

Personal Safety in the Desert

Don Endicott, CDAS

17 April 2021



Topics

- Personal Safety
- Heat Exhaustion and Heat Stroke
- Venomous Snakes
- Navigation
- Questions

Personal Safety

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search ID: rth0642

I hear they're delicious when they're sun-dried.



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Darn rescuers! Always spoiling things for us!

Desert Safety

- Drink Like a Fish
- Dress for Success
- Carry a Flare and a Spare
- If You Hit a Sandy Trap ...
- Know Where You're Going
- Mind the Spines
- Don't Bomb Out
- Don't Wash Away

Ten Essentials (Sierra Club)

To Find Your Way

1. Navigation (*map and compass*)
2. Illumination (*flashlight/ headlamp*)

For Your Protection

3. Sun protection (*sunscreen/ sunglasses/ hat*)
4. Nutrition (*extra food*)
5. Hydration (*extra water*)
6. Insulation (*extra clothing*)

For an Emergency

7. Fire (*waterproof matches and fire starter*)
8. Emergency Shelter
9. Repair Kit & Tools (*knife, duct tape, etc*)
10. First-Aid Kit

Ten Essentials

- **Navigation:** [map](#), [altimeter](#), [compass](#), [GPS device](#), [personal locator beacon](#)
- **Headlamp:** with [LED bulb](#) and spare batteries
- **Sun protection:** [sunglasses](#), [sun protective clothing](#), [sunscreen](#)
- **First aid:** a [first aid kit](#), wrapped in waterproof packaging
- **Knife:** hikers on a short trip may also carry a [multi-tool](#), [strong adhesive tape](#) and [cordage](#); on a longer trip, further small tools may be useful
- **Fire:** the means to both start and sustain a fire; either a [butane lighter](#) or [matches](#), or other [fire making](#) device. [Firestarters](#) for igniting even wet wood, and in areas where no firewood will be available, a stove is advisable.
- **Shelter:** plastic tube [tent](#), jumbo plastic [trash bag](#) or [bivy sack](#)
- **Extra food:** at least one day's food for a short hike, that should require no cooking.
- **Extra water:** [drinking water](#) and the skills and tools to [purify water](#)
- **Extra clothes:** additional items may be needed if spending the night in the emergency shelter

The first five items are intended to prevent and respond to emergencies, the second five to safely spend one or more nights outdoors

Desert Safety Checklist (Personal)

- Appropriate Clothing
- Food and Water (bring extra)
- Whistle and Signal Mirror
- Sunglasses and Sunscreen
- Pocket Knife or Multiplier Tool
- Waterproof Matches
- First Aid Kit (and knowledge to use it)
- Headlamp and/or flashlight (and spare batteries)
- Map
- Compass
- GPS Unit
- Cell Phone

Desert Safety Checklist (Vehicle)

- Tool Kit
- Extra Fluids (Oil, Coolant, Gas, Water)
- High Lift Jack
- Sand Boards/Mats
- Tow Rope/Strap/Chain
- Shovel
- Spare Tire
- Signal Devices (Mirror, Flares)
- Duct and Electrical Tape
- \$5 bill and \$1 change for Pay Phone

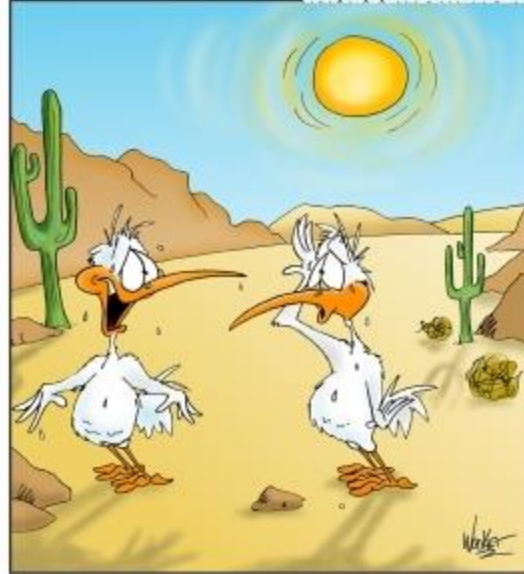
Desert Safety Checklist (Other)

- Comb (removing cholla)
- Tell someone where you are going, when you expect to return, who to contact if you don't return
- I also leave a note with this information inside my truck's windshield

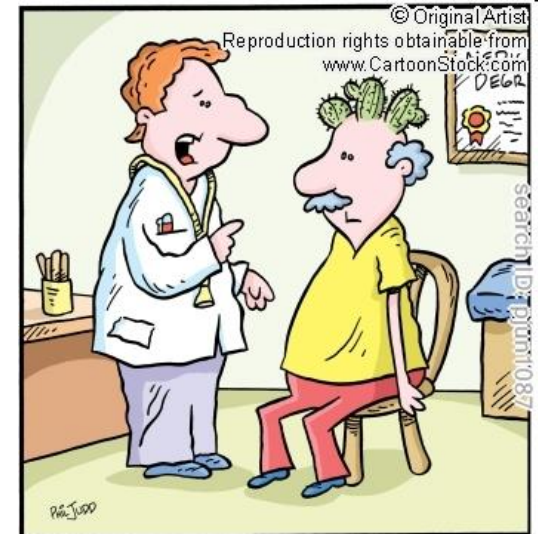
Heat and Water



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"Oh ya, we're a couple of hot chicks alright!"



"It's a clear case of dehydration."

Heat Illness

- When the body heats up faster than it can cool itself, mild to severe illness may develop. Air temperature, humidity, and clothing can increase the risk of developing heat-related illness. Age, gender, weight, physical fitness, and nutrition can play a role.
- Someone with a mild reaction to heat may have a rash called “prickly heat”. They can also have painful muscle spasms called heat cramps. These can happen during or after activity. A mild reaction may also include fatigue or dizziness.
- A moderate reaction to heat is heat exhaustion. A person could be sweating a lot. They could have cold, moist, pale or flushed skin. They might have thirst, extreme weakness or fatigue, as well as headache, nausea, lack of appetite, a rapid weak pulse, or giddiness. If not treated, the victim may collapse.
- Move anyone with mild or moderate symptoms to a cool, shaded place with circulating air. Have them lie down and, if conscious, have them sip cool water at frequent intervals. If symptoms continue, call a doctor.

Heat Stroke

- Heat Stroke is Hyperthermia (abnormally elevated body temperature)
- More severe than Heat Cramps or Heat Exhaustion – a true **Medical Emergency**
- Typically caused by combination of extreme heat, high humidity, and/or vigorous exertion under the sun
- Body normally generates heat as a result of metabolism and is usually able to dissipate that heat radiation through the skin or by evaporation of sweat
- In a Heat Stroke situation the body is unable to dissipate as much heat as it is generating and body temperature rises (can reach 106 degrees)
- One cause of Heat Stroke is Dehydration – person can not sweat fast enough for evaporation to regulate normal body temperature

Heat Stroke Symptoms

- High body temperature
- Absence of sweating (hot red or flushed dry skin)
- Rapid pulse
- Difficult breathing
- Strange behavior
- Hallucinations
- Confusion
- Agitation
- Disorientation
- Seizure
- Coma

Heat Stroke Prevention

- Avoid becoming dehydrated
- Drink: water
- Don't drink: alcohol, coffee, tea
- Wear clothing that helps protect body from direct sunlight and helps retain moisture (hat, light colored clothing, light and loose clothing)

Heat Stroke Treatment

- ***First and foremost, cool the victim!***
- Get the victim to shady area, remove clothing, apply cool or tepid water to the skin (e.g. with mister), place ice packs under armpits and groin area, fan the victim to promote sweating
- Monitor body temperature with a thermometer and continue cooling until temperature falls below 101-102 degrees
- Contact emergency services (911) as soon as possible

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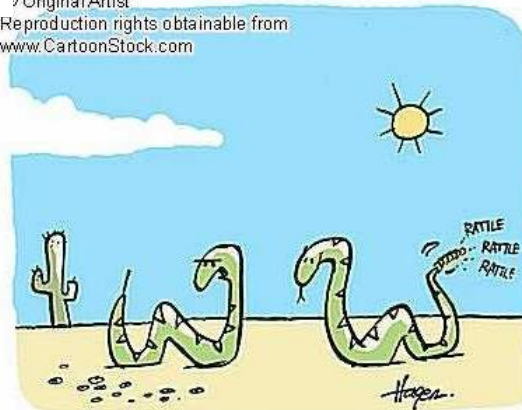
"It's true- the legs go first!"

Snakes

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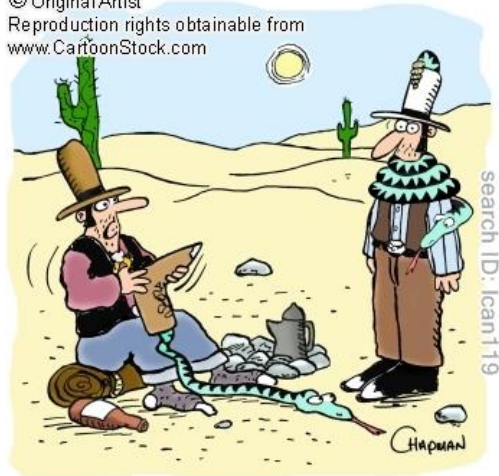


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OH FOR CRYING OUT LOUD, I KNEW I SHOULD
HAVE USED A LOCKWASHER!!

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"You forgot to shake out your
boot again, huh?"

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Get behind me Jed. When a rattler gets bongos out,
he means business!

