

C-2 Report on Multiple Discrete Returns

The USGS Lidar Base Specification Version 2.1 states: "Deriving and delivering multiple discrete returns are required in all conventional lidar data collection efforts. Data collection shall be capable of at least three returns per pulse. Full waveform collection is acceptable and is promoted; however, full waveform data are regarded as supplemental information."

The purpose of this section is to report on the presence and quantities of lidar returns in the LAS data. Empty return columns can indicate a collection or processing problem dealing with lidar return attribute information.

[Data Source - D:\00_Cherry\Client_Swaths](#)

File	First return	Second return	Third return	Other returns	Total points
CS_00200.las	181,628	62,337	17,082	2,183	263,230
CS_00201.las	12,166,700	4,643,028	1,494,664	259,459	18,563,851
CS_00202.las	3,838,562	1,093,903	316,604	46,597	5,295,666
CS_00204.las	26,707,472	11,577,598	3,724,633	723,754	42,733,457
CS_00205.las	47,756,852	20,255,267	6,109,435	1,190,682	75,312,236
CS_00207.las	75,617,931	29,613,687	7,910,549	1,443,637	114,585,804
CS_00208.las	94,161,314	34,719,105	8,209,585	1,377,561	138,467,565
CS_00210.las	108,077,840	38,196,023	7,625,771	1,094,647	154,994,281
CS_00211.las	116,550,820	33,847,529	5,780,604	712,718	156,891,671
CS_00212.las	226,866	93,961	27,831	4,056	352,714
CS_00213.las	11,969,579	5,080,495	1,710,324	286,227	19,046,625
CS_00214.las	3,878,873	1,249,508	391,539	60,883	5,580,803
CS_00216.las	26,015,045	12,365,594	4,374,552	930,731	43,685,922
CS_00217.las	48,823,149	22,519,660	7,295,003	1,579,417	80,217,229
CS_00219.las	76,246,033	31,164,465	8,872,571	1,762,267	118,045,336
CS_00220.las	94,161,438	37,141,175	9,504,020	1,856,572	142,663,205
CS_00222.las	107,826,617	38,046,620	8,177,826	1,400,596	155,451,659
CS_00223.las	115,502,937	36,298,393	6,511,189	955,617	159,268,136
CS_00224.las	125,132,367	37,617,624	6,039,597	693,523	169,483,111
CS_00225.las	132,319,199	32,810,081	4,720,462	424,661	170,274,403
CS_00226.las	133,629,418	29,036,605	3,343,631	246,154	166,255,808
CS_00228.las	138,502,522	24,549,803	2,271,956	128,364	165,452,645
CS_00230.las	141,780,520	22,758,097	1,862,420	91,018	166,492,055
CS_00231.las	149,963,282	22,569,735	2,007,382	98,954	174,639,353
CS_00232.las	150,268,248	22,743,799	2,106,145	114,097	175,232,289
CS_00234.las	124,315,468	37,443,035	6,418,114	854,155	169,030,772
CS_00235.las	132,051,630	35,397,412	5,080,198	492,464	173,021,704

C-2 Report on Multiple Discrete Returns - continued

File	First return	Second return	Third return	Other returns	Total points
CS_00236.las	133,389,364	28,925,433	3,405,812	256,679	165,977,288
CS_00238.las	138,550,126	25,962,982	2,258,234	129,977	166,901,319
CS_00240.las	141,730,122	23,230,618	1,865,429	86,003	166,912,172
CS_00241.las	149,780,017	23,439,256	1,889,126	86,482	175,194,881
CS_00242.las	149,909,715	23,345,259	2,069,573	103,427	175,427,974
CS_00244.las	156,013,558	23,256,259	2,264,351	128,951	181,663,119
CS_00245.las	156,454,977	23,132,258	2,315,141	140,604	182,042,980
CS_00246.las	156,979,073	22,297,986	2,233,399	134,592	181,645,050
CS_00247.las	152,330,454	21,471,369	2,240,882	136,711	176,179,416
CS_00248.las	156,228,199	24,078,629	2,224,313	118,345	182,649,486
CS_00249.las	156,084,480	23,478,335	2,192,673	118,353	181,873,841
CS_00250.las	157,413,813	23,150,324	2,184,629	120,959	182,869,725
CS_00251.las	151,070,928	21,752,418	2,022,906	106,894	174,953,146
CS_00252.las	4,769,483	422,670	32,127	783	5,225,063
CS_00254.las	16,514,492	1,469,999	110,064	3,120	18,097,675
CS_00256.las	32,454,974	2,812,727	195,903	5,499	35,469,103
CS_00257.las	41,727,757	3,424,515	219,280	5,450	45,377,002
CS_00258.las	4,333,605	382,774	25,558	448	4,742,385
CS_00260.las	16,761,761	1,581,992	103,132	2,047	18,448,932
CS_00262.las	32,978,509	2,995,002	173,840	3,177	36,150,528
CS_00263.las	42,199,808	3,680,288	209,070	4,037	46,093,203
CS_00264.las	5,105,538	1,568,226	399,817	43,945	7,117,526
CS_00265.las	13,856,047	5,079,086	1,285,873	143,249	20,364,255
CS_00266.las	28,608,261	10,779,887	2,574,929	282,199	42,245,276
CS_00267.las	53,041,650	19,057,713	4,084,098	434,266	76,617,727
CS_00268.las	80,411,576	28,077,287	5,854,514	687,561	115,030,938
CS_00269.las	99,219,316	31,236,433	5,381,471	544,205	136,381,425
CS_00270.las	115,322,649	34,979,892	5,001,679	414,045	155,718,265
CS_00271.las	126,405,850	31,381,911	3,789,863	269,189	161,846,813
CS_00272.las	142,683,050	33,015,064	3,602,544	220,028	179,520,686
CS_00273.las	173,763,687	24,367,871	2,663,713	162,972	200,958,243
CS_00274.las	170,340,896	24,224,078	2,943,566	186,433	197,694,973
CS_00276.las	178,325,734	25,806,718	3,255,774	211,512	207,599,738
CS_00278.las	171,120,277	25,810,040	3,547,424	248,014	200,725,755

