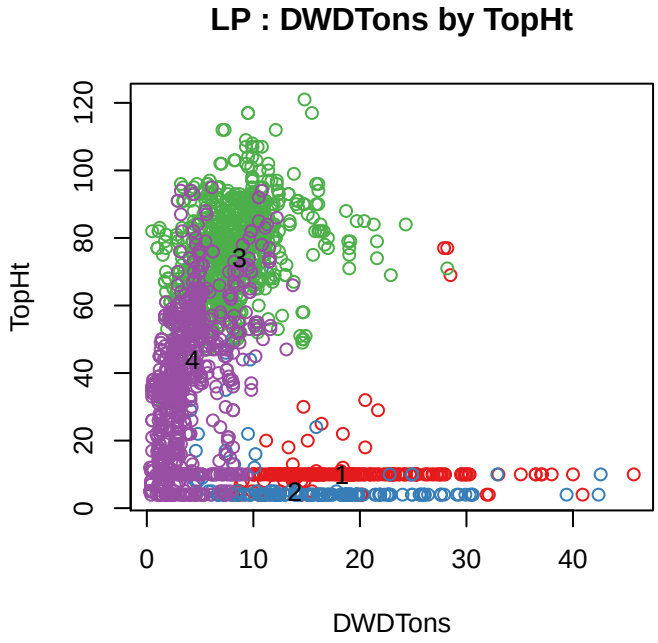
LP : DWDTons by TopHt
TopHt
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DWDTons
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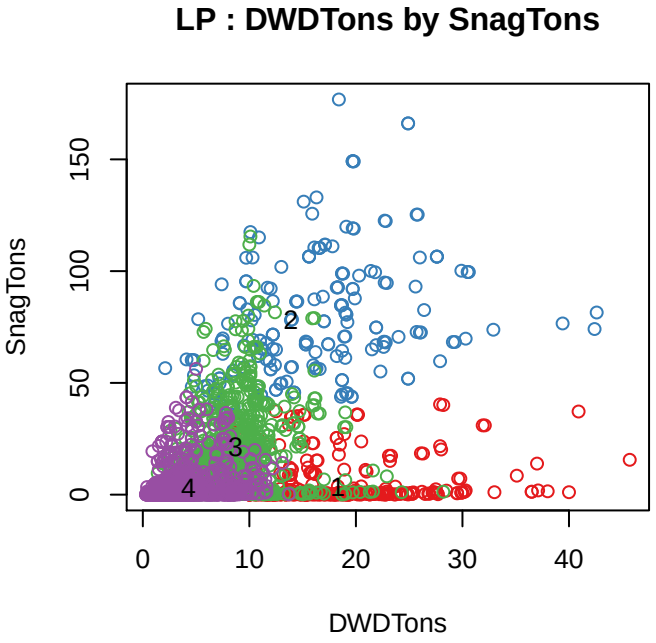
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SnagTons
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DWDTons
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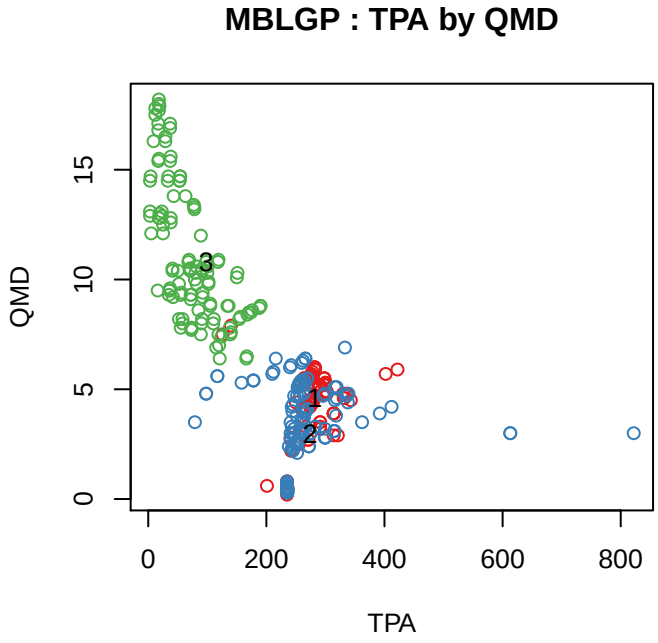
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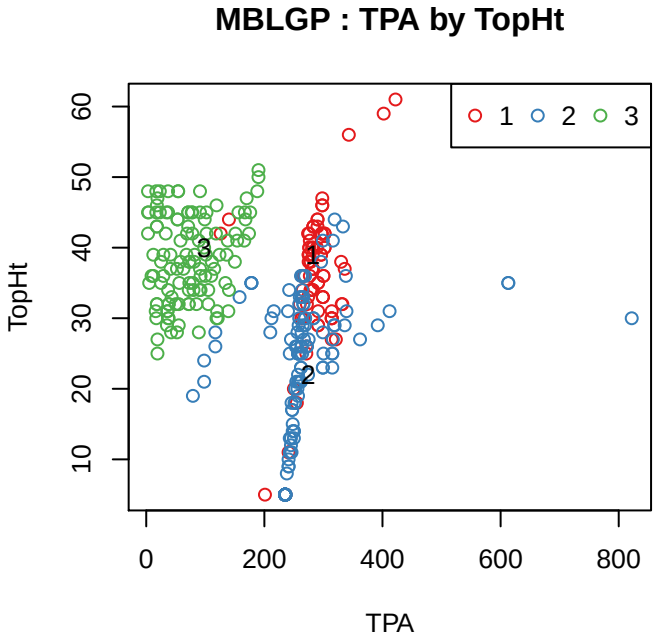
MBLGP : TPA by TopHt
TopHt
TPA
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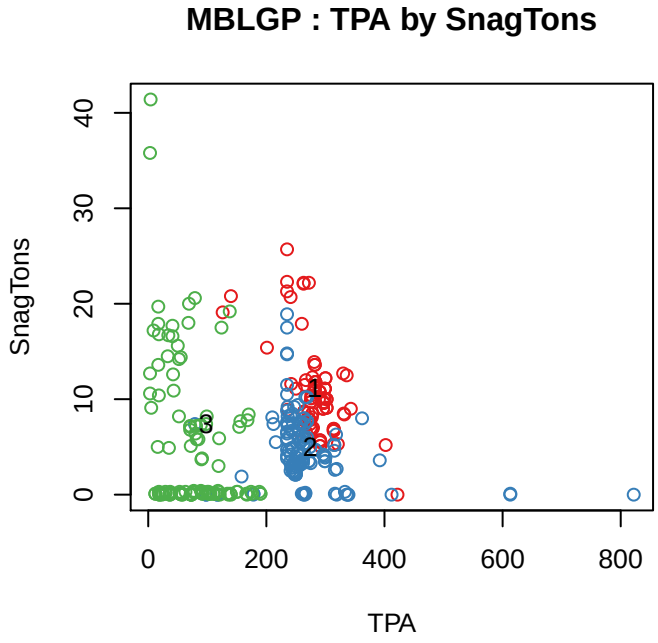
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SnagTons
TPA
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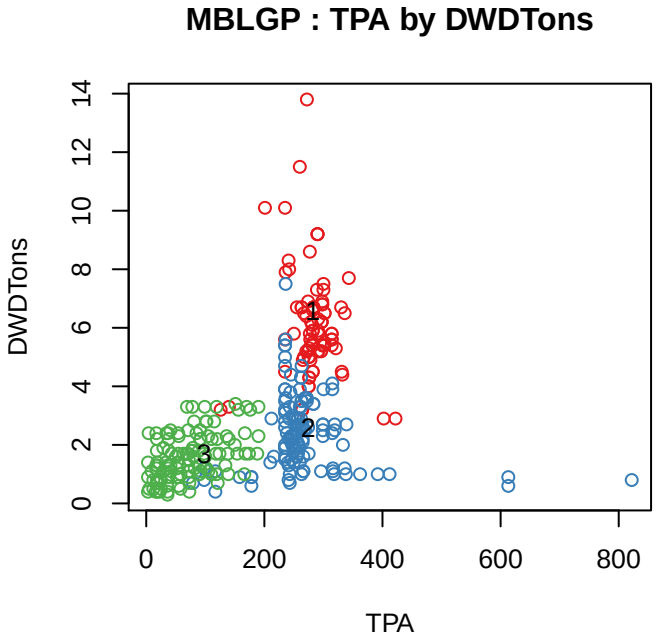
MBLGP : TPA by DWDTons
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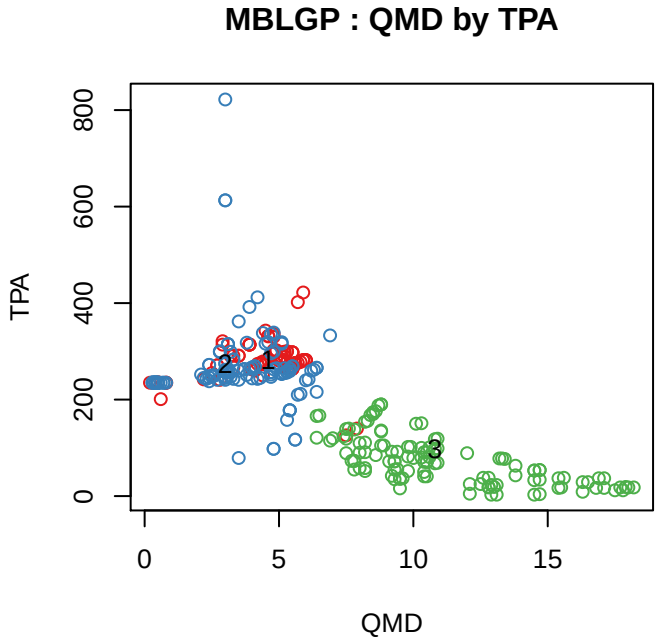
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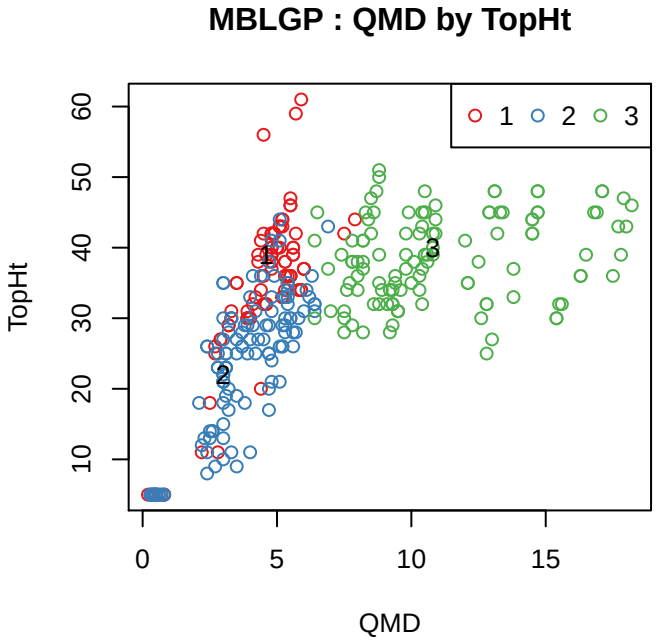
MBLGP : QMD by TopHt
TopHt
QMD
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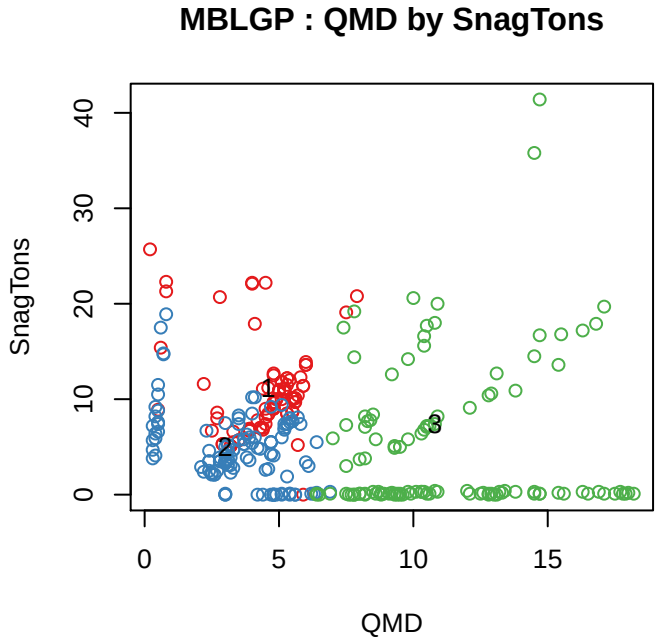
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SnagTons
QMD
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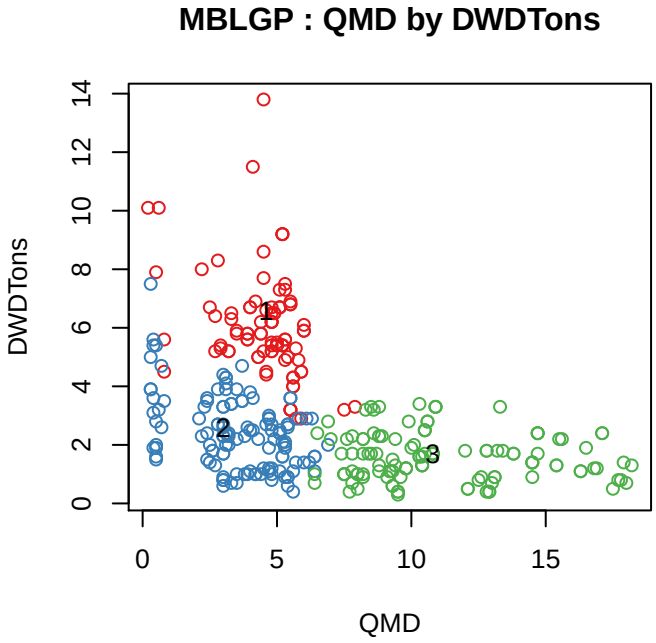
MBLGP : QMD by DWDTons
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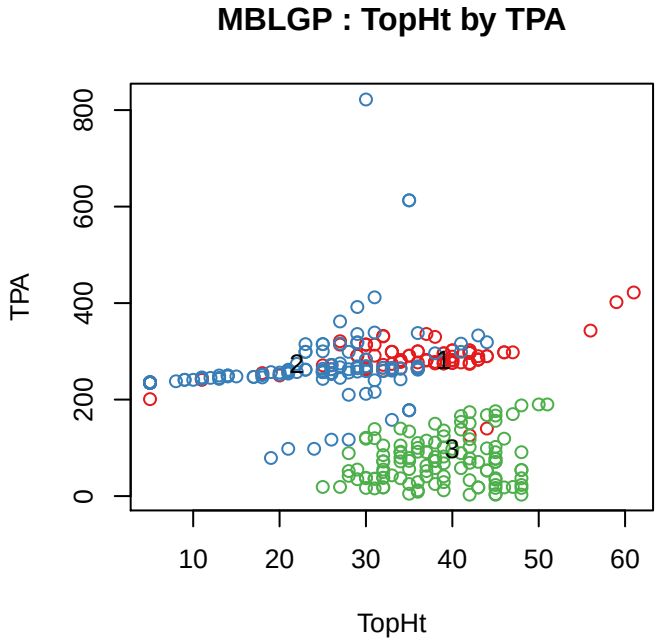
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TopHt
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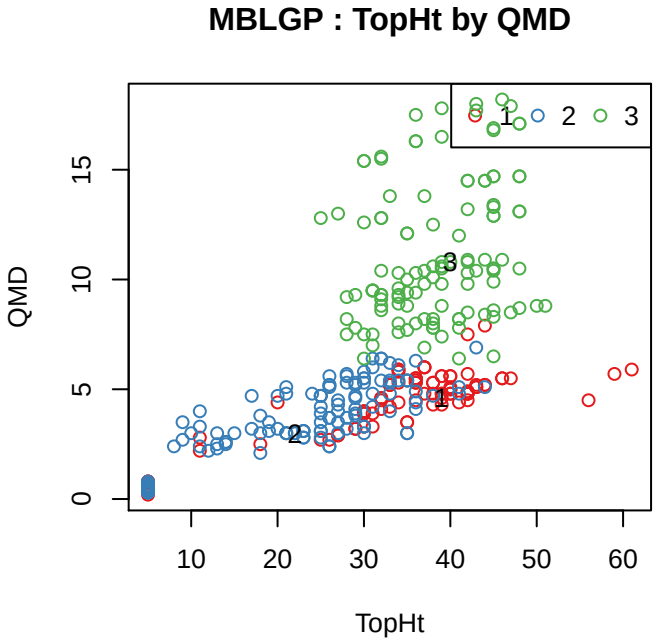
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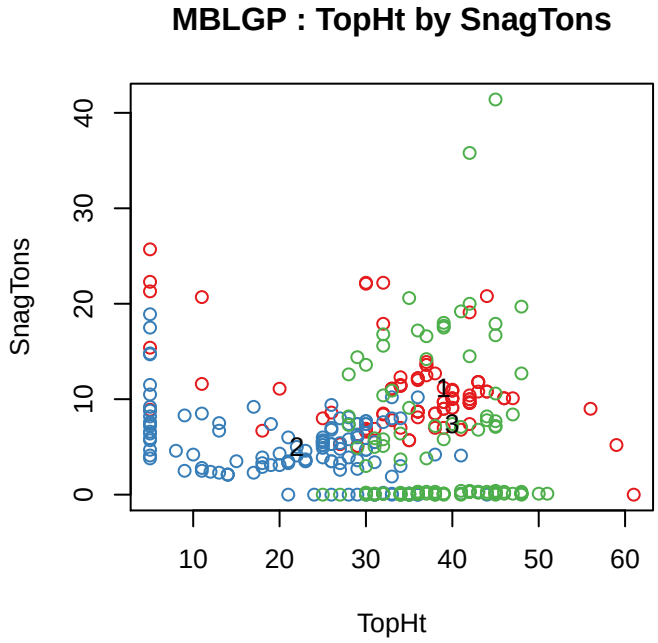
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TopHt
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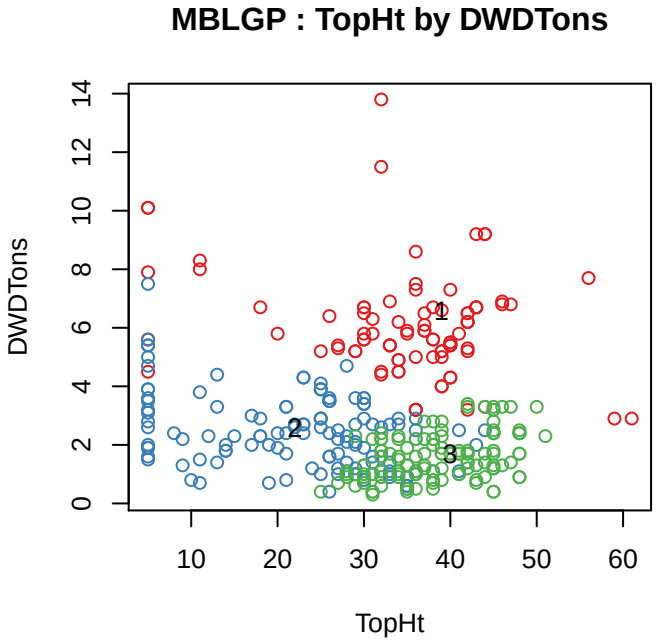
MBLGP : TopHt by DWDTons
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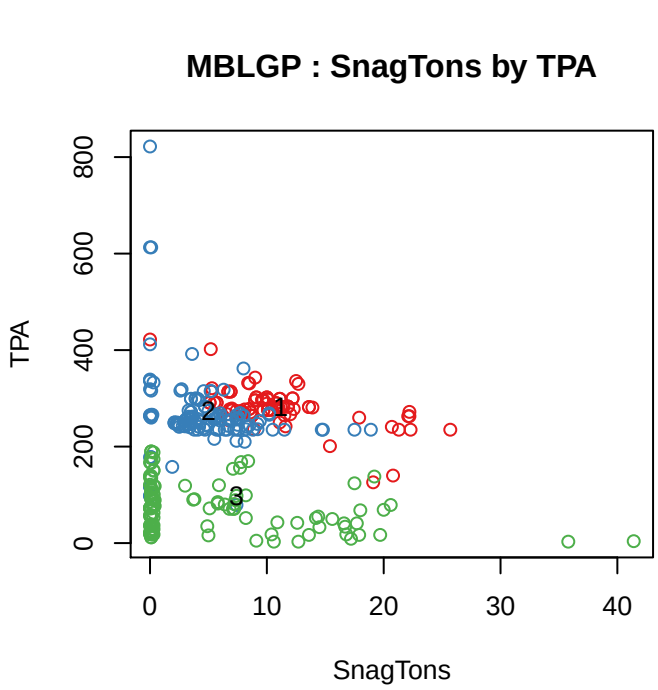
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SnagTons
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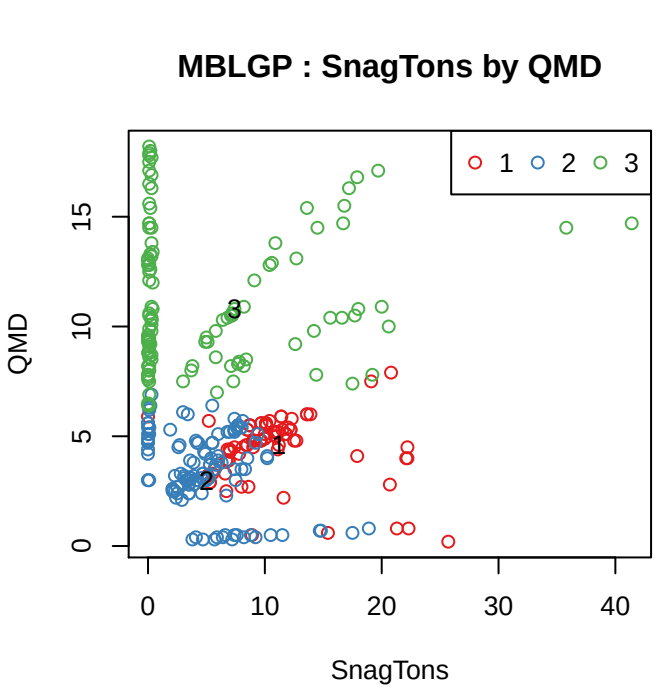
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SnagTons
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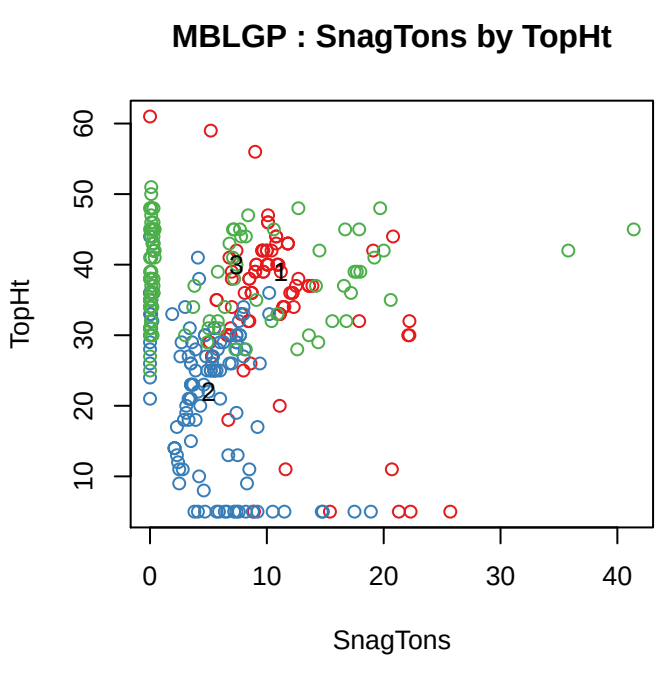
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TopHt
SnagTons
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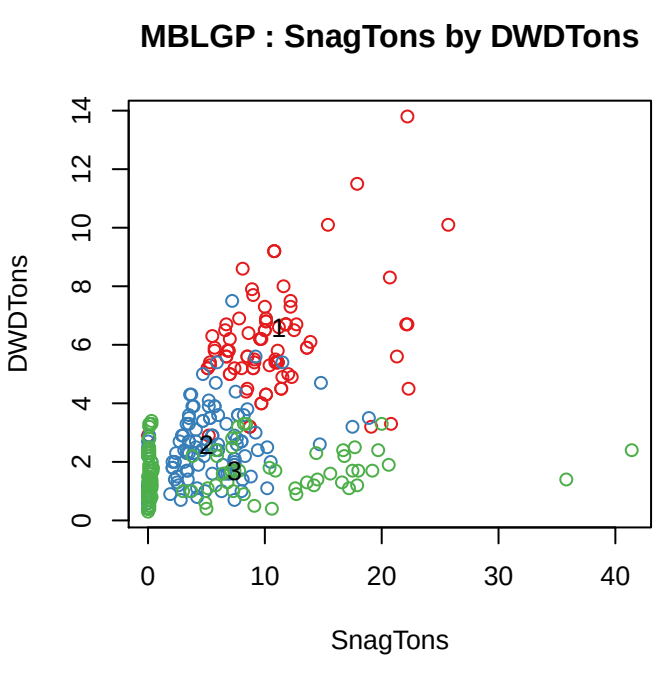
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DWDTons
SnagTons
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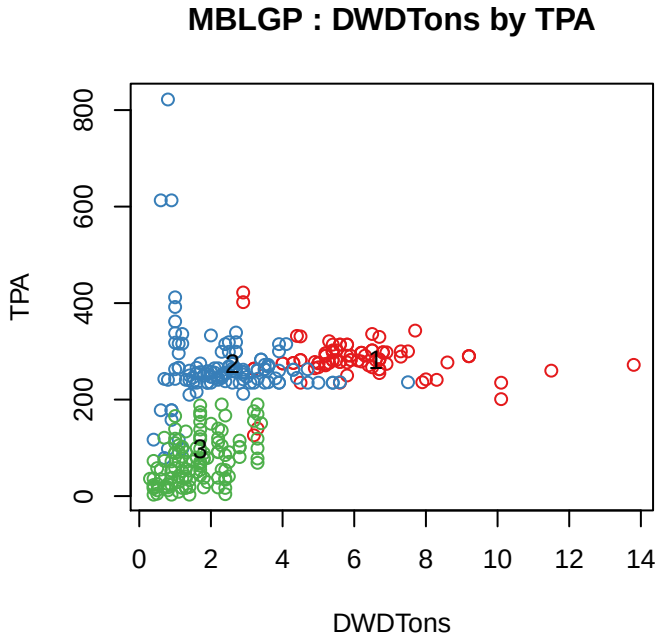
MBLGP : DWDTons by TPA
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DWDTons
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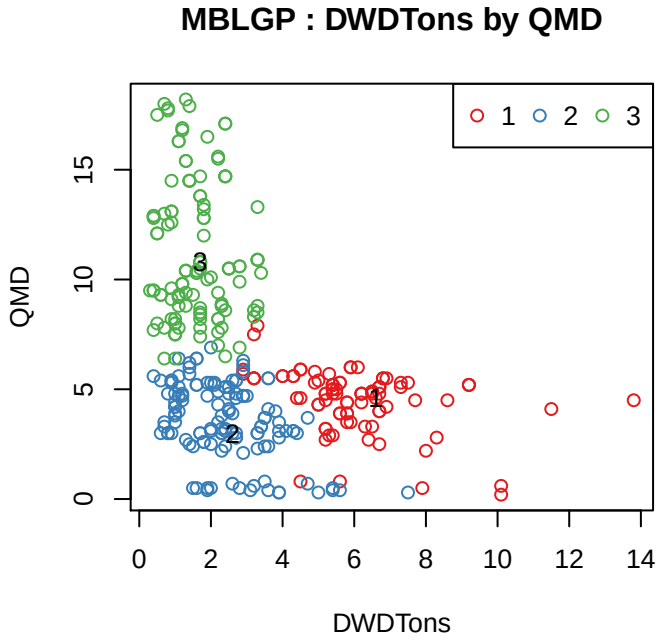
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DWDTons
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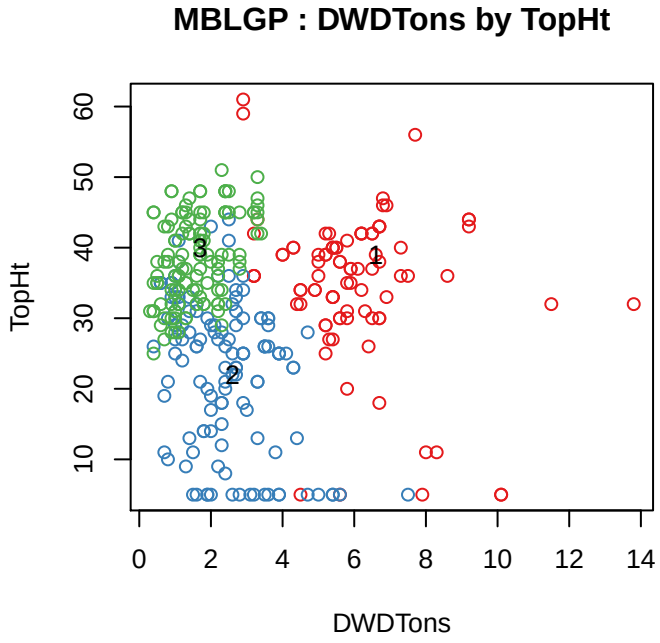
MBLGP : DWDTons by TopHt
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DWDTons
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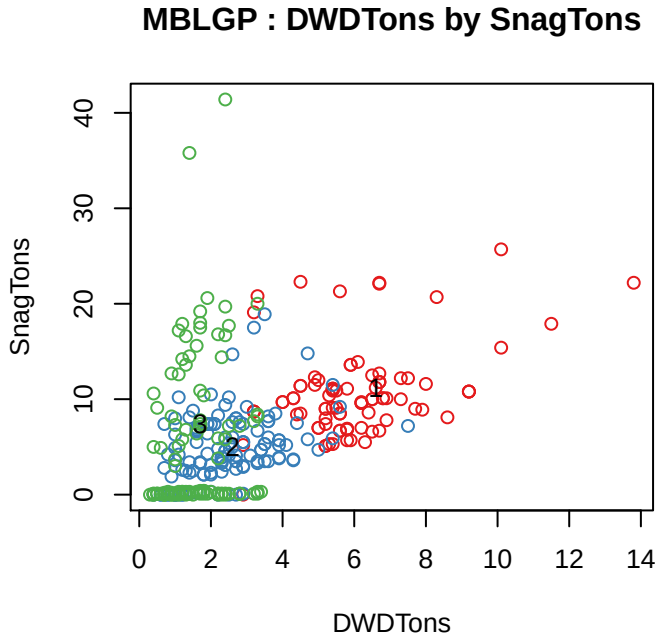
MBLGP : DWDTons by SnagTons
SnagTons
DWDTons
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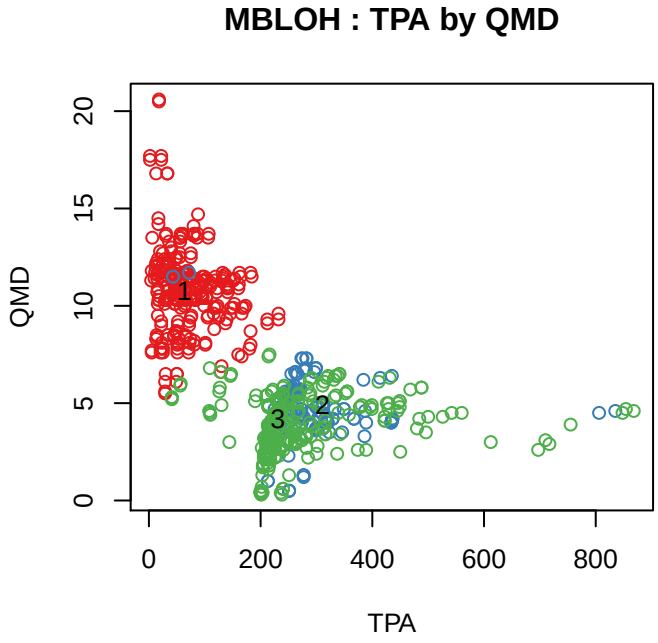
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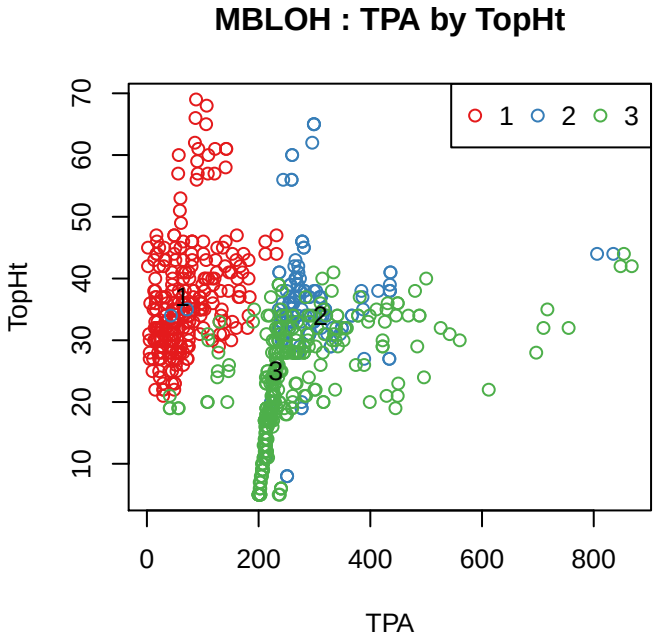
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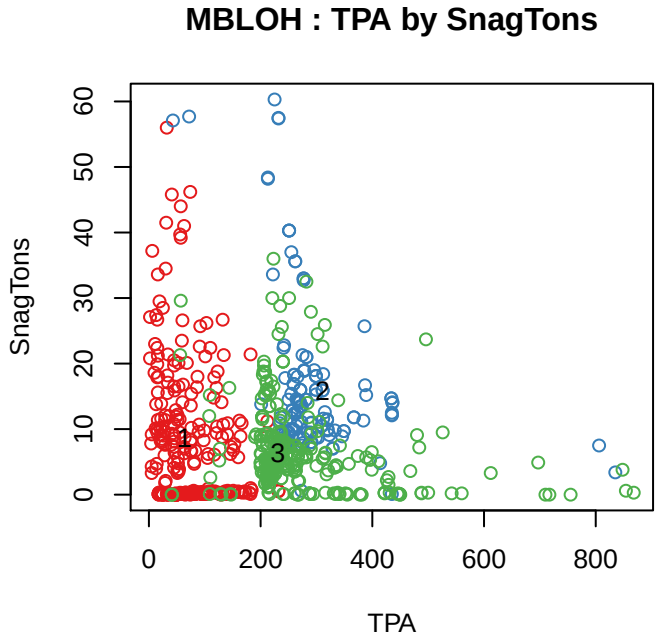
MBLOH : TPA by SnagTons
SnagTons
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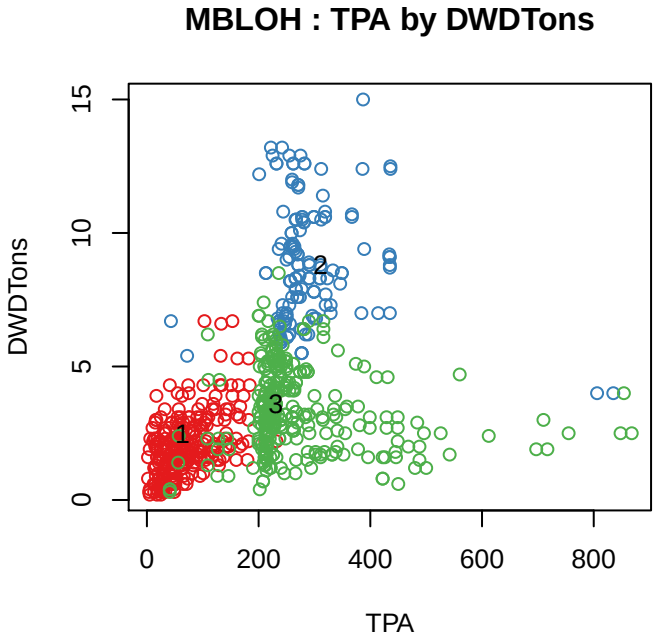
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DWDTons
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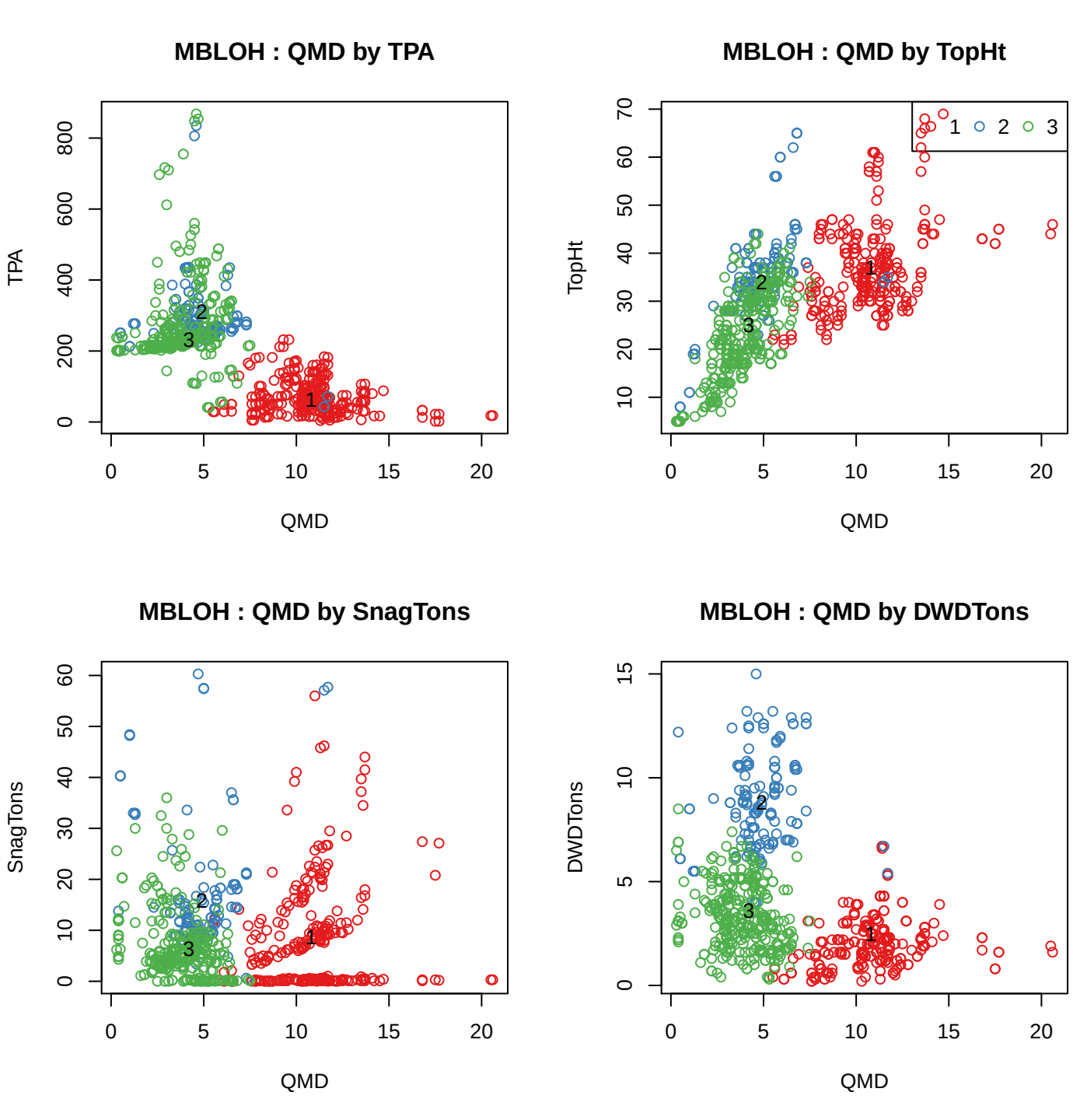
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TPA
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TopHt
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MBLOH : QMD by SnagTons
SnagTons
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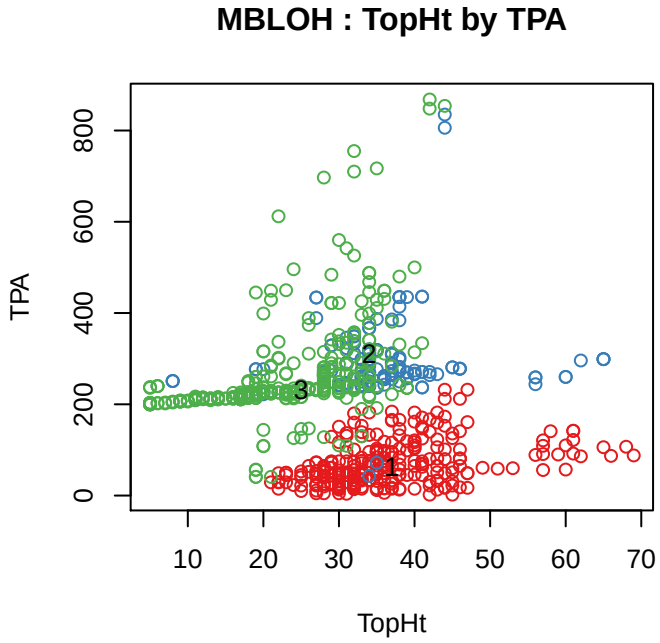
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TopHt
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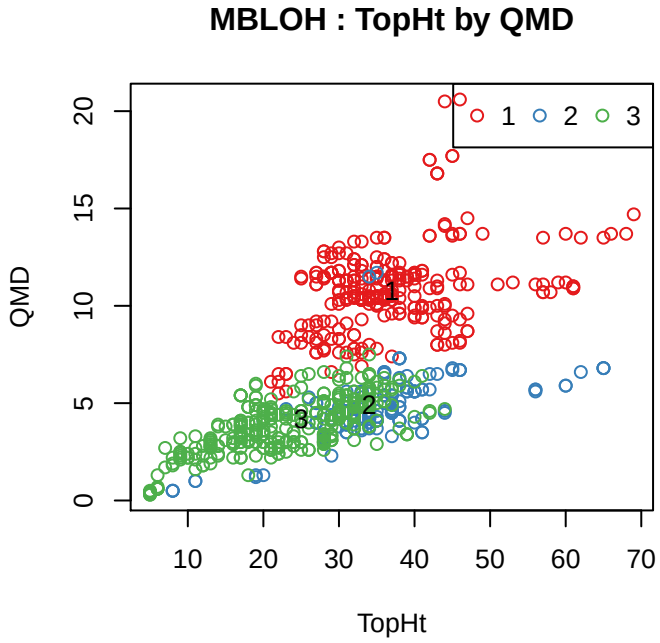
MBLOH : TopHt by QMD
QMD
TopHt
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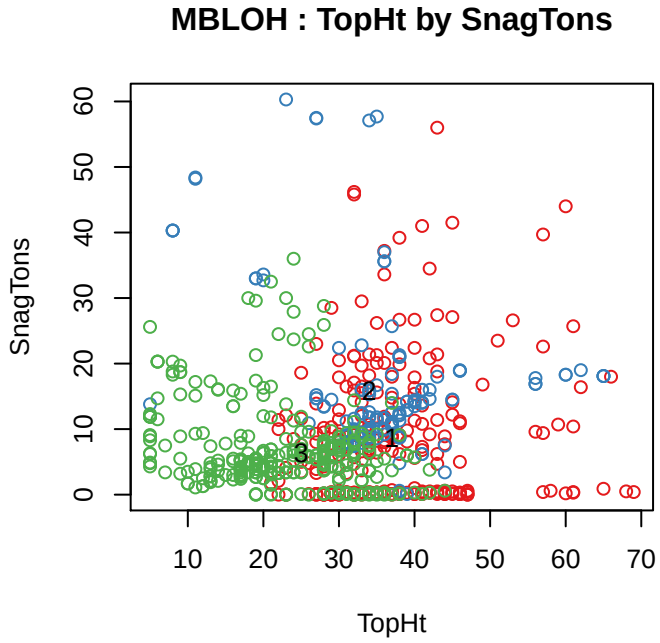
MBLOH : TopHt by SnagTons
SnagTons
TopHt
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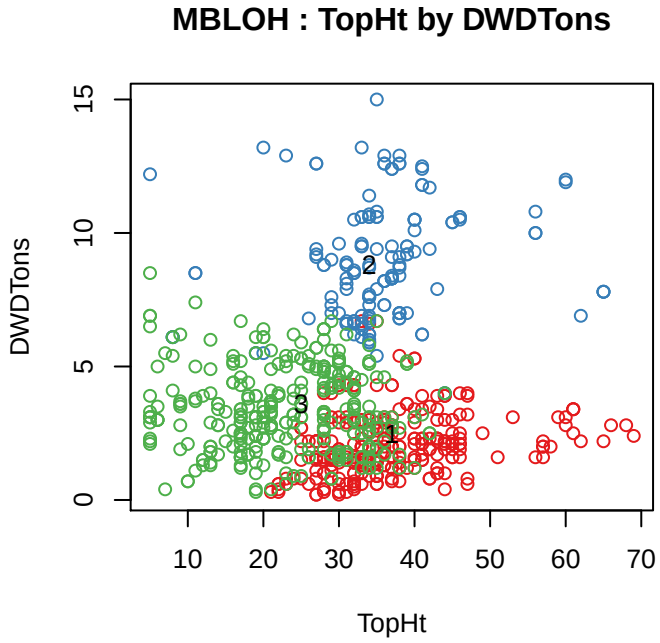
MBLOH : TopHt by DWDTons
DWDTons
TopHt
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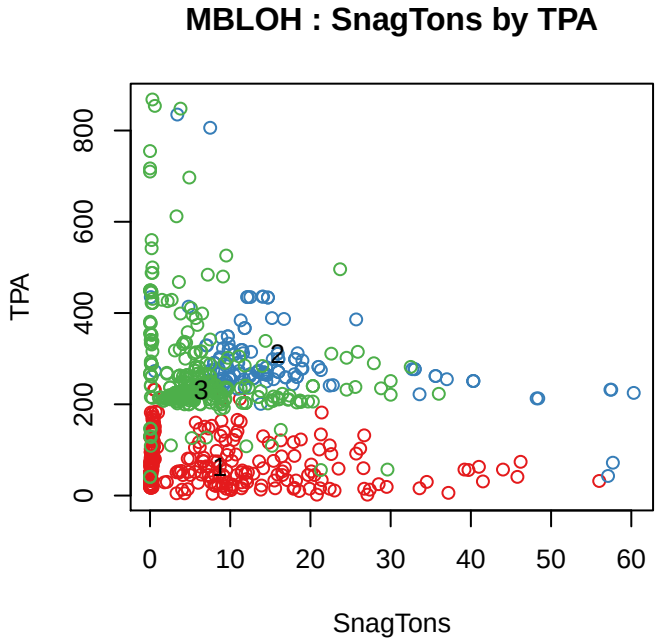
MBLOH : SnagTons by TPA
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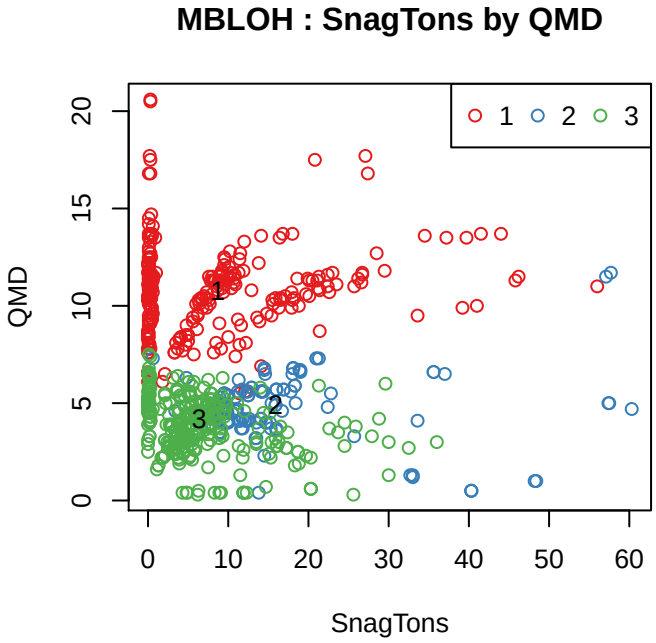
MBLOH : SnagTons by QMD
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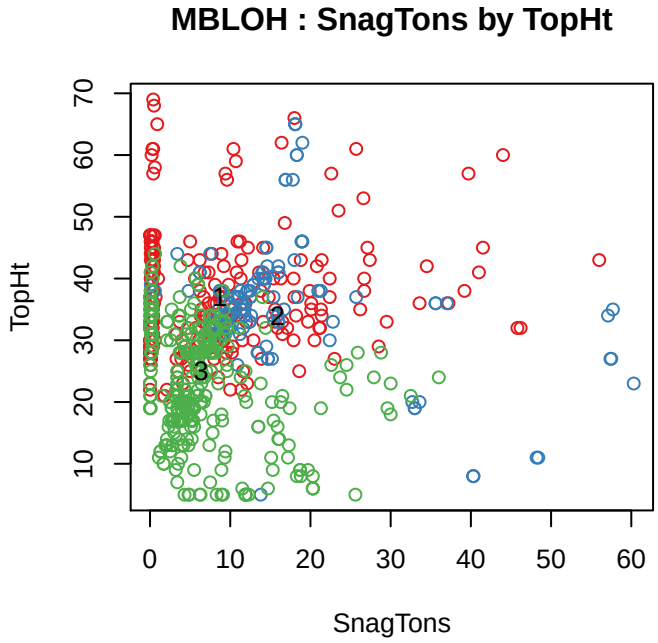
MBLOH : SnagTons by TopHt
TopHt
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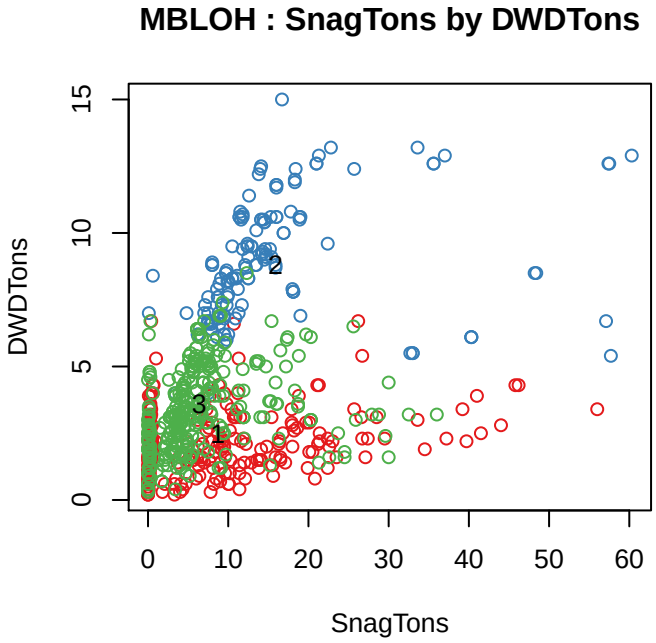
MBLOH : SnagTons by DWDTons
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SnagTons
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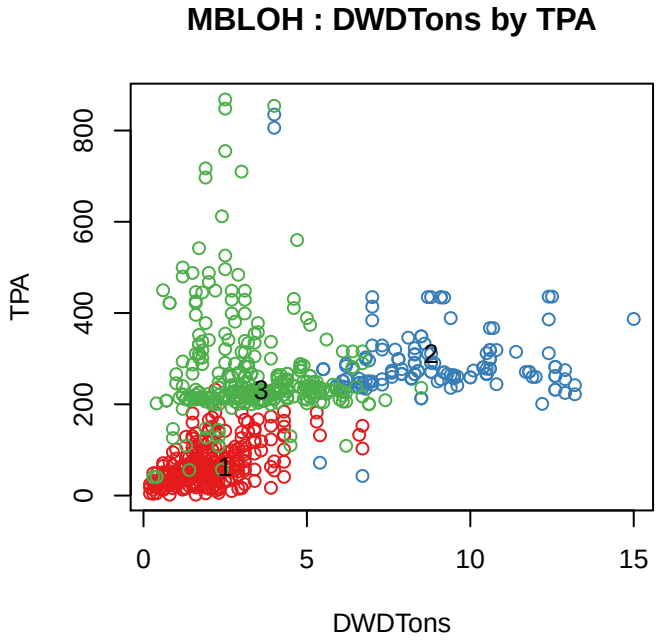
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TPA
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DWDTons
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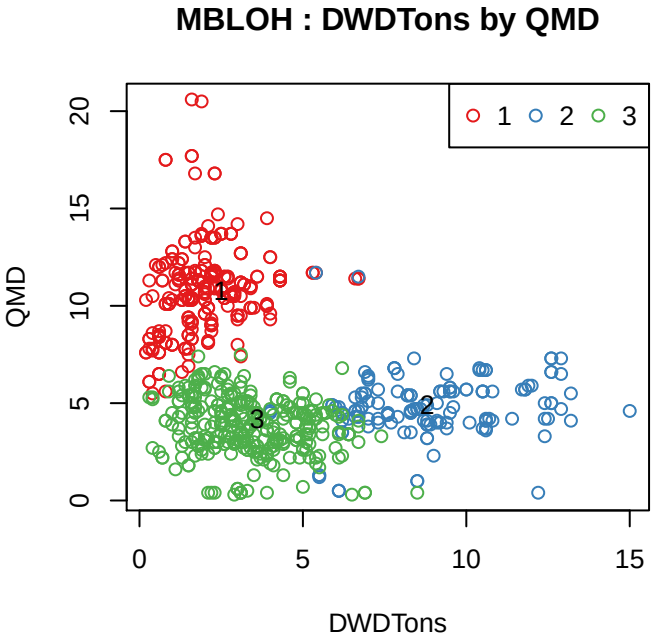
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DWDTons
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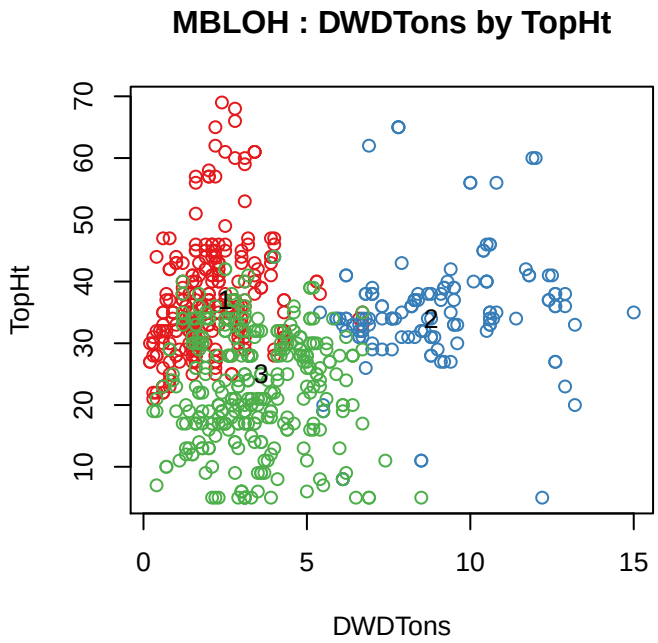
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DWDTons
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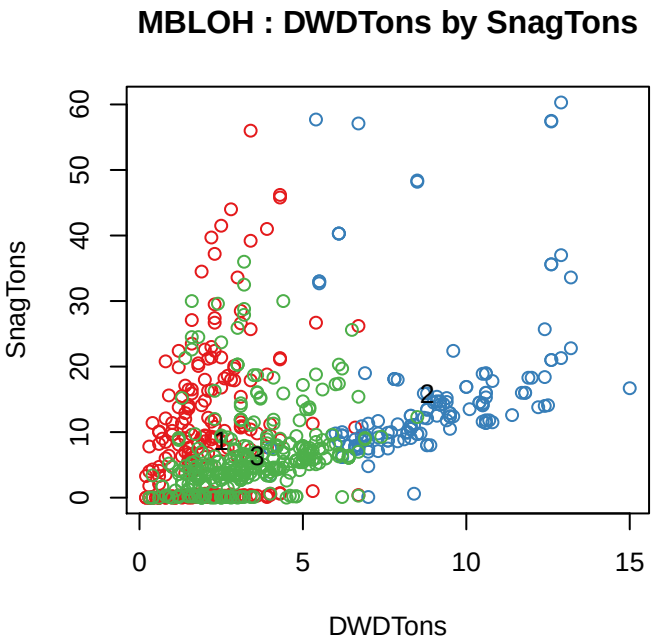
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DWDTons
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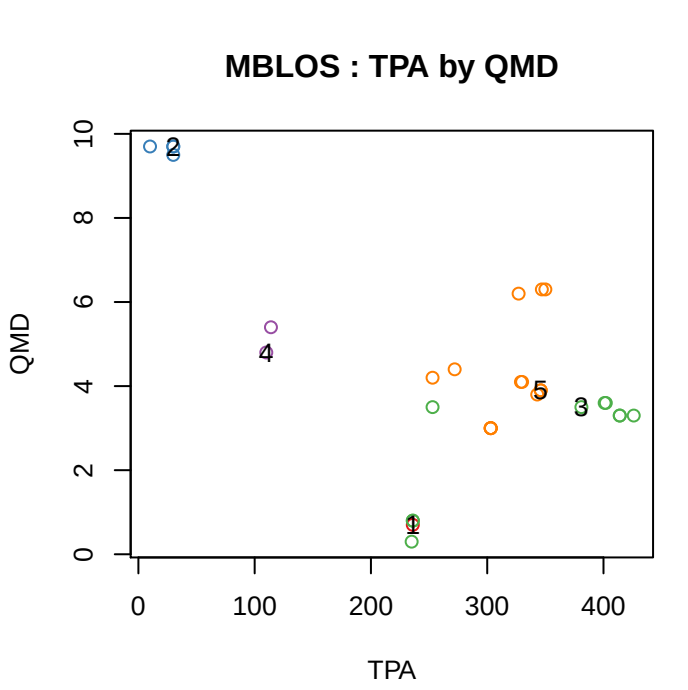
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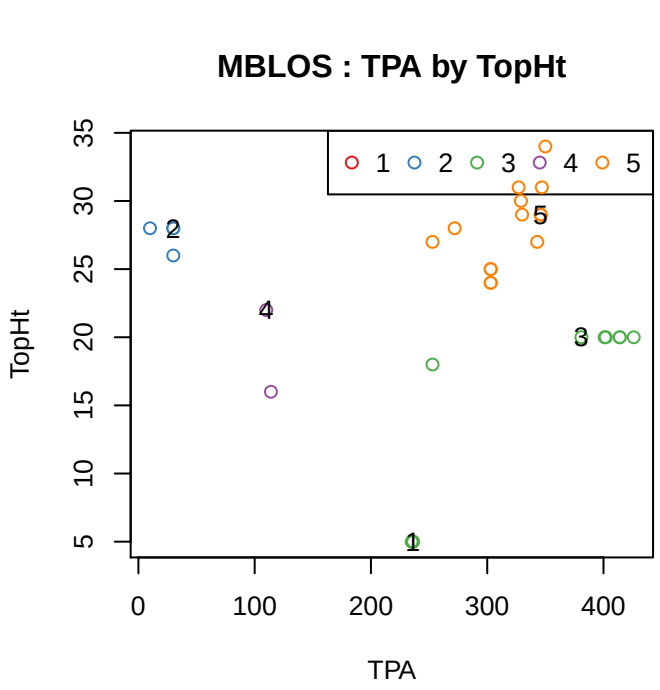
MBLOS : TPA by TopHt
TopHt
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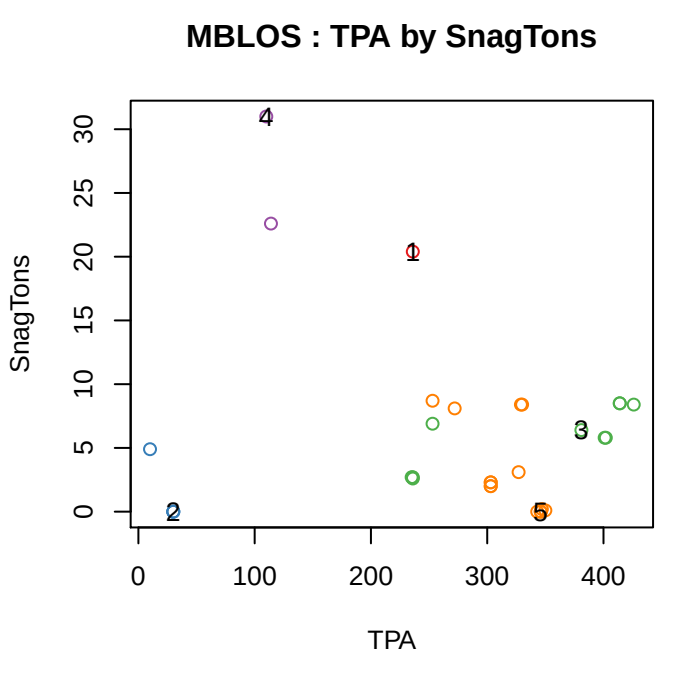
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SnagTons
TPA
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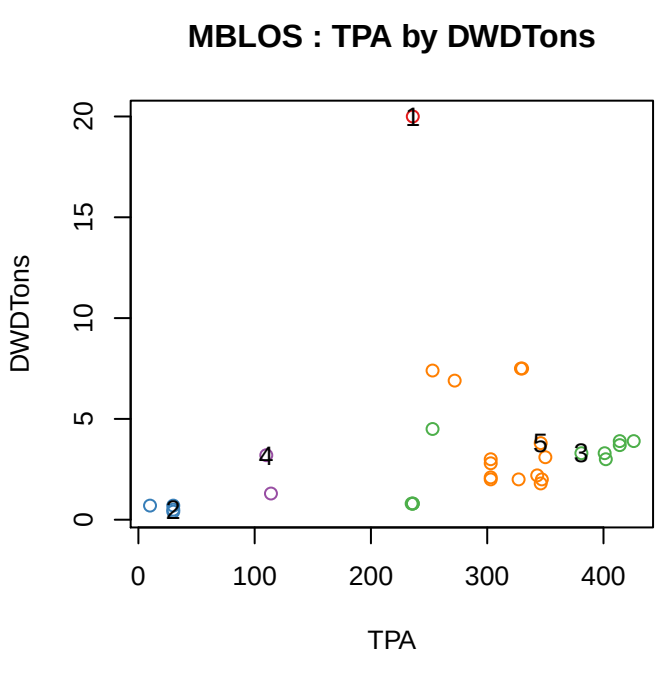
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DWDTons
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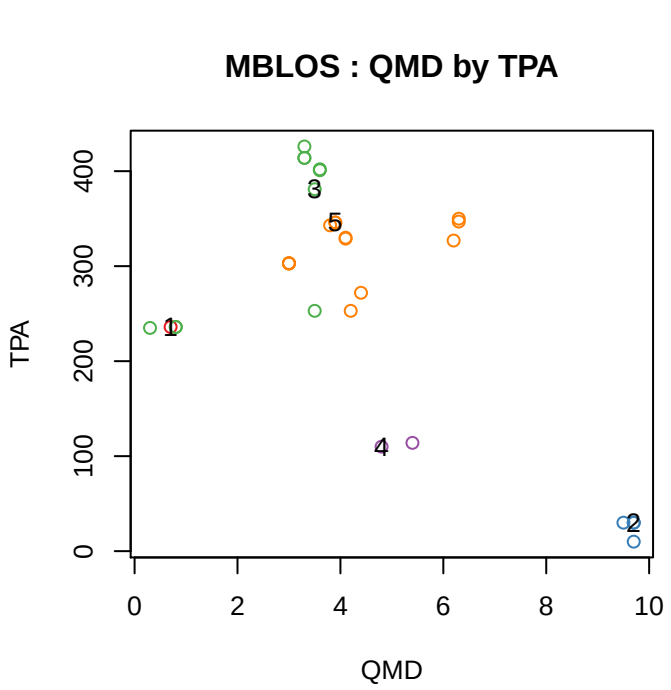
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QMD
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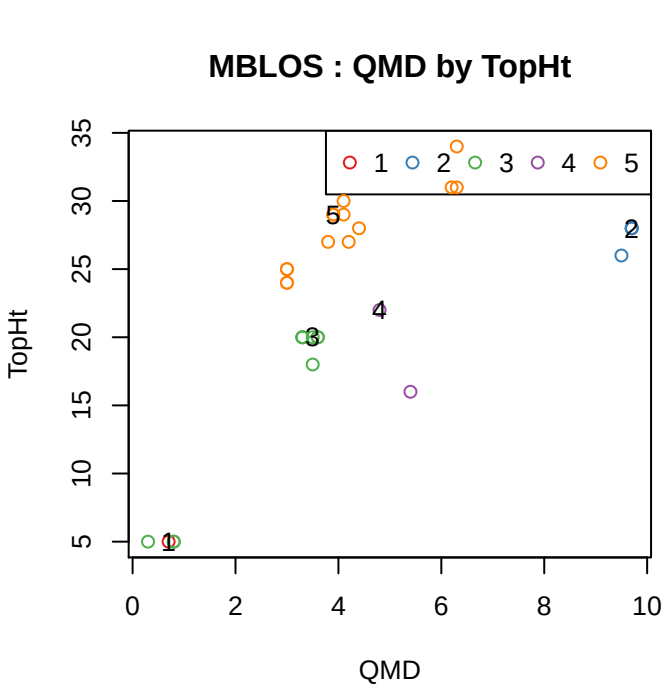
MBLOS : QMD by TopHt
TopHt
QMD
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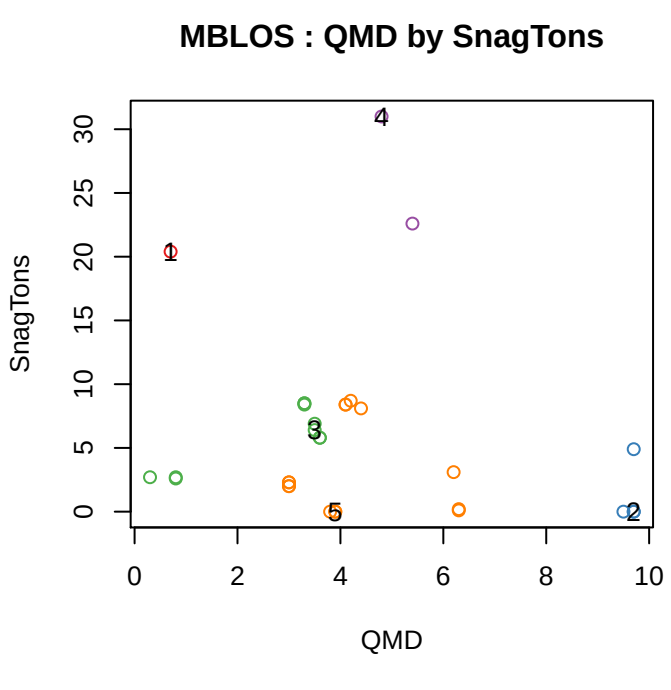
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SnagTons
QMD
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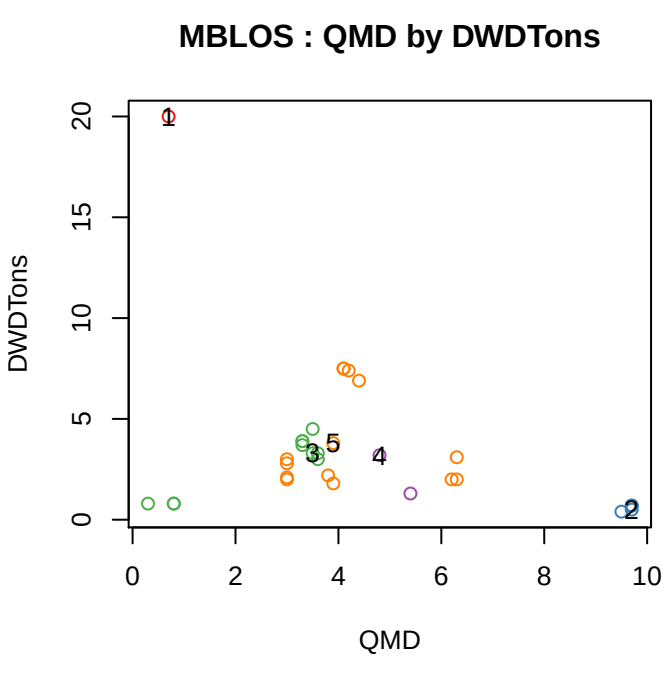
MBLOS : QMD by DWDTons
DWDTons
QMD
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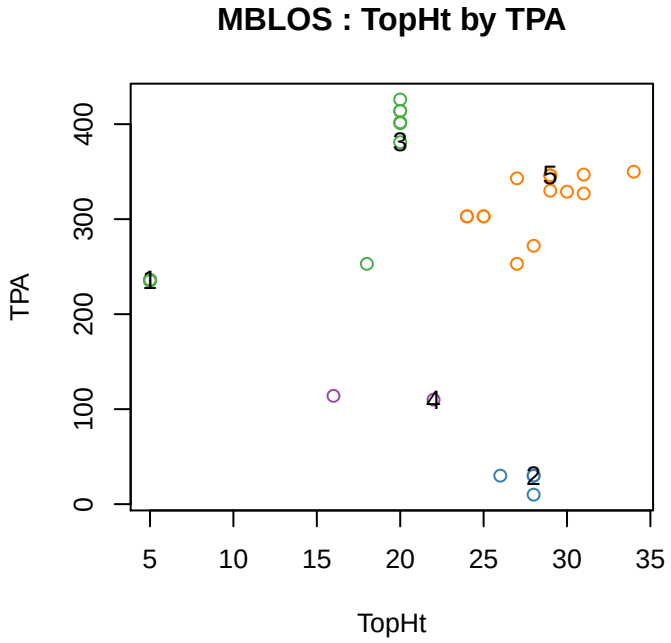
MBLOS : TopHt by TPA
TPA
TopHt
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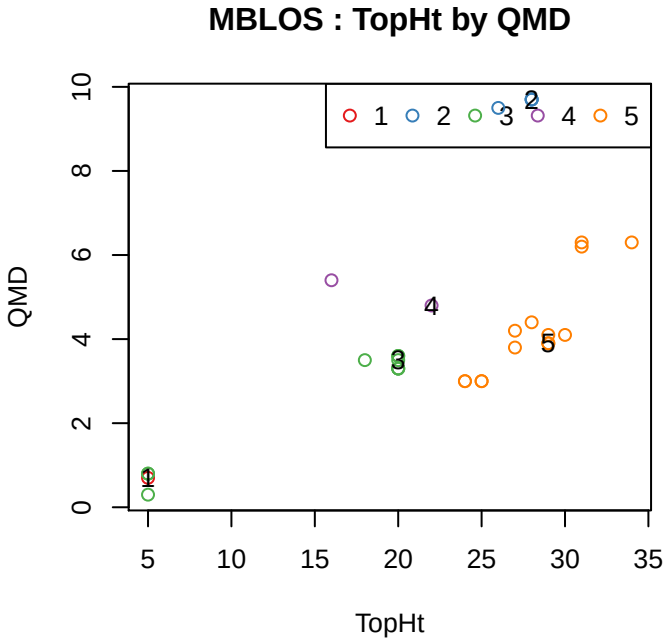
MBLOS : TopHt by QMD
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TopHt
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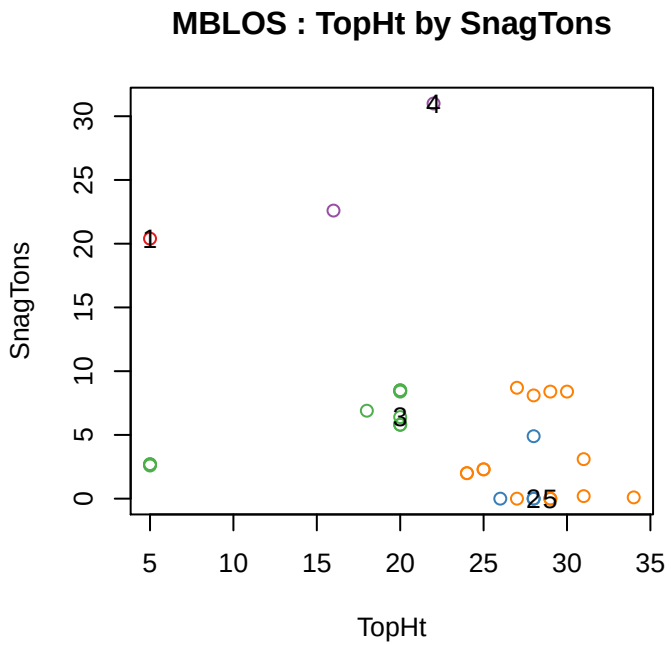
MBLOS : TopHt by SnagTons
SnagTons
TopHt
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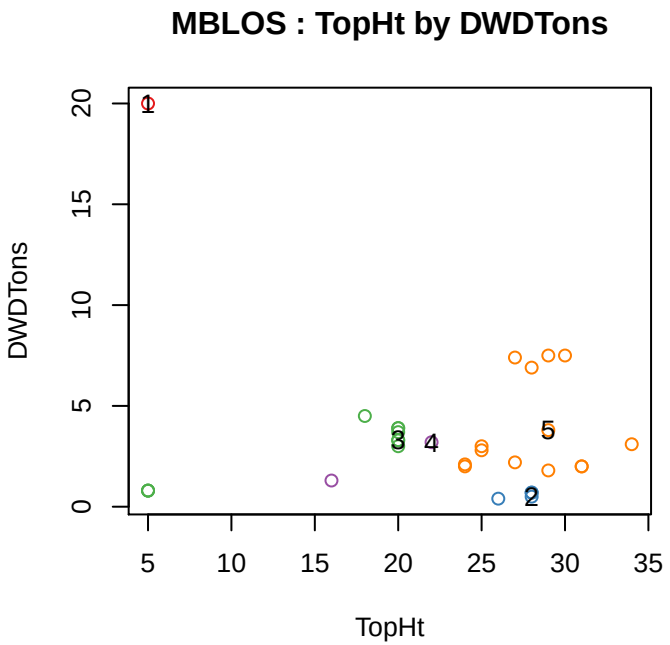
MBLOS : TopHt by DWDTons
DWDTons
TopHt
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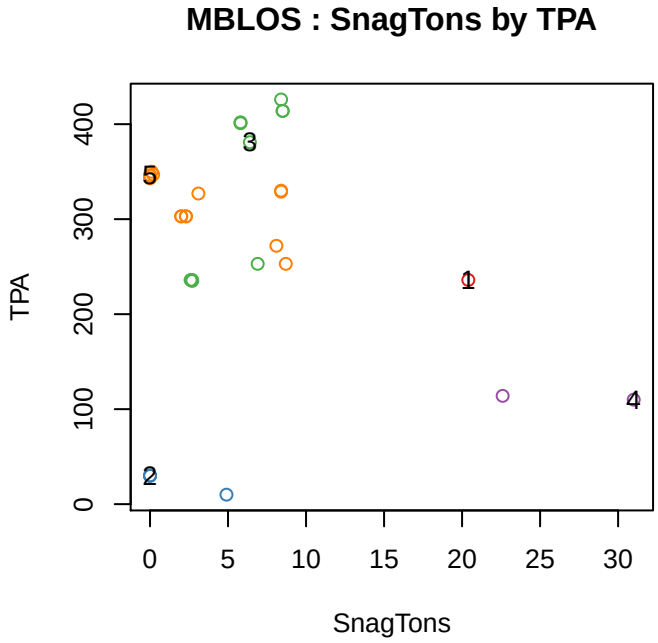
MBLOS : SnagTons by TPA
TPA
SnagTons
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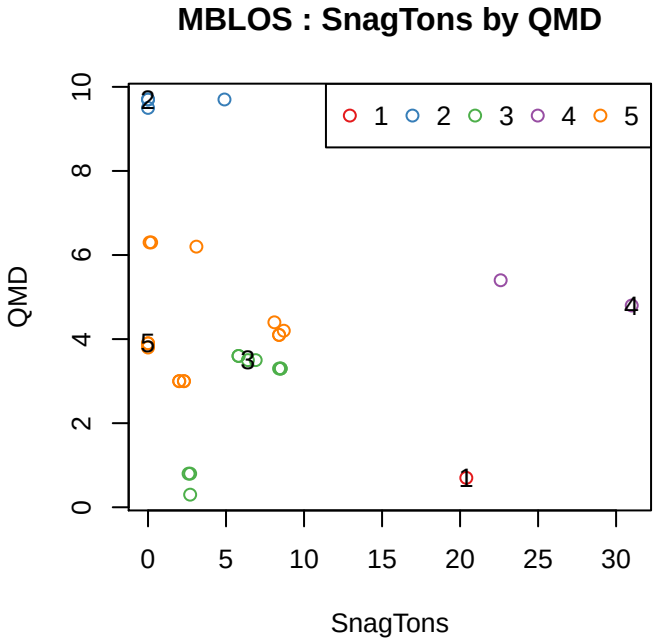
MBLOS : SnagTons by QMD
QMD
SnagTons
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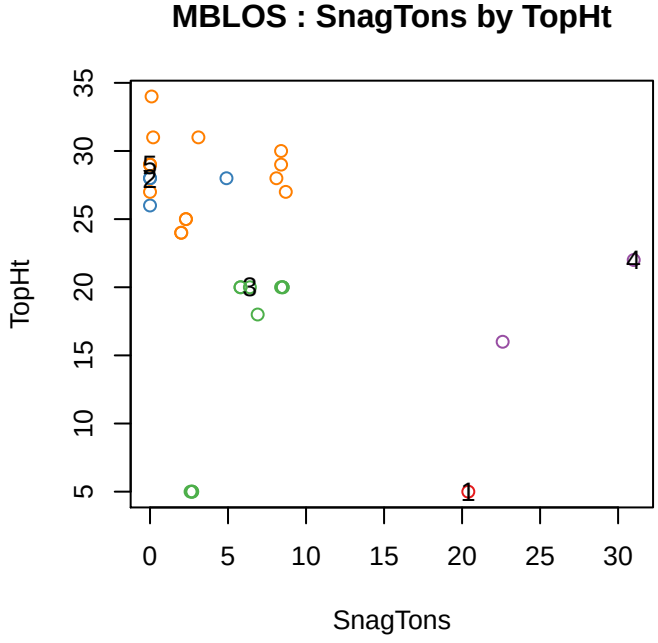
MBLOS : SnagTons by TopHt
TopHt
SnagTons
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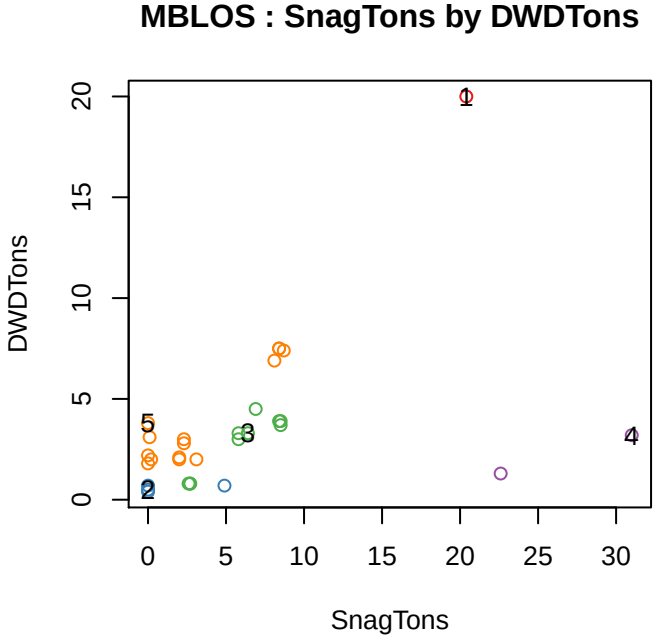
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DWDTons
SnagTons
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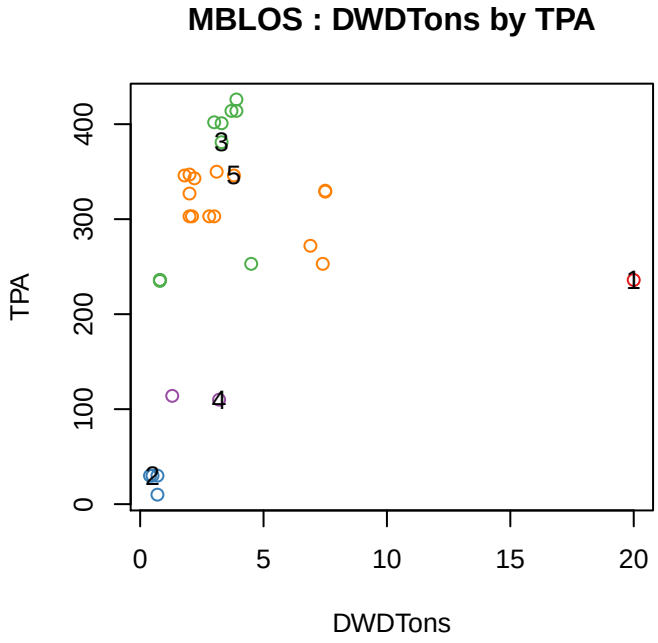
MBLOS : DWDTons by TPA
TPA
DWDTons
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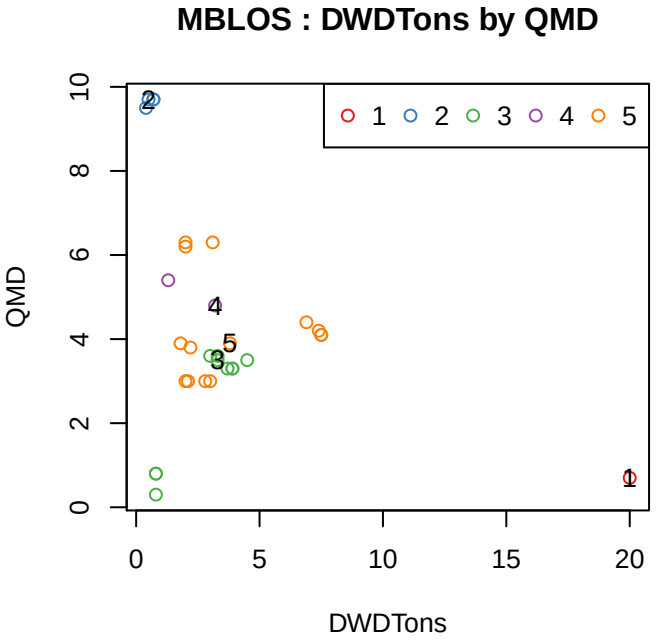
MBLOS : DWDTons by QMD
QMD
DWDTons
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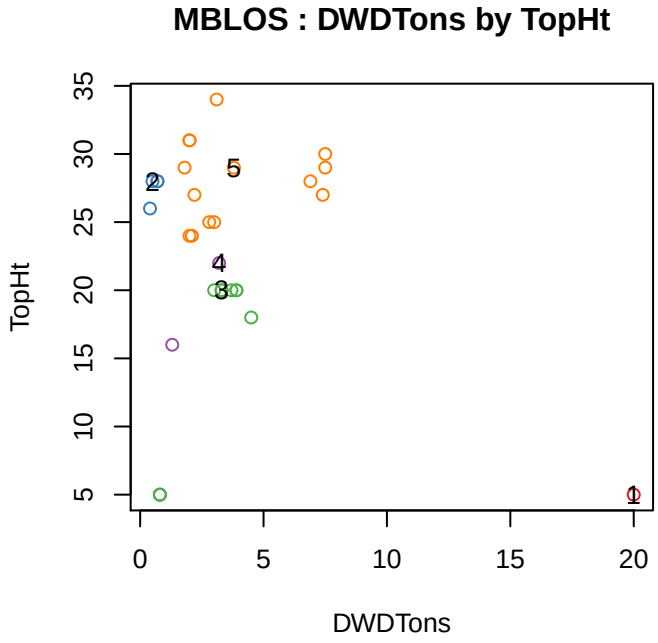
MBLOS : DWDTons by TopHt
TopHt
DWDTons
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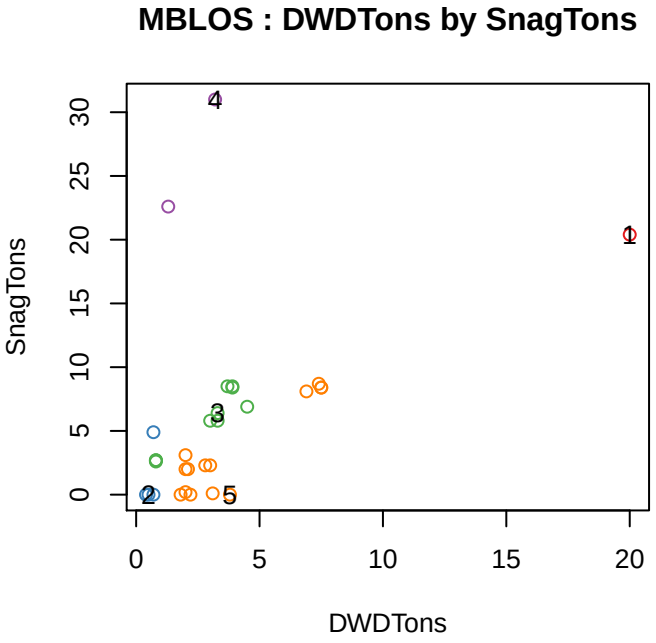
MBLOS : DWDTons by SnagTons
SnagTons
DWDTons
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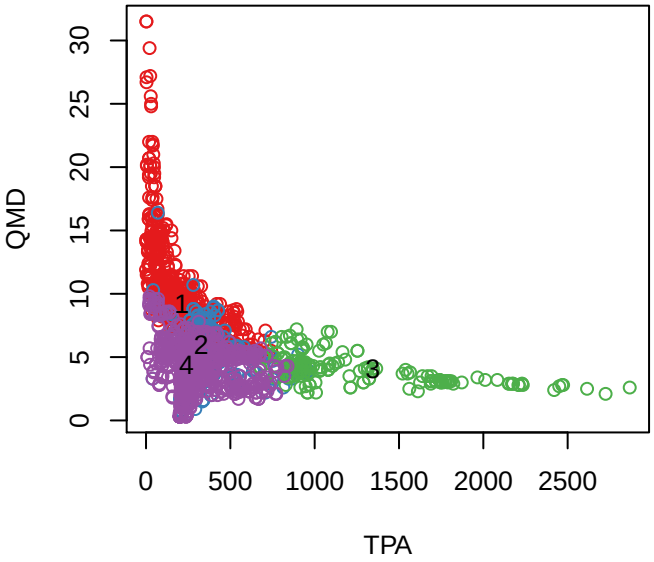
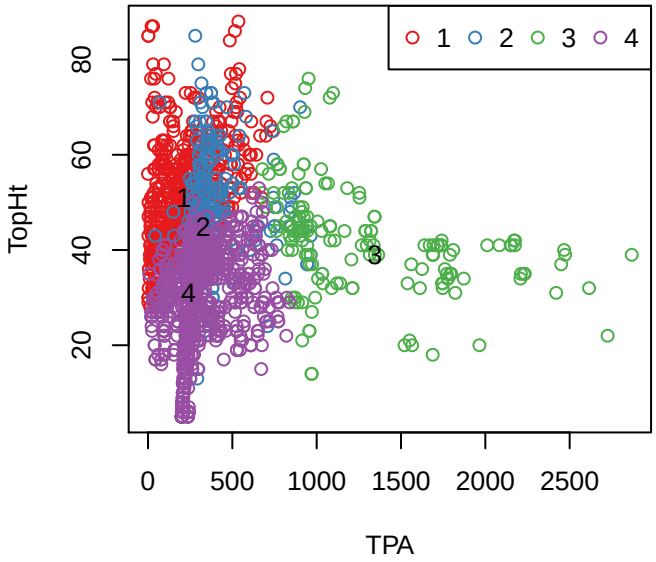
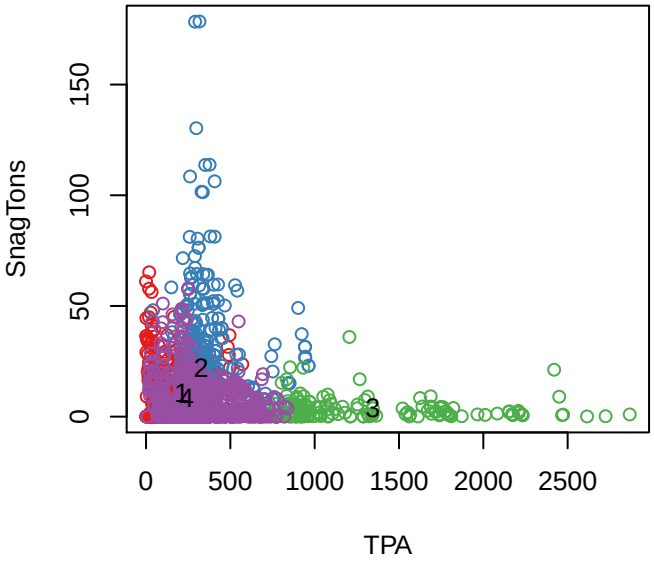
MBOOH : TPA by QMD



