

## fix\_SWE\_density

The script previously used to clean the survey forms had the incorrect radius for the snow tube. Will need to recalculate the SWE and density with the correct radius of 1.89 in the formula

373

	OBJECTID	ACO_Flight_Number	Plot_ID	SWE	Study_Area	cardinal	core	\
0	1		3 E3F	98.163593	Englishman	Centre	245.0	
1	2		3 E3F	NaN	Englishman	Centre	NaN	
2	3		3 E2A	NaN	Englishman	Centre	NaN	
3	4		3 E2A	96.720011	Englishman	Centre	218.0	
4	5		3 S4CC	NaN	Englishman	Centre	NaN	

	density	depth	distance	easting	height_ellipsoid_	latitude	\
0	0.397423	247	NaN	386896.521	NaN	49.203193	
1	NaN	201	NaN	386896.521	NaN	49.203193	
2	NaN	249	NaN	385876.355	NaN	49.208402	
3	0.394776	245	NaN	385876.355	NaN	49.208402	
4	NaN	128	NaN	387179.468	NaN	49.206275	

	longitude	mass	multi_core	northing	notes	\
0	-124.552697	1360.0	no	5451204.528	Used same tare as w3f	
1	-124.552697	NaN	NaN	5451204.528	NaN	
2	-124.566867	NaN	NaN	5451804.842	NaN	
3	-124.566867	1340.0	no	5451804.842	NaN	
4	-124.548909	NaN	NaN	5451541.403	NaN	

	plot_datetime	plot_type	plug	canopy_cover	canopy_density	\
0	4/23/2021 12:02:00	Cardinal 10 m	0	100.0	73.699997	
1	4/23/2021 12:02:00	Cardinal 10 m	0	100.0	73.699997	
2	4/22/2021 7:08:00	Cardinal 10 m	0	NaN	NaN	
3	4/22/2021 7:08:00	Cardinal 10 m	0	NaN	NaN	
4	4/23/2021 12:58:00	Cardinal 10 m	0	NaN	NaN	

	canopy_height	slope	elevation	aspect
0	11.0	13.670105	1242.030029	83.636284
1	11.0	13.670105	1242.030029	83.636284
2	NaN	13.682495	1454.859985	77.886871
3	NaN	13.682495	1454.859985	77.886871
4	NaN	20.065092	1262.310059	177.242859

Will change the column names of SWE and density to swe\_189, density\_189 so data users know problem has been ammended.

```
OBJECTID          int64
ACO_Flight_Number int64
Plot_ID           object
SWE               float64
Study_Area        object
cardinal          object
core              float64
density           float64
depth             int64
distance          float64
easting           float64
height_ellipsoid_ float64
latitude          float64
longitude         float64
mass              float64
multi_core        object
northing          float64
notes             object
plot_datetime     object
plot_type         object
plug              int64
canopy_cover      float64
canopy_density    float64
canopy_height     float64
slope             float64
elevation         float64
aspect            float64
dtype: object
```

Will need to also calculate the metrics for Englishman for aspect, canopy cover, and elevation. Will also change some of the column names to match Cruickshank

	objectid	aco_flight_number	plot_id	swe	study_area	cardinal	\
0	1	3	E3F	98.163593	Englishman	Centre	
1	2	3	E3F	NaN	Englishman	Centre	
2	3	3	E2A	NaN	Englishman	Centre	
3	4	3	E2A	96.720011	Englishman	Centre	
4	5	3	S4CC	NaN	Englishman	Centre	
..	...	...	...	...	...	...	
368	369	3	N2F	NaN	Englishman	SE	
369	370	3	N2F	85.893144	Englishman	E	
370	371	3	W3F	NaN	Englishman	NaN	
371	372	3	W3F	71.457321	Englishman	Centre	
372	373	3	E1A	82.284188	Englishman	E	

