How to Use the Tuamotus Tide Guestimator

Required Reading: Sections 1.4.1 through 1.4.5 in the Tuamotus Compendium. This fully explains the background of this spreadsheet and why it is called a **GUESS**timator. It is almost never accurate!

Migration – May 2023: Here's a phrase I often hear in the Tuamotus:

"The Guestimator was 2 hours off!"

Or maybe it's 2 or, 4, or 7. But there is almost always consternation and surprise.

For some reason sailors have completely forgotten the 'Guess' part of the Guestimator.

Gram did a great job creating the Guestimator with the information he had. However, Visions of Johanna (the boat Gram sailed on in the Tuamotus) transited through 6 passes on 4 different atolls (Hao, Makemo, Tahanea, Fakarava) over a period of just over a month (May 2010). That is not much time in an area that experiences a wide variety of conditions.

One example of this is the Guestimator's note on Tahanea: "Tahanea does not seem to be particularly affected by high winds and seas and exhibits minimal "Wind/Wave" current from waves coming over the rim of the atoll in normal conditions."

However, during the high SW swells that arrived at the atolls this past week (May 2023), the current was constantly outflowing from Tahanea for 3 days with speeds up to 8 knots. Of course, there was no way for Gram to know of this unless he was there when that type of event occurred, thus there is no way for the Guestimator to account for these conditions.

Gram certainly comes clean with the limitations of the Guestimator in this note on the Wind/Wave factor: "Note: At Fakarava South Pass, when the wind had been blowing hard out of the ESE, and the swell height was about 2-2.5 meters from the ESE we observed a much different current than our guestimator suggests -- incoming strong when our estimator said it should be outgoing."

But one certainly can't blame the Guestimator for getting it wrong. No scientifically-derived tool exists to estimate the current in passes. That's because there are so many complex factors involved that change for each atoll: wind speed and direction, wave size and direction, swell size and direction, atmospheric pressure, oceanic currents, number of motus and passes, underwater topography, and, of course, the tides.

The Guestimator takes the high and low tides from one tide station, interpolates what the tide should be at each pass based upon its distance from that tide station, applies a standard delay to some of the stations, and goes from there.

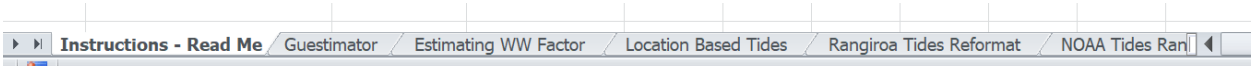
The problem is that few people look under the hood of the Guestimator. 13 of the 22 passes have no slack delay – you need to put that in yourself based on observations. And the normal max currents are best-estimates. Most importantly, the mechanism for adding wind/wave effect is pretty blunt and is based on a very small sampling of real-world data.

This is all to say that the Guestimator tends to be wrong about as much as it is right. During calm weather conditions in some atolls, it can be spot on for long periods. For other atolls with no real-world slack delay, it will be very wrong. And during periods of high winds and/or seas, it can be completely useless.

Am I saying don't use the Guestimator? Not at all. I'm just saying don't ONLY use the Guestimator. And remember its limitations.

The Guestimator is pretty simple. First, make sure you are using the Excel version (the new 2019 one is only available as Excel, as some features go away when it is converted to Open Document format).

This Excel file has multiple tabs found at the bottom of the page. Like this:



The first tab is the instructions page, the second is labeled "Guestimator" and is the actual user interface for the Guestimator, the 3rd tab has some hints for estimating the Wind/Wave factor to input into the Guestimator page.

The other tabs are background information that the Guestimator page uses, which you shouldn't be concerned about. Feel free to look, but don't touch! I think every page has a hyperlink back to the actual Guestimator page.

On the Guestimator page (screenshot below), just below where it says "Enter Data Only in Yellow Boxes", you will find a couple of yellow boxes. The first one is the location selection, on line 3. This is a Drop-Down box, click on it and it should expand and list all the pass locations that we included in the Guestimator. In this case, it has Fakarava – N Pass. When you select a different location, you should see the text to the right of the yellow box change to reflect the pass you selected. It will also change the data in the fields immediately below the yellow box. Don't touch these, they are data looked up from a table elsewhere in the spreadsheet.

