Guide for Gammath™ SPOT gScores

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PURPOSE

The purpose of this document is to introduce Gammath™ SPOT and explain how to use it along with gScores and micro-gScores.

OVERVIEW

Gammath™ SPOT (patent pending) is a free software for comprehensive stocks technical analysis. SPOT can be run on a Mac, PC and Cloud. It consists of tools such as scraper, analyzer/scorer, estimator/projector, historian and backtester that are packaged together and can be conveniently installed via Python's pip, or a containerized version can be conveniently installed via Docker. SPOT software can also be obtained in source code form via GitHub.

For users who are not equipped to run the software (locally or in the Cloud), SPOT subscription service is available via affordable subscription plans from our website.

These tools are used for technical analysis of stocks to assist in smart, faster, consistent decision-making (manual and automated). The intent is to identify stocks that meet the target return criterion for intended investment time horizon and then make buy/sell/hold decisions using a trading strategy that is back tested to preferably do better than the benchmark (e.g., S&P500) performance.

Each tool in this toolset has a specific purpose as described below:

- The scraper tool obtains the necessary information (from the Internet) for stock technical analysis. This is the only tool in the toolset that needs internet access. Rest of the tools can be run offline (unless you are running them in the Cloud).
- The analyzer/scorer tool analyzes the scraped data and algorithmically computes the gScore ('g' is for Gammath™) for each stock in the watch list to express its opinion on degree at which the stock is trading at a perceived premium or at a perceived discount. The gScore can then be used like an indicator in the process of making buy/sell/hold decision on the stocks.
- The computed gScore is between -1 and +1. If the gScore is closer to -1 then it means that the algorithm perceives the stock to be trading at a premium. If the gScore is closer to +1 then it means that the algorithm perceives the stock to be trading at a discount.
- The analyzer/scorer tool also generates charts to show the micro-gScores in one convenient file that help visualize and correlate the micro-gScores with stock price movement.
- The analyzer/scorer tool also has a feature that seeks to identify current moving estimated support and resistance levels for the stock's price. This can come in handy to determine current range of the stock price and how far the current price is from the current "top" and current "bottom".
- The analyzer/scorer tool also generates chart to help visualize current support and resistance level along with stock price.

- Below is an example of gScores presented for a sample watchlist from the past data:

overall_gscores

Ticker	sh_gscore	sci_gscore	final_gscore	Note
WMT	-0.55	0.11	-0.44	
TWTR	-0.21	0.04	-0.17	
PFE	-0.19	0.04	-0.15	
GS	0.02	0.01	0.03	
C	0.13	-0.05	0.08	
FB	0.11	0.03	0.14	
INTC	0.27	-0.05	0.22	
AAPL	0.08	0.19	0.27	
TSLA	0.26	0.04	0.3	
NVDA	0.29	0.03	0.32	
JPM	0.29	0.1	0.39	
AMZN	0.22	0.22	0.44	
GOOGL	0.3	0.15	0.45	
AMD	0.39	0.1	0.49	
BAC	0.47	0.1	0.57	
MSFT	0.42	0.19	0.61	

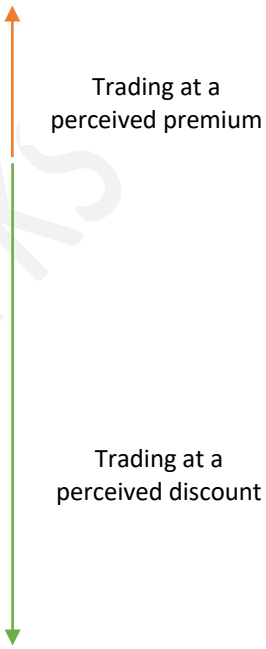

Figure 1Sample watchlist with gScores and micro-gScores

- It is important to note that the gScore by itself does NOT indicate a buy/sell/hold/avoid signal. It needs to be incorporated in a trading strategy to make buy/sell/hold/avoid decision on stocks.
- Example of an automated trading strategy (long-term and short-term strategy) is provided in our back testing example source code that the user can use as a starting point. This can be customized to match your specific trading strategy.
- For manual decision-making, we describe how to use this system effectively in our "On The SPOT" blog where gScores and micro-gScores are discussed/explained with real examples (free samples of the blog are available here). Access to this blog is available for subscribers who purchase one of the affordable subscription plans from https://www.gammathworks.com. Premium subscription plan will also grant you access to the premium content and software technical support.
- Price Estimator/Projector tool is used to estimate and project moving future price of the stocks. It also projects S&P500's future moving estimated projected value. This tool also generates charts showing current moving estimated support and resistance level.
- Historian tool is used to generate the gScores' history for the respective stocks in the watchlist. This is used for correlation of price with different micro-gScores. Please note that the historian tool will take longer to run depending on the length of the watch list.

