First example, BRAC on 18 Dec 2004, with a mix of positive and negative counted birds.

Here we counted nearly 1000 BRAC early in the survey, but also apparently missed 567 in precount areas or section 1.

				Cumulative			
BRAC 2004-12-18	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	0	-2	0	2	0	-2	
2							
3							
4							

In section 1, we passed 0 BRAC and 2 passed us. There are 0 known BRAC behind us and 2 known BRAC ahead of us at the end of section 1,

We set the draft number of Section 1 BRAC to 0.

We want to add those -2 back to section 1 so we set add backward to 2.

Because we're adding those 2 to section 1, we want to avoid adding them to a future section if we encounter them again, so we set carried forward to -2.

				Cumulative			
BRAC 2004-12-18	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	0	-2	0	2	0	-2	
2	923	-254	921	256	923	-254	
3							
4							
In section 2, we passed 923 BRAC and 254 passed us.							

At the end of section 2 there are a total of 923 known BRAC behind the boats. 2 of those have been encountered twice, first when they flew forward in section 1, and second when we passed them in section 2. The remaining 921 are uniquely new to section 2, so we set the draft number of BRAC in section 2 to 921.

The -254 in section 2 are a larger number than the net positives from previous sections (0) so cannot be explained by those birds, and they can't be both in front of and behind the boats at the end of section 2 so cannot be explained by the 923 positives in section 2. Thus, a logical conclusion is that we missed those birds somewhere in section 1 (either in the precount areas or in the section 1 boat area). We now have a cumulative 2 + 254 = 256 BRAC to add back.

Because the -2 from section 1 were subtracted from the 923 in section 2 to arrive at the section 2 draft, they should not be subtracted again from future sections. Thus, only the section 2 negatives should be subtracted from future sections, so we set known ahead to -254.

				Cumulative			
BRAC 2004-12-18	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	0	-2	0	2	0	-2	
2	923	-254	921	256	923	-254	
3	3	-1237	0	570	3	-1488	
4							

In section 3 we passed 3 BRAC and 1237 passed us.

We assume the 3 new BRAC behind the boats were among the 254 flying forward from section 2, so we set the draft number of BRAC in section 3 to 0.

Of the 1237 BRAC that flew past us in section 3, we assume 923 were among the birds that were behind us at the start of section 3. That leaves -1237 + 923 = 314 that cannot be explained by previously encountered birds and must be added backward. Again, we assume those were missed in section 1. We now have cumulative 314 + 256 = 570 to add backward to section 1.

Because we assume the 3 section 3 positives were among the -254 known ahead at the start of section 3, we now have -254 + 3 + -1237 = -1488 known BRAC ahead of the boats that were assigned to sections 1-3, so we set carried forward negatives to -1488.

				Cumulative			
BRAC 2004-12-18	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	0	-2	0	2	0	-2	
2	923	-254	921	256	923	-254	
3	3	-1237	0	570	3	-1488	
4	573	-2	0	570	574	-917	

In section 4 we passed 573 BRAC and 2 passed us.

All 573 positive BRAC can be explained by the 1488 BRAC that were already assigned to sections 1-3, so we set the draft number of BRAC in section 4 to 0.

We now have -1488 + 573 + -2 = -917 known BRAC ahead of us. These birds apparently left the bay ahead of us but since they were already assigned somewhere in sections 1-3 we let them go.

We assume the -2 in section 4 were among the 3 known to be behind the boats at the start of section 4, so there are no new BRAC to be added backward.

				Cumulative			
BRAC 2004-12-18	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	0	-2	0	2	0	-2	570
2	923	-254	921	254	923	-254	921
3	3	-1237	0	568	3	-1488	0
4	573	-2	0	570	574	-917	0
							1491

Now we add the backward BRAC back to section 1. We thus end up with a final 570 BRAC for section 1. We add no additional birds to sections 2-4.

And we arrive at a total of 1491 (570 + 921) uniquely encountered BRAC in the entire bay.

The original negative machine ended up with 0 in section 1, 923 in section 2, 3 in section 3, and 574 in section 4 for a total of 1500 BRAC in the entire bay.
Thus, the total is similar between the two methods, but they yield very different spatial distributions of birds in the bay.

Next, BRAC on 8 Feb 2009, with a mix of positive and negative counted birds, including a very large net negative.

