



North Carolina Department of Public Safety

Emergency Management North Carolina Geodetic Survey

Roy Cooper, Governor
Erik A. Hooks, Secretary

Michael A. Sprayberry, Director

LiDAR Quality Control Report – Statewide LiDAR Project Phases Four (4) and Five (5)

The North Carolina Geodetic Survey performed a vertical quality control (QC) survey in Phases 4 and 5 of the statewide LiDAR elevation project. The purpose of the survey was to test the elevation points contained in a dataset that was obtained by utilizing airborne Light Detection And Ranging (LiDAR) technology. The attached report contains the results of the vertical QC survey.

The QC test points were collected utilizing the North Carolina Real Time Network (NCRTN), and with conventional survey methods in areas unsuitable for GNSS observations.

The field survey data that was used to generate the attached report was performed by the North Carolina Geodetic Survey (NCGS) under the supervision of James Gay (L-3851). The review of the field data and the generation of the final QC report were performed under the supervision of Gary W. Thompson (L-2694).

The GNSS portion of the survey (performed by NCGS) was performed to the following parameters:

Class of survey:	Class B
Positional accuracy:	Vertical 0.04 USft Horizontal 0.02 USft
Type of field procedure used:	NCRTN, OPUS, and traditional trigonometric leveling
Dates of survey:	Phase Four:4/19/2016-6/27/2018, Phase Five:12/3/2019-4/3/2019
Horizontal datum/epoch	North American Datum 83(2011) epoch 2010.0
Vertical datum/epoch	North American Vertical Datum of 1988 (NAVD88)
Published fixed control used:	North Carolina Continuously Operating Reference Station (CORS) Network and NCRTN
Geoid model:	Geoid 12B
Combined grid factor:	See control datasheets
Units:	US Survey Feet

Trigonometric leveling was performed to Class C (56.1605) standards at any QC point that was in a location not suitable for GNSS observations.

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2018 Phase 5 NC LiDAR Independent Quality Control Summary - DEM03 Data

Non-Vegetated Area

County	NVA Type	NVA Minimum DZ	NVA Maximum DZ	NVA Mean DZ	NVA Mean Magnitude DZ	NVA Observations	NVA Standard Deviation DZ	NVA RMSE Z	95% Confidence Level Z
Ashe	2U, 2B	-0.438	0.754	0.064	0.396	62	0.211	0.219	0.429
Avery	2U, 2B	-0.563	0.703	0.066	0.462	61	0.256	0.262	0.514
Buncombe	2U, 2B	-0.515	1.105	0.090	0.410	102	0.228	0.244	0.478
Burke	2U, 2B	-0.639	0.823	0.058	0.433	57	0.273	0.277	0.543
Caldwell	2U, 2B	-0.434	0.510	0.026	0.346	73	0.163	0.163	0.320
Cherokee	2U, 2B	-0.657	0.610	0.127	0.436	86	0.197	0.233	0.456
Clay	2U, 2B	-0.197	0.901	0.256	0.526	91	0.193	0.320	0.627
Graham	2U, 2B	-1.749	0.595	0.001	0.408	78	0.285	0.283	0.555
Haywood	2U, 2B	-0.921	0.466	0.011	0.466	71	0.281	0.279	0.547
Henderson	2U, 2B	-0.559	0.708	0.165	0.459	89	0.208	0.264	0.518
Jackson	2U, 2B	-0.557	0.620	-0.006	0.459	72	0.253	0.252	0.493
Macon	2U, 2B	-0.810	0.352	-0.172	0.489	68	0.245	0.298	0.584
Madison	2U, 2B	-0.340	0.620	0.030	0.445	34	0.245	0.243	0.476
Mcdowell	2U, 2B	-0.404	0.524	0.038	0.367	58	0.171	0.173	0.340
Mitchell	2U, 2B	-0.633	0.996	-0.030	0.465	60	0.277	0.276	0.541
Polk	2U, 2B	-0.331	0.572	0.131	0.409	73	0.167	0.212	0.415
Rutherford	2U, 2B	-0.490	0.536	0.184	0.480	62	0.198	0.269	0.527
Swain	2U, 2B	-0.691	0.480	-0.051	0.461	65	0.278	0.280	0.549
Transylvania	2U, 2B	-0.325	0.853	0.120	0.479	80	0.258	0.283	0.555
Watauga	2U, 2B	-0.830	0.859	0.056	0.447	61	0.268	0.272	0.533
Yancey	2U, 2B	-0.708	0.744	-0.126	0.461	61	0.260	0.287	0.562

Vegetated Area

County	VVA Class	VVA Minimum DZ	VVA Maximum DZ	VVA Mean DZ	VVA Mean Magnitude DZ	VVA Observations	VVA Standard Deviation DZ	VVA RMSE Z	95th Percentile
Ashe	2L, 2M, 2H	-1.290	1.118	0.185	0.587	82	0.391	0.430	0.820
Avery	2L, 2M, 2H	-0.512	0.918	0.181	0.522	87	0.292	0.342	0.696
Buncombe	2L, 2M, 2H	-1.749	1.575	0.165	0.536	100	0.398	0.429	0.853
Burke	2L, 2M, 2H	-0.437	1.013	0.165	0.513	86	0.300	0.341	0.713
Caldwell	2L, 2M, 2H	-0.368	0.840	0.153	0.466	86	0.230	0.275	0.570
Cherokee	2L, 2M, 2H	-1.992	1.200	0.270	0.609	85	0.434	0.509	1.054
Clay	2L, 2M, 2H	-0.262	1.300	0.503	0.716	73	0.247	0.560	0.947
Graham	2L, 2M, 2H	-1.273	1.110	-0.021	0.510	85	0.357	0.355	0.716
Haywood	2L, 2M, 2H	-1.745	1.345	0.147	0.671	86	0.556	0.572	1.149
Henderson	2L, 2M, 2H	-0.293	0.952	0.338	0.607	84	0.281	0.438	0.789
Jackson	2L, 2M, 2H	-1.555	0.984	0.090	0.596	85	0.434	0.441	0.783
Macon	2L, 2M, 2H	-1.290	0.867	-0.046	0.503	85	0.333	0.334	0.609
Madison	2L, 2M, 2H	-1.219	0.954	0.080	0.539	31	0.418	0.419	0.832
Mcdowell	2L, 2M, 2H	-0.698	1.344	0.077	0.497	86	0.323	0.330	0.618
Mitchell	2L, 2M, 2H	-0.964	0.914	0.082	0.582	83	0.411	0.417	0.799
Polk	2L, 2M, 2H	-0.210	2.113	0.282	0.556	77	0.349	0.446	0.748
Rutherford	2L, 2M, 2H	-0.539	1.344	0.285	0.565	92	0.262	0.386	0.661
Swain	2L, 2M, 2H	-1.453	0.990	0.000	0.543	84	0.409	0.407	0.894
Transylvania	2L, 2M, 2H	-0.168	1.132	0.423	0.655	84	0.249	0.490	0.844
Watauga	2L, 2M, 2H	-0.640	1.171	0.206	0.567	84	0.351	0.405	0.734
Yancey	2L, 2M, 2H	-2.240	0.720	-0.061	0.504	90	0.374	0.377	0.606

All values except observations in US Feet

Phase 5 Overall Results	
Non-Vegetated Area	Vegetated Area
Minimum DZ:	-1.749
Maximum DZ:	1.105
Mean DZ:	0.058
Mean Magnitude DZ:	0.446
Observations:	1464
Standard Deviation DZ:	0.254
RMSE Z:	0.260
95% Confidence Level Z:	0.510
Minimum DZ:	-2.240
Maximum DZ:	2.113
Mean DZ:	0.166
Mean Magnitude DZ:	0.566
Observations:	1735
Standard Deviation DZ:	0.385
RMSE Z:	0.419
95th Percentile:	0.810

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
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Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: ashe_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

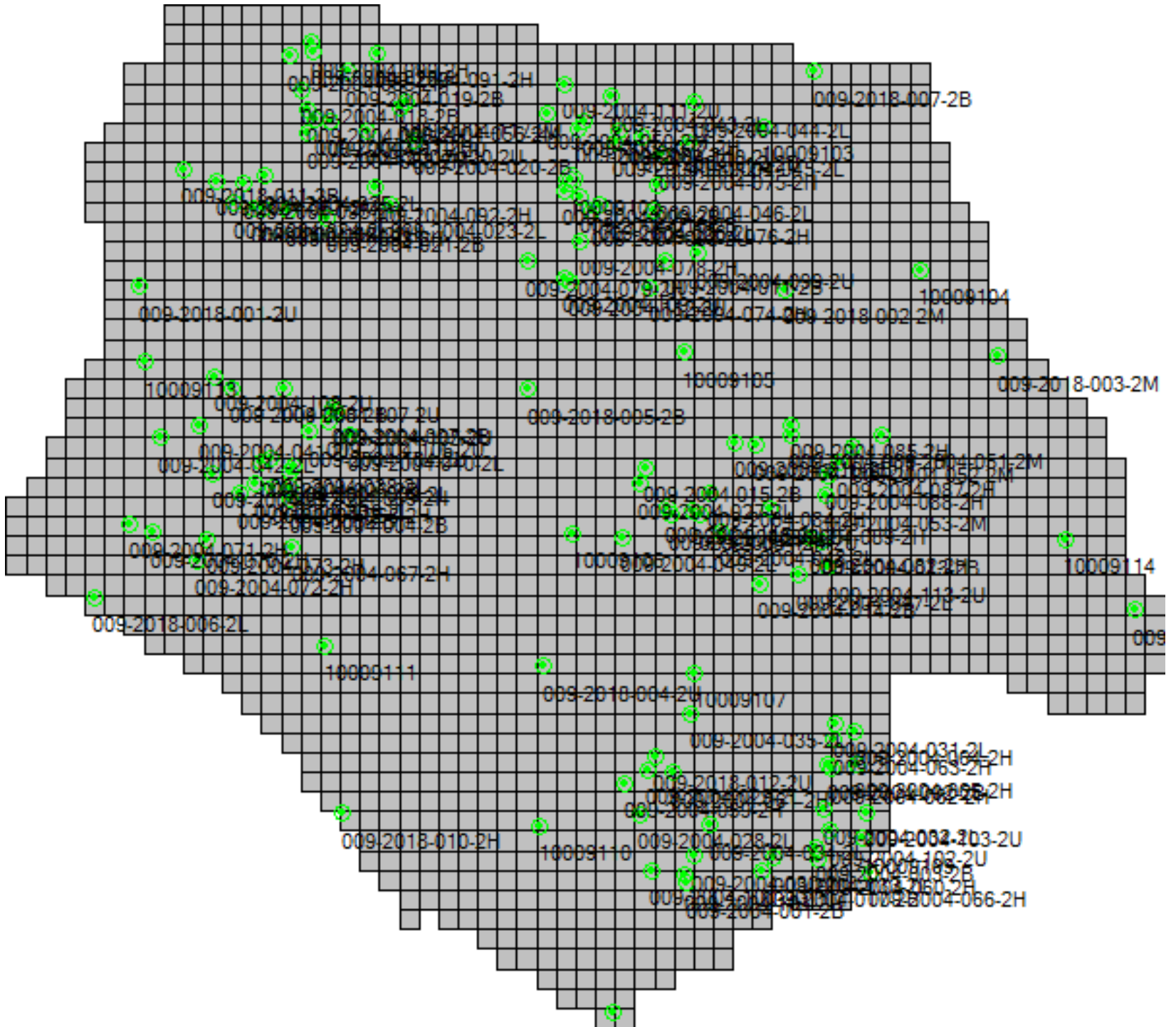
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	24	0.470		
2H	41		1.007	
2L	30		0.570	
2M	11		0.954	
2U	38	0.400		
Total	144			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.438

Maximum DZ: 0.754

Mean DZ: 0.064

Mean Magnitude DZ: 0.396

Number Observations: 62

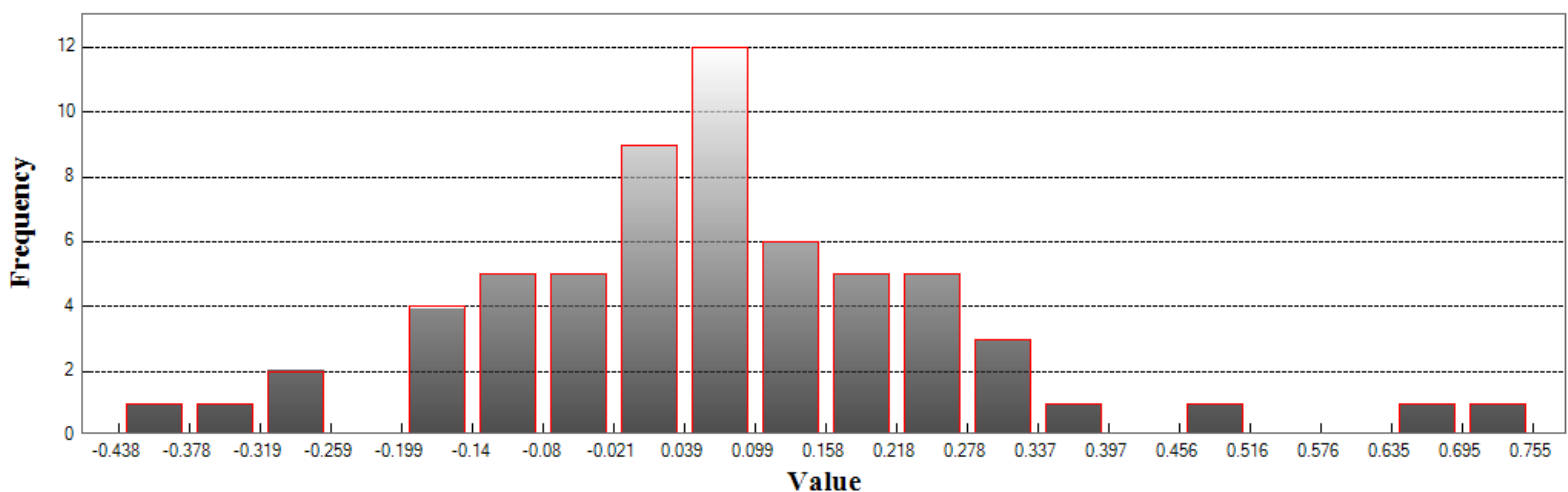
Standard Deviation DZ: 0.211

RMSE Z: 0.219

95% Confidence Level Z: 0.429

Units: US Survey Feet

Histogram



Min: -0.438

Max: 0.754

Number Of Bins: 20

Bin Interval: 0.06

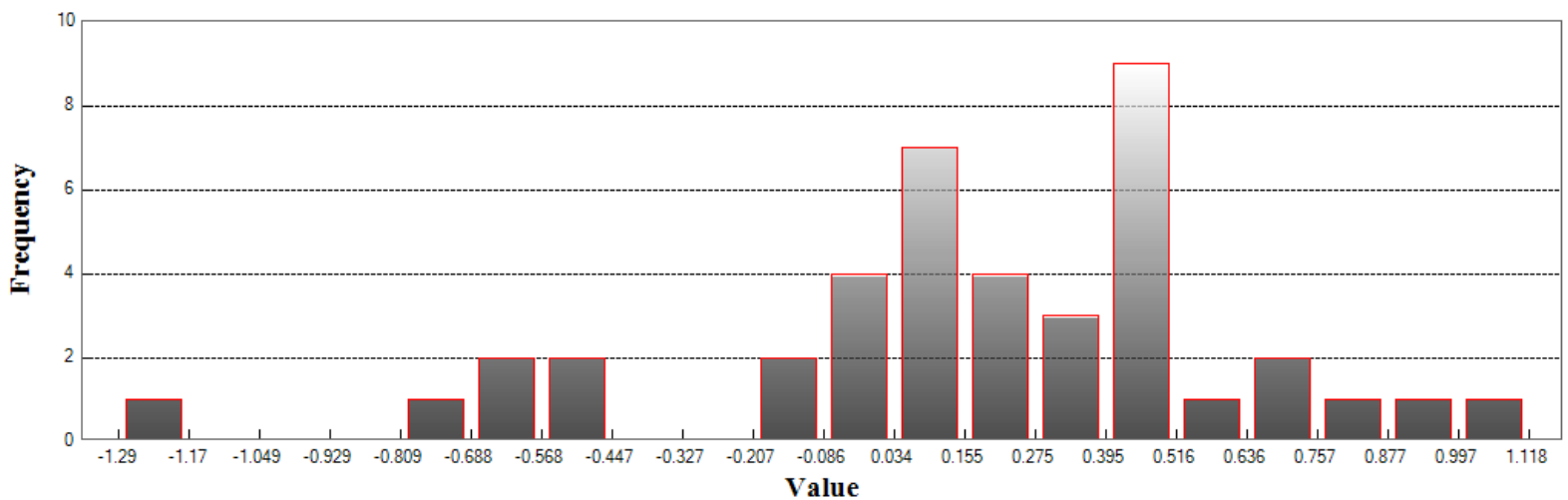


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -1.29
Maximum DZ: 1.118
Mean DZ: 0.168
Mean Magnitude DZ: 0.623
Number Observations: 41
Standard Deviation DZ: 0.465
RMSE Z: 0.489
95th Percentile: 1.007
Units: US Survey Feet

Histogram



Min: -1.29

Max: 1.118

Number Of Bins: 20

Bin Interval: 0.12

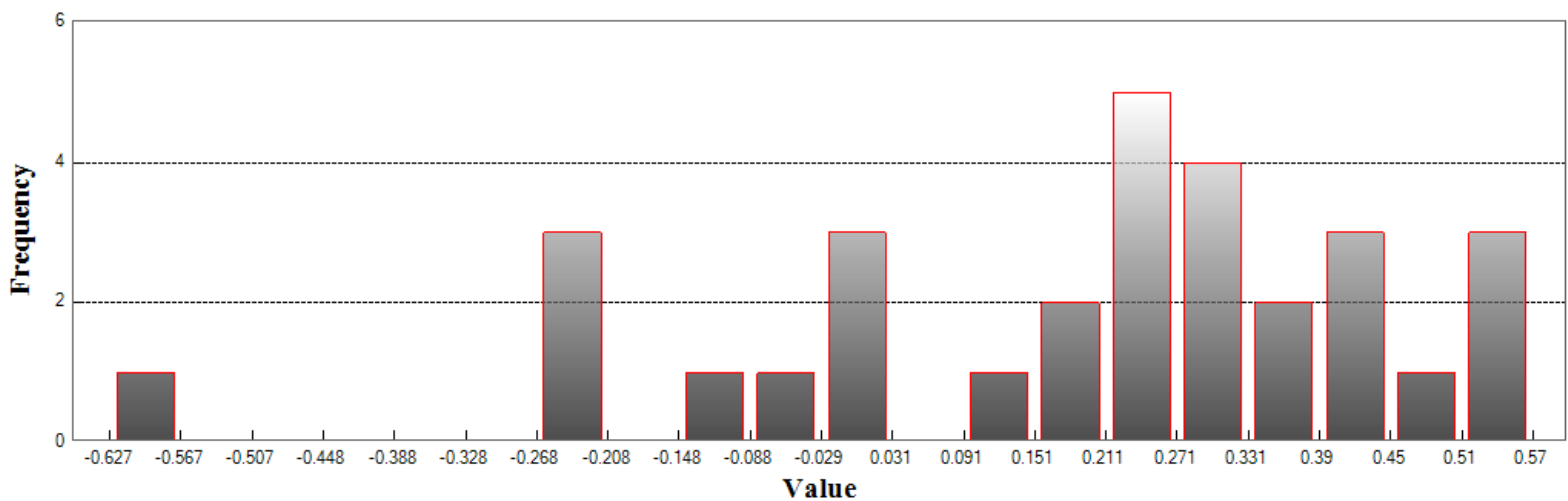


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.627
Maximum DZ: 0.57
Mean DZ: 0.183
Mean Magnitude DZ: 0.538
Number Observations: 30
Standard Deviation DZ: 0.281
RMSE Z: 0.332
95th Percentile: 0.57
Units: US Survey Feet

Histogram



Min: -0.627

Max: 0.57

Number Of Bins: 20

Bin Interval: 0.06

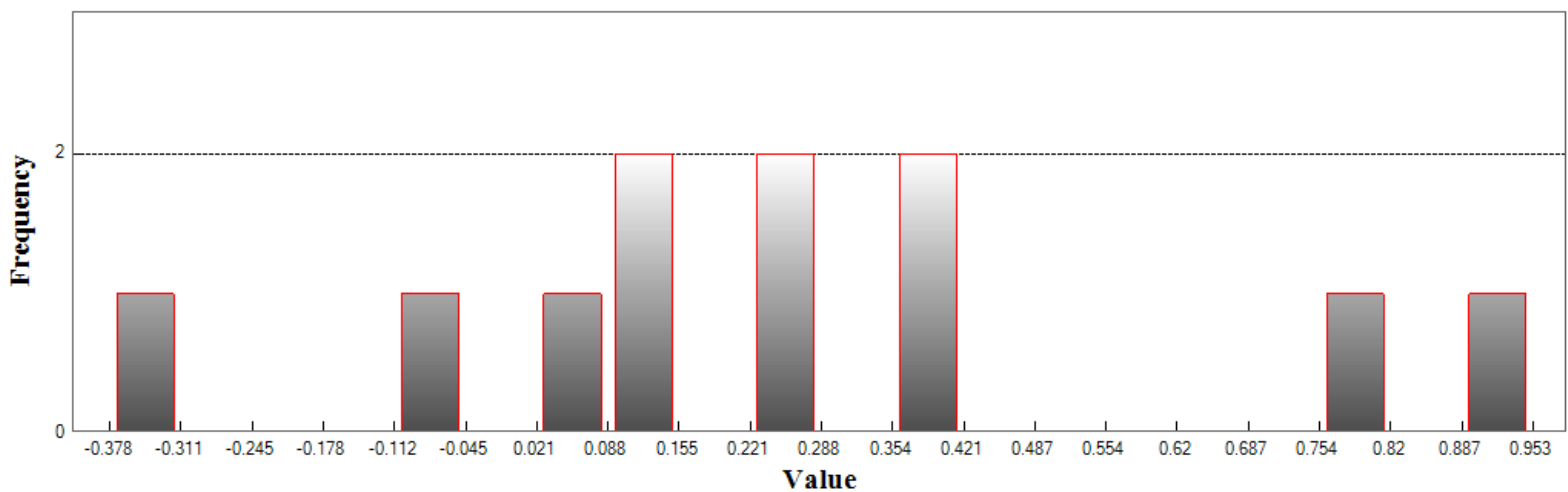


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.378
Maximum DZ: 0.954
Mean DZ: 0.254
Mean Magnitude DZ: 0.581
Number Observations: 11
Standard Deviation DZ: 0.373
RMSE Z: 0.438
95th Percentile: 0.954
Units: US Survey Feet

Histogram



Min: -0.378

Max: 0.954

Number Of Bins: 20

Bin Interval: 0.067

NORTH CAROLINA GEODETIC SURVEY

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(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: avery_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

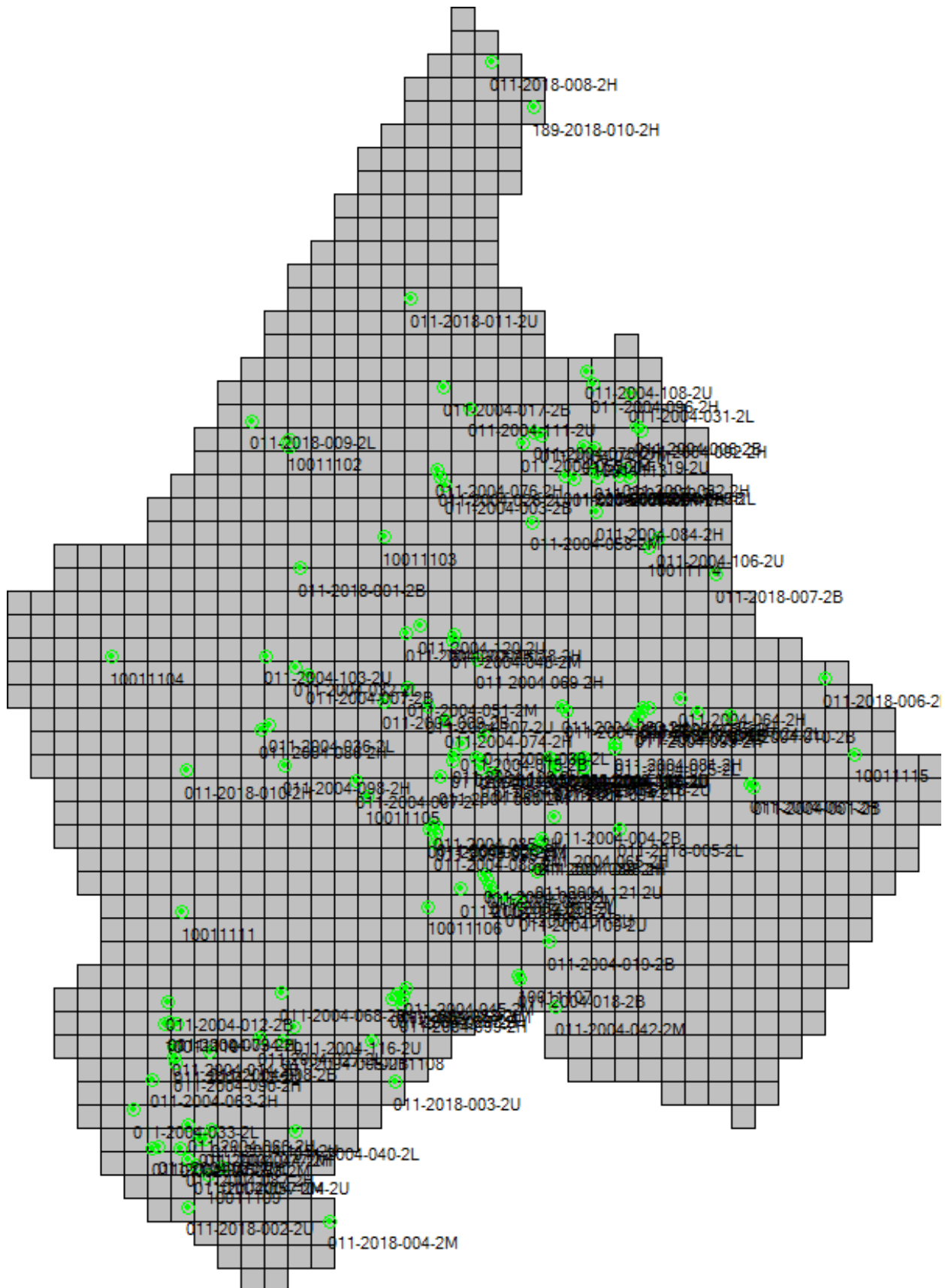
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	22	0.648		
2H	43		0.646	
2L	22		0.574	
2M	22		0.696	
2U	39	0.419		
Total	148			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.563

Maximum DZ: 0.703

Mean DZ: 0.066

Mean Magnitude DZ: 0.462

Number Observations: 61

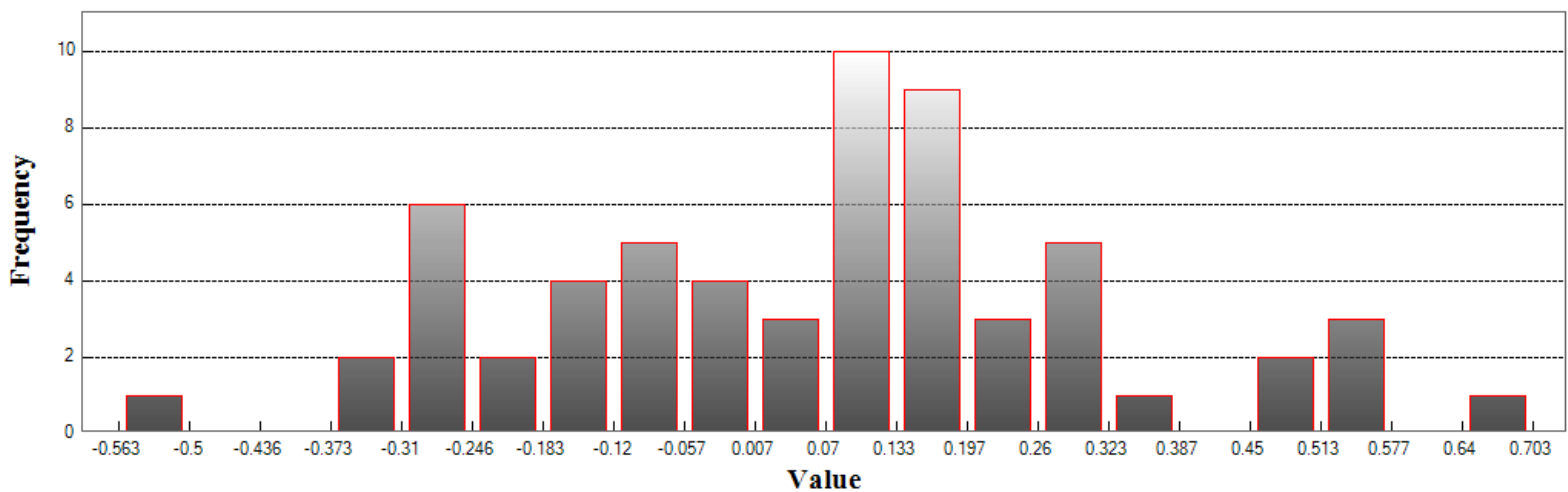
Standard Deviation DZ: 0.256

RMSE Z: 0.262

95% Confidence Level Z: 0.514

Units: US Survey Feet

Histogram



Min: -0.563

Max: 0.703

Number Of Bins: 20

Bin Interval: 0.063

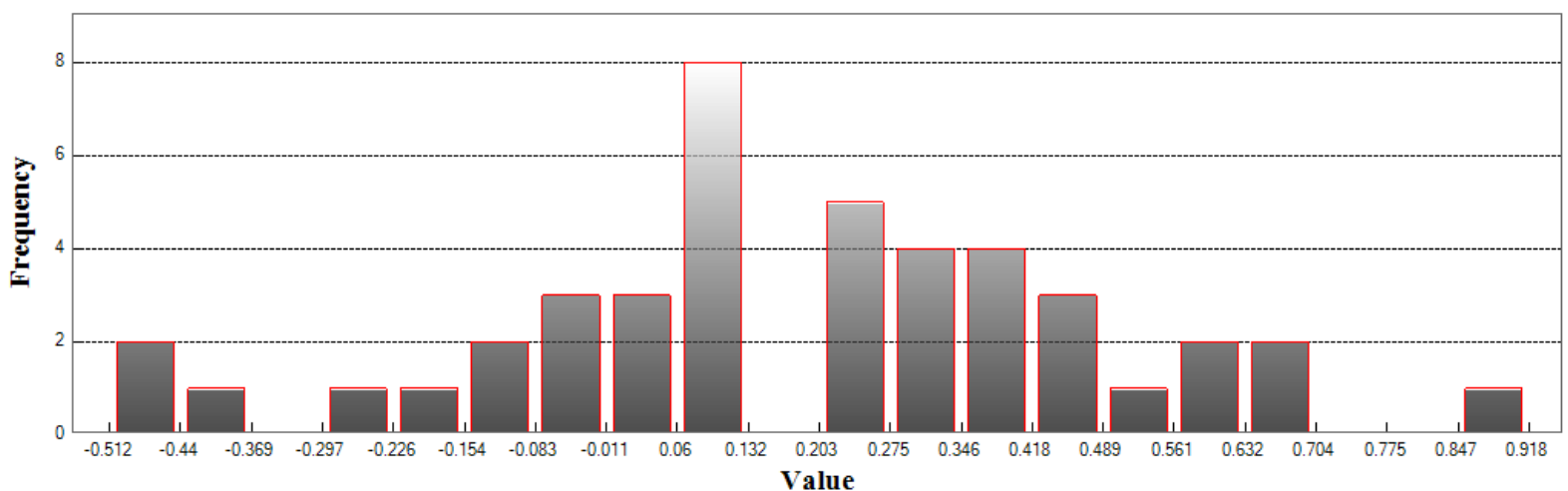


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.512
Maximum DZ: 0.918
Mean DZ: 0.183
Mean Magnitude DZ: 0.531
Number Observations: 43
Standard Deviation DZ: 0.308
RMSE Z: 0.355
95th Percentile: 0.646
Units: US Survey Feet

Histogram



Min: -0.512
Max: 0.918
Number Of Bins: 20
Bin Interval: 0.072

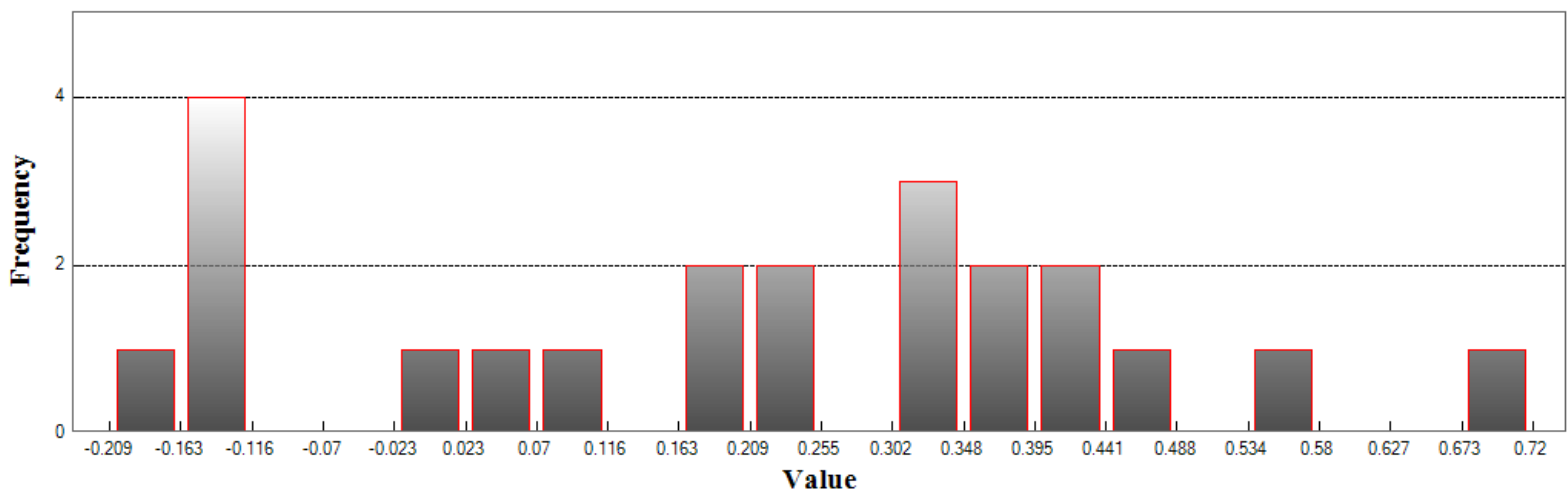


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.209
Maximum DZ: 0.72
Mean DZ: 0.205
Mean Magnitude DZ: 0.525
Number Observations: 22
Standard Deviation DZ: 0.256
RMSE Z: 0.323
95th Percentile: 0.574
Units: US Survey Feet

Histogram



Min: -0.209

Max: 0.72

Number Of Bins: 20

Bin Interval: 0.046

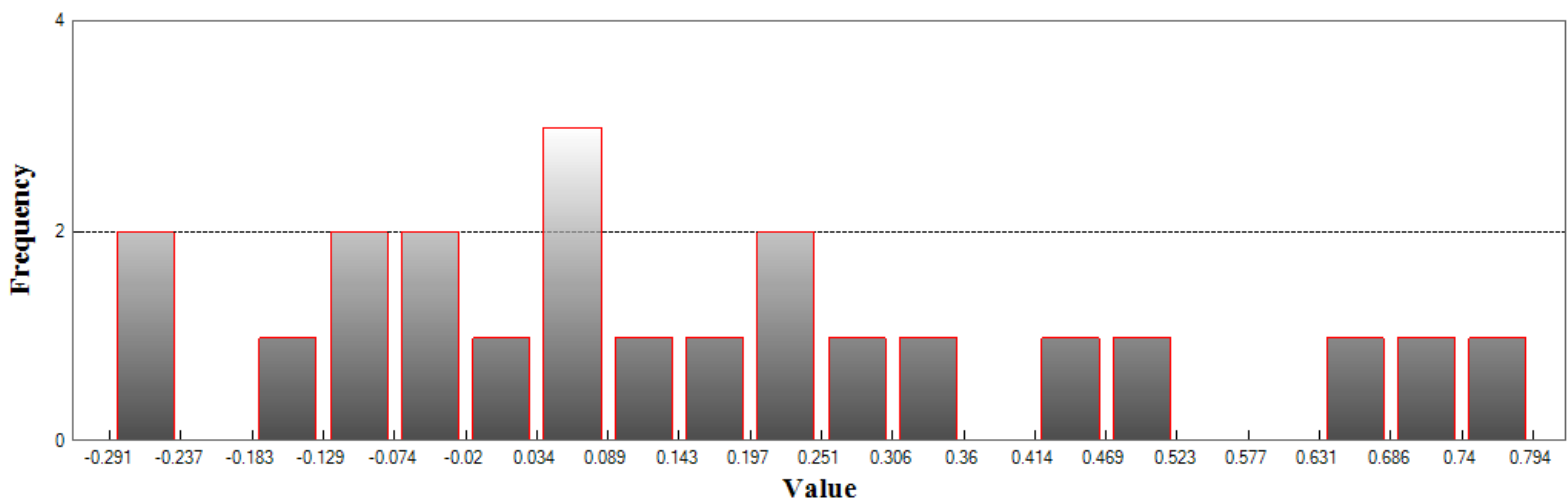


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.291
Maximum DZ: 0.794
Mean DZ: 0.155
Mean Magnitude DZ: 0.501
Number Observations: 22
Standard Deviation DZ: 0.303
RMSE Z: 0.334
95th Percentile: 0.696
Units: US Survey Feet

Histogram



Min: -0.291

Max: 0.794

Number Of Bins: 20

Bin Interval: 0.054

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Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: buncombe_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

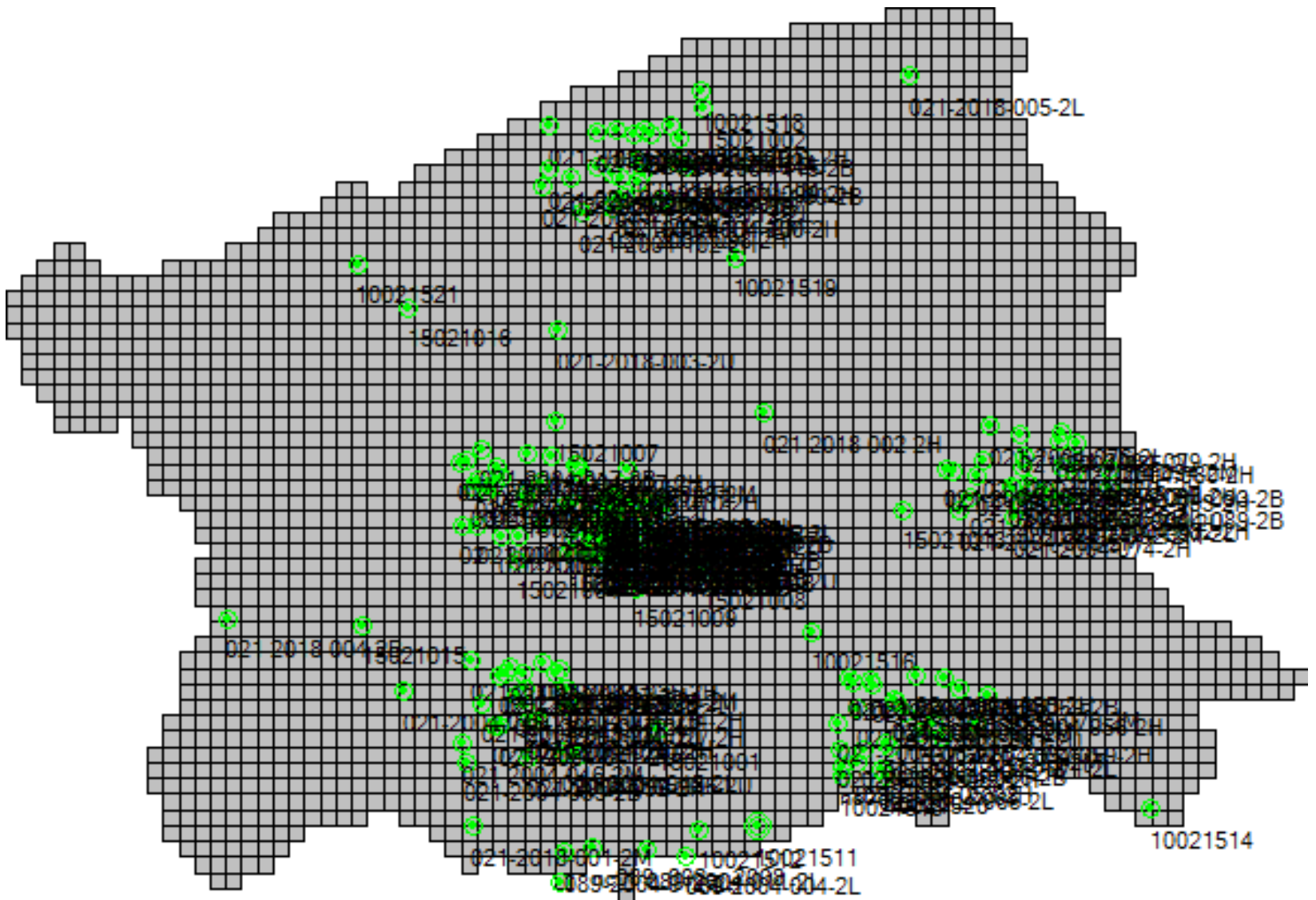
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	39	0.602		
2H	47		0.925	
2L	26		0.581	
2M	27		0.831	
2U	63	0.382		
Total	202			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.515