  

core	density	depth	distance	easting	latitude	longitude	\
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0	245.0	0.397423	247	NaN	386896.521	49.203193	-124.552697
1	NaN	NaN	201	NaN	386896.521	49.203193	-124.552697
2	NaN	NaN	249	NaN	385876.355	49.208402	-124.566867
3	218.0	0.394776	245	NaN	385876.355	49.208402	-124.566867
4	NaN	NaN	128	NaN	387179.468	49.206275	-124.548909
..	...	...	...	...	...	...	...
368	NaN	NaN	244	10.0	386566.412	49.199162	-124.557102
369	180.0	0.293151	293	10.0	386566.412	49.199162	-124.557102
370	NaN	NaN	181	7.5	386818.185	49.203339	-124.553777
371	179.0	0.366448	195	NaN	386818.185	49.203339	-124.553777
372	178.0	0.391829	210	NaN	385465.967	49.210793	-124.572578

	mass	multi_core	northing	notes \
0	1360.0	no	5451204.528	Used same tare as w3f
1	NaN	NaN	5451204.528	NaN
2	NaN	NaN	5451804.842	NaN
3	1340.0	no	5451804.842	NaN
4	NaN	NaN	5451541.403	NaN
..	...	...	...	...
368	NaN	NaN	5450763.019	Rock
369	1190.0	no	5450763.019	Air pockets good core
370	NaN	NaN	5451222.384	NaN
371	990.0	no	5451222.384	NaN
372	1140.0	yes	5452079.282	NaN

	plot_datetime	plot_type	plug	canopy_cover	canopy_density \
0	4/23/2021 12:02:00	Cardinal 10 m	0	100.0	73.699997
1	4/23/2021 12:02:00	Cardinal 10 m	0	100.0	73.699997
2	4/22/2021 7:08:00	Cardinal 10 m	0	NaN	NaN
3	4/22/2021 7:08:00	Cardinal 10 m	0	NaN	NaN
4	4/23/2021 12:58:00	Cardinal 10 m	0	NaN	NaN
..	...	...	...	...	...
368	4/23/2021 10:27:00	NaN	0	NaN	NaN
369	4/23/2021 10:27:00	NaN	2	NaN	NaN
370	4/23/2021 11:19:00	NaN	0	NaN	NaN
371	4/23/2021 11:19:00	NaN	0	NaN	NaN
372	4/22/2021 9:46:00	NaN	0	NaN	NaN

	canopy_height	slope	elevation	cover_type	aspect_type \
0	11.0	14.0	1242.030029	under_canopy	East
1	11.0	14.0	1242.030029	under_canopy	East
2	NaN	14.0	1454.859985	open	East
3	NaN	14.0	1454.859985	open	East
4	NaN	20.0	1262.310059	open	South
..	...	...	...	...	...
368	NaN	7.0	1332.550049	open	Northwest
369	NaN	7.0	1332.550049	open	Northwest
370	NaN	19.0	1244.339966	open	Northwest

371	NaN	19.0	1244.339966	open	Northwest
372	NaN	8.0	1549.069946	open	Northwest

	elevation_band	swe_189	density_189
0	1200.0	121.189621	0.490646
1	1200.0	NaN	NaN
2	1500.0	NaN	NaN
3	1500.0	119.407421	0.487377
4	1300.0	NaN	NaN
..	...	...	...
368	1300.0	NaN	NaN
369	1300.0	106.040918	0.361914
370	1200.0	NaN	NaN
371	1200.0	88.218915	0.452405
372	1500.0	101.585418	0.483740