				Cumulative			
BRAC 2009-02-08	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	0	0	0	0	0	0	
2							
3							
4							

At the end of section 1, we have passed 0 BRAC and 0 have passed us. The draft number of BRAC in section 1 and the number carried forward are 0, and birds cannot be added backward from section 1.

				Cumulative			
BRAC 2009-02-08	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	0	0	0	0	0	0	
2	2954	-7805	2954	7805	2954	-7895	
3							
4							

In section 2 we passed 2954 BRAC and 7805 passed us. We now have 2954 known BRAC behind the boats and 7805 known BRAC ahead of the boats.

Since no negative BRAC have flown forward from previous sections, we set the draft number of BRAC in section 2 to the value of the positives: 2954.

The -7805 that passed us cannot be explained by BRAC we encountered in section 1 (0), so we must assume that we somehow missed them in section 1. We set add backward to 7805, and since we have added those backward, we must also subtract them from any subsequently encountered BRAC, so we set known ahead to -7805.

				Cumulative			
BRAC 2009-02-08	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	0	0	0	2	0	0	
2	2954	-7805	2954	7805	2954	-7895	
3	8	-12	0	7805	2950	-7809	
4							

In section 3 we passed 8 BRAC and 12 passed us.

The 8 we passed can be explained by the 7805 that flew forward from section 2, so we set the draft number of BRAC in section 3 to 0 (i.e., those 8 have already been assigned to sections 1-2).

We now have a total of 7809 BRAC that have passed us (absolute value of -7805 + 8 + -12) but were assigned to sections 1-3, so we set carry forward to -7809.

The 12 new negatives can be explained by the 2954 positives from section 2, so there are no new birds to send backward. The cumulative add backward for section 3 is the same as section 2.

				Cumulative			
BRAC 2009-02-08	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	0	0	0	2	0	0	
2	2954	-7805	2954	7805	2954	-7895	
3	8	-12	0	7805	2950	-7809	
4	17	0	0	7805	2967	-7792	

In section 4 we passed 17 BRAC and 0 passed us.

These 17 can be explained by the -7809 that are know to be ahead of the boats (i.e., they have already been assigned to sections 1-3), so we set the draft number of BRAC in section 4 to 0.

We now have 7792 BRAC ahead of the boats that have apparently left the bay. Since they have been assigned to sections 1-3, we let them go.

There are no new unexplained (unassigned) BRAC to add backward. The cumulative add backward for section 4 is the same as section 3.

				Cumulative			
BRAC 2009-02-08	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	0	0	0	2	0	0	7805
2	2954	-7805	2954	7805	2954	-7895	2954
3	8	-12	0	7805	2950	-7809	0
4	17	0	0	7805	2967	-7792	0
							10759

We can now add any birds backward to section 1, for a total of 10759 BRAC in the entire bay.

The original negative machine assigned 0 to section 1, 2954 to section 2, 8 to section 3, and 4855 to section 4 for a total of 7817 BRAC in the entire bay. Thus, the total number and the spatial distribution are very different. The old method ignores an extra 2942 BRAC, apparently assuming that they could be explained by the 2954 positive birds in section 2.

Next, DCCO on 12 Jan 2019, with a mix of positive and negative counted birds.

				Cumulative			
DCCO 2019-01-12	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	1212	0	1212	0	1212	0	
2							
3							
4							

In section 1, we passed 1212 DCCO and 0 passed us. The draft number of DCCO in section 1 is 1212, and there are no birds to add backward from section 1. There are 1212 known DCCO behind the boats, and no known DCCO ahead of the boats.

				Cumulative			
DCCO 2019-01-12	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	1212	0	1212	0	1212	0	
2	261	-1136	261	0	337	-1136	
3							
4							

In section 2, we passed 261 DCCO and 1136 passed us. We have encountered 1437 (1212 + 261) unique DCCO; 1136 of those we have encountered twice: first when we passed them in section 1, and second when they passed us in section 2

Since there are no carry forward birds from section 1, the draft number of DCCO in section 2 is 261.

The 1136 that passed the boats can be explained by the 1212 from section 1, thus there are still no birds to be added backward.

Since those 1136 have already been assigned to section 1, they should be subtracted from any subsequent DCCO.