Maximum DZ: 1.105

Mean DZ: 0.09

Mean Magnitude DZ: 0.41

Number Observations: 102

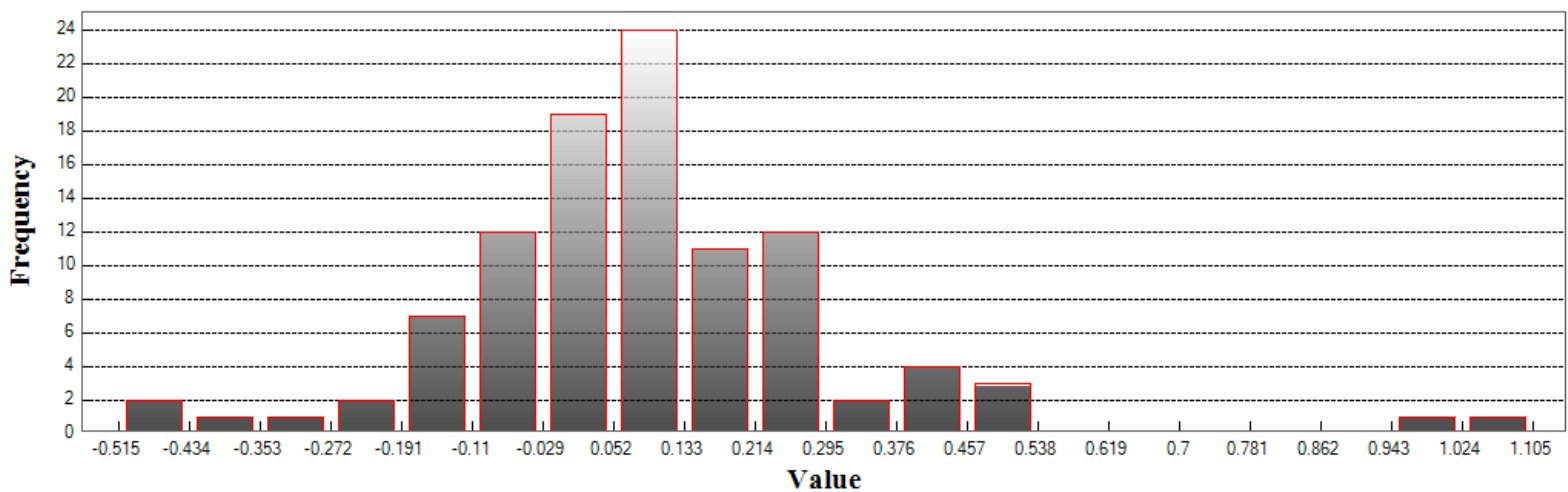
Standard Deviation DZ: 0.228

RMSE Z: 0.244

95% Confidence Level Z: 0.478

Units: US Survey Feet

Histogram



Min: -0.515

Max: 1.105

Number Of Bins: 20

Bin Interval: 0.081

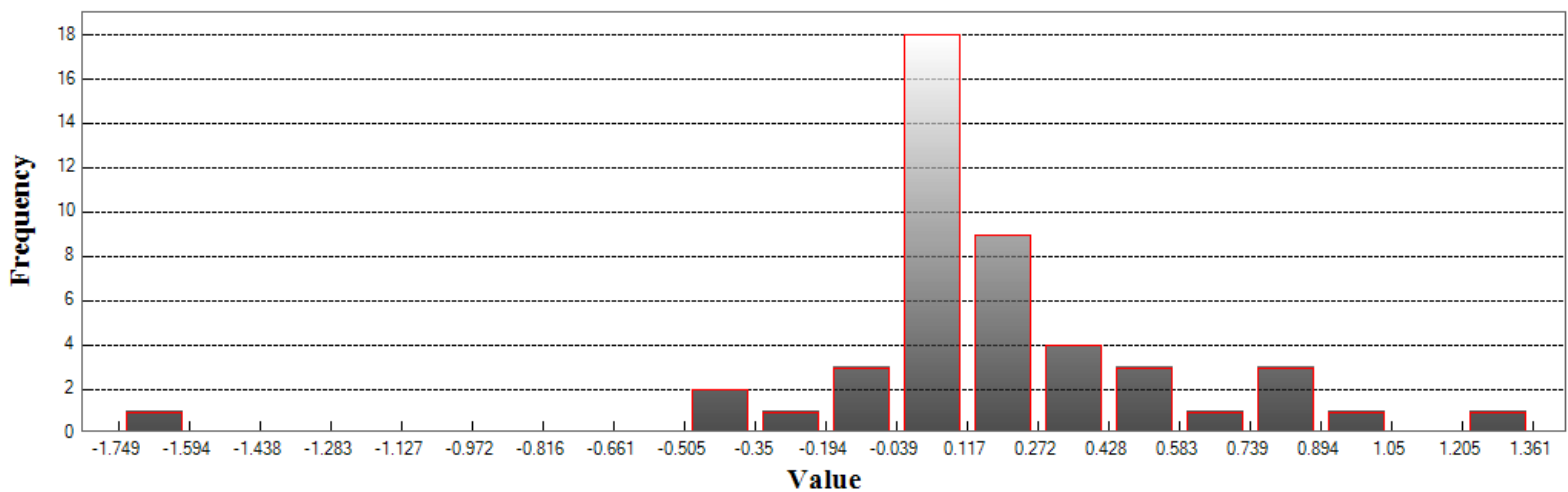


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -1.749
Maximum DZ: 1.36
Mean DZ: 0.156
Mean Magnitude DZ: 0.545
Number Observations: 47
Standard Deviation DZ: 0.448
RMSE Z: 0.47
95th Percentile: 0.925
Units: US Survey Feet

Histogram



Min: -1.749

Max: 1.36

Number Of Bins: 20

Bin Interval: 0.155

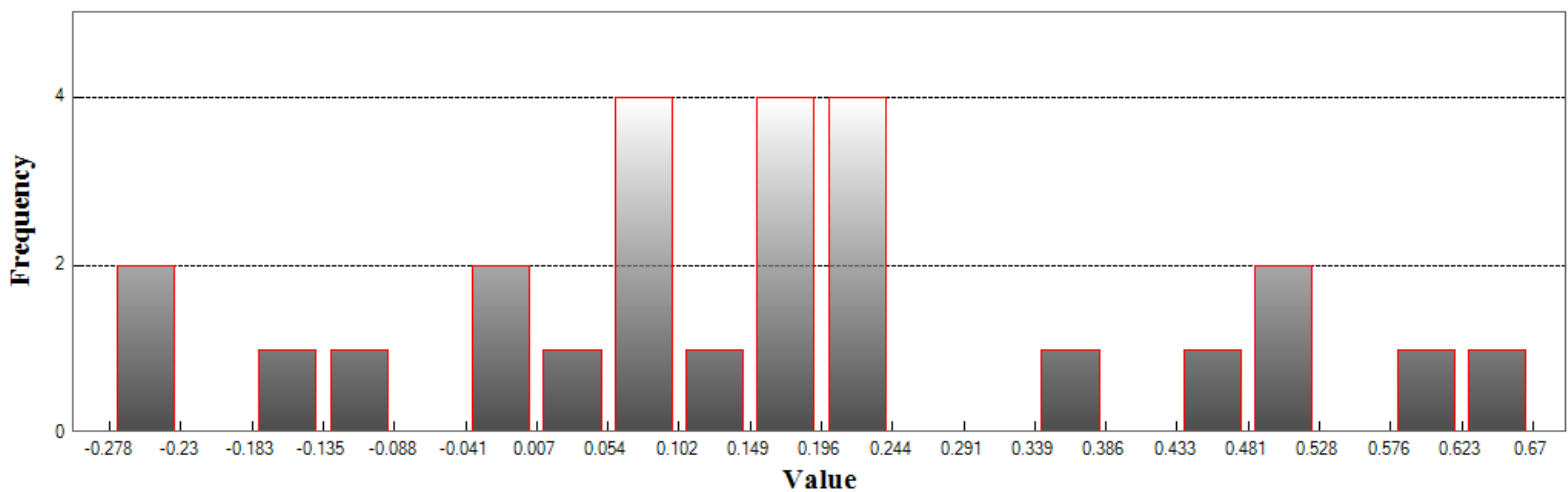


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.278
Maximum DZ: 0.67
Mean DZ: 0.162
Mean Magnitude DZ: 0.477
Number Observations: 26
Standard Deviation DZ: 0.244
RMSE Z: 0.289
95th Percentile: 0.581
Units: US Survey Feet

Histogram



Min: -0.278

Max: 0.67

Number Of Bins: 20

Bin Interval: 0.047

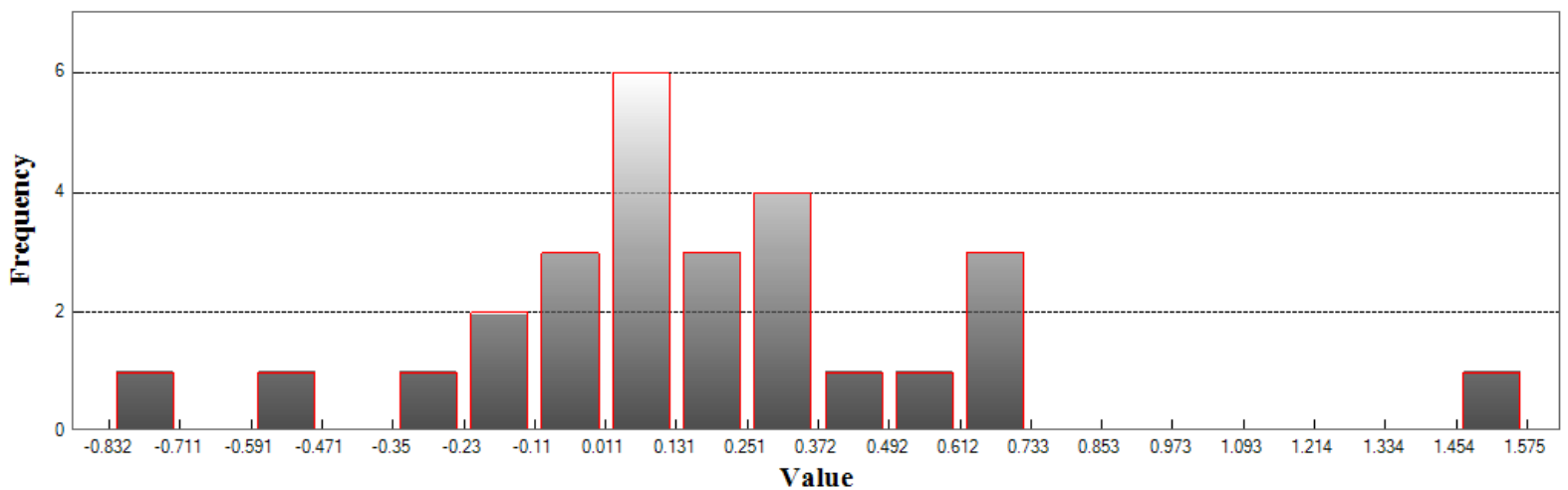


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.831
Maximum DZ: 1.575
Mean DZ: 0.185
Mean Magnitude DZ: 0.574
Number Observations: 27
Standard Deviation DZ: 0.437
RMSE Z: 0.467
95th Percentile: 0.831
Units: US Survey Feet

Histogram



Min: -0.831

Max: 1.575

Number Of Bins: 20

Bin Interval: 0.12

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Raleigh, North Carolina 27607
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Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: burke_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

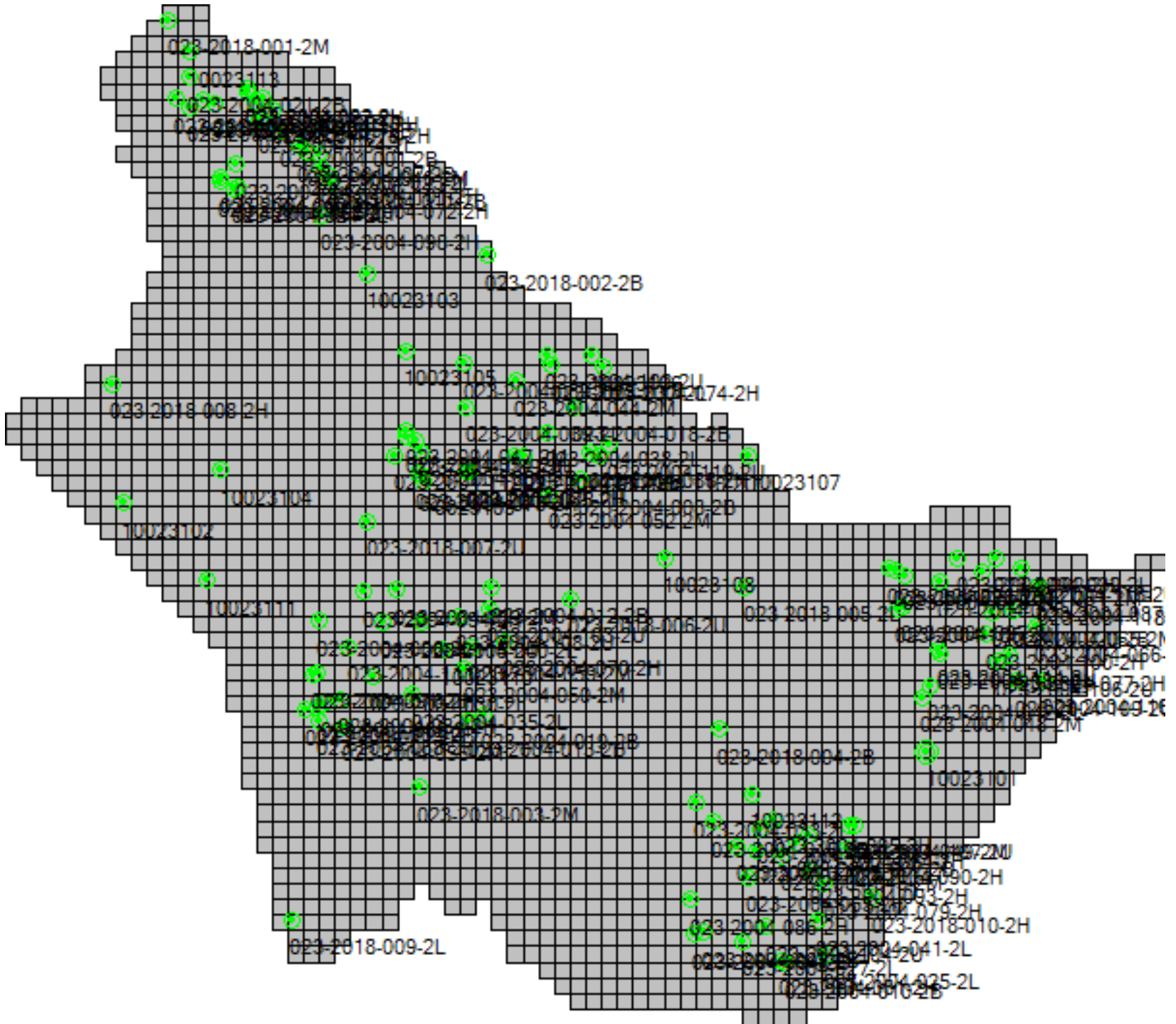
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: 2333 out of 2333



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA
DEM			
2B	23	0.687	
2H	42		0.713
2L	23		0.596
2M	21		0.870
2U	34	0.419	
Total	143		

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.639

Maximum DZ: 0.823

Mean DZ: 0.058

Mean Magnitude DZ: 0.433

Number Observations: 57

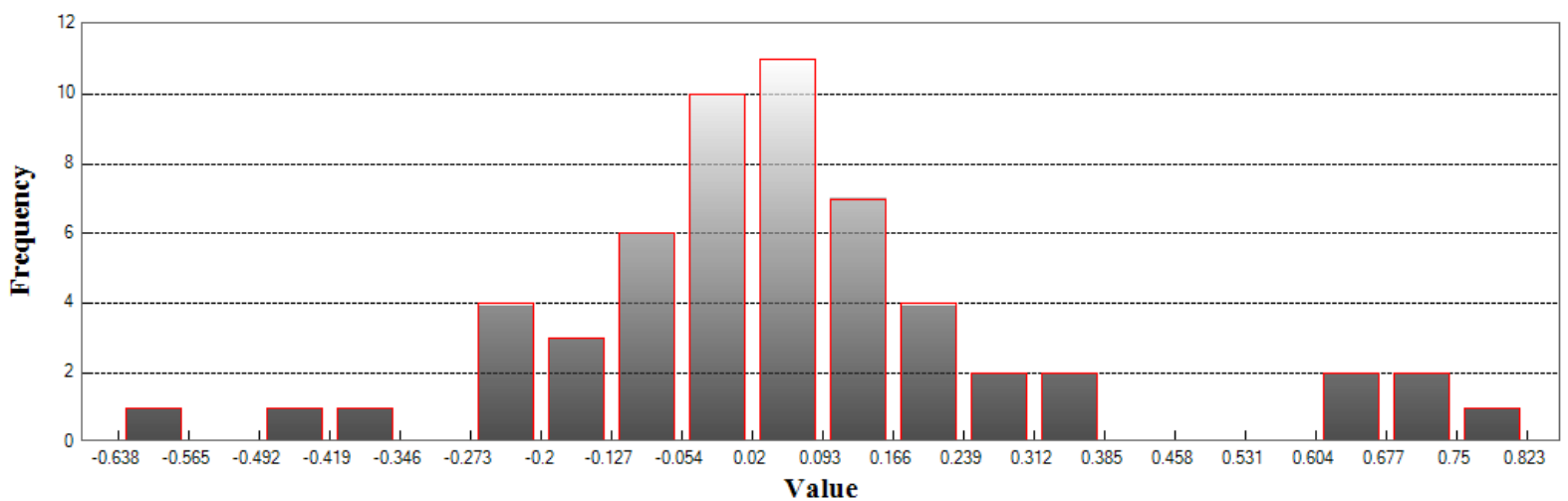
Standard Deviation DZ: 0.273

RMSE Z: 0.277

95% Confidence Level Z: 0.543

Units: US Survey Feet

Histogram



Min: -0.639

Max: 0.823

Number Of Bins: 20

Bin Interval: 0.073

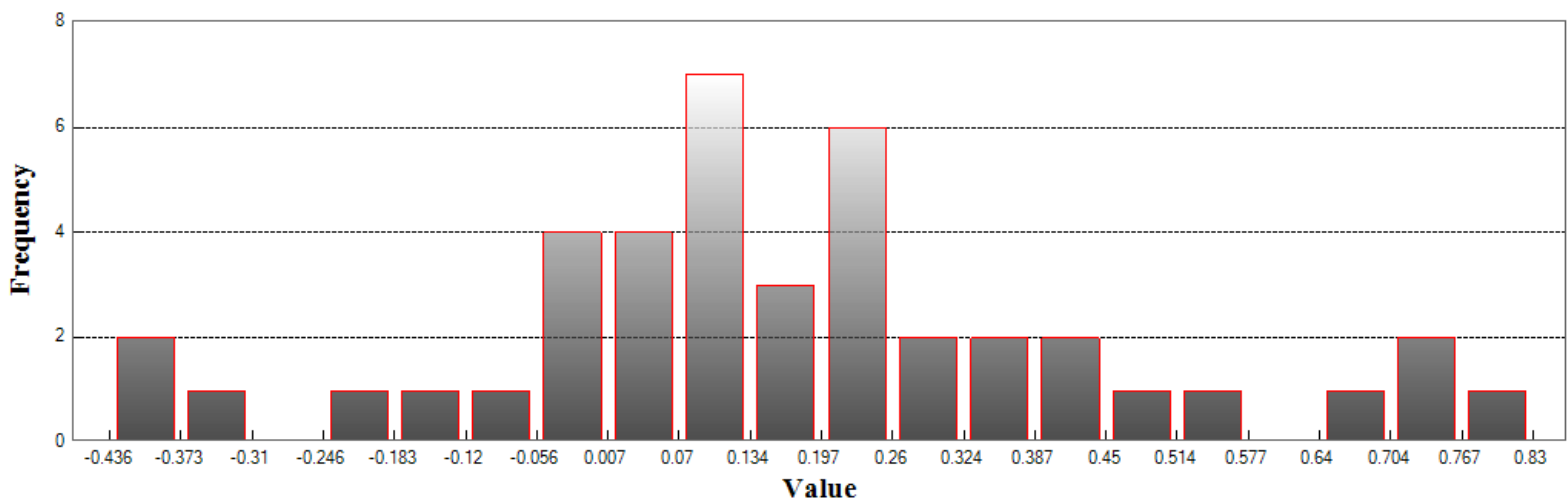


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.437
Maximum DZ: 0.83
Mean DZ: 0.168
Mean Magnitude DZ: 0.501
Number Observations: 42
Standard Deviation DZ: 0.285
RMSE Z: 0.328
95th Percentile: 0.713
Units: US Survey Feet

Histogram



Min: -0.437

Max: 0.83

Number Of Bins: 20

Bin Interval: 0.063

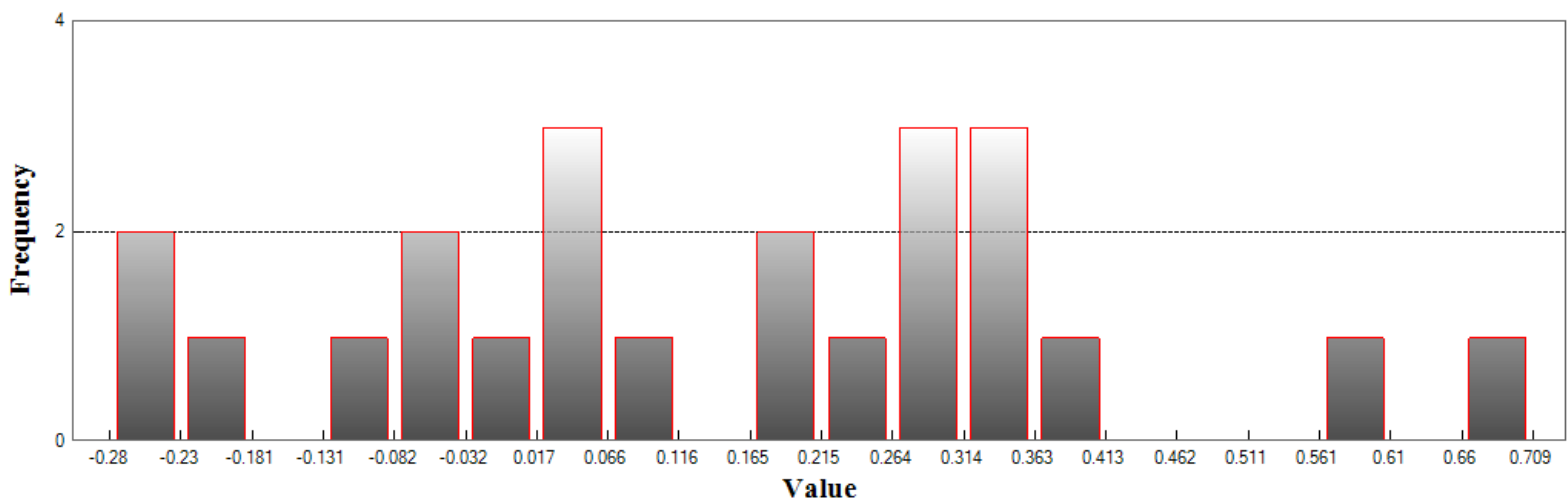


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.28
Maximum DZ: 0.709
Mean DZ: 0.15
Mean Magnitude DZ: 0.483
Number Observations: 23
Standard Deviation DZ: 0.252
RMSE Z: 0.289
95th Percentile: 0.596
Units: US Survey Feet

Histogram



Min: -0.28

Max: 0.709

Number Of Bins: 20

Bin Interval: 0.049

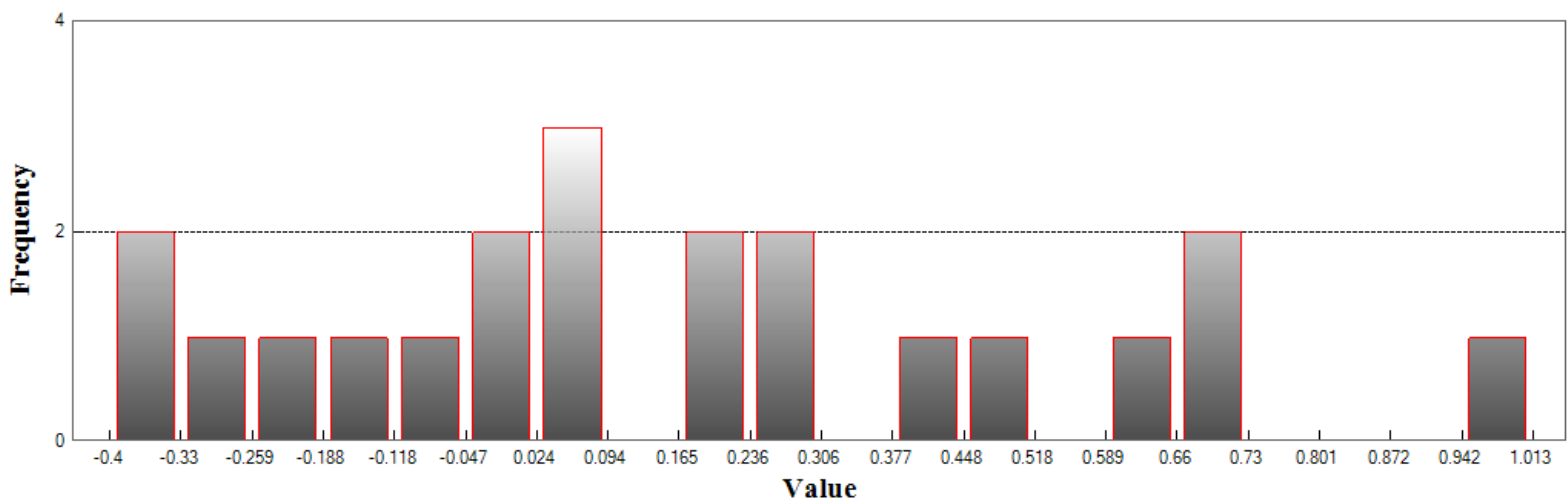


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.4
Maximum DZ: 1.013
Mean DZ: 0.175
Mean Magnitude DZ: 0.566
Number Observations: 21
Standard Deviation DZ: 0.381
RMSE Z: 0.411
95th Percentile: 0.87
Units: US Survey Feet

Histogram



Min: -0.4
Max: 1.013
Number Of Bins: 20
Bin Interval: 0.071

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: caldwell_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

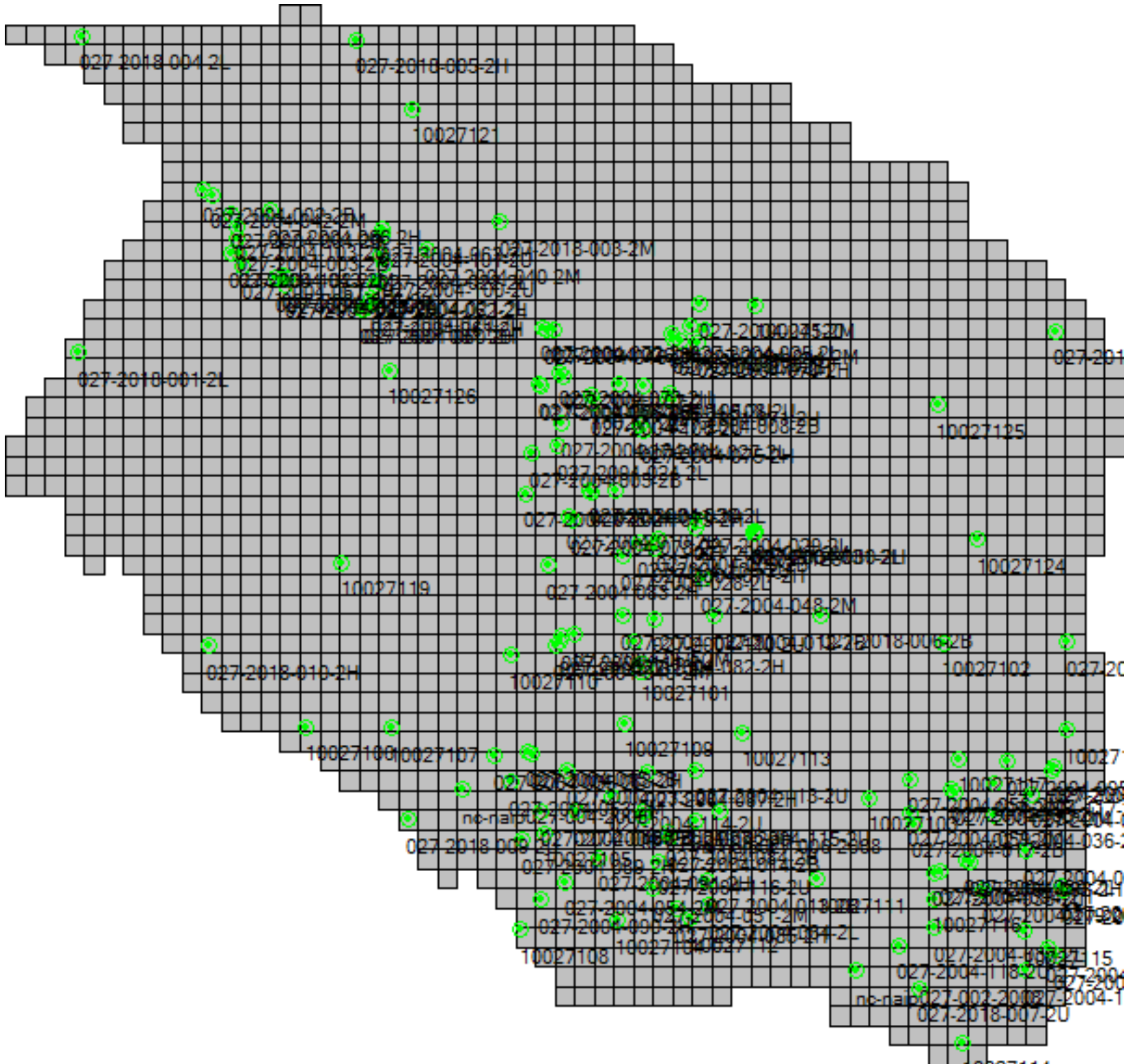
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: 2153 out of 2153



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	21	0.464		
2H	42		0.622	
2L	22		0.286	
2M	22		0.490	
2U	52	0.239		
Total	159			

Units: US Survey Feet

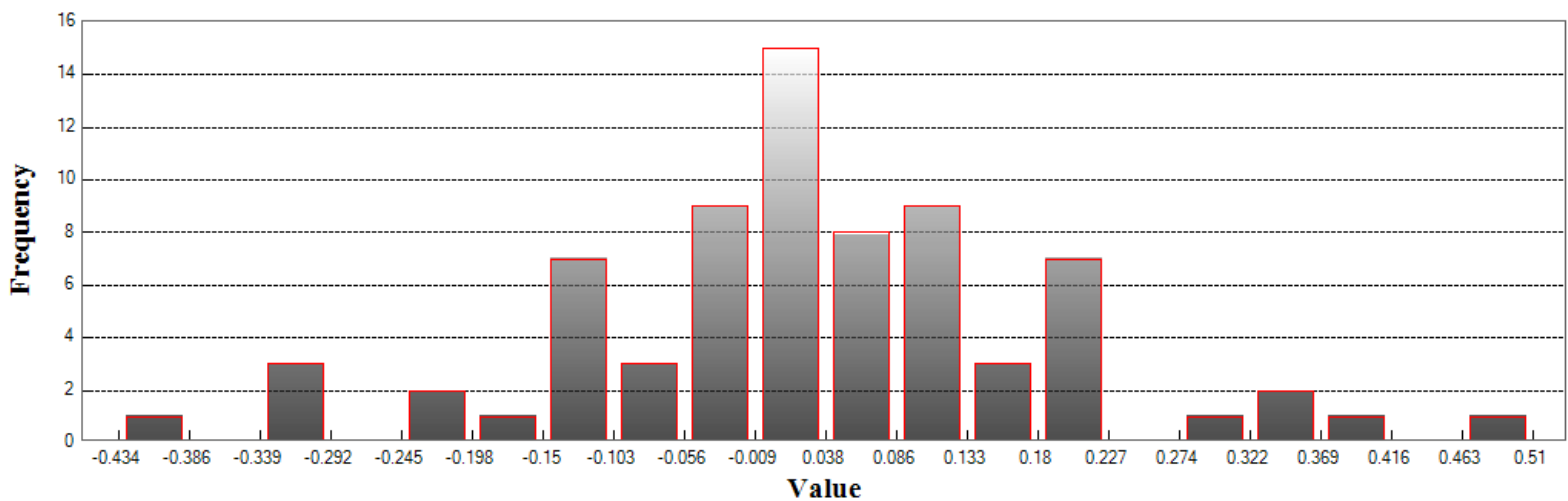


DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.434
Maximum DZ: 0.51
Mean DZ: 0.026
Mean Magnitude DZ: 0.346
Number Observations: 73
Standard Deviation DZ: 0.163
RMSE Z: 0.163
95% Confidence Level Z: 0.32
Units: US Survey Feet

Histogram



Min: -0.434

Max: 0.51

Number Of Bins: 20

Bin Interval: 0.047

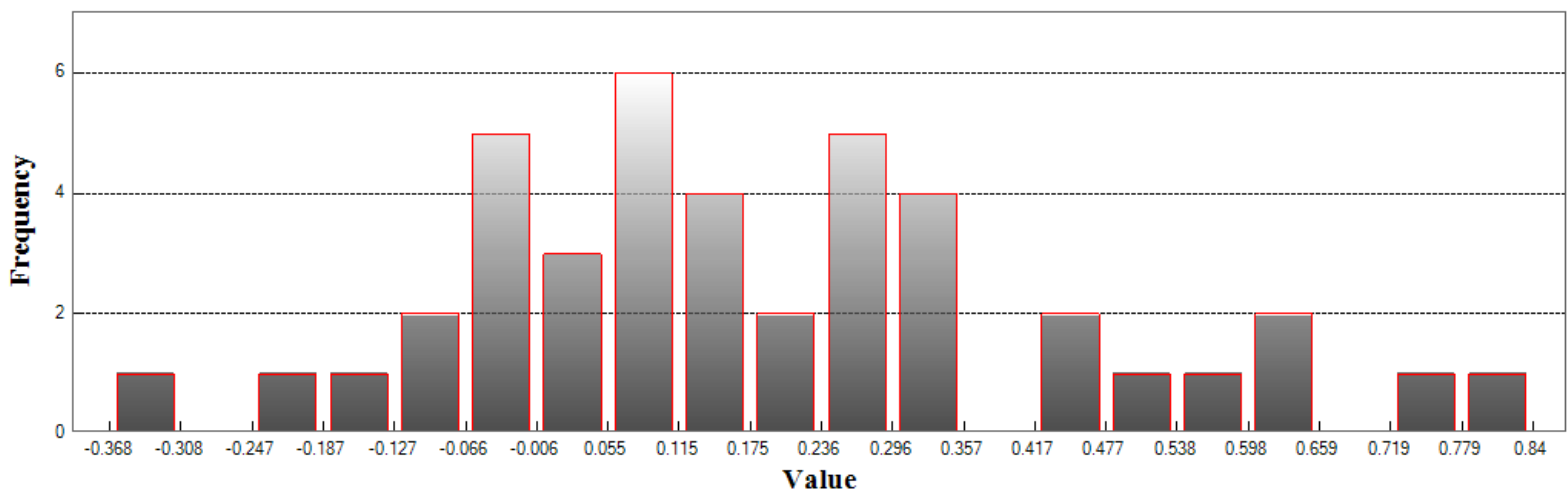


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.368
Maximum DZ: 0.84
Mean DZ: 0.191
Mean Magnitude DZ: 0.491
Number Observations: 42
Standard Deviation DZ: 0.256
RMSE Z: 0.317
95th Percentile: 0.622
Units: US Survey Feet

Histogram



Min: -0.368

Max: 0.84

Number Of Bins: 20

Bin Interval: 0.06

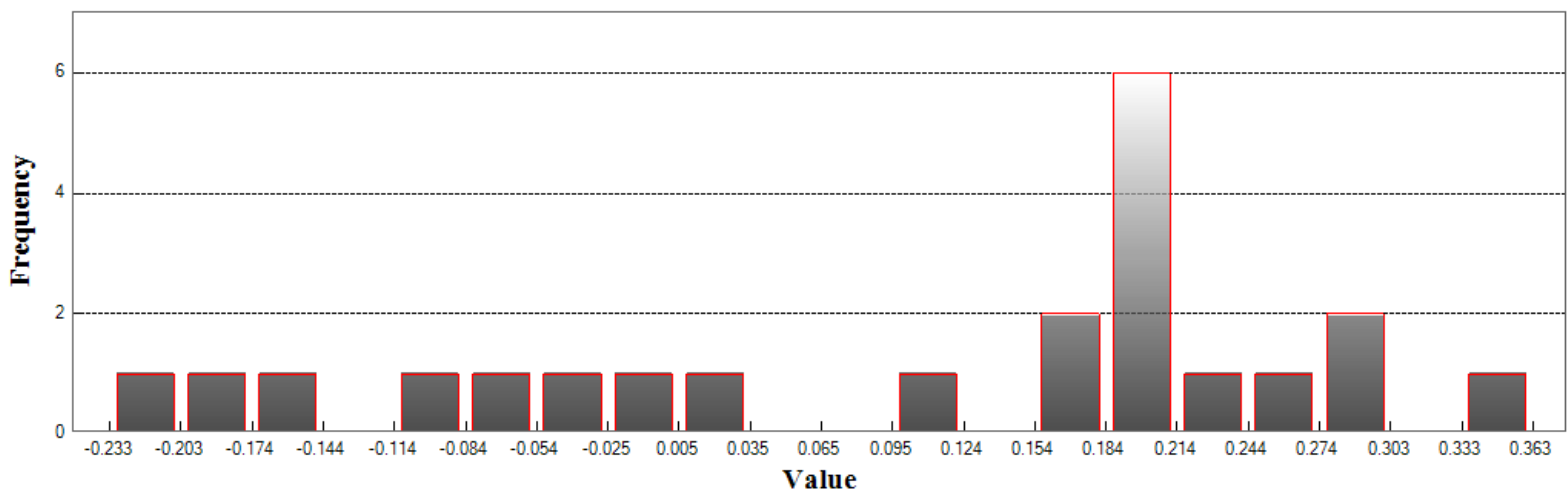


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.233
Maximum DZ: 0.363
Mean DZ: 0.103
Mean Magnitude DZ: 0.418
Number Observations: 22
Standard Deviation DZ: 0.17
RMSE Z: 0.195
95th Percentile: 0.286
Units: US Survey Feet

Histogram



Min: -0.233
Max: 0.363
Number Of Bins: 20
Bin Interval: 0.03

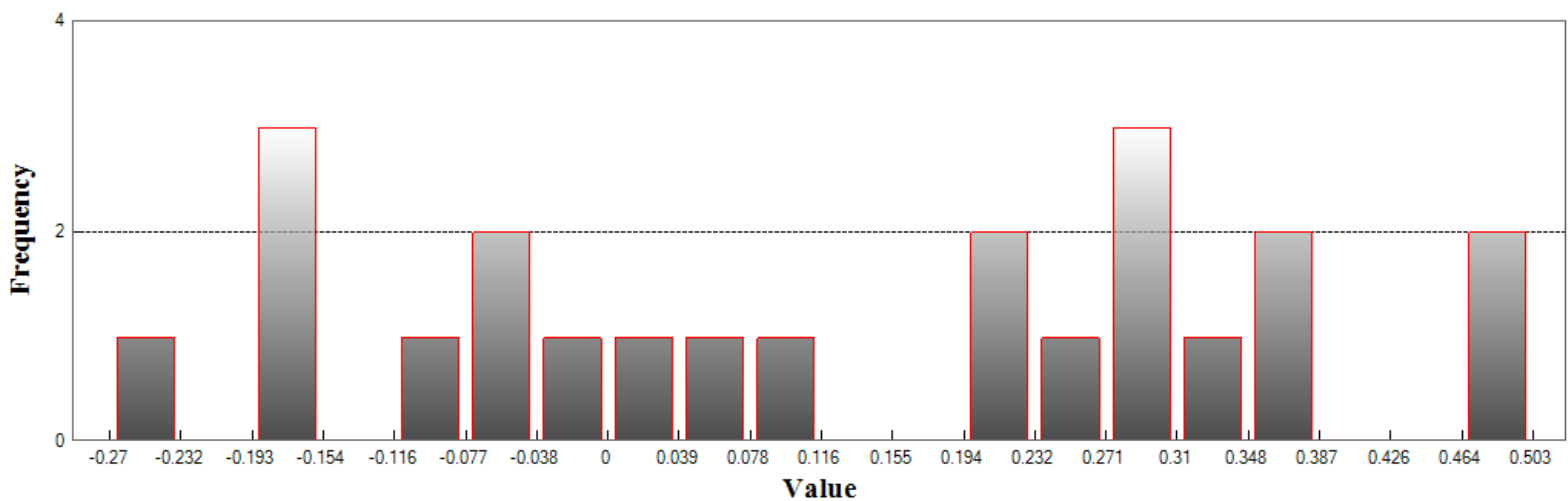


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.27
Maximum DZ: 0.503
Mean DZ: 0.13
Mean Magnitude DZ: 0.463
Number Observations: 22
Standard Deviation DZ: 0.228
RMSE Z: 0.258
95th Percentile: 0.49
Units: US Survey Feet

