Dowitcher Bills
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1. Background

The English names of Dowitchers indicate that Short-billed Dowitchers usually have shorter bills than Long-billed Dowitchers. However, the literature is rather indefinite on actual differences. Many authors only state that the areas are overlapping and Dowitchers are difficult to identify using bill length as a field mark. The purpose of this study is to find out, how much the areas are overlapping, and if there are cases, when the bill length is a useful field mark.

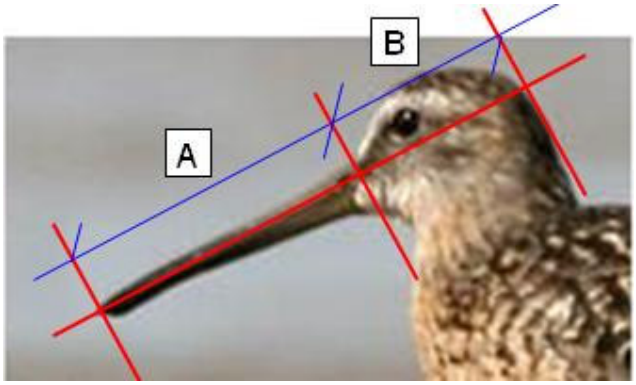
Another field mark in the bill is the shape. Only one, relatively old source (Vuorinen, Prater, Marchant: Kahlaajaopas, 1979 – the original book of Prater and Marchant is not checked) mentions that Short-billed Dowitcher has a high bill base. Checking a couple of photos, it is easy to recognize that the bill shapes differ in the described manner. Short-billed Dowitcher has a high bill base which lowers rapidly, and forms a clear curve in the upper profile. Long-billed Dowitcher has a straight profile, and the base is about as high as the bill elsewhere. The difference is easy to recognize in the photos:

Left: Long-billed, right: Short-billed Dowitcher

The purpose of this study is to show that this difference is crucial.

2. Procedure

For measuring a random sample of both Short- and Long-billed Dowitchers is needed. We used Google search using the scientific name as a keyword, first all Long-billed Dowitchers until the hits started to frequently show same individuals, and after that the same amount of Short-billed Dowitchers. Every measurable individual were measured. Since no selection was made, the sample fulfills the random sample criteria. For every individual, bill lengths and head lengths were measured as in the picture.



Based on these measures a ratio A/B was calculated. When needed, the photos were enlargened for measurement. The advantage of the method is that the birds need not be caught for measurement.

The bird was not measured in the following cases:

- The head position differed 15º or more from side position (based on trigonometry, the error is always less than 3.2 %)
- The bill direction was the same as back (flying birds) or the back side of the head was not clear
- The bill top was hidden (in water, mud or behind another individual)
- The photo was unclear or too small for reliable measuring
- The individual was identified as Limnodromus sp. (regardless of our opinion about the species)
- (We had doubts of identification – no such case appeared)
- Individuals interpreted as same individual as in other photos (in many sites the were series of pictures about the same bird)
- The individual was recognized as a measured individual (several photos were located in more than one site)
- Paintings or drawings.

The individuals of both species with high or low values were double-checked. Due to this reason, one Long-billed Dowitcher was deleted. The bill ended at another individual, and therefore the accurate ending point was unclear.

The bill shape of was checked, including also individuals, which were not measurable (except checked, unidentified or painted individuals).

The ratio is not necessarily the same as recognized measuring real birds. The method is, however same throughout the study, and therefore comparable. Based on measuring photos, the absolute measures (bill or head lengths) are impossible to achieve.

3. Basic results

In the following table, we have the basic results:

	Short-billed Dowitcher	**Long-billed Dowitcher**
sample size	66	65
number of sites	41	39
Ratio		
average	1,60153	1,91583
standard deviation	0,11122	0,13566
minimum	1,38	1,70
maximum	1,81	2,25
median	1,60	1,89
% shorter than shortest Long-billed	80,30 %	-
% longer than longest Short-billed	-	72,73 %
# shorter than shortest Long-billed	53	-
# longer than longest Short-billed	-	48

We know in advance that the male and female Dowitchers have different bill lengths (male shorter). Therefore this is not a normal distribution, but merely a sum distribution of two (possibly normal distributions). The gender of measured individuals was not separable.

