

Navigation Northwest

A Quarterly Publication of the Seattle Navigation Committee
Volume 5, Number 1 **March 2017**

--Navigation Northwest March Features--

Snowshoe Adventure on Rampart Ridge	Nancy Lloyd
The Frugal Navigator	John Godino
Jacobs Introduces CalTopo and SARTopo Offline	Matt Jacobs
Gaia App Plus Base Plate Compass Tips (and more!)	John Gilbert
Navigation Chairs Stumble On Big Leaf Maple Poaching Site	Peter Hendrickson
Q & A: Revised Wilderness Navigation Standards Approved	Brian Starlin
Clubwide Navigation Volunteer Recognition 2016	Navigation Chairs

Courses, Classes, Apps, Gear & Links

Wilderness Navigation Course 2017 Classes	
Smart Phone and Dedicated GPS 2017 Classes	
Introduction to Map, Compass & Altimeter 2017 Classes	
Other Branch and Club Navigation News and Classes	
Find Free Altimeter & GPS Apps: Android and iOS	Lynn Graf, Brian Starlin & Emma Agosta
Navigation Gear, Apps & Links of Interest	Pat Podenski
Seattle & Foothills Compass Recommendations for 2017	Bob Boyd
Seattle Program Center Compass Calibration Station	Bob Boyd

Editor's Note

We continue our search for outings where navigation and/or communications issues provide "Lessons Learned." Featured is a snowshoe trip in Rainier NP.

So many smartphone apps and navigation gear (including emergency communication) can be so expensive. Several articles this issue provide guidance for frugal but prudent back country navigators.

Freedom 9 is scheduled to be available for sale (paper, hard copy and e-version) in November.

At last, revised Navigation standards are approved. Seattle Navigation Chair Brian Starlin provides a Q & A rollout on changes and new emphases.

.....

Snowshoe Adventure on Rampart Ridge

By Nancy Lloyd

February 20, 2017 --The day's forecast at Mt. Rainier National Park was a bit iffy with a projected 3000' snow level and afternoon snow showers to deposit a few more inches. However, I believed it was worth a shot at Mildred Point from Longmire via the Wonderland Trail, then connecting with the Van Trump Park trail along Rampart Ridge. A major storm was not expected, but the gorgeous views would be limited or non-existent. Even so, I anticipated a long, enjoyable snowshoe outing.

My group of nine had a range of winter travel experience, and I expected some to be stronger than others. Before leaving Longmire that morning, I explained that I wanted us to stay fairly close together and not split up. The assistant leader agreed to be the 'sweep' and help keep track of everyone. Four or five of us had some form of GPS. I and one other (maybe a third, I don't recall exactly) had GaiaGPS, the others had Garmin units.

I had studied the route carefully because I had not done it before, and also carried a paper map, compass, and altimeter. But I told everyone that our trip was a group effort and appreciated input from them. I also wanted to give everyone an opportunity to lead the group.

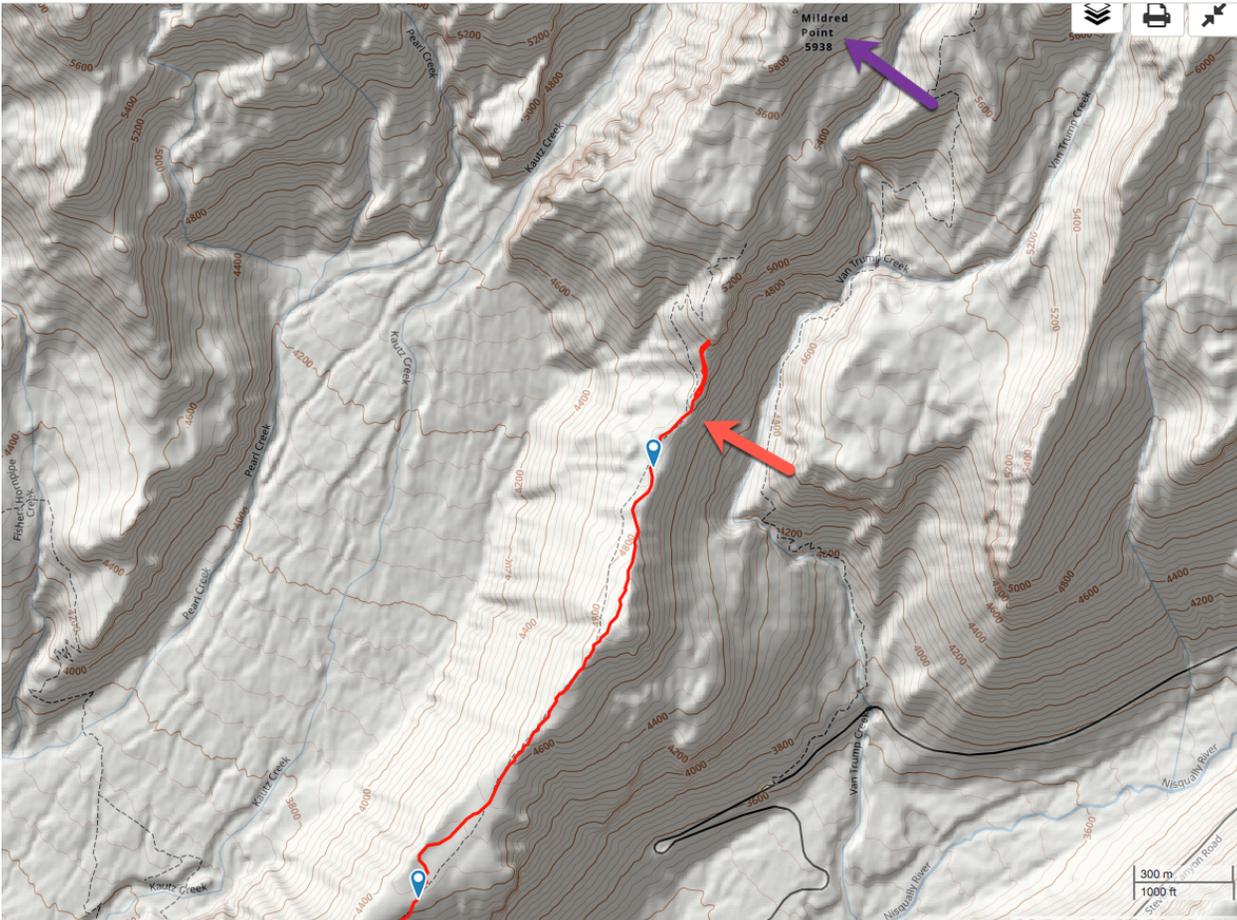
The Wonderland Trail was straightforward from the Longmire TH and obvious to the signed junction with the Van Trump Park Trail at about 3760'. I had done the Rampart Ridge loop a couple of weeks previously, and marked a waypoint at the junction. My GPS showed us exactly at that spot. A couple of participants disagreed, and insisted that we proceed 0.2 of a mile to the Rampart Ridge trail junction.

