The Mountaineers
EXPLORE • LEARN • CONSERVE

Navigation Northwest

A Quarterly Publication of the Seattle Navigation Committee
Volume 6, Number 2 **July 2018**

-- Navigation Northwest Summer Features --

Courses, Classes, Apps, Gear & Links

Editor Notes

- We continue our search for outings where navigation and/or communications issues provide "Lessons Learned."

Satellite Messenger or PLB? – That is the question

By Bruce Crawford

We now have electronic devices that can keep us in touch using satellite communication when out of cell range. There is confusion about what these devices can do. People also assume that communication will be as fast as cell phone texting (incorrect, especially if you are in a valley and much of the sky is blocked by mountains).

There are different options with different capabilities. What the best choice for you is depends on what functions are most important to you.

Available Functions

Tracking - The satellite messengers can send your location at timed intervals. People can view your track on a web-based map. If someone is concerned about you, this can give them peace of mind. They can look and see your track on an ongoing basis.

If you are out alone and worry about the risk of an injury that renders you unconscious, tracking provides an answer. If you are putting the device on a child or pet, tracking is also a preferred function. I put my Satellite Messengers on my dogs with tracking set to a ten minute interval. If I'm rendered unconscious, I'll be somewhere along the track. The dogs will always be at the end of the track.

Tracking is also a good way to learn how many of the location messages get through to a satellite on practice trips. It gives you a realistic understanding of how well a device works given the way you use it.

SOS - This would seem to be pretty simple. Just let rescuers know someone is hurt. But what is the likelihood of the message getting through quickly, or at all? It differs based on your device's power and the satellites accessed by the device. Cell phones are about the network. Similarly these devices are about the satellite constellations used for passing messages. Not all the constellations are equal.

Messaging - The best option is two way messaging, and that is now the base capability for new satellite messengers. Older SPOT units are one way, predefined messages you send out only (not optimal). So steer clear of the older SPOT units.

GPS Navigation - Some of the Garmin units can be used for GPS navigation. However, the built in maps are all you have. You can't load other maps and the map resolution isn't very high, closer to 1:100,000 detail than 1:24,000 detail. You can use this with the Earthmate app, or you can just use Gaia GPS an your phone instead.

Satellite Messengers

Satellite Messengers can do the things noted above, to a degree. The two main manufacturers are SPOT and Garmin (InReach). The SPOT units use the GlobalStar commercial satellite constellation. The Garmin units use the Iridium commercial satellite constellation. Since commercial satellites are used, you pay a fee to communicate, even for SOS messages. There are differing plans, just like for your cell phone. More messages and better capabilities cost more.

Note that communication may NOT be instant; you may wait, or your device may not work where you are. Read about satellite orbits below to learn why.

The transmission power is typically about half a watt (SPOT) to one and a half watts (Garmin). While the Garmin InReach mini is small, it has a smaller battery with half the life of the Explorer+.

Satellite Messengers can connect to an app on your phone using Bluetooth. Sounds cool, unless you are trying to limit battery consumption and don't want to drain batteries on both devices. It also means if you lose or damage your phone, you lose the connection to the messenger.

Personal Locator Beacons

All a PLB does is to send a one way SOS signal. There are no other types of messages with a PLB. The ResQLink PLB transmits at 5 watts. Between the power and the satellites, it is highly probable your SOS will get through. The PLB satellites are government owned, so there is no ongoing fee for use. But you do need to register your PLB.

A PLB is a subscription free way of shouting "HELP" very well. That is its only capability and purpose.

Power Budget

How long will the battery last? That's a question you need to answer given the things you want to do with your unit.

Newer units all use built in lithium ion batteries (older SPOTs use AAA rechargeables or single use lithiums). The newest Garmin InReach mini is small and has half the battery life of larger units. The display on the mini is also quite small, so you may be tempted to pair it with your phone. But Bluetooth use comes at the cost of more battery use both on your unit and on your phone.

The work of figuring out your battery use, and field recharging methods for longer trips, is a critical step in turning the fancy electronic box into a useful tool that you can make work day by day and in a crisis.

Cold is bad for chemical reactions in batteries. In winter you'll want to keep your device warm to extend battery life.

Satellites and Orbits

There are different types of satellite orbits and different satellite capabilities that define how well your device will actually work.

Low Earth Orbit (LEO) - These satellites are hundreds of miles up. But their orbital tracks may be thousands of miles from you horizontally. This means at least some of the time the satellites will be low in the sky. If you are in a valley, your device simply may not see a satellite for a while. LEO satellites also move quicker across the sky, completing an orbit in a couple of hours. If you see one now, that won't last long. Either another satellite will appear over the horizon, or you will lose the ability to communicate for a while.

LEO satellites are typically in orbital planes inclined to the equator. The commercial GlobalStar constellation is inclined to cover only up to middle latitudes (where the people who pay the bills recreate). A few government satellites with PLB receivers, and the Iridium constellation, are polar orbiting, so they sweep the whole earth.

It is important to understand Satellite Messengers do NOT guarantee instant communication. Sometimes it may be like texting, but sometimes you may wait. The less sky that is visible, the more you wait for a satellite to appear. If you use tracking to send your position, points on the web map may be few and far between, especially when your path is in a valley. An even greater restriction is where your device will work.

Iridium satellites can relay messages between each other, GlobalStar satellites can only talk to a ground station. This means SPOT only works in areas where satellites can see a ground station. SPOT IS NOT WORLDWIDE. Oceans and the poles are NOT places where a SPOT works. Just like your cell phone, check the coverage map. Garmin InReach uses Iridium, which is worldwide, but you may still wait for a satellite to be visible.

Medium Earth Orbit (MEO) - The GPS (USA), GLONASS (Russia) and Galileo (European) satellites are MEO, thousands of miles up, orbiting every 12 hours or so. These satellites have larger footprints, and as PLB receivers are launched on the newer satellites, there are going to be a lot of them listening. It takes four of these satellites to be visible for a good GPS calculation, but only one to relay a PLB SOS. The Satellite Messengers do NOT talk to any of these satellites.

Geostationary Earth Orbit - These satellites have an even higher orbit and appear to hover over the equator. There are some PLB receivers on some of these satellites.

Notice the PLB receivers on different satellites keep showing up? That's the real reason PLB's aren't old news. The message is likely to get through because many different satellites listen.

How to Choose

I suggest starting with determining how you plan to use your device, what functions you need, and how often you want to use it. Study both the devices, and the communication plans available for them to find one that fits your needs best. Note that device manuals are available on line, but since they typically are less than 10 pages, they may not answer all your questions.

Starting Out

This equipment may save your life. It is far more likely to do that if you have registered and activated it on line and practiced with it before you need it. While you can't fully test a PLB, and even partial testing uses up a bit of its one shot battery, you can test Satellite Messengers quite a bit, so do it, and learn how to make yours work for you.

