

## How to calibrate a counter

v170601

This two page document briefly presents some of the key concepts and steps regarding counter calibration. Counter calibration involves determining an adjustment factor and then applying this to data collected by the counter.

### Background

In certain situations it may be useful to calibrate a counter. Road and trail traffic counters are rarely 100% accurate. This applies to all brands and types of counters. Calibrating a counter involves comparing the counts the counter records with those observed visually. For example, if a counter records 93 counts over an hour and an attentive observer holding a clipboard records 105, then an adjustment or correction coefficient can be easily derived.

$$\frac{105 \text{ visual counts}}{93 \text{ counter counts}} = 1.12903 \text{ adjustment factor}$$

In short, the visual total divided by the counter's total equals the adjustment factor (also called correction coefficient). In TRAFx DataNet it is a snap to apply an adjustment factor to data (see Step 6 on next page). Always use an adjustment factor with at least five decimal places, as shown above.

Calibrating a counter takes time, effort and diligence to do well. Only do it if your specific management questions require a higher level of data precision. Do not calibrate just for the sake of calibrating. An important question to ask is: What level of accuracy do I need to answer my management-related questions? Generally, acceptable accuracy can be defined as the level sufficient to detect changes that are significant to management decisions (Hendee et al. 1990). That is, would the overall management decision for a site be different, for example, if the site received 270 versus 285 visits per month? Often, only orders of magnitude really matter (e.g., 10 vs. 100 vs. 1000 vs. 10000, etc.) for real-world decision-making.

Each counter should be calibrated separately. This is because there are numerous factors that have the potential to affect how a counter counts, including traffic density/spacing, trail or road width, speed of travel, counter settings (e.g., delay), installation distance, sensor variations, environmental influences, user diligence and attention to installation details, etc.

Counter calibration, statistically speaking, involves making inferences about a population (a data set) based upon a limited sampling of that population (i.e., a sub-sample). There is abundant statistical literature available to help guide one in this regard. Study design is beyond the scope and intent of this document.

### Preparation

In the office, create and print a form you will record visual observations on. Here's an example format.

Counter calibration form

Site name: Pine	Serial number: 1705FN	Date: 2017-05-24	Your name: Albert Einstein
	Start time: 11:00:00	End time: 12:00:00	Weather: clear; 20C

No.	Visual Counts	Comments
100		Started at 11:00
200		
300		
etc		

### Optional

Counter calibration is also a good opportunity, if desired, to collect additional information such as:

#### **Trails**

- Classification (walker, hiker, jogger, biker, etc.)
- Visitor characteristics (age class, gender, etc.)
- Other (dogs, direction of travel, group size, etc.)

#### **Roads (vehicles)**

- People per vehicle
- Classification (RVs, industrial vehicles, etc.)
- Direction of travel
- Other (State/Province of origin)

## How to calibrate a counter – Step by step

Below is a simplified way to calibrate a counter. It assumes your counter:

- is currently installed in the field, collecting data, and has been operating smoothly for at least a few weeks
- its date/time were properly set (note: beware of daylight savings time)

### Step 1: Arrive at the counter in the field about 10 minutes before the top of the hour (e.g., 10:50)

In field

Find a safe and comfortable location near the counter. Have your clipboard and form ready. (At this point, there is no need to do anything with the counter).

### Step 2: Start your calibration session at the top of the hour

In field

At the top of the hour (e.g., 11:00) begin writing things down on your form (see previous page).

It is easiest to make tick marks. If the road or trail is busy with higher traffic volume, an hour long session is usually sufficient. On quiet, lower volume roads and trails it may take several hours. The rule of thumb is that you should manually record at least 100 events for calibration purposes.

### Step 3: Download your counter

In field

At five minutes after the top of the next hour (e.g., 12:05) download / launch the counter with your dock (in Shuttle mode). Your field session is now finished.

*Caution: do not download before the top of the hour! Also, your watch's time and the counter's time might be a little out of sync so wait about five minutes after the top of the hour (e.g., 12:05) before downloading.*

### Step 4: Transfer data from dock to PC

In office

Return to your office and download the dock as you normally would.

### Step 5: Tally up tick marks and compare to counter

In office

Back in your office, tally up the counts you wrote down on the form (e.g., 128). Next, open the data file you downloaded (double click it) and find the hourly total for the calibration session (e.g., 113). To figure out the adjustment factor, divide your visual counts by the counter counts. Example:

Start time: 11:00:00      End time: 12:00:00

Total visual counts	Counter counts (from downloaded data file)
128	yy-mm-dd,hr:mm,total 17-05-24,08:00,00051 17-05-24,09:00,00083 17-05-24,10:00,00096 17-05-24,11:00,00113
	} Hourly totals Note that "11:00" means 11:00 to 12:00 In other words, hours project forward.

$$\frac{128 \text{ visual counts}}{113 \text{ counter counts}} = 1.13274 \text{ adjustment factor/correction coefficient}$$

### Step 6: In TRAFx DataNet, specify an adjustment factor for the particular counter site (e.g., Pine Road)

In office

Now that you have determined the adjustment factor you can apply it. Login to your DataNet account, click on the **MANAGE** tab, and then on the particular counter site. Now, look for Data Options and "Adjustment Factor".



Adjustment factor 1 [Edit]  
 Divide by 2 NO [Edit]  
 Filter timestamps 0 [Edit] sec

Click **Edit** and enter an adjustment factor with at least 5 digits (for mathematical reasons). This adjustment factor will be applied to all the data associated with the particular counter site. You're finished. Well done!