When we compared GPS readings, it was apparent that confusion probably resulted from differences in how the route appeared on different kinds of units (Garmin vs. Gaia app), and because of their map interpretation or datum confusion. Also, trails on GPS maps do not always appear in their exact location, but are definitely not 0.2 of a mile off. I knew I was correct as I had dropped the waypoint, but agreed to go ahead a short distance in the wrong direction. Three participants in the lead shortly turned around, and we continued on the correct route toward Mildred Point on the Van Trump Park trail.

I did not record our track along the Wonderland Trail, and forgot to begin recording until about 4110' on the Van Trump trail. This was not a problem though, because our snowshoe track was quite deep and deepening as we traveled. I went to the back of the group and checked GPS frequently.

The front person began to veer left off track (northwesterly) at about 4450', so I yelled up to go right. We did, and were back on track until about 4840' when those up front wisely stayed about 50' higher than the trail to avoid a steep area. This took us almost over the top of the 'hump' which forced us to drop about 100' feet before heading up again. See Figure 1.

Figure 1. Upper purple arrow shows Mildred Point (elev 5938') and lower red arrow track shows leaving intended trail off to left (west).



I became confident in our progress and did not check my GPS again until the group was heading up a steepening slope. I had expected a traverse and then switchbacks, but we were suddenly going almost straight up around trees; it did not feel or look like what I anticipated. I pulled out my GPS and saw that we had begun going straight up a ridge at about 4840'.

It's hard to estimate how many feet we were off course, probably a hundred feet or so east toward Van Trump Canyon. It does not sound like much, but it put us on a very steep slope with soft, slippery, unconsolidated snow. We turned back at just over 5000' after a couple of falls.

We all used trekking poles with snow baskets, and three of us carried ice axes on our packs. Ice axe arrest in a fall would have been almost impossible given the soft, deep, unstable snow. I tried using an ice axe for support and it was useless, particularly for descending.

Once back on gentler ground, we compared GPS readings again. We certainly did miss the mapped traverse and switchbacks at 4800' that could have eventually taken us to Mildred Pt. But it was surely an adventure and a learning experience.

Here is a link to the GPS track displayed in Figure 1

<https://www.gaiagps.com/datasummary/folder/a4251492-a7d4-4b4f-95eb-3af450839d2a/?layer=GaiaTopoRasterFeet>

Lessons learned? It's easy to get complacent when things are going well. Assume nothing, remain vigilant throughout your trip, and stay aware of the terrain as you travel. Keep checking your GPS or map/compass/altimeter and adjust course as needed – established routes were established there for a reason.

[Datum disagreement can produce up to 195m (0.12 miles) northing difference in our area. Communication issues may occur when party elements drift apart. For more Mildred Point info see Mt Rainier Tourism <http://visitrainier.com/mildred-point-snowshoe/> –Ed.]

--Nancy is a Hike, Scramble, Snowshoe, and XC Ski leader. A Past Olympia Hiking Chair and former branch Secretary, she is a member of various Olympia Branch Committees. Contact: nanlloy@gmail.com.

The Frugal Navigator

By John Godino

Mountaineering is an expensive sport. It's especially daunting for beginners, who often have to prioritize spending across competing items. With a fixed amount of money, do you go for Gore-Tex undies, an ice axe made of sleek unobtanium . . . or yawn, a compass? (Let's face it, a shiny new cam is way sexier than a compass.)

So, given that the main four navigation tools are a map, compass, GPS and altimeter (with an optional 5th being an emergency communication device like a Spot or inReach), how might a frugal navigator procure these essentials?

As a lifelong cheapskate, I've given a lot of thought to this issue. Here's my take. Your opinion will probably vary. Please debate freely.

Maps

Solution: CalTopo. Learn it in a few minutes (via YouTube) and you may never pay for a topo map again. CalTopo's newest layer, "MapBuilder Topo," is especially useful, offering shaded relief, good visibility of trails, decent contour lines, basic vegetation cover, and overall is just about perfect for backcountry travel. Print out any map scale you like on most any size of paper. Overlay a GPX track and waypoints. Email yourself a PDF file of the map to keep on your phone as a back up to your printed copy, and do so at various scales (e.g., 1:25,000 for the actual climb, and maybe 1:50,000 for the approach hike.)

Maps: \$Free

Compass

My go-to compass is the Suunto M3. It's a solid base plate compass with adjustable declination, and does not have a sighting mirror (which I consider unnecessary for most recreational users, and which adds weight and cost). REI has really jacked the price on the M3 over the last year or so, but you can get this compass at Amazon for about \$30.

If you really want to go frugal, one step down is the Suunto A-10. It does not have adjustable declination, but you can draw in your local declination with a sharpie pen and use that. The A-10 is \$17.30 (today, March 2017) on Amazon.

Compass: \$17

GPS

As soon as I got Gaia GPS on my iPhone, I ditched my old Garmin and haven't looked back. This \$20 app has superior screen resolution, map sources, and user interface compared to dedicated GPS units. Yes, it's not as durable and the battery life can be a limitation, but I treat the phone pretty carefully and always carry an external battery pack and short charging cable, which I consider the 11th essential(s).

GPS: Gaia GPS \$20 + Anker auxiliary battery pack & 4 inch charging cable \$20 = \$40

Altimeter

The (rare) times I use an altimeter, I use an iPhone app. Most newer smart phones have a barometric pressure sensor in them, and the various free altimeter apps are quite accurate.

Altimeter: \$Free

Emergency communication device

I don't own one, and don't plan to. I feel it's not realistic to ask beginning climbers to buy one, and most weekend warriors probably won't either.

However, if you're in a formal leadership role and taking organized groups to more remote places, it can certainly be a good idea to have one.

There are various approaches. One that's fairly realistic is to buy one collectively with a few friends and share the unit and the costs. DeLorme inReach SE (now owned by Garmin) is \$300. Cheapest contract, \$12 per month, \$144 year. Total \$444 for the first year, divided by four friends, \$111 per person for the first year, \$36 a year after that. Extend this out to three years (a reasonable lifespan for technology) and you pay a total of \$184ish over three years for a 25% share.

Communicator: Cost over 3 years: \$184

So, let's tally it up. Map= \$Free, Compass=\$17, GPS=\$40, Altimeter=free, DeLorme inReach \$184 (for 3 years) = \$241

Dropping the optional inReach, you're only paying for a GPS and compass, which **totals \$57**. That's about the price of a brand-new #2 Camelot. Now which one do I really need?