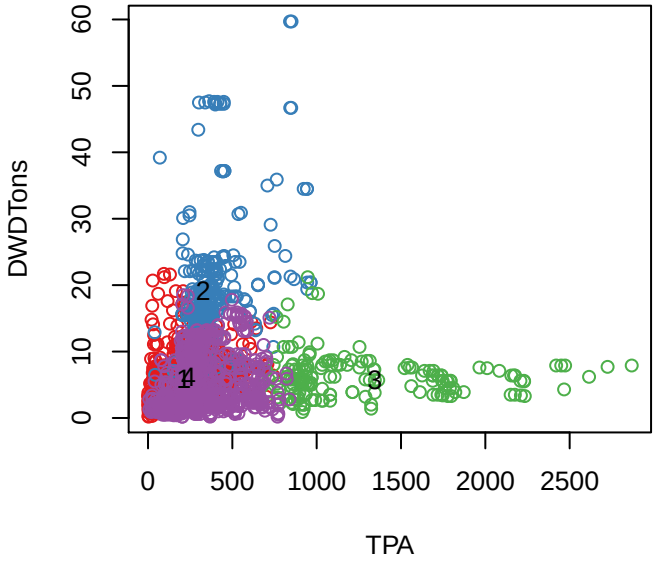
MBOOH : TPA by TopHt

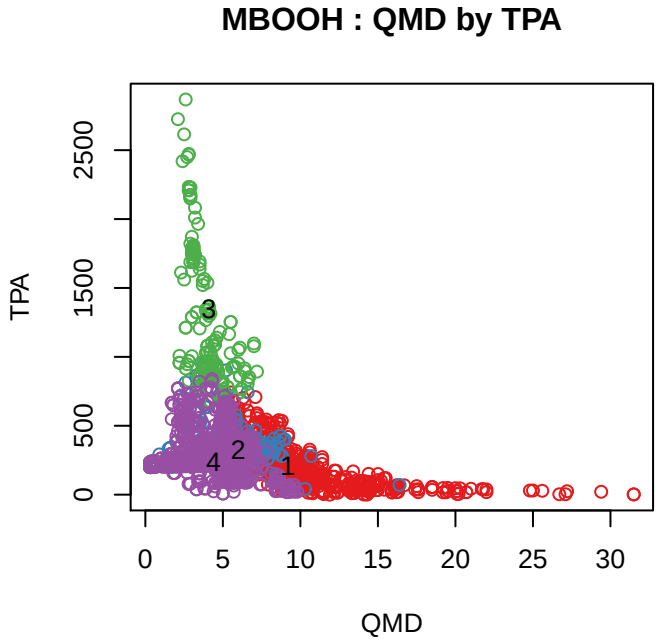


MBOOH : TPA by SnagTons



MBOOH : TPA by DWDTons




MBOOH : QMD by TPA
TPA
QMD
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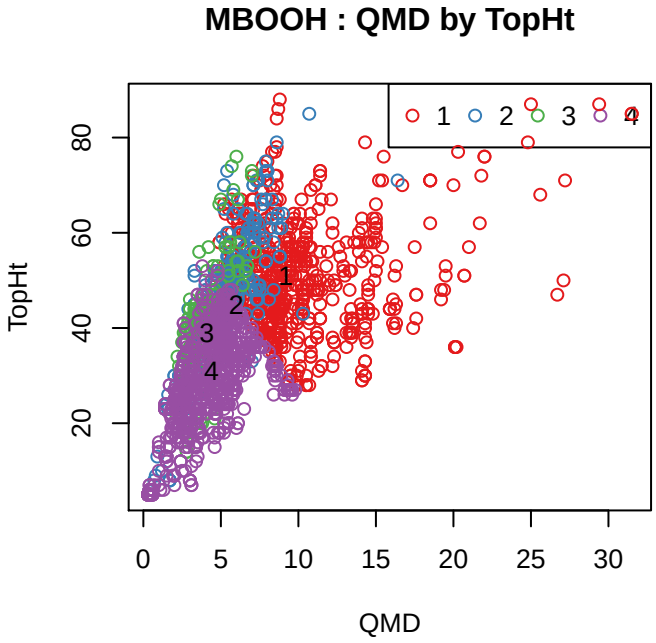
MBOOH : QMD by TopHt
TopHt
QMD
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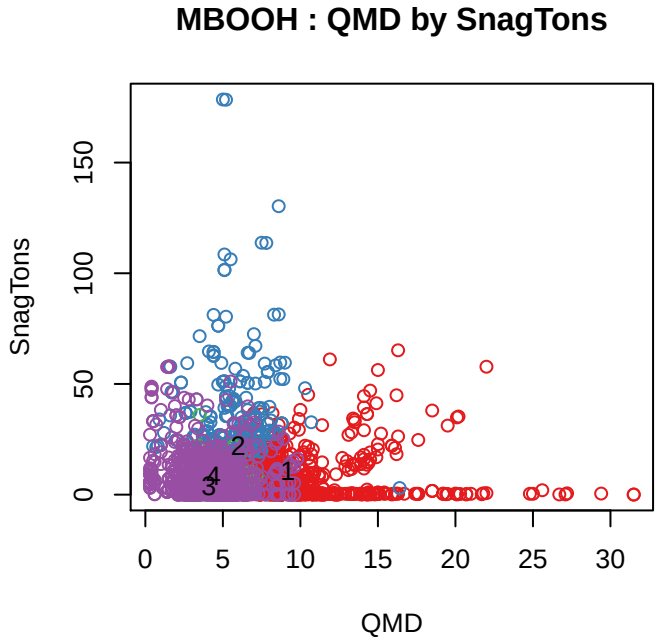
MBOOH : QMD by SnagTons
SnagTons
QMD
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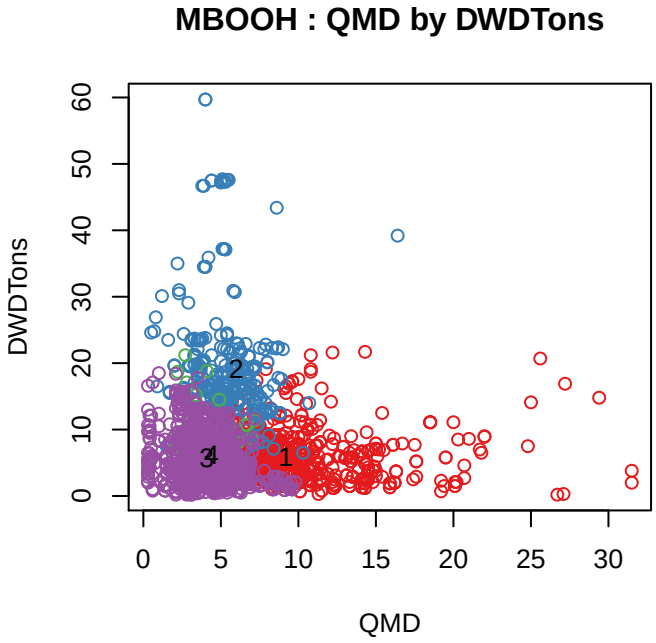
MBOOH : QMD by DWDTons
DWDTons
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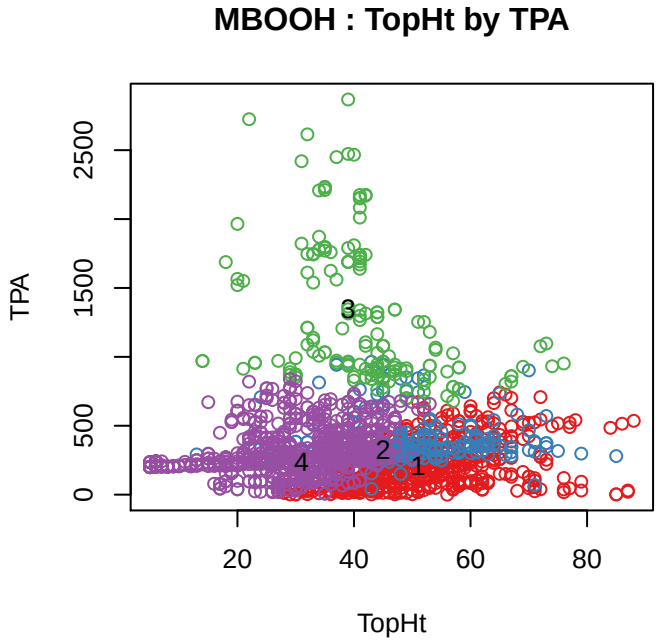
MBOOH : TopHt by TPA
TPA
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TopHt
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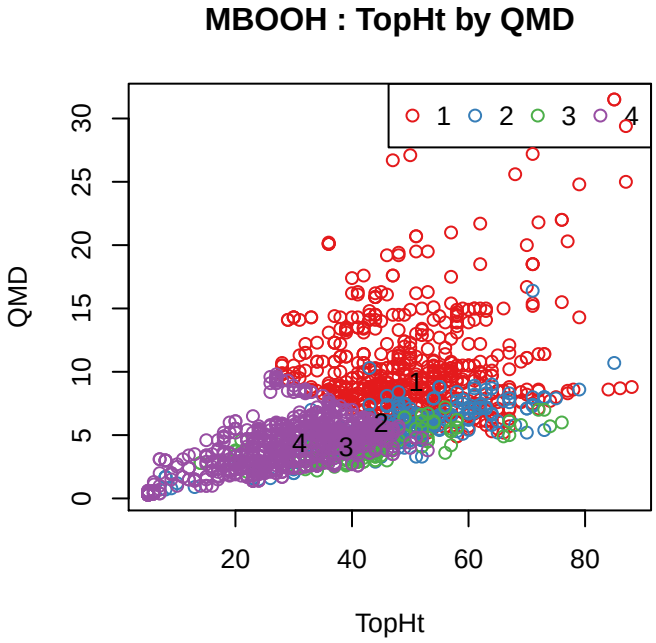
MBOOH : TopHt by QMD
QMD
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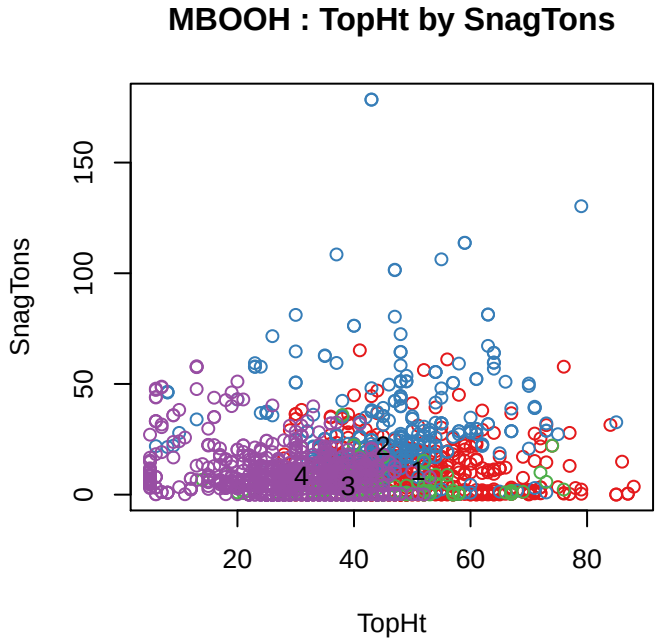
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SnagTons
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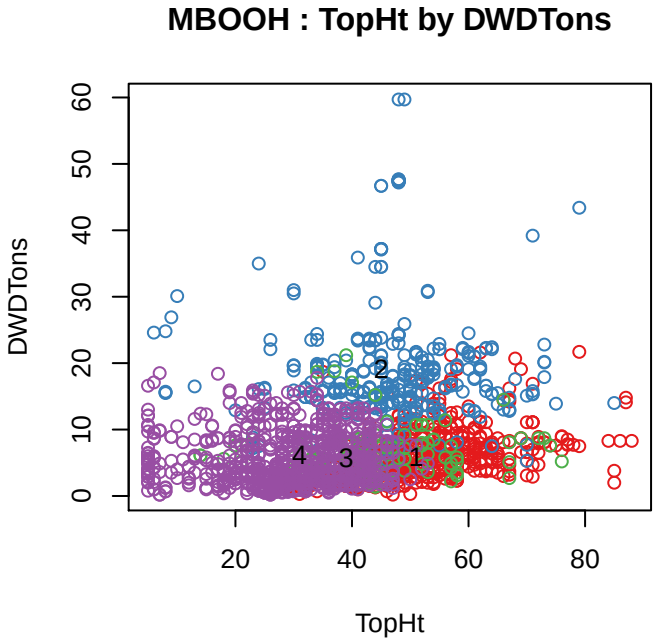
MBOOH : TopHt by DWDTons
DWDTons
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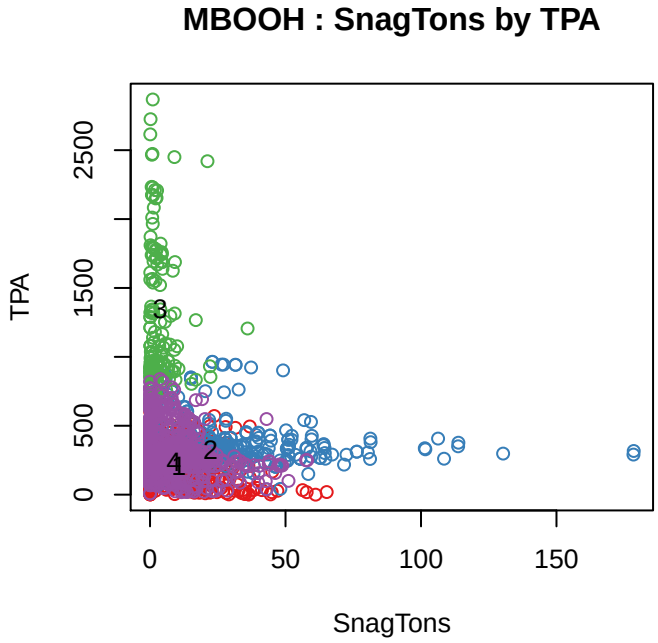
MBOOH : SnagTons by TPA
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SnagTons
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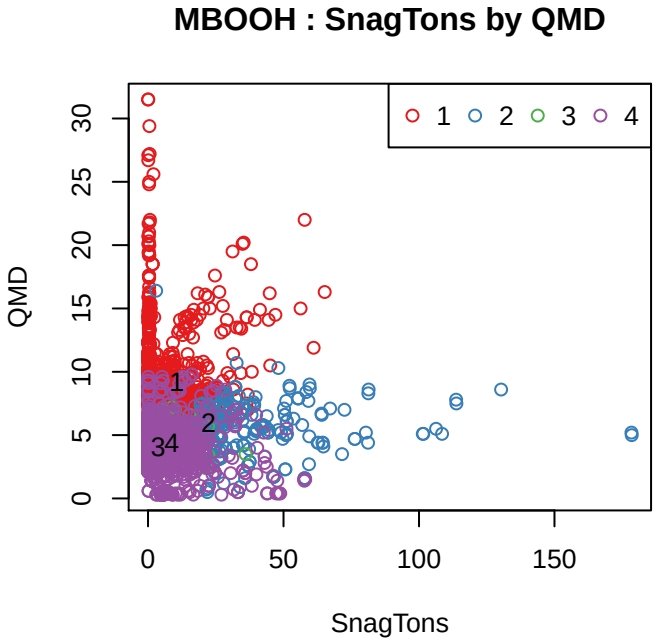
MBOOH : SnagTons by QMD
QMD
SnagTons
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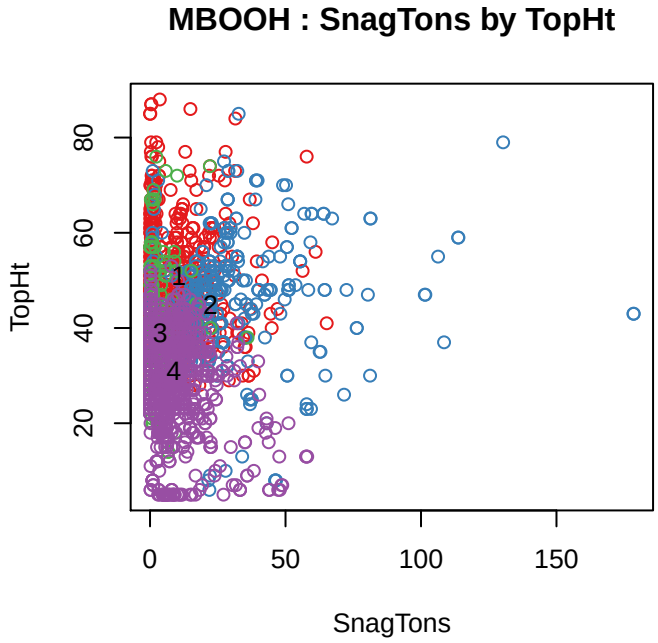
MBOOH : SnagTons by TopHt
TopHt
SnagTons
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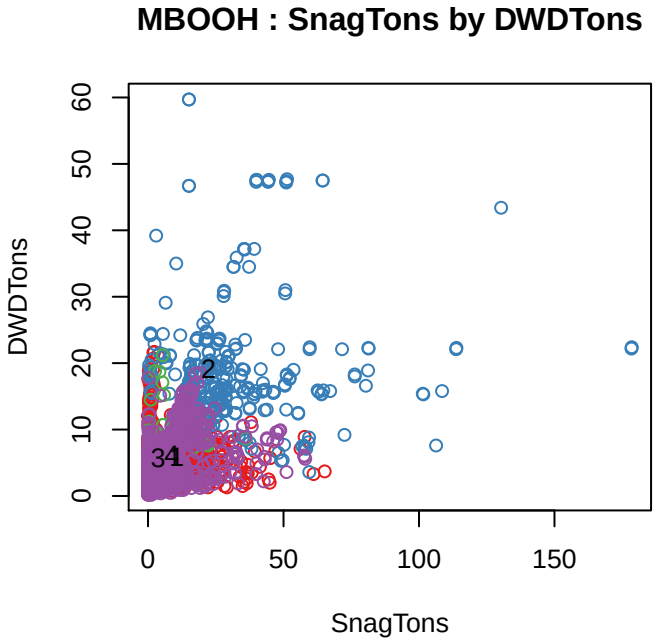
MBOOH : SnagTons by DWDTons
DWDTons
SnagTons
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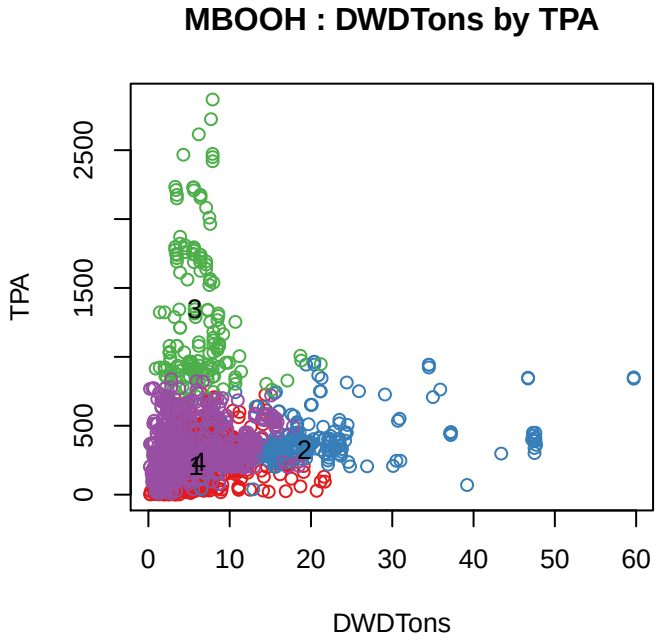
MBOOH : DWDTons by TPA
TPA
DWDTons
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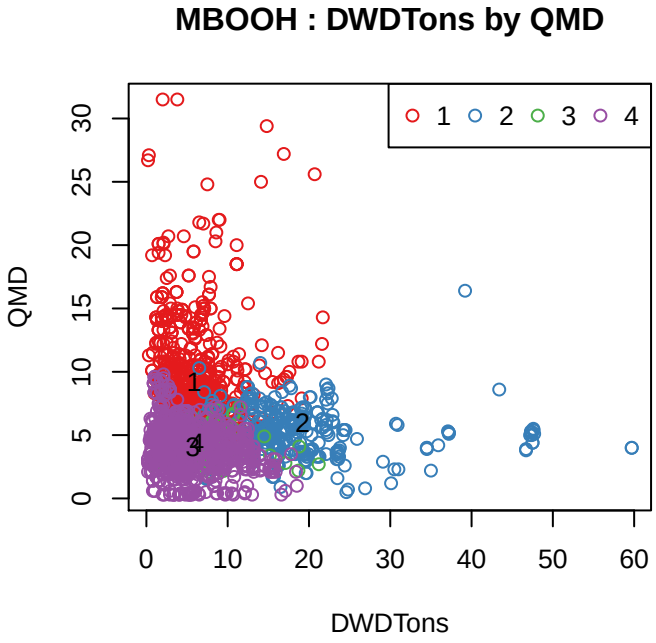
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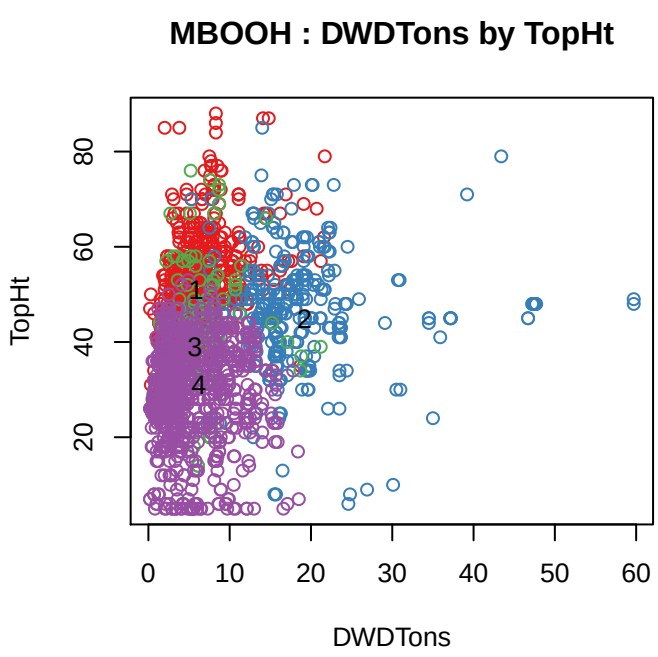
MBOOH : DWDTons by TopHt
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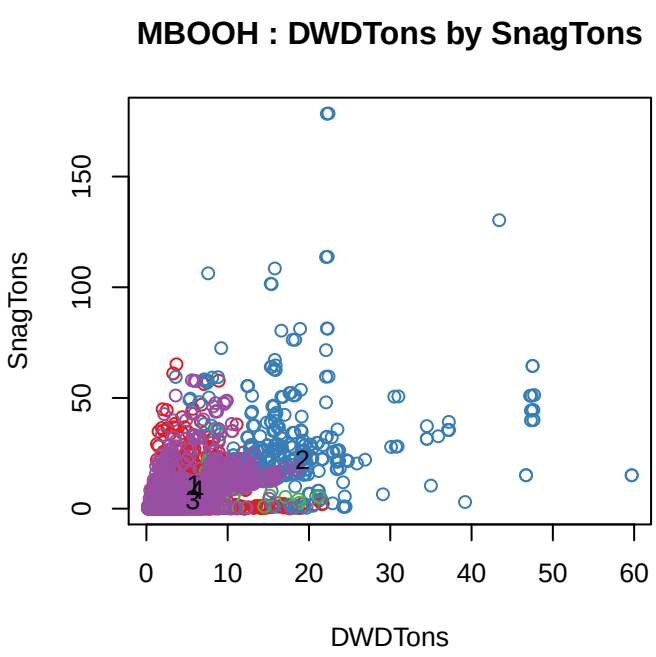
MBOOH : DWDTons by SnagTons
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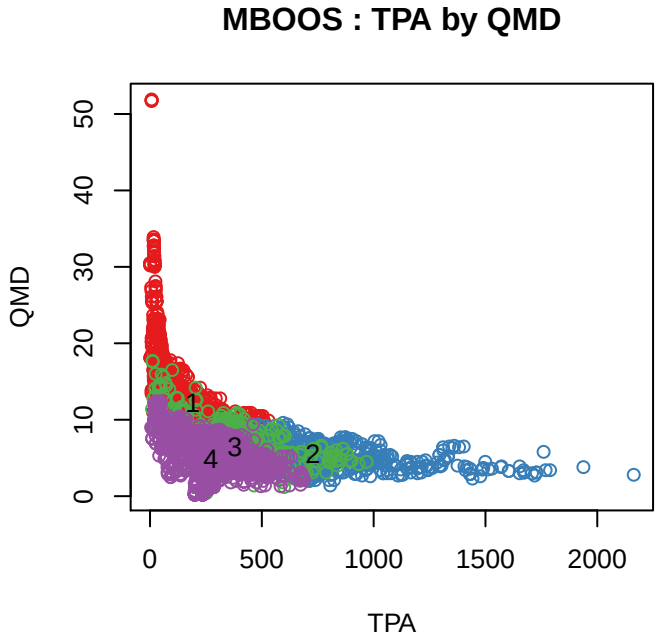
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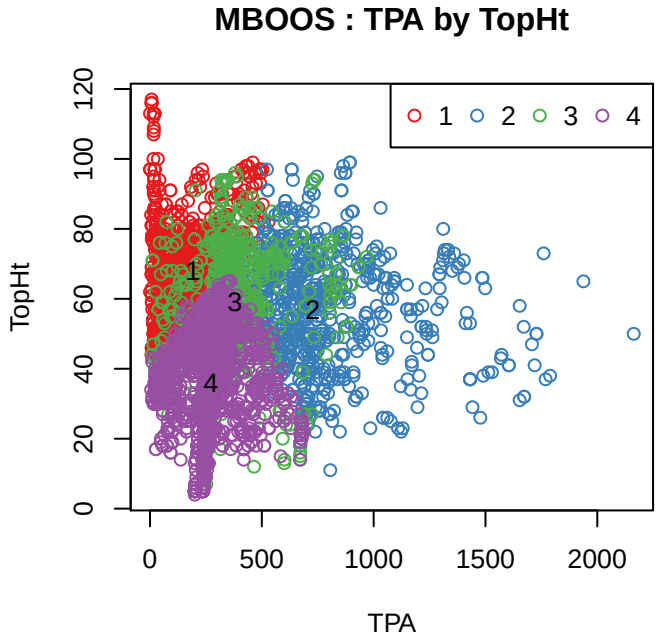
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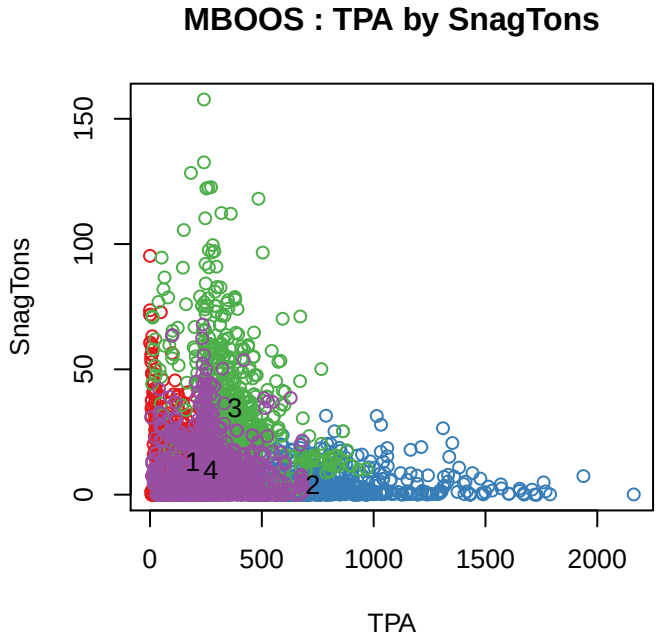
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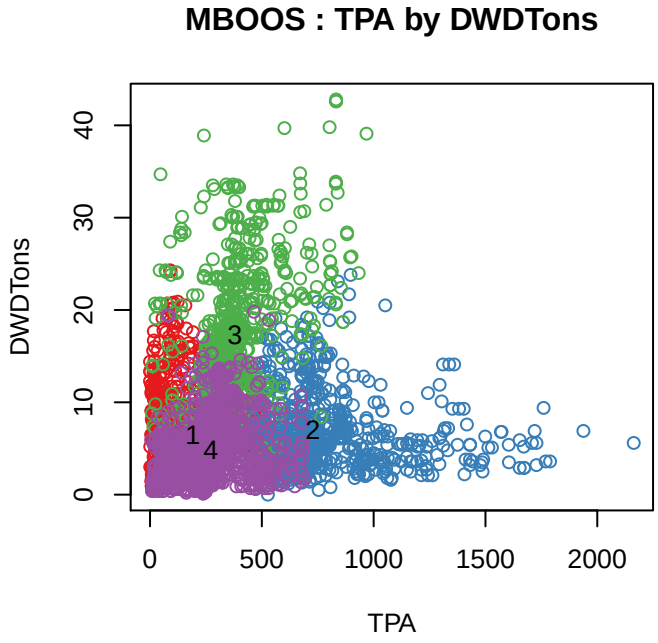
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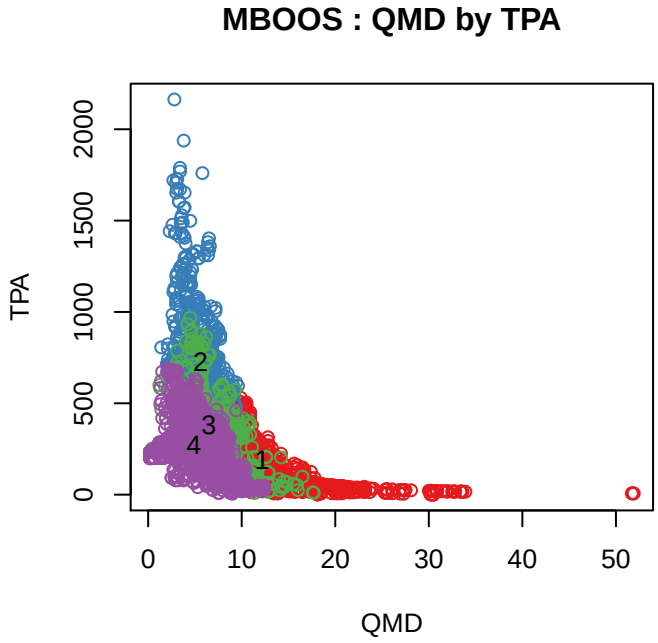
MBOOS : QMD by TPA
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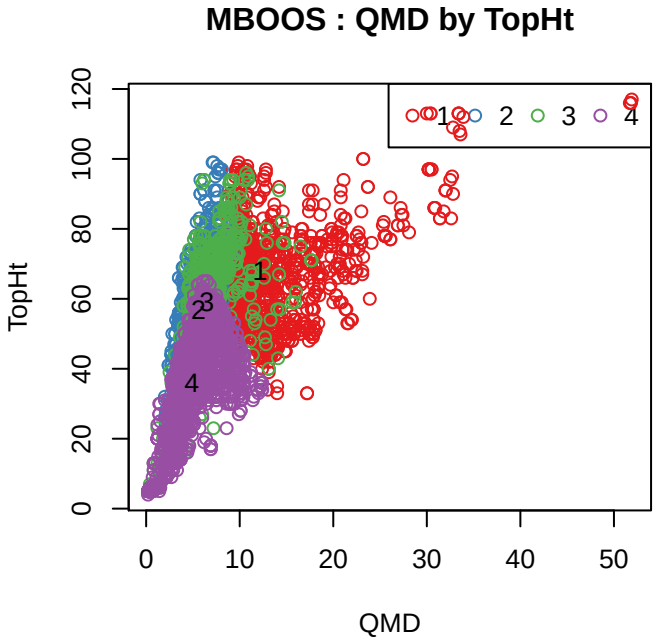
MBOOS : QMD by TopHt
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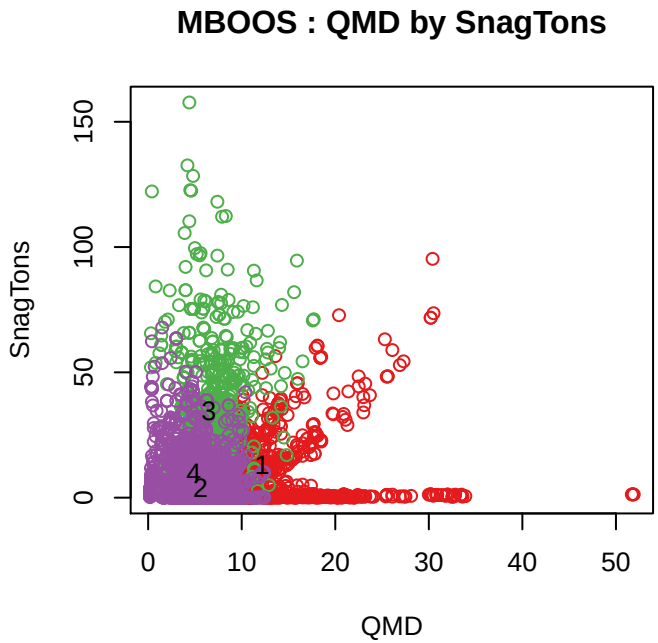
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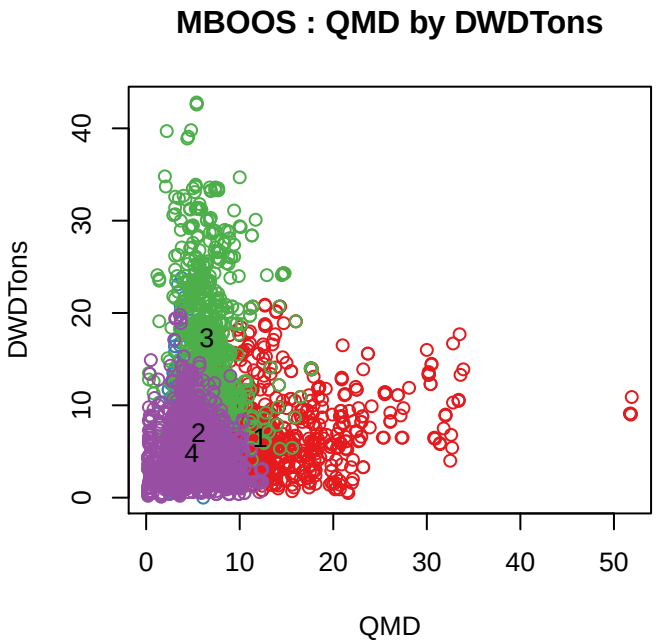
MBOOS : QMD by DWDTons
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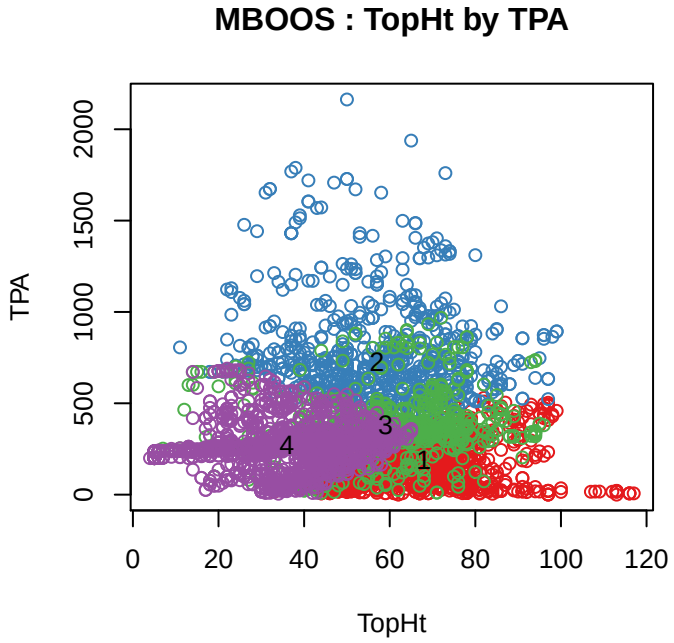
MBOOS : TopHt by TPA
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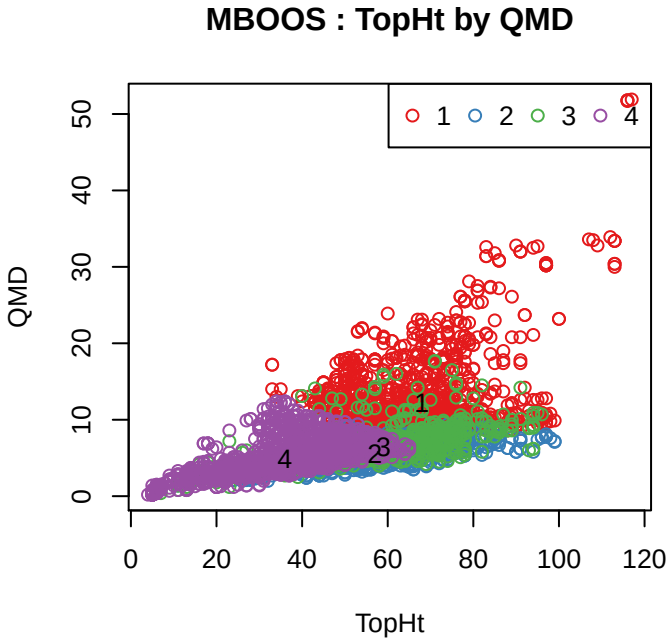
MBOOS : TopHt by QMD
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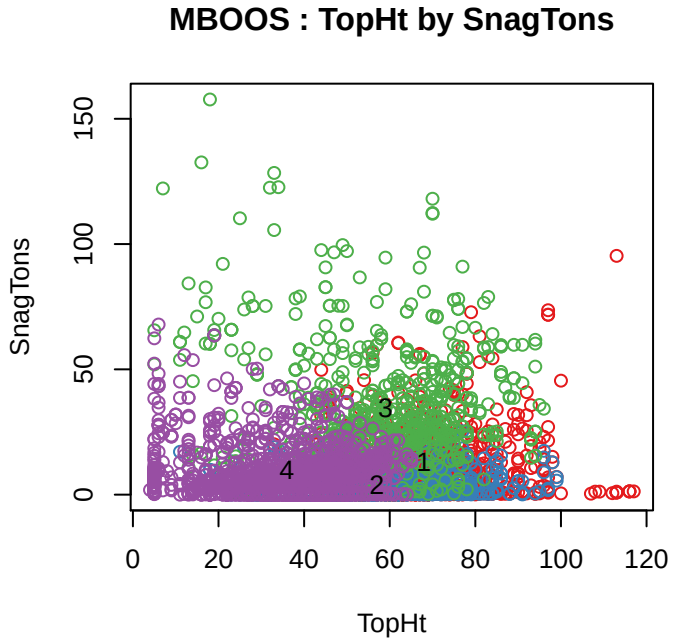
MBOOS : TopHt by SnagTons
SnagTons
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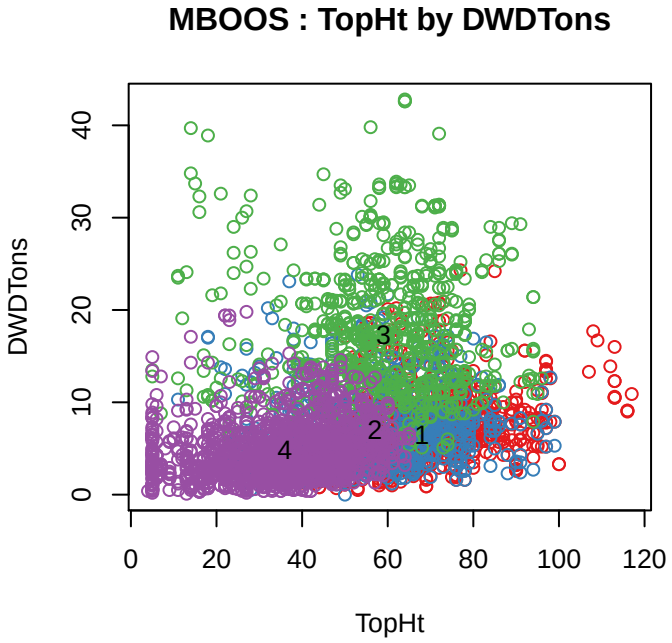
MBOOS : TopHt by DWDTons
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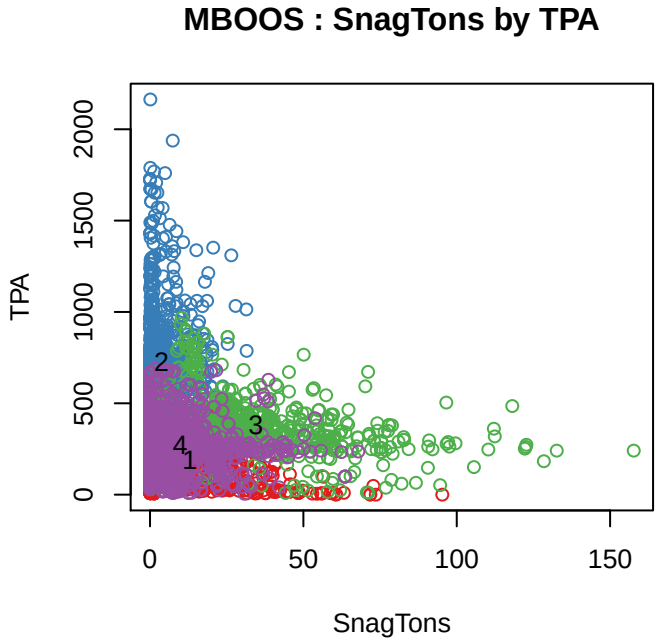
MBOOS : SnagTons by TPA
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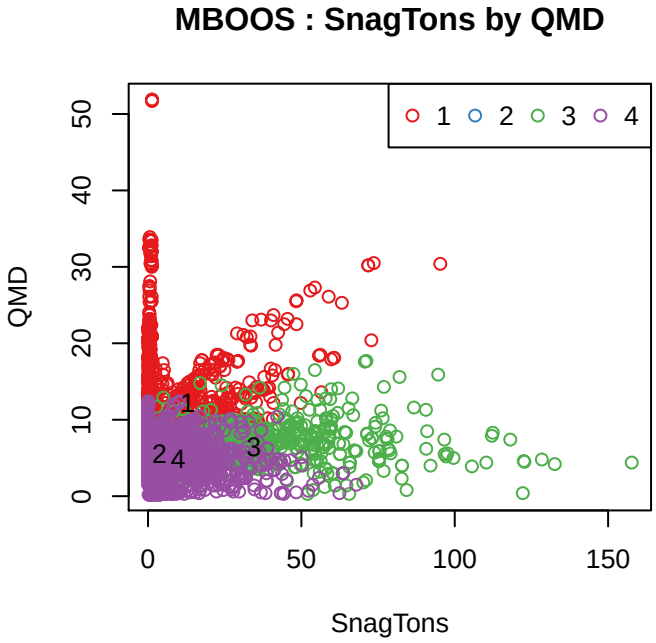
MBOOS : SnagTons by QMD
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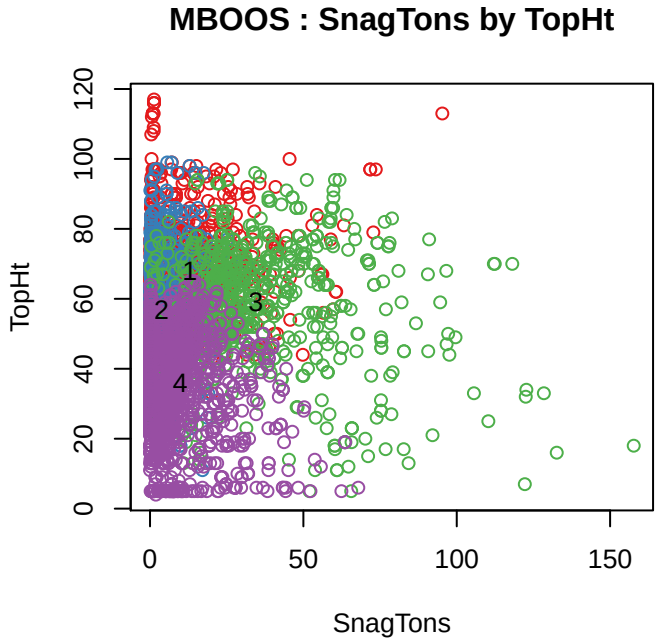
MBOOS : SnagTons by TopHt
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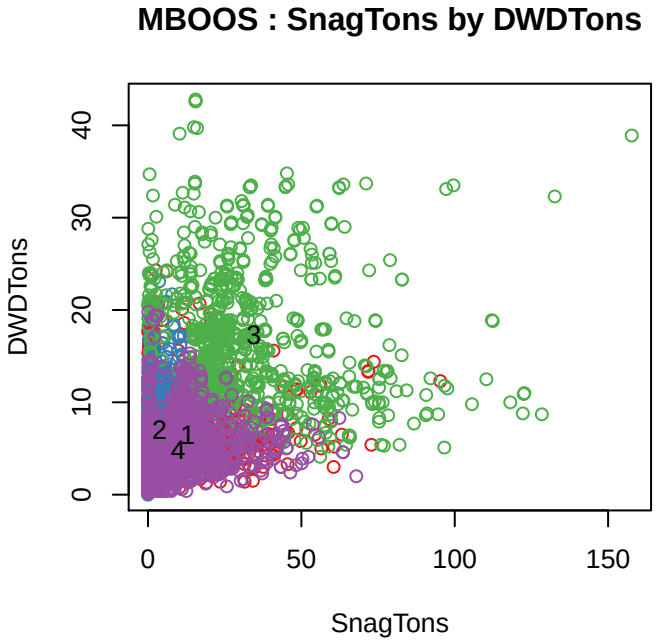
MBOOS : SnagTons by DWDTons
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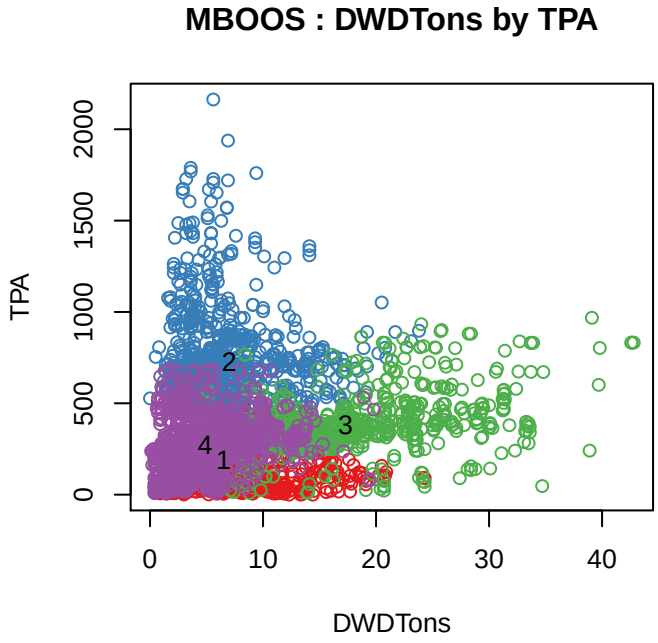
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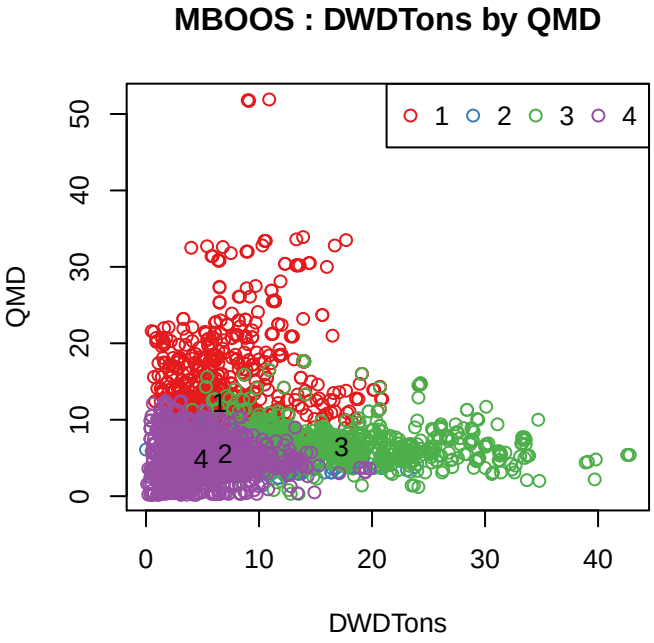
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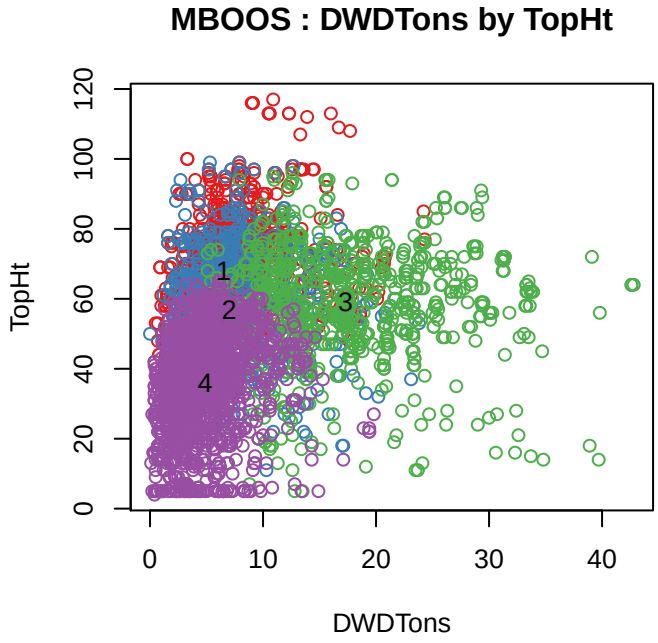
MBOOS : DWDTons by TopHt
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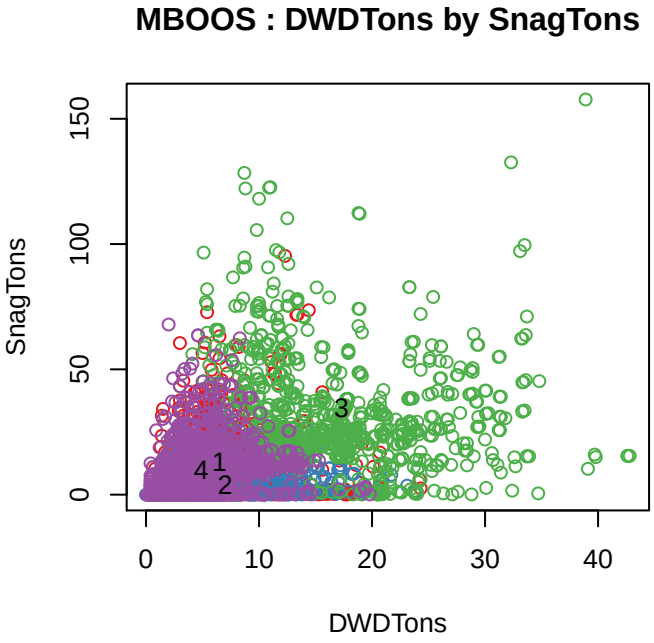
MBOOS : DWDTons by SnagTons
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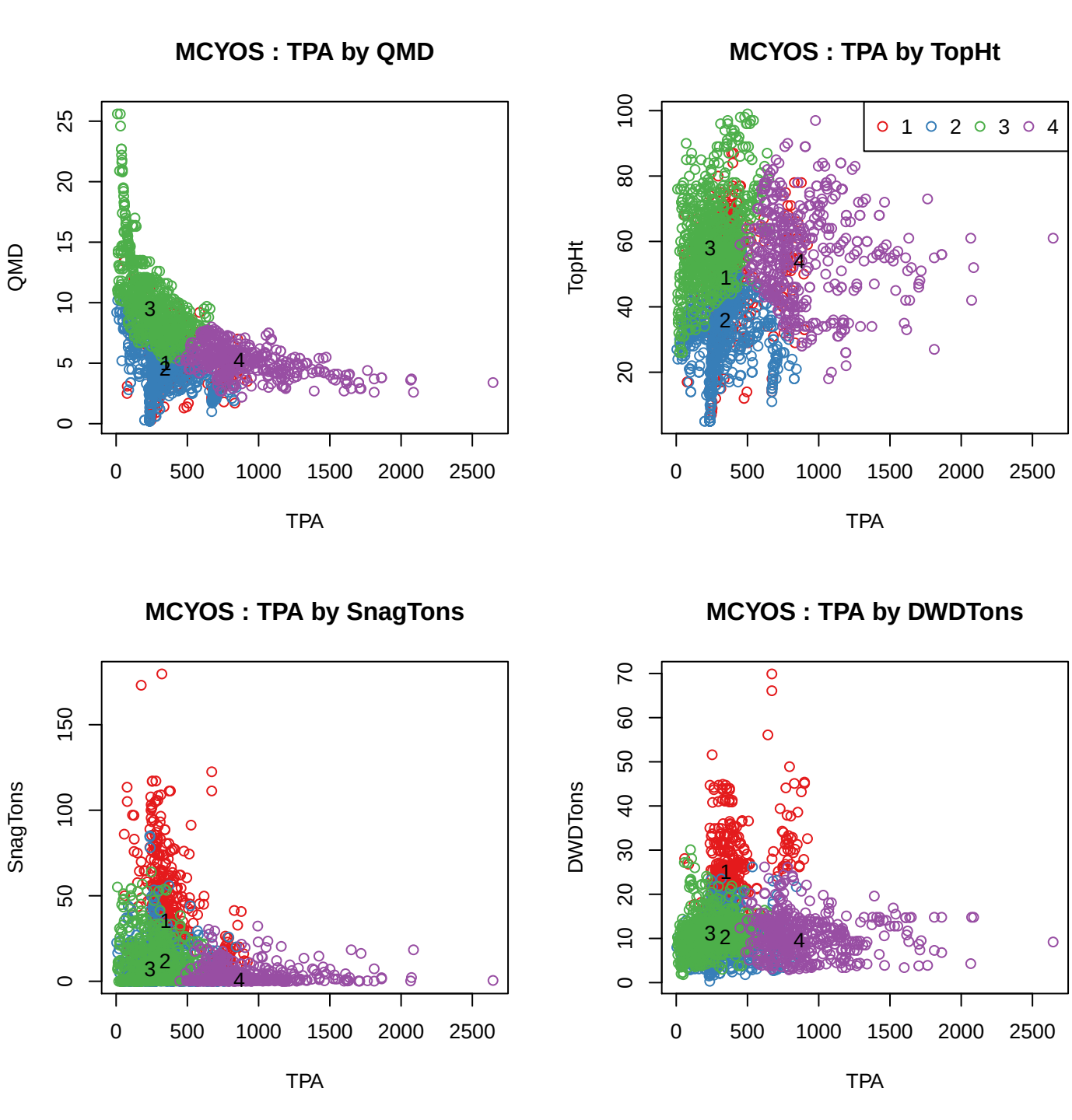
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MCYOS : TPA by TopHt
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MCYOS : TPA by SnagTons
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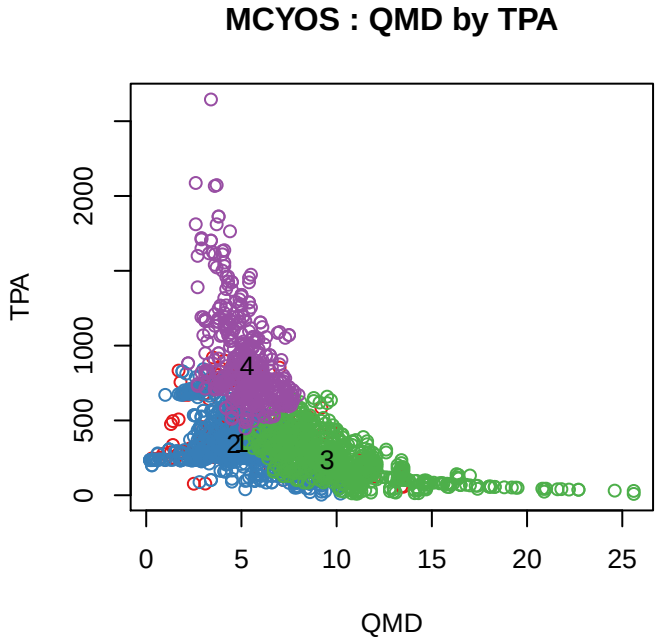
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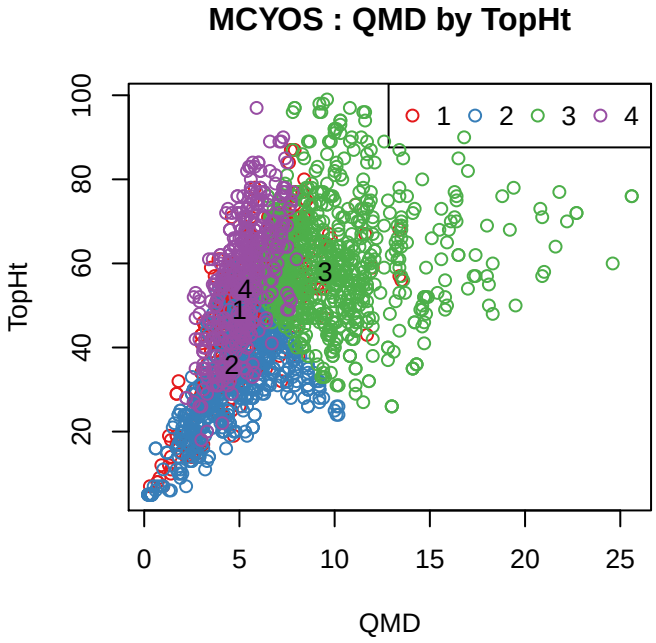
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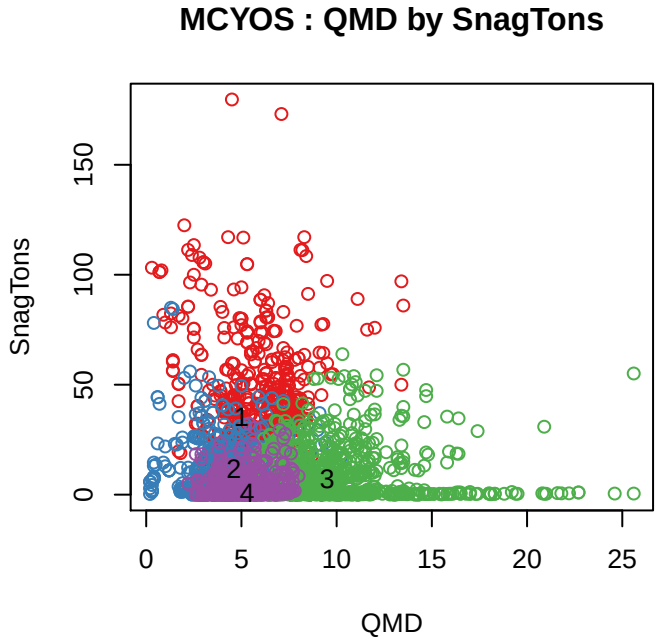
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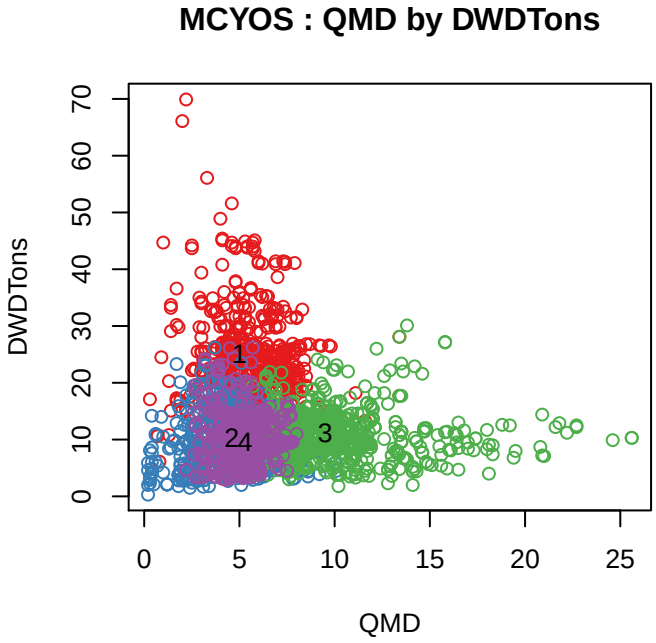
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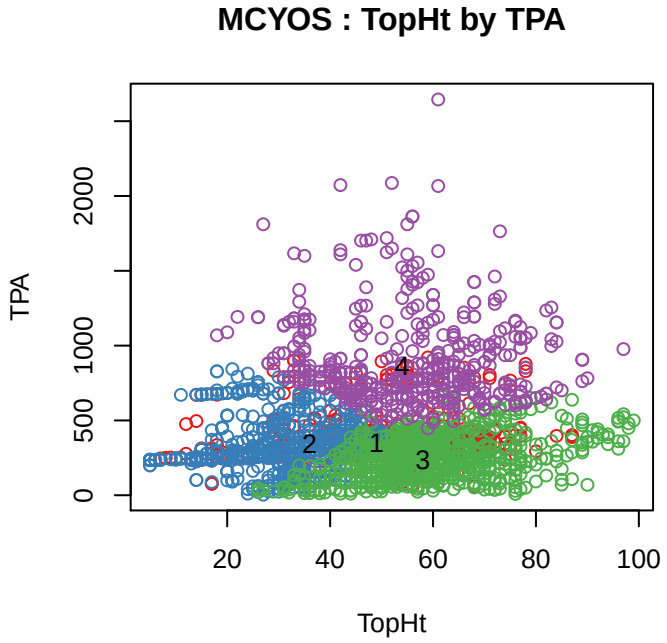
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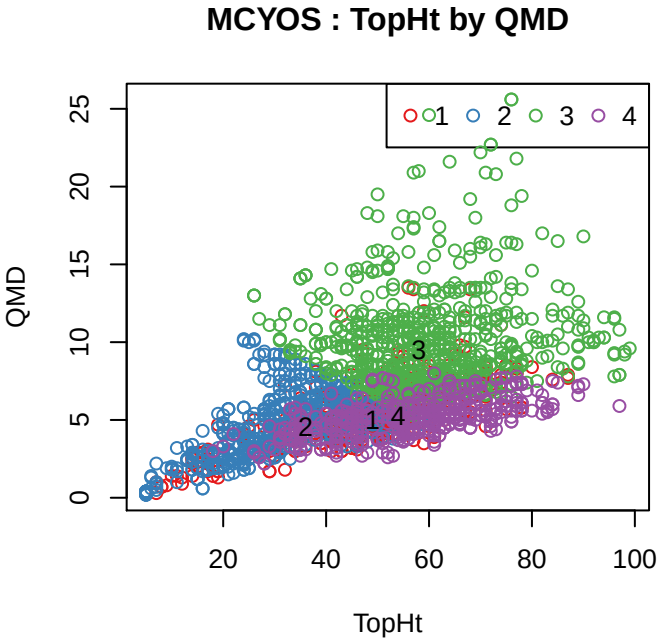
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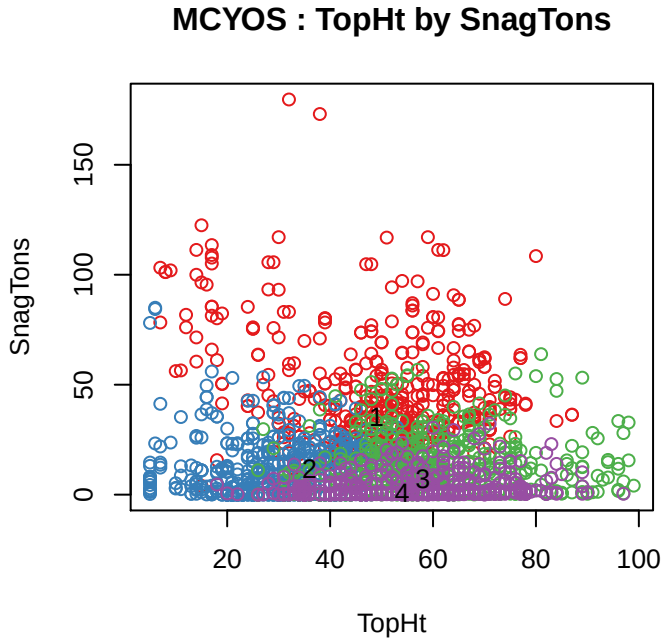
MCYOS : TopHt by SnagTons
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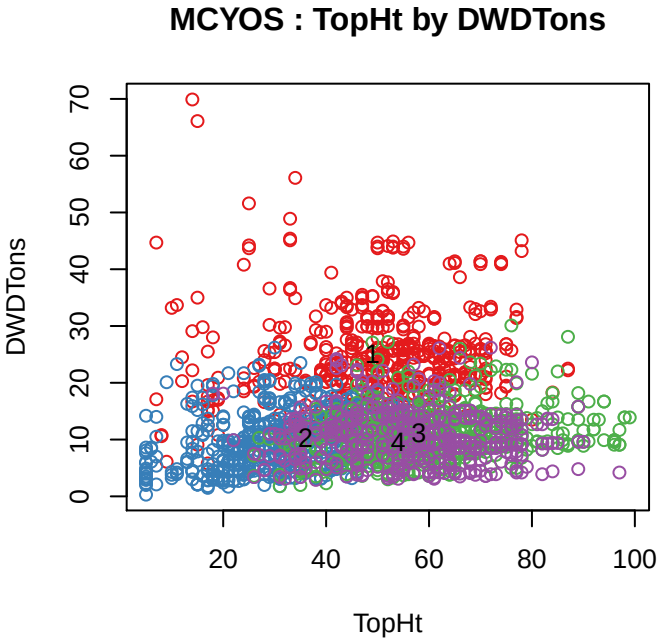
MCYOS : TopHt by DWDTons
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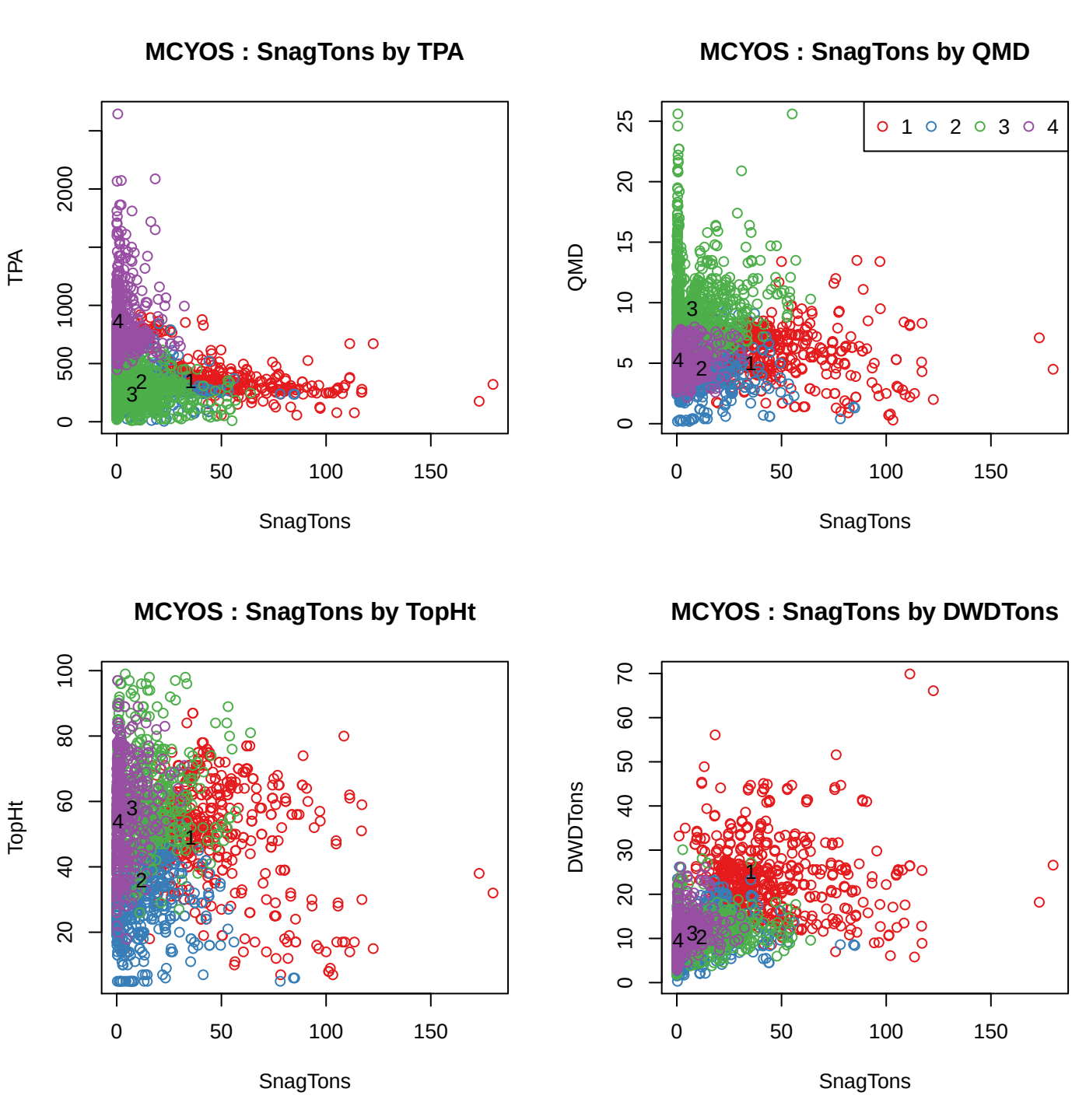
MCYOS : SnagTons by TPA
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MCYOS : SnagTons by QMD
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MCYOS : SnagTons by TopHt
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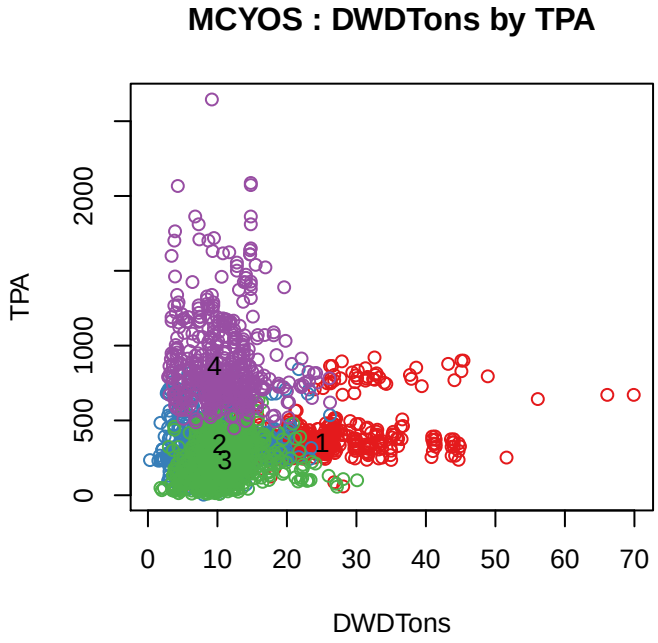
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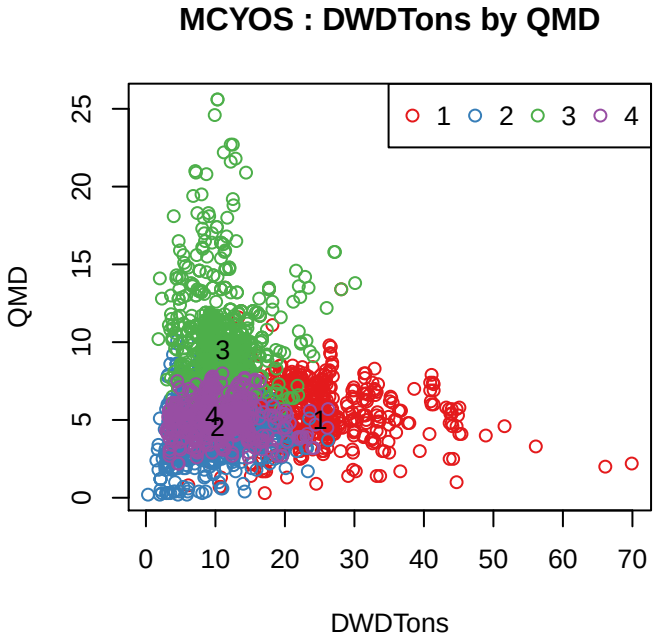
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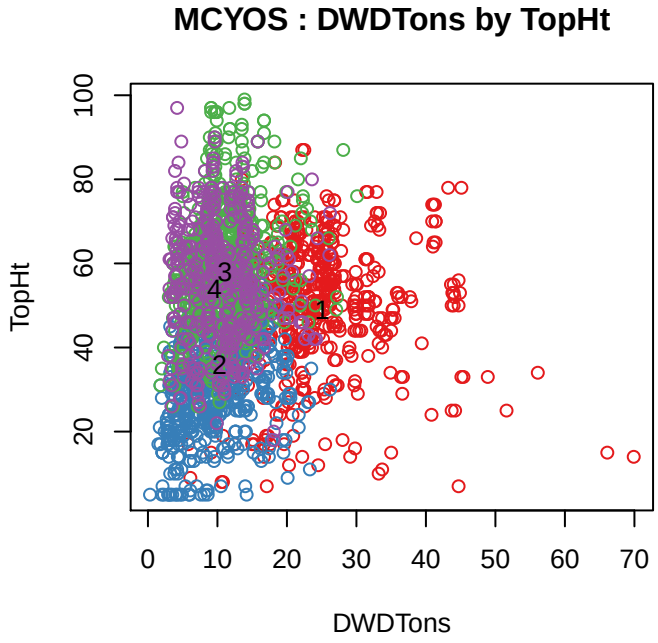
MCYOS : DWDTons by TopHt
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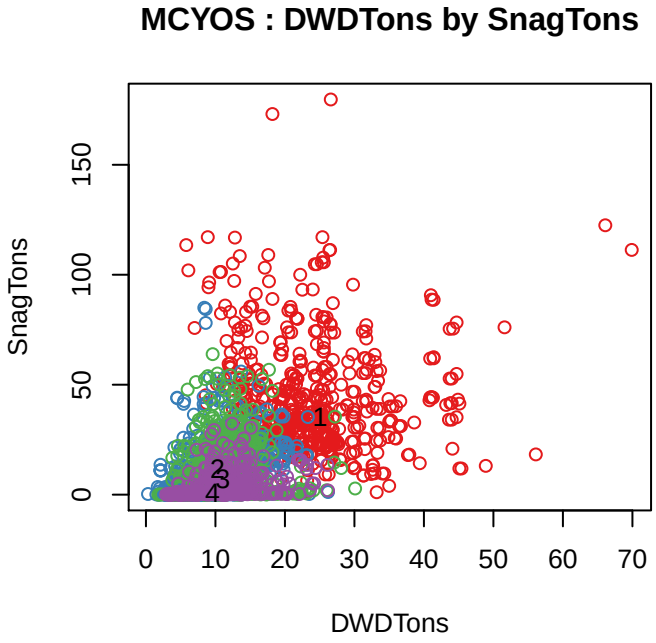
MCYOS : DWDTons by SnagTons
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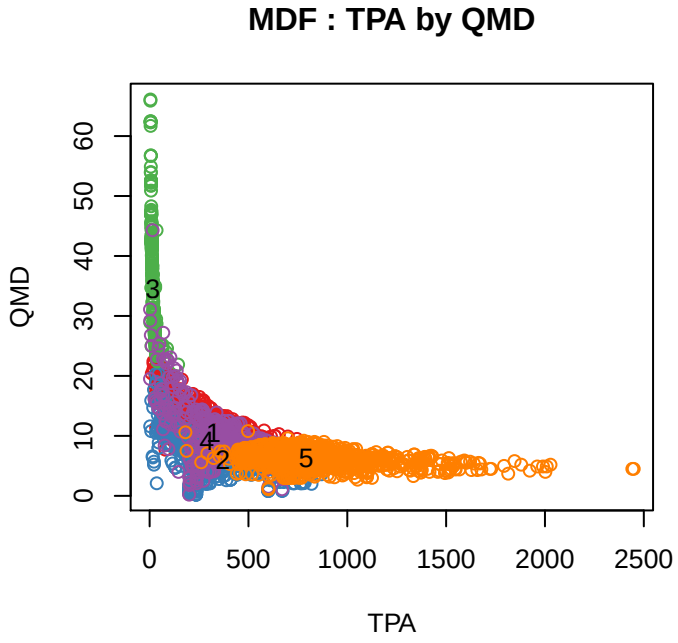
MDF : TPA by QMD
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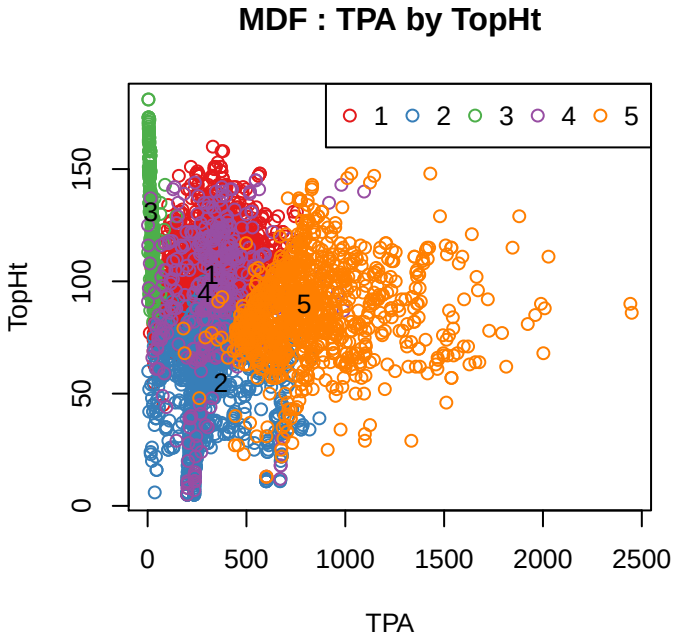
MDF : TPA by TopHt
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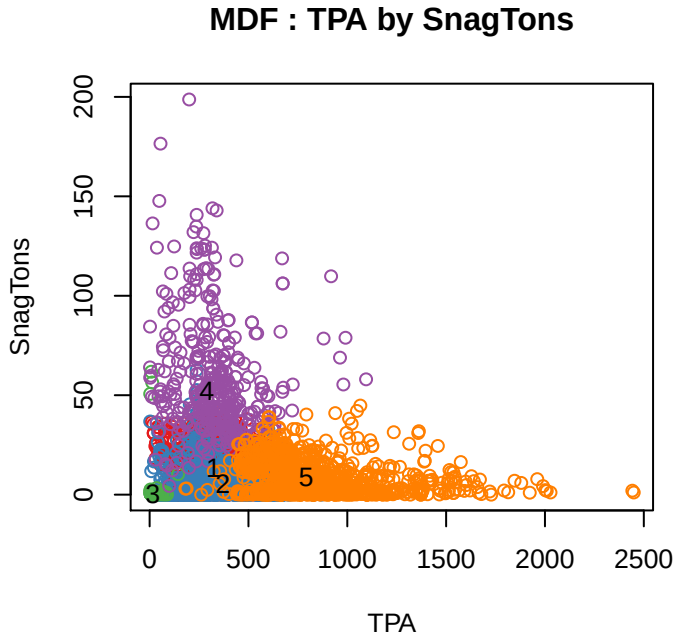
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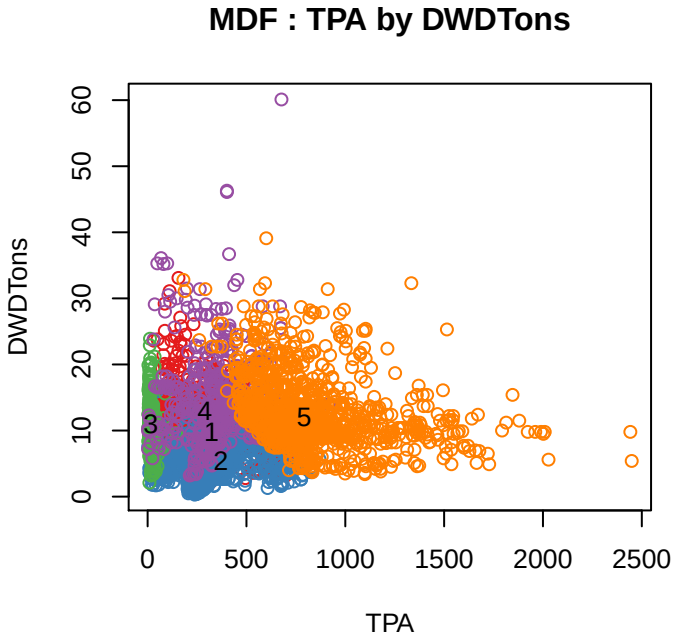
MDF : TPA by DWDTons
DWDTons
TPA
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30
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50
60
0
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1000
1500
2000
2500
1
2
3
4
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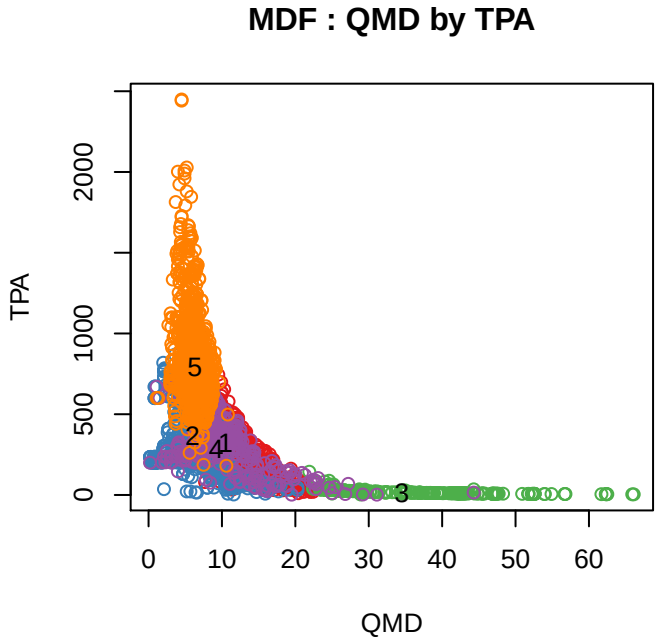
MDF : QMD by TPA
TPA
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500
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10
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30
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50
60
QMD
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2
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1
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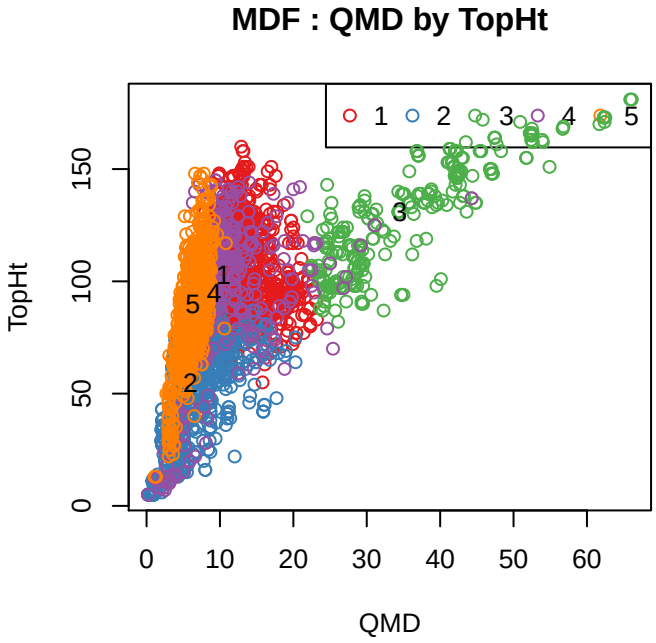
MDF : QMD by TopHt
1
2
3
4
5
TopHt
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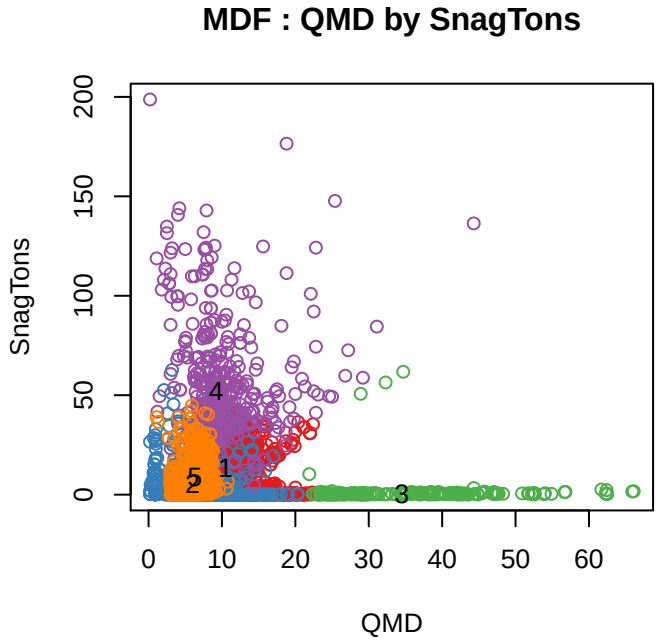
50
100
150
0
10
20
30
40
50
60
QMD
5
4
1
2
3


MDF : QMD by SnagTons
SnagTons
0
50
100
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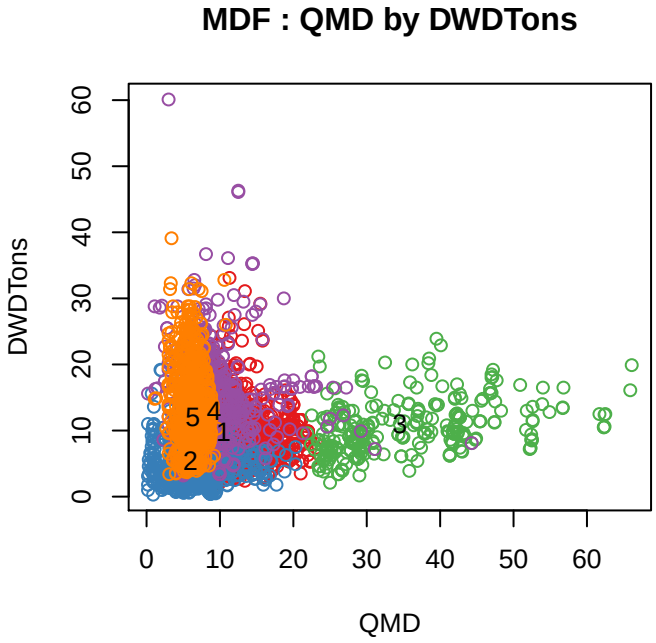
200
0
10
20
30
40
50
60
QMD
4
5
2
1
3


MDF : QMD by DWDTons
DWDTons
0
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50
60
QMD
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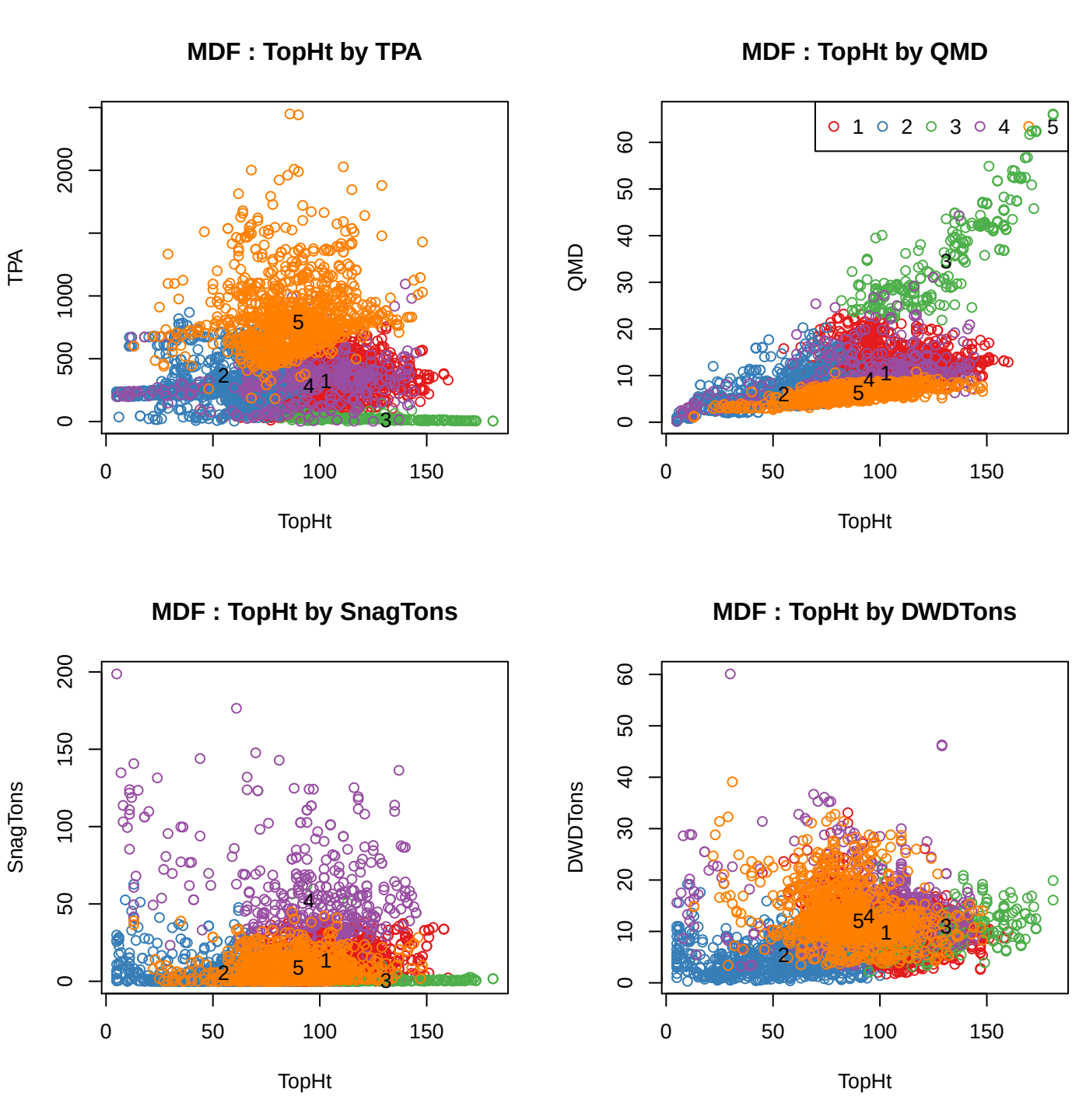
MDF : TopHt by TPA
TPA
TopHt
0
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1000
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0
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100
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1
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5
MDF : TopHt by QMD
QMD
TopHt
0
10
20
30
40
50
60
0
50
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150
1
2
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4
5
MDF : TopHt by SnagTons
SnagTons
TopHt
0
50
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50
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150
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MDF : TopHt by DWDTons
DWDTons
TopHt
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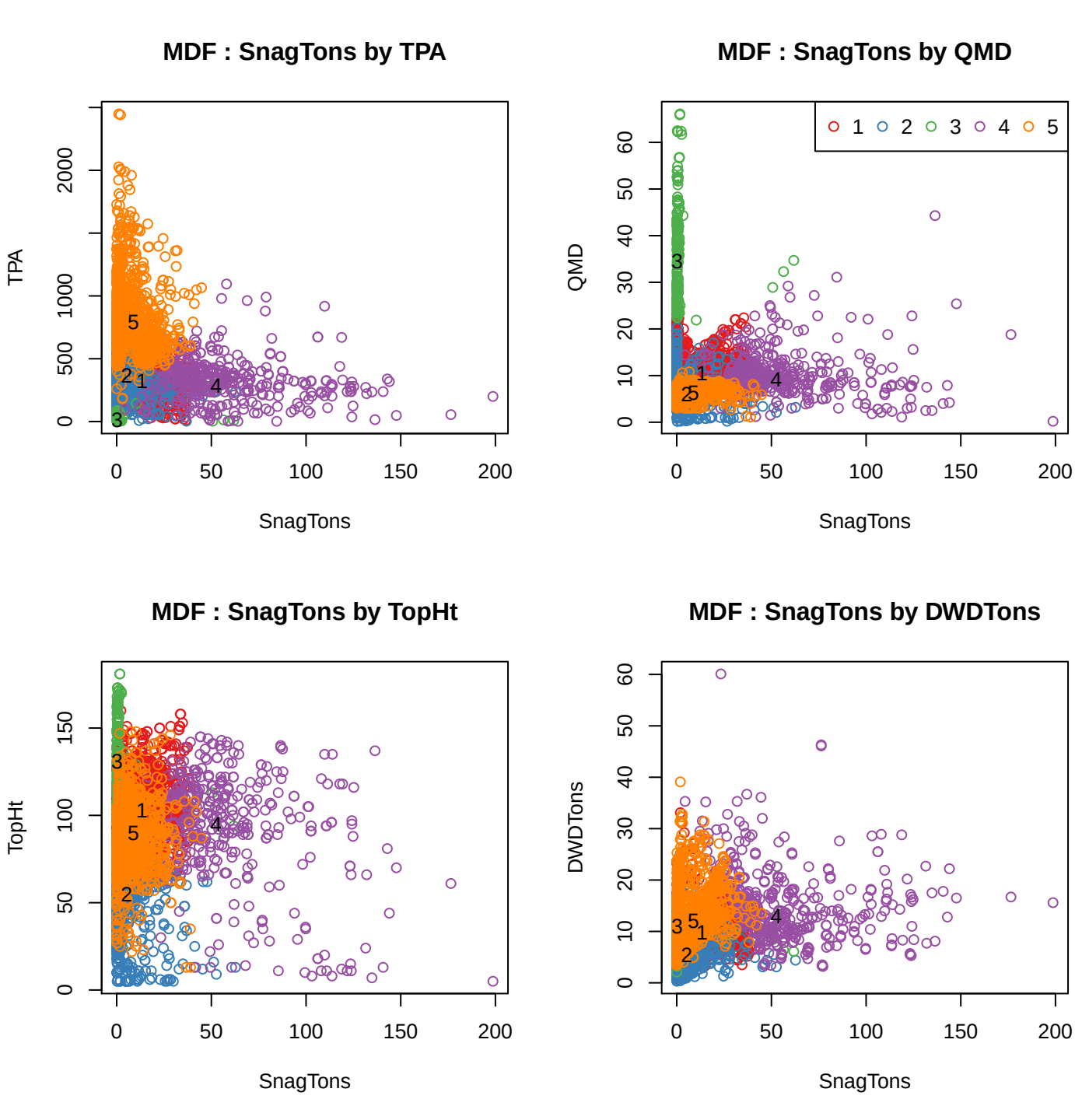
MDF : SnagTons by TPA
TPA
SnagTons
0
500
1000
2000
0
50
100
150
200
MDF : SnagTons by QMD
QMD
SnagTons
1
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3
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5
0
10
20
30
40
50
60
MDF : SnagTons by TopHt
TopHt
SnagTons
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MDF : SnagTons by DWDTons
DWDTons
SnagTons
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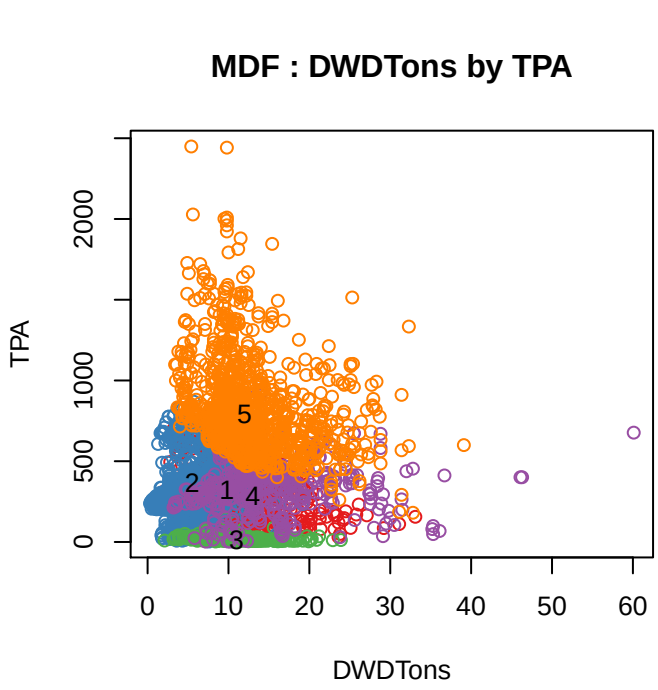
MDF : DWDTons by TPA
TPA
DWDTons
0
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1000
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4
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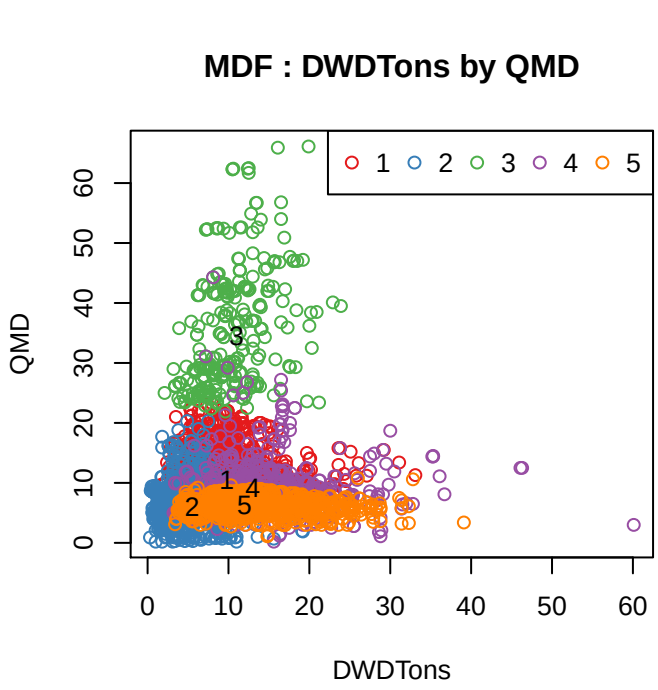
MDF : DWDTons by QMD
QMD
DWDTons
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2
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4
5
0
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50
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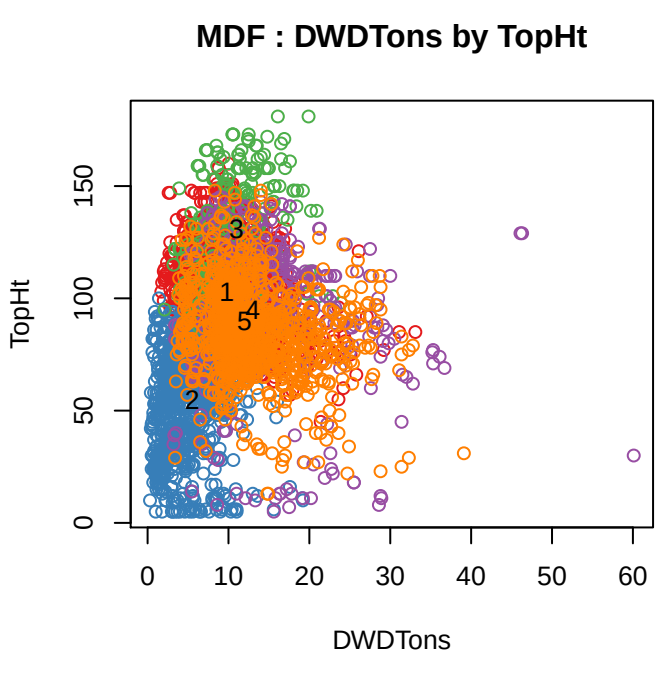
MDF : DWDTons by TopHt
TopHt
DWDTons
0
50
100
150
0
10
20
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40
50
60
1
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4
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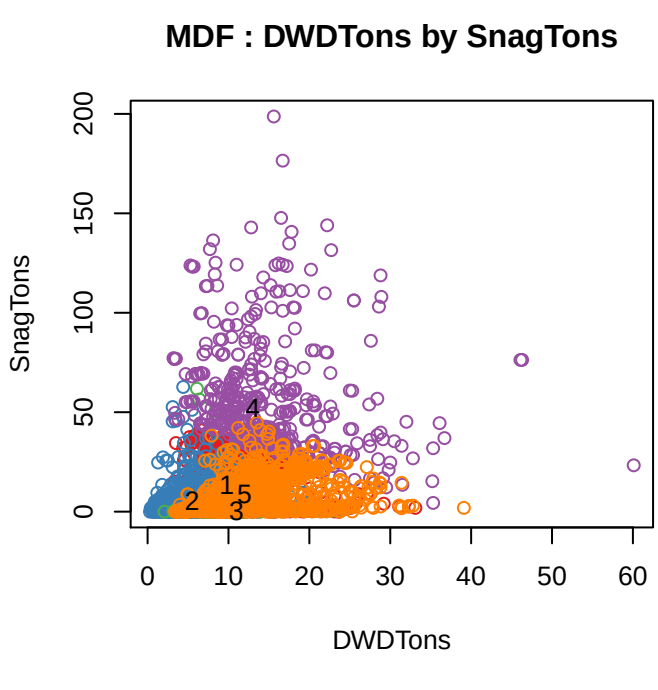
MDF : DWDTons by SnagTons
SnagTons
DWDTons
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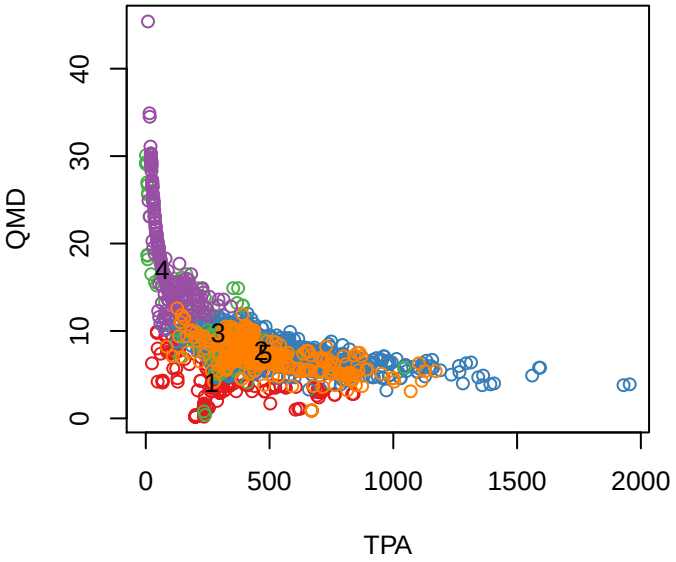
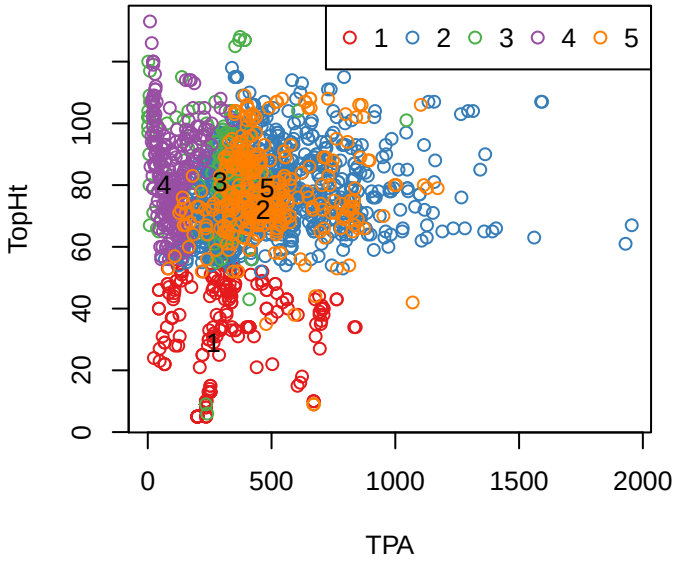
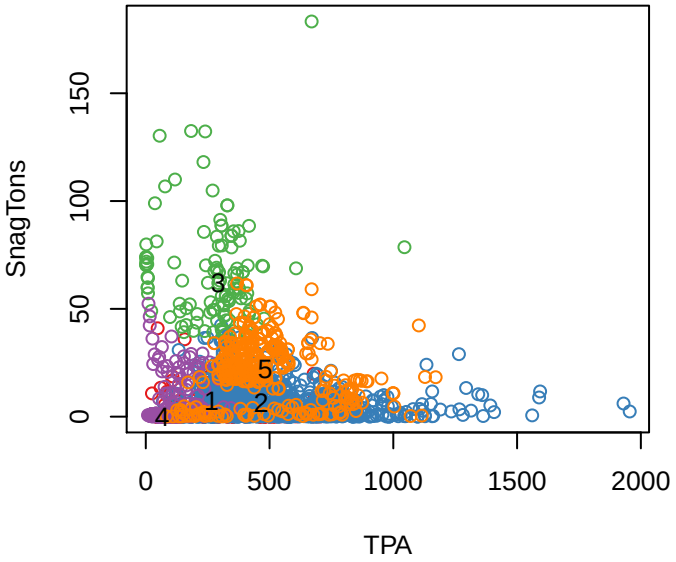
MDFBO : TPA by QMD



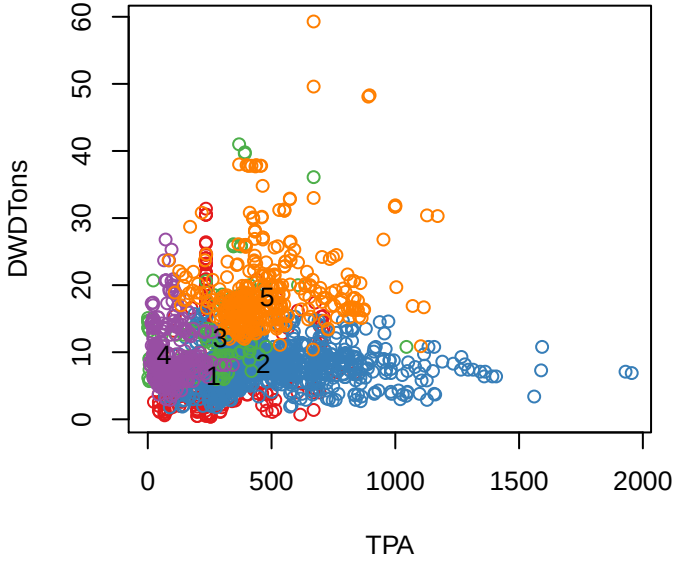
MDFBO : TPA by TopHt

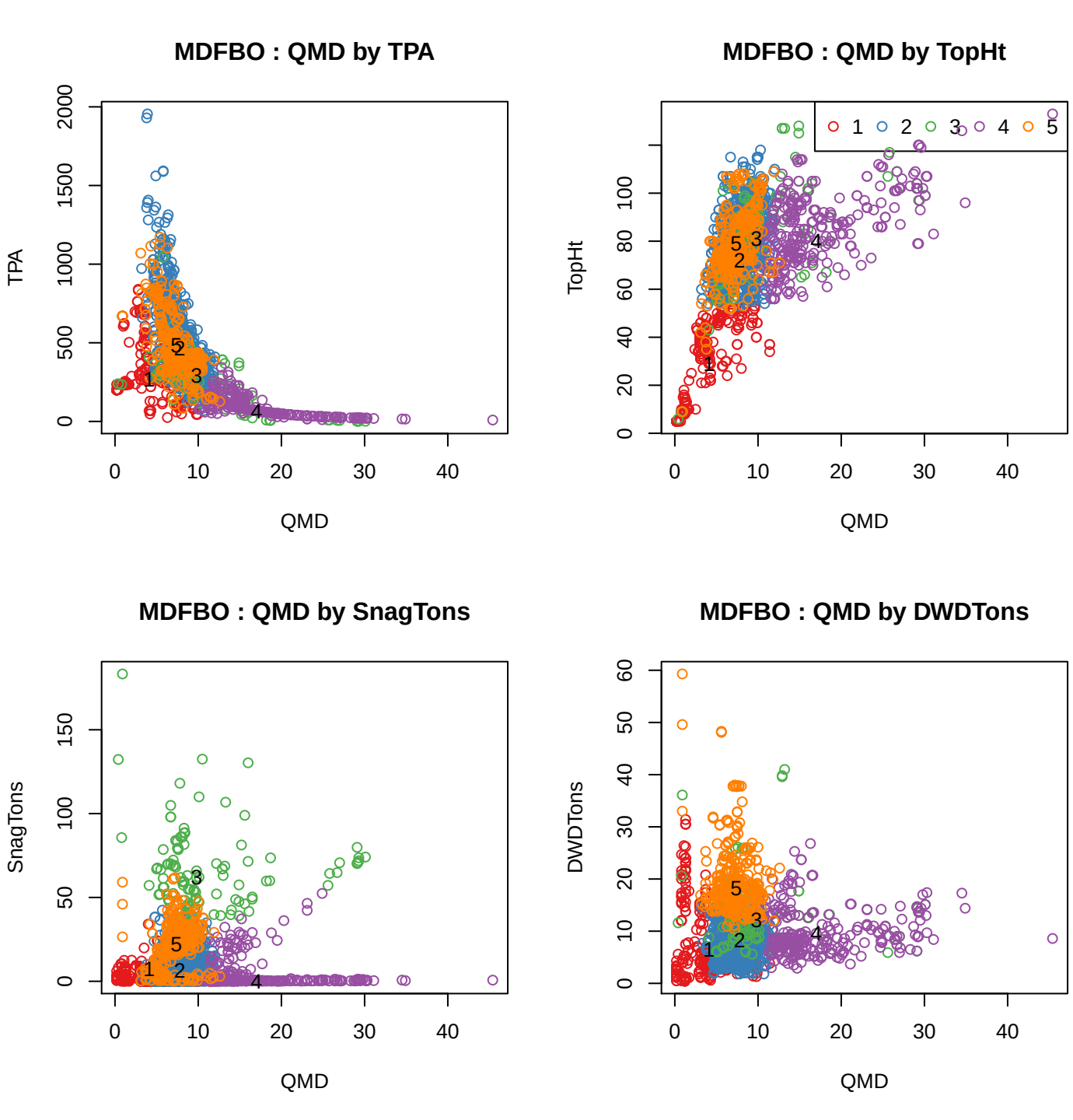


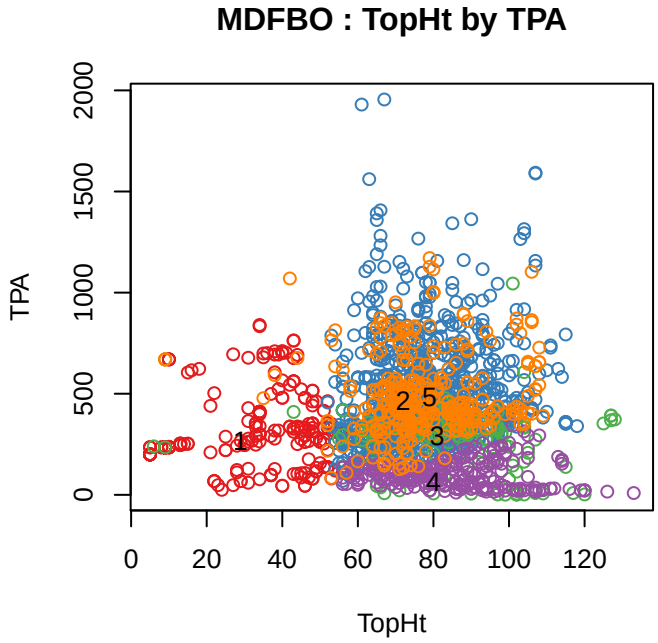
MDFBO : TPA by SnagTons

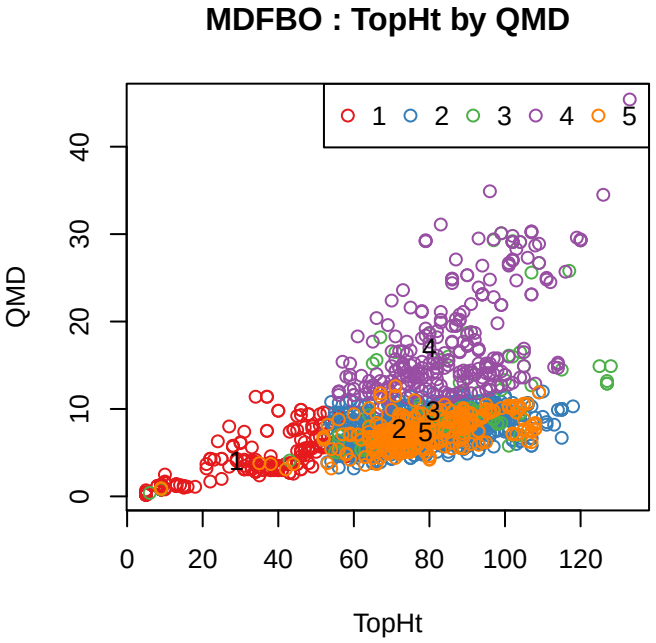


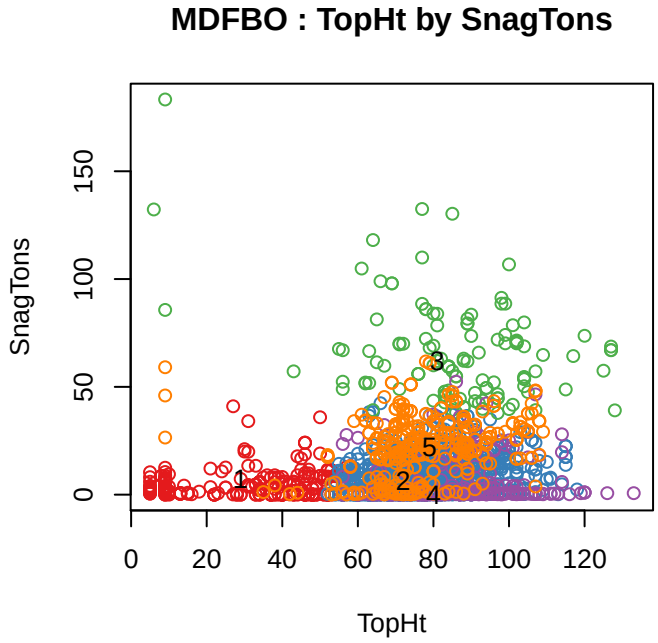
MDFBO : TPA by DWDTons

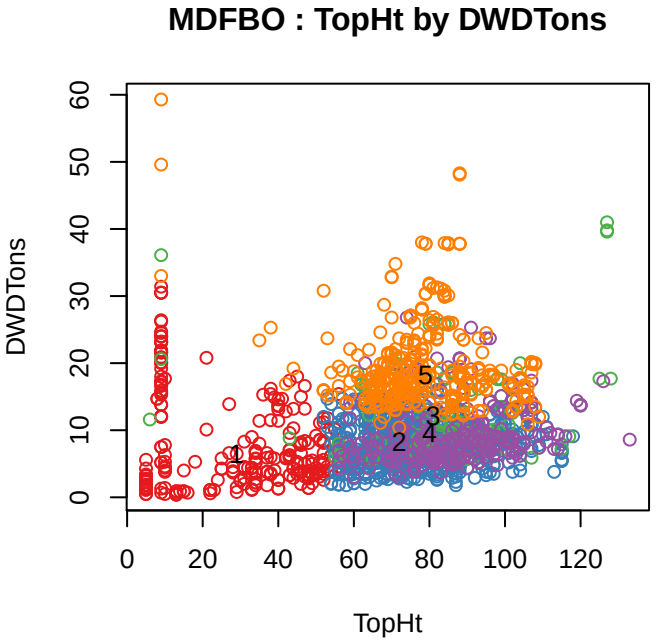



MDFBO : QMD by TPA
TPA
QMD
0
500
1000
1500
2000
0
10
20
30
40
MDFBO : QMD by TopHt
TopHt
QMD
1
2
3
4
5
0
20
40
60
80
100
MDFBO : QMD by SnagTons
SnagTons
QMD
0
50
100
150
MDFBO : QMD by DWDTons
DWDTons
QMD
0
10
20
30
40
50
60


MDFBO : TopHt by TPA
TPA
TopHt
0
500
1000
1500
2000
0
20
40
60
80
100
120


MDFBO : TopHt by QMD
QMD
TopHt
1
2
3
4
5
0
10
20
30
40
0
20
40
60
80
100
120


MDFBO : TopHt by SnagTons
SnagTons
TopHt
0
50
100
150
0
20
40
60
80
100
120


MDFBO : TopHt by DWDTons
DWDTons
TopHt
0
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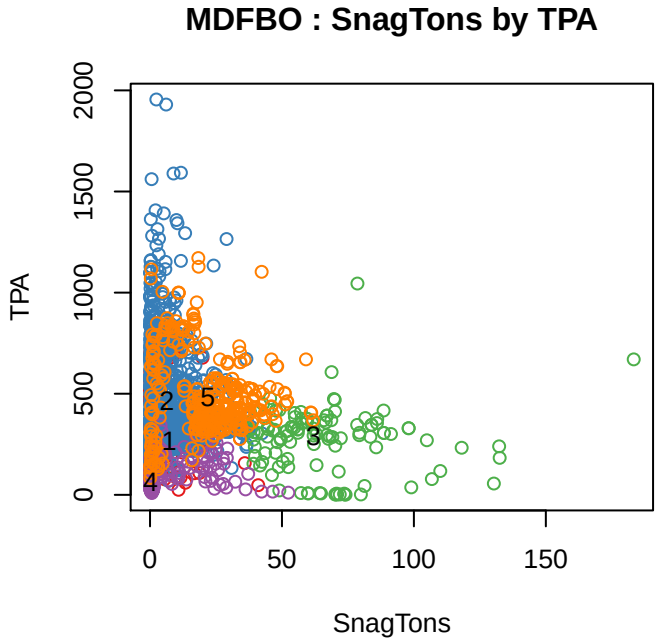
100
120


