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GPS Operations & NW Trails FUNdamentals



presented by
Randy Cler
([cavyguy](#))



Prepared by SSO JOAT with
notable contributions by Ladybug Kids

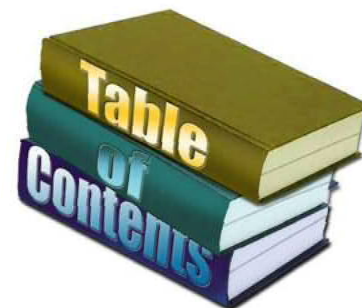
Anchorage with Fairbanks and
Soldotna via WebEx

18 October 2012

Tonight's Topics:



- ▶ Global Positioning System (GPS)
- ▶ Causes of Poor Accuracy
- ▶ Brands of GPS Receivers (GPSr)
- ▶ GPS Settings, Coordinate Systems & Map Datums
- ▶ GPS Maps and Garmin Software
- ▶ NW Trails – Installation & Use
- ▶ NW Trails – Capturing Trail Data
- ▶ NW Trails – Submitting Trail Data



Global Positioning System



- ❖ GPS consists of a constellation of 24-32 satellites orbiting at an altitude of 12,550 miles above the Earth
- ❖ Signals sent by these satellites are received by your handheld GPS receiver (GPSr)
- ❖ The signal includes the satellite's exact position and the exact atomic time, controlled from a ground station
- ❖ Time shifts in the signals are used to figure out the distance to the satellites, which can then be used to calculate (triangulate) the position of the GPSr
- ❖ A timing error of only 1/1000 of a second translates to as much as a 200 mile ground error! Time is critical.

Cause of Poor Accuracy



- Radio signals going through the atmosphere slow down with great variations; this introduces timing errors
- In certain geographic settings, the signals can bounce off objects, adding time to their travel and creating errors
- Obstruction of a portion of the sky reduces the number and quality of signals being received, which results in fewer points to use for computing your location
- These errors are countered by atmospheric modeling and the use of ground-based corrections through Differential GPS and Wide Area Augmentation System
- Those systems use fixed GPSr with known locations, so they can compare the signal to the known and the exact error can be calculated and sent out for correction use

Brands of Handhelds



- ➔ Garmin - www.garmin.com
- ➔ Magellan - www.magellangps.com
- ➔ DeLorme - www.delorme.com
- ➔ Lowrance - www.lowrance.com
- ➔ Trimble - www.trimbleoutdoors.com



Just a sample of the popular brands of handheld GPSr

Garmin Handhelds



➤ Basic non-mapping Handhelds:

➤ eTrex H & GPS 72

➤ Mapping Handhelds:

➤ eTrex 10, 20 & 30

➤ GPSMAP 62 & 78 series

➤ Montana, Oregon & Dakota series



The “Other” Guys



- **Magellan** eXplorer GC, 310, 510, 610, and 710, all are capable of “paperless” caching
- **DeLorme** Earthmate PN 40, 60, & 60w, some use satellite images and the “w” pairs to a [SPOT](#)
- **Lowrance** Endura Out&Back, Safari, & Sierra use a combination of touch screen & physical buttons
- **Trimble**’s focus is on Smartphone GPS applications including [Geocache Navigator](#)

GPSr Settings



- ➔ Most GPSr can be used right out of the box without changing anything
- ➔ At a minimum, ensure that you have the coordinate system and map datum set to the right units for Geocaching use
- ➔ Other settings include standard or metric units, time formats, and battery types

GPSr Settings



- The coordinate system used in Geocaching is Degrees Minutes or “DMM”
- Format: **N** DD° MM.MMM’ **W** DDD° MM.MMM’
- Map Datums are the survey “baseline” coordinates used when drawing a map
- The Map Datum used in Geocaching is **WGS 84** which stands for “World Geodetic System 1984”
- Note that much of Alaska’s mapping was done under North American Datum 1927 (NAD27), which can still be found on USGS paper maps

Electronic Compass



- Some GPSr have a separate electronic compass built in, the rest rely on your changes in position to figure out which way you are going. If you are standing still, only an electronic compass will point you the right direction!
- Most GPSr use an automatic declination for any compass heading features
- Most can be set to switch between the electronic compass and your heading calculation at a certain speed of travel
- Electronic compasses must be **calibrated**
- A 2-axis compass must be held level

GPSr Maps



- ✘ A non-mapping GPS will show you a blank “map” with relative waypoint positions and show your “breadcrumb” track log
- ✘ The basemap included with many mapping units is a very simplistic street and feature map with marginal accuracy
- ✘ More accurate and complete maps come with high-end units or can be purchased

GPSr Street Maps



- ❖ Street Maps show details of roads and street addresses without much terrain
- ❖ Used for vehicle navigation, the accuracy and detail drops as you get further away from large cities



Topographic Maps



- ❖ USGS type topographic maps are the most common for outdoor users
- ❖ They show all terrain features just like a paper map as well as most roads
- ❖ Many varieties are available

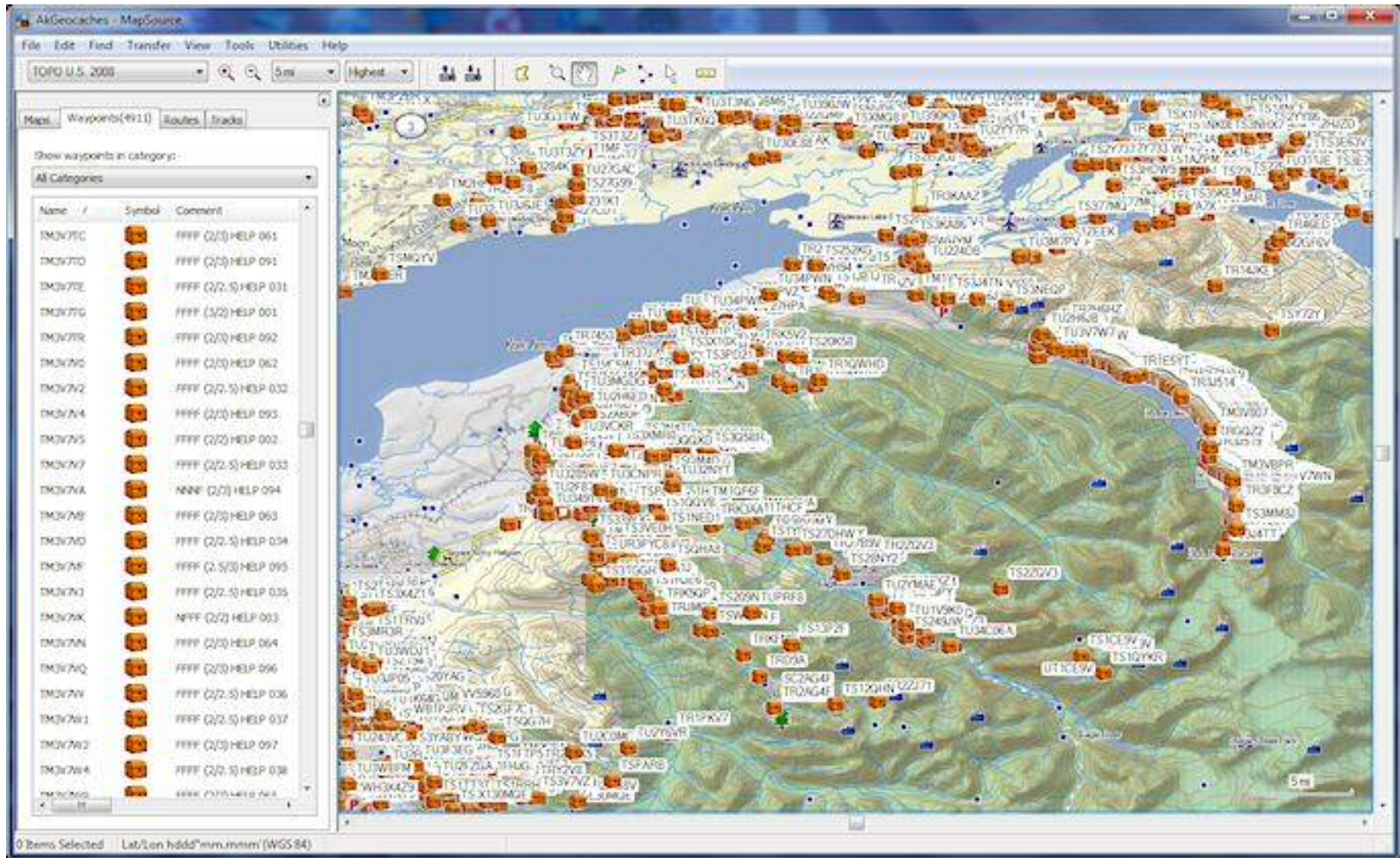


Garmin Software



- **MapSource:** The original Garmin interface software which used to be included with any new GPSr purchase, no longer available to buy.
- **BaseCamp:** The latest Garmin software which can be [downloaded](#) from Garmin's website
- Garmin software allows creation and editing of waypoints, tracks, routes, and uploading or downloading of all data from your Garmin GPSr, including purchased map products & NW Trails

Garmin's MapSource



NW Trails Maps

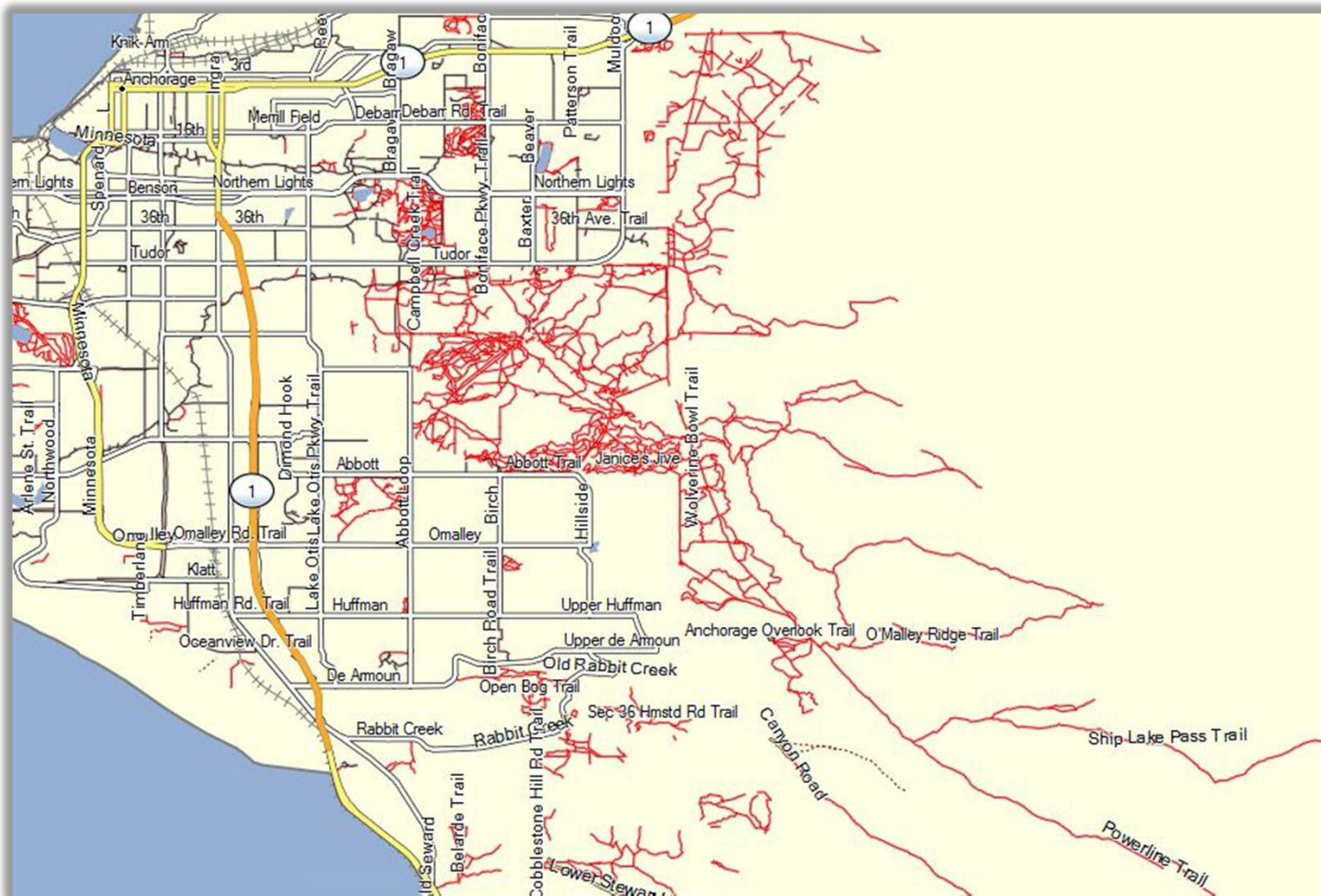


- ❖ These are a set of user-created map overlays that can be put “on top” of your existing maps
- ❖ The “trails” are track log files submitted by individuals and then compiled into the map
- ❖ Garmin users can [download](#) and install into the MapSource or BaseCamp program and then upload maps into your Garmin GPSr
- ❖ DeLorme users can [download](#) a modified version from TotemLake’s website and follow separate instructions for installing in DeLorme GPSr

NW Trails Maps



Sample of the Anchorage area NW Trails as viewed in MapSource:



NW Trails Maps



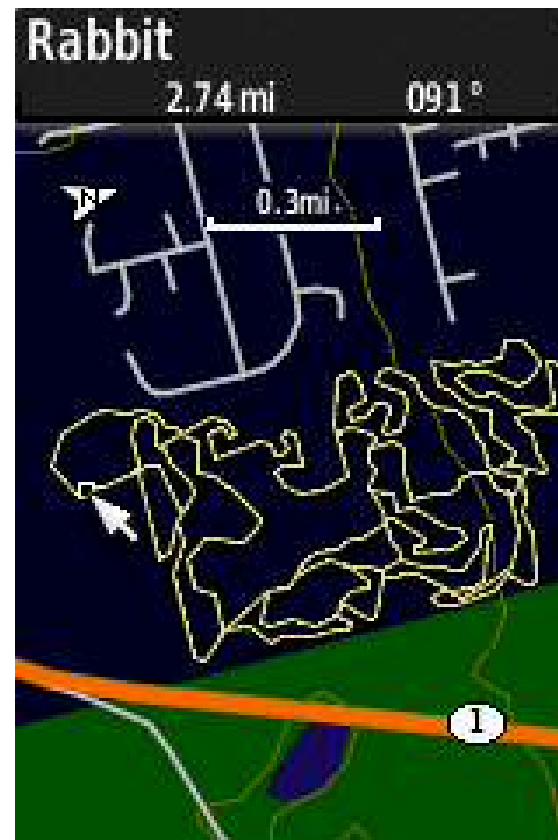
Examples of NW Trails as viewed on GPSr screen:



GPSr in Day Mode

Trail name that is under the arrow pointer

NW Trails overlay with user-supplied trail labels and loaded with solid lines



GPSr in Night Mode

NW Trails Maps




- To install NW Trails, go to switchbacks.com and download the zip file appropriate to your operating system
- Make sure MapSource is not running, open the zip folder and run the file
- This installs the NW Trails data as a new map set within your MapSource program
- Does not affect your other Garmin maps

NW Trails Maps



http://www.switchbacks.com/nwtrails/ MSN.com assent - Google Search Switchbacks.com > GPS Ma... x

Google Search Share More >> Sign In



GPS Maps

HOME GPS MAPS STATIC MAPS SHOP LINKS EXTRAS FORUMS BLOG GEOCACHING info@switchbacks.com

Northwest Trails

Current Version: 1.75
Released September 19, 2012 (Revision History)

Download Northwest Trails for PC (32.1 MB)
Download Northwest Trails for Mac (31.6 MB)
Download Northwest Trails Image (12.0 MB)

- **Custom type files** (rename and use to replace the existing .typ file in your Northwest Trails installation folder to quickly change your custom types without reinstalling):
 - Solid Trails
 - Dashed Trails
 - Outlined Trails
 - Green Trails

[Make A Donation](#)

Have data to contribute? Visit the [Switchbacks Data Submission page!](#)

What is Northwest Trails?

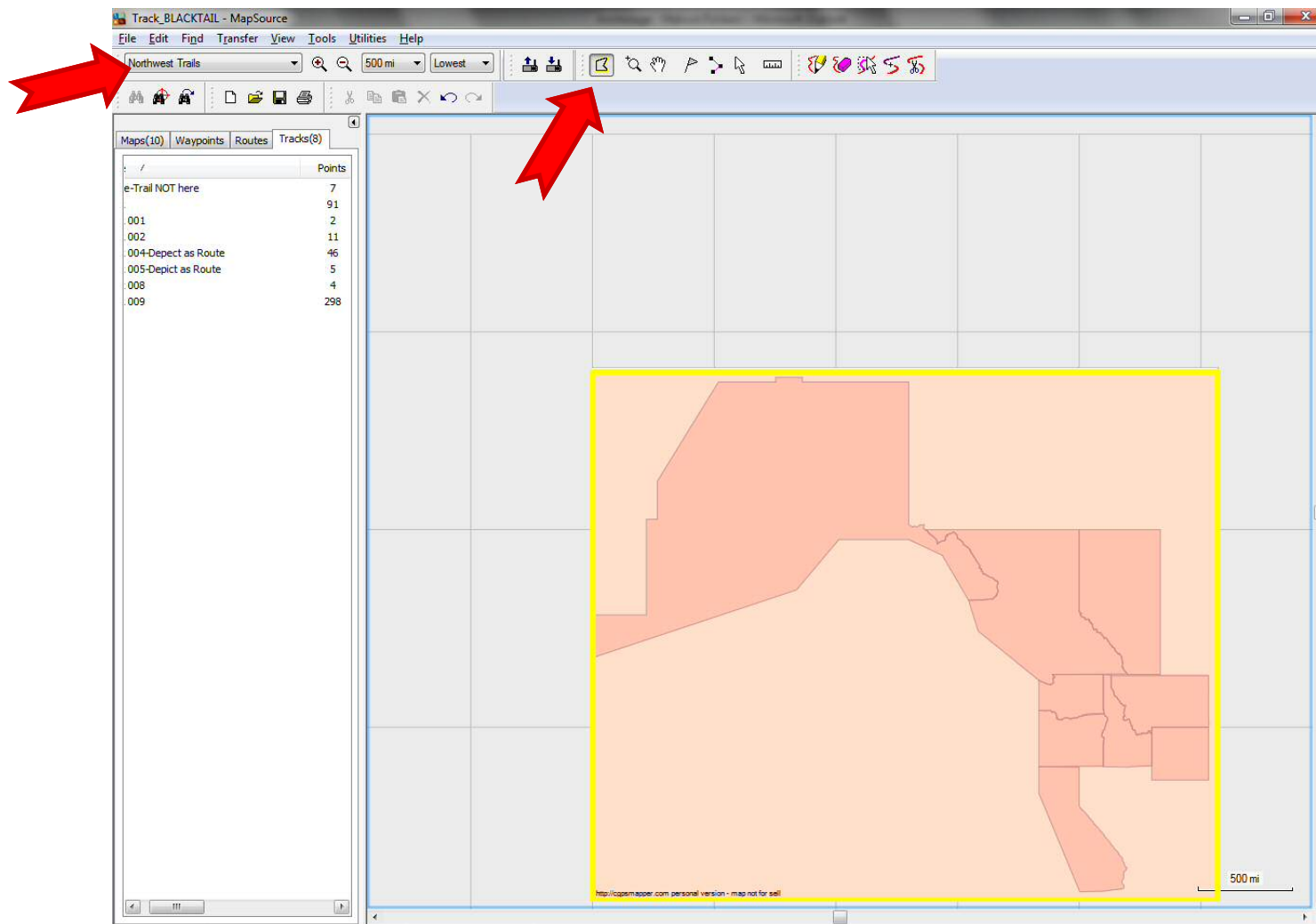
In short, Northwest Trails is a mapset of trails designed for upload to any map-enabled Garmin GPS receiver. It is more than just a mapset, though; it is also a community effort initiated to record and collect GPS data for trails in the Northwest (Washington, Idaho, Oregon, Montana, Wyoming, Alaska, British Columbia and Alberta) and provide that data for general public use.

NW Trails Maps

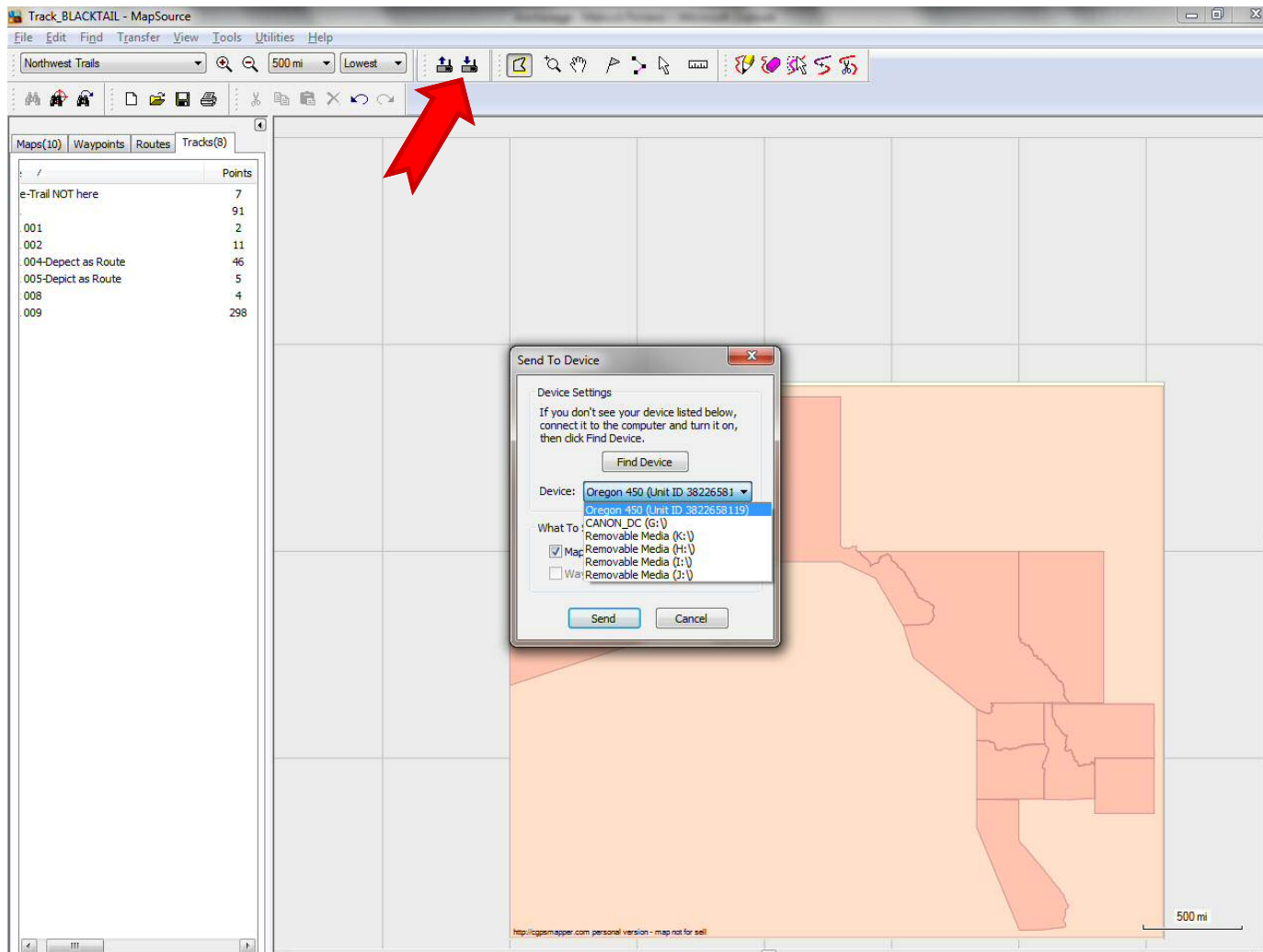


- Open MapSource and look at the drop down map list at the top left corner
- Select the Northwest Trails map set
- Zoom out to about 500 miles so the entire set is visible on the screen
- Select the states that you want included in the map set (currently 9 available states)
- Do NOT select the background map

NW Trails Maps



NW Trails Maps



NW Trails Maps

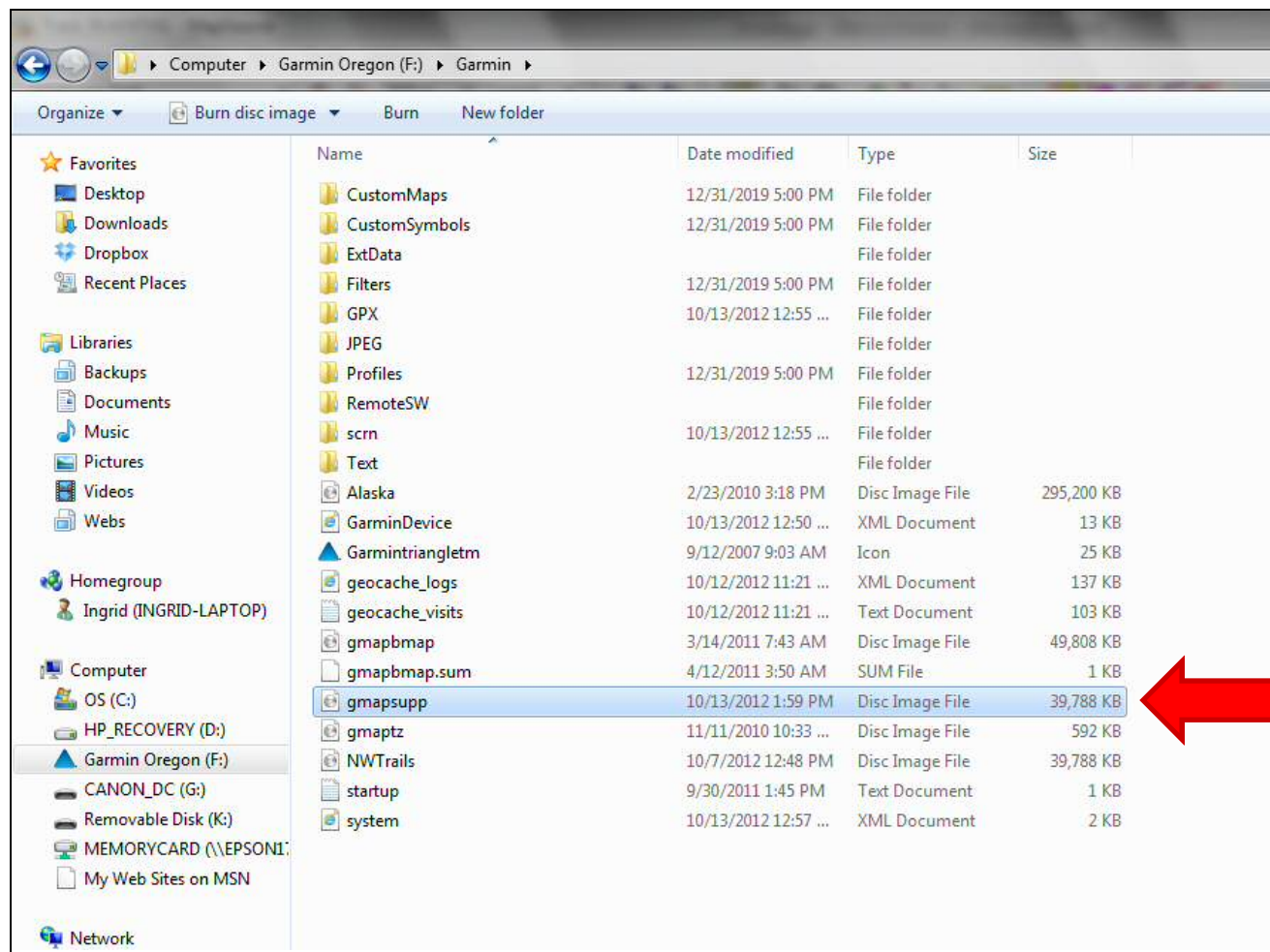


- **Caution!** If you have another Garmin mapset that you download from MapSource, you must change the map set in the top left box and select all of the map sections you want from those other map products prior to downloading the entire map set to your GPSr!!!
- This does NOT apply to newer units that came with a pre-loaded internal map set

