Analysis of SMO Flight Traffic

Saturday, January 08, 2011

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February 17, 2011

Introduction

On Saturday January 08, 2011, concerned residents of neighborhoods surrounding Santa Monica Airport (SMO) conducted a test of airport flights in order to accurately assess the nature of the flights occurring on the weekend, the noise impacts of those flights, and the compliance levels of the flights with recommended flight paths for SMO. The test involved a number of volunteers stationed at positions along the takeoff path in order to accurately determine the exact flight path taken. Flight paths were determined by each observer according to the options shown in the Figure 1. Aircraft noise levels were measured using a Decibel meter at the 18th/Dewey location (station 1). Simultaneously, tail numbers were recorded at the flight line for all aircraft as they took off. We had two manned observation stations in front of the flight path (see Figure 1). This report is an update to an earlier version dated 1/15/2011, the primary modification being the addition of the section analyzing the observed flight paths against the paths provided by the WebTrak system. This report is one in an on-going series of such reports conducted by residents to monitor airport operations. The previous report analyzed traffic on November 13, 2010.

By looking up the registrations for each tail number together with other data from various flight tracking web sites, we were able to determine the operators of each aircraft and thus to break the flights observed into three major categories for the purposes of analysis:

1. Flight Schools and Training Flights
2. Jet Aircraft
3. Other Prop Aircraft Traffic

A total of 81 flights were recorded during the period from 11:00 AM to 4:00 PM, an average of one flight every 3-4 minutes.

Significant report findings include the following:

- Approximately 2/3 of airport traffic is flight school and training related.
- Roughly half of all flights are not following the recommended flight paths.
- Of flights not following recommended paths, on this occasion around 3/4 of the violations were committed by flight schools.
- There appear to be large differences in flight path compliance levels between the various flight schools.
- The WebTrack flight tracking system exhibits systemic path errors, particularly at low altitudes, but is nonetheless an improvement over the system used in the past by airport staff.

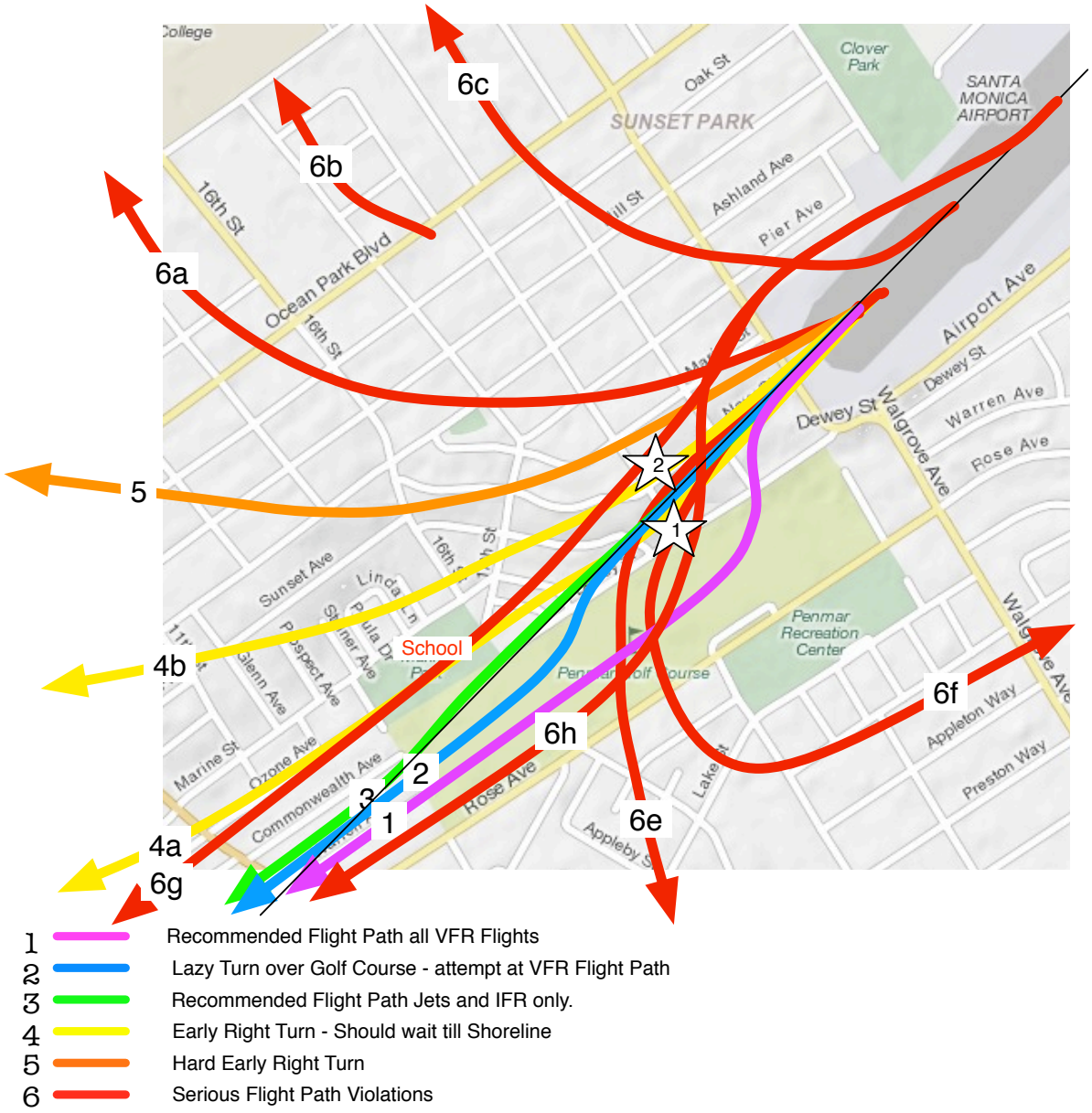


Figure 1 - SMO Flight Paths Tracked during Observations

Types of Use

For the purpose of this analysis, category 1 (Flight schools and training flights) included not only aircraft that could be directly tracked to flight school operators, but also flights that did more than one takeoff and landing within a one hour period. These flights are mostly flying round SMO's local loop in order to practice takeoffs and landings. The local loop traffic should fly path 1 (see Figure 1) until Lincoln then turn left and pass back to the south of the airport in order to return to land. Figure 2 below shows the breakdown of flight according to the three usage types defined above.

