

# Ipad 2 Field Testing Notes

By Larry Aragon — Air Tactical Group Supervisor



## Model Tested

Ipad 2 with 64gb memory and Wi-Fi/3G-Verizon.

Note: (only the 3G capable models have independent/built in GPS antennas. GPS is completely independent of cell service and works even if no cell service contract is purchased)

- Accessory tested: Camera download kit
- Magnetic auto off/on screen cover

## Overview

Ipad was utilized every day in my role as an exclusive use air attack and was with me throughout season with 118 missions flown between June and October 2012 and again during the 2013 season. It was utilized daily and on every mission in multiple ways as described in the details below. This unit was provided by the USFS under a testing program. Earlier testing occurred in 2011 with a unit I purchased myself.



Pre-flight it was used for gathering situational awareness on weather, flight restrictions, Incident specific information/maps, briefings and flight planning. During flight it was used for storing mission data, rapid information access such as radio frequencies/reference lookups, and most importantly for locating our current GPS location on detailed topographic maps, agency maps, and incident maps. Post flight it was used to send data to dispatch and fire managers, process aircraft payments, and store mission statistics for post season review.

The unit was rugged and trouble free. Battery life was excellent and well suited to a small cockpit environment as no cables or attachments were needed. In the rare times the unit locked up (maybe 5 times all season), it was rebooted and running in under 2 minutes (try that with a lap top).

The unit was an incredible supplement to our situational awareness, displaying approaching weather and maps of the terrain below us. It enabled us to rapidly provide useful intelligence to ground personnel and fire managers that were not on site. Some people commented that the Ipad could be another distraction in the aircraft keeping the crews eyes from scanning for aerial hazards, but reality was the opposite. The ipad provided rapid data/map access that would have required much more head down time in the cockpit searching conventional paper maps or other reference material buried in a back seat bag.

Multiple programs can run at the same time and be switched to with the swipe of the hand. Integration and cross communication with USFS PC based programs like Word, Excel and Outlook was excellent.

Need for technical support was zero.

Bottom line – the iPad is a great supplement to aviation safety and work efficiency if properly utilized.

## Details

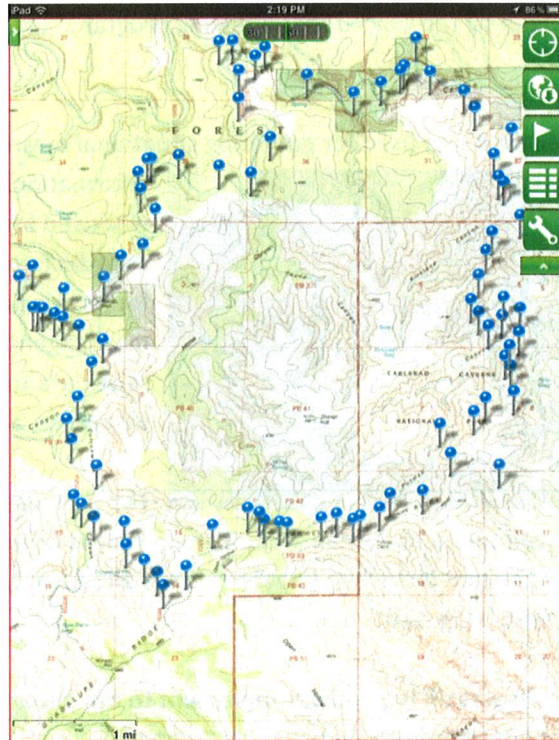
### Non-Agency Programs --Add on Software:



#### **Offline Topo Maps:** (and Gaia GPS)

This was the most used software of the season when in flight.

This program displays your GPS location on detailed USGS maps at a 1:24,000 scale. It costs less than \$10 and allows unlimited map downloads anywhere in the U.S. The maps are cached and stored on the iPad and are available for use in remote locations when there is no cell phone or Wi-Fi connection (this is key). Users can store locations (waypoints) and assign them names. Waypoints can be “dropped” at your current location, dragged to a location, or entered using coordinates. Coordinates can be displayed in multiple formats including degrees/minutes/seconds and degrees/decimal minutes. You can zoom in and out to different map scales by pinching and maps can be panned by dragging.



Extensive map storage requires a lot of memory and as such, I suggest that users purchase the 64 or 128 GB iPad model. I cached maps for about 30% of Washington and 70% of Oregon requiring 23.6 GB of storage space. Maps can be downloaded by dragging a download area box or tile around an area. This “tile” can be given a unique name if you choose. This is handy if you want to locate a download tile to delete later from your storage space if you don’t think you’ll have future use for it. Downloads should be done over Wi-Fi connection as they will rapidly use up all your purchased 3G monthly data limit.

The software occasionally crashes soon after launch. This problem is cleared up by using the "clear map cache" feature. This does not delete pre-stored topo maps.

The accuracy and rapid location acquisition of the built in GPS antenna inside the cockpit was excellent. I tested it in the front and back seats of an aero-commander and the front seat of a king air aircraft.