Based on the behavior of normal distributions, we can estimate that:

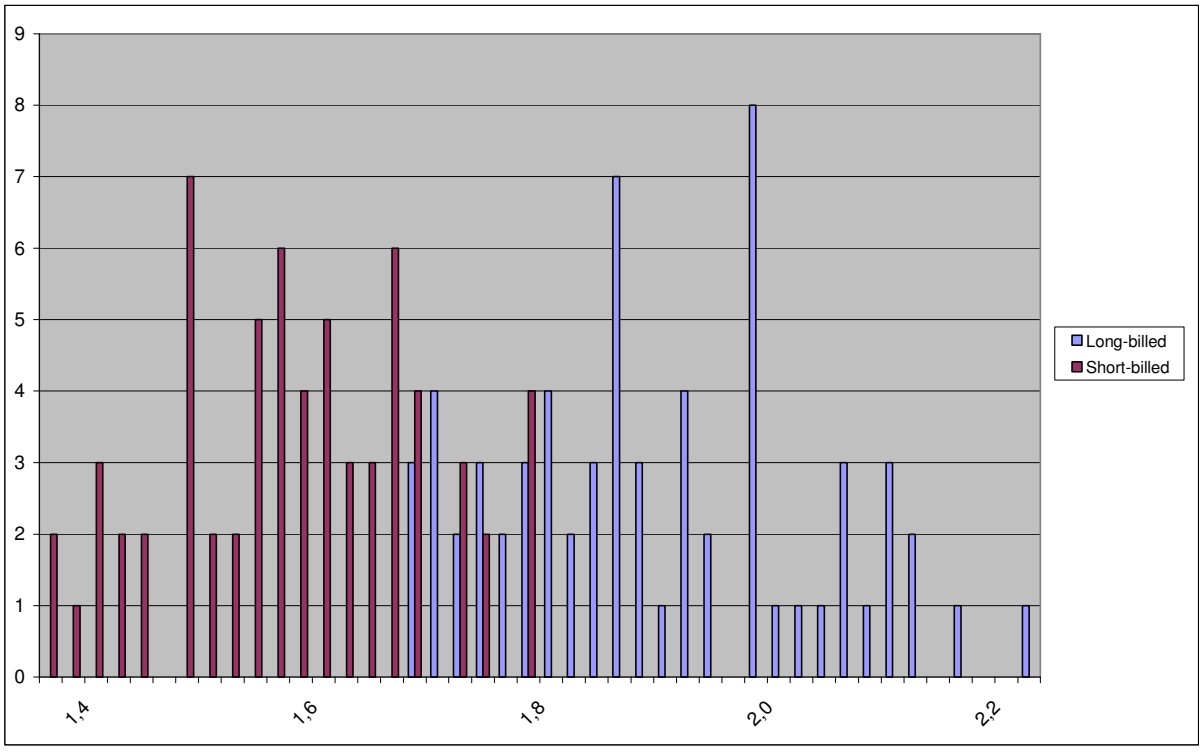
- Dowitcher is certainly (statistically significant limit) Short-billed, if the ratio is 1.60 or below. In this sample 51 % fulfilled the condition.
- Dowitcher is with very high certainty (statistically very significant limit) Short-billed, if the ratio is 1.50 or below. In this sample 15 % fulfilled the condition.
- Dowitcher is certainly (statistically significant limit) Long-billed, if the ratio is 1.86 or above. In this sample 64 % fulfilled the condition.
- Dowitcher is with very high certainty (statistically very significant limit) Long-billed, if the ratio is 1.95 or above. In this sample 38 % fulfilled the condition.

The deviation in a sum distribution is larger than in original distributions. Therefore, these figures contain relatively high certainty marginal, which is not possible to estimate accurately. Based on general theories and measured distributions (see the graph below), our unofficial estimate for statistically very significant limits would be 1.55 (30 % Short-billed Dowitchers in the sample) and 1.92 (45 % of Long-billed Dowitchers in the sample), if the gender of the measured individuals were known.