NW Trails Maps



Open the mass storage mode of your GPSr to view your map sets. The default map name is [gmapsupp.img](#) which should be renamed if you download other maps separately to newer GPSr . Suggest using NWTrails or similar for ease in identification.



NW Trails Maps



- The trails in NW Trails are recorded in the field by users, such as you
- To contribute to the project, consider recording trail track logs to add
- It is important to get clean tracks and remove extraneous portions as needed
- Submit new tracks via a webform located at www.switchbacks.com/upload/default.aspx

NW Trails Maps

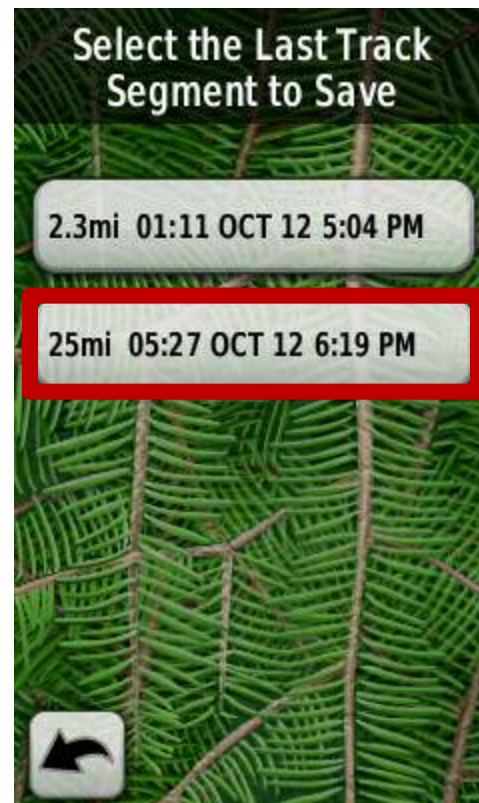
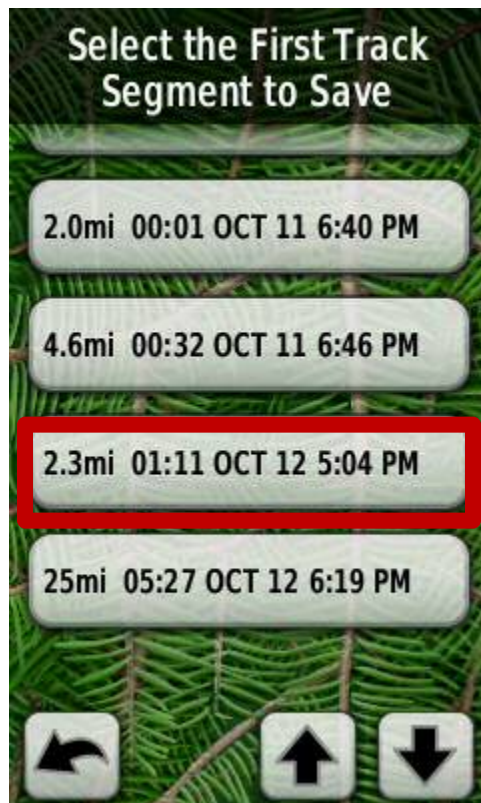


- The following set of screen shots will walk through saving tracks with Garmin's Colorado, Oregon, and Montana GPSr
- Other units may have a different set of procedures; refer to the owner's manual
- Also, set your unit's tracklog to record with the greatest detail available