The program provides a "seamless" view of your maps. In other words, you do not travel to the edge of a map border and then the program opens the next map. The maps are continuous and you never see the edge or border of a map. This is not true of another program called "Topo Maps for iPad". I did brief testing with "My Topo Maps by Trimble". I found it to be very slow and prone to crashing. During the 2013 season I upgraded Offline Topo Maps to "Gaia GPS" from the same software company. It provides the same features as Offline Topo Maps and adds the ability to view and store you GPS track (a line that is drawn showing where you've traveled). Track storage is especially useful for mapping fire perimeters when walking or by helicopter. This is not so useful in an airplane which cannot accurately fly fire perimeters with intricate detail.

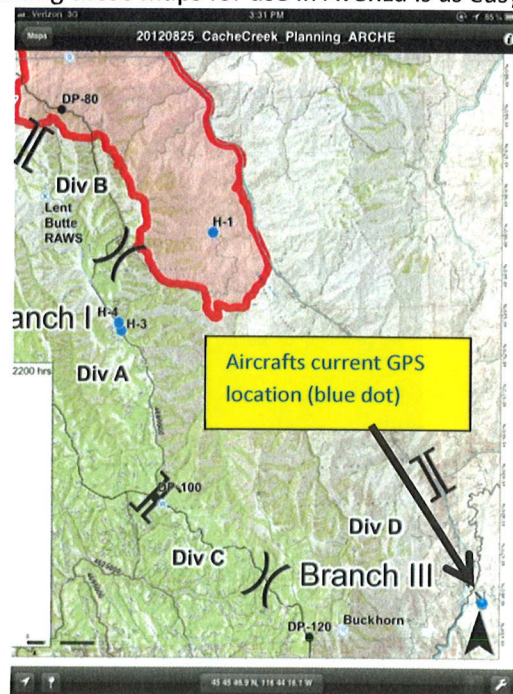


#### Avenza PDF Maps:

Avenza was used extensively. This free map software displays GPS location on maps that are exported from GIS as "geo-referenced PDF's". Exporting these maps for use in Avenza is as easy as selecting "File-Export" in GIS. You can also export geo-referenced aerial photos and display GPS location on them.

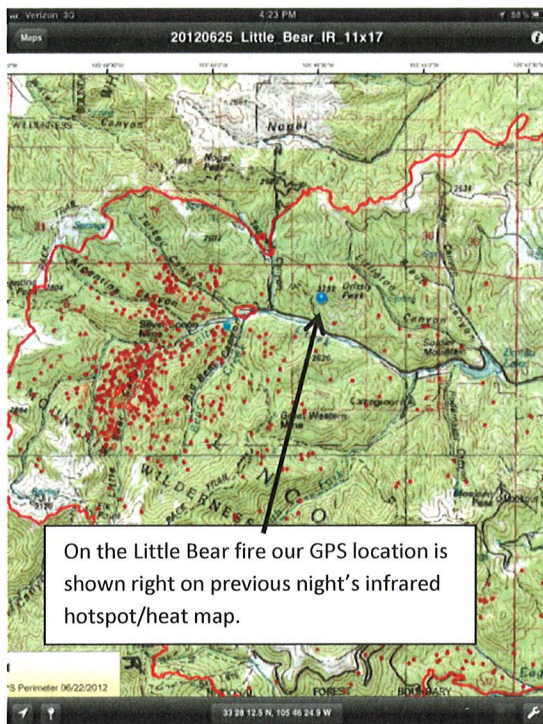
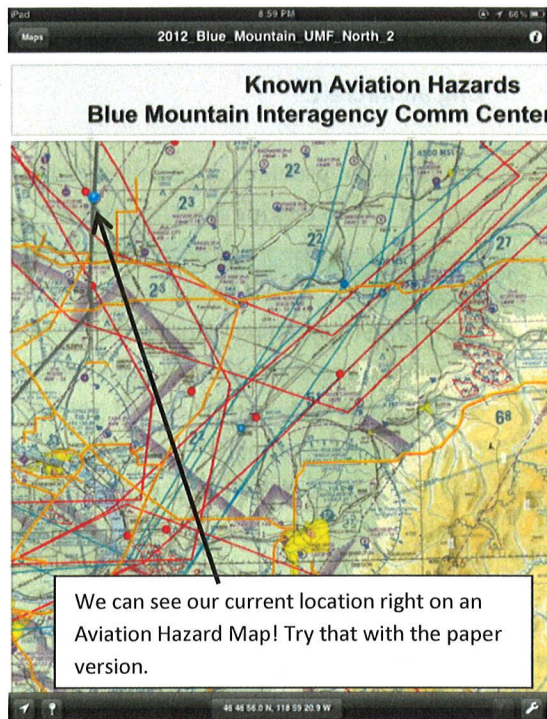
Some GIS experts have suggested we use GIS applications which are available for the Ipad. I tested some and found them to be very confusing and complex. They might be well suited to GIS experts in the field, but not most others.