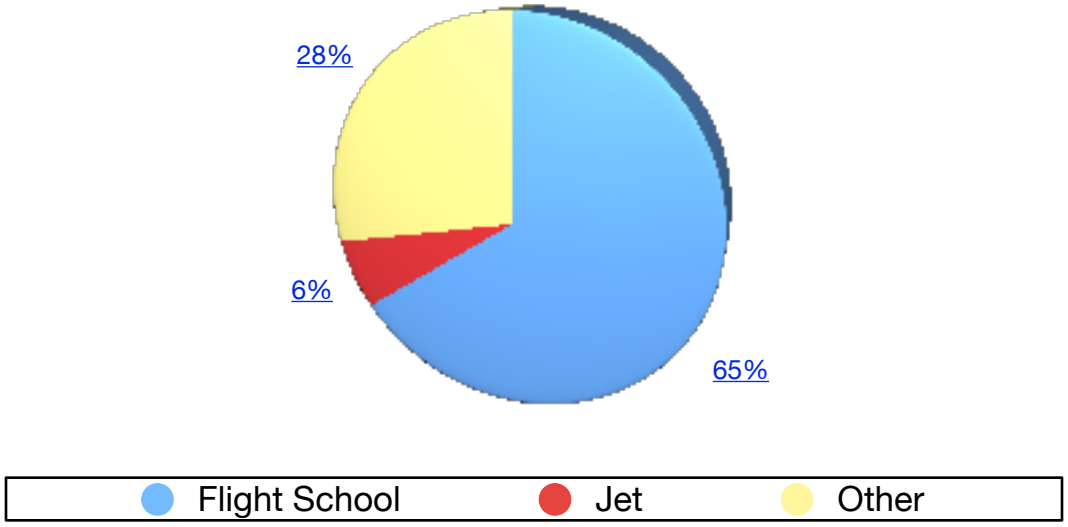


Figure 2 - Flight Breakdown by Usage Type

Sixty four percent (65%) of the flights were flight school and training related, 28% were other prop traffic, and 6% were jet traffic.

Figure 3 below shows the distribution of these flights between the three categories over the day using the same color scheme. Note the

surge in the level of flight school traffic in the early afternoon (1:00 PM - 2:30 PM).

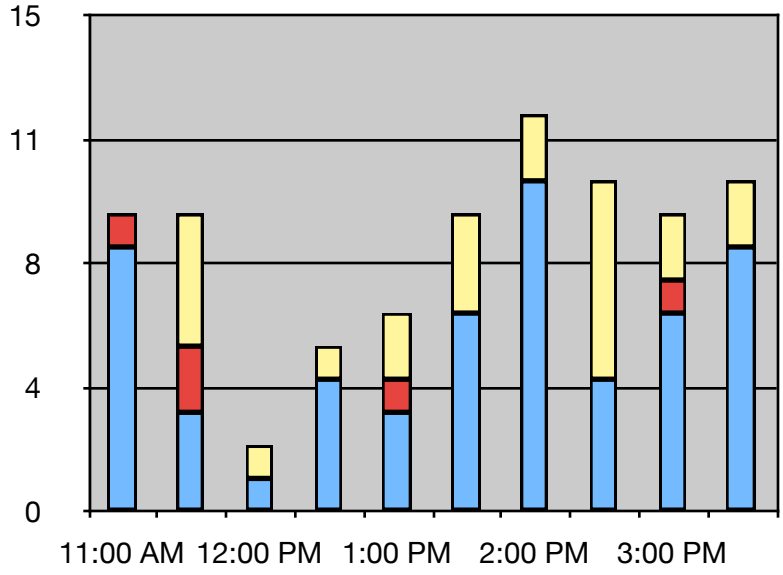


Figure 3 - Flight Breakdown by Usage Type & Time

Noise

The table below summarizes the peak noise level findings from the study:

Usage Type	Average	Maximum
Flight Schools	76.4 dB	85 dB
Jet Aircraft	81.1 dB	83.8 dB
Other Prop. Traffic	76 dB	83.9 dB

We can see that on this occasion the average flight school traffic peak noise levels were similar to those of other prop traffic at around 76 dB, while Jet traffic was louder by around 4-5 dB.

This simplistic analysis however does not accurately measure 'perceived' noise impact which also depends upon how long the noise goes on for. The noise envelope for the three classes of traffic appear as shown in Figure 4 below. Jet traffic, while usually louder, lasts for less time. Flight school traffic tends to be on lower performance aircraft (e.g., Cessna 172) and hence the noise envelope lasts much longer and the perceived impact can be greater. Other traffic tends to be higher performance prop-planes and thus has an envelope/impact mid-way between the two extremes.