--John Godino is Mazamas' main navigation instructor and committed cheapskate. He is a frequent contributor to Navigation Northwest. Contact him at johngo.pdx@gmail.com.

Invited Critique of The Frugal Navigator

By Bruce Crawford

I'd agree on all except the PLB. They are typically tied to one person's contact info for emergency use. The SPOT capital and operating costs are about half those of InReach. If you want to forgo the annual fees, look at a ResQLink instead. The one-time cost is offset by no annual fees.

But PLB's, like much technology, are complex and can be used in different ways. Do you want SOS and an "I'm OK" message? Look at a SPOT. Do you want tracking? Look at SPOT with extreme tracking. Do you want two-way messaging? Look at InReach. Do you just want SOS without subscription fees? Look at the ResQLink.

SPOT covers portions, but not all of the world's landmasses, and not much of the ocean. InReach covers a lot more. But in the continental US they both work similarly. (Trying to avoid a detailed technical discussion of the satellite networks.)

My first MOFA instructor was a smart SAR guy. He said sending a bit of money to SAR organizations was cheap life insurance that would actually benefit you, not your heirs. A PLB would complement those contributions.

--Bruce Crawford is a veteran member of the Seattle Navigation Committee, much involved in recent revisions to the Wilderness Navigation curriculum. A civil engineer, he is active in the mushing community. Contact him at bikejor@me.com.

Author's Response to Crawford Critique

By John Godino

That's about the kindest "critique" I've ever had! Bruce must be a very charitable guy (=^). I agree with all that Bruce said. He clearly has researched the rescue beacon thing more than I. Good to know about "probably can't share a PLB issue". How might this affect Mazamas / Mountaineers, if our clubs were to buy a dozen Spots to issue to leaders? [Ed Note: Seattle Climbing loans out 10 ACR ResQLink PLB-375 devices and rewards trip leaders at a certain volunteering level.]

The PLB options are expensive, a bit confusing, and not for everyone. And I fully agree to donate to your local SAR team!

**Ed Note: Freedom 9 will introduce the navigation tools quintet this fall in the new edition. The most basic, individual emergency communication tool is a human powered whistle. Coast Guard required on your PFD (audible for at least a half-mile) – strongly recommended on land by Mountaineers. Three tweets – distress! Two tweets – come here. One tweet – Hello or Yes. If you tweet twice, and then I tweet once it means "OK, here I am, I will come to you". If somebody else tweets 3 times, that overrules both of us. Two whistle sources:*

<https://www.rei.com/product/100521/whistles-for-life-tri-power-whistle>

Official NASAR whistle vendor: <http://www.whistlesforlife.com/whistles.html>

Jacobs Introduces CalTopo and SARTopo Offline

[Ed Note: Reprinted with permission from the CalTopo Blog
<http://caltopo.blogspot.com/>]

CalTopo

Tuesday, March 7, 2017

[CalTopo Offline](#)

In the very beginning, I started what would ultimately become CalTopo as a hobby project focused on offline environments - a command post or tailgate somewhere off in the woods far away from the nearest internet connection. As CalTopo grew, that ability for entirely self-contained operation has remained as a little known but fundamental building block of the codebase. Flip out a few of the underlying bits - Google Maps with OpenLayers, a standalone database with HSQLDB, Tomcat with Winstone - and you'd get a free-standing Java web app with no external dependencies.

For search and rescue, those who knew the secret handshake could get a similarly configured copy of SARTopo, delivered via physical thumb drives along with statewide map data. While this system worked for a while, it's been chugging along on a donut spare and one headlight for some time. Although releasing copies of a subscription-driven website into the wild feels a bit risky, it's past time to make the offline functionality a supported feature that doesn't require my involvement with every install.

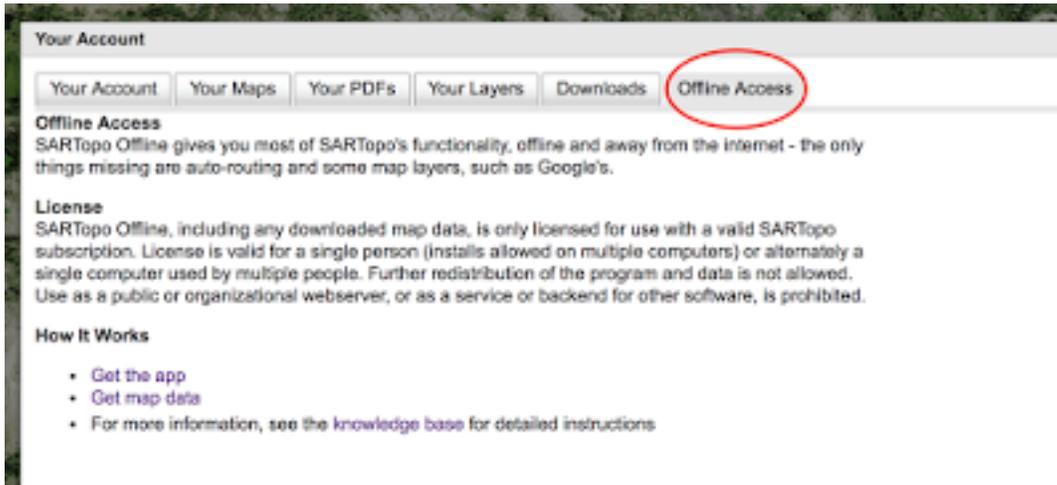
Welcome to CalTopo (and SARTopo) Offline.

Due to the costs of delivering map data and the extra support footprint it will present, there was no way I could roll the offline functionality into the existing subscription levels. Instead there is now a \$100/yr offline subscription level that also includes all pro-level features. First responders who have upgraded to a SAR account will see a \$50/yr offline upgrade option.

Upgrades: click on a plan to upgrade (actual charge will be pro-rated for existing subscriptions.)

