SURFLINE TEAHUPOO, TAHITI SURF REPORT

Historical Analysis of Swell Patterns in April & May, 1997–2009

Prepared for Billabong ~ by Sean Collins, July 2009

Billabong has requested assistance to choose improved dates during the months of April and May for their ASP World Tour event at Teahupoo, Tahiti. The event traditionally has been scheduled for a 10 day waiting period in May, and was held during the May 9-20th period in 2009. Unfortunately, in the last few years the event has struggled with less than optimum surf, which prompted Billabong to explore a possible better time period to run the event. In this analysis our goal will be to help choose an improved future 10 day swell window during the months of April and May.

Historical swell patterns for the south shore of Tahiti were reviewed in this analysis. All significant swells for this area are generated by storms in the South Pacific, and surface pressure and swell analysis charts were reviewed during the April-May 1997-2009 periods to study large scale high pressure and low pressure patterns. These pressure patterns control all storm development and possible swell generation for Teahupoo, Tahiti.

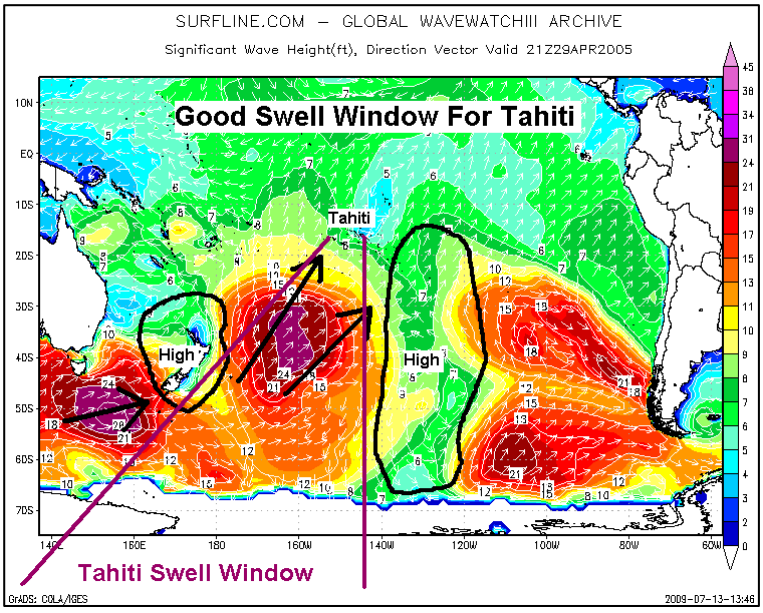
Additionally, Surfline LOLA and Wavewatch III archived swell data between 1997 and 2009 was used to develop a statistical foundation for our expectations of future swell patterns. The exact swell model data point was located at 17.95 South and 149.5 West, approximately 10 nautical miles southwest of Teahupoo, Tahiti.

The final conclusion of this report is that the best time period for significant swell for Teahupoo, Tahiti during the months of April and May, are during the last two weeks of April and the first week of May.

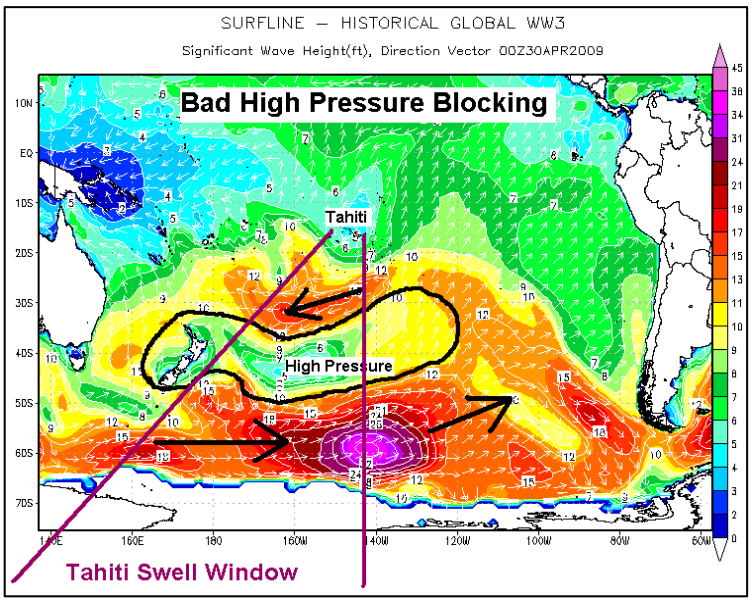
WEATHER ANALYSIS OF SURFACE PRESSURE AND WAVE HEIGHT CHARTS – April-May, 1997-2009

