

## C-2 Report on Multiple Discrete Returns

The USGS Lidar Base Specification 2022 rev. A 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."

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 - C:\00\\_ISGS\Swaths](#)

File	First return	Second return	Third return	Other returns	Total points
CS_00001.las	543,428,573	11,595,208	3,099,538	403,621	558,526,940
CS_00002.las	529,373,580	31,358,145	9,826,574	2,017,690	572,575,989
CS_00003.las	854,557,951	33,474,637	10,470,825	1,795,603	900,299,016
CS_00004.las	946,777,605	35,925,749	10,797,449	1,752,398	995,253,201
CS_00005.las	161,998,780	2,469,159	613,482	70,892	165,152,313
CS_00006.las	732,891,854	24,901,702	7,436,724	1,188,576	766,418,856
CS_00008.las	630,536,852	23,887,467	7,391,945	1,215,822	663,032,086
CS_00009.las	79,998,178	4,096,297	1,124,409	151,224	85,370,108
CS_00010.las	303,173,441	13,464,138	3,780,231	547,083	320,964,893
CS_00011.las	328,389,169	12,853,362	3,833,987	605,304	345,681,822
CS_00012.las	675,404,386	21,690,776	5,998,935	871,921	703,966,018
CS_00013.las	1,072,159,121	64,152,858	16,123,206	2,066,933	1,154,502,118
CS_00014.las	292,991,451	5,821,969	1,331,002	159,974	300,304,396
CS_00015.las	1,216,460,122	87,116,758	21,598,276	2,673,661	1,327,848,817
CS_00016.las	1,114,587,124	79,977,550	19,275,054	2,385,107	1,216,224,835
CS_00017.las	601,984,464	37,920,578	9,620,145	1,319,523	650,844,710
CS_00018.las	890,753,980	64,754,003	16,526,067	2,216,767	974,250,817
CS_00019.las	1,018,473,557	77,101,752	19,046,033	2,495,259	1,117,116,601
CS_00021.las	42,779,078	298,400	52,469	11,527	43,141,474
CS_00026.las	204,819,103	18,600,132	6,548,718	1,228,506	231,196,459
CS_00027.las	507,412,047	39,816,806	13,662,644	2,439,774	563,331,271
CS_00032.las	495,461,034	36,778,285	12,347,662	2,112,415	546,699,396
CS_00042.las	1,526,589,626	19,944,781	4,475,845	434,134	1,551,444,386
CS_00044.las	1,468,230,688	16,639,731	3,699,838	347,387	1,488,917,644
CS_00045.las	1,018,044,657	43,871,103	12,559,769	1,886,540	1,076,362,069
CS_00047.las	1,286,504,869	29,732,249	6,241,159	745,745	1,323,224,022
CS_00049.las	1,052,434,461	42,717,693	12,146,655	1,733,384	1,109,032,193
CS_00050.las	1,117,012,451	35,166,623	7,717,518	844,985	1,160,741,577

## *C-2 Report on Multiple Discrete Returns - continued*

File	First return	Second return	Third return	Other returns	Total points
CS_00051.las	504,896,778	5,798,248	793,503	38,674	511,527,203
CS_00052.las	530,882,168	23,587,169	6,528,054	895,531	561,892,922
CS_00053.las	231,025,399	504,769	85,671	5,806	231,621,645
CS_00055.las	1,264,378,942	33,281,312	7,379,603	738,863	1,305,778,720
CS_00057.las	284,117,727	7,419,188	1,587,171	171,574	293,295,660
CS_00058.las	1,430,408,056	32,078,608	6,775,894	640,301	1,469,902,859
CS_00059.las	1,532,599,648	35,544,074	7,558,723	745,835	1,576,448,280
CS_00060.las	188,928,595	4,171,816	858,363	90,492	194,049,266
CS_00062.las	1,548,365,285	21,783,238	5,124,595	579,938	1,575,853,056
CS_00063.las	1,430,679,743	25,545,858	5,863,742	644,289	1,462,733,632
CS_00064.las	1,641,156,019	27,924,382	6,164,718	634,858	1,675,879,977
CS_00065.las	1,439,451,728	27,649,576	6,930,205	880,078	1,474,911,587
CS_00066.las	1,072,009,211	35,261,962	7,524,250	735,834	1,115,531,257
CS_00067.las	1,064,359,548	36,640,835	8,029,311	809,229	1,109,838,923
CS_00068.las	1,017,811,439	30,568,392	6,500,297	615,670	1,055,495,798
CS_00069.las	1,083,672,142	26,547,894	5,506,979	508,739	1,116,235,754
CS_00070.las	1,036,676,380	34,579,429	7,493,487	715,896	1,079,465,192
CS_00071.las	1,256,842,837	19,829,336	3,577,354	264,418	1,280,513,945
CS_00072.las	1,316,822,183	20,176,835	3,916,684	331,352	1,341,247,054
CS_00073.las	1,258,083,597	18,680,961	3,681,826	316,877	1,280,763,261
CS_00074.las	1,013,970,476	24,234,150	5,146,057	487,608	1,043,838,291
CS_00077.las	1,086,947,356	18,553,430	4,511,588	521,812	1,110,534,186
CS_00079.las	566,995,482	11,321,149	2,195,075	189,780	580,701,486
CS_00080.las	436,859,164	4,890,638	1,134,314	120,140	443,004,256
CS_04131.las	7,963,428	68,746	5,571	349	8,038,094
CS_05921.las	257,725,481	30,049,444	2,393,051	285,248	290,453,224
CS_06931.las	48,840,389	4,507,052	366,078	44,336	53,757,855
Total	45,265,697,403	1,477,326,402	364,978,323	47,735,282	47,155,737,410