Until this tool is optimized, we recommended to use a smaller watchlist (e.g., a list of closely watched stocks that the user wants to trade [buy/sell/hold]). The gScores history is very helpful in verifying how a trading strategy that uses gScores and micro-gScores did in the past.

- Backtester tool is used to test a strategy using historical gScores and micro-gScores. This way the user can check how the strategy did historically and then decide on whether to use the respective trading strategy for making concurrent buy/sell/hold decisions.

WHERE DO I FIND USAGE INSTRUCTIONS?

For instructions on installation, obtaining source code, build and how to run the scraper, scorer, pep, historian and backtester tools, please refer to the link here.

HOWTO USE GAMMATH™ SPOT TOOLSET?

The general order of usage is as follow:

1) Run scraper tool to collect the data for analysis.
2) Run the Scorer to analyze, compute gScores, compute useful probabilities, support and resistance levels, and relevant charts for the stock.
3) Run the Price estimator and projector tool to get future moving estimated price projection and corresponding chart for stocks (and S&P500). Pick the stocks that meet future return criteria and create a “closely watched” watchlist.
4) Run the Historian to generate historical gScores/micro-gScores (approximately last 5 years) for “closely watched” watchlist from step 3.
5) Run the Backtester to test your strategy for the “closely watched” watchlist from step 3. Based on how the strategy did over historical intervals, one can decide whether to use it for contemporary trading (buy/sell/hold) decisions. An example of back testing for a short-term and long-term trading strategy is provided in the software. It also saves “Todays_Actions” that can be used as convenient summary of buy/sell decisions of the day if one chooses to use the default strategy implemented for back testing.
6) This way the entire technical stock analysis and decision-making process is fully automated.

HOWTO USE GSCORE

We think that gScore is a clear, easy, and effective way of comprehending stock technical analysis results.

Following are some manual ways in which we have used gScore that has served us very well. For some of the automated ways, please refer to the back testing source code for more detail.

1. We use gScore for better dollar cost averaging i.e., Instead of buying our favorite stock (i.e., a stock we have researched and like the business and fundamentals of the company) on arbitrary days, we choose buying over a time interval after gScore is relatively higher

(for example in above list, we would consider buying WMT after its gScore is 0.54 as opposed to when its gScore is -0.44).

2. We consider buying (meaning we add the stock to our closely watched list) when stock's gScore is more than 0.5 (higher the better unless we have strong reasons to buy at lower gScore). If you are using the historian tool, then the gScores history can be examined to decide on a "buy zone" (back testing example in the software might help clarify).
3. We consider selling (meaning we add the stock on closely watched list) a stock when its gScore is less than -0.5 or when any of our sell criteria are met (back testing example in the software might help clarify for long-term and short-term criteria.
4. We diversify as much as possible i.e., if there are 10 stocks in our watchlist that have a gScore of more than 0.5 then we consider buying stock(s) of as many of those 10 companies that we like (in small quantity).
5. We tend not to buy when the stock price is falling. So, as mentioned in point 2 above, once the gScore is above 0.5, we put the stock on closer watch, and we prefer to buy only when the stock price starts rising. Similarly, when gScore is negative, we put the stock on closer watch, and we prefer to sell only when the stock price starts falling (and our sell criteria is met). The support and resistance level computed by this toolset for the stock could be helpful in this step.
6. We check the news of specific company and evaluate any positive or negative impact of the news before deciding to buy/sell/hold.
7. We check the general news affecting the markets before deciding to buy/sell.
8. If you run Gammath™ SPOT on your machine or in the cloud or have subscribed to a premium plan from our website, then the stock's signal.txt file can be checked for finer detail (described later in this document) before making buy/sell decision. There are many criteria logged in it and can be used to match personal preference.
9. If you run Gammath™ SPOT on your machine or in the cloud or have subscribed to a premium plan from our website, then the stock's charts can be checked for graphical visualization of indicators.
10. A significant component of this algorithmic analysis is the historical price data. As a result, we prefer to invest in stocks that have at least 5-years price history.
11. We prefer to invest in stocks that have a positive 5-years and 1-year return on investment.
12. We use micro-gScores and gscores history to fine tune our buy/sell/hold criteria.
13. It is much easier to explain how gScore-based dollar cost averaging would work from back testing example. We have provided a basic back testing example (for short-term and long-term investment horizon) in the source code to show one way to do this.
14. We tend to backtest our strategy on each stock on our closely watched list before deciding which strategy to use. Please refer to the backtester tool source code for an example.
15. We tend to use current-info-component (sci_gscore) of gScore as a filtering criterion and then on that filtered list, we use the stock-history-component (sh_gscore) of gScore for historical analysis and back testing.