Maps utilized included Incident maps, USFS and BLM agency maps, infra-red maps, and other custom maps we created to help us such as retardant avoidance areas, agency boundaries, dispatch area boundaries, radio repeater locations, and aerial hazard maps. I was also able to download lightning strikes and display them over agency maps. Avenza PDF Maps is the key to allowing us to utilize agency produced maps as



GPS enabled maps on the Ipad.

The software is very easy to use. Once a map is downloaded, you simply open it and press the "show my location" icon. You can save waypoints and label them. The program also does



acreage calculations and is very accurate.

While working several type I and II incidents, we were able to download the daily Incident

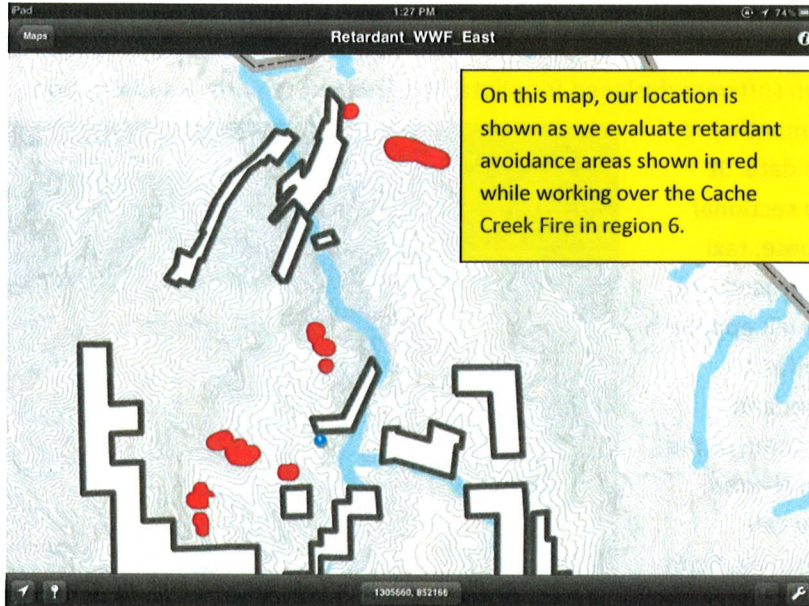
Action Plan map and the previous night's Infrared map directly from the Boise FTP site. I typically did this while having breakfast and gathering other intelligence for the day like weather and the incident action plan.



I found many other air attacks and ground based fire fighters using Avenza this summer. Everyone I talked to was very enthusiastic and excited about the idea of agencies providing more incident related maps in geo-referenced .pdf format.

I would like to see federal land management agencies embrace this software and work with this company to enhance this program to even

better serve our needs. There are many enhancements that would lend themselves to aiding wildland fire management, like the ability to download incident maps from the Boise FTP site right from the Avenza "Store" front, the ability to draw line and text right on the maps, and the ability to download agency maps like National Forest Recreation maps from the Store front.

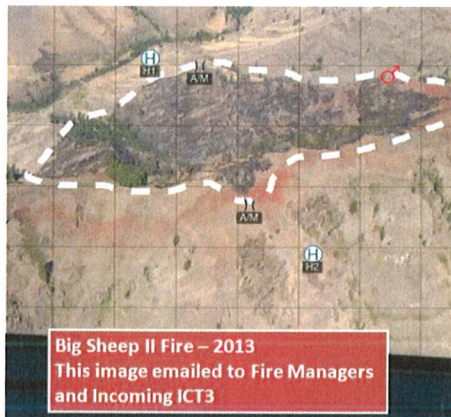
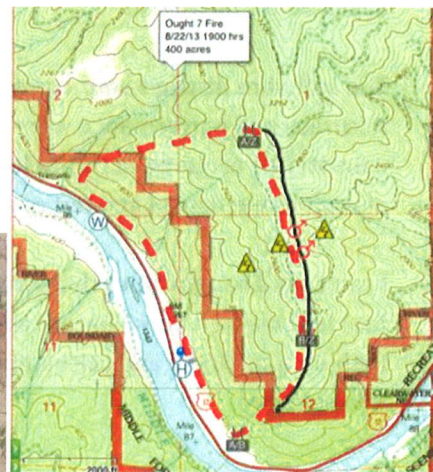


If we really embrace Apple products for field use, this software will be key. Providing "geo-referenced PDF map" products to our employees will greatly increase situational awareness. I would like to see dedicated USFS and BLM map internet download sites providing geo-referenced multi-agency pdf maps across the nation. A one-stop solution for agency maps for mobile devices.

#### Incident Command Table:



Incident Command Table allows you to draw incident maps with ICS/wildland fire symbols on aerial photographs or screen captures of topographic maps. Cost: \$13. It is really simple to use. Images can be shared via email or with another Incident Command Table user who can then edit/build upon your work.