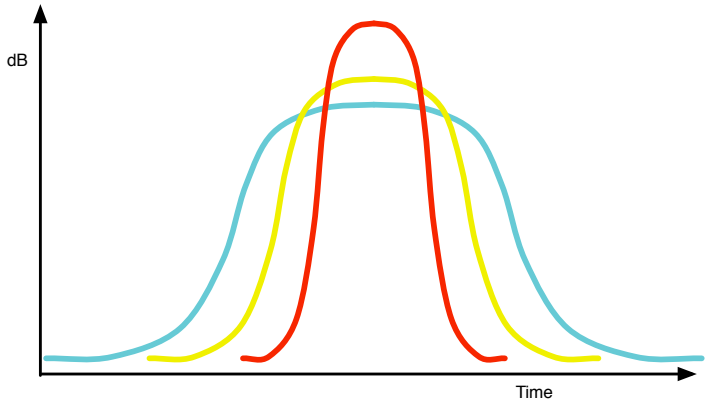


Figure 4 - Noise Envelopes

The average time for any

given plane going around the local loop is once every 12-15 minutes. Thus with just 4 planes engaged in training at the same time, these 4 planes alone account for one flight every 3 minutes. There can often be far more than 4 planes in the local loop during peak flight school hours. With a noise envelope of some 45 seconds to a minute for the slower aircraft, it is often the case that only 1 minute in 3 is actually free of aircraft noise. During periods of peak activity (see 11:16, 2:20, 3:21) flights departed approximately every 40 seconds which means that the aircraft noise is continuous. Regardless of the lower peak noise levels, this essentially continuous noise can be far more annoying than louder but less frequent events.

Flight Paths

Figure 5 below summarizes the flight paths actually taken for the 81 flights observed compared with the expected ratios if aircraft were all following the recommended flight paths:

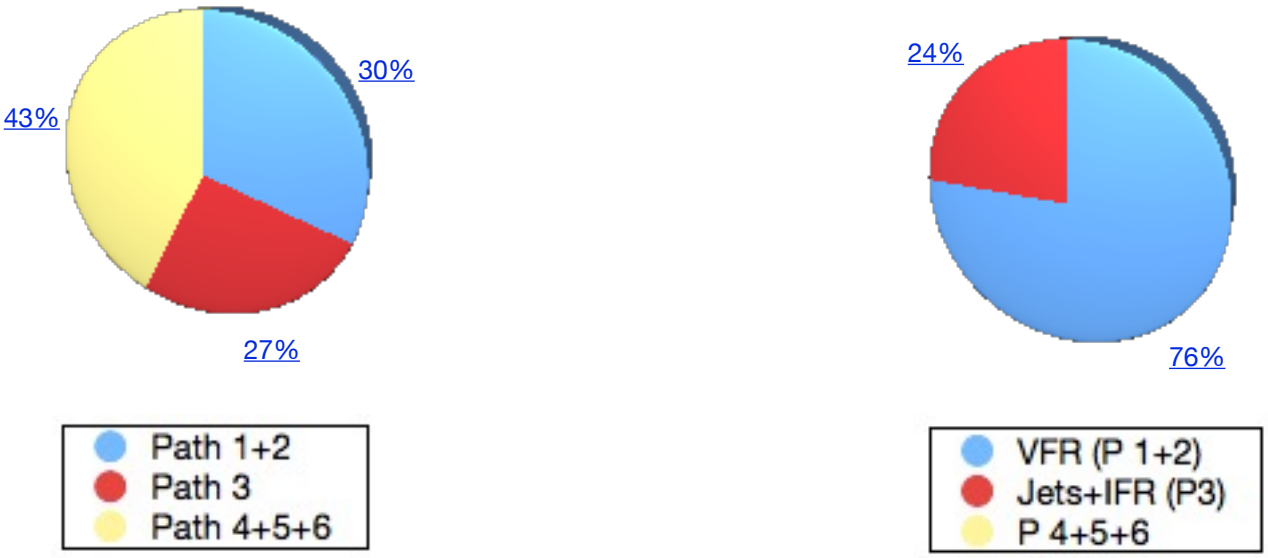


Figure 5 - Actual vs. Recommended Flight Paths

As can be seen from Figure 1, all Jet traffic and Instrument Flight Rules (IFR) traffic, barring any weather situations, should follow flight path 3 (straight out). The 2009 annual noise report states that 24% of flights originating from SMO are IFR flights, the remainder are Visual Flight Rules (VFR) flights and should all use path 1 according to that report. In reality just 21% of departing flights follow path 1 (vs. 76% according to the rules). 100% of all jet traffic was observed to follow path 3 (as it should). By lumping paths 1 and 2 together, we reach 30% of flights making some kind of attempt to follow the golf course on takeoff, still far short of the the 76% mark. The fact that 30% of flights follow path 1 or 2 rather than the 76%

expected indicates that a large number of VFR pilots appear to be unaware that they should be following the golf course after takeoff.

Note that we have refined our flight path map since the previous report to include tracking of the tendency of many flights to take off early, and then float north of the runway before reaching the end. The new flight paths 6g and 6h reflect this behavior. Adding tracking of this northward excursion increased the total violation percentage (paths 4-6) by approximately 13% relative to earlier reports that ignored this portion of the flight path.

A full 43% of all flights followed non-recommended paths 4-6. It appears that the effort to educate pilots flying out of SMO to follow the recommended flight paths has not resulted in the levels of compliance one would expect given the length of time these flight rules have been in effect. Reports from Sunset Park residents indicate that the percentages of all kinds of VFR flights failing to follow path 1/2 increased dramatically at the time of the FAA test and has yet to return to pre-test levels.

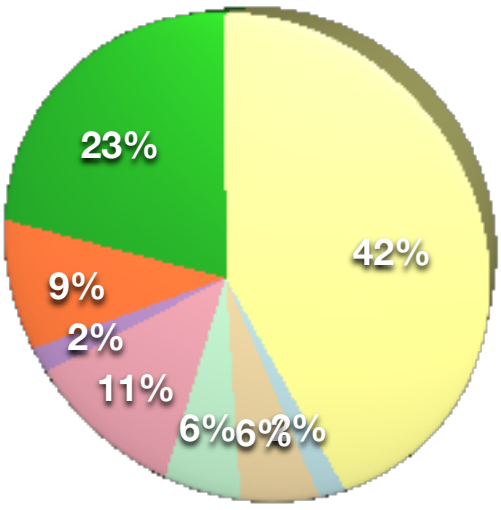
Of the flights following invalid flight paths 4-6, 77% are flight school related (a sharp increase from the previous report), which indicates that despite recent attempts at outreach to the flight schools, there are still high levels of violations. The fact that on this occasion only 23% of the violations are by non-flight school pilots (a large improvement over the previous measurement), would tend to indicate that non-flight school pilots are actually now following Santa Monica's guidelines more closely than are the flight schools. This is a surprising result given the higher ratio of itinerant traffic in this group so that one might anticipate that pilots may not be as familiar with SMO and its flight rules.