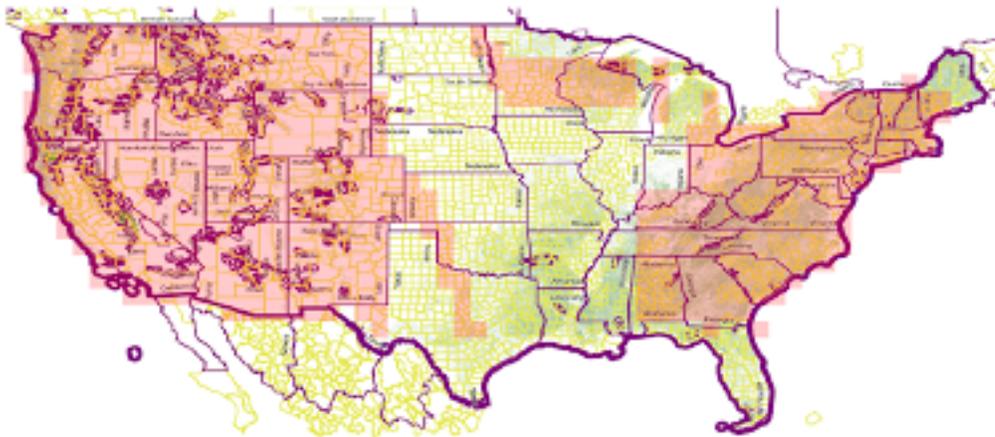
Basic \$20/yr	Pro \$50/yr	Offline \$100/yr
20 private maps PDFs up to 13x19 or 15 pages 800 file KMZ exports KML Super Overlays	200 private maps PDFs up to 36x48 or 40 pages, shareable forever 3200 file KMZ exports KML Super Overlays Customizable MapBuilder layers WMS and WMTS access Exportable elevation profiles	All Pro-level features Offline support, including: 300 GB/yr of map downloads including 1 meter imagery licensed for one user (on multiple computers) -or- licensed for one computer (with multiple users)

After upgrading, your account dialog will have an offline access tab with links to downloading both map data and a copy of the program:



Map data is provided in 1 degree by 1 degree blocks, in MBTiles format. Available layers include USGS 7.5' topos, forest service maps, slope angle shading, elevation data for profiles and viewsheds, and NAIP aerial imagery down to 1 meter resolution; most blocks include 2 years' worth of imagery.

Each account is allowed 300GB worth of map downloads per year, with no geographic restrictions other than being limited to the lower 48 states. It's up to you whether you want to skip the imagery and cover a larger footprint, or get 2 years worth of 1 meter imagery for a smaller coverage area. At the moment data is only available for the red-shaded areas below, but that should grow to full lower-48 coverage within another week or two.



I'd post some screenshots, but there's not much to show - the offline version looks very much like caltopo.com. For more information on how this all works, check out some of the [very thorough documentation](#) written by Patty Lindsay (there is hopefully more documentation of this caliber coming to help.caltopo.com).

Posted by [Matt Jacobs](#) at [6:11 PM](#) [No comments](#):

Gaia App Plus Base Plate Compass Tips (and more!)

By John Gilbert

Prudent wilderness navigators carry all five navigation tools on backcountry outings (hard copy map, altimeter, compass, gps device & emergency communicator*). The GPS is handy for figuring out where you are and determining the bearing to where you want to go, but it does not work well to tell you exactly which direction to turn & walk and then keep you on track as you scramble over and around obstacles. A precise traditional magnetic compass is needed for *that*. Here are two techniques to snag compass bearings from your Gaia app.

--Zoom in on the Gaia screen, so you can tap and have Gaia set a waypoint right where you touch. If you tap it again, a box will pop up showing the bearing and distance to that spot. You can then delete the waypoint if it is not needed. Lastly, you rotate your compass bezel to that number just read.

--Or simply lay your baseplate compass down on the top of the screen and plot a bearing just like on a paper map. I align the plastic edge of the compass with where I am located and also where I want to go—my direction of travel. I then rotate the bezel so it aligns with the side of the screen.

The first approach is fastest to get the numeric bearing, but does not work well if you are wearing gloves.

The second approach has the benefit of setting the compass, which if that is the ultimate goal, takes care of the second step of the first approach.

A picture of a compass laying on top of a phone might be helpful, but the only camera I now have is my phone, so I can't take a picture at the same time I plot a bearing.

By the way....It bugs me that the font in which Gaia displays the waypoint info is way too small. Another tip: I use the magnifying glass on my compass to read the screen.

And...In the winter, I carry a touch screen stylus in my jacket pocket. That is a device that looks like a ballpoint pen, but has a rubber cap covering a metal tip. This device enables me to tap/click on my phone screen while wearing big gloves. I taped a piece of 3 mm cord to the stylus so it won't get lost when I accidentally drop it in the snow.

Finally...When it is raining, I carry my phone in a sandwich bag. The plastic bag is thin enough to allow the screen to still be clicked/tapped.

--*John Gilbert has been a scramble leader since 2004 and has led over 130 scrambles. A "Super Volunteer," he is also a navigation instructor. Contact: JohnGilbertWentClimbing@hotmail.com.*

Navigation Chairs Stumble On Big Leaf Maple Poaching Site

By Peter Hendrickson

Two navigation seasons ago Brian Starlin, current Seattle Navigation Chair, and I attempted to clear blow down from a FS Road to provide emergency access to the Heybrook Ridge field trip site. We did not expect to encounter a crime scene.

We carpoled from Monroe to the west entrance off Hwy2 in Baring with a dash over the rail lines. The committee checks out a FS padlock key for routine entrance to the west access out of Index. That spur has been problematic with washouts, deep ruts and overgrown plant life. It is currently not practically useful. We used to station a vehicle at the catch line of the final problem in case we had to evacuate a student or instructor with medical issues.

Road access also facilitated toting the place-and-remove signage for the various problem sets. Brian and I thought there might be an access solution from the Baring gate. Turned out the key was not needed as the lock had been cut. And a huge Big Leaf Maple just ahead was in pieces, burl sections missing. We worked through the left-behinds and sawed our way west.

After hours of wet, misery work with hand saws and a few batteries worth of reciprocating sawing, we reconsidered. The final hour was spent on a ~24" diameter tree needing two cuts. Brian's 4WD Outback pulled the 15' section off the roadway but the way forward was even more tangled.

We retreated and Brian later called the State Patrol to report the open gate and massacred maple. We never learned if prosecution resulted but *High Country News* ran a feature this month. The link gives a deeper understanding about the forests we love and those who would destroy them.

<http://www.hcn.org/issues/49.5/busting-the-tree-ringen>

--Peter Hendrickson is a past Seattle Navigation Chair and current Seattle Branch Chair. Contact p.hendrickson43@gmail.com.