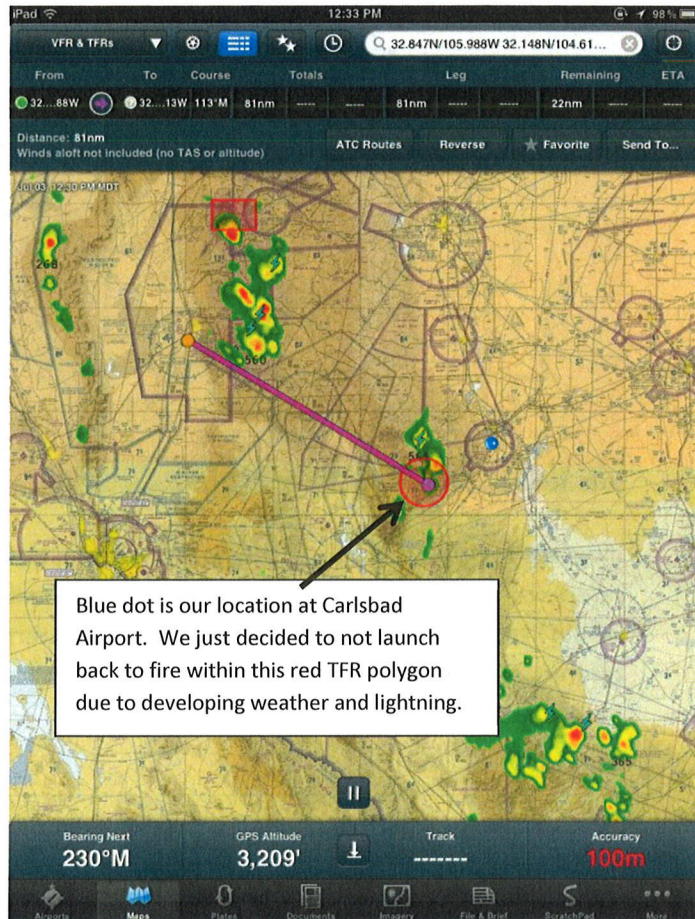




### ForeFlight:

ForeFlight is aviation software designed for pilots. It is free but requires a subscription

(\$75/year or \$25/3months) to download real time data. It provides up to date sectional maps, airport database, taxi diagrams, terminal procedures, VFR/IFR charts, and IFR approach plates. It also provides a multitude of weather and satellite maps with some of the best high resolution Nexrad radar I've seen. You can graphically view lightning, flight rules, visibility, wind, sky coverage, pilot reports, temporary flight restrictions, AIRMET's and SIGMET's. Pilots can also file flight plans and receive weather briefings. When updated data/maps are available, a red bubble appears on the software icon indicated the number of updated items available for download.



The software displays your current aircraft GPS location on a VFR or IFR sectional chart. Accuracy and performance were excellent. This software and the iPad's built in GPS consistently acquired accurate location faster than two dedicated aircraft GPS units in our aircraft as we flew in and out of a military GPS exclusion zone on a southern New Mexico fire.

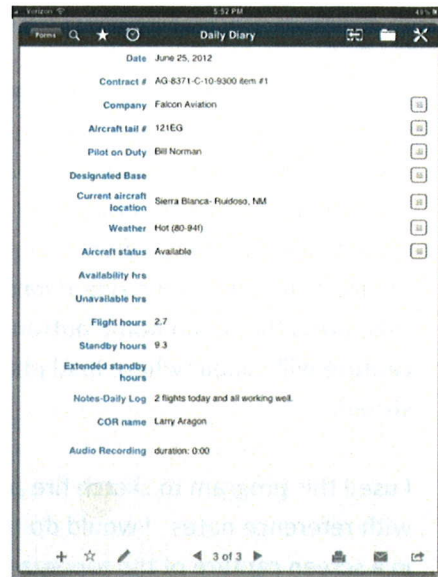
I can't say enough about this software. We relied on this tool as our primary pre-flight briefing tool for weather, aerial hazard awareness, TFR awareness, and for displaying our intended flight path on a sectional and calculating flight time estimates. My pilot was also using an iPad 2 and this software.

### Tap Forms HD:



Tap forms allows you to create your own custom forms that can be used to store and report data. Forms can be customized with pull down menus, look up tables, and store text, numbers, location, photos, voice memos, notes, dates, and calculated data. Reports can be easily shared with others via email.

I used tap forms to create forms to store mission information/statistics that are used for post season reporting. The flight form also stored and calculated my flight hours and was used for entry into ABS for aircraft payments. I also created a daily diary form and submitted my daily diaries from this software to the contracting officer.

A screenshot of the 'Daily Diary' form in the Tap Forms HD app. The form is titled 'Daily Diary' and shows a date of 'June 25, 2012'. It contains several fields with data: 'Contract #' (AQ 6371-C-10-6300 Item #1), 'Company' (Falcon Aviation), 'Aircraft tail #' (121EG), 'Pilot on Duty' (Bill Norman), 'Designated Base' (Sierra Blanca-Fludoso, NM), 'Current aircraft location' (Sierra Blanca-Fludoso, NM), 'Weather' (Hot (80-94)), 'Aircraft status' (Available), 'Availability hrs' (2.7), 'Standby hours' (9.3), 'Extended standby hours' (0.0), 'Notes-Daily Log' (2 flights today and all working well), 'COR name' (Larry Aragon), and 'Audio Recording' (duration: 0:00). The form is displayed on a tablet screen with a navigation bar at the bottom.