Rattlesnakes 101

- Rattlesnakes (Crotalidae) are pit vipers and may inject varying amounts of venom including none at all (20-30% of bites).
- Vast majority of human-snake encounters result in the snake retreating if it can find an escape path
- 7,000-8,000 venomous snake bites/year in all of the U.S. with an average of 5 deaths/year)
- Any bite from a venomous snake should be treated as a medical emergency (per American Red Cross)
- Most rattlesnakes have hemotoxic venom. Exceptions: baby rattlesnakes and Mojave Rattlesnake have neurotoxic elements.
- Hemotoxic venom results in tissue damage, destroy blood cells and skin tissues, and cause internal hemorrhaging.
- Neurotoxic venom immobilizes the nervous system, affects breathing (sometimes stopping it)

Avoiding Rattlesnake Bites

- Leave snakes alone - don't handle them or try to kill them (they are protected in ABDSP)
- Keep hands and feet out of areas you can't see
- Be watchful when climbing rocks
- Wear snake gators, especially in grassy areas
- Use hiking poles or hiking staff as probes, especially when walking off trail

Treating Snake Bites

- Do:
 - Wash the bite with soap and water
 - Immobilize the bitten area; keep it lower than the heart
 - Get medical help
 - Main objective is to get to a hospital as quickly as possible where antivenin can be administered
 - If unable to reach medical care within 30 minutes, some medical professionals *cautiously* recommend wrapping a bandage above the bite to slow venom (loose enough to fit a finger under it) and/or using a suction device over the bite (but DO NOT cut)
- Don't:
 - Apply ice
 - Use a tourniquet
 - Make any incisions

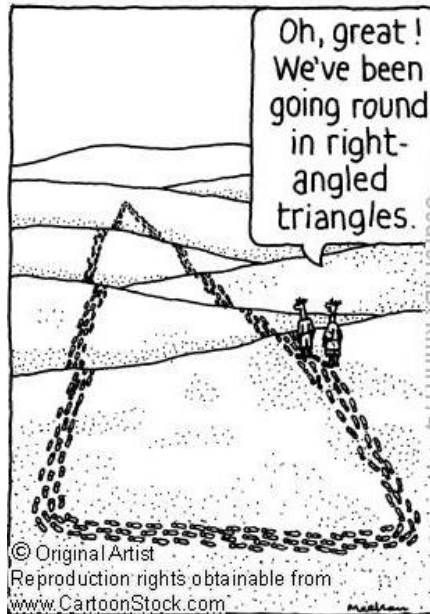
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"Hi, I'm from search and rescue,
try not to move!"

Navigation

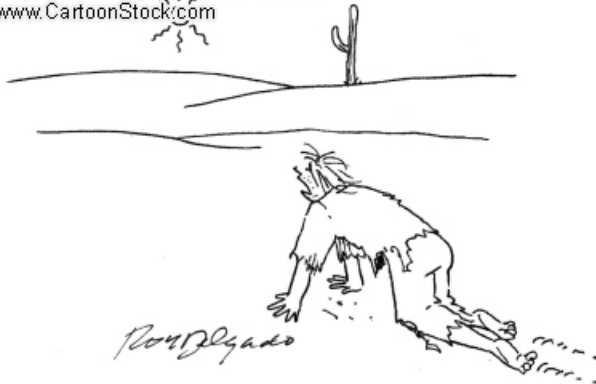


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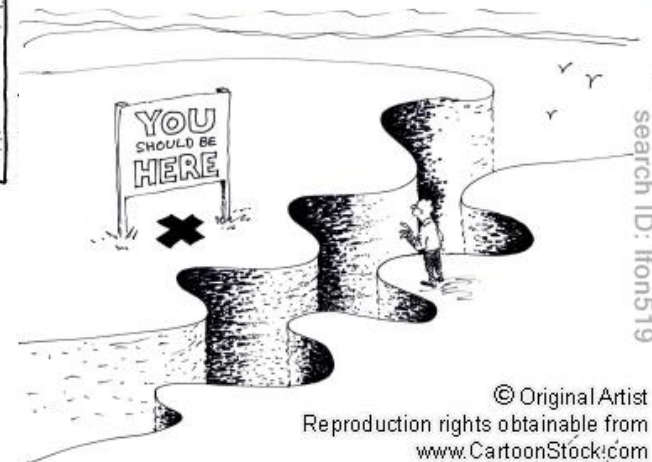


"GPS! GPS!"



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Navigation

- Become familiar with a good map of your area. Get to know the principal topographic features and direction and distance to nearest roads
- Learn to use a compass (GPS devices are great tools but worthless if the batteries are dead)
- Don't expect to have cell phone coverage. Reserve and check out one of the Park radios (if available).
- If you become truly lost, it is best to stay where you are, especially if you are with your vehicle

Navigation (Sierra Club)

- Possibly the most challenging item on the Ten Essentials list.
- Having a basic knowledge of the principle we call *staying found* will go a long way towards keeping you safe and on track.
- Having a map and compass is handy when your phone battery dies and you still need to get back to the trailhead. Even a basic map can keep a trail hiker from going too far astray.
- Knowing where North is; knowing where you started from, what the land looks like, being prepared and aware - these factors will help get you back home.

Questions?

Break

Getting to Know Your GPS

Geolocation Skills Refresher for Site Stewardship and Field Archaeology

Don Endicott
17 April 2021



GPS Workshop Outline

- What is GPS?
- Maps and Navigation
- Geodesy and Datums
- Map Projections/Coordinate Systems
- GPS Receivers
- Getting to know your GPS
- Maps
- Navigating with GPS
- GPS Field Exercises
- Review and Feedback

What is GPS?

- GPS is an acronym for Global Positioning System
- Developed by U.S. military in 1970s; made available for civilian use in 1980s; fully operational in 1995
- Constellation of satellites (24 active plus spares) orbiting the earth twice a day that send precise details of their position in space back to earth
- The signals are decoded and processed by GPS “receivers” to calculate the receivers position (horizontal and elevation, speed, and time).
- Our “consumer grade” handheld units are GPS receivers. They typically track 8 or more satellites at a given time. At least 4 satellites are required for a position fix.
- Minimum accuracy 10m (~30 ft) but often within 3m (~10 ft)
- Contemporary cell phones are capable GPS receivers

What is GPS? - Videos

- Video 1: How GPS Works (Smithsonian) – 1 min
- Video 2: How GPS Works (Air Force) – 3 min 45 sec
- Video 3: GPS Basics (Wikipedia) – 5 min 35 sec
- Video 4 (optional): How GPS Works (white board) – 5 min 40 sec

Maps and Navigation



"Well if I'm so 'bloody useless' perhaps
you'd better read the map!"

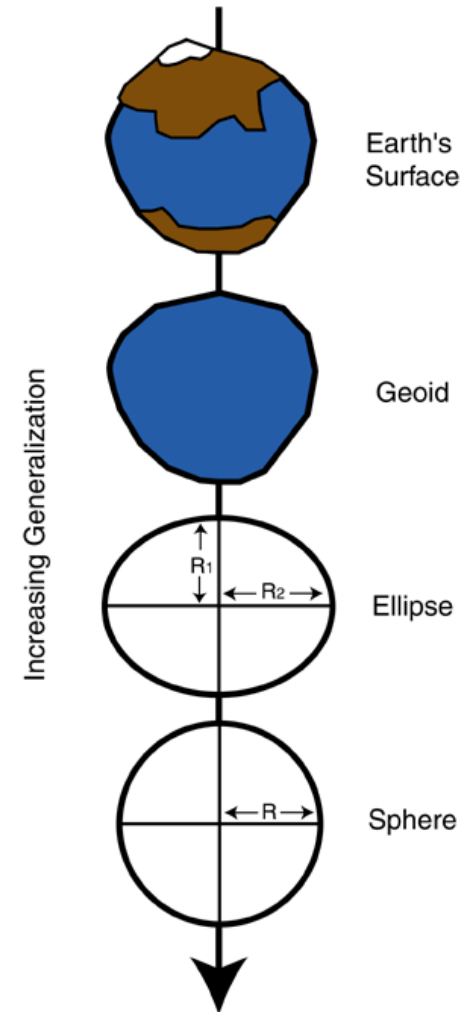
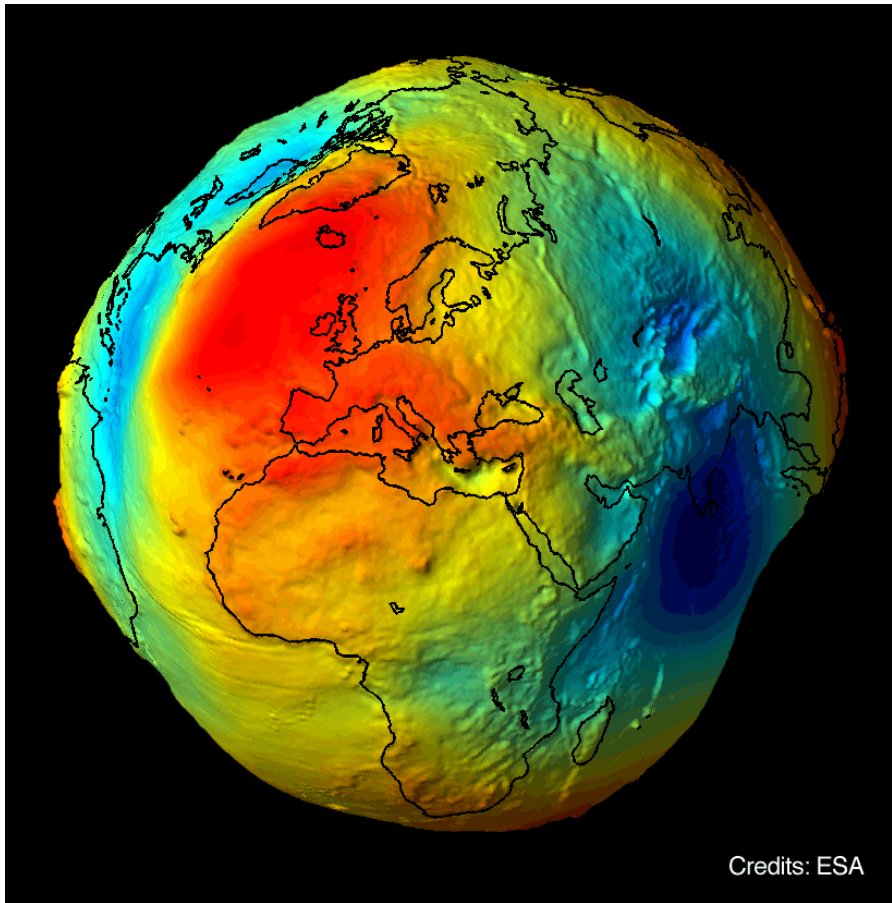
Navigation Terminology

- Finding your current position
- Marking and labeling waypoints; navigating to waypoints
- Recording & saving a track
- Planning and following a route
- Specific steps to follow depend on the manufacturer, the GPS model and user interface, the software release, etc.
- Best learned through practice and reference to the product manual for your particular GPS

Maps and Navigation

- Geodesy and Datums – contending with a lumpy earth
- Cartography and Projections - multiple ways to translate positions on a 3-dimensional globe into 2-dimensional maps with measurable coordinates
- Navigation: Determining where you are and how to get to where you want to be
- Navigation tools
 - Map and compass
 - GPS (dedicated or cellphone)
 - Differential GPS
 - Other navigation aids (e.g. radio navigation)

Geodesy and Datums



Geodesy and Datums

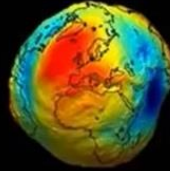
- Geodesy (definition): the science of accurately measuring and understanding the Earth's geometric shape, orientation in space, and gravity field as well as changes over time
- Putting it another way - enables precise navigation on our lumpy, asymmetric planet
- Geoid (definition): mathematical model of the Earth's surface
- Geodetic Datum (definition): a spatial reference system that describes the shape and size of the earth and establishes an origin for coordinate systems
- Video 5: Simple Explanation of Datum (2 min 10 sec)
- (Optional) Video 6: Coordinate System Jargon (8 min)

Geodesy and Datums



Actual Earth

A very lumpy object that has topography, bathymetry, changing ocean height, etc.