Flight School Details

As this and earlier reports have shown, approximately 1/2 to 3/4 of weekend traffic and noise tends to be caused by flight school operations. In addition, on this occasion more than 2/3 of all flight path violations were committed by flight school planes. These percentages warrant additional analysis to compare and contrast the 'sociability' of the various flight schools operating out of SMO.

School/Loop Traffic	Color	Flights	Avg. dB	Path Violation
Justice Aviation		22	79.5	50%
Skyward Aviation		1	80.1	0%
Proteus Air Services		3	79.6	33%
Santa Monica Flyers		3	68.8	100%
American Flyers		6	78.0	16%
Seaside Aviation	Do not provide aircraft. Instruction is in own aircraft			
Santa Monica Aviation		1	79.9	0%
Air-Spacers Flying Club		5	80.4	40%
Local loop traffic		12	81.4	50%

Percentage of Flights



As can be seen from the analysis above, on this date Justice Aviation represents more flights than all the other identified flight schools put together with fully 42% of all flight school traffic. The un-traced local

loop traffic follows with 23%, and all other flight schools are at or below 10% each.

Worthy of particular mention is that the N1111X aircraft operated for the 3 flights recorded by Santa Monica Flyers is at least 10 dB quieter than all the other flights. It is clear that flight schools could significantly reduce their impact on the neighborhood by moving to more modern quieter aircraft like this. Unfortunately, this aircraft violated flight path guidelines 100% of the time.

As far as flight path violations in general, there appear to be large discrepancies between the levels of compliance across the various schools. American Flyers near perfect record with 6 flights places them as the most responsible school in this sample. As a percentage, Santa Monica Flyers has the worst record in the sample. Local Loop Traffic and Justice Aviation are tied for second worst percentage offenders at 50%, followed by Air-space Flyers club at 40%. However, in terms of the absolute number of violations during the day, Justice Aviation (by virtue of its much larger number of flights) is the clear leader with 11 violations, twice that of any other group.

We will continue to monitor flight school performance in future reports and hope to see improvements. Perhaps shifting takeoff and landing training from the weekend to business hours during the week, while doing less runway intensive training on the weekends, would help to reduce impact on the community. Future analyses will study the comparative differences between weekday and weekend operations and once this is understood, we can come up with and track a 'neighborly ranking' for the schools. In any scenario where the number of flight school operations were to be limited in the future, the use of such a ranking should be a key determining factor.

WebTrak Comparison

Our objective in this section is to look at the report data in comparison to the LAX WebTrak historical data which can be found at: http://www331.webtrak-lochard.com/webtrak/lax4

This site offers both live tracking and historical playback of aircraft traffic around LAX including that to/from SMO. We are considering using the WebTrak site to record flight paths in future reports, thereby reducing the number of volunteers necessary to create these reports. It is therefore important that we understand the accuracy and reliability of the WebTrak system enough to determine its suitability for this purpose.

Example WebTrak - N1111X departure at 2:42 PM

The LAX WebTrak system can be used to obtain a flight track for most aircraft operating out of SMO. This web site operates with a 20 minute delay for security purposes. For aircraft operating out of SMO under Instrument Flight Rules (IFR), the aircraft registration number and destination is shown on the WebTrak site. Visual Flight Rules (VFR) aircraft usually do not show the registration number, but the flight track is still displayed. By cross checking actual flight path observations on the ground with the LAX WebTrak system, it is therefore possible to check the accuracy of the WebTrak system, as well as the actual VFR/IFR percentages. A more detailed understanding of WebTrak accuracy is essential since this is the same system that Santa Monica will be deploying to aid residents in tracking SMO flights, and these WebTrak tracks will become the basis for responding to resident noise complaints by the airport noise staff.

IFR/VFR Percentages

In this report, we assumed that 24% of SMO traffic was IFR traffic (per the 2009 Annual Noise Report). In fact, according to WebTrak 20% of the flights were IFR which means that the 24% assumption is a good approximation.

WebTrak Path Accuracy

Of the 81 flights detailed in the report, there are 21 instances where the WebTrak path differs materially from that actually observed, which is a discrepancy rate of 26%. In addition, fourteen of the WebTrak tracks (17%) are missing a portion of the flight track, most frequently the portion straight after takeoff, thus making it hard to compare the WebTrak records with those observed for paths like 6f,

6g and 6h. Three of the flights (4%) are missing entirely from the WebTrak record. In total therefore 21% of the WebTrak records are missing some or all of the flight path. The 'discrepancy' and 'missing' percentages do not vary significantly when we restrict the comparison to just paths 4-6. This might suggest that the WebTrak error rate is largely independent of the track involved.

However, in the sample data in this report, there were no flights that took paths 5, 6a or 6c, which means that we cannot determine if the WebTrak accuracy falls off for flights flying northwards and low over the hill in Sunset Park. Flights on these paths more closely match the ground clearance situation immediately after takeoff, so one might expect the missing percentage for such flights to move from 4% towards the 21% we see for the initial portion of all flight tracks. Obtaining the answer to this question is important if WebTrak data becomes the basis for reporting and responding to airport noise and flight path complaints.