Integrating the device into your routine is the next step. Not only do you need to train yourself, you need to train the people who will be looking at your track or messaging with you. Create contacts for those people and practice messaging them.

You don't want people to panic when you don't always respond to messages quickly or there are blank spots on your track. It helps if they understand the limitations of the satellites and your equipment.

People may lose the link to your track map or the password to message you. Before each trip I send a form email to the people on my contact list. It contains all the typical info about my car and the trailhead, the itinerary, my equipment, the party, the SAR contact (sheriff or national park phone number) and links and passwords to the maps and messaging screens.

After you return from a trip, don't forget to message, text, or call your contacts. Let people know you're OK in a timely manner. Your track may end well before the trailhead if the view to the sky is limited and you turn the device off just as you get to your car. Once the devices is off, you disappear electronically, so make an effort to communicate that all is well.

--Bruce Crawford is a veteran wilderness navigator and stalwart of the Seattle Navigation Committee. Contact him at bikejor@me.com

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Green Trail's Hike into the Digital World

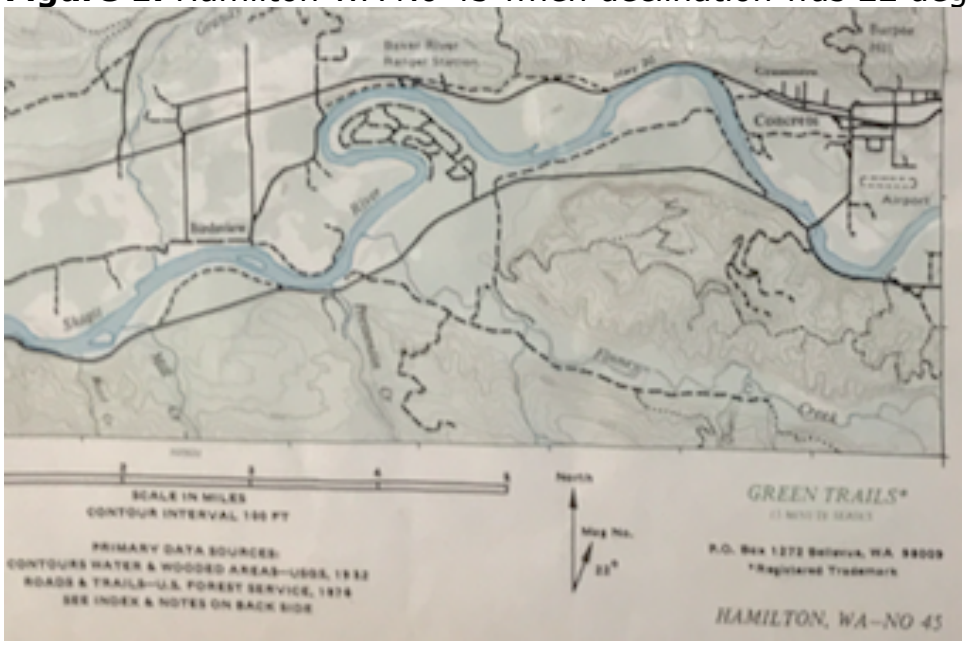
By Alan Coburn

Green Trails Maps turns 45 this year! And like many 45 year olds (and older) we continue to search for ways to preserve our youth. Well let's face it; just preserve our being. And then, as we age, we look for ways to leave a legacy and to leave the world a better place because of our time here. That's our mission: make sure people stay connected to the places we all love and have access to accurate and current information to plan, enjoy, and remember great adventures in the PNW out of doors.

A bit of history for context: Green Trails Maps was founded in 1973 by F. Walter Locke. Walt, an avid hiker, saw a great need for better hiking maps. He saw that the USGS 7.5 and 15 minute map series had great topo and hydro data, but were suffering from a huge information void when it came to trailhead, trail, and road information. Additionally at about the same time, the USGS announced their planned abandonment of production of the 15 minute series. That left the 'aerial updates' of USGS data, which Walt felt just wasn't cutting it when it came to providing good on the ground information for hikers and climbers.

Walt saw a huge opportunity and quit his job to pursue his passion. He started preparing hiking maps based on the 15 minute national SAR grid of the time. He of course first focused on his favorite hiking areas in the Cascades, followed by the Olympics and then the Oregon Cascades. [See the Figure 1 sample from editor's thick collection of old GT maps.]

Figure 1. Hamilton WA No 45 when declination was 22 degrees east



Fast forward 20 years to 1992; Walt had completed about 120, 15' titles on the classic 12x18 in paper sheets covering the premier hiking areas of Washington and

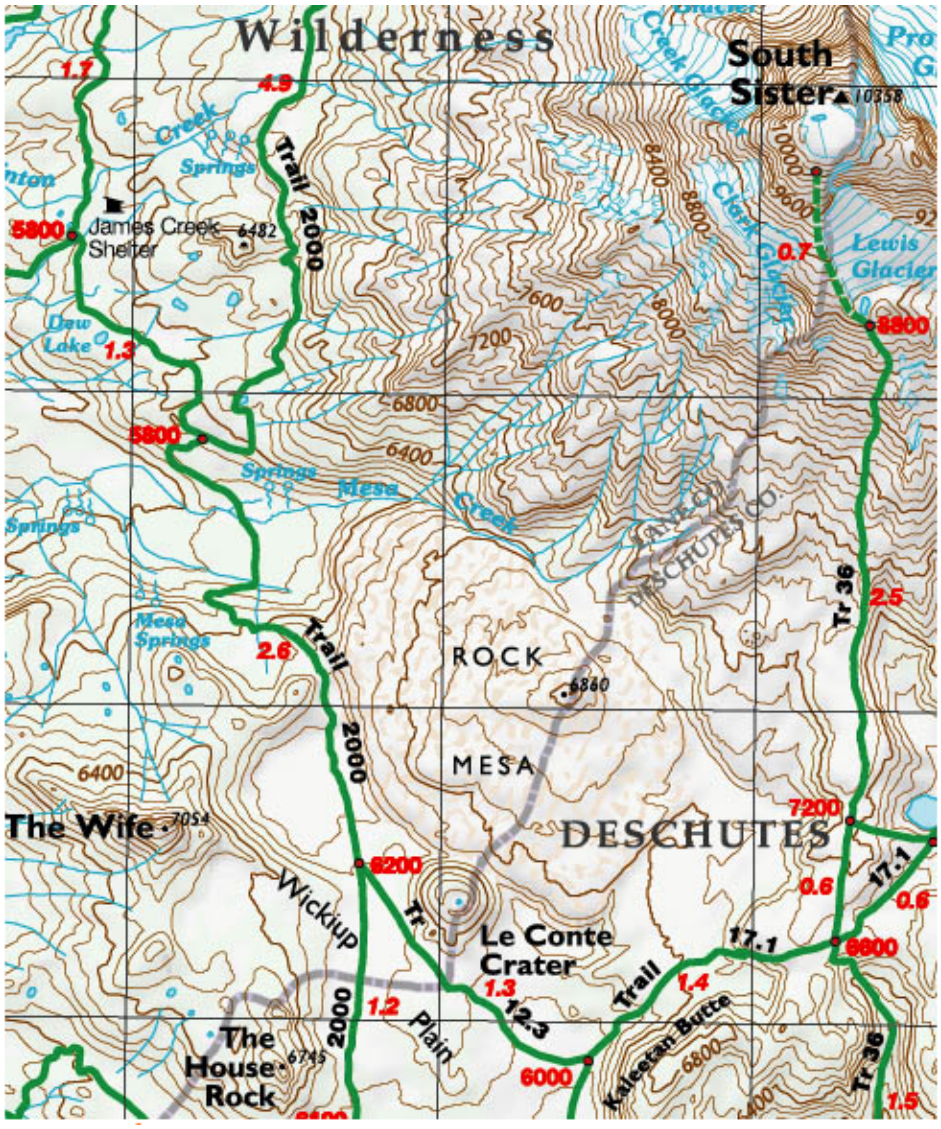
Oregon. In late 1992 Walt suffered a debilitating stroke. This is when his old friend Alan Coburn entered to help out with sales and collections. Walt decided to sell in 1993 requesting acquisition proposals from numerous local map makers. After much consideration and evaluation, he and his wife Dolores chose Alan and wife, Gail, to run the next leg of the Green Trails relay.