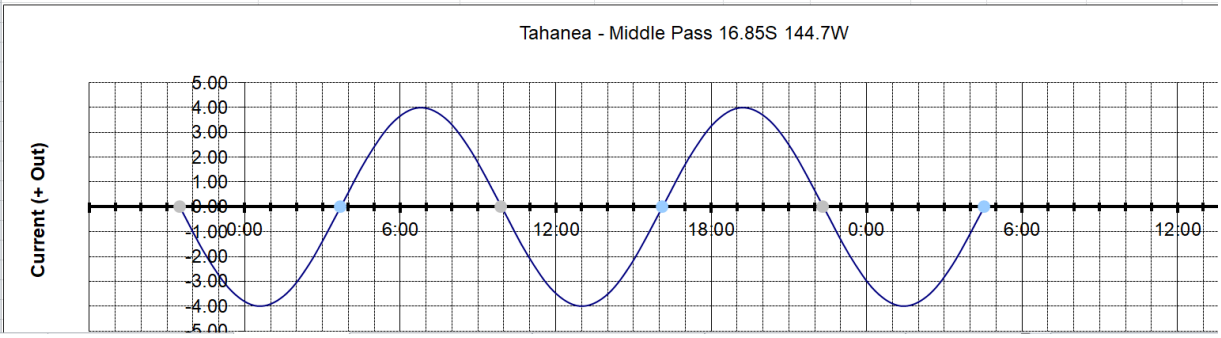
	A	B	C	D	E	F	G	H
1	**Guestimator V1.6**	Visions of Johanna Blog		**Valid for 2019 Only**		(See Instructions on how to Update)		
2	**Enter Data Only in Yellow Boxes**							
3	**---> Select Location**	Fakarava - N Pass		Fakarava - N Pass 16.08S 145		Location List		
4	(Lookup) Latitude (Deg | Min)	16	5	16.08 degrees		To Add or Fiddle with a Location		
5	(Lookup) Longitude (Deg | Min)	145	3	145.05 degrees				
6	(Lookup) Max Tidal Current	6	kts					
7	(Lookup) Rangi Tide Offset Corr	-16	minutes			**Donate**	to buy Gram (the develop	
8	(Lookup) Tidal Slack Delay	0:10	hrs	See Note 3			Scroll down to Donate Bu	
9	(Lookup) Pass Faces	NNW						
10								
11	Enter Date mm/dd/yyyy	2/12/2019	Tue					
12	Enter Wind/Wave Current Factor	0	kts	Notes on Estimating Wind/Wave Factor				
13								
14	(Calc) Local Time of 1st High Tide	9:25 AM				<-- Enter Alternate Tide Data Here, if available		
15	(Ref) Rangiroa Tides for Date	L-3:47 AM	H-10:12 AM	L-4:36 PM	H-10:34 PM			
16								
17	The graph below shows the estimated time of slack water, where the curve crosses the time-axis							
18								

The next important entry field is the date field, shown in yellow below the location field. Entering just the location and the current date should give you "normal" approximate tide Highs and Lows for the pass you selected.

There are only two tide points given in official tide tables in that part of French Polynesia, Rangiroa and Hao. So we the first step in the process is to get an approximate time of YOUR pass based on relative longitude from Rangiroa and Hao, where there are tide reference points.

Lines 14 and 15, and the tide graph below those lines provide the result of this calculation.

11	Enter Date mm/dd/yyyy	4/19/2019	Fri		
12	Enter Wind/Wave Current Factor	0	kts	Notes on Estimating Wind/Wave Factor	
13					
14	(Calc) Local Time of 1st High Tide	3:41 AM			<-- Enter Alternate Tide Data Here, if available
15	(Ref) Rangiroa Tides for Date	H-4:17 AM	L-10:36 AM	H-4:45 PM	L-10:55 PM
16					
17	The graph below shows the estimated time of slack water, where the curve crosses the time-axis				



If you change the location, or the date, both the Local Time of 1st High Tide and the Graph, should change to reflect our Guestimate of the normal time for the tides at the selected pass.