The April to May period in the southern hemisphere tropics is Fall, when water and air temperatures are generally the warmest after the long Summer. Tropical cyclone activity has typically winded down somewhat but there is still the possibility of late season tropical activity. The jet streams near Antarctica and the Roaring 50's latitude region begin to shift north in April and May, also bringing cooler air masses farther north to mix with warmer air closer to the tropics. The mixing of the cold air from Antarctica and the warmer tropical air create atmospheric instability and deepening low pressure systems between 30 - 65 degrees South latitude. The developing low pressure systems in this region break the typical southern hemisphere west to east flow of winds and seas , to develop more south to north flow of winds and seas resulting in increased swell for Tahiti.

The ideal swell window for Teahupoo, Tahiti is displayed in the chart on the right. This swell window is the region that extends from just east of New Zealand to directly south of Tahiti, between 140-180 degrees West Longitude. As storms move underneath New Zealand, the storm fetch will extend northward throughout this region with strong winds and seas aimed at Tahiti. During April and May, a prevalent high pressure system is typically located over New Zealand and will extend eastward at variable times. Typically this high pressure system will help to generate strong winds on the back side of the storm with lots of swell.



Strong high pressure systems follow storms around the globe and can occasionally lock themselves down in specific areas for a month or more. If one of these strong high pressure systems happens to lock down in the middle of the swell window for Tahiti as per the example in the chart at the right, it will block swell generation by forcing the storm tracks to stay far to the south in a west to east flow of winds and swell. This is exactly the poor swell situation that happened this year in 2009 when a strong high pressure system blocked the storm track during the waiting period of May 9-20th.



The primary goal in long range forecasting is to calculate where the high pressure systems will lock down because their location will also dictate the storm tracking patterns. The April and May period in the South Pacific is a transitional period when the jet streams, high pressure systems, and storm tracks will be adjusting from their Summer to Winter patterns. The high pressure location over New Zealand is fairly consistent during April and May, and the eastern boundary of that high pressure system will bulge eastward with the ebb and flow of the passing storms.

Historically, April through May are good months for South Pacific swell activity due to the increased mixing of cold and warm air masses, and a receded ice pack off Antarctica also allows more swell generating fetch in the storms. After reviewing the charts archives for 1997-2009, there is a noticeable pattern of a sub-transitional period in May when the New Zealand high pressure will extend eastward as another high pressure system develops in the mid South Pacific. As this situation develops the Tahiti swell window may be temporarily blocked, and the time period might vary between a few days or a few weeks depending on the strength and location of the high pressure systems.

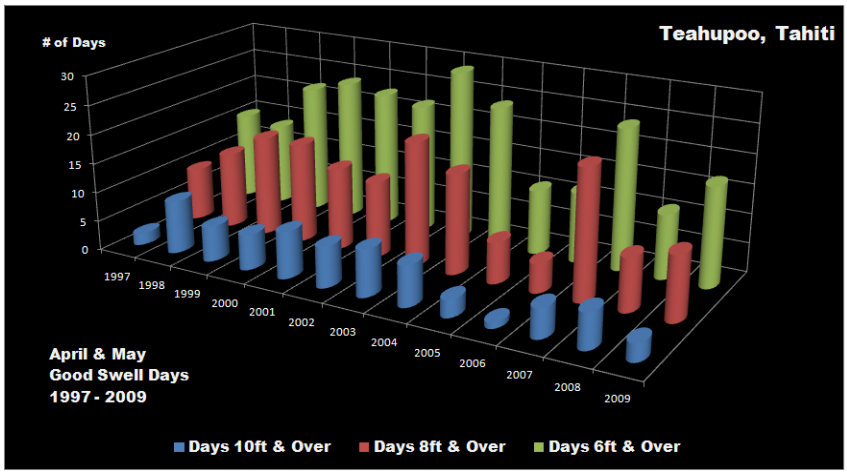
It's really impossible with today's technology to accurately forecast a year in advance when the New Zealand high pressure system might extend eastward to block the storm track resulting in smaller swell for Tahiti. But we can identify general periods when the odds are more likely for this not to happen and where there would be more swell for Tahiti. The analysis of the historical charts indicate that mid April through June are the most consistent periods of swell for Tahiti, but very difficult to pin down the 1-2 week transitional period that seems to occur in May when the New Zealand high pressure system may extend out to block swell.