				Cumulative			
DCCO 2019-01-12	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	1212	0	1212	0	1212	0	
2	261	-1136	261	0	337	-1136	
3	117	0	0	0	454	-1019	
4							

In section 3 we passed 117 DCCO and 0 passed us. The 117 can be explained by the 1136 that flew forward from section 2, so we set the draft number of DCCO in section 3 to 0.

Of the 1136 that flew ahead from section 2 we assume that 117 stopped in section 3, and because there are no new negatives in section 3 there are now -1136 + 117 = 1019 known DCCO ahead of the boats.

There are now 337 + 117 = 454 known DCCO behind the boats.

Since all the birds encountered in section 3 can be explained by birds encountered in sections 1-2, there are no DCCO to add backward.

				Cumulative			
DCCO 2019-01-12	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	1212	0	1212	0	1212	0	
2	261	-1136	261	0	337	-1136	
3	117	0	0	0	454	-1019	
4	6	0	0	0	460	-1013	

In section 4 we passed 6 DCCO and 0 passed us. Those 6 can be explained by the known 1019 DCCO ahead of the boats at the start of section 4, so we set the draft number of DCCO in section 4 to 0.

There are now 1013 DCCO that have left the bay ahead of us (-1019 + 6). Since they have been assigned to sections 1-3 we let them go.

Since all DCCO encountered in section 4 can be explained by previously encountered DCCO, there are 0 to add back.

				Cumulative			
DCCO 2019-01-12	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	1212	0	1212	0	1212	0	1212
2	261	-1136	261	0	337	-1136	261
3	117	0	0	0	454	-1019	0
4	6	0	0	0	460	-1013	0
							1473

Since there are no DCCO in any section to add back, the Final count is the same as the draft count for all section, for a total of 1473 DCCO in the entire bay.

The original negative machine assigned 1212 to section 1, 0 to section 2, 0 to section 3, and 758 to section 4 for a total of 1970 DCCO in the entire bay. The spatial distribution and total number are very different. The old method apparently assumes that the -1136 in section 2 were totally different birds than the 1212 from section 1 (but provides no explanation of where they came from) but that they were re-encountered in sections 2 and 3 (assuming implicitly that all the section 2 positives were among the section 2 negatives) and adds 1136 – 261 – 117 = 758 back to section 4.

First example, BRAC on 9 Feb 2013, with a mix of positive and negative counted birds.

				Cumulative			
BRAC 2013-02-09	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	2	0	2	0	2	0	
2							
3							
4							

In section 1, we passed 2 BRAC and 0 passed us. There are 2 known BRAC behind us and 0 known BRAC ahead of us at the end of section 1.

We set the draft number of Section 1 BRAC to 2.

There are no negatives yet to add back or subtract forward.

				Cumulative			
BRAC 2013-02-09	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	2	0	2	0	2	0	
2	211	0	211	0	213	0	
3							
4							

In section 2, we passed 211 BRAC and 0 passed us. There are now 213 known BRAC behind us and 0 known BRAC ahead of us at the end of section 2.

We set the draft number of Section 2 BRAC to 211.

There are no negatives yet to add back or subtract forward.

				Cumulative			
BRAC 2013-02-09	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	2	0	2	0	2	0	
2	211	0	211	0	213	0	
3	1	-151	1	0	63	-151	
4							

In section 3, we passed 1 BRAC and 151 passed us. We assume those 151 are part of the 213 known BRAC behind us at the start of the section.

There were no negatives before section 3 to explain the 1 BRAC we passed in section 3, so that is a newly-encountered bird and we set the draft number of Section 3 BRAC to 1.

Thus, at the end of section 3 there are now 213 – 151 + 1 = 63 known BRAC behind us and 151 known BRAC ahead of us. Those 151 ahead of us should be subtracted from any subsequent counts.

Because we assume the -151 are part of the 213 that had been behind us, we don't need to add those backward so add backward remains at 0.

				Cumulative			
BRAC 2013-02-09	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	2	0	2	0	2	0	
2	211	0	211	0	213	0	
3	1	-151	1	0	63	-151	
4	0	-159	0	96	0	-310	

In section 4, we passed 0 BRAC and 159 passed us. We assume that 63 of those 159 can be explained by the 63 known BRAC still behind us at the start of the section, while the remaining 96 are new, unencountered birds.