Histogram



Min: -0.27
Max: 0.503
Number Of Bins: 20
Bin Interval: 0.039

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: cherokee_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

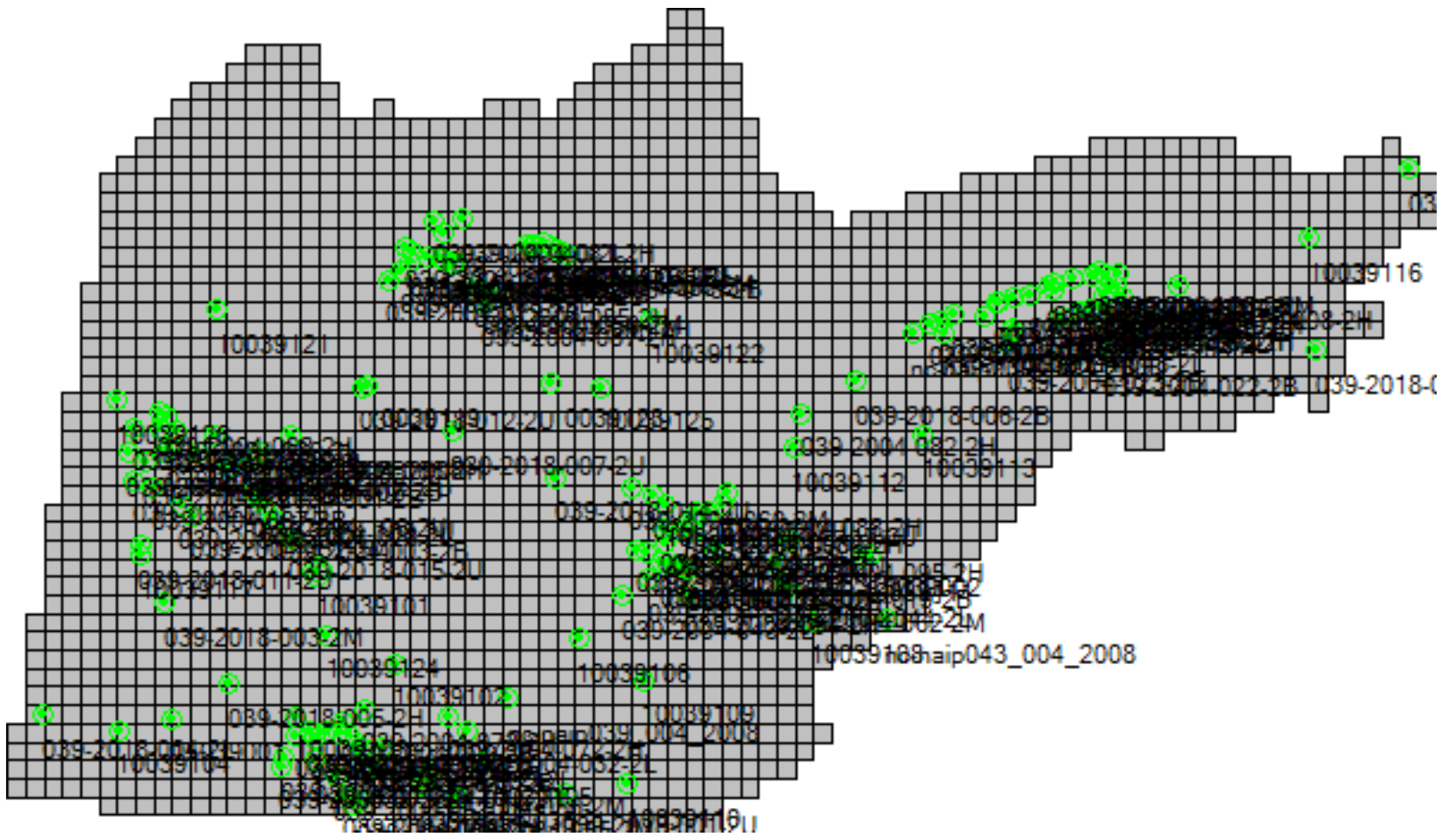
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: 1749 out of 1749



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	28	0.449		
2H	42		1.141	
2L	25		1.017	
2M	18		0.810	
2U	58	0.460		
Total	171			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.657

Maximum DZ: 0.61

Mean DZ: 0.127

Mean Magnitude DZ: 0.436

Number Observations: 86

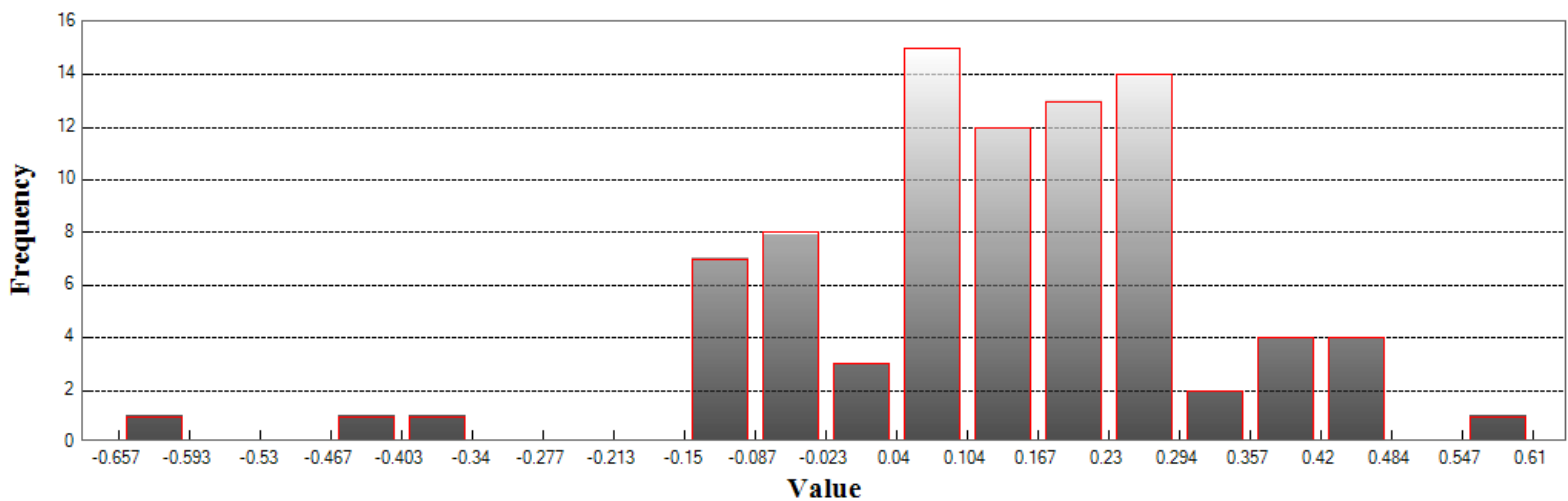
Standard Deviation DZ: 0.197

RMSE Z: 0.233

95% Confidence Level Z: 0.456

Units: US Survey Feet

Histogram



Min: -0.657

Max: 0.61

Number Of Bins: 20

Bin Interval: 0.063

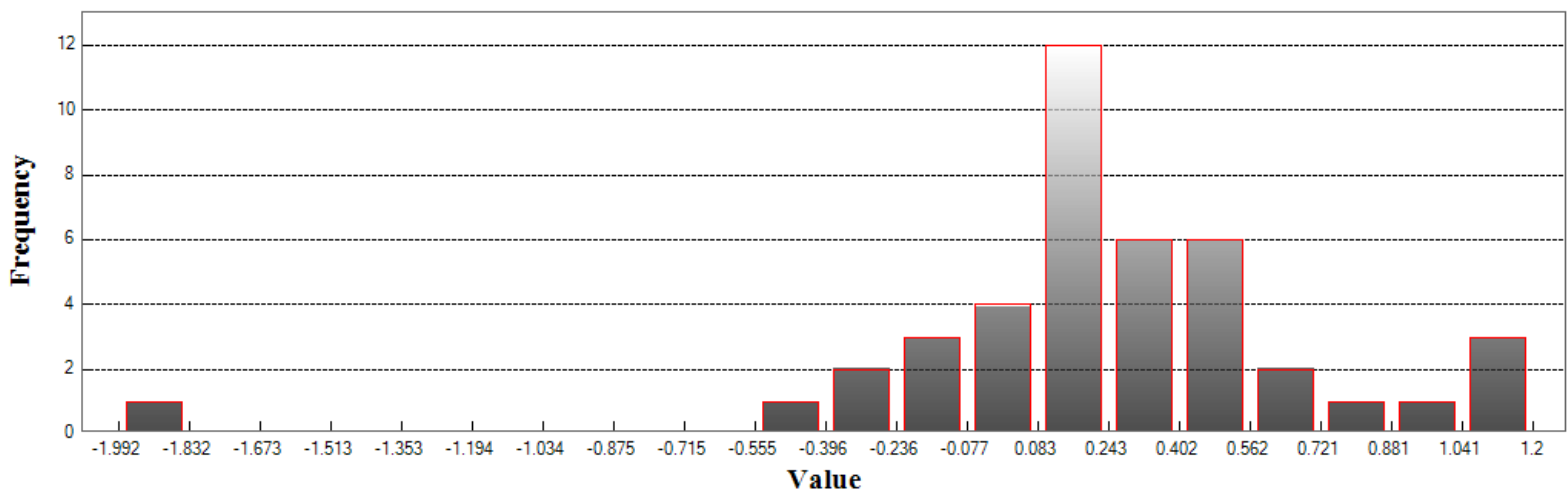


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -1.992
Maximum DZ: 1.2
Mean DZ: 0.234
Mean Magnitude DZ: 0.633
Number Observations: 42
Standard Deviation DZ: 0.515
RMSE Z: 0.56
95th Percentile: 1.141
Units: US Survey Feet

Histogram



Min: -1.992

Max: 1.2

Number Of Bins: 20

Bin Interval: 0.16

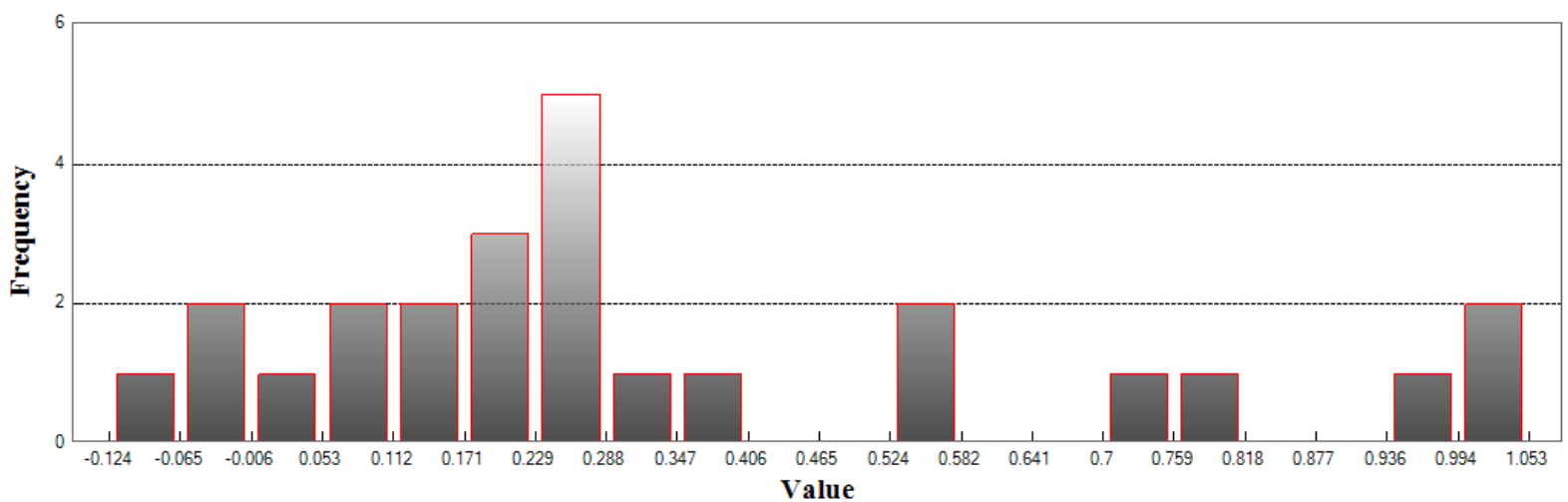


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.123
Maximum DZ: 1.054
Mean DZ: 0.339
Mean Magnitude DZ: 0.595
Number Observations: 25
Standard Deviation DZ: 0.336
RMSE Z: 0.472
95th Percentile: 1.017
Units: US Survey Feet

Histogram



Min: -0.123

Max: 1.054

Number Of Bins: 20

Bin Interval: 0.059

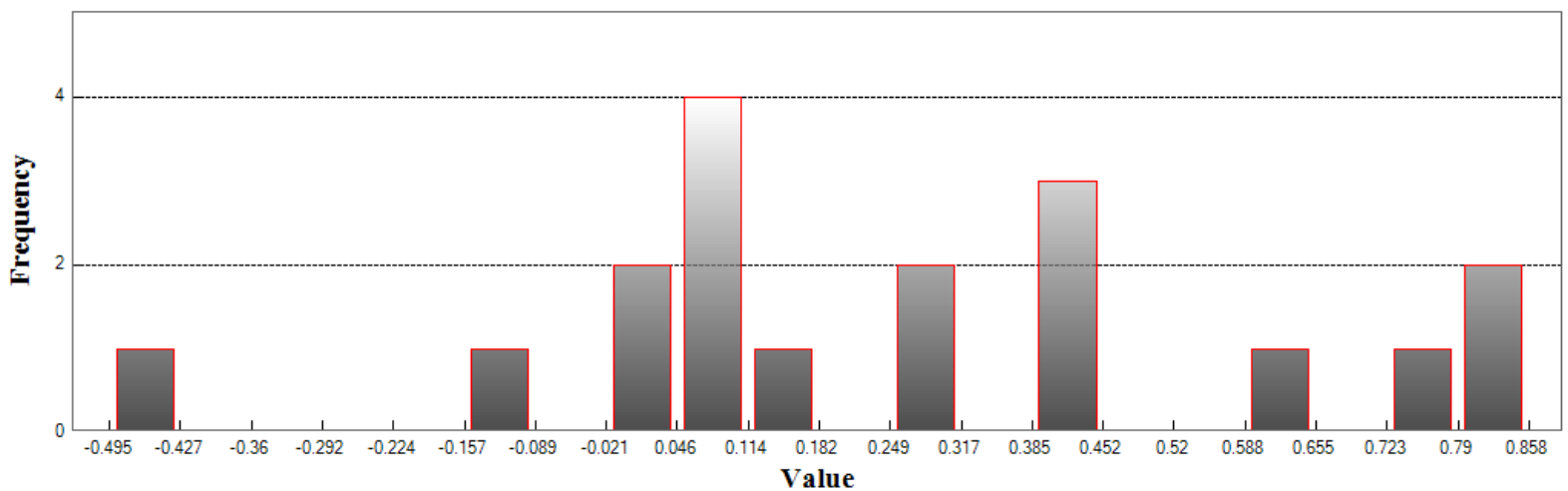


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.495
Maximum DZ: 0.858
Mean DZ: 0.261
Mean Magnitude DZ: 0.571
Number Observations: 18
Standard Deviation DZ: 0.348
RMSE Z: 0.427
95th Percentile: 0.81
Units: US Survey Feet

Histogram



Min: -0.495

Max: 0.858

Number Of Bins: 20

Bin Interval: 0.068

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: clay_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

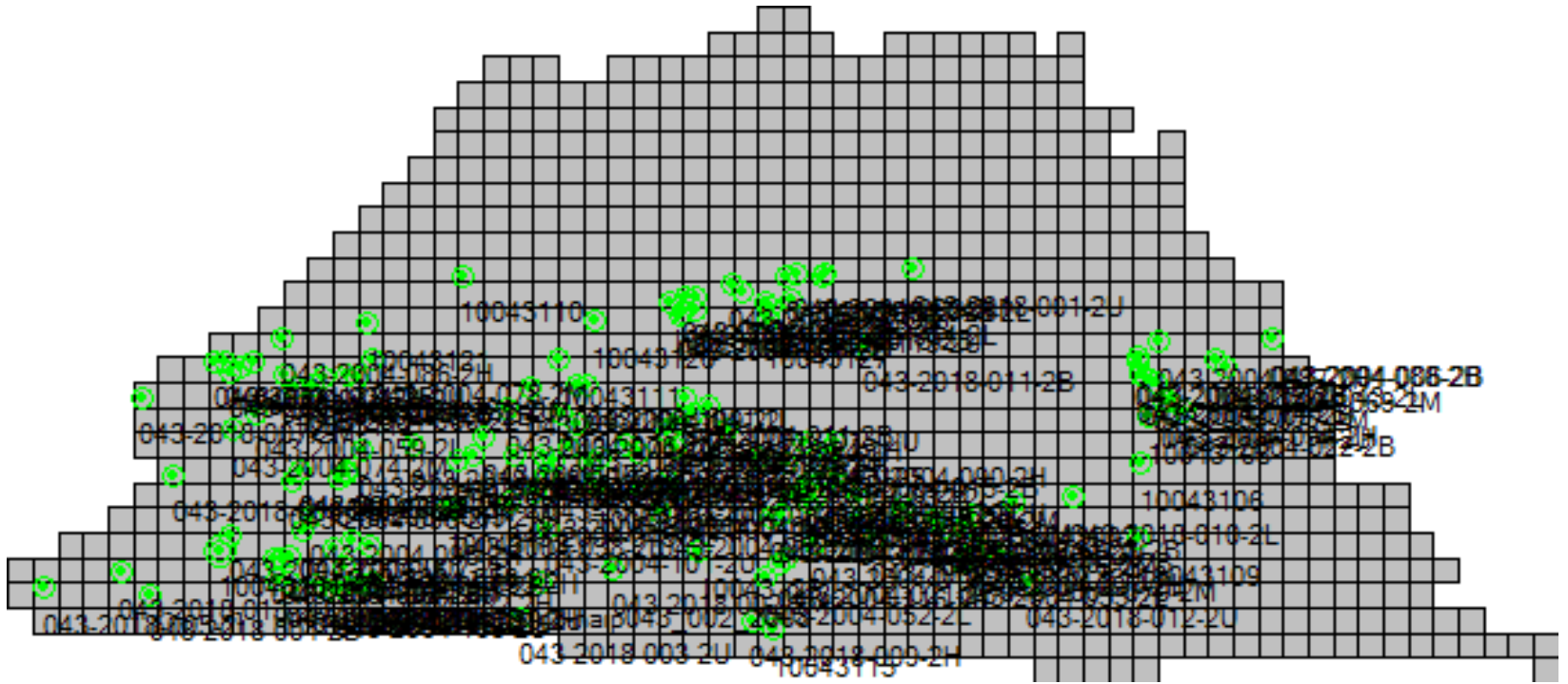
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: 1749 out of 1749



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	34	0.702		
2H	21		1.153	
2L	33		0.786	
2M	19		0.834	
2U	57	0.578		
Total	164			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.197

Maximum DZ: 0.901

Mean DZ: 0.256

Mean Magnitude DZ: 0.526

Number Observations: 91

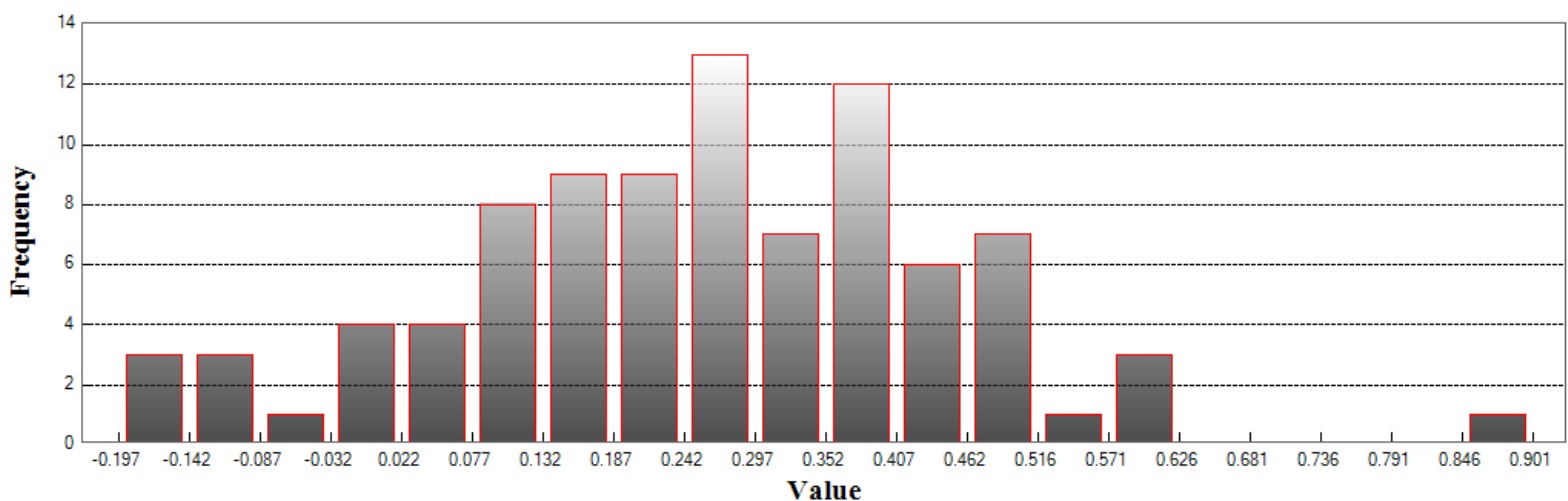
Standard Deviation DZ: 0.193

RMSE Z: 0.32

95% Confidence Level Z: 0.627

Units: US Survey Feet

Histogram



Min: -0.197

Max: 0.901

Number Of Bins: 20

Bin Interval: 0.055

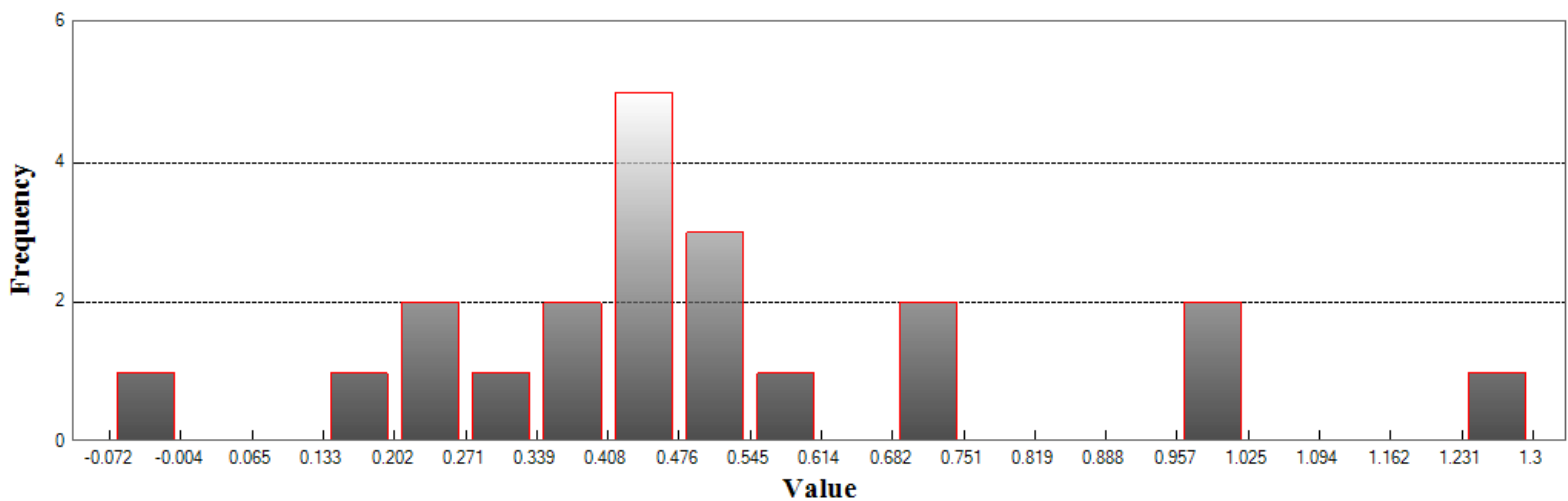


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.072
Maximum DZ: 1.3
Mean DZ: 0.509
Mean Magnitude DZ: 0.718
Number Observations: 21
Standard Deviation DZ: 0.311
RMSE Z: 0.593
95th Percentile: 1.153
Units: US Survey Feet

Histogram



Min: -0.072

Max: 1.3

Number Of Bins: 20

Bin Interval: 0.069

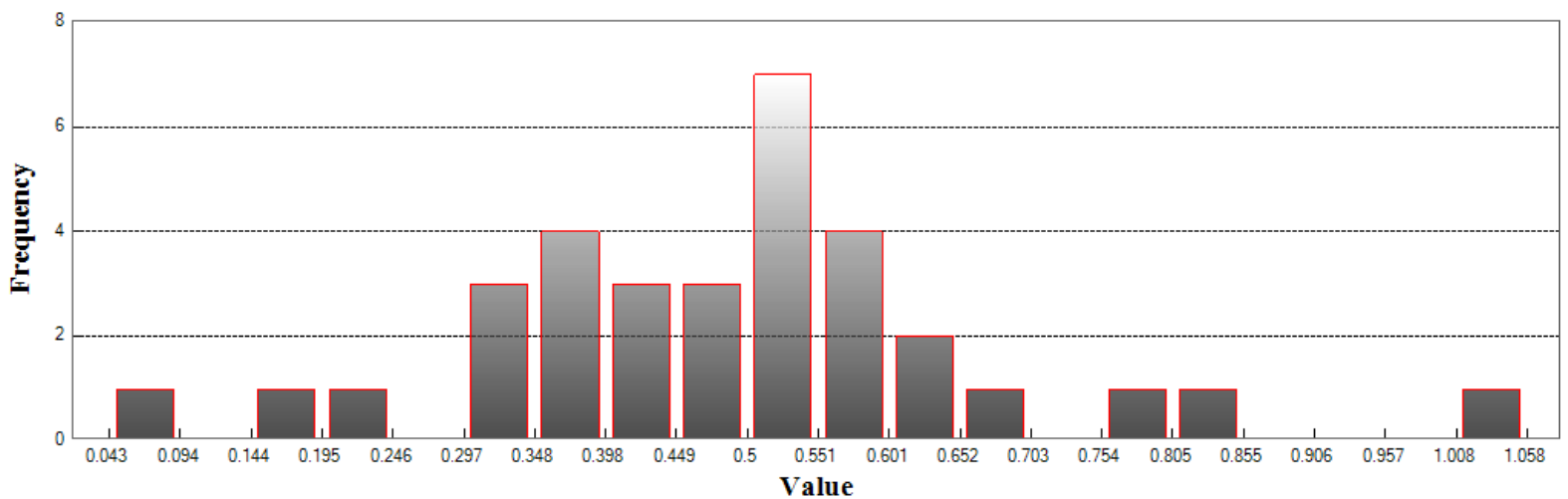


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: 0.043
Maximum DZ: 1.059
Mean DZ: 0.491
Mean Magnitude DZ: 0.701
Number Observations: 33
Standard Deviation DZ: 0.192
RMSE Z: 0.526
95th Percentile: 0.786
Units: US Survey Feet

Histogram



Min: 0.043

Max: 1.059

Number Of Bins: 20

Bin Interval: 0.051

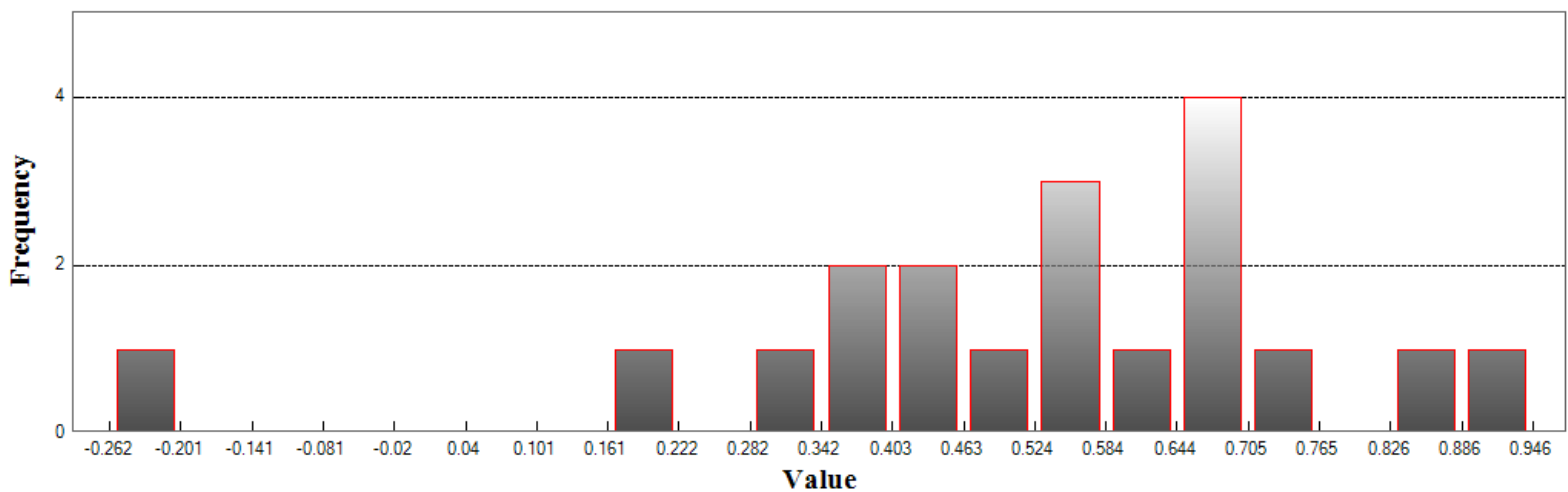


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.262
Maximum DZ: 0.947
Mean DZ: 0.519
Mean Magnitude DZ: 0.739
Number Observations: 19
Standard Deviation DZ: 0.264
RMSE Z: 0.579
95th Percentile: 0.834
Units: US Survey Feet

Histogram



Min: -0.262

Max: 0.947

Number Of Bins: 20

Bin Interval: 0.06

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: graham_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

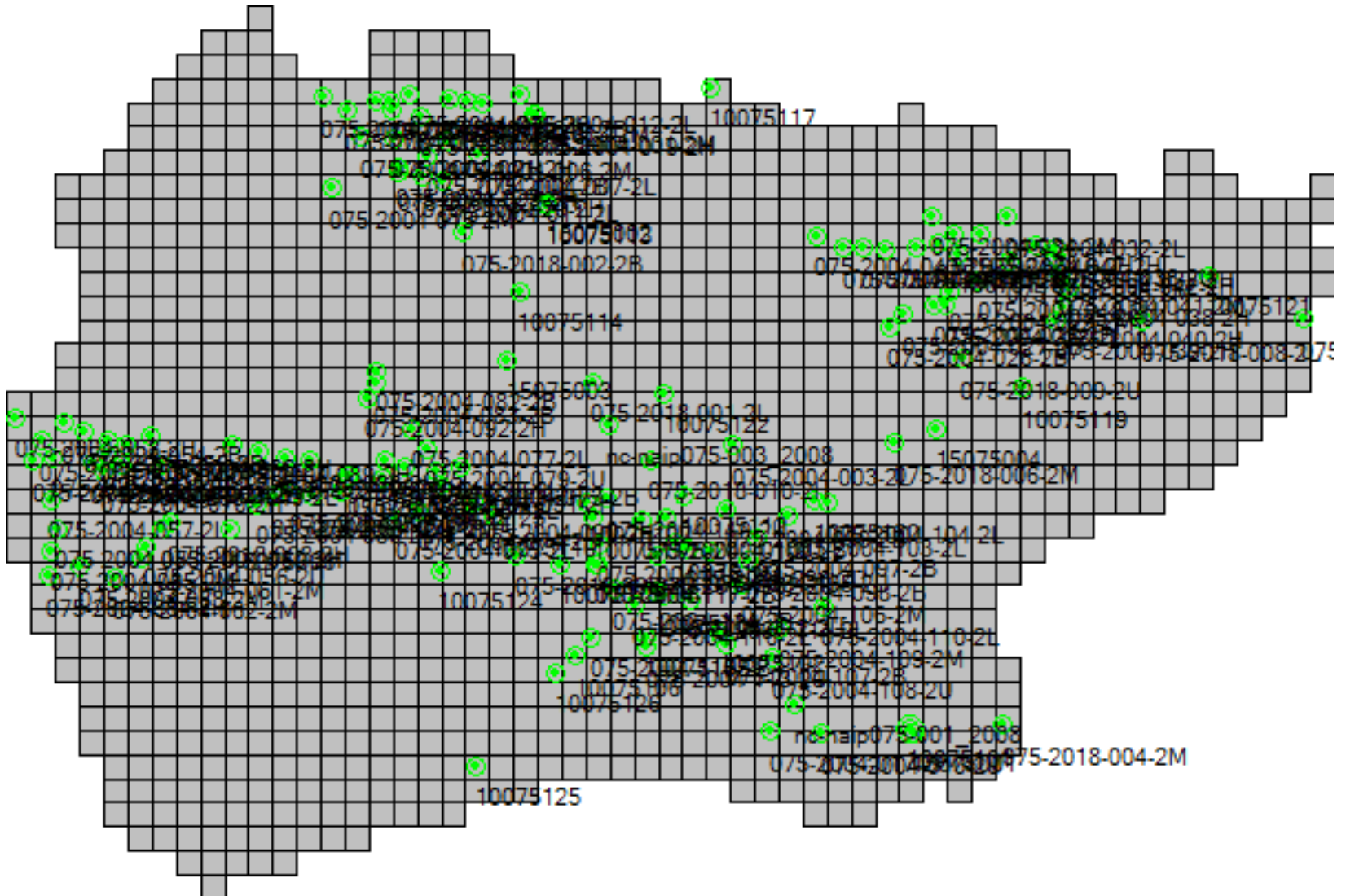
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	22	0.394		
2H	41		0.695	
2L	22		0.353	
2M	22		1.110	
2U	56	0.606		
Total	163			

Units: US Survey Feet

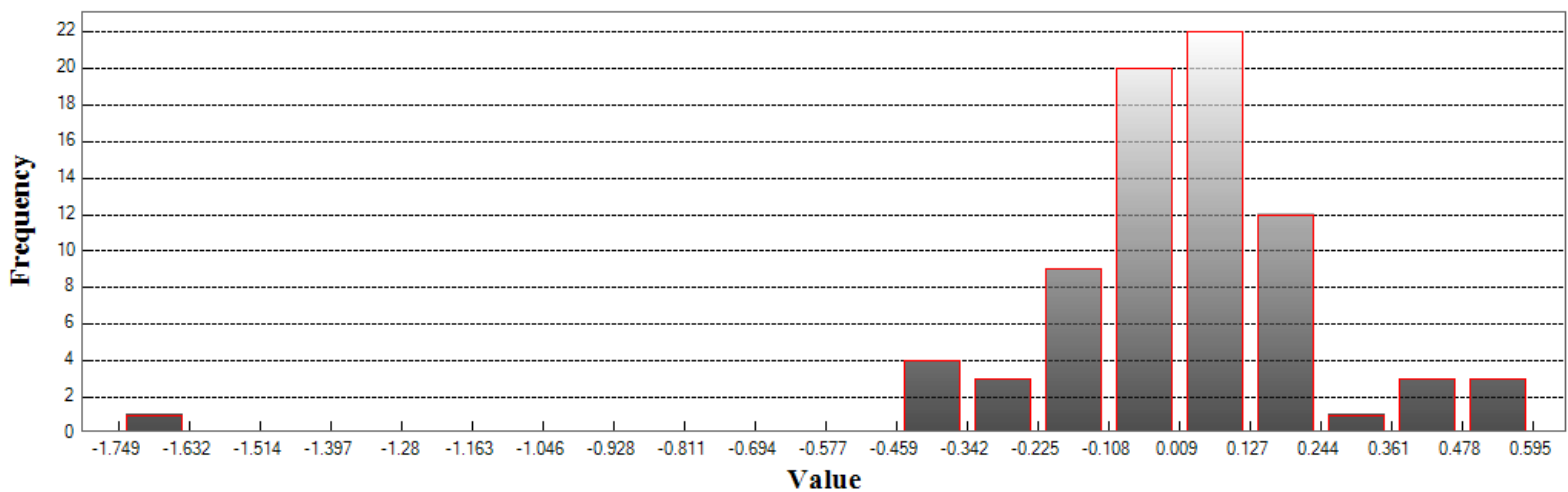


DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -1.749
Maximum DZ: 0.595
Mean DZ: 0.001
Mean Magnitude DZ: 0.408
Number Observations: 78
Standard Deviation DZ: 0.285
RMSE Z: 0.283
95% Confidence Level Z: 0.555
Units: US Survey Feet

Histogram



Min: -1.749
Max: 0.595
Number Of Bins: 20
Bin Interval: 0.117

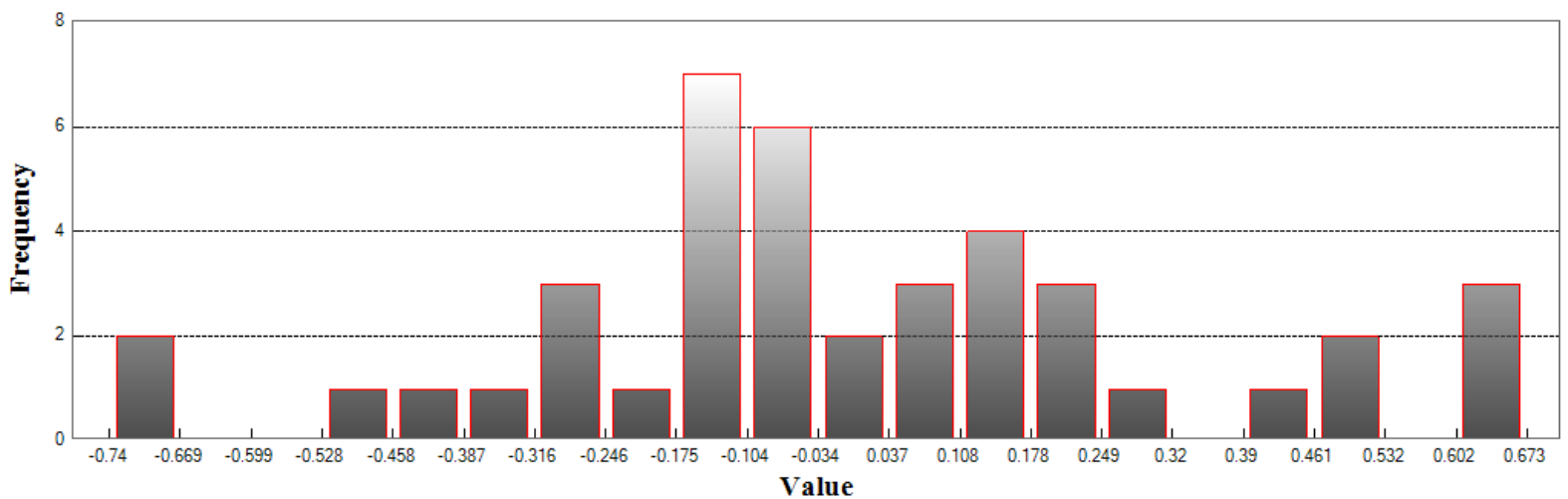


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.74
Maximum DZ: 0.673
Mean DZ: -0.002
Mean Magnitude DZ: 0.505
Number Observations: 41
Standard Deviation DZ: 0.333
RMSE Z: 0.329
95th Percentile: 0.695
Units: US Survey Feet

Histogram



Min: -0.74
Max: 0.673
Number Of Bins: 20
Bin Interval: 0.071

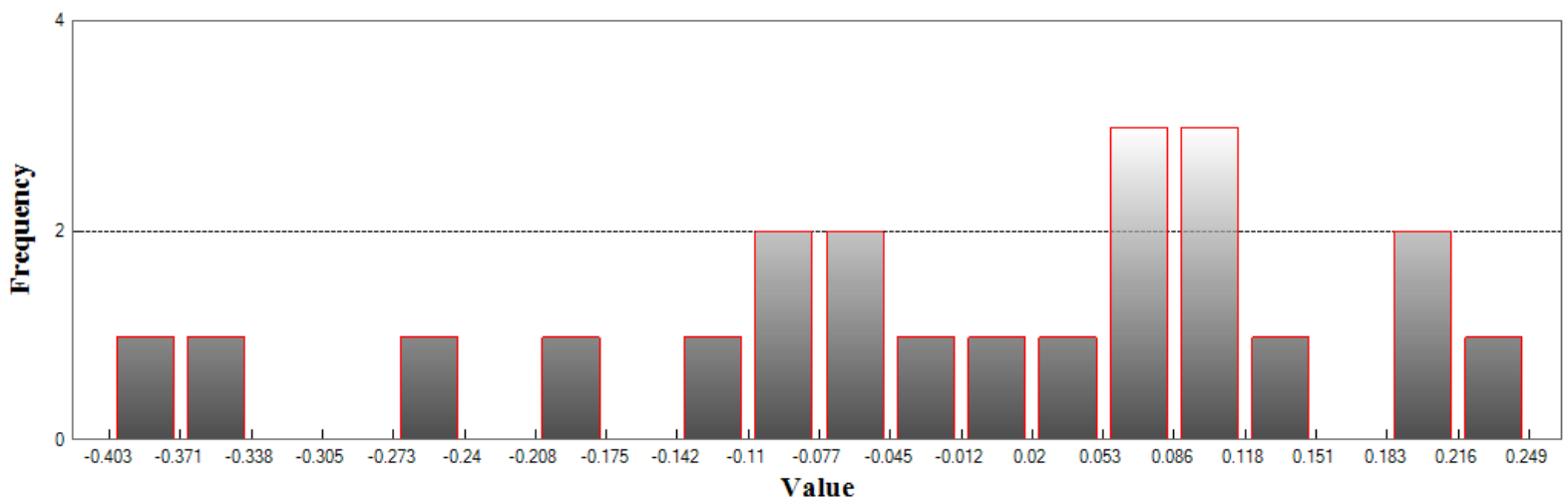


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.403
Maximum DZ: 0.249
Mean DZ: -0.015
Mean Magnitude DZ: 0.37
Number Observations: 22
Standard Deviation DZ: 0.173
RMSE Z: 0.17
95th Percentile: 0.353
Units: US Survey Feet