ANALYSIS OF SWELL DATA FOR TEAHUPOO, TAHITI – April-May, 1997-2009

Wave data was retrieved for the swell model point located just southwest of Teahupoo, Tahiti. The first step was to eliminate all swell data that did not fall into the parameters to generate possible good swell for Teahupoo (North swells, East/southeast trade wind swell, etc.). The data studied for this project was: **all swells 6 feet of deep water swell height or greater; AND only swells with periods of 12 seconds or greater; AND only swells with a specific directional range between south/southeast and southwest (160-240 degrees True) at the swell model location.** Using these parameters all potentially good April and May swell events for Teahupoo were isolated throughout the 1997 through 2009 period.

The swell data was displayed in a series of graphs to allow easier analysis and presentation within this report, and additional filters were added to gain more resolution into the data. A shorter time period between 2005 and 2009 also displays a more near-term trend over the last 5 years versus the entire 13 year period to avoid long term skewed data. Swell heights were filtered from 6, 8, and 10 feet with 12 and 14 second periods to help isolate the larger swells. The source of swells for Tahiti is usually within 1,500 miles, so the 12-14 second period filters are the most significant to review and would also contain the longer 16-20 second period energy of the largest swells.

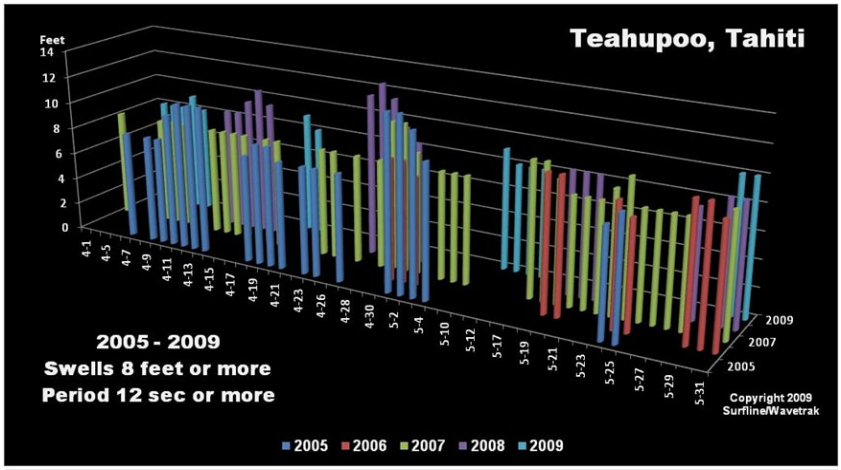
The graph to the right displays the overall swell trend for April and May throughout the entire 1997-2009 period, and the number of days of deep water swell 6 feet or greater, 8 feet or greater, and 10 feet or greater - but only when the period is 12 seconds or greater and the swell within the directional parameters for Teahupoo. This data indicates very good years of swell during April and May for 1999 through 2004, and 2007. Generally poor years of swell during April and May were 1997, 1998, and 2005 through 2009 with the exception of 2007.



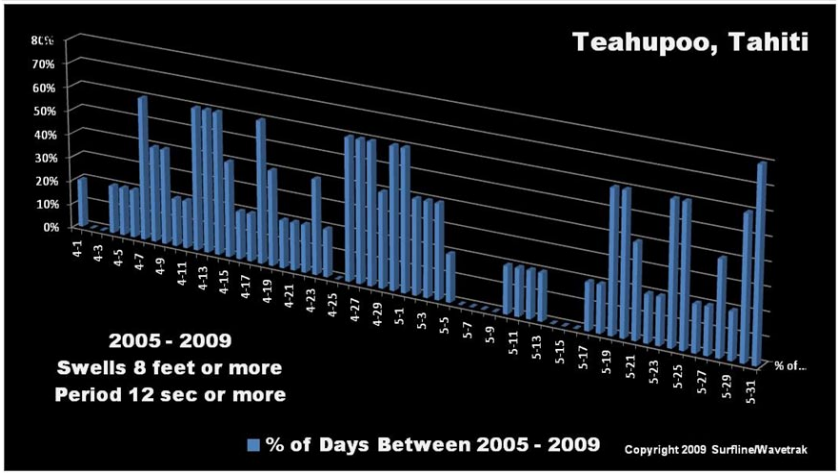
When comparing these graphs of swell model data to the historical Weather Analysis covered in the previous section, the swell results in Tahiti are very clearly affected by the location of the high pressure system over New Zealand and whether it was blocking in the swell window or allowing the swell window to be open. Additionally, the swell model data seems to be validated by the history of swell for the Billabong Teahupoo event.

