

CHOICE of HABITAT USE STATISTIC in STATIC ACOUSTIC MONITORING



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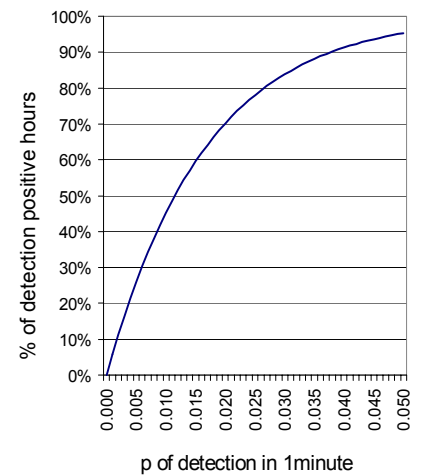
The *proportion of time units with detections* is widely used as a statistic of habitat use. What size of time unit should we use? Large time units have the disadvantage that all or most of the units may be positive and consequently fail to show the differences between sites. But larger units also have the advantage of reducing the effect of variation in sensitivity between different loggers. (Dähne *et al* 2006).

In theory: If detections were random over time, and
 DPM = fraction of all minutes that have one or more detections
 n = number of minutes in larger time unit
 P = fraction of larger units that have one or more detections

then
$$P = 1 - (1 - DPM)^n$$

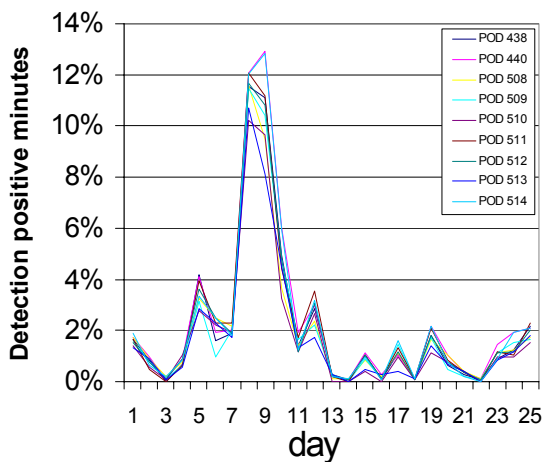
The significance of this relationship is that below 30% positive units there is a nearly linear relationship between any time unit and any smaller time unit, e.g. the graph illustrates *detection positive hours* against *detection positive minutes*.

This linearity means that information is not being lost by using the larger unit, so this sets an upper limit to our choice of time unit.

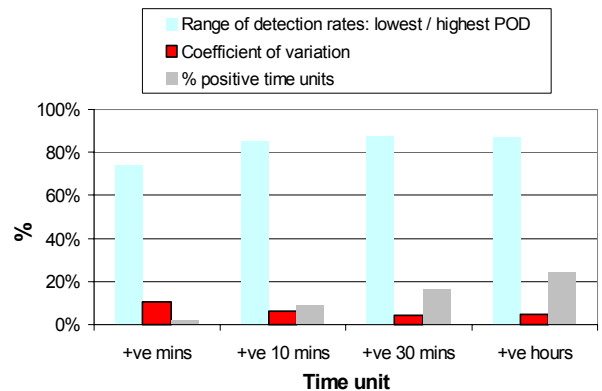


In the sea: Detections are actually clustered in time as one animal, or one group, typically score several hits on the logger during a passage through its locality. Any one of these hits makes the time unit positive and any variation between loggers affecting how many more click trains are logged in that time unit is not reflected in the statistic. So we may expect to see that variation between loggers is reduced by larger time units. We test this on some data from a group of nine T-PODs set close together:

Raw data:



Effect of different time units



The CV is of the set of 9 T-POD values of DPUnits over the whole period. Note reduction in CV as time unit increases. (CV is standard deviation expressed as a fraction of the mean)

In this case DP10M (detection positive 10 minute periods) reduces the CV from 0.1 to 0.06, and DP30M reduces it to 0.04. These CVs include all sampling error as well as variation between loggers.

Conclusions: The best statistic uses the *largest time unit* that gives *under 30% of units positive* in all data sets to be analysed. In ongoing studies a margin must be allowed for unknown future higher detection rates. 1min, 10min or 1hr are probably the sensible choices in most studies. For comparison with other studies DPM values should be given in reports or publications. For communication with wider audiences larger units such as Detection Positive Days per month or season will often work much better.

References: Dähne M, Verfuß UK, Diederichs A, Meding A, Benke H, *T-Pod Test Tank Calibration and Field Calibration*. Proceedings of the Workshop on Static Acoustic Monitoring of Cetaceans, ECS, Gdynia, 2006