Below is the list of locations that can be selected, and the current entries for lat/long:

	A	B	C	D	E	F	G	H	I	J
73			Location List				Rangi			
74						Normal	Offset	Normal		
75		Lat-DD	Lat-MM	Long-DDD	Long-MM	Max Current	(Minutes)	Delay	Notes	Pass Faces
76	Ahe	14	27	146	22	4		0:00	See Note 1	NW
77	Amanu	17	50	140	51	4		0:00	See Note 1	WNW
78	Apataki - N Pass	15	18	146	24	4		0:00	See Note 1	NW
79	Apataki - S Pass	15	34	146	25	4		1:30		WSW
80	Arutua	15	22	146	37	4		0:00	See Note 1	ESE
81	Faaite	16	42	145	21	4		0:00	See Note 1	WNW
82	Fakarava - N Pass	16	5	145	3	6	-16	0:10	See Note 3	NNW
83	Fakarava - S Pass	16	31	145	28	5	-60	0:00	See Note 2	SSW
84	Hao	18	4	141	0	6		3:00		NNW
85	Katiu	16	22	144	21	6		1:00	See Note 1	NNE
86	Kauehi	15	57	145	11	4		0:00	See Note 1	SW
87	Makemo - E Pass	16	37	143	34	4.5	54	1:30		NNW
88	Makemo - NW Pass	16	27	143	58	4.1	54	1:00		NW
89	Manihi	14	28	146	4	5		1:00	See Note 3	SSW
90	Rangiroa - Avatoru	14	56	147	43	4		0:00	See Note 1	NNW
91	Rangiroa - Tiputa	14	58	147	38	4		0:30	See Note 1	NE
92	Raraka	16	6	144	58	4		0:00	See Note 1	NNW
93	Raroia	16	1	142	28	4		0:00	See Note 1	W-WNW
94	Tahanea - Middle Pass	16	51	144	42	4		0:00		NNE
95	Toau - Anse Amyot	15	48	146	9	1		0:00		WNW
96	Toau - SE Pass	15	55	145	53	5		0:00	See Note 1	ENE

(This table is at the bottom of the “Guestimator” page).

Note 1: We have not visited this atoll, so these values are more of a guess than the rest of them!!!

Note 2: In a strong (20-25 kt) east wind, the current seemed to run IN, no matter what the tide was doing.

Note 3: Tide offset is to correct the H/L tide times based on the French Poly tidal information at SHOM.fr vs Noaa’s Rangiroa and Hao values.

The other two entry fields on this page are Line 12, the Wind/Wave factor, and Line 14, where you can enter a different time for the first high tide of the day (this would be based on your own observations).

A note on date formats: The two people who have worked on this spreadsheet (Gram Schweikert from s/v Visions of Johanna and Sherry McCampbell from s/v Soggy Paws) are both Americans with computers using American standard date format (MM/DD/YYYY). If your computer is set to a different date format, you MAY be able to enter it in your format, and Excel may be savvy enough to recognize and handle that properly. If not, enter the date using the American date format. Double-check the day of the week next to the date field to make sure the calculations are based on the correct date!!

Entering Wind/Wave Adjustments

What is the wind/wave adjustment? A number of factors may combine to alter the "standard" tidal flow at any given atoll. Here are a few of the factors:

- The physical configuration of each atoll, how many passes it has. For example, whether the SE side of the pass is low (reef only) or high (actual land).
- Which way the wind has been blowing and for how long
- How big the swell is and from what direction

Entering a number in the Wind/Wave Current Factor will adjust the graph slightly to account for a projected increase in inward or outward flow from the pass caused by wind and waves vs pure moon-based tidal pull.

Here are some suggestions we came up with for entering something in the Wind/Wave Current Factor box. (There is much more discussion on wind/wave factors in Section 1.4 of the Tuamotus Compendium).

- Add 1 kt for every day the wind has been blowing over 20 kts from a S or W component
- Add .5 kt for every day the wind has been blowing over 15 kts from a S or W component
- Add .5 kt for every 1/2 meter increment of southerly swell over 1.5 meters (ie 3 meter swell = +1.5 kt)
- Cap the Wind Wave factor at 1.5 times the Normal Max Current
- Subtract .5 kt for wide/deep passes and for each extra pass that an atoll has
- In S Fakarava, we also noted a NEGATIVE (we think) current factor when the wind was blowing strong out of the E and NE

This is oriented at wind and waves from south or west, because that is where most atolls are low and wind waves wash over them into the lagoon.