MDFBO : SnagTons by TPA
TPA
SnagTons
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500
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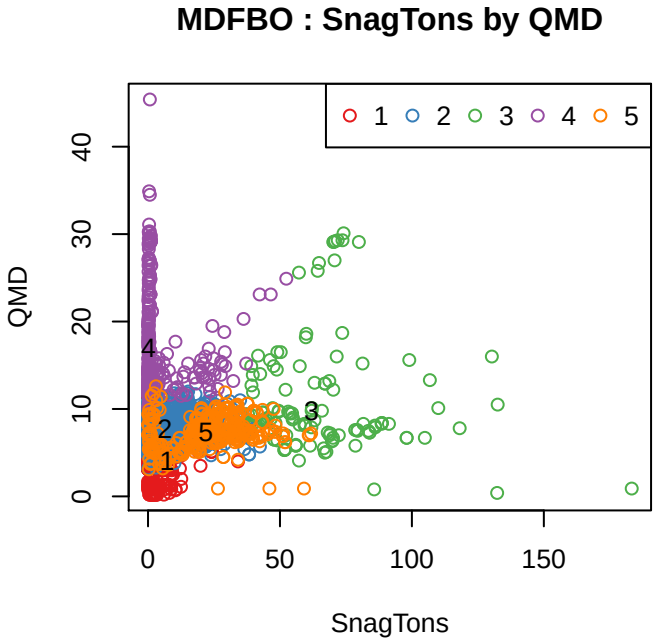
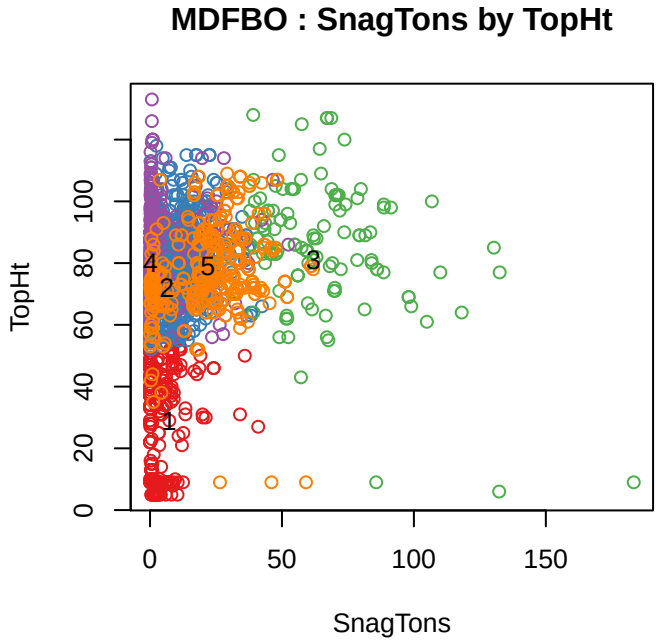
1500
2000
0
50
100
150


MDFBO : SnagTons by QMD
1 2 3 4 5
QMD
SnagTons
0
10
20
30
40
0
50
100
150


MDFBO : SnagTons by TopHt
TopHt
SnagTons
0
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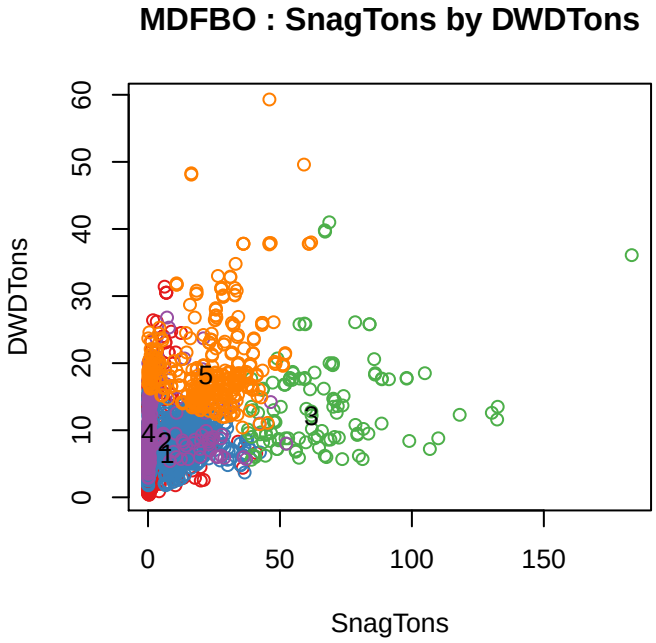
MDFBO : SnagTons by DWDTons
DWDTons
SnagTons
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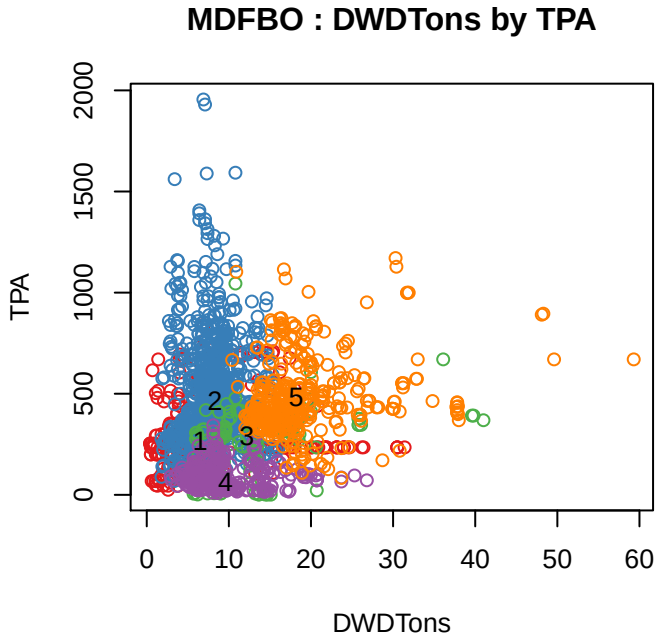
MDFBO : DWDTons by TPA
TPA
DWDTons
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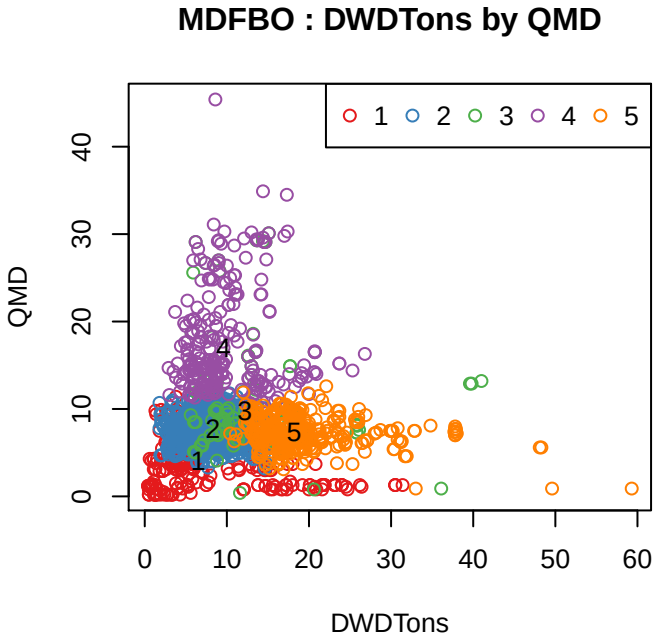
MDFBO : DWDTons by QMD
QMD
DWDTons
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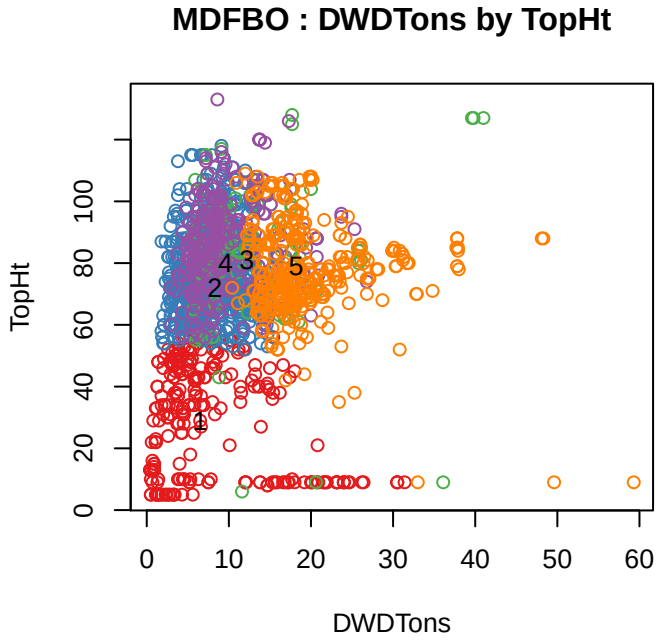
MDFBO : DWDTons by TopHt
TopHt
DWDTons
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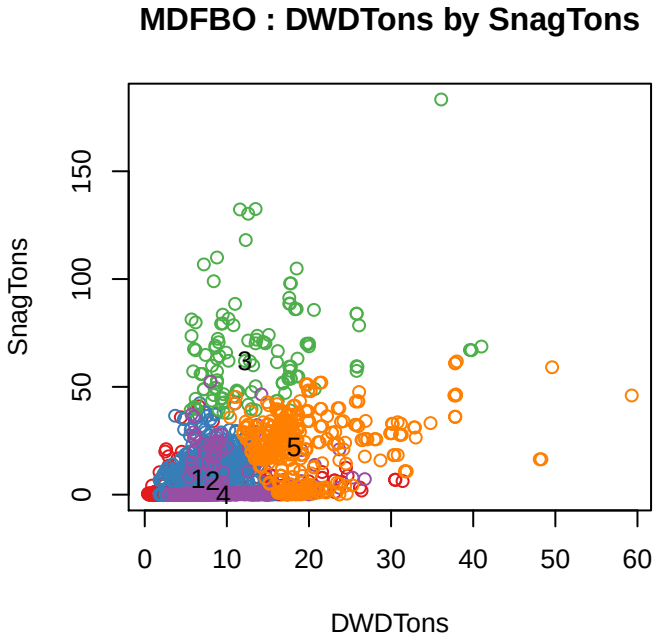
MDFBO : DWDTons by SnagTons
SnagTons
DWDTons
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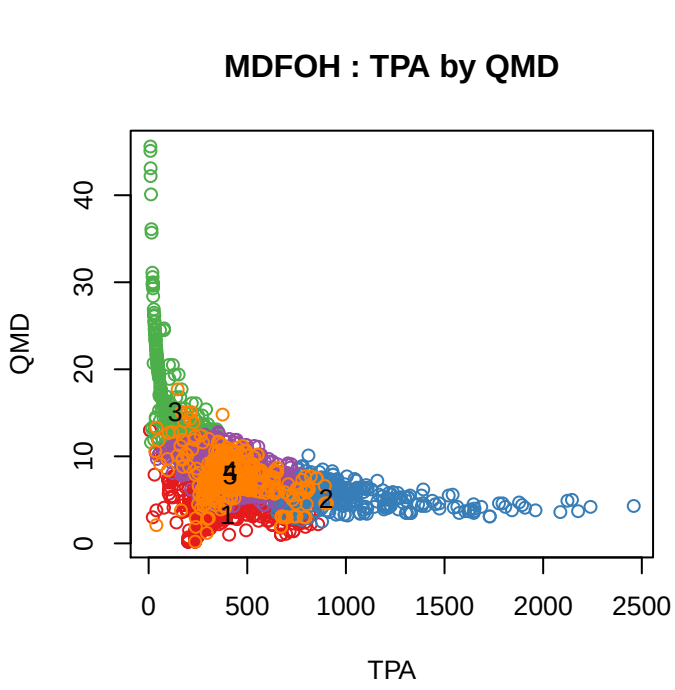
MDFOH : TPA by QMD
QMD
TPA
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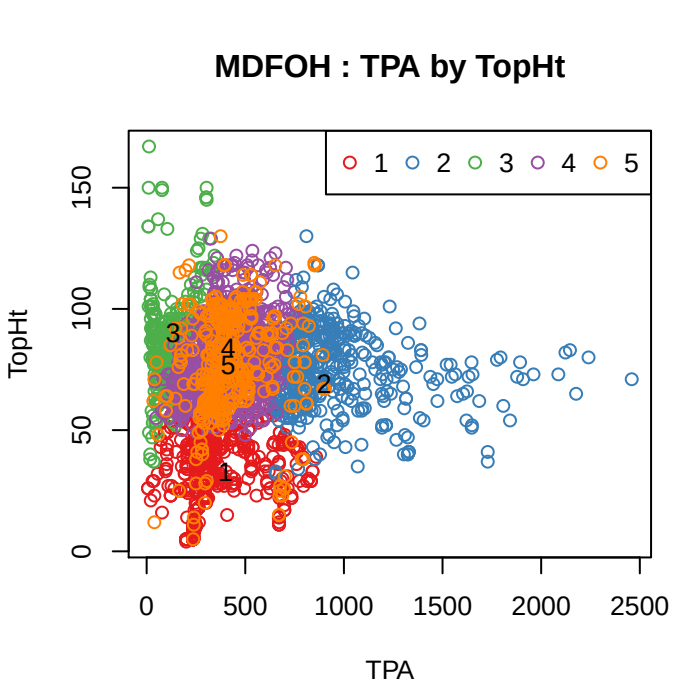
MDFOH : TPA by TopHt
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4
5
TopHt
TPA
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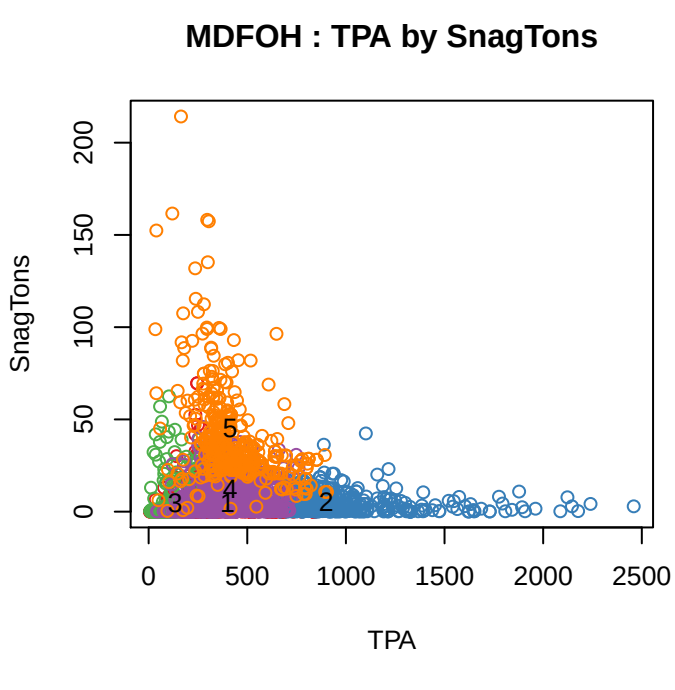
MDFOH : TPA by SnagTons
SnagTons
TPA
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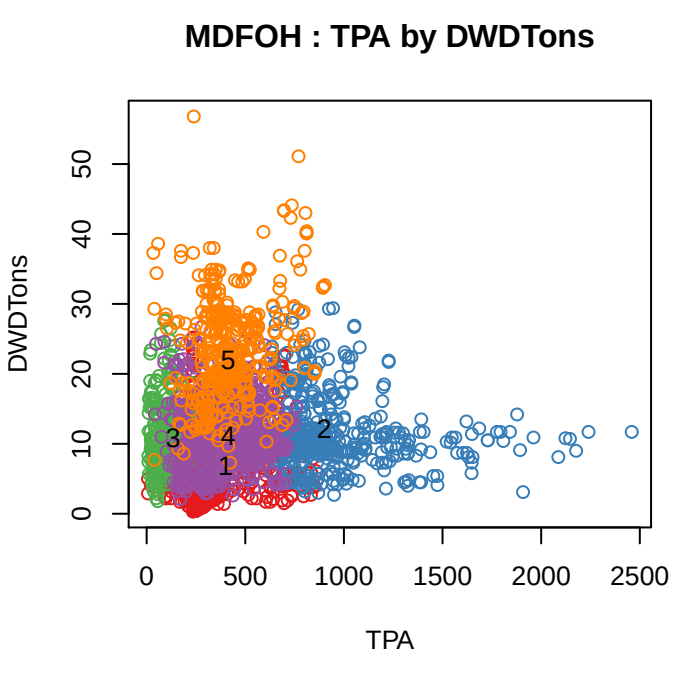
MDFOH : TPA by DWDTons
DWDTons
TPA
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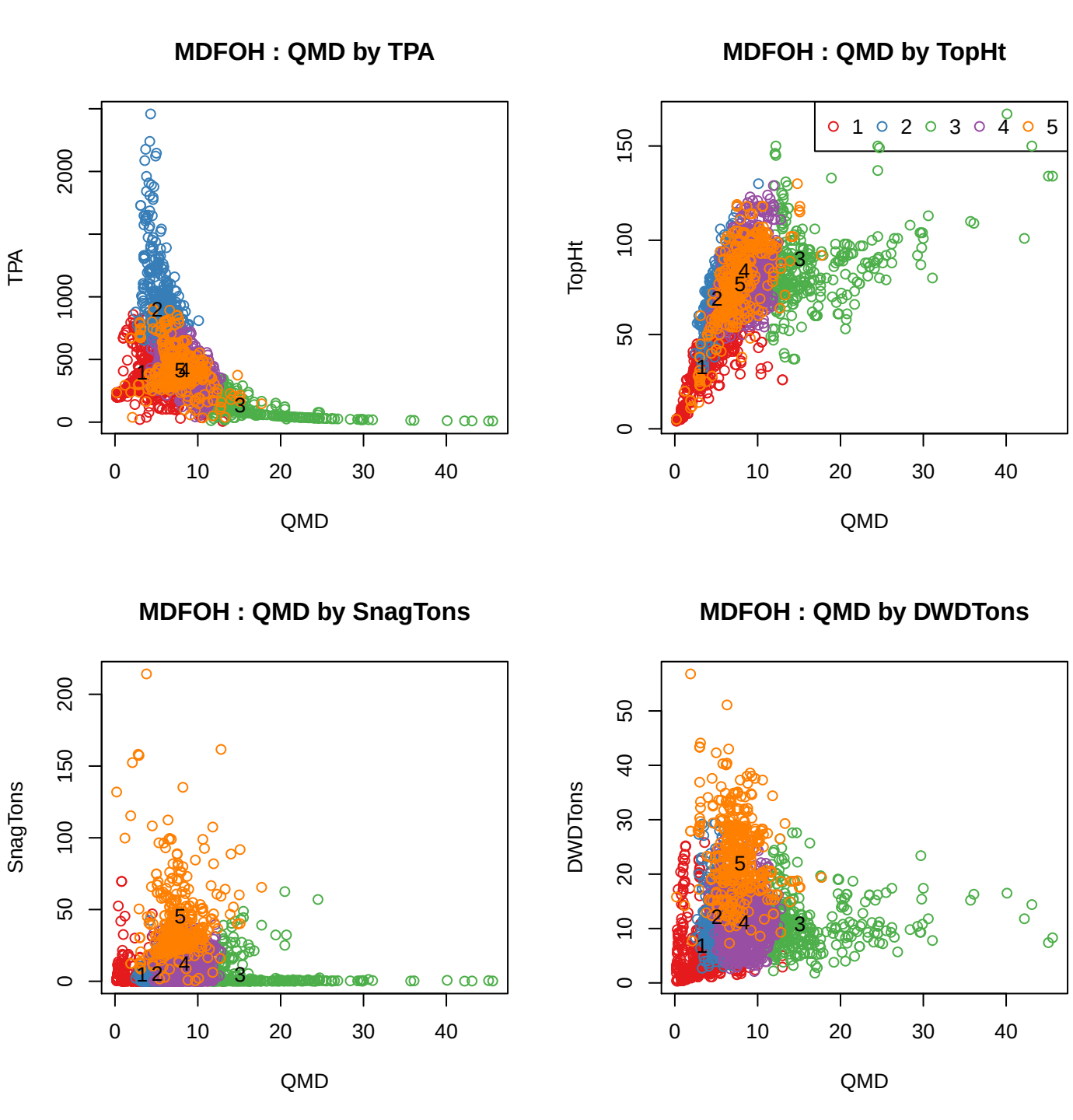
MDFOH : QMD by TPA
TPA
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QMD
MDFOH : QMD by TopHt
TopHt
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QMD
MDFOH : QMD by SnagTons
SnagTons
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QMD
MDFOH : QMD by DWDTons
DWDTons
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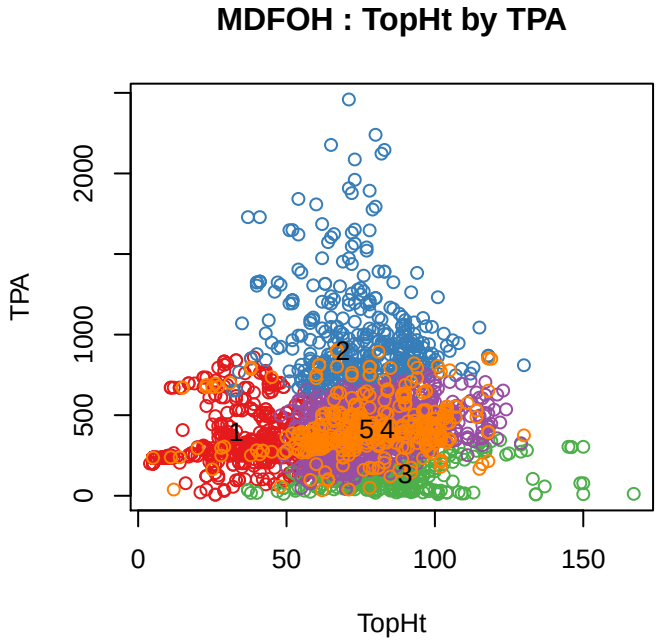
QMD


MDFOH : TopHt by TPA
TPA
TopHt
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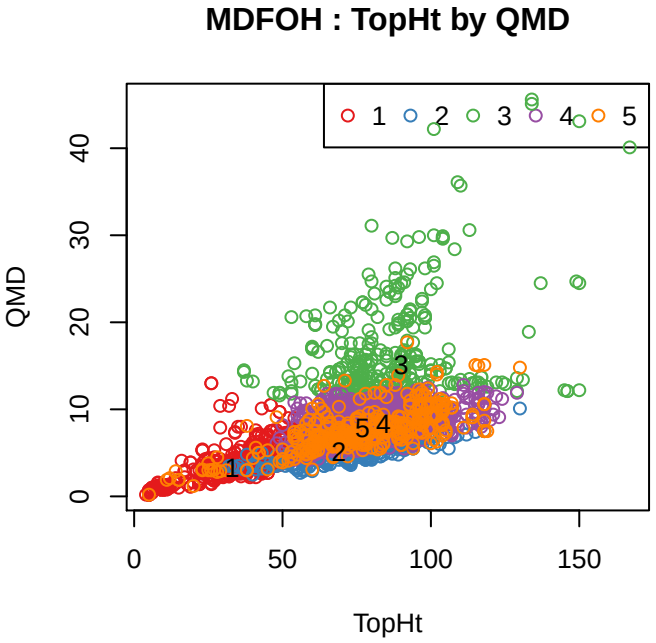
MDFOH : TopHt by QMD
QMD
TopHt
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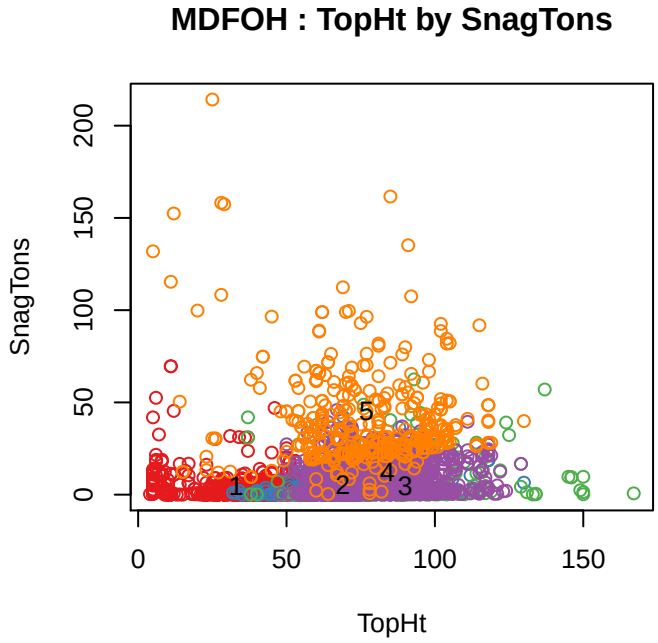
MDFOH : TopHt by SnagTons
SnagTons
TopHt
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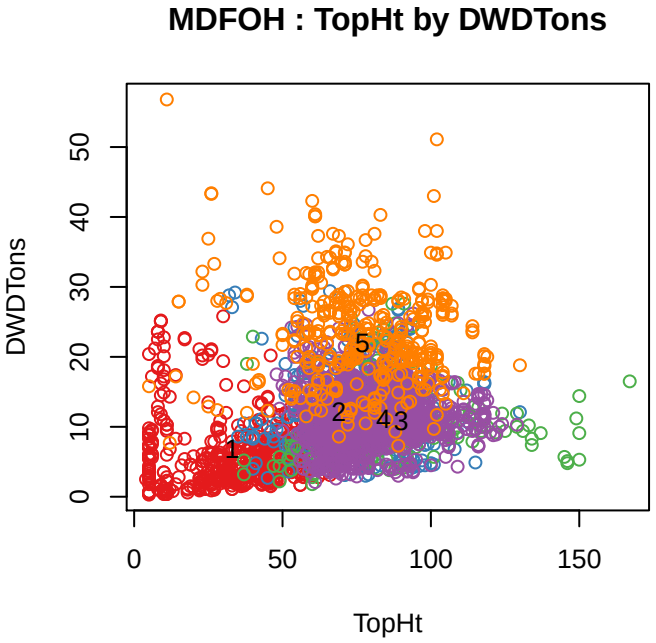
MDFOH : TopHt by DWDTons
DWDTons
TopHt
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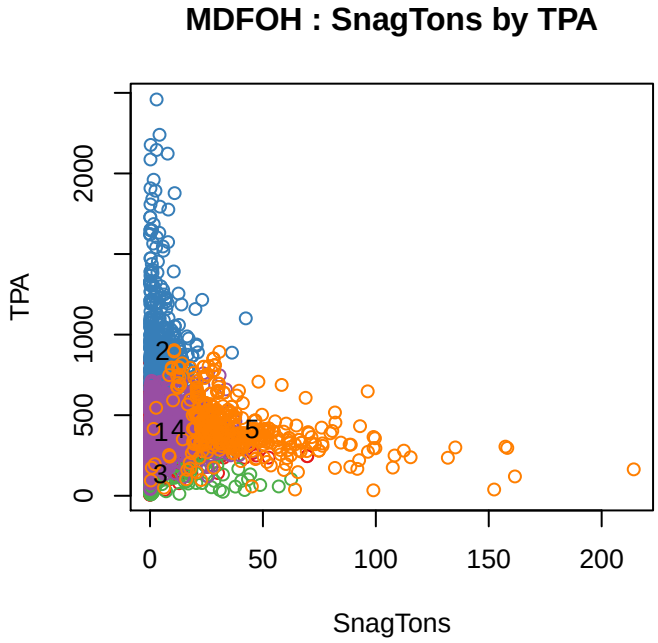
MDFOH : SnagTons by TPA
TPA
SnagTons
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200
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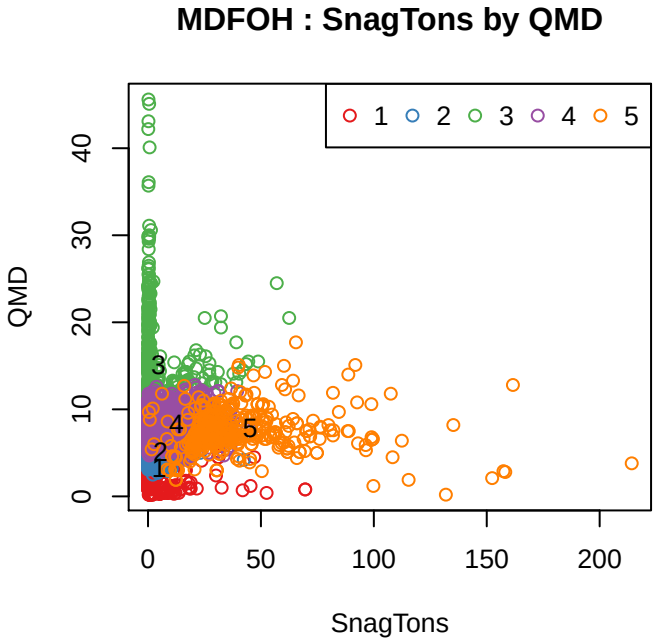
MDFOH : SnagTons by QMD
QMD
SnagTons
0
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0
50
100
150
200
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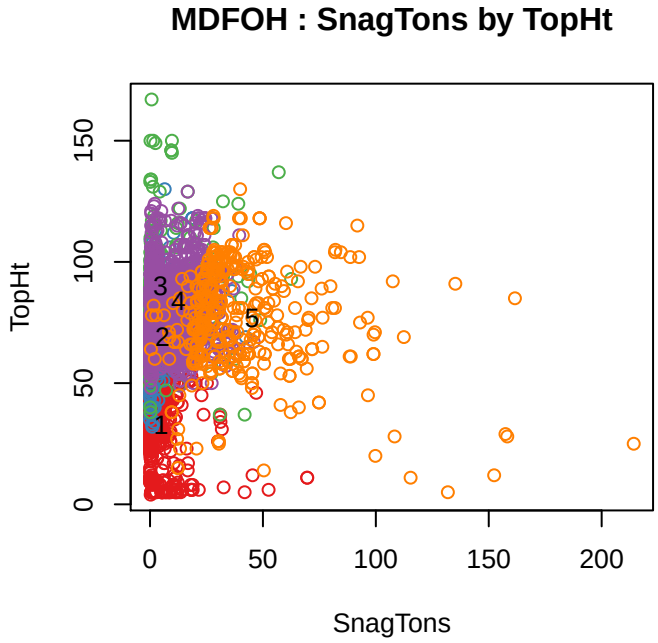
3
4
5


MDFOH : SnagTons by TopHt
TopHt
SnagTons
0
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100
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0
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100
150
200
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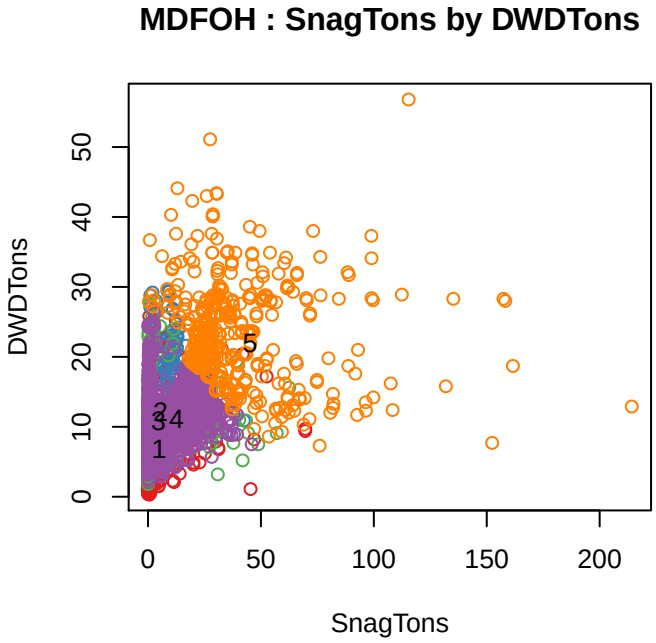
MDFOH : SnagTons by DWDTons
DWDTons
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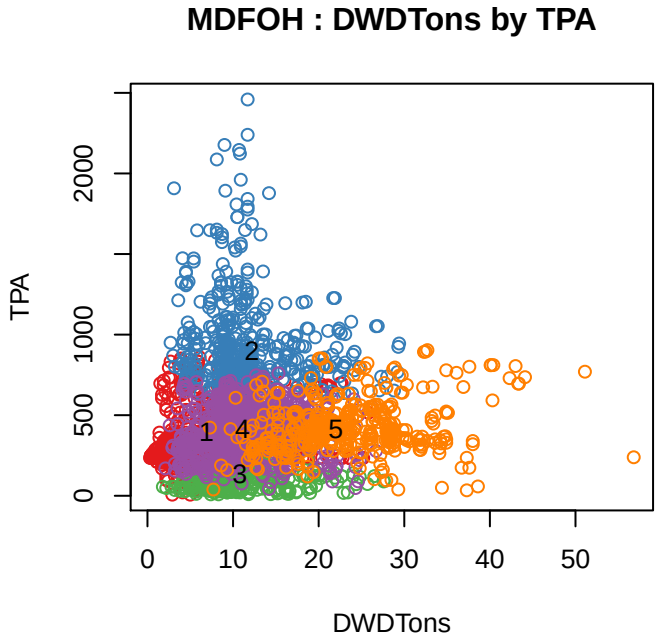
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DWDTons
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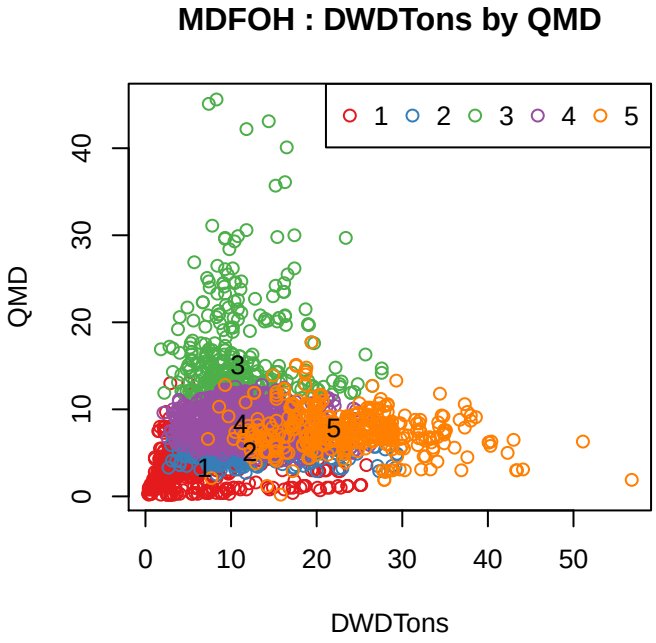
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QMD
DWDTons
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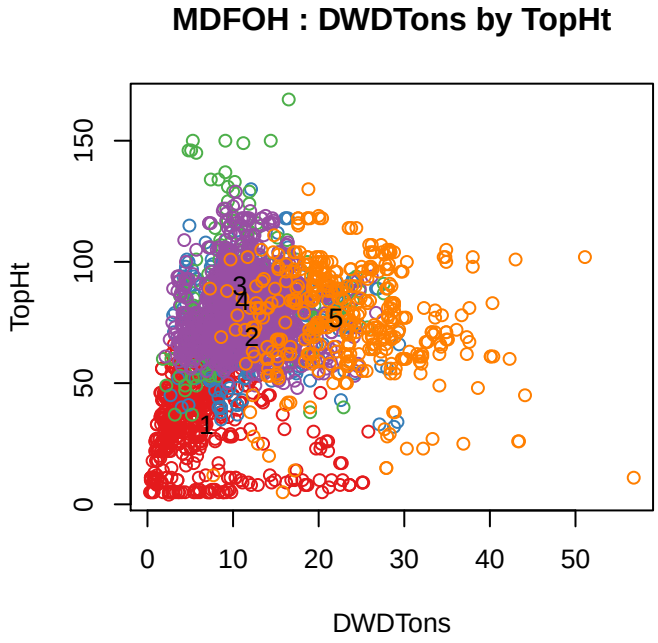
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DWDTons
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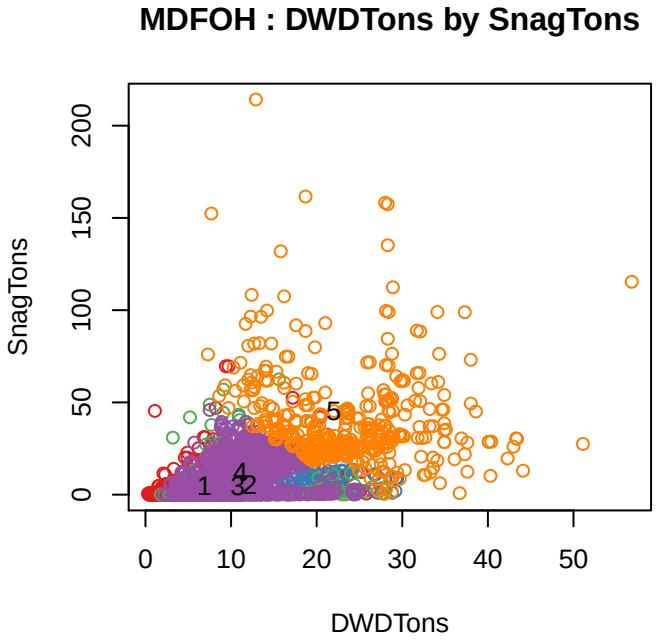
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SnagTons
DWDTons
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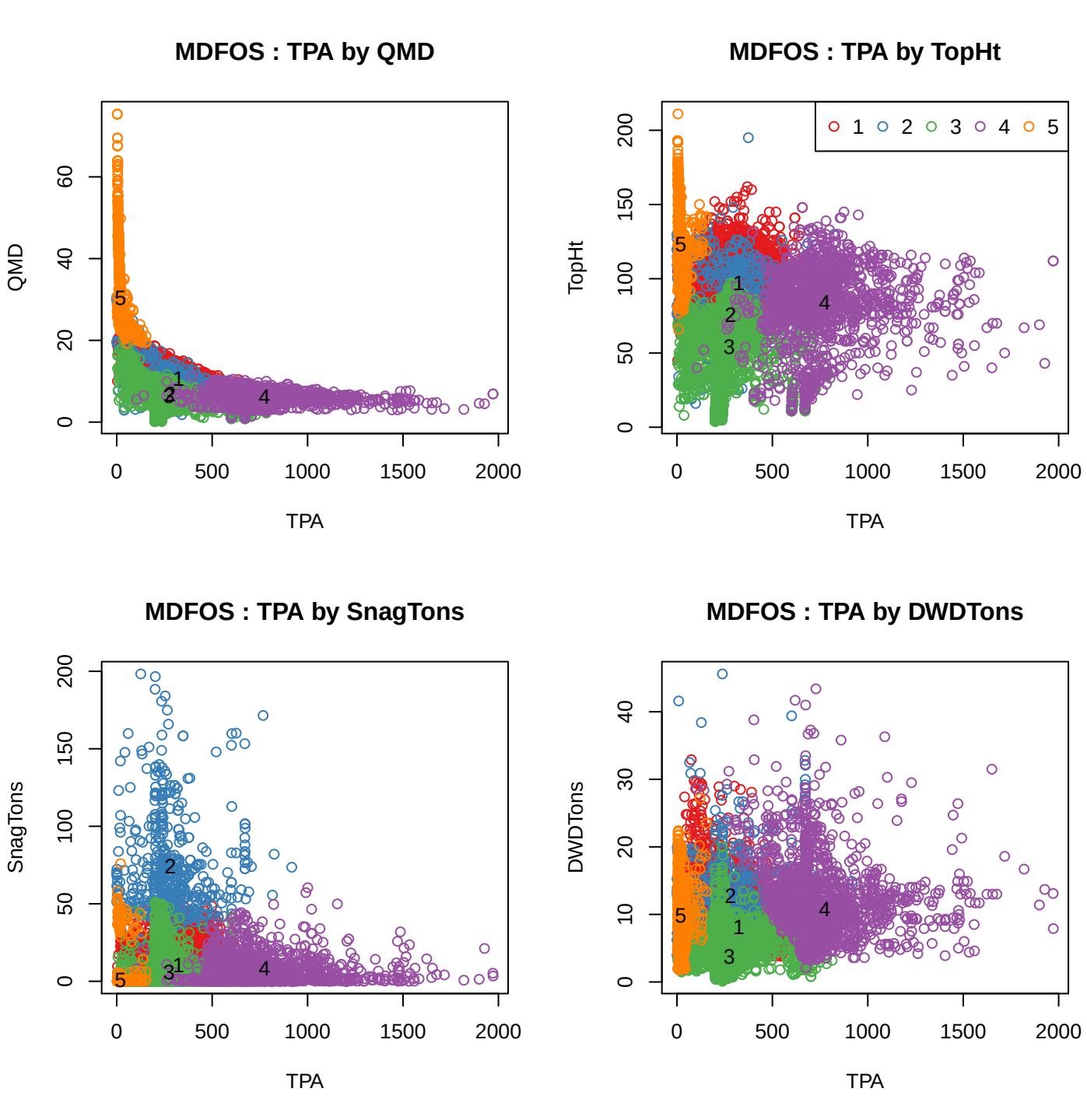
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TPA
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MDFOS : TPA by TopHt
TopHt
TPA
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MDFOS : TPA by SnagTons
SnagTons
TPA
MDFOS : TPA by DWDTons
DWDTons
TPA
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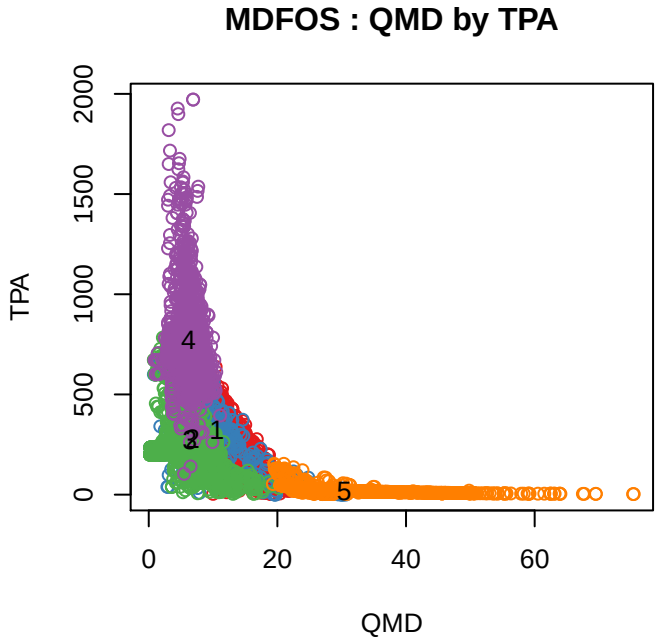
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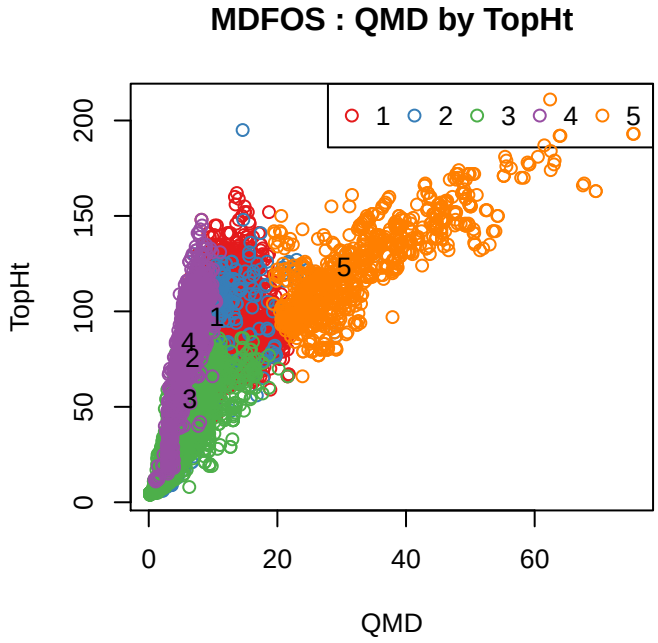
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QMD
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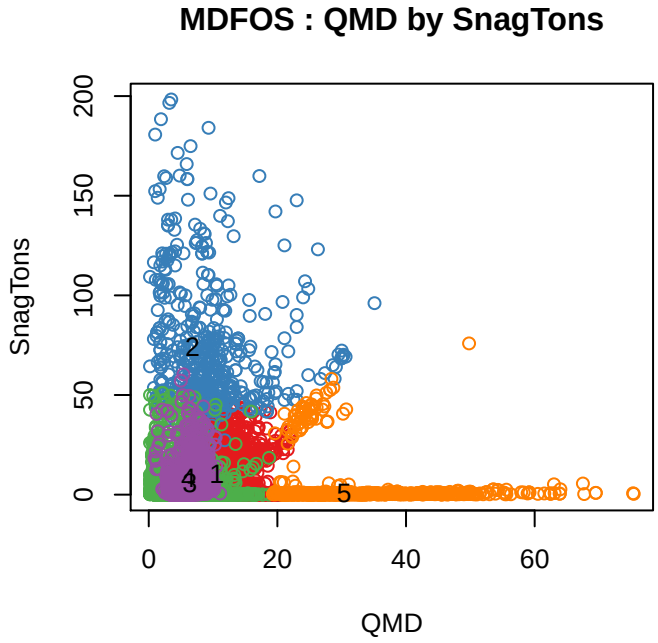
MDFOS : QMD by SnagTons
SnagTons
QMD
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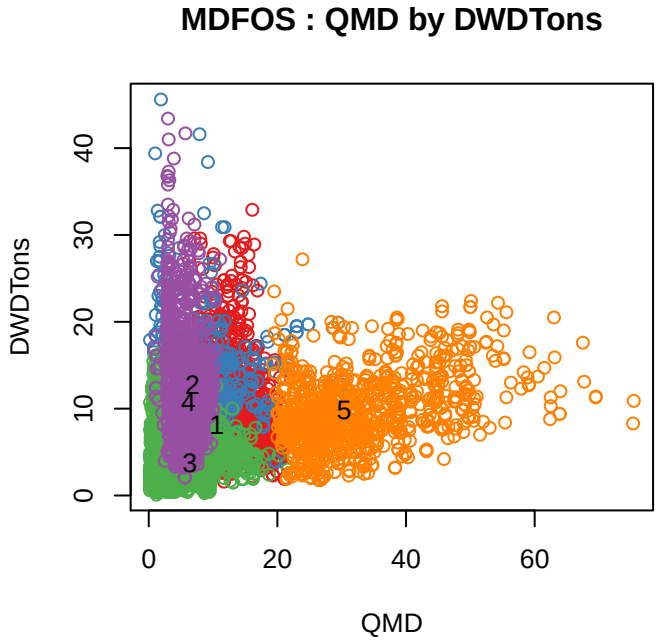
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DWDTons
QMD
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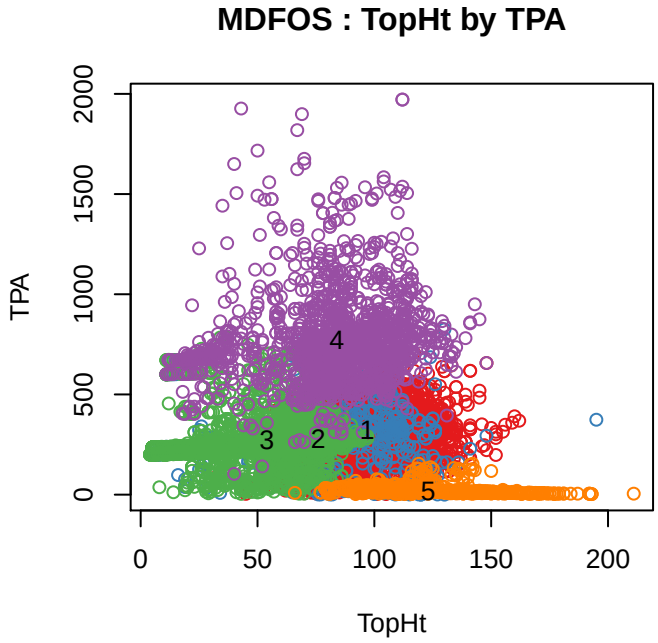
MDFOS : TopHt by TPA
TPA
TopHt
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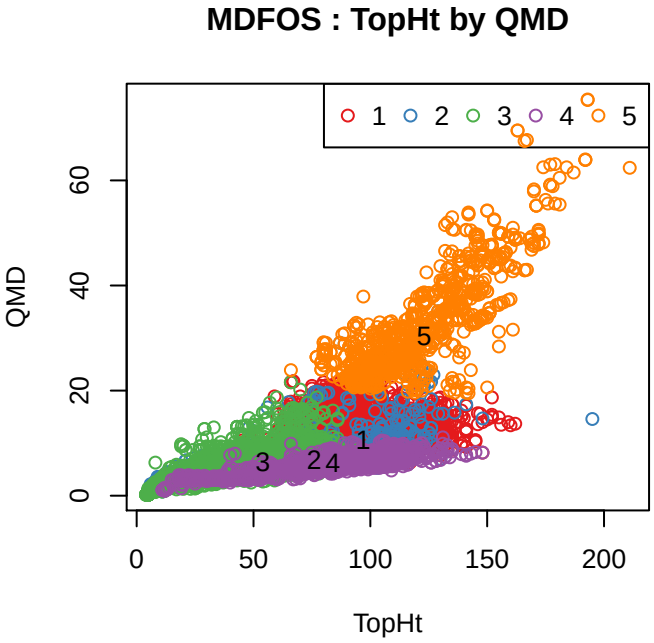
MDFOS : TopHt by QMD
QMD
TopHt
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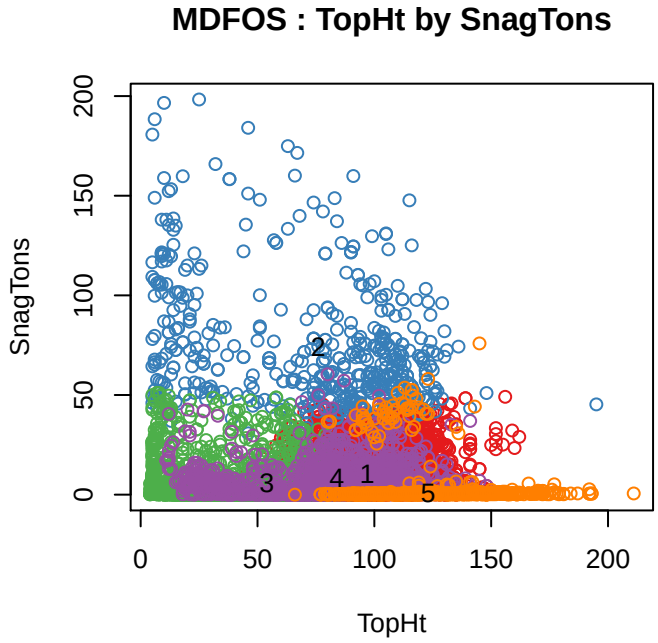
MDFOS : TopHt by SnagTons
SnagTons
TopHt
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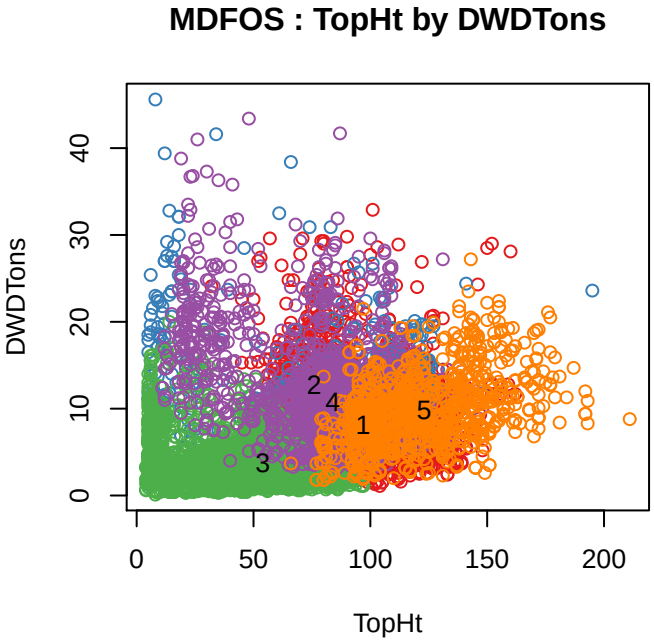
MDFOS : TopHt by DWDTons
DWDTons
TopHt
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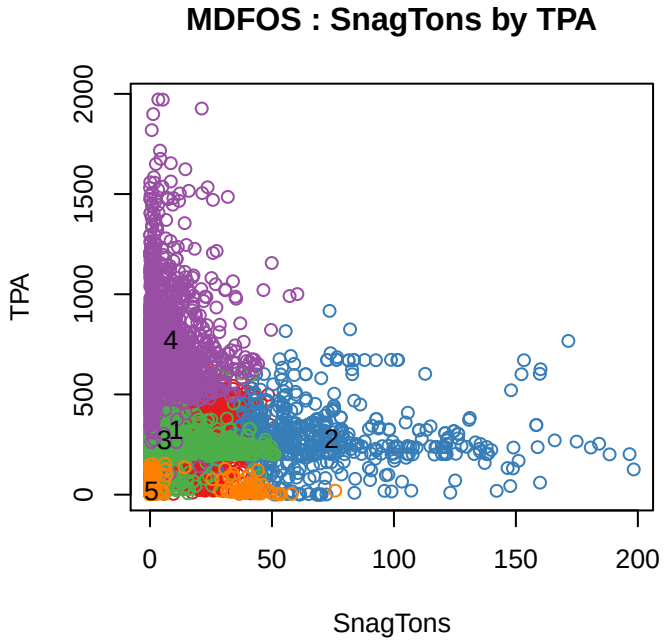
MDFOS : SnagTons by TPA
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SnagTons
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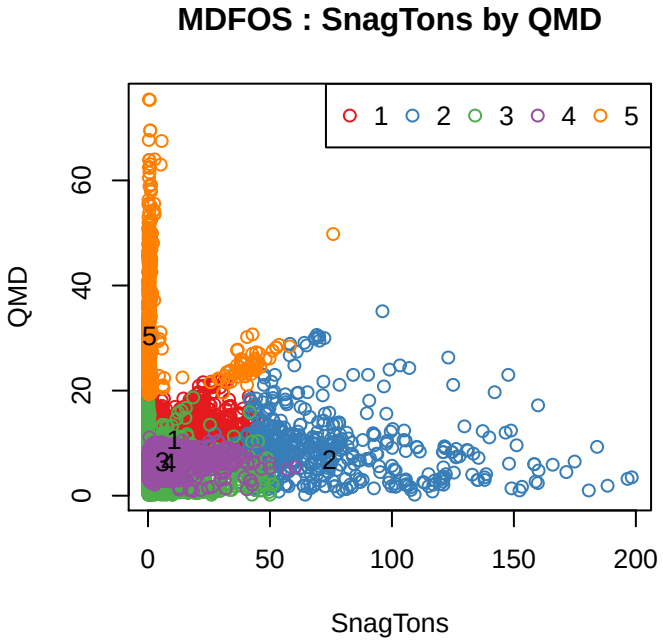
MDFOS : SnagTons by QMD
QMD
SnagTons
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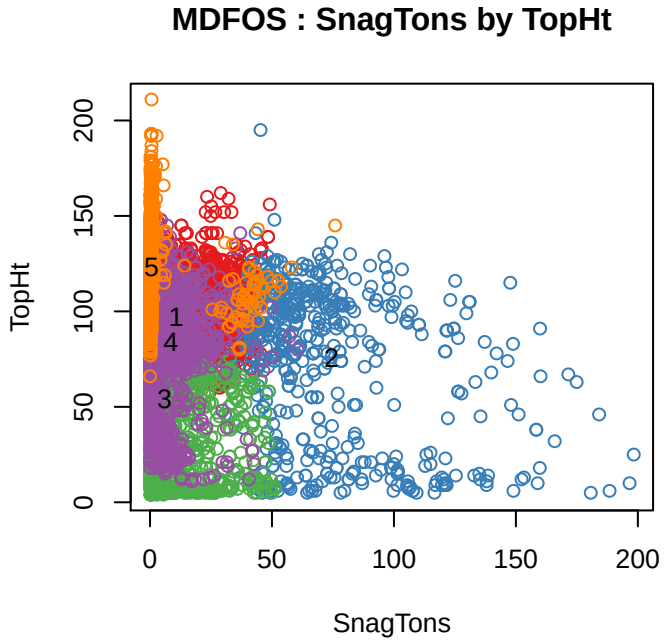
MDFOS : SnagTons by TopHt
TopHt
SnagTons
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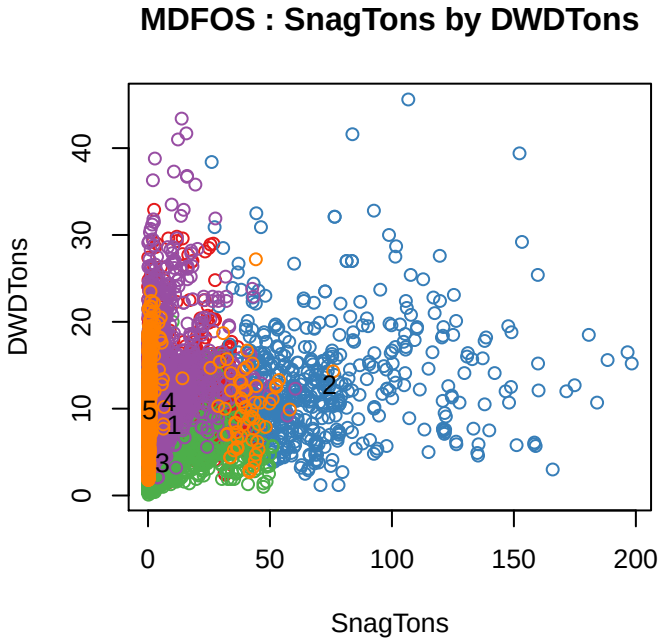
MDFOS : SnagTons by DWDTons
DWDTons
SnagTons
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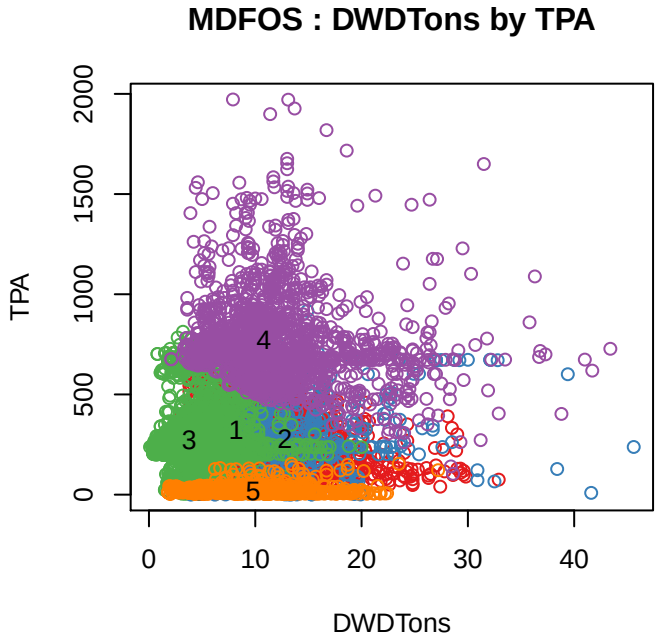
MDFOS : DWDTons by TPA
TPA
DWDTons
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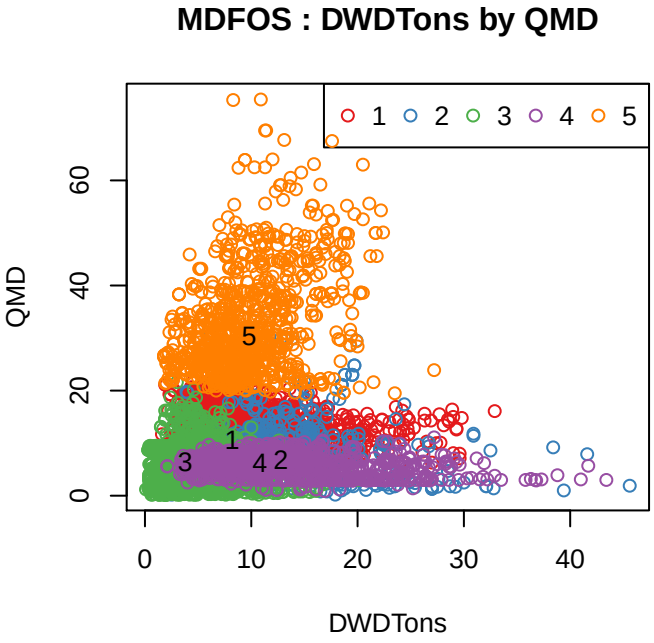
MDFOS : DWDTons by QMD
QMD
DWDTons
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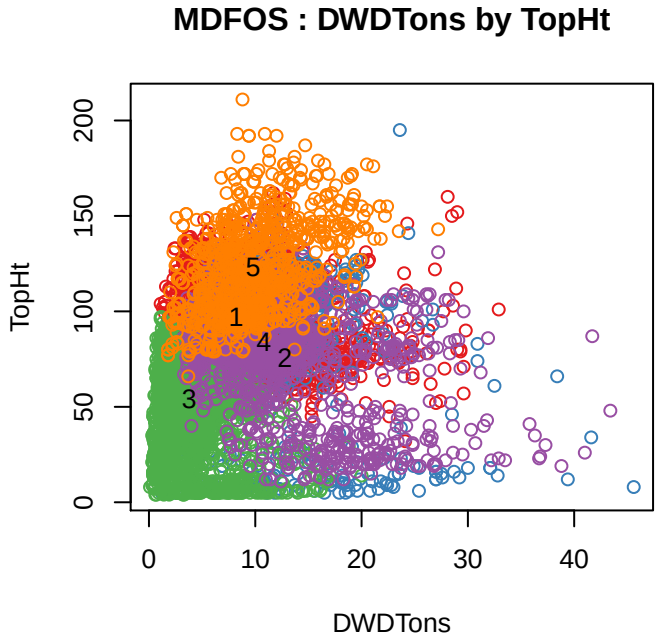
MDFOS : DWDTons by TopHt
TopHt
DWDTons
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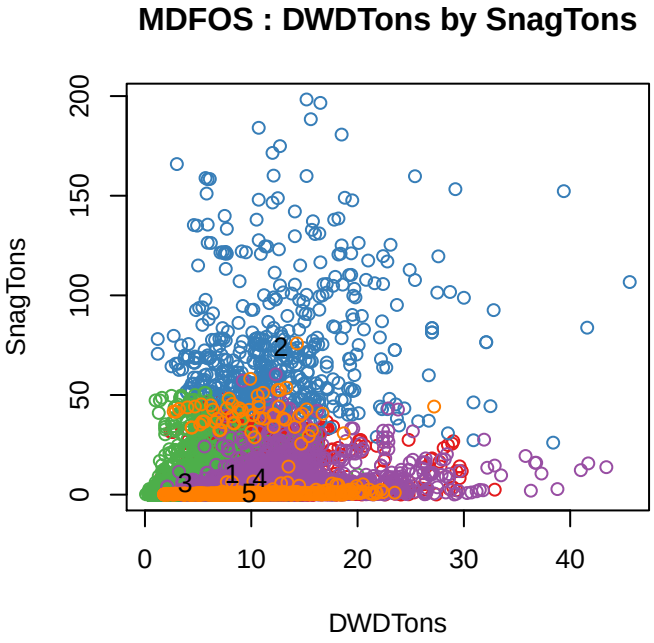
MDFOS : DWDTons by SnagTons
SnagTons
DWDTons
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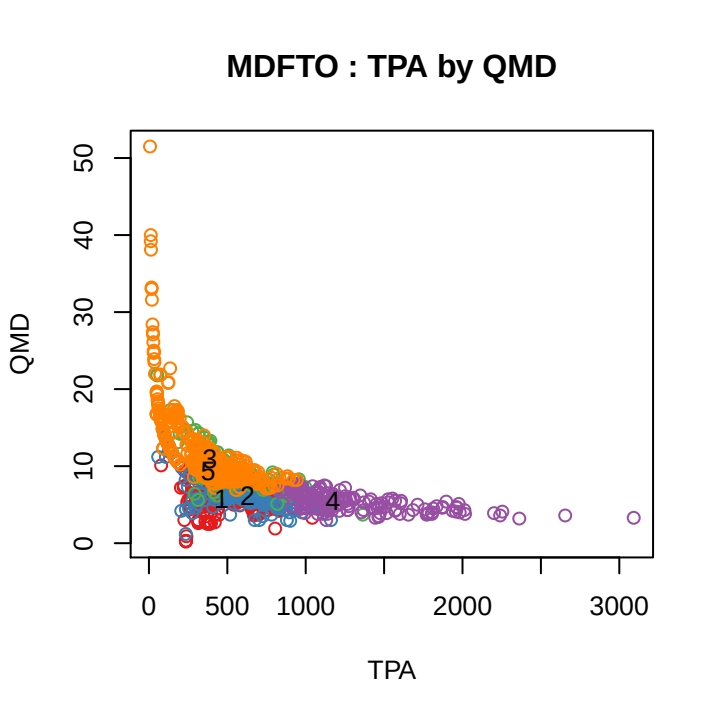
MDFTO : TPA by QMD
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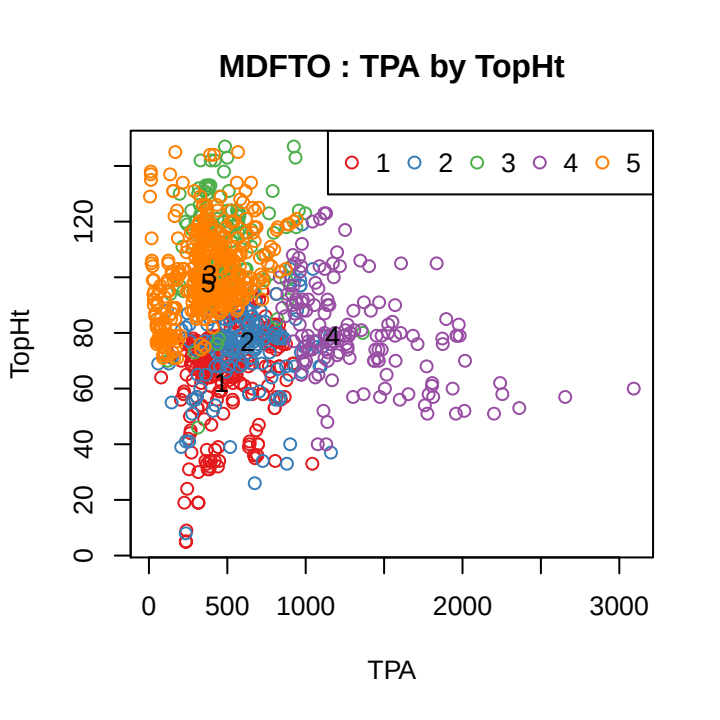
MDFTO : TPA by TopHt
TopHt
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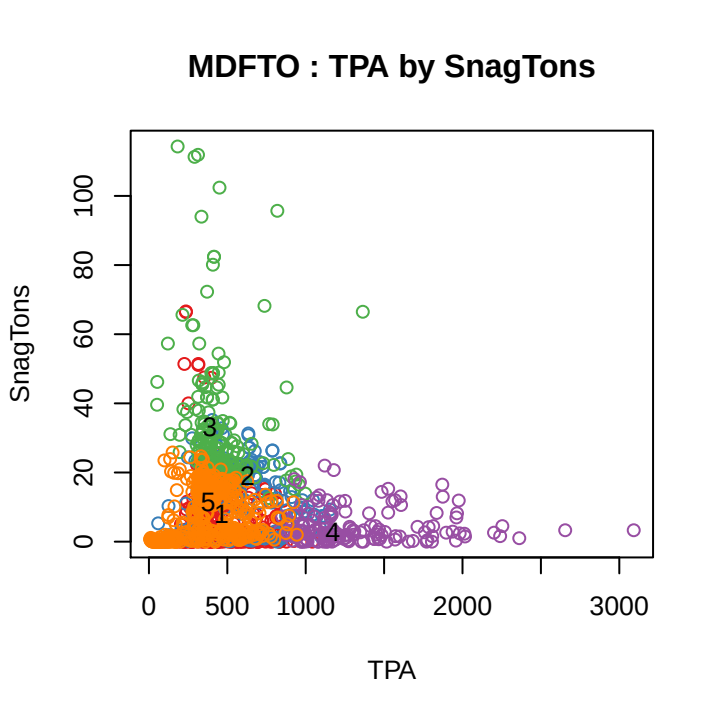
MDFTO : TPA by SnagTons
SnagTons
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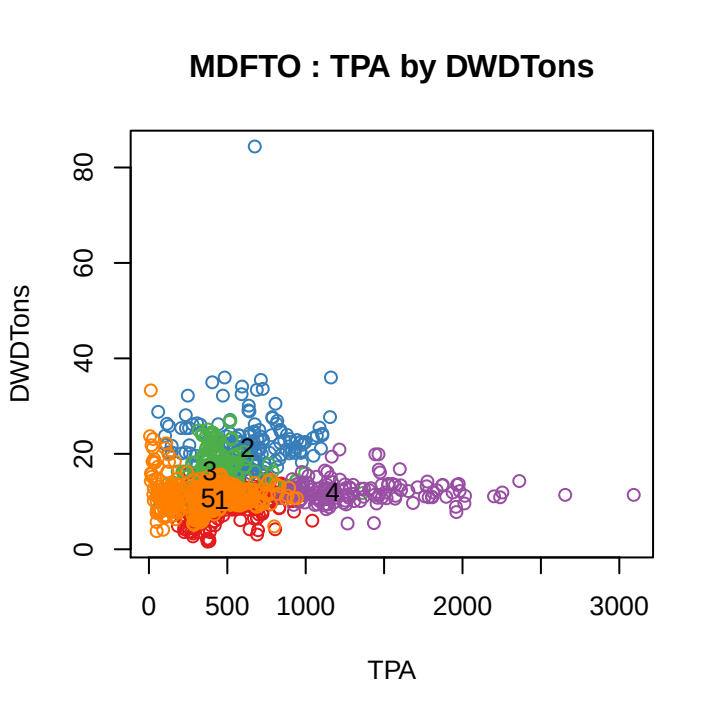
MDFTO : TPA by DWDTons
DWDTons
TPA
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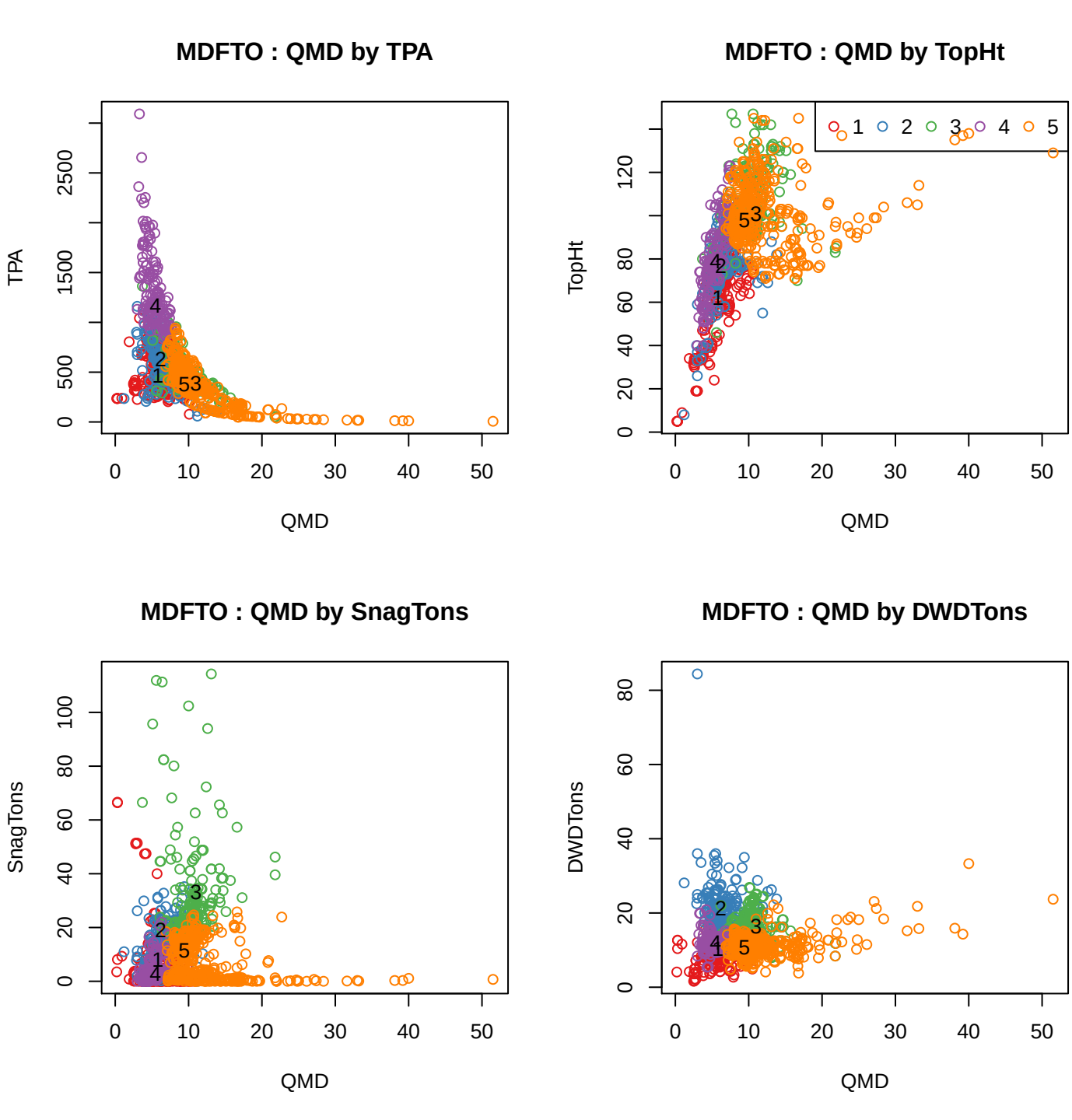
MDFTO : QMD by TPA
TPA
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MDFTO : QMD by TopHt
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MDFTO : QMD by SnagTons
SnagTons
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MDFTO : QMD by DWDTons
DWDTons
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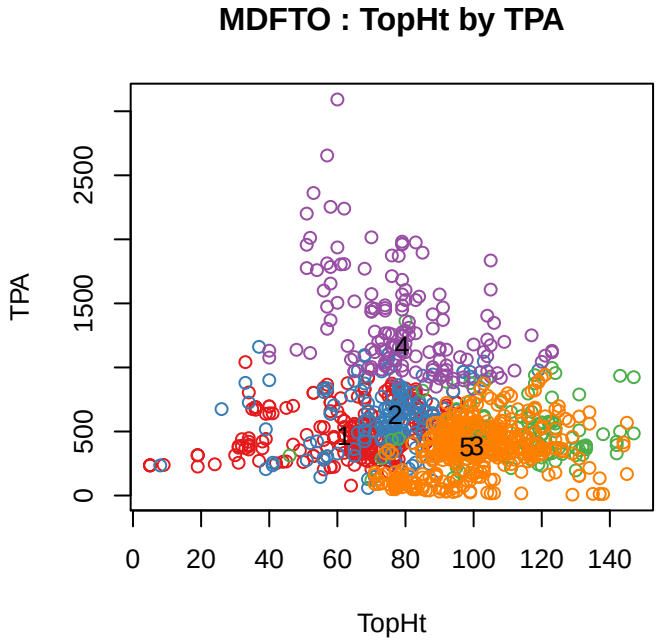
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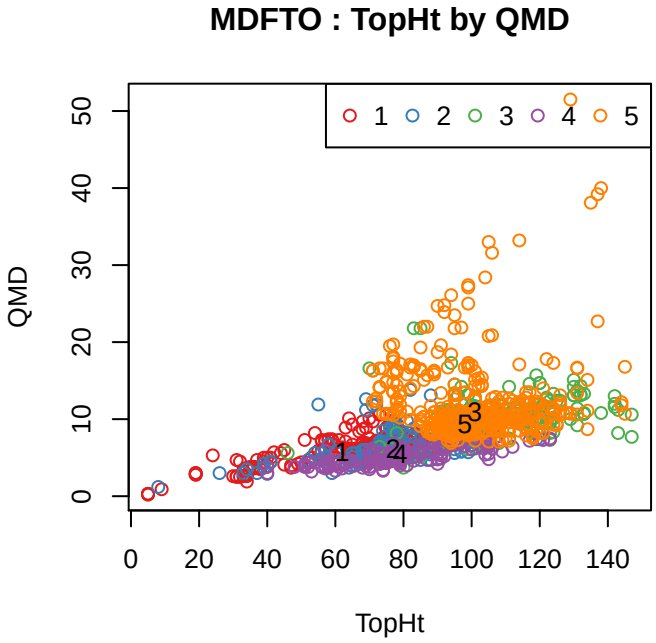
TopHt


MDFTO : TopHt by QMD
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QMD
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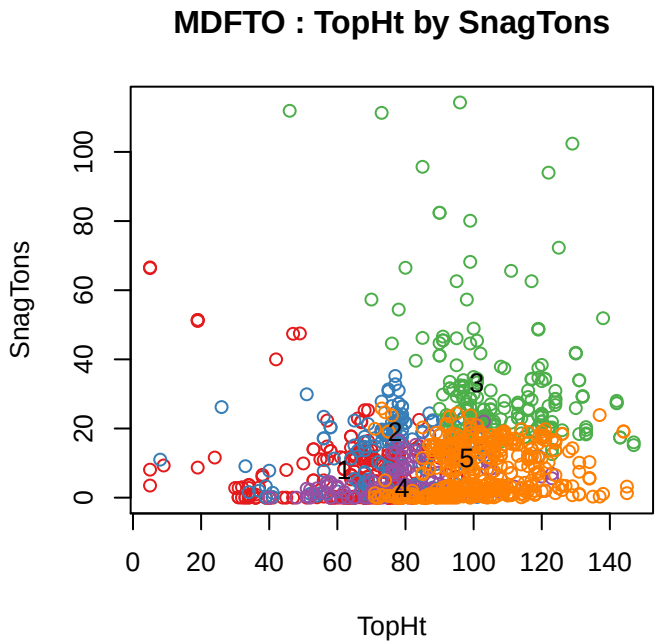
TopHt


MDFTO : TopHt by SnagTons
SnagTons
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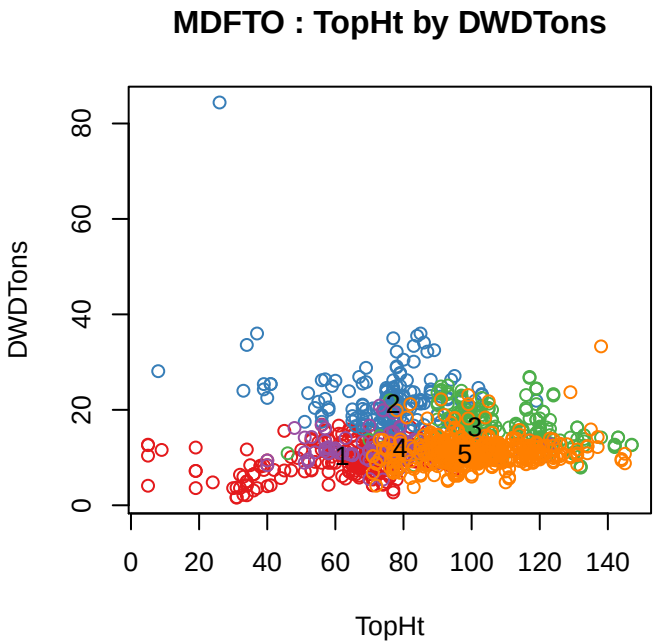
TopHt