1993 was the beginning of the dot.com boom and the dawn of the digital world immersing the masses. All of the Green Trails maps are "analog"; produced by cartographers hunched over light tables scribing and laying tape to demark trails and roads and typing and taping every bit of text on each map. The maps were then printed from layers of negatives converted to a wet photo printing process.

Alan and Gail bought a place to accommodate a dark room complete with high volume, variable speed, reversible exhaust fan, developer, cameras, and many huge oversized drawers of files for the dozen or so negatives for each of the 120 maps. Alan envisioned that eventually the same room could accommodate the racks of servers necessary to produce the digital files of the future. Oh, and a fan will be there to cool or redistribute the server heat. By the late 90s the map printer let us know that they were converting to digital printing presses.
We took the hint in 2000 and began digitally producing all new and revised map editions. We are frequently asked if we have any digital products. The answer is yes. All of our products are digital, except our famous Map Sacks which, "keep your maps warm, clean, and dry even when you can't be!" And speaking of the Map Sacks (which are the only product Alan, current president and CEO, has ever 'invented', copyrighted, and trademarked), we received a large order for the map sacks in the fall of 2001 from the Pentagon. It turned out that a 1st Special Forces officer from then Fort Lewis (now JBLM) was in the Pentagon and was equipping forces for the 'invasion' of Afghanistan and Pakistan shortly after 9/11.

Beginning in 2003 and continuing today, all new maps released were produced digitally and all 'old' maps were converted to digital for revisions before reprinting. The content of the 'old' maps was also revised, i.e. roads, trails, trailheads, and trail artifacts were, and are to this day, mapped by paid mapping crews.

Figure 2. South Sister digital image from a Green Trails HC map.



The conversion of analog maps from negatives to digital maps turned out to be painful and costly process. Green Trails spent about $3 million converting to digital. However, the conversion was absolutely necessary for the production of our maps and the survival of Green Trails Maps. But, there is little change in perceived value by the customer. The maps 'look the same,' to them. The conversion from analog to digital is basically the same as creating a new map and costs the same as creating a new map, but the end user sees little difference!

The great news is that digital maps are much easier to revise when new information becomes available and the need to replenish inventory and reprint coincide. Therefore we frequently do what we call 'light revisions' before many if not all reprintings. When we do a light revision by remapping certain new, rerouted, or abandoned trails, we update the edition date to that data date. Because of this aggressive approach to keeping the information as current as possible, our average age of the information on our 140+ titles is now less than two years.

To cap off our digital odyssey, Green Trails Maps also has a webstore (greentrailsmaps.com), from which both individual retail and wholesale store customers can purchase our maps. Additionally we've launched the Green Trails MAPP app. You can get it **free** at the Apple store. Alone you can use it to track your route and elevation changes anywhere in the world **for free (remember GPS use=battery use, so watch your battery level**. [See following review by Don Sarver. –Ed.] MAPPs is resident on your Apple device. AND you can purchase and download the 'digital' GT map covering your intended hike(s).

So why buy a solar powered, no batteries required, unbreakable, water proof, ultralight, ultra-accurate, glare free, Green Trails map when you have the Green Trails APP? Beyond the self-evident features in the question above, you'll have connectivity and context on your terms, i.e. you'll connect with your immediate natural environment (probably and hopefully one of the reasons you are where you are anyway) and unlike small screen device derived information you'll have context and be able to reconcile your location by knowing and sharing the names of the peaks, ridges, and water features viewed from your location (you'll look and be smarter!)

So why buy the Green Trails MAPPS (or any other device navigation apps)? Because you can turn it on and: 1) IF you have battery power; (2) IF you have GPS connectivity; (3) find yourself anywhere in the world on Google maps for FREE by pressing the Green Trails icon; (4) IF you downloaded the Green Trails map you'll know exactly where you are in the context of a recently updated by 'boots on the ground' mapping team information.

For example if you downloaded our Mount Rainier 269SX, everything you can see on the hard copy printed map in exquisite detail, you will know your position or be able to track your route and elevation profile. If you have sufficient battery life, the right light conditions to prevent glare, GPS connectivity, previously downloaded GT Maps and no rain; you can track your route and know your position.

But because of these contingencies, we still recommend the waterproof; unbreakable; ultralight; ultra-accurate; solar powered no batteries required non glare printed version with guaranteed connectivity and context included at no extra cost. Look for recently released, rigorously researched new titles for The Wallowas-Eagle Cap Wilderness, 475SX (a wildly popular hikers' bucket list destination), and the myriad of trails West of Bend in the Sisters Area, 622SX, and The Snoqualmie Middle Fork, 174SX, a premier, readily accessible area to Seattle.

--Alan Coburn is the president and CEO of Green Trails. He provided a mapping update to the Navigation Summit some months ago. Contact him at alan@greentrailsmaps.com.

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Review: Green Trails Free MAPP App for iPhone

By Don Sarver

Green Trails (GT), publisher of high-quality, waterproof and tear-resistant recreational topographical maps, has a free MAPP iPhone app that provides two distinctly different navigation functions.