Some atolls may be different!!

Note: At Fakarava South Pass, when the wind had been blowing hard out of the ESE, and the swell height was about 2-2.5 meters from the ESE, we observed a much different current than our guestimator suggests (incoming strong when our estimator said it should be outgoing)

So a strong EASTERLY component may blow water OUT of the atoll vs. IN, if the atoll is low (no land) on the opposite side of where the wind is blowing from.

Using Your Own Observations to Create the Graph

Gram (the spreadsheet originator) originally set the spreadsheet up to allow you to enter your own tide points from observations at a single point throughout a day or two for the time of high and low tides.

This section of the Guestimator is very advanced, and I personally have never used it, so I can't explain how to use it. But it is found further down on the Guestimator page. Excel experts may have fun playing with it (or it may no longer function correctly as Gram hasn't touched the spreadsheet since 2010 and several people have had their fingers in it since then).

				Fit	D^2			
103	**For Plotting First-Hand Obs on the Graph**							
104	Actual Passage Time + Date			0.00	0.00			
105	Actual Passage Current		kts					
106	First Review Time			0.00	0.00			
107	Estimated Passage Current		kts					
108	Second Review Time			0.00	0.00			
109	Estimated Passage Current		kts					
110	Third Review Time			0.00	0.00			
111	Estimated Passage Current		kts					
112	Fourth Review Time			0.00	0.00			
113	Estimated Passage Current		kts		0.00			
114								
115	**Using Solver to get best fit to observed data**							
116 117	If you can get 3 or 4 reliable observations within a 36 hour period across enough conditions, you can use the excel solver to refine the current and delay values for a best fit to your observed data. If you are unfamiliar with Solver, this is probably best left unused, but if you are familiar, you can set the solver to vary the 3 current inputs to minimize the sum in cell E20. This will solve a least squares fit to the observed data. If the result looks reasonable, it is most likely an improvement over your guestimates.							

Bottom Line

So the bottom line is OBSERVATION. Do the best you can to estimate the slack time, get to the pass a little early, and wait patiently until you can see with the binoculars that the current is slack and there are no large standing waves in the pass.

But remember that absolute slack is usually only necessary when you have a strong wind-against-current situation. A knot or three of current in light wind situations is usually no big deal, if your engine is working.

(Again, more comments along these lines are in the Tuamotus Compendium, Section 1.4)

What to Do Instead of Relying on the Guesstimator

So what can you do? Here are some tips:

1. Use multiple resources to retrieve tidal information for your position: Guestimator, SHOM, Total Tides, OpenCPN, Navionics, tide apps, etc. Use them all and interpolate the tides for where you are based.
2. Contact every cruising boat that arrives or departs (call them on the VHF after they leave – you do keep your VHF on, don't you?) and keep a log of the time, current direction and strength. Remember that the tides progress 35-60 minutes each day (refer to the tidal information you sourced). That will give you the best idea of what will be happening when it's time for you to leave.
3. If you are anchored near the pass, go check it out yourself and add the information to your log. If you're diving the pass, you'll already know when slack is.
4. Ask local fishermen, remembering that their speedboats can handle very different conditions than our sailboats.
5. To make the Guestimator as accurate as possible, add observed slack delays – adjusting them as conditions change. To really improve accuracy, add your observed data (there's a place for it) and create your own graph.

Notes on Using an Open Document Version of this Spreadsheet

As of 2019, I have not provided an "Open Document" version of the spreadsheet, because I found that the conversion removed the "drop down box" for location selection. I think the spreadsheet can be converted to ODS format (in Excel, Save As and select format ODS), but the user must then find the pass you want in the Location table and copy the Location name exactly into the Location Selection box on Line 3. Then the spreadsheet should be able to find the location's information in the table and use that data to make the calculations for approximate time of local tide.

If you do this, you should check that the Lat / Longs on Lines 4 and 5, and the Max Tidal Current on Line 6 matches the values in the table for that location. Otherwise the subsequent calcs will be wrong.

Sherry McCampbell
April, 2019
Cruising the Solomon Islands