MDFTO : TopHt by DWDTons
DWDTons
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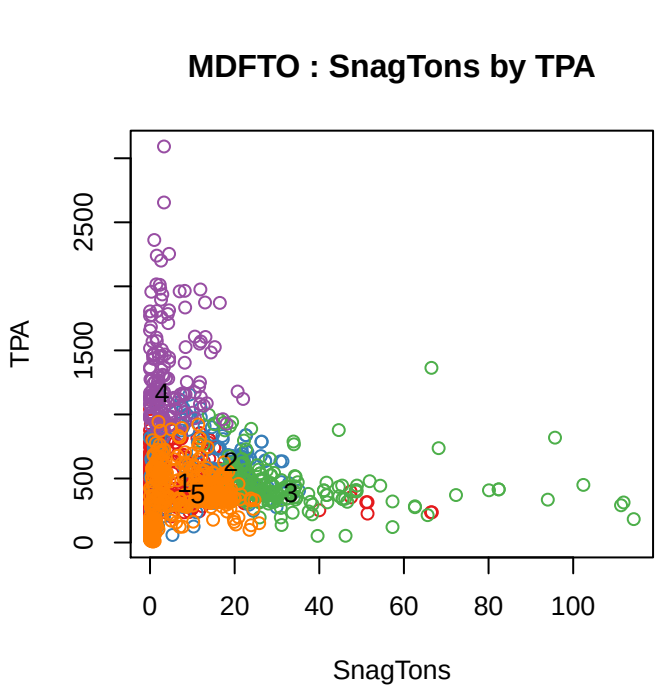
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SnagTons
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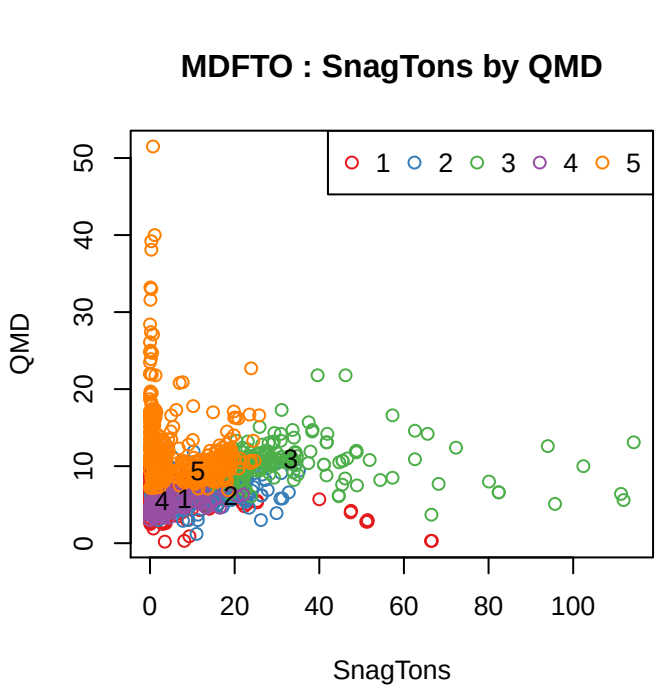
MDFTO : SnagTons by QMD
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SnagTons
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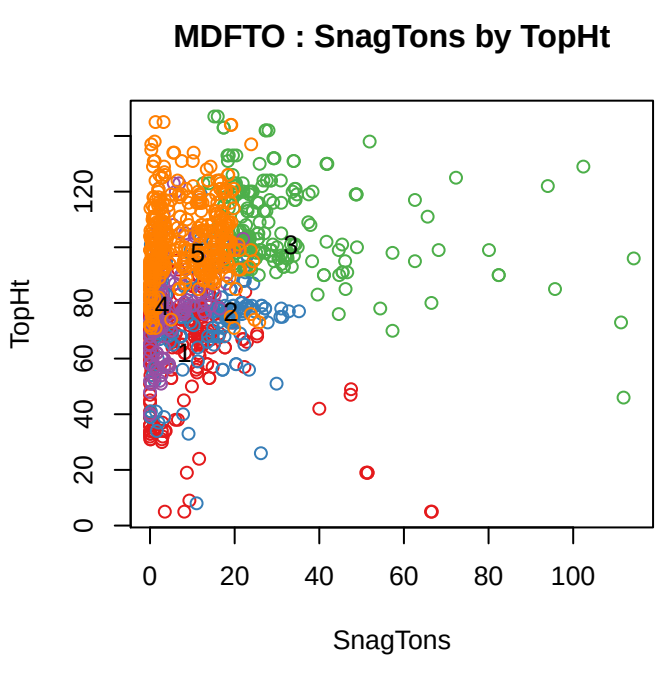
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SnagTons
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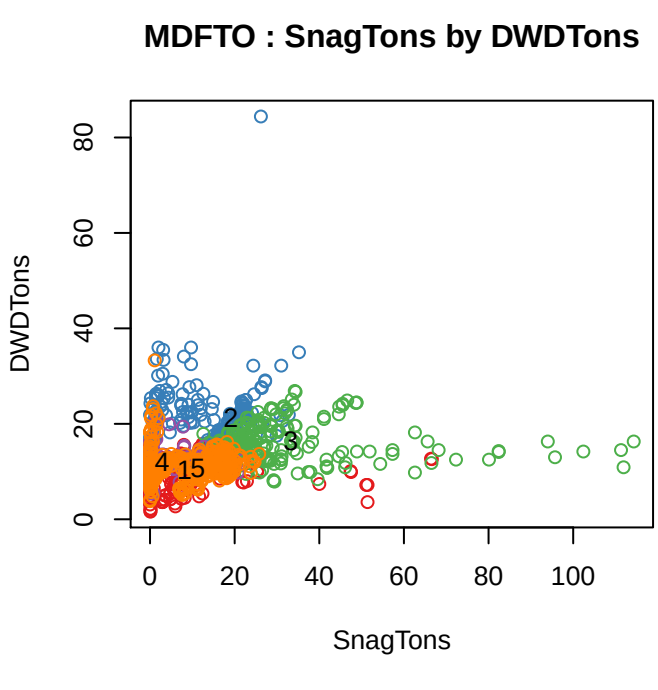
MDFTO : SnagTons by DWDTons
DWDTons
SnagTons
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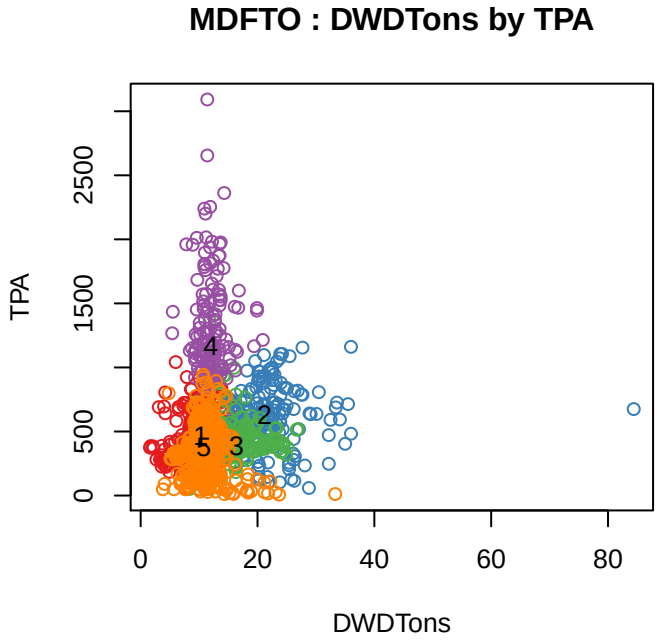
MDFTO : DWDTons by TPA
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DWDTons
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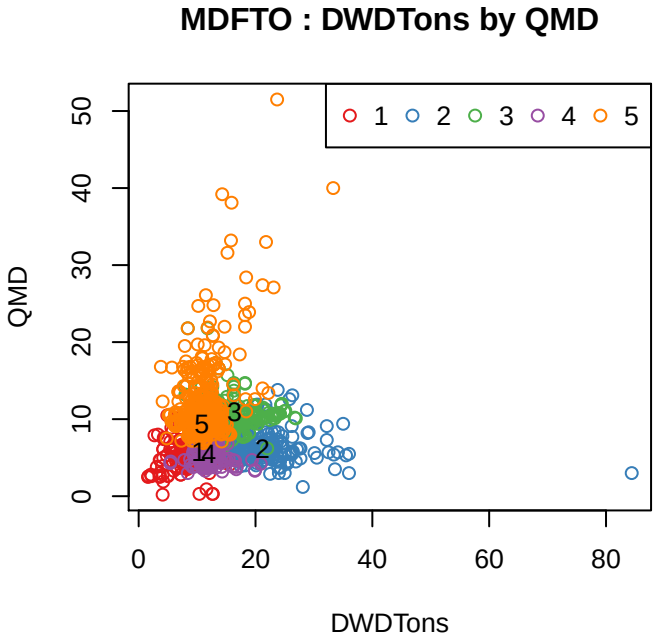
MDFTO : DWDTons by QMD
QMD
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DWDTons
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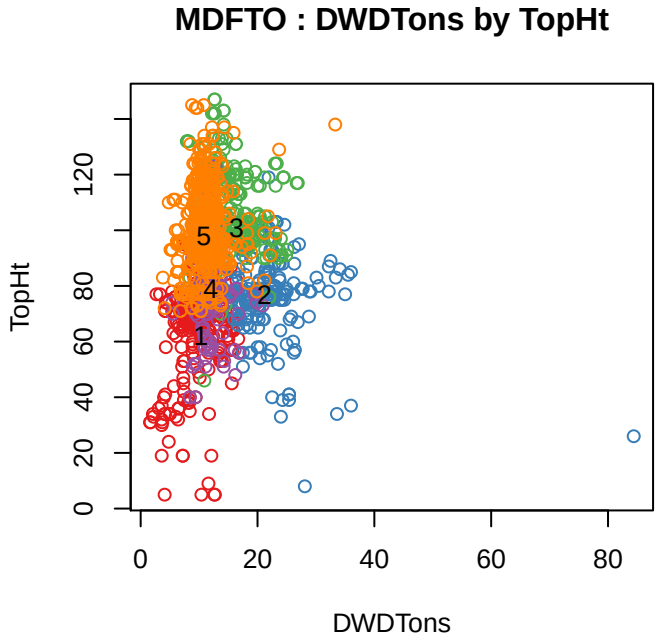
MDFTO : DWDTons by TopHt
TopHt
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DWDTons
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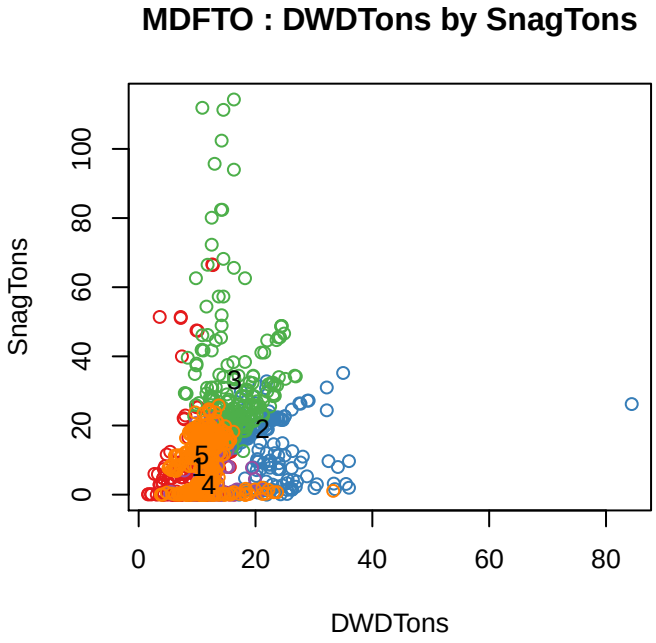
MDFTO : DWDTons by SnagTons
SnagTons
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DWDTons
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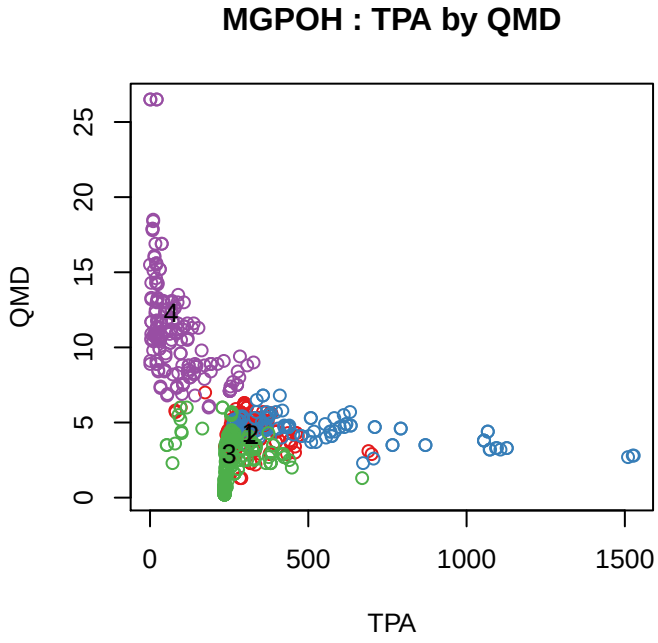
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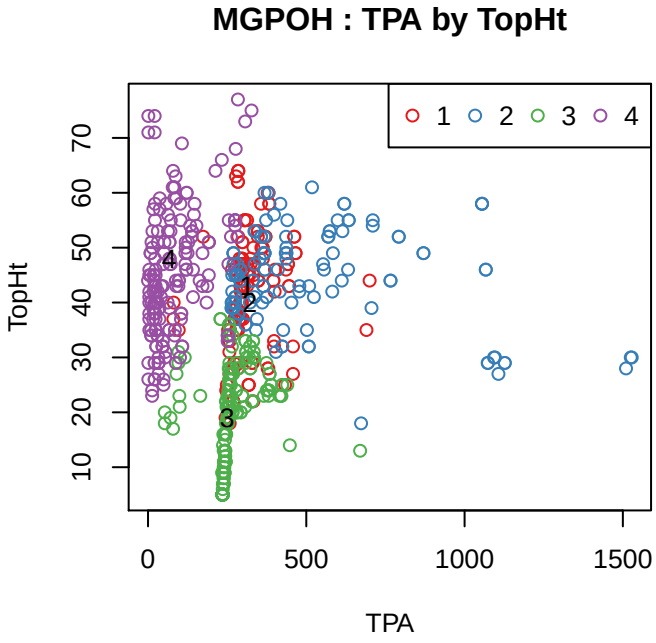
MGPOH : TPA by TopHt
TopHt
TPA
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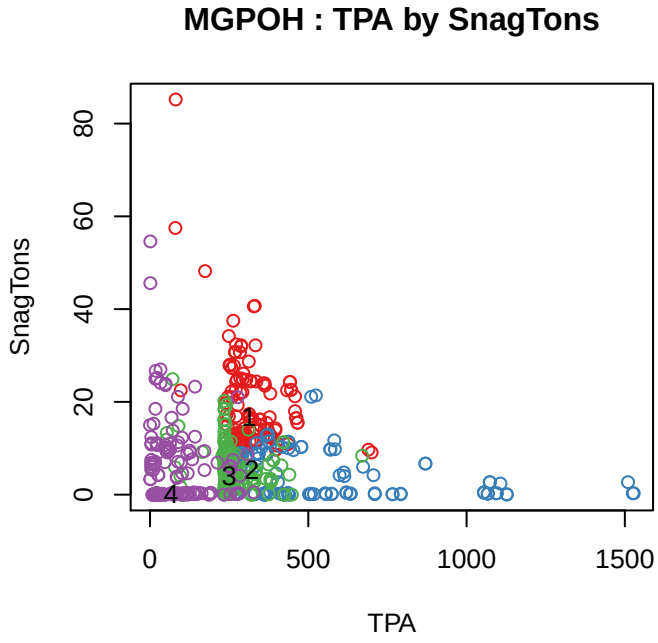
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TPA
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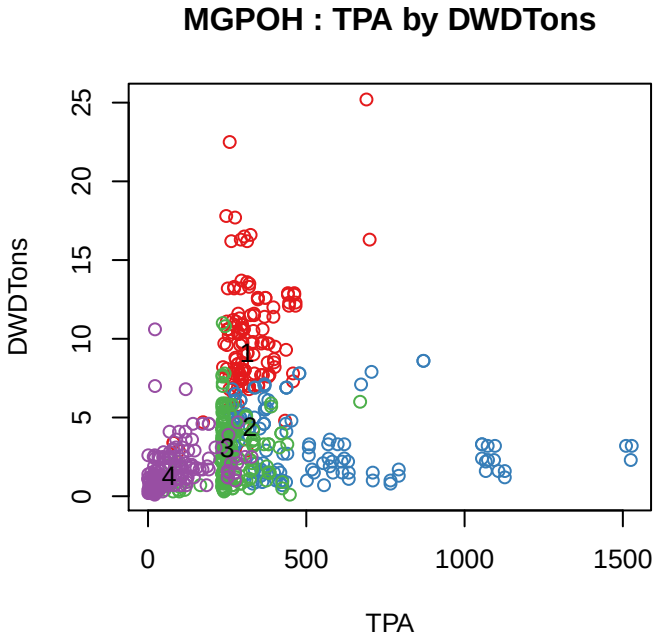
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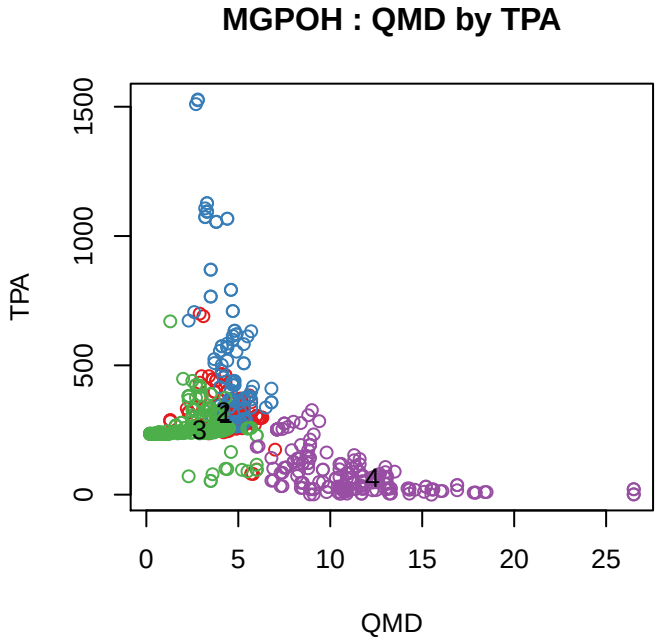
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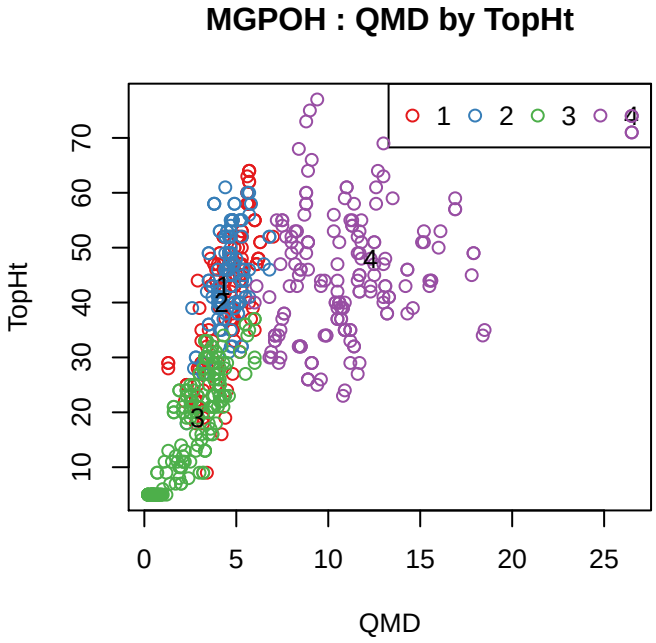
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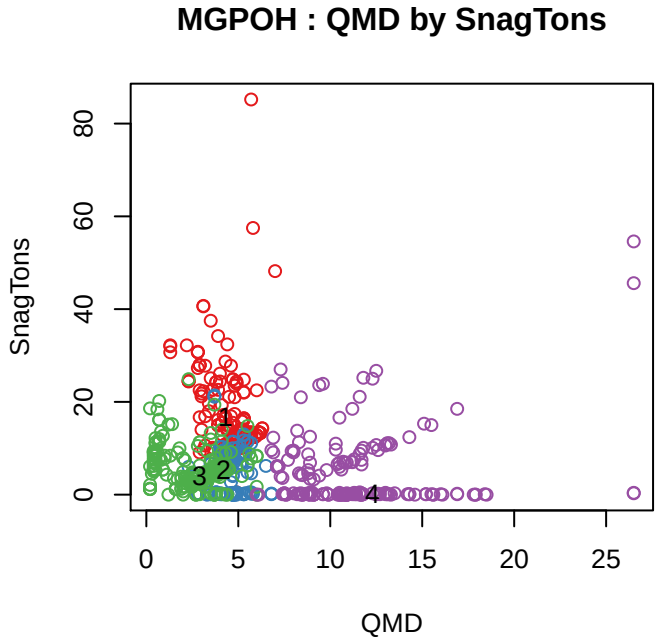
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QMD
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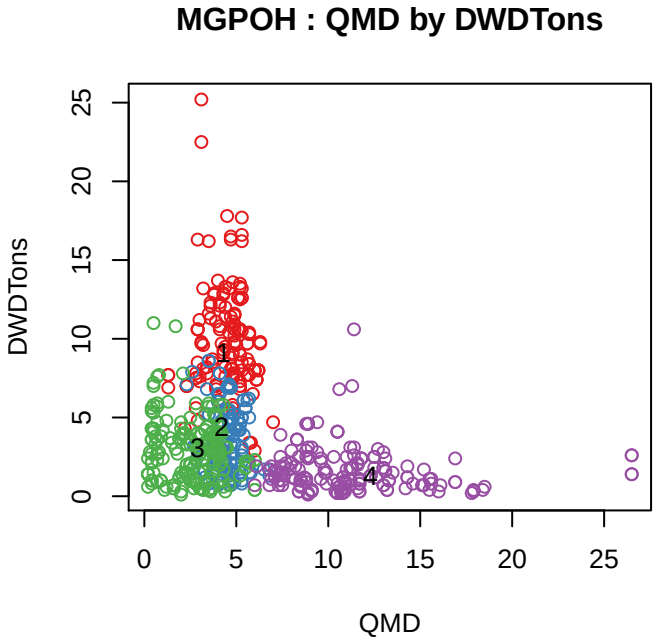
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DWDTons
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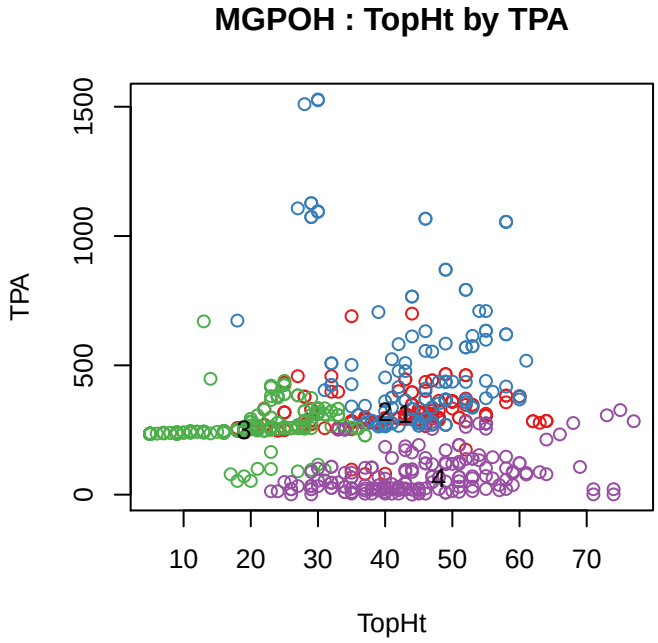
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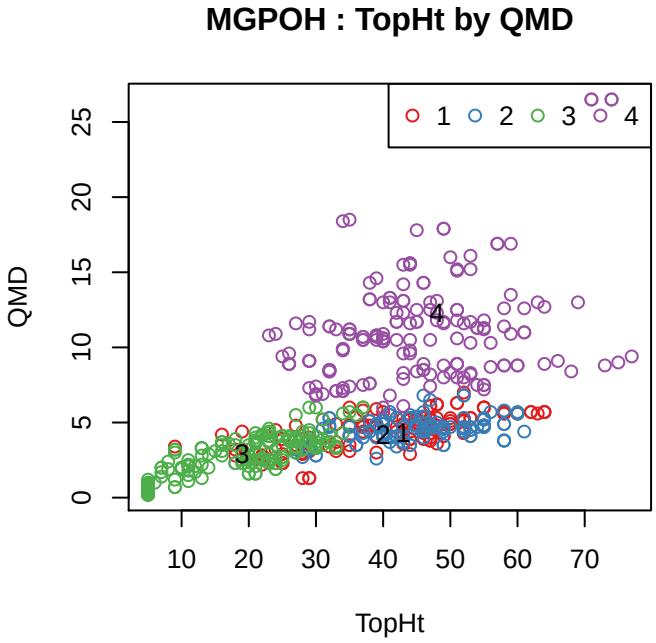
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QMD
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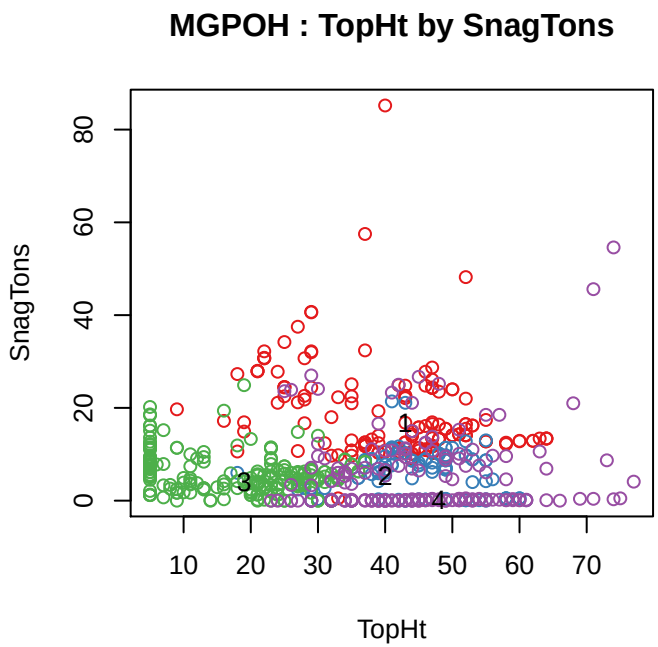
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SnagTons
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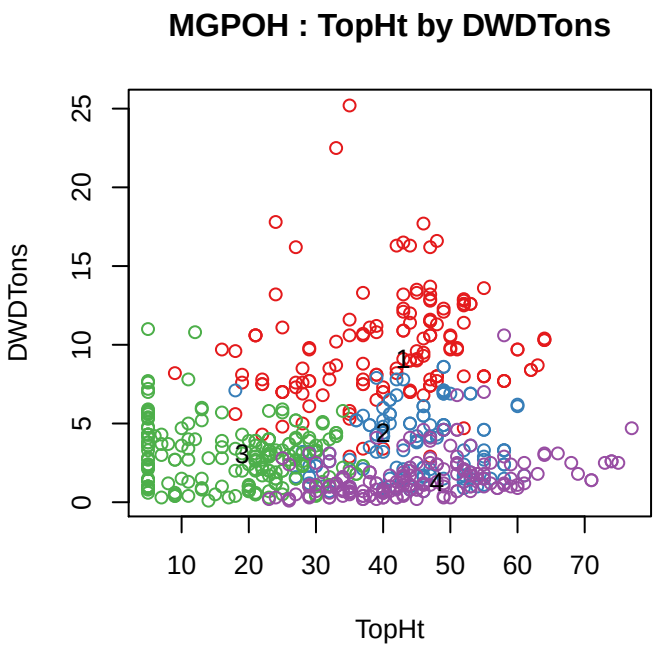
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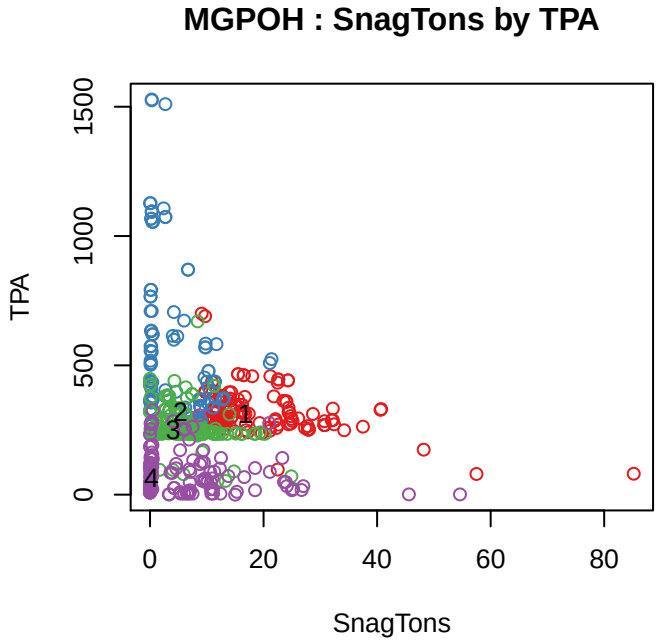
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TPA
SnagTons
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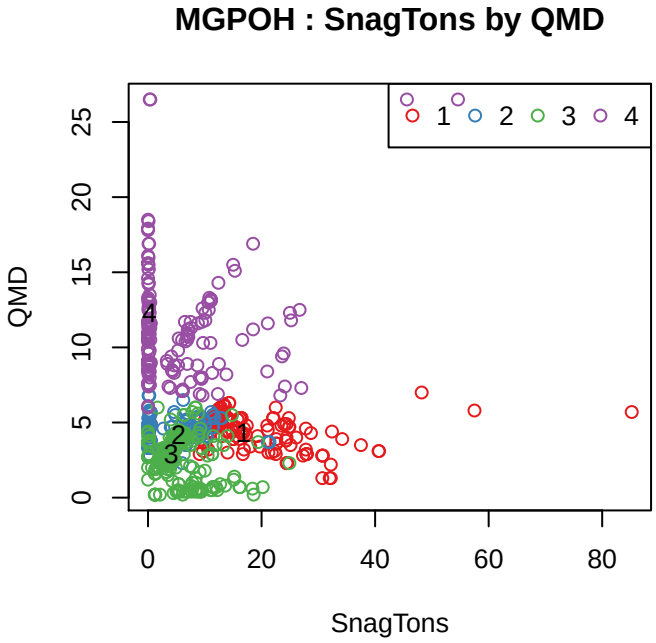
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SnagTons
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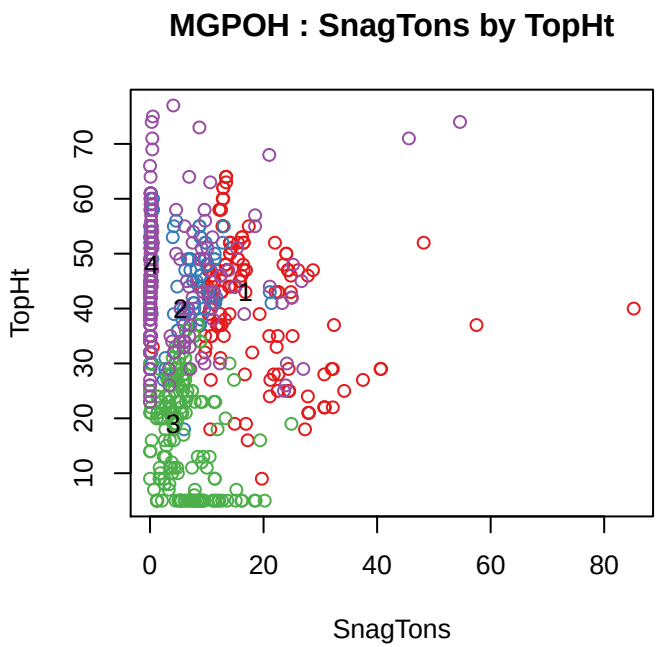
MGPOH : SnagTons by TopHt
TopHt
SnagTons
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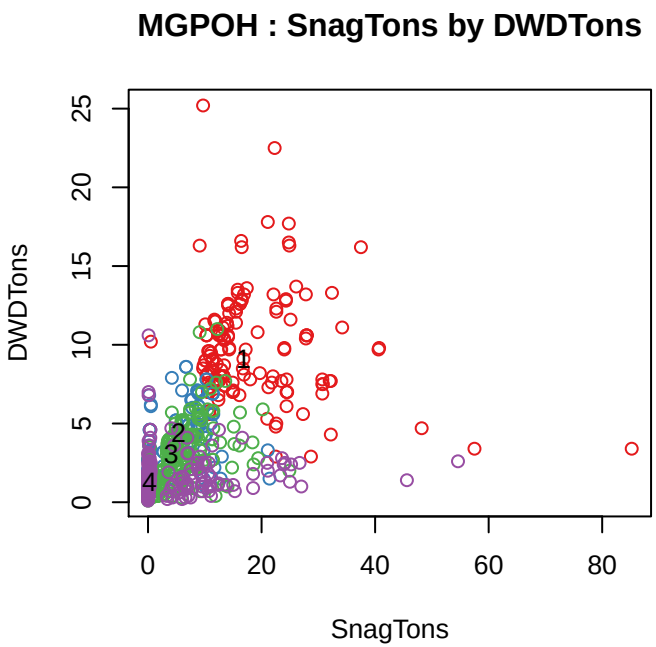
MGPOH : SnagTons by DWDTons
DWDTons
SnagTons
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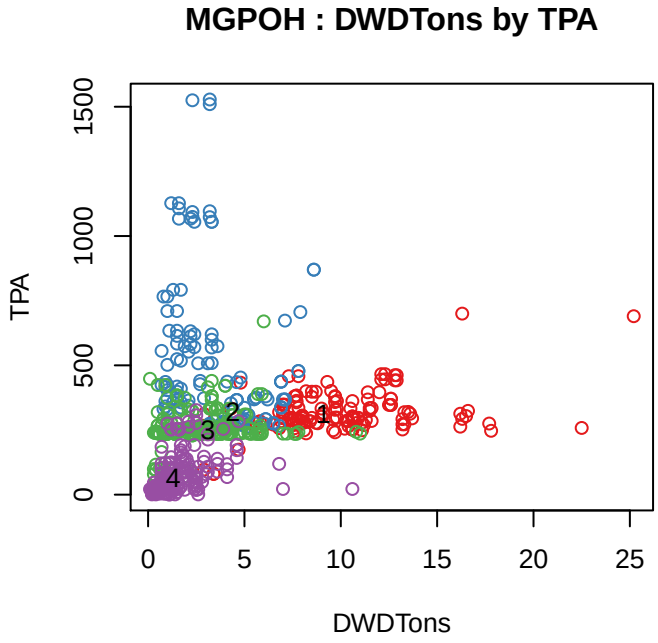
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DWDTons
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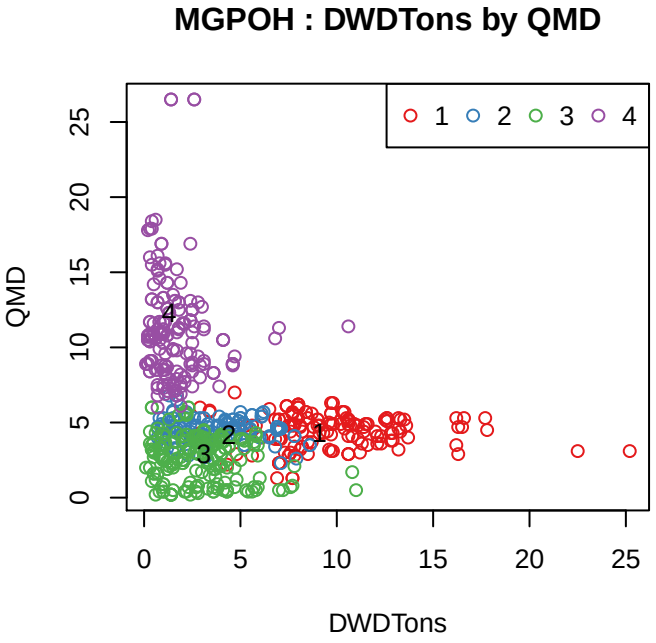
MGPOH : DWDTons by QMD
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DWDTons
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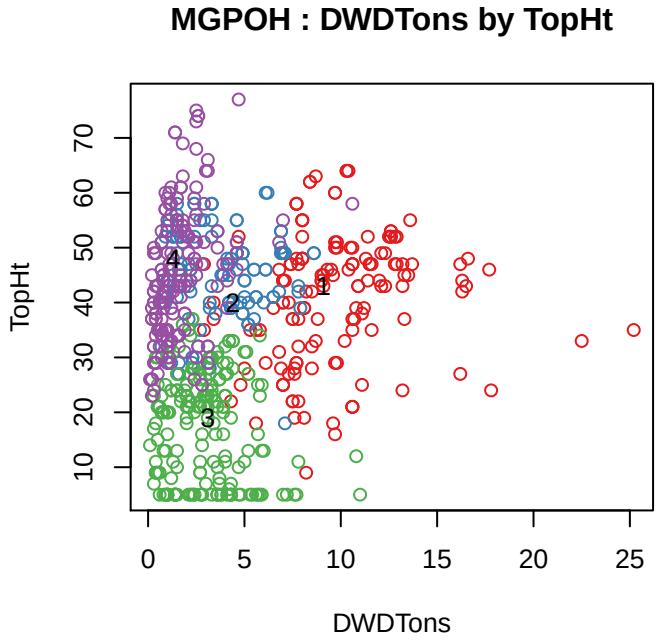
MGPOH : DWDTons by TopHt
TopHt
DWDTons
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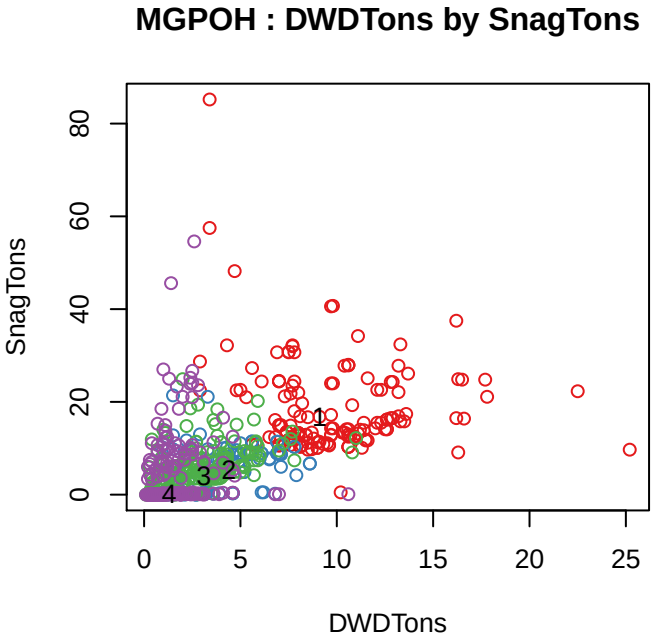
MGPOH : DWDTons by SnagTons
SnagTons
DWDTons
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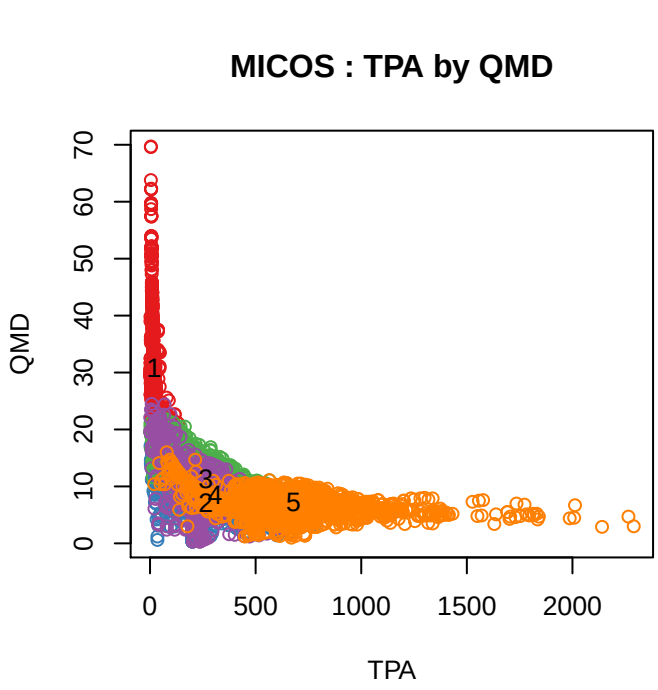
MICOS : TPA by QMD
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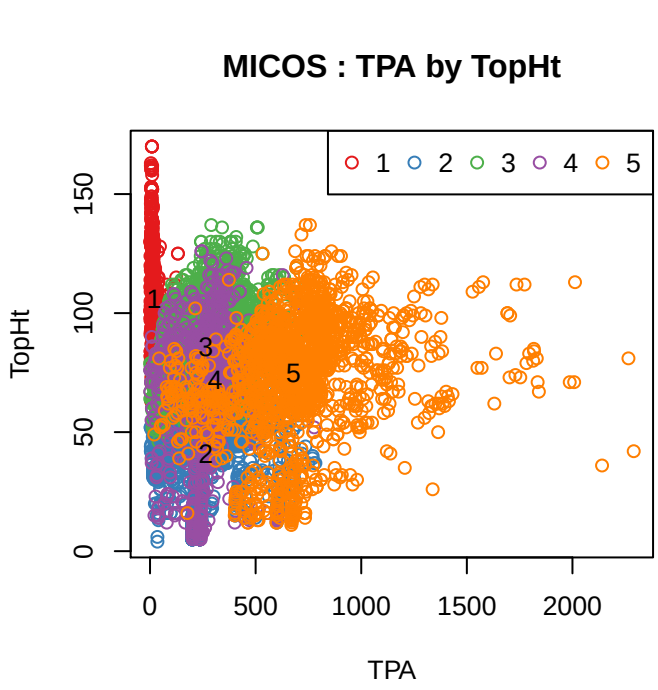
MICOS : TPA by TopHt
TopHt
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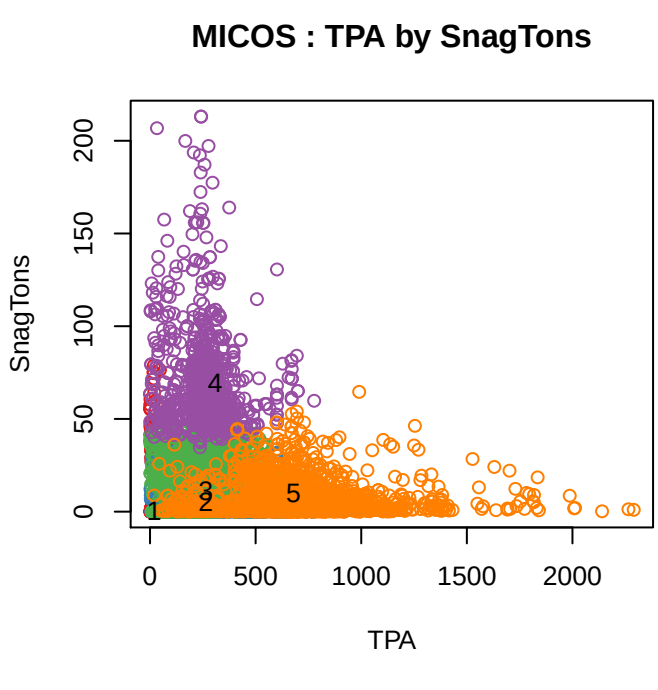
MICOS : TPA by SnagTons
SnagTons
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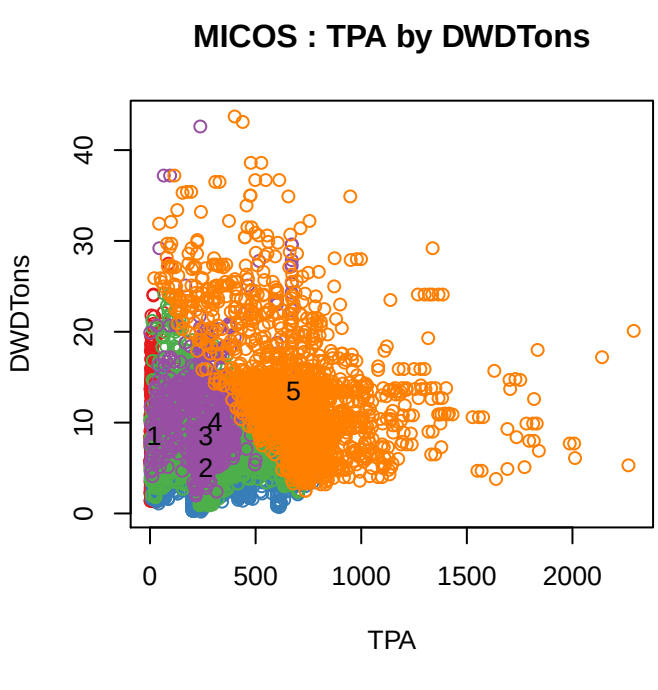
MICOS : TPA by DWDTons
DWDTons
TPA
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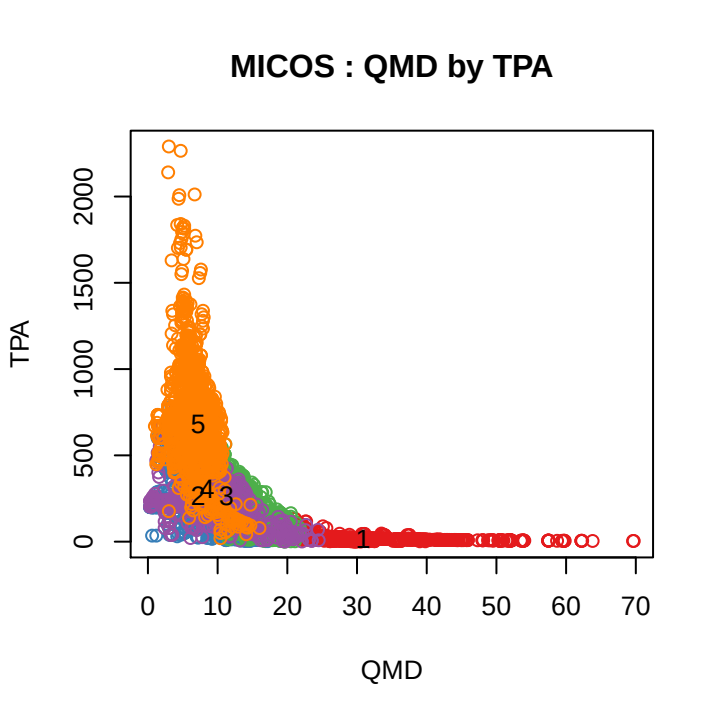
MICOS : QMD by TPA
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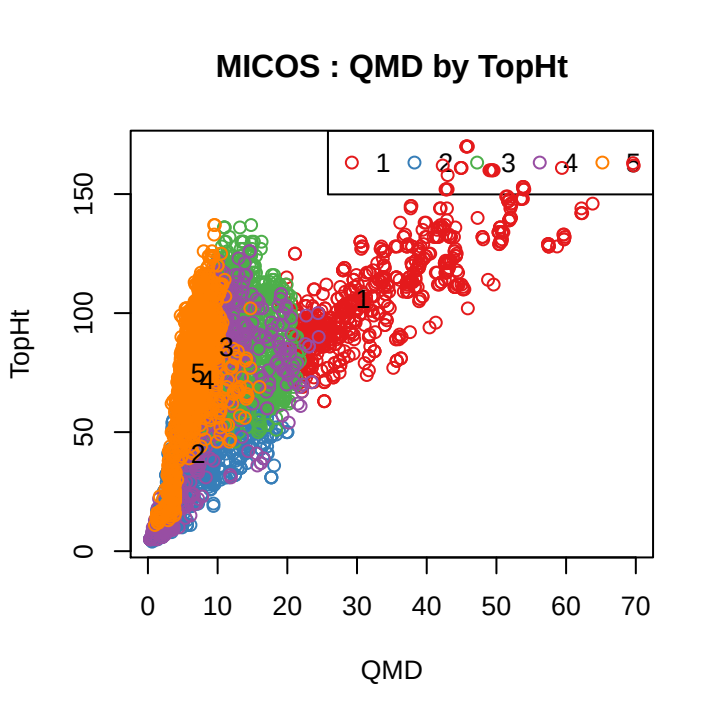
MICOS : QMD by TopHt
TopHt
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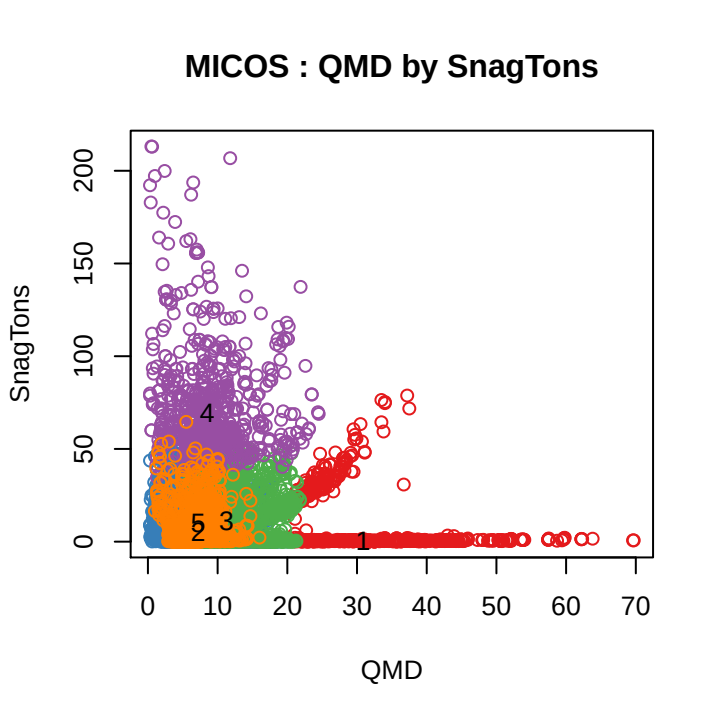
MICOS : QMD by SnagTons
SnagTons
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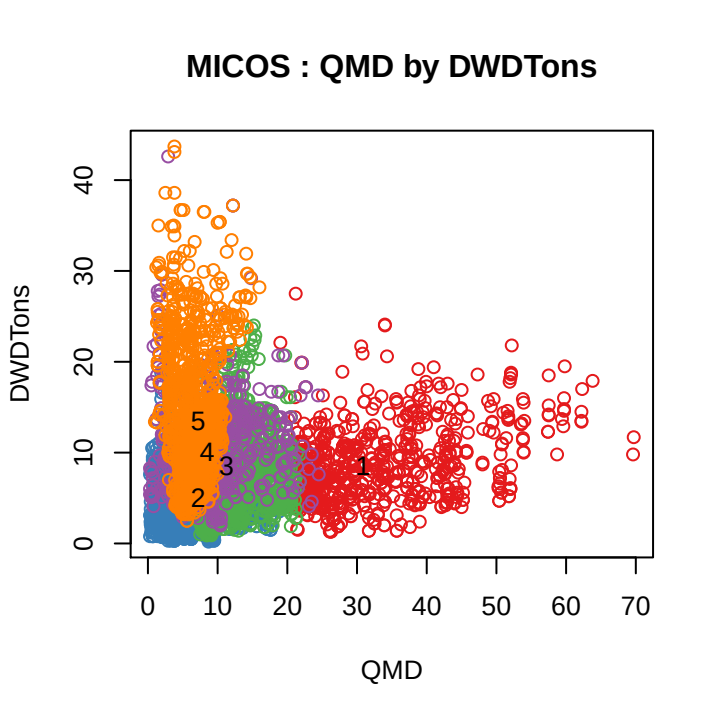
MICOS : QMD by DWDTons
DWDTons
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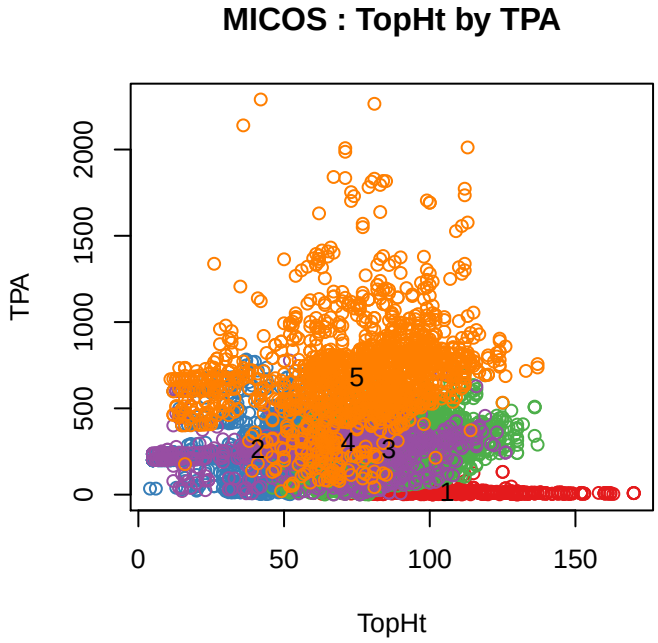
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TopHt
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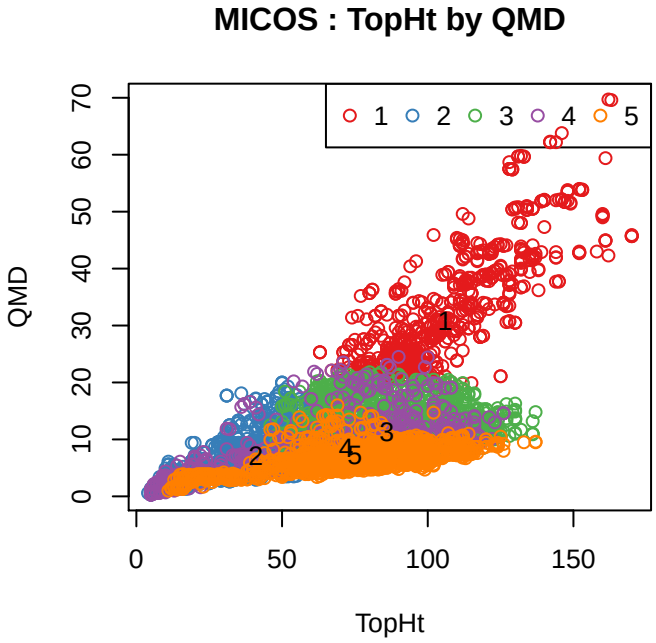
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TopHt
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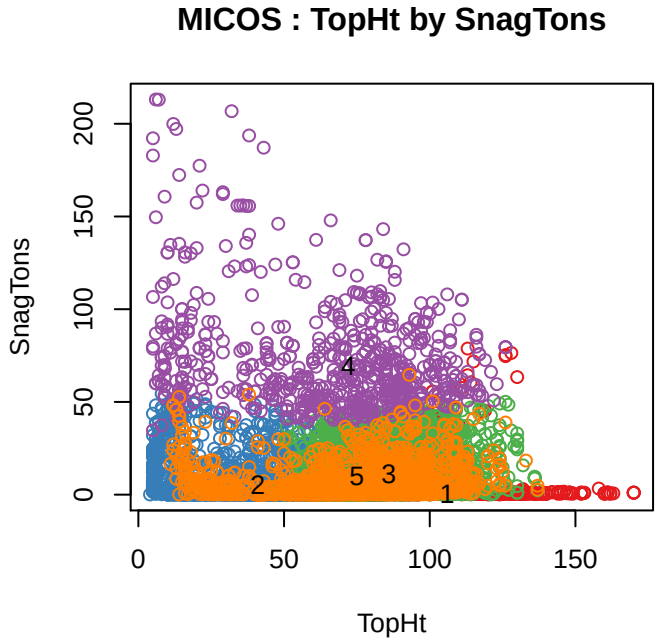
MICOS : TopHt by SnagTons
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TopHt
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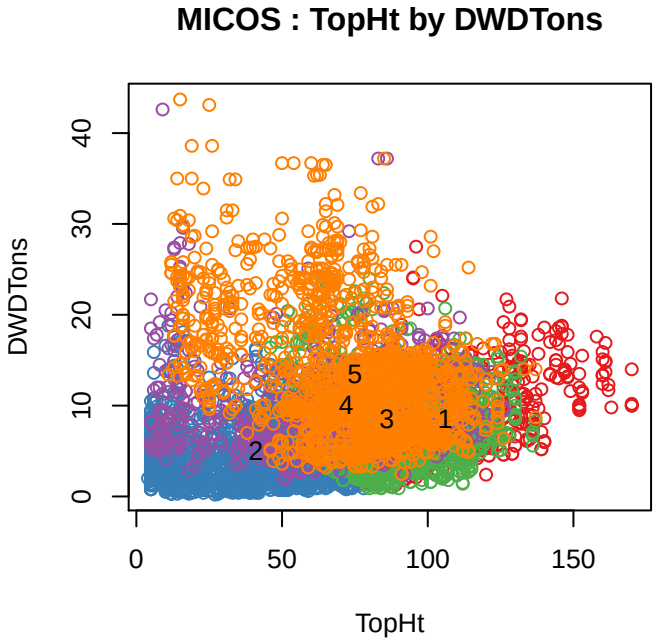
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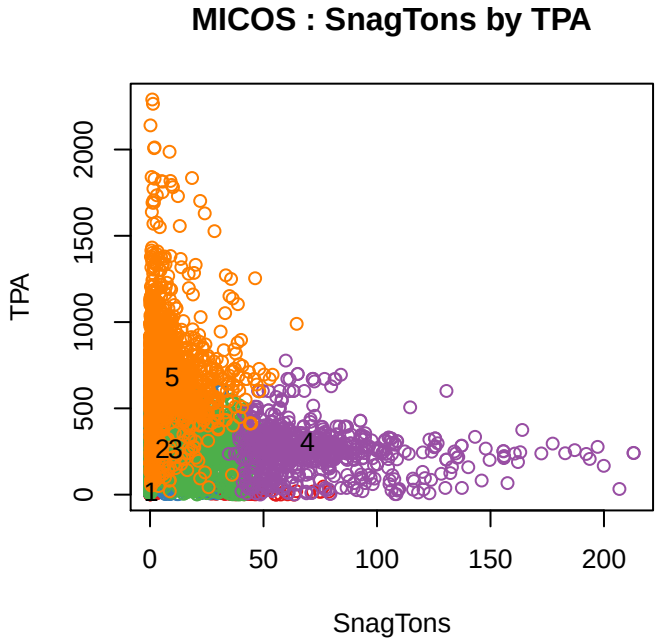
MICOS : SnagTons by TPA
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SnagTons
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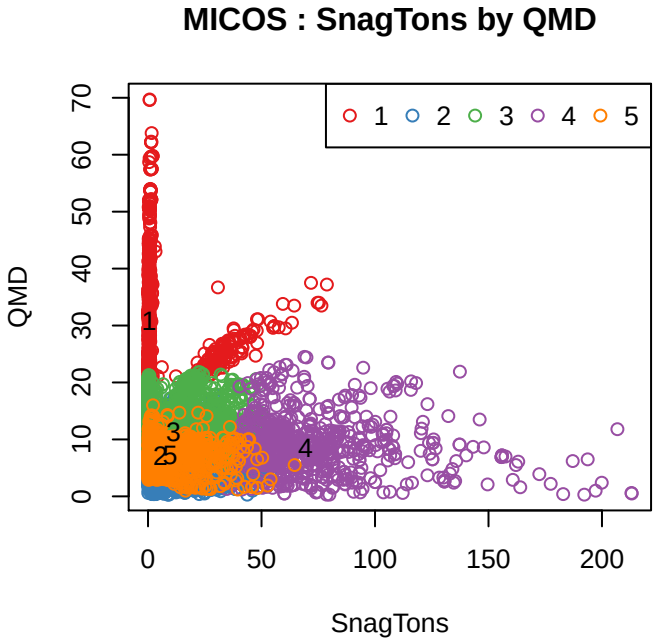
MICOS : SnagTons by QMD
QMD
SnagTons
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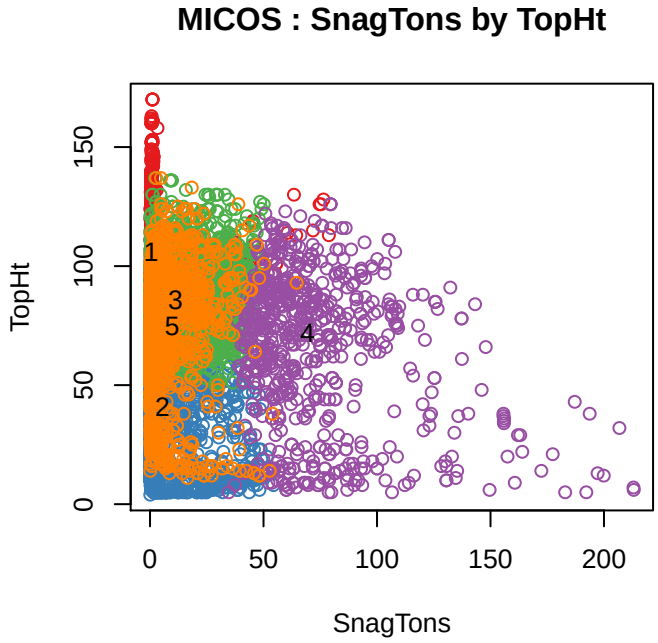
MICOS : SnagTons by TopHt
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SnagTons
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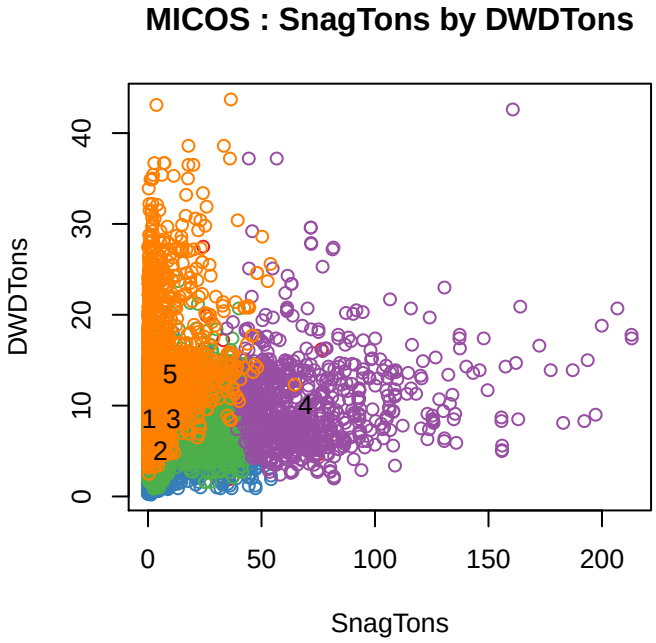
MICOS : SnagTons by DWDTons
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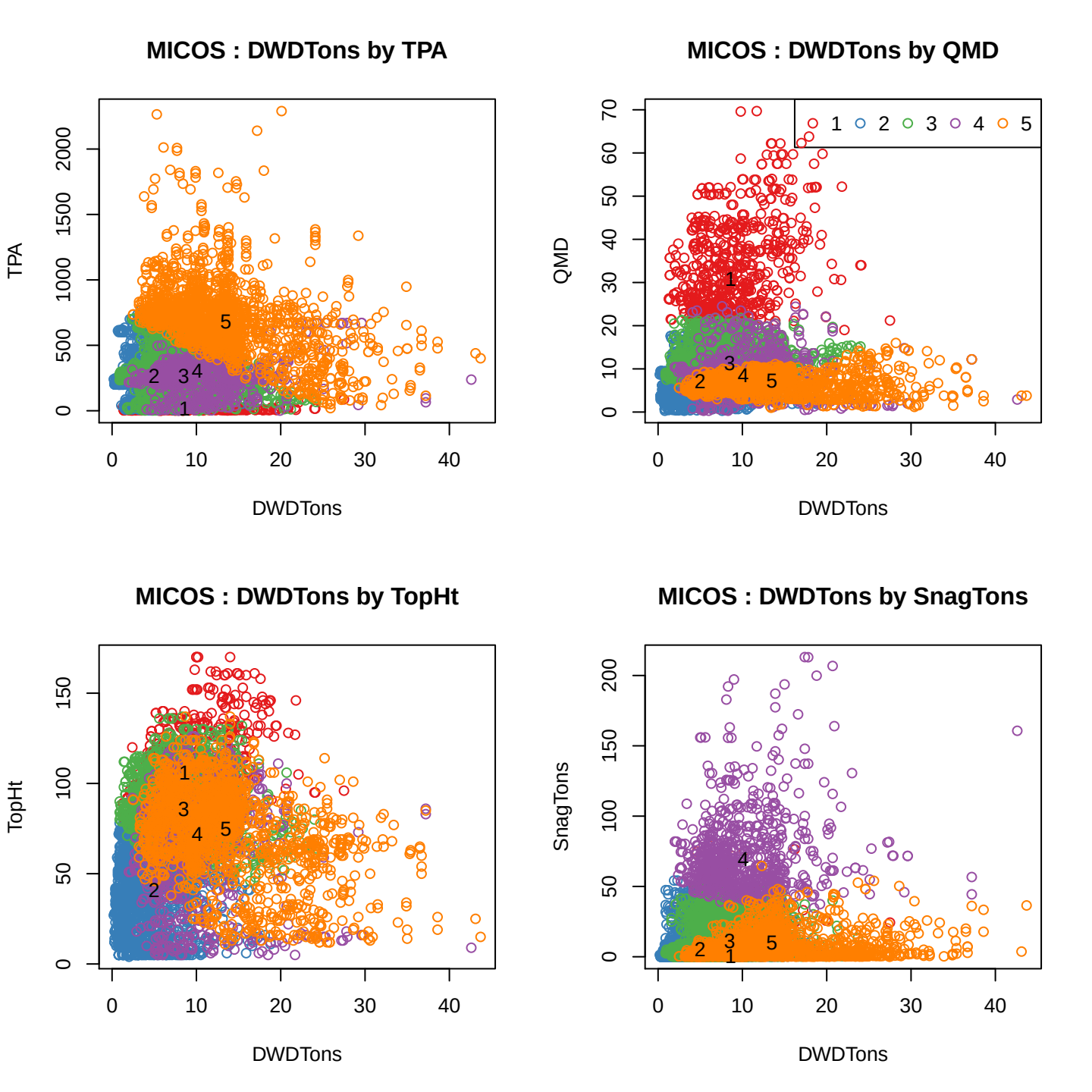
MICOS : DWDTons by TPA
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MICOS : DWDTons by QMD
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MICOS : DWDTons by TopHt
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MICOS : DWDTons by SnagTons
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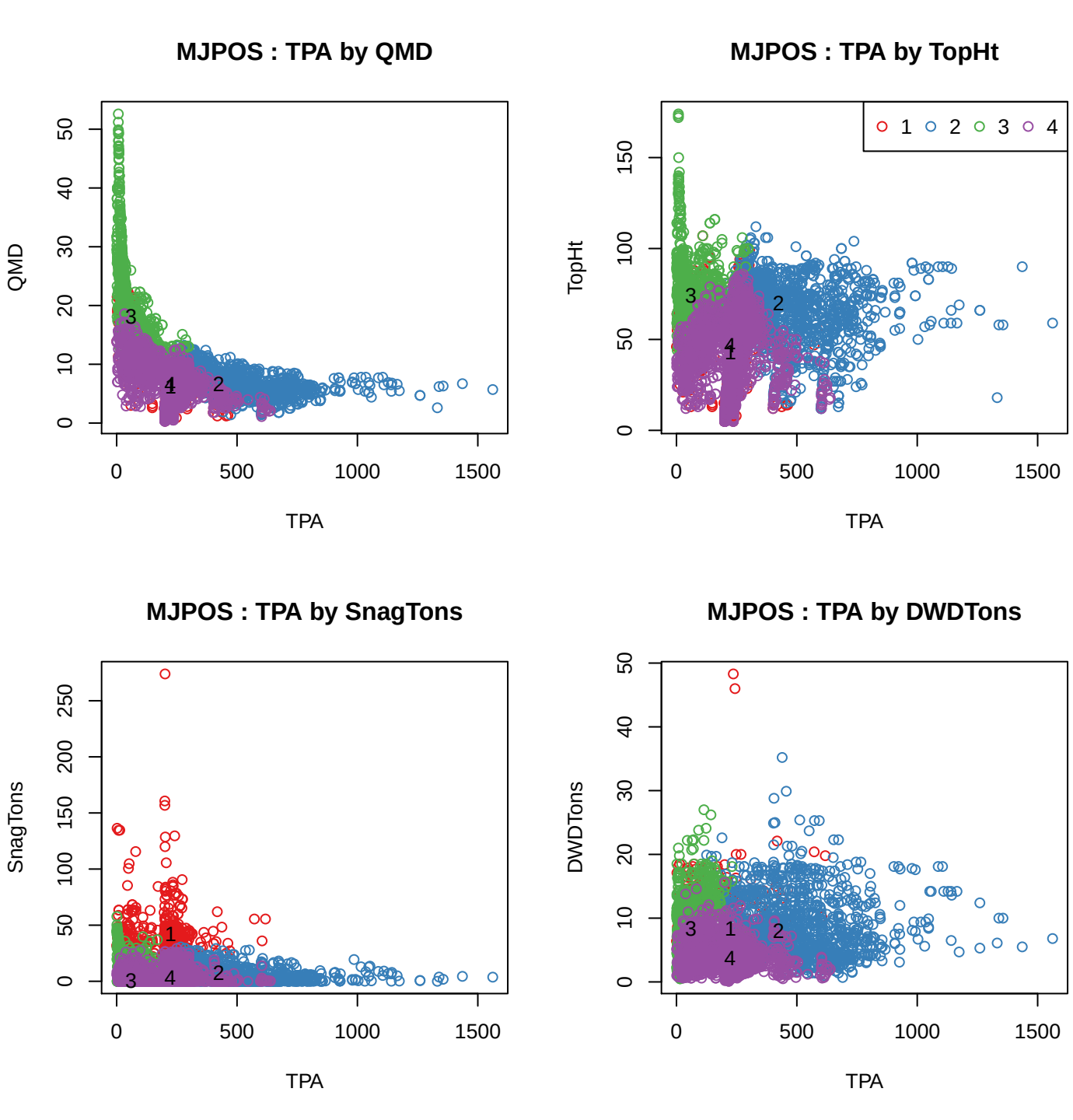
MJPOS : TPA by QMD
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MJPOS : TPA by TopHt
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MJPOS : TPA by SnagTons
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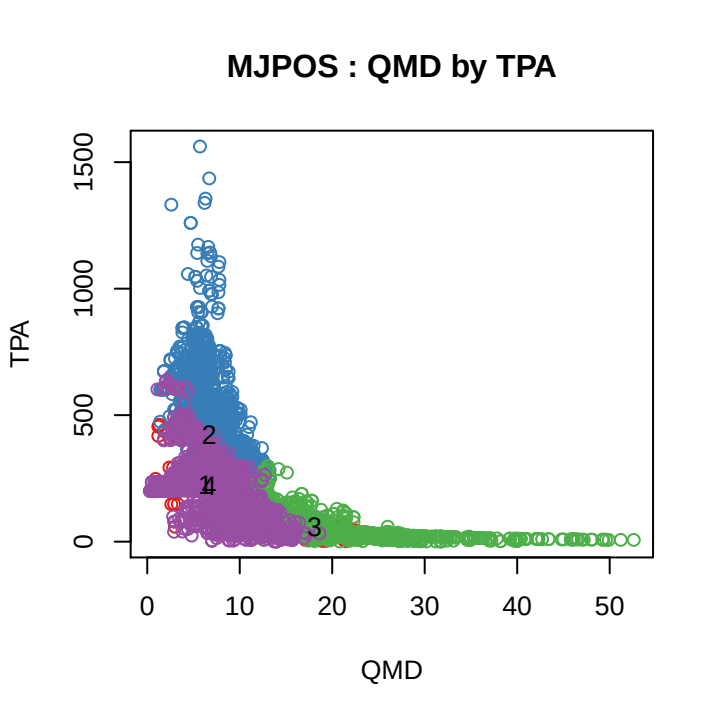
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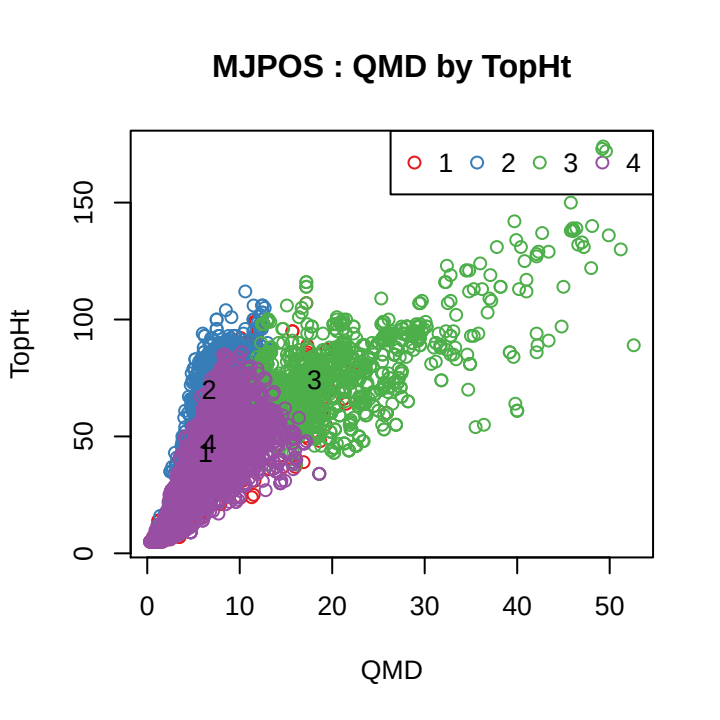
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TopHt
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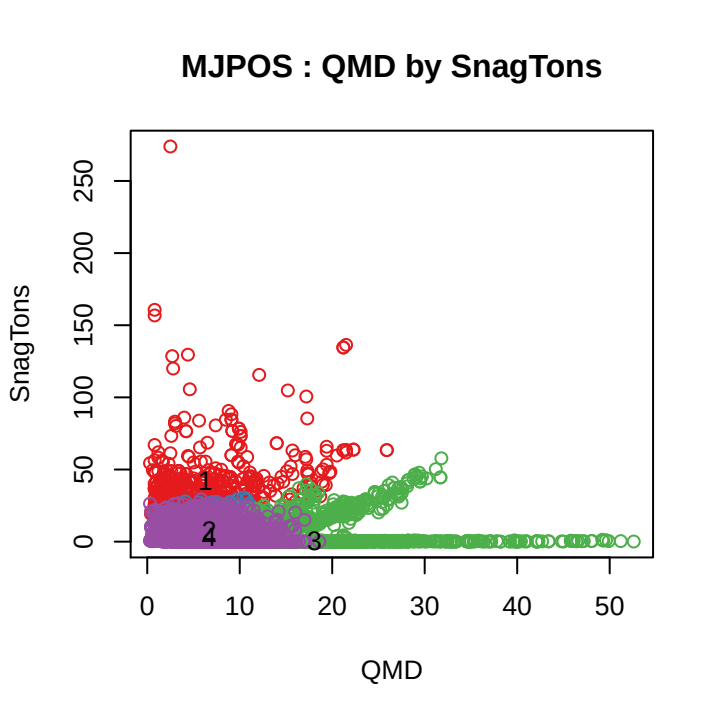
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SnagTons
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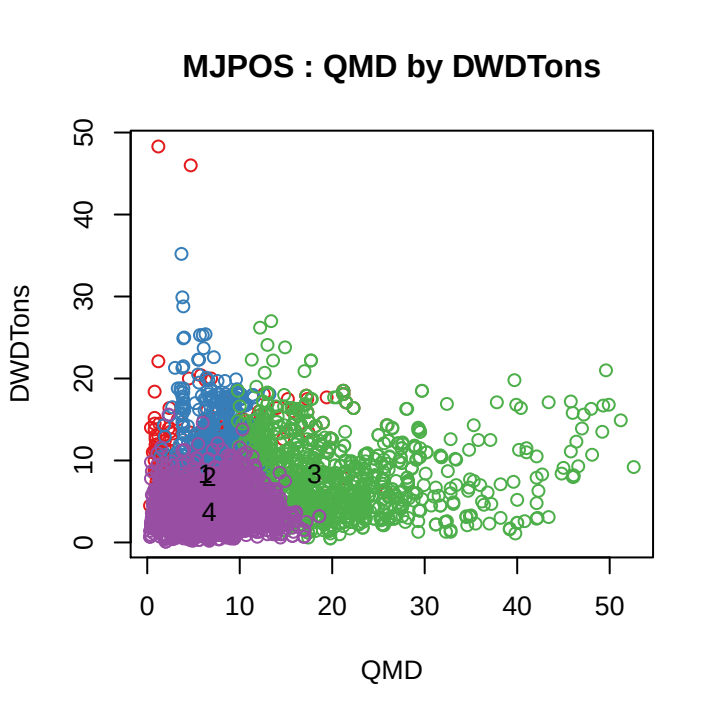
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DWDTons
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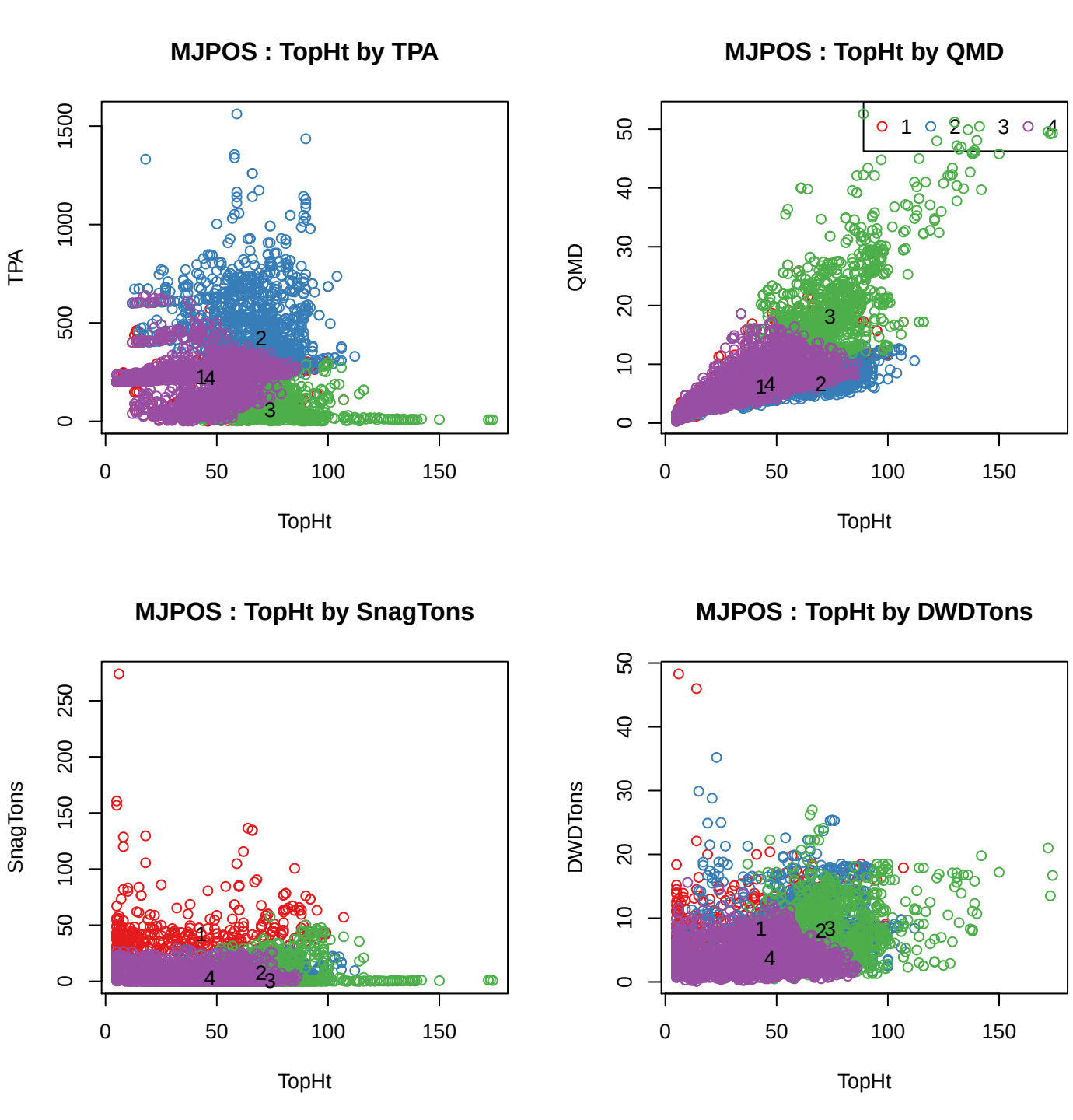
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TPA
TopHt
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1000
1500
0
50
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150
2
14
3
MJPOS : TopHt by QMD
QMD
TopHt
1
2
3
4
0
10
20
30
40
50
0
50
100
150
3
14
2
MJPOS : TopHt by SnagTons
SnagTons
TopHt
0
50
100
150
200
250
0
50
100
150
1
4
2
3
MJPOS : TopHt by DWDTons
DWDTons
TopHt
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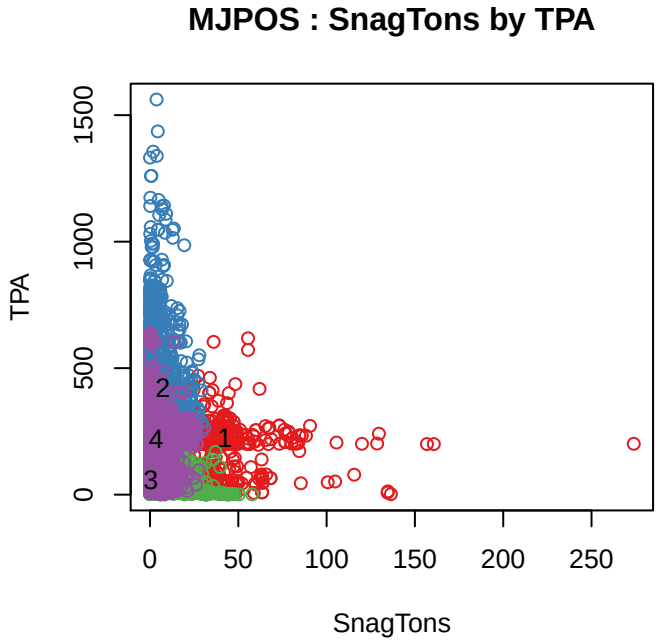
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SnagTons
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3
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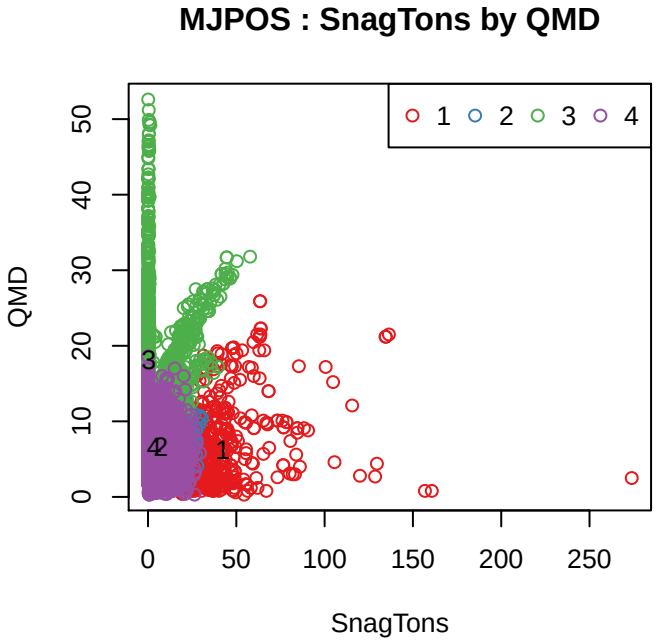
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0
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40
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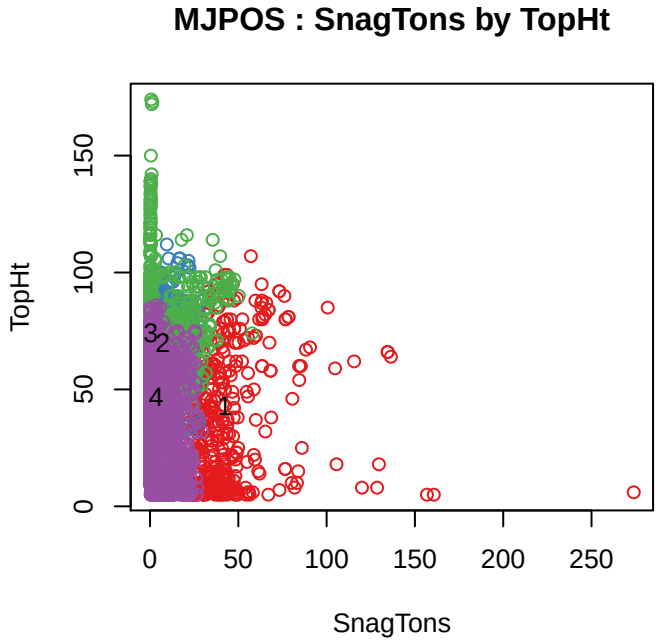
100
150
200
250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SnagTons
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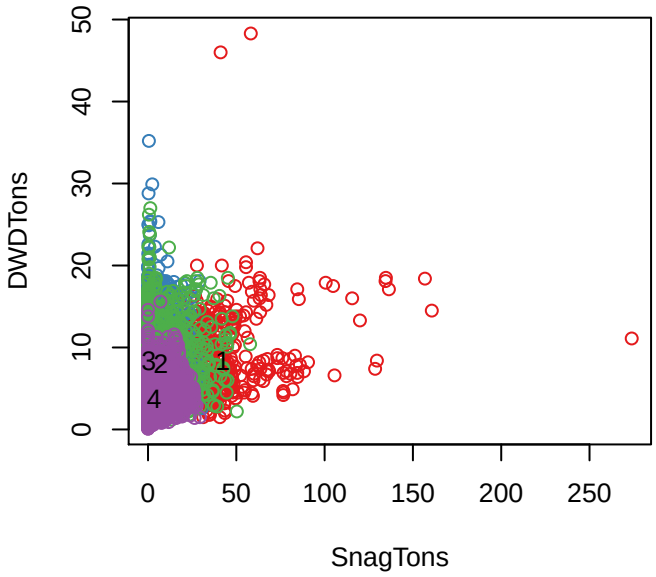
MJPOS : SnagTons by DWDTons
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SnagTons
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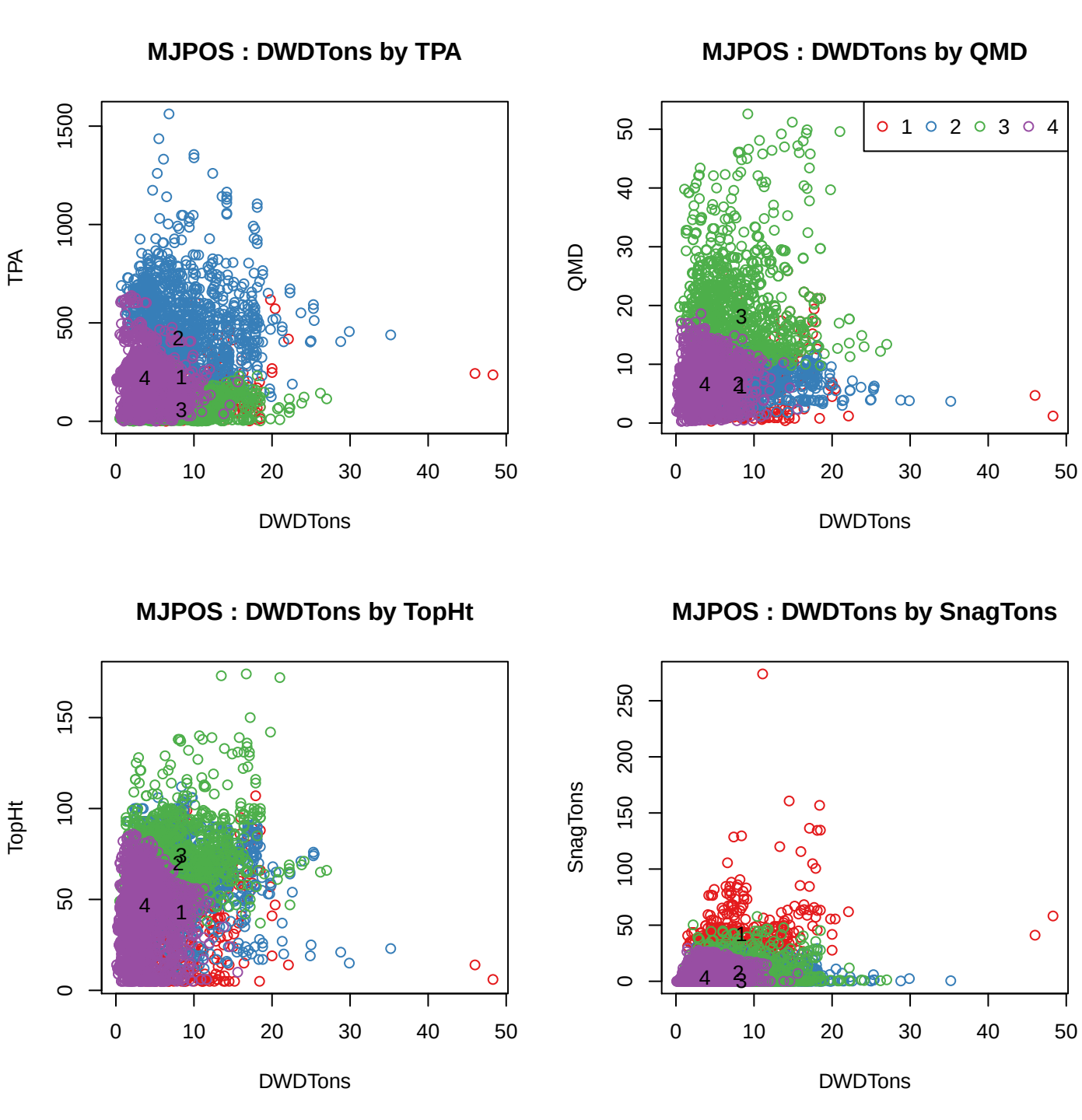
MJPOS : DWDTons by TPA
TPA
DWDTons
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4
MJPOS : DWDTons by QMD
QMD
DWDTons
1
2
3
4
MJPOS : DWDTons by TopHt
TopHt
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MJPOS : DWDTons by SnagTons
SnagTons
DWDTons
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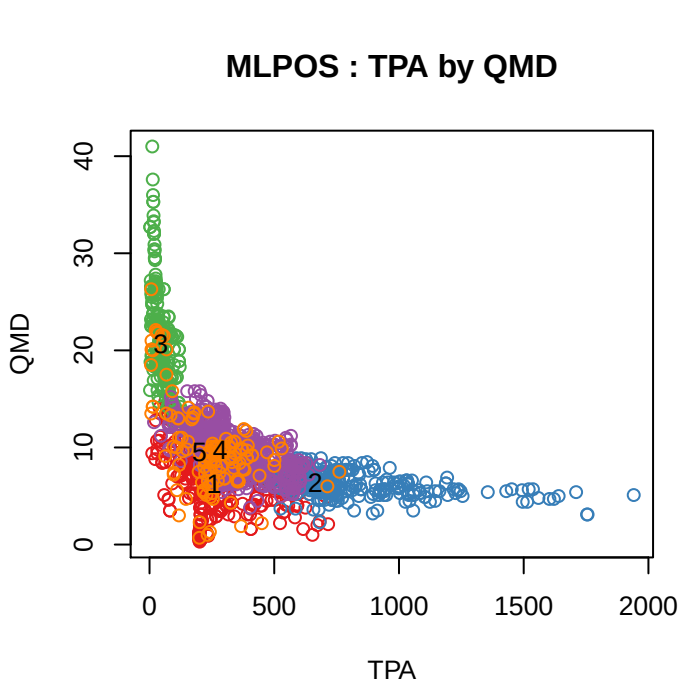
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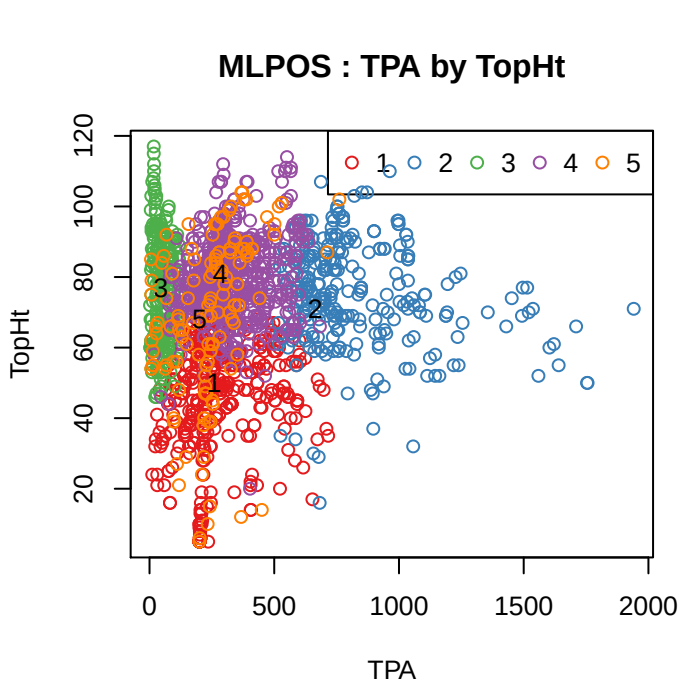
MLPOS : TPA by TopHt
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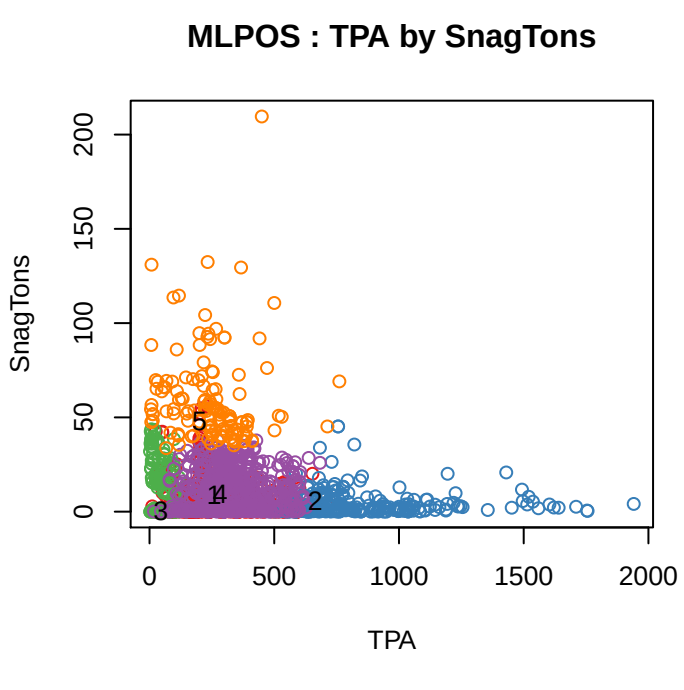
MLPOS : TPA by SnagTons
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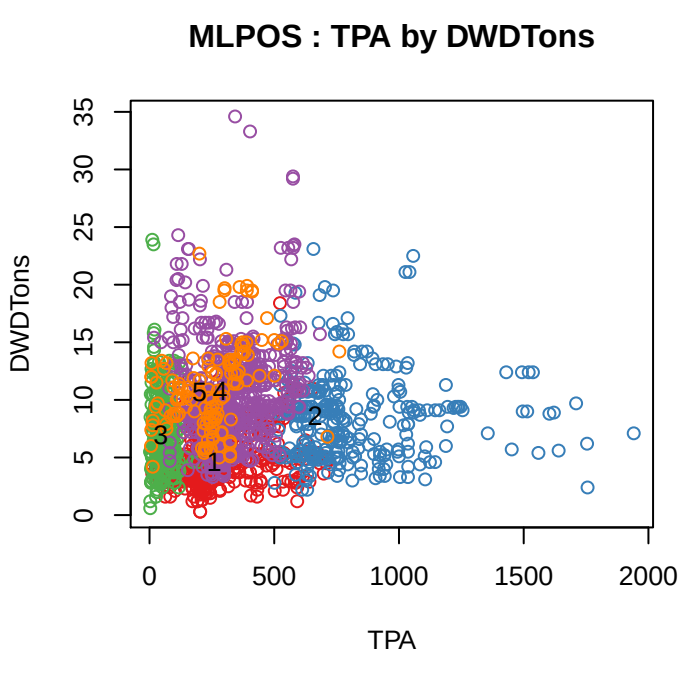
MLPOS : TPA by DWDTons
DWDTons
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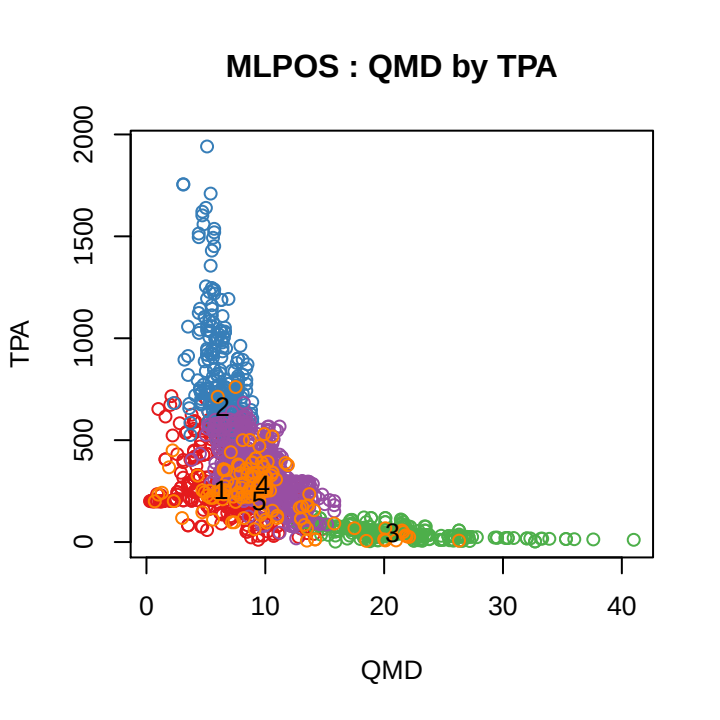
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QMD
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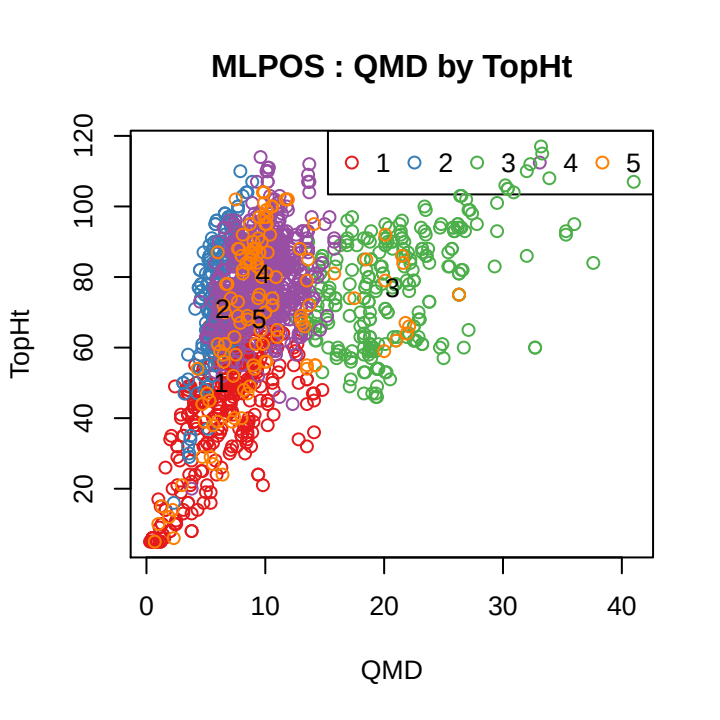
MLPOS : QMD by TopHt
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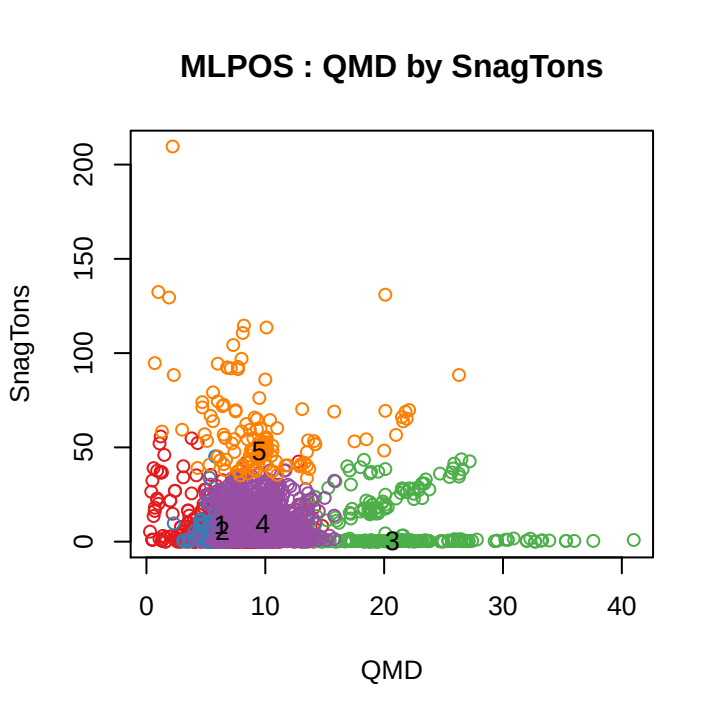
MLPOS : QMD by SnagTons
SnagTons
QMD
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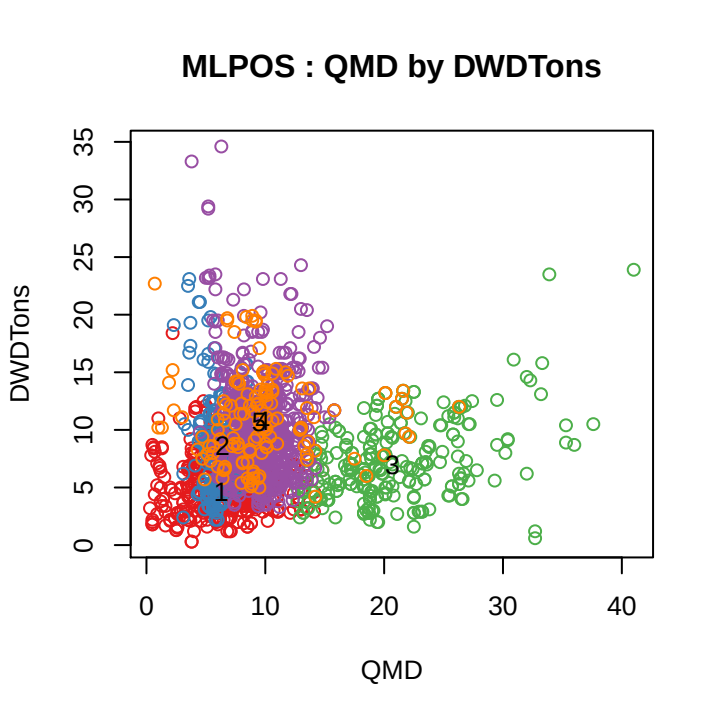
MLPOS : QMD by DWDTons
DWDTons
QMD
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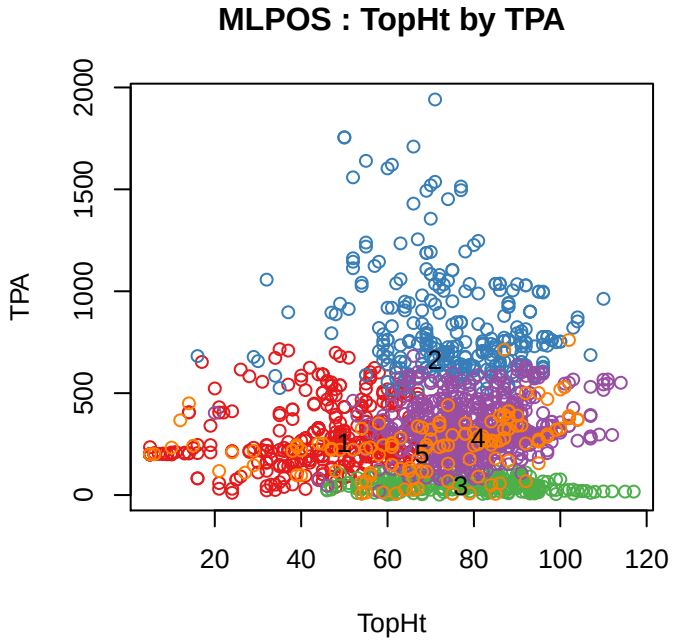
MLPOS : TopHt by TPA
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TopHt
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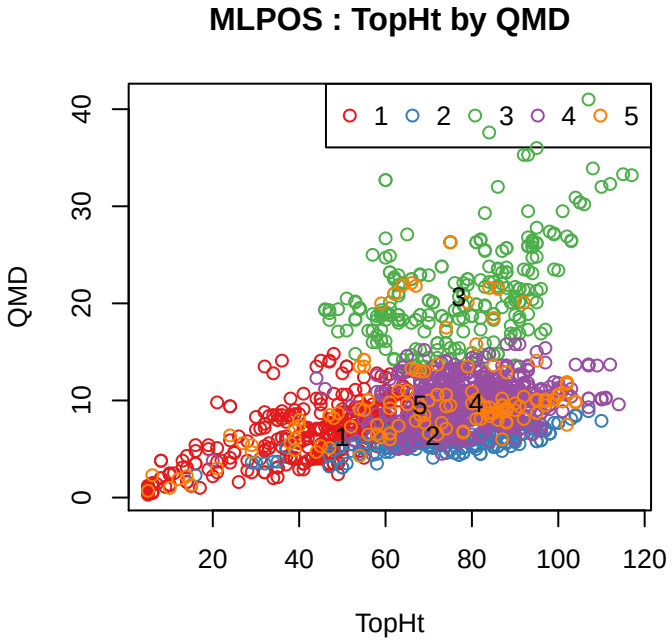
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QMD
TopHt
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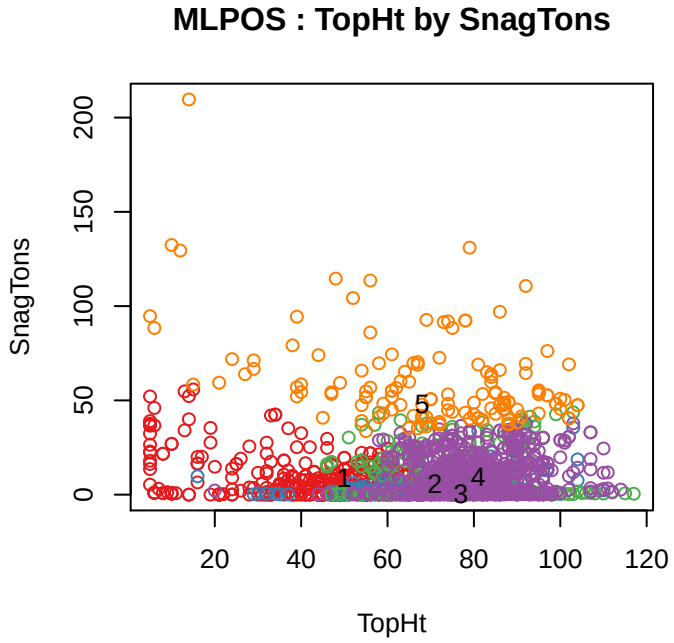
MLPOS : TopHt by SnagTons
SnagTons
TopHt
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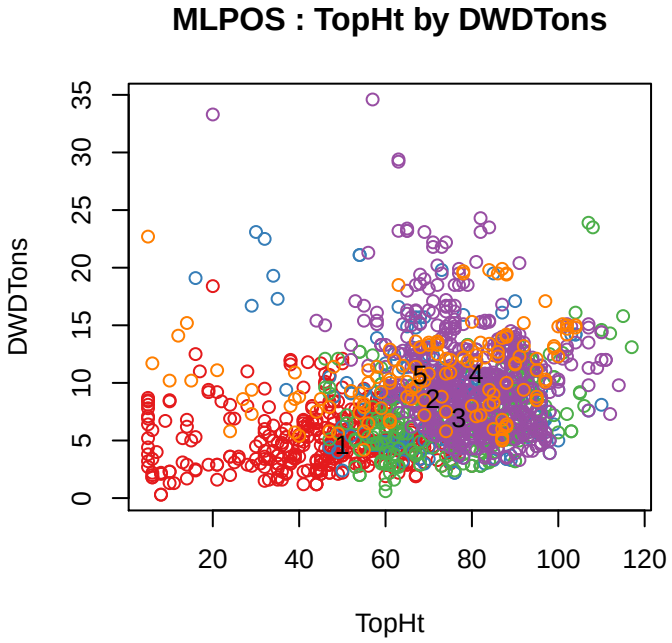
MLPOS : TopHt by DWDTons
DWDTons
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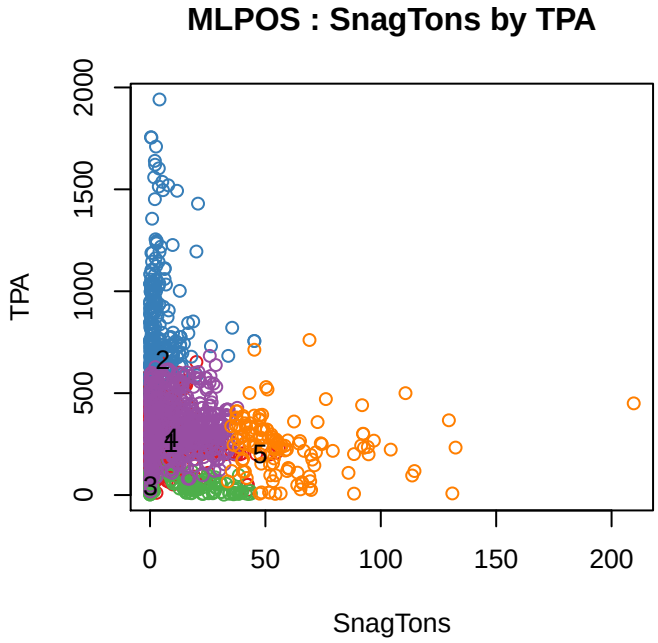
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SnagTons
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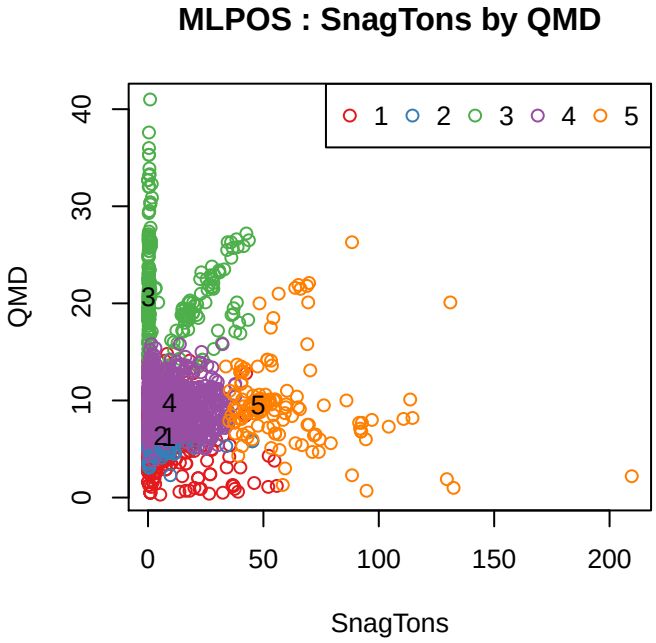
MLPOS : SnagTons by QMD
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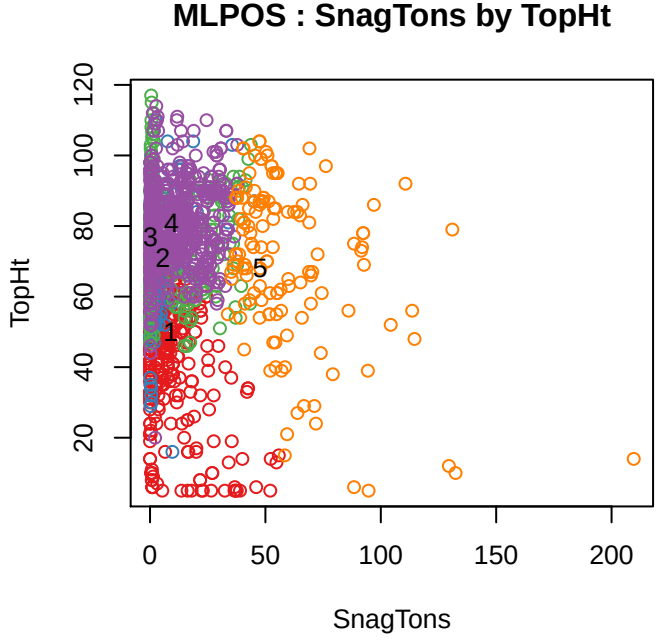
MLPOS : SnagTons by TopHt
TopHt
SnagTons
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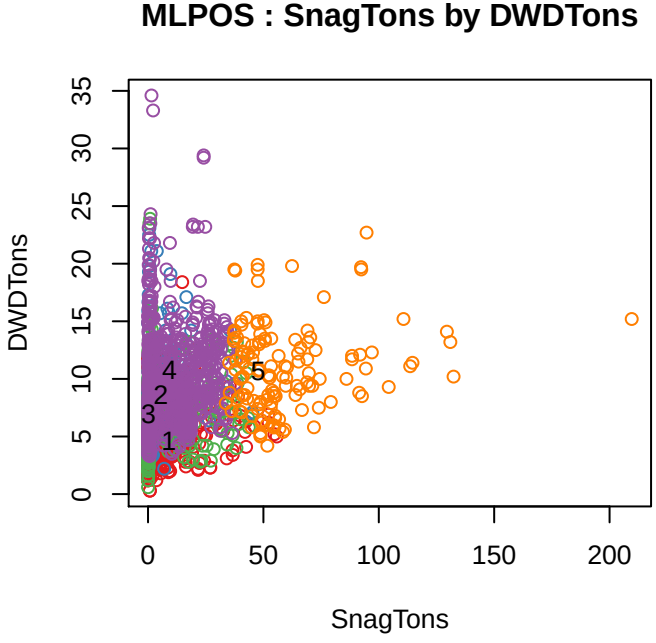
MLPOS : SnagTons by DWDTons
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SnagTons
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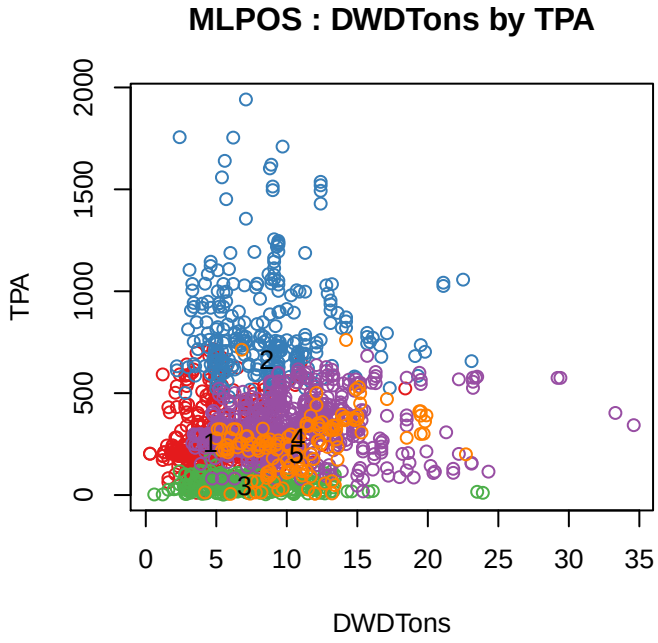
MLPOS : DWDTons by TPA
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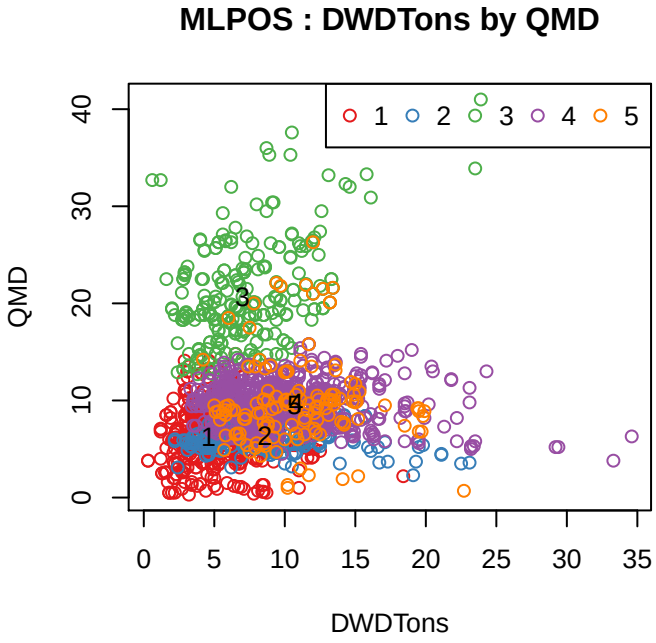
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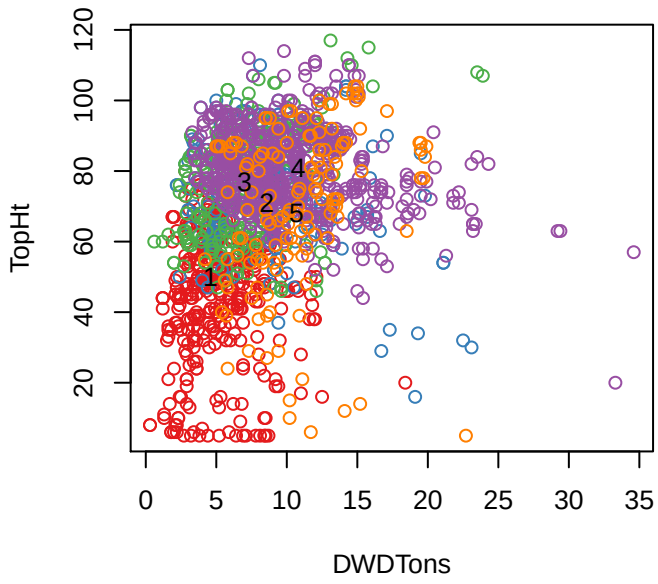
MLPOS : DWDTons by TopHt
TopHt
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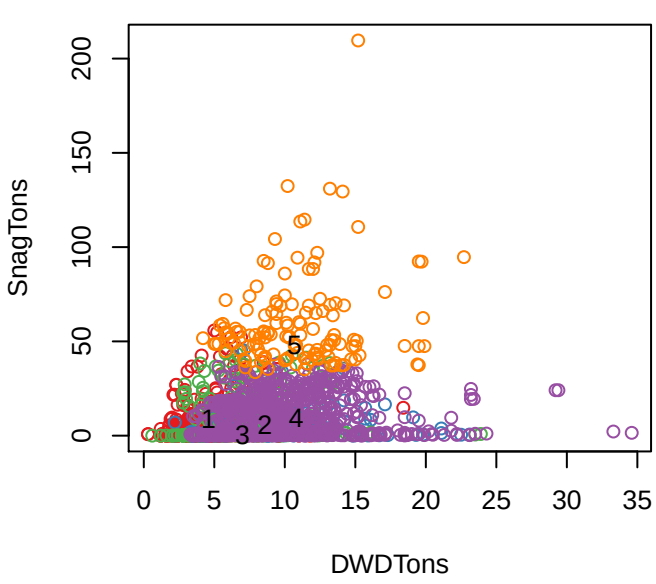
MLPOS : DWDTons by SnagTons
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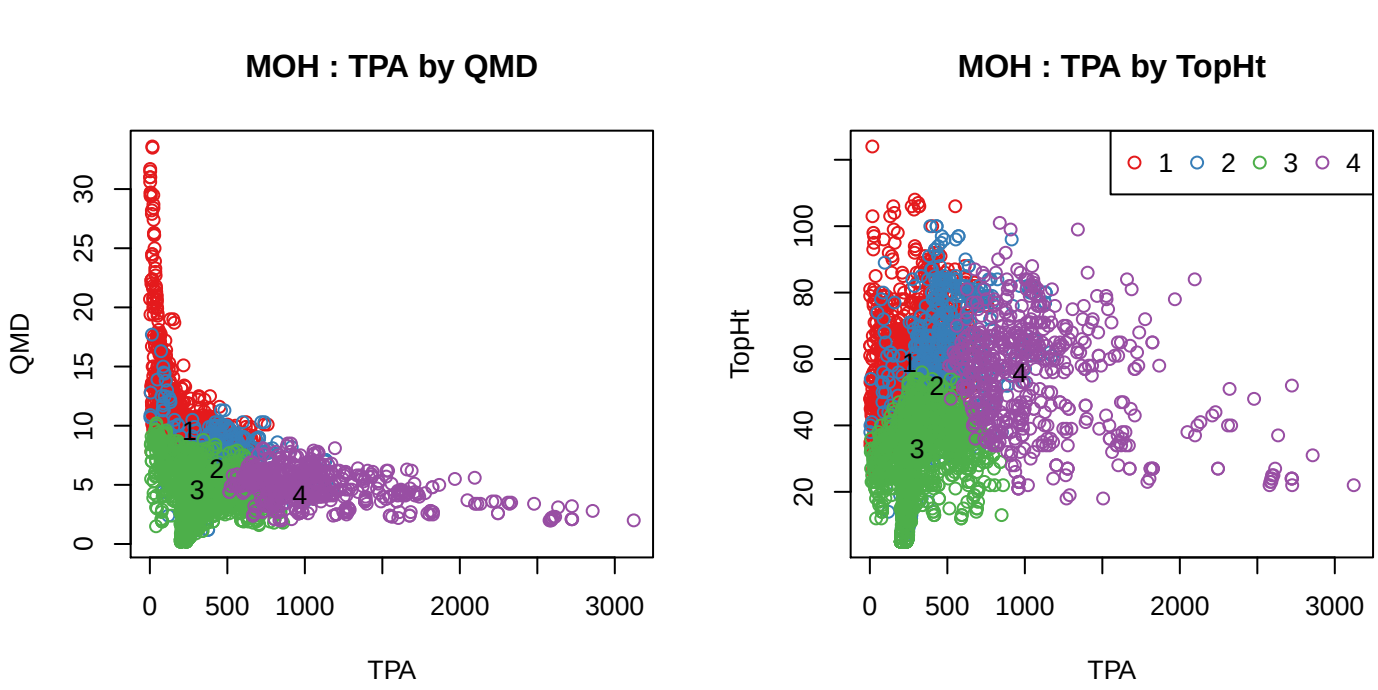
MOH : TPA by QMD
QMD
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MOH : TPA by TopHt
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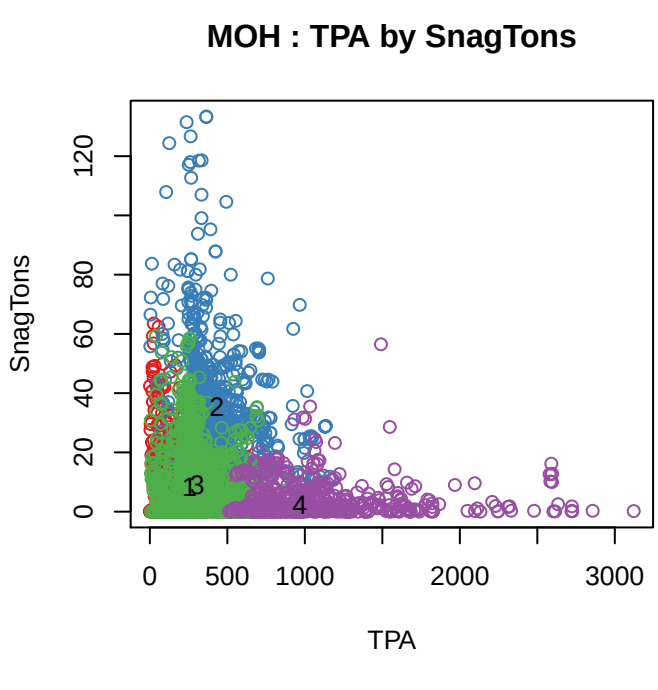
MOH : TPA by SnagTons
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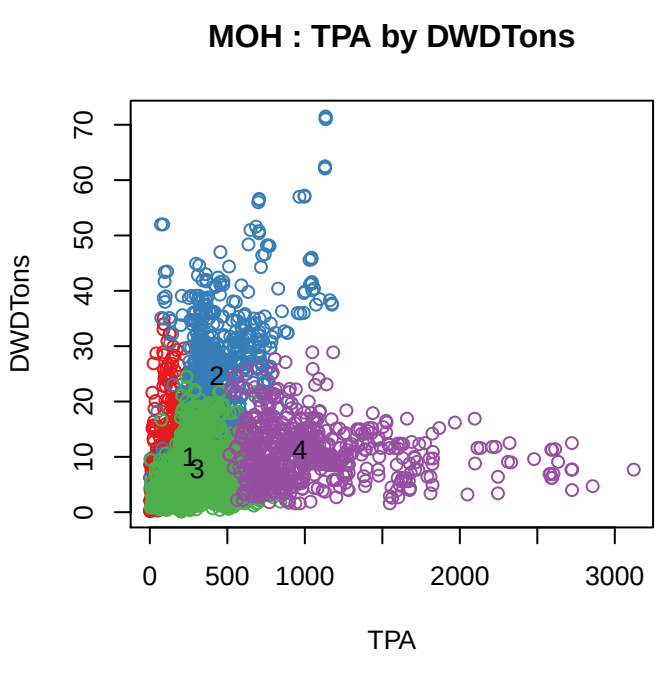
MOH : TPA by DWDTons
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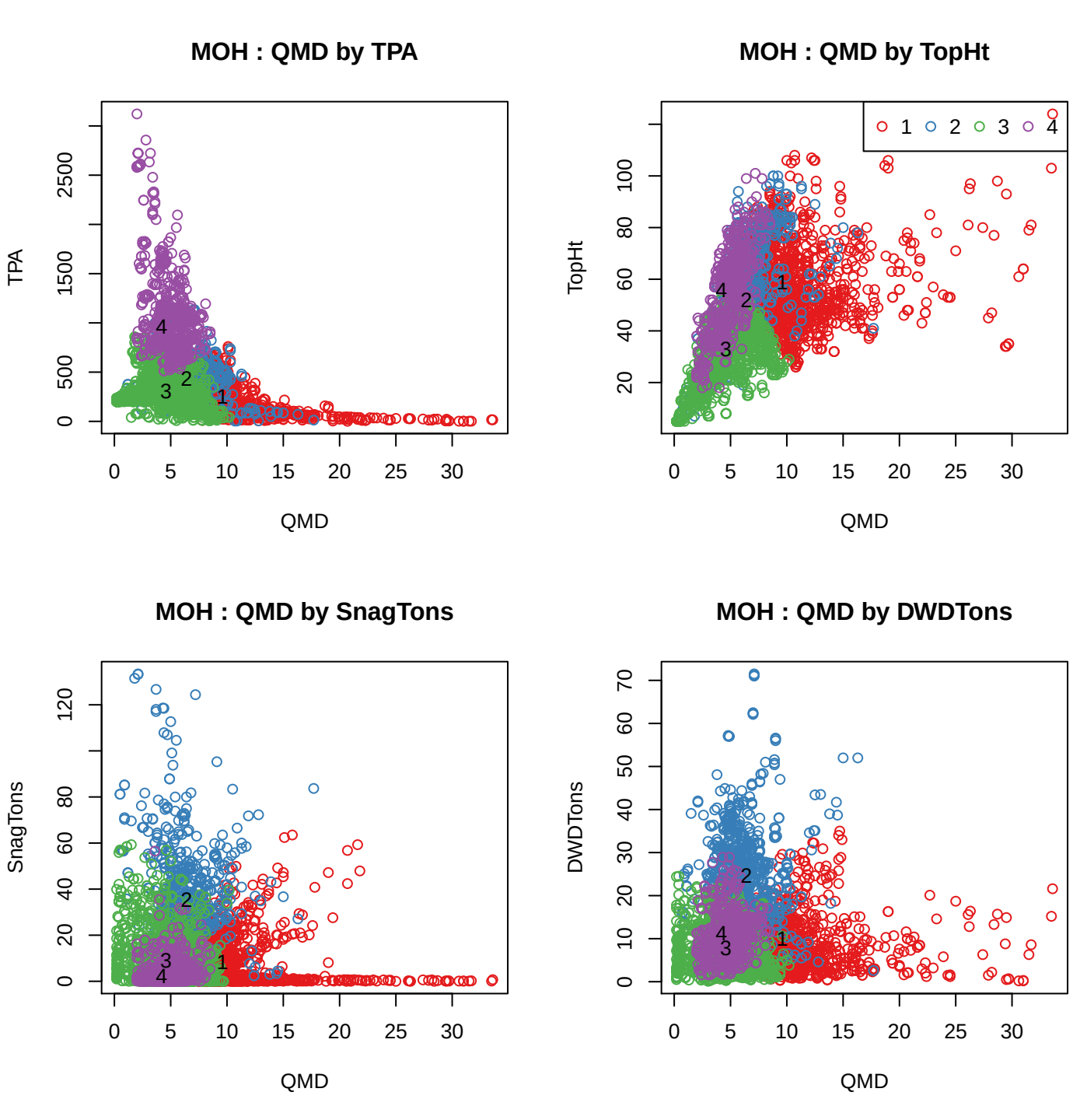
MOH : QMD by TPA
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MOH : QMD by TopHt
TopHt
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MOH : QMD by SnagTons
SnagTons
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MOH : QMD by DWDTons
DWDTons
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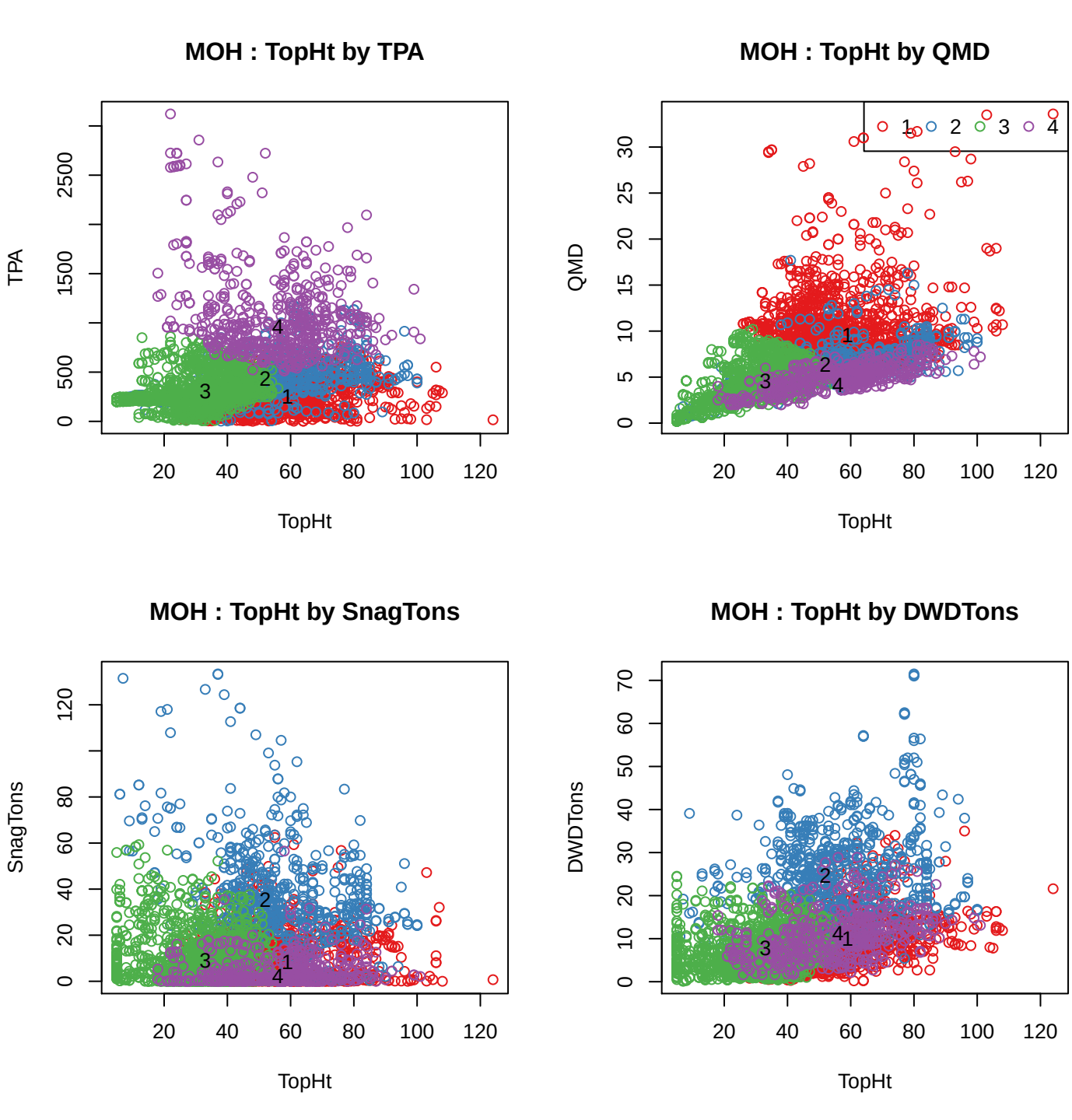
MOH : TopHt by TPA
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TopHt
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MOH : TopHt by QMD
QMD
TopHt
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MOH : TopHt by SnagTons
SnagTons
TopHt
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MOH : TopHt by DWDTons
DWDTons
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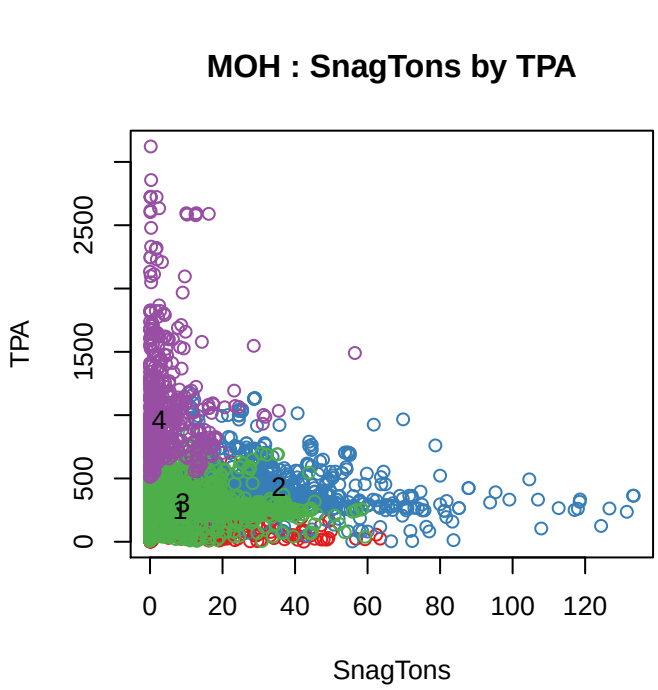
MOH : SnagTons by TPA
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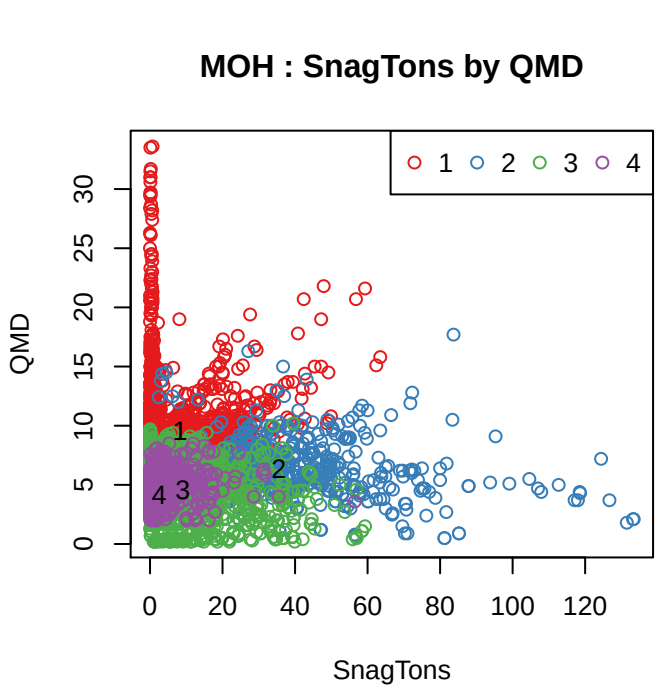
MOH : SnagTons by QMD
QMD
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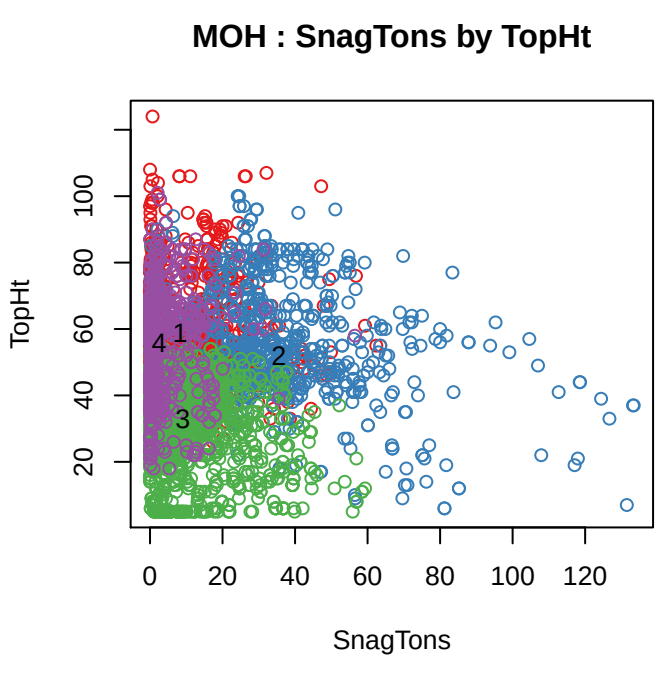
MOH : SnagTons by TopHt
TopHt
SnagTons
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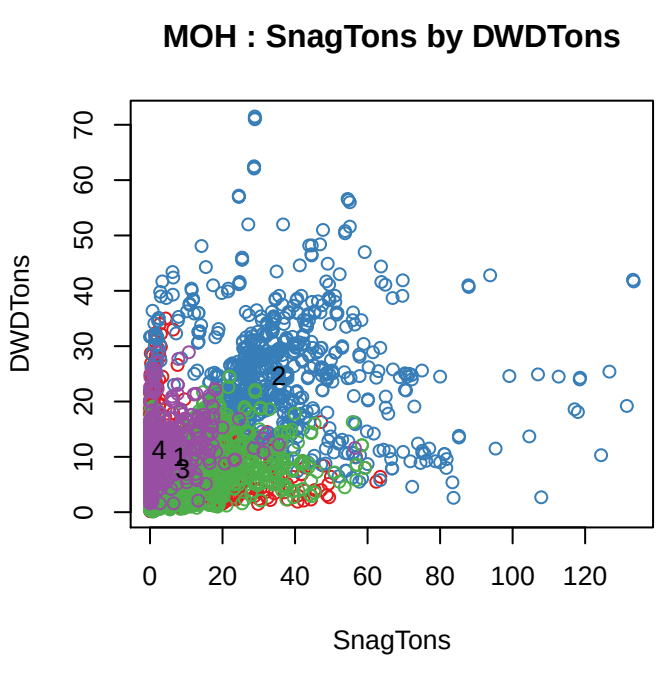
MOH : SnagTons by DWDTons
DWDTons
SnagTons
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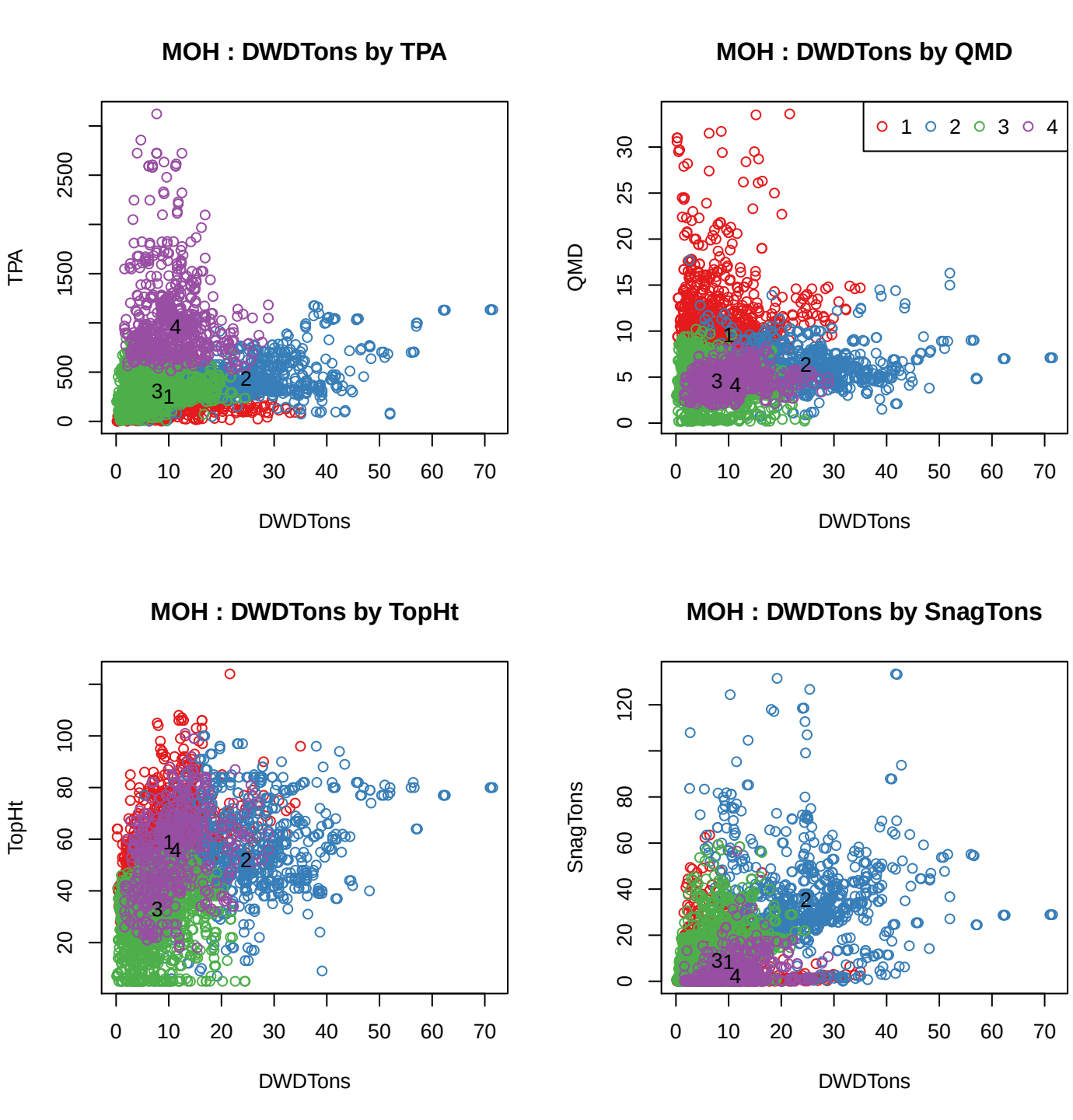
MOH : DWDTons by TPA
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DWDTons
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MOH : DWDTons by QMD
QMD
DWDTons
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MOH : DWDTons by TopHt
TopHt
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MOH : DWDTons by SnagTons
SnagTons
DWDTons
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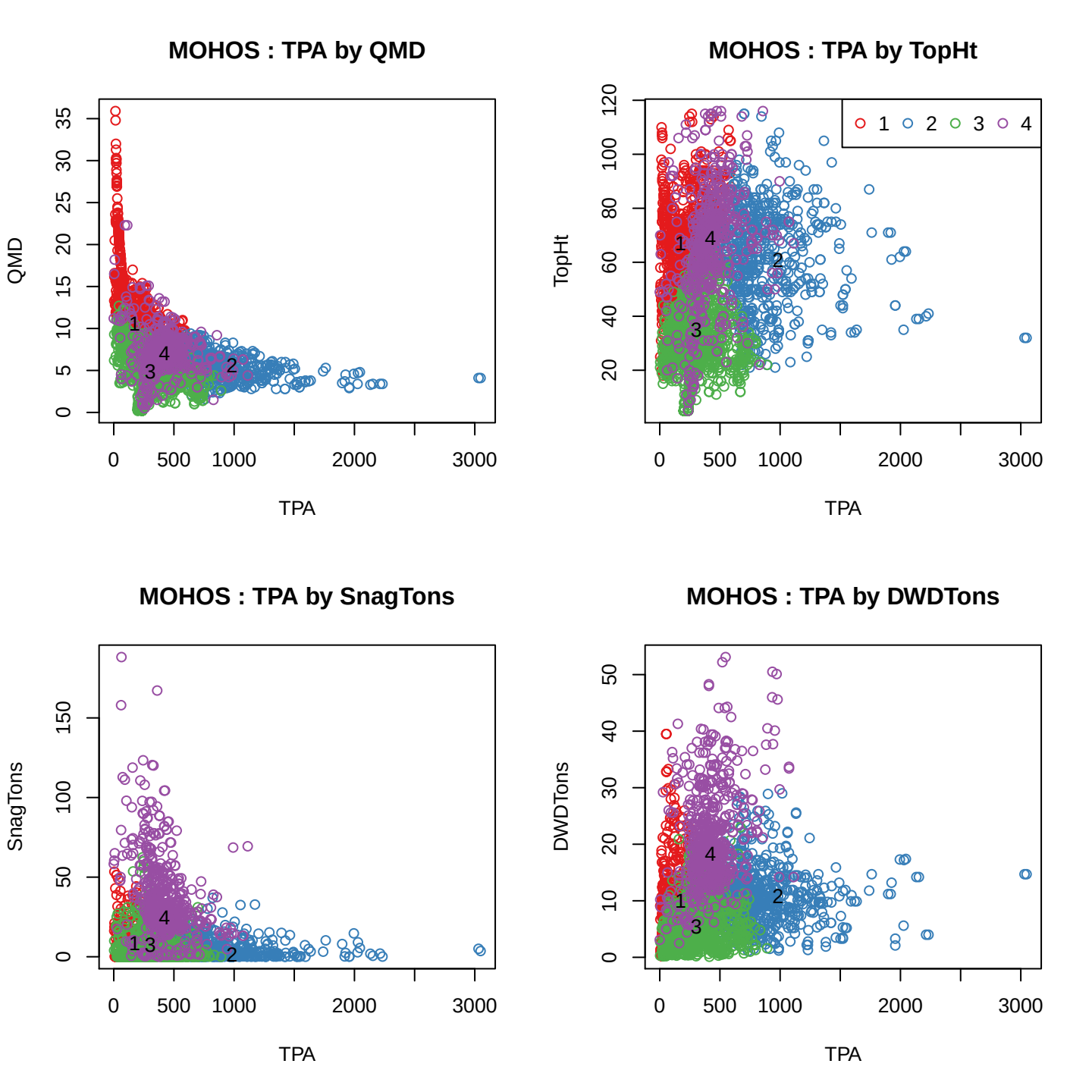
MOHOS : TPA by QMD
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MOHOS : TPA by TopHt
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MOHOS : TPA by SnagTons
SnagTons
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MOHOS : TPA by DWDTons
DWDTons
TPA
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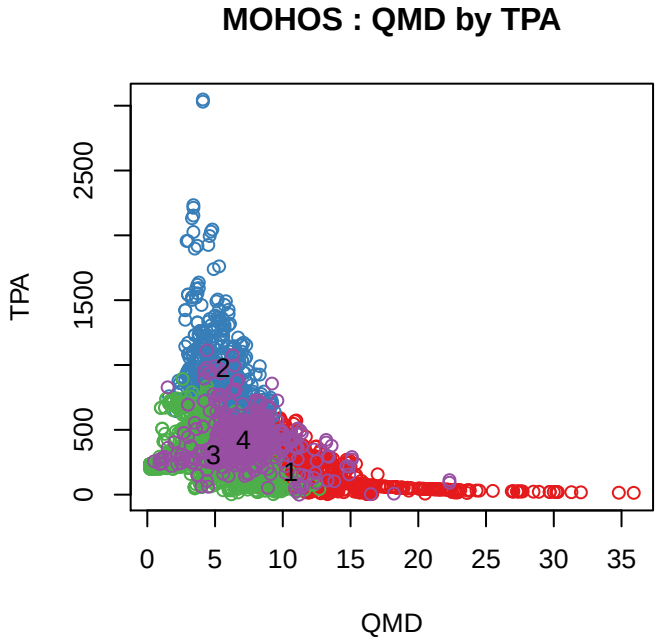
MOHOS : QMD by TPA
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QMD
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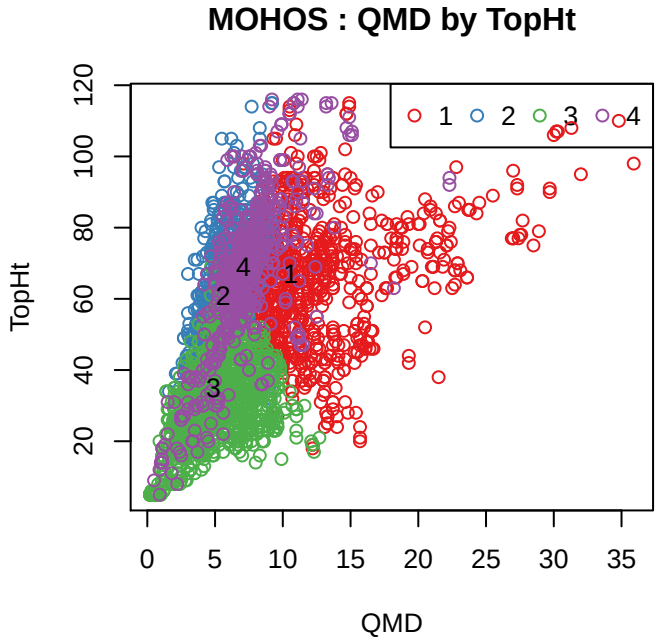
MOHOS : QMD by TopHt
TopHt
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15
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30
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QMD
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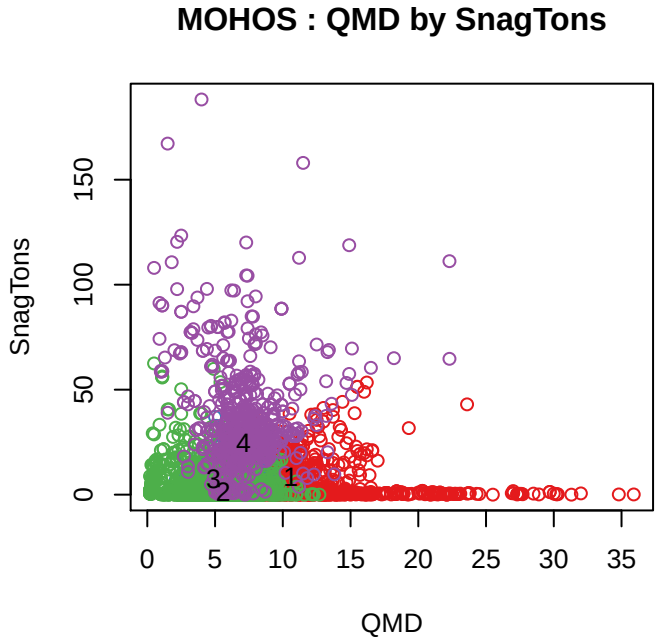
2
3
4