Revised Wilderness Navigation Standards Approved

By Brian Starlin

Branch Leadership Committee on second reading unanimously approved revised Clubwide Minimum Standards for wilderness navigation without comment at their March 15 monthly meeting. Some changes reflect anticipated revisions in next fall's *Freedom of the Hills*, 9th edition. Below, in a Question and Answer format, are details worked out over many months across branches and activity committees impacted by navigation standards. [Find standards here.](#)

Q: Why change the standards? A: *This isn't a change in standards, but the first setting of the standard for Navigation.*

Q: What instruction and which activities are impacted? A: *This only covers the Wilderness Navigation Course or any similar course that leads to the awarding of the Basic Navigation Badge.*

Q: When do these standards go into effect? Are courses changing this spring? A: *The branches will determine if any changes are necessary and how long they will need to effect changes. However, the standard was written with all existing courses in mind, so the changes should be minimal.*

Q: Do I still need to carry a hard copy map if I have digital maps? A: *The course still focuses on using the paper map because it shows the overall area covered by the training and is easier for instructors and students alike. And it avoids issues with digital-only mapping, such as battery life, power constraints, size of screen, etc.*

Q: I have a digital compass on my smartphone. Is that enough? A: *The course still focuses on the traditional consumer-grade compass with adjustable declination and the digital compass is not sufficient for the course.*

Q: Do all students now need altimeters for back country outings? A: *The altimeter is not required in the workshop or the field trip. Students may bring one and practice with it during the "Where are you" questions, but it is not required equipment.*

Q: Will GPS be the major focus of instruction going forward? A: *The standards position the GPS as a "source of information" and as a tool that may be available within the team, but not as an individual item, and not as a major focus of instruction.*

Q: My Gaia app has maps, gps, altimeter, bearings. Is that all I need? A: *No, the course focuses on the foundational skills using paper map and handheld compass. Branches may offer an additional course on GPS, using Gaia as an instructional tool, but it is not yet part of the minimum standards.*

Q: Why are expensive emergency, satellite communicator devices noted in the standards? A: *Satellite communication devices make use of the GPS system, and GPS is already heavily used by navigators. It helps to understand the technologies used by our tools, along with the strengths and limitations of such tools.*

Q: I've taught Wilderness (Basic) Navigation for several years. Do I need to retrain?

A: *You may need a refresher. The Seattle Branch offers instructor training twice a year and has online courses available to help instructors understand any new material.*

Q: Does the online Wilderness Navigation elearning workshop reflect these new standards? A: *The Online Workshop definitely covers these standards, and more. It's an excellent course for those who need an alternative to the in-person workshop.*

Q: How are trip leader or instructor navigation standards different from student or participant standards? A: *Instructors are expected to be more experienced in the use of altimeter and GPS so that they can share such information during the field trip. For example, students need not have their own altimeter or GPS, but the instructor at a field trip should have their own altimeter and GPS, or have access to one, and be able to provide information from these tools to help the student understand, "Where am I?"*

Q: What happened to position triangulation and 2 degree accuracy as skills? A: *Triangulation relies only on Map and Compass and takes time. It can be one component in the decision making process. A group of people in the wilderness often has access to other tools, to include map, compass, altimeter, and GPS, so it makes sense to teach how to take advantage of multiple tools at once, rather than relying solely upon the compass readings. And the use of multiple tools can be faster than triangulation alone. The ability to plot a bearing from the field onto the map, however, is still an important component among the entire toolset.*

Q: Do these standards mean more work before classes or outings? A: *It may mean more time during the workshop and/or more homework for the students before the workshop or field trip.*

Q: Who was consulted in drafting these standards? A: *The document includes feedback from every active navigation committee across branches Seattle, Tacoma, Everett, Olympia, Kitsap, and Foothills. It also includes feedback from other committee chairs in across branches, including Climbing, Scrambling, Snowshoe, Skiing, and even Kayak committees.*

Q: Could my branch or activity committee demand higher standards for participants, instructors or trip leaders? A: *This is a "minimum" standard. Any course can go above and beyond the minimum. For example, the core skill is map and compass, with GPS as a possible source of coordinates. A course can go into more detail on GPS, or more detail on altimeter, without contravening the "minimum" standard.*

--Brian Starlin is Seattle Branch Navigation Chair. He is a volunteer climbing trip leader & instructor, Seattle Mountain Rescue member, Boy Scout trip leader and Washington Trails Association crew leader. Contact him at brian.starlin@comcast.net.

Recognizing and Rewarding Navigation Volunteers

--Editor

Navigation courses, seminars and events call for scores of volunteers each year to serve the 100's of students. Recognition and reward for those efforts varies widely across branches and over time. Branch Leadership Committee (BLC – branch, safety and global adventure chairs) is committed to establishing and supporting improved “R&R” in all branches. A recent Clubwide inventory of practices by COO Bill Ashby showed:

- No formal recognition program across branches. Those who volunteer have Basic (Wilderness) Badge renewed. Verbal thanks are offered after workshops and fieldtrips.
- Rewards include unfunded cafe invites to dine post field trips and (in early 2017) Seattle gifts of gear and software subscriptions.

In this issue we list all navigation volunteers, by branch, to recognize freely given time and talent. We understand that many volunteers volunteer beyond instructing or leading activities and events. Foothills Branch has pioneered a weighted point system that recognizes and rewards hike, navigation and backpack instructors, trip leaders, committee leaders, curriculum developers and others. Weights vary from year to year depending on emphasis areas. The 2015-16 leader recognition weights were:

- Day Hike, Snowshoe Trip, Navigation FT/Classroom support (1.0),
- Overnight Backpack/winter camp, Mentor of new leader (1.5),
- Multi-night backpack, CR instructor (2.0), and
- Course administration and/or content development (4.0)

A minimum number of points

is set as a threshold and the available funds are then divided according to volunteer point totals. REI gift cards standard awards—maximum \$150.

Other branches may adopt variations of the point system. BLC is considering a draft Recognition and Reward policy that states in part:

"Volunteers are the collective engine that inspires and powers The Mountaineers. Volunteers are the key to increasing our capacity for delivering high-quality programs. Recruiting, training, and mentoring volunteers are necessary but not sufficient without recognition and rewards.

We flourish as a club when we recognize and reward volunteers' freely donated time, inspired leadership and deep talent across committees, courses, activities and events.

Volunteers should be broadly and equitably recognized across branches for their contributions of time, leadership and talents.

Volunteers should be rewarded in a systematic and transparent fashion within branches for their contributions of time, leadership and talents."

The draft policy also calls for a minimum reward expenditure of at least 10% of committee operating budgets.