Without GT Map File If you are not in an area bounded by a GT map or you have not purchased the GT file for a GT map, your location will be accurately displayed but you will not see the detail found on a hard copy GT map. Options for free app viewing include:

- Terrain provides the classic Google shaded relief
- Road is a Google overlay of streets
- Satellite is Google imagery
- Hybrid display labels the roads in the satellite image
- None of the above

All screens display UTM coordinates (Northing is displayed before Easting), elevation in feet and a heading in degrees. A slider provides some control over the density of overlays.

With Purchased GT Map File If you purchase a GT map file corresponding to one of the HC maps, you bring up zoomable detail for navigation. Prices vary from $0.99 (older, lower demand, e.g. Stevens Pass 2012) to $4.99 (newer, custom maps e.g. $4.99 Middle Fork Snoqualmie, 2017).

I used the free App over a weekend backpacking trip to Ancient Lakes outside of Quincy WA. I've never used smartphone enabled GPS/Map applications before beyond the built in Apple Maps, so there was some excitement when given the opportunity to review the Green Trails offering.

Version Tested: 5.6 (Feb,2 2018 release date)
Device Info: Apple iPhone 6
IOS Version: 10.3.3

While trip planning I found the free App frustrating to use as there was no tutorial or documentation. When I explored the App on the trail I finally figured out some features and capabilities. I was pleasantly surprised with the low battery usage and GPS tracking feature. I encourage the developer to address some of the

“cons” to make it more user friendly. At this time, I'll pass on the free Green Trails Map App until a more full-featured version.

Pros

- Battery usage is low while tracking your position. I found that after 7 hours of using only the Green Trails Map, my battery only reduced by 50%.
- It has the ability to track your GPS path distance with elevation gain and saves tracks. However in the GPS track, the map loses detail and resembles a transit map overlay. No way to export your GPS track.
- Green Trails Maps detail is available on the App. One of the major benefits of using this App is having that same level of high detail in the Green Trails paper maps on your iPhone.

Cons

- Not Enough Map Coverage. In order to take advantage of Green Trails' high detailed maps you must be adventuring in an area where they have map coverage (https://greentrailsmaps.com/maps). My backpacking adventure wasn't, so I wasn't able to buy a map that area.
- Location Service still gets used despite "Location Service" disabled in the App. This was frustrating because in order to get the app to stop using my location I had to repeatedly force quit the App.
- The Direction/Heading Icon is confusing. The equilateral triangle of their logo (with a cross on top) gives the heading. It is unclear what direction the app thinks you’re pointed.
- There is a "Legend and Tips" section in settings that explains some of the icons, but it is not a tutorial and some may not think to look there.
- Very rudimentary user interface. For example, the summary section in settings holds previous GPS Logged tracks. I only found out what summary was after my adventure.
- GPS track logging can be spotty. As seen in my screenshot there were times Green Trails was able to track me and other times it would log a straight line, and one occurrence where it put me in a spot distant from my path and logged it. See Figure 2.
- Pans To Current Location button doesn't zoom in far enough in the free function. Let’s say you are scouting ahead on your map studying the path or figuring out the elevation gain of your next incline. The App centers you and zooms out to about a 100 mile radius of your current location. You must zoom back in to your point position.

- Zooms to Map Extent (Green Globe) button is not useful for navigation. It doesn't actually center you on the map, just shows the user where the Green Trails map coverage is.
- Contour lines disappear at a certain zoom. In non Green Trails Map coverage mode the map at a certain zoom level contour lines disappear and don't repeat until you zoom out. Despite the user's need to see more detail on the terrigen/path the contour lines simply disappear.

Figure 1. Contour line drop out.

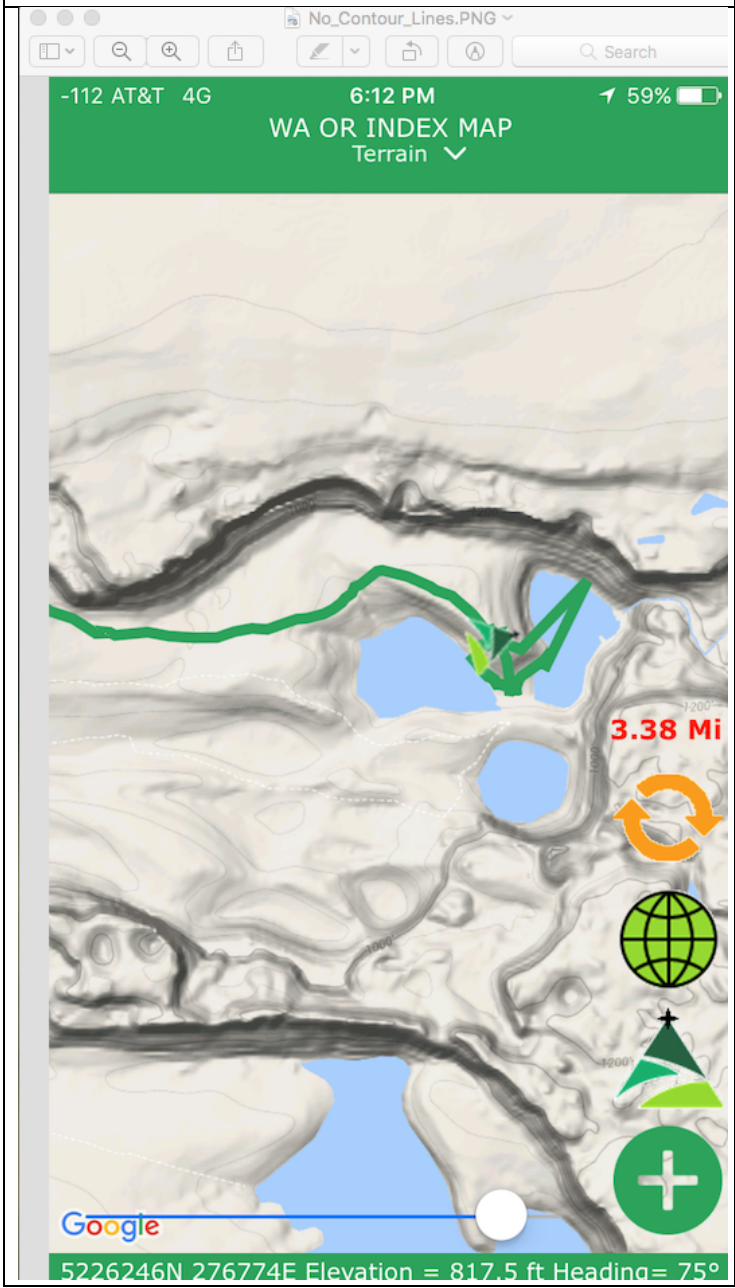
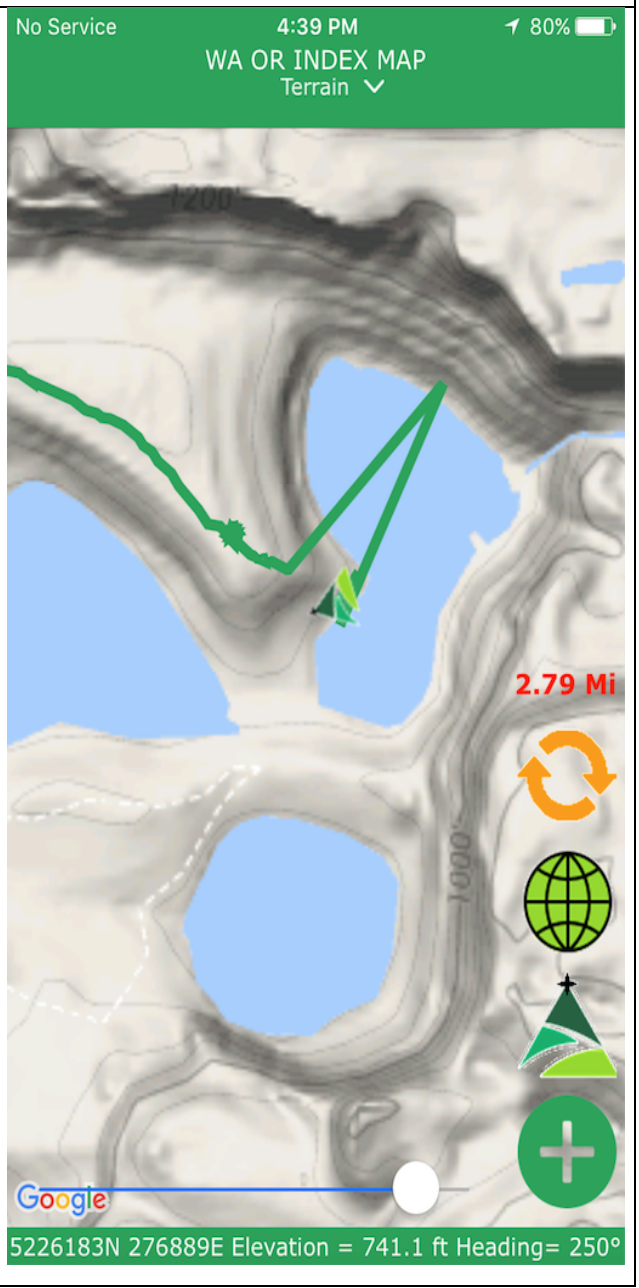