MOHOS : QMD by SnagTons
SnagTons
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0
5
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30
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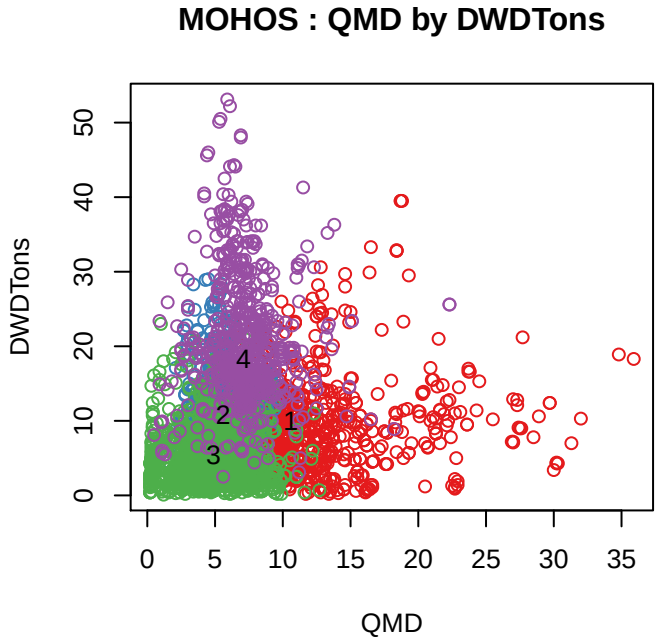
QMD
1
2
3
4