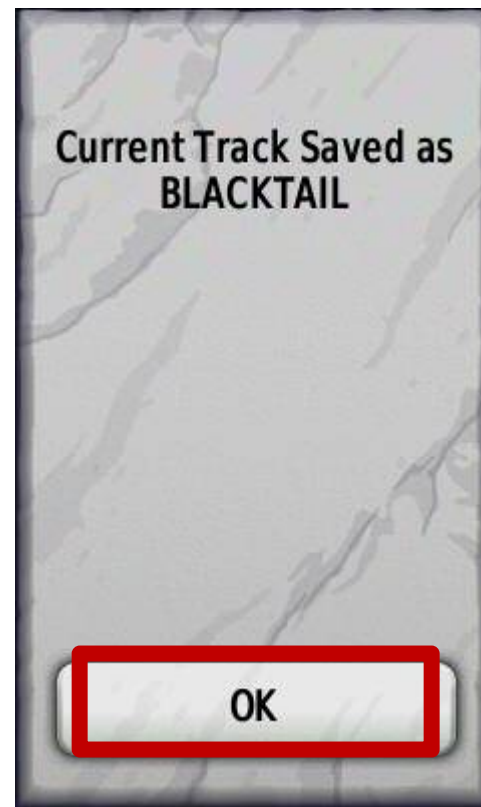
NW Trails Maps



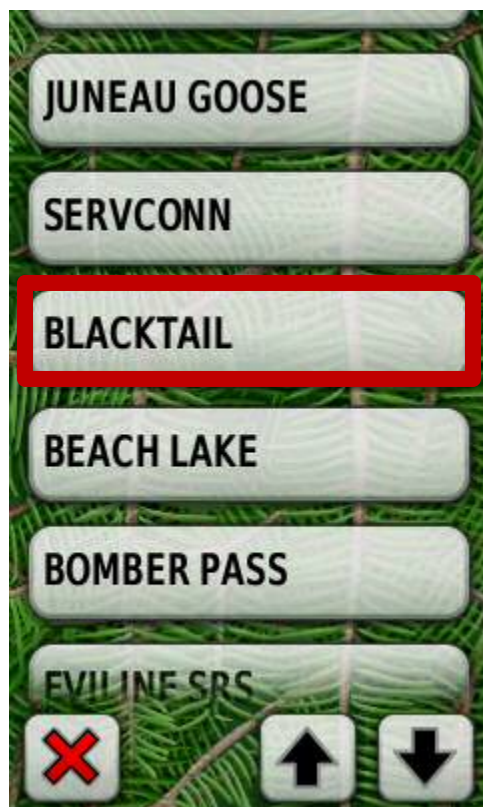
NW Trails Maps



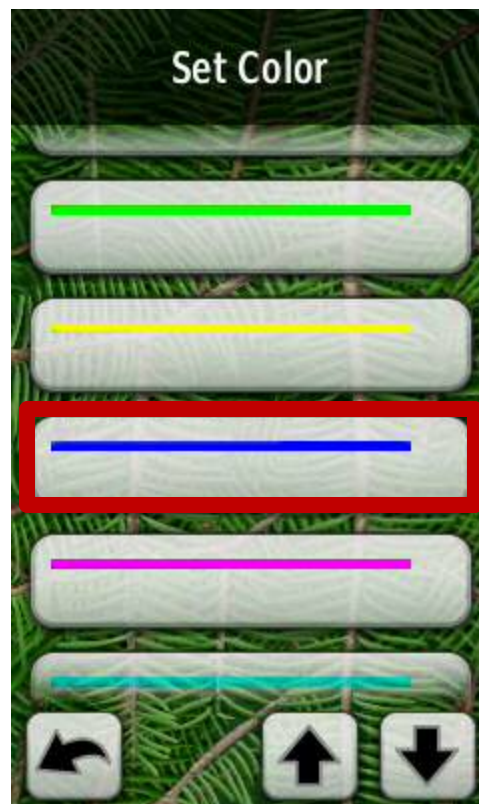
NW Trails Maps



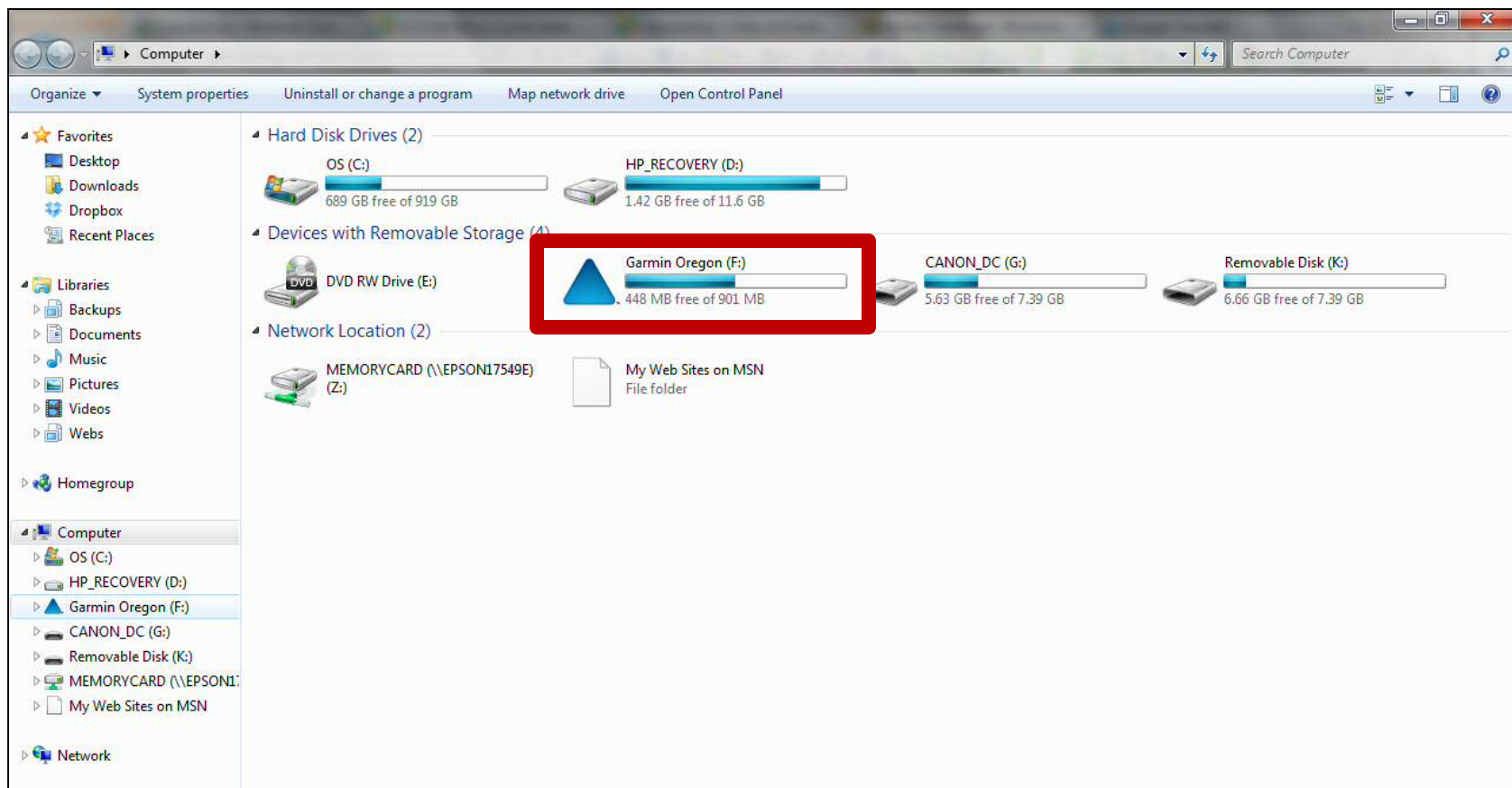
NW Trails Maps



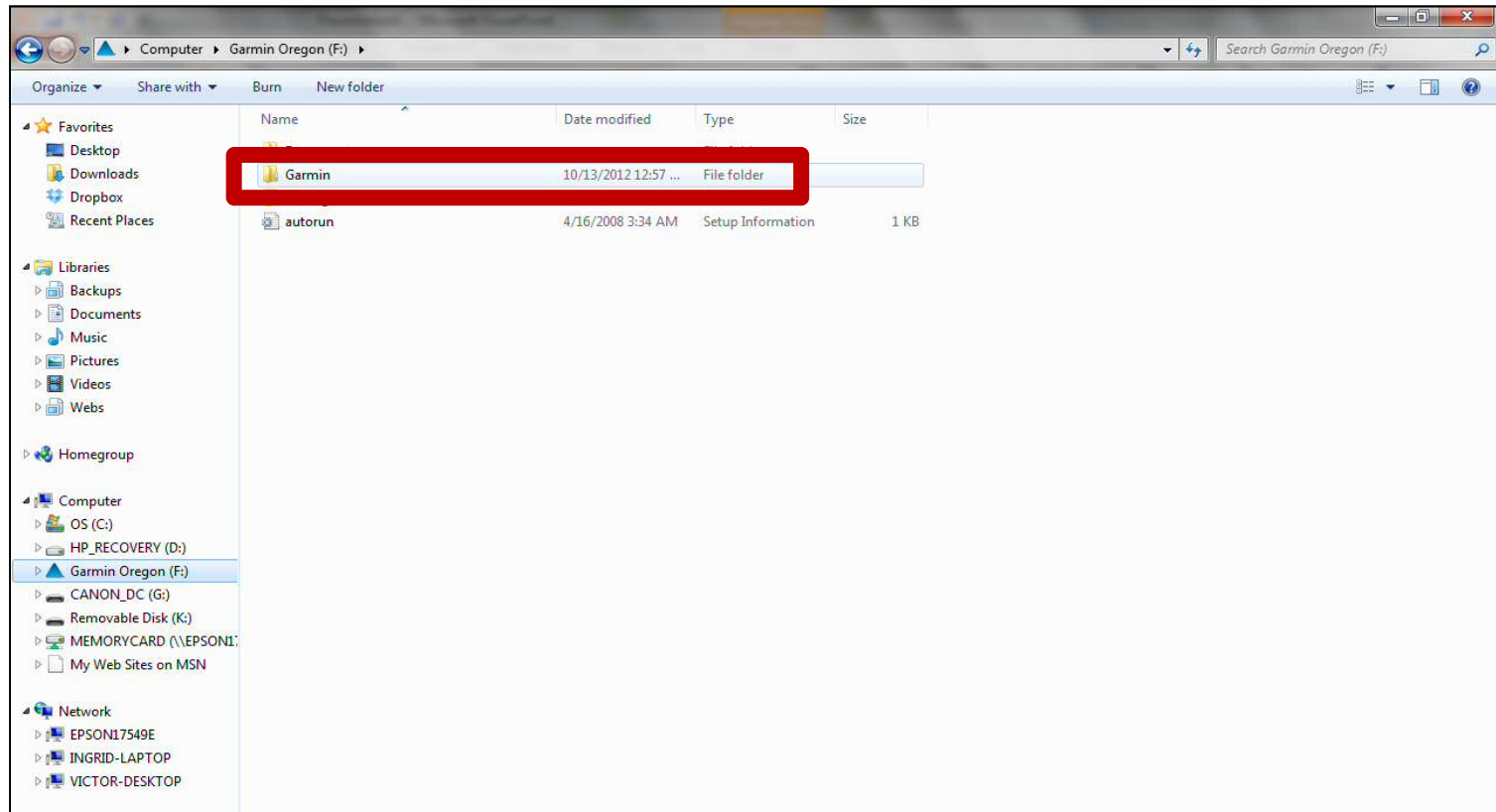
NW Trails Maps



NW Trails Maps



NW Trails Maps

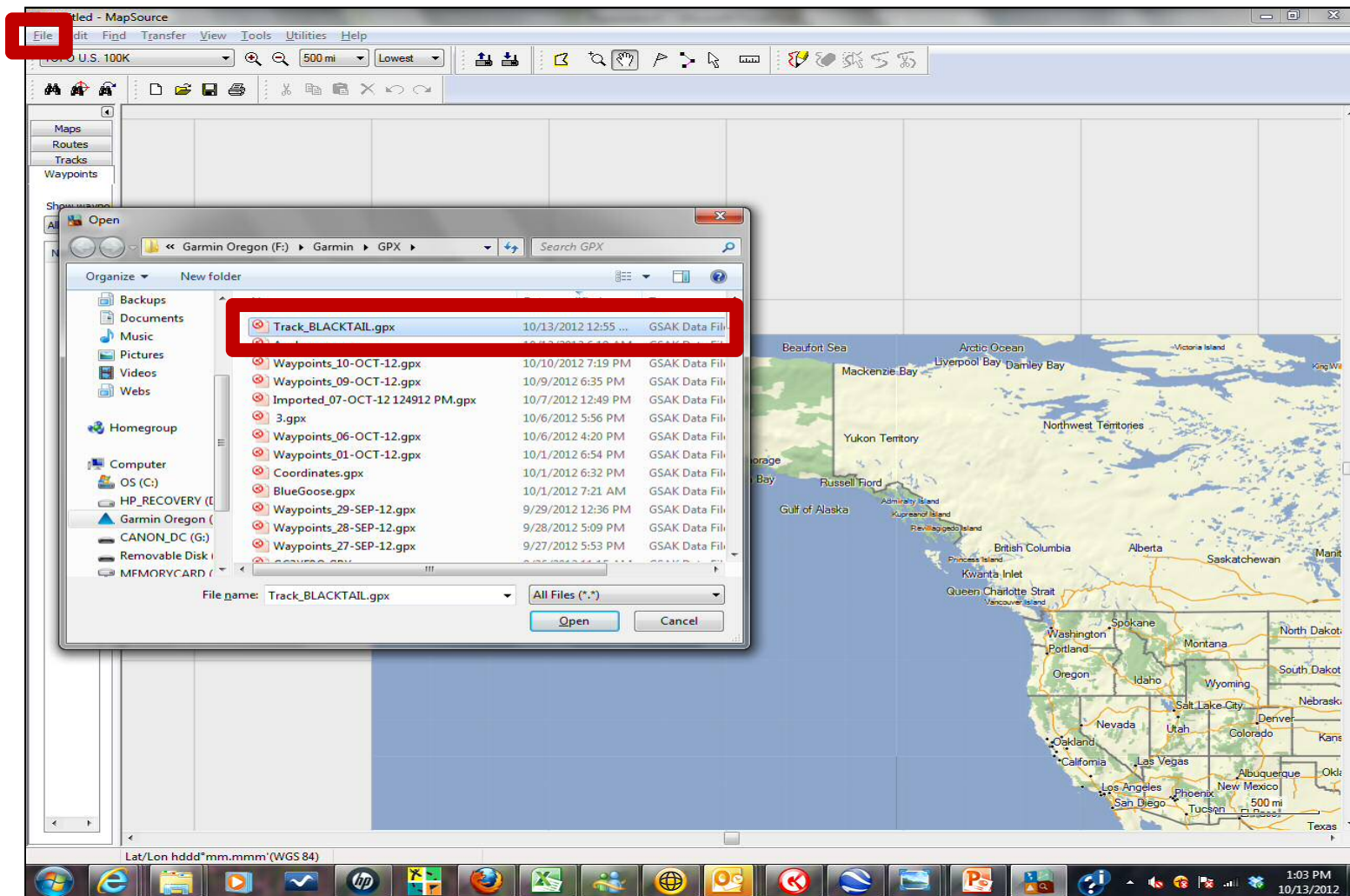


NW Trails Maps



Name	Date modified	Type	Size
GC3V5TW.GPX	8/24/2012 3:01 PM	GSAK Data File	9 KB
GCXRF6.GPX	8/26/2012 2:54 PM	GSAK Data File	8 KB
Waypoints_26-AUG-12.gpx	8/26/2012 4:22 PM	GSAK Data File	2 KB
Waypoints_31-AUG-12.gpx	8/31/2012 5:24 PM	GSAK Data File	2 KB
GC3VVEV.GPX	8/31/2012 10:01 PM	GSAK Data File	6 KB
GC3VT0Y.GPX	8/31/2012 10:02 PM	GSAK Data File	5 KB
GC3VPPR.GPX	8/31/2012 10:02 PM	GSAK Data File	6 KB
GC3VPP1.GPX	8/31/2012 10:02 PM	GSAK Data File	7 KB
GC3VPMW.GPX	8/31/2012 10:02 PM	GSAK Data File	6 KB
GC3VNB3.GPX	8/31/2012 10:02 PM	GSAK Data File	4 KB
Waypoints_06-SEP-12.gpx	9/6/2012 6:42 PM	GSAK Data File	2 KB
Waypoints_08-SEP-12.gpx	9/8/2012 4:44 PM	GSAK Data File	2 KB
Waypoints_14-SEP-12.gpx	9/14/2012 7:21 PM	GSAK Data File	2 KB
GC3WPKV.GPX	9/16/2012 3:02 PM	GSAK Data File	7 KB
GC3WP85.GPX	9/16/2012 3:02 PM	GSAK Data File	5 KB
GC3WJAN.GPX	9/16/2012 3:05 PM	GSAK Data File	7 KB
Waypoints_21-SEP-12.gpx	9/21/2012 6:18 PM	GSAK Data File	2 KB
GC3XDXR.GPX	9/25/2012 7:02 AM	GSAK Data File	11 KB
GC3XFKG.GPX	9/25/2012 7:02 AM	GSAK Data File	6 KB
Waypoints_16-APR-12.gpx	9/25/2012 5:55 PM	GSAK Data File	2 KB
LBKHide.gpx	9/26/2012 11:07 AM	GSAK Data File	1,632 KB
GC3XFKZ.GPX	9/26/2012 11:14 AM	GSAK Data File	8 KB
GC3XF9Q.GPX	9/26/2012 11:15 AM	GSAK Data File	8 KB
Waypoints_27-SEP-12.gpx	9/27/2012 5:53 PM	GSAK Data File	2 KB
Waypoints_28-SEP-12.gpx	9/28/2012 5:09 PM	GSAK Data File	2 KB
Waypoints_29-SEP-12.gpx	9/29/2012 12:36 PM	GSAK Data File	2 KB
BlueGoose.gpx	10/1/2012 7:21 AM	GSAK Data File	125 KB
Coordinates.gpx	10/1/2012 6:32 PM	GSAK Data File	2 KB
Waypoints_01-OCT-12.gpx	10/1/2012 6:54 PM	GSAK Data File	2 KB
Waypoints_06-OCT-12.gpx	10/6/2012 4:20 PM	GSAK Data File	2 KB
3.gpx	10/6/2012 5:56 PM	GSAK Data File	4 KB
Imported_07-OCT-12 124912 PM.gpx	10/7/2012 12:49 PM	GSAK Data File	1 KB
Waypoints_09-OCT-12.gpx	10/9/2012 6:35 PM	GSAK Data File	2 KB
Waypoints_10-OCT-12.gpx	10/10/2012 7:19 PM	GSAK Data File	2 KB
Track_BLACKTAIL.gpx	10/13/2012 12:55 ...	GSAK Data File	267 KB