16. Once we finalize a thoroughly back tested strategy to use, we simply use the "Todays_Actions.csv" (generated by backtester tool) to get a list of "today's" buy/sell actions. This saves us a lot of time.
17. Please note that if the strategy doesn't conclude "buy"/"sell" decision for any stock in your watchlist on the day then this list could be empty. There could be many days where there is no buy/sell activity. This is fine for us as we can verify its prior recommendations in stock-specific back testing stats as described here.
18. ***Please note**: Selling a stock is a very subjective criteria and one is not necessarily required to sell a stock just because it is trading at a premium (especially if the user decides that the stock has great long-term prospects). However, if user wants to get out a stock position when in "green" then gScore based dollar cost averaging could possibly show a way out. We backtest our strategy to determine if strategy worked at least on historical data and enables us to get out of a position if we wanted to.*

HOWTO BACKTEST MY STRATEGY?

A general strategy that uses gScores is provided in the source code as an example. The intent is to show a strategy for the short-term (less than 1 year intended holding time interval) and a strategy for the long-term (more than 1 year intended holding time interval) as an example to make buy/sell/hold decisions. You can check the results in the corresponding files (described in later section). You can use the historian-generated charts to correlate and come up with a different strategy that matches your investment style.

WHERE DO I FIND GSCORES?

If you are using the free version of Gammath™ SPOT software or have subscribed to our premium content, then gScores (for entire watchlist) are saved in a file name 'overall_gscores.csv' in the 'tickers' directory.

HOWTO INTERPRET OVERALL_GSCORES.CSV?

The five columns in this file are:

a) ticker: Stock ticker symbol of the company.
b) final_gscore: Final gScore between -1 and +1.
c) sh_gscore and sci_gscore show the two components that makeup the overall gScore. sh_gscore is stock history (sh) based gScore component and sci_gScore is stock current information (sci) based gScore component. Current information (sci) based gScore component can be used as a filtering criterion.
d) Note: This field contains special notes. For e.g., 'NO_PRICE_DATA_FROM_TODAY' indicates that stock history is not valid (data could be stale) so the gScore for that stock should NOT be used for concurrent decision-making.

WHERE DO I FIND DATA USED FOR ANALYSIS?

The stock-specific data used and formatted by Gammath™ SPOT can be found in 'tickers/<ticker_symbol>' directory. For example, data used for analysis of Apple, Inc's stock can be found in 'tickers/AAPL' directory. S&P500-specific data can be found in the 'tickers' directory.

WHAT TYPE OF DATA IS USED/SAVED FOR ANALYSIS/REFERENCE?

Depending on the data availability, one can find all or some of the following data saved in ticker_symbol-specific sub-directory (e.g., 'tickers/AAPL' directory):

1. <ticker_symbol>_calendar.csv: Information such as next earnings date (if available) can be found in this file.
2. <ticker_symbol>_call_<date>.csv: Information about calls (options data if available) can be found in this file.
3. <ticker_symbol>_put_<date>.csv: Information about puts (options data if available) can be found in this file.
4. <ticker_symbol>_history.csv: Information about Price history (if available) can be found in this file.
5. <ticker_symbol>_qbs.csv: Information about quarterly balance sheet (if available) can be found in this file.
6. <ticker_symbol>_qcf.csv: Information about quarterly cash flow (if available) can be found in this file.
7. <ticker_symbol>_qe.csv: Information about quarterly earnings flow (if available) can be found in this file.
8. <ticker_symbol>_qf.csv: Information about quarterly financials (if available) can be found in this file.
9. <ticker_symbol>_reco.csv: Information about Industry Analysts' recommendations (if available) can be found in this file.
10. <ticker_symbol>_summary.csv: Information about Stock summary (if available) can be found in this file.
11. <ticker_symbol>_st_page.html: HTML page referenced for sentiment score from stocktwits website (if available) can be found in this file.