Data entry forms you create can be shared and used by other TapForms users.

### TurboScan:



TurboScan allows you to scan a document or map and turn it into .pdf files that you can view and share with others. Scans are done using the Ipad camera and the quality is surprisingly excellent. Multiple documents/pages can be put into one .pdf file. Cost \$5

I found myself using this program all the time. I saved travel receipts in here. I scanned maps and IAP's and shared them with others via email. I was skeptical when I first downloaded this program. I didn't believe the reviews that a document you scanned/photographed with your Ipad/iPhone camera could look like the original document. I was wrong, it works great. I even scanned my "Red Card" and kept it here instead as another wallet stuffer.

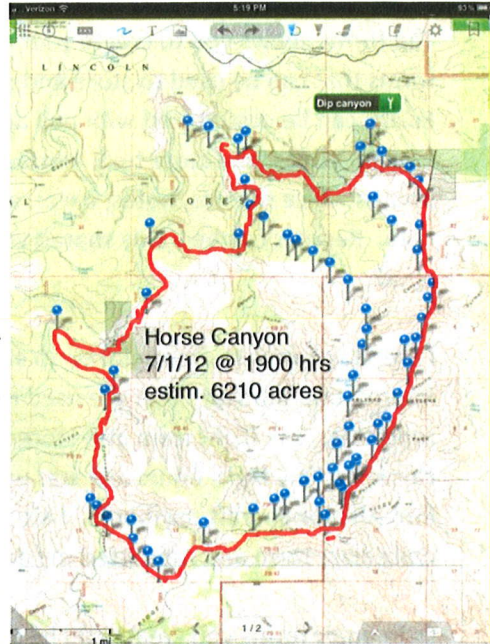
Think about the uses. You can scan a document, map, hand written notes, photos, typed notes, or white-board notes at a meeting. No need for a PC/computer or scanner. You can store them here, email them, or save them to iBooks for filing and reference later. Email them to yourself for filing on your PC when back in the office. Great way to capture meeting notes.

#### Notability:



Notability is a note taking program that allows you create notes with text, sketches, and photos. You can sketch over a photo which can be a screen capture snapshot of a topo map where a fire is located (note: to grab a screen capture on the Ipad, hold down the sleep/wake button and then press the round home button – your capture will appear where Ipad photos are stored.

I used this program to sketch fire perimeter maps with reference notes. I would do this by pasting in a screen capture of the topographic map for the fire area from Offline Topo Maps or Avenza PDF Maps. I could then add text information like name/date/size. You can also draw on the imported map with multiple colored pens and hi-lighters.



Your finished product can be emailed as a .pdf file so anyone can see it. During the 2013 season I switched to using "Incident Command Table" instead of this program (see description earlier in this document).

#### Numbers:



Numbers is Apple's spreadsheet program with similar functionality to Excel. Cost \$10

I used this to create and work with spreadsheets imported from Excel. It imported and exported to Excel with no issues and spreadsheets could also be shared as PDF's if you weren't sure the receiver had a spreadsheet program to open your files.

#### Pages:



Pages is Apple's word processor program with similar functionality to Microsoft Word. Cost \$10

I used this to create and work with documents imported from Word. It imported and exported to Word with no issues and documents could also be shared as PDF's if you weren't sure the receiver had a word processor program to open your files.

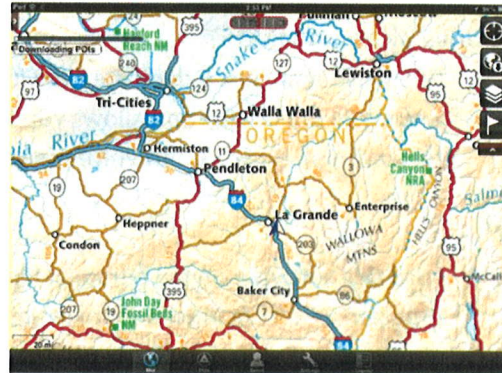
If you have no plans to edit or create documents on the Ipad and only want to view Microsoft Word documents, you would be better served to export them as .PDF files and use the free IBooks program to view them instead of spending money on Pages.



#### Benchmark Map Atlas:

This free program is simply a road atlas for your Ipad like a road atlas you'd buy at a truck stop. It shows your current GPS location on the road map.

I found a need for this program because the built in map program only shows you maps when you have an internet connection. Benchmark allows you to download and cache maps so you can use them when you don't have a connection. Downloading works just like Offline Topo Maps. You simply drag a box around the area you want to download and save.