Because of the method we used to observe flight paths, we have confidence in the accuracy of the observations. This prompts the question of how accurate the WebTrak flight path is compared to reality, given the 26% rate of discrepancy between ground observations and the WebTrak data.

We have been unable to get any definitive published statements as to the accuracy of the WebTrak information however, the following statement appears on the WebTrak site for LA/Ontario Airport (ONT):

The intended use of this Web site is to display the general location and flow of air traffic in the greater Los Angeles region. WebTrak information is not intended for navigational purposes or airline schedule information. While ANOMS processes a large quantity of

radar data with a very high level of accuracy, in a small number of cases, flight plan and noise data may not be correlated correctly. You may also notice aircraft icons sometimes "dropping off" and/or suddenly doing unusual things. This is especially true in the area immediately around ONT, but could also occur away from the airport as well. These "ghost" aircraft are due to radar and aircraft transponder reflections from the ground and high rise buildings around the airport, and possibly from terrain and meteorological conditions farther away from ONT.

This statement would seem to confirm our perceptions that the data becomes less accurate the closer an aircraft is to the ground and/or ground clutter. The screen shot below shows a minor example of the kinds of 'quirks' mentioned. The zig-zag in this image gives a direct clue to the inaccuracies involved in the tracks since such a maneuver is clearly impossible.

Perhaps a better idea of absolute accuracy can be obtained by looking at aircraft landing tracks, since we know for certain that aircraft land on the runway.

The image above is of a landing a few days ago. The image shows a consistent radar ranging error of approximately 750 feet when the aircraft is below a certain height above the ground. Note that the offset applies to the approach path all the way out to the point where the track crosses Colby Avenue at which time WebTrak indicates that the aircraft is 200 feet above the runway. Before intersecting Colby, the track appears to be accurate and aligned with the runway. The corrective dogleg above Colby is therefore an artifact of the WebTrak system and indicates that flight paths at ground clearances less than 200 feet may be inaccurate by up to 750 feet. This systemic error

could easily account for all the discrepancies with ground observations. Note also that the effect of this error is to move tracks southwards, that is to make takeoffs appear to more closely follow the golf course path than they actually do. This is consistent with the nature of the discrepancies that we see with our ground observations.

The image to the right shows the same consistent offset error, but also illustrates the effects of large buildings at the east end of the runway on the track. As the aircraft gets further from the ground, these kinds of effects disappear, but ranging errors at low clearances remain.

We have been advised that many aircraft have onboard GPS units which give positional accuracy down to around 10 feet. If we can obtain GPS flight tracks for some flights from SMO, we would be able to compare those tracks with the WebTrak paths in order to answer the still unanswered question of WebTrak accuracy at ground clearances above 200 feet. Recent tests by a pilot flying out of SMO indicate that the WebTrak tracks can be “plus or minus at least two city blocks”.

Conclusions

Given the information we have so far on WebTrak accuracy, it would appear that the system is a valuable tool, but is not accurate enough to be relied on entirely when investigating detailed flight paths near SMO. The radar tracks appear to have significant range errors at ground clearances below approximately 200 feet. Since the hill of Sunset Park rises above the airport runway, Webtrak records of flights veering north over the Sunset Park neighborhood may be particularly inaccurate.

Despite the shortcomings of the WebTrak system, it clearly represents a significant improvement in accuracy over the radar tracks that have been used by airport staff in the past to evaluate noise and flight path complaints. During discussions with staff regarding flight paths detailed in the November 13 report, it became clear that the existing radar data/system used to evaluate tracks has a significantly higher percentage of full/partial missing paths, and exhibits far more dramatic anomalies than does WebTrak. It is hoped that when the dedicated SMO WebTrak system goes on-line it will make the process of registering and evaluating noise and flight path complaints significantly better for all parties involved.

Notes

This study represents a single snapshot of aircraft activity at SMO. In order to develop a more complete picture, and to validate that the observations are typical, we will be conducting similar trials in the future. The following points/issues need to be examined more carefully:

- There may be a significant difference between weekday and weekend traffic. The level of jet traffic may be higher during the week and may peak early in the morning and late at night. We need to gather further data during these times.
- This study does not address non-noise pollution impacts from aircraft, particularly jet aircraft.
- We need to staff additional observation points along the takeoff paths in order to more fully assess compliance with the entirety of recommended flight paths, particularly the fact that northern turns should not begin until the shoreline, and southern and local loop turns should not occur before Lincoln.
- We need to gather complete sound envelopes for the various usage types so that we can empirically arrive at the actual SENEL impact for each type (as opposed to peak noise levels) rather than compute it based on FAA models. Our equipment is capable of this, but has not yet been used in this manner.
- Repeating these observations at regular intervals is essential in order to determine if any trends or changes are occurring. It is hoped that as pilot education regarding adverse impacts improves, they will adopt more 'friendly' patterns of behavior which should be visible in future observations. These trend lines will be critical in reaching a peaceful co-existence with the community.