[373 rows x 30 columns]

	aco_flight_number	plot_id	study_area	cardinal	core	depth	distance	\
0	3	E3F	Englishman	Centre	245.0	247	NaN	
1	3	E3F	Englishman	Centre	NaN	201	NaN	
2	3	E2A	Englishman	Centre	NaN	249	NaN	
3	3	E2A	Englishman	Centre	218.0	245	NaN	
4	3	S4CC	Englishman	Centre	NaN	128	NaN	
..	...	...	...	...	...	...	...	
368	3	N2F	Englishman	SE	NaN	244	10.0	
369	3	N2F	Englishman	E	180.0	293	10.0	
370	3	W3F	Englishman	NaN	NaN	181	7.5	
371	3	W3F	Englishman	Centre	179.0	195	NaN	
372	3	E1A	Englishman	E	178.0	210	NaN	

	easting	latitude	longitude	mass	multi_core	northing	\
0	386896.521	49.203193	-124.552697	1360.0	no	5451204.528	
1	386896.521	49.203193	-124.552697	NaN	NaN	5451204.528	
2	385876.355	49.208402	-124.566867	NaN	NaN	5451804.842	
3	385876.355	49.208402	-124.566867	1340.0	no	5451804.842	
4	387179.468	49.206275	-124.548909	NaN	NaN	5451541.403	
..	...	...	...	...	...	...	
368	386566.412	49.199162	-124.557102	NaN	NaN	5450763.019	
369	386566.412	49.199162	-124.557102	1190.0	no	5450763.019	
370	386818.185	49.203339	-124.553777	NaN	NaN	5451222.384	
371	386818.185	49.203339	-124.553777	990.0	no	5451222.384	
372	385465.967	49.210793	-124.572578	1140.0	yes	5452079.282	

	notes	plot_datetime	plot_type	plug	\
0	Used same tare as w3f	4/23/2021 12:02:00	Cardinal 10 m	0	
1	NaN	4/23/2021 12:02:00	Cardinal 10 m	0	
2	NaN	4/22/2021 7:08:00	Cardinal 10 m	0	

3		NaN	4/22/2021 7:08:00	Cardinal	10 m	0
4		NaN	4/23/2021 12:58:00	Cardinal	10 m	0
..		...	...	...	...	
368		Rock	4/23/2021 10:27:00		NaN	0
369	Air pockets good	core	4/23/2021 10:27:00		NaN	2
370		NaN	4/23/2021 11:19:00		NaN	0
371		NaN	4/23/2021 11:19:00		NaN	0
372		NaN	4/22/2021 9:46:00		NaN	0

	canopy_cover	canopy_density	canopy_height	slope	elevation	\
0	100.0	73.699997	11.0	14.0	1242.030029	
1	100.0	73.699997	11.0	14.0	1242.030029	
2	NaN	NaN	NaN	14.0	1454.859985	
3	NaN	NaN	NaN	14.0	1454.859985	
4	NaN	NaN	NaN	20.0	1262.310059	
..	...	...	...	...	...	
368	NaN	NaN	NaN	7.0	1332.550049	
369	NaN	NaN	NaN	7.0	1332.550049	
370	NaN	NaN	NaN	19.0	1244.339966	
371	NaN	NaN	NaN	19.0	1244.339966	
372	NaN	NaN	NaN	8.0	1549.069946	

	cover_type	aspect_type	elevation_band	swe_189	density_189
0	under_canopy	East	1200.0	121.189621	0.490646
1	under_canopy	East	1200.0	NaN	NaN
2	open	East	1500.0	NaN	NaN
3	open	East	1500.0	119.407421	0.487377
4	open	South	1300.0	NaN	NaN
..	...	...	...	...	...
368	open	Northwest	1300.0	NaN	NaN
369	open	Northwest	1300.0	106.040918	0.361914
370	open	Northwest	1200.0	NaN	NaN
371	open	Northwest	1200.0	88.218915	0.452405
372	open	Northwest	1500.0	101.585418	0.483740

[373 rows x 27 columns]

	aco_flight_number	plot_datetime	study_area	plot_id	plot_type	\
0	3	4/23/2021 12:02:00	Englishman	E3F	Cardinal 10 m	
1	3	4/23/2021 12:02:00	Englishman	E3F	Cardinal 10 m	
2	3	4/22/2021 7:08:00	Englishman	E2A	Cardinal 10 m	
3	3	4/22/2021 7:08:00	Englishman	E2A	Cardinal 10 m	
4	3	4/23/2021 12:58:00	Englishman	S4CC	Cardinal 10 m	
..	...	...	...	...	...	
368	3	4/23/2021 10:27:00	Englishman	N2F	NaN	
369	3	4/23/2021 10:27:00	Englishman	N2F	NaN	
370	3	4/23/2021 11:19:00	Englishman	W3F	NaN	
371	3	4/23/2021 11:19:00	Englishman	W3F	NaN	