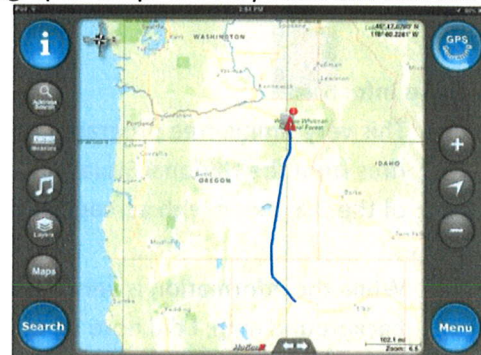
This program appears in the App Store under the name of each state in the U.S. – like “New Mexico Atlas”, but regardless of which state you download, it allows you to view and download roadmaps for any state. Maps can be downloaded at different scales. The more detailed the scale, the more space they take. The highest detailed maps include national forest road numbers in some areas. Like Offline Topo Maps, they use a lot of memory to download, so insure you have the memory space needed.



#### GPS HD by Motion X:

This program emulates the features of a dedicated handheld GPS unit like a Garmin. It can save multiple tracks (bread crumb trail of where you've been), and waypoints. It can display your location on multiple map types (road/topo). The latest version allows you to download maps and cache them, but I haven't tried this feature. Topographic maps are very basic and lack the detail of Offline Topo Maps. Cost \$2.

If you are mapping fire perimeters by walking or by helicopter, this is one of the best solutions. It easily exports via email and sends 3 export file types at once -- a .gpx file, a .kmz file and a .jpg photo showing a map with the track drawn upon it. These file types are fairly universal and can be opened in GIS, Google Earth and several mapping programs. If



you have Google Earth installed in your PC when you receive the export email, simply double click on the .kmz file and the track will be displayed in Google Earth. I didn't use this software very much in the airplane as we can't fly a perimeter accurately like a helicopter, but I know many other users like this one.



#### GPS Drive by MotionX:

GPS Drive emulates a dedicated driving GPS like a Tom-Tom. It provides turn by turn navigation when you are driving and allows you to enter addresses and search for businesses (like hotels or restaurants). Cost \$1, but voice assisted navigation requires a \$10 yearly subscription (worth it!).

I use this software on my personal iPhone, but it works the same on the Ipad. This is my go to program when I'm in an unfamiliar city and I need to find a motel or somewhere close to the airport to eat. It is excellent. Voice navigation is far superior to my dedicated Tom-Tom in my personal car. It's so good at giving you directions, you rarely need to look at the screen, which is a real safety plus when in heavy traffic. The downside is that it only works when you have an internet connection (via 3G or Wi-Fi), so it great for city navigation, not so great for cross country.



#### iMovie:

iMovie allows you to edit video clips by clipping pieces together with other videos and photos to produce one seamless video. You can also clip together multiple photos that will play like a video slide show. Sound or music can be overlaid as can text. Cost \$10

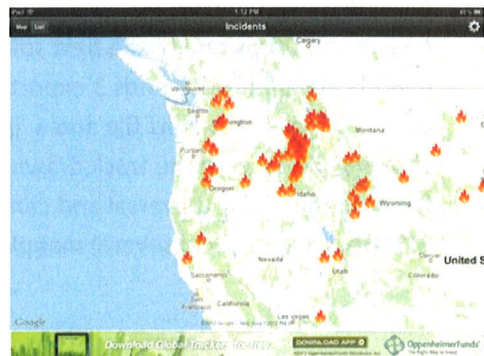
I didn't use this software until late in the season when we had a dedicated wide angle video camera installed on our aircraft. We often would take videos of fires, but when we went to email them to a manager, the file size was enormous and couldn't be emailed. By downloading video from the camera to the Ipad via the Apple Camera Download Kit (\$30), we were able to edit videos and create short clips that provided the needed information. Very easy to use.



#### Wildfire Info:

This very simple free program just displays large fires from the National Situation Report on a map of the U.S. along with acreage. Cost is free.

While the information is very basic as is the background map, I did note on one large fire I



was working that the fire perimeter updated daily appeared to be the same perimeter I was getting via our nightly IR flight. Not sure how or where they get the data for their fire updates, but it was surprisingly accurate for the fire I was on. Not all fires have perimeter mapping when you zoom in.



**My Radar:**



My Radar is a free weather program that displays current weather motion Doppler radar over US/state maps.

This program is simple and one of the fastest ways to display Doppler radar. While many free weather programs display this data, My Radar seems to bring up the data the fastest. It is not as detailed as the pay for subscription data in ForeFlight, but it's pretty darn good for free stuff.



**Google Earth:**

This free program displays your GPS location on an aerial photo view of the earth.

I never used this software as you need an internet connection to see the satellite photo imagery. I needed a mapping solution where I could cache/save maps for use where I had no internet. Offline Topo Maps and Avenza PDF Maps better served this need.



**Calculator:**

There are several free calculator programs for the Ipad. Nice to not have to carry another device.