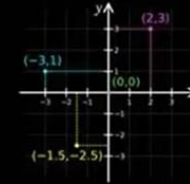
Geoid

A less lumpy mathematical approximation of the earth.



Ellipsoid (lat, long) *

A way of assigning a set of coordinates to locations.



Planar Coordinates (ft, km) *

A way to give coordinates real world, linear measurements.



* Datums:

There are many ellipsoids you can use to reference locations on the earth with latitude and longitude, these different **geographic coordinate systems** are called datums. Certain datums fit different parts of the lumpy earth better than others, so changing datums can make measurements more accurate depending on where you are.

For nearly all basic mapping, however, there are two datums that are all you need to know:

WGS 84 and NAD 83



* Projections:

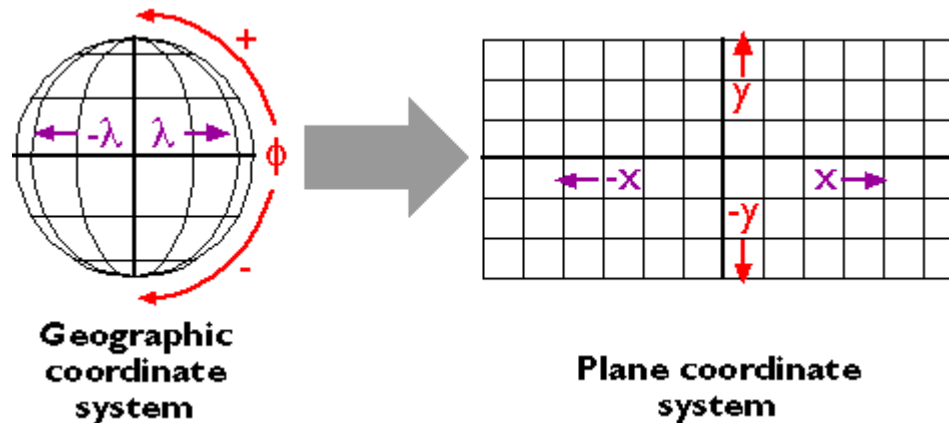
In order to transform these latitude and longitude coordinates into meaningful units, the datum must be transferred to a planar (cartesian) coordinate system. There are many ways to do this, and these are called **projections**.

There are three ways to transfer the curved surface of the ellipsoid to a flat plane, you can make **planar (azimuthal)**, **cylindrical**, or **conic** projections.

In order to make different measurements – distance, area, shape, or direction – you must choose the best projection for the job.

Map Projections

- Projections are systematic transformations of from geographic coordinates to planar coordinates
- Example geographic coordinates are degrees of latitude and longitude
- Multiple ways to project flat maps to support navigation
- Video 6: *Map Projections* (LizardTech University) - 14 min 24 sec



Coordinate Systems

- Three coordinate systems are typically used on GPS devices in the United States
- Example: Security Sign outside BARC

Lat/Long (Latitude/Longitude)

N33 15.373, W116 24.211

N33.25622, W116.40351

N33° 15' 22.4", W116° 24' 12.6"

UTM (Universal Transverse Mercator)

11S 555560E 3679851N

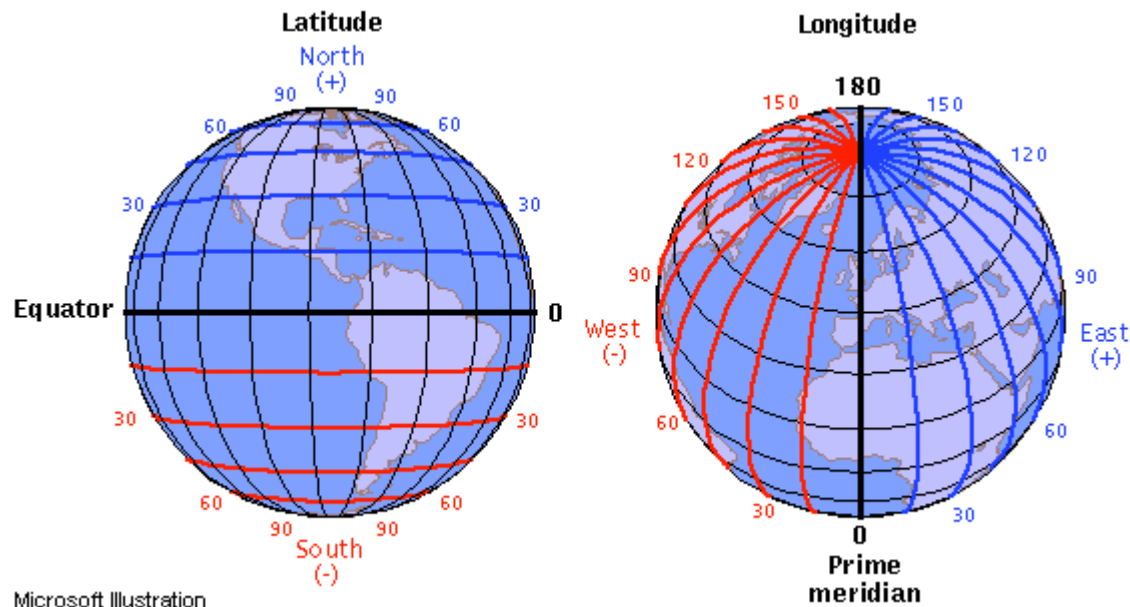
USNG (US National Grid)

11SNS55567985 (10m sq)

11SNS5556079851 (1m sq)

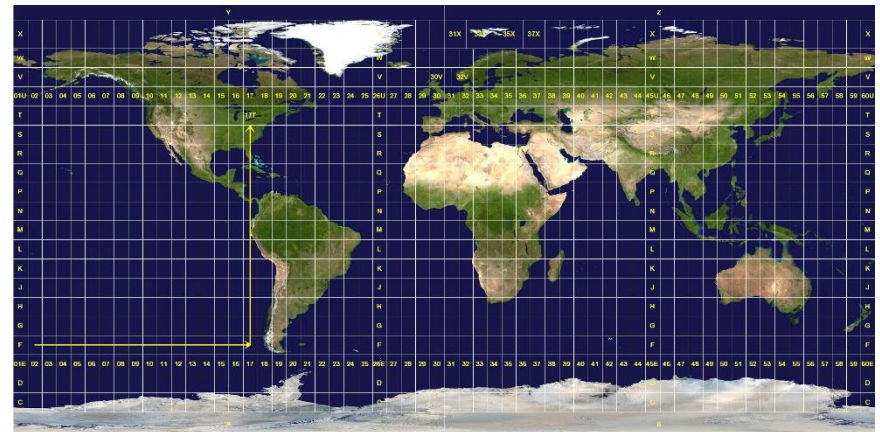
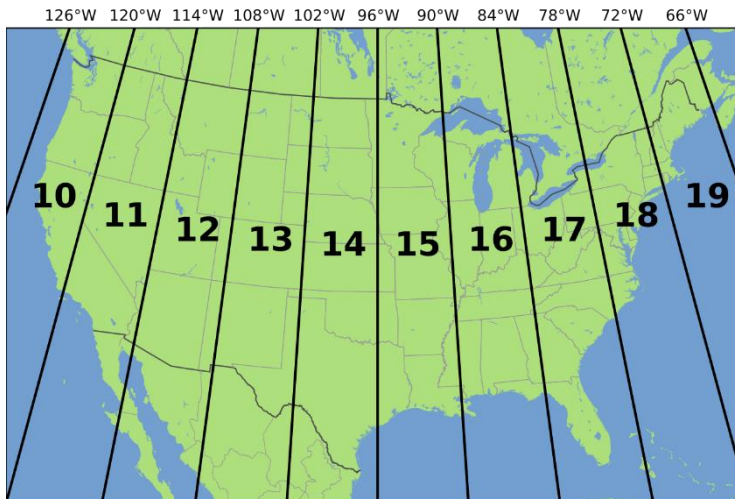
Coordinate Systems – Lat/Long

- Geographic coordinate system
- Latitude: Degrees North (+) or South (-) of the equator
- Longitude: Degrees East (+) or West (-) of prime meridian (Greenwich, England)