Navigation Course(s) Volunteers 2016 – Leadership Bold

Everett

Andy Monts-Homkey,
Chair

Edward Andrews, 1
Luke Angelis, 1
Mike Braun, 1
Tracy Buchanan, 1
Norman Buckley, 2
Laura Culver, 1
Brittany Darnell, 1
Randy Furnas, 1
Lyle Harvey, 1
Doris Hatton, 1
Andy Kemberling, 1
Matthew Kuhn, 1
Dan Labovitch, 1
Jessi Loerch, 1
Dennis Miller, 1

Per Monts-Homkey, 2

Ronald Riter, 1
Lisa Romberg, 1
Rachel Sadri, 1
Hillary Shearer, 1
Edward Smith, 1
Brian Starlin, 1
Don Swanson, 2
Charlie Waite, 1
Jeff Wilcox, 2
Bruce Wolverton, 1

Foothills

Dave Coate, Chair
David Coate, 3
Maureen Corlas, 1
Anda Cornea, 1
Heidrun Eberhardt, 2
Barbara Folmer, 1
Steve Lebrun, 2
Sarah McCroy, 1
Karen McFarland, 2
Nichole McMullen, 1
Monty Pratt, 2
Michele Ritala, 3
Dale Shoup, 1
Cheryl Talbert, 1

Kitsap

Jerry Logan, Chair
Steve Anderson, 6
Linda Anderson-Carnahan, 2
Cyndie Bruner, 2

Brian Carpenter, 5

Jorge Cascante, 2
Suzy Diesen, 2
Scott Ekin, 1
Tina Fox, 2

John Howard, 2

Troy Hubbs, 5

Jerry Logan, 8

Ed Lucas, 5
Lonny Moore, 2
Dan Prince, 1
Jeff Schreppe, 2
Debbie Straub, 6
John Straub, 2
Greg Thies, 2
Max Thornton, 1

Olympia

Mike Kretzler, Chair
Mark Brown, 1
Lucia Cantu, 2

Tom Eckhout, 4

John Eliasson, 1

David Geeraerts, 4

Terri Hoselton, 3

Doug Hutcheson, 1
Theresa Jump, 2
Bob Kernanen, 1
Neal Kirby, 1

Mike Kretzler, 4

Michael Mellors, 3

Patti Miller-Crowley, 2

Todd Mooney, 3

Matt Pahs, 1
Tiffany Pahs, 1
Kim Parsons, 2
Kim Pohlman, 1
Karen Pyle, 1
Curt Rosler, 1
Ginger Sarver, 1
Michael Silverstein, 3
Jan Skoropinski, 4
James Stage, 3
Andy Weber, 2
David Wilson, 1
Janice Wu, 1
Janette Zumbo, 1

Seattle

Brian Starlin, Chair

James Adkins, 2

Emma Agosta, 4

Steve Allen, 3

Mark Anderson, 4

William Ashby, 2

Mary Aulet, 1

Mary Lou Biggs, 2

Jeff Boersema, 1

Bill Borom, 2

Lisa Boynton, 1

Mike Braun, 3

Janine Burkhardt, 2

Richard Burt, 2

Andy Cahn, 1

doug Canfield, 2

Brian Carpenter, 16

Chris Caviezel, 2

Suj'n Chon, 2

Peter Clitherow, 1

David Coate, 7

Wes Cooper, 2

Nina Crampton, 8

Bruce Crawford, 5

Tom Cushing, 1

Brett Dyson, 2

Tad Englund, 2

Todd Enos, 3

Glen Ferguson, 1

Rick Finkle, 1

Mathew Gilson, 2

Lynn Graf, 2

Peter Hendrickson, 14

Brian Hill, 2

Elise Hollowed, 2

Michael Hutchens, 4

Brian Kennan, 2

Fritz Klein, 13

Sam Kohl, 2

Takeo Kuraishi, 1

shawna leatherby, 2

Kristine Linn, 1

Kate Lunceford, 1

Dick Maguire, 6

Sean Mathias, 1

Steven F McClure, 2

Patricia McDonald, 3

Frank McJannet, 3

Noel Miller, 2

Aaron Molskness, 1

Barbara Motteler, 2

Brandon Myers, 1

Tyler Nelsen, 2

Jeff Panza, 7

Mary Panza, 1

Jeffrey Patterson, 1

Bryan Pelach, 1

Kirk Peterson, 1

Chris Pribbernow, 2

Rojesh Punnath, 2

Jill Reeder, 6

Craig Rixon, 1

Shelley Rixon, 1

Wesley Rogers, 13

Stevie Russell, 2

Courtney Jacquelyn Ryan, 1

Gwen Sauvage, 4

Brian Seater, 16

Brian Starlin, 23

Jerry Stein, 1

Heath Stewart, 1

Cheryl Talbert, 1

Nancy Temkin, 8

Paul Thomsen, 5

Win Van Pelt, 2

Thomas Vogl, 2

Walter Von Der Linden, 1

Robert Waage, 2

Heidi Walker, 5

Bryce Wentworth, 2

Rayna Weth, 2

Jason Williams, 2

Tacoma

Rick Finkle, Chair

Bill Carver, 3

Kevin DeFields, 9

Rick Finkle, 13

Peter Hendrickson, 1

Gene Keltgen, 3

Philip Owens, 6

Susan Rowe, 3

Scott Schissel, 1

Dave Schultz, 3

Gary Zink, 3

Wilderness Navigation Course Offerings 2017--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. We are developing a Seattle version of Foothill's Staying Found, which does not meet back country course requirements. <https://www.mountaineers.org/about/branches-committees/seattle-branch/committees/seattle-navigation-committee/course-templates/basic-navigation-course/wilderness-navigation-course-seattle-2017>

Date & Day	Workshops*	Date & Day	Fieldtrips
Tuesday, Mar 28	Program Center	Saturday, April 01	Heybrook Ridge
		Saturday, April 22	Heybrook Ridge
Wednesday, Oct 25	Program Center	Sat or Sun, Nov 4 (Nov 5, if needed)	Heybrook Ridge

**Note: Students may also 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 some Gaia GPS apps 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. This course is open to Wilderness Navigation students and graduates. Fee and Badge.

Topics include:

- Overview of how GPS works
- Common accuracy issues and solutions
- Review of UTM coordinates
- 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 volunteers) and Garmin dedicated units. Other brand GPS units are welcome, but instructors may not be familiar with them. Lead course administrator is Brian Seater assisted by Michael Hutchens.