**Wildland Toolkit:**

This \$6 application includes multiple tools for the wildland firefighter including ability to do fire behavior calculations. Calculations include RH/dewpoint, fine fuel moisture, probability of ignition, and fire behavior such as rate of spread and flame length.

The program includes many other utilities too:

- Complexity analysis
- After Action Review
- Downhill fire line construction guidance

- Fire Orders, watch outs, LCES
- Safety Zone guidance
- Thunderstorm Safety
- Training quizzes
- ICS org charges
- Hand Signals
- A teaching guide for recognizing cloud types and weather implications.

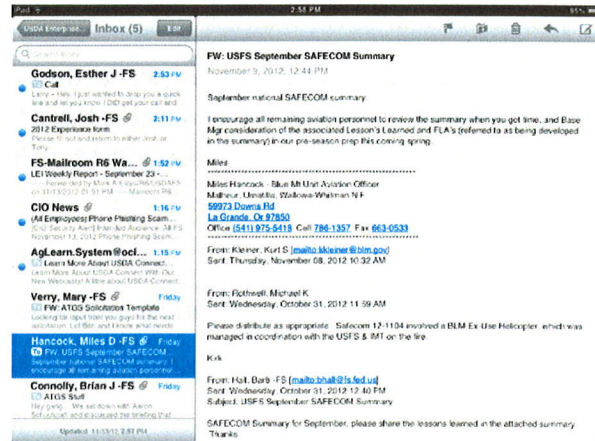
## **Software that comes with Ipad**



I was able to set up multiple email accounts and view them all from the same program. This included my personal Gmail and my USFS Outlook accounts.

It was a great time saver to be able to view/edit/receive/send email from my US Forest Service Outlook account via the Ipad (note – this is a feature currently only on USFS test models, not available to all users yet). When I used to operate with my laptop during fire season during periods of heavy fire travel, I rarely accessed my email (maybe once a week or I'd wait two weeks till I was back home). The result was people had to wait to hear back from me on information they needed and I'd dread reading the massive pile of accumulated mail, resulting in more deletion than reading.

With email on the Ipad, I find myself accessing my email multiple times per day when I have just an extra minute or two. As such, I keep up with mail and I'm very responsive to coworkers needing communication.



My Outlook email filing folders showed up in the Ipad's email program and when I filed email, created new folders, or deleted items, they appeared the same way when I accessed my PC based Outlook email. EXCELLENT!

Managers – save some money and increase your employee's efficiency. Consider Ipads for field going supervisors at district level and buying less office PC's/laptops. They will find them much more useful, stay more connected and yet have more field work time. In addition they will find multiple other Ipad software solutions to increase their own work efficiency. These devices

should be heavily targeted at field personnel and not upper management as just another way to read email outside the office.



#### **iBooks:**

iBooks does two things – it stores your library of downloaded books and more important for work, it stores and allows you to organize/file your downloaded .pdf files.

I used this program to store and organize a multitude of documents I would otherwise carry around with me in paper form. Any document, directory, map, contract, spreadsheet can be saved as .pdf file and stored and read here. Phone books, mobilization guides, radio frequency books, radio programming cheat sheets, contracts, user manuals, policy documents, guide books, etc., etc. You name it – if you need piles of documents to reference on the job, here's the place to store it. You can organize them into folders and reading them is just like reading a paper document, except they are searchable!!! Need to find a reference for a radio problem in a contract, just type in "radio" and it brings up all places in the contract where radio is used. Need to find a radio frequency for the Wenatchee dispatch area – just enter the radio guide and type Wenatchee and there it is.

It is also great for purchasing and reading books and learning from free user manuals.

This is a simple program, but very useful no matter what your job is. You can even scan a document/map/photo/note/white-board with TurboScan, and then store it here. No need for a PC/computer or scanner. Great way to capture meeting notes and save them.



#### **Notes:**

Notes is a built in application that allows you to save individual notes not unlike you would write on a yellow sticky note. The power of notes is they are searchable by any word in a note. This is an important feature once you create many notes and don't want to read through every one to find the right note.

You can email individual notes or copy and paste text to and from notes. You cannot paste photos or anything other than text into a note and save it there. For more advanced features like this, see the "Notability" program described above.



#### **App Store:**

The App Store is where you get software for your Ipad (free and pay). The second function of the App Store is to download software updates. When you have installed software with updates available, a red numeric bubble shows up on the App Store icon. Updates are always free. Most software is under \$5.

You must create an Apple Account in order to download software and set up a username and password. You must register a credit card or debit card with the account. You can also purchase Itune Gift Cards at places like WalMart and load your account with funds from these cards. Purchases will first be charged to Itunes Cards, and when they are used up, then to your registered credit/debit card. Receipts for each purchase are sent to you via email. Agencies need decide how software download/purchases will be handled as most user are not card holding micro puchasers. I suggest that they allow assigned users authority to requisition purchase of Itunes cards to load their units with credits. The cost of purchasing Ipad software is no budget braker, so managers shouldn't get too wrapped up in the cost and control of it. Allowing users some freedom here will really pay work dividends as users will explore software that enhances their work (this is really true). The opposite model is to control everything and tell them what limited applications they are authorized to use. This is a sure model to finding this cutting edge technology sitting dusty on a shelf.