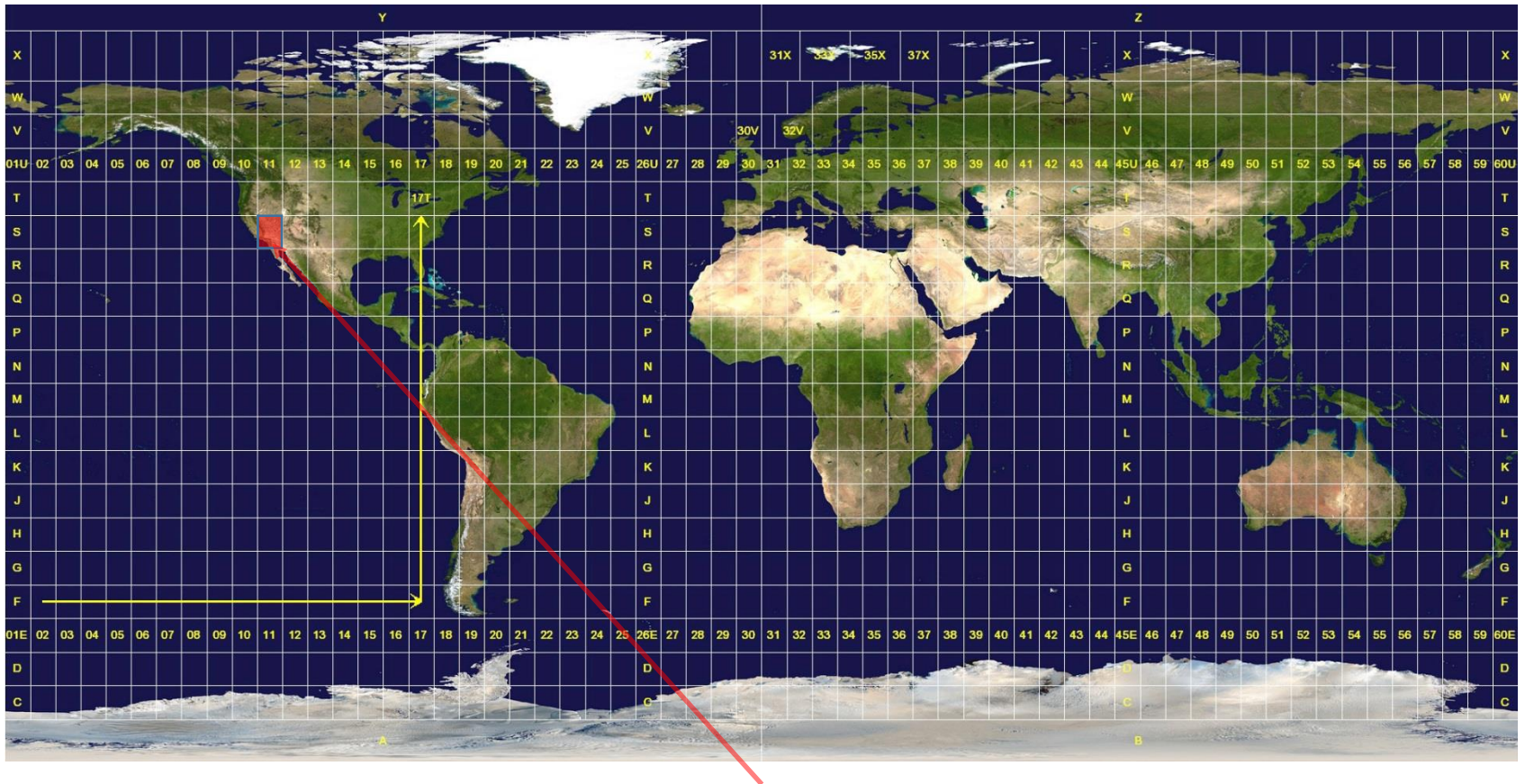
Coordinate Systems - UTM

- Divides Earth into sixty numbered Zones of 6° longitude (Zone 1 – 60)
- Each Zone is segmented into 20 lettered latitude Bands, each 8° high (Band C – X with I and O not used)
- Covers 80°S to 84°N
- Zone and Band define a “grid zone” – San Diego County falls in 11S
- Origin of a UTM zone is intersection of zone meridian with equator; measured as meters distant from equator (“northing” in Northern Hemisphere). Longitude measured as meters east of meridian (“easting”).
- All meridians arbitrarily set as 500 000 m to avoid negative numbers in any Zone; equator arbitrarily set as 10 000 000 m



The UTM Grid

San Diego County = Zone 11 S



Zone 11: Longitude W114° to W120°, Meridian = W117°

Zone Designator S: Latitude N 32° to N 40°

UTM Easting = meters east/west relative to 117 degree meridian¹; UTM Northing = meters north of equator

¹All UTM meridians artificially assigned value of 500,000 meters

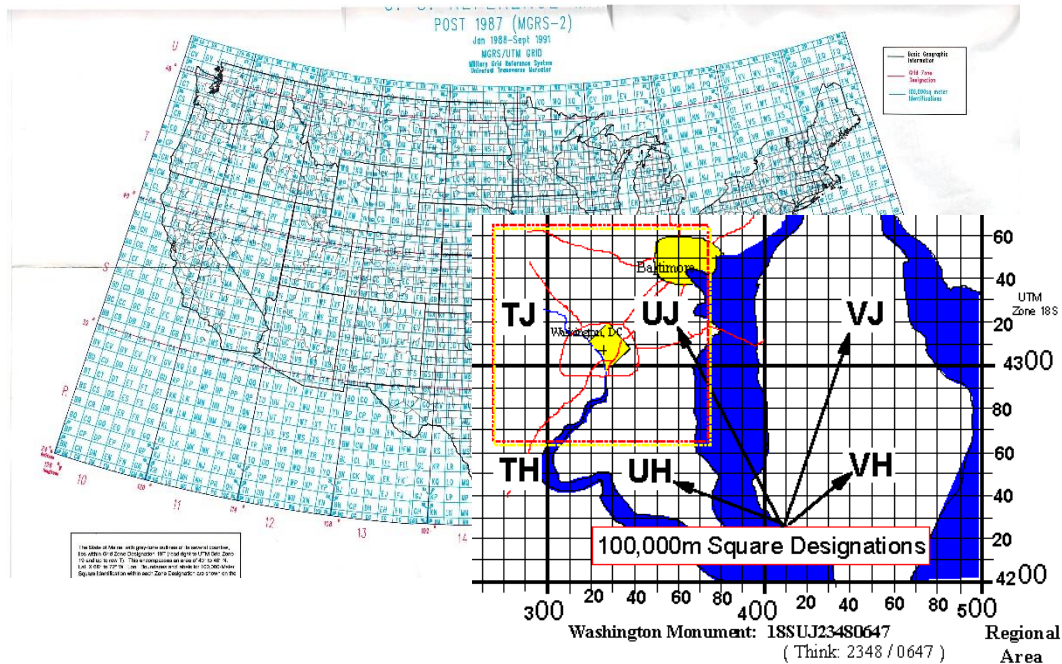
Our UTM Zone (11 S)

Points in Zone 11 S Grid	Latitude/Longitude (Degrees)	Standard UTM (Easting/Northing)
Origin/lower left corner (~200 miles W of Ensenada)	N 32 00.000 W 120 00.000	216577 E 3544370 N
33/116 Confluence (Fish Creek Mountains)	N 33 00.000 W 116 00.000	593419 E 3651731 N
Borrego Springs (Christmas Circle)	N 33 15.390 W 116 22.497	558216 E 3679892 N

Zone 11 Meridian (center axis in longitude) is W 117 = 500000 Easting

Coordinate Systems – US National Grid

- Adopted in 2002 as a National Standard
- Derives from Military Grid Reference System
- Alphanumeric point reference system overlaid on UTM numeric grid. Adds two-letter prefix to identify 100,000 m square regions. Drops the last digit of E and N and combines all three into a single identifier (XX 1234 5678) for 10m square

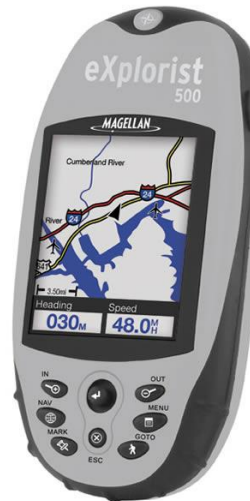


Navigating with GPS



I blame it on the GPS-System myself:
Hardly anybody gets lost around here anymore...

GPS Receivers



Consumer Grade GPS Receivers

- Garmin handheld models are the most widely used (e.g. GPSmap, Etrex, Oregon, Montana)
- Other manufacturers include Magellan, DeLorme
- Available with physical buttons and/or touch screens
- Loadable maps from variety of sources
- All have comparable functionality and accuracy
- All interface with compatible computer applications

An Example: Garmin GPSmap 62st



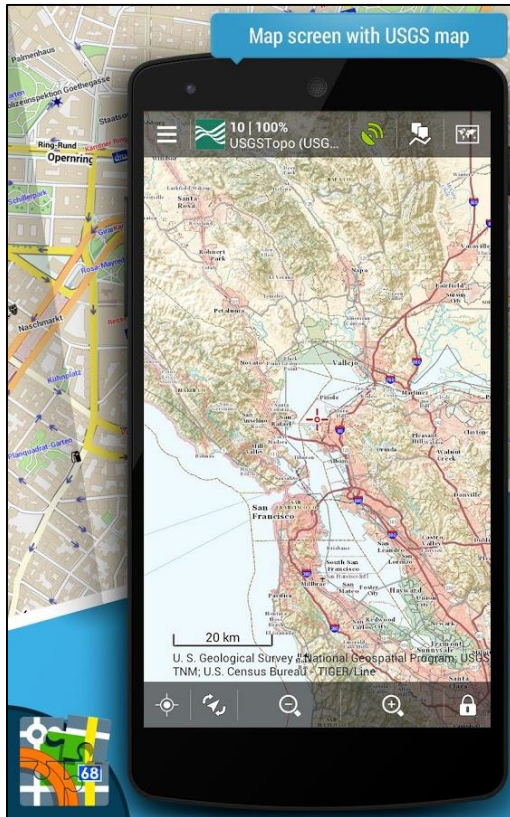
Smartphones and Tablets



Smartphones and Tablets

- Increasing market share and navigation capabilities
- Advantages: convenient for local hikes, bike rides, daily activity logging; taking georeferenced photos; inexpensive maps including satellite imagery; storage capacity, features
- Disadvantages: accuracy, durability, battery life, can be difficult to view outdoors, operating stability
- Special considerations
 - Need to configure for off cellular grid use
 - Operating in airplane mode significantly increases battery life in the field (requires apps/maps be functional offline)
 - Geotagging of photos is default setting and can introduce a confidentiality issue
 - Cellular devices require additional protection from moisture and damage from physical impacts

Cellphone Examples

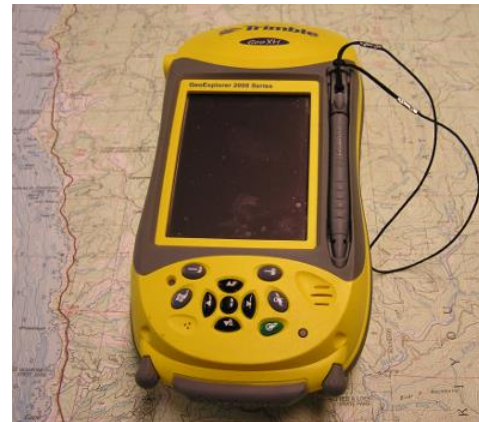
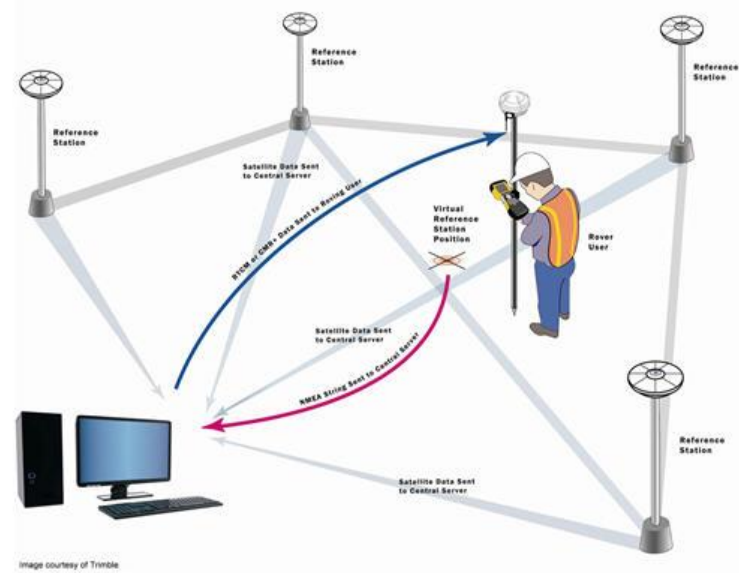


Locus Map on Android



Gaia GPS on iPhone

Survey grade GPS Systems



Getting to know your GPS



Sorry Charles, but according to my GPS-receiver,
I'm still in my own territory...