Many of the following swell graphs were probably unnecessary to include for the scope of this report but are very interesting to review and many people may like to see them. These graphs below display two views of the data: the first view showing the actual maximum swell heights for each day during April and May, and the second view showing the overall percentage of the time throughout the period that a specific day was over 6 feet, 8 feet, or 10 feet. Additional filters for the 12 and 14 second swell periods show even more detail into the more significant swells.

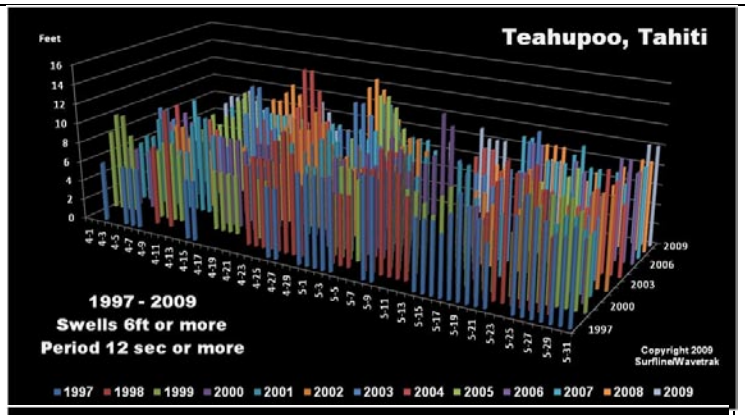
The graphs that strongly reflect the detail that helps to determine the best historical period of waves in the months of April and May, are the 8 foot swell charts. These swells are significant swell events and the filtered 12 and 14 second period charts add even more resolution. This view of the data between 1997-2009, and especially over the last five years between 2005-2009, **strongly indicates that the best periods for significant swell for Teahupoo have been during the last two weeks in April and into the first week of May.**

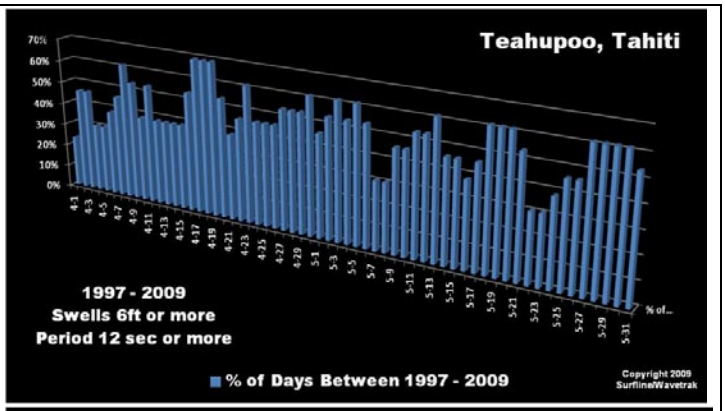


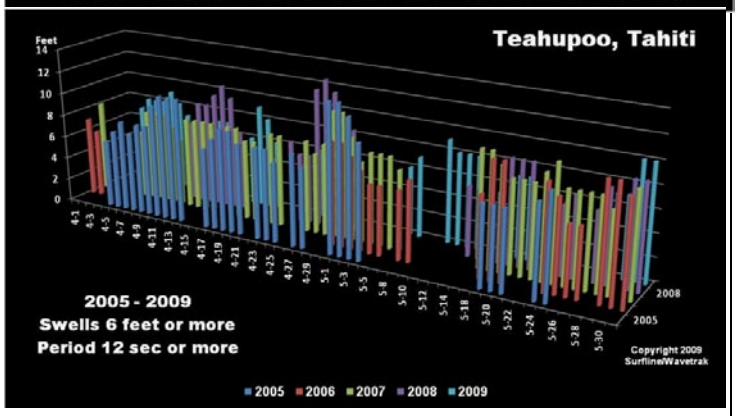
An additional glaring result from the swell data shows how poor the current waiting period has been during 2005-2009 for the Billabong Pro at Teahupoo, May 9-20th. As discussed in the previous Weather Analysis section, the sub transitional period in May when the high pressure over New Zealand shifts into Tahiti's swell window, may occur more often during the second week in May as reflected by the data.