#### **Photos/ and built in camera:**

The Photos program is where all your photos/pictures/videos/screen-captures are stored. Photos can be emailed to others directly from here. Minor editing (cropping, photo rotation, brightening) can be performed. Photos and videos taken with the built in camera/video camera are stored here.

Built in camera – the built in Ipad camera can take single images and videos. Photo quality is very grainy under low light conditions and digital zoom does not offer much magnification. The camera quality is much better in newer Ipad models.

Taking pictures with the Ipad is awkward and I rarely used it due to poor photo quality and minimal zoom capability (this has improved with new Ipad models). I used my dedicated digital camera to take photos/video from the aircraft. I then downloaded the photos into the Ipad for emailing to dispatch/fire managers. Downloading was done via the \$30 Apple Camera Download kit. This kit comes with two connectors. One allows you to attach you digital camera to the Ipad via your cameras USB download cable. The other connector accepts SD size media cards (handy if your camera uses this type of card) directly into a slot. I liked the SD card reader because I didn't have to carry another cable with me. Whichever method is used, downloads are simple and the Ipad automatically recognizes that there are photos to download as soon as you make the connection.



#### **Calendar:**

The built in calendar program is just that – a calendar. It allows you to store appointments and you can set reminders/alarms to remind you of upcoming events.

The Calendar can be linked to other calendars you may use like the one in the USFS Outlook email and Google Calendar. I used both links and all these other calendars showed up here and worked seamlessly just like I was working with one calendar. Appointments I made within the Ipad showed up in my Outlook and in my Google Calendar and vice-versa.



#### **Reminders:**

Reminders allows you to create reminder lists of any topic you want. When you check off something as completed, it disappears from your list (you can find it later for reference if needed). You can create reminder alarms and due dates for items if needed.

You can create multiple lists with different topic headings.

You can make a reminder list for anything – packing lists, grocery list, meeting agenda list, to-do list, maintenance/repair needs a quick list of items to grab when you get to office, etc.



#### **Contacts:**

Contacts is basically an address book that is searchable by first name, last name, and company fields. Data such as phone numbers, email addresses and physical addresses can be stored. Additional fields like notes can be stored.

Contacts synchronize with your Microsoft outlook email contacts address book automatically as well as other address books such as Google if you choose. By using “key search words” in the “company” data field, you can use this as a powerful search database to find people. For example, I might add the words ATGS, Safety Workgroup and Portland to a person’s data. As such, searching for any of these key words will yield this person in my search list.



#### **Maps (formerly Google Maps):**

The Maps program is an online road/street map that covers all countries in the world. It displays your GPS location the map. You can search for cities, addresses, and business by name or category. Very handy when traveling in unfamiliar cities.

The program was recently upgraded to include turn by turn navigation when driving or walking. It also provides public transportation information.



**Safari:**

Safari is the built in web browser program. It works well for navigating to internet web pages and favorites can be book marked in pull down menus or short cut icons can be added to be launched just like applications.



## **Agency Programs (web based- accessed using Safari)**

### **Coordination Center Intelligence**

Accessing intelligence data provided from Northwest and Southwest Interagency Coordination centers worked well.

### **Fire Weather**

Accessing weather information from the National Weather Service including Fire Weather worked well.

### **ABS**

Accessing and inputting daily invoice payment information into Aviation Business System worked very well. I did payment invoices and bi-monthly payment roll ups to aircraft vendor using the Ipad all season.

The only thing that does not work is the field lookup function in data entry fields like "origin" and "destination" and "User Unit". For example, in a PC based web browser – input of an "origin" like LGD would yield an automatic lookup response return of "KLGD – La Grande County Airport". Even though lookups did not work, the program accepted the inputted data just fine. Data fields with pull down menus did work.

The functionality with ABS was an immense time saver. I was able to quickly log in to ABS at airports or while waiting for dinner and get payment invoices completed with the pilot present to look over data for accuracy. The vendor really liked this because we were able to accurately keep up with daily paperwork. Upon completion, a snapshot of the resulting daily "122 invoice" was emailed to the aircraft vendor for review. This saved considerable time as they kept up with paperwork and any corrections were caught daily, avoiding complicated corrections after bi-monthly roll ups were done.

**Paycheck**

The US Forest Service Paycheck program functioned well on the Ipad.

**GovTrip**

GovTrip functioned well on the Ipad for all aspects of the authorization and vouchering process except for attaching electronic copies of travel receipts. Attaching receipt files could not be done on the Ipad.

**Sit Report**

The National Situation Report could be accessed on the Ipad.

**2 Automated Flight Following**

Automated Flight Following (AFF) works, but not with the included Safari web browser. You must run it within the Google Chrome browser which is free.

**SafeCom**

Reporting and reviewing SafeCom reports worked well with the Ipad.