Figure 2. Track log issue.



- Certain buttons provide no value to the user in non Green Trails Maps covered areas. In the area I was in I found that the sliding bar at the bottom

of the app did nothing and I'm not sure why its there. The dropdown at the top of the app (WA OR INDEX MAP) there is a selection for "None" that removes the entire world and makes the screen blank beige with no data/information of any kind minus the buttons. The Toggle Map Side/Map Index also provides no value in these non Green Trails Maps covered areas.

- Download Maps are massive (5 gb for three) and slow to download. The developer reports best to use a broadband (WiFi) connected network and not over cellular data.
- No support for Android Users. Sorry folks, Green Trails Maps only support iPhone at this time.

--Don Sarver is a Wilderness Navigation Instructor with the Seattle Branch and an avid climber, hiker and backpacker. He is a Systems Engineer for Amazon Web Services. Contact him at sarverd@gmail.com.

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Bench tests support update for required compass models

Seattle navigation's compass guy, Bob Boyd, has completed bench tests of three preferred compass models for Wilderness Navigation instruction. The registered land surveyor used his home test station to challenge Silva, Brunton and Suunto performance. Updated Mountaineers-wide compass requirements follow on the next page. *--Editor*

Compass Test	**Silva Ranger** #1 & #2	**Brunton TruArc** #3 & #4	**Suunto MC-2** #5 & #6	**Other Remarks** Both USGS Suuntos are for the US
Packaging	Overdone	Overdone	Easy Open	
Shipped By	Amazon	Back Country	Amazon	
Freezer Test	Good	Good	Good	
Opens	Easy	Easy	Easy	
Hinge	Good	Good	Good	
Lanyard	Short & pulls apart	Short but good	Short but good	Silva has a two piece measuring lanyard that can pop apart, loosing your compass.
Scales	UTM & others	Scales but not UTM	UTM & others	
Magnifying Lens	Yes	Yes	Yes	
Leveling Bubble	No	Yes	No	
Information Cards	Yes	Yes	Yes	These cards have miscellaneous information & scales.
Bezel Turns	Good & Very Hard To Turn	Too Loose	Good	Compass #2 took two hands to turn. The Bruntons will almost turn themselves. Compass #5 glows in dark.
Declination	With a screw driver	Friction	With a screw driver	The Brunton system is hard to master
Bezel Centered	Yes	Yes	OK	Keep Suunto bezel pushed forward.
Mirror	Good	Good	Some warpage	The Silva has an X to look at. Suunto mirror makes a poor signaling device.
Needle Length	1 - 7/16"	1-1/8"	1-5/16"	Longer is better to align.
Global Needle	No	Yes	No	The Brunton global needle has a lot of needle dip, which can be hard to align.
Orienting Lines	Good	Good	Yes, but short	First remove white plastic from bottom of the Brunton bezel.
Set A Bearing	Easy	Too Easy	Good	Compass #2 has a still bezel. Bruntons almost turn themselves.
Pointing Error	1º Lt & Good	2º Rt & 1º Rt	Both <1º	
Clinometer	Yes	Yes	Yes	

Mountaineers Required Compass Features

Wilderness Navigation & Other Courses

Revised July 2018

1. **Adjustable declination**: This feature simplifies map and compass work. Most compasses with adjustable declination have an adjustment screw, usually brass or copper-colored, and a small key attached to the lanyard. Some have a 'tool-less', pinch-to-adjust feature.

- All students MUST have a compass with adjustable declination. The presence of a declination scale does not guarantee that it can be adjusted.
- Even if you already have a compass without adjustable declination, you may not use it in this course. Experience indicates that such compasses detract from the learning experience.

2. A **transparent rectangular base plate** with a direction of travel arrow or a sighting mirror.

- Transparency allows map features to be seen underneath the compass.
- A rectangular shape provides straight edges and square angles to plot on the map.

3. A **0 to 360 bezel** (the rotating housing) marked clockwise from 0 to 360 degrees in increments of two degrees or less. Bezels should be large to allow use with gloves - the larger size also improves accuracy. Do not get one marked in 0-90 degree quadrants OR one marked in O-6400 mils!

4. **Meridian lines**: Parallel 'meridian lines' on the bottom of the interior of the circular compass housing rotate with the bezel when it is turned. Longer lines are better. Meridian lines run parallel to the north-south axis of the bezel, however turned, for use with a topo map.