Several literal sources (books and web sites) mentions that Dowitcher is Short-billed, if the ratio is 1.5, and Long-billed, if the ratio is 2 or above. In the area between 1.7 to 1.8 the individual may be of either species. Our result is exactly the same, although we have measured the ratio in photos, and (we believe) the literature means measuring real birds.

We believe that this proves the measuring method applicable for field identification, since the ratio can be measured in photos, and estimated in the field. It is also important that there are a substantial number of Dowitchers that can be identified using this measure (together with other field marks, of course).

In the following graph the results have been classified with 0.02 steps:

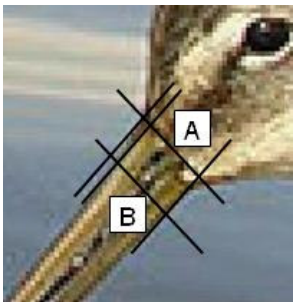


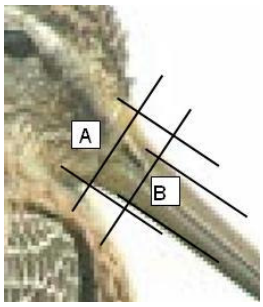
4. Error marginal

All lengths are measured with 1 mm accuracy, thus the possible error is 0.5 mm. The average length was 27 mm (over all measures). All the lengths have been measured on screen, which contains slight inaccuracy compared to measuring paper photos. However, when one measure had to be rounded upwards and the other downwards, we enlargened the photo to avoid accumulating errors. Therefore the real marginal is substantially smaller. The individuals with highest and lowest values are double-checked and therefore possible error is smaller, too. Assuming cumulating error (which probably is not the case) we have the maximum error of 5 % in each individual ratio (including the error caused by bird position).

5. Bill shape

Short-billed Dowitcher has a high bill base which lowers rapidly, and forms a clear curve in the upper profile. Long-billed Dowitcher has a straight profile, and the base is about as high as the bill elsewhere. One way to find the difference is to measure bill height proportions as described in the following pictures of typical individuals of both species:





Left: Long-billed, right: Short-billed

One can easily see that the height of Long-billed Dowitcher's bill outside the nostril is practically same as the base. Ratio A/B of this individual is about 1.1 (10 % difference). Short-billed Dowitcher in the picture has a ratio of 1.7 (70 % difference). The difference is clear and visible.

The bill shape of every measured Long-billed Dowitcher was checked. In addition, every individual was checked that appeared in the sample, although it was not possible to measure, provided that it otherwise fulfilled the sample criteria.

The number of checked individuals was 100 (we did not target into a prompt number, it just happened to be). The sample contained photos from North America, Siberia and Europe. None of them had a high bill base, and everyone had a straight upper bill profile.

This shows that Long-billed Dowitcher does not have a high bill base, and that the profile is straight. Obviously, no statistical method is needed nor can be used. In our opinion, this also proves that this difference can be used as a field mark at least to the extent that **Dowitcher with a high bill base is definitely Short-billed**.

We also visually checked 102 Short-billed Dowitchers. The sample has been collected in a separate session using the same random technique. The result is as follows:

- 91 individuals had a clearly high bill base
- 10 individuals had high bill base, but the difference was not so clear (we would say that it is not recognizable in the field) – all with age information were juvenile or first winter birds
- one individual (juvenile) had no clear difference compared to Long-billed

This shows that a low bill base does not definitely identify, but strongly indicates Long-billed.

6. Conclusions

It has been shown that the used methods are applicable in field, especially if the Dowitcher is photographed. About 30 % of Short-billed Dowitchers and about 40 % of Long-billed Dowitchers can be identified based on proportional bill length.

It has also been shown that the bill shape is a secure field mark to the extent that a high bill base and curved upper bill profile identifies Short-billed Dowitcher. A low bill base and straight bill profile strongly indicates Long-billed Dowitcher (about 90 % probability).