NW Trails Maps

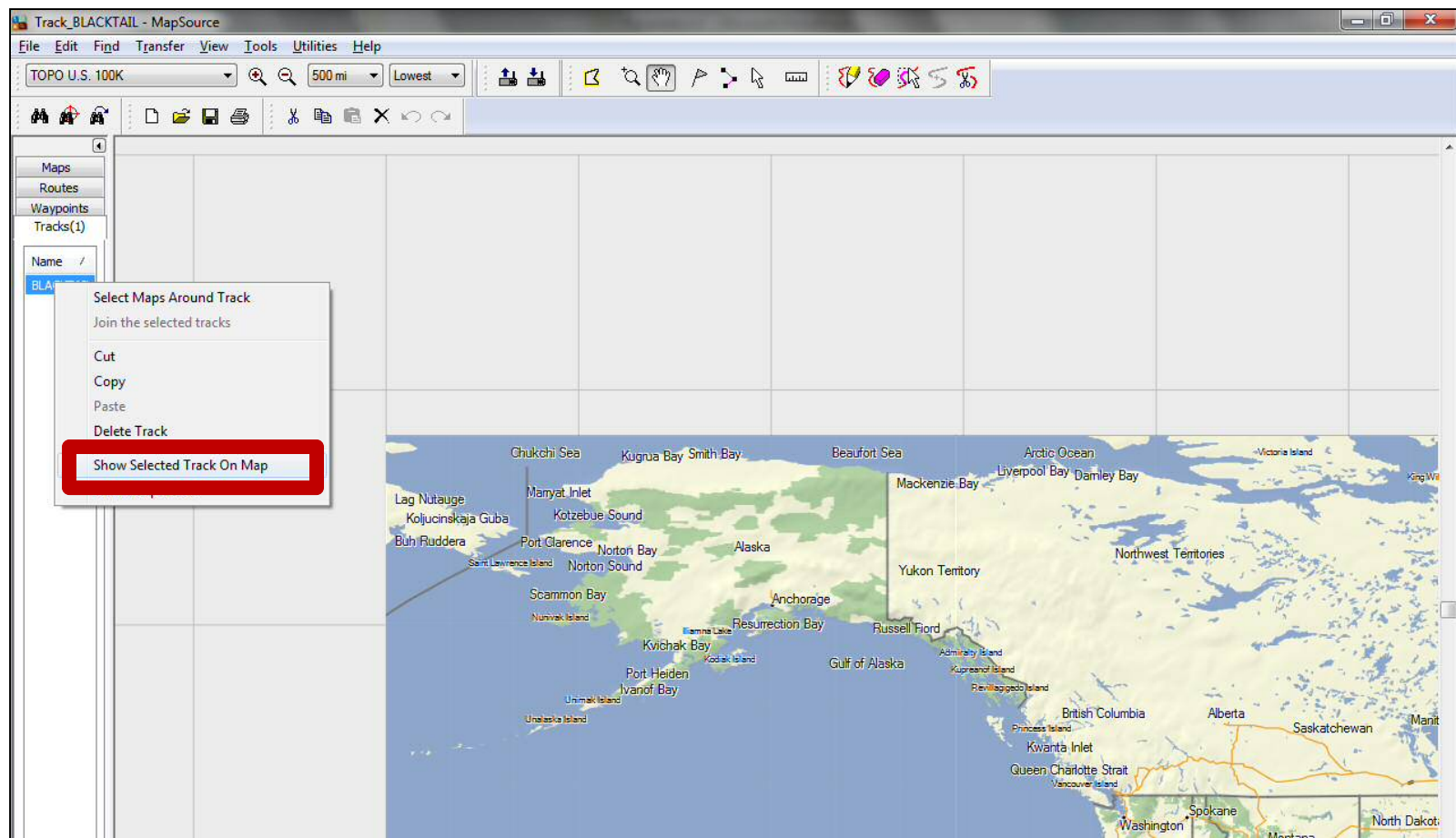


18 October 2012

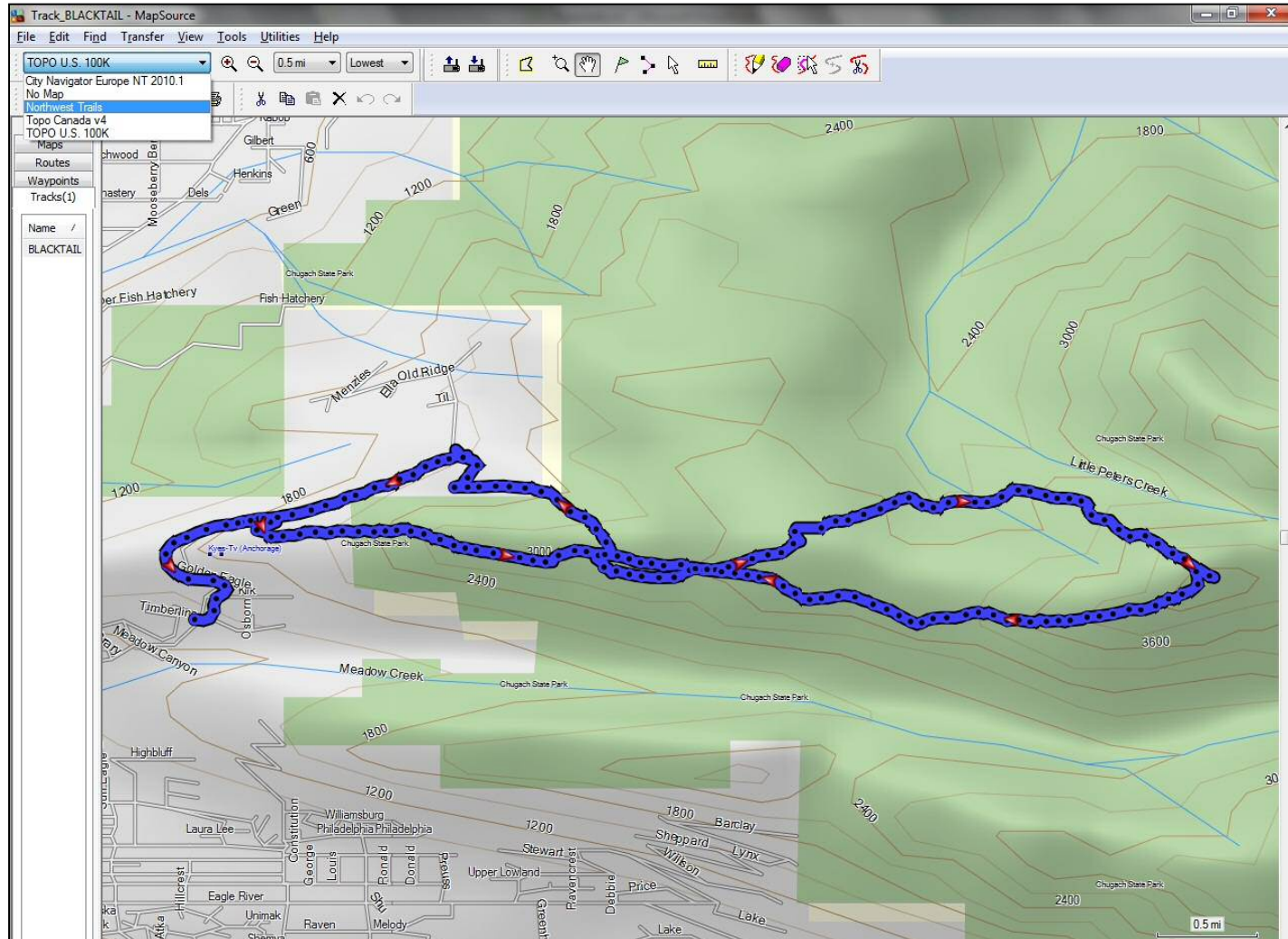
GPS Operations & NW Trails
FUNdamentals

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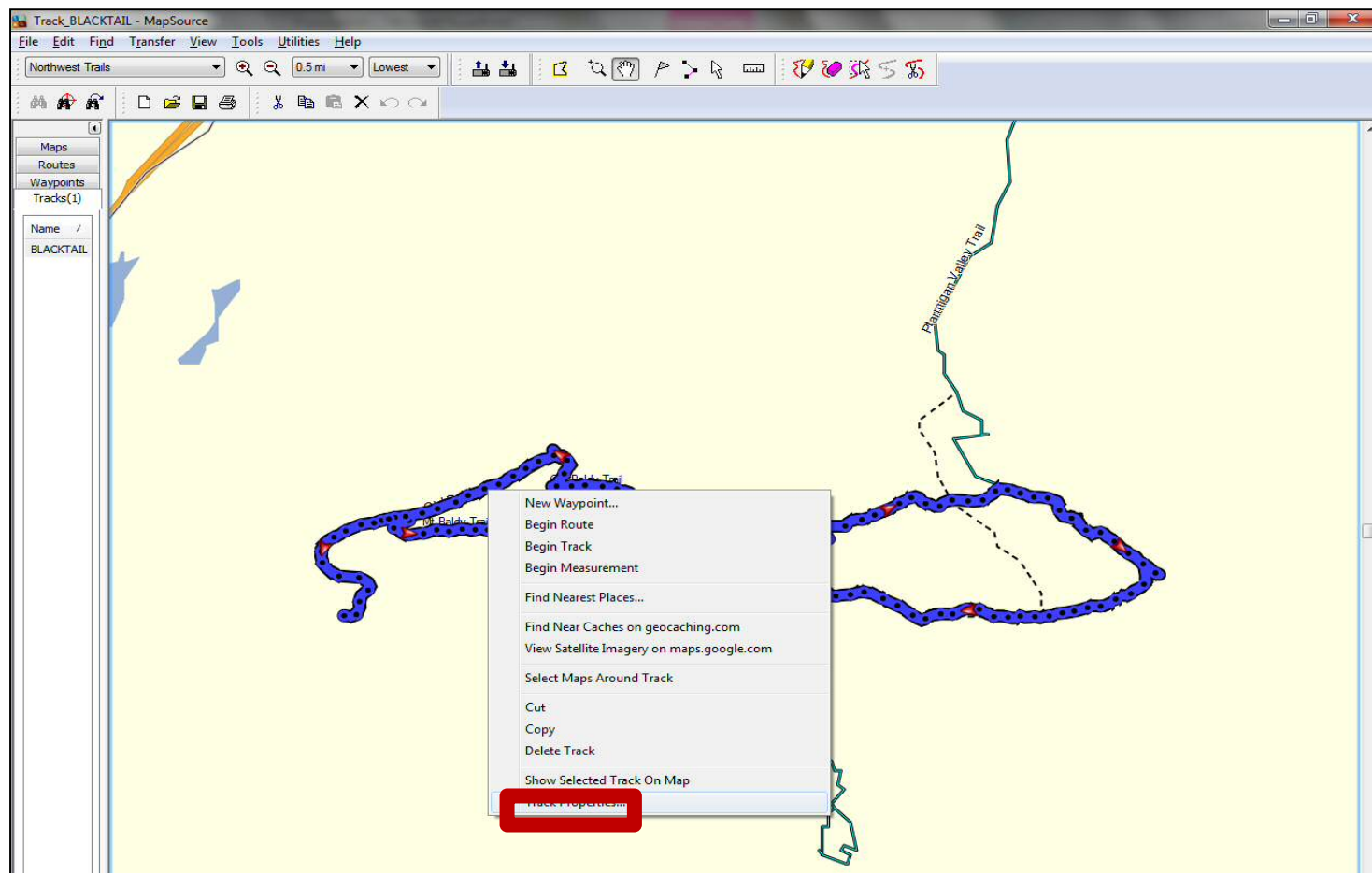
NW Trails Maps



NW Trails Maps



NW Trails Maps



NW Trails Maps



Track Properties

Name: BLACKTAIL Color: Blue

Index	Time	Elevation	Depth	Temperature	Leg Length	Leg Time	Leg Speed
383	10/12/2012 5:48:16...	2968 ft			39 ft	0:00:08	3 mph
384	10/12/2012 5:48:24...	2959 ft			51 ft	0:00:09	4 mph
385	10/12/2012 5:48:33...	2946 ft			9 ft	0:00:02	3 mph
386	10/12/2012 5:48:35...	2943 ft			11 ft	0:00:02	4 mph
387	10/12/2012 5:48:37...	2942 ft			67 ft	0:00:10	5 mph
388	10/12/2012 5:48:47...	2929 ft			65 ft	0:00:09	5 mph
389	10/12/2012 5:48:56...	2926 ft			39 ft	0:00:05	5 mph
390	10/12/2012 5:49:01...	2921 ft			53 ft	0:00:08	5 mph

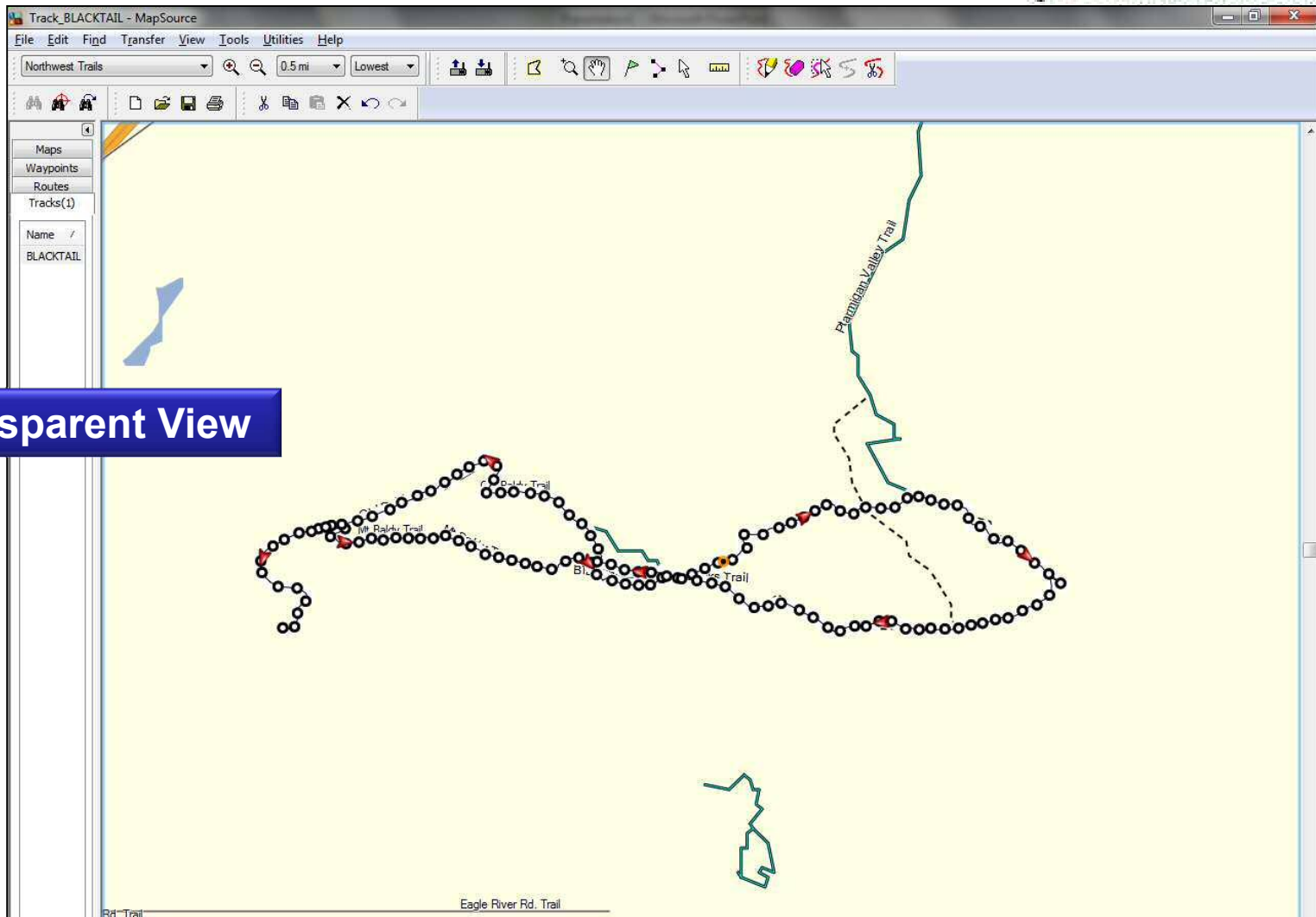
Center map on selected item(s)