MOHOS : QMD by DWDTons
DWDTons
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QMD
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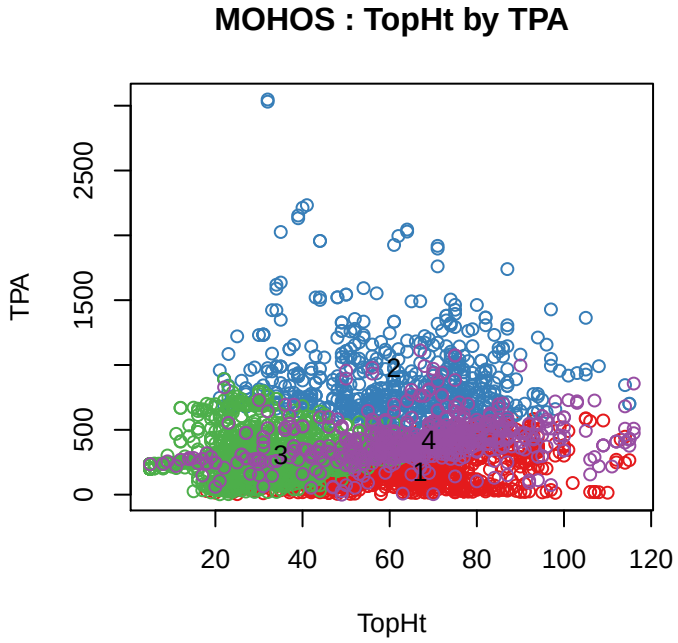
MOHOS : TopHt by TPA
TPA
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100
120
TopHt
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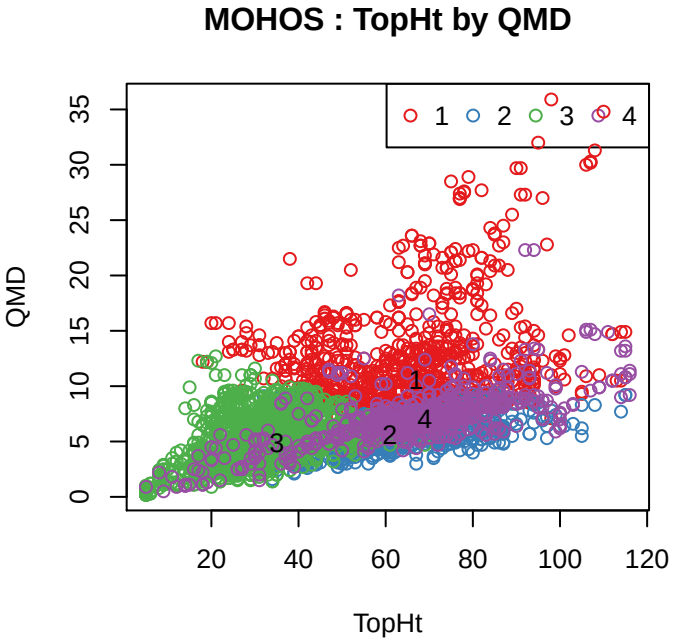
MOHOS : TopHt by QMD
QMD
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5
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TopHt
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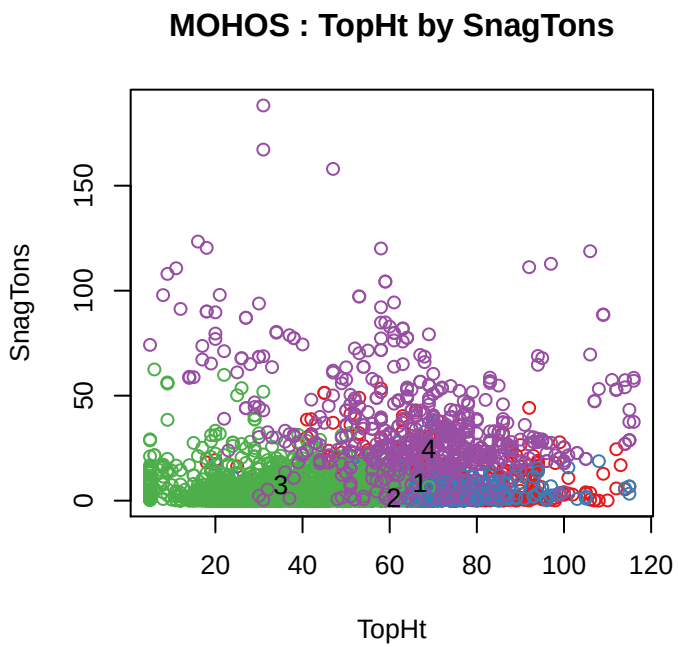
MOHOS : TopHt by SnagTons
SnagTons
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120
TopHt
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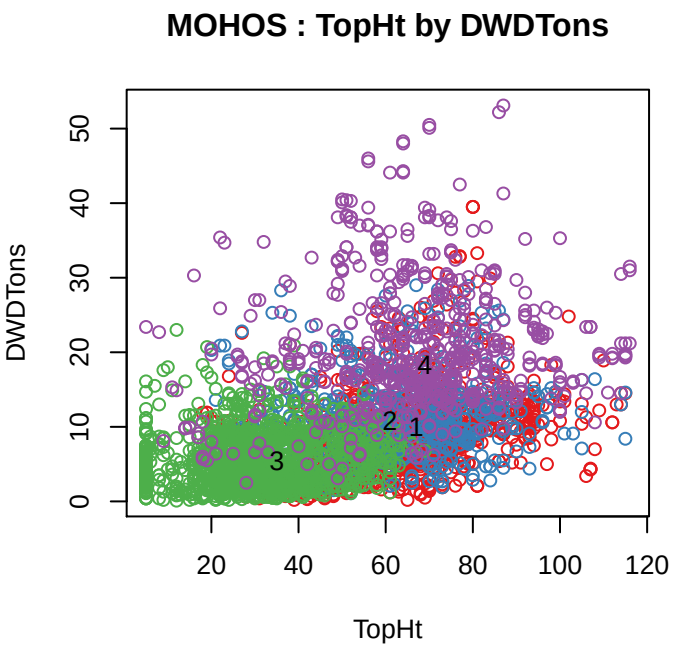
MOHOS : TopHt by DWDTons
DWDTons
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TopHt
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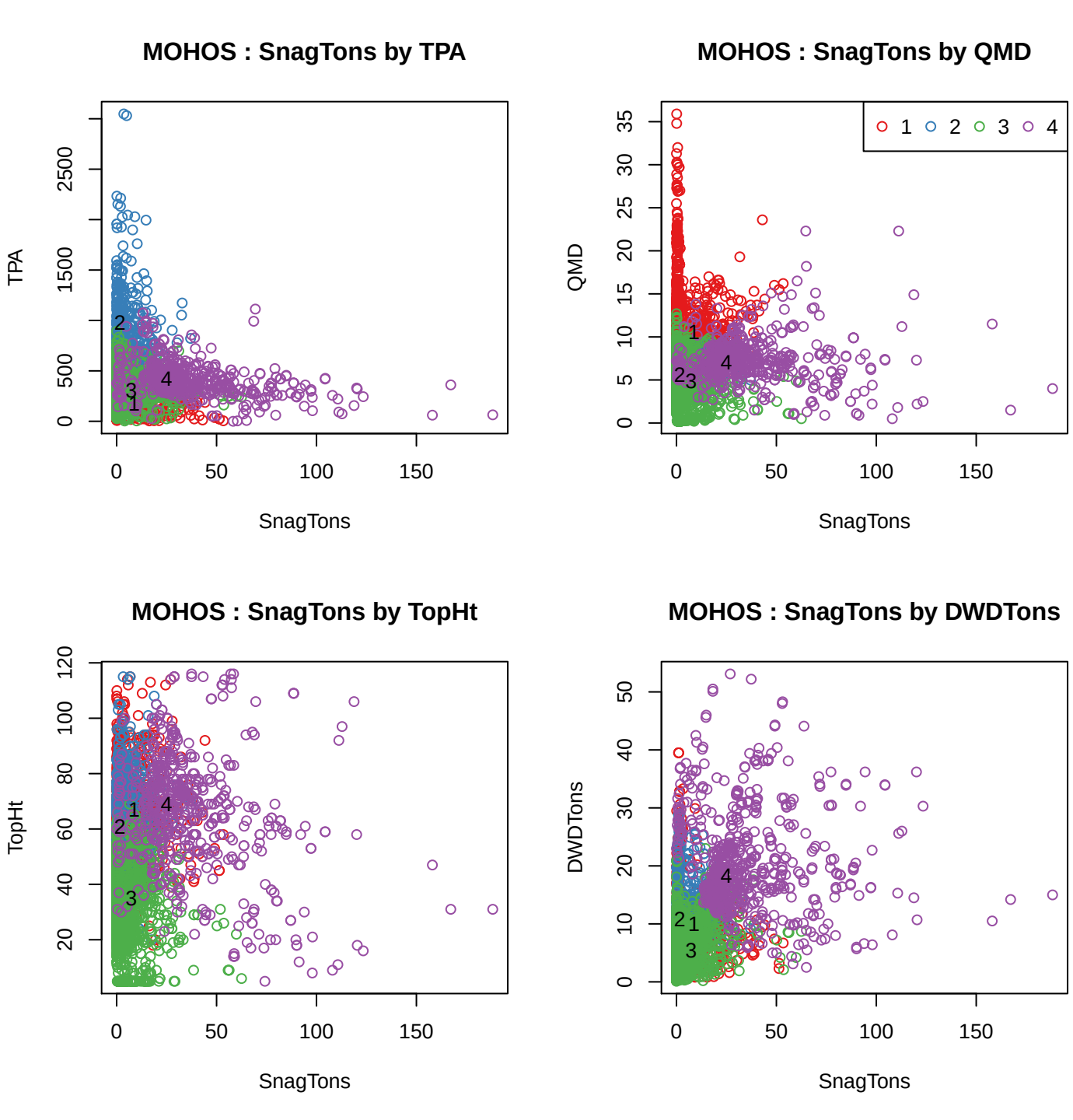
MOHOS : SnagTons by TPA
TPA
SnagTons
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MOHOS : SnagTons by QMD
QMD
SnagTons
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MOHOS : SnagTons by TopHt
TopHt
SnagTons
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MOHOS : SnagTons by DWDTons
DWDTons
SnagTons
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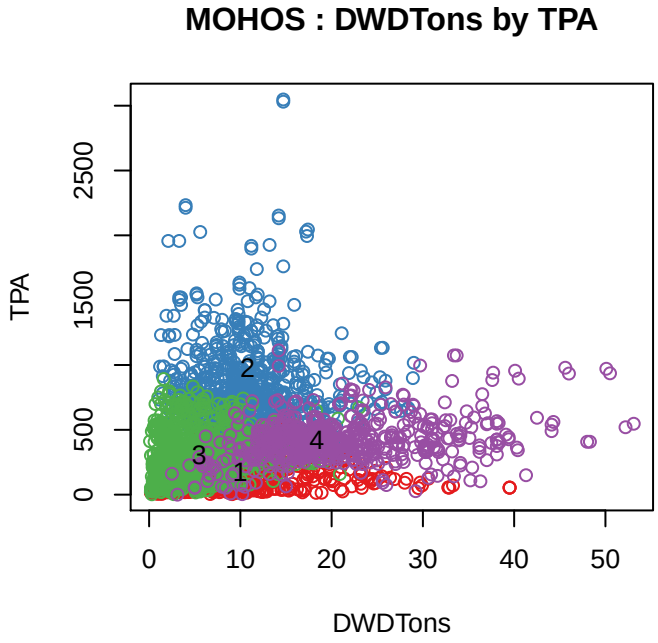
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DWDTons
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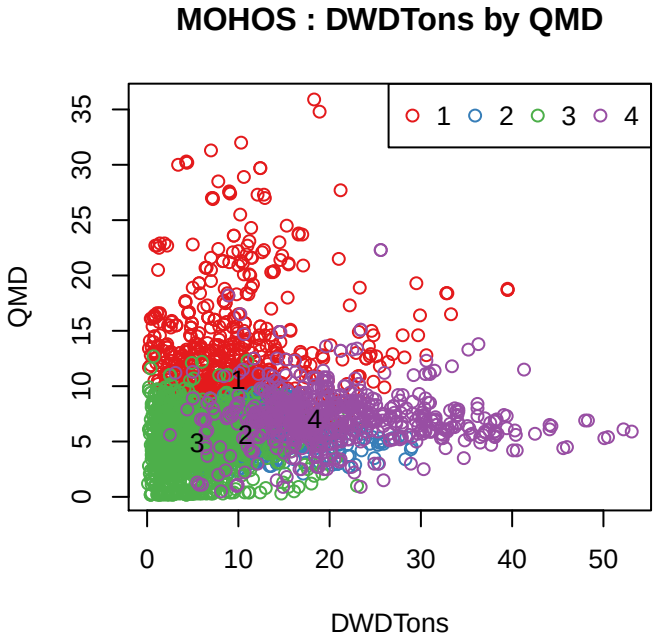
MOHOS : DWDTons by QMD
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DWDTons
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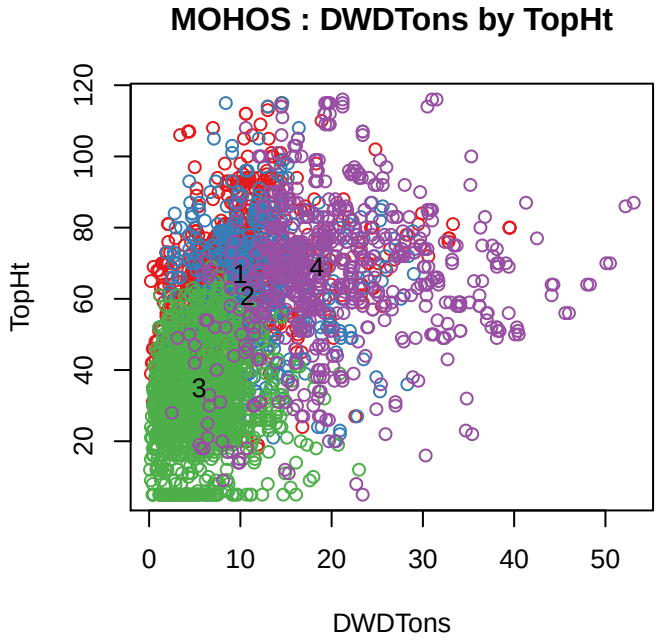
MOHOS : DWDTons by TopHt
TopHt
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DWDTons
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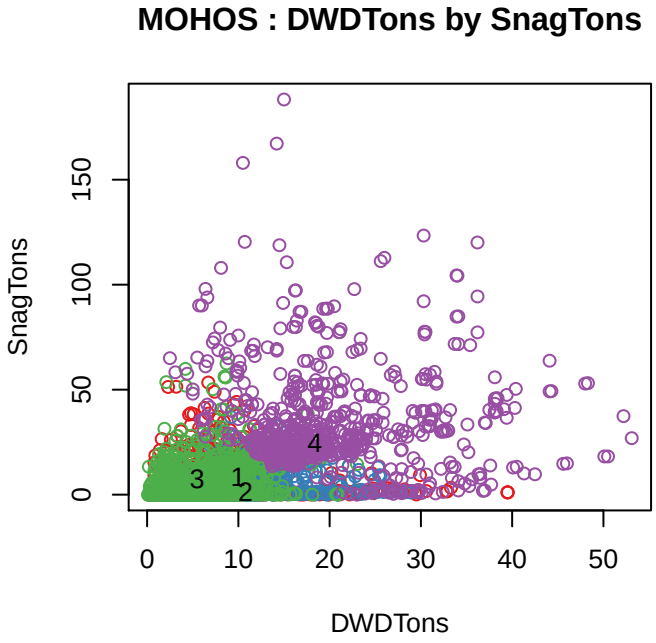
MOHOS : DWDTons by SnagTons
SnagTons
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DWDTons
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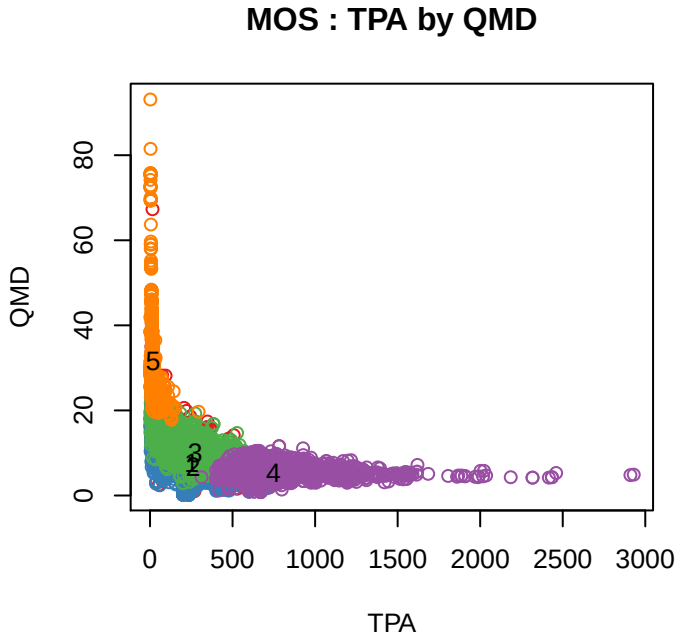
MOS : TPA by QMD
QMD
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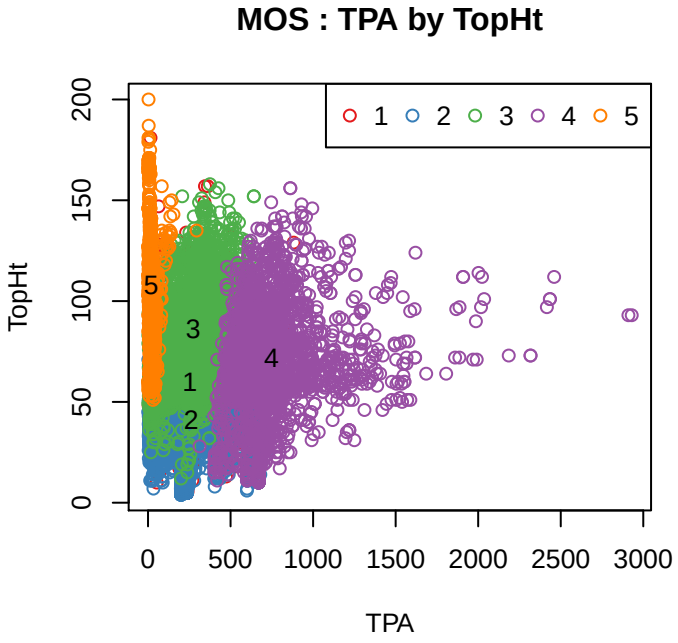
MOS : TPA by TopHt
TopHt
TPA
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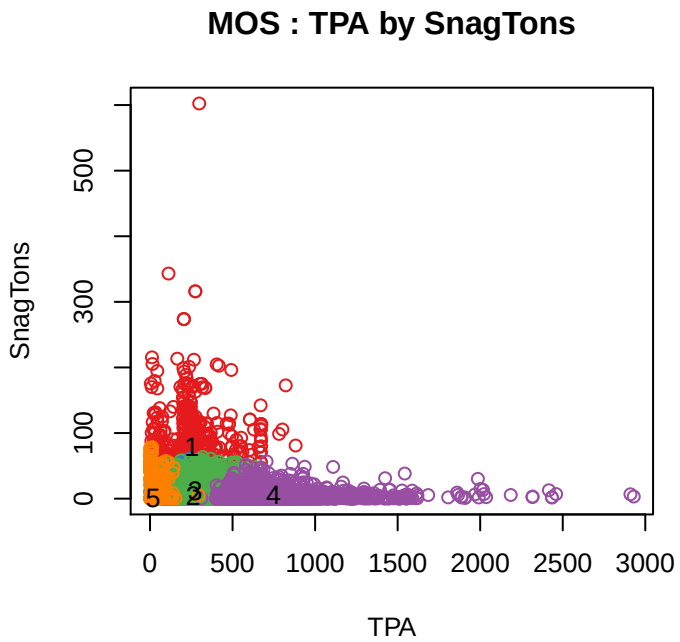
MOS : TPA by SnagTons
SnagTons
TPA
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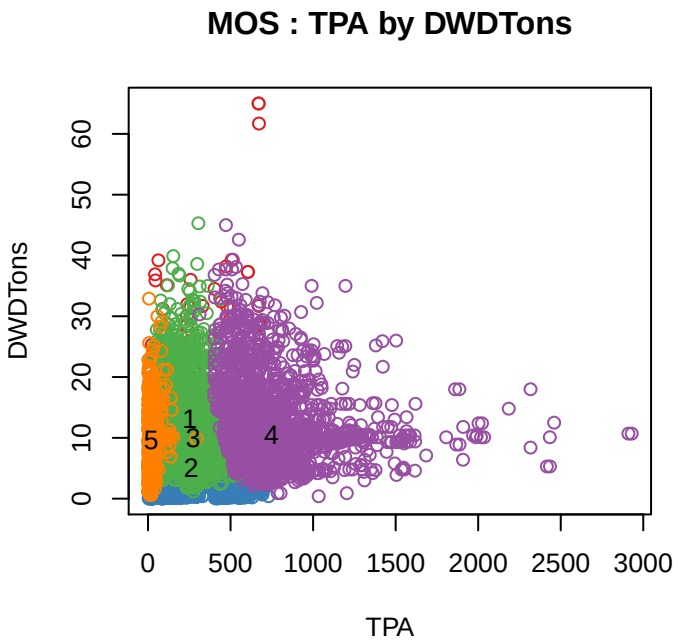
MOS : TPA by DWDTons
DWDTons
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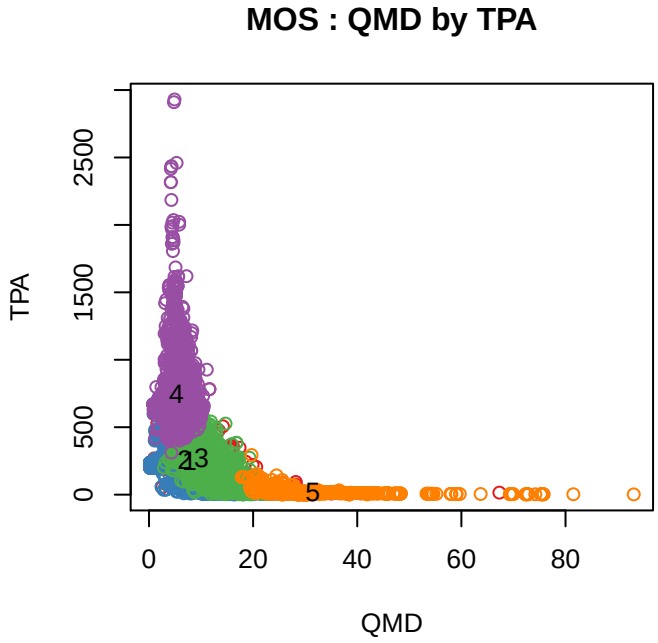
MOS : QMD by TPA
TPA
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QMD
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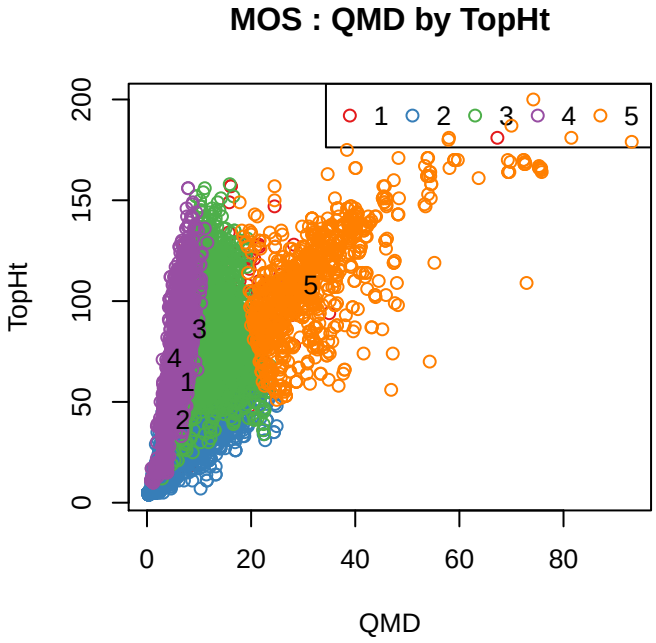
MOS : QMD by TopHt
TopHt
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QMD
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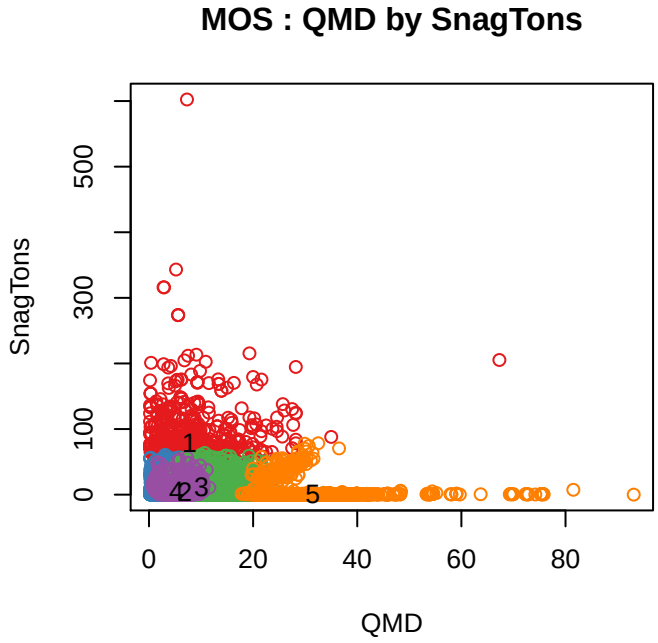
MOS : QMD by SnagTons
SnagTons
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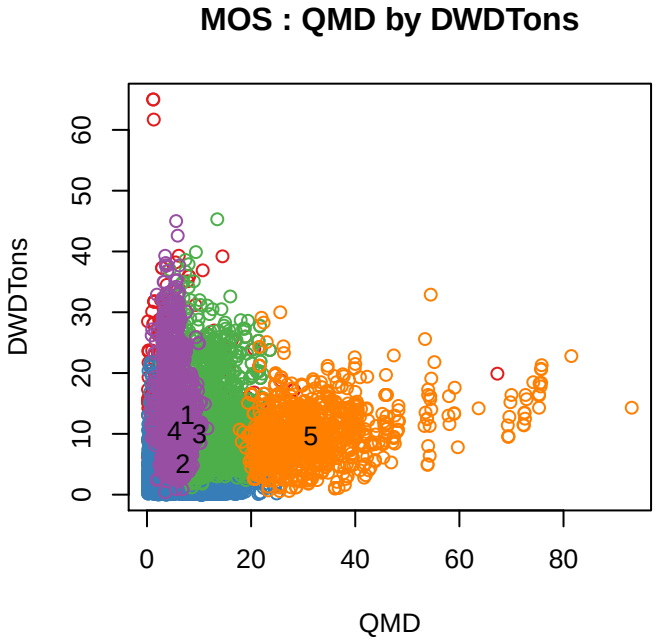
MOS : QMD by DWDTons
DWDTons
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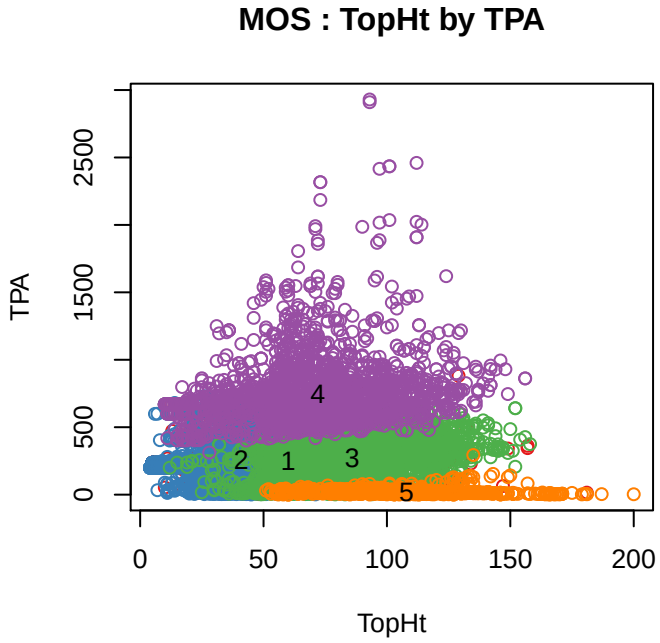
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TopHt
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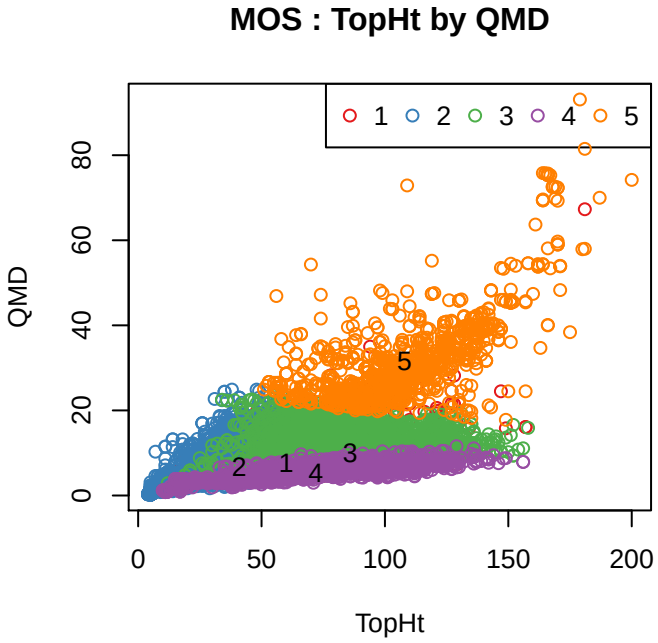
MOS : TopHt by QMD
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QMD
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TopHt
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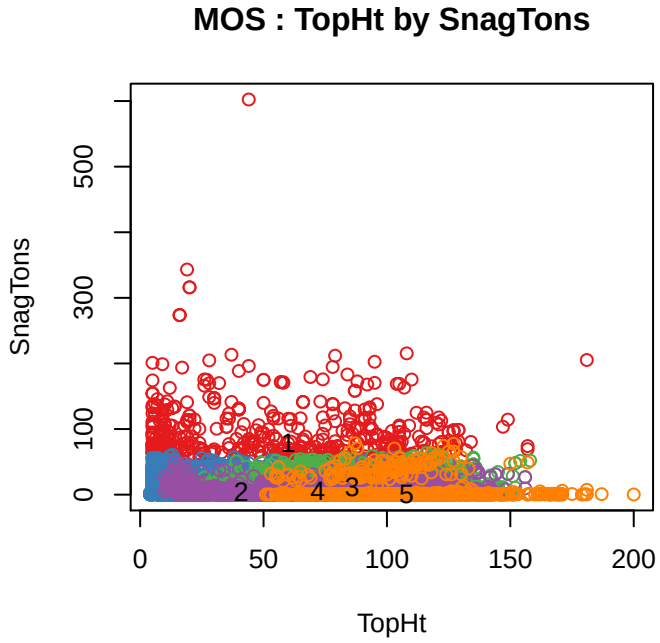
MOS : TopHt by SnagTons
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TopHt
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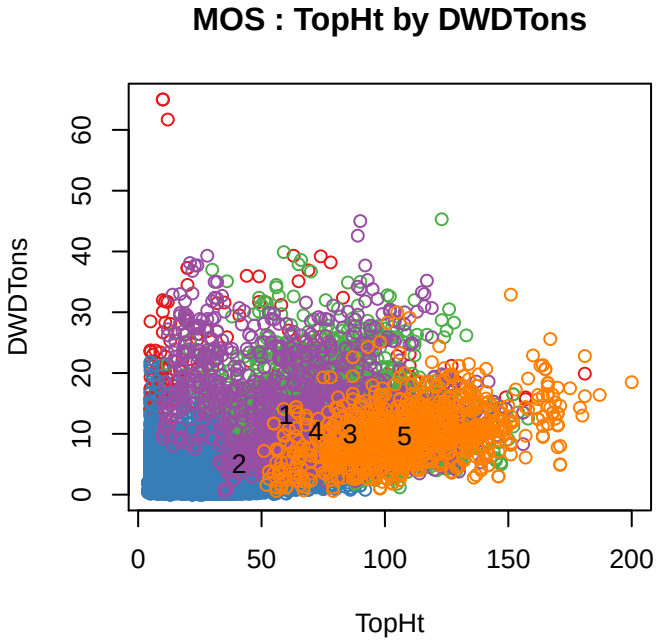
MOS : TopHt by DWDTons
DWDTons
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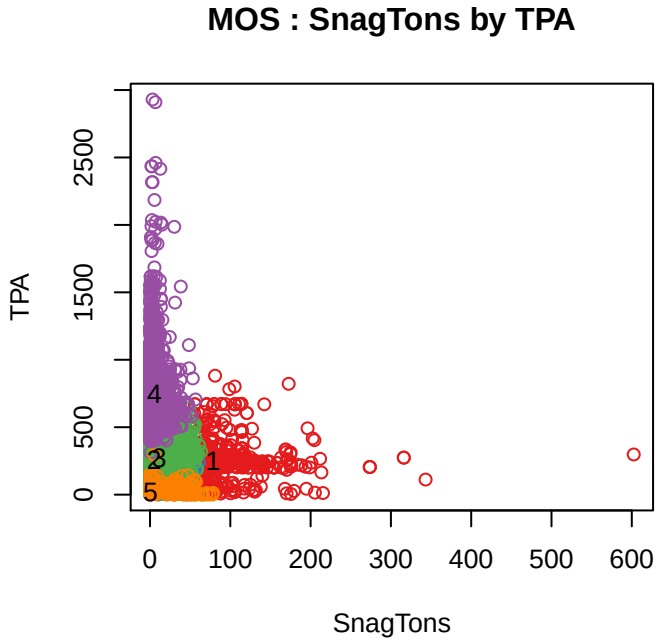
MOS : SnagTons by TPA
TPA
SnagTons
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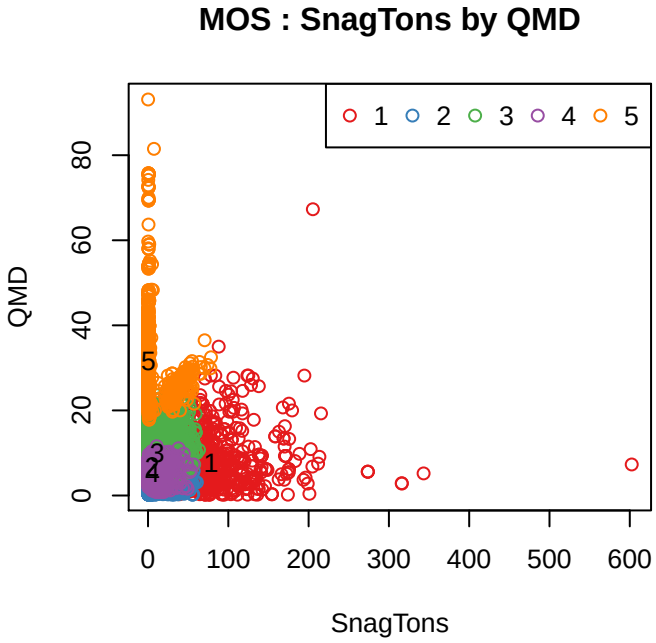
MOS : SnagTons by QMD
QMD
SnagTons
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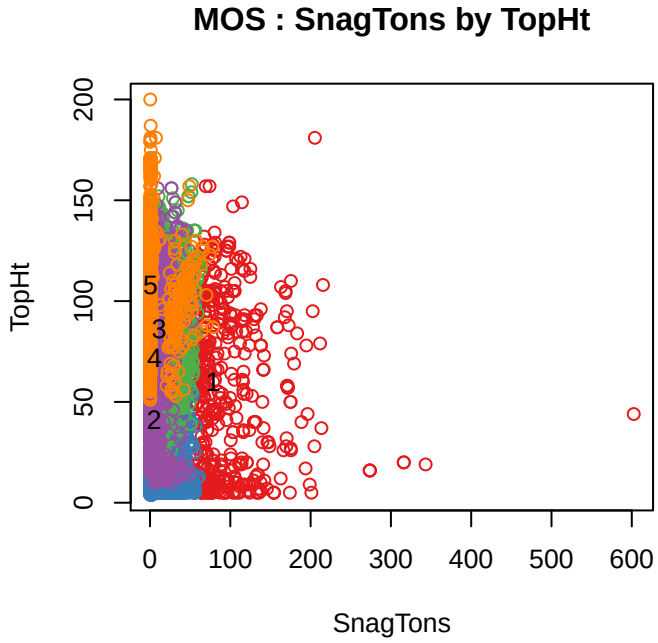
MOS : SnagTons by TopHt
TopHt
SnagTons
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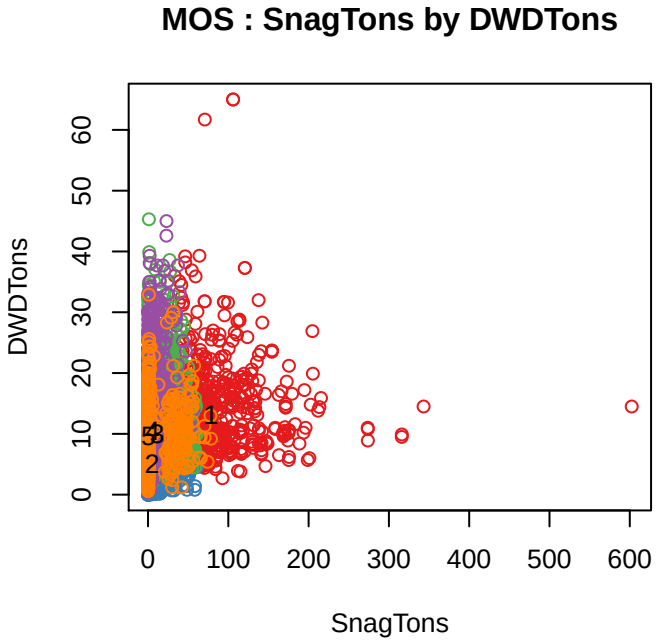
MOS : SnagTons by DWDTons
DWDTons
SnagTons
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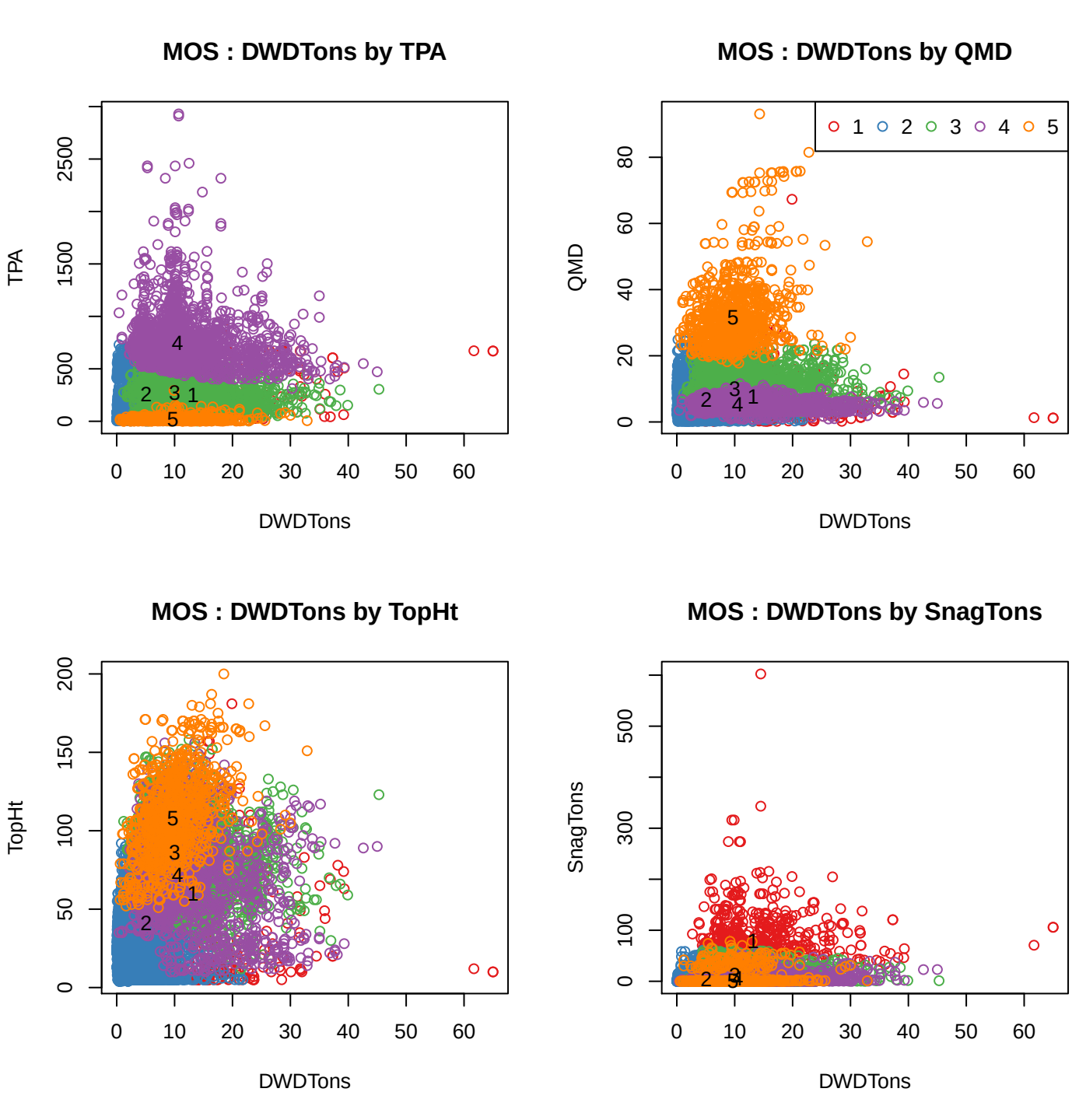
MOS : DWDTons by TPA
TPA
DWDTons
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MOS : DWDTons by QMD
QMD
DWDTons
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MOS : DWDTons by TopHt
TopHt
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MOS : DWDTons by SnagTons
SnagTons
DWDTons
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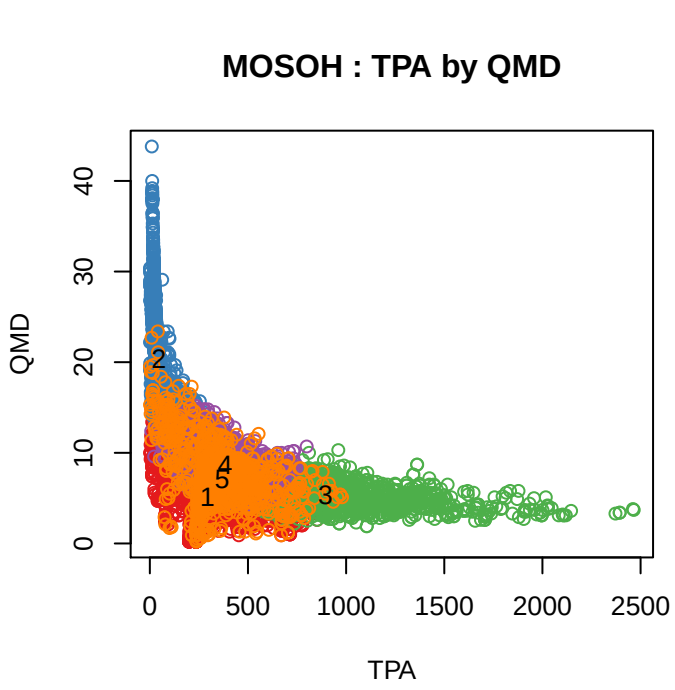
MOSOH : TPA by QMD
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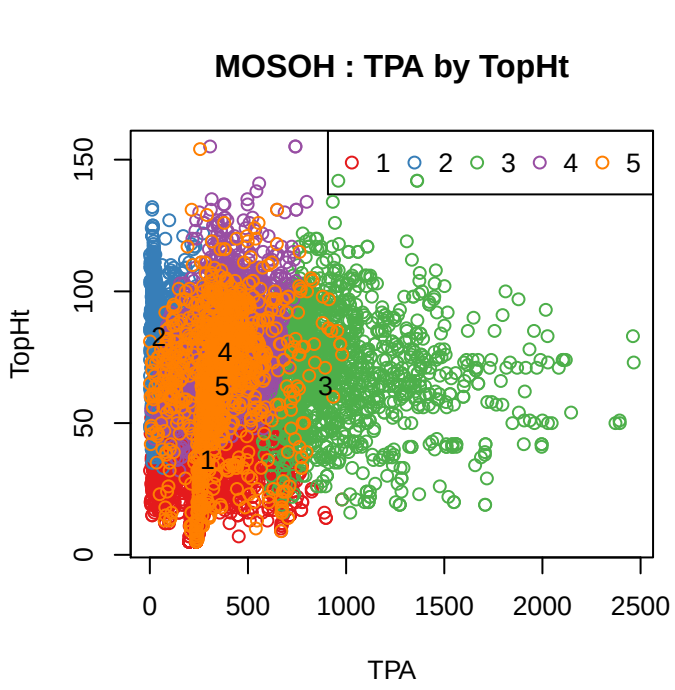
MOSOH : TPA by TopHt
TopHt
TPA
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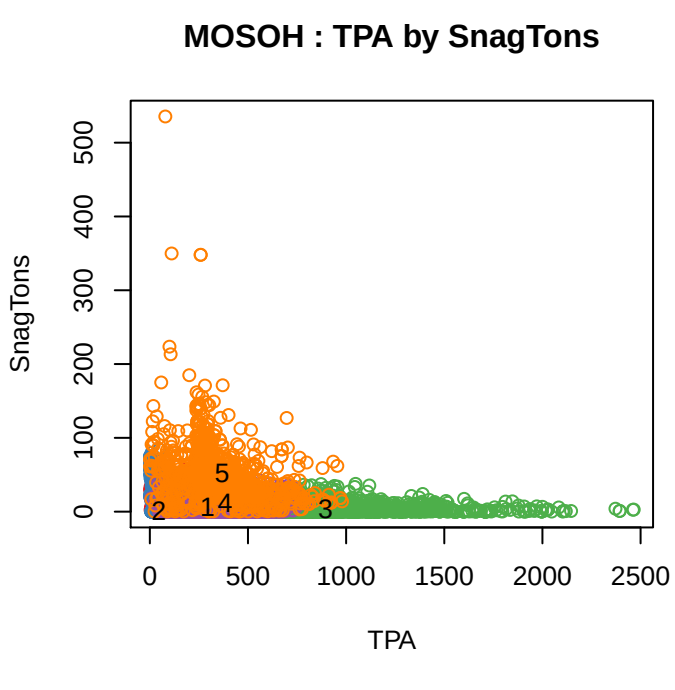
MOSOH : TPA by SnagTons
SnagTons
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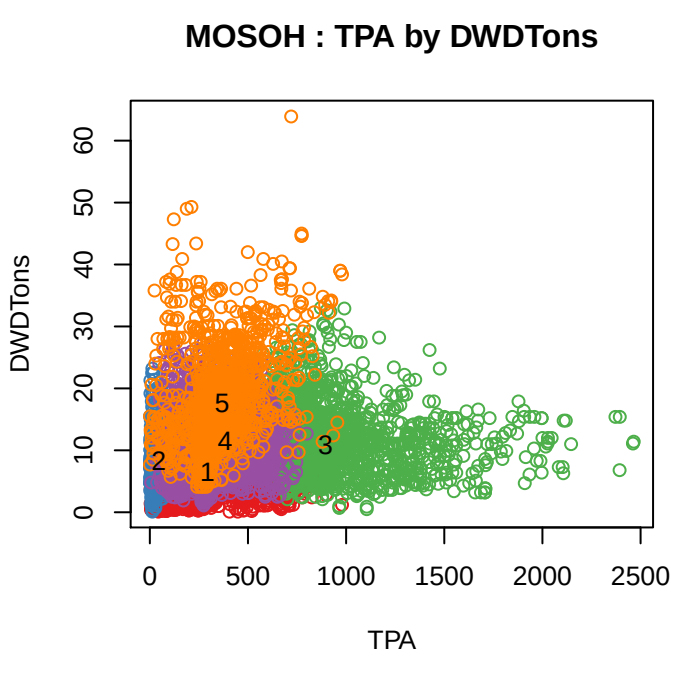
MOSOH : TPA by DWDTons
DWDTons
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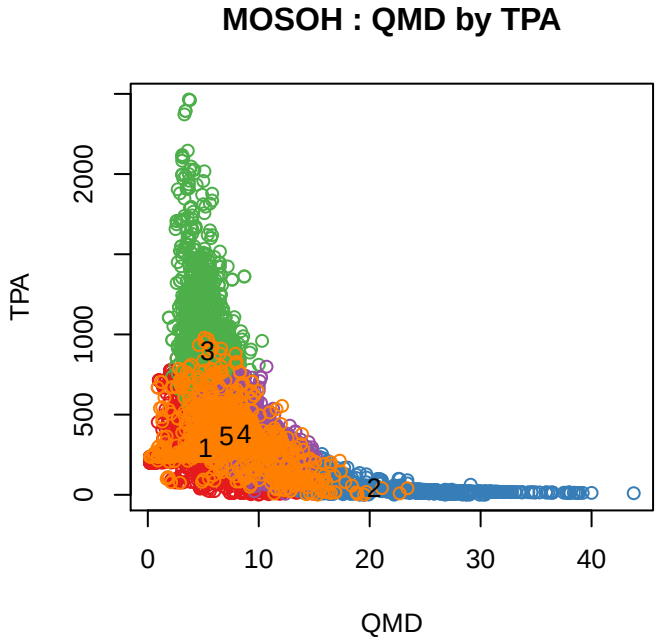
MOSOH : QMD by TPA
TPA
QMD
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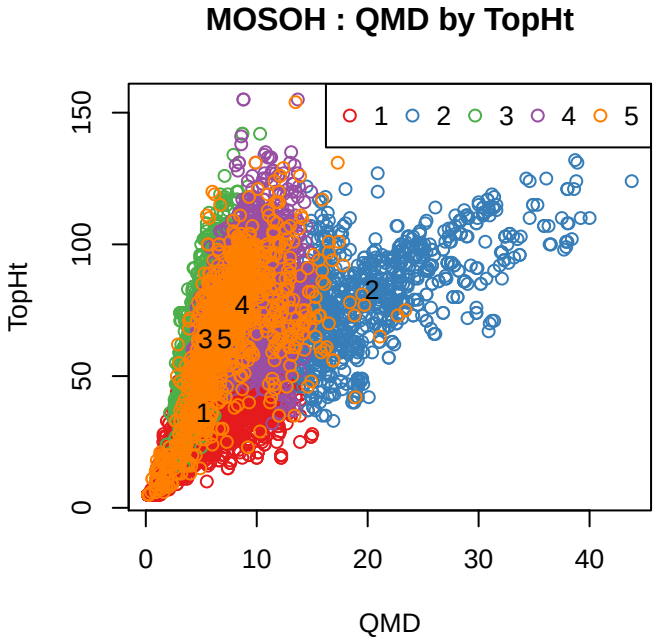
MOSOH : QMD by TopHt
TopHt
QMD
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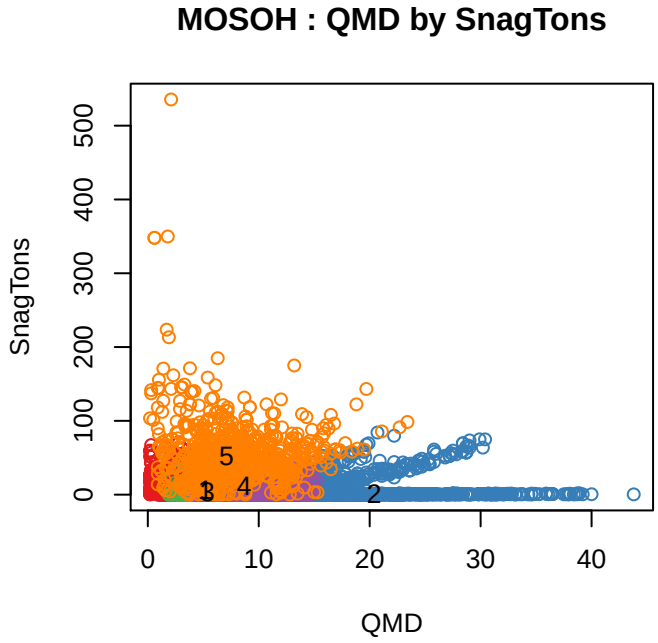
MOSOH : QMD by SnagTons
SnagTons
QMD
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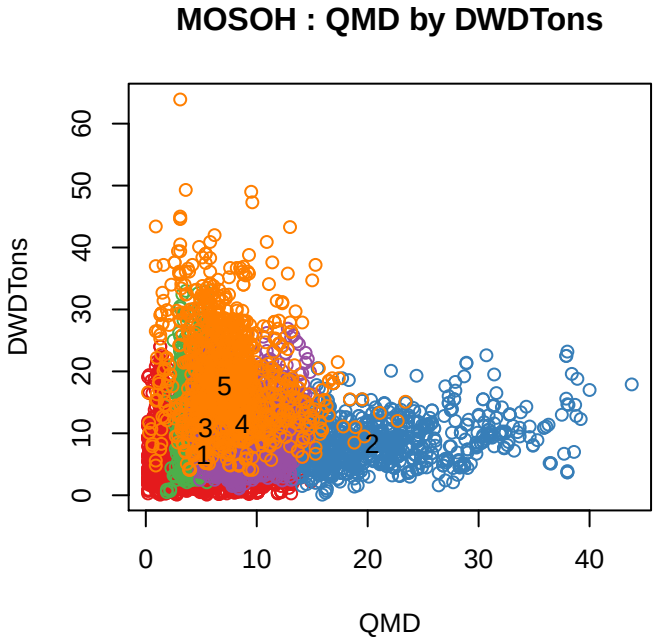
MOSOH : QMD by DWDTons
DWDTons
QMD
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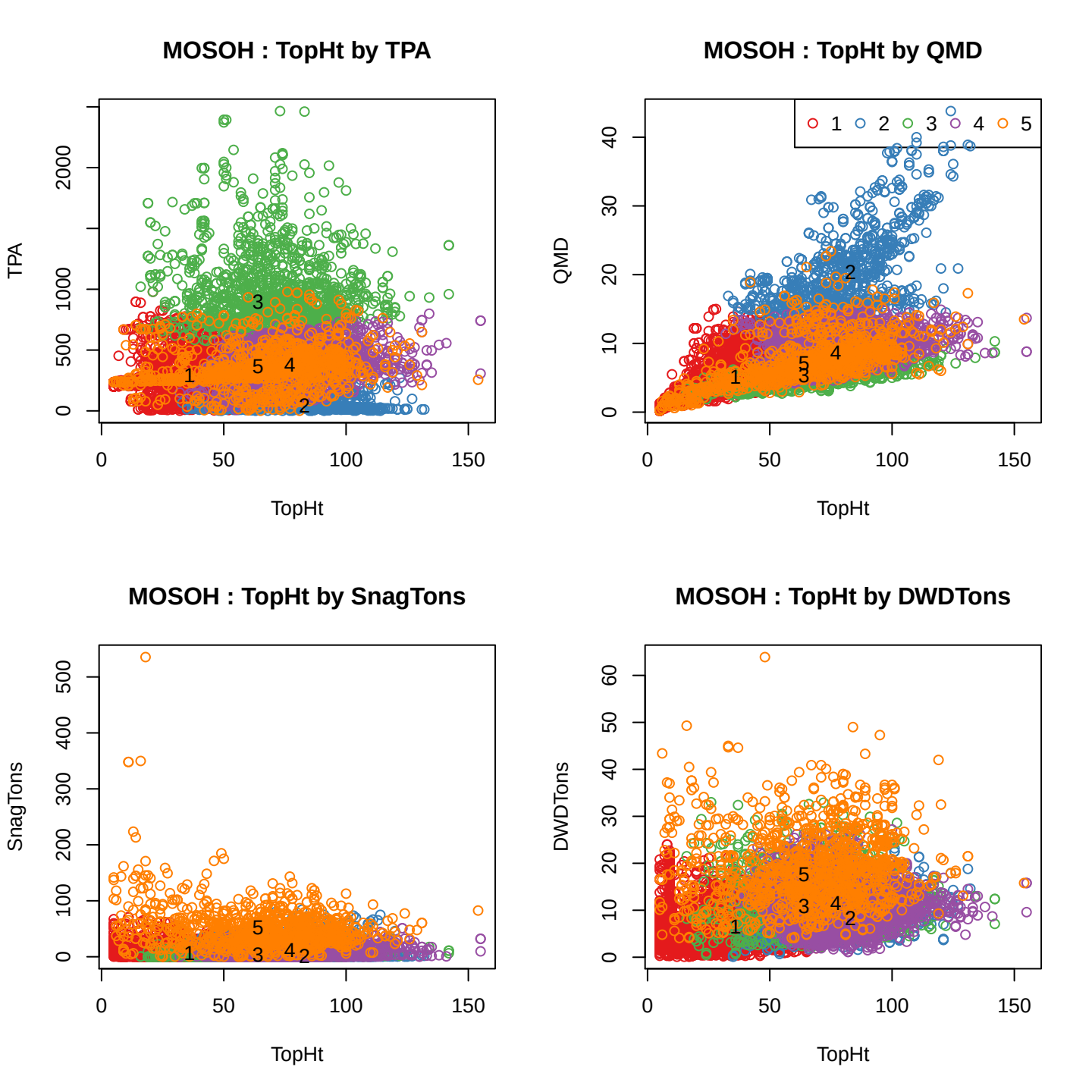
MOSOH : TopHt by TPA
TPA
TopHt
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MOSOH : TopHt by QMD
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TopHt
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MOSOH : TopHt by SnagTons
SnagTons
TopHt
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MOSOH : TopHt by DWDTons
DWDTons
TopHt
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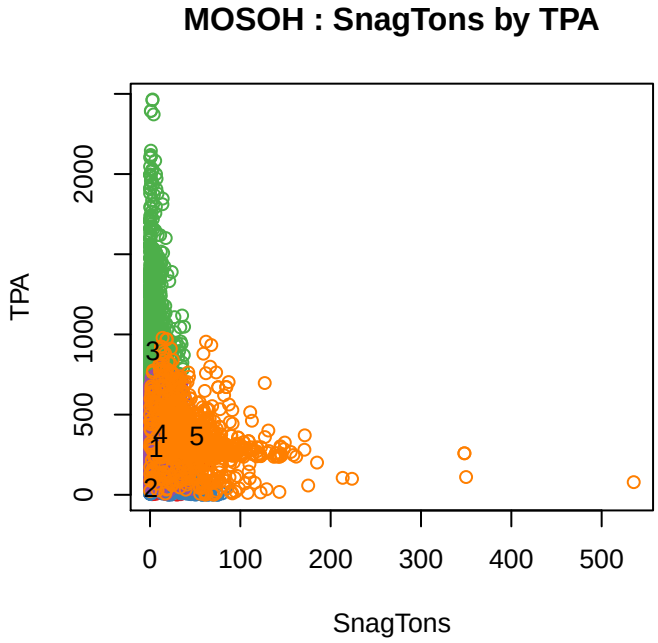
MOSOH : SnagTons by TPA
TPA
SnagTons
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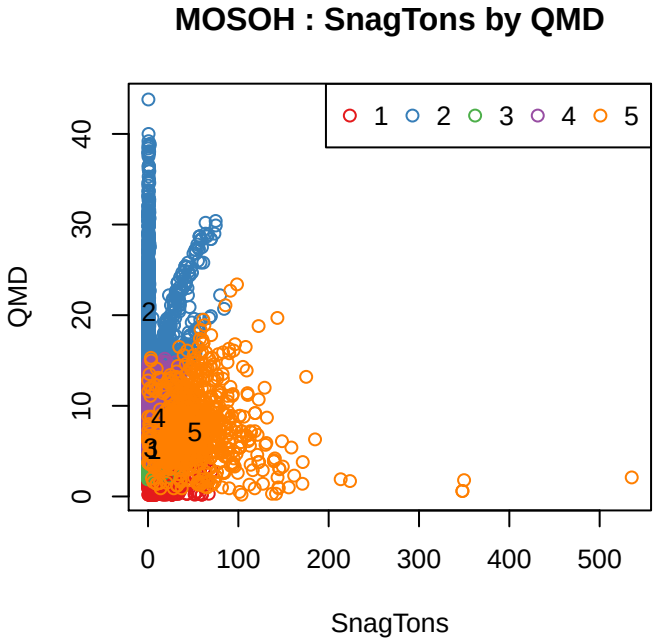
MOSOH : SnagTons by QMD
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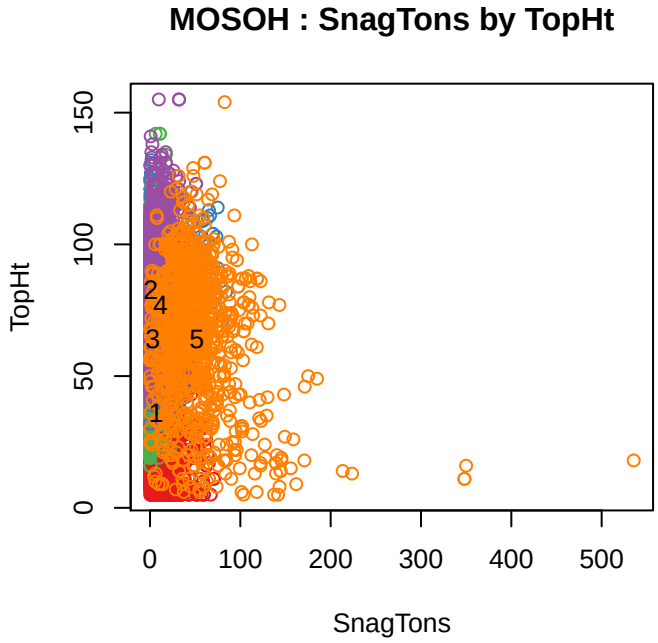
MOSOH : SnagTons by TopHt
TopHt
SnagTons
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200
300
400
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4
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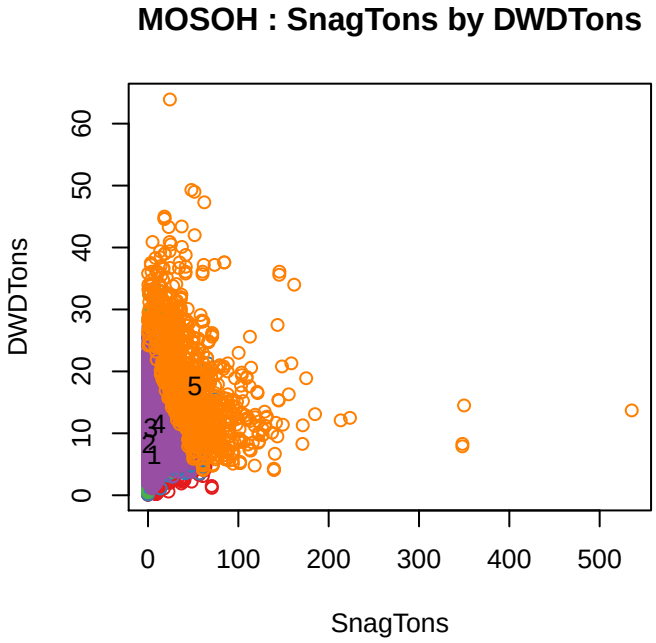
MOSOH : SnagTons by DWDTons
DWDTons
SnagTons
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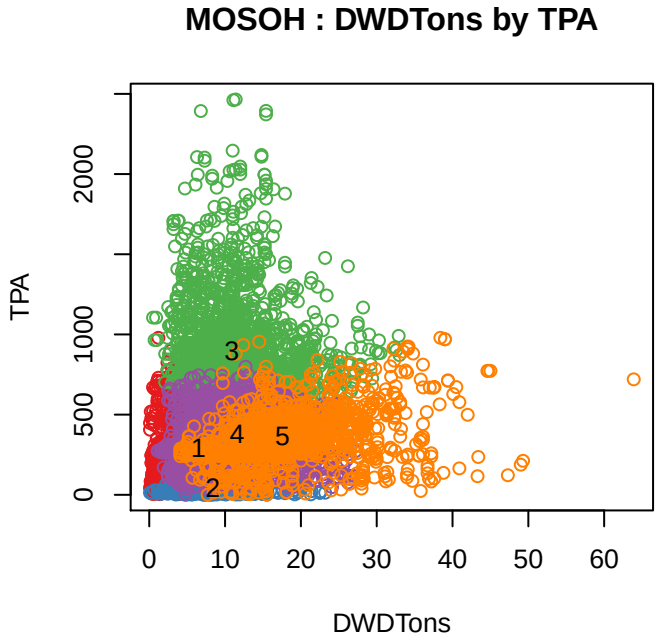
MOSOH : DWDTons by TPA
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DWDTons
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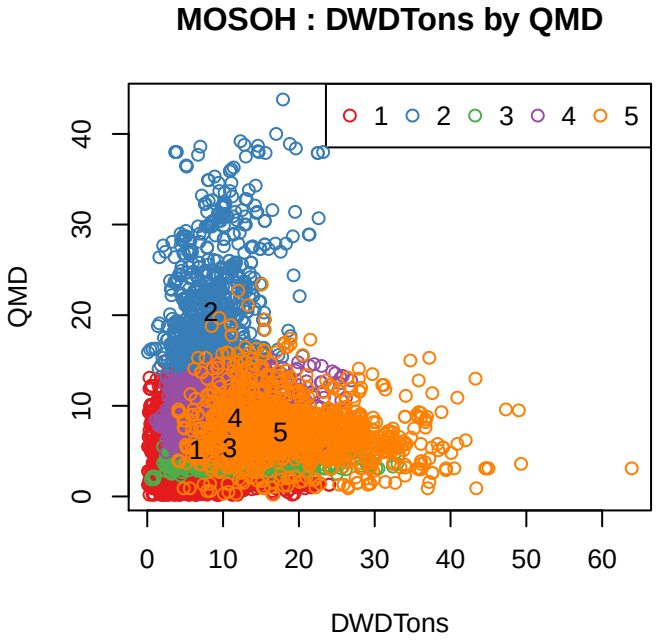
MOSOH : DWDTons by QMD
QMD
DWDTons
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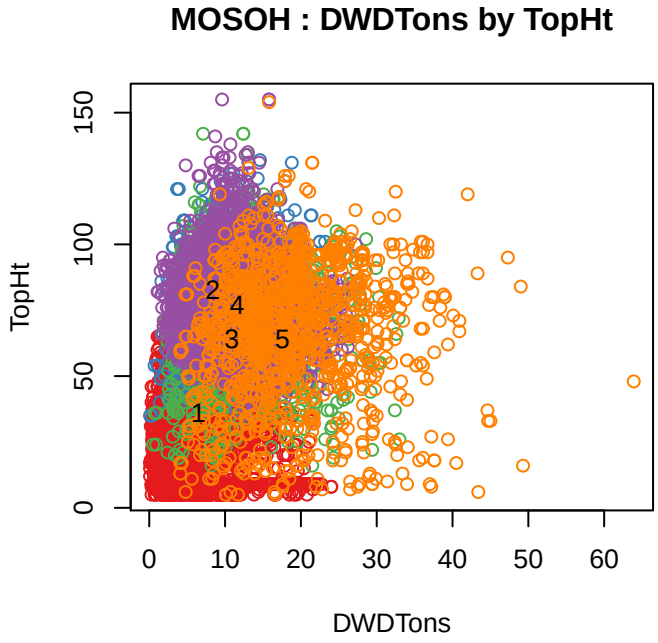
MOSOH : DWDTons by TopHt
TopHt
DWDTons
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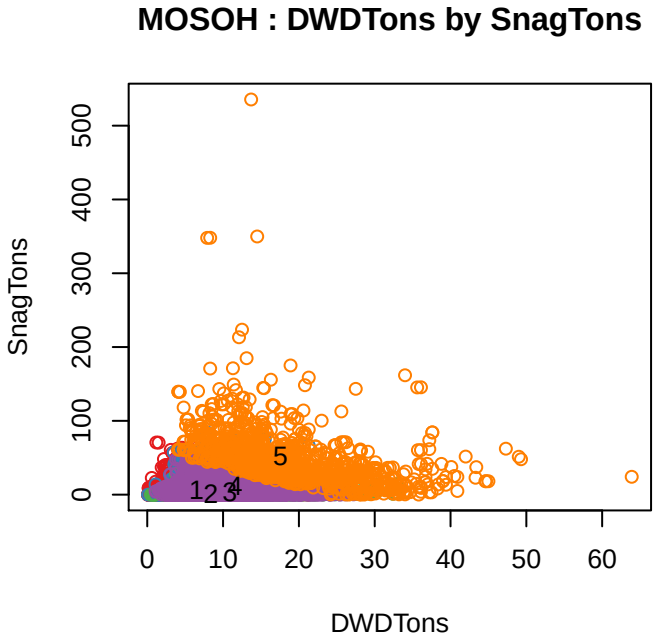
MOSOH : DWDTons by SnagTons
SnagTons
DWDTons
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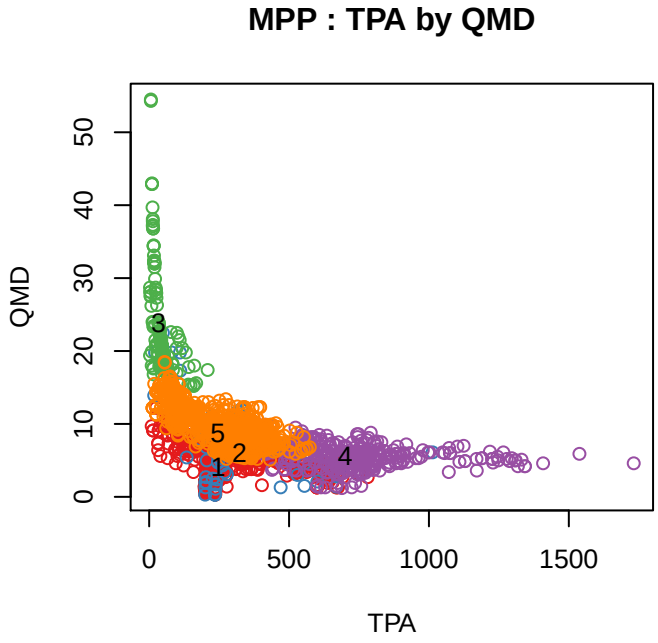
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QMD
TPA
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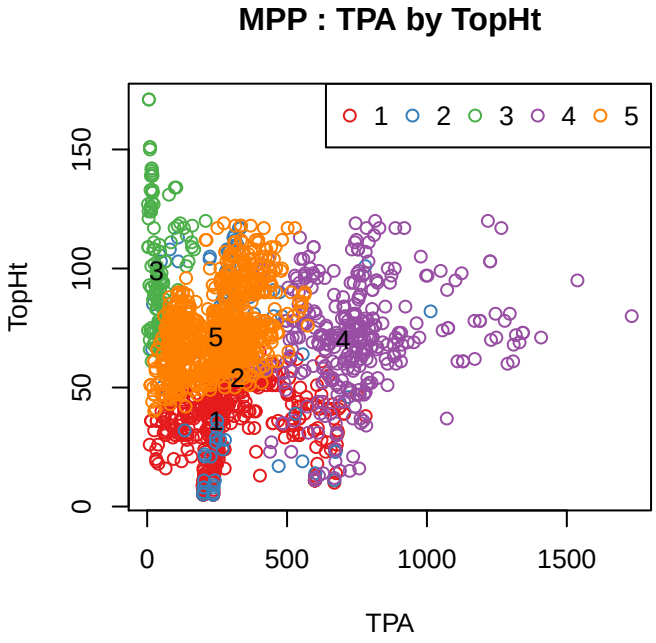
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TopHt
TPA
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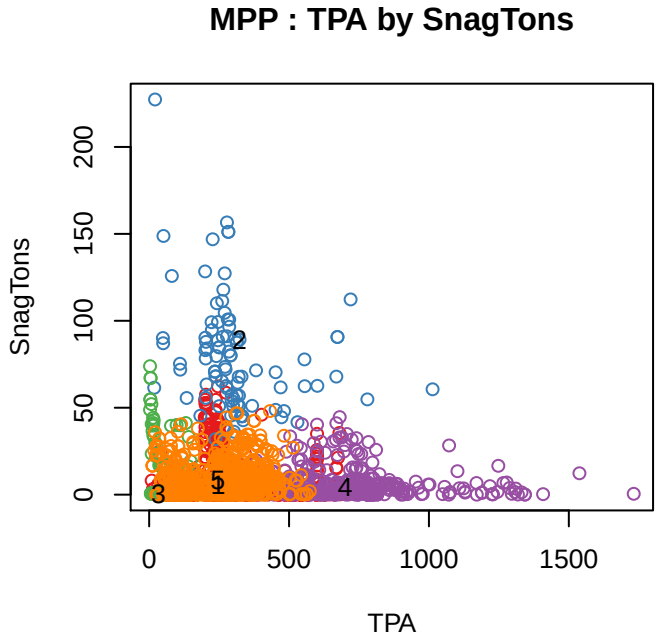
MPP : TPA by SnagTons
SnagTons
TPA
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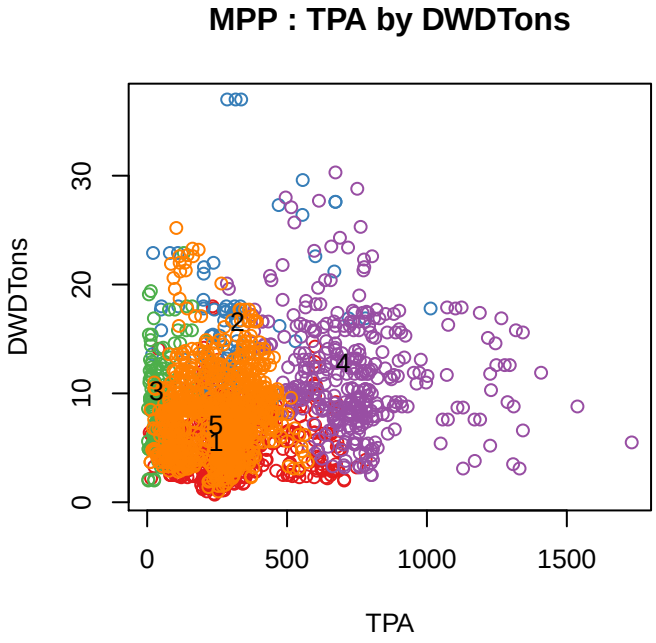
MPP : TPA by DWDTons
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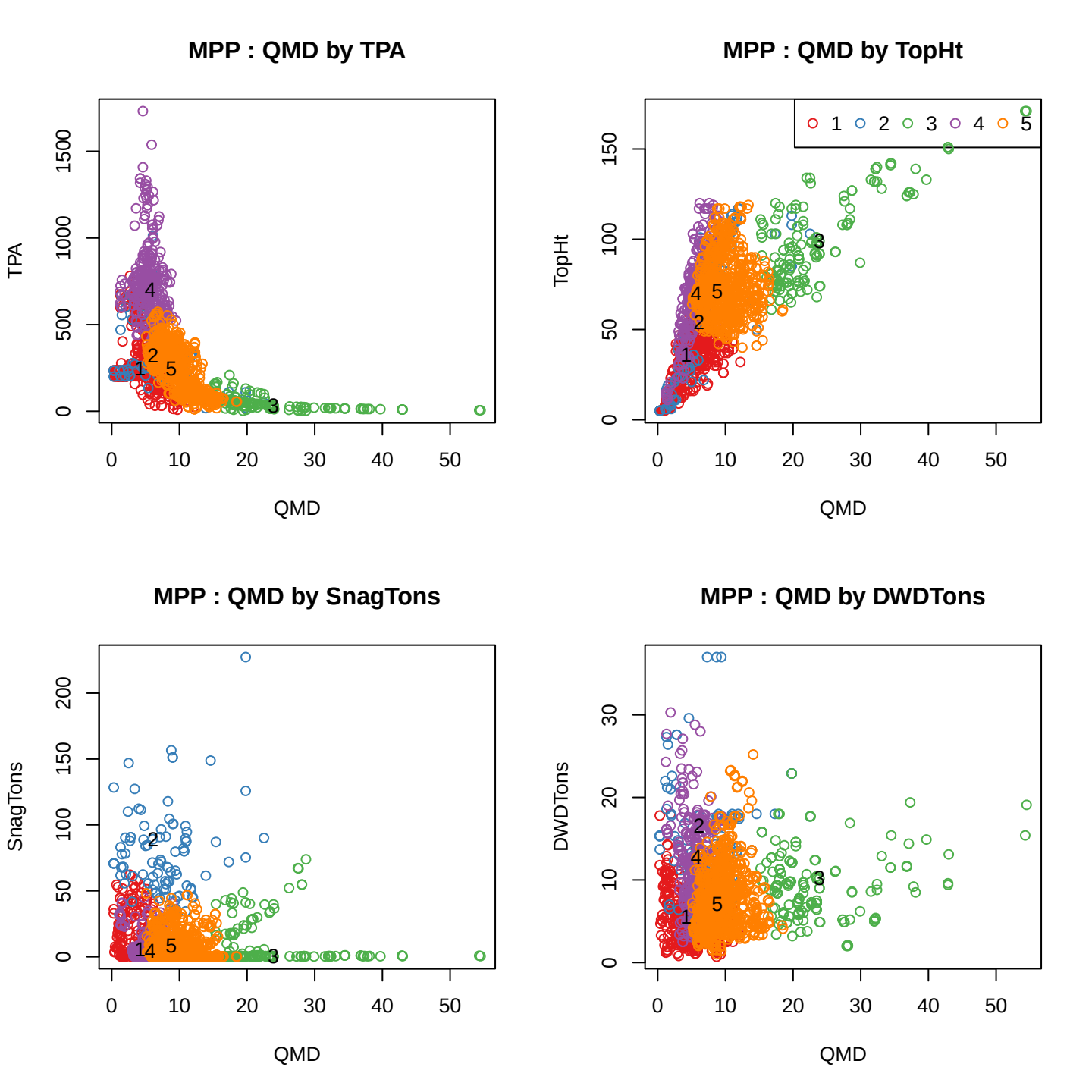
MPP : QMD by TPA
TPA
QMD
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MPP : QMD by TopHt
TopHt
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MPP : QMD by SnagTons
SnagTons
QMD
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MPP : QMD by DWDTons
DWDTons
QMD
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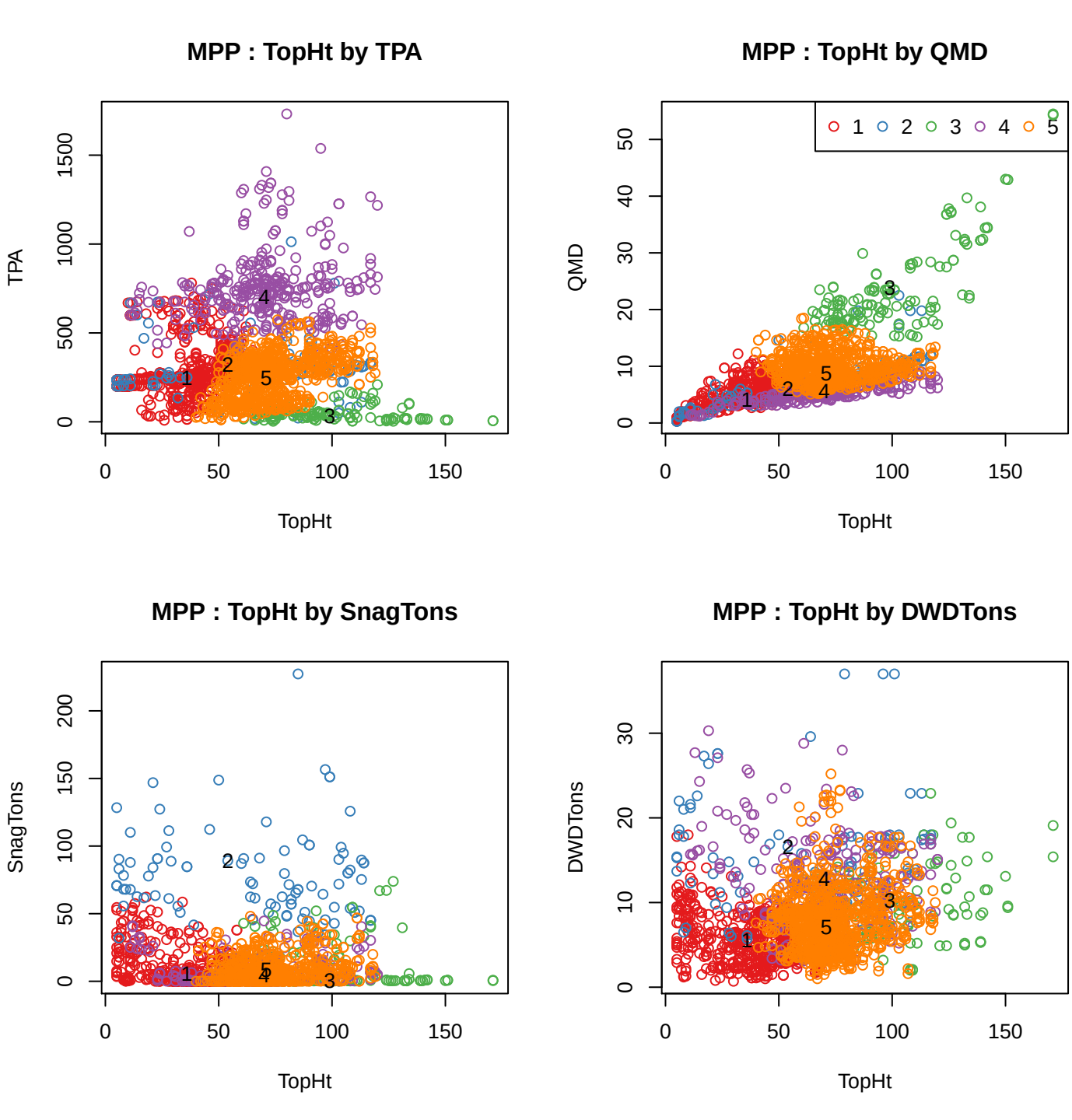
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MPP : TopHt by QMD
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MPP : TopHt by SnagTons
SnagTons
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MPP : TopHt by DWDTons
DWDTons
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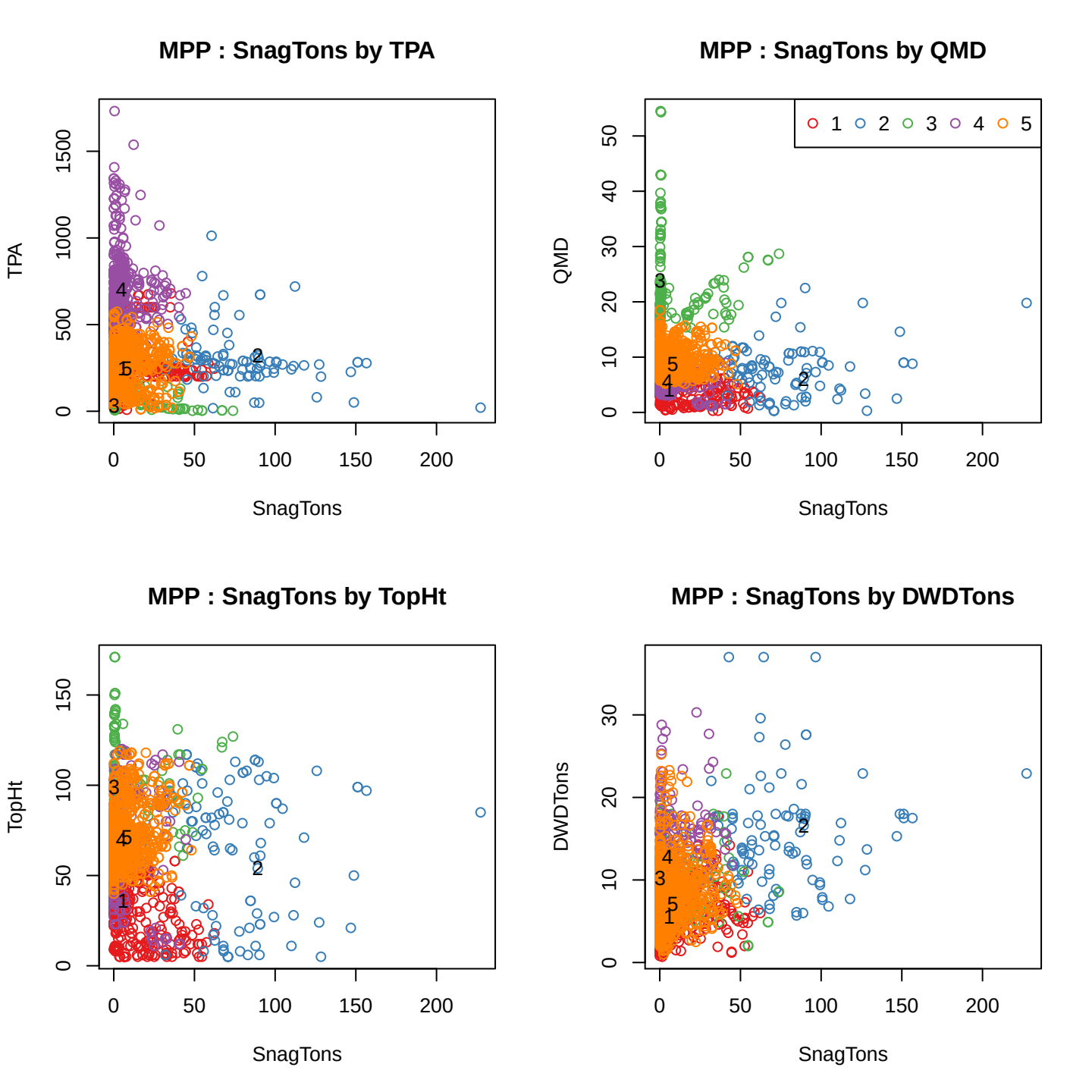
MPP : SnagTons by TPA
TPA
SnagTons
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MPP : SnagTons by QMD
QMD
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MPP : SnagTons by TopHt
TopHt
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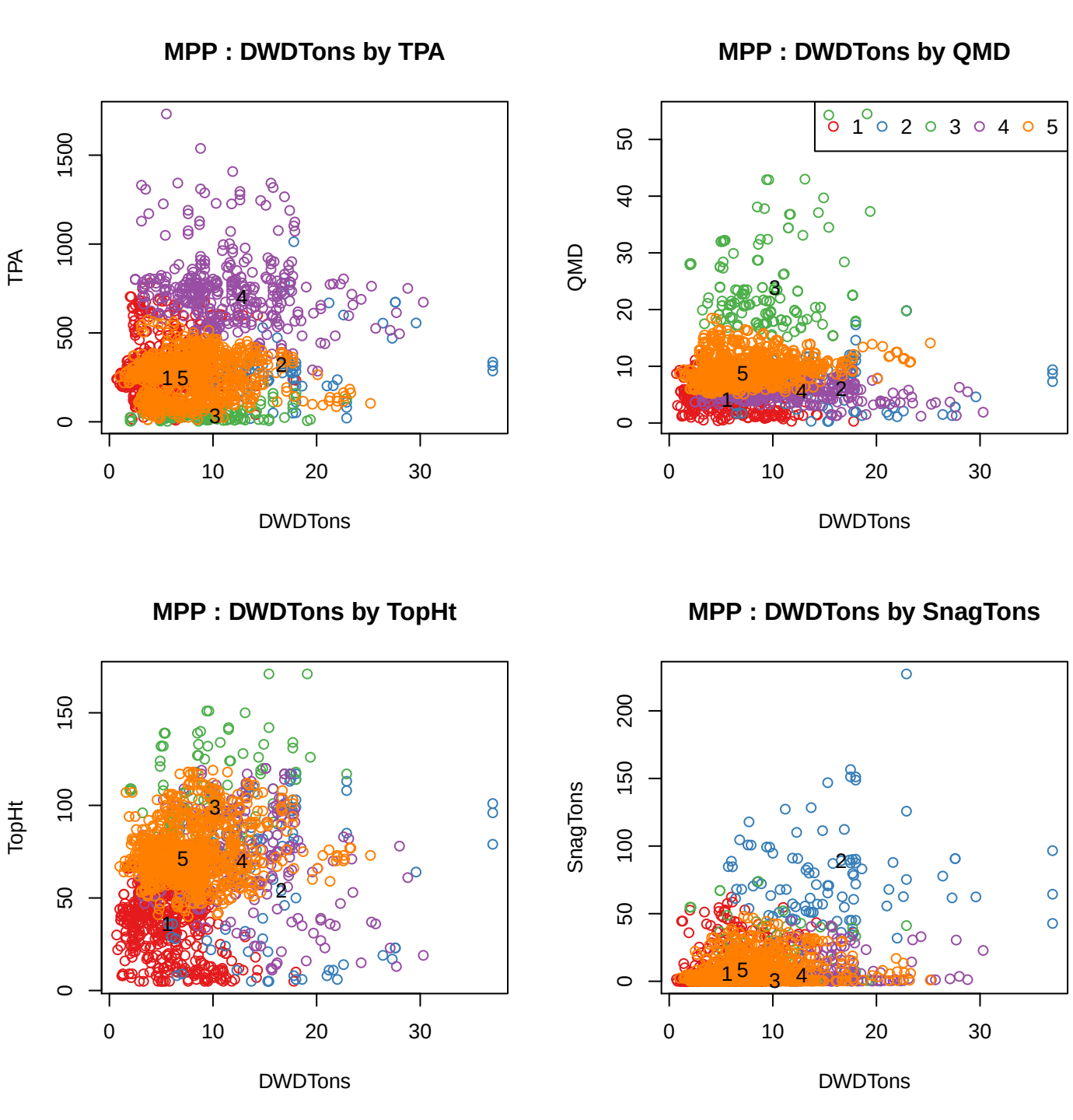
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DWDTons
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MPP : DWDTons by QMD
QMD
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MPP : DWDTons by TopHt
TopHt
DWDTons
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MPP : DWDTons by SnagTons
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DWDTons
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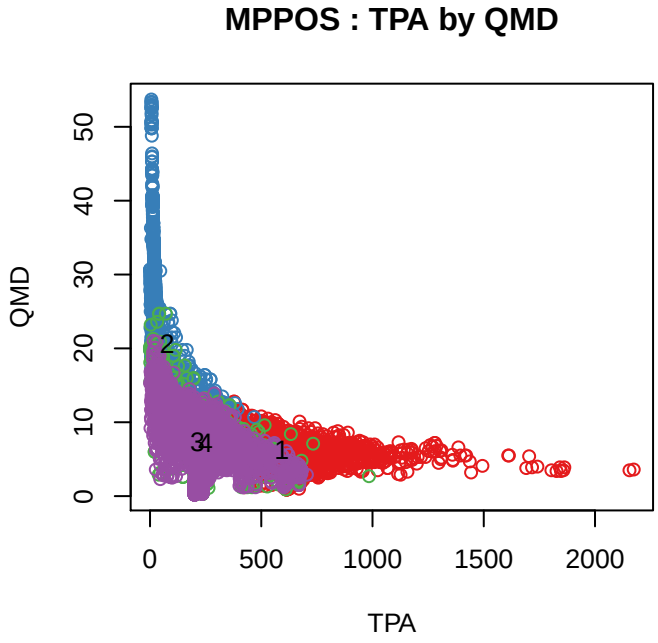
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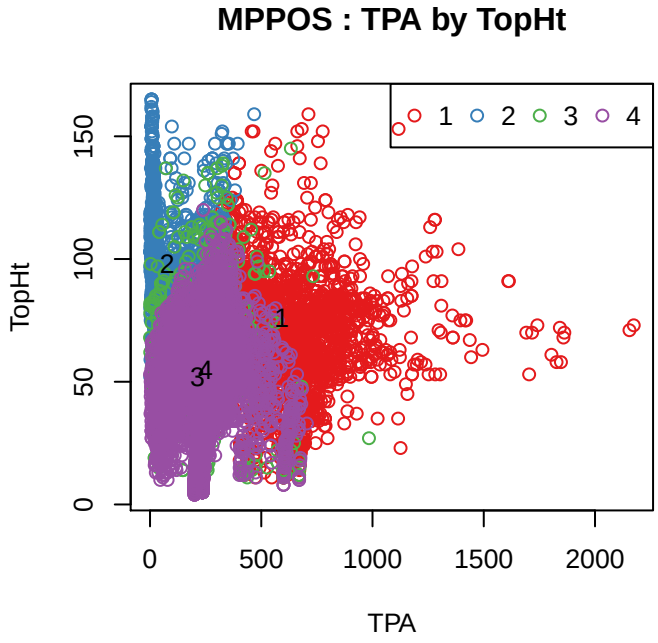
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TopHt
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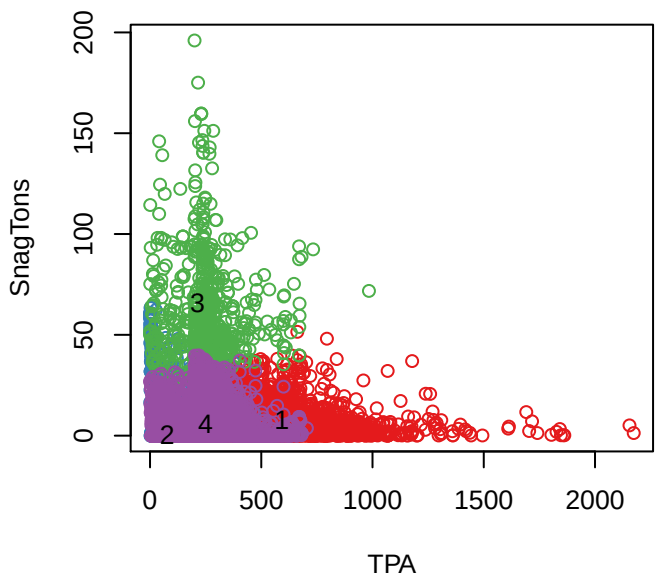
MPPOS : TPA by SnagTons
SnagTons
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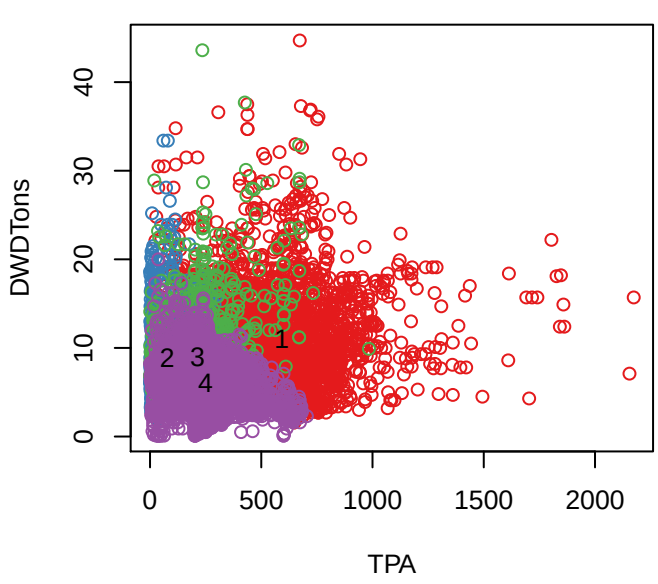
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DWDTons
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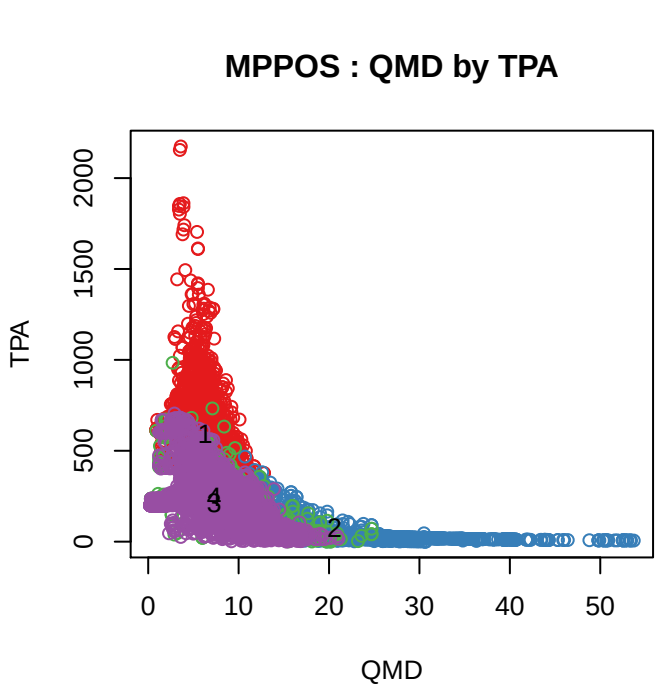
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QMD
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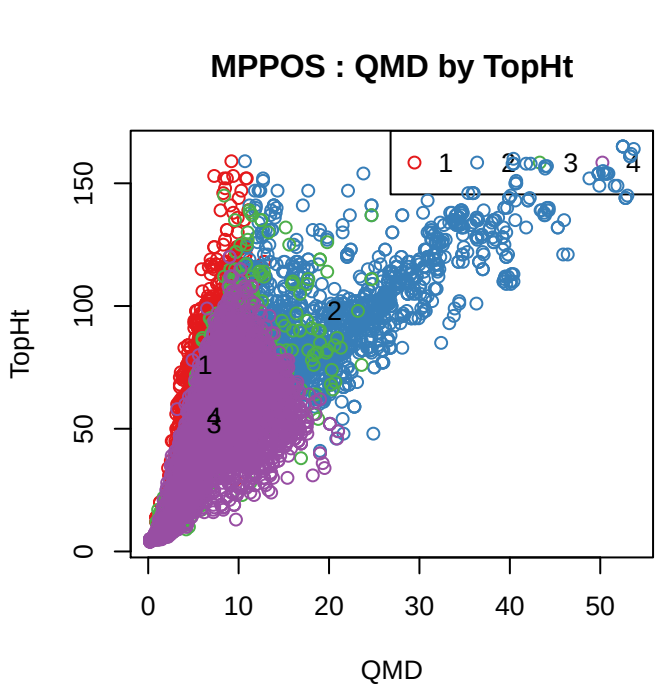
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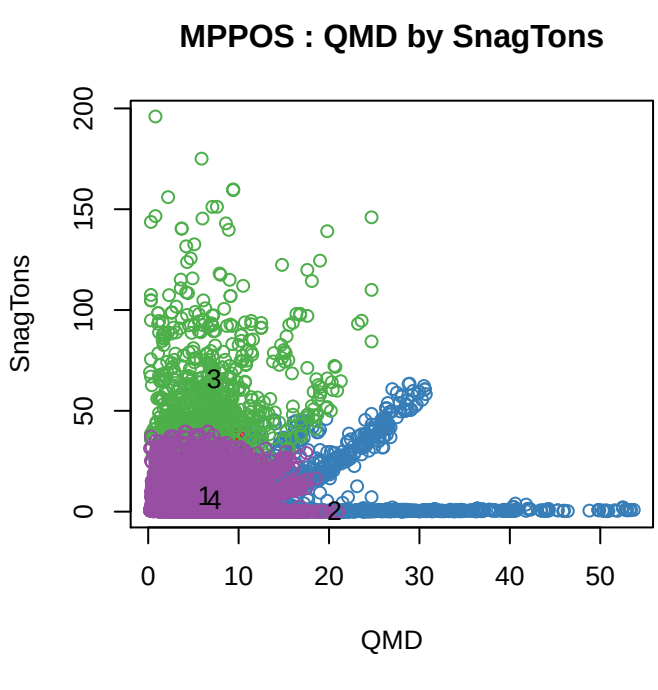
MPPOS : QMD by SnagTons
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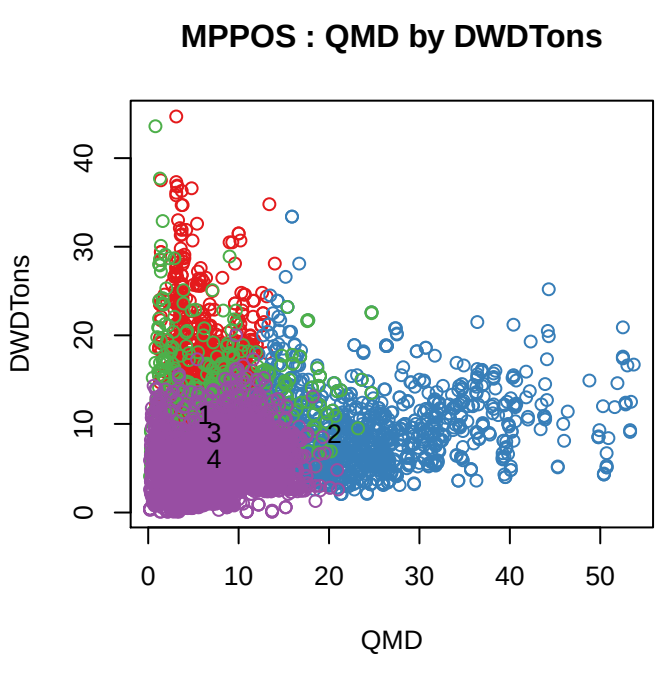
MPPOS : QMD by DWDTons
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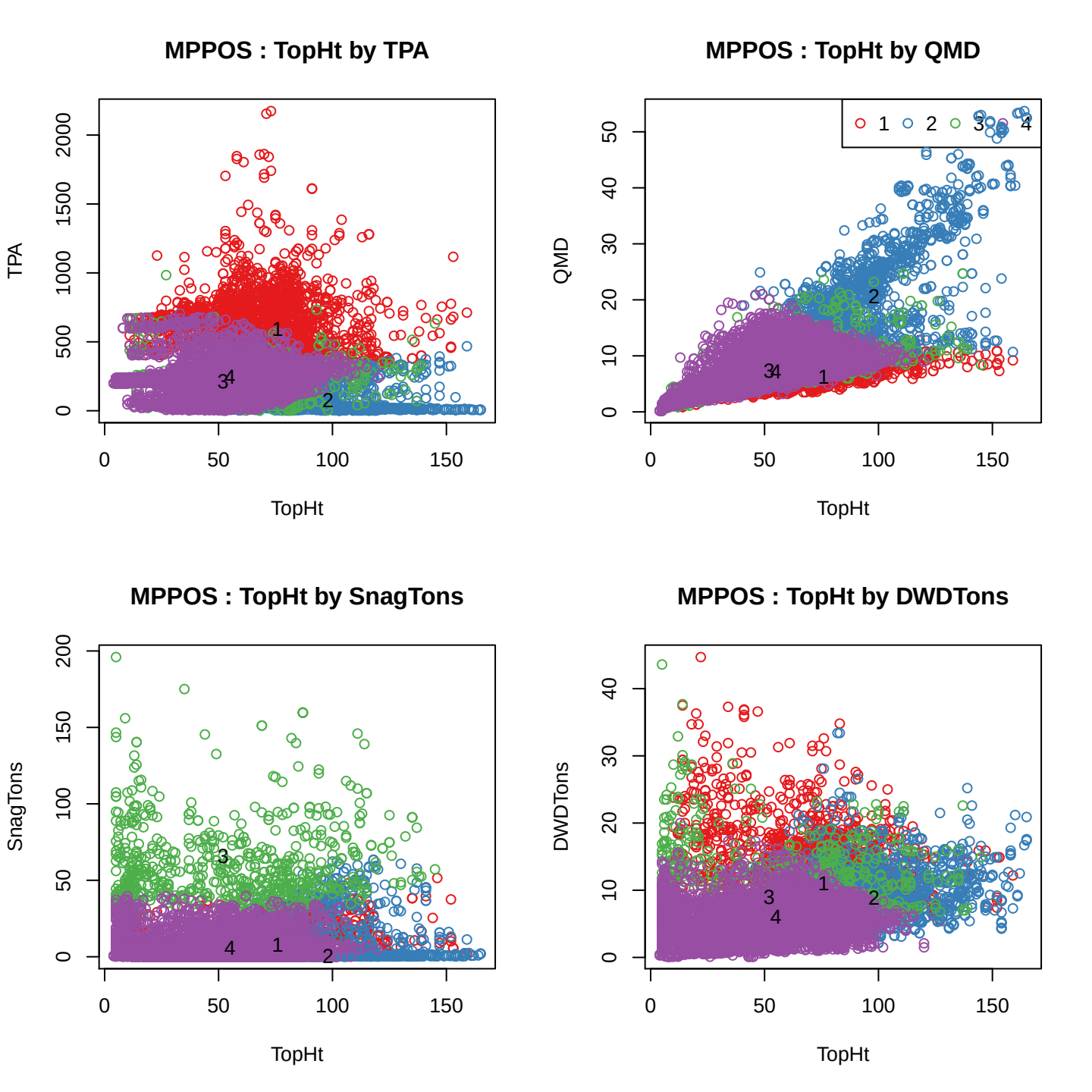
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MPPOS : TopHt by QMD
QMD
TopHt
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MPPOS : TopHt by SnagTons
SnagTons
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MPPOS : TopHt by DWDTons
DWDTons
TopHt
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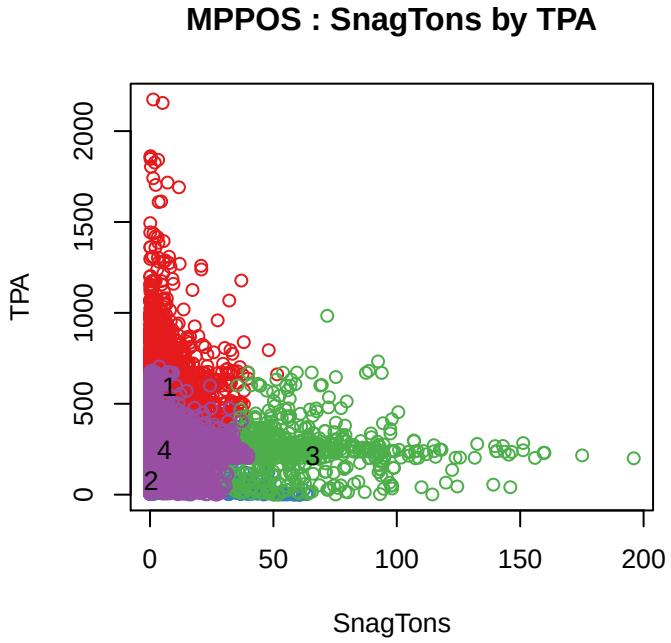
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SnagTons
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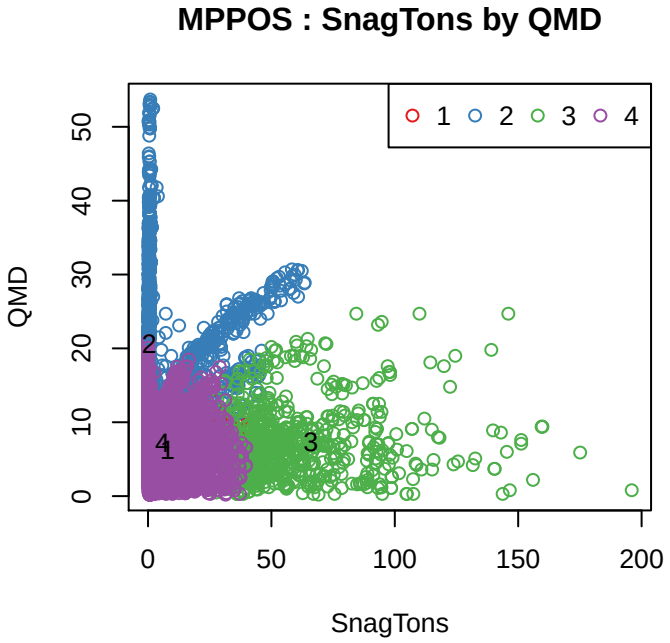
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SnagTons
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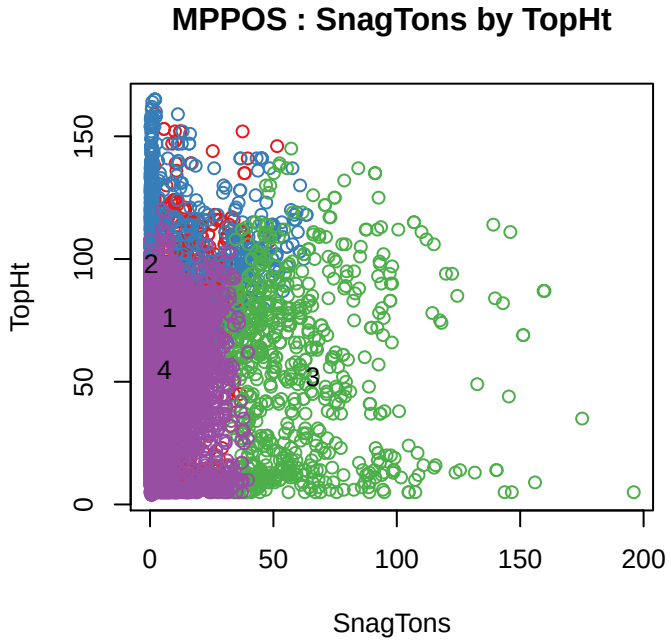
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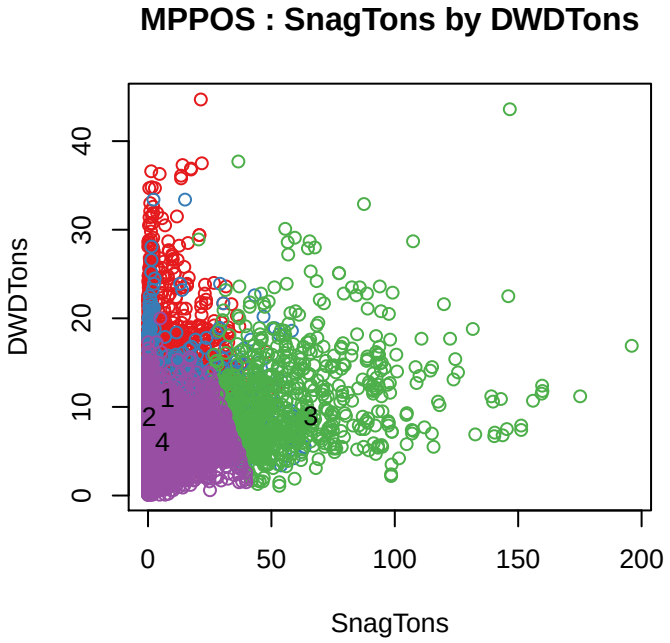
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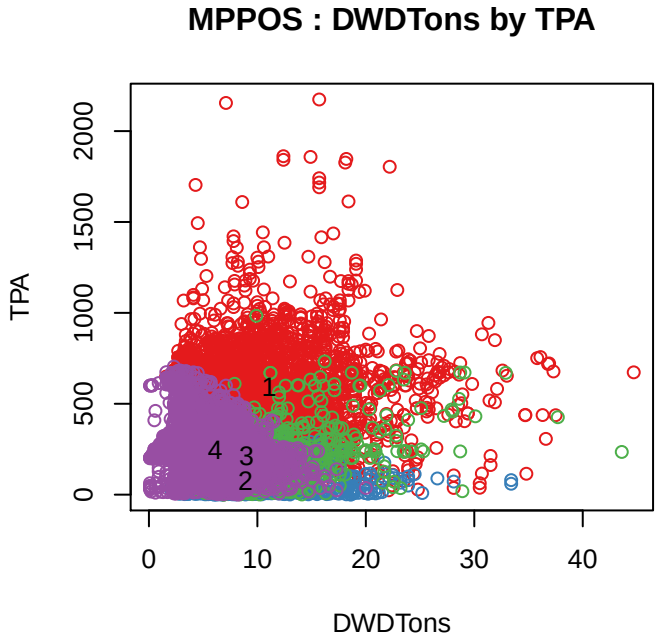
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DWDTons
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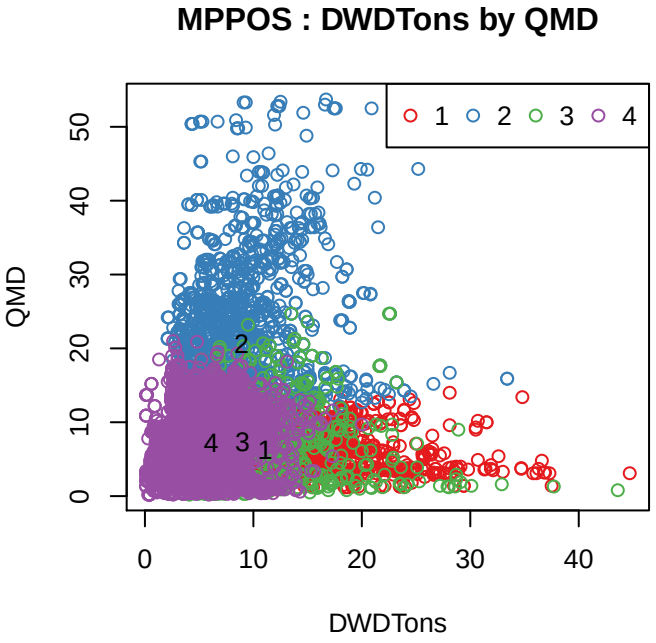
MPPOS : DWDTons by QMD
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DWDTons
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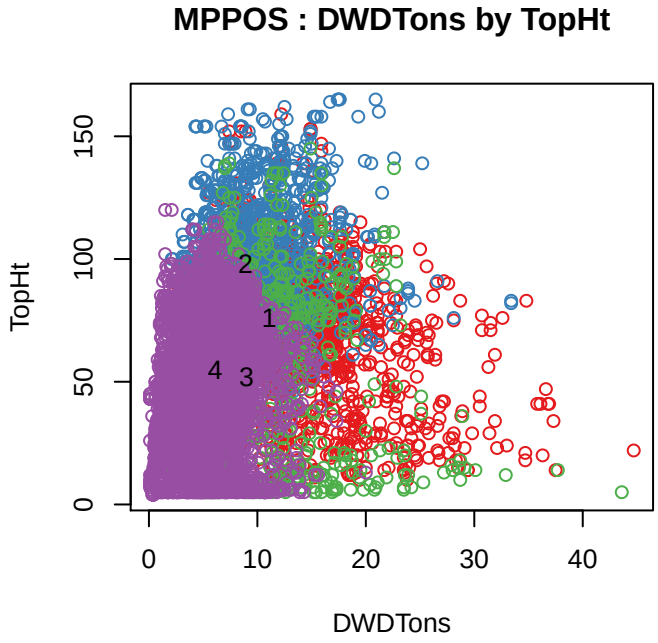
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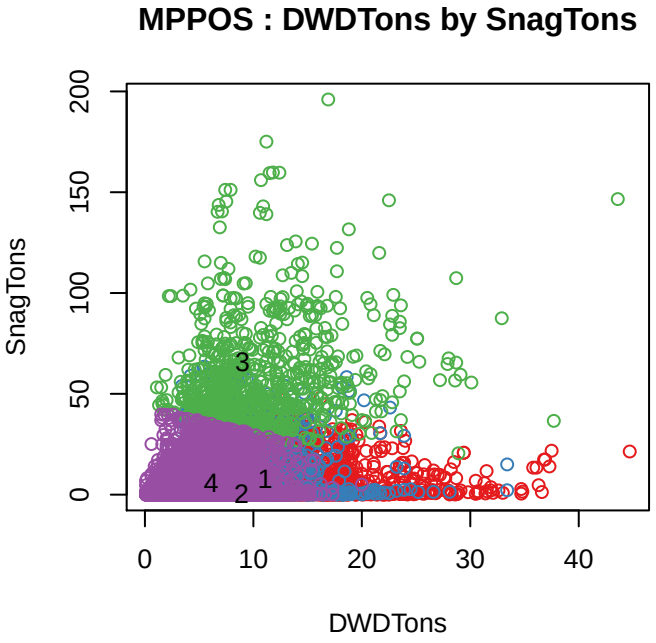
MPPOS : DWDTons by SnagTons
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DWDTons
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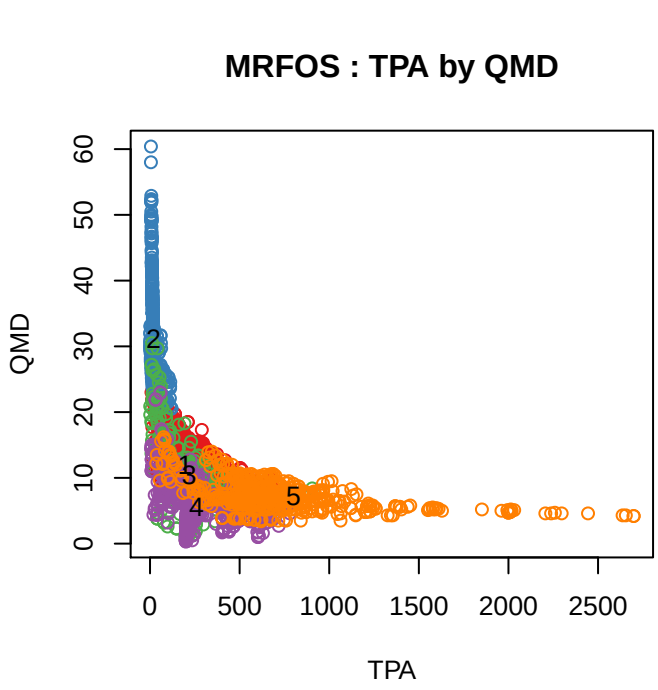
MRFOS : TPA by QMD
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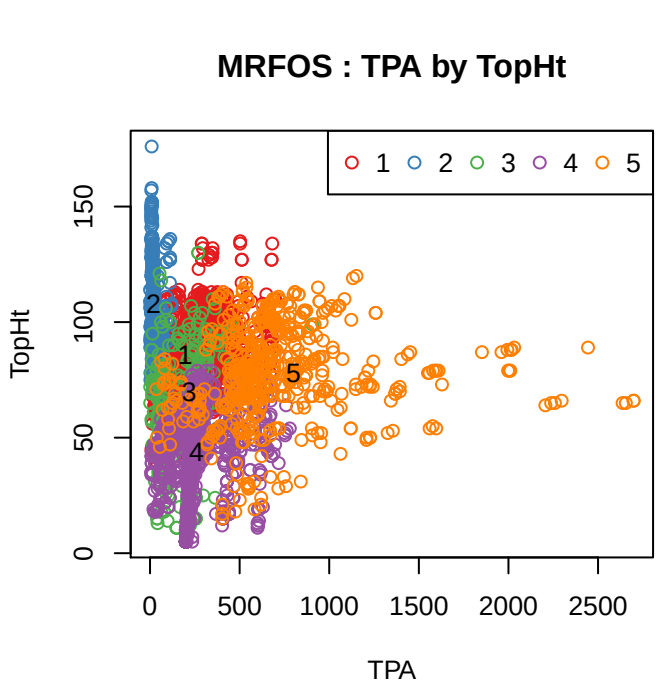
MRFOS : TPA by TopHt
TopHt
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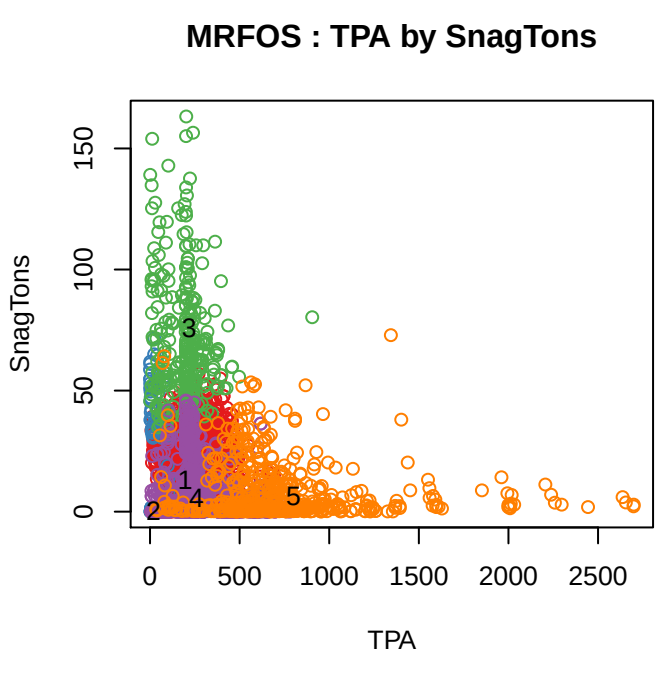
MRFOS : TPA by SnagTons
SnagTons
TPA
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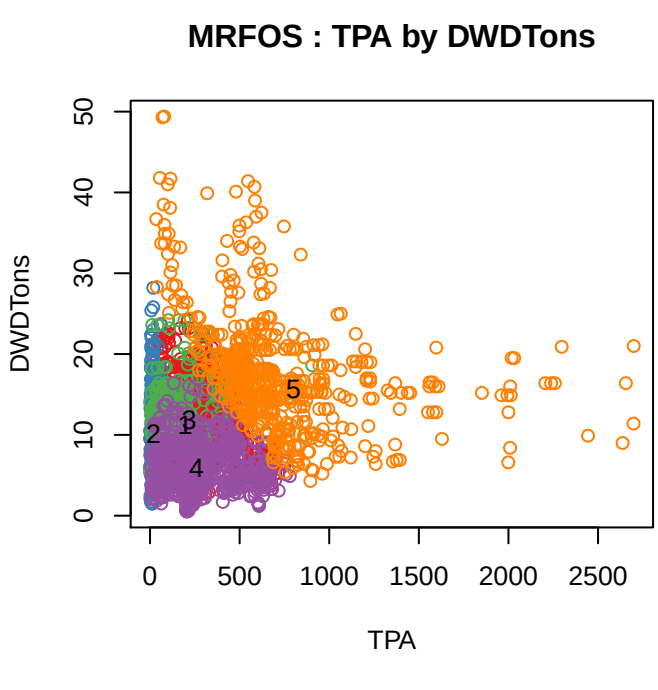
MRFOS : TPA by DWDTons
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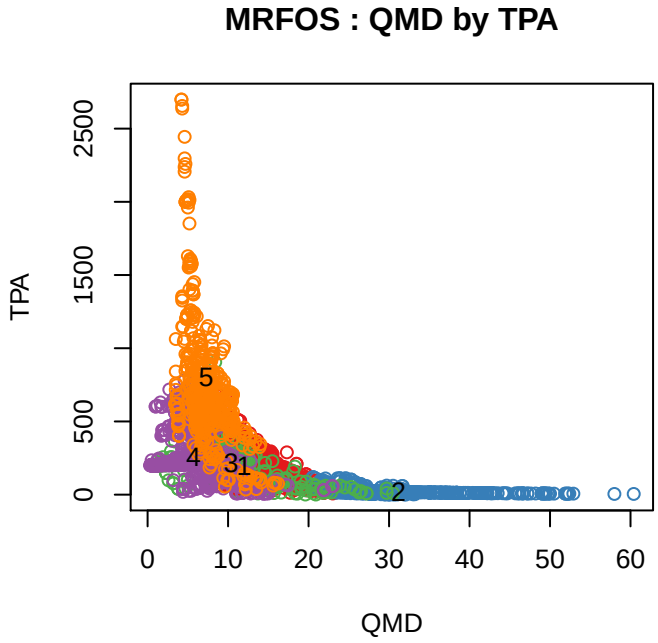
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TPA
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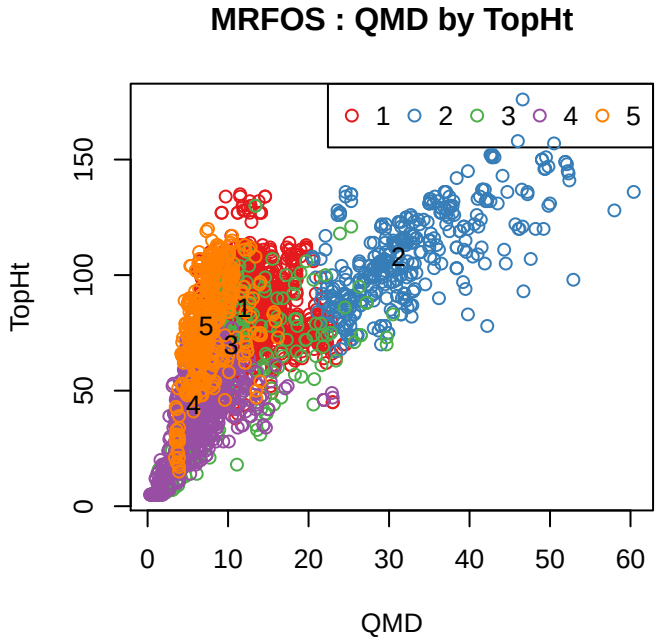
MRFOS : QMD by TopHt
1
2
3
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TopHt
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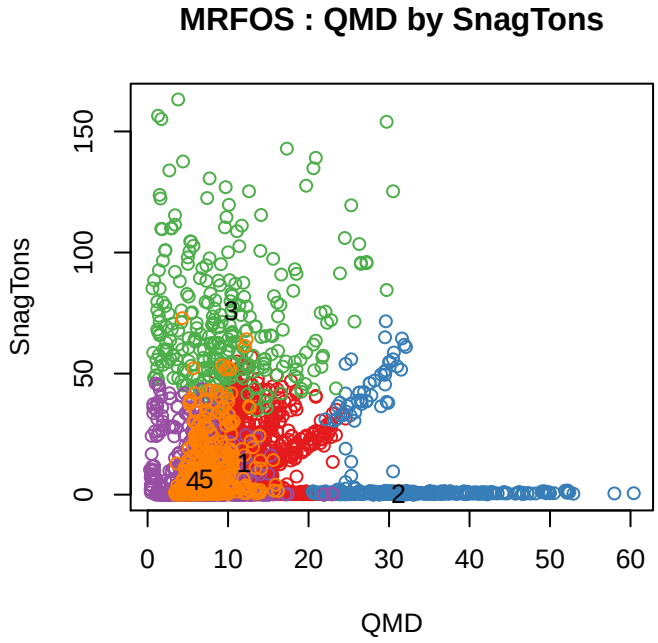
MRFOS : QMD by SnagTons
SnagTons
QMD
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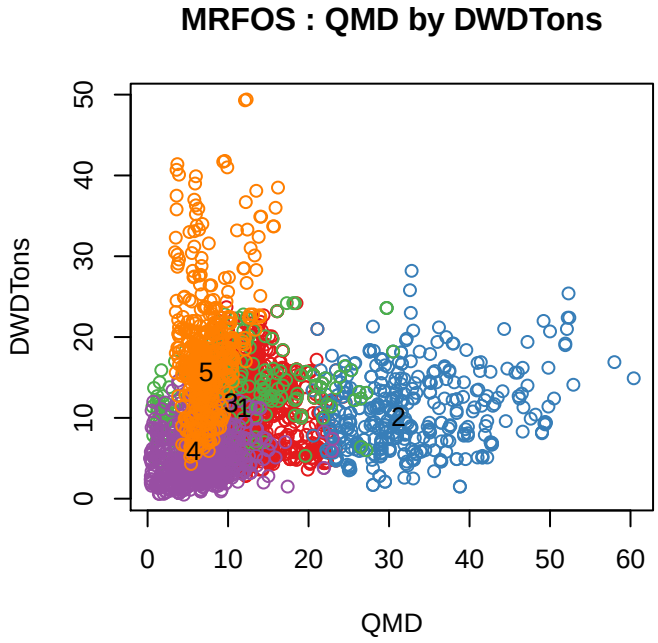
MRFOS : QMD by DWDTons
DWDTons
QMD
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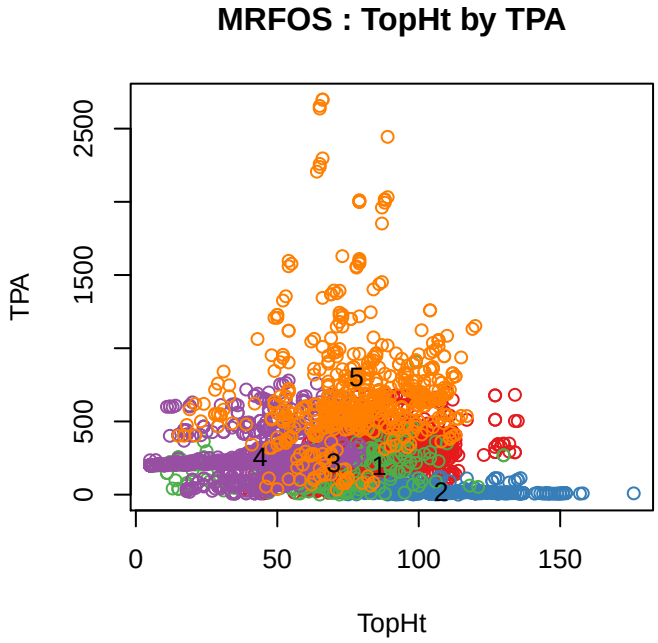
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TPA
TopHt
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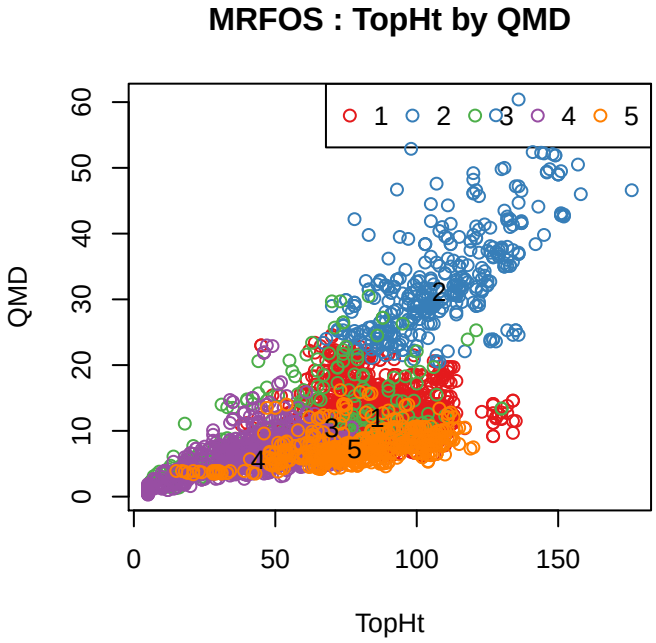
MRFOS : TopHt by QMD
QMD
TopHt
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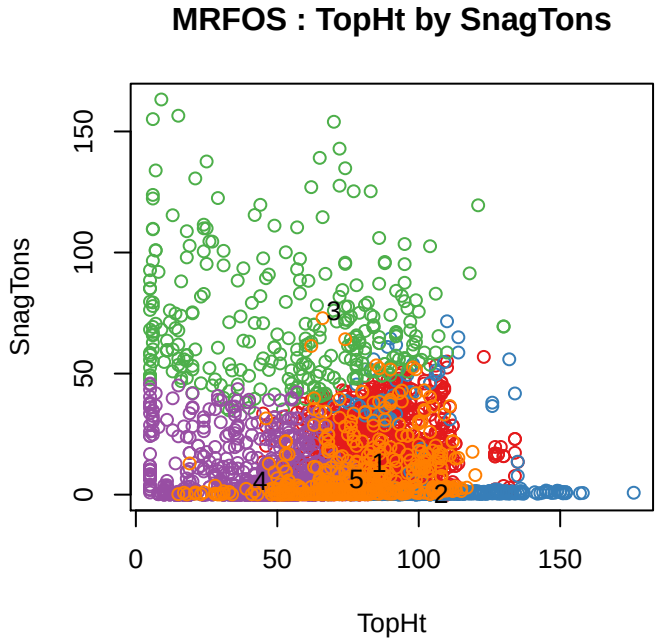
MRFOS : TopHt by SnagTons
SnagTons
TopHt
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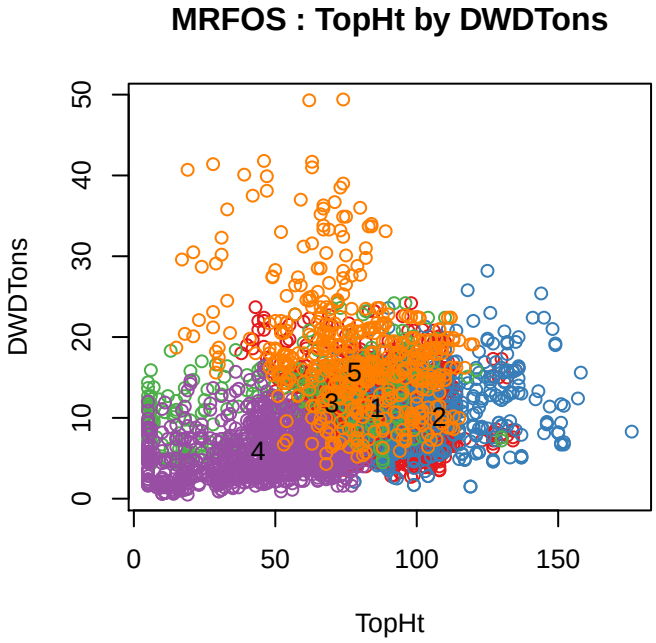
MRFOS : TopHt by DWDTons
DWDTons
TopHt
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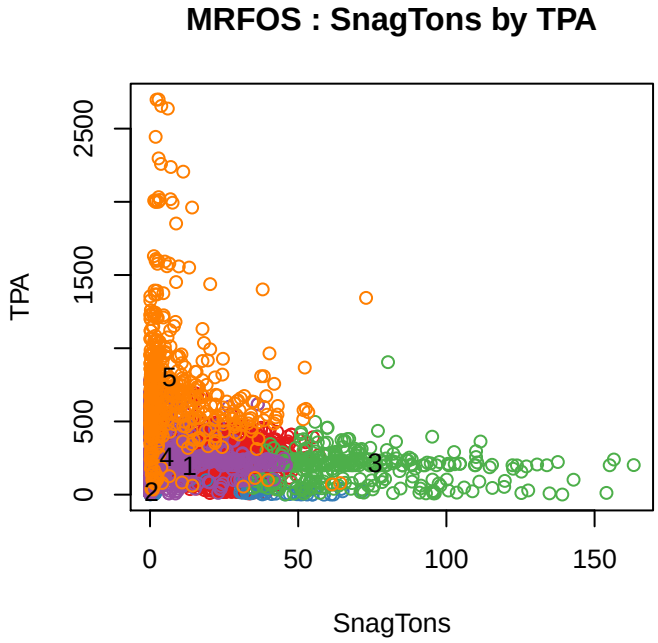
MRFOS : SnagTons by TPA
TPA
SnagTons
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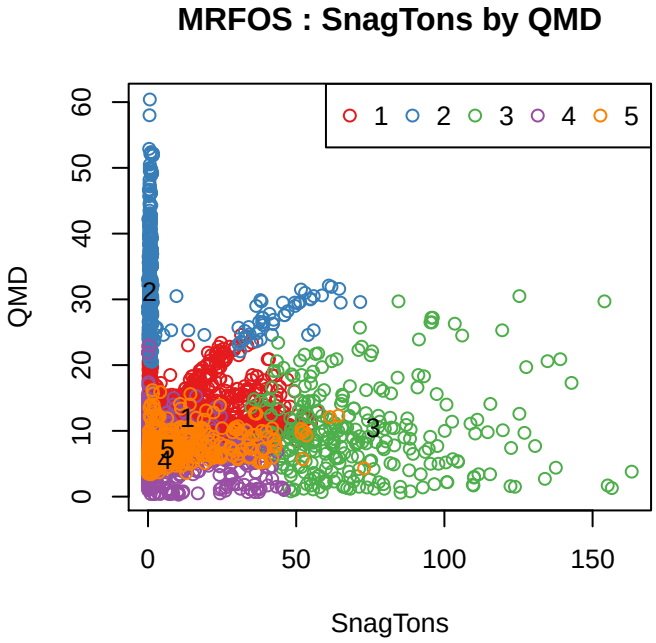
MRFOS : SnagTons by QMD
QMD
SnagTons
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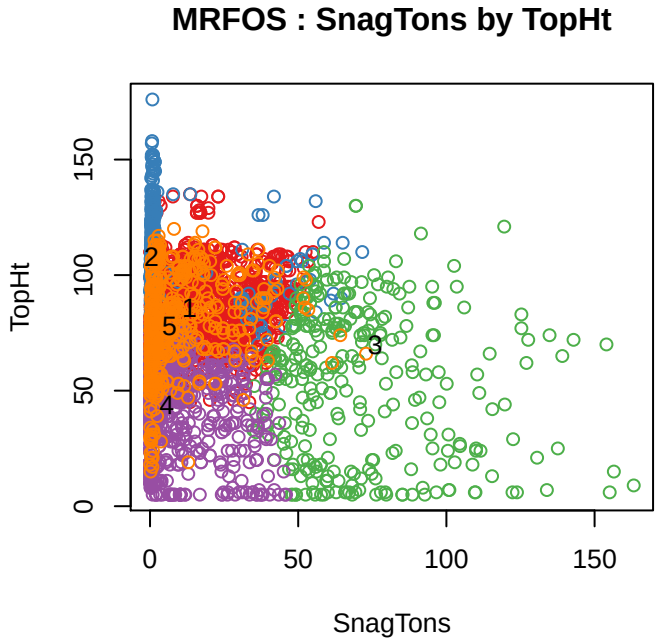
MRFOS : SnagTons by TopHt
TopHt
SnagTons
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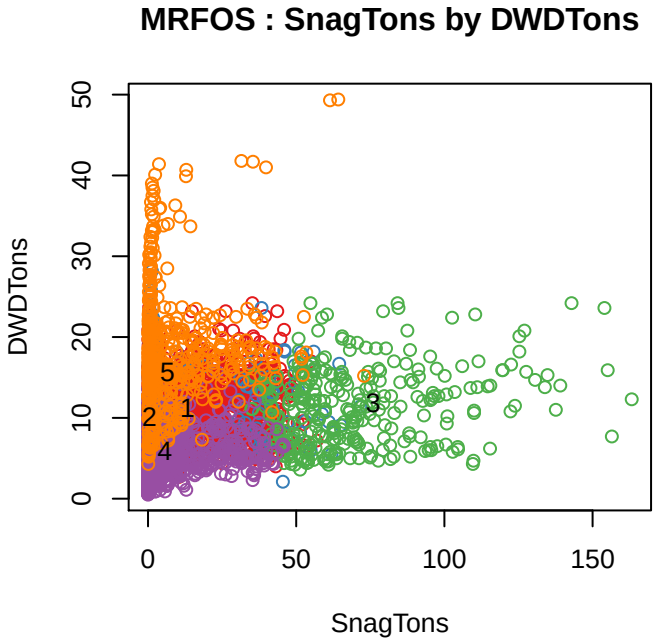
MRFOS : SnagTons by DWDTons
DWDTons
SnagTons
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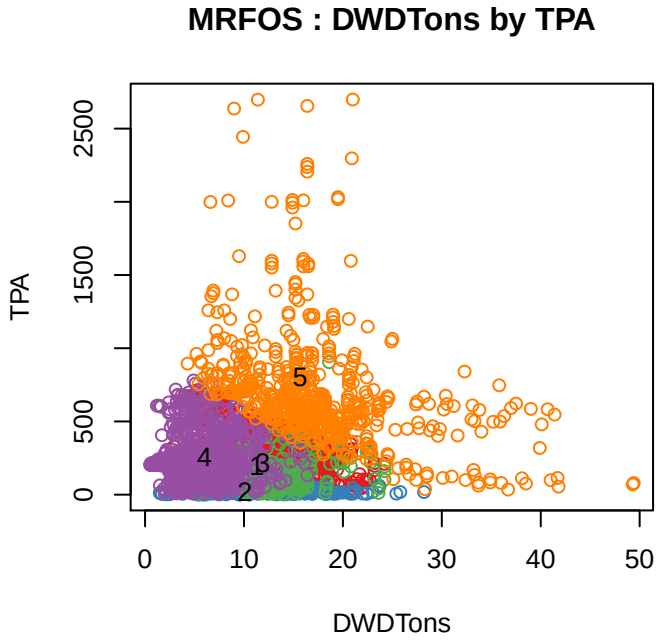
MRFOS : DWDTons by TPA
TPA
DWDTons
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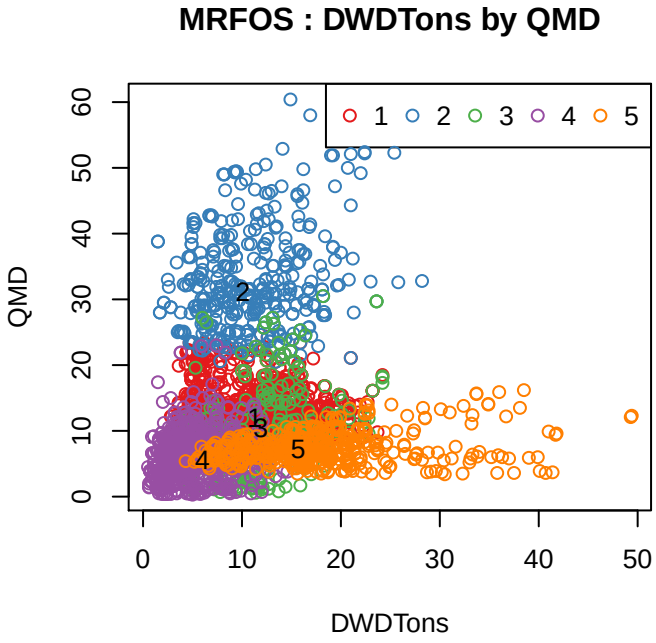
MRFOS : DWDTons by QMD
QMD
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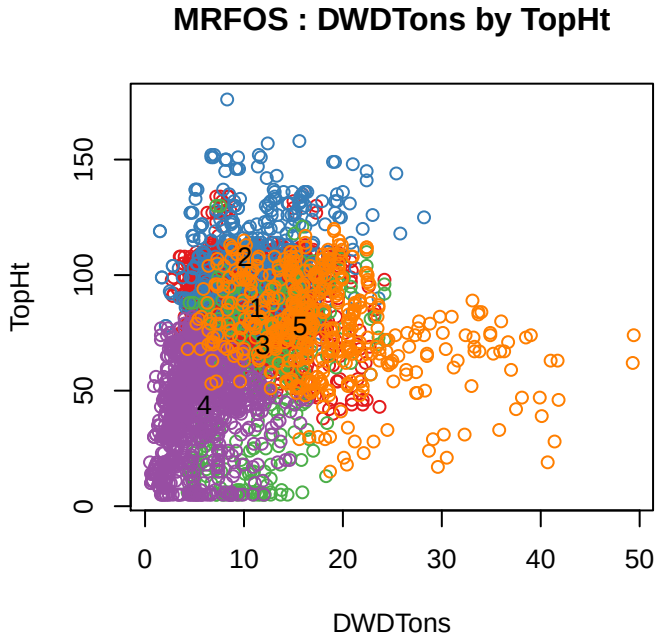
MRFOS : DWDTons by TopHt
TopHt
DWDTons
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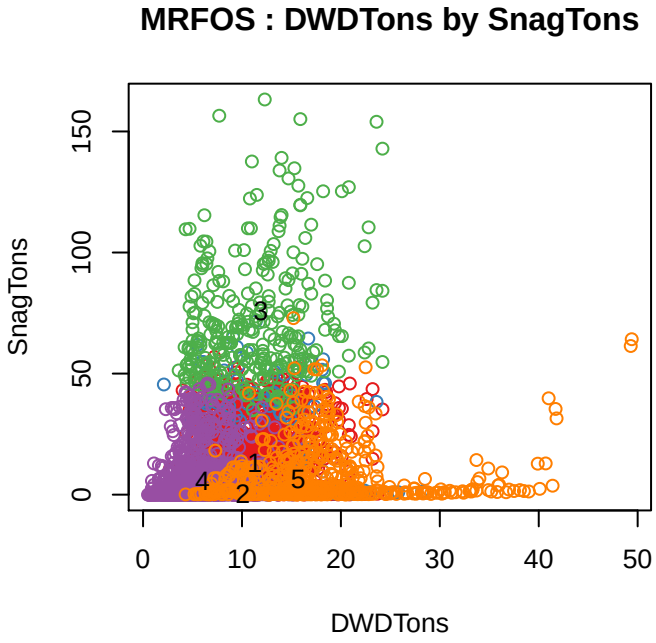
MRFOS : DWDTons by SnagTons
SnagTons
DWDTons
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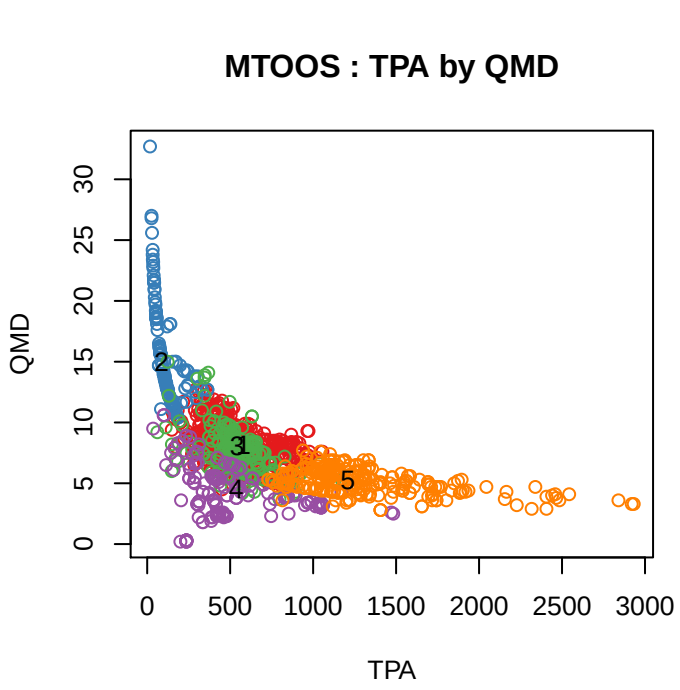
MTOOS : TPA by QMD
QMD
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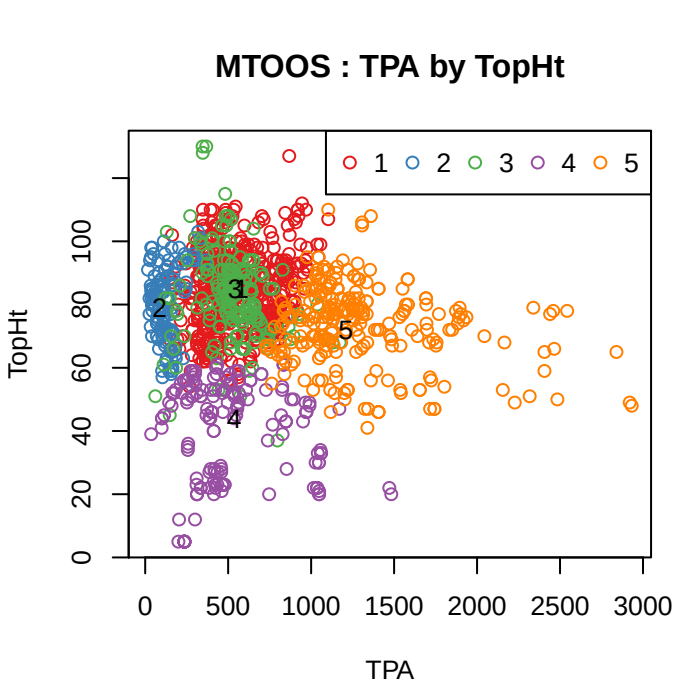
MTOOS : TPA by TopHt
TopHt
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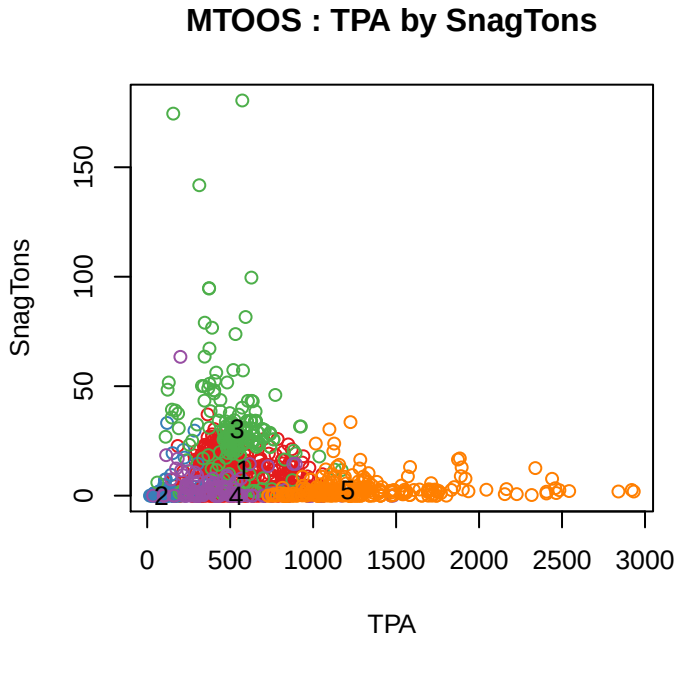
MTOOS : TPA by SnagTons
SnagTons
TPA
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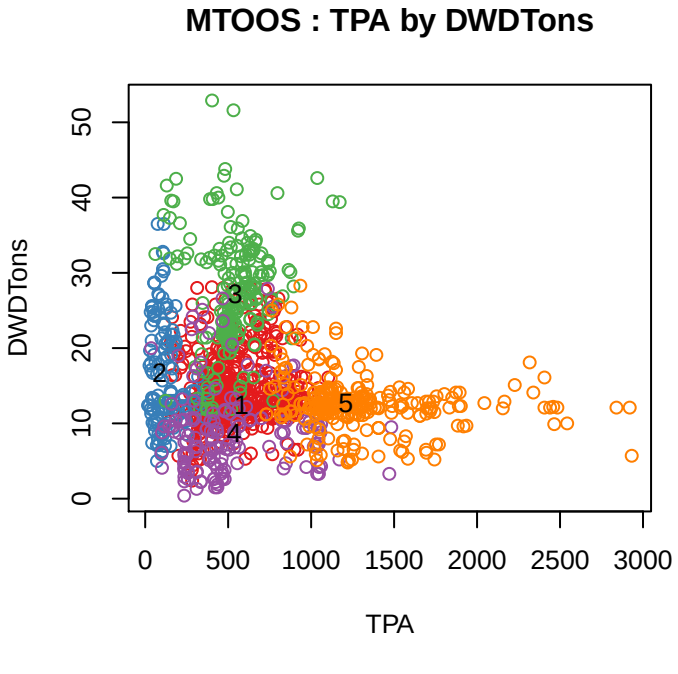
MTOOS : TPA by DWDTons
DWDTons
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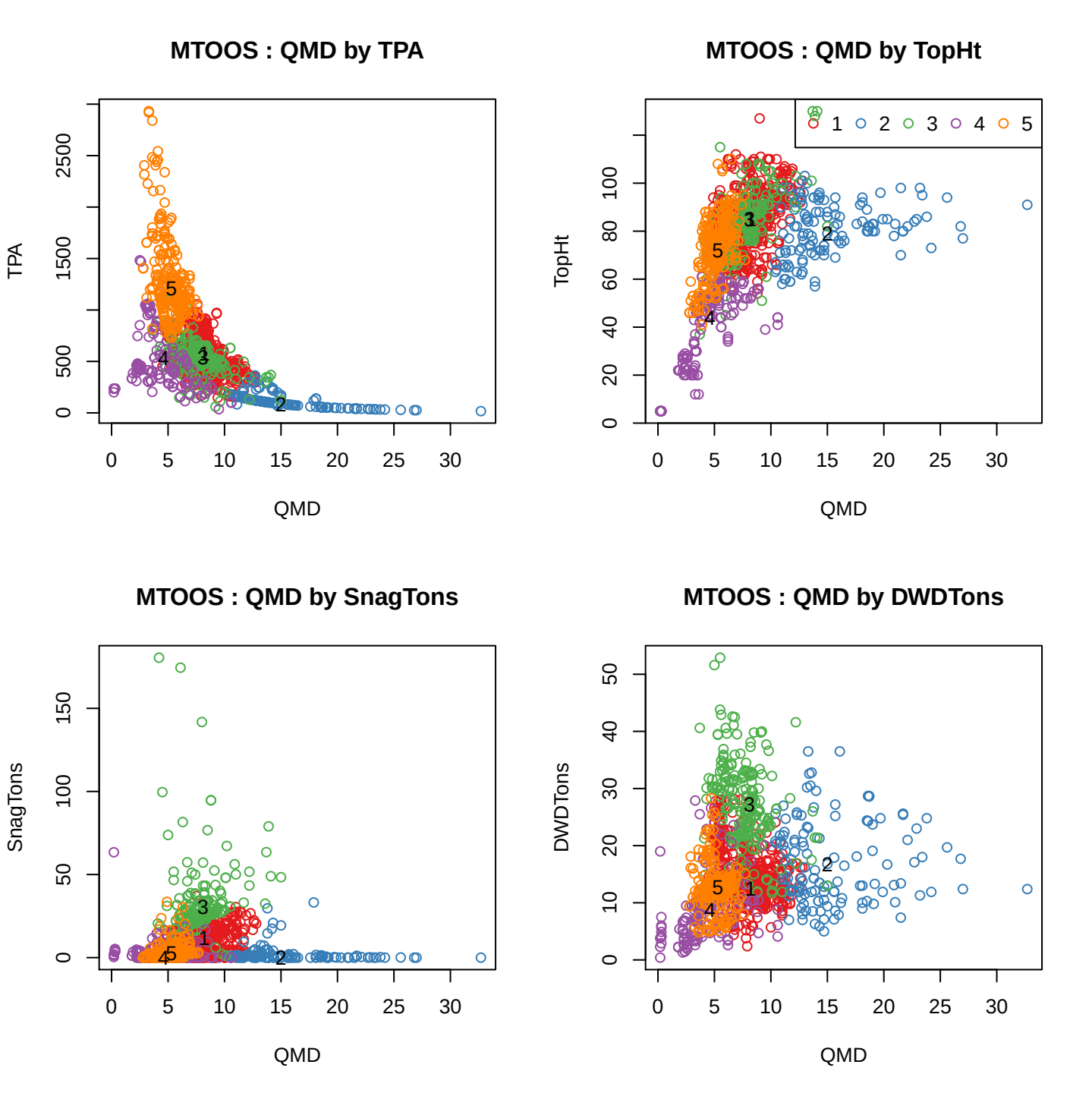
MTOOS : QMD by TPA
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QMD
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MTOOS : QMD by TopHt
TopHt
QMD
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MTOOS : QMD by SnagTons
SnagTons
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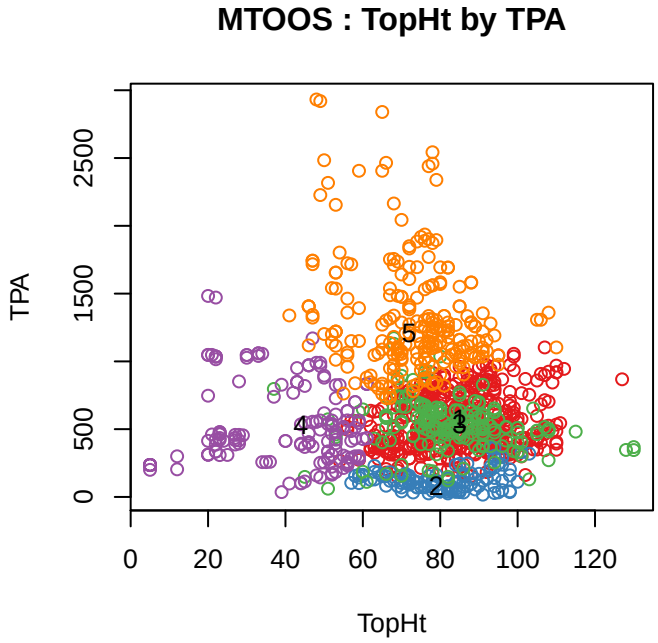
MTOOS : TopHt by TPA
TPA
TopHt
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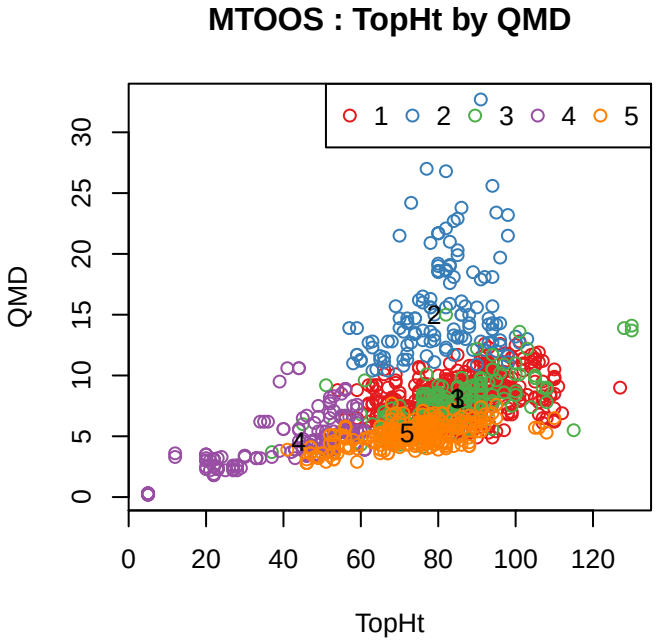
MTOOS : TopHt by QMD
QMD
TopHt
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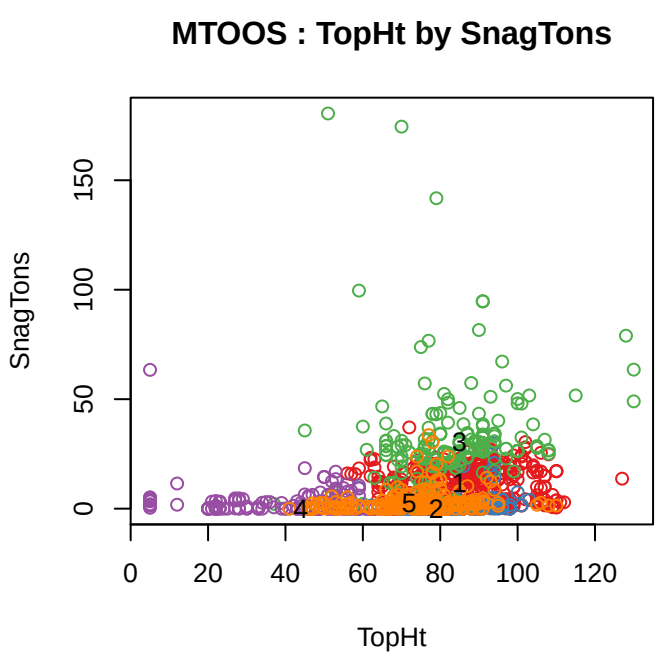
MTOOS : TopHt by SnagTons
SnagTons
TopHt
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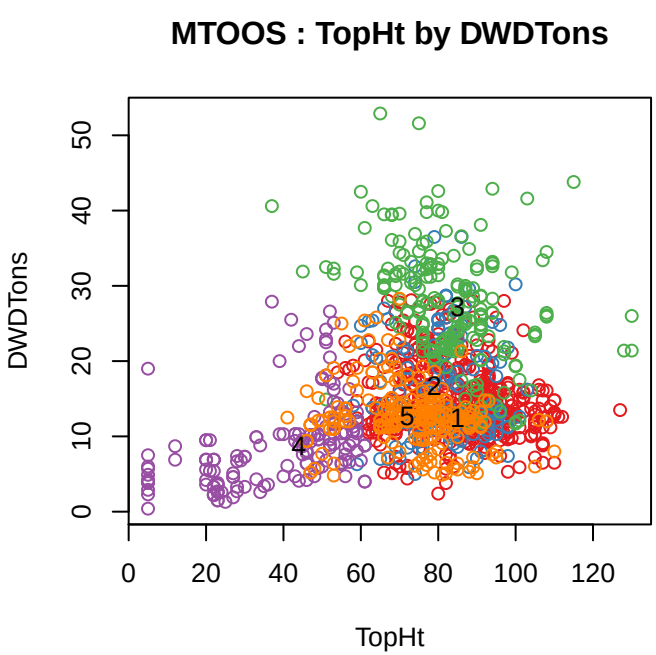
MTOOS : TopHt by DWDTons
DWDTons
TopHt
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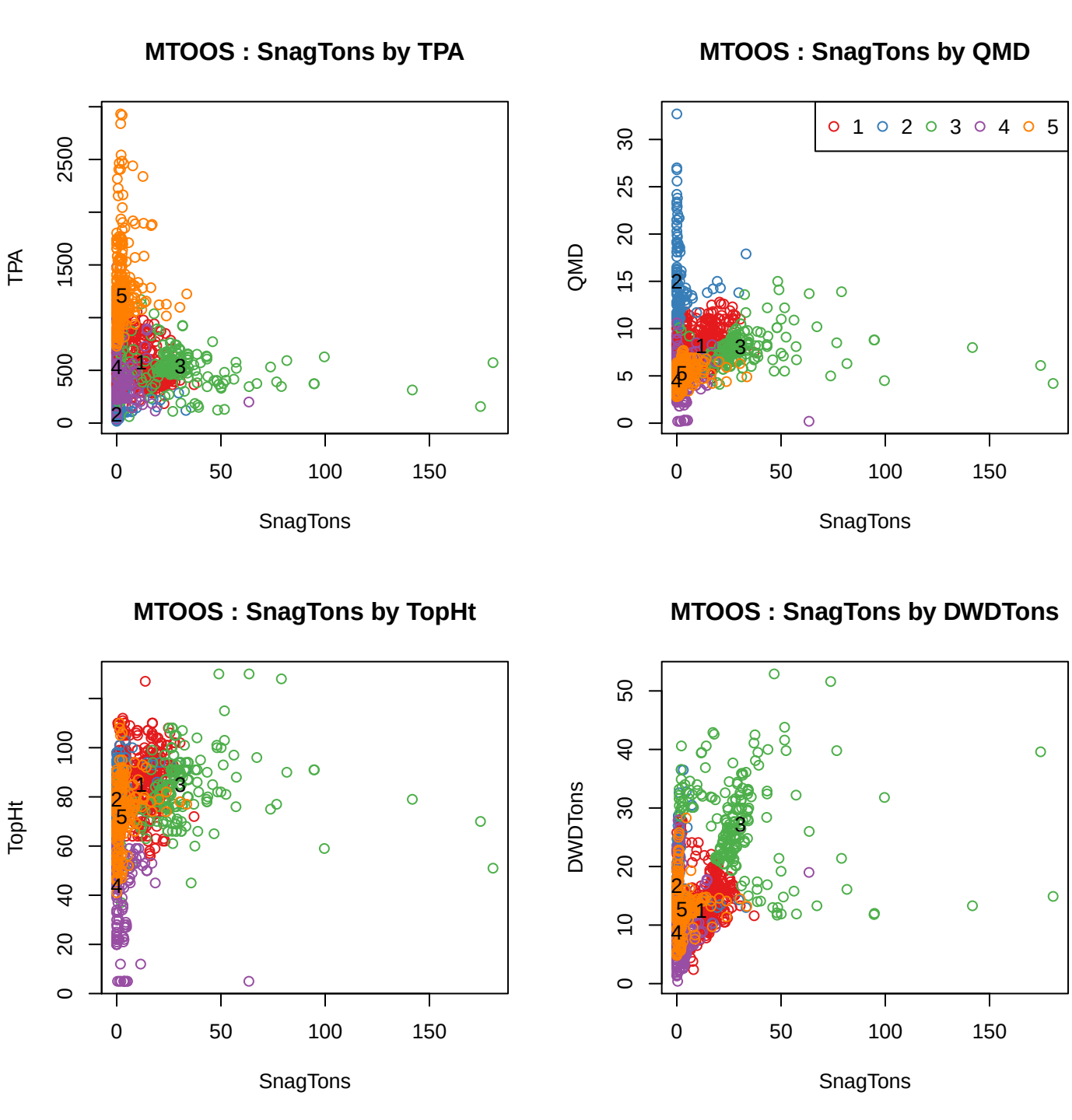
MTOOS : SnagTons by TPA
TPA
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MTOOS : SnagTons by QMD
QMD
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MTOOS : SnagTons by TopHt
TopHt
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MTOOS : SnagTons by DWDTons
DWDTons
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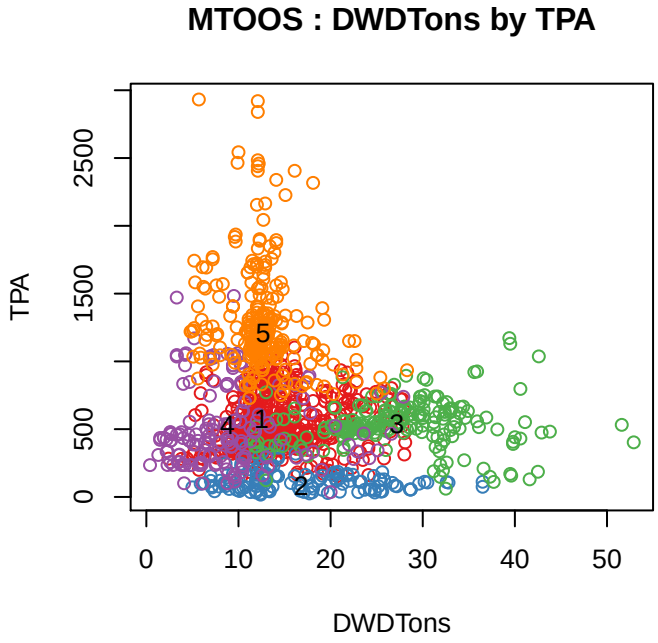
MTOOS : DWDTons by TPA
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DWDTons
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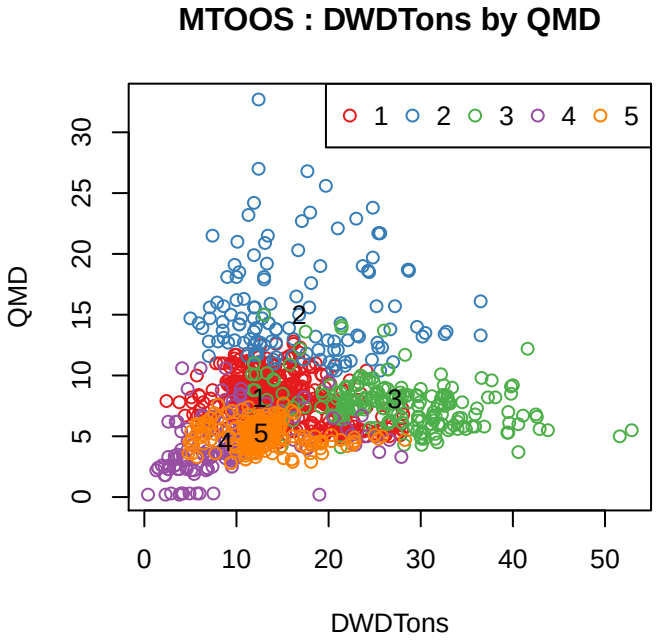
MTOOS : DWDTons by QMD
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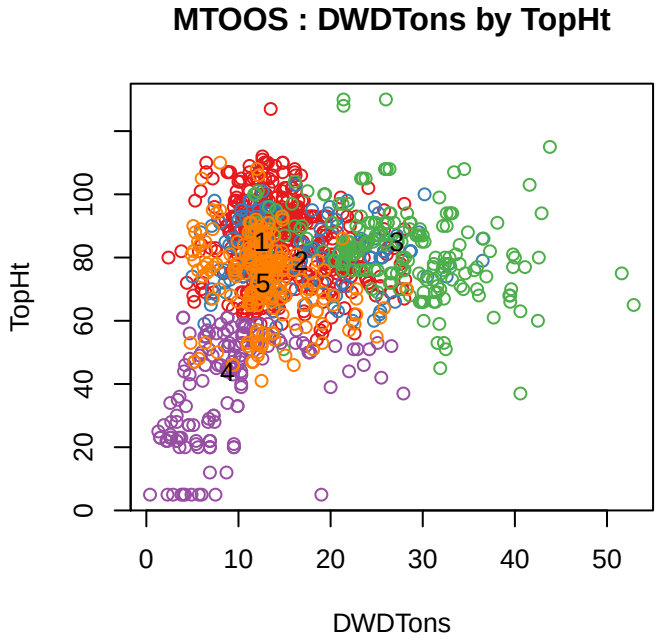
MTOOS : DWDTons by TopHt
TopHt
DWDTons
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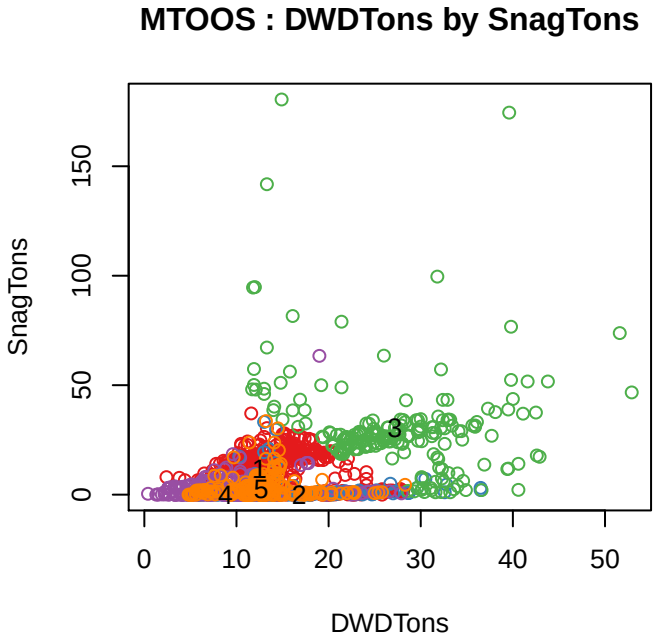
MTOOS : DWDTons by SnagTons
SnagTons
DWDTons
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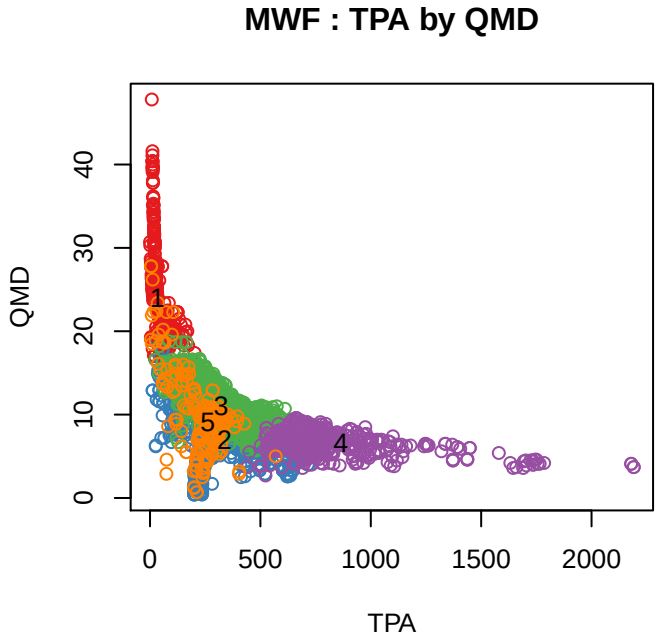
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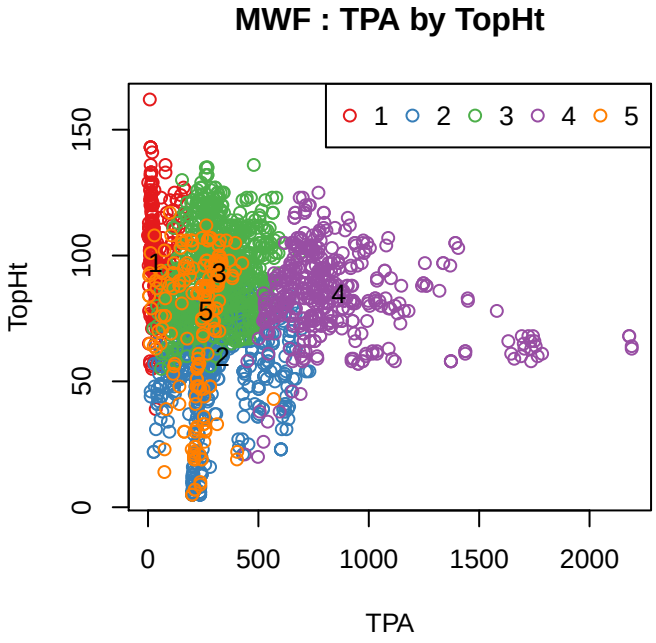
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TopHt
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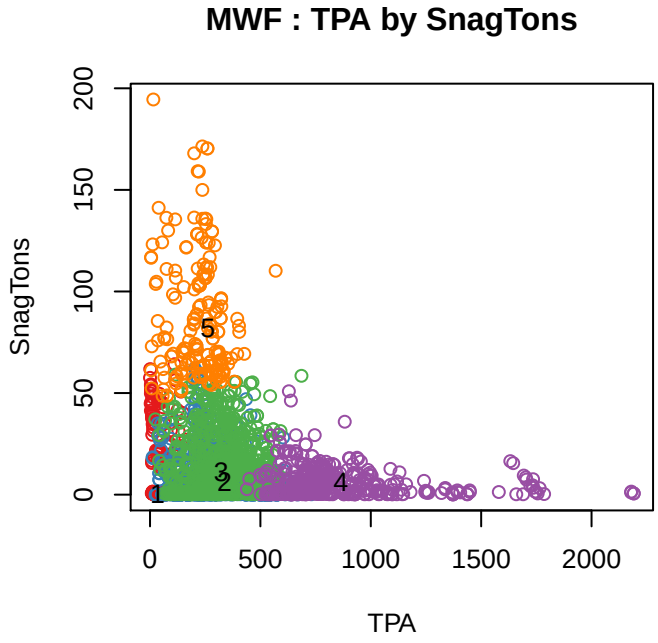
MWF : TPA by SnagTons
SnagTons
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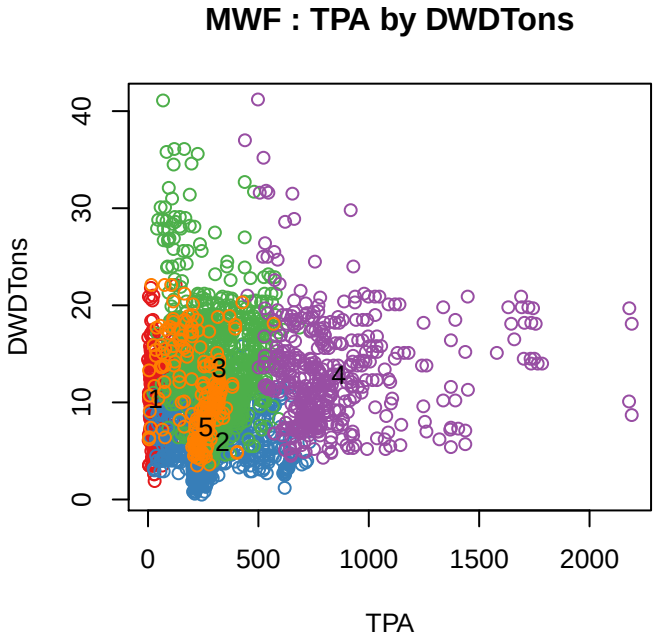
MWF : TPA by DWDTons
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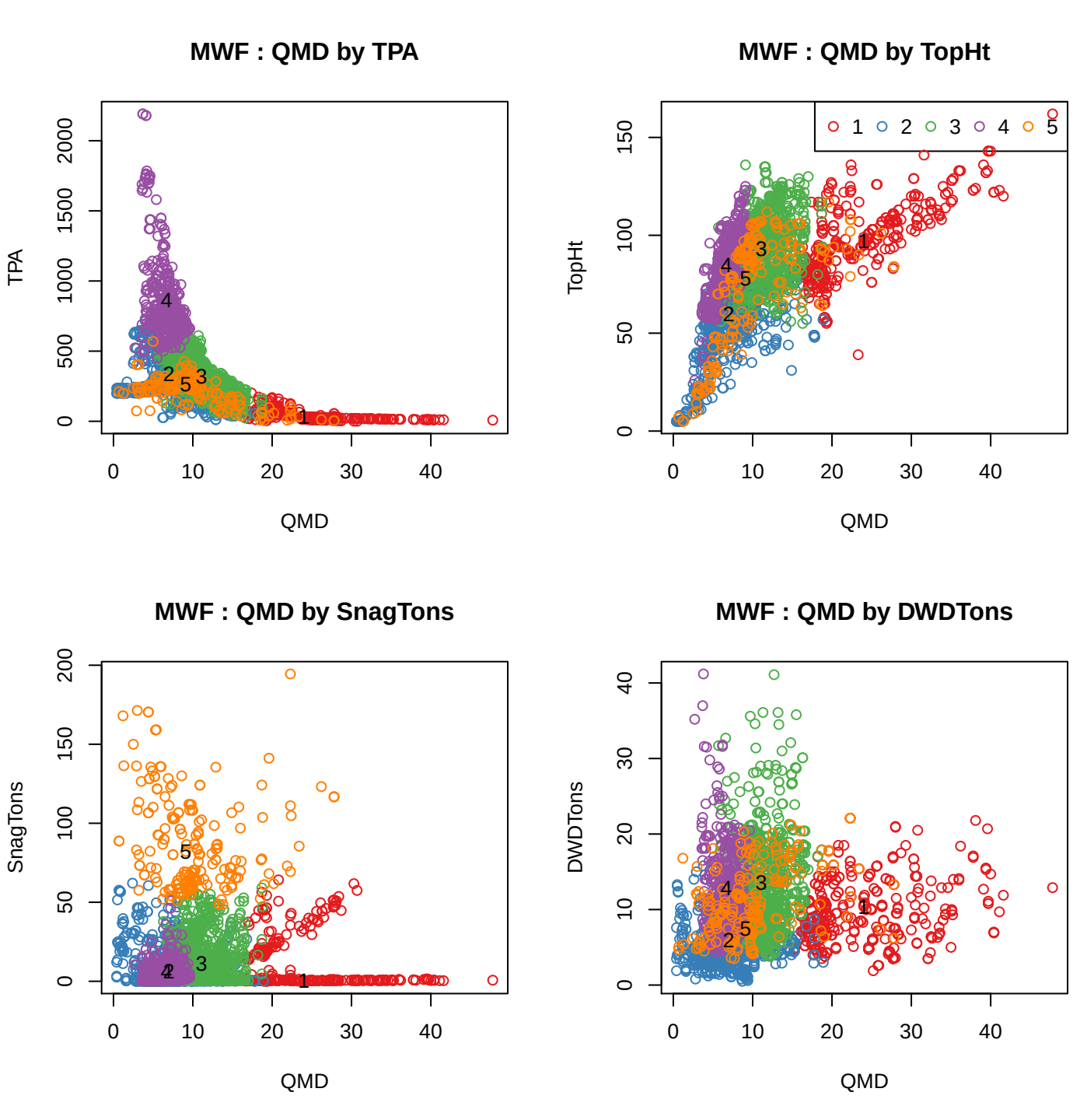
MWF : QMD by TPA
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MWF : QMD by TopHt
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MWF : QMD by SnagTons
SnagTons
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DWDTons
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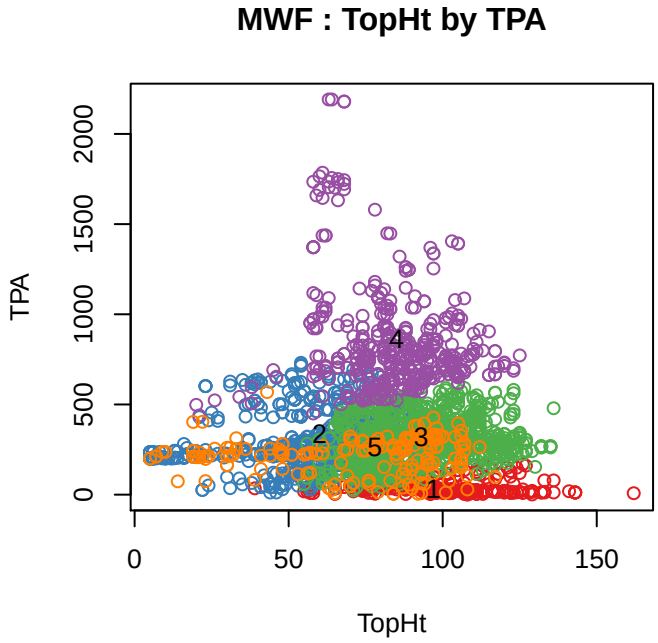
MWF : TopHt by TPA
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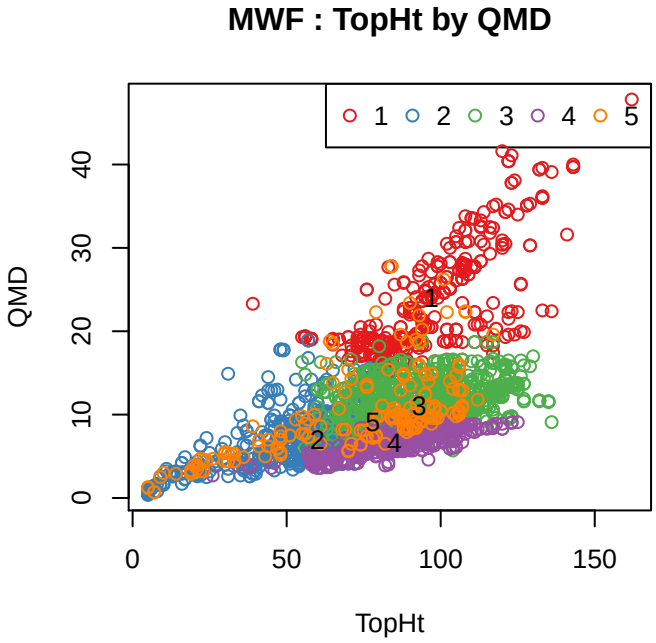
MWF : TopHt by QMD
QMD
TopHt
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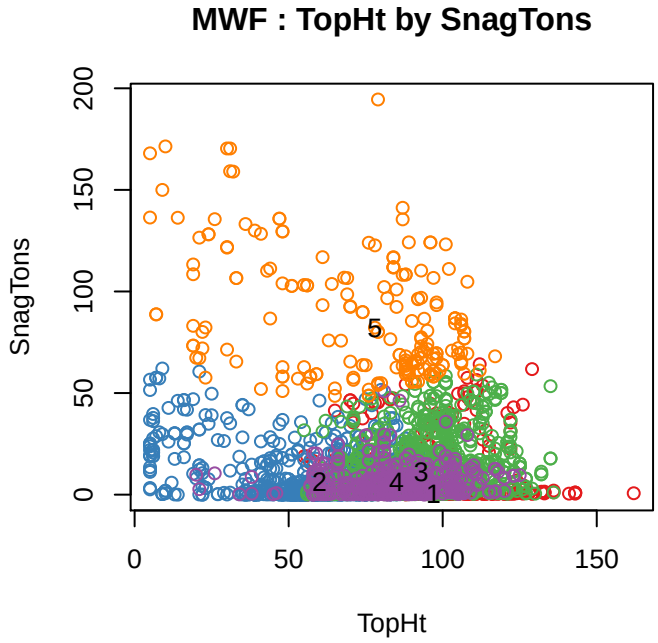
MWF : TopHt by SnagTons
SnagTons
TopHt
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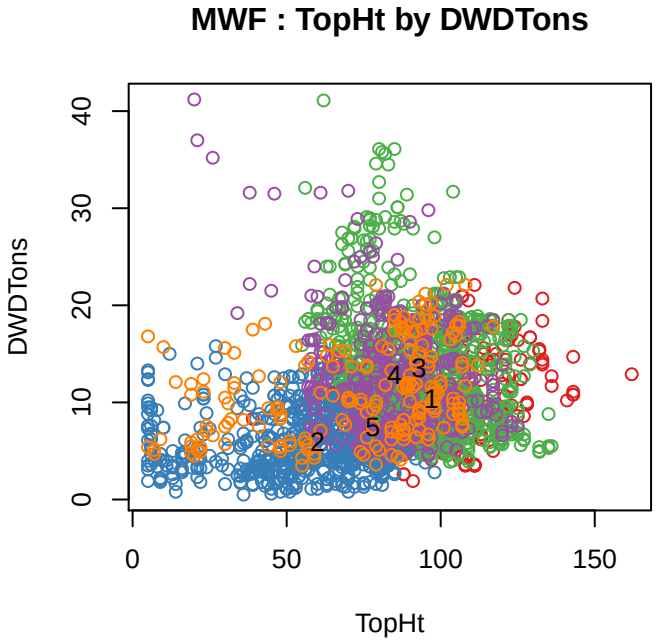
MWF : TopHt by DWDTons
DWDTons
TopHt
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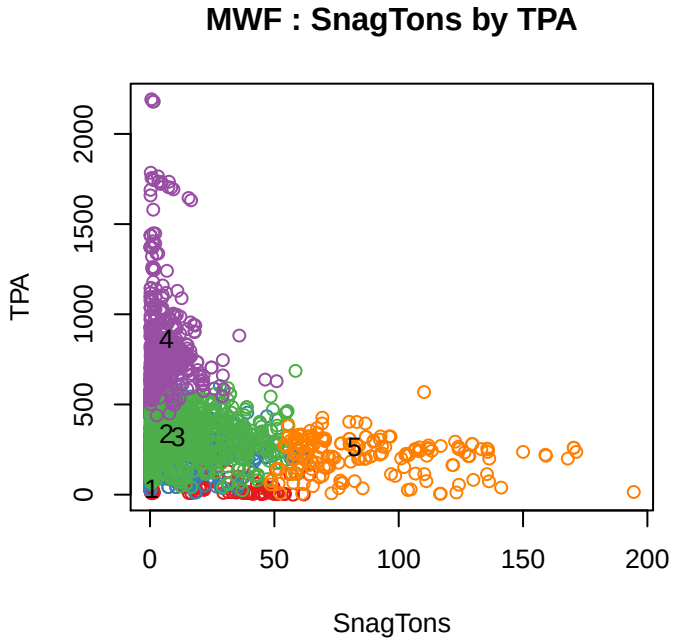
MWF : SnagTons by TPA
TPA
SnagTons
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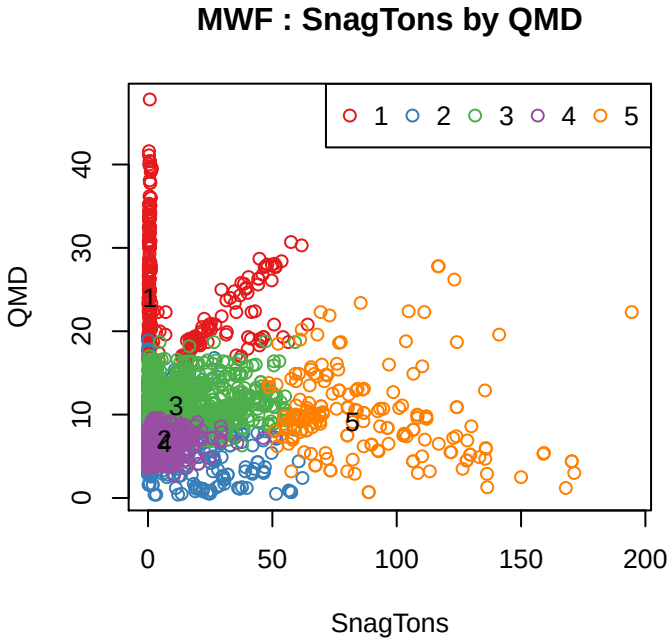
MWF : SnagTons by QMD
QMD
SnagTons
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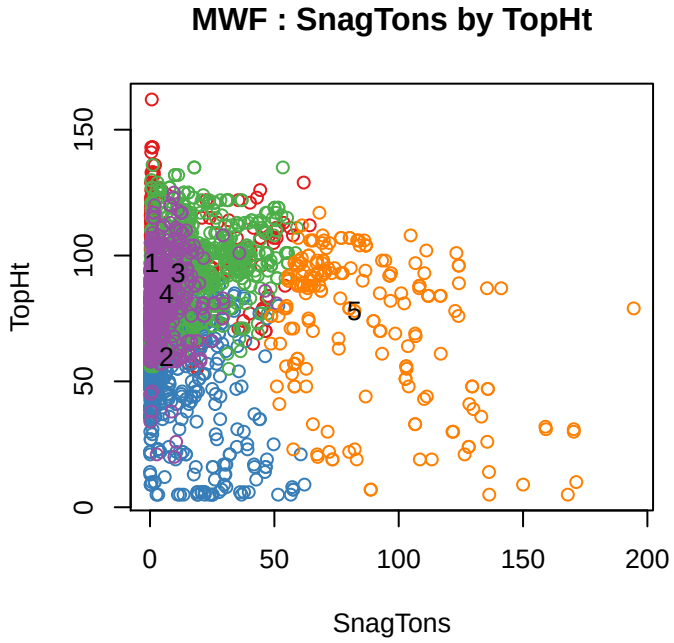
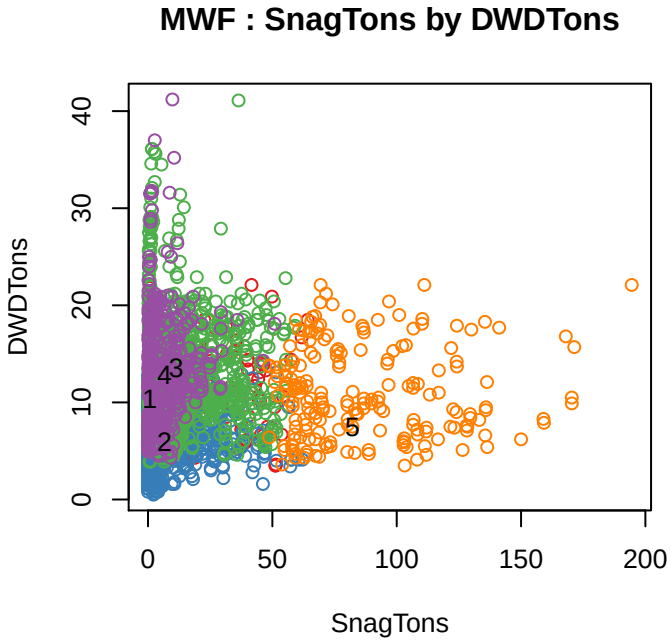
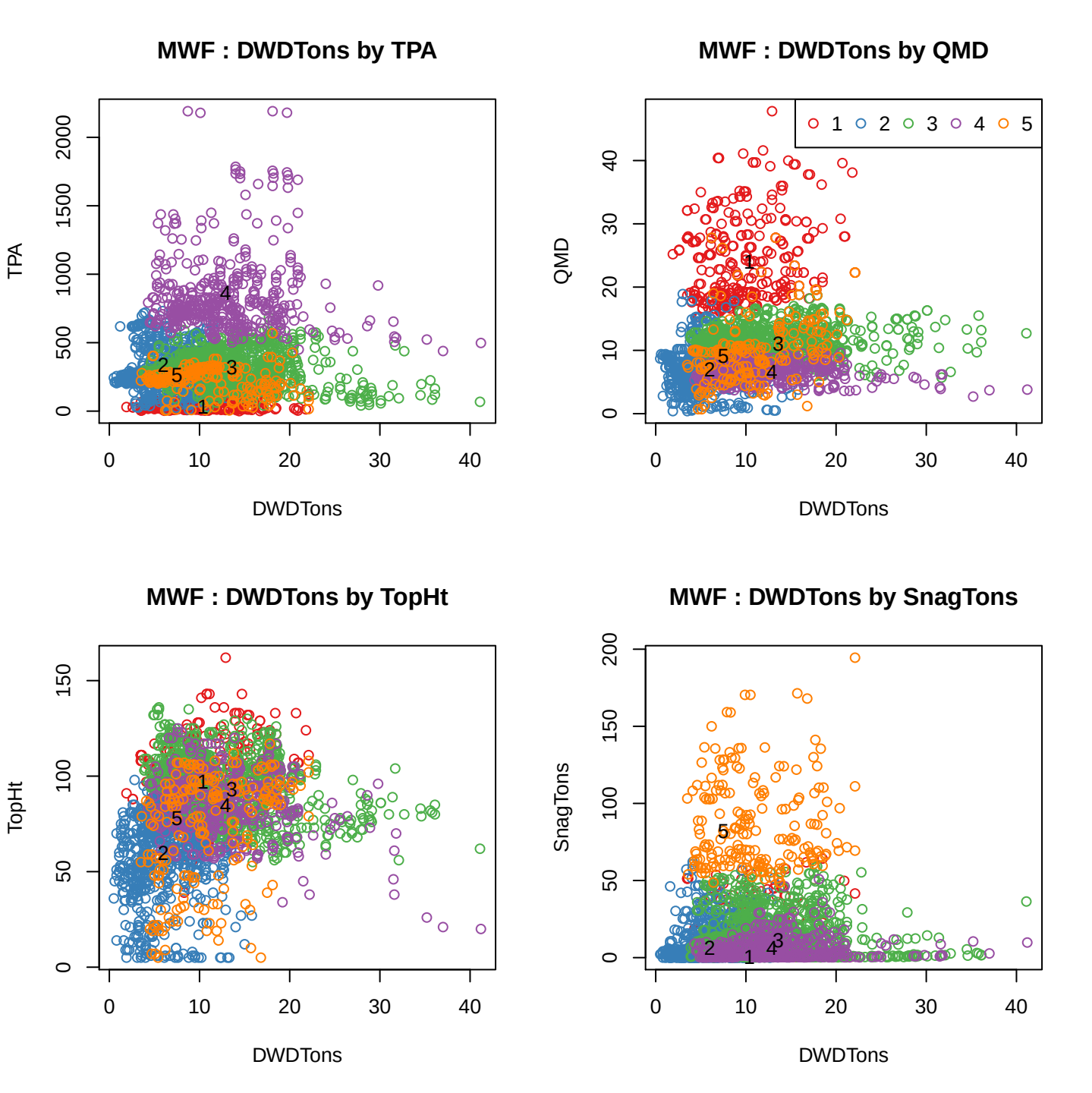
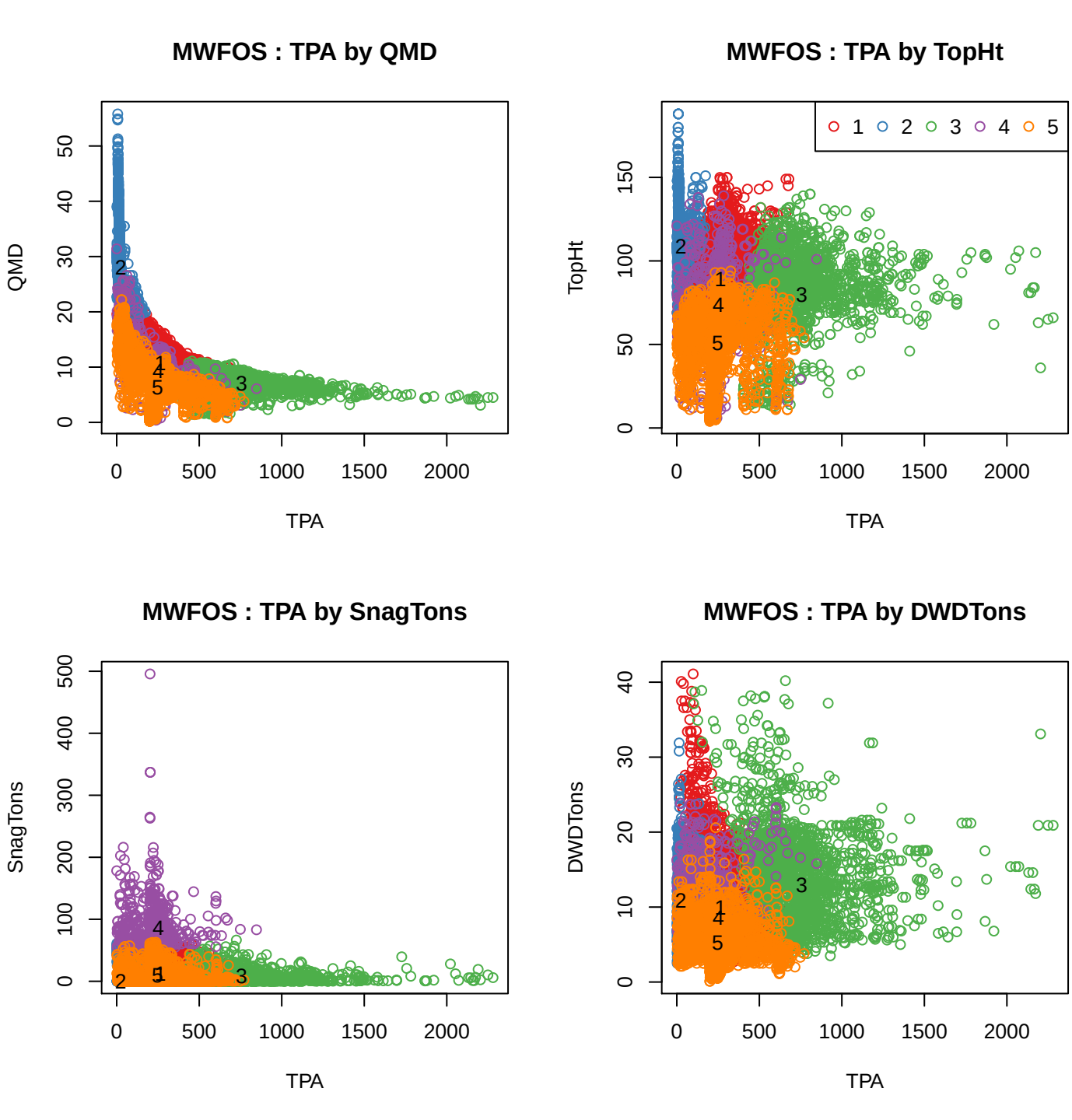