5. A **ruler and/or gradient scale** engraved on one of the straight edges, used for measuring distances. In the U.S. 1:24000 scales (rather than 1:25000) are preferred. Both are acceptable.

6. A **3 to 4-inch base plate**. A longer straight edge makes map work easier.

Additional recommendations

- A sighting mirror in the cover: May reduce error introduced when moving compass from eye-level after sighting to waist-level for reading the dial. Protects the bezel.
- A liquid-filled housing: Reduces erratic needle movement (common on better compasses). In some cases, steadying the compass needle can be difficult
- An inclinometer: A gravity driven arrow that allows you to measure slope angle.

Current favorites: Silva, Suunto, and Brunton are favorites. All have adjustable declination. Their quality and usability varies, so **keep any receipt**. We have unfortunately seen many defective compasses in the past.

Maker	Models	Features +	Features -	Vendors	Cost
Silva of Sweden	Ranger CL515 *Ranger 2.0*	Slope card, *New, more features*	Still available?	Cabela's, Online	~$55 *~$50*
Suunto of Finland	MC-2 *M3-D Leader* MC-2G Navigator	Northern Hemisphere *Mirrorless* 20 degree tilt margin	*Lacks clinometer*	REI, Online	~$40-64 *~$44* ~$95
Brunton of Colorado	TRUARC 15* *TRUARC 5*	*Global needle, mirror *Global needle, 51 Grams* *Luminous*	Bezel may pop out *Bubbles? Mirrorless*	REI, Cabela's, Online	~$50-60 *~$20-30*

Manufacturers make continuing improvements and corrections in models. Model variations and designations proliferate – insist on features 1 to 6 above. Manufacturers make continuing improvements and corrections in models.

(Rev 3July2018/ph bb bs jl)

Wilderness Navigation Course Offerings--Seattle

Basic Navigation transitioned to Wilderness Navigation in 2016, clearly focused on wilderness/back country travel including off trail navigation to meet requirements for Alpine Scramble, Basic Climbing, Snowshoe and BC Ski students (and others). Altimeters and GPS units (basic point position) are included. Fee and badge.

Date & Day	Workshops*	Date & Day	Fieldtrips
Mon, Sep 24 to Oct 23	Online Classroom	Saturday, Nov 3	Heybrook Ridge
Thursday, Oct 25	Program Center	Saturday, Nov 3	Heybrook Ridge

**Note: Students may enroll in the elearning program, as available, to complete the workshop online prior to their fieldtrip.*

Smart Phone and Dedicated GPS Navigation Course—Seattle*

Are you interested in learning to use your smart phone as a wilderness GPS? Maybe you have had a dedicated GPS for years and want to get the most out of it? The Smart Phone and Dedicated GPS Navigation course is for you! We will cover basic usage of both dedicated GPS units and the Gaia GPS app for smart phones, as well as common issues that can affect GPS accuracy and ways to avoid them. This course is an evening at the Mountaineers Seattle Program Center, split between a classroom lecture and a hands-on outdoor exercise. Prior completion of the Wilderness Navigation course is strongly encouraged. Fee and Badge.

Topics include:

- Overview of how GPS works
- Common accuracy issues and solutions
- Review of UTM coordinates – Working knowledge is assumed
- Entering waypoints
- Navigating to a way point
- Back tracking a route
- Overview of emergency communication devices (SPOT & PLB)

Students need to bring a GPS enabled device to the class; loaners are not available. We cover both Gaia for iOS and Android devices ($20, pro not required/Free to Mountaineers) and Garmin dedicated units. Other brand GPS units are welcome, but instructors may not be familiar with them. Lead course administrator is Michael Hutchens.

The current URL provides a description and the 2018 dates are on the calendar: GPS2018Seattle

Smart Phone & Dedicated GPS Course	Location
Wednesday, August 22	Seattle Program Center
Wednesday, September 26	Seattle Program Center

Introduction to Map & Compass (& Altimeter) – Seattle*

The Seattle Navigation Committee scheduled six 2018 Introduction to Map and Compass dates at the Seattle Program Center from 6:30 to 8:30 p.m. Instructors are drawn from the pool of Wilderness Navigation Course teachers.

Administrative leads are Nina Crampton & SuJ'n Chon. This Getting Started introductory class does not satisfy the navigation requirement for Alpine Scramble, Basic Climbing, Snowshoe or Backcountry Ski. Fee, no badge.

Intro to Map, Compass (& Altimeter)	**Location**
Monday, August 13	Seattle Program Center
Monday, September 10	Seattle Program Center

Other Seattle 2018 Navigation Seminars/Clinics*

Seminars/Clinics	**Dates**
Instructor Training Elearning – No fee	Wed, Oct 10
Mentor Sessions Wilderness Navigation – No fee	Thur Nov 1
Wilderness Navigation Equivalency – No fee	Rolling enrollment
Contact Leader Lynn Graf	

Other Branches 2018 Navigation Courses*

Branch	**Course**	**Dates**
Everett	Basic Navigation Workshop & FT Camp Edward	Saturdays TBA
	Wilderness Navigation eLearning Option	Under Consideration
Foothills	Staying Found	TBD
	Wilderness Navigation	Spring 2019
	Digital Trip Planning & Navigation	TBD
	Wilderness Navigation Equivalency	Contact TBD
Kitsap	Both series have Elearning Wkshp Option	Sep 17 thru 28
	Wilderness Navigation Lectures Option	Thursday, Oct 4
	Wilderness Navigation Wkshp/Field Trip	Saturday, Oct 6
Olympia	Navigation Lectures 1 and 2	Tues & Thurs TBD
	Navigation Field Trips	Sat or Sun TBD
Tacoma	Wilderness Navigation Lectures 1 & 2; Field Trip	Aug 7 & 9; Sat 11

* Check mountaineers.org for up-to-date listings.

Navigating Through the Wild Elearning Course – No Badge

Books -- National	Online Lessons Support Backcountry Off Trail Travel -- Contact Doug Canfield, Books	Completed, No plans to repeat

Mazamas (Portland, OR) 2018 Navigation Instruction*

Portland	Navigation Skill Builder Class – Videos, Wkshp, Field work	TBD
	Wilderness Navigation Smartphone GPS (Gaia)	TBD

*Northwest climbing clubs support similar goals for exploration, learning and conservation. Reciprocity is routinely granted across state lines. Mazamas lead navigation instructor is John Godino, contact johngo.pdx@gmail.com.

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Navigation Gear, Apps & Links of Interest

Your comments and suggestions are ever welcome regarding the Seattle Navigation website and links in Navigation Northwest. –Pat Podenski, Section Ed

The Gear…

- Ziplock sandwich bags remain the weather protector of choice for Gaia route maps printed to 8.5 * 11" paper. Clever quarter folding exposes the area of current interest and the packet slips easily in and out of trouser pockets.