Histogram



Min: -0.403

Max: 0.249

Number Of Bins: 20

Bin Interval: 0.033

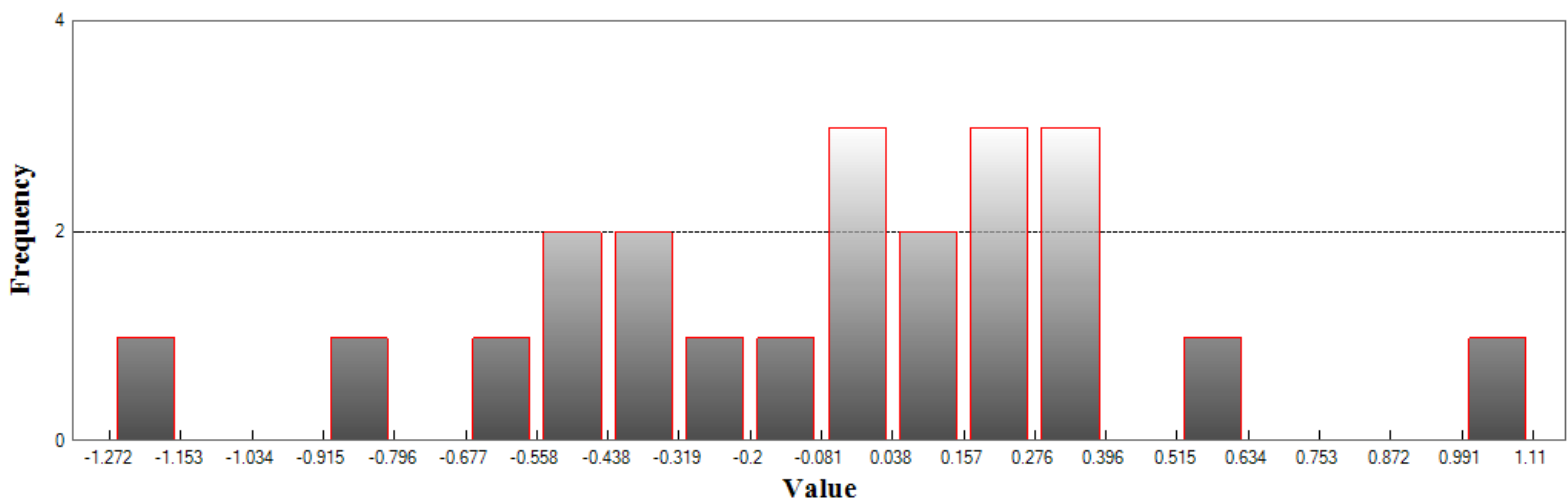


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -1.273
Maximum DZ: 1.11
Mean DZ: -0.06
Mean Magnitude DZ: 0.626
Number Observations: 22
Standard Deviation DZ: 0.514
RMSE Z: 0.506
95th Percentile: 1.11
Units: US Survey Feet

Histogram



Min: -1.273

Max: 1.11

Number Of Bins: 20

Bin Interval: 0.119

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: haywood_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

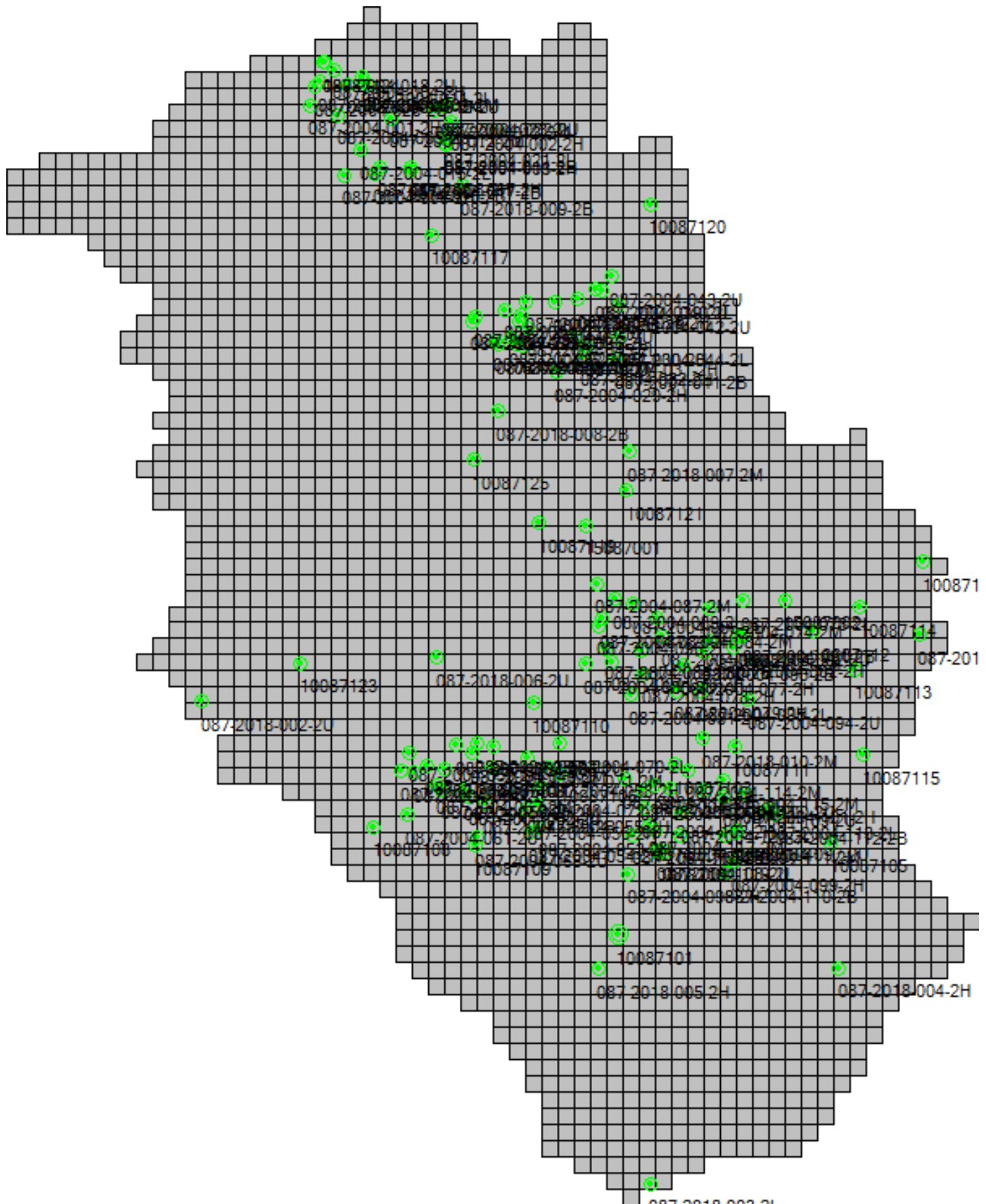
Tile Index Attribute: las_file

Data Filename:

Number of Data Files Matching Attribute: 2221 out of 2221



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	22	0.613		
2H	42		0.936	
2L	22		0.874	
2M	22		1.345	
2U	49	0.515		
Total	157			

Units: US Survey Feet

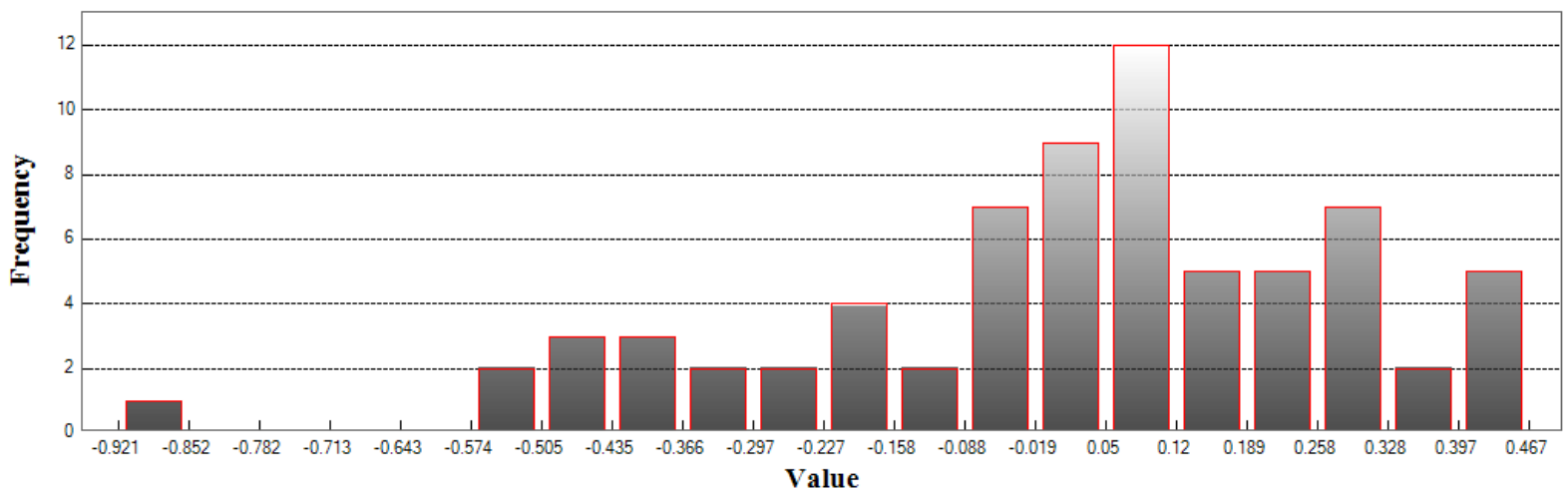


DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.921
Maximum DZ: 0.466
Mean DZ: 0.011
Mean Magnitude DZ: 0.466
Number Observations: 71
Standard Deviation DZ: 0.281
RMSE Z: 0.279
95% Confidence Level Z: 0.547
Units: US Survey Feet

Histogram



Min: -0.921

Max: 0.466

Number Of Bins: 20

Bin Interval: 0.069

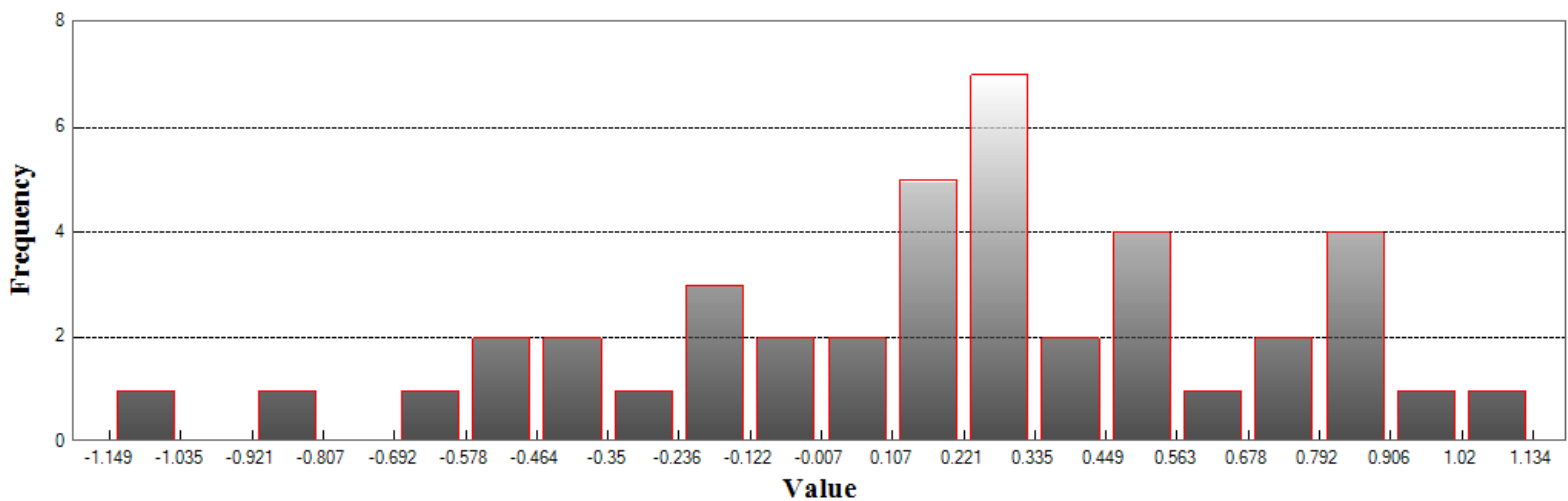


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -1.149
Maximum DZ: 1.134
Mean DZ: 0.185
Mean Magnitude DZ: 0.665
Number Observations: 42
Standard Deviation DZ: 0.509
RMSE Z: 0.536
95th Percentile: 0.936
Units: US Survey Feet

Histogram



Min: -1.149
Max: 1.134
Number Of Bins: 20
Bin Interval: 0.114

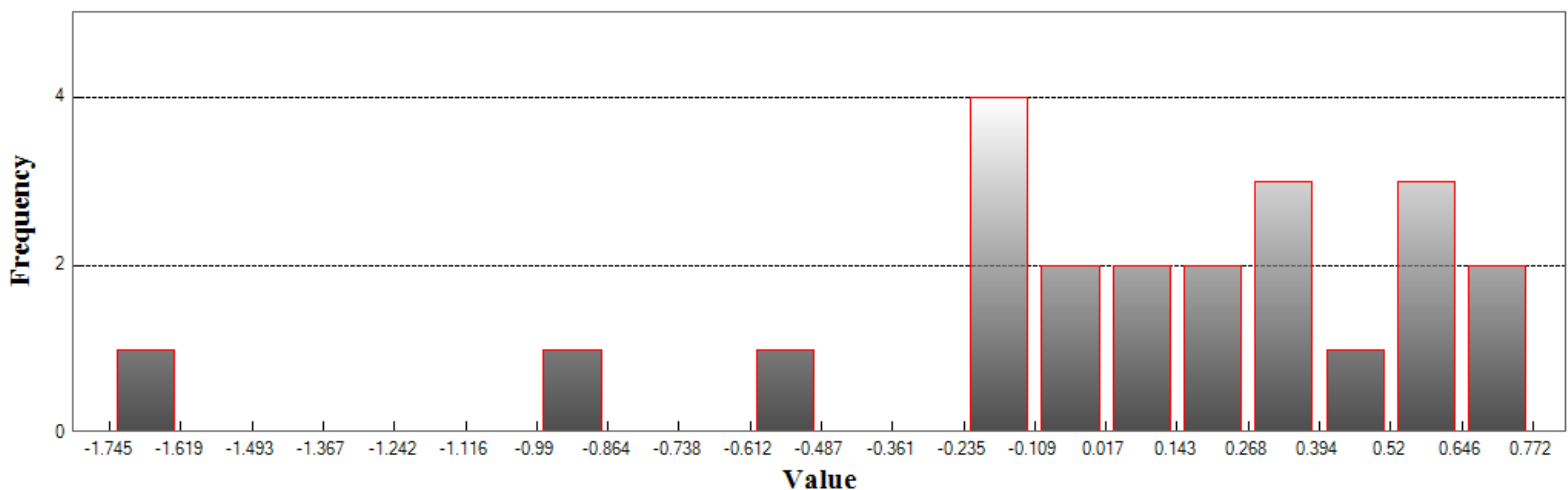


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -1.745
Maximum DZ: 0.772
Mean DZ: 0.067
Mean Magnitude DZ: 0.647
Number Observations: 22
Standard Deviation DZ: 0.58
RMSE Z: 0.571
95th Percentile: 0.874
Units: US Survey Feet

Histogram



Min: -1.745
Max: 0.772
Number Of Bins: 20
Bin Interval: 0.126

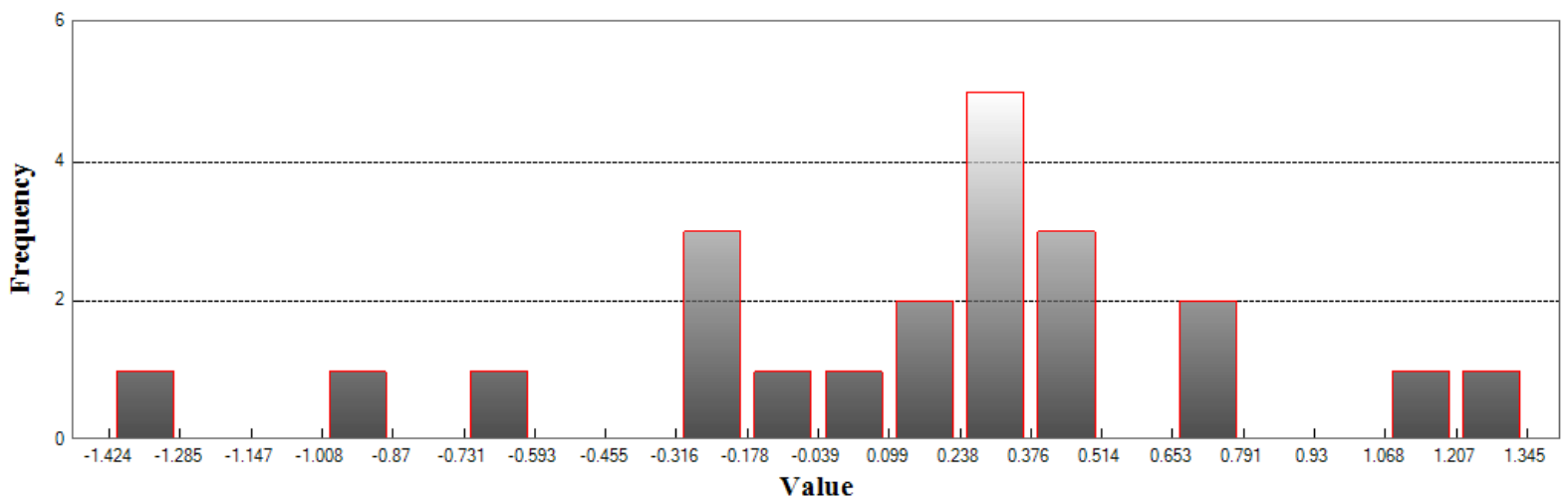


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -1.423
Maximum DZ: 1.345
Mean DZ: 0.154
Mean Magnitude DZ: 0.706
Number Observations: 22
Standard Deviation DZ: 0.631
RMSE Z: 0.635
95th Percentile: 1.345
Units: US Survey Feet

Histogram



Min: -1.423

Max: 1.345

Number Of Bins: 20

Bin Interval: 0.138

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: henderson_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

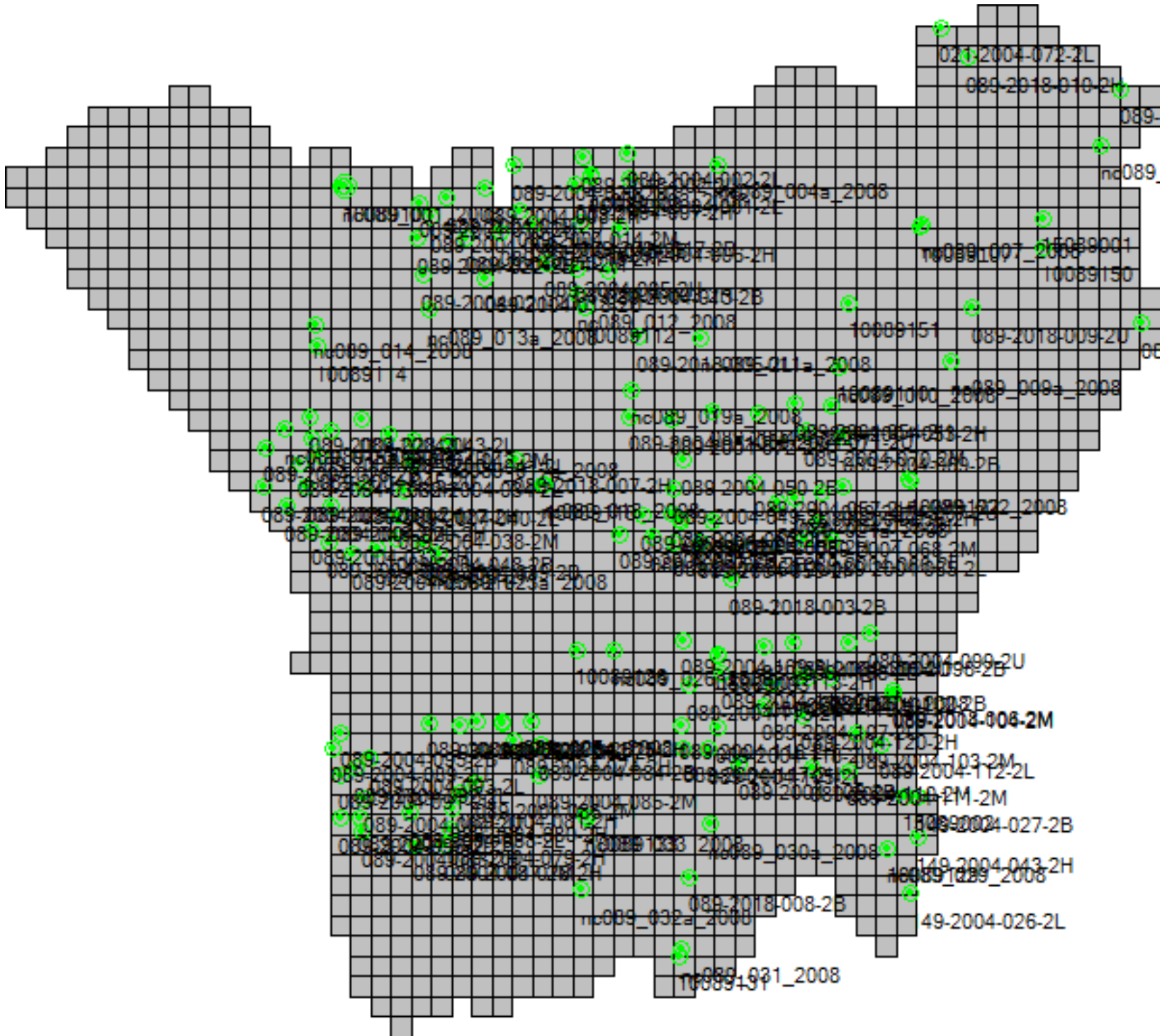
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	22	0.666		
2H	42		0.769	
2L	21		0.886	
2M	21		0.806	
2U	67	0.459		
Total	173			

Units: US Survey Feet

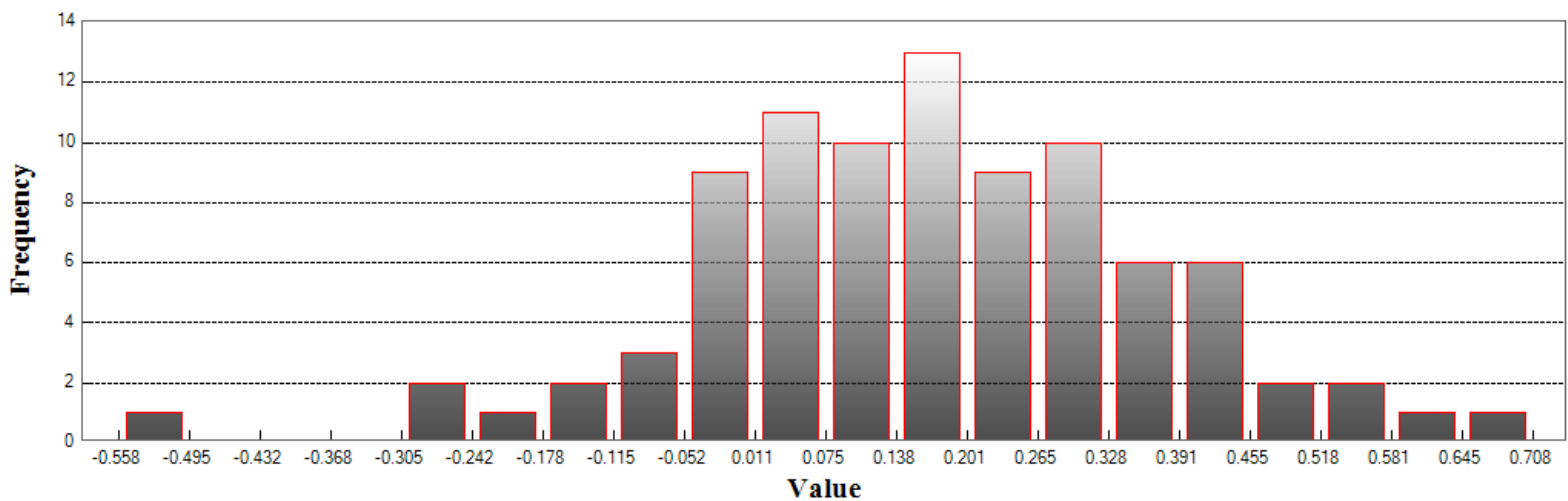


DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.559
Maximum DZ: 0.708
Mean DZ: 0.165
Mean Magnitude DZ: 0.459
Number Observations: 89
Standard Deviation DZ: 0.208
RMSE Z: 0.264
95% Confidence Level Z: 0.518
Units: US Survey Feet

Histogram



Min: -0.559
Max: 0.708
Number Of Bins: 20
Bin Interval: 0.063

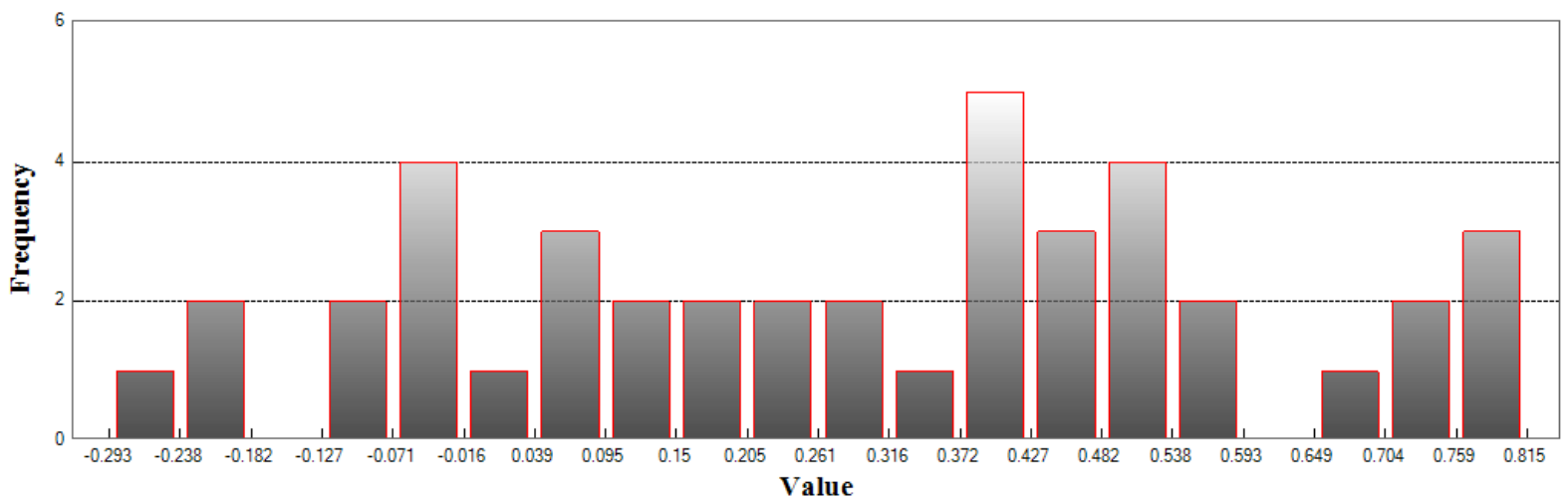


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.293
Maximum DZ: 0.814
Mean DZ: 0.286
Mean Magnitude DZ: 0.582
Number Observations: 42
Standard Deviation DZ: 0.301
RMSE Z: 0.413
95th Percentile: 0.769
Units: US Survey Feet

Histogram



Min: -0.293

Max: 0.814

Number Of Bins: 20

Bin Interval: 0.055

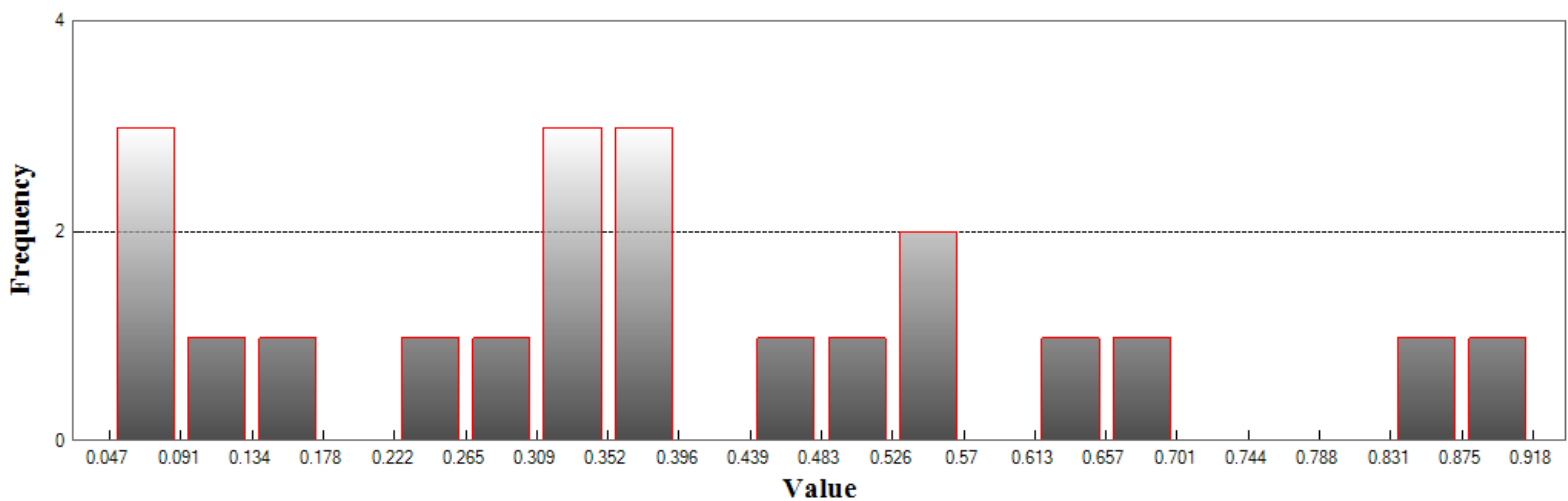


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: 0.047
Maximum DZ: 0.918
Mean DZ: 0.392
Mean Magnitude DZ: 0.626
Number Observations: 21
Standard Deviation DZ: 0.247
RMSE Z: 0.46
95th Percentile: 0.886
Units: US Survey Feet

Histogram



Min: 0.047

Max: 0.918

Number Of Bins: 20

Bin Interval: 0.044

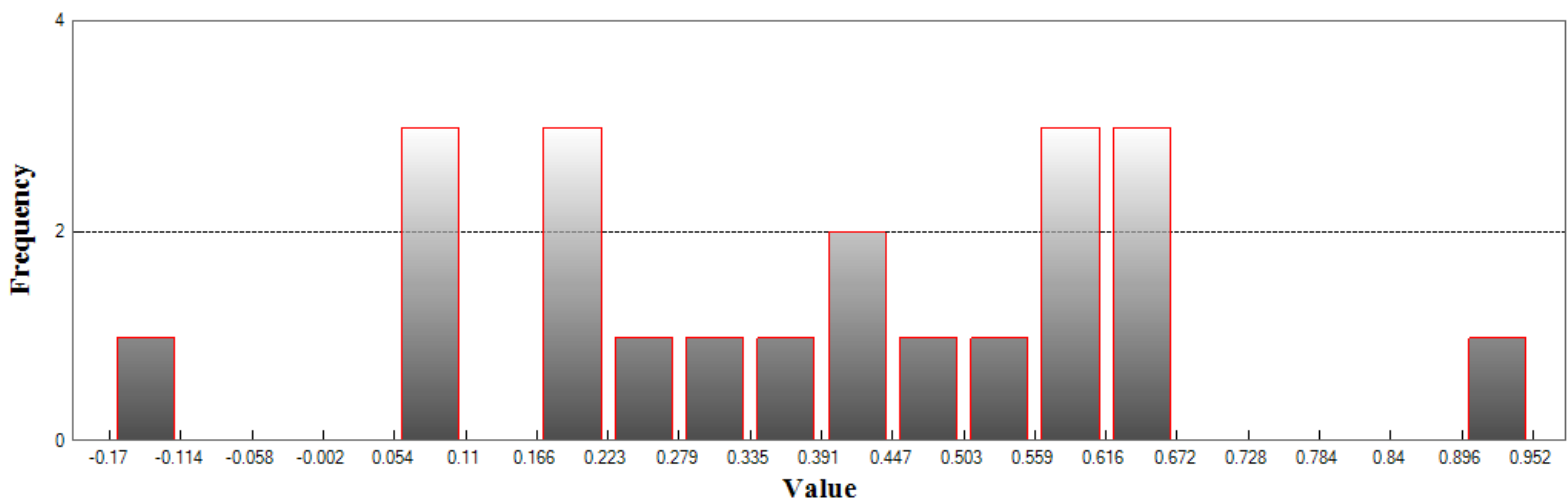


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.17
Maximum DZ: 0.952
Mean DZ: 0.387
Mean Magnitude DZ: 0.635
Number Observations: 21
Standard Deviation DZ: 0.264
RMSE Z: 0.465
95th Percentile: 0.806
Units: US Survey Feet

Histogram



Min: -0.17

Max: 0.952

Number Of Bins: 20

Bin Interval: 0.056

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: jackson_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

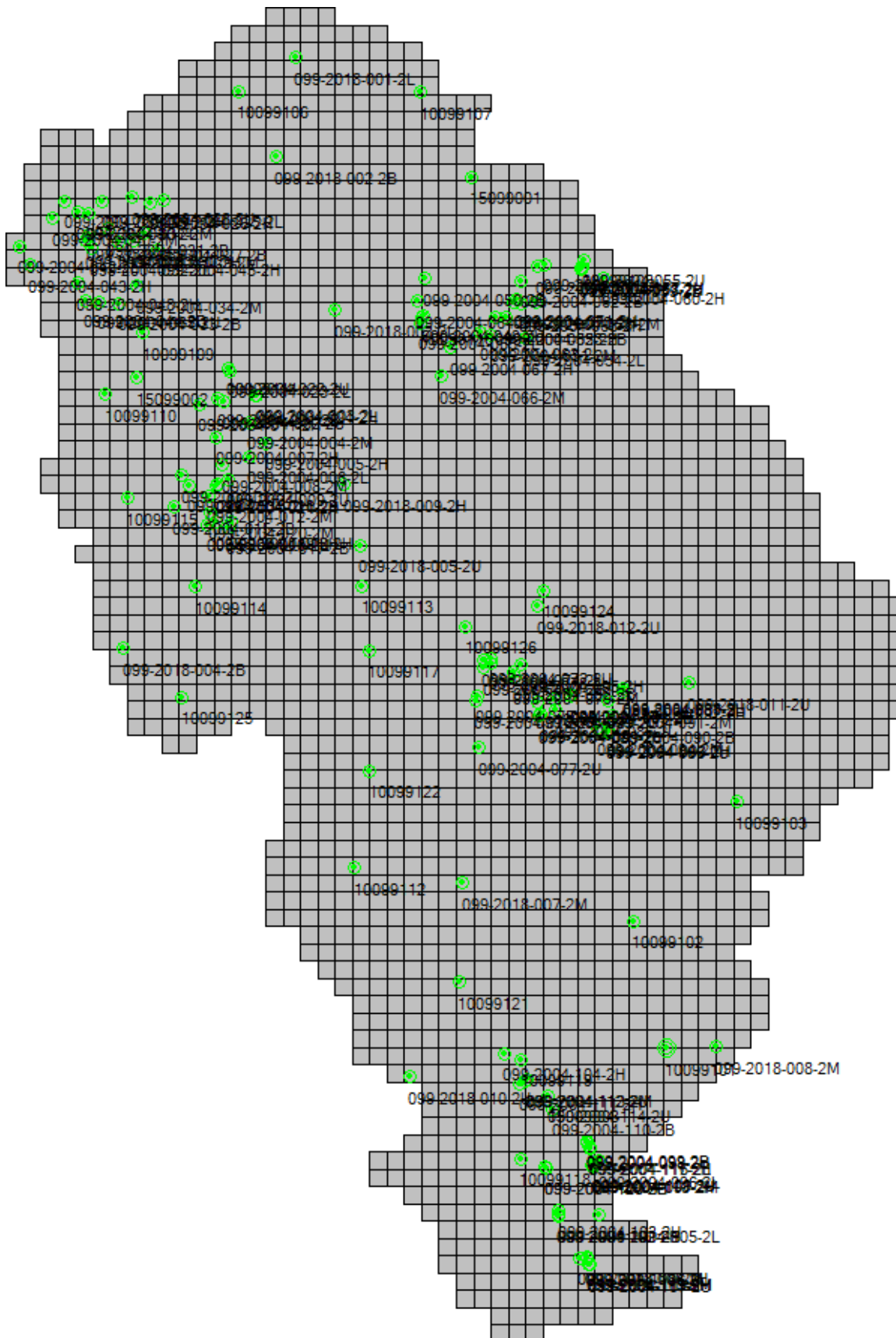
Tile Index Attribute: las_file

Data Filename:

Number of Data Files Matching Attribute: 2221 out of 2221



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	22	0.493		
2H	42		0.783	
2L	21		0.587	
2M	22		0.784	
2U	50	0.493		
Total	157			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.557

Maximum DZ: 0.62

Mean DZ: -0.006

Mean Magnitude DZ: 0.459

Number Observations: 72

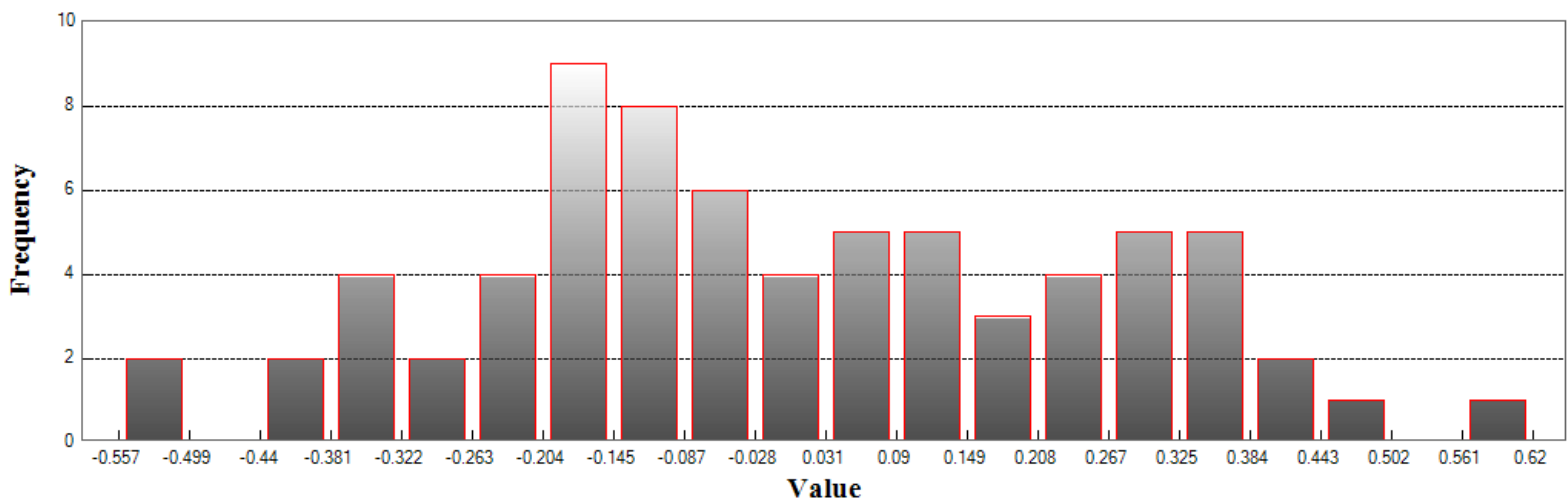
Standard Deviation DZ: 0.253

RMSE Z: 0.252

95% Confidence Level Z: 0.493

Units: US Survey Feet

Histogram



Min: -0.557

Max: 0.62

Number Of Bins: 20

Bin Interval: 0.059

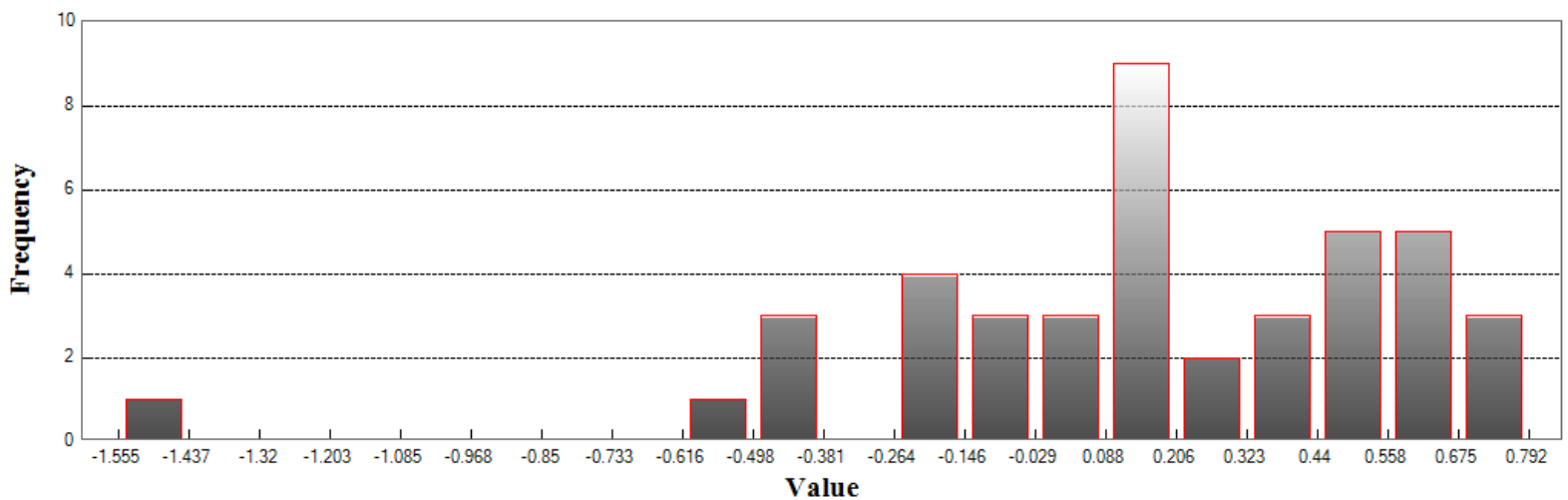


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -1.555
Maximum DZ: 0.792
Mean DZ: 0.156
Mean Magnitude DZ: 0.607
Number Observations: 42
Standard Deviation DZ: 0.444
RMSE Z: 0.466
95th Percentile: 0.783
Units: US Survey Feet