Essential Basic Skills

- Mark a point – record/save the location of a feature, artifact, or place of interest such as where you parked or a reference landmark
- Find a point – navigate to points saved in your navigation device
- Record a track – record/save a continuous series of points to document a path such as your hike to/from a site or the perimeter of a feature or cluster of features
- Download points and tracks to a computer for storage, editing, transferring to Park staff
- Upload points from a computer for use in the field

Additional Skills

- Loading maps into your GPS device
 - Garmin: Mapinstall application
 - Cellphone: maps install through application specific procedures
- Changing which maps are displayed on your device
 - Garmin: a menu selection on the device
 - Cellphone: through application specific menus
- Managing “geotags” in metadata of photographs

Before you start recording in the field

- Become familiar with the physical layout, controls, and menus for your GPS receiver (manual, YouTube)
- Preload any known reference waypoints
- Check battery level (and bring spares)
- Calibrate altimeter (if taking elevation readings)
- Check position readings are stable
- <Mark> your starting position
- Save current track (if appropriate)
- Clear trip computer
- Clear current track

Recommended Settings

- Position Format: *UTM UPS*; Datum: *NAD83*
- North Reference: *True*
- Bearing: *Numeric Degrees*
- Units/Distance and Speed: Statute or Metric
- Units/Elevation: Feet (ft/min)*
- System/GPS: *WAAS/EGNOS* or *WAAS/GLONASS*
- System/Battery Type: Rechargeable NiMH
- Display/Battery Save: On
- Software Version: verify you have latest available

* *To match elevation units on USGS 7.5' and 15' printed maps*

Location Tags (Geotags)

- Cellphone cameras and digital cameras with GPS features default to recording location information in their EXIF metadata (EXIF = Exchangeable Image File Format)
- EXIF data also includes camera model, aperture, shutter speed, ISO, focal length, date, time, and customizable fields.
- Distributing photos with embedded geotags potentially risks exposing sensitive location information associated with features or artifacts to unauthorized persons
- Default settings can be edited to turn off recording location coordinates
- Location information can also be removed from any image's metadata in Windows, macOS, or cellphone applications

Geotag Applications

- Cellphone/tablet applications are available that overlay geotag information visibly on to images – coordinates, elevation, azimuth (direction camera was facing)
- Some of these applications can retroactively overlay this information on to older images if EXIF data was originally recorded
- This capability may be useful for creating reference sets of images with understanding they should not be posted, published, or shared publically
- Examples: Nav Camera (iOS), AngleCam (Android)

Computer Software for your GPS



Interfacing with your Computer

The primary tools I use on my PC

- EasyGPS: Very useful for downloading/uploading waypoints and tracks; quick views of waypoints and tracks on street or aerial map backgrounds, and editing waypoint files (nominal annual subscription (\$11.99/year))
- GPS Track Editor: used to create “clean” tracks
- GPS Visualizer: web-based application for converting gpx files to kml/kmz format (Google Earth) or elevation profiles
- Garmin BaseCamp: multifunction software to transfer, edit, store, view, and merge/export GPS tracks and waypoints
- Garmin MapInstall: transferring maps to your GPS
- Garmin WebUpdater or Garmin Express: check for handheld software version; updating to latest version

EasyGPS – Street View

The screenshot displays the EasyGPS application window. The main map area shows a green grid with a pink route plotted. The route starts at waypoint JF_PS11 and ends at JF_PS01. The waypoints are labeled with their IDs and descriptions. The map also shows a blue line representing a water feature, likely a river or stream.

Waypoint List:

Label	Symbol	Description
JF_PS01	[Symbol]	Hidden Spring pictograph site HSPIC10
JF_PS02	[Symbol]	Main village split metate site ME1
JF_PS03	[Symbol]	Main village stone bowl site, formerly PS4
JF_PS04	[Symbol]	Main village solstice cupules two morteros MO3CU2
JF_PS05	[Symbol]	Main village milling slick MI1 near rock ring RR2
JF_PS06	[Symbol]	Main village, formerly PS2, view to SE
JF_PS07	[Symbol]	Main village, formerly PS2, view to SW
JF_PS08	[Symbol]	Main village mortar and pestle site MO2
JF_PS09	[Symbol]	Main village view to agave juicing chute MI3
JF_PS10	[Symbol]	Main village above morteros & cupules site MO3CU1
JF_PS11	[Symbol]	Main village Pleides cupules tilted mortero MO6CU4
JF_PS12	[Symbol]	Central sector cobble & sherd cluster Heather 21
JF_PS13	[Symbol]	West village near pot sherd scatter PSS3

Map Information:

- Scale: 1 : 3771 | zoom = 17 WGS 84 UTM 778 ft 248.51" True
- Coordinates: X-axis (Easting) from 556000 to 557300; Y-axis (Northing) from 3000000 to 3001300.
- Map Source: mapbox, OpenStreetMap

Windows Taskbar:

- Search: Type here to search
- System Tray: 11:22 AM, 4/16/2021

EasyGPS – Aerial View

The screenshot displays the EasyGPS software interface. The main window shows an aerial photograph of a desert landscape with a pink route overlaid. The route starts at JF_PS10 and ends at JF_PS13, passing through several other waypoints. The waypoints are labeled as follows:

- JF_PS10
- JF_PS11
- JF_PS12
- JF_PS13
- JF_PS01
- JF_PS02
- JF_PS03
- JF_PS04
- JF_PS05
- JF_PS06
- JF_PS07
- JF_PS08
- JF_PS09

The software interface includes a menu bar (File, Edit, Geocache, Tools, Map, GPS, Window, Help), a toolbar with icons for New, Open, Save, Print, Send, Receive, MoveMap, Zoom, Select, Waypoint, Route, Track, Street, and Aerial. A list of waypoints is visible on the left side of the screen, with columns for Label, Symbol, and Description.

Label	Symbol	Description
JF_PS01	Scenic Area	Hidden Spring pictograph site HSPIC10
JF_PS02	Scenic Area	Main village split metate site ME1
JF_PS03	Scenic Area	Main village stone bowl site, formerly PS4
JF_PS04	Scenic Area	Main village solstice cupules two morteros MOSCU2
JF_PS05	Scenic Area	Main village milling slick M11 near rock ring RR2
JF_PS06	Scenic Area	Main village, formerly PS2, view to SE
JF_PS07	Scenic Area	Main village, formerly PS2, view to SW
JF_PS08	Scenic Area	Main village mortero and pestle site MO2
JF_PS09	Scenic Area	Main village view to agave juicing chute M3
JF_PS10	Scenic Area	Main village above morteros & cupules site MO3CU1
JF_PS11	Scenic Area	Main village Pleides cupules tilted mortero MO6CU4
JF_PS12	Scenic Area	Central sector cobble & sherd cluster Heather 21
JF_PS13	Scenic Area	West village near pot sherd scatter PSS3

The bottom status bar shows the scale (1:3771), zoom level (17), and coordinates (WGS 84 UTM, 0.20 mi 199.60° True). The system tray at the bottom right indicates the time (11:23 AM) and date (4/16/2021).

GPS Track Editor

The screenshot displays the GPS Track Editor v1.15.141 application. The main map area shows a yellow track starting from a point and moving towards a peak labeled "Peak 3268 996 m". The map is titled "Santa Rosa Wilderness".

Tracks Panel:

Name	Start	Finish	C...
Track_2018...			

Point Properties Panel:

Main

Number	1
Coordinates	33.390600°, -116.363763
Elevation	1,316 ft
Date & time	5/20/2018 8:14:23 AM
Status	OK

Calculated

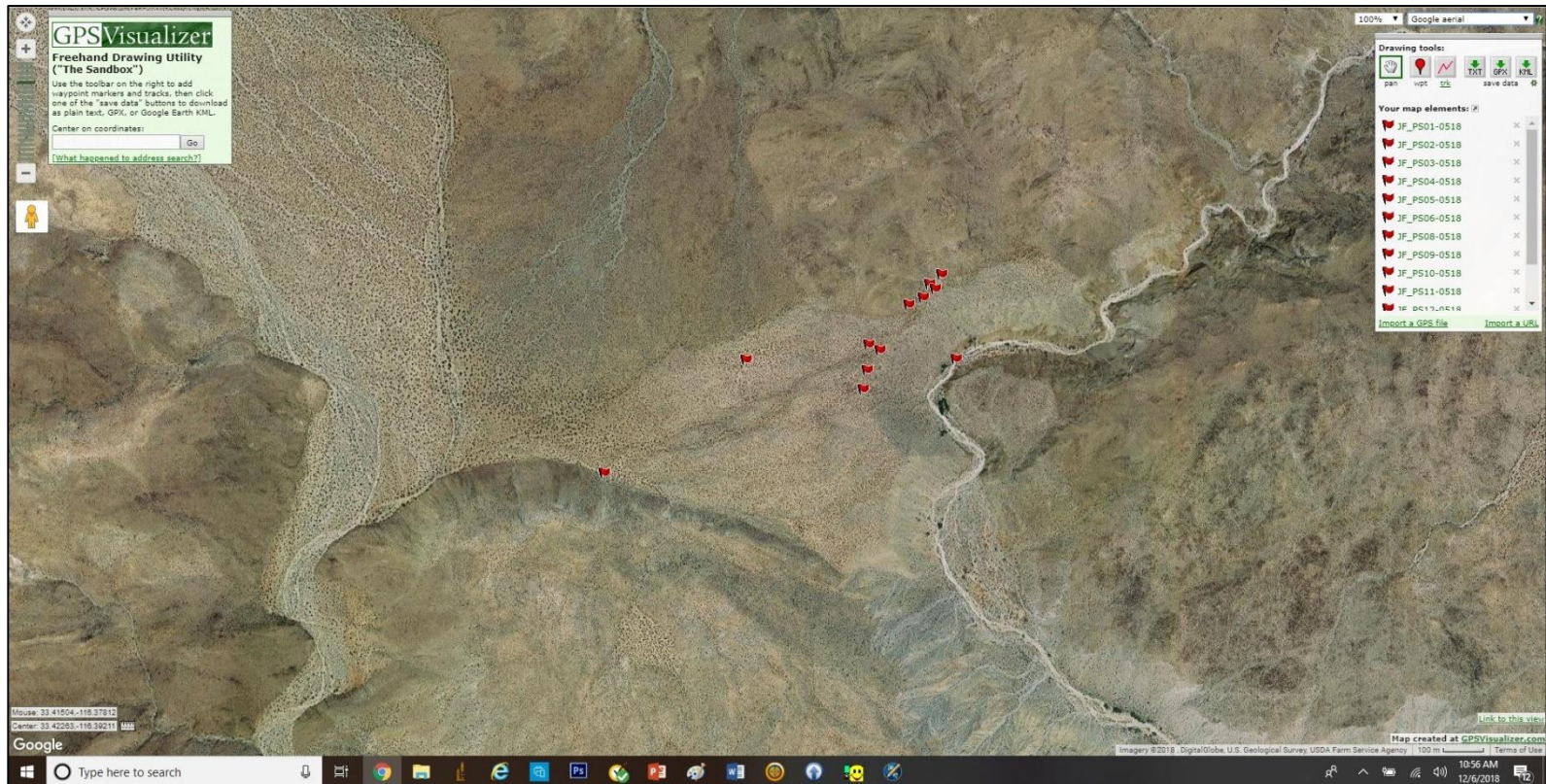
Dist. from start	0 ft
Speed	0.0 mph
Acceleration	0.00 ft/s ²
Heading	0°

