

ATLAS - Deployment Plan Web App Documentation

Dear ATLAS-Users,

we have developed a new web application tool to help you and us to better plan tag deployments in the HULA valley.

The app can be found on the Minerva Center page here:

<http://move-ecol-minerva.huji.ac.il/page/3>

or can be accessed directly from shinyapss.io:

<http://huji-atlas.shinyapps.io/AtlasTags>

The **ATLAS Tools** page currently includes the tag deployment plan with three components: **Plot**, **Table** and **Map**. The two Plots are potentially confusing hence please read carefully the following guidelines. ***This information is in good faith, we will regularly monitor and evaluate the performance of the system, and get your feedback to further improve this tool and the system's performance.***

Plots:

The two plots show the **predicted effect of the current deployment plan on the performance of the two main tasks** that have to be executed by each base-station, i.e. **searching** (for tags that have not been detected lately) and **tracking** (of tags that have been detected). The upper plot shows the expected number of tags. The lower plot shows a scaled measure of the expected number of localizations, taking into account the number of tags and their sampling rate. In the lower plot, we separated the tags into day(orange) and night(blue), as we hope to implement a way to reduce the sampling frequency during the night/day to reduce the effect on the tracking performance of the system (currently assuming a sampling rate of 0.125Hz). In both plots, the status is divided into three conditions "good", "monitor" and "critical", which imply, respectively, that we do not expect problems, the system performance should be regularly checked, and problems are to be expected. While evaluating the practical conclusions from these two plots to our planned work, we need to consider two potential bottlenecks, one is tracking performance and the other is searching performance. Ideally, we would want the system to allocate its computational time only to tracking, but then tags that are not detected will never be found again. Conversely, if efforts were to be devoted to mostly searching, it would come at the expense of the systems ability to track the tags it has found.

Tracking Performance:

Assuming we have found all tags - very unlikely - the system can in theory support up to 125 tags sampling at 1Hz simultaneously. The system, however, is set to spend 50% of its time tracking and 50% of its time searching, and this is necessary due to shifts in the timing of tags and interference. That means tracking will operate smoothly up to 60 tags sampling at 1Hz or any equivalent thereof.

Searching Performance:

Predicting searching performance is pretty much impossible, as too many extraneous factors play a role here. We know from experience that up to 60 tags can be supported without problems up to 90 will require monitoring and beyond that we have real issues - this is pretty much in line with the capabilities of the system spending half of its time searching and the other half tracking.

What does this mean for your plans:

*First, look at the status (good/monitor/critical) on the days you have planned for your tag deployment in the upper plot. **This plot is evidently less optimistic than the lower one. You should consider this upper plot as the baseline**, showing a situation where the system intensively has to search for tags. The lower plot is more optimistic since having tags with sampling frequencies lower than 1Hz yields higher tracking (but not searching) efficiency. However, due to the uncertainty regarding searching efficiency, we cannot tell if the system will perform as bad as the upper plot, or as good as the lower plot. Should your tags deployment lie during a time when either threshold is exceeded you may expect reduced ability of the system to find/track your tags. This means gaps in the recording get larger and it will take the system longer to find your tags if they are lost. As emphasized above, we will regularly monitor and evaluate the performance of the system, and with your feedback will further improve the system's performance.*

As an example, the upper plot implies too heavy load that from February onward, whereas the lower plot indicated a bottleneck only during August. It means serious problems in August. Since the outcome depends on what all groups will do, we will work with each group towards adjustments of the plans -- including changes in the number of tags, sampling frequency and timing -- to maximize the benefit of the system to all users.

Table:

The Table provides you with a detailed list of all tag deployments for each day, including a summary for every day. If at any given time either of the two thresholds is exceeded the respective rows will be highlighted in red.

Slider:

The slider will adjust the date range for both plots and the table, allowing you to narrow down on a specific date range.

Maps:

These are first example maps, one based on a small subset of the barn owl data collected in 2017 and the other from tracks of Egyptian fruit bats, giving a percentage of achieved localizations, estimated from linear interpolation of minor gaps in the original data, within a 250*250m grid. This will give you first indication of the approximate quality of the data that you are going to collect in certain areas of the Hula valley. If an area is not colored then animals never ventured there. You

should also consider that the animals behaviour (like flight height) will have a strong effect on the quality of your data.

What does this mean for your deployment:

If your planing on tagging animals in an area where there are no localizations then sadly we dont know what the quality will be like. We will, however, add more maps in the future allowing you to sample data from a variety of species covering different areas of the Hula valley.

If you are planning to deploy tags in an areas where more localizations are lost(red colored areas) you may have problems getting your tags localized and it would be recommended to check with Yotam for deployment of additional basestations in your area to increase performance!

Login: The login functionality is for database requests and admin purposes