372	3	4/22/2021 9:46:00	Englishman	E1A	NaN
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	cardinal	distance	multi_core	depth	core	plug	mass \
0	Centre	NaN	no	247	245.0	0	1360.0
1	Centre	NaN	NaN	201	NaN	0	NaN
2	Centre	NaN	NaN	249	NaN	0	NaN
3	Centre	NaN	no	245	218.0	0	1340.0
4	Centre	NaN	NaN	128	NaN	0	NaN
..	...	...	...	...	...	...	...
368	SE	10.0	NaN	244	NaN	0	NaN
369	E	10.0	no	293	180.0	2	1190.0
370	NaN	7.5	NaN	181	NaN	0	NaN
371	Centre	NaN	no	195	179.0	0	990.0
372	E	NaN	yes	210	178.0	0	1140.0

		notes	elevation	longitude	latitude	easting \
0	Used same tare as w3f		1242.030029	-124.552697	49.203193	386896.521
1		NaN	1242.030029	-124.552697	49.203193	386896.521
2		NaN	1454.859985	-124.566867	49.208402	385876.355
3		NaN	1454.859985	-124.566867	49.208402	385876.355
4		NaN	1262.310059	-124.548909	49.206275	387179.468
..		...	...	...	...	...
368		Rock	1332.550049	-124.557102	49.199162	386566.412
369	Air pockets good core		1332.550049	-124.557102	49.199162	386566.412
370		NaN	1244.339966	-124.553777	49.203339	386818.185
371		NaN	1244.339966	-124.553777	49.203339	386818.185
372		NaN	1549.069946	-124.572578	49.210793	385465.967

	northing	canopy_cover	canopy_density	canopy_height	slope	\
0	5451204.528	100.0	73.699997	11.0	14.0	
1	5451204.528	100.0	73.699997	11.0	14.0	
2	5451804.842	NaN	NaN	NaN	14.0	
3	5451804.842	NaN	NaN	NaN	14.0	
4	5451541.403	NaN	NaN	NaN	20.0	
..	...	...	...	...	...	
368	5450763.019	NaN	NaN	NaN	7.0	
369	5450763.019	NaN	NaN	NaN	7.0	
370	5451222.384	NaN	NaN	NaN	19.0	
371	5451222.384	NaN	NaN	NaN	19.0	
372	5452079.282	NaN	NaN	NaN	8.0	

	aspect_type	cover_type	elevation	swe_189	density_189
0	East	under_canopy	1242.030029	121.189621	0.490646
1	East	under_canopy	1242.030029	NaN	NaN
2	East	open	1454.859985	NaN	NaN
3	East	open	1454.859985	119.407421	0.487377
4	South	open	1262.310059	NaN	NaN
...	...	...	...	...	...

368	Northwest	open	1332.550049	NaN	NaN
369	Northwest	open	1332.550049	106.040918	0.361914
370	Northwest	open	1244.339966	NaN	NaN
371	Northwest	open	1244.339966	88.218915	0.452405
372	Northwest	open	1549.069946	101.585418	0.483740

[373 rows x 27 columns]

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['aco_flight_number',
 'plot_datetime',
 'study_area',
 'plot_id',
 'plot_type',
 'cardinal',
 'distance',
 'multi_core',
 'depth',
 'core',
 'plug',
 'mass',
 'elevation',
 'longitude',
 'latitude',
 'easting',
 'northing',
 'canopy_cover',
 'canopy_density',
 'canopy_height',
 'slope',
 'aspect_type',
 'cover_type',
 'elevation',
 'swe_189',
 'density_189']
```

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