GPS

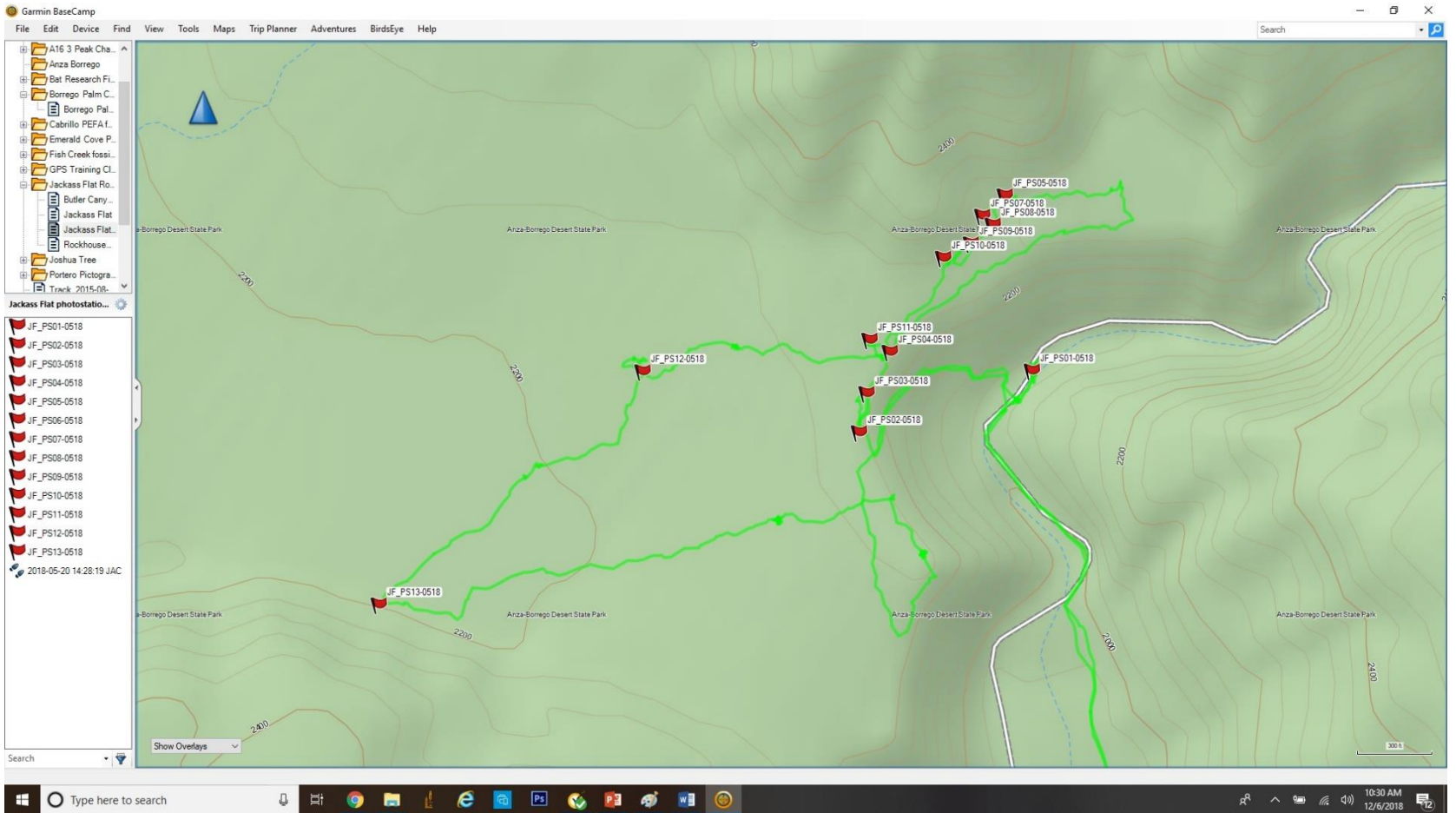
GPS speed	
GPS heading	
HDOP	
VDOP	
PDOP	
Satellites in view	

Windows Taskbar: Shows the system tray with the time 10:49 AM on 12/6/2018 and various application icons.

GPS Visualizer (web app)



Garmin BaseCamp



Garmin MapInstall

The screenshot displays the Garmin MapInstall application window, which is divided into two main sections. The left section is titled "Please select the device you want to install maps on:" and features the Garmin logo and a large vertical "MapInstall" banner. Below this, there are "Device Settings" instructions, a "Find Device" button, and a dropdown menu showing the selected device: "GPSMAP 62st (Unit ID 386433)".

The right section is titled "The following map products can be installed to your GPSMAP 62st (Unit ID 3864337411)." and "You can customize your install by checking/unchecking map products below." It lists several map products with their installation status and size, each with a dropdown menu to select the installation option:

Map Product	Installation Status	Size	Dropdown Option
California Trail Map	PARTIAL INSTALL	45.7 MB	Leave as is
California Trail Map Topo	PARTIAL INSTALL	684.7 MB	Leave as is
Topo U.S. 24K West	PARTIAL INSTALL	1.43 GB	Leave as is
US Mountain OSM Topo	ALREADY INSTALLED	178.1 MB	Checked
US Mountain OSM Topo	ALREADY INSTALLED	143.7 MB	Checked
US Pacific OSM Topo	PARTIAL INSTALL	907.0 MB	Leave as is
California Trail Map Transparent	NOT INSTALLED	16.1 MB	Unchecked

At the bottom of the right section, there is a progress bar showing "12.1 GB free (3.34 GB used)" and a "Advanced/Partial Install..." button. A map of the Pacific Northwest and West Coast of the United States is displayed on the right side of the window, with various cities and regions highlighted in different colors. The "Continue" button is visible at the bottom right.

Garmin WebUpdater



Maps

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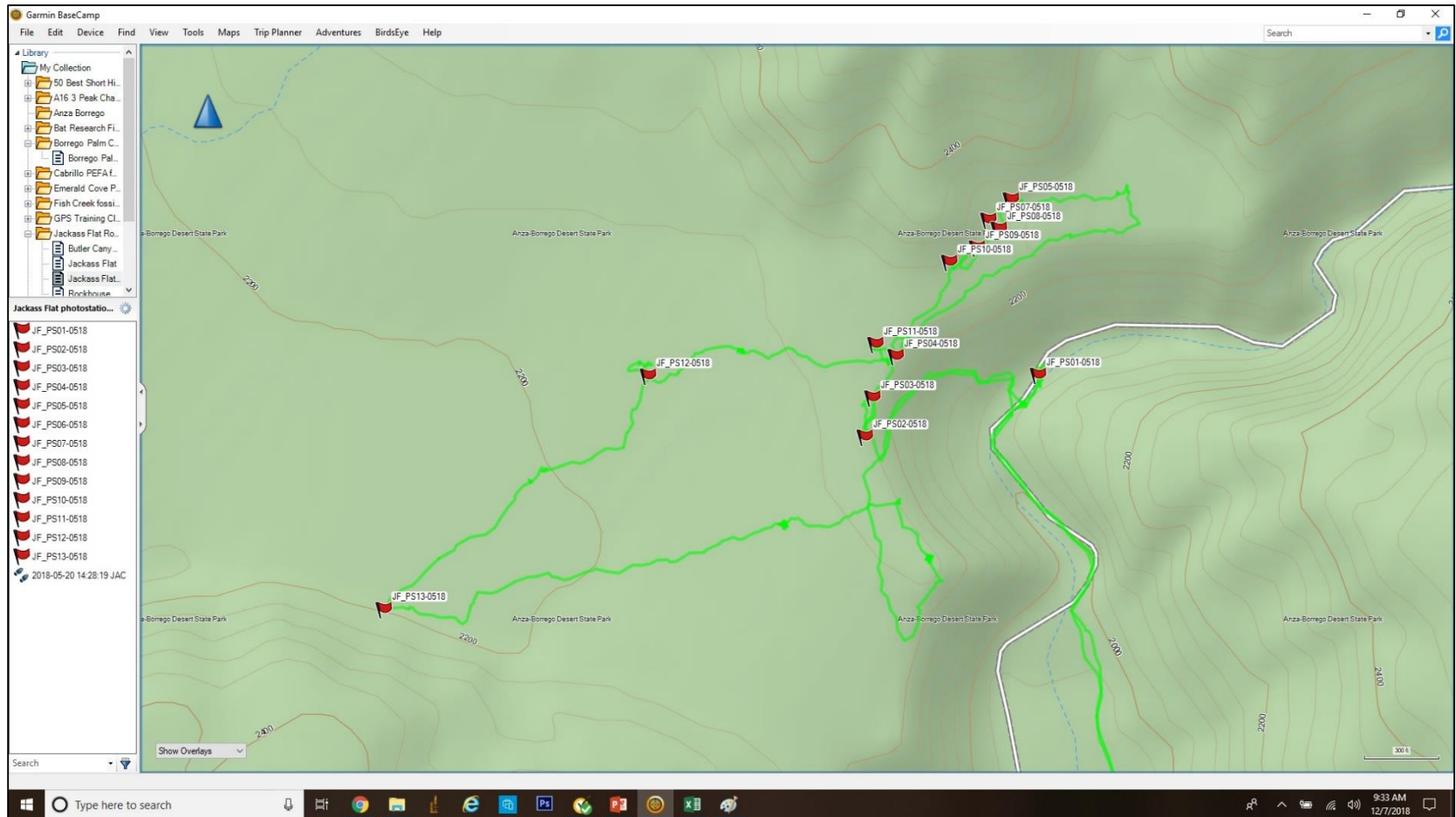


"My dad's GPS says I don't need to learn how to read maps."