Histogram



Min: -1.555
Max: 0.792
Number Of Bins: 20
Bin Interval: 0.117

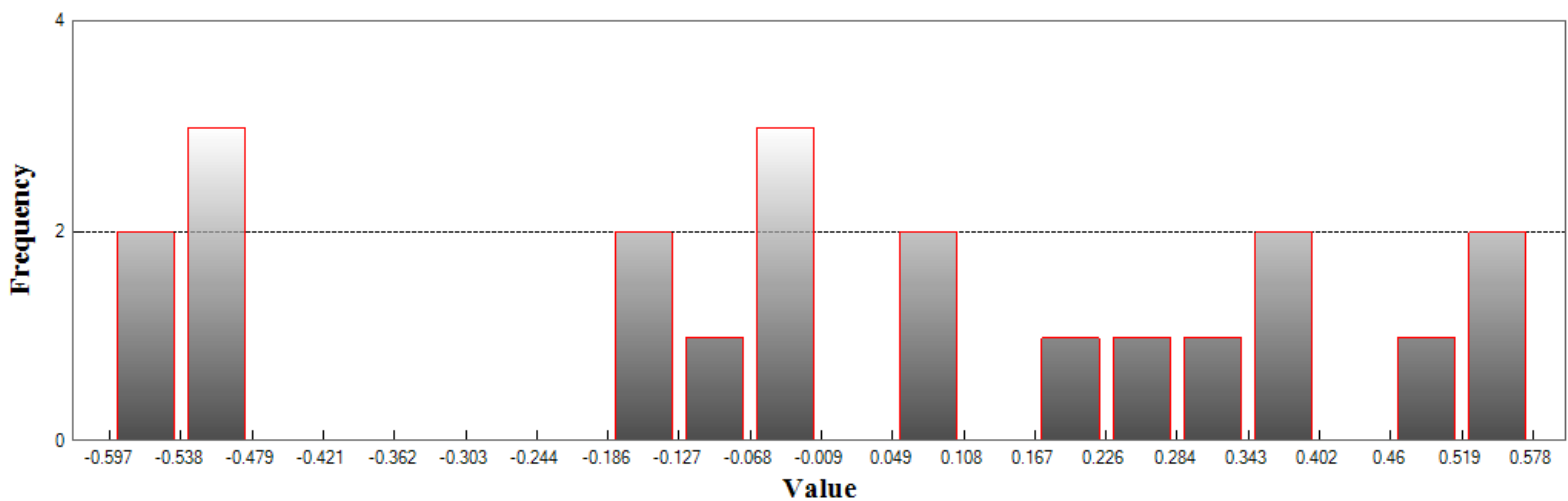


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.596
Maximum DZ: 0.578
Mean DZ: 0.003
Mean Magnitude DZ: 0.561
Number Observations: 21
Standard Deviation DZ: 0.385
RMSE Z: 0.376
95th Percentile: 0.587
Units: US Survey Feet

Histogram



Min: -0.596

Max: 0.578

Number Of Bins: 20

Bin Interval: 0.059

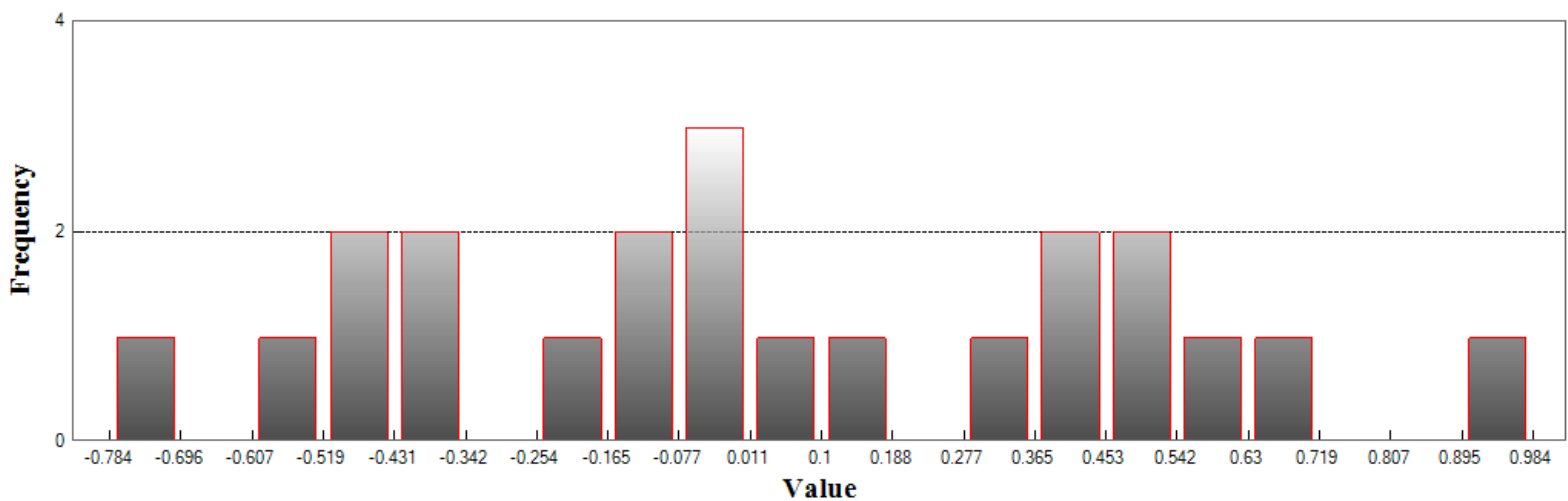


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.784
Maximum DZ: 0.984
Mean DZ: 0.046
Mean Magnitude DZ: 0.608
Number Observations: 22
Standard Deviation DZ: 0.457
RMSE Z: 0.449
95th Percentile: 0.784
Units: US Survey Feet

Histogram



Min: -0.784

Max: 0.984

Number Of Bins: 20

Bin Interval: 0.088

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: macon_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

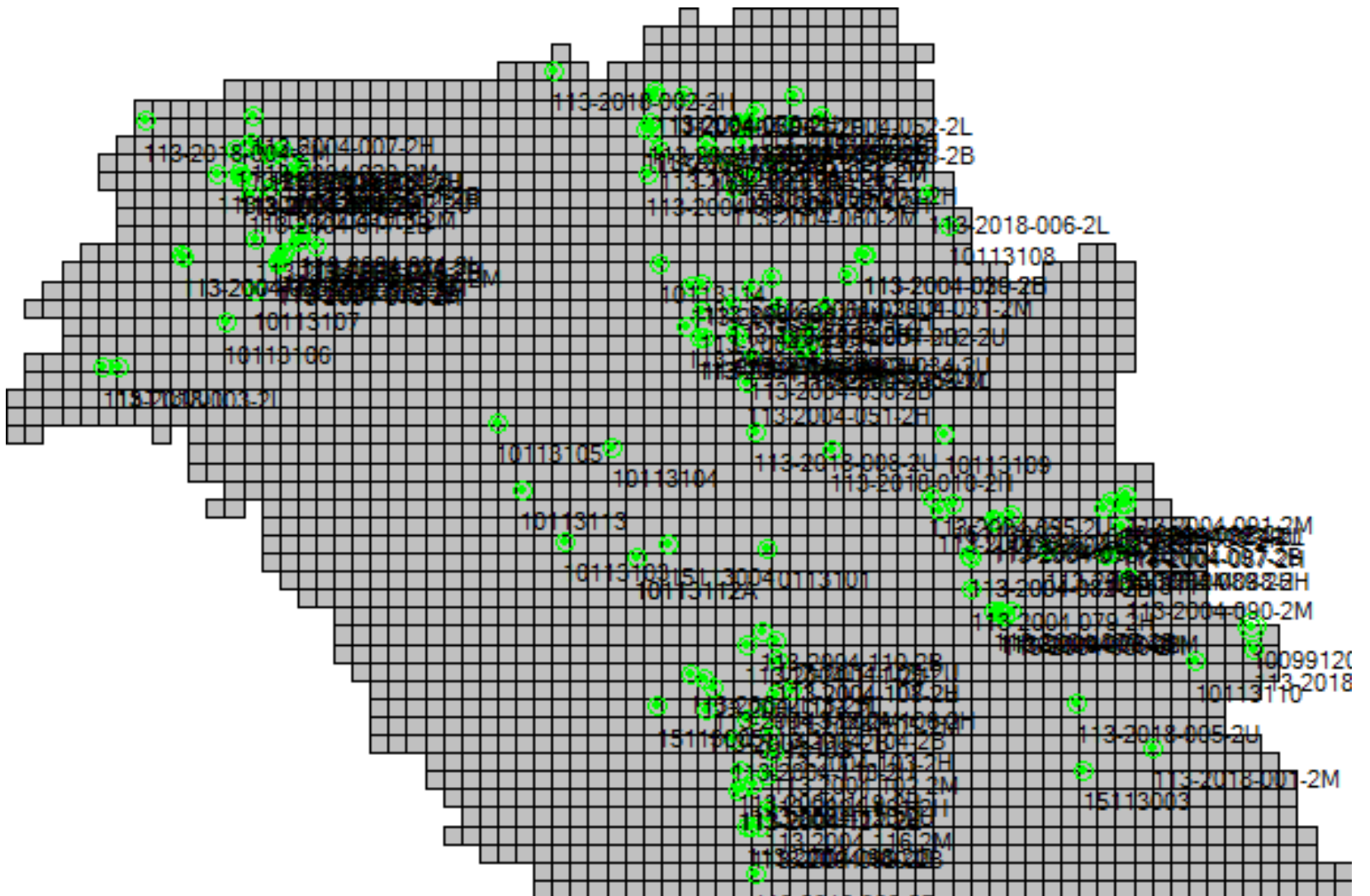
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	24	0.658		
2H	39		0.603	
2L	22		0.451	
2M	24		0.609	
2U	44	0.539		
Total	153			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.81

Maximum DZ: 0.352

Mean DZ: -0.172

Mean Magnitude DZ: 0.489

Number Observations: 68

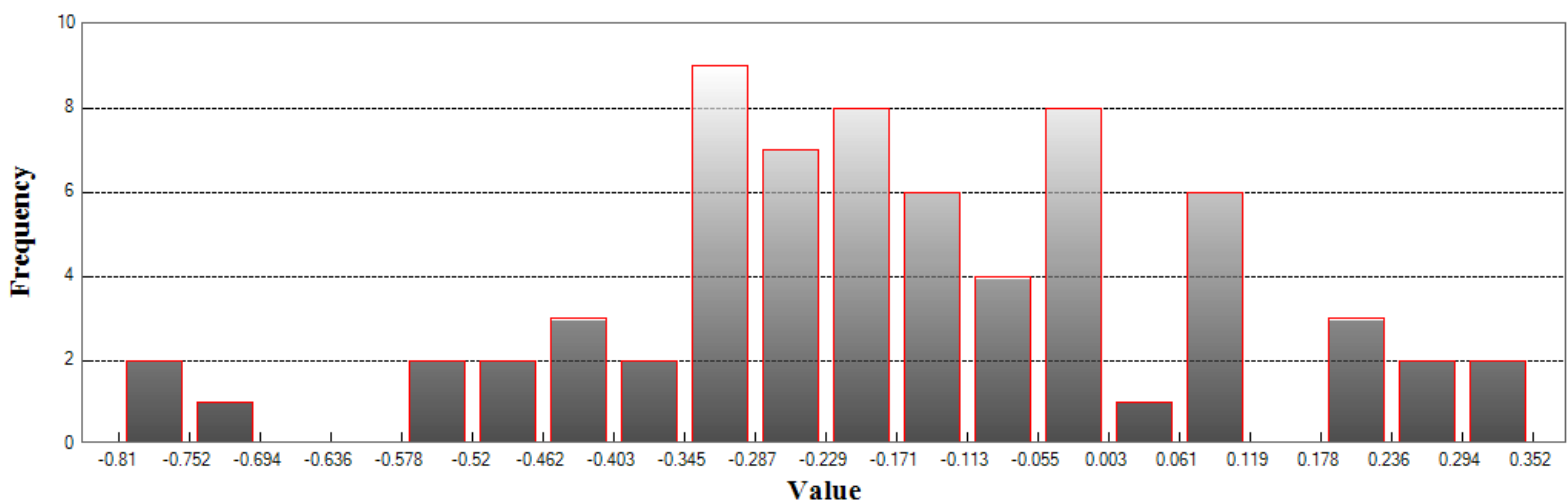
Standard Deviation DZ: 0.245

RMSE Z: 0.298

95% Confidence Level Z: 0.584

Units: US Survey Feet

Histogram



Min: -0.81

Max: 0.352

Number Of Bins: 20

Bin Interval: 0.058

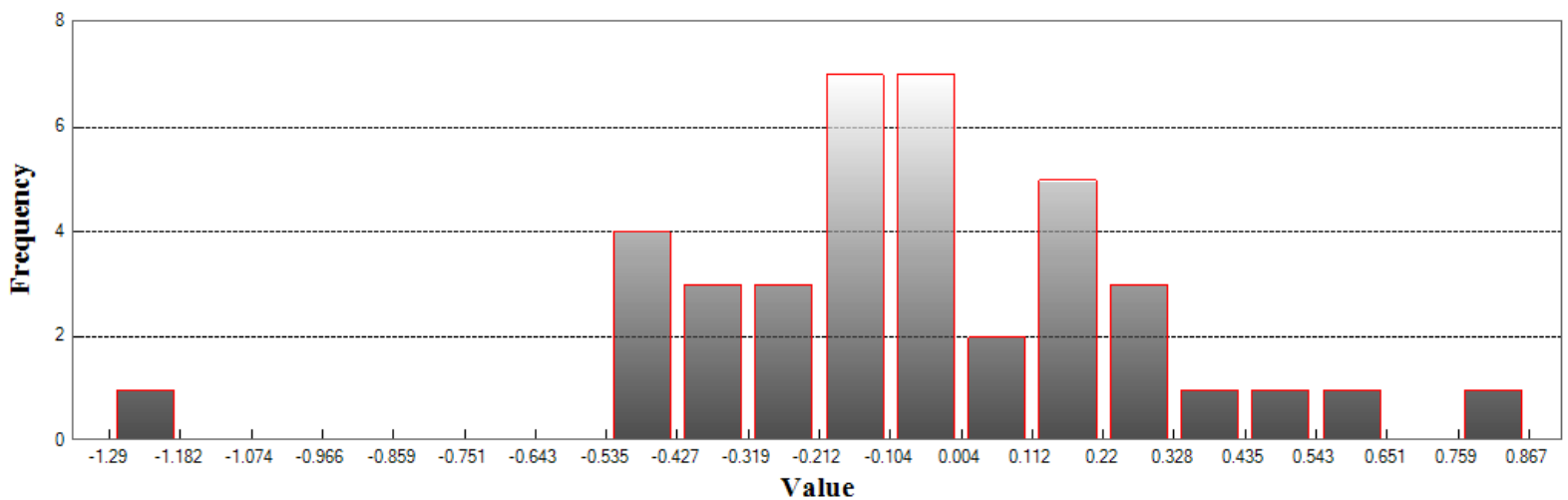


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -1.29
Maximum DZ: 0.867
Mean DZ: -0.068
Mean Magnitude DZ: 0.518
Number Observations: 39
Standard Deviation DZ: 0.364
RMSE Z: 0.365
95th Percentile: 0.603
Units: US Survey Feet

Histogram



Min: -1.29

Max: 0.867

Number Of Bins: 20

Bin Interval: 0.108

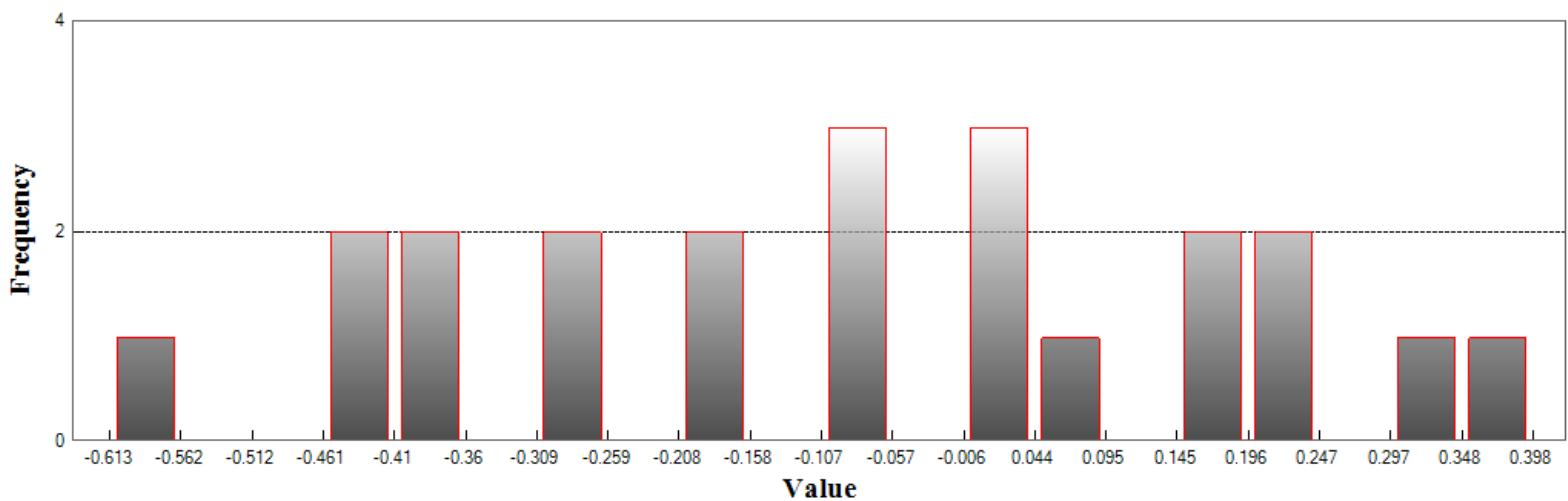


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.612
Maximum DZ: 0.398
Mean DZ: -0.079
Mean Magnitude DZ: 0.477
Number Observations: 22
Standard Deviation DZ: 0.273
RMSE Z: 0.278
95th Percentile: 0.451
Units: US Survey Feet

Histogram



Min: -0.612

Max: 0.398

Number Of Bins: 20

Bin Interval: 0.051

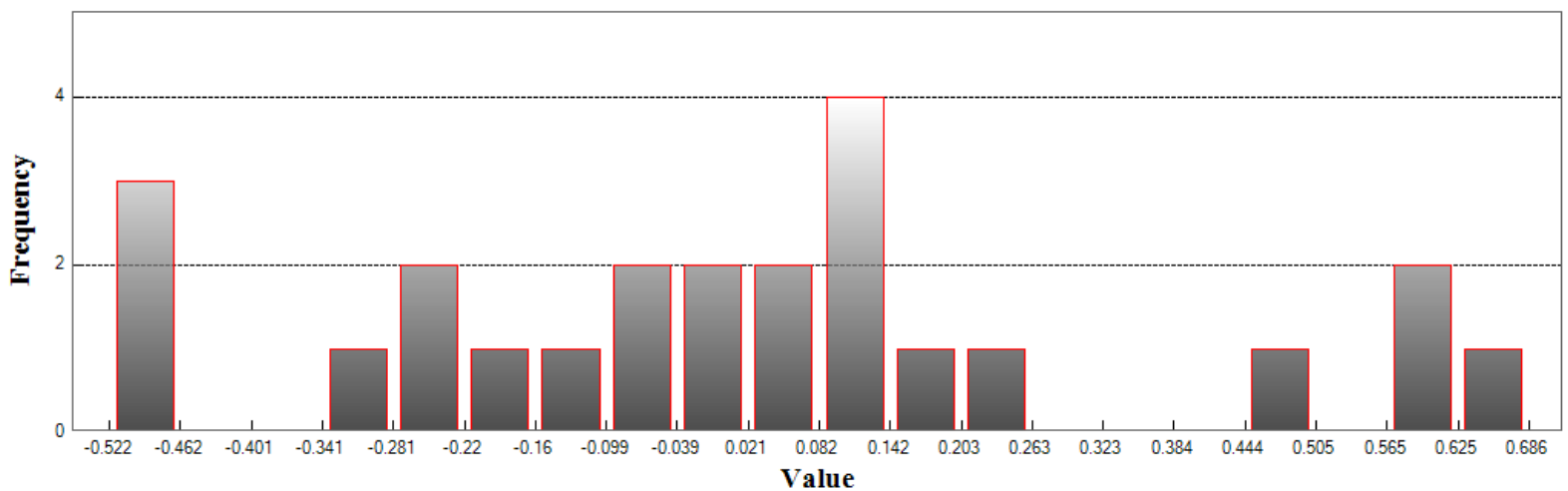


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.522
Maximum DZ: 0.686
Mean DZ: 0.02
Mean Magnitude DZ: 0.503
Number Observations: 24
Standard Deviation DZ: 0.334
RMSE Z: 0.328
95th Percentile: 0.609
Units: US Survey Feet

Histogram



Min: -0.522

Max: 0.686

Number Of Bins: 20

Bin Interval: 0.06

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: madison_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

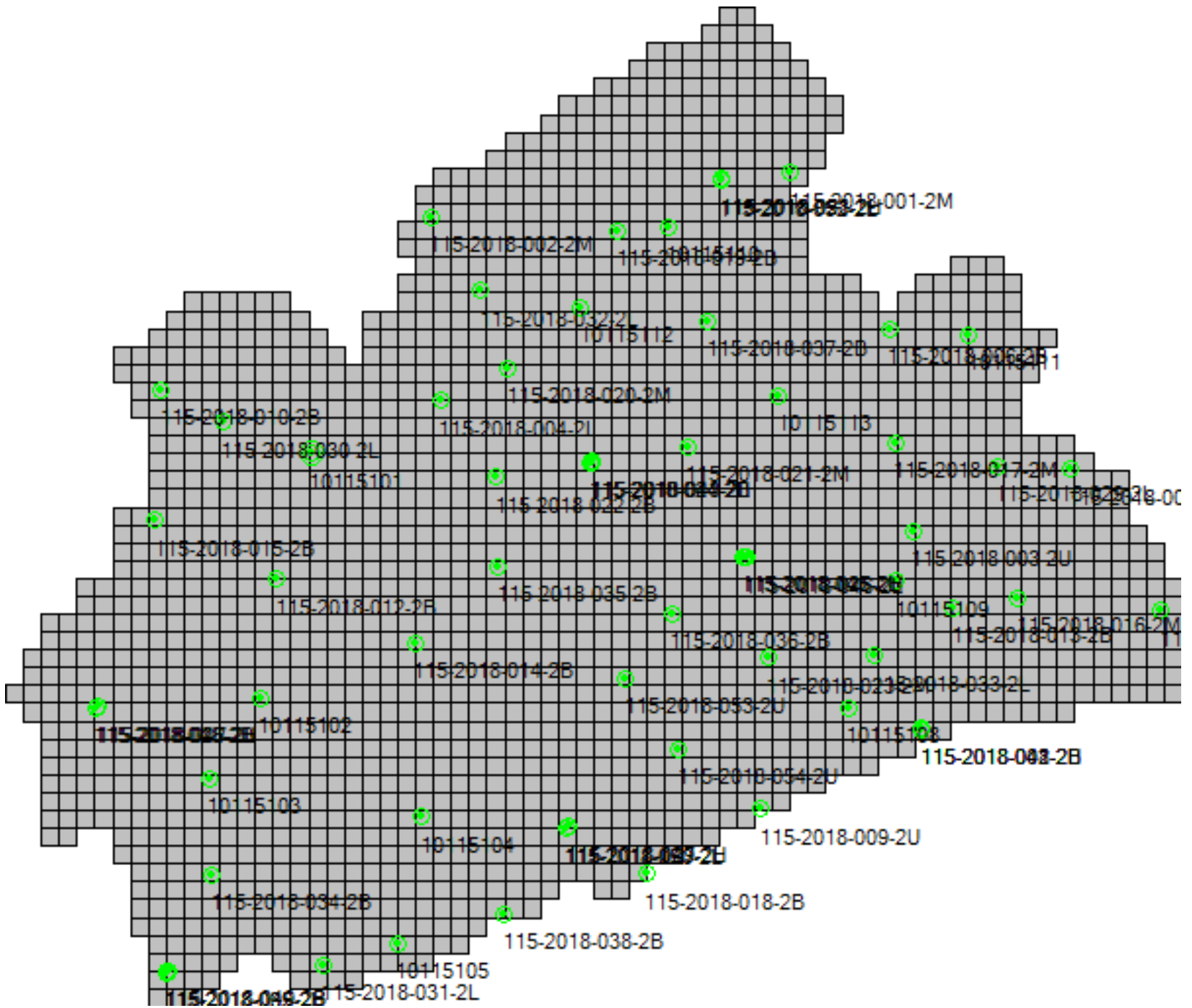
Tile Index Attribute: las_file

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	19	0.492		
2H	7		1.219	
2L	17		0.304	
2M	7		0.832	
2U	15	0.455		
Total	65			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.34

Maximum DZ: 0.62

Mean DZ: 0.03

Mean Magnitude DZ: 0.445

Number Observations: 34

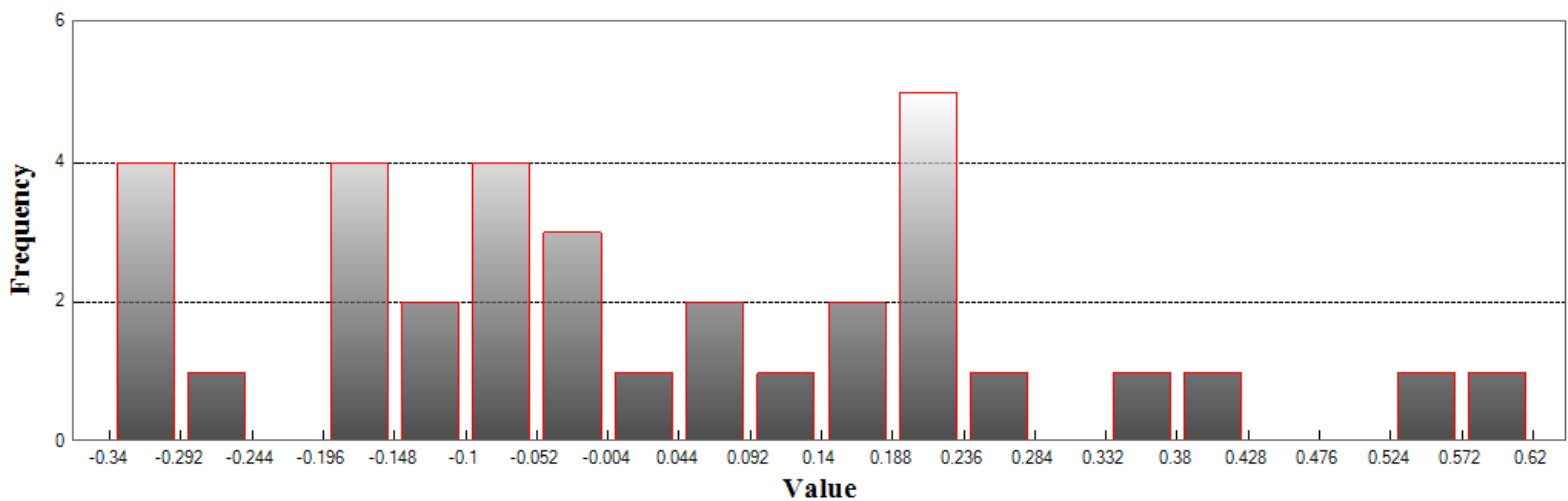
Standard Deviation DZ: 0.245

RMSE Z: 0.243

95% Confidence Level Z: 0.476

Units: US Survey Feet

Histogram



Min: -0.34

Max: 0.62

Number Of Bins: 20

Bin Interval: 0.048

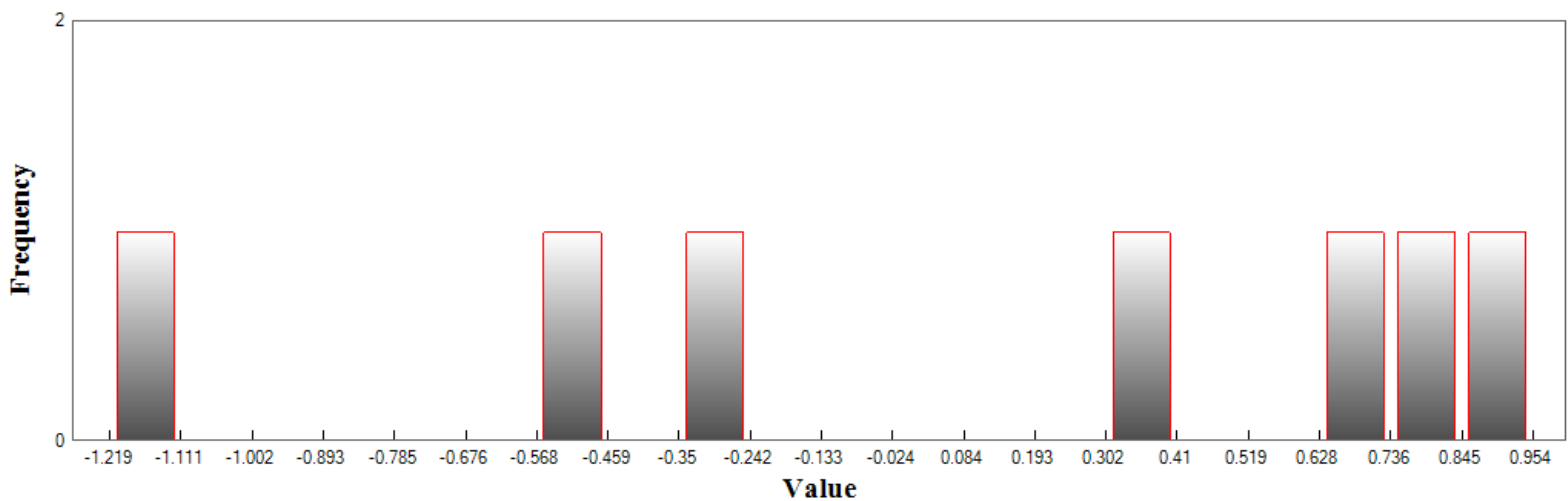


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -1.219
Maximum DZ: 0.954
Mean DZ: 0.111
Mean Magnitude DZ: 0.832
Number Observations: 7
Standard Deviation DZ: 0.81
RMSE Z: 0.758
95th Percentile: 1.219
Units: US Survey Feet

Histogram



Min: -1.219

Max: 0.954

Number Of Bins: 20

Bin Interval: 0.109

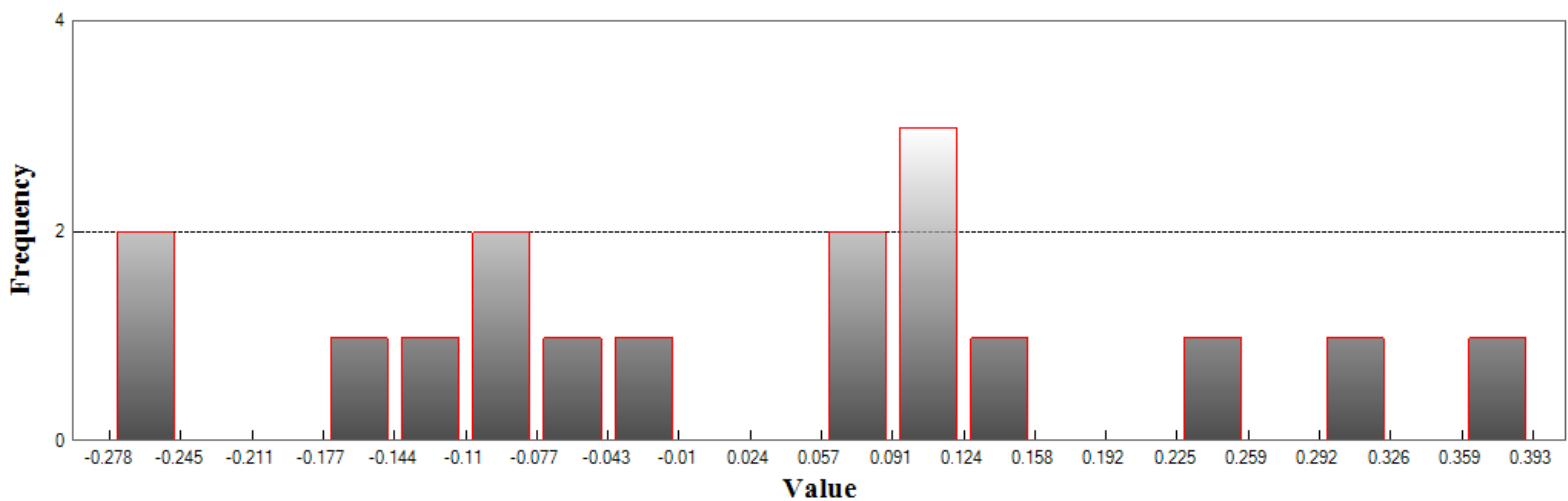


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.278
Maximum DZ: 0.393
Mean DZ: 0.023
Mean Magnitude DZ: 0.393
Number Observations: 17
Standard Deviation DZ: 0.188
RMSE Z: 0.184
95th Percentile: 0.304
Units: US Survey Feet

Histogram



Min: -0.278

Max: 0.393

Number Of Bins: 20

Bin Interval: 0.034

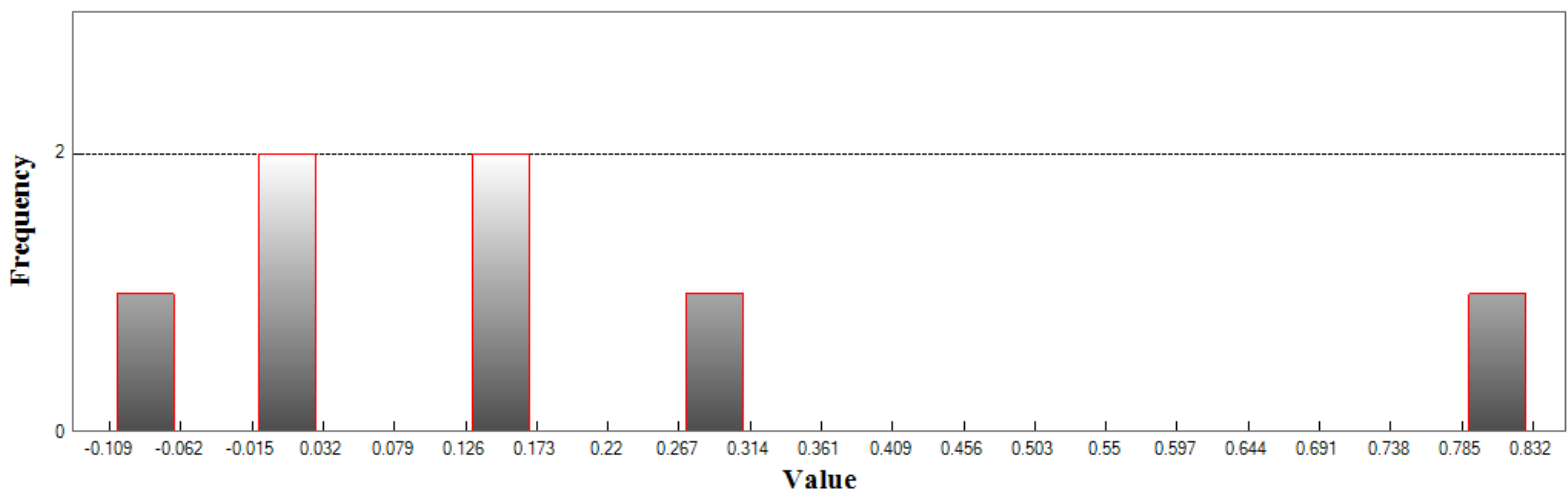


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.11
Maximum DZ: 0.832
Mean DZ: 0.188
Mean Magnitude DZ: 0.47
Number Observations: 7
Standard Deviation DZ: 0.313
RMSE Z: 0.345
95th Percentile: 0.832
Units: US Survey Feet

Histogram



Min: -0.11

Max: 0.832

Number Of Bins: 20

Bin Interval: 0.047

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: mcdowell_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	23	0.366		
2H	42		0.698	
2L	22		0.618	
2M	22		0.465	
2U	35	0.321		
Total	144			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.404