Full Result Spreadsheet

Time	Aircraft Type (Prop - P or Jet - J)	Tail Number	Flight Path (See Attached Map)	Max.Db Reading (Cnr. 18th & Dewey)	Registered to/Operated by: (FAA Website)	Notes
11:04	P (2005 Cessna 172S) Single Engine	N353MV	3	78.8	Registered to PIA Aviation LLC, 12753 Appleton Way, Los Angeles CA 90066-1755 (Corporation). Operated by Justice Aviation	
11:06	P (2001 Cessna 172S) Single Engine	N830SP	3	78.2	Registered to Kylan Aviation Inc, 13218 Fiji Way, Unit A, Marina Del Rey CA 90292-7067. Operated by Justice Aviation	
11:10	P (2008 Cirrus SR22) Single Engine	N462CP	2	82.9	Registered to RTJ Aircraft Inc., 3511 Silverside Rd., Ste 105, Wilmington DE 19810-4902 (Corporation)	
11:16	P (2005 Cessna 172S) Single Engine	N353MV	3	76.6	Registered to PIA Aviation LLC, 12753 Appleton Way, Los Angeles CA 90066-1755 (Corporation). Operated by Justice Aviation	
11:16	P (1973 Cessna 172M) Single Engine	N5155Q	2	78.4	Registered to Planeminder LLC, 1627 Crescent Pl, Venice CA 90291-3820 (Corporation). Operated by Justice Aviation,	
11:22	P (2008 Cirrus SR22) Single Engine	N462CP	3	83.9	Registered to RTJ Aircraft Inc., 3511 Silverside Rd., Ste 105, Wilmington DE 19810-4902 (Corporation)	
11:23	P (1999 Cessna 172R) Single Engine	N2447B	2	80.4	Registered to Justice Aviation Inc., 3011 Airport Ave, Santa Monica CA 90405-6110 (Corporation)	
11:27	P (2005 Cessna 172S) Single Engine	N353MV	2	78.2	Registered to PIA Aviation LLC, 12753 Appleton Way, Los Angeles CA 90066-1755 (Corporation). Operated by Justice Aviation	
11:29	J (2004 Gulfstream 200)	N722QS	3	79.1	Registered to Netjets Sales Inc, c/o Netjets Sales, 100 N Broadway Ave, Oklahoma City OK 73102 (Co-owned)	
11:30	Helicopter		1	62.9		
11:31	P (1975 Beech F33A) Single Engine	N48BW	6h	82.3	Registered to Wayne Miller, 724 Alta Ave, Santa Monica CA 90402-2808 (Individual)	
11:34	P (2008 Cirrus SR22) Single Engine	N462CP	2	84.7	Registered to RTJ Aircraft Inc., 3511 Silverside Rd., Ste 105, Wilmington DE 19810-4902 (Corporation)	

11:37	J (2010 Embraer-Empresa EMB-500)	N581JS	3	83.8	Registered to Bank of Utah Trustee, 200 E South Temple Ste 210, Salt Lake City UT 84111-1346 (Corporation)	
11:38	P (1993 Piper PA-32R-301) Single Engine	N9233Z	3	83.7	Registered to Alan Lund Trustee, 3135 Mountain View Ave, Los Angeles CA 90066 (Co-owned)	
11:39	P (2005 Cessna 172S) Single Engine	N353MV	6h	80.1	Registered to PIA Aviation LLC, 12753 Appleton Way, Los Angeles CA 90066-1755 (Corporation). Operated by Justice Aviation	
11:41	P (PA-28R-201T) Single Engine	N2443M	3	78.2	Registered to Victor Haluska, 1585 K M Ranch Rd, Whitefish MT 59937-8394 (Individual)	
11:47	P (2009 CC11-100) Single Engine	N399CC	Departed to the East	Not available	Registered to Richard Festa, 955 Enchanted Way, Pacific Palisades CA 90272-2824 (Individual)	Departed to the East
11:51	P (PA-28-161) Single Engine	N2092L	2	80.1	Registered to Skyward Aviation Inc., 3147 Donald Douglas Loop S, Santa Monica CA 90405-3210 (Corporation)	
11:58	J (1999 Cessna 750)	N702FL	3	77.8	Registered to Flight Options LLC, 26180 Curtiss Wright Pkwy, Richmond Heights OH 44143 (Co-owned)	
12:19	P (2006 Cirrus SR22) Single Engine	N554MC	3	81.9	Registered to First Media Inc, 10573 W. Pico Blvd #842, Los Angeles CA 90064 (Corporation)	
12:24	P (Cessna 172R) Single Engine	N2447B	1	79.1	Registered to Justice Aviation Inc., 3011 Airport Ave, Santa Monica CA 90405-6110 (Corporation)	
12:30	P (PA-28R-201T) Single Engine	N2443M	1	76.8	Registered to Victor Haluska, 1585 K M Ranch Rd, Whitefish MT 59937-8394 (Individual)	
12:41	P (2002 Cessna 172S) Single Engine	N974TA	1	80.8	Registered to Envision Aviation LLC, 959 E Carillo Rd, Santa Barbara CA 93103-2422 (Corporation). Operated by Justice Aviation	
12:51	P (2008 Cirrus SR22) Single Engine	N462CP	3	81.1	Registered to RTJ Aircraft Inc., 3511 Silverside Rd., Ste 105, Wilmington DE 19810-4902 (Corporation)	Flyover - did not land
12:53	P (Cessna 172R) Single Engine	N2447B	1	79.8	Registered to Justice Aviation Inc., 3011 Airport Ave, Santa Monica CA 90405-6110 (Corporation)	
12:59	P (Piper PA-28-181) Single Engine	N253FD	Started as 1 then 4a	79.3	Registered to Olson Aviation LLC, Chandler, AZ (Corporation). Operated by Justice Aviation	