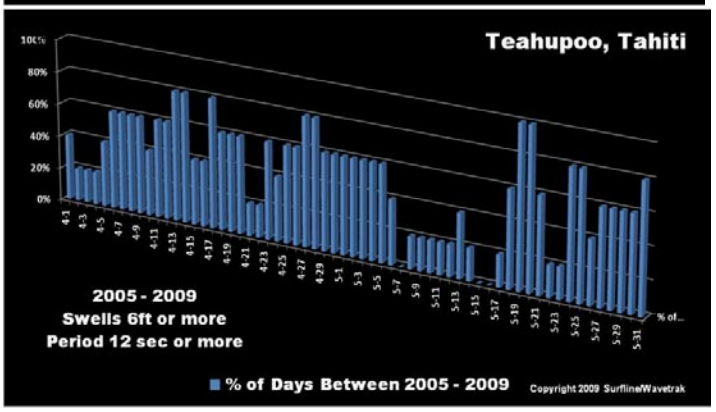


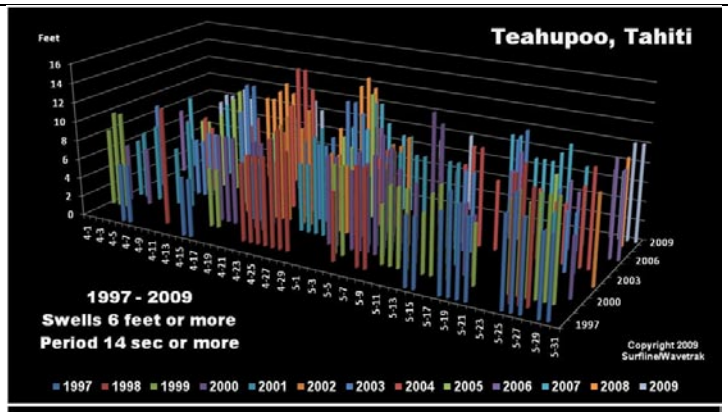
Following are additional graphs of the swell data that help to confirm the swell climate of Tahiti.