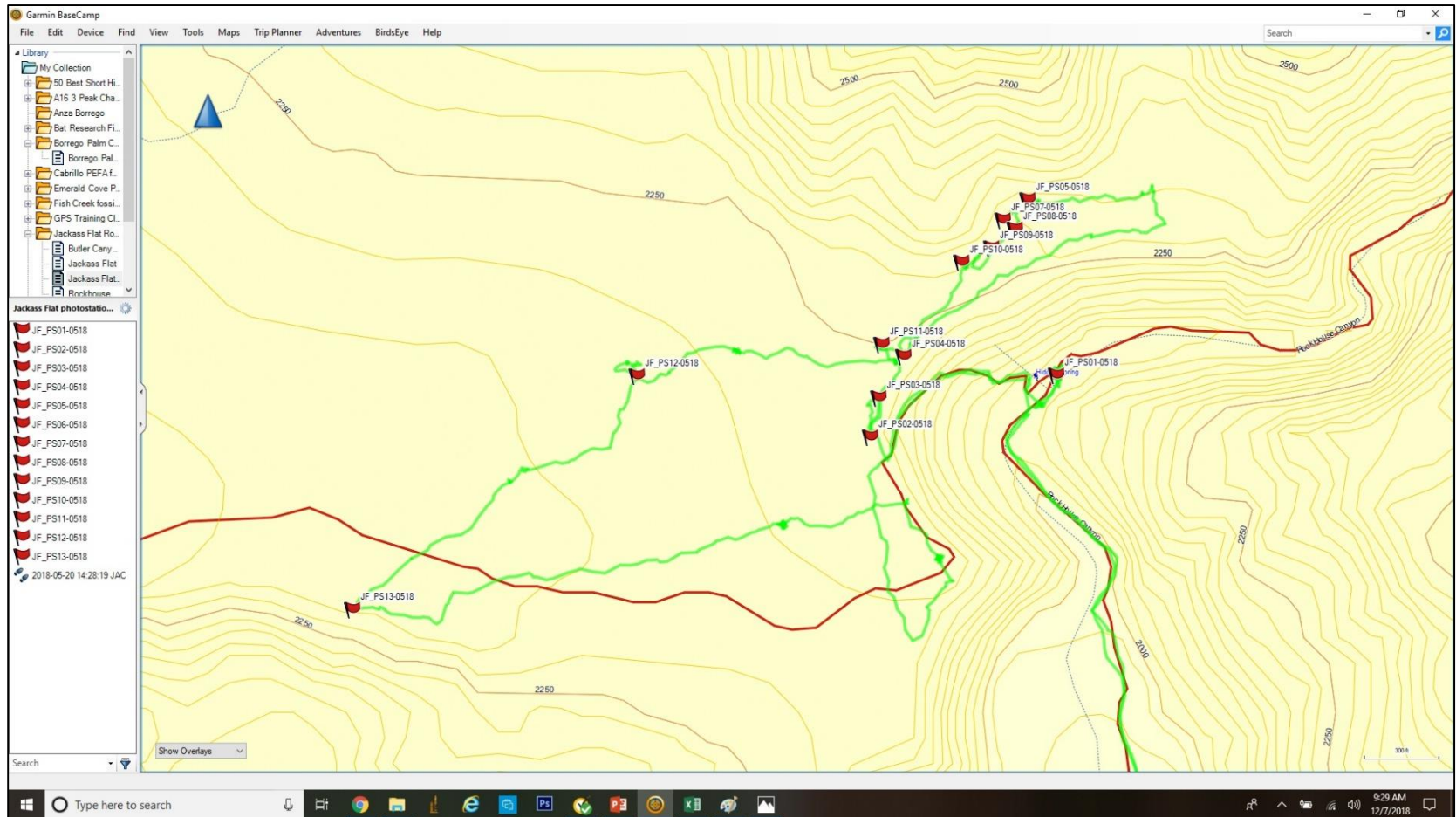
Maps for your GPS

- Garmin Base Map: bundled with your Garmin GPS; typically 100K topographic map for entire country
- Garmin Topo U.S. 24K West: proprietary, requires purchase (~\$100), more topographic detail and possibly more accurate elevation for California, Hawaii, Nevada, Oregon, Washington
- OpenStreetMap (OSM) on Garmin: free, routable, open source maps available for nearly all regions of the world; convenient, intuitive self-installer. No elevation data.
- US OSM Topo Routable Map: free, routable, accurate topography, many ground features; a little trickier to install.
- California Trail Map: local San Diego product, lifetime updates all formats (\$45); works on Garmin, Android, iOS devices. Features topographic and overlay maps with nearly all trails and dirt roads for all of Southern California and jurisdictional boundaries

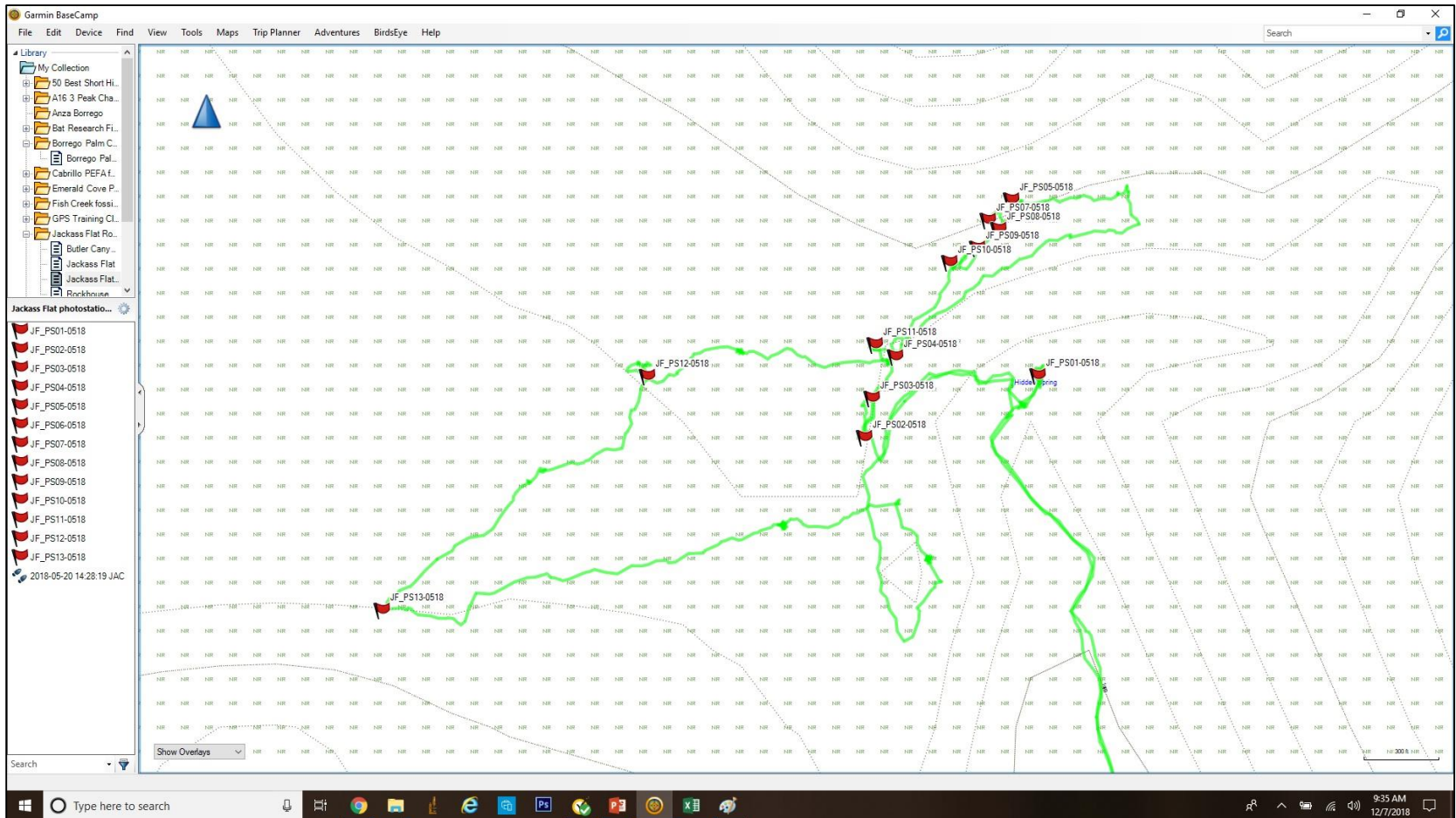
Garmin Topo 24K Map



California Trail Map



US Pacific OSM Topo Map



Map Apps for your cellphone or tablet

- Wide variety of Android and iOS mapping applications are available that tap into the GPS capabilities of cellular devices
- Many are free or minimal cost
- Some allow map downloads for use outside of cellular tower range
- Additional maps are often available for use with these apps
- Some include detailed topographic information, satellite imagery aerial imagery
- Apps I use (Android): Locus Map Pro, Gaia GPS, Google Maps
- Apps I use (iOS): Gaia GPS, Galileo Pro, Spyglass, Google Maps
- Maps I use regularly: California Trail Map, US OSM Topo Rutable, USGS 7.5' topographic, Open Street Map, GAIA's subscription topographic, aerial, and satellite maps

Locus Map Pro (Android app)

The image is a screenshot of a web browser displaying the Locus Map Pro website. The browser's address bar shows the URL www.locusmap.eu. The website's navigation menu includes links for APPLICATION, MAPS, NEWS, DOWNLOAD, LIVE TRACKING, and CONTACT US. The main content area features a large smartphone displaying a map with a route and a speed of 23.86 km/h. To the right of the phone, the text reads "MAP LOCUS ...MORE FUN(CTIONS) FOR YOUR ADVENTURES" and "GET IT ON Google Play" with a "more downloading options >>" link. Below this, three circular icons represent activities: "GO HIKING!" (with a hiker icon), "GO BIKING!" (with a cyclist icon), and "GO GEOCACHING!" (with a geocache icon). The background of the website is a scenic landscape with two cyclists on a dirt path. The browser's taskbar at the bottom shows the Windows logo, a search bar, and various application icons, with the system tray displaying the time as 11:05 AM on 12/6/2018.