The current URL provides a description and the 2017 dates are on the calendar: <https://www.mountaineers.org/about/branches-committees/seattle->

[branch/committees/seattle-navigation-committee/course-templates/smart-phone-dedicated-gps-seattle/smart-phone-dedicated-gps-seattle-2017](http://www.mountaineers.org/about/branches-committees/seattle-branch/committees/seattle-navigation-committee/course-templates/smart-phone-dedicated-gps-seattle/smart-phone-dedicated-gps-seattle-2017)

Smart Phone & Dedicated GPS Course	Location
Monday, April 17	Seattle Program Center
Wednesday, May 24	Seattle Program Center
Tuesday, June 27	Seattle Program Center
Wednesday, August 16	Seattle Program Center
Tuesday, October 17	Seattle Program Center

Introduction to Map & Compass (& Altimeter) -- Seattle

The Seattle Navigation Committee scheduled six 2017 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. Enroll at URL below or others posted: <https://www.mountaineers.org/about/branches-committees/seattle-branch/committees/seattle-navigation-committee/course-templates/introduction-to-map-compass/activities/introduction-to-map-compass-mountaineers-seattle-program-center-17>. 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
Tuesday, April 11	Seattle Program Center
Wednesday, May 17	Seattle Program Center
Thursday, June 15	Seattle Program Center
Monday, August 14	Seattle Program Center
Wednesday, September 13	Seattle Program Center

Other Branches 2017 Navigation Courses*

Branch	Course	Dates
Everett	Basic Navigation	Mar 4, Mar 18
	Wilderness Navigation eLearning Option	Under Consideration
Foothills	Staying Found	May 20
		Fall TBD
Kitsap	Wilderness Navigation Wkshp/Field Trip	Oct 18/Oct 21
	Wilderness Nav eLearning Wkshp/Field Trip	Sep 18-Oct16/Oct 21
Olympia	Basic Navigation	Apr 18, 20 Lecture
		Apr 22, 23 Field Trip
Tacoma	Wilderness Navigation Lectures 1 & 2; Field Trip	Apr 13 & 19; Apr 22
Tacoma	Wilderness Navigation Lectures 1 & 2; Field Trip	Aug 10 & 17; Aug 19

* Be sure to check mounaineers.org for up-to-date listings.

Mazamas (Portland, OR) 2017 Navigation Instruction*

Portland	Navigation Skill Builder Class	April 9
	Smartphone GPS	June 11

*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.

Navigation Project(s)

>>Our Seattle Volunteer Park effort to create a self-guided navigation map, compass, and SmartPhone (altimeter & UTM coordinates) practice course is online. You may download the PDF (with answers) here:

<https://www.mountaineers.org/about/branches-committees/seattle-branch/committees/seattle-navigation-committee/files/seattle-navigation-self-guided-practice-volunteer-park/> Thanks to Nancy Temkin and Bob Boyd for 2015 beta testing. And to Brian Starlin for 2016 improvements.

>> Seattle Navigation Ad Hoc "Modernization Committee" Formed

Freedom of the Hills, 9th Edition (Fr9) is anticipated in November and newest co-author of Chapter 5 (Navigation), Steve McClure, reported on innovations expected in the new edition at a March Seattle Navigation Committee meeting.

- Ten Essentials navigation tools lists map, altimeter, compass, GPS device (many choices) and a (Personal Locator Beacon) PLB-type device.
- Map now is either physical or digital, if no hard copy map is available.
- Workflow is emphasized in trip preparation and trip execution. Checklists are available but may need to be recreated for navigation use.
- Situational awareness introduces the "OODA Loop" -- Observe, Orient, Decide and Act to encourage the use of the full suite of navigation tools.
- The ethic of self-reliance encourages prudent risk taking in the face of ever more powerful tools which may tempt bolder outings

Some nine climb, scramble and navigation committee members are meeting about next steps in continuing to modernize navigation practice. They will make recommendations to the Navigation Committee this summer. Steps will be:

1. Determine current best practices in modern navigation for multi-day, off trail wilder mountain travel among: guides, experienced travellers, and AMGA, NOLS, OB and similar organizations.
2. Prioritize tools and techniques to be taught roughly within the footprint of the class-- about 12 hours.
3. Pilot class as part of an evaluation plan.

The committee was charged to determine best practices for new navigators, develop a course, teach it, and evaluate the experience. This could be tried out with Intense Basic Climbing or Scramble Compressed.

I wish I was their GPS app...



So they would hold me and look at me all day.

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...

--No reports this issue.

The Apps...

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

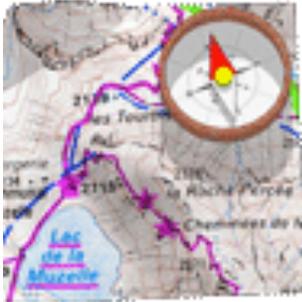
(<https://www.mountaineers.org/blog/how-to-pick-an-altimeter>) describing a systematic comparison of several Android apps.

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.

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 <i>[Note: Also authored Coordinate Master to convert Lat/Long to UTM]</i>	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 way points 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...

- Nautical chart and compass navigation
<https://www.youtube.com/watch?v=8w1eUOUpYNM>
- Free USGS Quads (really, the whole collection)
<http://www.natgeomaps.com/trail-maps/pdf-quads>
- 5 Cool Things.
<https://www.adventure-journal.com/2017/02/5-cool-things-didnt-know-topo-maps/>
- A rescue and a lesson.
<http://shredhood.org/backcountry/941-the-snow-was-so-good-i-couldn-t-stop-how-mt-hood-s-president-of-pow-fell-victim-to-the-mount-hood-triangle>
- Datums, need more datums!
<http://gisgeography.com/geodetic-datums-nad27-nad83-wgs84/>
- Way too many GPS links.
<http://gpsinformation.net>

Some sectionhiker.com resources:

- 10 GPS beginner mistakes.
<http://sectionhiker.com/10-beginner-gps-mistakes/>
- Using PDF maps on smart phones.
<http://sectionhiker.com/gps-navigation-with-pdf-maps-on-smartphones/>
- Some other navigation considerations during winter months.
<http://sectionhiker.com/9-winter-navigation-hazards/>

Out of date maps.

<http://sectionhiker.com/backcounty-navigation-with-incomplete-or-out-of-date-maps/>

Navigation Gear--Compasses

Required Compass Features: Seattle Wilderness (Basic) Navigation Course & Foothills Staying Found Seattle Mountaineers—Revised March 2017

- 1. Adjustable declination:** If there is one feature that simplifies map and compass work, this is it. Compasses with adjustable declination can often be identified by the presence of an adjustment screw, usually brass or copper-colored, and a small key attached to the lanyard. It allows you to move the orienting arrow in relation to the azimuth ring.
 - All students **MUST** have a compass with adjustable declination. The presence of a declination scale does not guarantee that it can be adjusted. Avoid the 'tool-less' declination feature on the Brunton (see below).
 - 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. In general, bezels should be large to allow use while wearing gloves - the larger size also improves accuracy. Do not get one marked in 0-90 degree quadrants OR one marked in 0-6400 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 plotting and triangulating on the 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.
- 6. A 3 to 4-inch base plate.** A longer straight edge makes map work easier.