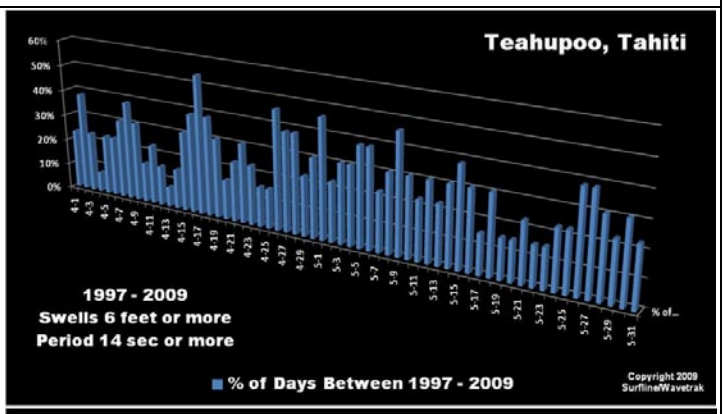


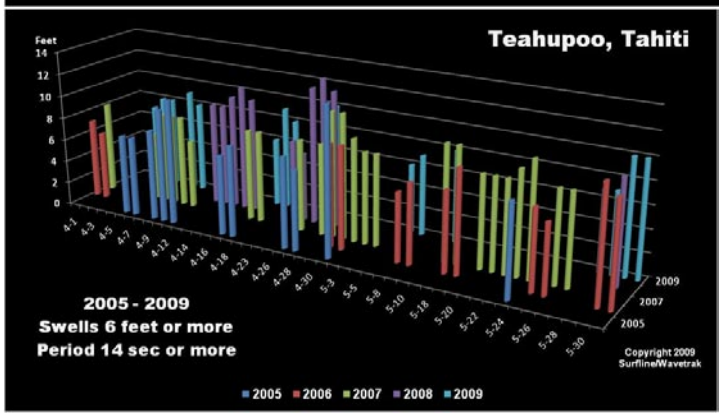


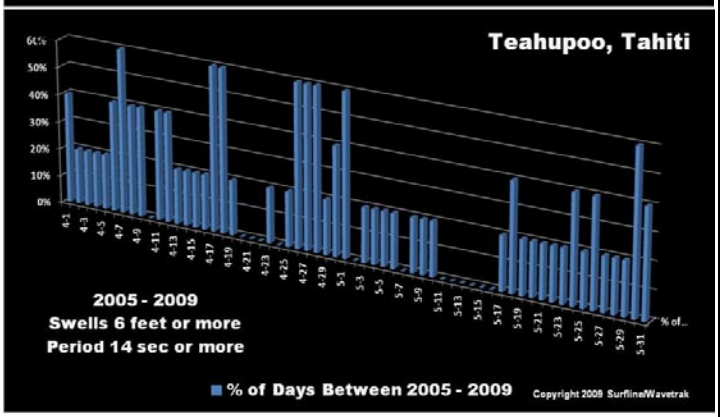


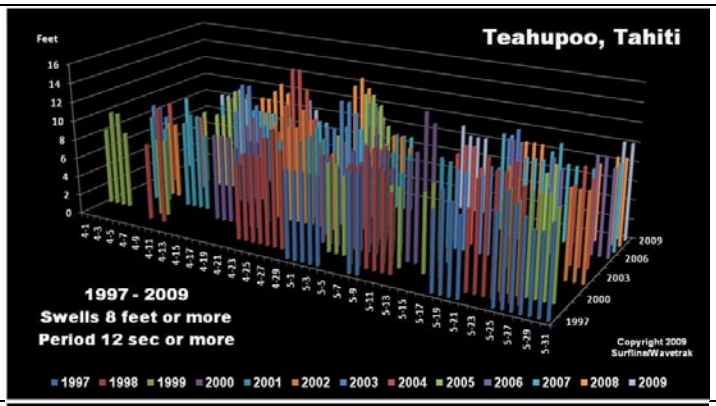


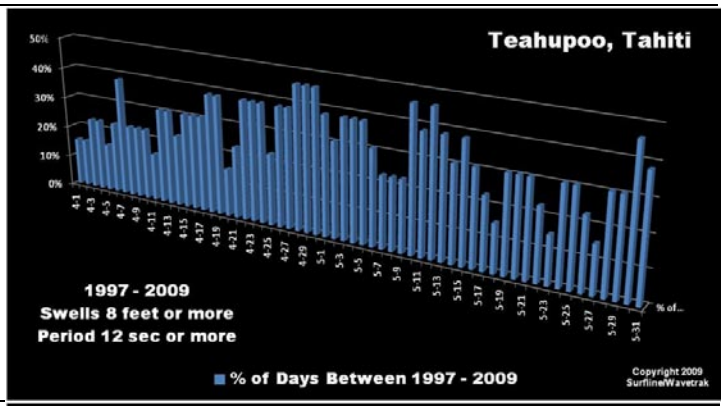


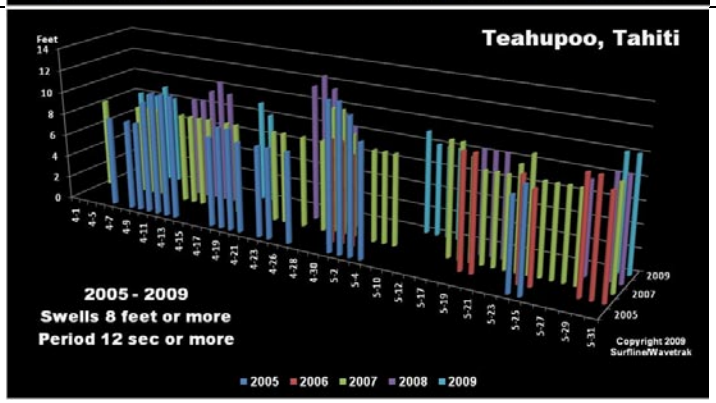


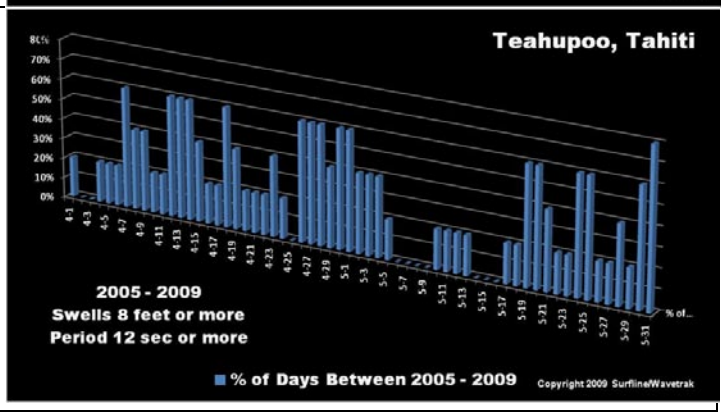


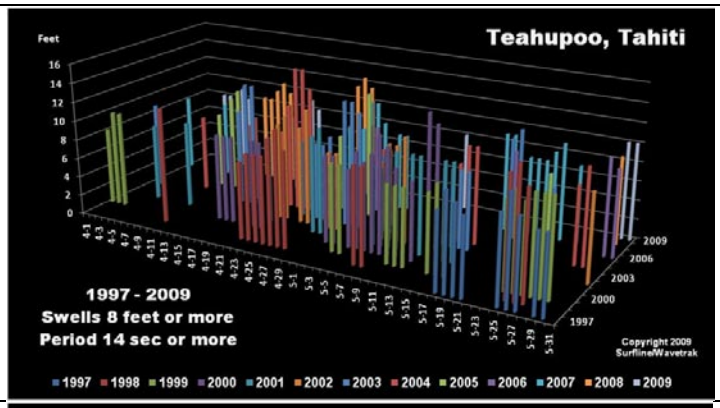


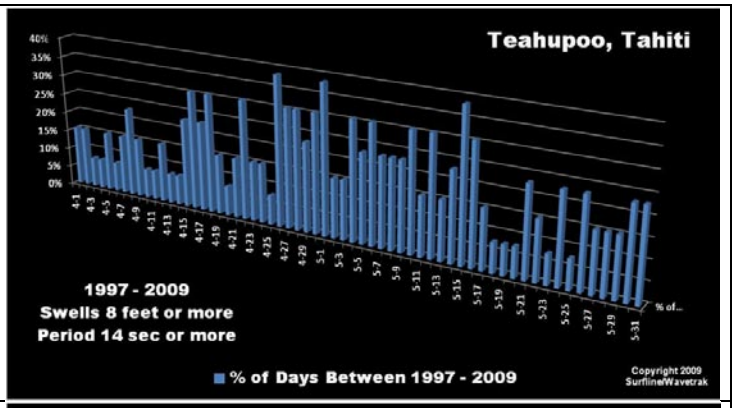

Teahupoo, Tahiti
Feet
1997 - 2009
Swells 8 feet or more
Period 12 sec or more