13:00	P (1971 Piper PA-28-140) Single Engine	N4252T	3	78.2	Registered to Flightwing Equipment Corp, 335 N. Oakhurst Dr., Apt 3, Beverly Hills CA 90210-4160 (Corporation). Operated by Proteus Air Services	
13:01	Helicopter		3	77.4		
13:09	P (1968 Cessna A185E) Single Engine	N2252T	3	68.7	Registered to James Elliott, 2043 Merriman Way Rd., Moneta VA 24121-3160	
13:14	J (2001 Cessna 550)	N721T	3	83.1	Registered to Sadler/ Chauncey LLC, 1209 N Orange St, Wilmington DE 19801-1120 (Corporation)	
13:17	P (1978 Gulfstream AA-5B) Single Engine	N41D	3	79.5	Registered to Zachary Bryson, 3942 Yellowtail Dr., Rossmoore CA 90720 (Individual)	
13:19	P (1971 Piper PA-28-140) Single Engine	N4252T	6e	79.9	Registered to Flightwing Equipment Corp, 335 N. Oakhurst Dr., Apt 3, Beverly Hills CA 90210-4160 (Corporation). Operated by Proteus Air Services. Operated by Proteus Air Services	
13:26	P (1976 Cessna 172M) Single Engine	N73262	6g	79.8	Registered to Air Spacers Inc, 3025 Airport Ave Ste 11, Santa Monica CA 90405 (Corporation)	
13:33	P (Piper PA-28-181) Single Engine	N253FD	4a	79.5	Registered to Olson Aviation LLC, Chandler, AZ (Corporation). Operated by Justice Aviation	
13:34	P (1976 Cessna 172M) Single Engine	N73262	4a	81.8	Registered to Air Spacers Inc, 3025 Airport Ave Ste 11, Santa Monica CA 90405 (Corporation)	
13:38	Helicopter		1	67.9		
13:41	P (1967 Piper PA-24-260) Single Engine	N9220P	6f	79.5	David Rever Aviation LLC, 3511 Silverside Rd, Ste 105, Wilmington DE 19819-4902 (Corporation)	
13:42	P (1976 Cessna 172M) Single Engine	N73262	1	80.5	Registered to Air Spacers Inc, 3025 Airport Ave Ste 11, Santa Monica CA 90405 (Corporation)	
13:44	P (Aero Commander 112) Single Engine	N27007	3	81.4	Registered to Paul Davis, 1794 Carlisle Pl., Merrick NY 11566-3805 (Co-owned)	
13:49	P (1976 Cessna 172M) Single Engine	N73262	1	79.6	Registered to Air Spacers Inc, 3025 Airport Ave Ste 11, Santa Monica CA 90405 (Corporation)	
13:51	P (2002 Cirrus Design Corp SR22) Single Engine	N246TJ	1	81.9	Registered to Lobo & Chiat LLC, 1252 26th St Frnt, Santa Monica CA 90404-1473 (Corporation)	

13:57	P (1976 Cessna 172M) Single Engine	N73262	1	80.5	Registered to Air Spacers Inc, 3025 Airport Ave Ste 11, Santa Monica CA 90405 (Corporation)	
13:59	P (2001 Cessna 172R) Single Engine	N67AF	6h	77.2	Registered to Ameriflyers of Florida LLC, 16151 Addison Rd, Addison TX 75001-3252 (Corporation)	
14:00	P (2003 Cirrus SR22)	N1663C	6g	81.6	Registered to Olson Aviation LLC, Chandler, AZ (Corporation). Operated by Justice Aviation	
14:02	P (1983 Cessna 172RG) Single Engine	N9378D	6h	80.8	Registered to Planeminder LLC, PO Box 162, Crawford TX 76638-0162 (Corporation). Operated by Justice Aviation	
14:03	P (Cessna 172R) Single Engine	N2447B	6g	80.4	Registered to Justice Aviation Inc., 3011 Airport Ave, Santa Monica CA 90405-6110 (Corporation)	
14:07	P (2003 Cirrus SR22)	N1663C	1	80.5	Registered to Olson Aviation LLC, Chandler, AZ (Corporation). Operated by Justice Aviation	
14:12	P (Sportcruiser - single-engine)	N1111X	6g	68.5	Registered to Santa Monica Flyers Inc., 3159 Donald Douglas Loop S#305, Santa Monica CA 90405 (Corporation). Note: Appears on Santa Monica Aviation Website as one of their Aircraft for Rental. www.smaviatioin.com/Aircraft_rental.html	
14:13	P (2003 Cirrus SR22)	N1663C	4a	78.8	Registered to Olson Aviation LLC, Chandler, AZ (Corporation). Operated by Justice Aviation	
14:20	P (1973 Cessna 172M) Single Engine	N5155Q	6h	77.2	Registered to Planeminder LLC, 1627 Crescent Pl, Venice CA 90291-3820 (Corporation). Operated by Justice Aviation,	
14:21	P (1972 Cessna 172L)	N19736	6h	77.8	Registered to Robert Siegenberg, 1748 Palisades Dr, Pacific Palisades, CA 90272-2115 (Individual)	
14:22	P (2003 Cirrus SR22)	N1663C	4a	81.5	Registered to Olson Aviation LLC, Chandler, AZ (Corporation). Operated by Justice Aviation	

14:23	P (Sportcruiser - single-engine)	N1111X	6g	68.9	Registered to Santa Monica Flyers Inc., 3159 Donald Douglas Loop S#305, Santa Monica CA 90405 (Corporation). Note: Appears on Santa Monica Aviation Website as one of their Aircraft for Rental. www.smaviatioin.com/ Aircraft_rental.html	
14:26	P (Socata TBM 700) Single Engine	N722SR	3	82.4	Registered to Go-Mav Inc., c/ o Lucas Franco, 938 Westranch Pl, Simi Valley CA 93065 (Corporation)	
14:28		N9448Z	4a	69	Registered to Ameriflyers of Florida LLC, 16151 Addison Rd, Addison TX 75001-3252 (Corporation)	
14:31	P (James Gates Lancair 235) Single Engine	N320JG	4a	77.8	Registered to James Gates, 142 Via Pasqual, Redondo Beach CA 90277 (Individual)	Experimental/ Amateur Built
14:35	P (1980 Cessna 172RG) Single Engine	N4677V	1	78.9	Registered to Ameriflyers of Florida LLC, 16151 Addison Rd, Addison TX 75001-3252 (Corporation)	
14:37	P (1973 Cessna 210L) Single Engine	N307CF	1	83.9	Registered to Patmos, Inc., c/ o Johannes Schwarzenburg, 7456 Mulholland Dr., Los Angeles CA 90046 (Corporation)	Very noisy. Takes off at the Tower
14:41	P (1977 Rockwell 112TCA) Single Engine	N4638W	3	79.5	Registered to Berkeley Brandt, 2715 Surfrider Ave., Ventura CA 93001-4139 (Co-owned)	
14:42	P (Sportcruiser - single-engine)	N1111X	Started as a 4a with early south turn	69	Registered to Santa Monica Flyers Inc., 3159 Donald Douglas Loop S#305, Santa Monica CA 90405 (Corporation). Note: Appears on Santa Monica Aviation Website as one of their Aircraft for Rental. www.smaviatioin.com/ Aircraft_rental.html	
14:44	P (1960 Cessna 180D) Single Engine	N6451X	4a then south turn	78.7	Registered to Paul Ryan, 528 Hill Street, Santa Monica CA 90405 (Individual)	Very noisy at take-off
14:47	P (1979 Cessna 172N) Single Engine	N5624G	3	82.1	Registered to Richard Parmelee, 2629 Windsor Cir., Corona CA 92881-6618 (Co-owned)	
14:54	P	Unknown	4a	80.2	Not available	
14:55	P (1960 Cessna 180D) Single Engine	N6451X	6h	83.2	Registered to Paul Ryan, 528 Hill Street, Santa Monica CA 90405 (Individual)	Very noisy at take-off