MWF : SnagTons by TopHt
TopHt
SnagTons
0
50
100
150
0
50
100
150
200


MWF : SnagTons by DWDTons
DWDTons
SnagTons
0
10
20
30
40
0
50
100
150
200


MWF : DWDTons by TPA
TPA
DWDTons
0
500
1000
1500
2000
0
10
20
30
40
MWF : DWDTons by QMD
QMD
DWDTons
1
2
3
4
5
MWF : DWDTons by TopHt
TopHt
DWDTons
0
50
100
150
MWF : DWDTons by SnagTons
SnagTons
DWDTons
0
50
100
150
200


MWFOS : TPA by QMD
QMD
TPA
0
10
20
30
40
50
0
500
1000
1500
2000
1
2
3
4
5
MWFOS : TPA by TopHt
TopHt
TPA
0
50
100
150
0
500
1000
1500
2000
1
2
3
4
5
MWFOS : TPA by SnagTons
SnagTons
TPA
0
100
200
300
400
500
0
500
1000
1500
2000
1
2
3
4
5
MWFOS : TPA by DWDTons
DWDTons
TPA
0
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30
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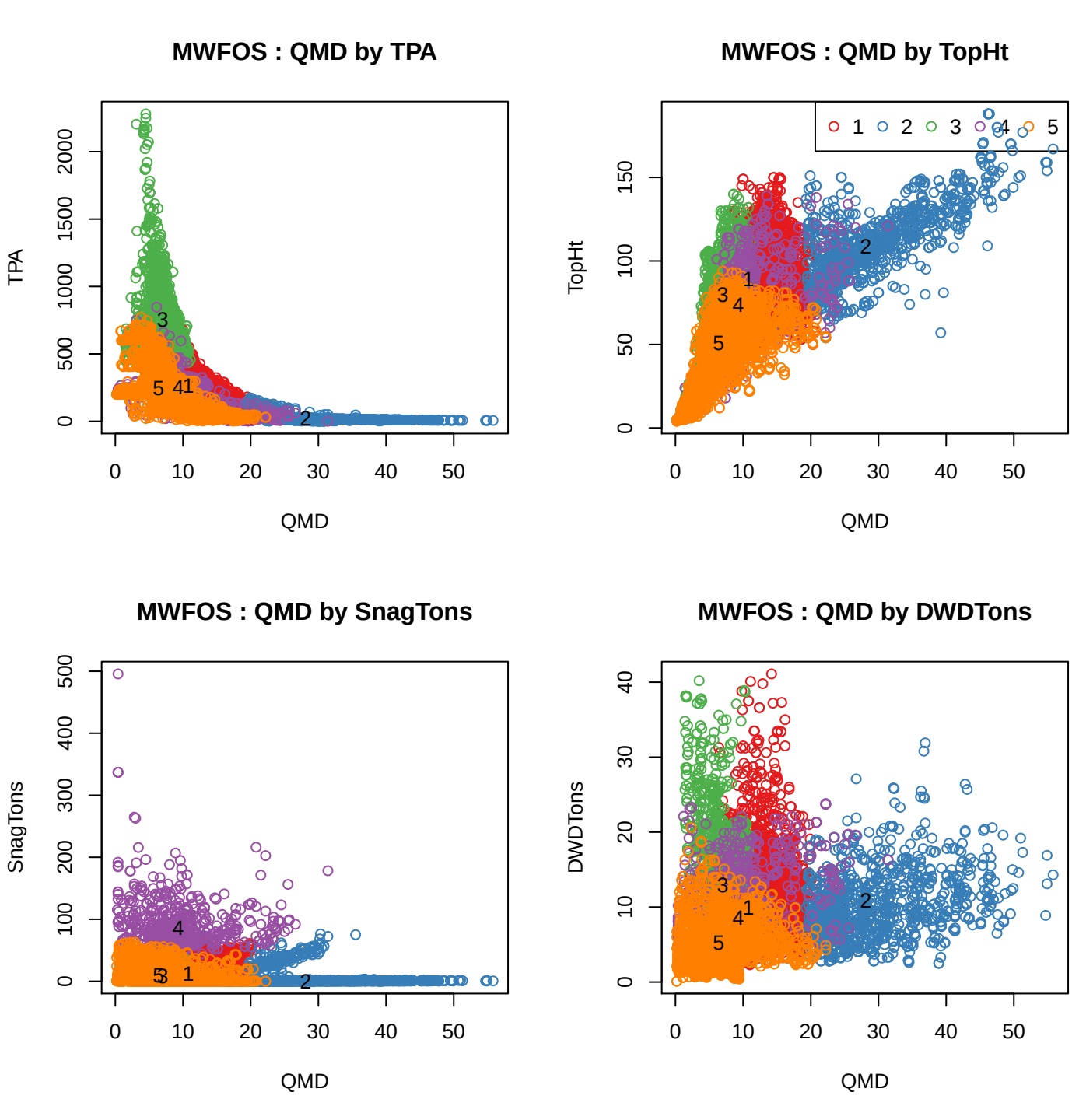
1000
1500
2000
1
2
3
4
5


MWFOS : QMD by TPA
TPA
QMD
0
500
1000
1500
2000
0
10
20
30
40
50
3
5
4
1
2
MWFOS : QMD by TopHt
TopHt
QMD
1
2
3
4
5
0
50
100
150
MWFOS : QMD by SnagTons
SnagTons
QMD
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300
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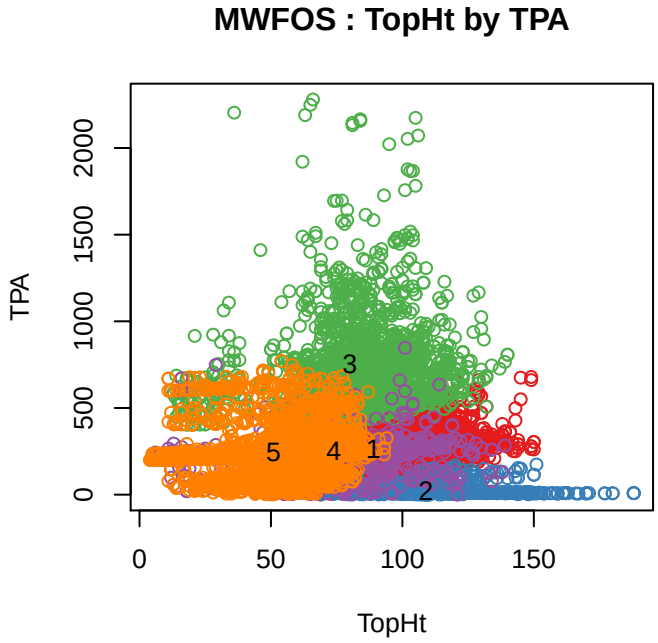
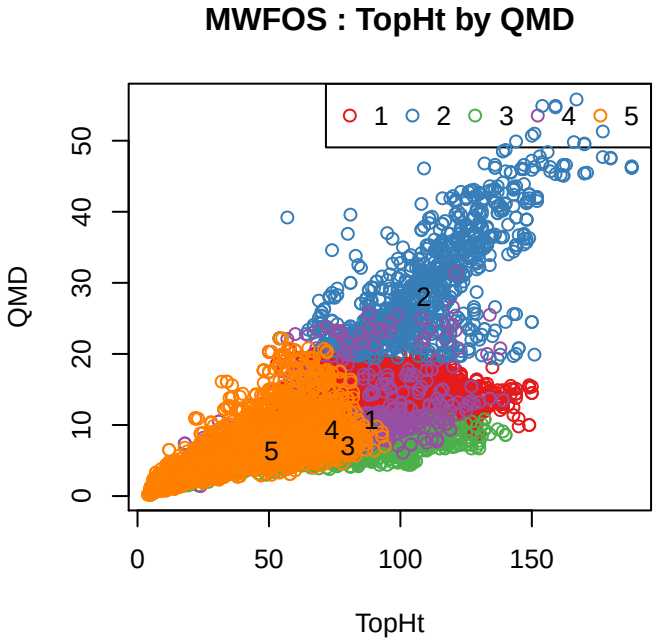
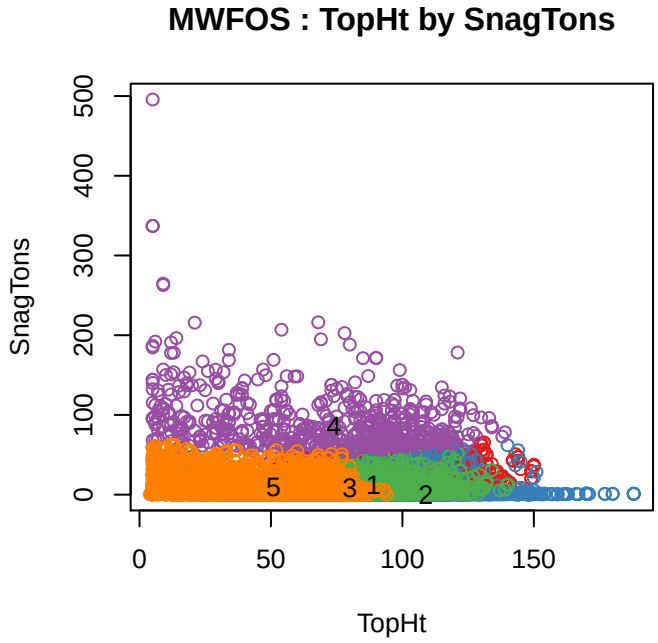
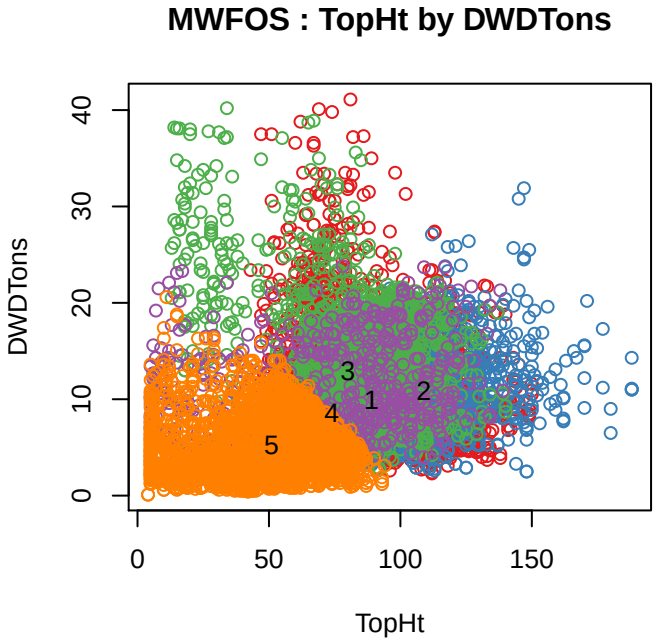
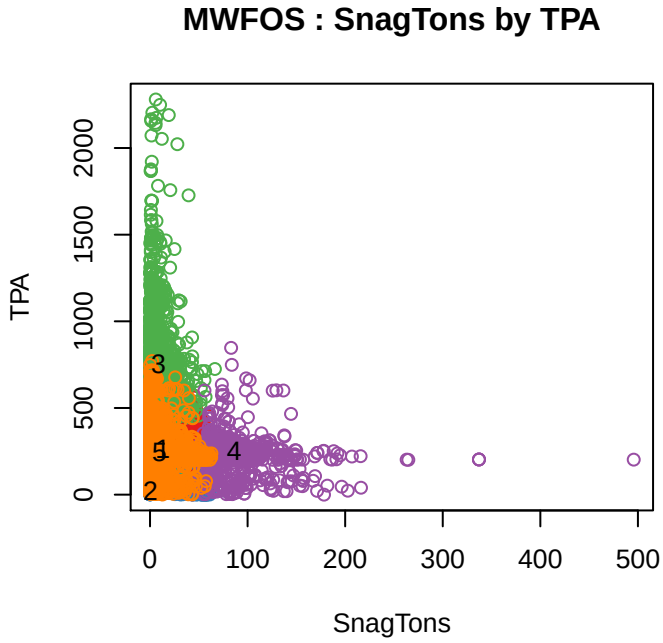
500
MWFOS : QMD by DWDTons
DWDTons
QMD
0
10
20
30
40

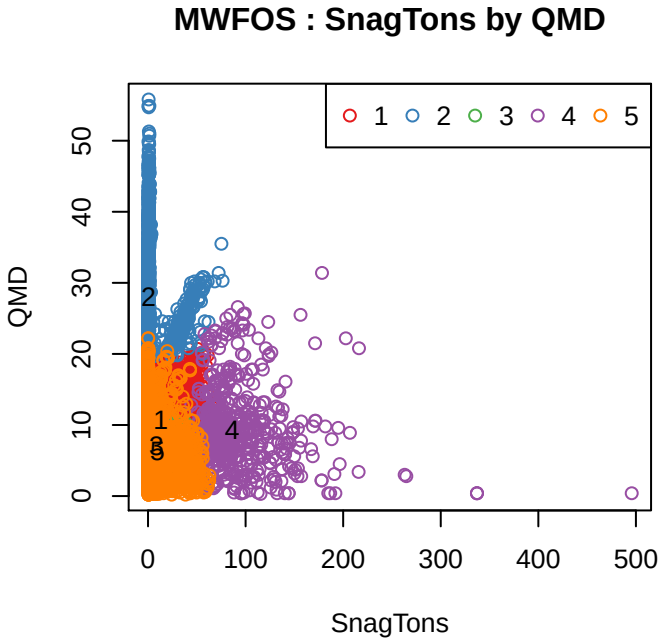

MWFOS : TopHt by TPA
TPA
0
500
1000
1500
2000
0
50
100
150
TopHt
1
2
3
4
5

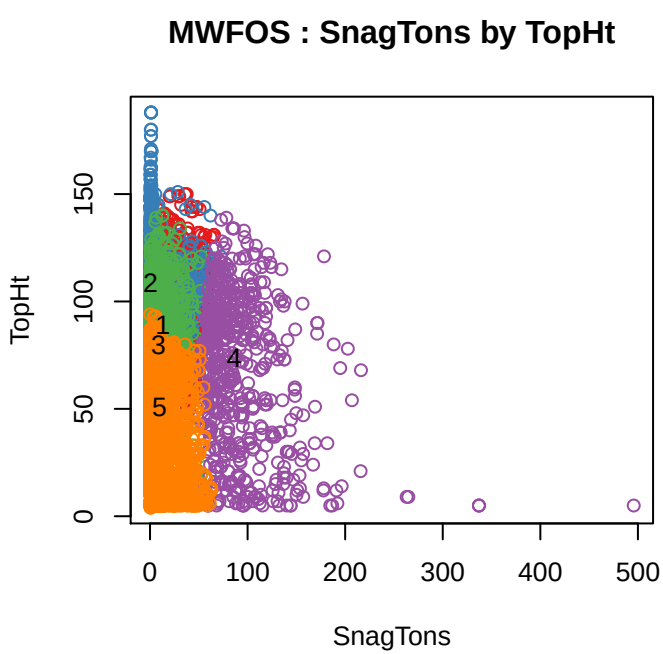

MWFOS : TopHt by QMD
QMD
0
10
20
30
40
50
0
50
100
150
TopHt
1
2
3
4
5

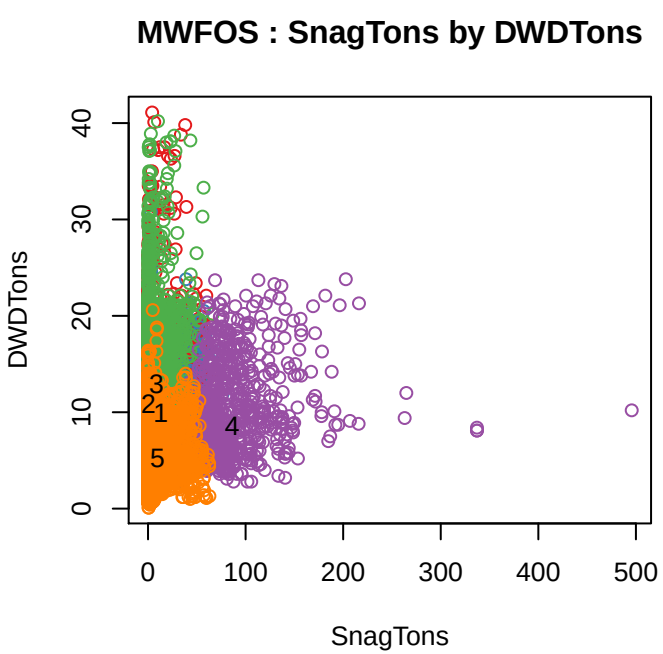

MWFOS : TopHt by SnagTons
SnagTons
0
100
200
300
400
500
0
50
100
150
TopHt
1
2
3
4
5


MWFOS : TopHt by DWDTons
DWDTons
0
10
20
30
40
0
50
100
150
TopHt
1
2
3
4
5


MWFOS : SnagTons by TPA
TPA
SnagTons
0
500
1000
1500
2000
0
100
200
300
400
500


MWFOS : SnagTons by QMD
1 2 3 4 5
QMD
SnagTons
0
10
20
30
40
50
0
100
200
300
400
500


MWFOS : SnagTons by TopHt
TopHt
SnagTons
0
50
100
150
0
100
200
300
400
500


MWFOS : SnagTons by DWDTons
DWDTons
SnagTons
0
10
20
30
40
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100
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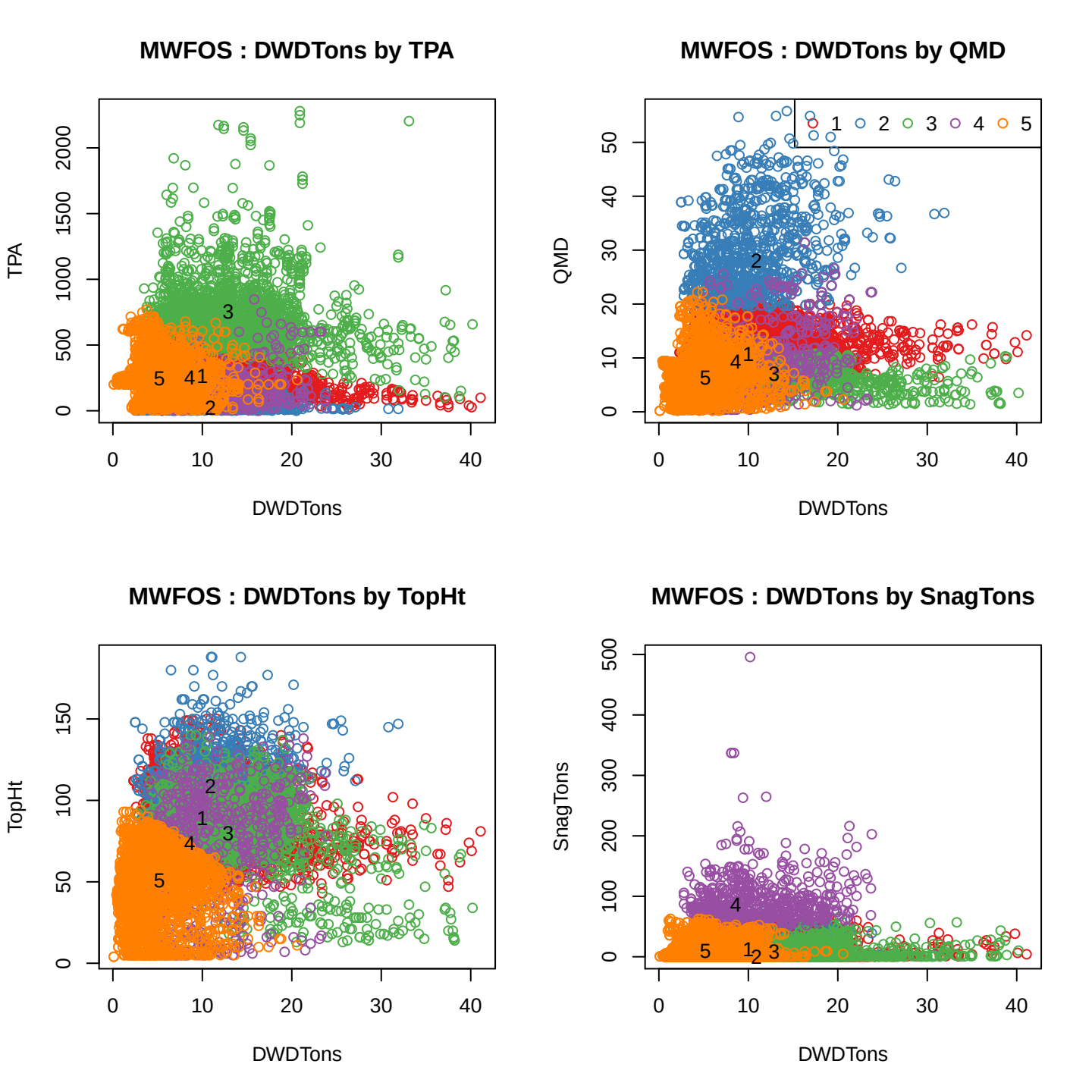
400
500


MWFOS : DWDTons by TPA
TPA
DWDTons
0
500
1000
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5
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MWFOS : DWDTons by QMD
QMD
DWDTons
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MWFOS : DWDTons by TopHt
TopHt
DWDTons
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1
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4
5
MWFOS : DWDTons by SnagTons
SnagTons
DWDTons
0
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300
400
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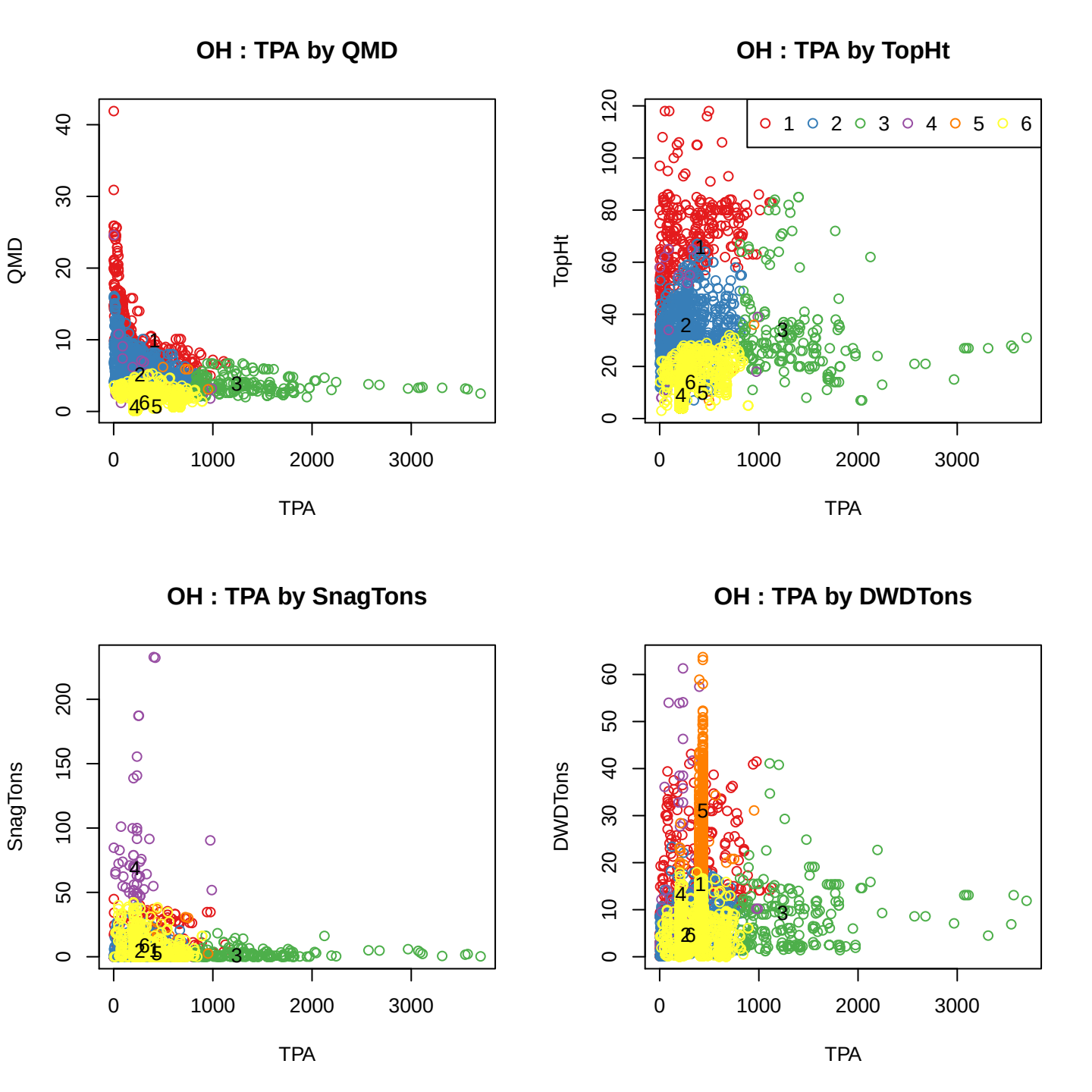
5
1
2
3


OH : TPA by QMD
QMD
TPA
0
10
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30
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0
1000
2000
3000
OH : TPA by TopHt
TopHt
TPA
1 2 3 4 5 6
0
20
40
60
80
100
120
OH : TPA by SnagTons
SnagTons
TPA
0
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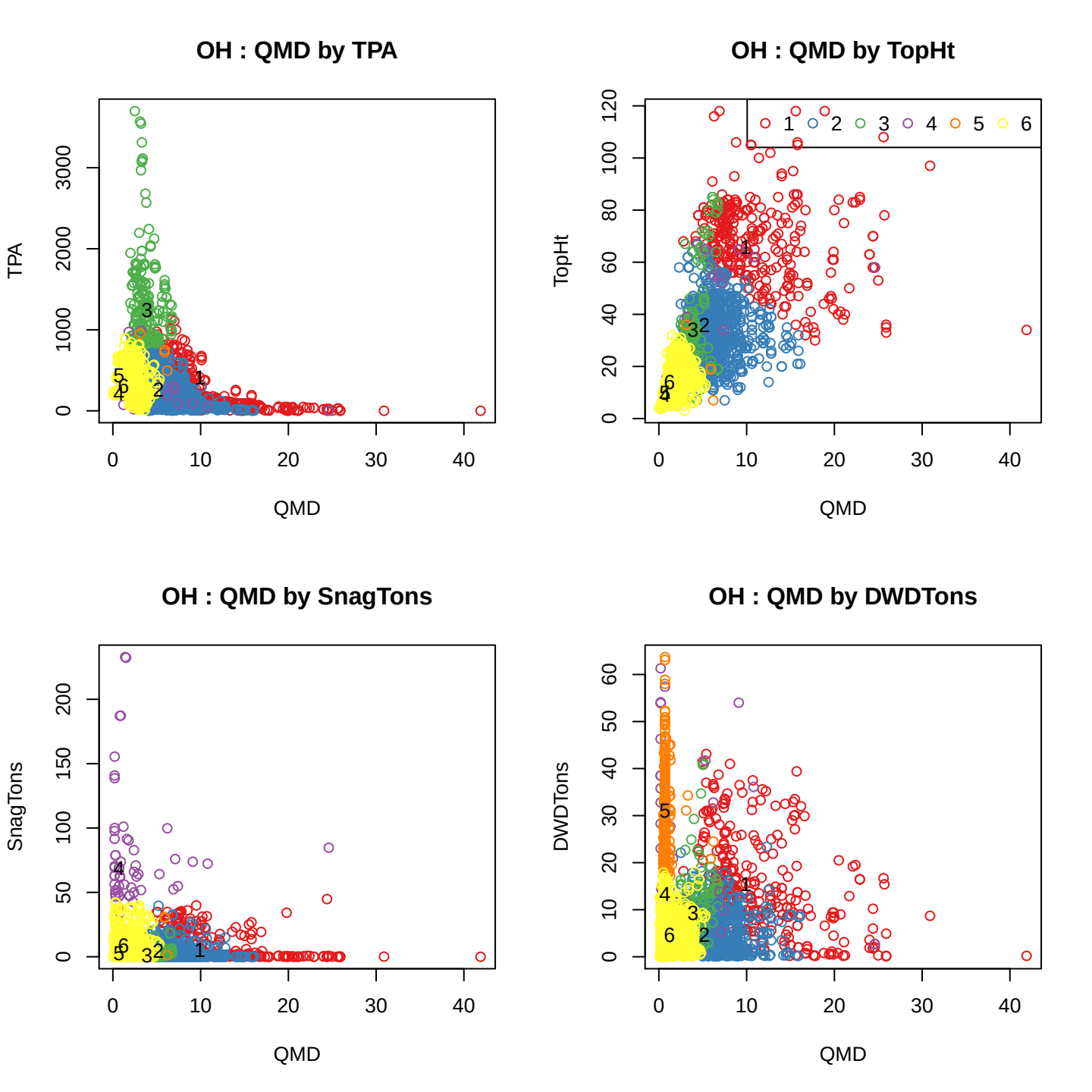
100
150
200
OH : TPA by DWDTons
DWDTons
TPA
0
10
20
30
40
50
60


OH : QMD by TPA
TPA
QMD
0
1000
2000
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OH : QMD by TopHt
TopHt
QMD
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OH : QMD by SnagTons
SnagTons
QMD
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OH : QMD by DWDTons
DWDTons
QMD
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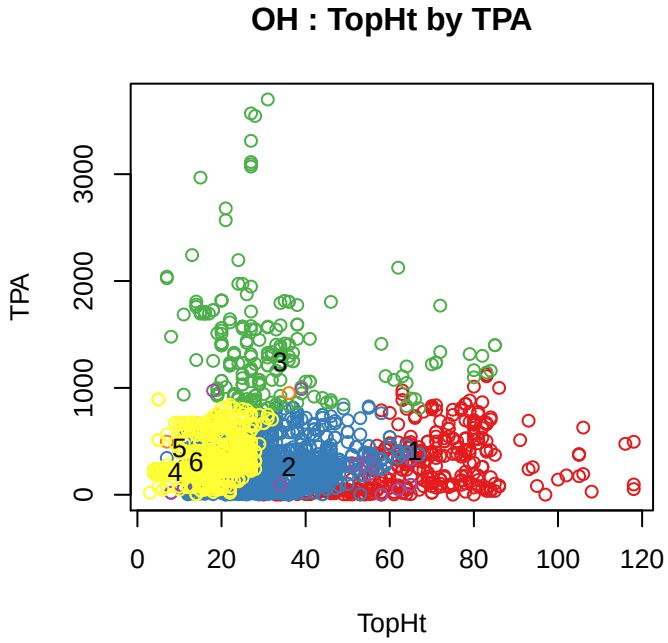
OH : TopHt by TPA
TPA
TopHt
0
1000
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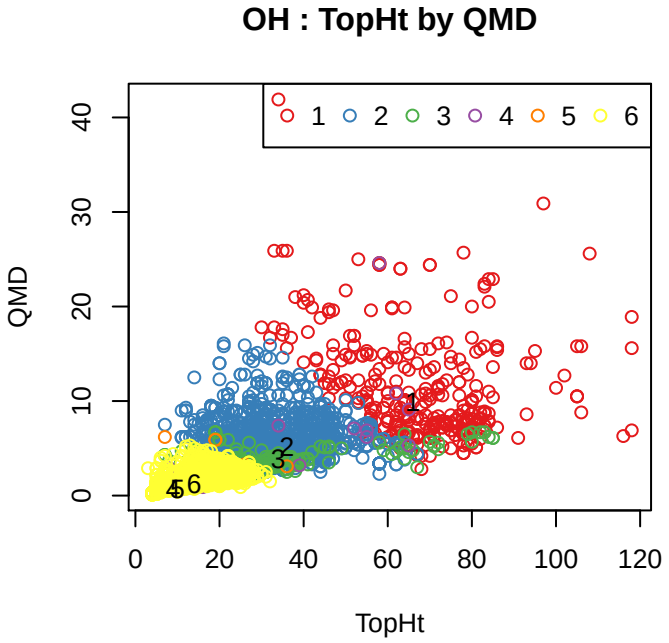
OH : TopHt by QMD
QMD
TopHt
1 2 3 4 5 6
0
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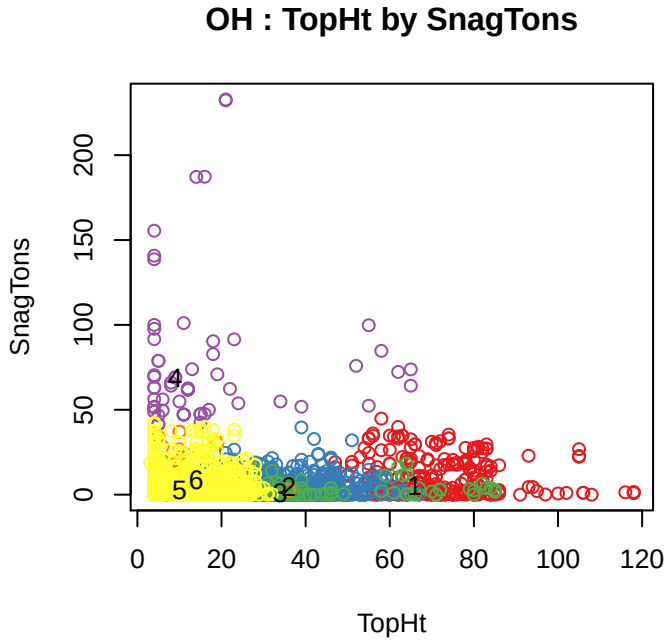
OH : TopHt by SnagTons
SnagTons
TopHt
0
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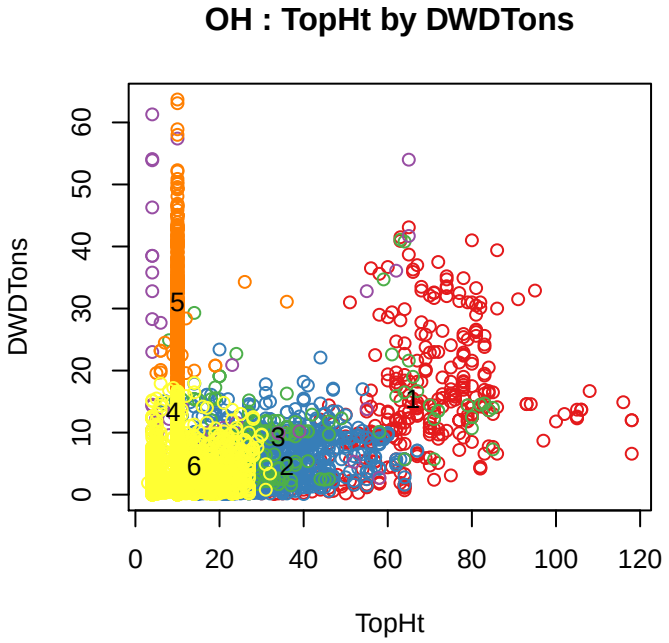
OH : TopHt by DWDTons
DWDTons
TopHt
0
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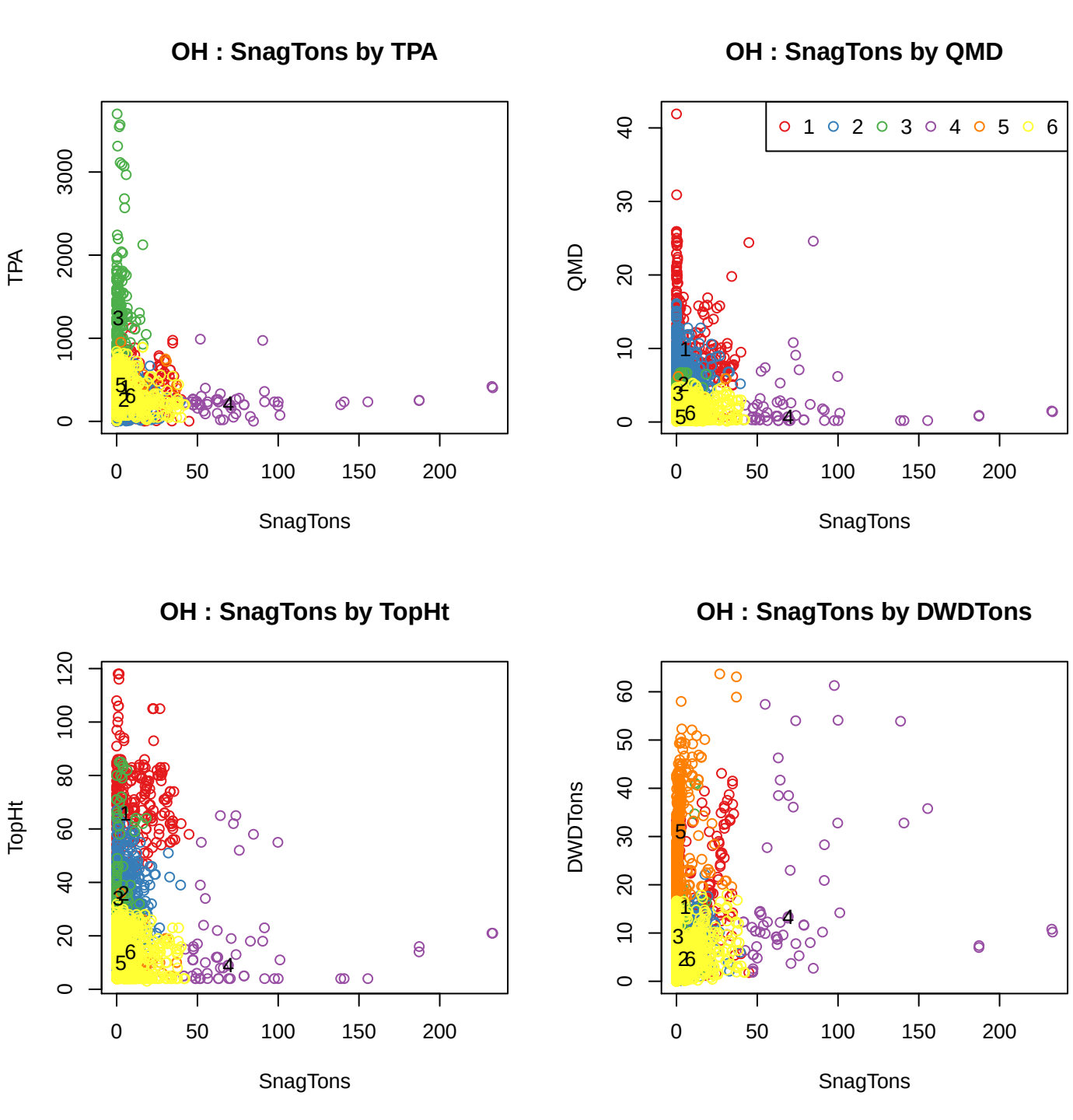
OH : SnagTons by TPA
TPA
SnagTons
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50
100
150
200
OH : SnagTons by QMD
QMD
SnagTons
1 2 3 4 5 6
0
10
20
30
40
OH : SnagTons by TopHt
TopHt
SnagTons
0
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OH : SnagTons by DWDTons
DWDTons
SnagTons
0
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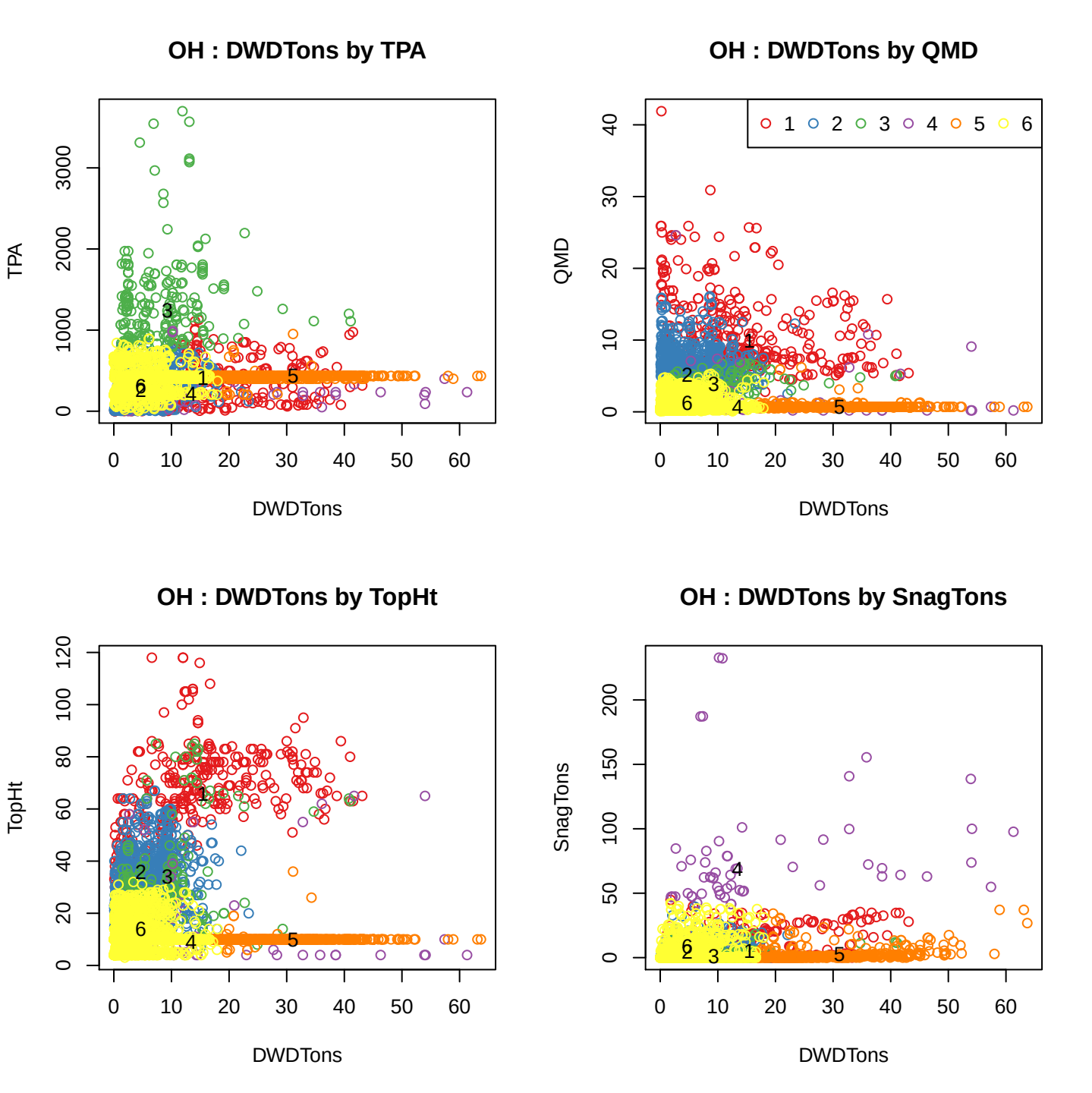
OH : DWDTons by TPA
TPA
DWDTons
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60
OH : DWDTons by QMD
QMD
DWDTons
1 2 3 4 5 6
OH : DWDTons by TopHt
TopHt
DWDTons
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OH : DWDTons by SnagTons
SnagTons
DWDTons
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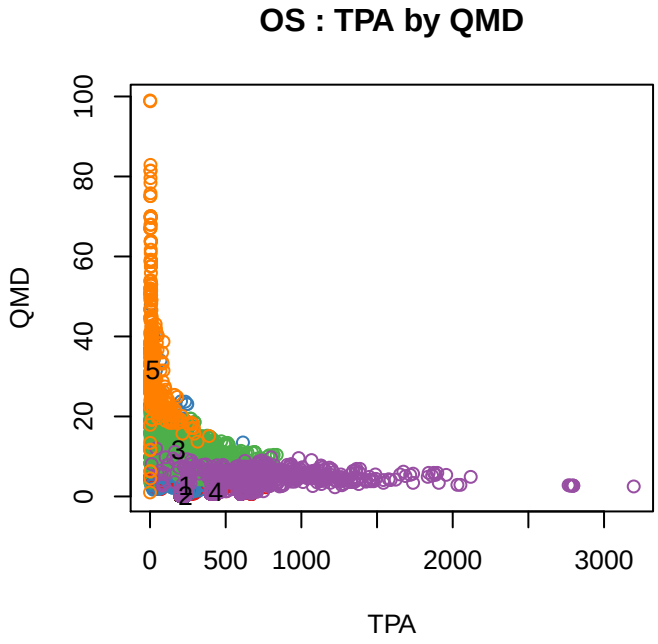
OS : TPA by QMD
QMD
TPA
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1000
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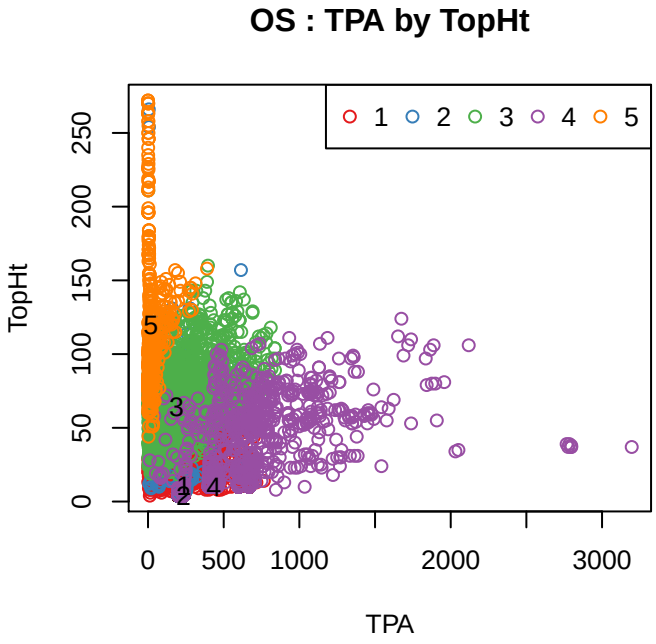
OS : TPA by TopHt
TopHt
TPA
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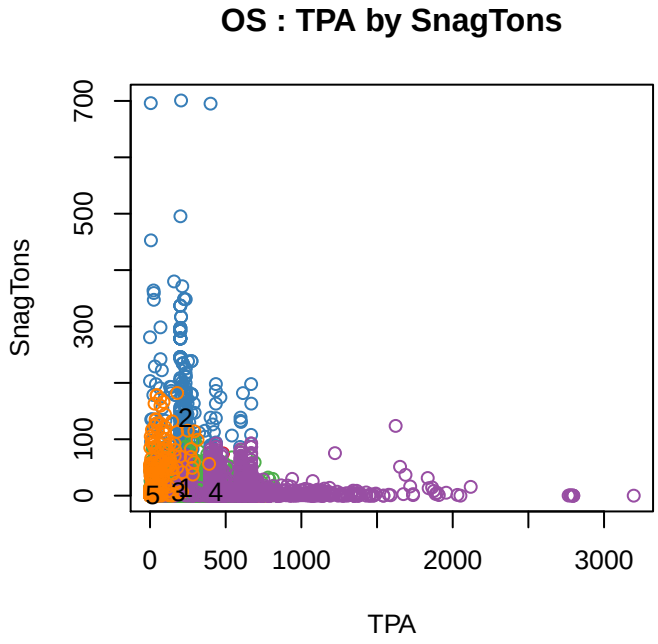
OS : TPA by SnagTons
SnagTons
TPA
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1000
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5
3
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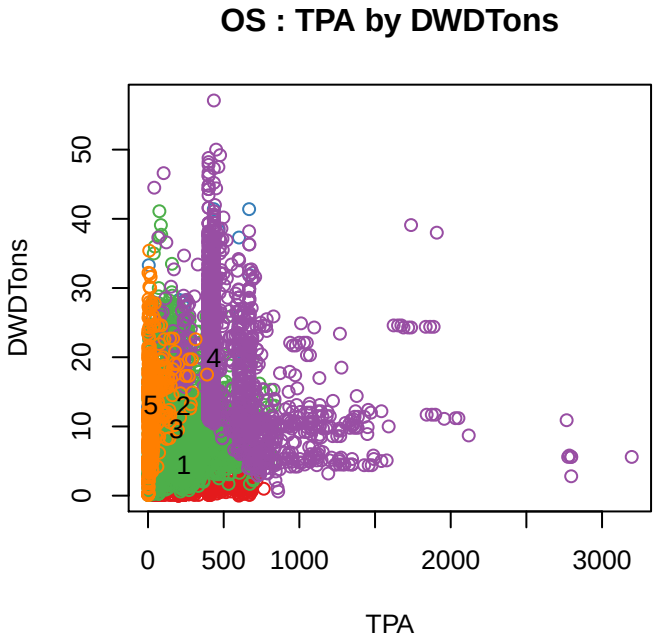
OS : TPA by DWDTons
DWDTons
TPA
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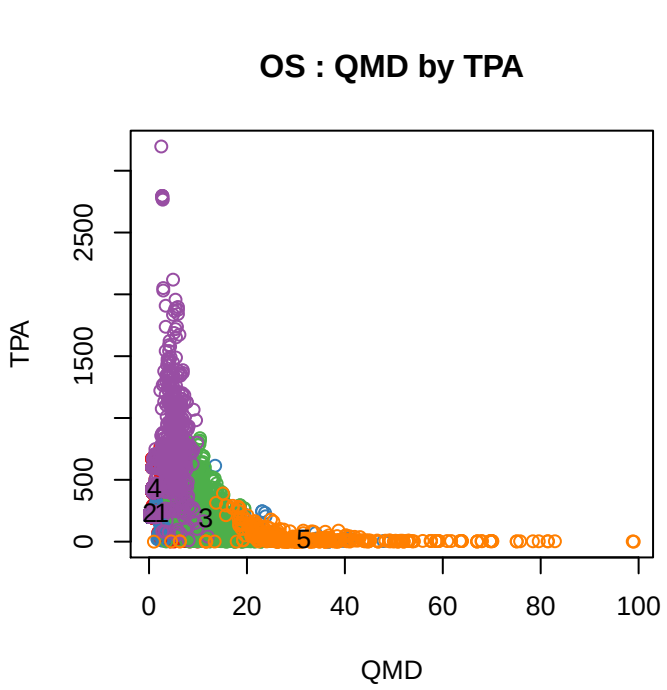
OS : QMD by TPA
TPA
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1500
2500
QMD
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80
100
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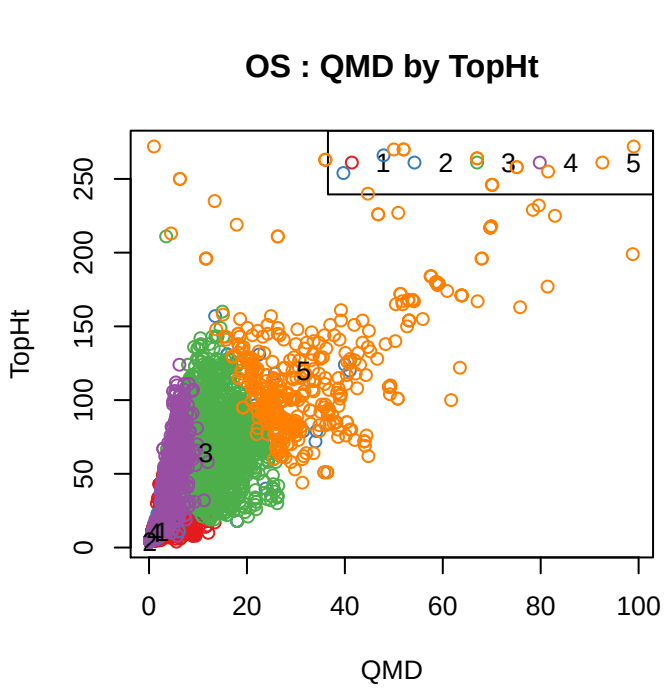
3
5


OS : QMD by TopHt
TopHt
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200
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QMD
0
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60
80
100
1
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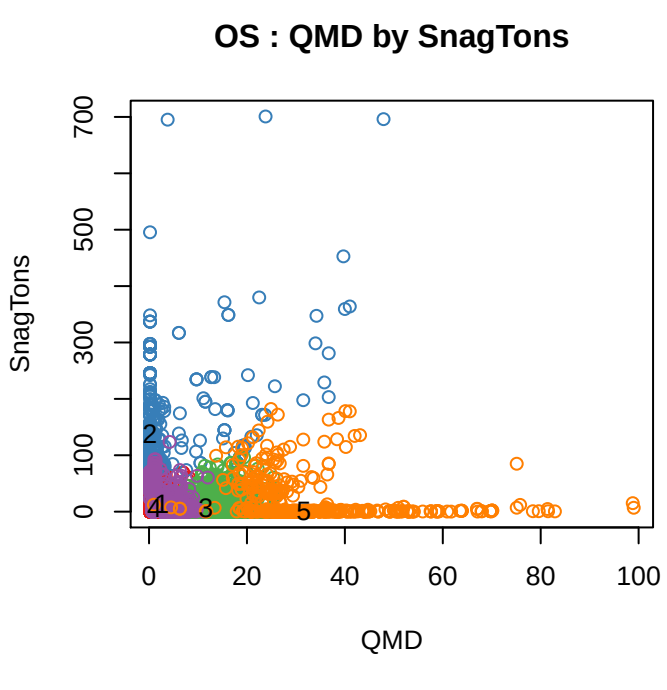
4
5


OS : QMD by SnagTons
SnagTons
0
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QMD
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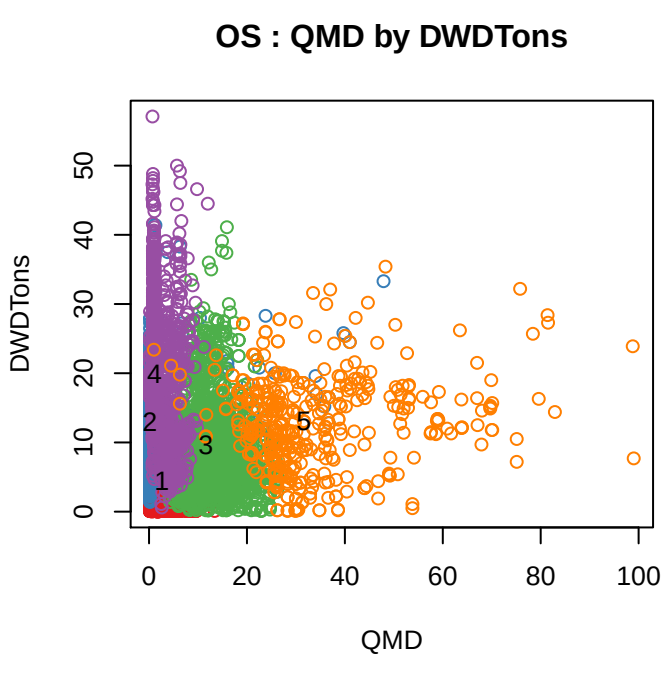
OS : QMD by DWDTons
DWDTons
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QMD
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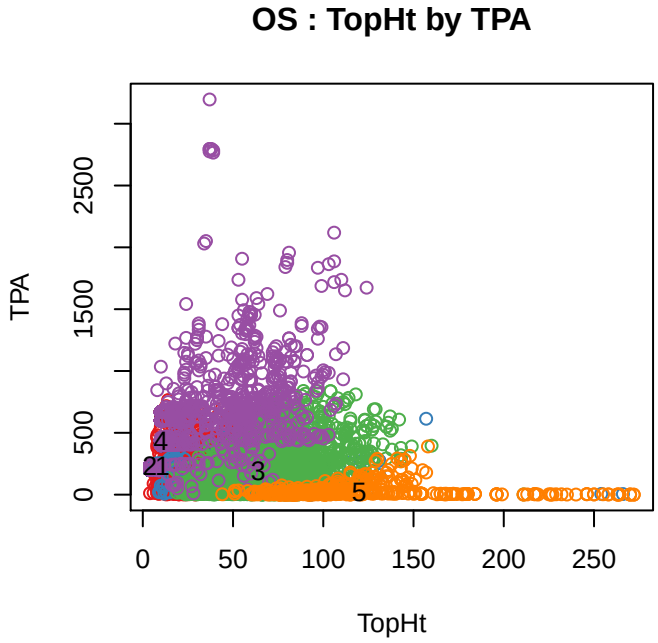
OS : TopHt by TPA
TPA
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150
200
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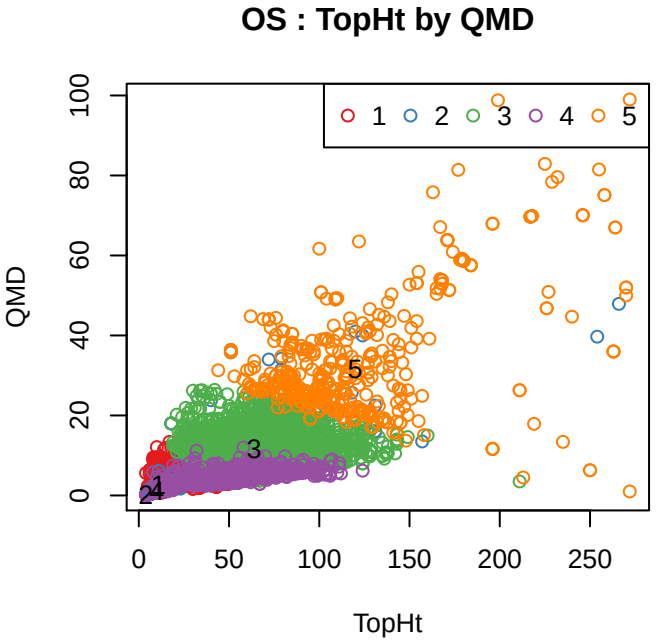
TopHt
4
2
1
3
5


OS : TopHt by QMD
QMD
0
20
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TopHt
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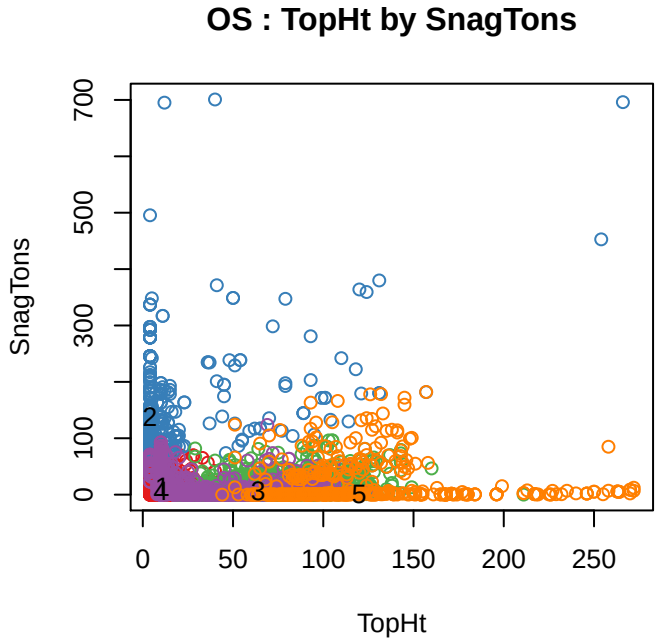
OS : TopHt by SnagTons
SnagTons
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0
50
100
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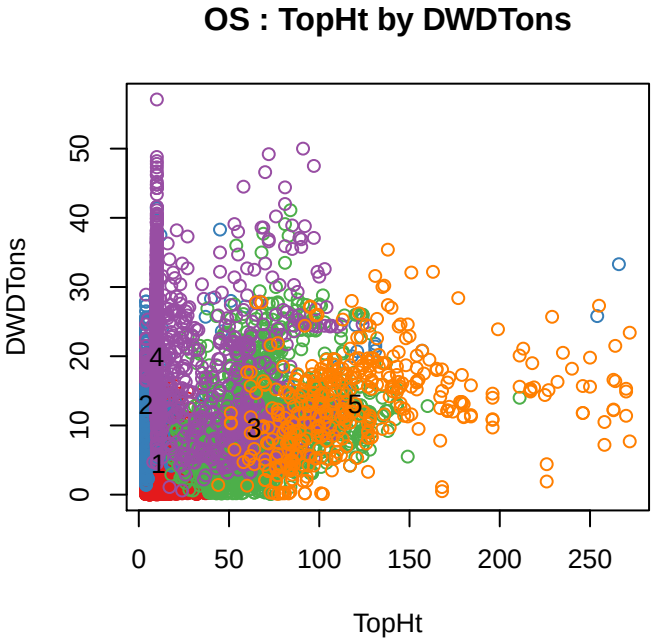
200
250
TopHt
2
4
3
5


OS : TopHt by DWDTons
DWDTons
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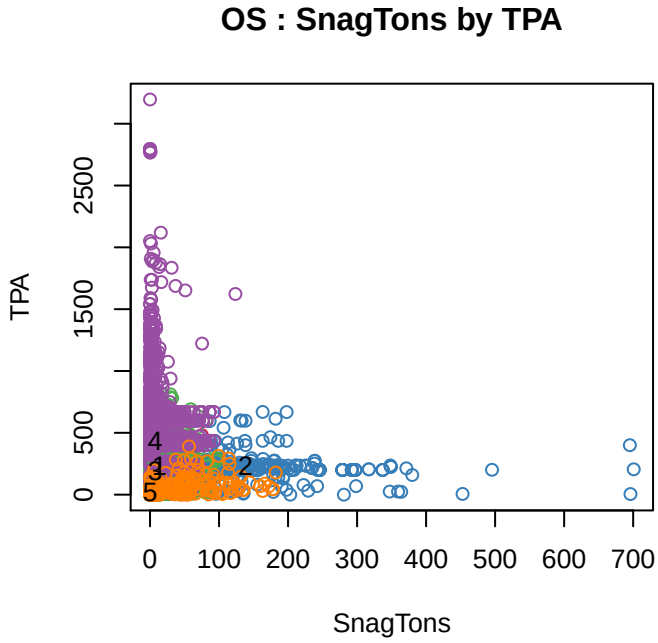
0
50
100
150
200
250
TopHt
4
2
3
5
1


OS : SnagTons by TPA
TPA
SnagTons
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500
1500
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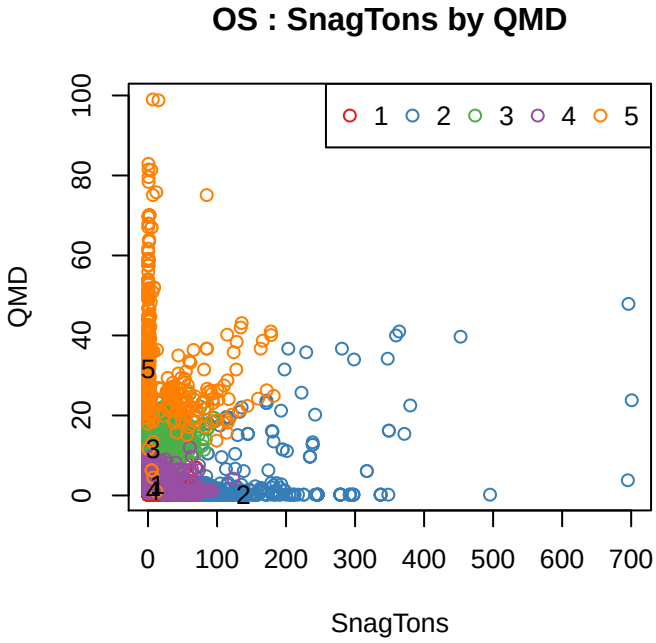
600
700