WHERE DO I FIND CHARTS GENERATED BY GAMMATH SPOT?

1. The stock-specific charts generated by Gammath™ SPOT Analyzer/Scorer tool can be found in 'tickers/<ticker_symbol>/<ticker_symbol>_charts.pdf'. For example, charts generated as part of analysis of Apple, Inc's stock can be found in 'tickers/AAPL/AAPL_charts.pdf' file.
2. Trend lines to show current moving estimated support and resistance level lines can be found in 'tickers/<ticker_symbol>/<ticker_symbol>_tc.pdf'.

3. The stock-specific current estimated price projection generated by PEP tool can be found in 'tickers/<ticker_symbol>/<ticker_symbol>_pep.pdf' file.
4. The stock-specific gScore/micro-gScore history charts generated by the historian tool can be found in 'tickers/<ticker_symbol>/<ticker_symbol>_gscores_charts.pdf' file.

WHERE DO I FIND STOCK'S PEP DATA FROM GAMMATH SPOT?

If you ran the PEP tool, then the stock-specific Price Estimator and Projector (PEP) data from Gammath™ SPOT can be found in 'tickers/<ticker_symbol>/<ticker_symbol>_pp.csv' file. You can load its content into a Pandas series/dataframe.

WHERE DO I FIND SORTED LIST OF 5Y PEP FROM GAMMATH SPOT?

A sorted (moving estimated projected 5Y return) list of 5Y PEP from Gammath™ SPOT can be found in 'tickers/MPEP.csv' file (if you ran the PEP tool). You can load its content into a Pandas series/dataframe.

WHERE DO I FIND STOCK'S MICRO-GSCORES FROM GAMMATH SPOT?

The stock-specific gScore and micro-gScores from Gammath SPOT can be found in 'tickers/<ticker_symbol>/<ticker_symbol>_gscores.csv' file. For example, micro-gScores generated as part of analysis of Apple, Inc's stock can be found in 'tickers/AAPL/AAPL_gscores.csv' file. You can load its content into a Pandas dataframe.

WHERE DO I FIND STOCK'S GSCORE-HISTORY FROM GAMMATH SPOT?

Please note that this is generated if the historian tool is run based on these instructions. The gScore consists of stock-history-specific component and current-info-specific component.

1. The gScores history is obviously available for the stock-history-specific component only. The historical gScores (along with micro-gScores) can be found in 'tickers/<ticker_symbol>/<ticker_symbol>_micro_gscores.csv'. You can load the CSV file's content into a Pandas dataframe.
2. The 'tickers/<ticker_symbol>/<ticker_symbol>_gscores_charts.pdf' has the corresponding charts.

WHERE DO I FIND STOCK'S BACKTESTED STATS FROM GAMMATH SPOT?

Please note that this is generated if Gammath SPOT's backtester tool is run based on these instructions. Back testing stats of specific strategy used for a stock can be found in

'tickers/<ticker_symbol>/<ticker_symbol>_gtrades_stats_<term>.csv'. Here, 'term' refers to "short-term" and "long-term".

WHERE DO I FIND TODAY'S ACTIONS FROM GAMMATH SPOT?

Please note that this is generated if Gammath SPOT's backtester tool is run based on these instructions. If the default strategy finds buy/sell actions for "today" then those can be found in 'tickers/Todays_Actions.csv'. Please note that if the strategy doesn't conclude "buy"/"sell" decision for any stock in your watchlist then this list could be empty (on many days).

WHERE DO I FIND ANALYSIS/SIGNALS FROM GAMMATH SPOT?

The stock-specific analysis/signals from Gammath SPOT can be found in 'tickers/<ticker_symbol>/<ticker_symbol>_signal.txt'. For example, signals information generated as part of analysis of Apple, Inc's stock can be found in 'tickers/AAPL/AAPL_signal.txt' file.