14:56	P (2000 PC-12/45) Single Engine	N373KM	6f	80.7	Registered to Ouch Pro Cycling LLC, 27450 Ynez Rd., Ste 128, Temecula CA 92591-4680 (Corporation)	
15:01	P (1960 Cessna 180D) Single Engine	N6451X	6f	79.1	Registered to Paul Ryan, 528 Hill Street, Santa Monica CA 90405 (Individual)	
15:07	J (2003 Cessna 525) Multi Engine	N814SP	3	81.8	Registered to Charlie Juliet Inc, 9300 Stockdale Hwy, Ste 300, Bakersfield CA 93311-3611 (Corporation)	
15:08	P (1980 Cessna P210N)	N827RP	6f	79.3	Registered to Mark Rudolph, 131 Walford Dr, Moraga CA 94556-2538 (Individual)	
15:08	P (1960 Cessna 180D) Single Engine	N6451X	6f	85	Registered to Paul Ryan, 528 Hill Street, Santa Monica CA 90405 (Individual)	
15:14	P (2001 Cessna 172R) Single Engine	N83AF	1	77.2	Registered to Ameriflyers of California Inc, 16151 Addison Rd, Addison TX 75001-3252 (Corporation)	
15:15	P (1983 SF. 260TP) Single Engine	N350TP	1	79.1	Registered to AC Sunni LLC, 1500 S. Evergreen Ave., Los Angeles CA 90023-3618 (Corporation)	Military WW2
15:19	P (DA 40) Single Engine	N183DF	2	79.9	Registered to Albert Perdon, 3651 North Way, Oceanside CA 92056-4109 (Individual)	
15:21	P (1974 Piper PA-28-180) Single Engine	N400JW	1	80.7	Registered to Airfleet Holdings LLC, 335 N Oakhurst Dr., Apt 3, Beverly Hills CA 90210-4160. Operated by Proteus Air Serives	
15:21	P (2005 Cessna 172S) Single Engine	N353MV	4a	79.1	Registered to PIA Aviation LLC, 12753 Appleton Way, Los Angeles CA 90066-1755 (Corporation). Operated by Justice Aviation	
15:30	P (DA 40) Single Engine	N183DF	3	80.4	Registered to Albert Perdon, 3651 North Way, Oceanside CA 92056-4109 (Individual)	
15:32	P (2002 Cessna 172S) Single Engine	N974TA	4a	79.6	Registered to Envision Aviation LLC, 959 E Carrillo Rd, Santa Barbara CA 93103-2422. Operated by Justice Aviation	
15:33	P (1972 American Aviation AA-1A) Single Engine	N6446L	1	68.4	Registered to Satoshi Tateshima, 16123 W. Sunset Blvd, Unit 305, Pacific Palisades CA 90272-3577 (individual)	
15:33	P	N48204	6h	79.9	Registration pending. Santa Monica Aviation, 3159 Donald Douglas Loop South, Santa Monica CA 90405 (Corporation)	

15:40	P (1984 Cessna 172P) Single Engine	N96575	1	79.6	Registered to Nacelle Aviation Inc, 2629 Foothill Blvd #537, La Crescenta CA 91214-3511 (Corporation). Operated by Justice Aviation	
15:41	P (2001 Cessna 172R) Single Engine	N67AF	6h	78.2	Registered to Ameriflyers of Florida LLC, 16151 Addison Rd, Addison TX 75001-3252 (Corporation)	
15:42	P (DA 40) Single Engine	N183DF	6g	80.1	Registered to Albert Perdon, 3651 North Way, Oceanside CA 92056-4109 (Individual)	
15:44	P (PA-28R-201T) Single Engine	N2443M	1	80.2	Registered to Victor Haluska, 1585 K M Ranch Rd, Whitefish MT 59937-8394 (Individual)	
15:52	P (2001 Cessna 172R) Single Engine	N67AF	6h	78.9	Registered to Ameriflyers of Florida LLC, 16151 Addison Rd, Addison TX 75001-3252 (Corporation)	
15:52	P (DA 40) Single Engine	N183DF	6g	78.2	Registered to Albert Perdon, 3651 North Way, Oceanside CA 92056-4109 (Individual)	

Justice Aviation				
Skyward Aviation				
Proteus Air Services				
Santa Monica Flyers				
American Flyers				
Seaside Aviation		Do not provide aircraft. Instruction is in own aircraft		
Santa Monica Aviation				
Air-Spacers Flying Club				
Local loop traffic				