Points	Length	Area	Elapsed Time	Avg. Speed
1	65 ft	0 sq ft	0:00:09	5 mph

Links

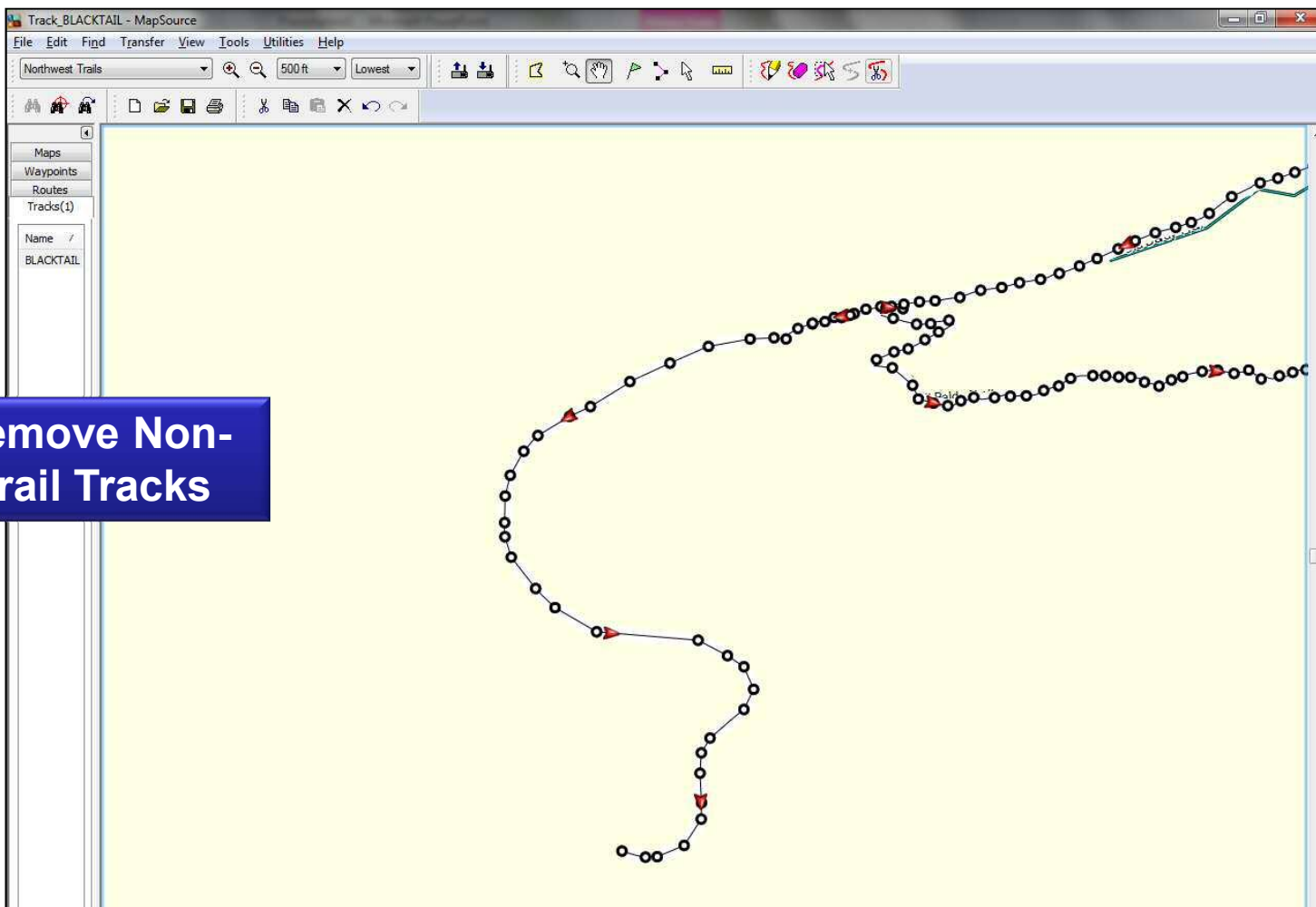
File/URL:

NW Trails Maps

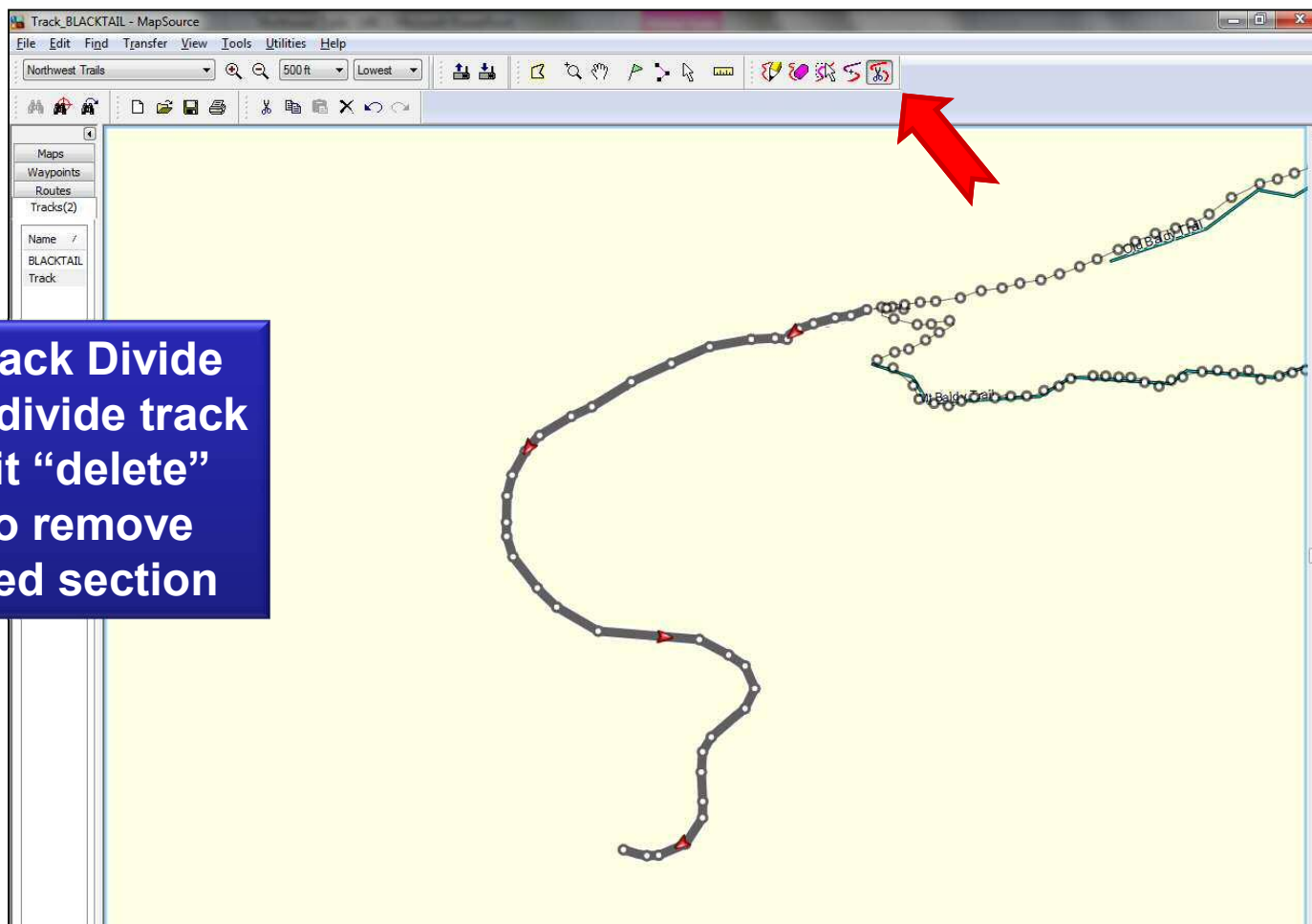


Transparent View

NW Trails Maps

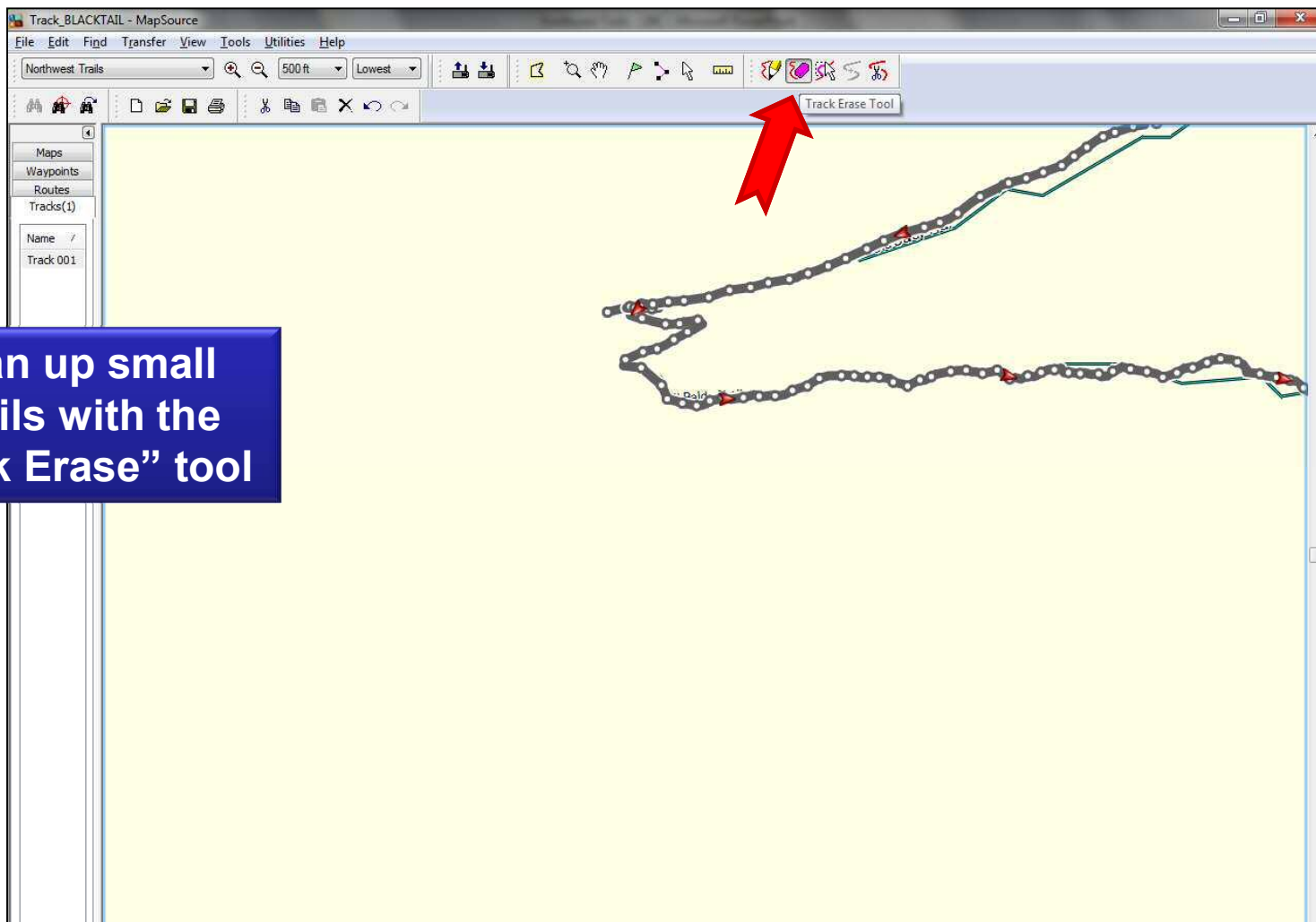


NW Trails Maps



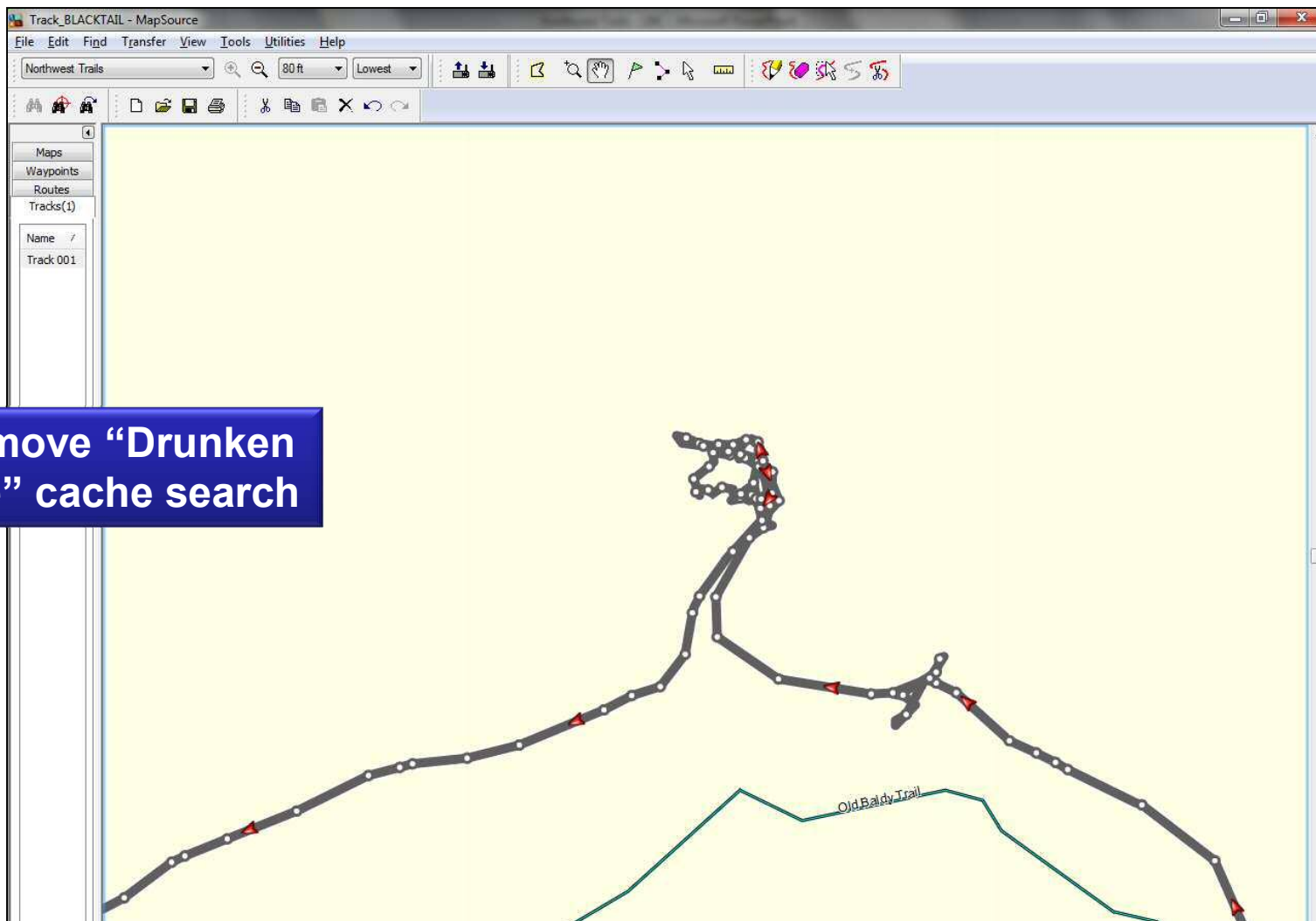
**Use Track Divide
Tool to divide track
and hit "delete"
key to remove
selected section**

NW Trails Maps



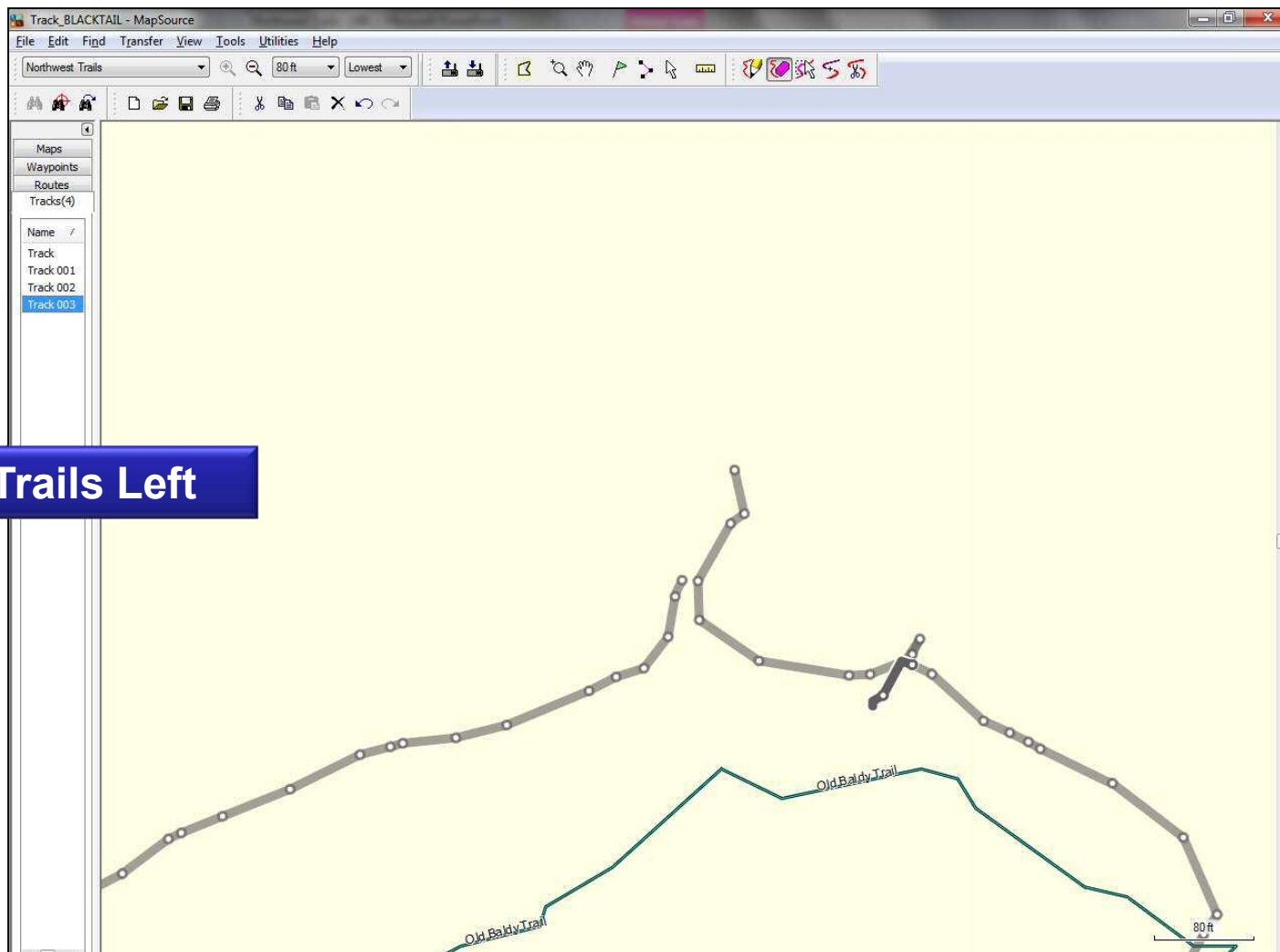
Clean up small details with the "Track Erase" tool