The Apps…

- **(Following apps first published in June 2017 issue)**

Free (or nearly) Altimeter Apps For Smart Phones

By Lynn Graf

	App Name	Device	Developer	Cost
	Gareth Altimeter	Android	Gareth Price	free
	Accurate Altimeter	Android	AR Labs	free
	Pro Altimeter	iPhone	Hunter Research and Technology	$0.99
	Altimeter Plus	iPhone	Sichtwerk AG	free

Short guide to a few recommended altimeter apps for cell phones

Don't want to spend the money for a classic wristwatch altimeter, one more gadget? Basically all SmartPhones nowadays have GPS capability. This means that they can pinpoint your spatial position without cell service, which is often spotty or non-existent in the backcountry (and searching for a signal drains the battery, in

case you haven't noticed). Many of the newer models (iPhone 6 and later, for example) also have a pressure sensor. This can be used for extra correction or a cross-check of elevation by barometric pressure (which is what wristwatch altimeters use) but that is not really necessary and requires more frequent calibration.

Here are recommendations for two very basic apps for Android and two for iPhones.

Selection Criteria (not in order of importance): low or no cost, easy to use, no cell service required, no ads, low memory and storage usage, reasonable speed at obtaining GPS signals, clear numerical display, recommendation from Mountaineers member(s) who have used it in the field.
There are many more out there, more all the time, and increasingly with features in addition to GPS-based elevation. We invite you to try them, see how they work for you, and let us know if they don't work as advertised. If you want additional information, see the article in Navigation Northwest (https://www.mountaineers.org/blog/how-to-pick-an-altimeter) describing a systematic comparison of several Android apps.
Also, The Mountaineers currently has a deal for free use of GAIA Pro that basically turns your cell phone into an advanced GPS device. Check the website under "Benefits" (https://www.mountaineers.org/membership/benefits/instructions-for-redeeming-member-benefits). It is highly recommended but requires time and practice to set up and use efficiently. The Seattle Navigation GPS class features Gaia as the app of choice. Backcountry Navigator, another full-service GPS app, also has many followers. Both are well worth it, in my opinion, but a paper map, compass and altimeter app will get you a long ways, both on and off-trail.

--Lynn Graf is a past Seattle Navigation chair and an active hikes and scrambles trip leader. She is a frequent contributor to Navigation Northwest. Contact her at: lynn.graf@gmail.com.

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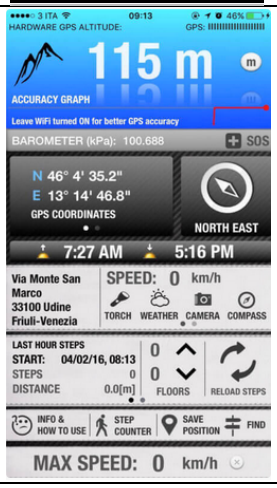
Free (or nearly) GPS Apps for Smart Phones

By Brian Starlin and Emma Agosta

Screen Shot	App Name	Device	Developer	Cost
	MyTrails	Android	FrogSparks	Free Pro €2
	GPS Essentials	Android	Schollmeyer Software Engineering	Free
	Handy GPS	iPhone	Anthony Dunk [*Note: Also authored Coordinate Master to convert Lat/Long to UTM*]	Free
	Altimeter GPS	iPhone	Andrea Piani	Free

Criteria for Android and iOS GPS:

1) Backcountry oriented (Topo Maps rather than street maps)
2) Works offline, in airplane mode, with only the GPS on

3) Can display UTM and Lat/Long
4) Has at least NAD83/WGS84, but gets extra points if it has NAD27
5) Extra points if it's available for Android and iOS
6) Able to save data and send in GPX format
7) Able to import GPX format
8) Accurate (although I believe it's based on underlying GPS hardware)
9) Extra credit if tracks can be shared on a cloud service
10) Free

We used a 10-point scale with higher numbers meaning more of the above features were found. Also, there is a main point we need to make. Gaia is a serious app for backcountry use and has all the features we want. And Gaia Pro is currently free to Mountaineers members.

Android Reviews (Brian)
>>GPS ESSENTIALS (mictale.com) -- 5 points
Only available on Android.
It only uses cached maps, which limits its offline usefulness.
Very robust dashboard, highly configurable.
Limited selection of map sources
The UI is clunky. It uses a thing called "streams" to store data. The Import/Export functions were hidden in the "streams." The track recording was also buried in the stream screens. The Dashboard is great, but the other functions are clunky.

>>HANDY GPS (BinaryEarth) -- 2 points
Great for just displaying your coordinates in various formats. It has very limited maps -- a blank screen, and the Google Maps. The map does not work offline and cannot be downloaded.

>>MYTRAILS (FrogSparks) -- 6 points.
Great selection of maps. I think it has only NAD83/WGS84 because I don't see a Datum setting. Tracks and waypoints can be saved as GPX. The free version can only save the current track, plus one. And can only store 100 tiles at a time in the offline storage. UTM displays on the screen. It's on Android.

>>RAMBLR (Bientus) -- 2 points
This is more of a journaling and trip sharing app than a GPS app. It's very focused on tracking and sharing details of a trip. It has Google Terrain and OpenCycle maps. It can use an offline map. It does not display coordinates, but it can show you your location on the map background. As I said, it's a journaling app.

iOS Reviews (Emma)
Additional features I noticed are under "other features and comments."

>>ALL TRAILS -- 3 points, free

Hiking oriented but by trail (not backcountry). More like WTA app. Works offline. WGS 83/84. Available for IOS and Android. Map overlays (such as USGS topo) are in the Pro version ($29.99/year). No UTM or Lat/Long. Other features/Comments: ability to track a route, keep history etc. Many other apps do this for hiking, biking, running and other sports. I do not believe these are the kind of apps our readers are looking for.

>>ALTIMETER GPS -- 4 points, free.
Not backcountry oriented. Lat and Long: yes. No UTM. Elevation (ft/meters). Accuracy: unknown. Available on both? Some features only work with internet (i.e. choice of map format). Other features/comments: Weather, barometric pressure. Compass heading, Step Counter. Speedometer. Save position. Ads (non intrusive at the bottom, yet one can accidentally click). Find feature to search for location.

>>DECLINATION -- 1 point, free
Not backcountry oriented (map: satellite view). Lat and Long and UTM. Works offline: yes. Accuracy: unknown; Datum: ? Other features/Comments: Declination; Ability to search by Lat and Long. Ads.

>>HANDY GPS -- 6 points, free
Not backcountry oriented. Works offline: yes. UTM and Lat/Long, (plus elevation); Datum: ? Available for both IOS and Android. Able to save data and email : yes. GPX file: no; Accuracy level (+-10m). Other features/comments: nice display: uncluttered; intuitive, user-friendly; key features: Map. Digital Compass. Can save waypoints and email position from within the app. No ads. My favorite among free but cannot compete with Gaia.