Additional recommendations

- A sighting mirror in the cover: Reduces error introduced when moving compass from eye-level after sighting to waist-level for reading the dial.
- 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, Kasper & Richter, and Brunton are the common favorites. Their quality and usability varies, so **keep any receipt**. We have unfortunately seen many defective compasses in the past. Beware the UST ~\$7 knock-off baseplate compass available via Amazon and other outlets. Our gear tests show it to be unreliable.

--From Silva, with a sighting mirror, is the Silva Ranger 515 CL (not the CLQ). Without a mirror is the Silva Explorer Pro (not the 203 or Polaris). Silvas are available at Cabela's or online.

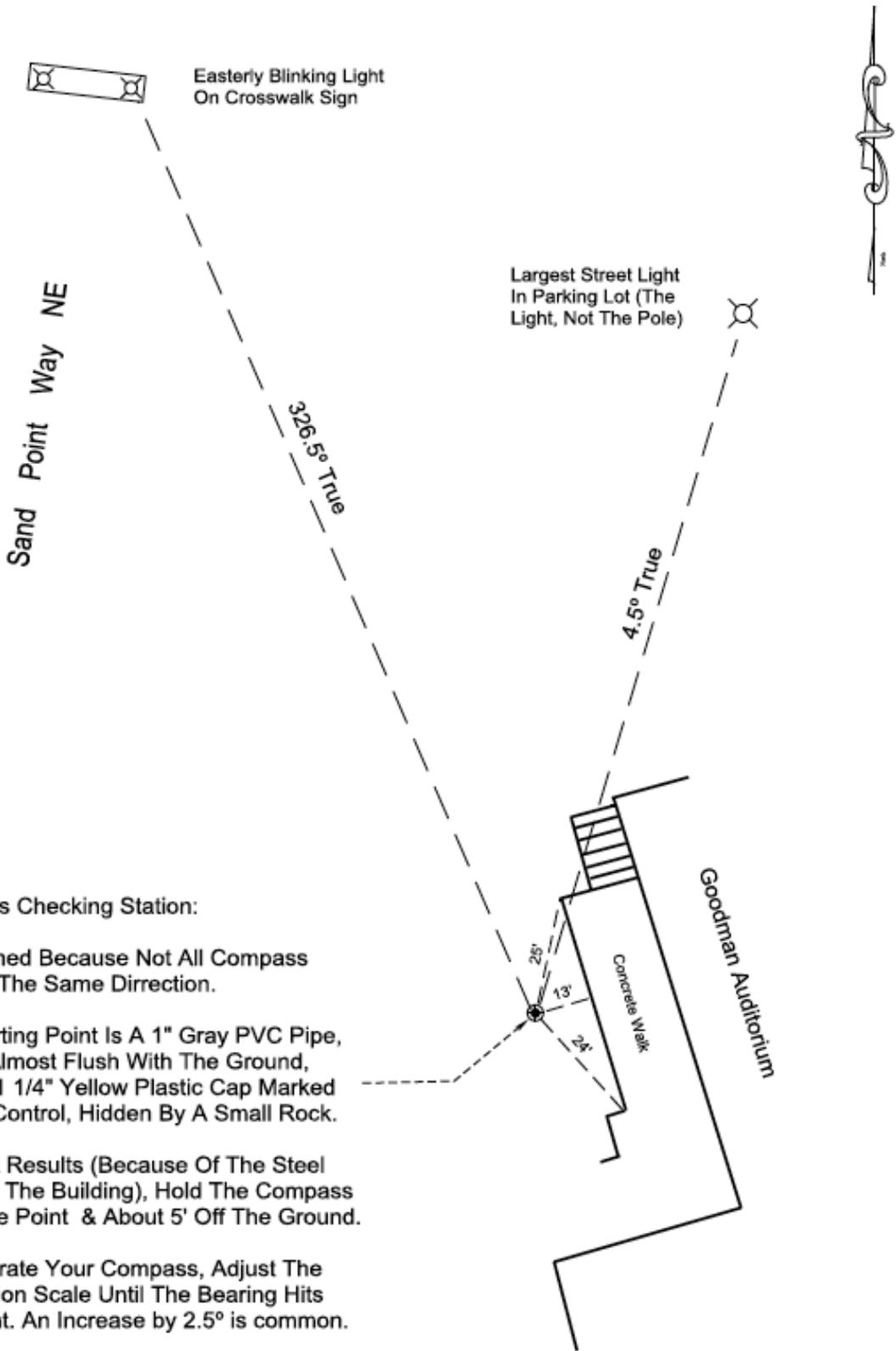
--K & R has the Sherpa and Alpin using 1:25,000 vs. 1:24,000 rulers. They are available online.

--Brunton has several compasses that meet our requirements but present issues with "tool-less declination", lack of clearly visible meridian lines or scales and curvy shapes. Several tool-less declination models have come apart in user hands. Preferred models are TruArc 15 (mirrored), and TruArc 5 (non-mirrored). The TruArc 10 has measurement scales (good) but curvy sides (not good). The TruArc 3 lacks clear meridian lines and is short. Bruntons are available at REI, Cabela's or online.

--Newly available retooled Suunto MC-2 (mirrored) and M-3 (non-mirrored) 2016 models passed all bench tests with flying colors. Suunto is currently available at REI, Feathered Friends and online.

Manufacturers make continuing improvements and corrections in models.

(Rev Mar2017/bb)



Compass Checking Station:

Established Because Not All Compass Point In The Same Dirrection.

The Starting Point Is A 1" Gray PVC Pipe, Driven Almost Flush With The Ground, With A 1 1/4" Yellow Plastic Cap Marked Survey Control, Hidden By A Small Rock.

For Best Results (Because Of The Steel Roof On The Building), Hold The Compass Over The Point & About 5' Off The Ground.

To Calibrate Your Compass, Adjust The Declination Scale Until The Bearing Hits The Light. An Increase by 2.5° is common.

Please Hide With Rock When Finished.

RWB
2/2014

Seattle Program Center Compass Calibration Station

Navigation Northwest Copy and Publish Deadlines 2017

Calendar 2017	Copy Deadlines	Publish Dates
Volume 5, Issue 2	June 1	Late June 2017
Volume 5, Issue 3	September 1	Late September 2017
Volume 5, Issue 4	December 1	Late December 2017

Inquiries, Contributions, Letters to the Editor to Peter Hendrickson
p.hendrickson43@gmail.com

OK to forward

OK to use with attribution

Email Navigation Northwest to any friends/outdoors partners to distribute

Guidelines for contributor submissions:

- Word doc...Google doc OK but not a PDF
- 12 pt Verdana
- Standard margins
- Indicate in body of text where you would like figs/tables etc. to go
- 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

(Rev.14Apr2017/ph)