Maximum DZ: 0.524

Mean DZ: 0.038

Mean Magnitude DZ: 0.367

Number Observations: 58

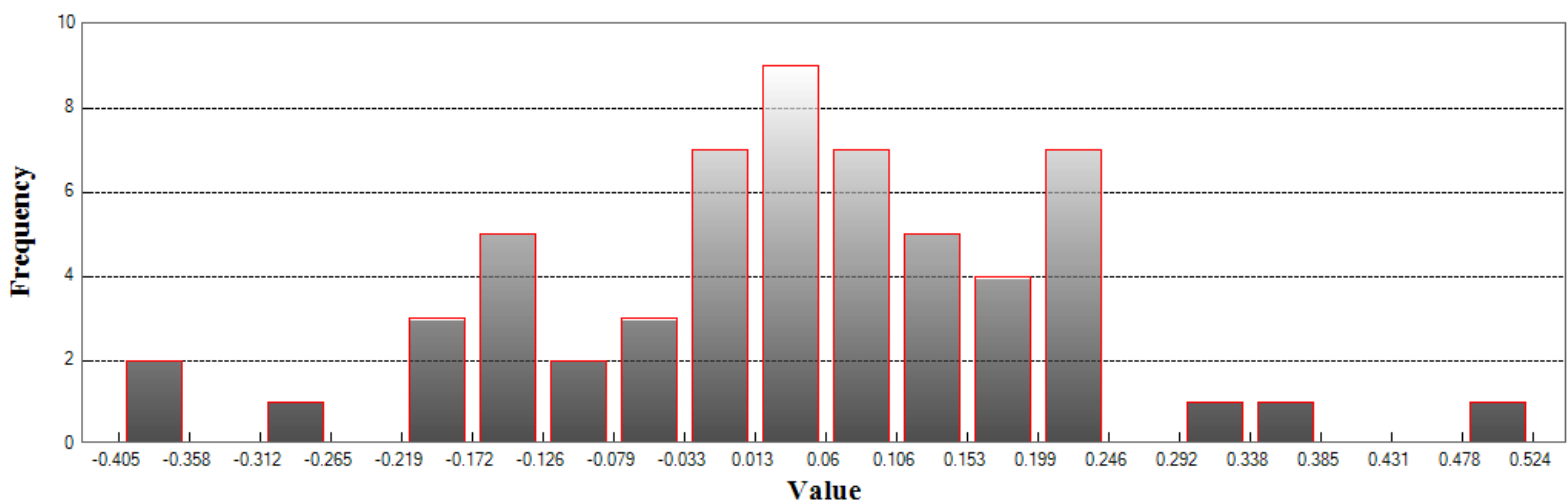
Standard Deviation DZ: 0.171

RMSE Z: 0.173

95% Confidence Level Z: 0.34

Units: US Survey Feet

Histogram



Min: -0.404

Max: 0.524

Number Of Bins: 20

Bin Interval: 0.046

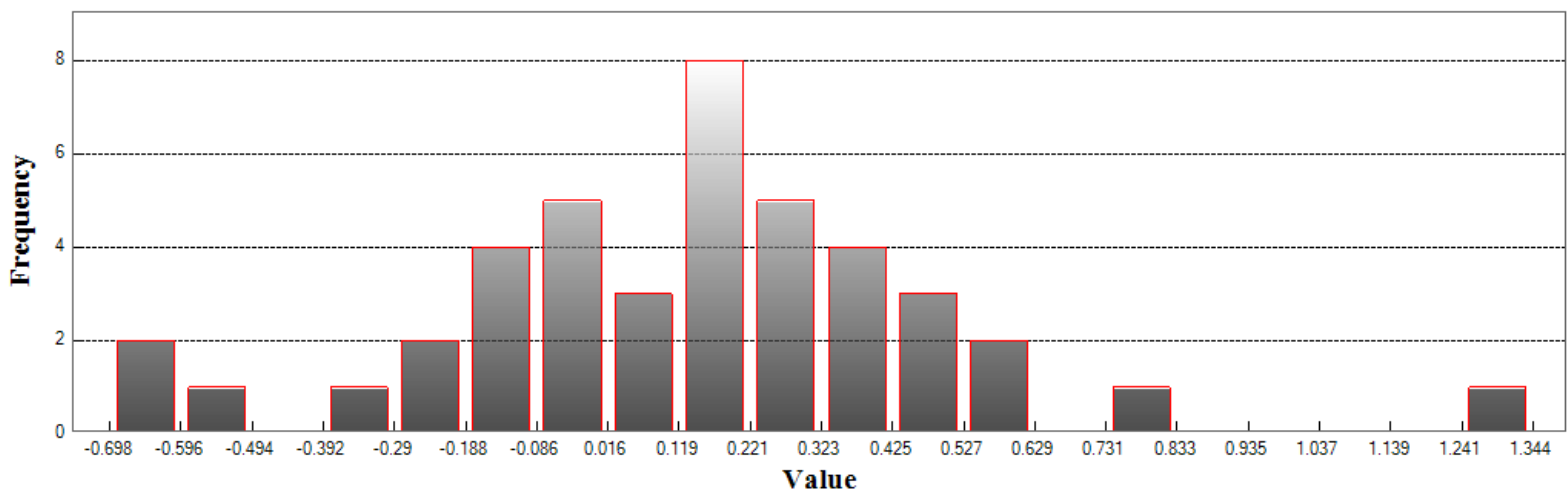


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.698
Maximum DZ: 1.344
Mean DZ: 0.13
Mean Magnitude DZ: 0.544
Number Observations: 42
Standard Deviation DZ: 0.37
RMSE Z: 0.388
95th Percentile: 0.698
Units: US Survey Feet

Histogram



Min: -0.698

Max: 1.344

Number Of Bins: 20

Bin Interval: 0.102

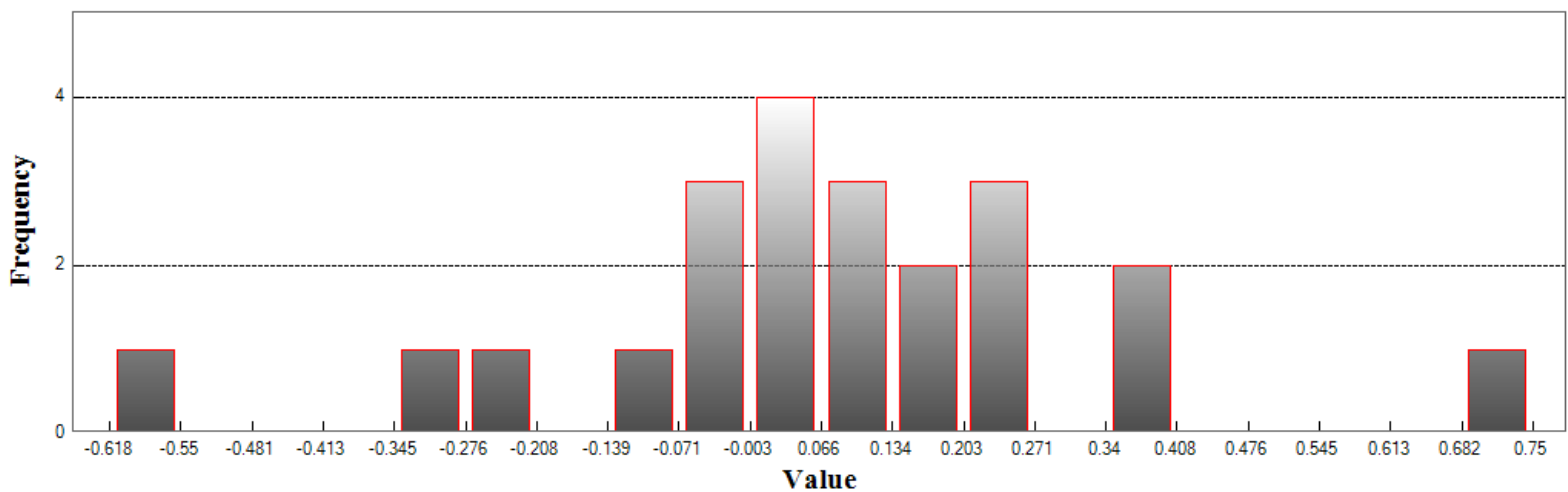


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.618
Maximum DZ: 0.75
Mean DZ: 0.077
Mean Magnitude DZ: 0.442
Number Observations: 22
Standard Deviation DZ: 0.267
RMSE Z: 0.272
95th Percentile: 0.618
Units: US Survey Feet

Histogram



Min: -0.618

Max: 0.75

Number Of Bins: 20

Bin Interval: 0.068

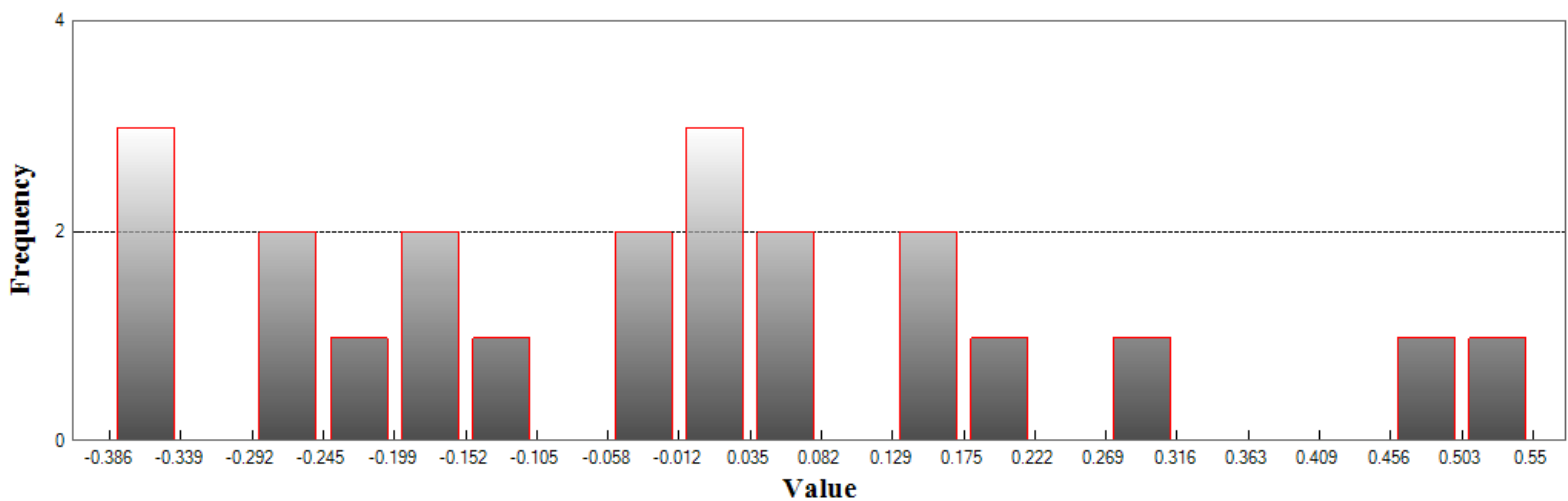


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.385
Maximum DZ: 0.55
Mean DZ: -0.024
Mean Magnitude DZ: 0.453
Number Observations: 22
Standard Deviation DZ: 0.26
RMSE Z: 0.255
95th Percentile: 0.465
Units: US Survey Feet

Histogram



Min: -0.385

Max: 0.55

Number Of Bins: 20

Bin Interval: 0.047

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: mitchell_tiles.shp
Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified
Data Filename: Not Specified
Number of Data Files Matching Attribute: Not Specified

DEM:

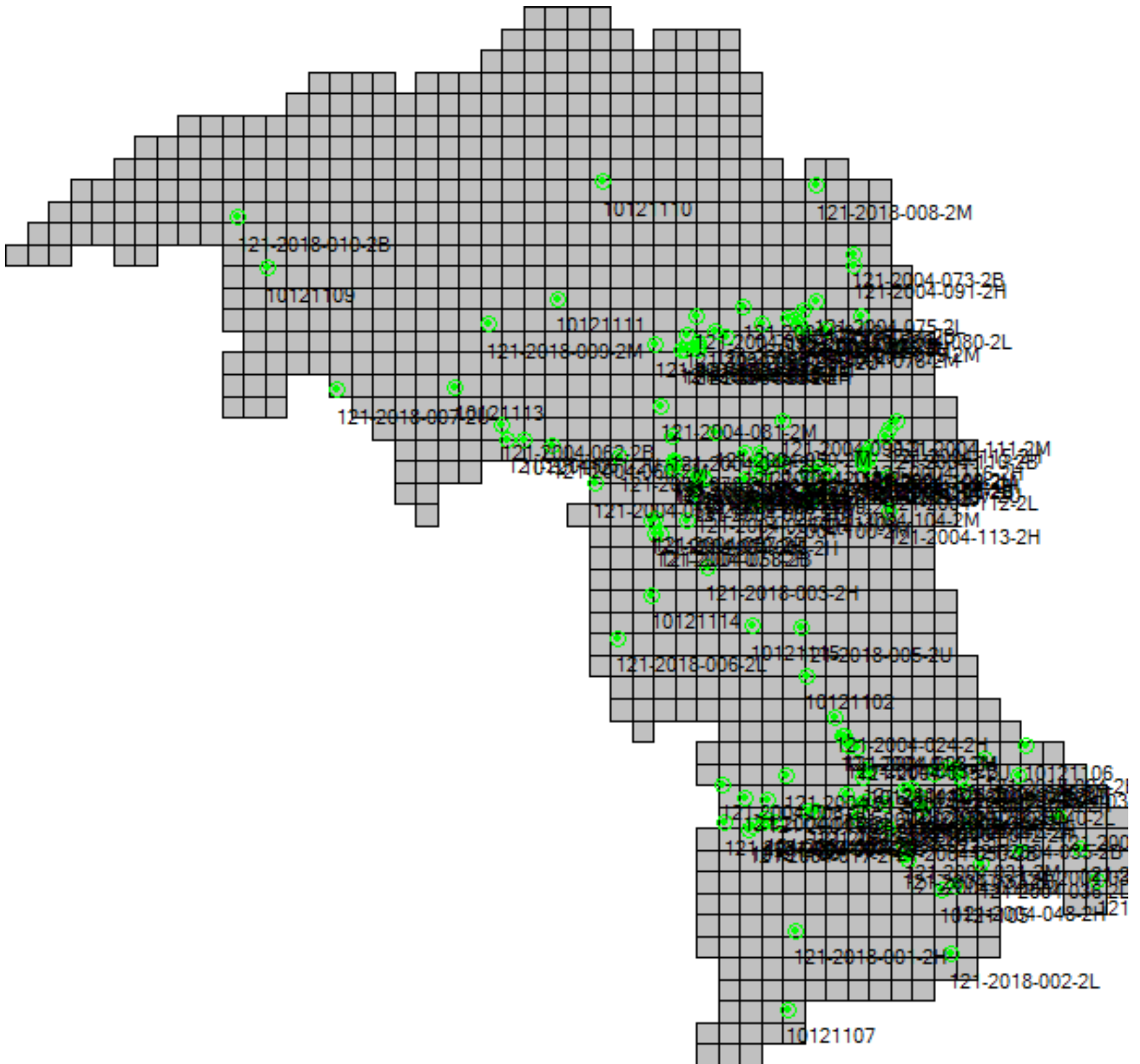
Tile Index Attribute: dem03_file
Data Filename: DEM03
Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute: las_file
Data Filename:
Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	21	0.597		
2H	42		0.858	
2L	20		0.496	
2M	21		0.857	
2U	39	0.508		
Total	143			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.633

Maximum DZ: 0.996

Mean DZ: -0.03

Mean Magnitude DZ: 0.465

Number Observations: 60

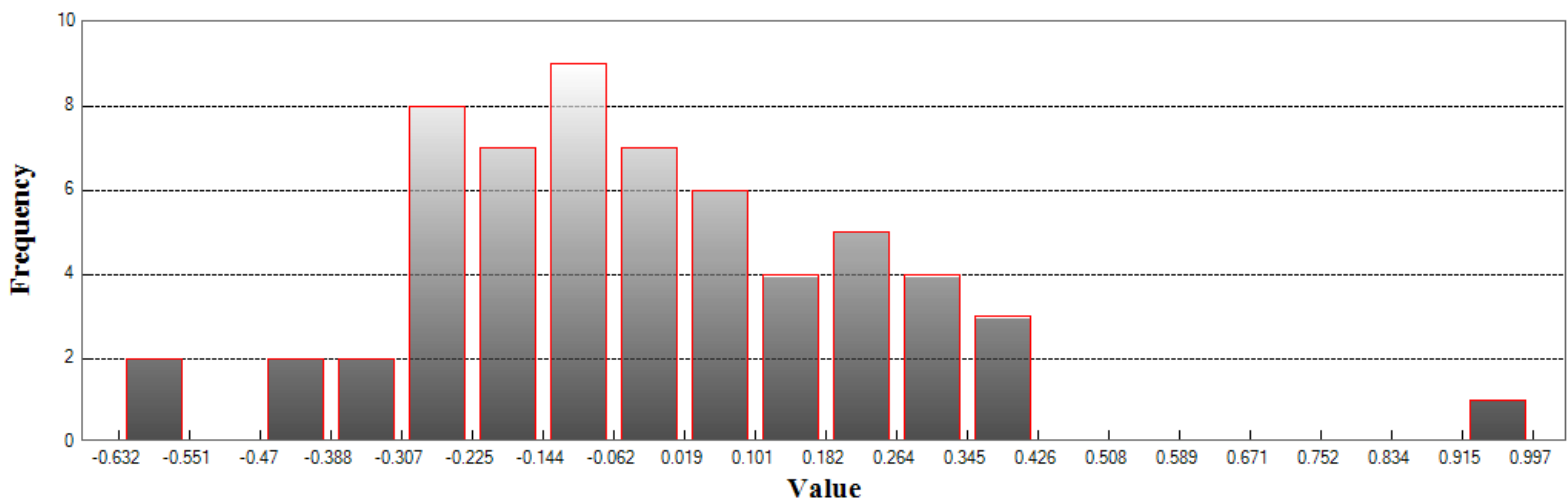
Standard Deviation DZ: 0.277

RMSE Z: 0.276

95% Confidence Level Z: 0.541

Units: US Survey Feet

Histogram



Min: -0.633

Max: 0.996

Number Of Bins: 20

Bin Interval: 0.081

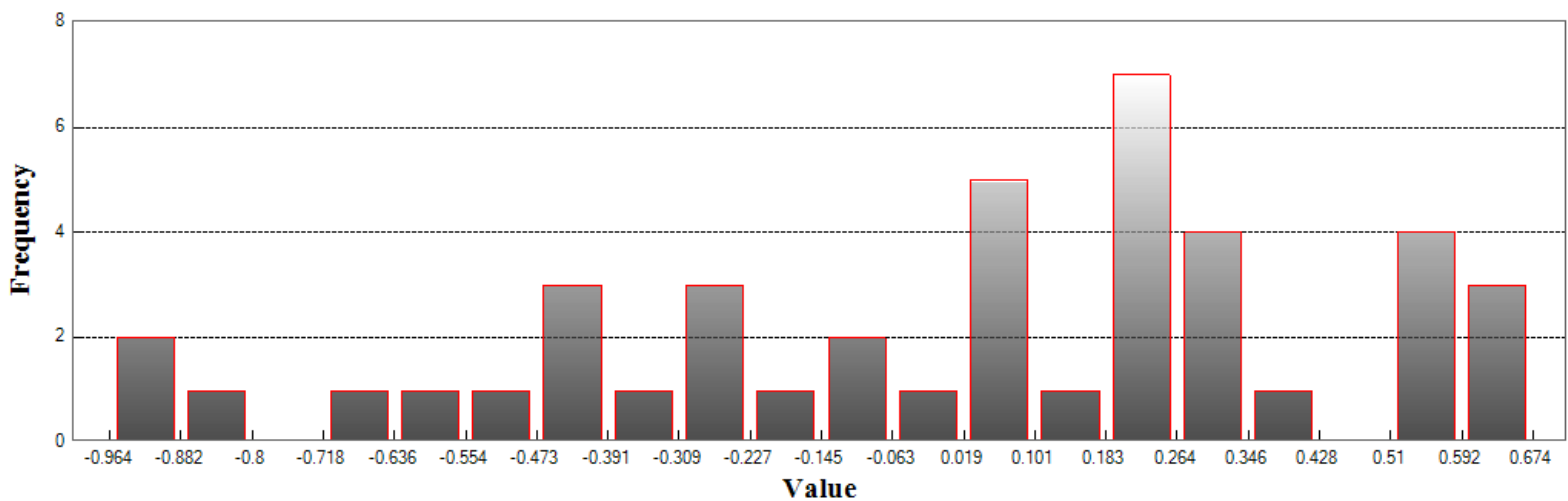


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.964
Maximum DZ: 0.674
Mean DZ: 0.007
Mean Magnitude DZ: 0.605
Number Observations: 42
Standard Deviation DZ: 0.444
RMSE Z: 0.439
95th Percentile: 0.858
Units: US Survey Feet

Histogram



Min: -0.964
Max: 0.674
Number Of Bins: 20
Bin Interval: 0.082

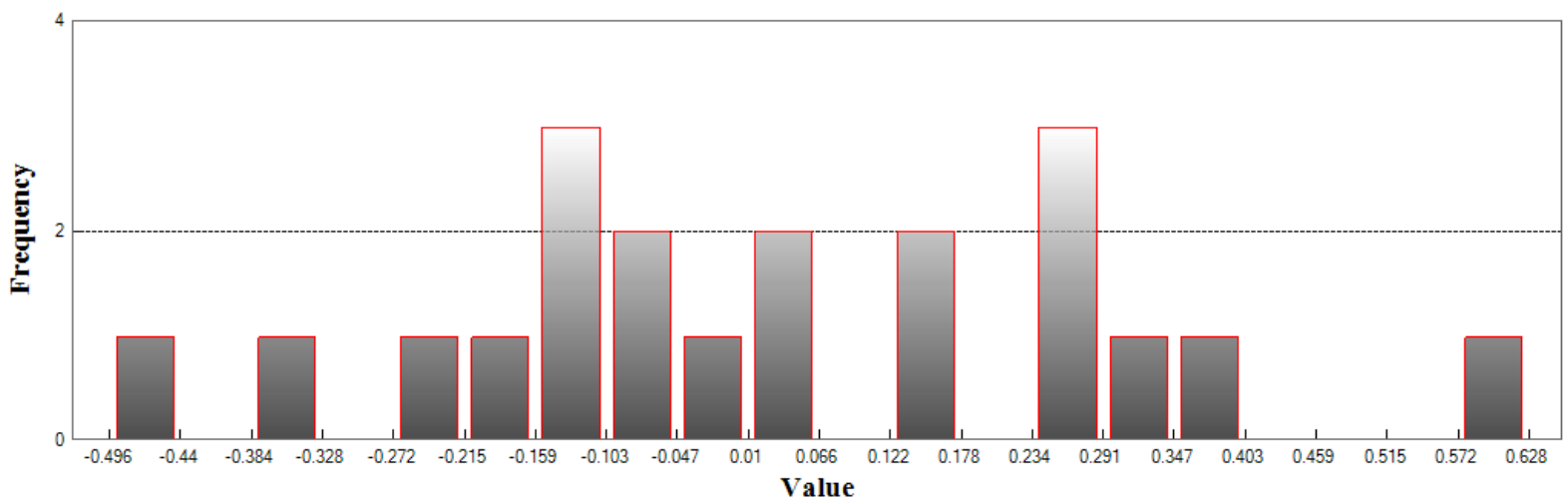


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.496
Maximum DZ: 0.628
Mean DZ: 0.031
Mean Magnitude DZ: 0.464
Number Observations: 20
Standard Deviation DZ: 0.271
RMSE Z: 0.266
95th Percentile: 0.496
Units: US Survey Feet

Histogram



Min: -0.496
Max: 0.628
Number Of Bins: 20
Bin Interval: 0.056

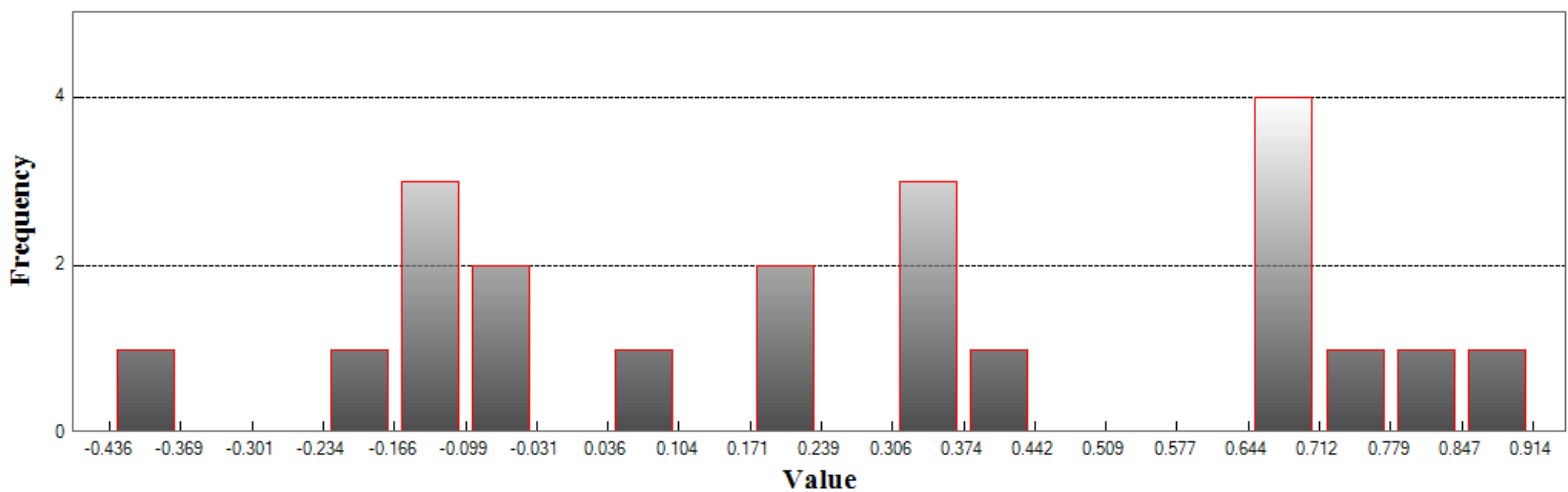


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.437
Maximum DZ: 0.914
Mean DZ: 0.282
Mean Magnitude DZ: 0.633
Number Observations: 21
Standard Deviation DZ: 0.402
RMSE Z: 0.483
95th Percentile: 0.857
Units: US Survey Feet

Histogram



Min: -0.437

Max: 0.914

Number Of Bins: 20

Bin Interval: 0.068

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: polk_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

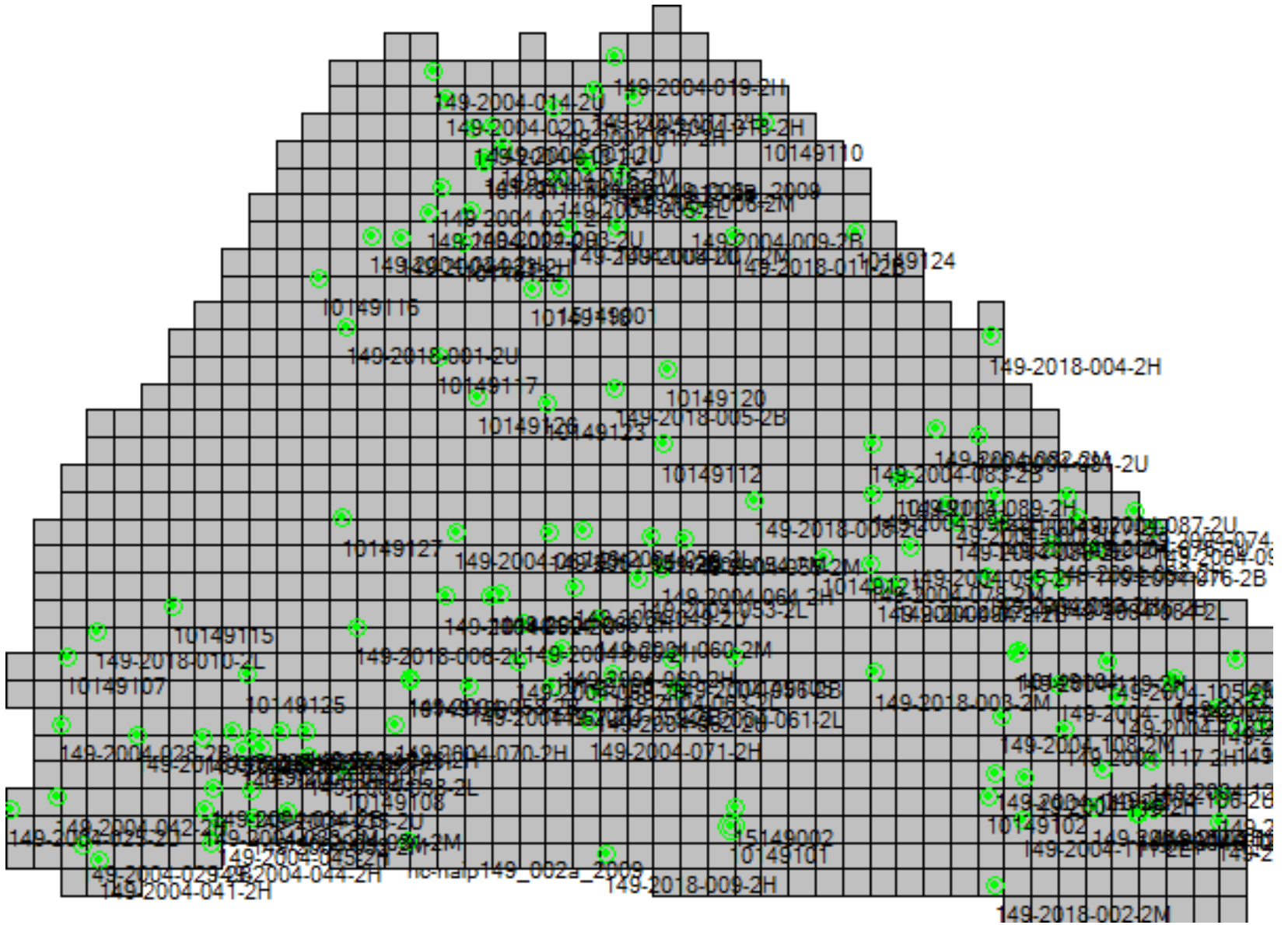
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA
DEM			
2B	20	0.562	
2H	40		0.748
2L	18		0.651
2M	19		0.944
2U	53	0.344	
Total	150		

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.331

Maximum DZ: 0.572

Mean DZ: 0.131

Mean Magnitude DZ: 0.409

Number Observations: 73

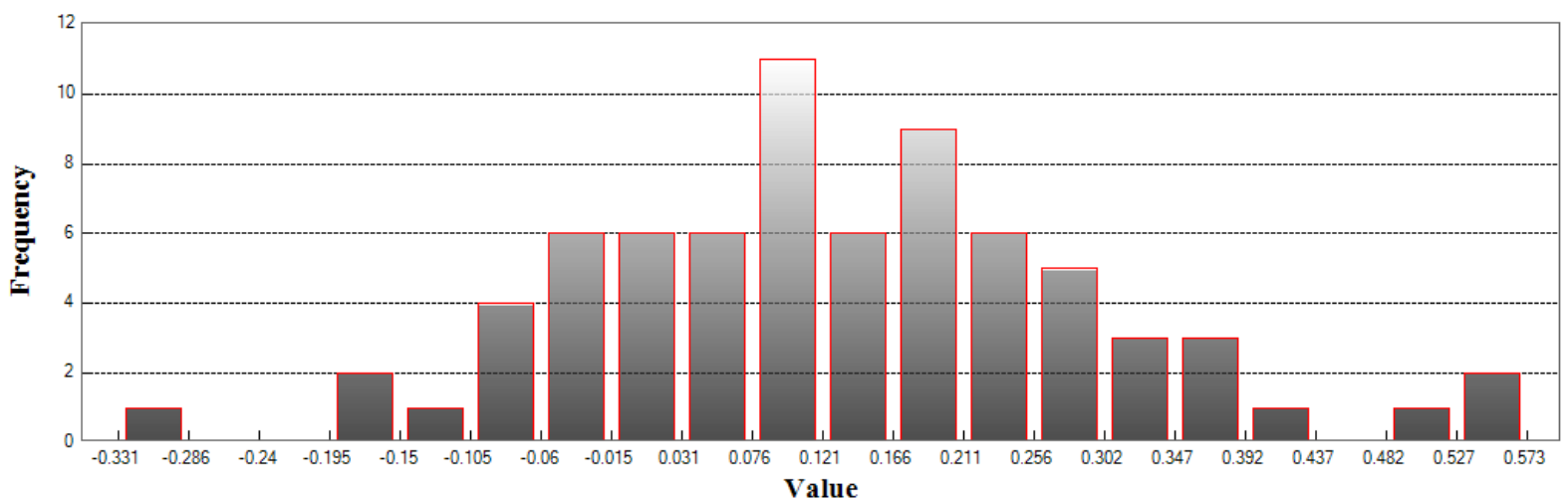
Standard Deviation DZ: 0.167

RMSE Z: 0.212

95% Confidence Level Z: 0.415

Units: US Survey Feet

Histogram



Min: -0.331

Max: 0.572

Number Of Bins: 20

Bin Interval: 0.045

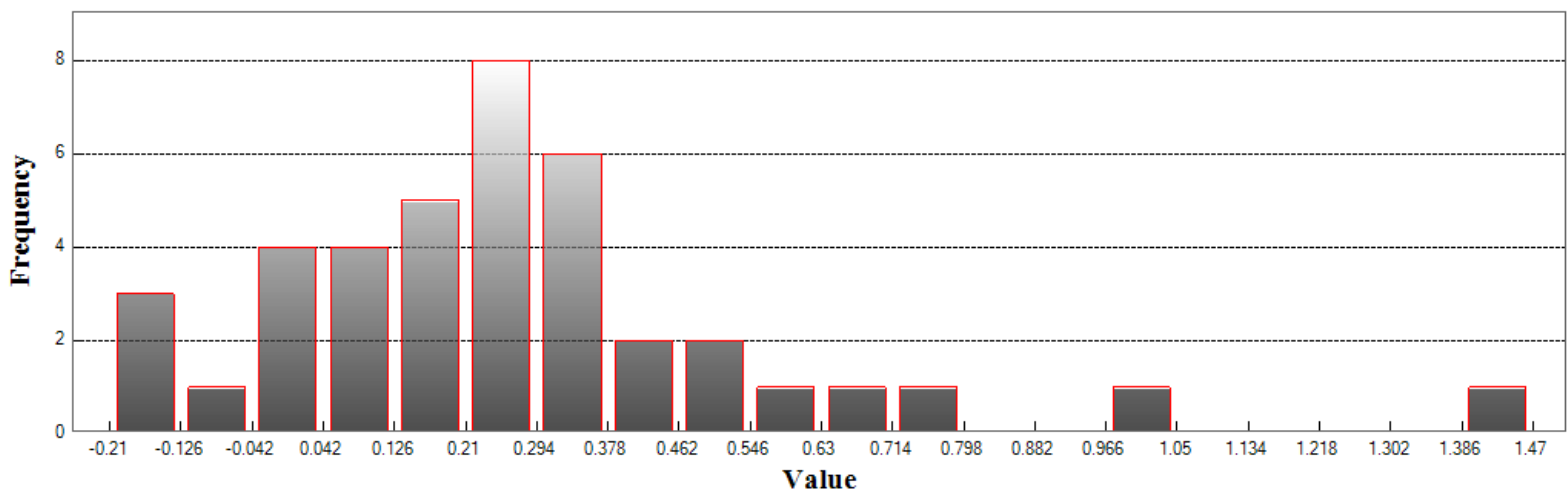


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.21
Maximum DZ: 1.47
Mean DZ: 0.273
Mean Magnitude DZ: 0.556
Number Observations: 40
Standard Deviation DZ: 0.317
RMSE Z: 0.415
95th Percentile: 0.748
Units: US Survey Feet

Histogram



Min: -0.21

Max: 1.47

Number Of Bins: 20

Bin Interval: 0.084

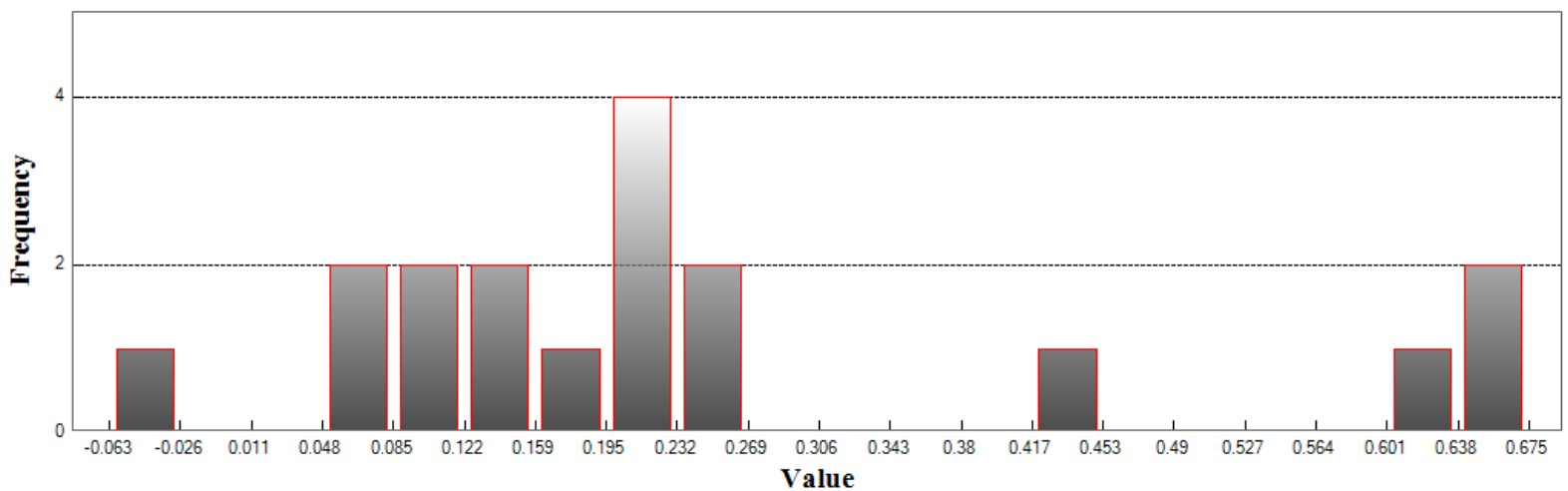


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.062
Maximum DZ: 0.675
Mean DZ: 0.248
Mean Magnitude DZ: 0.505
Number Observations: 18
Standard Deviation DZ: 0.211
RMSE Z: 0.322
95th Percentile: 0.651
Units: US Survey Feet

Histogram



Min: -0.062

Max: 0.675

Number Of Bins: 20

Bin Interval: 0.037

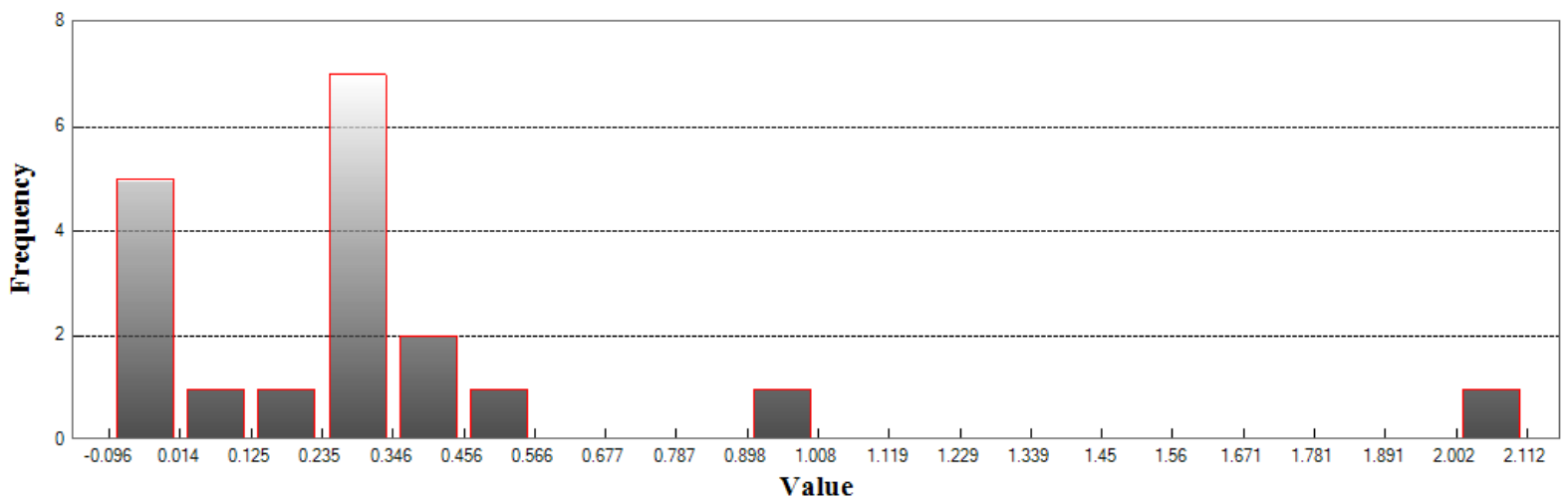


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.096
Maximum DZ: 2.113
Mean DZ: 0.332
Mean Magnitude DZ: 0.601
Number Observations: 19
Standard Deviation DZ: 0.499
RMSE Z: 0.589
95th Percentile: 0.944
Units: US Survey Feet

Histogram



Min: -0.096

Max: 2.113

Number Of Bins: 20

Bin Interval: 0.11

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: rutherford_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA
DEM			
2B	24	0.596	
2H	43		0.710
2L	25		0.508
2M	24		0.625
2U	38	0.479	
Total	154		