HOW DO I INTERPRET SIGNAL.TXT FILE FROM GAMMATH SPOT?

The stock-specific algorithmic analysis' output from Gammath™ SPOT is saved in <ticker_symbol>_signal.txt for reference. It can be used to get finer details on gScore to help make criteria-specific decision on respective stock. Following micro-gScores (when possible) can be found in <ticker_symbol>_signal.txt:

1	Price
2	RSI
3	Bollinger Bands
4	MACD
5	Kalman Filter
6	Ordinary Least Squares
7	MFI
8	Stochastic
9	Options data
10	Analysts' recommendations or Fundamental Analysis
11	Sentiment score

Table 1: micro-gScores

These micro-gScores make up the overall gScore for the stock and can be used for more detailed selection criteria (manually or automated in your code). There is more information embedded for each of these micro-gScores in <ticker_symbol>_signal.txt as follows:

Price:

Price-micro-gScore (between -10 and +10) based on Price history data analysis.
[price direction (rising/falling)] [bottom/middle/top quantile for current rising/falling consecutive days count] [current price] [bottom/middle/top quantile in last 52-week range] [price gScore (10% weightage in overall gScore)] [note indicating if it is new 52-week low/high]

Relative Strength Index (RSI):

RSI-micro-gScore (between -10 and +10) based on RSI analysis.
[RSI level below average/average/above average] [oversold/overbought/normal] [rising/falling/unclear] [bottom/middle/top quantile for consecutive days if oversold/overbought] [RSI gScore (10% weightage in overall gScore)]

Bollinger bands:

Bollinger-bands-micro-gScore (between -10 and +10) based on Bollinger bands analysis.
[Price is below/above average compared to middle Bollinger band] [Price is closer to lower/middle/upper Bollinger band] [Bollinger band gScore (10% weightage in overall gScore)]

Moving Average Convergence/Divergence (MACD):

MACD-micro-gScore (between -10 and +10) based on MACD analysis.
[Trend is positive/negative] [Price when buy/sell signaled] [bottom/middle/top quantile for days in current trend] [bottom/middle/top quantile for current difference] [MACD gScore (10% weightage in overall gScore)]

Kalman Filter (KF):

KF-micro-gScore (between -10 and +10) based on "digital filtering" (Intent of using the Kalman Filter to "smoothen/filter out spikes" and check if current price is above or below "filtered" average).
[negative/positive days i.e., price is below or above "filtered average" respectively] [bottom/middle/top quantile for days in this trend] [bottom/middle/top quantile for current difference compared to "filtered average"] [KF_IC. Information Coefficient] [KF gScore (10% weightage in overall gScore)]

Ordinary Least Square (OLS):

OLS-micro-gScore (between -10 and +10) to determine if price is above or below "expected" average and if 5Y and 1Y slopes of Least Squares line is positive. This is used to determine if dollar cost averaging is risky for a given stock trend (e.g., if slopes are negative then it could be risky to double-down).
[fit score indicating how well stock price chart fits OLS model. Fit score >= 0.9 is considered a great fit] [1Y slope: positive/negative] [5Y slope: positive/negative] [positive/negative difference compared to Least Squares line ("expected average")] [bottom/middle/top quantile for current

difference compared to "expected average"] [OLS_IC. Information Coefficient] [OLS gScore (10% weightage in overall gScore)]

Money Flow Index (MFI):

MFI-micro-gScore (between -10 and +10]) based on MFI analysis.
[MFI level: below average/average/above average] [rising/falling/unclear] [oversold/overbought/blank] [MFI gScore (10% weightage in overall gScore)] [Indicator for possible price reversal: price could start rising or falling]

Stochastic Indicator (stochs):

Stochastic-micro-gScore (between -5 to +5) based on Stochastic analysis.
[stochs-slowd level: below average/average/above average] [oversold/overbought/blank] [Last slowk/slowd crossover date] [stoch gScore (5% weightage in overall gScore)]

Options data (options):

Options-micro-gScore (between -10 and +10) based on Options data (short ratio, calls, puts info) analysis. This can be useful to estimate what options traders are betting on stock.
[short ratio] [Bullish/Bearish] [options gScore (10% weightage in overall gScore)]

Analysts' recommendations (reco):