OS : SnagTons by QMD
QMD
SnagTons
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4
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40
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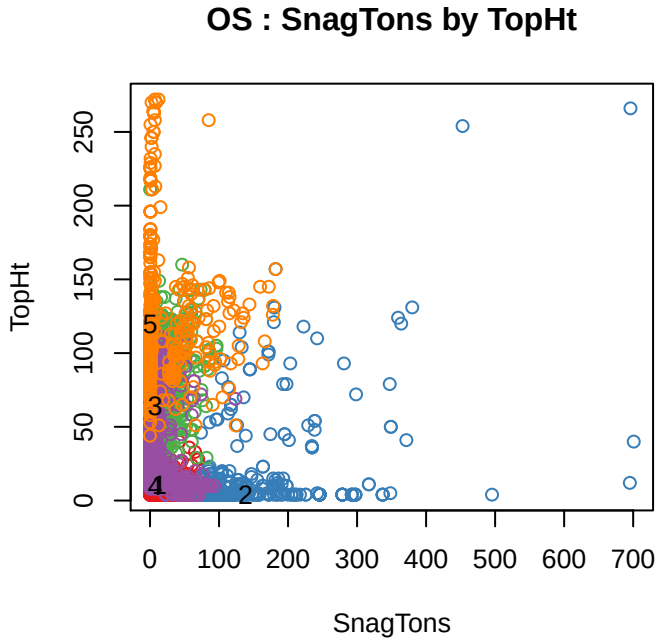
OS : SnagTons by TopHt
TopHt
SnagTons
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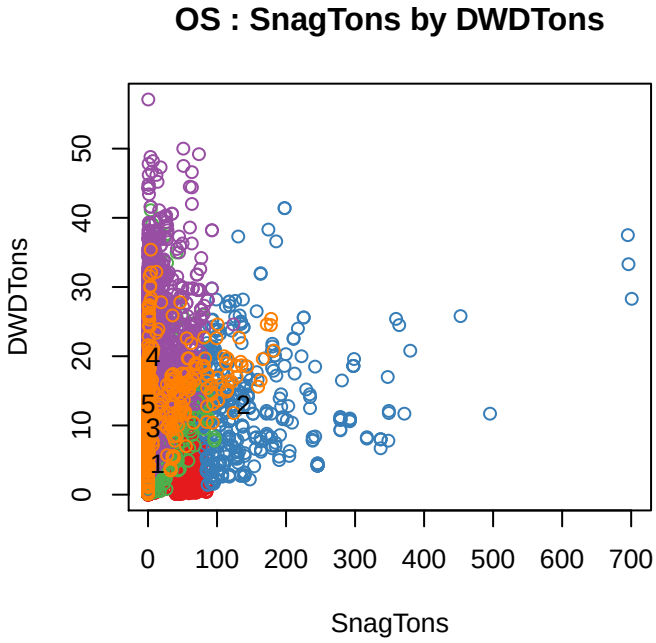
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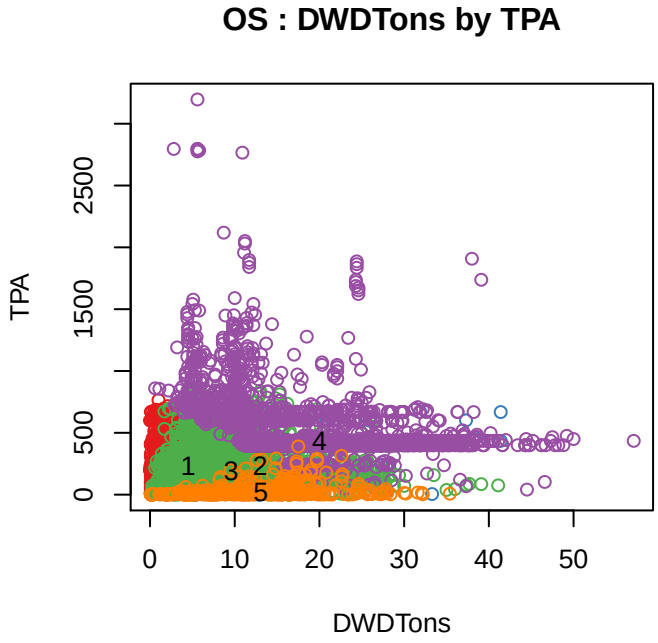
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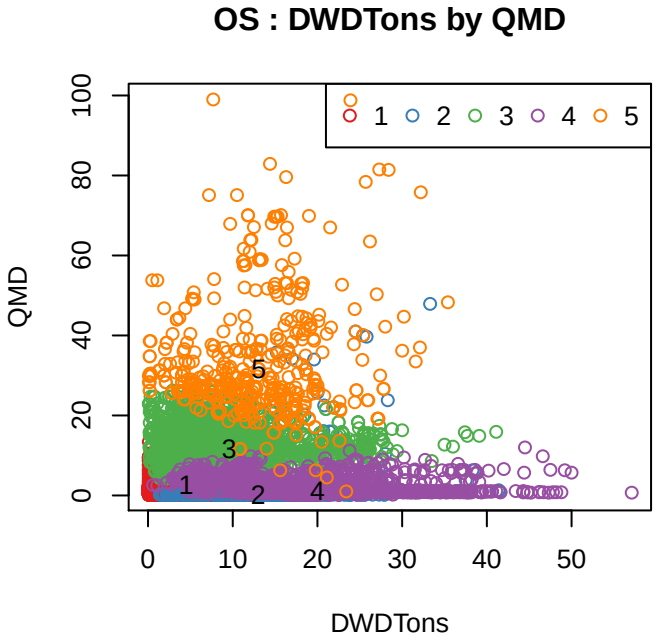
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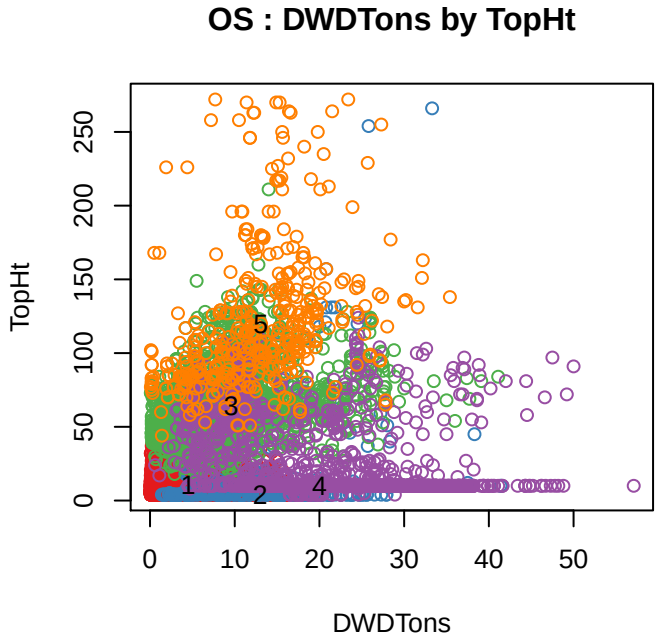
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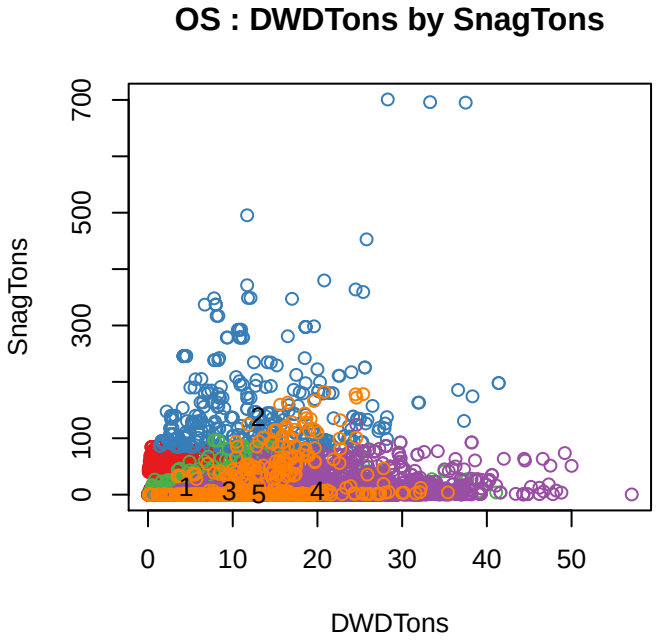
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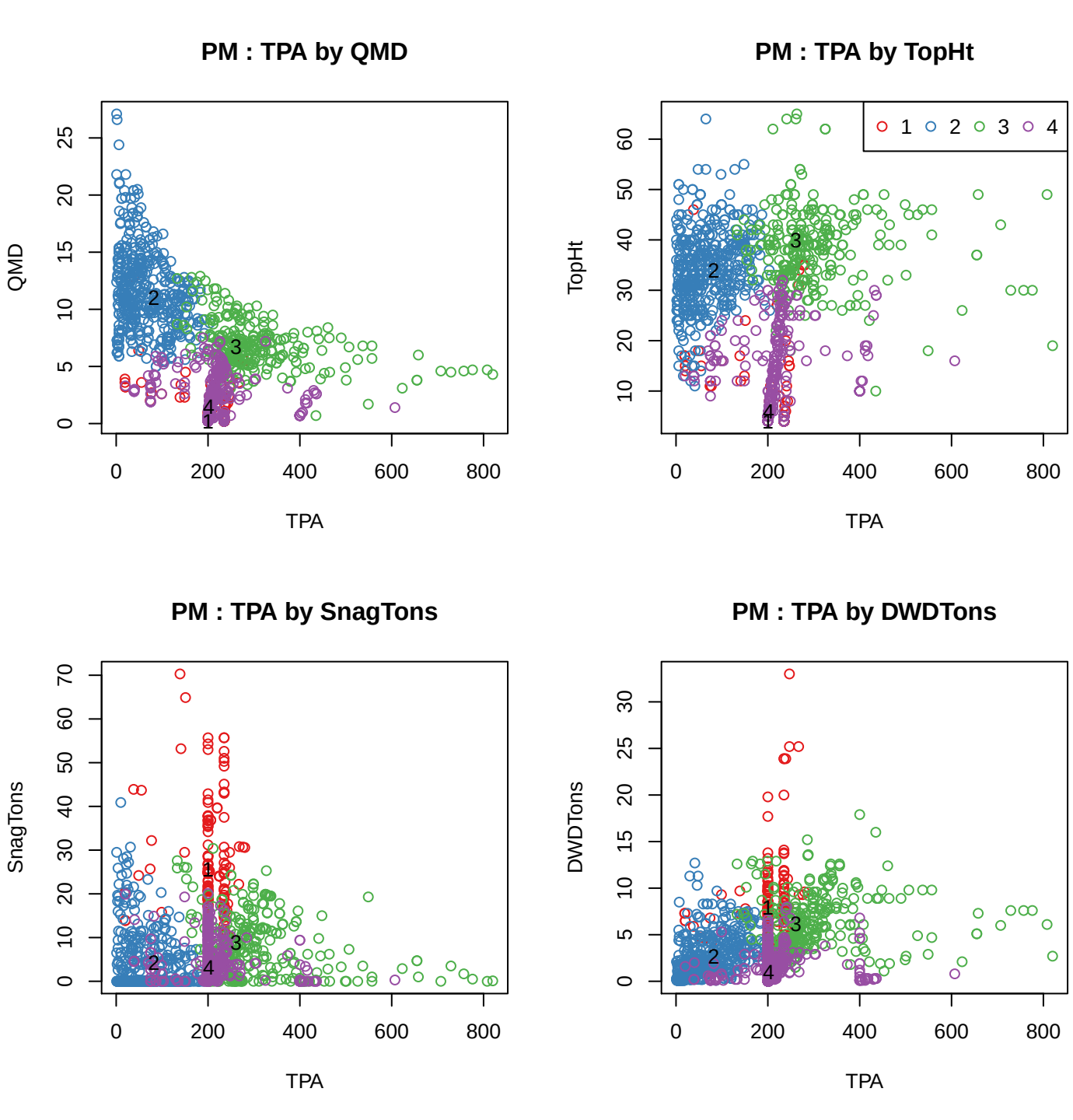
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PM : TPA by TopHt
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PM : TPA by SnagTons
SnagTons
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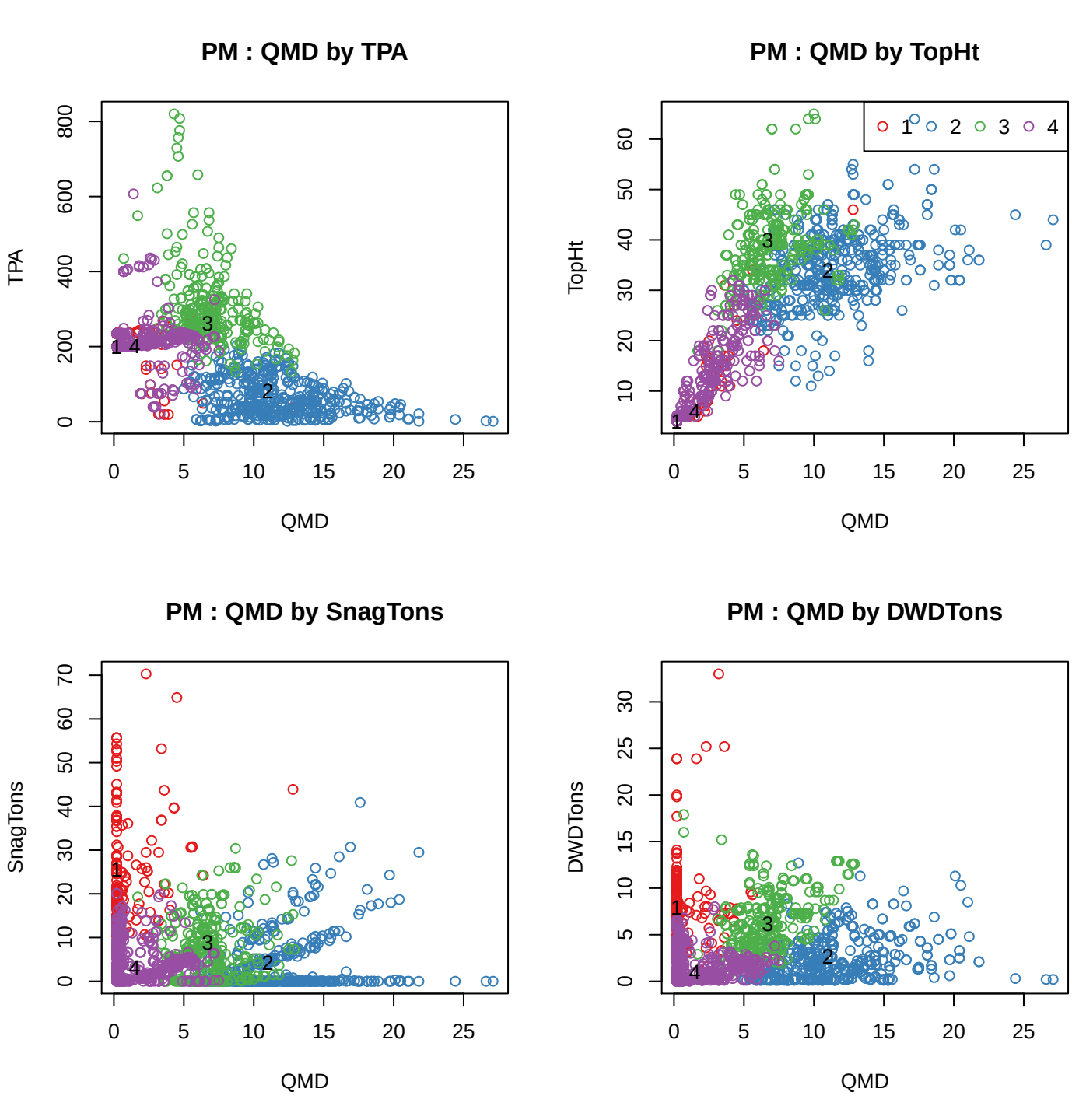
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PM : QMD by SnagTons
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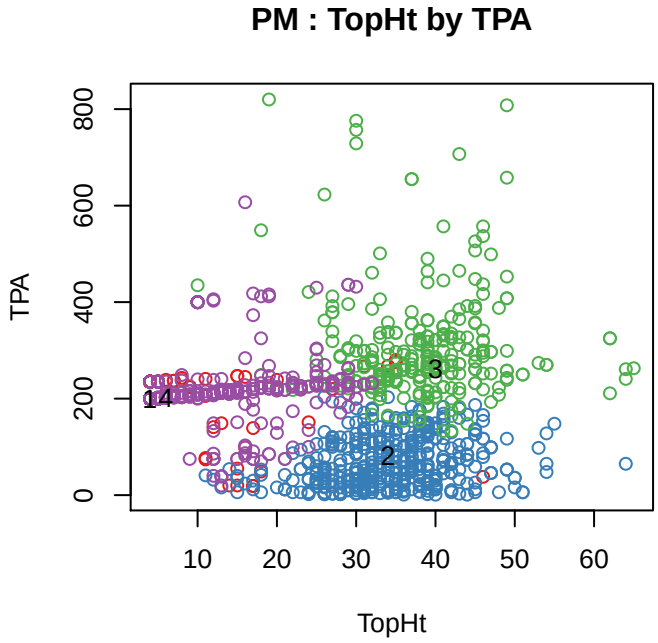
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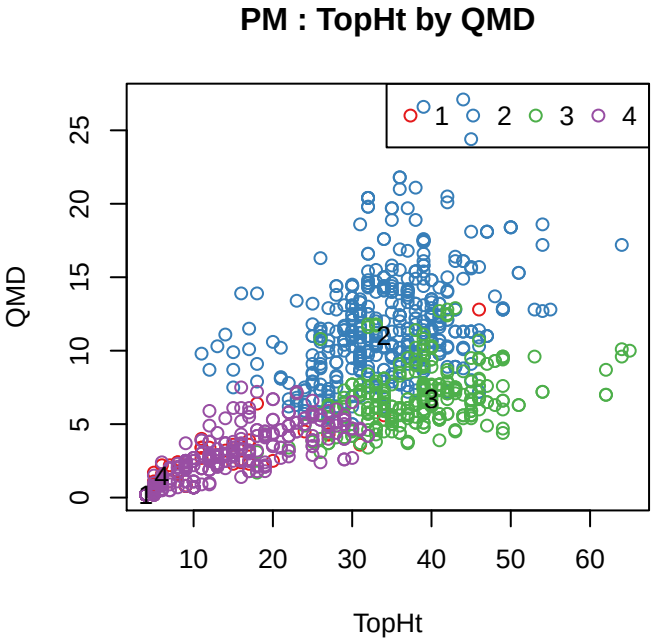
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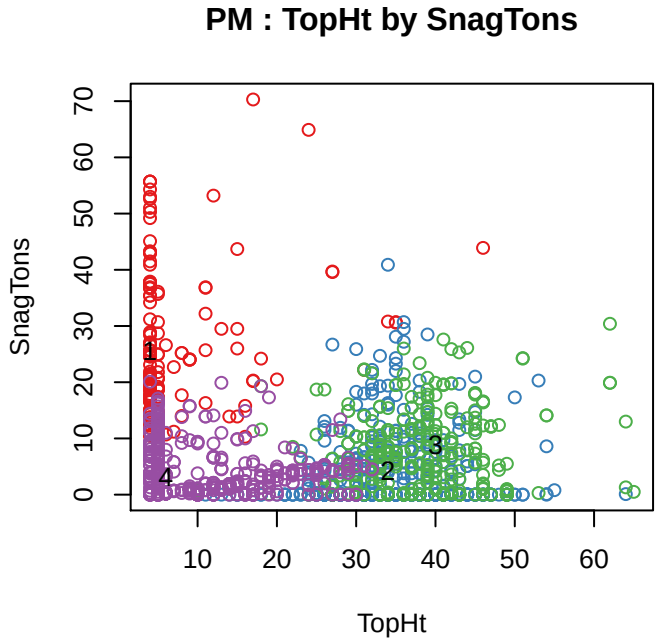
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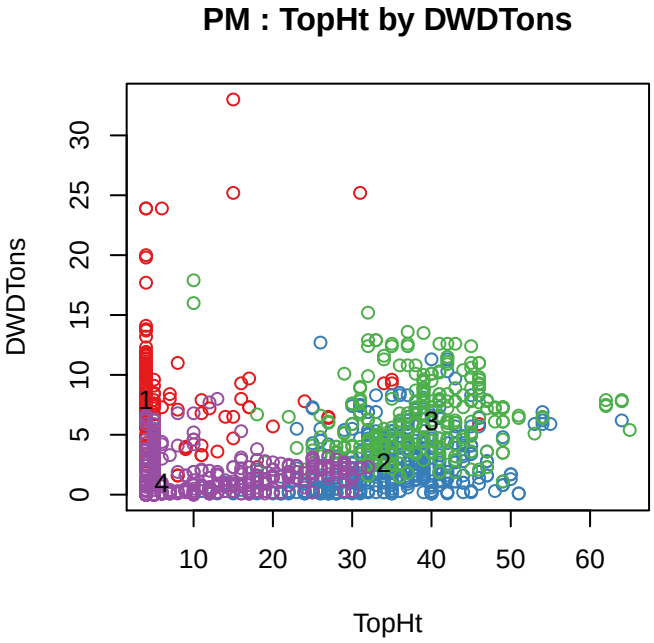
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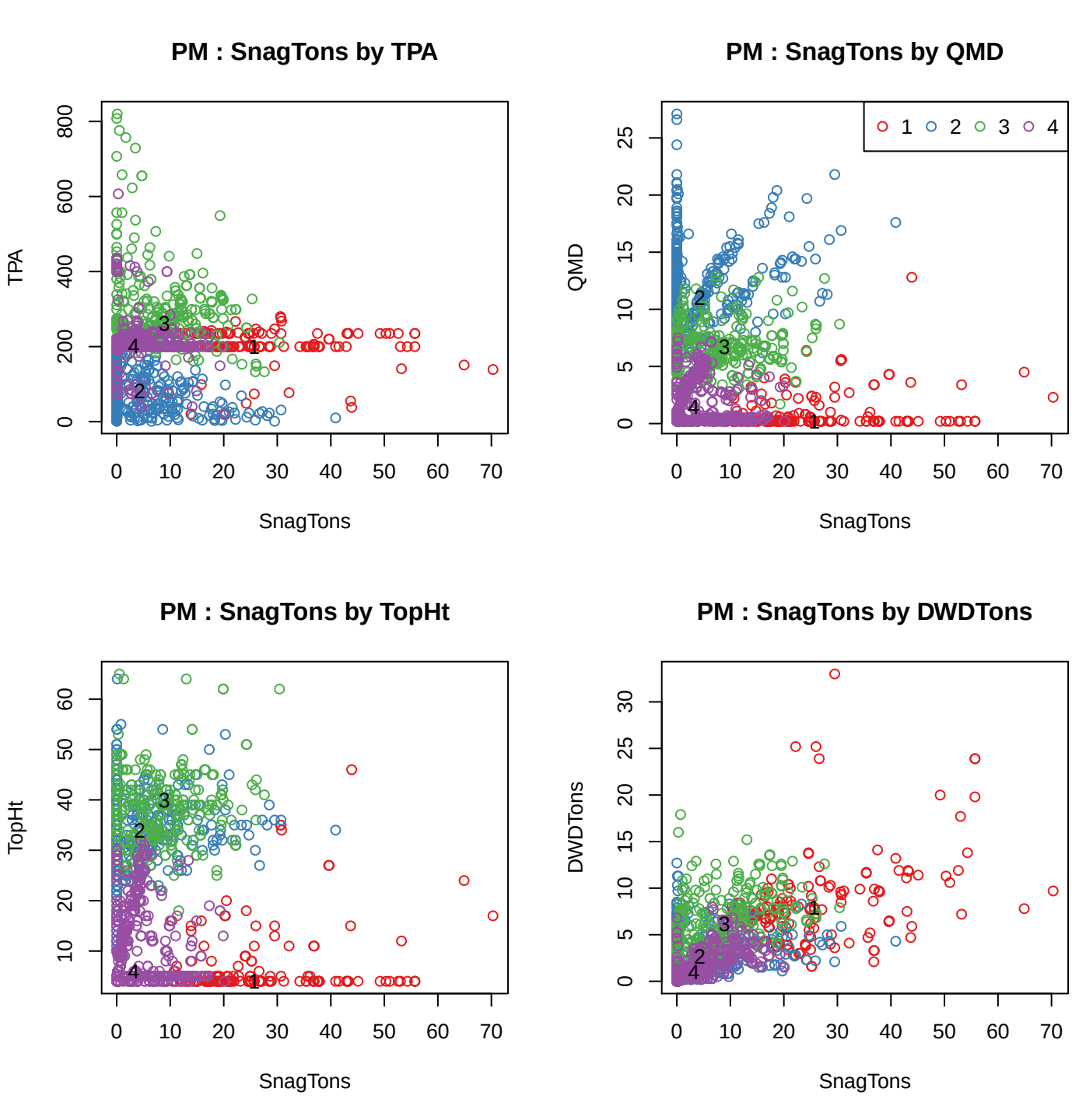
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PM : SnagTons by QMD
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PM : SnagTons by TopHt
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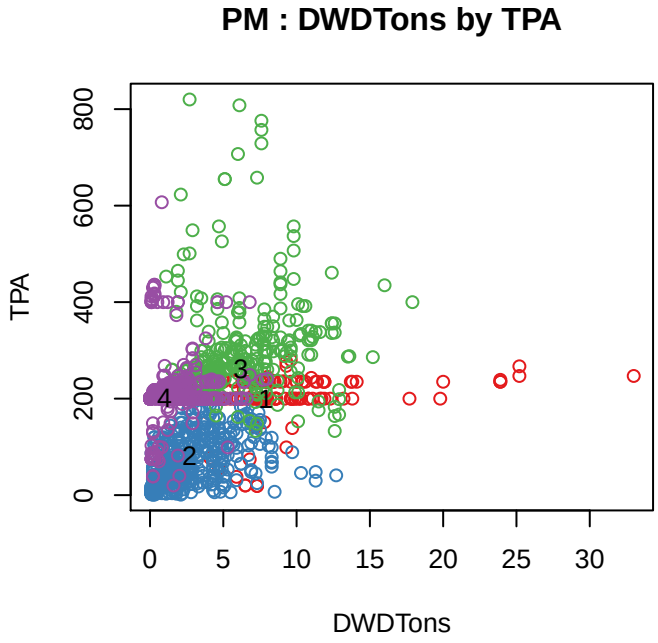
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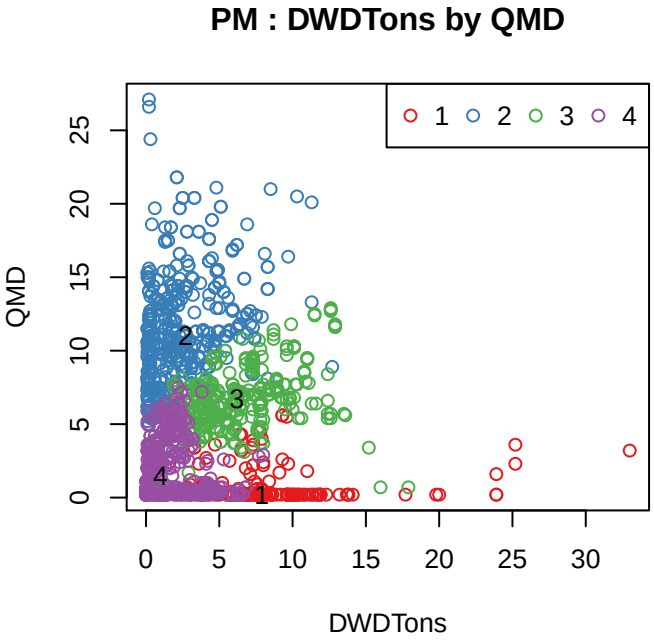
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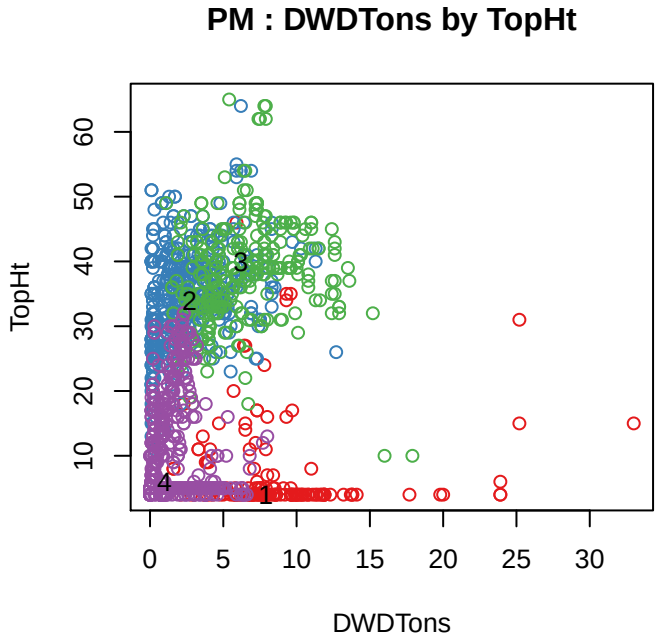
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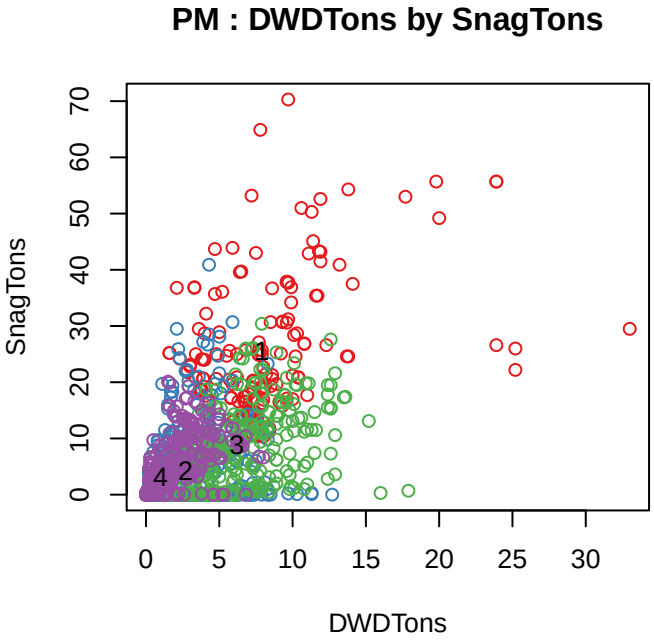
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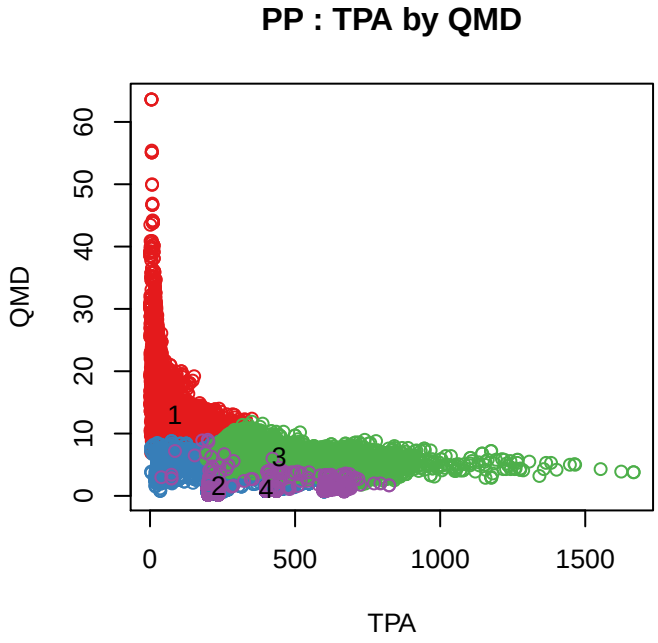
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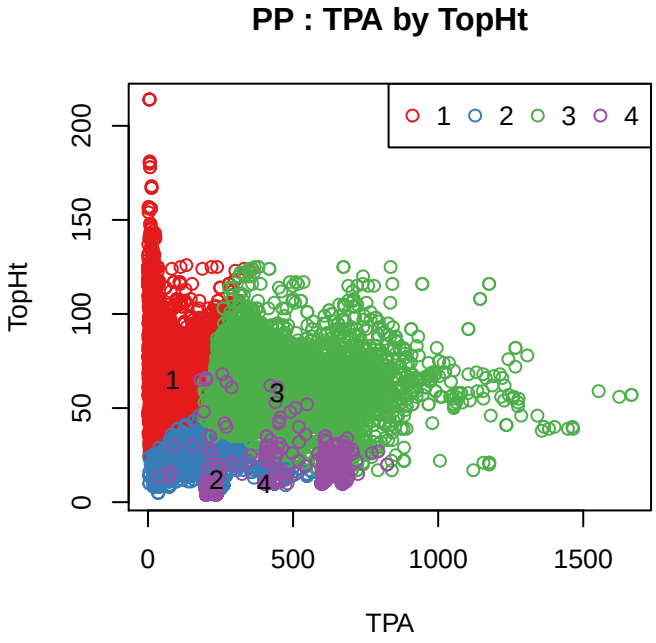
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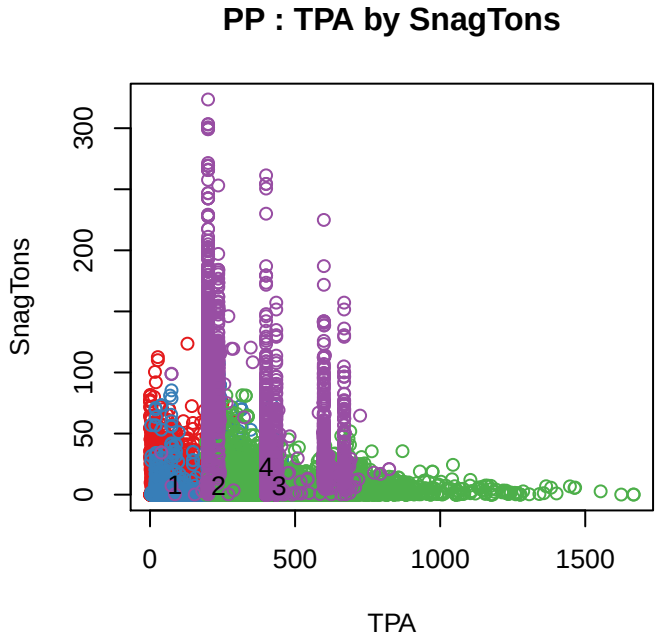
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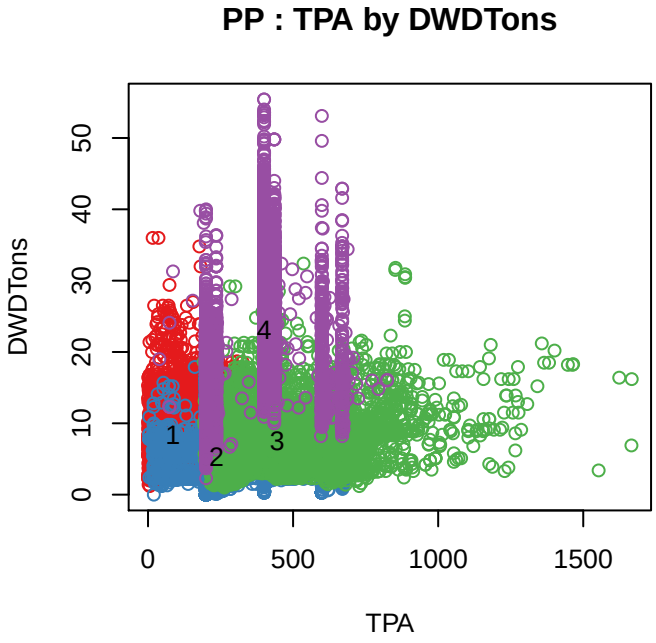
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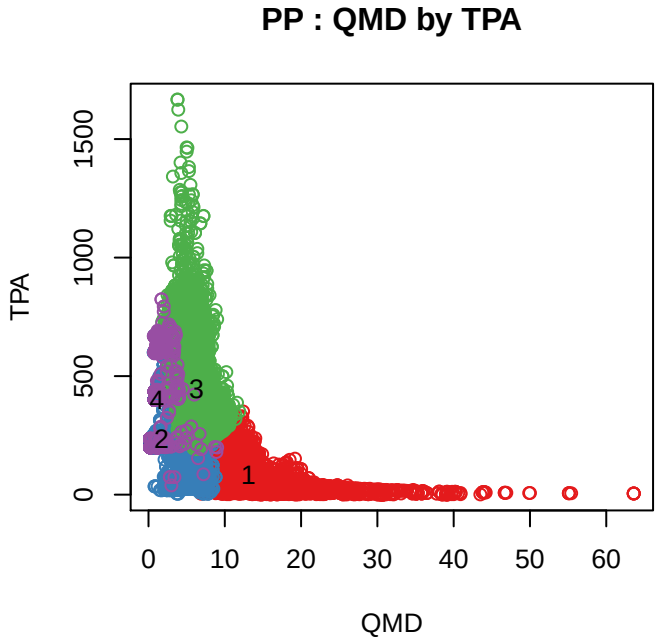
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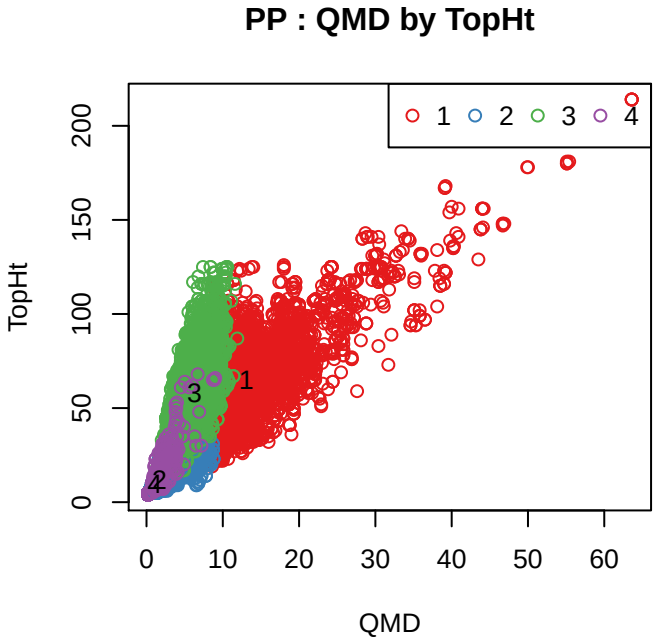
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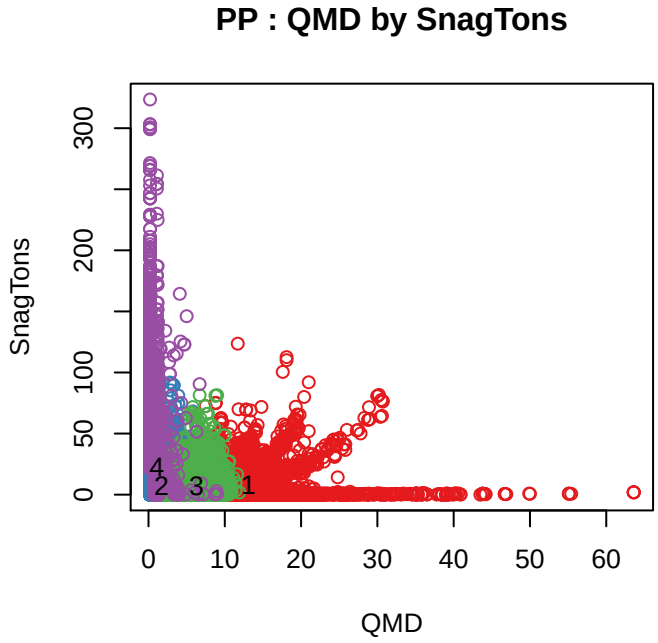
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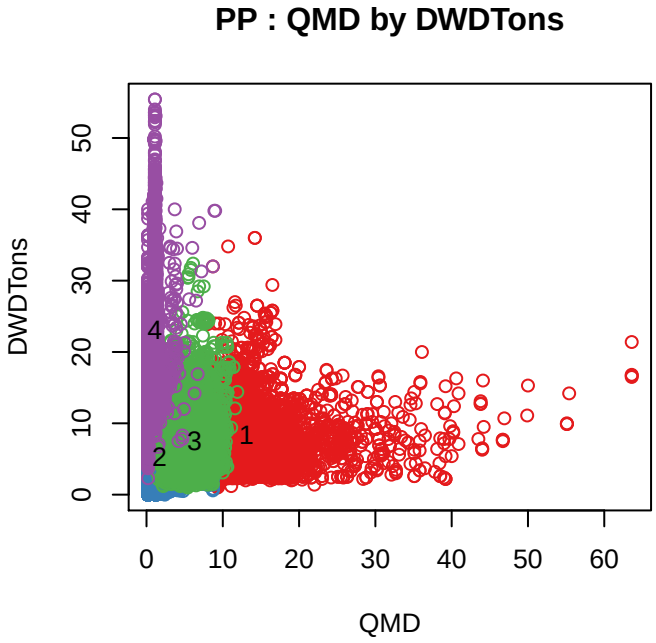
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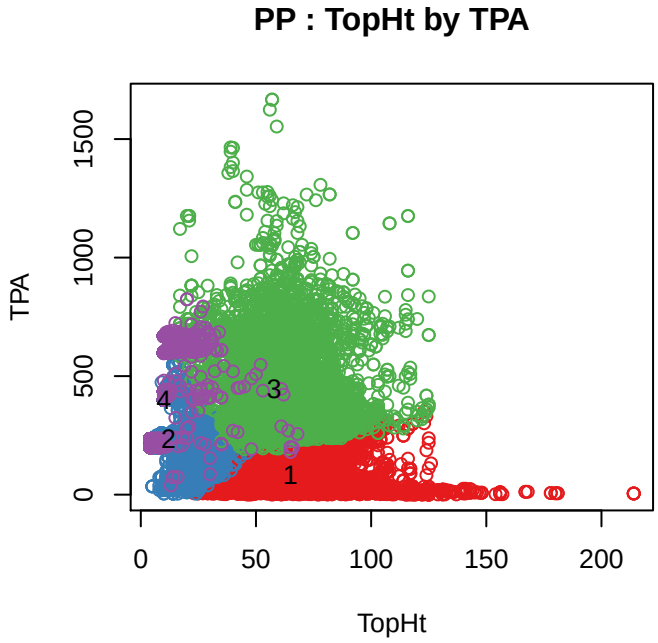
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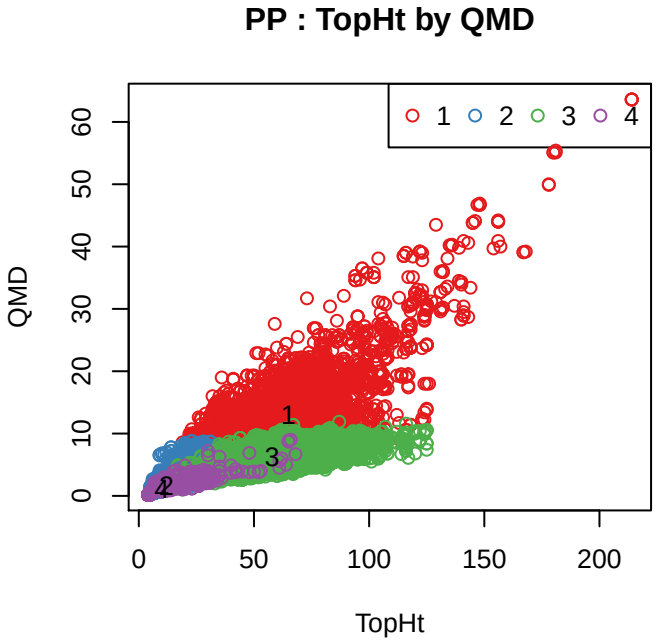
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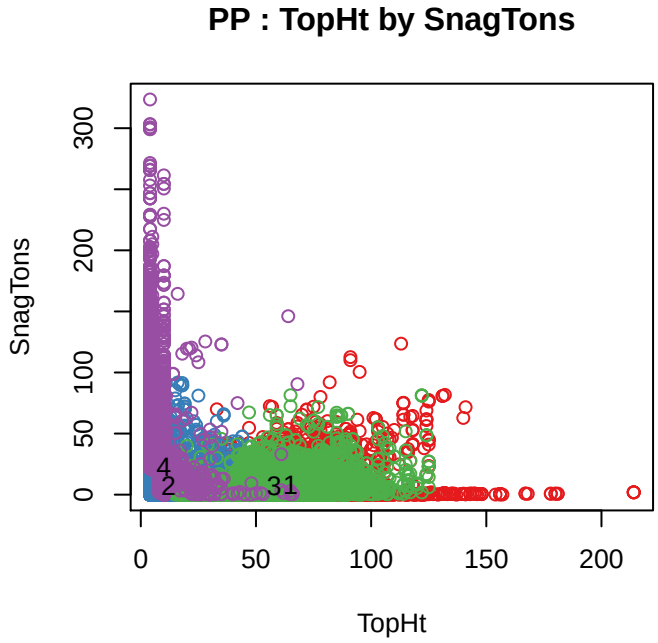
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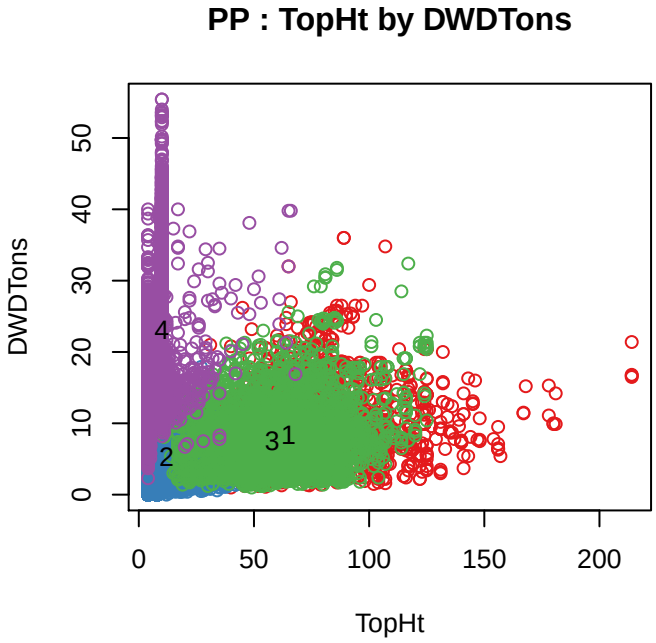
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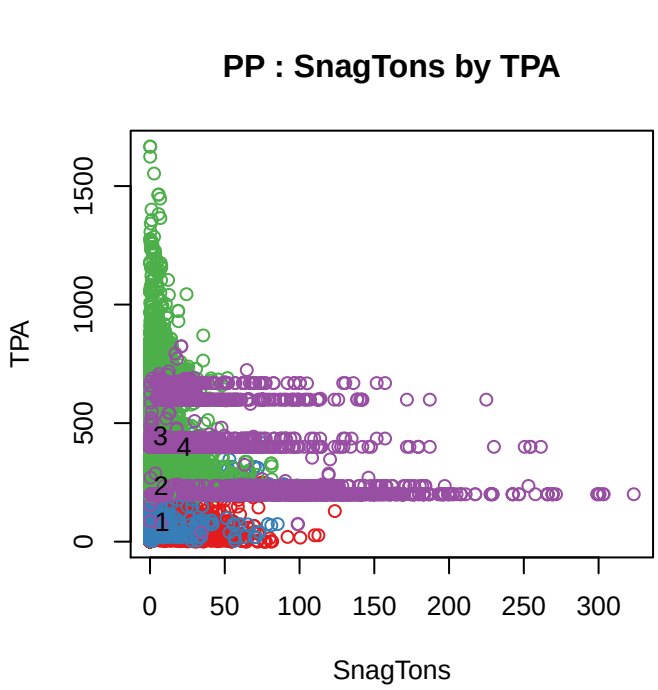
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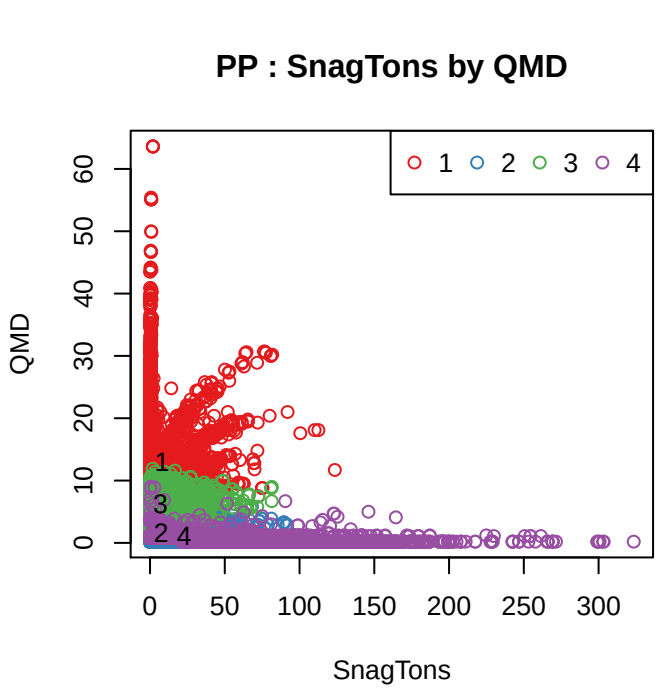
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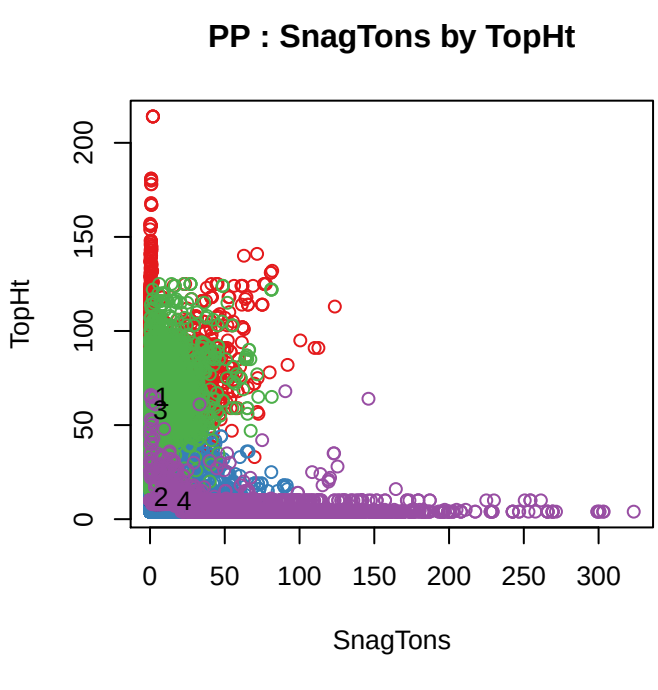
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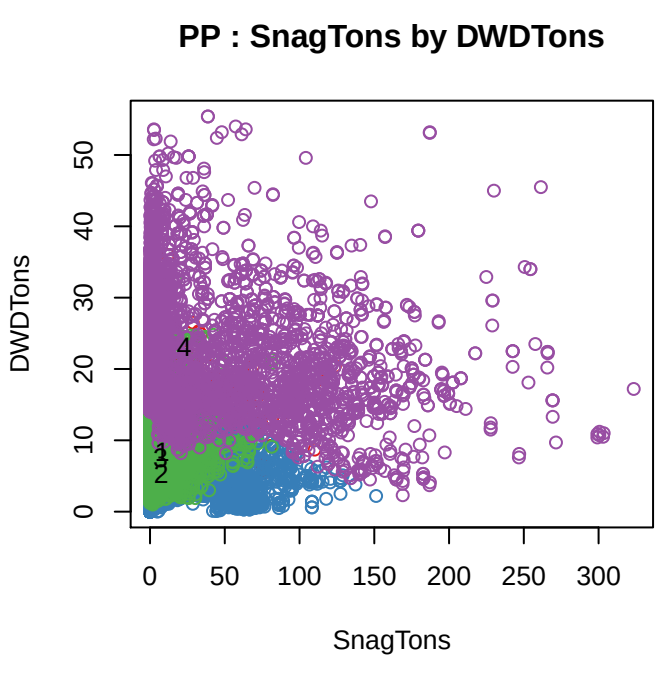
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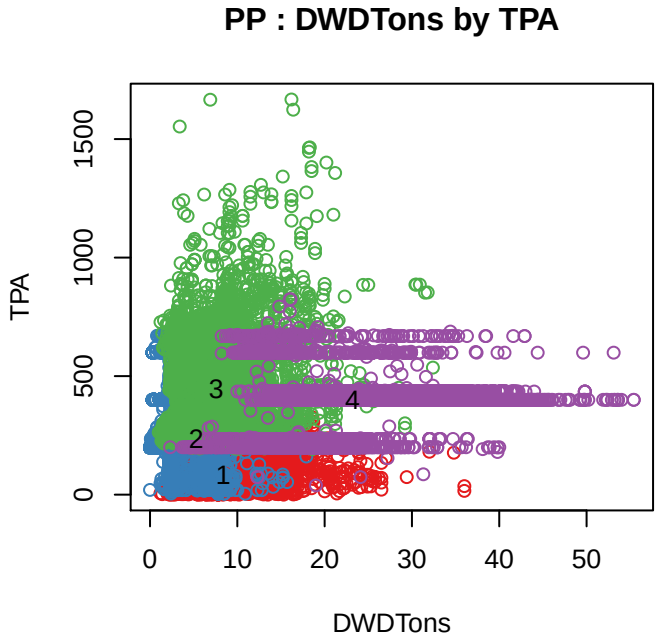
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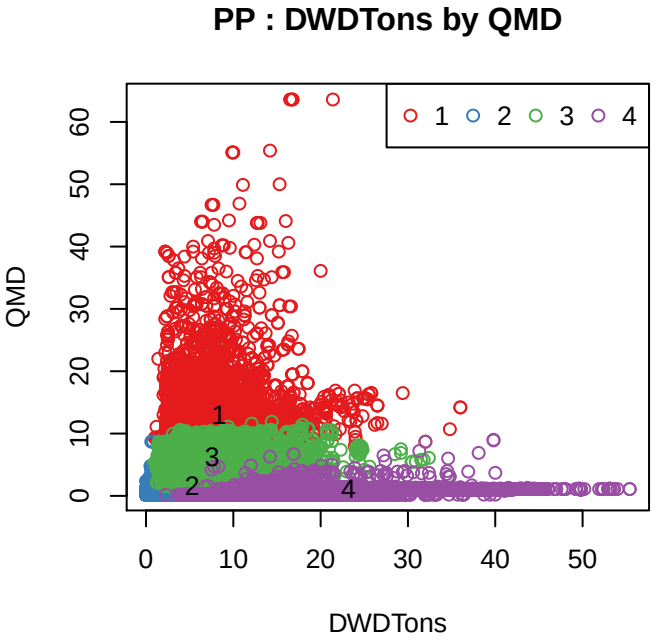
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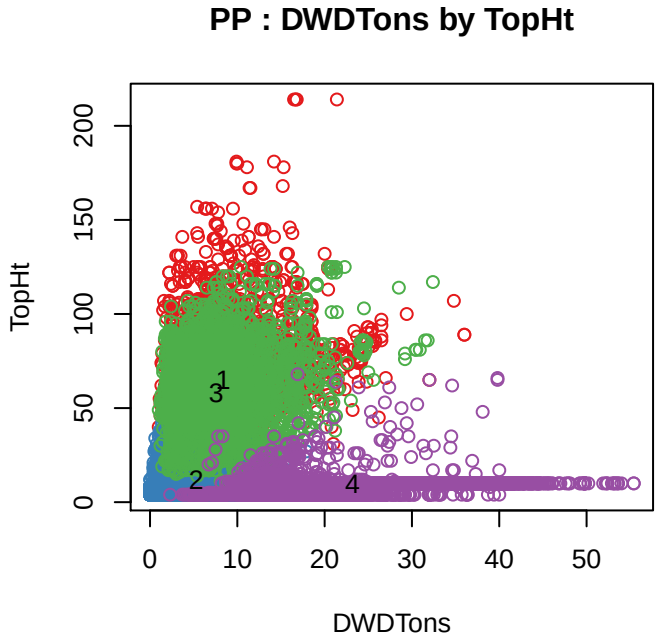
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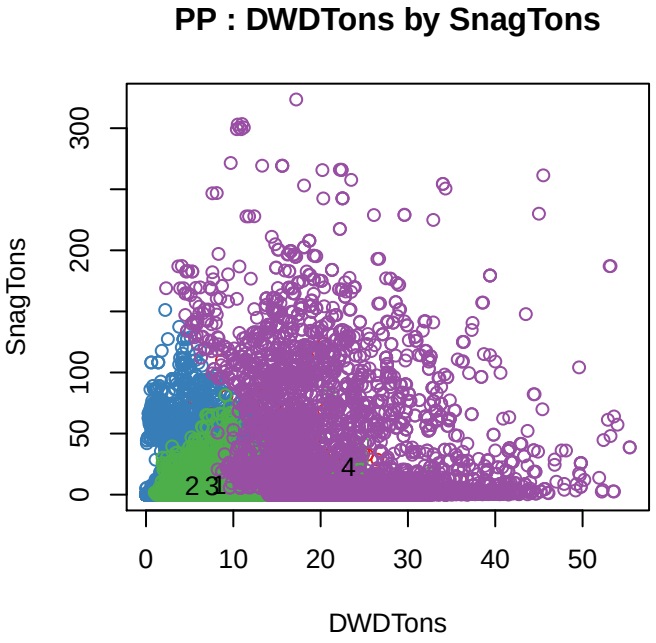
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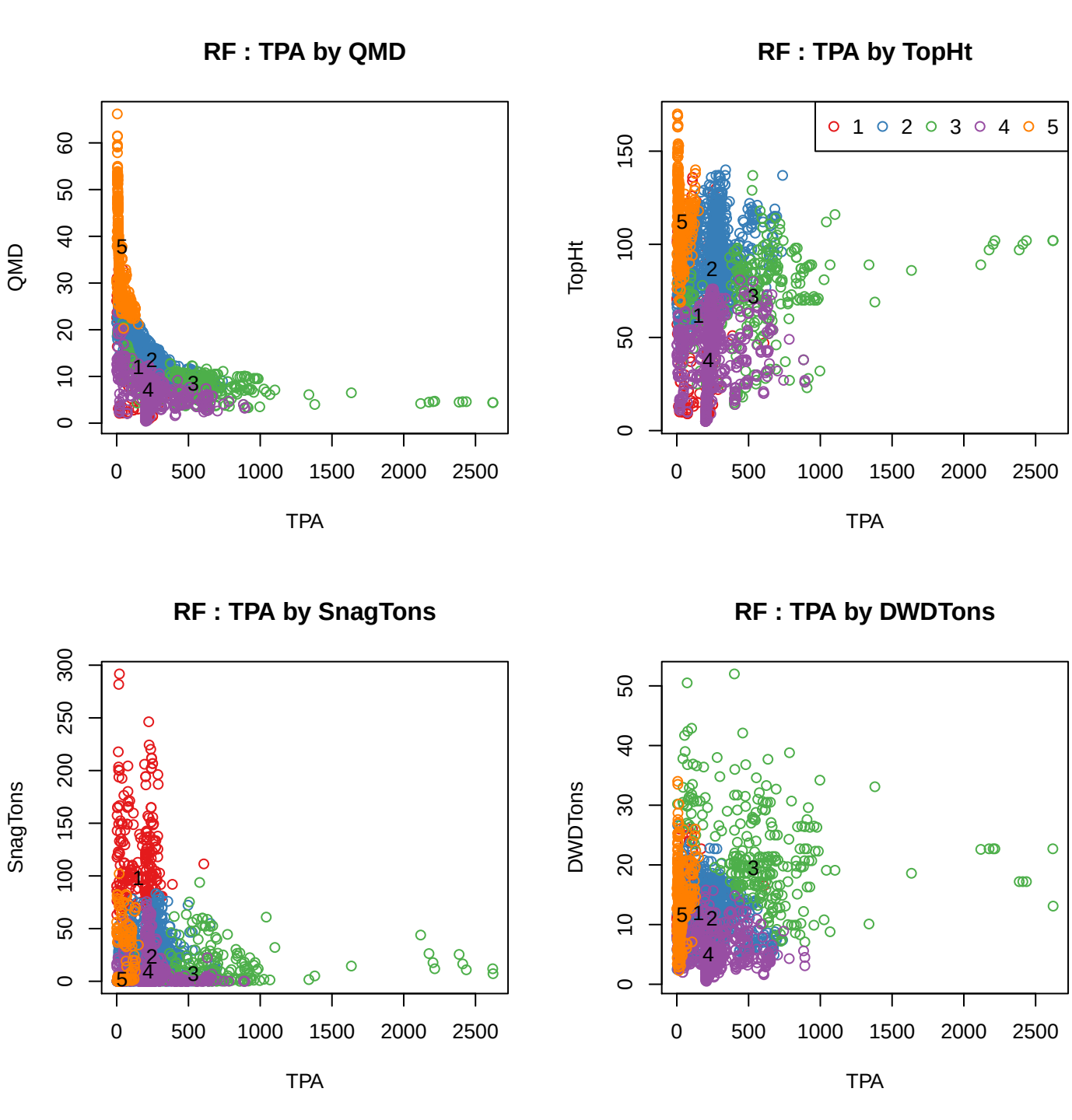
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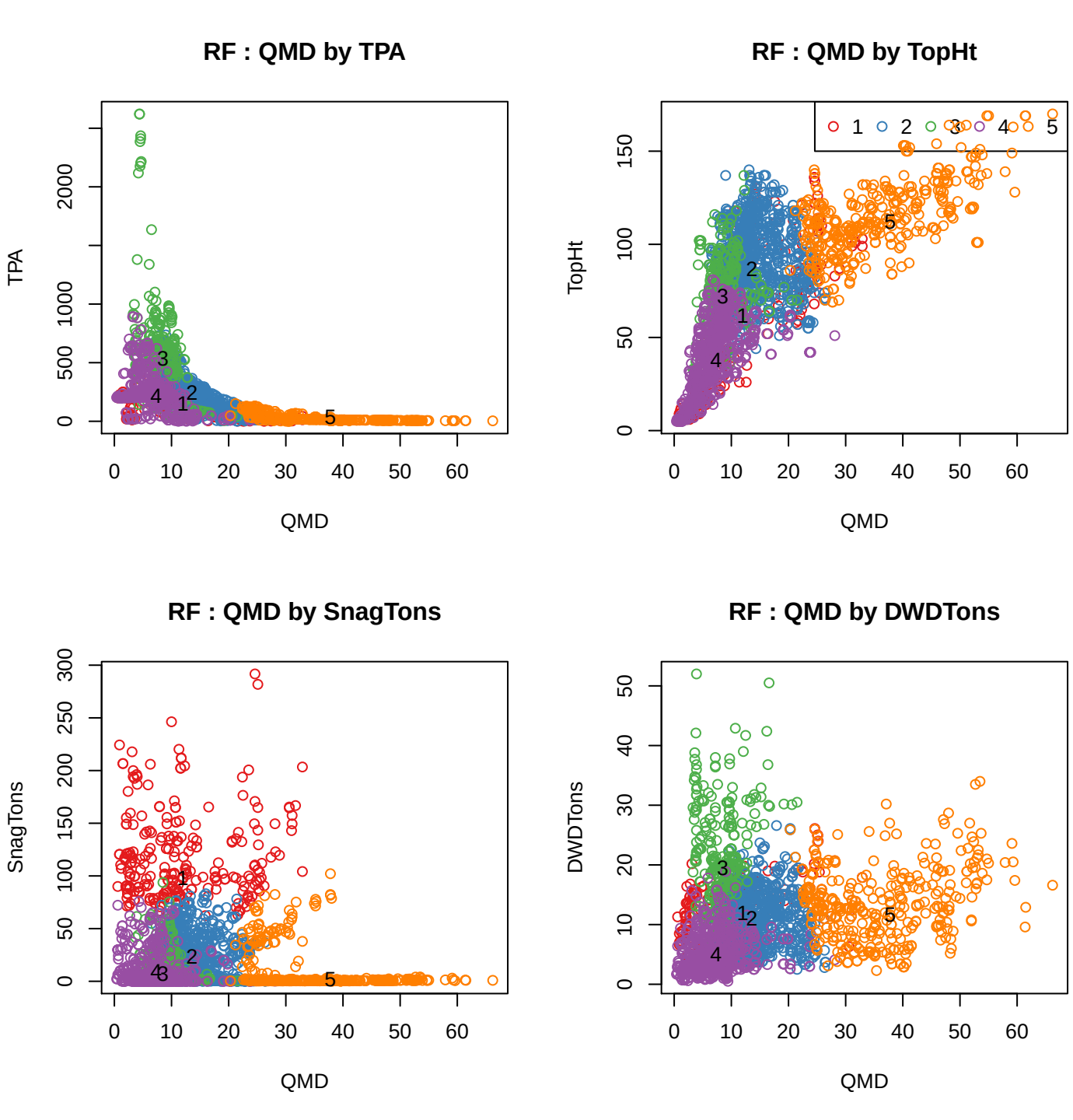
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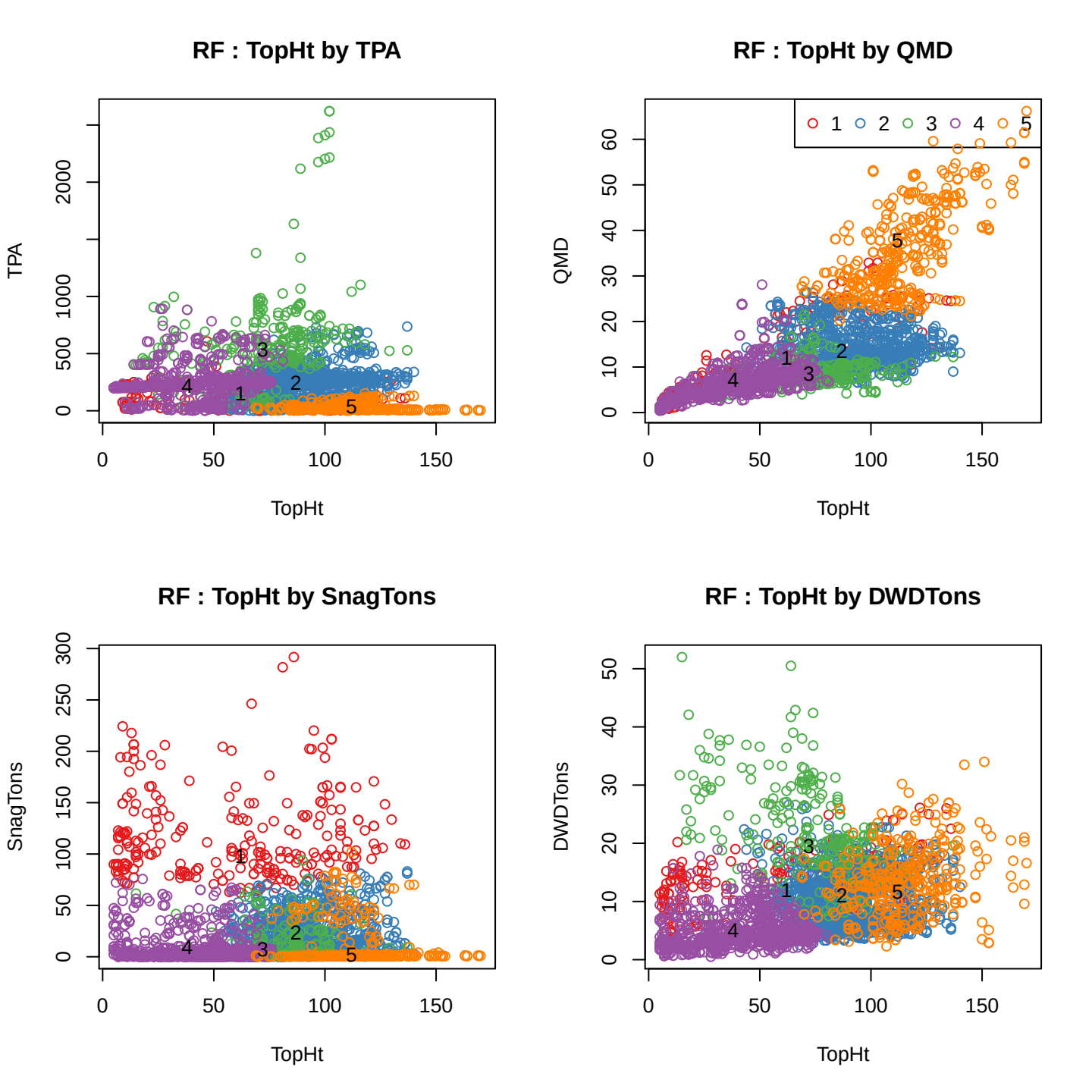
RF : TopHt by TPA
TPA
TopHt
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RF : TopHt by QMD
QMD
TopHt
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RF : TopHt by SnagTons
SnagTons
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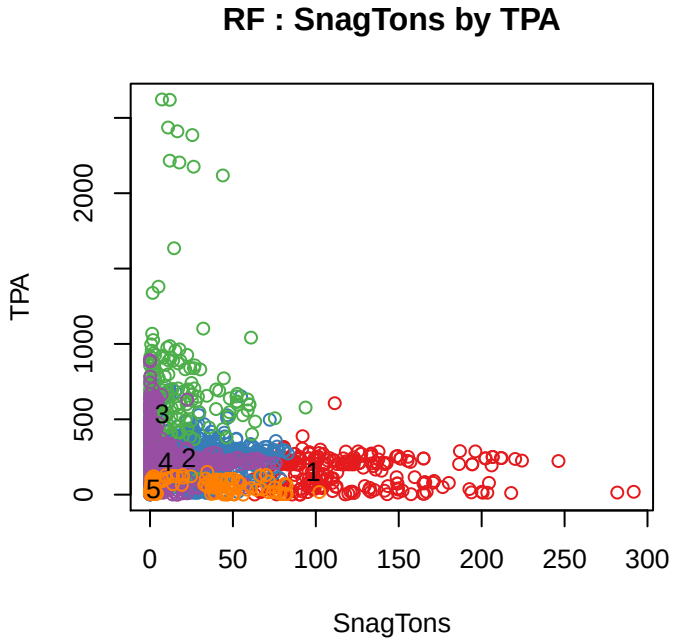
RF : TopHt by DWDTons
DWDTons
TopHt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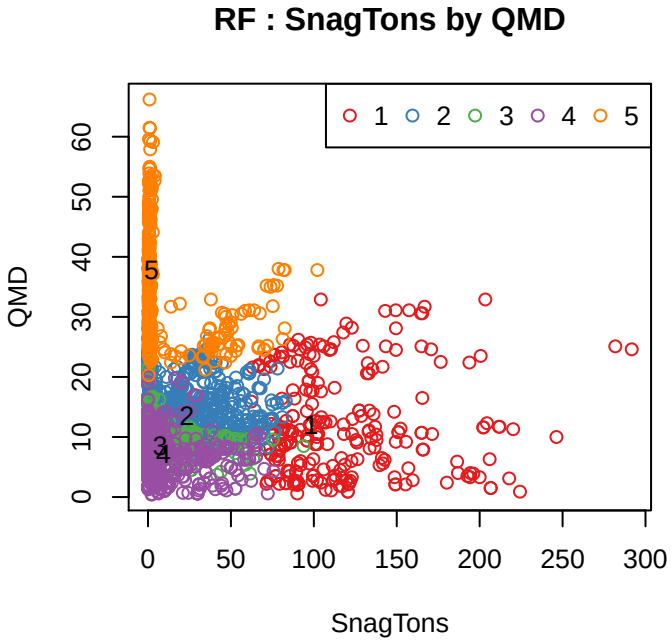
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QMD
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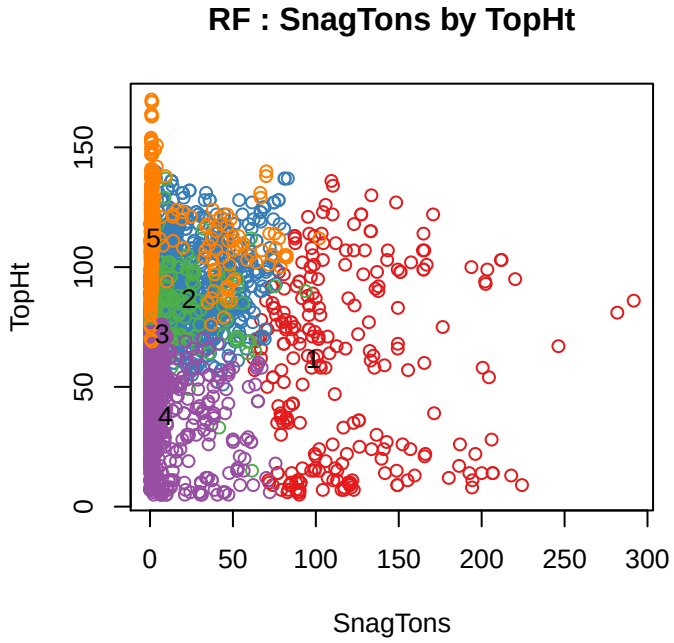
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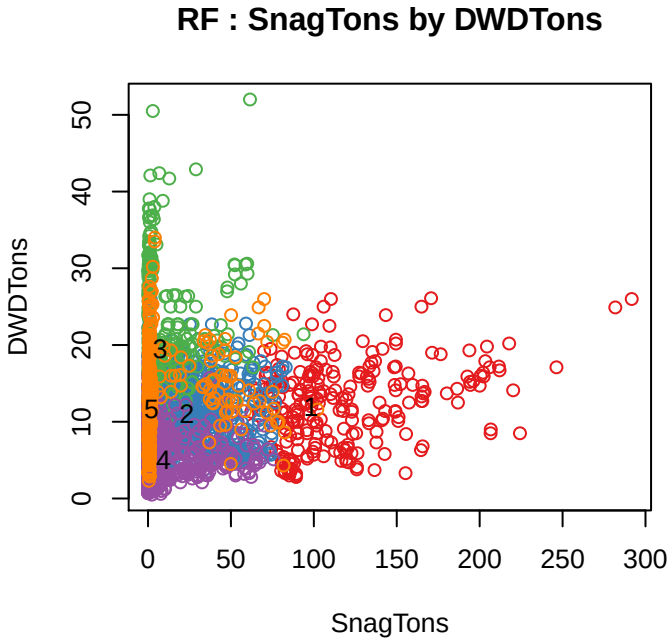
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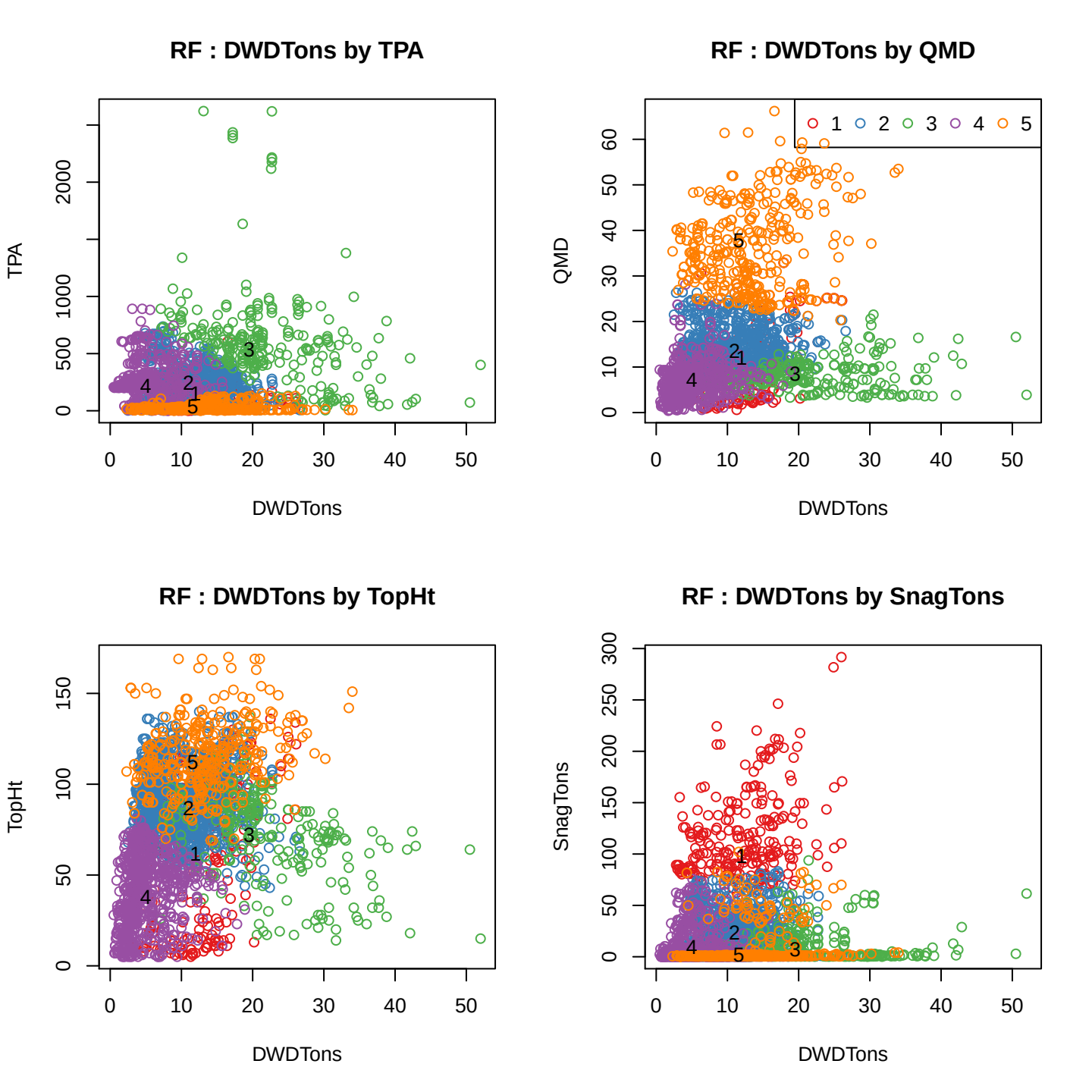
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RF : DWDTons by QMD
QMD
DWDTons
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RF : DWDTons by TopHt
TopHt
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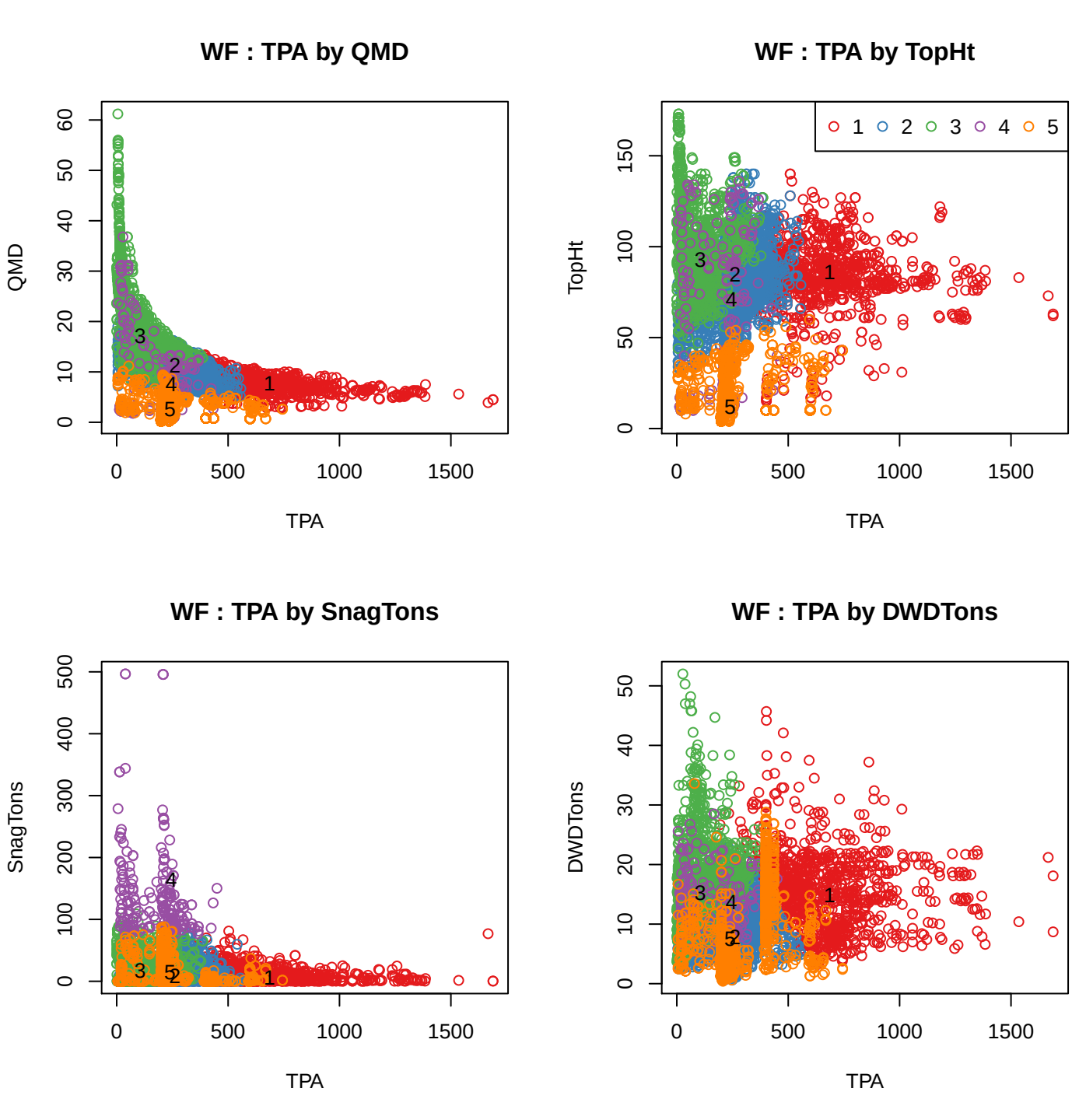
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WF : TPA by TopHt
TopHt
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WF : TPA by SnagTons
SnagTons
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WF : TPA by DWDTons
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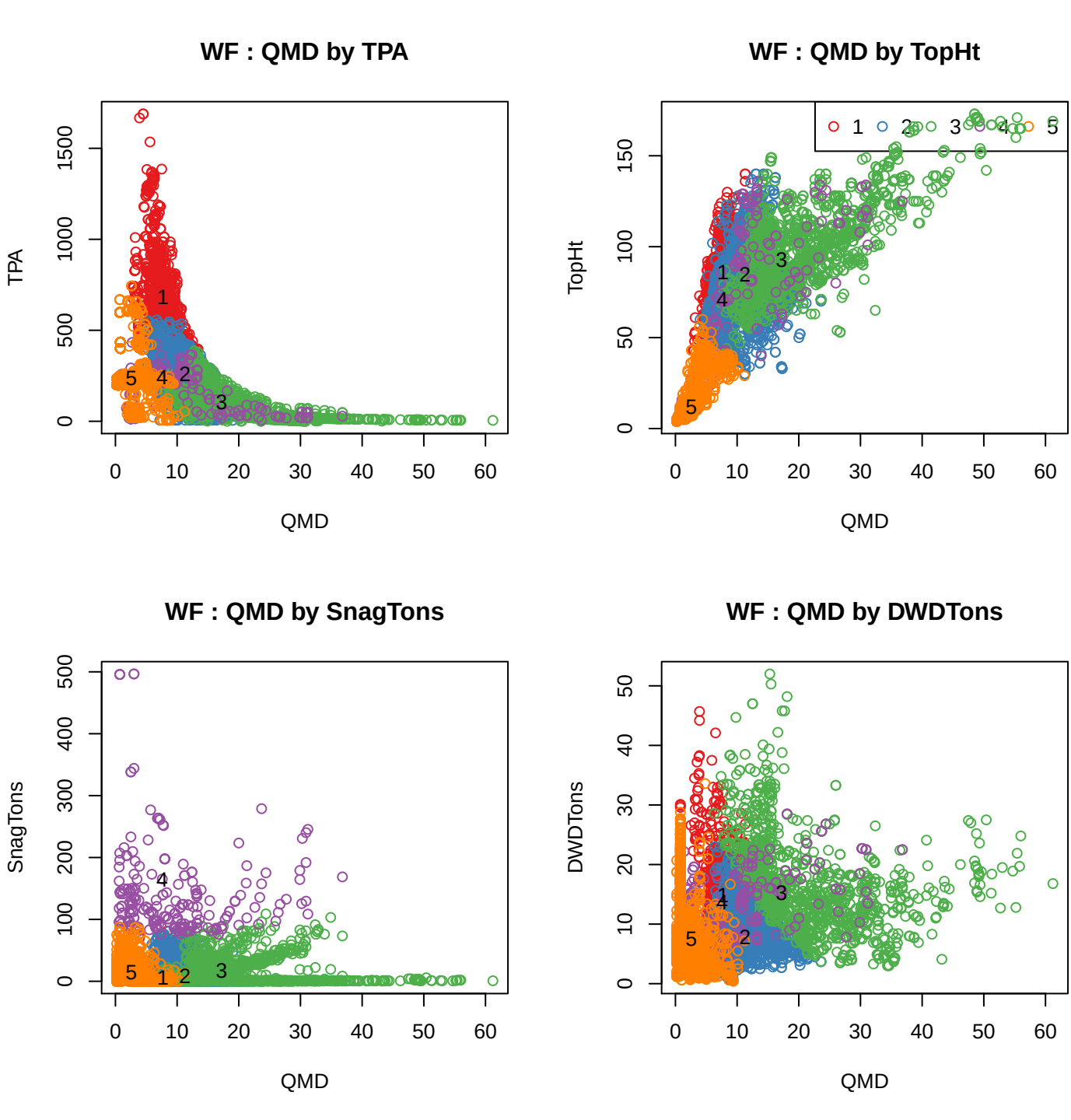
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WF : QMD by TopHt
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WF : QMD by SnagTons
SnagTons
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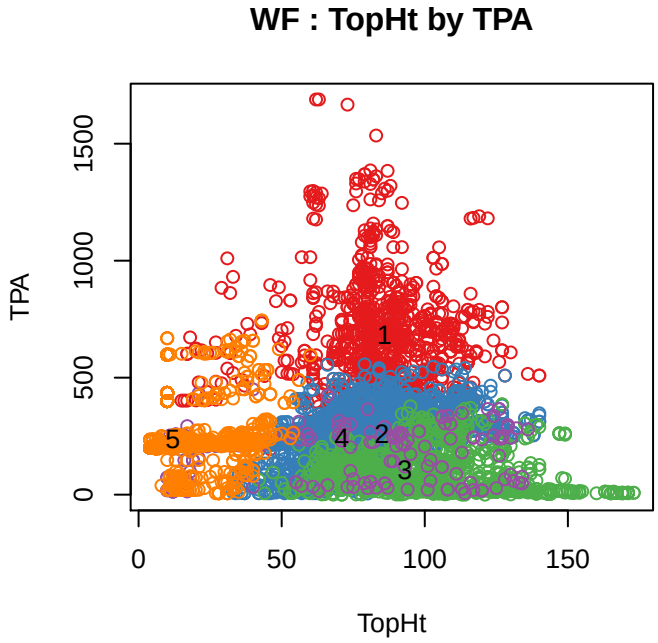
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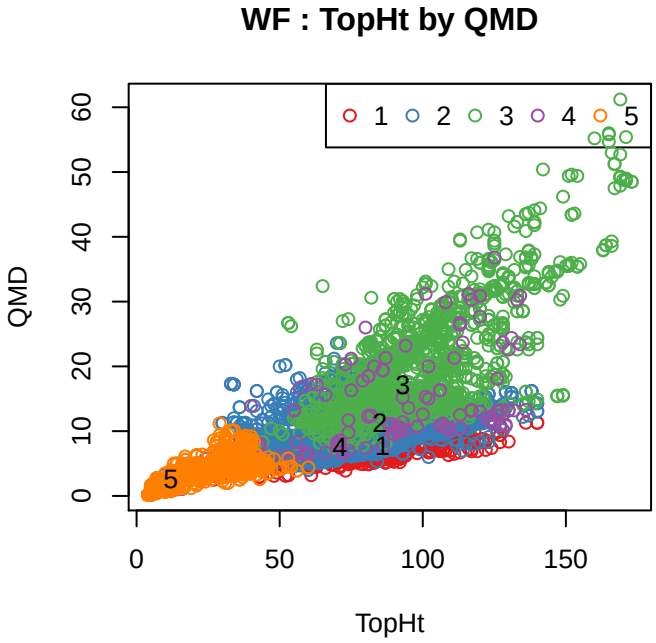
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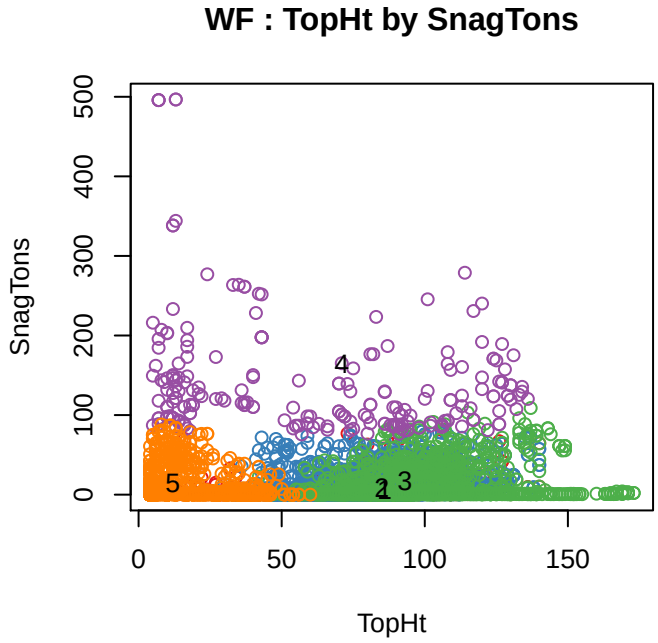
WF : TopHt by SnagTons
SnagTons
TopHt
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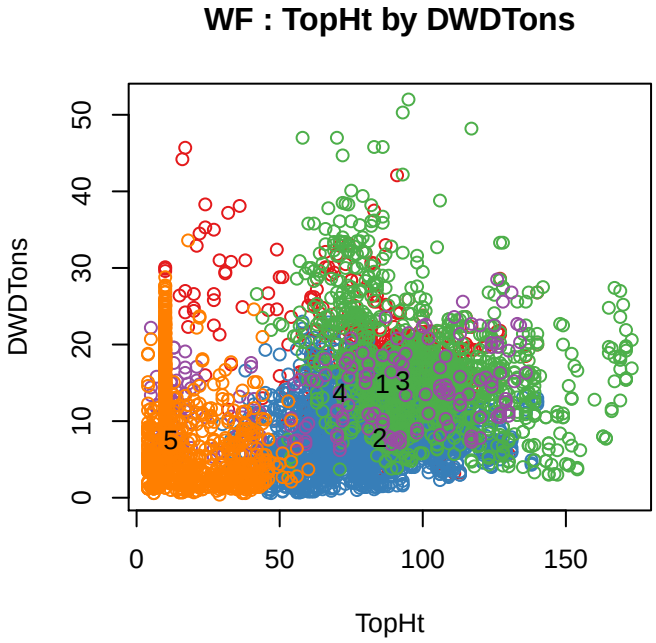
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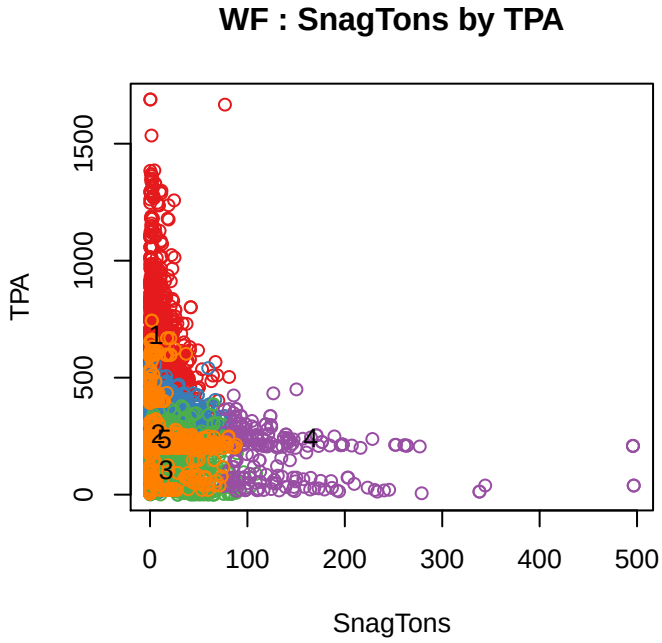
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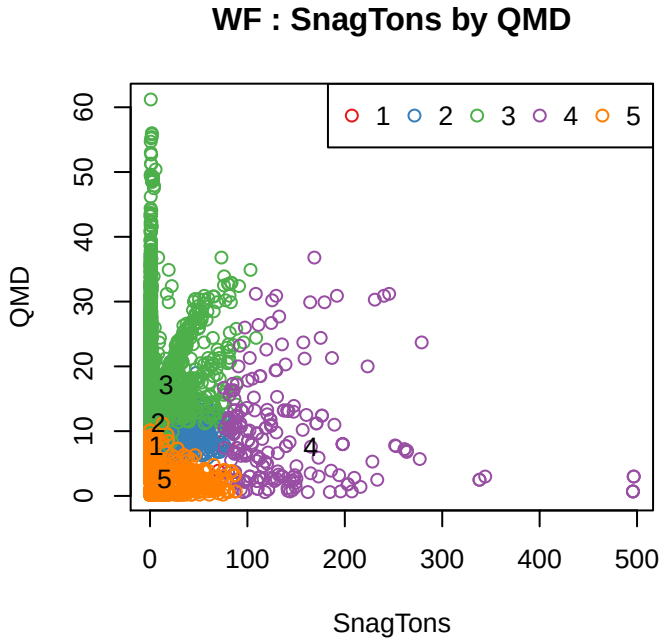
WF : SnagTons by QMD
QMD
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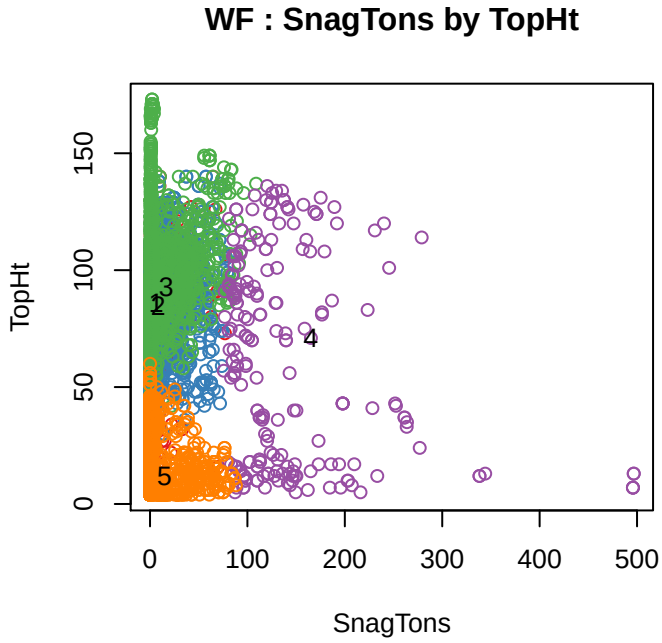
WF : SnagTons by TopHt
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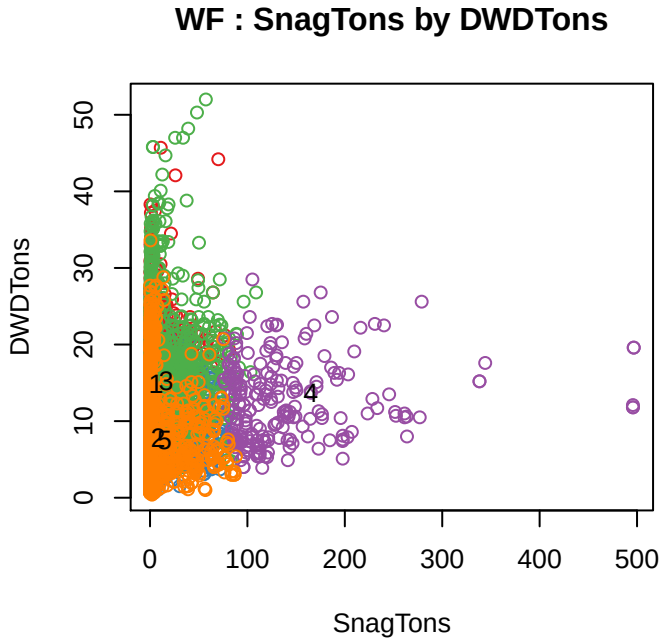
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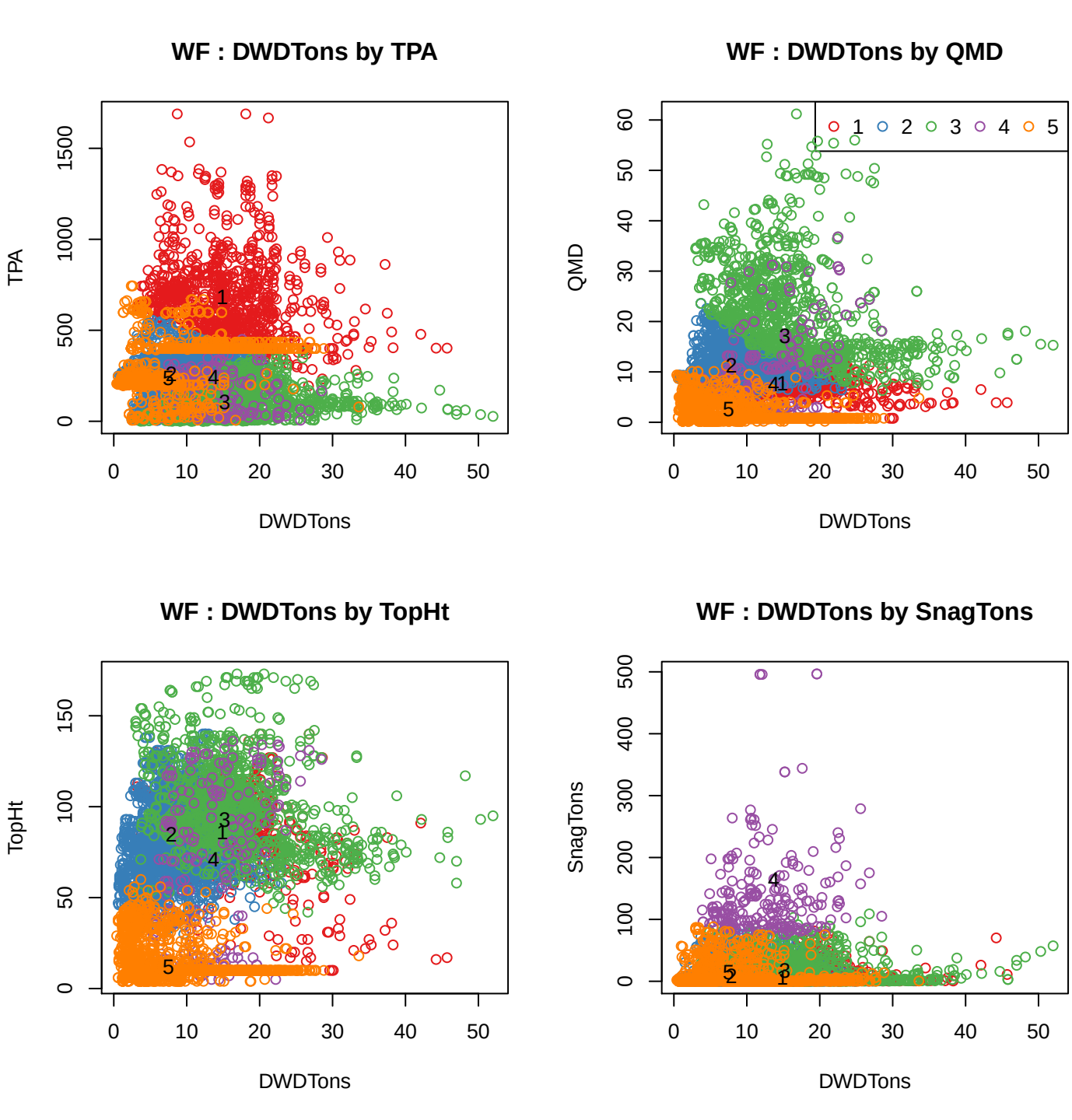
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WF : DWDTons by QMD
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WF : DWDTons by TopHt
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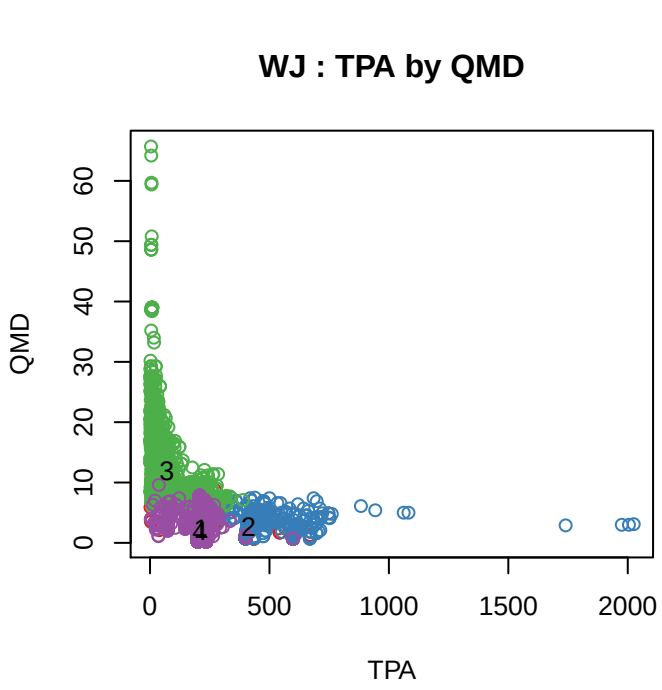
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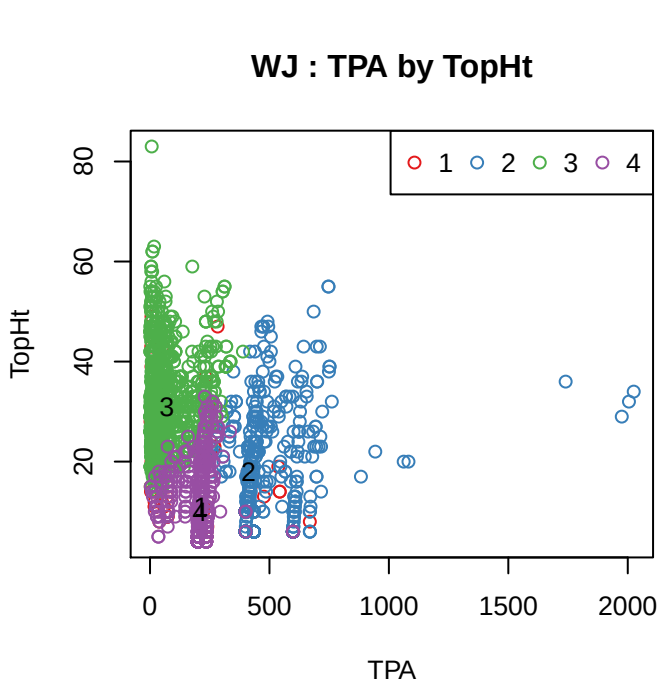
WJ : TPA by TopHt
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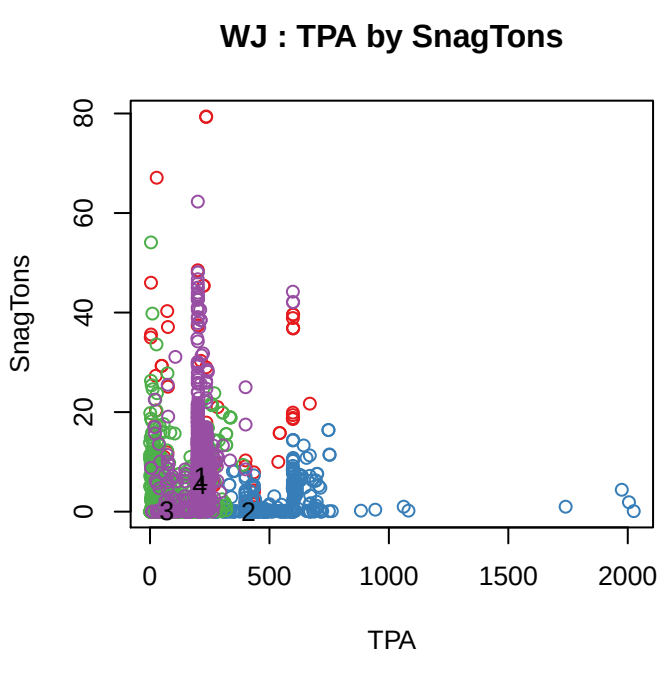
WJ : TPA by SnagTons
SnagTons
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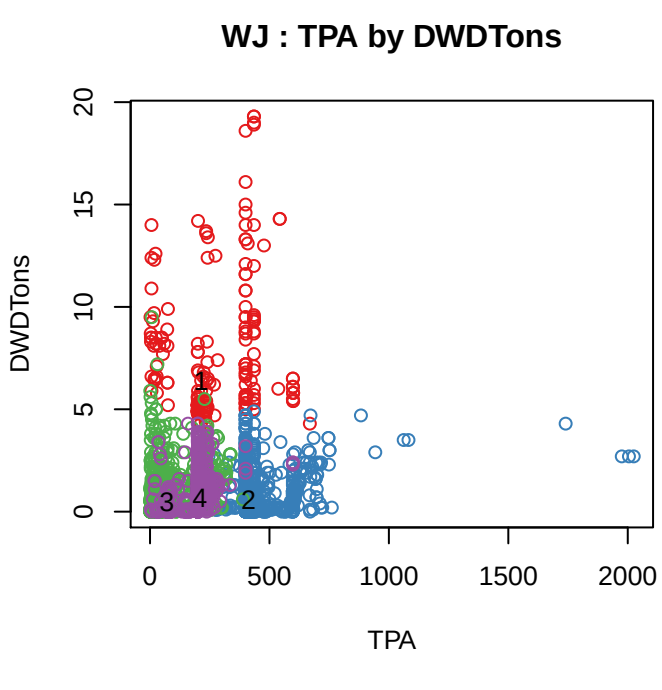
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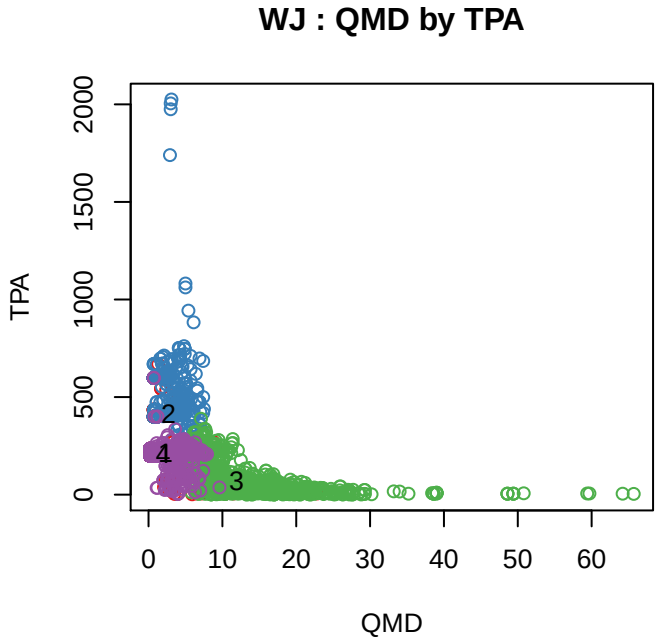
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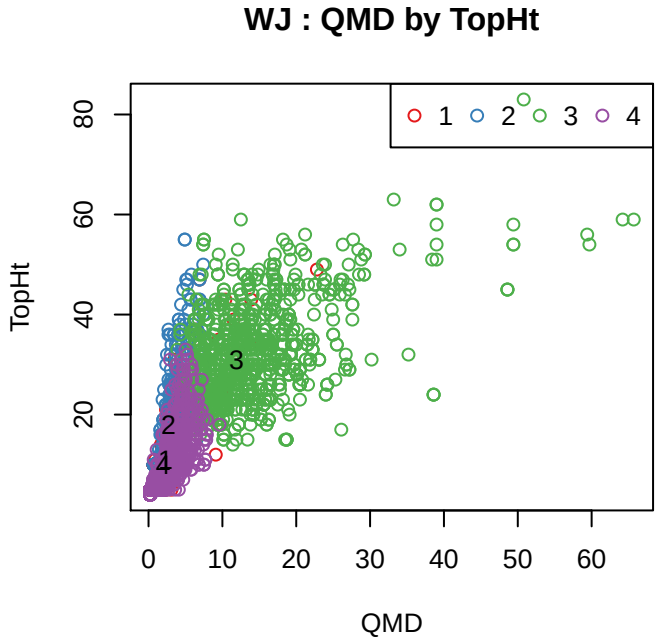
WJ : QMD by TopHt
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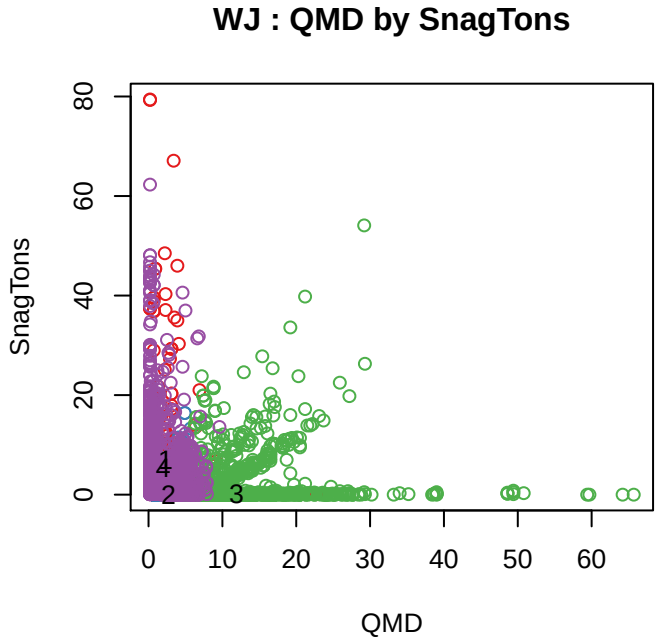
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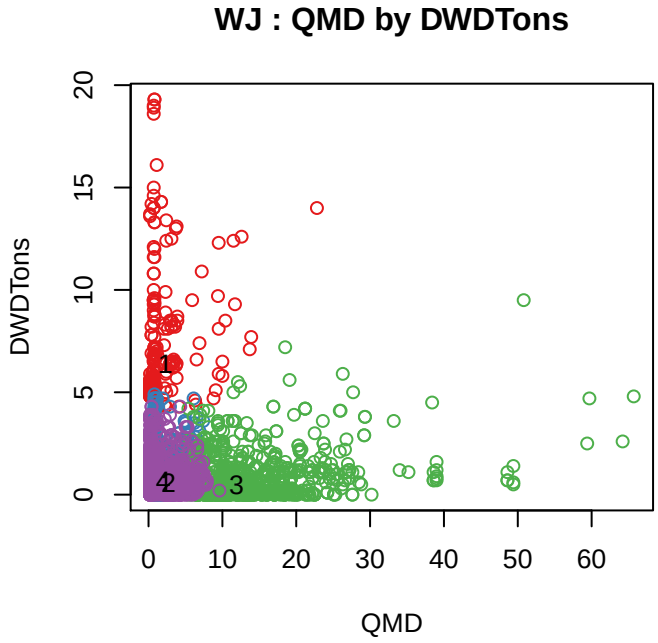
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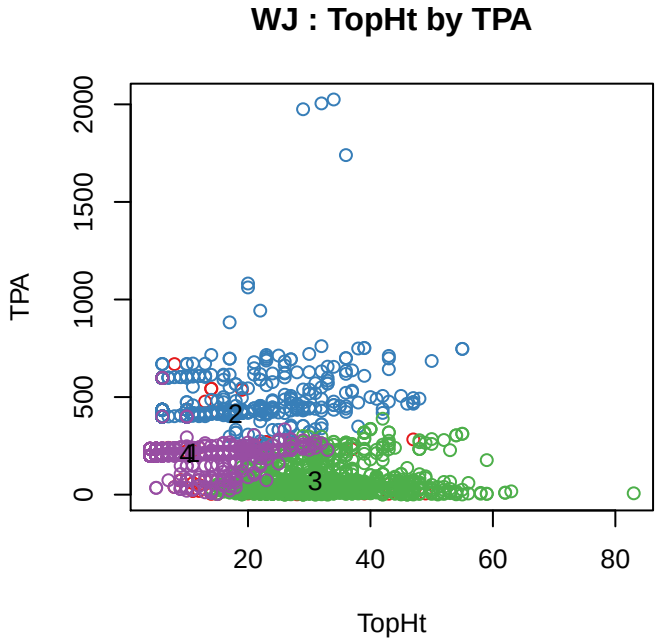
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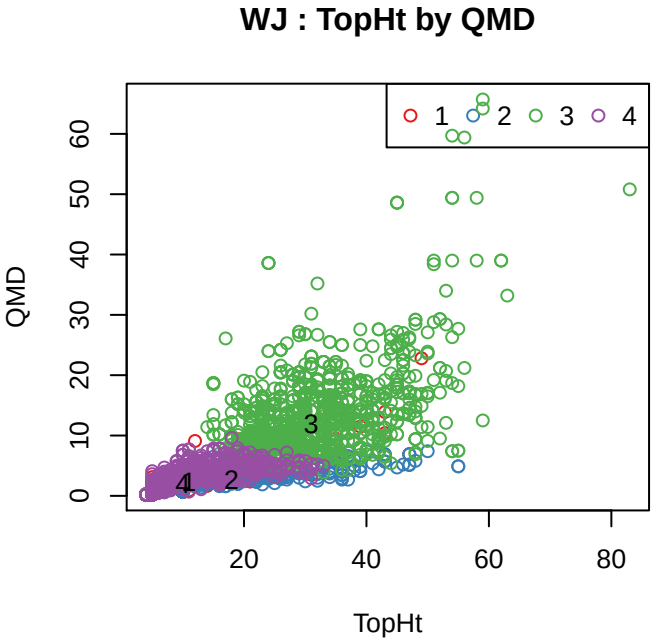
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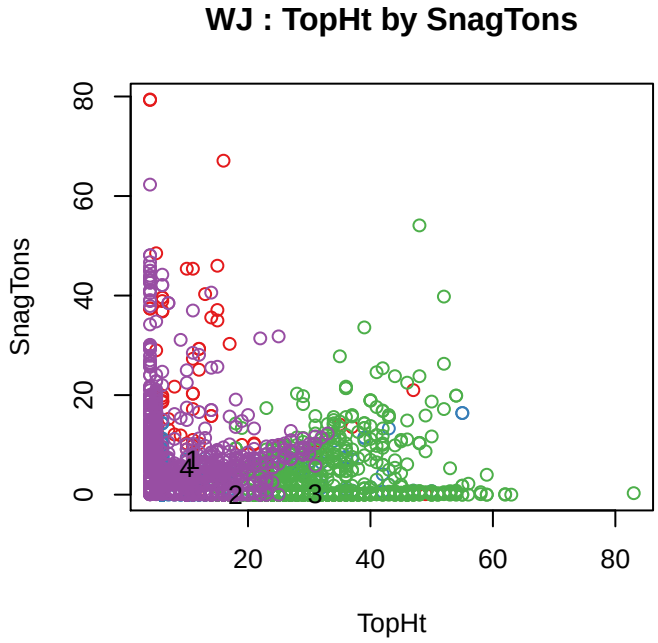
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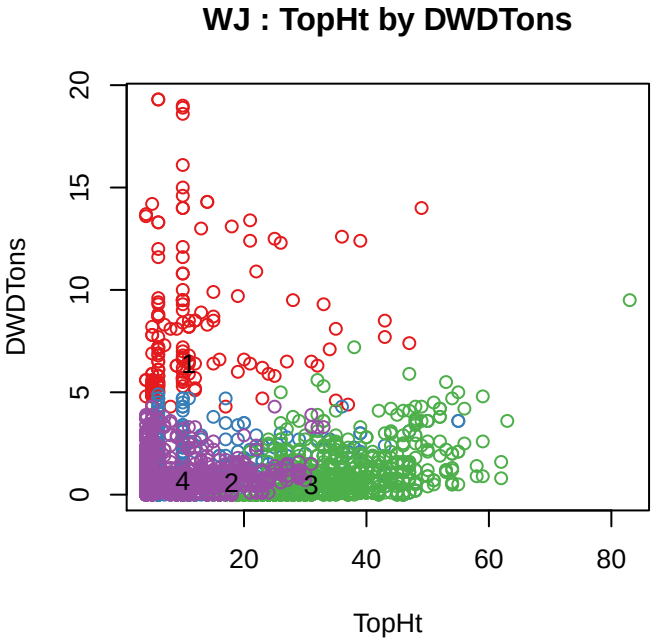
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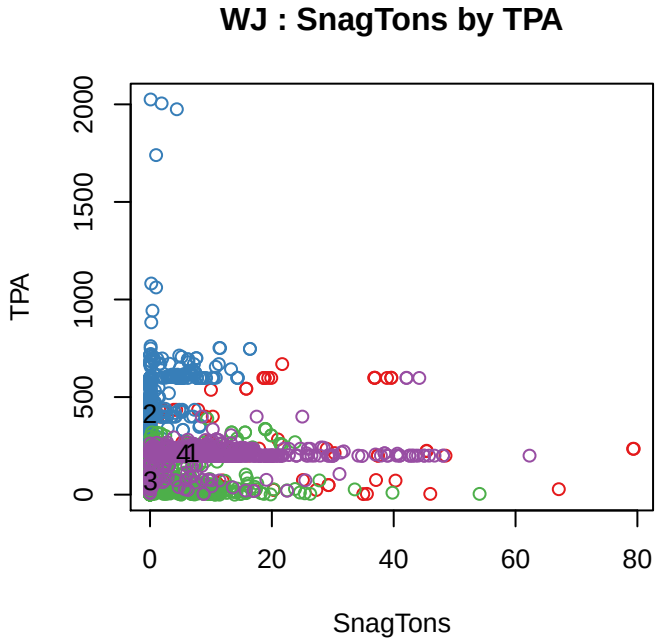
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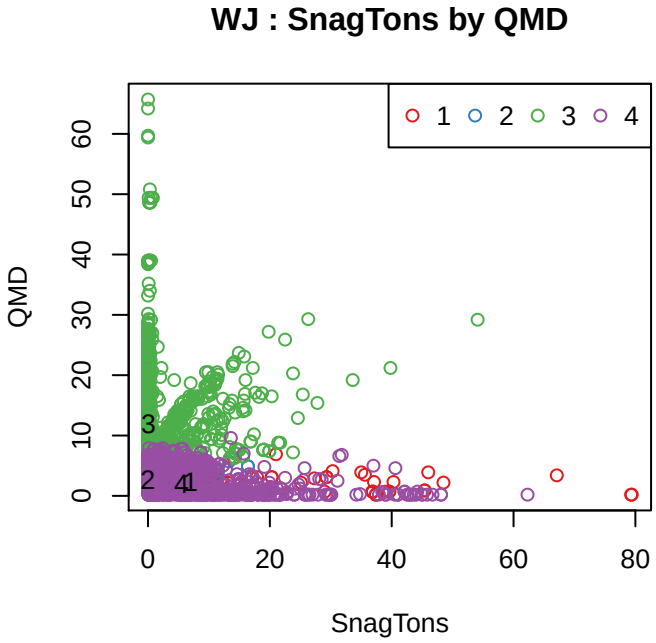
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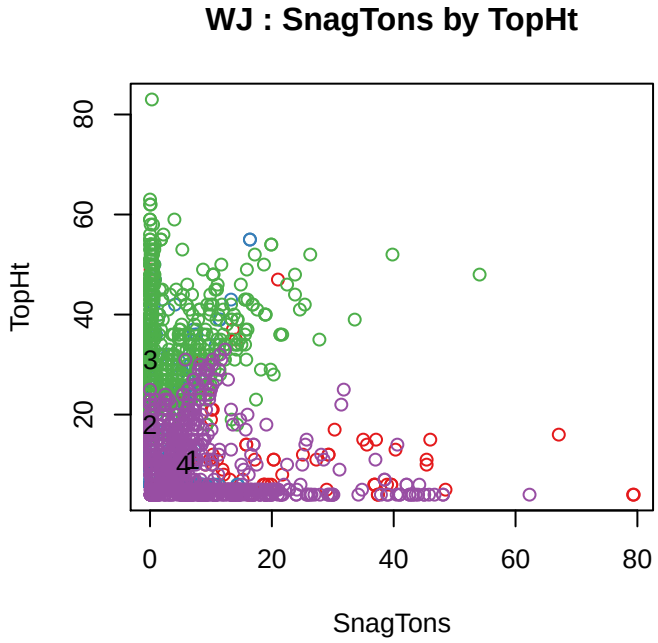
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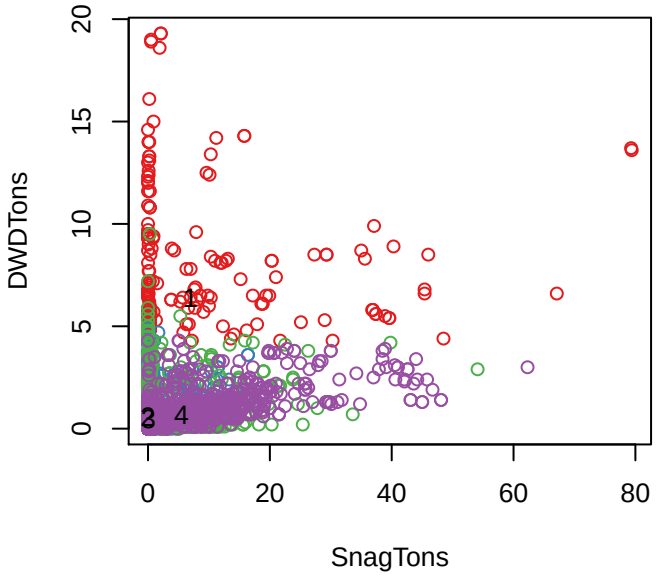
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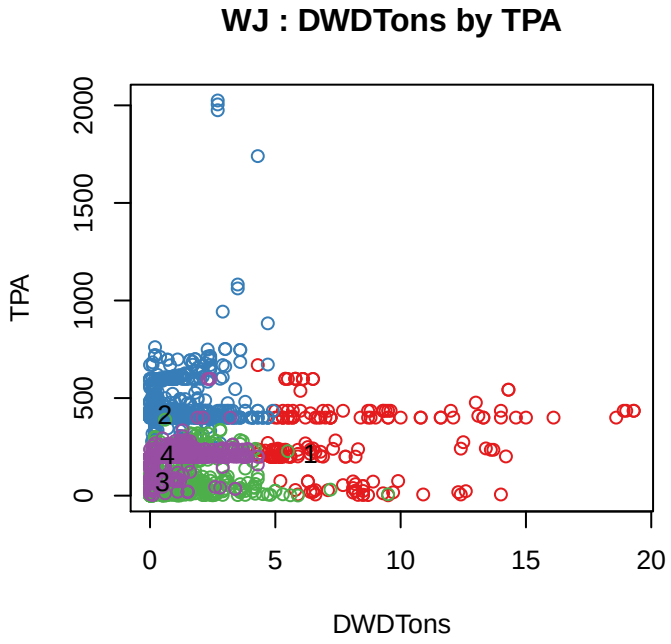
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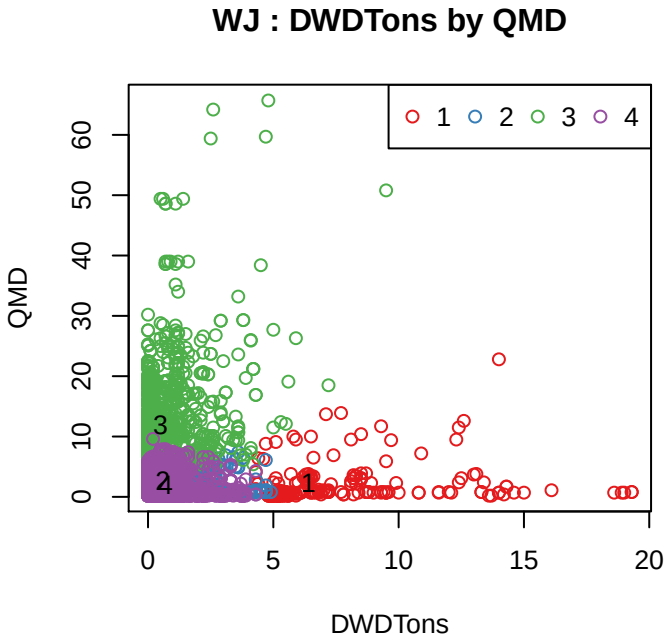
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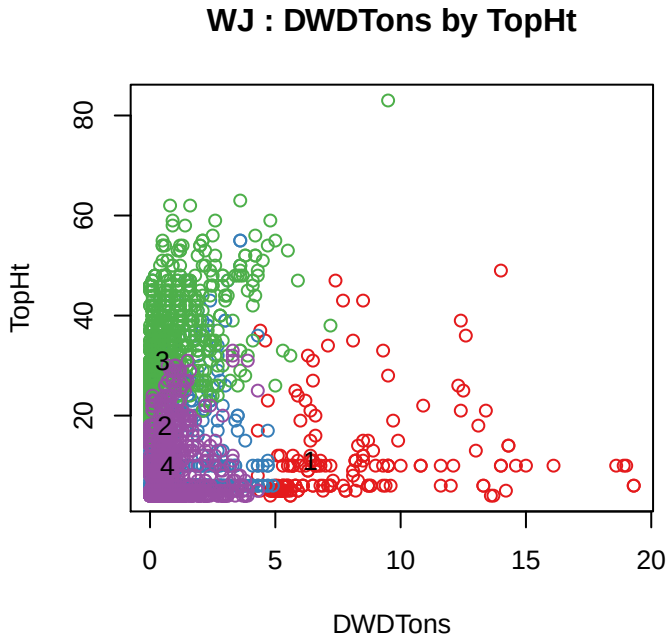
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TopHt
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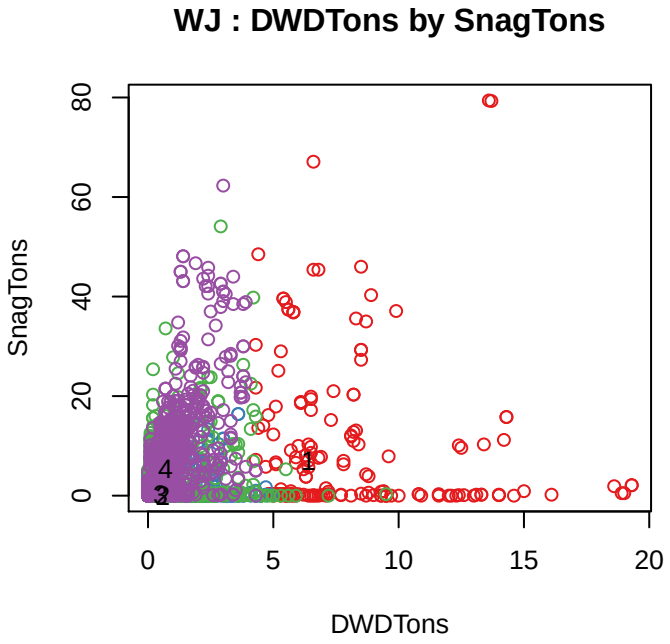
WJ : DWDTons by SnagTons
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