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.49

Maximum DZ: 0.536

Mean DZ: 0.184

Mean Magnitude DZ: 0.48

Number Observations: 62

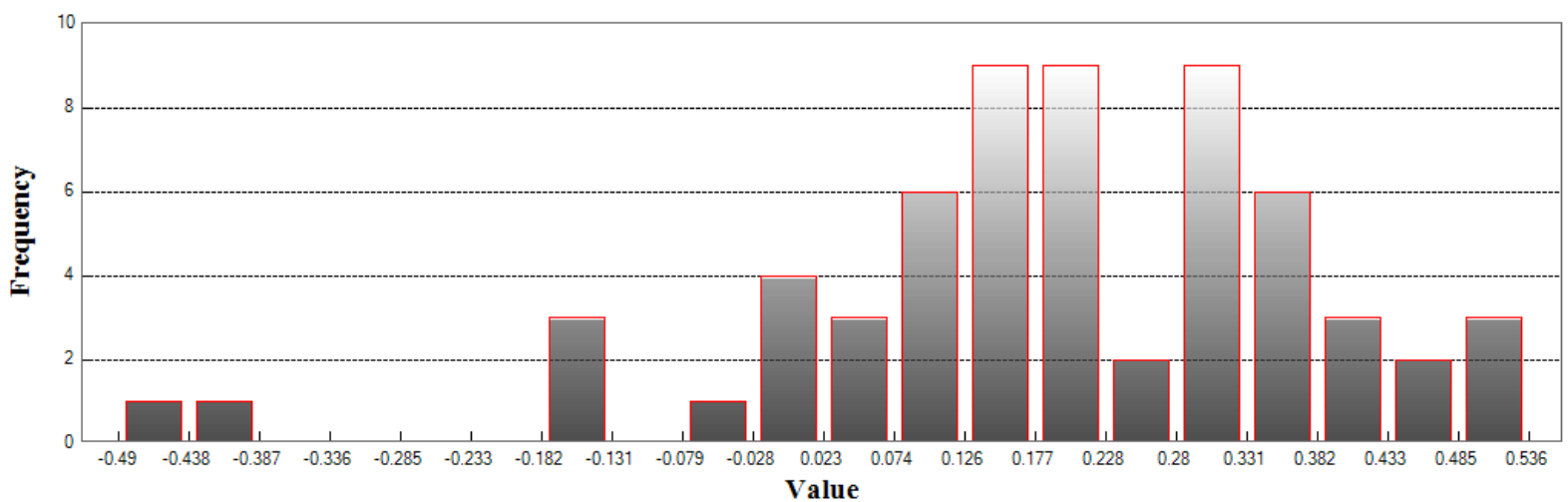
Standard Deviation DZ: 0.198

RMSE Z: 0.269

95% Confidence Level Z: 0.527

Units: US Survey Feet

Histogram



Min: -0.49

Max: 0.536

Number Of Bins: 20

Bin Interval: 0.051

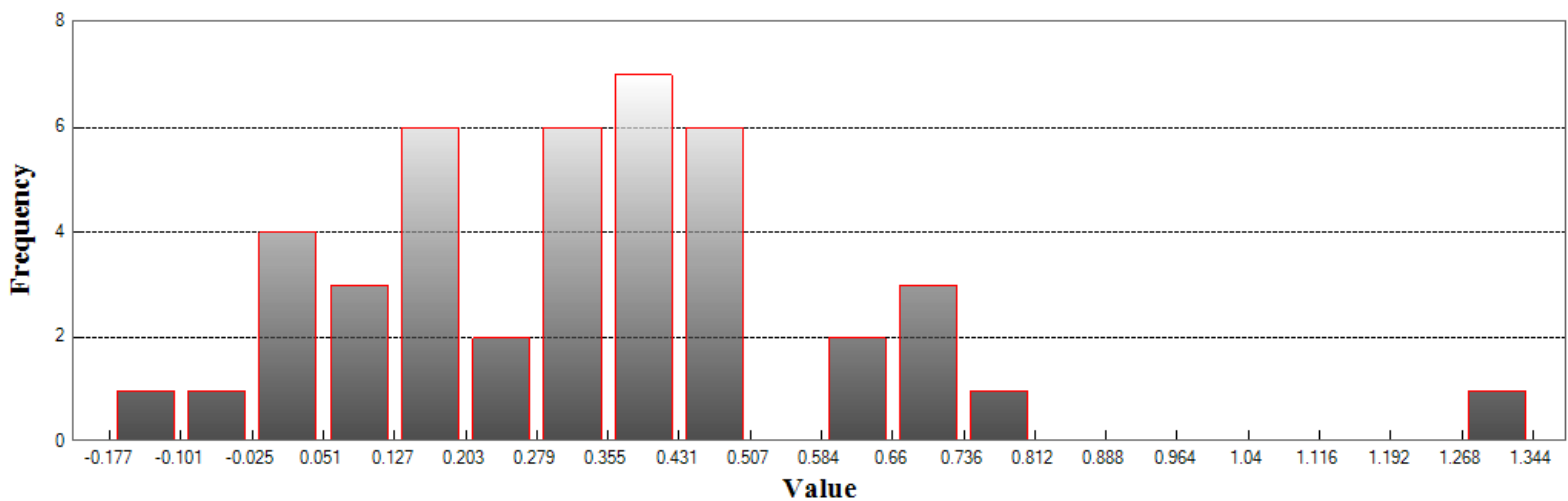


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.177
Maximum DZ: 1.344
Mean DZ: 0.336
Mean Magnitude DZ: 0.59
Number Observations: 43
Standard Deviation DZ: 0.272
RMSE Z: 0.43
95th Percentile: 0.71
Units: US Survey Feet

Histogram



Min: -0.177

Max: 1.344

Number Of Bins: 20

Bin Interval: 0.076

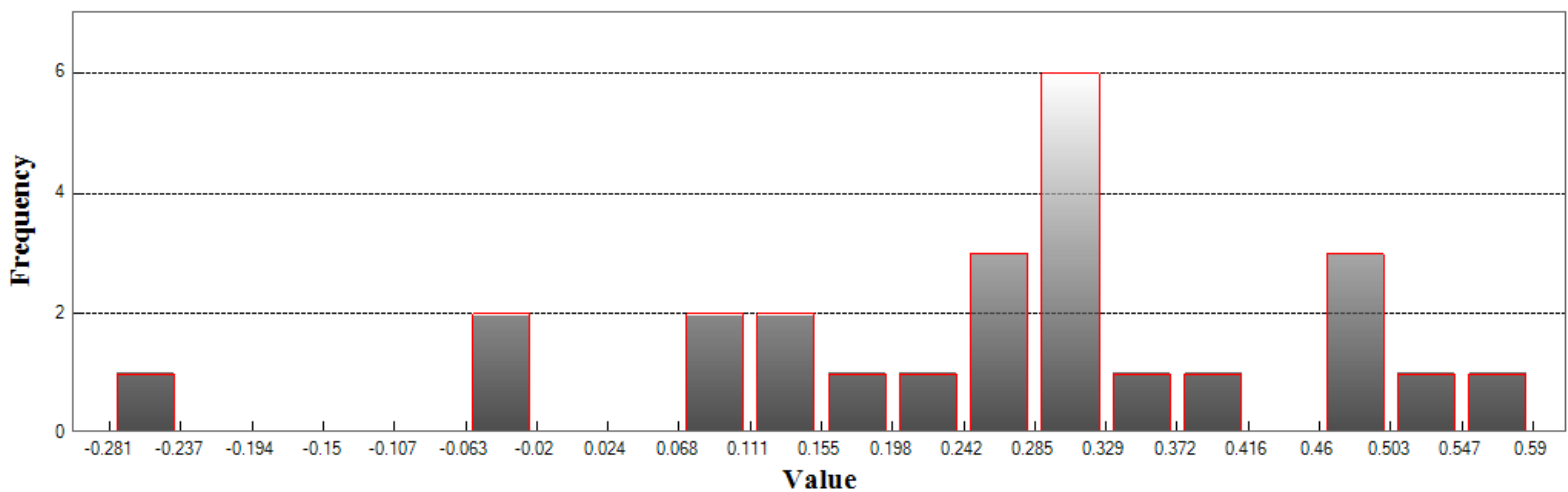


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.281
Maximum DZ: 0.59
Mean DZ: 0.254
Mean Magnitude DZ: 0.533
Number Observations: 25
Standard Deviation DZ: 0.197
RMSE Z: 0.319
95th Percentile: 0.508
Units: US Survey Feet

Histogram



Min: -0.281

Max: 0.59

Number Of Bins: 20

Bin Interval: 0.044

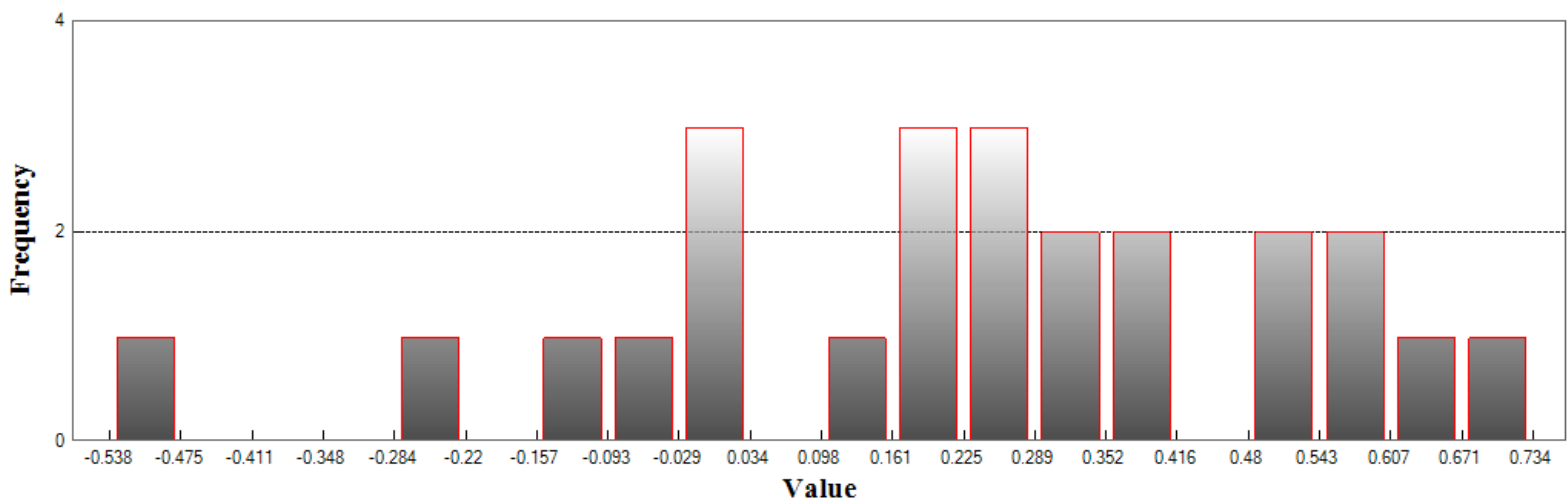


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.539
Maximum DZ: 0.734
Mean DZ: 0.225
Mean Magnitude DZ: 0.553
Number Observations: 24
Standard Deviation DZ: 0.295
RMSE Z: 0.366
95th Percentile: 0.625
Units: US Survey Feet

Histogram



Min: -0.539

Max: 0.734

Number Of Bins: 20

Bin Interval: 0.064

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: swain_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	22	0.599		
2H	42		0.968	
2L	22		0.462	
2M	20		0.894	
2U	43	0.522		
Total	149			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.691

Maximum DZ: 0.48

Mean DZ: -0.051

Mean Magnitude DZ: 0.461

Number Observations: 65

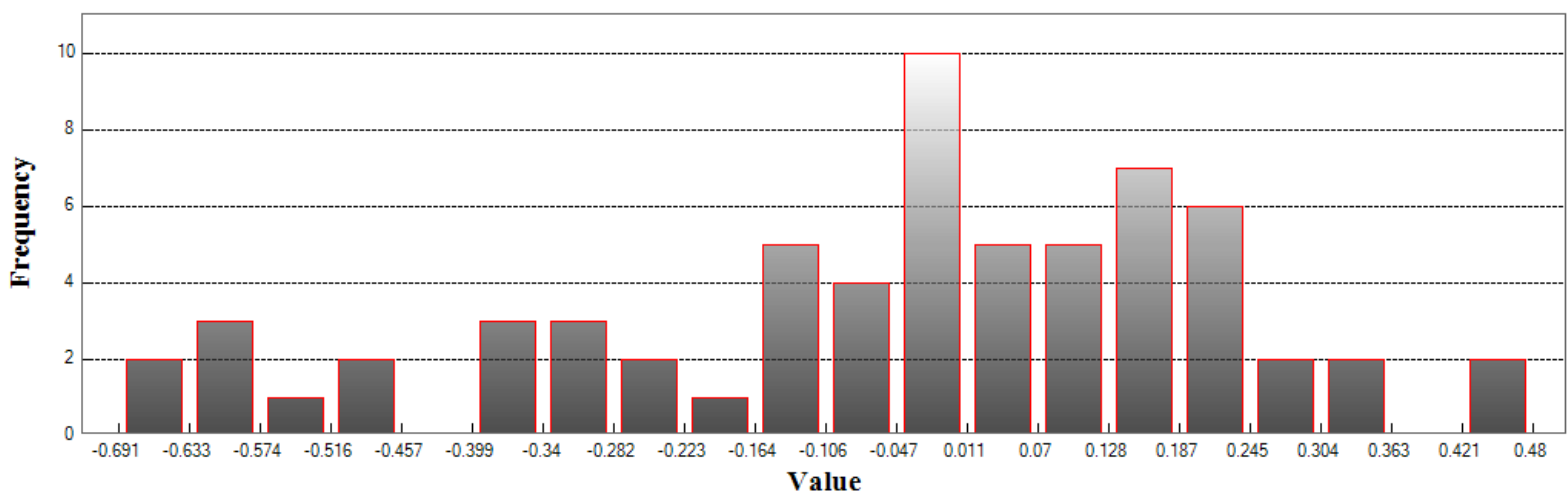
Standard Deviation DZ: 0.278

RMSE Z: 0.28

95% Confidence Level Z: 0.549

Units: US Survey Feet

Histogram



Min: -0.691

Max: 0.48

Number Of Bins: 20

Bin Interval: 0.059

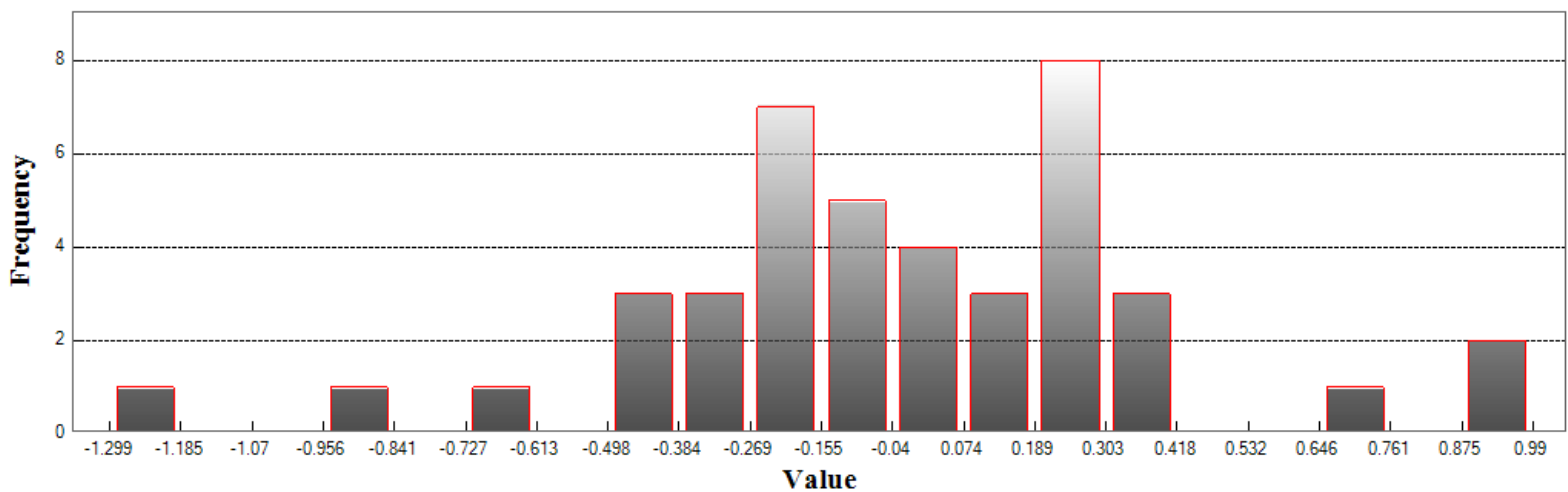


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -1.299
Maximum DZ: 0.99
Mean DZ: -0.026
Mean Magnitude DZ: 0.56
Number Observations: 42
Standard Deviation DZ: 0.426
RMSE Z: 0.421
95th Percentile: 0.968
Units: US Survey Feet

Histogram



Min: -1.299

Max: 0.99

Number Of Bins: 20

Bin Interval: 0.114

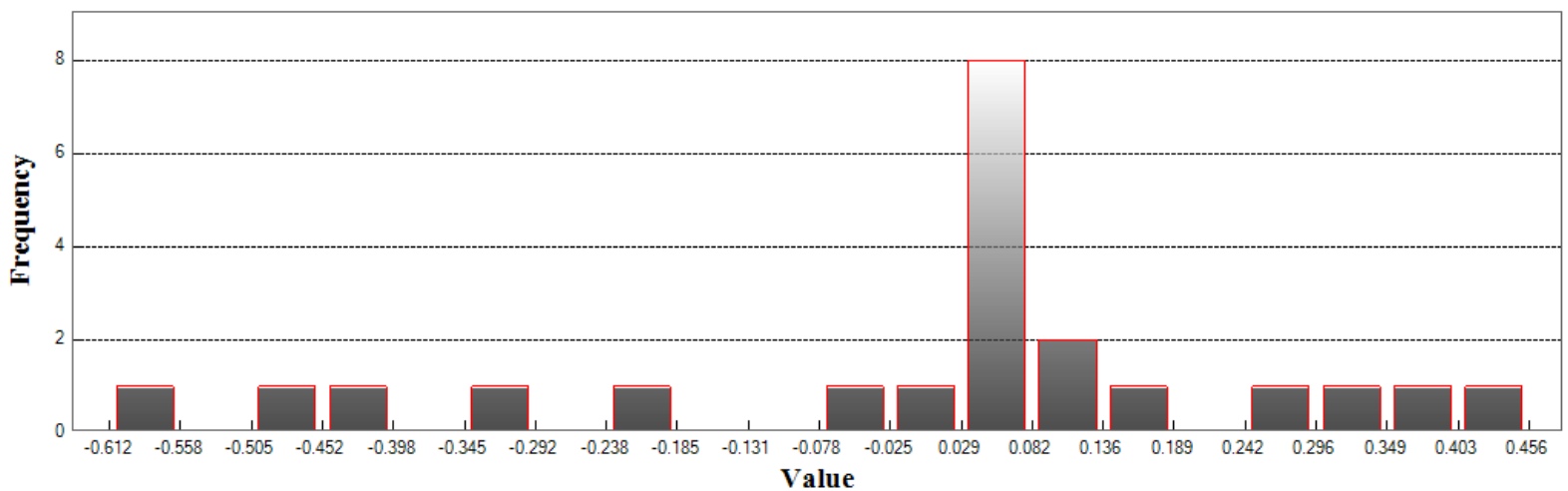


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.612
Maximum DZ: 0.456
Mean DZ: 0.008
Mean Magnitude DZ: 0.446
Number Observations: 22
Standard Deviation DZ: 0.268
RMSE Z: 0.262
95th Percentile: 0.462
Units: US Survey Feet

Histogram



Min: -0.612

Max: 0.456

Number Of Bins: 20

Bin Interval: 0.053

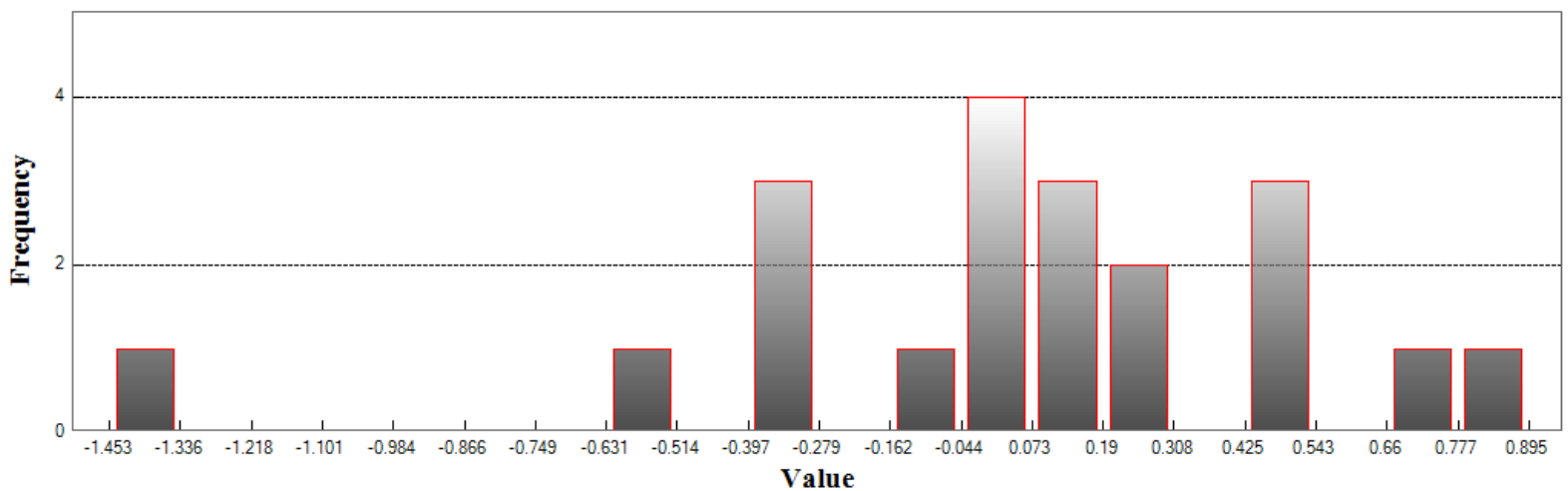


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -1.453
Maximum DZ: 0.894
Mean DZ: 0.046
Mean Magnitude DZ: 0.602
Number Observations: 20
Standard Deviation DZ: 0.507
RMSE Z: 0.497
95th Percentile: 0.894
Units: US Survey Feet

Histogram



Min: -1.453

Max: 0.894

Number Of Bins: 20

Bin Interval: 0.117

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: transylvania_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

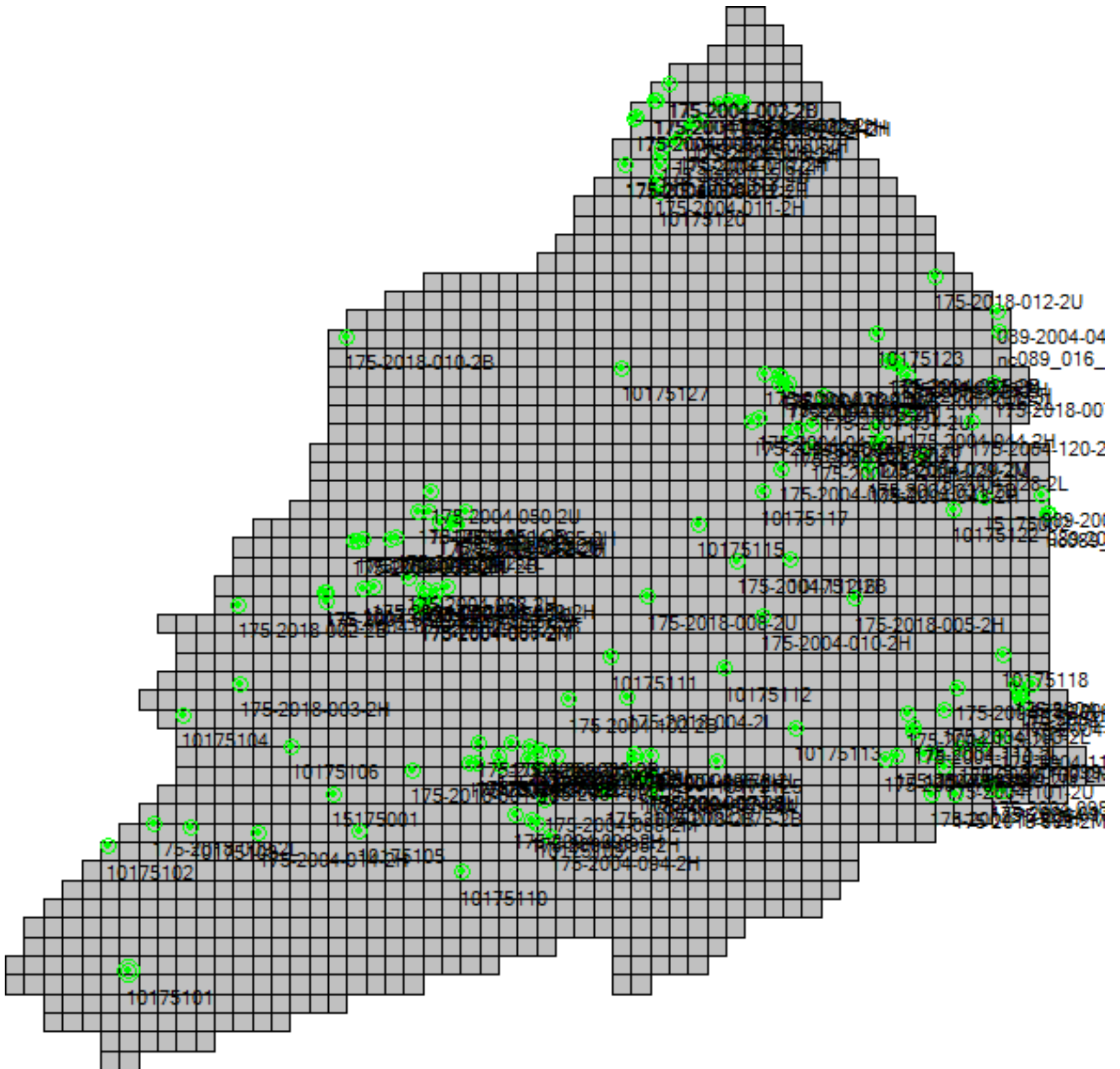
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	24	0.635		
2H	49		0.904	
2L	19		0.739	
2M	16		0.643	
2U	56	0.516		
Total	164			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.325

Maximum DZ: 0.853

Mean DZ: 0.12

Mean Magnitude DZ: 0.479

Number Observations: 80

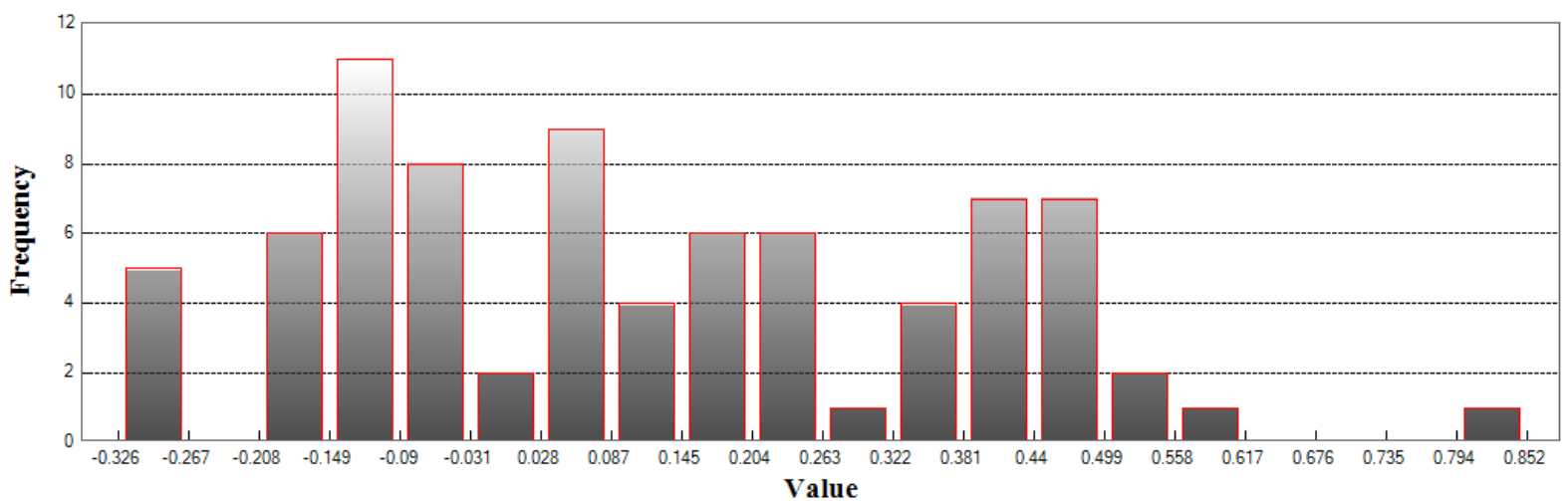
Standard Deviation DZ: 0.258

RMSE Z: 0.283

95% Confidence Level Z: 0.555

Units: US Survey Feet

Histogram



Min: -0.325

Max: 0.853

Number Of Bins: 20

Bin Interval: 0.059

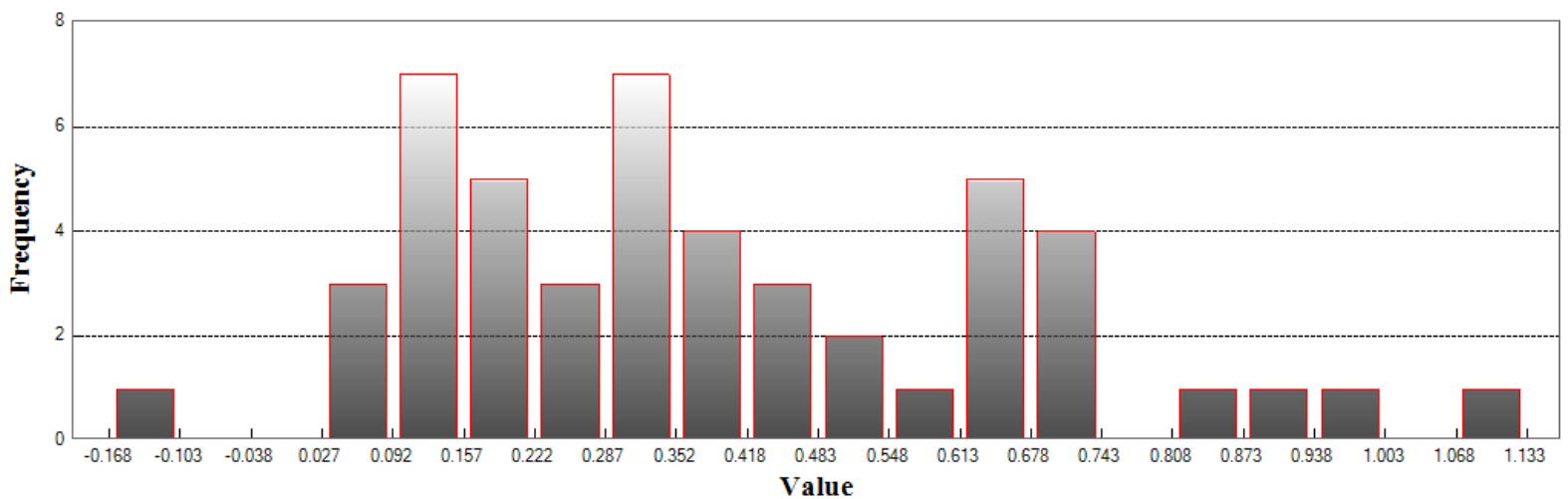


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.168
Maximum DZ: 1.132
Mean DZ: 0.391
Mean Magnitude DZ: 0.631
Number Observations: 49
Standard Deviation DZ: 0.273
RMSE Z: 0.475
95th Percentile: 0.904
Units: US Survey Feet

Histogram



Min: -0.168

Max: 1.132

Number Of Bins: 20

Bin Interval: 0.065

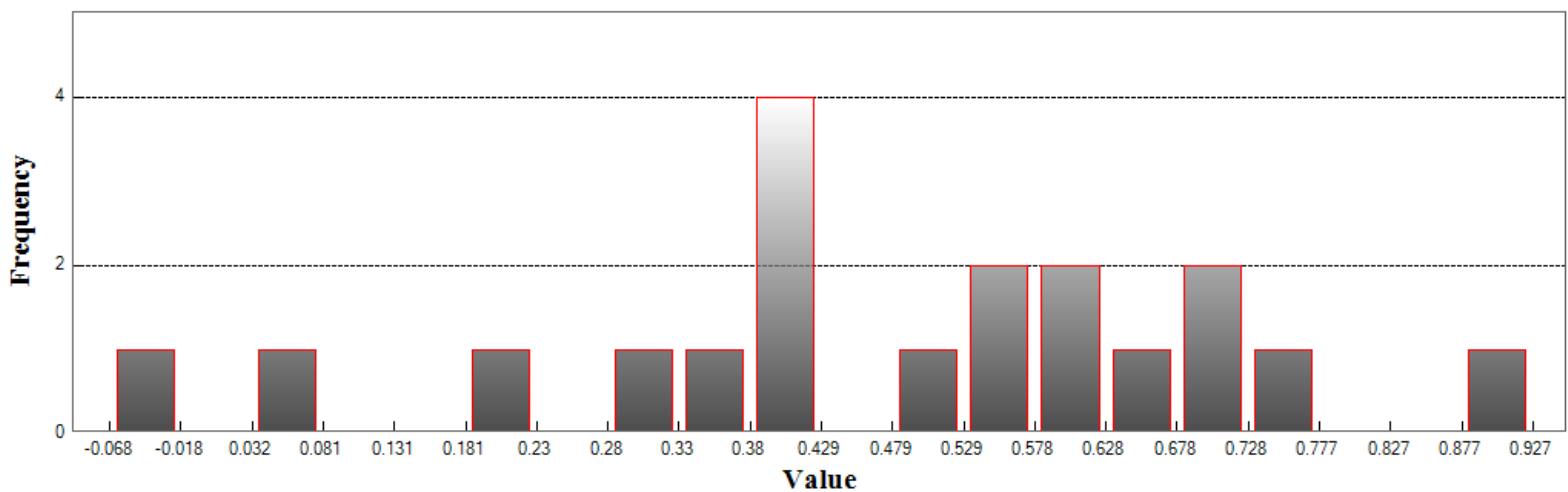


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.068
Maximum DZ: 0.926
Mean DZ: 0.471
Mean Magnitude DZ: 0.692
Number Observations: 19
Standard Deviation DZ: 0.244
RMSE Z: 0.528
95th Percentile: 0.739
Units: US Survey Feet

Histogram



Min: -0.068

Max: 0.926

Number Of Bins: 20

Bin Interval: 0.05

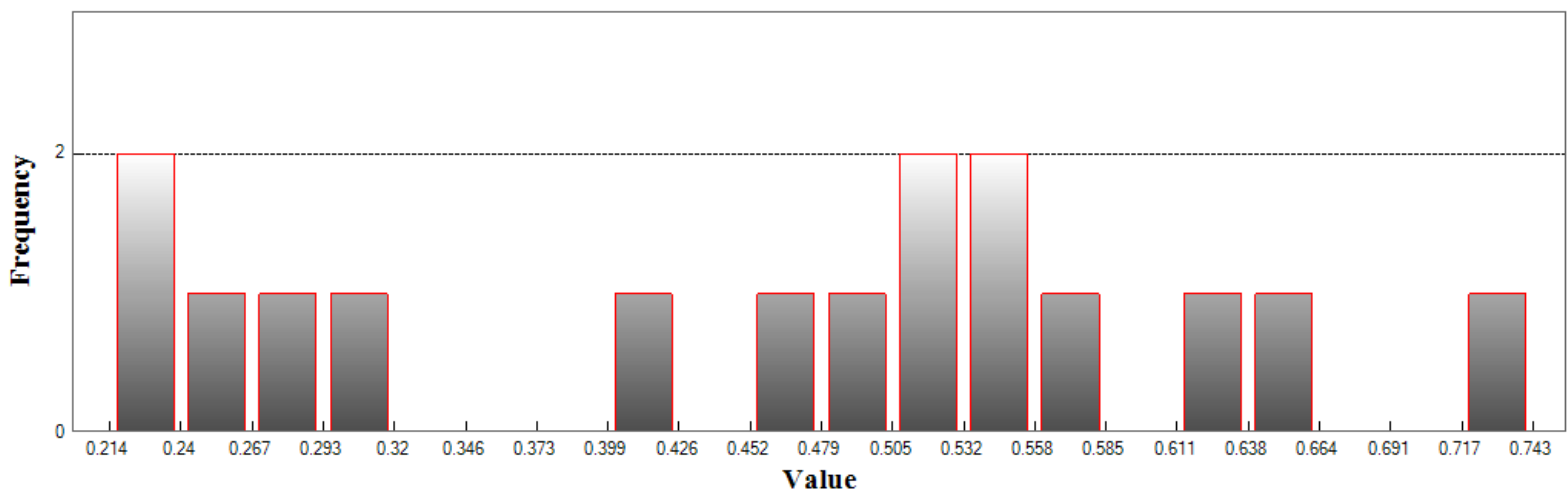


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: 0.214
Maximum DZ: 0.744
Mean DZ: 0.461
Mean Magnitude DZ: 0.679
Number Observations: 16
Standard Deviation DZ: 0.162
RMSE Z: 0.487
95th Percentile: 0.643
Units: US Survey Feet

Histogram



Min: 0.214

Max: 0.744

Number Of Bins: 20

Bin Interval: 0.026

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: watauga_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

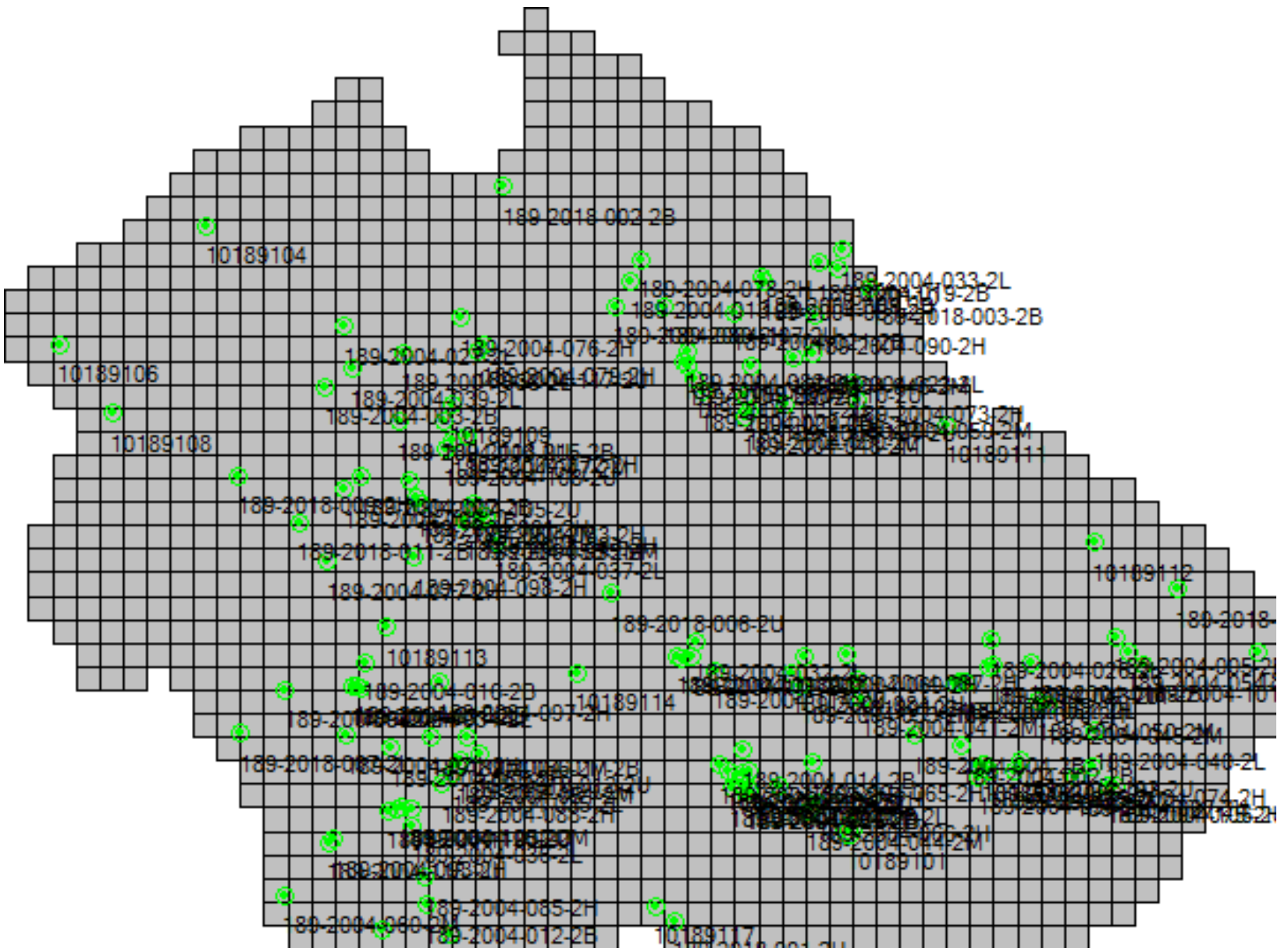
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	24	0.387		
2H	41		0.714	
2L	21		0.906	
2M	22		0.829	
2U	37	0.609		
Total	145			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.83