Gaia GPS (Android & iOS app)

GAIA GPS Explore the Map

Log In Sign Up

Trail Maps for All Your Adventures

Try the best app for hiking, hunting, offroad, and professional outdoor maps.

Now Includes NatGeo Maps!

Hiking Trails Hunting Maps Camping & Offroad

California Trail Map

The screenshot shows the website <https://www.californiatrailmap.com/Features.aspx>. The page title is "CALIFORNIA TRAIL MAP" with the subtitle "GPS Map for Hiking, Biking, Horseback and Off-Roading". Navigation tabs include "Purchase", "Features", "Android", "iPhone", "Garmin", "Lowrance", "Desktop", "Trail Finder", and "Reviews".

Features

Map Demo

A video player shows a "California Trail Map Demo" with a play button and a "Share" link. The video thumbnail features the text "CALIFORNIA TRAIL MAP" and "GPS Map for Hiking, Biking, Horseback and Off-Roading" over a landscape image.

Trails and Roads

Hiking, Biking and Horseback

- Hiking and Biking
- Hiking and Horseback
- Hiking
- Ohv - Rough Trail
- Ohv - Minor
- Ohv - Major
- Dirt Road - Rough
- Dirt Road - Minor
- Dirt Road - Major
- Paved Rd - Minor
- Paved Rd - Major
- Burnt Highway

Trail Based Map

The California Trail Map was designed for outdoor activities including hiking, mountain biking, horseback riding and off-roading. Freeways, highways, primary and secondary roads are included but not all residential streets. Residential and lesser used rural roads are only included when they are needed for trail access, through access or for reference/bearing. Limiting the number of paved roads reduces visual distractions and increases the usability of the trail map features. Detail is increased by zooming into the map or changing the detail level setting in BaseCamp or on the GPS.

Only Bike Paths (class 1) are blue trails. Bike lanes and routes(class 2 & 3) that are shared with motorized traffic are not displayed on the map as a blue trail. The majority of bike trails on the map are unpaved. Cities that permit horseback riding on the sidewalk or shoulder will have a green trail next to the road.

Exclusive Trail Data

Trail and off-road data was created exclusively for the California Trail Map using modern mapping technologies that produce a highly accurate digital map. The vast majority of the trail data is unavailable on any other digital map or even paper.

Search functionality can be used to locate any trail or road by name when using a Garmin GPS, Lowrance GPS or the BaseCamp application.

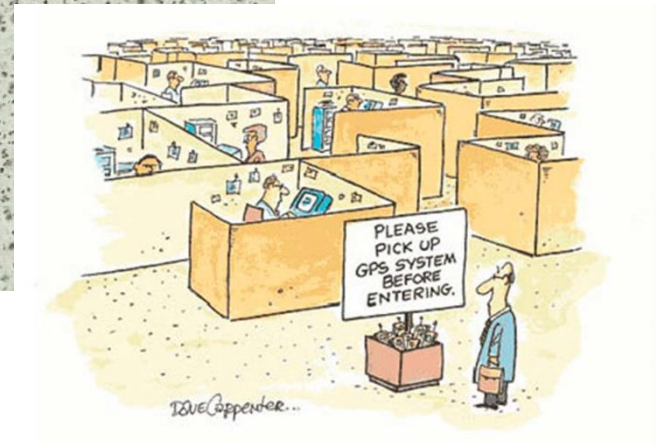
Color Coded Trails

Easily locate the trails you can use

Color	Miles	Trail or Road Type
Green	12,585	Hiking, Biking and Horseback
Blue	2,846	Hiking and Biking

The Windows taskbar at the bottom shows the date and time as 11:23 AM on 12/6/2018.

GPS Field Exercises



GPS Field Exercises

- Locating artifacts and features using provided location information given (in UTM coordinates)
 - (1) Waypoints are known (find)
 - (2) Distance and bearing from a feature are known (projection)
- Recording location information for objects you find (in UTM coordinates)
- Applying techniques for improving accuracy of recorded positions
- Mapping the perimeter of a cultural site
- Determining the area of a cultural site

We will pair up for these exercises

Field Exercises - Assignments

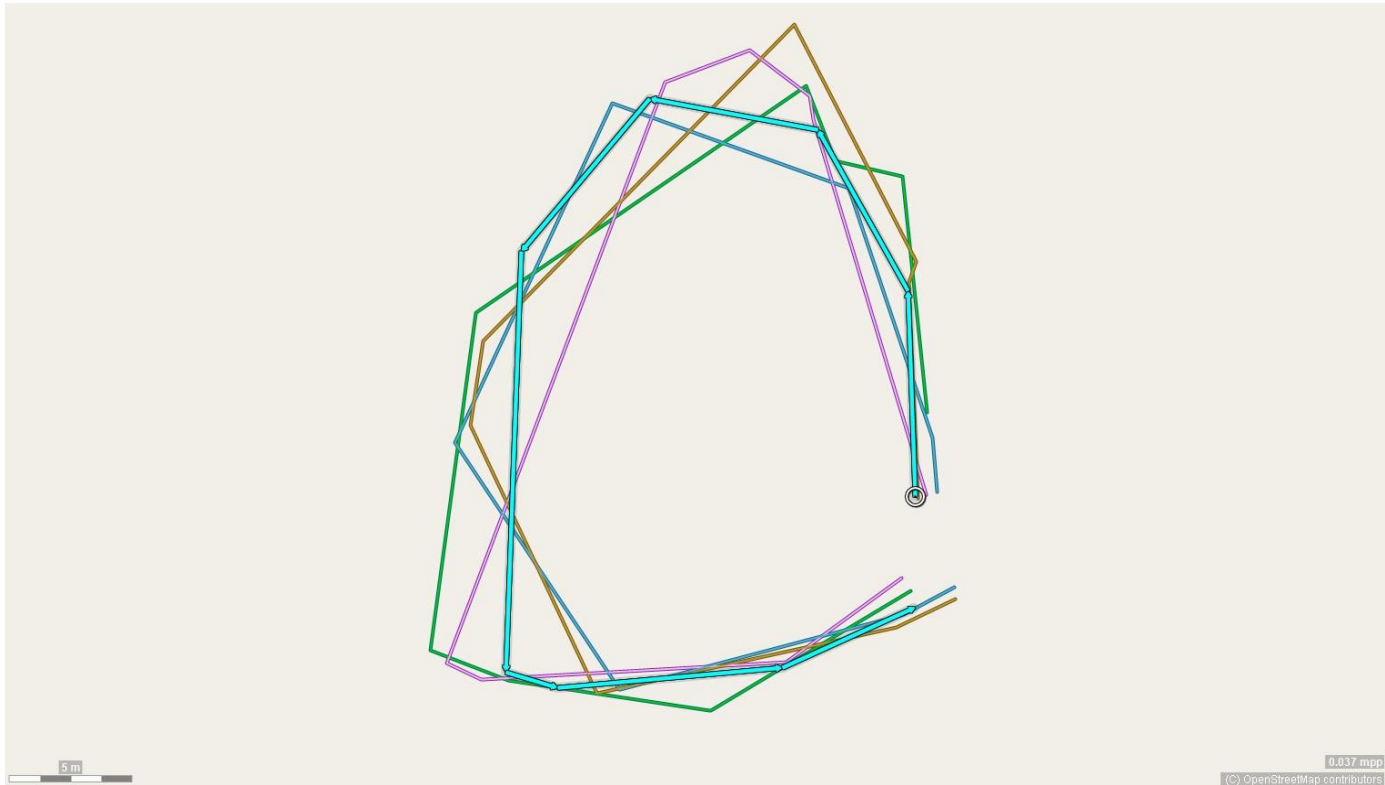
- Exercise 1: Find fixed points with known coordinates; record any offset as viewed on your GPS (in meters)
- Exercise 2: Find an object by projecting from a fixed point with known coordinates
- Exercise 3: Record coordinates for objects you find (quick look and with position averaging)
- Exercise 4: Walk and record a perimeter
- Exercise 5: Estimate area within a perimeter

We will pair up for these exercises

Field Exercise Results



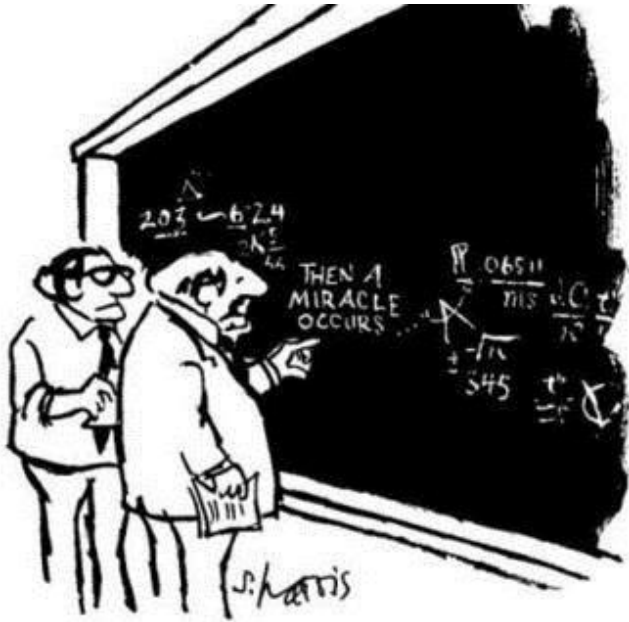
Field Exercise Results



Review

- What is GPS?
- Maps and Navigation
- Geodesy and Datums
- Map Projections/Coordinate Systems
- GPS Receivers
- Getting to know your GPS
- Maps
- Navigating with GPS
- GPS Field Exercises

Feedback?



"I THINK YOU SHOULD BE MORE EXPLICIT HERE IN STEP TWO."



Backup

Some thoughts on configuration

- Learn the factory settings first
- Get to know your way around the Main Menu, Setup menu, and the choices available when pressing the <menu> button
- Ensure at least one display screen includes UTM coordinates when doing archaeology field work
- Experiment with screens you think you will use most
- (Optional) Add/subtract screens to simplify use in the field
- (Optional) Tailor data fields on display screens to match your needs

An Example: Garmin GPSMAP 62s

- See “Configuration and Controls Crib Sheet” (handout)
- See “How to Use in Field Crib Sheet” (handout)

Locus Map Resources

Website (scroll to bottom for help resources)

<https://www.locusmap.app/>

User Guide

https://docs.locusmap.eu/doku.php?id=manual:user_guide

Basics

https://docs.locusmap.eu/lib/exe/fetch.php?media=manual:locus_map_basics.pdf