C-2 Report on Multiple Discrete Returns - continued

<u>File</u>	<u>First return</u>	<u>Second return</u>	<u>Third return</u>	<u>Other returns</u>	<u>Total points</u>
CS_00279.las	173,512,864	26,200,049	3,650,611	262,067	203,625,591
CS_00280.las	178,029,363	26,268,785	3,795,456	292,553	208,386,157
CS_00281.las	5,213,417	1,758,664	448,155	43,741	7,463,977
CS_00282.las	13,602,214	5,080,120	1,221,822	118,751	20,022,907
CS_00283.las	29,542,086	11,272,349	2,416,699	207,676	43,438,810
CS_00284.las	52,100,964	18,925,057	3,703,368	323,271	75,052,660
CS_00285.las	80,668,889	27,339,268	5,176,230	522,219	113,706,606
CS_00286.las	98,202,419	30,897,592	5,078,905	489,143	134,668,059
CS_00287.las	114,381,040	30,597,725	3,654,453	247,958	148,881,176
CS_00288.las	124,700,579	30,849,756	3,306,213	218,525	159,075,073
CS_00289.las	141,661,386	29,949,515	2,758,219	130,968	174,500,088
CS_00290.las	173,961,966	26,029,614	2,555,306	138,468	202,685,354
CS_00291.las	169,713,751	25,885,229	2,822,829	162,209	198,584,018
CS_00293.las	178,661,706	27,635,961	3,106,444	182,355	209,586,466
CS_00295.las	171,300,208	27,517,509	3,286,930	199,895	202,304,542
CS_00296.las	174,041,179	27,893,030	3,362,875	208,584	205,505,668
CS_00297.las	178,112,310	27,326,533	3,343,124	212,454	208,994,421
CS_00298.las	192,466,847	25,355,180	3,494,597	282,311	221,598,935
CS_00299.las	178,390,383	20,402,669	2,446,721	182,908	201,422,681
CS_00300.las	178,663,094	19,491,258	2,018,326	123,173	200,295,851
CS_00302.las	171,842,829	17,616,181	1,721,547	103,315	191,283,872
CS_00304.las	179,223,745	16,826,565	1,546,228	91,413	197,687,951
CS_00305.las	151,929,681	13,445,682	1,261,605	69,465	166,706,433
CS_00306.las	146,726,898	13,831,482	1,622,770	117,150	162,298,300
CS_00307.las	135,896,198	13,490,334	1,770,050	136,866	151,293,448
CS_00308.las	192,606,368	26,015,082	3,104,379	208,034	221,933,863
CS_00309.las	178,489,874	21,204,075	2,374,743	163,596	202,232,288
CS_00310.las	178,917,827	20,077,499	1,856,432	94,965	200,946,723
CS_00312.las	171,441,362	18,506,234	1,657,518	86,726	191,691,840
CS_00314.las	180,069,664	17,568,711	1,383,248	62,830	199,084,453
CS_00315.las	151,181,949	13,845,539	1,168,025	57,262	166,252,775
CS_00316.las	147,459,943	14,336,602	1,488,522	92,004	163,377,071
CS_00317.las	135,773,375	14,151,147	1,694,087	118,110	151,736,719
CS_00318.las	117,593,431	11,926,512	1,519,250	106,370	131,145,563

C-2 Report on Multiple Discrete Returns - continued

<u>File</u>	<u>First return</u>	<u>Second return</u>	<u>Third return</u>	<u>Other returns</u>	<u>Total points</u>
CS_00320.las	86,877,931	8,200,813	960,950	70,051	96,109,745
CS_00322.las	61,626,443	5,467,027	519,024	28,092	67,640,586
CS_00323.las	48,239,778	4,136,846	280,556	8,625	52,665,805
CS_00324.las	117,422,295	11,965,466	1,240,351	69,482	130,697,594
CS_00326.las	87,202,535	8,671,915	904,973	56,436	96,835,859
CS_00328.las	61,670,857	5,551,500	427,735	16,956	67,667,048
CS_00329.las	48,505,895	4,302,350	265,245	7,182	53,080,672
Total	11,061,177,599	1,990,383,263	286,938,915	30,685,309	13,369,185,086