Copyright 2009 SurflineWavetrak
1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

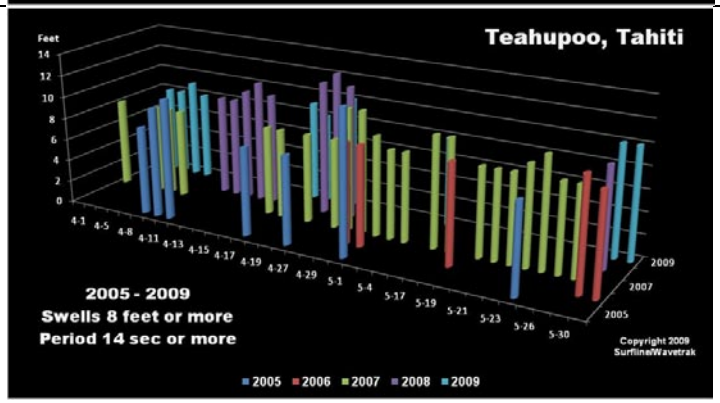

Teahupoo, Tahiti
1997 - 2009
Swells 8 feet or more
Period 12 sec or more
% of Days Between 1997 - 2009
Copyright 2009 SurflineWavetrak

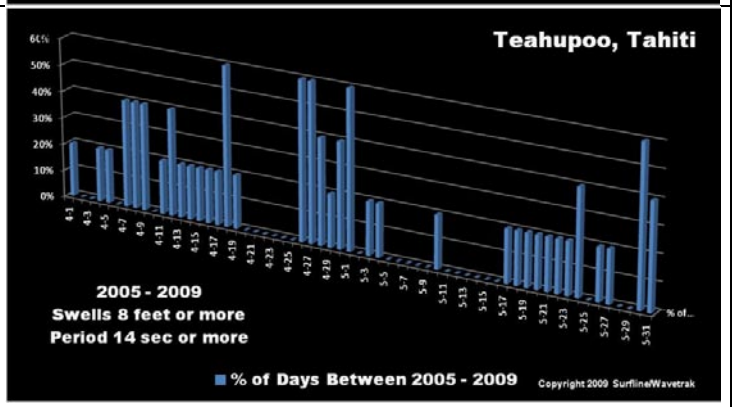

Teahupoo, Tahiti
Feet
2005 - 2009
Swells 8 feet or more
Period 12 sec or more
Copyright 2009 SurflineWavetrak
2005 2006 2007 2008 2009