Analysts'-recommendations-micro-gScore (between -10 and +10) based on Industry analysts' recommendations data (i.e., publicly available upgrades/downgrades, positive/negative rating data from industry analysts). This is particularly useful when making decisions on stock that one has no expertise in.
[reco gScore (10% weightage in overall gScore)]

Fundamental data:

Note: If Analysts' recommendations data is available then following data (if available) is just logged and not factored into the gScore. In the absence of Analysts' recommendations data, following data (if available) is factored into the gScore:

PE:
[Trailing PE (TPE] [Average TPE of sector if stock is in S&P500 list] [Forward PE (FPE)] [Average FPE of sector if stock is in S&P500 list] [PE gScore]

PEG:
[PEG value] [PEG gScore]

Beta:
[Beta value] [Beta gScore]

Institutional holding:
[Institutional holding percentage value] [IHP gScore]

Insider holding:
Note: This is for reference only and not using in scoring
[Insider holding percentage value] [INSHP gScore]

QBS:
[Debt to capital ratio value] [Current ratio] [Quick ratio] [QBS gScore]

PBR:
[Price to Book ratio value] [PBR gScore]

Sentiment and message volume Score (st_sv):

Sentiment-micro-gScore (between -5 and +5) based on analysis of social media website such as stocktwits.
[st_sv on stocktwits gScore (5% weightage in overall gScore)]

Probabilities:

Overall Price Direction Probability:

We use this to determine overall UP price direction probability and DOWN price direction probability.

Next Day Price Direction Probability:

We use this to determine the price direction (up/down) probability with respect to entire sample. The intent is to use it to buy when price rises after multi-day decline. This data is also saved in the micro-gscores history. We demonstrate how we use this data in our basic back testing example as it has a very specific purpose.

Next Week, Month Price Direction Probability:

We generate price direction (up/down) probability for “after a week” and “after a month” by using Logistic Regression. The intent is to use it in making buy/sell decisions. This data is also saved in the micro-gscores history.

Moving Technical Conjecture of Price in 5Y:

This is a dynamic/moving 5-year price conjecture. Price prediction doesn’t make sense to us without accurate information on how the business is doing. In the absence of that, we are approximating price based on past performance and adapting to price changes dynamically. As

a result, we call it a calculated, moving price conjecture. This is a quick solution for the sake of analysis. We demonstrate how we use it for a basic long-term strategy in our back testing source code. When possible, this price conjecture is also included in 'tickers/<ticker_symbol>/<ticker_symbol>_micro_gscores.csv'.
Note: A more serious price projection is supported via our PEP tool as described in the next section.

Moving Technical Price Projection:

This is a dynamic/moving technical estimated price projection for approximately 3months, 1 year and 5 years. As mentioned in previous section, we don't do constant price prediction in the absence of up-to-date business-specific information. Instead, we use a linear model (Stochastic Gradient Descent) to make estimated price projection for the future timeline. This is a more serious estimate that we use to check for projected rate of return over different intervals for future times. If you run the Gammath™ PEP tool, then entire price projection is saved in 'tickers/<ticker_symbol>/<ticker_symbol>_pp.csv'. This tool includes 5Y moving estimated projection for S&P500 value as well. A sorted list of moving estimated 5Y projected returns can be found in 'tickers/MPEP.csv' (corresponding to the watchlist that was passed to pep tool and includes the corresponding value for S&P500).

Current Moving Estimated Support and Resistance level:

This is a dynamic/moving estimated current support and resistance level for the stock price as generated by our Analyzer/Scorer tool. This is useful in making buy/sell/hold decision. The file 'tickers/<ticker_symbol>/<ticker_symbol>_tc.pdf' contains stock-specific support and resistance lines chart. In addition, following data is logged in signal.txt file and is included with gScore and micro-gScore history:
[current support level][support line slope][current price diff %]
[current resistance level][resistance line slope][current price diff %]

CONCLUDING REMARKS

Gammath™ SPOT is a dynamic system intended to account for changes in the investment parameters as they happen. When the facts change, so should the conclusions (much like how a vehicle navigation system estimates arrival time and changes it if parameters change). Its gScore based dollar cost averaging is a "defensive" way of investing that has helped us immensely. We hope the same for you. A lot of detail is not described in this document for the sake of brevity. If you have any questions/concerns, then please don't hesitate to let us know via the "contact" form on our website.

Happy SPOTing!