Since we passed no new BRAC in section 4, we set the draft number of Section 4 BRAC to 0.

At the end of section 4 there are now no known BRAC behind us and 310 known BRAC ahead of us. Of the 310 ahead of us, 214 have been encountered twice this day (we passed them then they passed us) and are already assigned to sections 1-3, so we let them go.

The remaining 96 of those 310 were newly encountered in section 4. We assume they were missed somewhere earlier in the bay, so we need to add them back.

				Cumulative			
BRAC 2013-02-09	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	2	0	2	0	2	0	98
2	211	0	211	0	213	0	211
3	1	-151	1	0	63	-151	1
4	0	-159	0	96	0	-310	0
							310

Finally, we can add the 96 back to section 1 and count a total of 310 BRAC on the entire bay.

The old negative machine assigned 2 BRAC to section 1, 211 to 2, 0 to 3, and 99 to 4 for a total of 310 in the entire bay. Thus, the total number is the same, but the spatial distributions is quite a bit different.

Next, BRAC on 14 Feb 2015, with many positives early in the bay and many (but not as many) negatives in section 4.

				Cumulative			
BRAC 2015-02-14	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	8	-1	8	1	8	-1	
2							
3							
4							

In section 1, we passed 8 BRAC and 1 passed us. The draft number of DCCO in section 1 is 8.

There are a total of 8 known BRAC behind the boats and 1 known BRAC ahead of the boats. The 1 BRAC that flew ahead of us must be added back to section 1.

				Cumulative			
BRAC 2015-02-14	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	8	-1	8	1	8	-1	
2	3578	-201	3577	194	3578	-201	
3							
4							

In section 2, we passed 3578 BRAC and 201 passed us. 1 of those 3578 can be explained by the bird that passed us in section 1 (and that bird will be added back to section 1), so the draft number of BRAC in section 2 is 3578 – 1 = 3577.

8 of the 201 that passed us in section 2 can be explained by the 8 we passed in section 1, so there are now -201 + 8 = 193 new unexplained BRAC that need to be added backward, so the cumulative total to be added back is now 194.

We assume that the 1 negative from section 1 is among the 3578 positive in section 2, so only the new negatives from section 2 need to be subtracted from future counts, carried forward = -201.

				Cumulative			
BRAC 2015-02-14	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	8	-1	8	1	8	-1	
2	3578	-201	3577	194	3578	-201	
3	3	-573	0	194	3008	-771	
4							

In section 3, we passed 3 BRAC and 573 passed us.

We assume all 3 positives were among the 201 that passed us in section 2 (and that will be added back to section 1), so they are not added to section 3 and the draft number of BRAC in section 3 is 0.

Similarly, we assume all 573 that passed us in section 3 are some of the 3578 known to be behind the boats at the end of section 2, so there are no new unexplained BRAC that need to be added backward.

There are now 3578 + 3 + -573 = 3008 known BRAC behind the boats and -201 + 3 + -573 = -771 known BRAC ahead of the boats.

				Cumulative			
BRAC 2015-02-14	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	8	-1	8	1	8	-1	
2	3578	-201	3577	194	3578	-201	
3	3	-573	0	194	3008	-771	
4	0	-1212	0	194	1796	-1983	

In section 4, we passed 0 BRAC and 1212 passed us.

The draft number of BRAC in section 4 is 0.

There were still 3008 known BRAC behind the boats at the start of section 4. We assume all 1212 negatives in section 4 were among those 3008 so there are no new unexplained BRAC to add backward.

There are now 3008 + -1212 = 1796 known BRAC behind the boats and -771 + -1212 = -1983 known BRAC ahead of the boats.

				Cumulative			
BRAC 2015-02-14	Positive	Negative	Draft	Add backward	Known behind	Known ahead	Final
1	8	-1	8	1	8	-1	202
2	3578	-201	3577	194	3578	-201	3577
3	3	-573	0	194	3008	-771	0
4	0	-1212	0	194	1796	-1983	0
							3779

Finally, we can add the 194 back to section 1 and end up with a total of 3779 BRAC for the entire bay.

The old method assigned 7 to section 1, 3538 to section 2, 3 to section 3 and 0 to section 4 for a total of 3548 BRAC on the entire bay. The old method assumes the negatives counted in section 2 were among the positives in section 2.