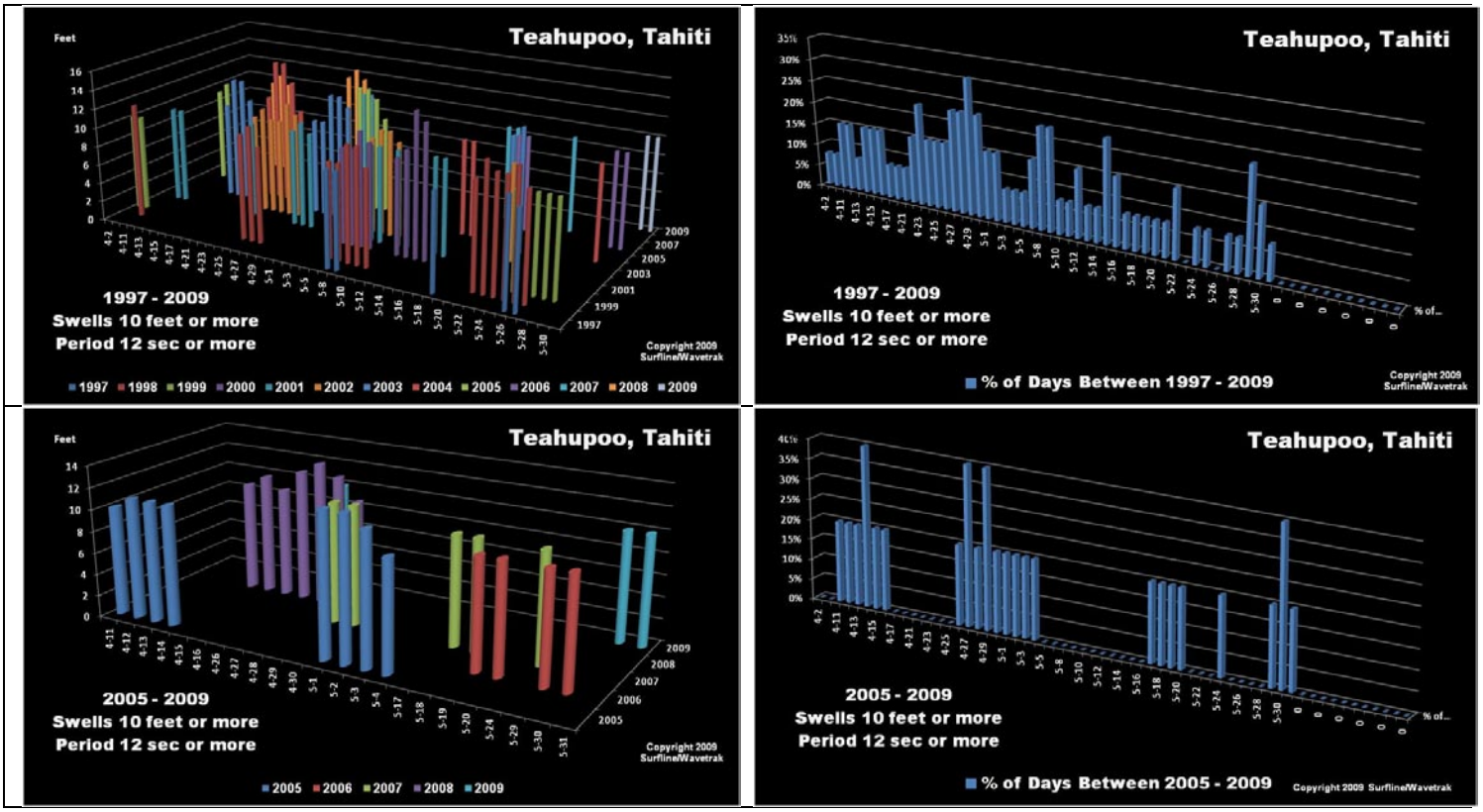

Teahupoo, Tahiti
2005 - 2009
Swells 8 feet or more
Period 12 sec or more
% of Days Between 2005 - 2009
Copyright 2009 SurflineWavetrak


Teahupoo, Tahiti
Feet
1997 - 2009
Swells 8 feet or more
Period 14 sec or more
Copyright 2009 SurflineWavetrak
1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009


Teahupoo, Tahiti
1997 - 2009
Swells 8 feet or more
Period 14 sec or more
% of Days Between 1997 - 2009
Copyright 2009 SurflineWavetrak


Teahupoo, Tahiti
Feet
2005 - 2009
Swells 8 feet or more
Period 14 sec or more
Copyright 2009 SurflineWavetrak
2005 2006 2007 2008 2009


Teahupoo, Tahiti
2005 - 2009
Swells 8 feet or more
Period 14 sec or more
% of Days Between 2005 - 2009
Copyright 2009 SurflineWavetrak



Additional data reviewed and compared for analysis in this report included local Tahiti moon phases, local tides, El Nino and La Nina oscillations, and even sunspot historical data, to explore what other variables might possibly exist that could have additional effects on the swell. At this time, none of these other factors showed significant possibilities to add valuable input for future long term forecasts. Although there did seem to be more consistent swell during the transition from New Moon to Full moon phases for some reason. Hmmmm…

I hope you enjoyed this report. I enjoyed doing the study and certainly keep learning more and more the deeper we get into the science and art of wave forecasting.

Hope you score great surf!

Sean Collins…