NW Trails Maps



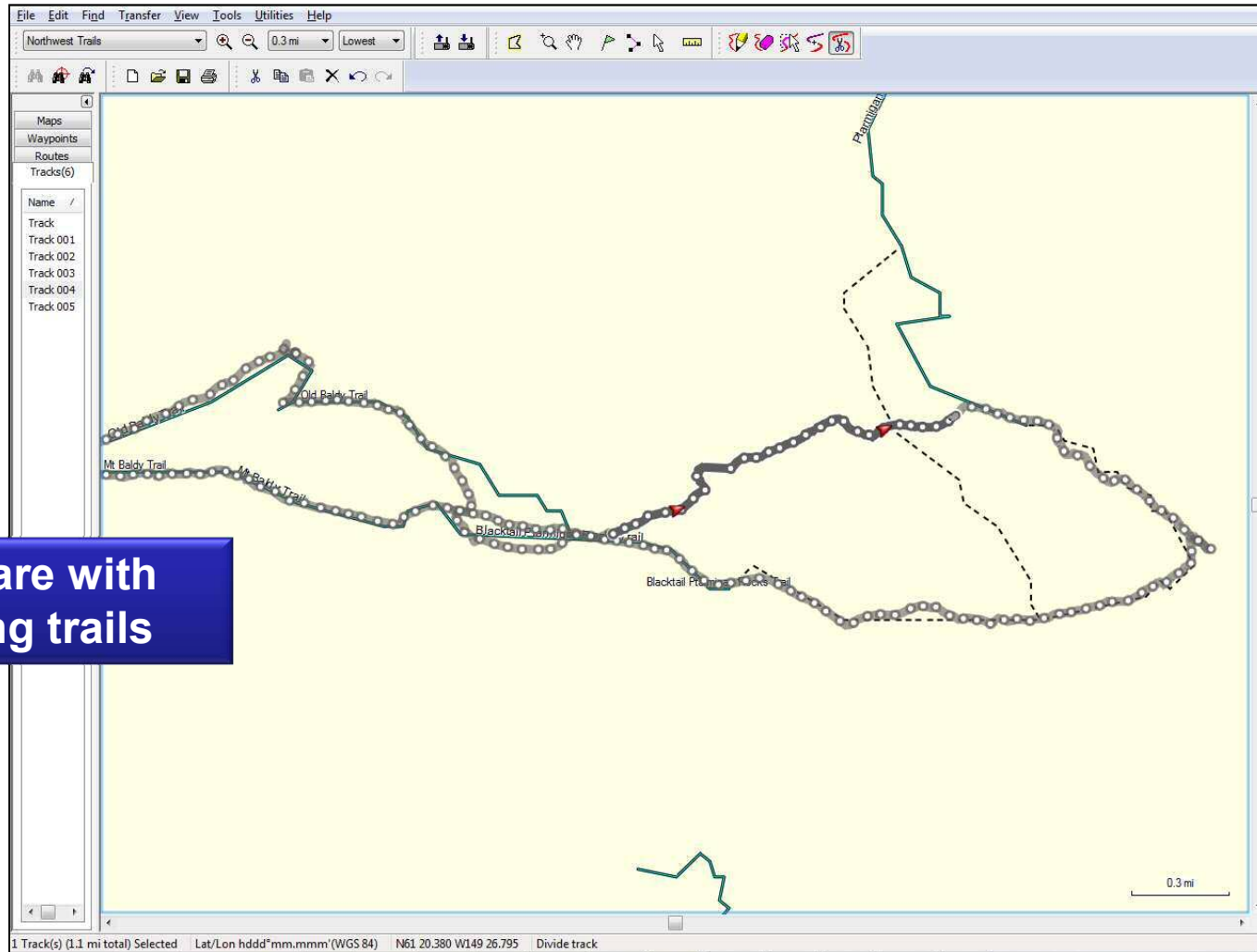
Remove "Drunken Bee" cache search

NW Trails Maps



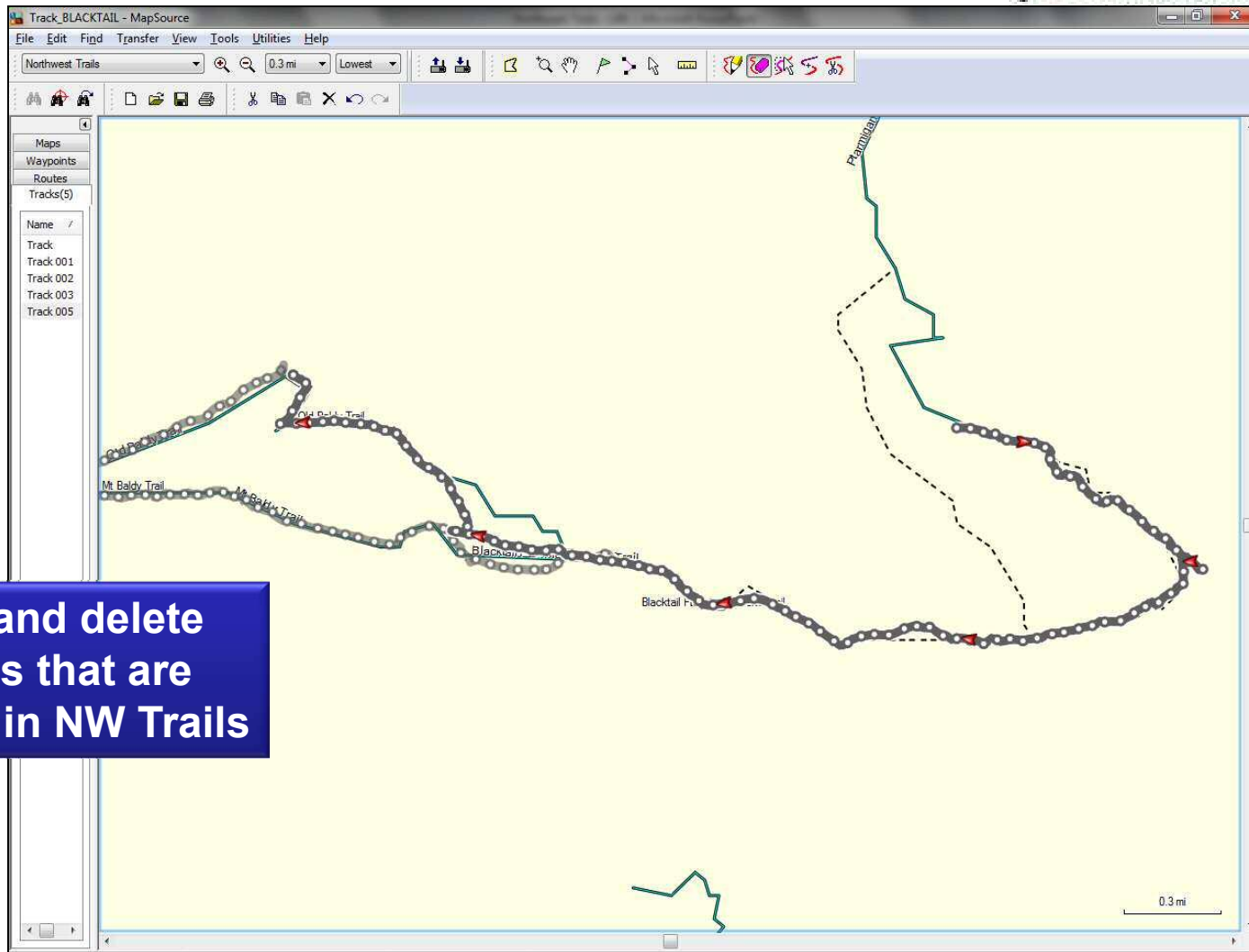
Only Trails Left

NW Trails Maps



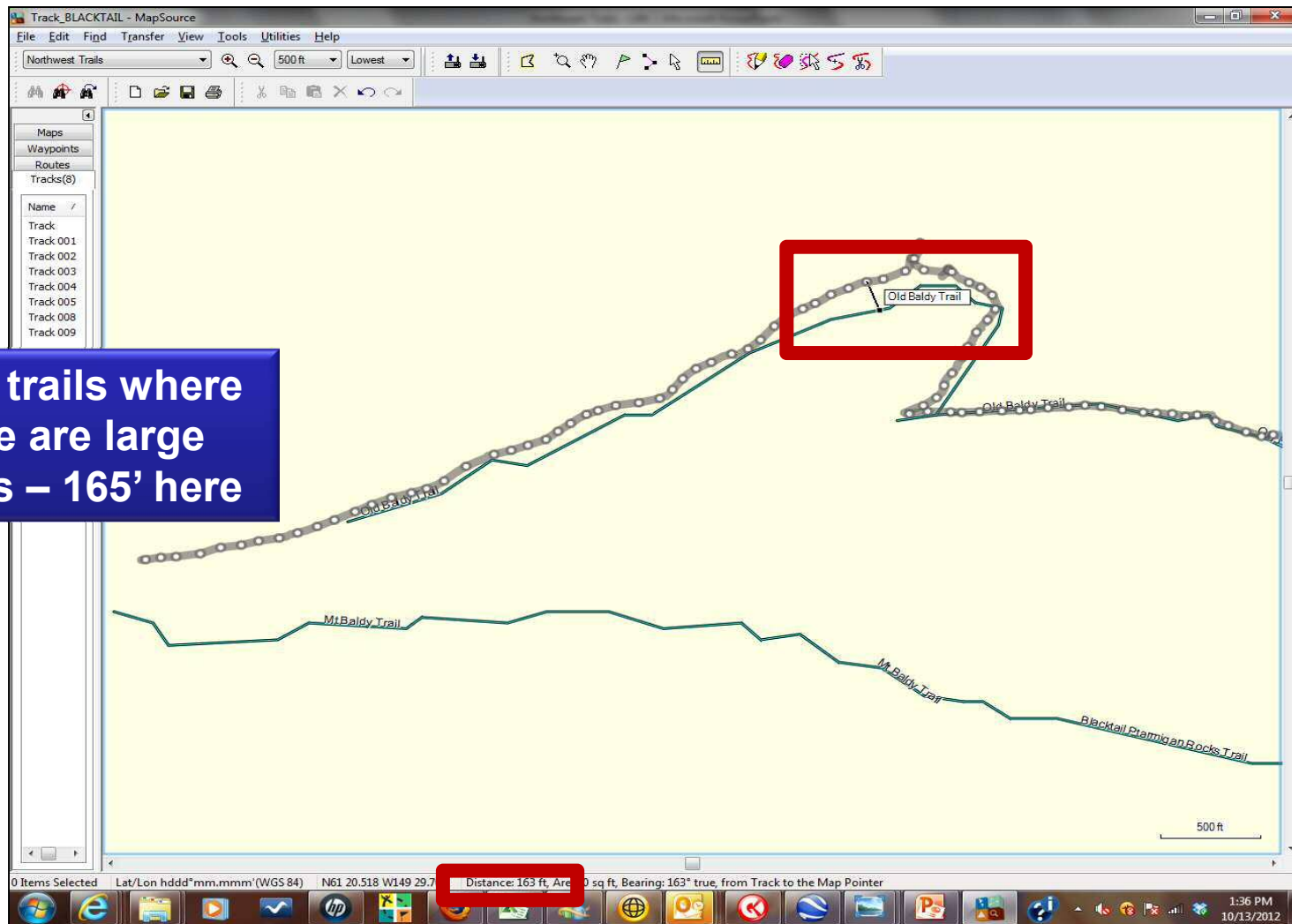
Compare with existing trails

NW Trails Maps



Snip and delete tracks that are already in NW Trails

NW Trails Maps



Leave trails where there are large offsets – 165' here

NW Trails Maps

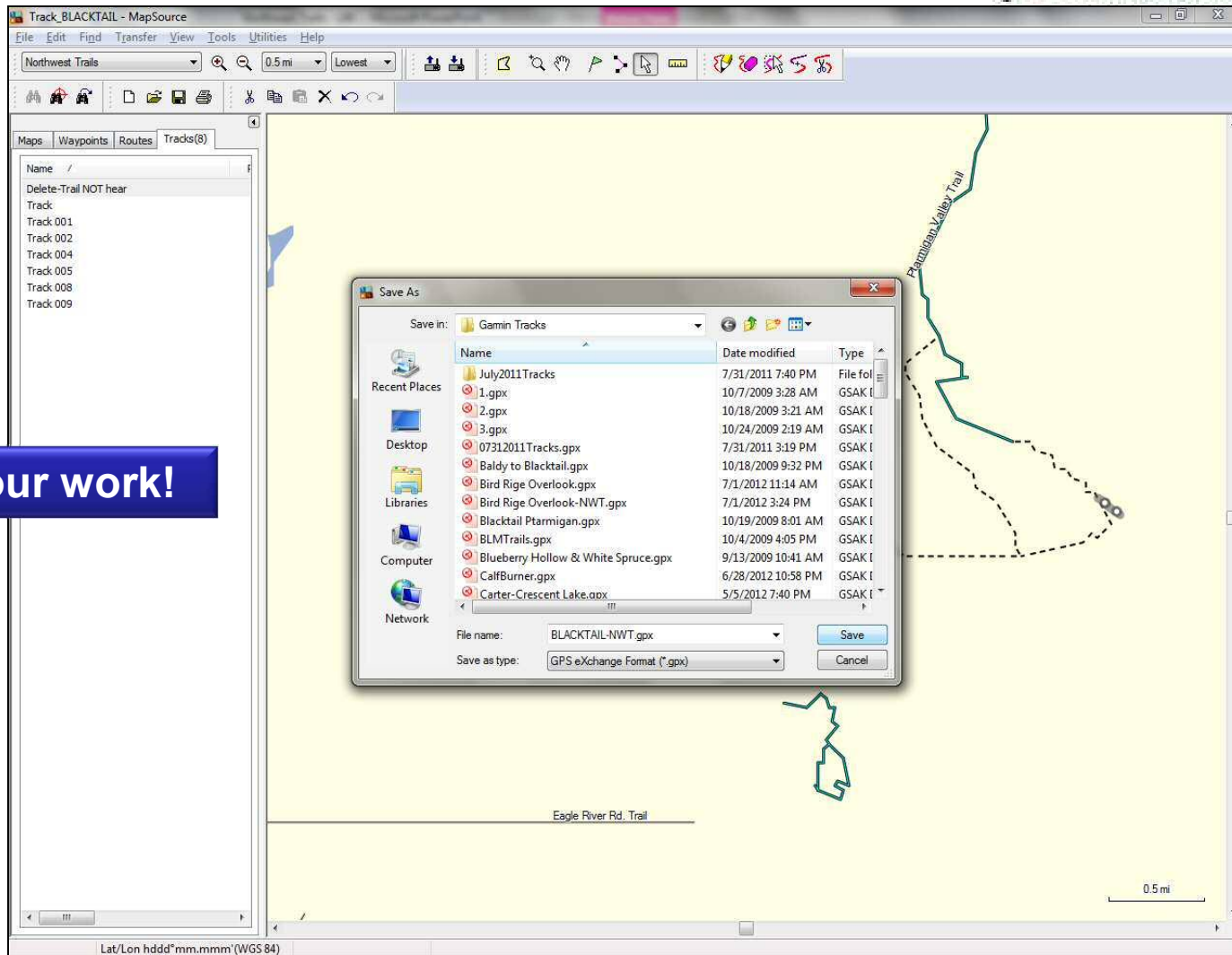


The screenshot shows the MapSource software interface. The main map area displays several trails: 'Ptarmigan Valley Trail' (a long, winding green line), 'Ptarmigan Valley Trail' (a shorter green line), 'Mt. Baldy Trail' (a red line), 'Blacktail' (a red line), and 'Ptarmigan Valley Trail' (a dashed line). A scale bar at the bottom right indicates 0.5 miles. The left sidebar shows a list of tracks with columns for Name, Points, and Start Time.

Name	Points	Start Time
Delete-Trail NOT here	7	
Track	91	10/12/2012 11:
Track 001	2	10/12/2012 10:
Track 002	11	10/12/2012 10:
Track 004-Depect as Route	46	10/12/2012 7:5
Track 005-Depect as Route	5	
Track 008	4	10/12/2012 5:4
Track 009	298	10/12/2012 10:

Final Product with Additions and Deletions / Trail and Route Specifications

NW Trails Maps



Save your work!

NW Trails Maps



http://www.switchbacks.com/upload/default.aspx

MSN.com

Google

Switchbacks.com

HOME GPS MAPS STATIC MAPS SHOP LINKS EXTRAS FORUM

Data Submission

Thank you for contributing data! If this is your first time doing so, please read the [guidelines for data submissions](#).

GPX (GPS Exchange Format) is the preferred file format, although you can also upload with Garmin's GDB format as most of the tools that I use for editing do.

If you run into any problems, feel free to email for support at the [Forums](#).

Choose the file to upload:

Please provide some details about this data:

Your name (or Geocaching.com alias):

Your email (in case of questions or issues):

Confirm email address:

State or province in which the data is located:

Surface type(s) of data in submission:

- Trail
- Minor Trail
- Paved Trail or Boardwalk
- Motorized (Motorcycle/ATV) Trail
- Unpaved Road
- Paved Road

Choose File to Upload

Geocaching > Garmin Tracks

Documents library

Garmin Tracks

Name	Date modified
July2011 Tracks	7/31/2011 7:40
BLACKTAIL-NWT.gpx	10/13/2012 1:4
MatPkAllNeil	8/13/2012 10:0
MatPkAllNeil.gpx	8/13/2012 10:0
GovernmentPeakTrail.gpx	7/22/2012 9:45
HatcherSummit.gpx	7/22/2012 9:42
Wynn Nature Center.gpx	7/21/2012 8:47

File name: BLACKTAIL-NWT.gpx

All Files (*.*)

**Submit to
Switchbacks.com**

NW Trails Maps



Fill in details about the trail and submit it for inclusion in future revisions of NW Trails

http://www.switchbacks.com/upload/default.aspx MSN.com assent - Google Search Switchbacks.com > GPS Ma... x

Google Search Share More >> Sign In

Confirm email address: ladybugs@geocachealaska.org

State or province in which the data is located: Alaska

Surface type(s) of data in submission:

- Trail
- Minor Trail
- Paved Trail or Boardwalk
- Motorized (Motorcycle/ATV) Trail
- Unpaved Road
- Paved Road
- Other/Varied (please explain in the notes below)

Permitted user types:

Summer Uses:

Hikers: Yes No Unknown

Horses: Yes No Unknown

Mountain Bikes: Yes No Unknown

Motorcycles: Yes No Unknown

ATVs: Yes No Unknown

Winter Uses:

X-C Skis: Yes No Unknown

Snowshoeing: Yes No Unknown

Snowmobiles: Yes No Unknown

City, town or feature closest to the recorded data: Eagle River

Name of park or area in which the data is located: Chugach State Park

GPS used to record the data: Oregon 450

Notes regarding this data: Hi Jon:
Here are some additional trail segments for the Mt. Baldy/Blacktail Rocks area of Chugach State Park. Note there is one segment that should be deleted

Related file (explanatory drawing, photo, etc.):

Do you want email confirmation of your submission? No Yes

Resources



- GS Knowledge Books: support.groundspeak.com
- GeocacheAlaska! Forums: geocachealaska.proboards.com
- Trimble GPS Tutorial: www.trimble.com/gps
- Switchback's NW Trails: www.switchbacks.com/nwtrails/
- TotemLake's DeLorme Trails: totemlake.wix.com/hotm
- Garmin GPS Info: www8.garmin.com/aboutGPS/
- US Gov't GPS Info: www.gps.gov