Maximum DZ: 0.859

Mean DZ: 0.056

Mean Magnitude DZ: 0.447

Number Observations: 61

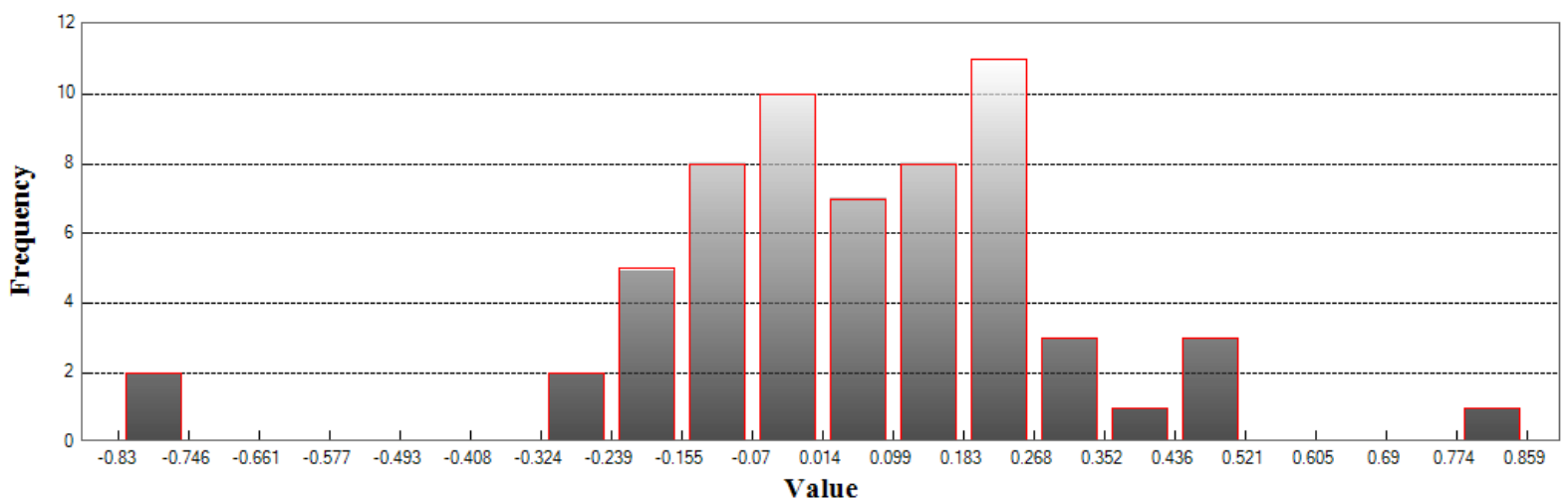
Standard Deviation DZ: 0.268

RMSE Z: 0.272

95% Confidence Level Z: 0.533

Units: US Survey Feet

Histogram



Min: -0.83

Max: 0.859

Number Of Bins: 20

Bin Interval: 0.084

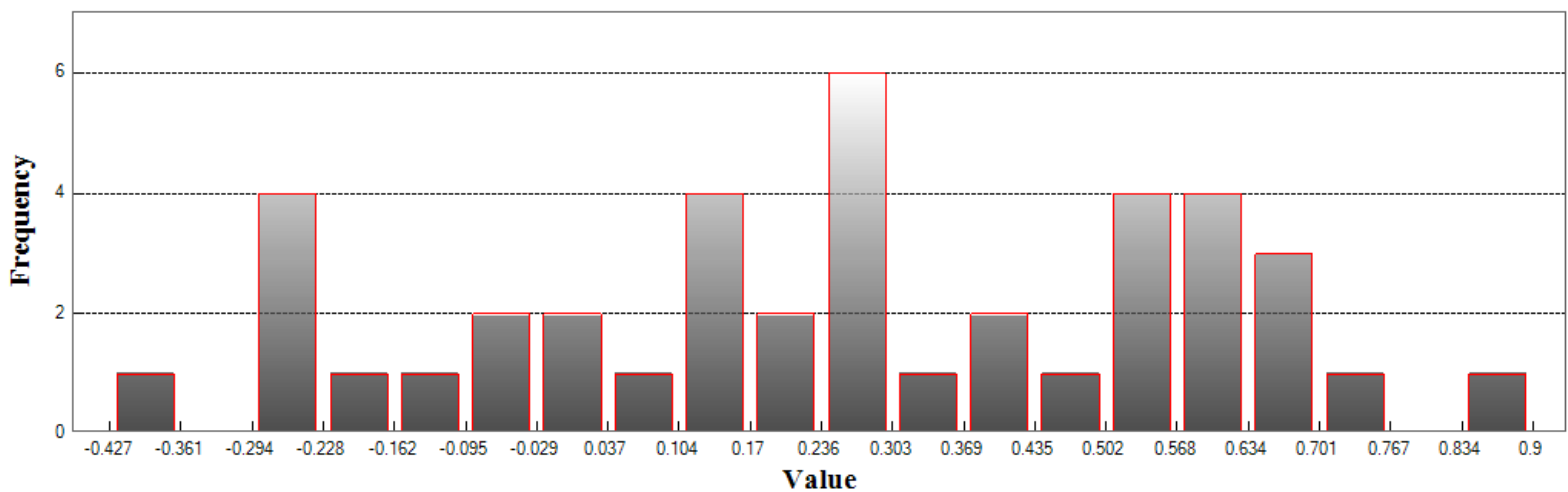


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.427
Maximum DZ: 0.9
Mean DZ: 0.255
Mean Magnitude DZ: 0.589
Number Observations: 41
Standard Deviation DZ: 0.325
RMSE Z: 0.41
95th Percentile: 0.714
Units: US Survey Feet

Histogram



Min: -0.427

Max: 0.9

Number Of Bins: 20

Bin Interval: 0.066

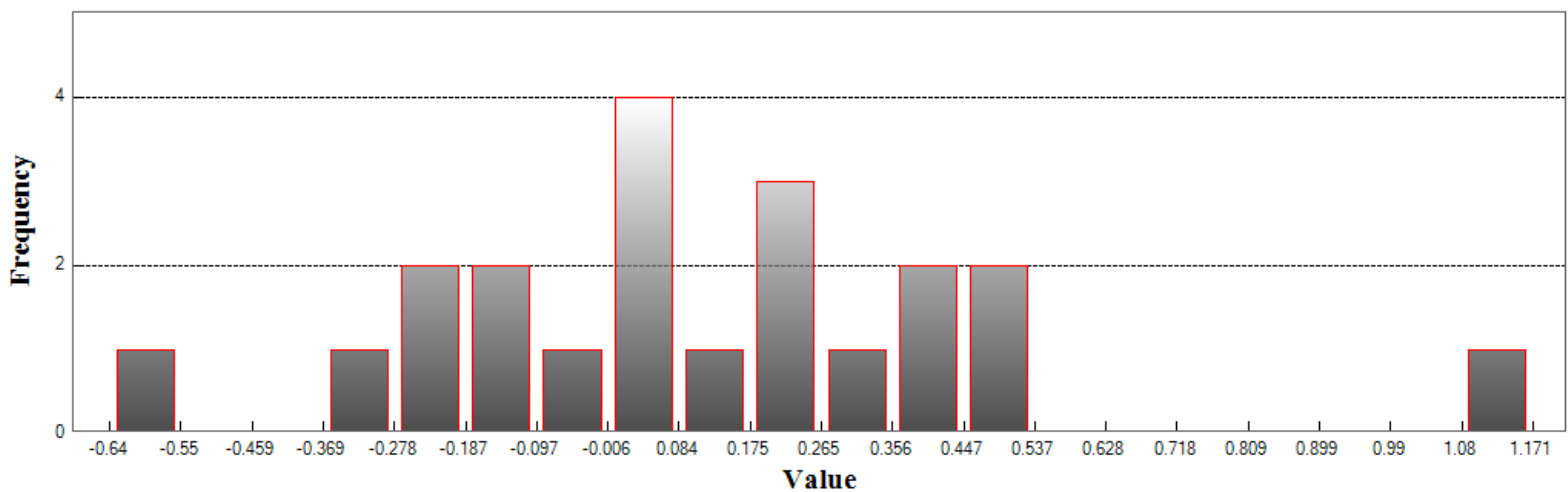


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.64
Maximum DZ: 1.171
Mean DZ: 0.123
Mean Magnitude DZ: 0.532
Number Observations: 21
Standard Deviation DZ: 0.372
RMSE Z: 0.384
95th Percentile: 0.906
Units: US Survey Feet

Histogram



Min: -0.64

Max: 1.171

Number Of Bins: 20

Bin Interval: 0.091

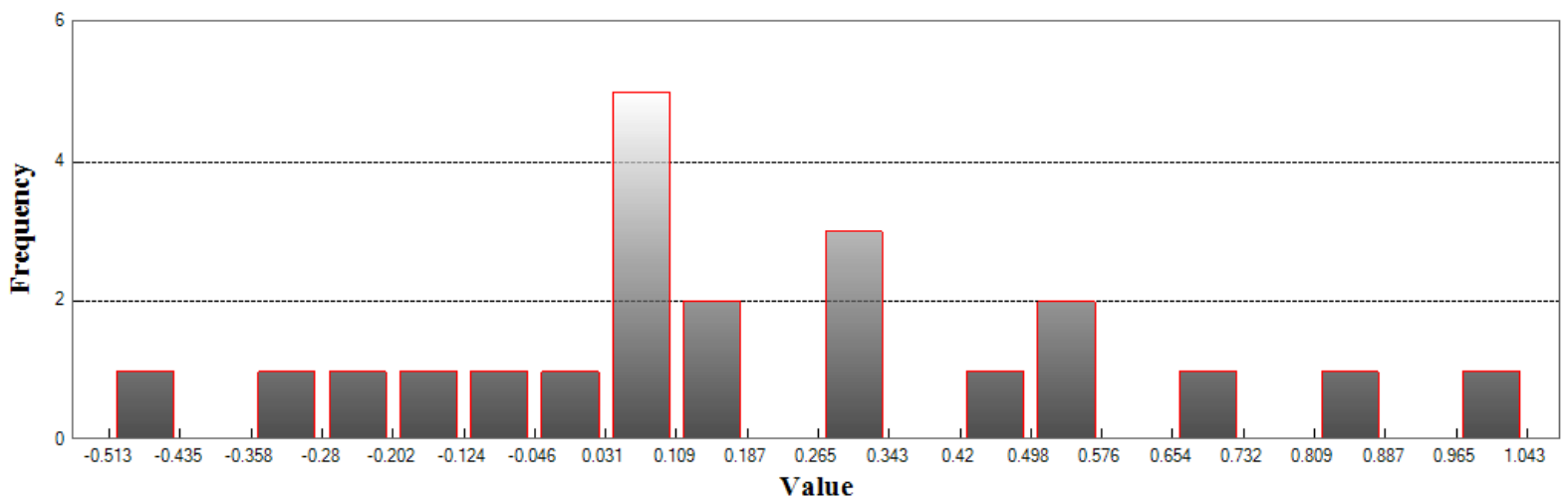


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.513
Maximum DZ: 1.043
Mean DZ: 0.195
Mean Magnitude DZ: 0.558
Number Observations: 22
Standard Deviation DZ: 0.377
RMSE Z: 0.416
95th Percentile: 0.829
Units: US Survey Feet

Histogram



Min: -0.513

Max: 1.043

Number Of Bins: 20

Bin Interval: 0.078

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: yancey_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem03_file

Data Filename: DEM03

Number of Data Files Matching Attribute: Not Specified

LAS:

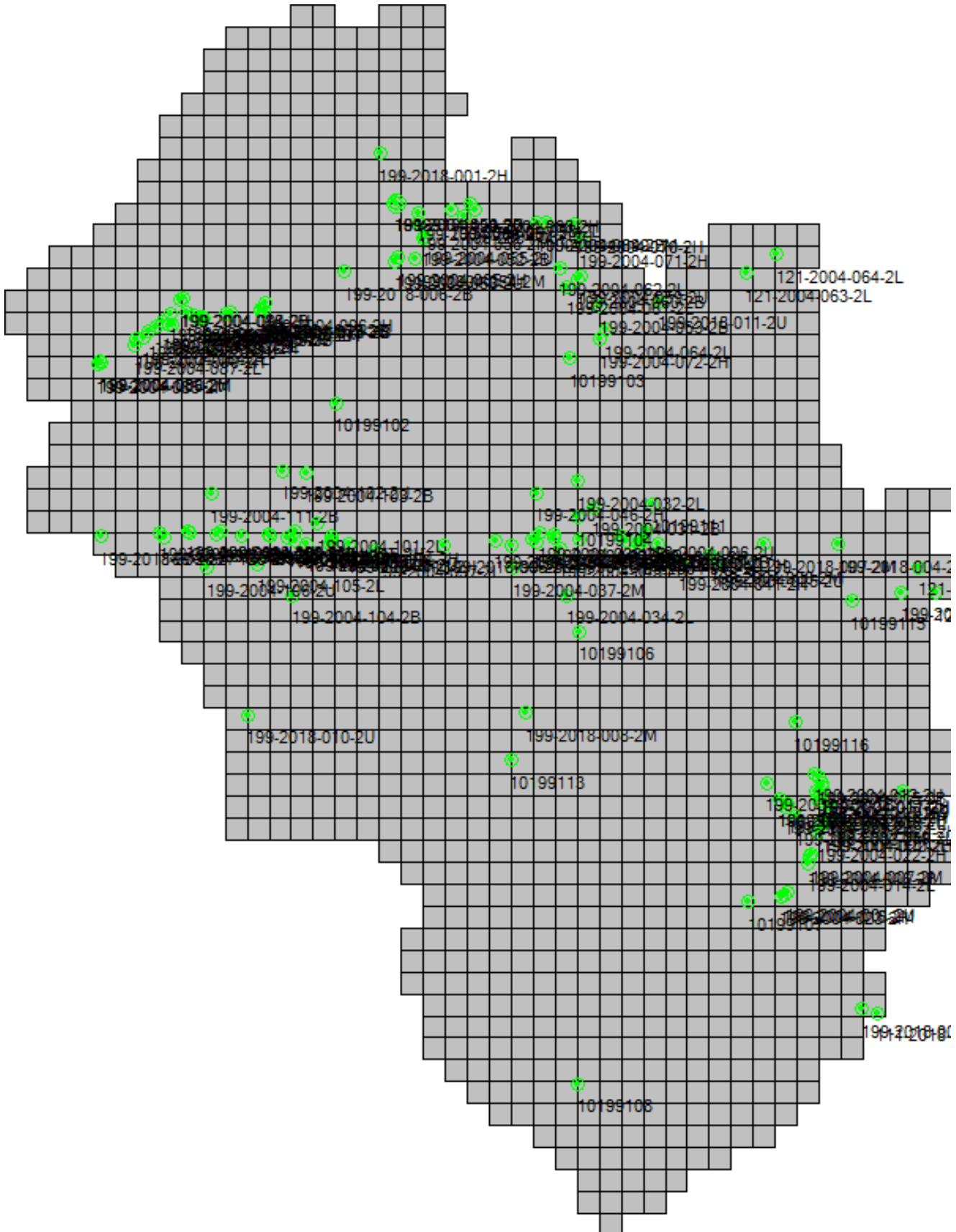
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	24	0.592		
2H	42		0.720	
2L	25		0.430	
2M	23		0.606	
2U	37	0.541		
Total	151			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.708

Maximum DZ: 0.744

Mean DZ: -0.126

Mean Magnitude DZ: 0.461

Number Observations: 61

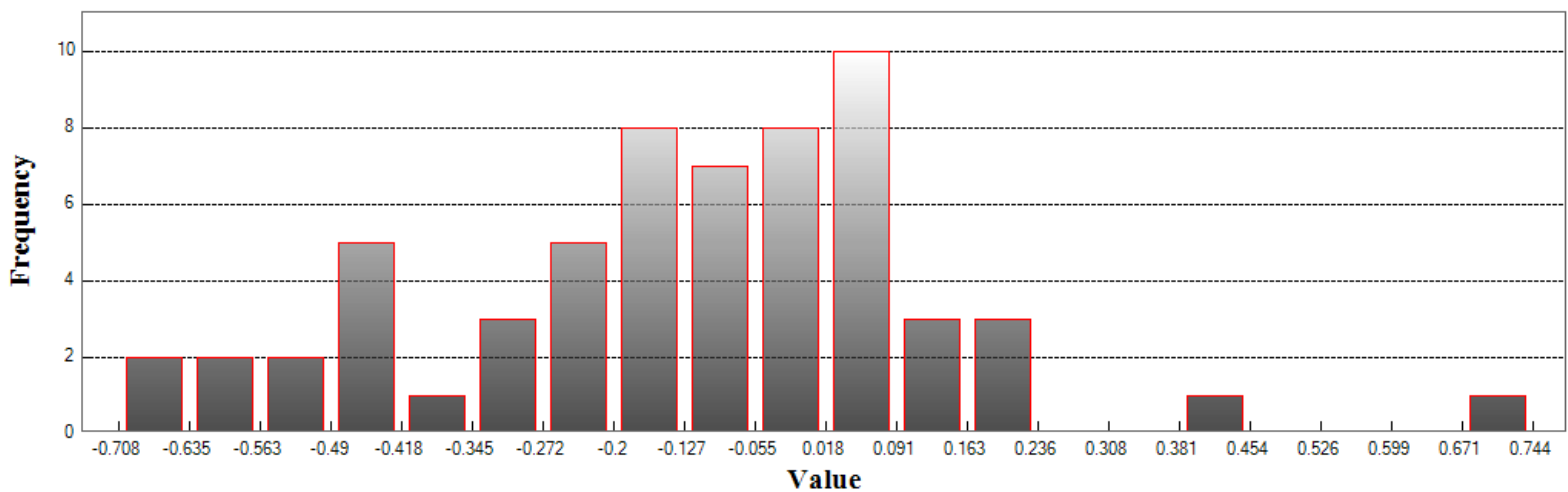
Standard Deviation DZ: 0.26

RMSE Z: 0.287

95% Confidence Level Z: 0.562

Units: US Survey Feet

Histogram



Min: -0.708

Max: 0.744

Number Of Bins: 20

Bin Interval: 0.073

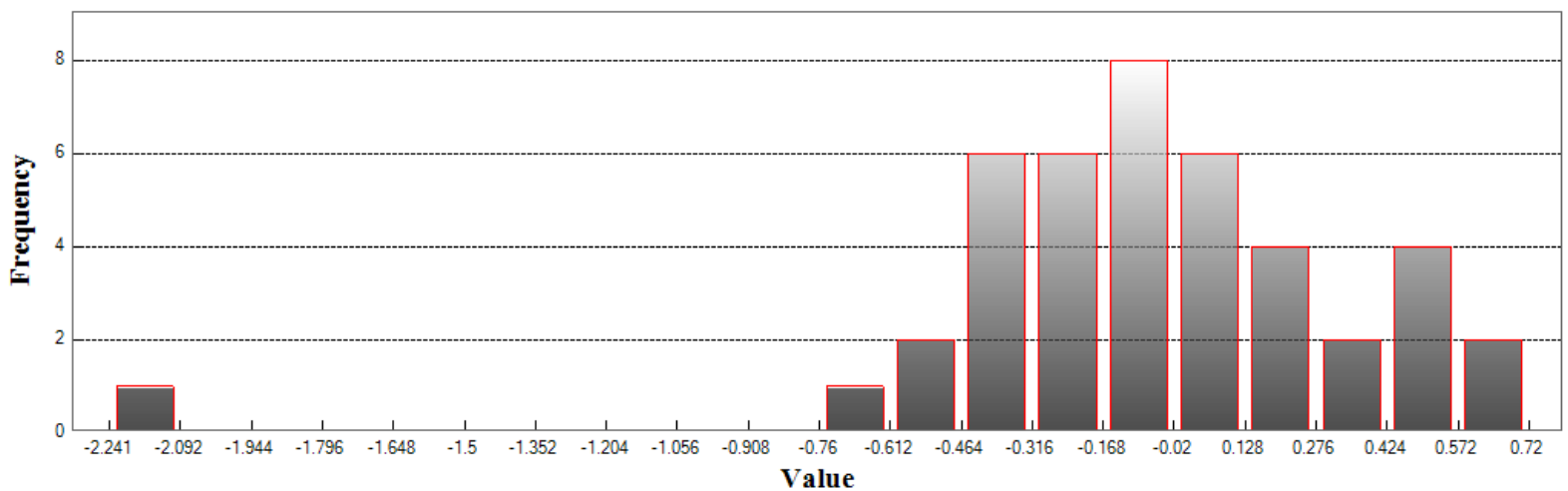


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -2.24
Maximum DZ: 0.72
Mean DZ: -0.073
Mean Magnitude DZ: 0.576
Number Observations: 42
Standard Deviation DZ: 0.487
RMSE Z: 0.487
95th Percentile: 0.72
Units: US Survey Feet

Histogram



Min: -2.24

Max: 0.72

Number Of Bins: 20

Bin Interval: 0.148

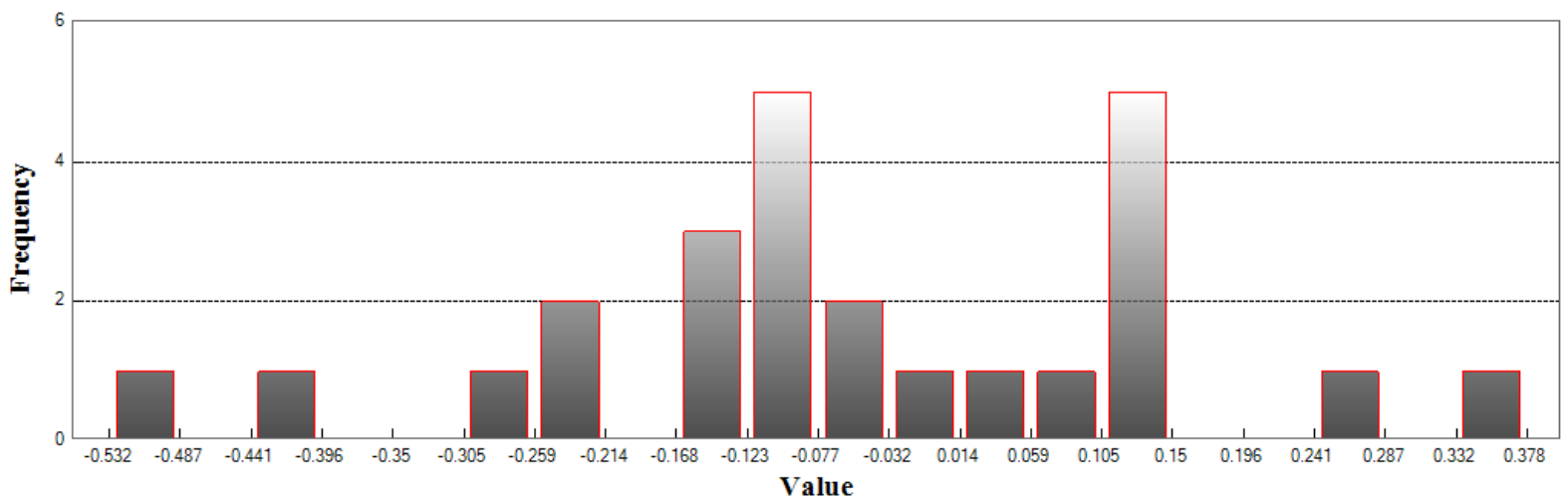


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.532
Maximum DZ: 0.378
Mean DZ: -0.06
Mean Magnitude DZ: 0.409
Number Observations: 25
Standard Deviation DZ: 0.203
RMSE Z: 0.208
95th Percentile: 0.43
Units: US Survey Feet

Histogram



Min: -0.532

Max: 0.378

Number Of Bins: 20

Bin Interval: 0.045

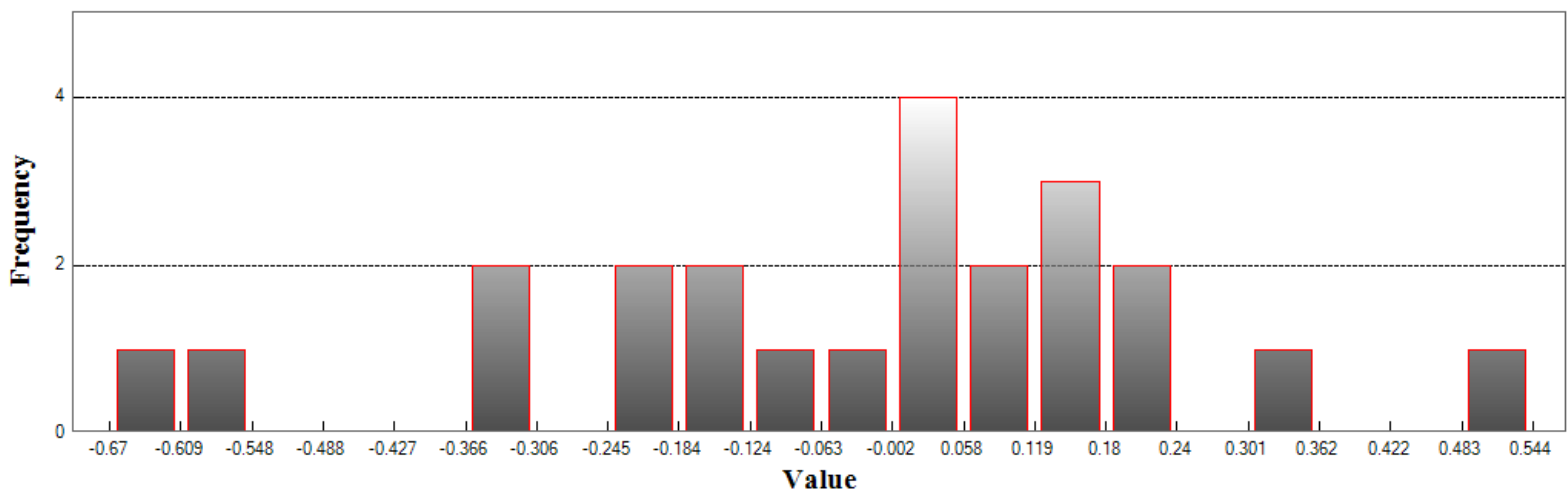


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.669
Maximum DZ: 0.544
Mean DZ: -0.039
Mean Magnitude DZ: 0.455
Number Observations: 23
Standard Deviation DZ: 0.279
RMSE Z: 0.276
95th Percentile: 0.606
Units: US Survey Feet

Histogram



Min: -0.669

Max: 0.544

Number Of Bins: 20

Bin Interval: 0.061

Station Name	PID	NAVD88			NAD83(2011) Epoch 2010.0			SPC Combined Factor
		Ellipsoid Height (m)	Orthometric Height (m)	Latitude DMS	Longitude DMS	SPC North (m)	SPC East (m)	
ALBEMARLE CORS ARP	DG5755	112.630	142.970	35 20 17.30339 N	080 12 48.52476 W	176846.600	499299.251	0.99985604
ASHEBORO 2 CORS ARP	DL6900	210.381	240.790	35 37 49.38501 N	079 45 53.75304 W	208859.939	540319.797	0.99986134
ASU-BOONE CORS ARP	DF4365	957.907	989.120	36 12 50.84473 N	081 40 54.64789 W	276616.959	368477.452	0.99986327
BEAUFORT CORS ARP	DK7561	-27.858	9.650	34 43 08.50895 N	076 40 18.99140 W	109995.822	822811.707	0.99991989
BODIE ISLAND CORS ARP	DO2877	-33.046	5.940	35 50 44.35730 N	075 33 48.94199 W	237848.248	919957.886	0.99993139
BRYSON CITY CORS ARP	DL2762	566.148	594.790	35 22 21.56251 N	083 30 23.37131 W	189293.916	200277.527	0.99978597
BURLINGTON CORS ARP	DF9213	173.401	203.610	36 05 29.58604 N	079 26 12.17620 W	259845.465	570271.809	0.99995269
BURNSVILLE 2007 CORS ARP	DL6201	748.693	778.830	35 54 29.30454 N	082 20 49.87834 W	244501.699	307532.708	0.99982060
BUXTON CORS ARP	DM5409	-25.445	13.270	35 15 58.08197 N	075 33 06.82885 W	173632.372	923246.647	0.99987661
CARTHAGE CORS ARP	DG5938	149.613	181.000	35 20 30.04880 N	079 23 05.08515 W	176632.942	574629.599	0.99985034
CASTLE HAYNE 2007 CORS ARP	DK7086	-22.806	13.900	34 20 40.22860 N	077 52 29.89892 W	66537.627	713112.699	1.0000050
CEDAR ISLAND CORS ARP	DL3071	-30.613	7.250	35 01 03.76013 N	076 18 55.28490 W	143939.877	854565.507	0.99988569
CLINTON CORS ARP	DK4041	23.862	58.490	34 59 25.65387 N	078 21 31.47816 W	137793.395	668139.845	0.99987918
CONCORD CORS ARP	DF7471	154.382	184.820	35 22 35.24392 N	080 33 51.11399 W	181542.684	467489.138	0.99985072
CRESWELL CORS ARP	DK7747	-28.220	8.918	35 54 56.93091 N	076 28 25.29176 W	243161.208	837585.924	0.99994407
DOBSON CORS ARP	DF5767	340.642	373.920	36 25 31.51455 N	080 43 11.71069 W	298143.588	455359.078	1.00002904
DUCK 3 CORS ARP	DK3334	-24.775	14.110	36 10 54.01098 N	075 45 04.79522 W	274539.934	901788.896	1.00000811
DURHAM COOP CORS ARP	DG9328	117.466	148.790	35 59 46.12942 N	078 53 58.03641 W	249177.805	618666.816	0.99993843
ELIZABETH CITY CORS ARP	DL6896	-29.750	7.600	36 20 28.79075 N	076 15 29.27386 W	290874.906	855730.326	1.00005810
ELIZABETHTOWN CORS ARP	DI1680	-9.537	25.460	34 39 13.60147 N	078 31 11.73447 W	100363.878	653606.669	0.99992817
FAYETTEVILLE 2006 CORS ARP	DH9594	16.914	50.450	35 02 02.48998 N	078 52 14.73160 W	142444.626	621393.108	0.99987712
FORT FISHER CORS ARP	DM3521	-29.165	8.320	33 57 38.26113 N	077 56 18.76581 W	23891.297	707718.933	1.00012861
FRANKLIN CORS ARP	DG4257	620.895	649.270	35 11 30.68622 N	083 23 41.74673 W	168802.916	209516.356	0.99977570
GASTON CORS ARP	DE8425	213.712	245.140	35 18 39.79151 N	081 11 19.54124 W	175361.640	410593.642	0.99983959
GATESVILLE CORS ARP	DL6898	-20.472	15.650	36 26 12.65517 N	076 43 16.51658 W	300420.808	813921.941	1.00008983
GOLDSBORO CORS ARP	DK5550	14.068	48.900	35 25 16.86892 N	078 03 30.57562 W	185808.939	695094.939	0.99987475
GREENVILLE NC CORS ARP	DL7337	4.907	40.810	35 36 18.30987 N	077 21 55.47952 W	207005.628	757690.324	0.99989078
HAYWOOD CORS ARP	DE8228	809.314	838.220	35 31 35.39633 N	082 55 30.12730 W	204104.221	253736.164	0.99975705
HENDERSONVILLE CORS ARP	DK7853	654.472	684.850	35 21 21.89173 N	082 30 03.99653 W	183772.967	291488.002	0.99977154
HICKORY CORS ARP	DM3523	326.299	358.470	35 44 31.01014 N	081 18 30.93483 W	223397.889	400811.751	0.99985789
HIGH POINT CORS ARP	AI4198	267.948	299.220	35 57 56.48686 N	080 00 48.93737 W	246260.723	518178.455	0.99990805
I77 WELCOME CNTR CORS ARP	DF6318	157.556	187.950	35 07 21.25422 N	080 54 58.46768 W	153944.753	434964.997	0.99985039
JACKSON NC CORS ARP	DH7133	13.257	47.680	36 24 30.56335 N	077 26 15.30879 W	296031.384	749749.096	1.00007439
JACKSONVILLE CORS ARP	DK6239	-26.125	10.950	34 44 46.81575 N	077 27 11.71789 W	111628.027	751216.799	0.99991534
JORDAN LAKE CORS ARP	DL3891	45.996	77.430	35 46 52.49646 N	079 02 03.92766 W	225330.877	606489.109	0.99990797
KENANSVILLE CORS ARP	DI1071	15.560	51.360	34 56 30.49763 N	077 58 49.94532 W	132685.360	702719.518	0.99988470
KINSTON CORS ARP	DM3989	-3.126	32.790	35 19 18.56728 N	077 36 49.27040 W	175242.563	735637.711	0.99987383
LEXINGTON CORS ARP	DG5757	194.102	225.340	35 48 53.14318 N	080 13 46.20206 W	229736.512	498497.891	0.99989030
LILLINGTON 2004 CORS ARP	DG5759	25.706	58.730	35 25 12.54674 N	078 48 40.33946 W	185286.626	626745.253	0.99987286
LUMBERTON CORS ARP	DI1682	15.824	49.560	34 37 36.33605 N	079 04 39.69481 W	97263.238	602477.201	0.99992918

Note: Published positional informaton of published Continuous Operating Reference Stations (CORS) are denoted in meters (m).

Station Name	PID	NAVD88			NAD83(2011) Epoch 2010.0		SPC North (m)	SPC East (m)	SPC Combined Factor
		Ellipsoid Height (m)	Orthometric Height (m)	Latitude DMS	Longitude DMS				
MARION CORS ARP	DE8230	366.984	398.800	35 39 13.38510 N	081 57 16.17206 W	215162.325	342120.619	0.99983954	
MARSHALL CORS ARP	DG7400	560.633	590.850	35 48 47.31356 N	082 41 22.67321 W	235064.443	276250.707	0.99983251	
MONROE CORS ARP	DF5880	144.332	174.600	34 58 54.77687 N	080 31 25.79009 W	137720.671	470484.517	0.99986097	
MOORESVILLE CORS ARP	DH3838	266.205	297.570	35 34 46.87707 N	080 48 12.53662 W	204453.424	446161.276	0.99984714	
MORGANTON CORS ARP	DH7137	344.831	377.000	35 42 27.07386 N	081 39 23.99857 W	220367.093	369236.777	0.99985003	
MURPHY CORS ARP	DL1890	476.123	504.800	35 04 06.77760 N	083 57 59.36142 W	157594.804	156842.278	0.99980296	
NASHVILLE CORS ARP	DK7576	34.500	68.960	35 58 09.06797 N	078 01 11.34161 W	246618.195	698006.712	0.99994546	
NCSA SALISBURY CORS ARP	DN5840	174.906	206.250	35 42 41.69212 N	080 25 55.99488 W	218535.902	480015.188	0.99987726	
NCSO SWANQUARTER2 CORS ARP	DQ9090	-29.912	8.020	35 23 40.93853 N	076 19 31.76835 W	185719.856	852514.443	0.99988038	
NEW BERN NCGS CORS ARP	DN8739	-16.105	21.070	35 06 45.99769 N	077 06 14.29783 W	152823.201	782416.342	0.99987805	
NEWLAND 2007 CORS ARP	DM3991	1124.527	1155.410	36 04 39.95811 N	081 54 40.29398 W	262073.985	347419.061	0.99979994	
NORTH WILKESBORO CORS ARP	DK4047	270.426	303.570	36 09 59.27542 N	081 07 57.22423 W	270132.288	417741.217	0.99985750	
PARI_OBS_NC_2008 CORS ARP	DM6192	880.094	909.630	35 12 06.96417 N	082 52 20.90284 W	167939.378	257095.138	0.99973486	
PEA ISLAND CORS ARP	DG5313	-31.109	7.780	35 41 02.04056 N	075 28 56.35040 W	220170.749	927930.973	0.99990584	
PITTSBORO CORS ARP	DE8234	102.804	133.850	35 43 11.21331 N	079 10 38.62673 W	218525.196	593551.641	0.99988974	
POLKTON CORS ARP	DG7402	84.929	115.530	34 59 33.17297 N	080 10 37.85763 W	138473.153	502143.744	0.99986944	
RALEIGH CORS ARP	AJ2913	142.997	175.910	35 47 12.85298 N	078 38 19.41118 W	226017.117	642259.673	0.99989367	
RALEIGH DOT CORS ARP	DG4687	51.789	85.400	35 45 49.50795 N	078 34 44.39448 W	223469.874	647669.715	0.99990429	
REIDSVILLE CORS ARP	DM3525	234.815	266.700	36 21 42.71489 N	079 39 56.54007 W	289954.707	549851.005	1.00002348	
ROBBINSVILLE CORS ARP	DM3993	606.659	635.150	35 19 15.69235 N	083 47 48.68948 W	184808.885	173646.886	0.99977812	
ROCKINGHAM CORS ARP	DM3995	91.872	122.950	34 57 51.98780 N	079 47 47.74087 W	135010.039	536859.244	0.99987067	
ROXBORO CORS ARP	DM3527	194.654	225.650	36 23 28.05620 N	078 59 54.41890 W	293001.606	609740.318	1.00003983	
SANFORD CORS ARP	AM7024	95.450	127.140	35 28 24.67784 N	079 09 28.98436 W	191202.330	595258.352	0.99986507	
SHALLOTTE CORS ARP	DK3336	-10.002	25.750	33 58 57.20129 N	078 23 24.30664 W	25972.444	665965.745	1.00011715	
SHELBY CORS ARP	DG7404	264.465	296.210	35 16 53.64241 N	081 29 28.11569 W	172739.799	383023.692	0.99983123	
SMITHFIELD CORS ARP	DK6525	24.469	58.660	35 33 49.60980 N	078 20 10.80495 W	201405.073	669760.307	0.99988353	
SPARTA CORS ARP	DL1707	839.991	871.970	36 29 51.90632 N	081 06 52.93270 W	306852.726	420130.758	0.99997742	
SPINDALE CORS ARP	DK4043	302.765	334.650	35 21 55.83430 N	081 54 57.34807 W	183099.887	344671.752	0.99982704	
STATESVILLE CORS ARP	DK7549	228.842	261.190	35 51 19.72891 N	080 50 55.47790 W	235120.895	442629.732	0.99989208	
SW COMMUNITY COLL CORS ARP	DH3874	645.113	673.650	35 20 52.40748 N	083 12 23.38897 W	185353.255	227392.744	0.99977276	
SWANNANOVA CORS ARP	DG5311	659.842	689.830	35 35 46.03847 N	082 25 24.22964 W	210140.053	299464.372	0.99978706	
SWANQUARTER CORS ARP	DL1892	-30.398	7.510	35 23 40.86368 N	076 19 33.37884 W	185716.456	852473.883	0.99988046	
TARBORO CORS ARP	DK7578	-0.513	34.830	35 52 56.96198 N	077 34 21.39610 W	237489.266	738477.556	0.99993315	
TROY CORS ARP	DK4045	144.044	174.590	35 22 01.84517 N	079 52 12.77094 W	179740.437	530528.389	0.99985200	
WALNUT COVE CORS ARP	DL1894	276.319	309.540	36 22 19.68806 N	080 11 05.62514 W	291528.706	503266.558	1.00002046	
WARRENTON CORS ARP	DM3529	76.208	109.530	36 23 41.68571 N	078 10 13.74958 W	293732.691	684023.061	1.00005974	
WASHINGTON 2007 CORS ARP	DK7551	-25.416	11.220	35 33 34.78484 N	077 03 31.44193 W	202467.748	785569.672	0.99989097	
WASHINGTON CORS ARP	AJ2915	-25.317	11.260	35 33 34.80249 N	077 03 31.54255 W	202468.242	785567.128	0.99989095	
WEST JEFFERSON CORS ARP	DL2082	934.802	966.060	36 23 34.94821 N	081 28 42.26843 W	295989.718	387260.230	0.99992435	
WHITEVILLE CORS ARP	DJ8943	-2.342	32.360	34 16 49.59006 N	078 42 59.33169 W	58881.567	635708.028	1.00001544	
WILLIAMSTON 2 CORS ARP	DN8741	-21.901	14.180	35 49 49.75739 N	077 02 06.20973 W	232550.205	787120.808	0.99992694	
WILLIAMSTON CORS ARP	DF8715	-20.544	15.530	35 49 48.75037 N	077 02 04.93157 W	232519.811	787153.494	0.99992667	
WILMINGTON CORS ARP	AJ2917	-24.775		34 14 09.45795 N	077 55 45.16083 W	54442.078	708252.321	1.00003228	
WILSON CORS ARP	DK7563	11.179	46.030	35 42 26.29637 N	077 55 57.08393 W	217645.964	706192.128	0.99990236	
WINSTON SALEM CORS ARP	DH5853	254.046	286.560	36 04 15.67829 N	080 13 37.75017 W	258164.236	499061.500	0.99993484	

Note: Published positional informaton of published Continuous Operating Reference Stations (CORS) are denoted in meters (m).

Acronyms, Abbreviations, and Definitions

ARP – Antenna Reference Point

CORS – Continuous Operating Reference Station

DMS – Degrees Minutes Seconds

m – Meter

PID – Permanent Identifier

SPC – State Plane Coordinates

Statistical Definitions:

Nonvegetated Vertical Accuracy (NVA) – The vertical accuracy at the 95-percent confidence level in nonvegetated open terrain, where errors should approximate a normal distribution.

Supplemental Vertical Accuracy (SVA) – Term for reporting the vertical accuracy at the 95th percentile in each separate land cover category where vertical errors may not follow a normal error distribution.

Vegetated Vertical Accuracy (VVA) – An estimate of the vertical accuracy, based on the 95th percentile, in vegetated terrain where errors do not necessarily approximate a normal distribution.

Minimum DZ – This statistic represents the change in value between the Z-coordinate location based on LiDAR and Z-coordinate location in the survey. The minimum of each simply represents the smallest value out of all of the analyzed locations. This component of the statistics can be used to show which locations most closely correspond to the surveyed points.

Maximum DZ – This statistic represents the change in value between the Z-coordinate location based on LiDAR and Z-coordinate location in the survey. The maximum value of each represents the largest value out of all of the analyzed locations. Maximum values can be used to show which locations most closely correspond to the surveyed points.

Mean DZ - The statistic of the mean DZ is intended to show the average values of the DZ. These statistics show the change in value between the Z-coordinate location based on LiDAR and Z-coordinate location in the survey. The mean values can be used to show the average off-sets of all of the analyzed locations

Mean Magnitude DZ - The statistic of the mean DZ is intended to show the average values of the DZ. These statistics show the change in value between the Z-coordinate location based on LiDAR and Z-coordinate location in the survey. The mean values can be used to show the average off-sets of all of the analyzed locations.

Number Observations – Number of observations

Standard Deviation DZ - A measure of spread or dispersion of a sample of errors around the sample mean error. It is a measure of precision, rather than accuracy; the standard deviation does not account for uncorrected systematic errors.

RMSE Z - The square root of the average of the set of squared differences between dataset coordinate values and coordinate values from an independent source of higher accuracy for identical points. The RMSE is used to estimate the absolute accuracy of both horizontal and vertical coordinates when standard or accepted values are known, as with GPS-surveyed check points of higher accuracy than the data being tested. In the United States, the independent source of higher accuracy is expected to be at least three times more accurate than the dataset being tested. RMSE Z measures RMSE in the Z direction only.

95th Percentile – A measure used in statistics indicating the value below which a given percentage of observations (absolute values of errors) in a group of observations fall. For example, the 95th percentile is the value (or score) below which 95 percent of the observations may be found.