>>MAP TOOLS -- 3 points, $0.99
Street oriented; Works offline; Lat and Long and UTM; Datum: ?; GPX format: no; accuracy: unknown. Other features/comments: Not intuitive. Confusing zoom in and out feature. Declination provided.

--Brian Starlin is the Seattle Navigation Chair and a frequent Navigation Northwest contributor. Contact him at brian.starlin@comcast.net

--Emma Agosta is a Seattle Navigation instructor and committee member. A geologist, she is fluent in land forms (and Italian). Contact her at emagosta@gmail.com

And the links …

- GaiaMapLoad is a new YouTube tutorial from Gaia to select, save and load maps for use beyond cell tower range.

- Map layers introductory article describing why digital map layers are useful

https://sectionhiker.com/introduction-map-layers-backcountry-navigation/

- An excellent, in-depth, comprehensive review of the new Garmin inReach Mini (subscription required to read entire article)

  https://backpackinglight.com/garmin-inreach-mini-review/

- While technology continues its relentless pursuit, this article surveys some U.K. hikers regarding their choices for navigation

  https://www.tgomagazine.co.uk/skills/navigation-skills/digital-feature-the-future-of-mountain-navigation-and-mapping/

- Warkum Point was located just above Indian Pass in a strategic location to catch enemy aircraft coming off the coast, sneaking up the Bogachiel or Calawah River Valleys, enroute to bomb the Puget Sound region. The article describes navigating to Warkum.

  http://www.nwhikers.net/forums/viewtopic.php?t=8026801

- The Mazamas hiking and climbing map resources online

  https://mazamas.org/resources/maps-for-climbing-and-hiking/

- The MSR blog discusses the skills needed to navigate when hiking a route versus hiking on a trail (part 2 of a two-part article series)

  https://thesummitregister.com/hiking-a-route-vs-hiking-a-trail-part-2/

- A cartographer describes the Art of Drawing Maps class at the North Cascades Environmental Learning Center

  https://blog.ncascades.org/life-at-the-learing-center/you-are-here-a-weekend-of-maps-at-the-north-cascades-institute/

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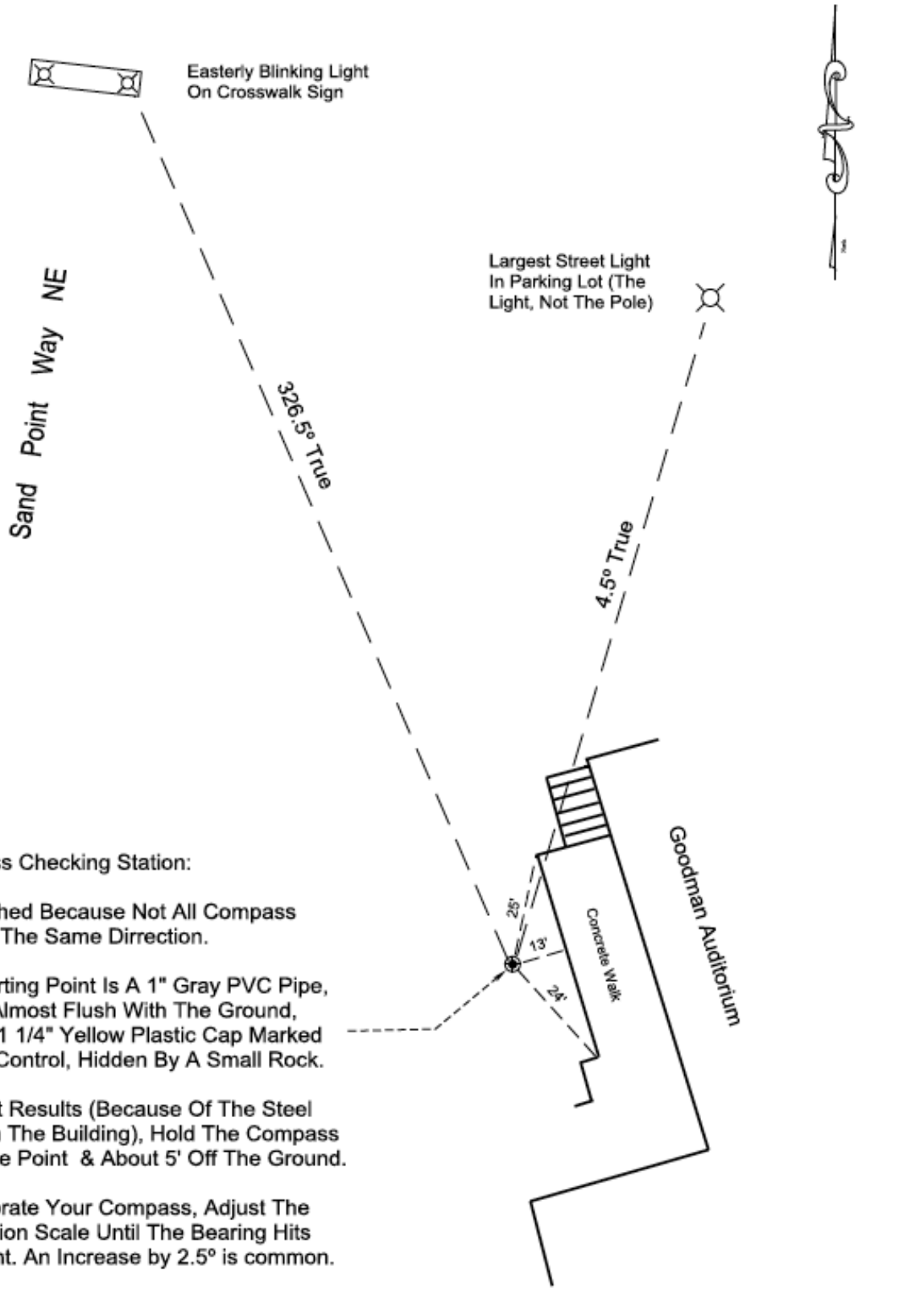

Seattle Program Center Compass Calibration Station

Navigation Northwest Copy and Publish Targets 2018

Calendar 2018	Copy Deadlines	Publish Dates
Volume 6, Issue 3	**September 1**	**Late September 2018**
Volume 6, Issue 4	**December 1**	**Late December 2018**

Inquiries, Contributions, Letters to the Editor to Peter Hendrickson
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--Word doc...Google doc OK but not a PDF
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--Send figures, tables, photos as attachments or by separate email
--Refer to figs by number in body of text
--No footnotes, header or footer
--Author blurb with preferred email contact address

Kindly contact editor for further information regarding topics, length, tables, figures, deadlines...

"Do not go where the path may lead, go instead where there is no path and leave a trail." *--Ralph Waldo Emerson, American writer, 1803-1882*

(Rev06July2018/ph)