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GPS Operations & NW Trails FUNdamentals

presented by

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(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** eXplorist 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

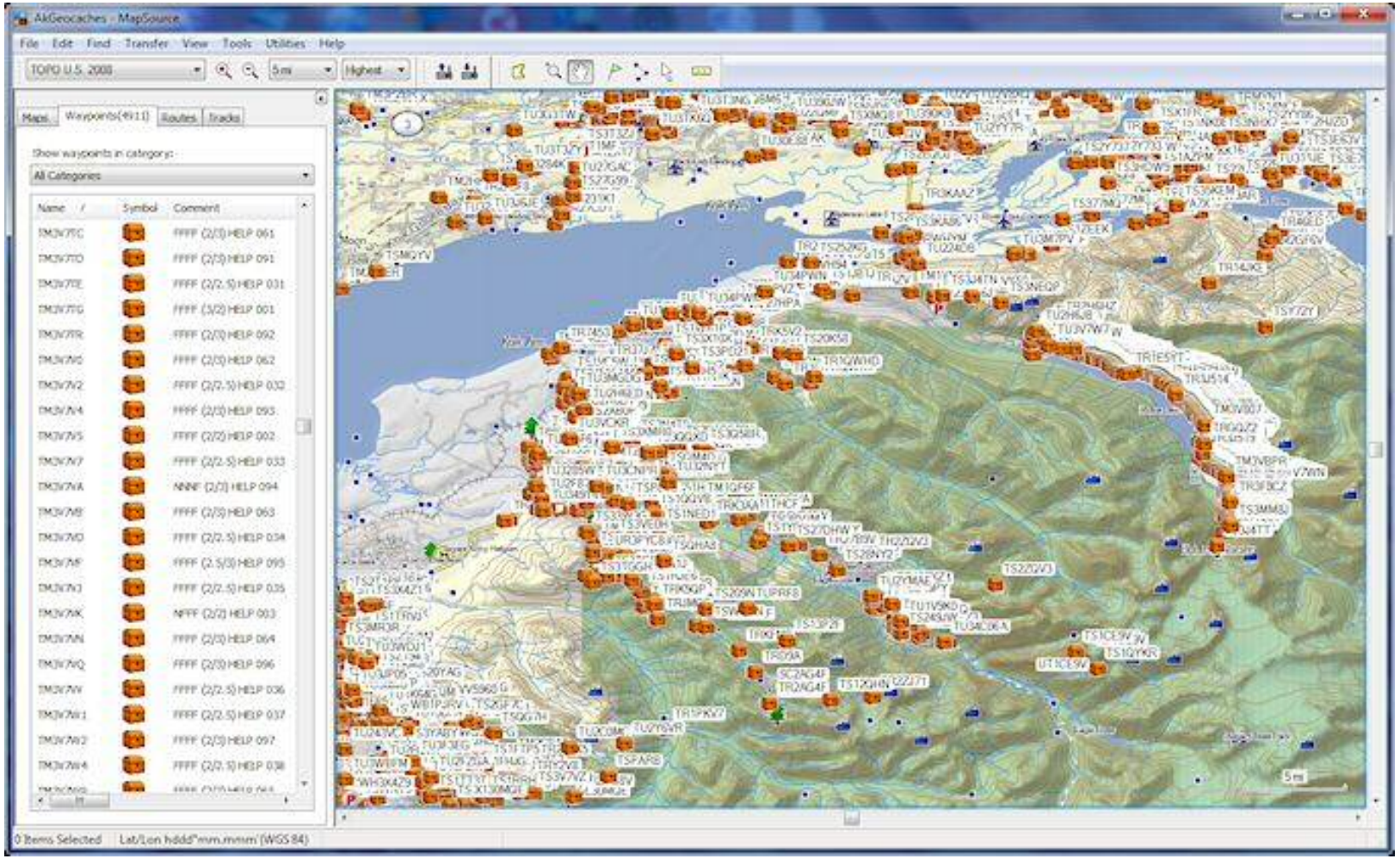
Topographic Maps

- 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

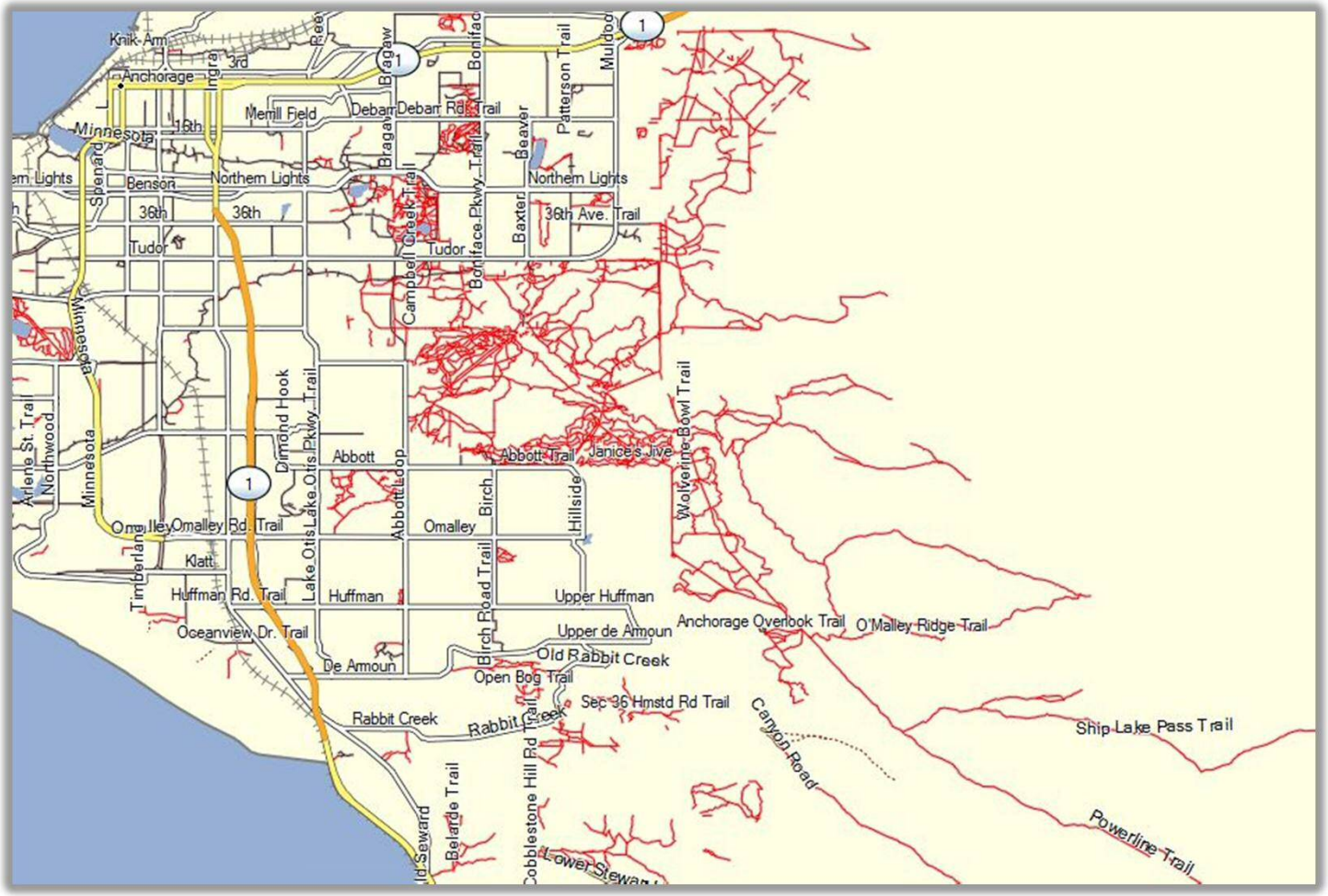


NW Trails Maps

- 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:



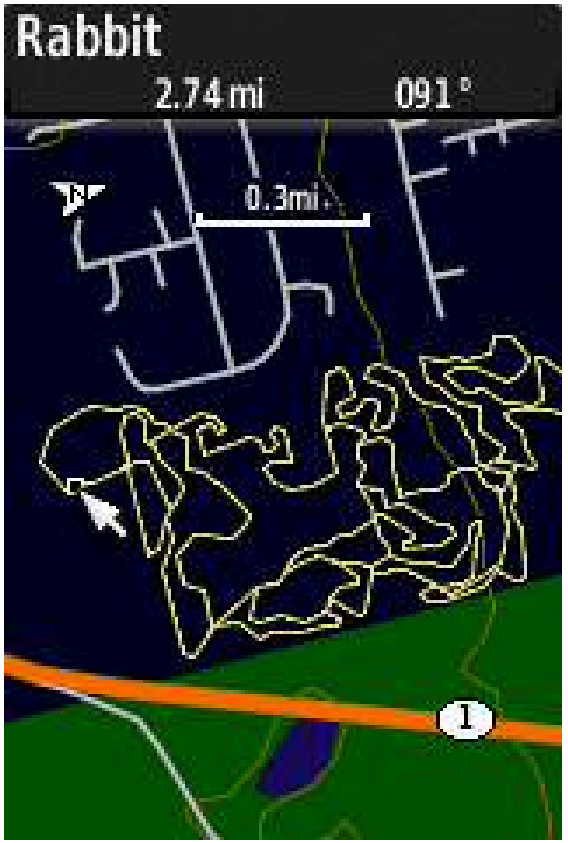
NW Trails Maps

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

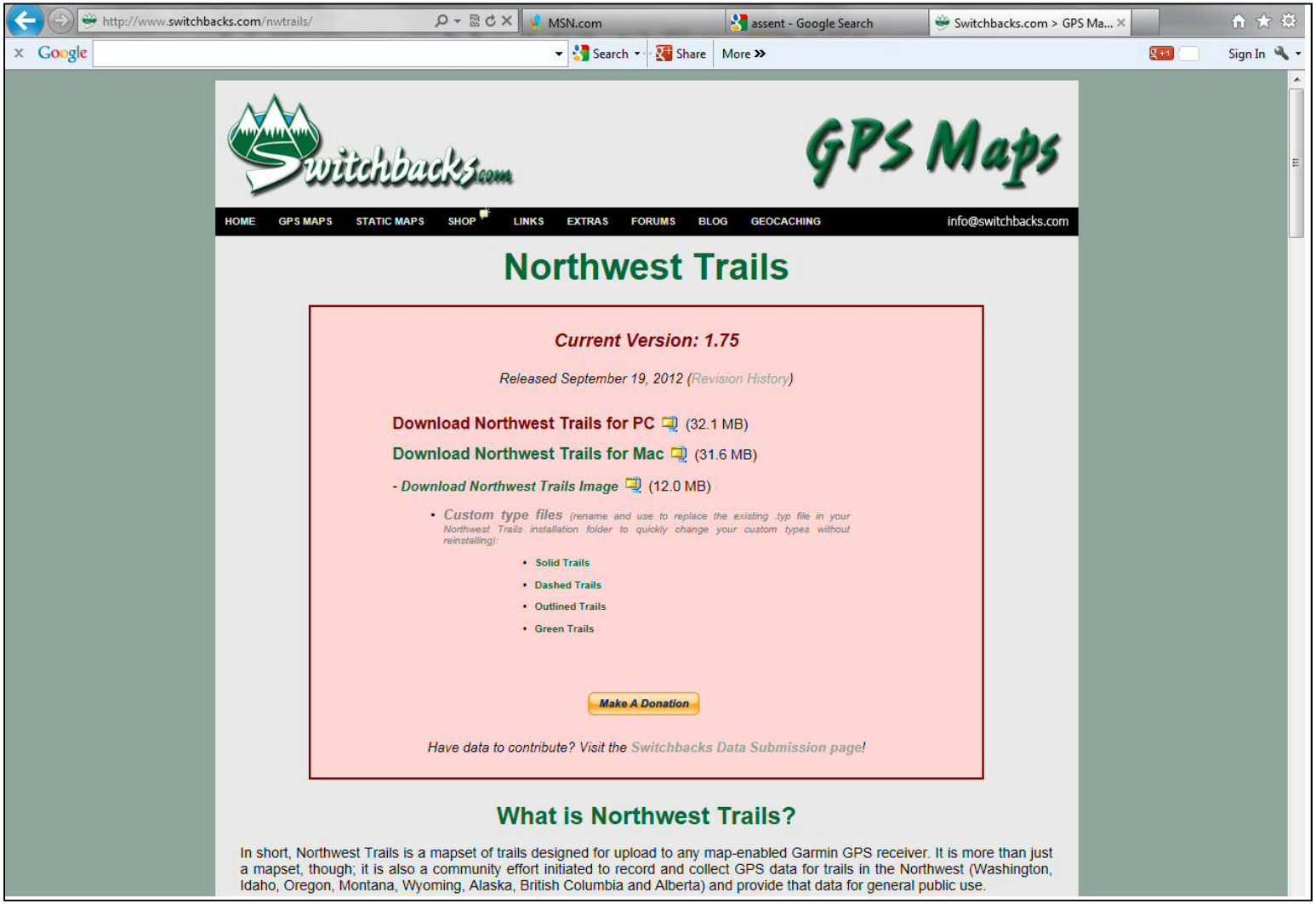


GPSr in Night Mode

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

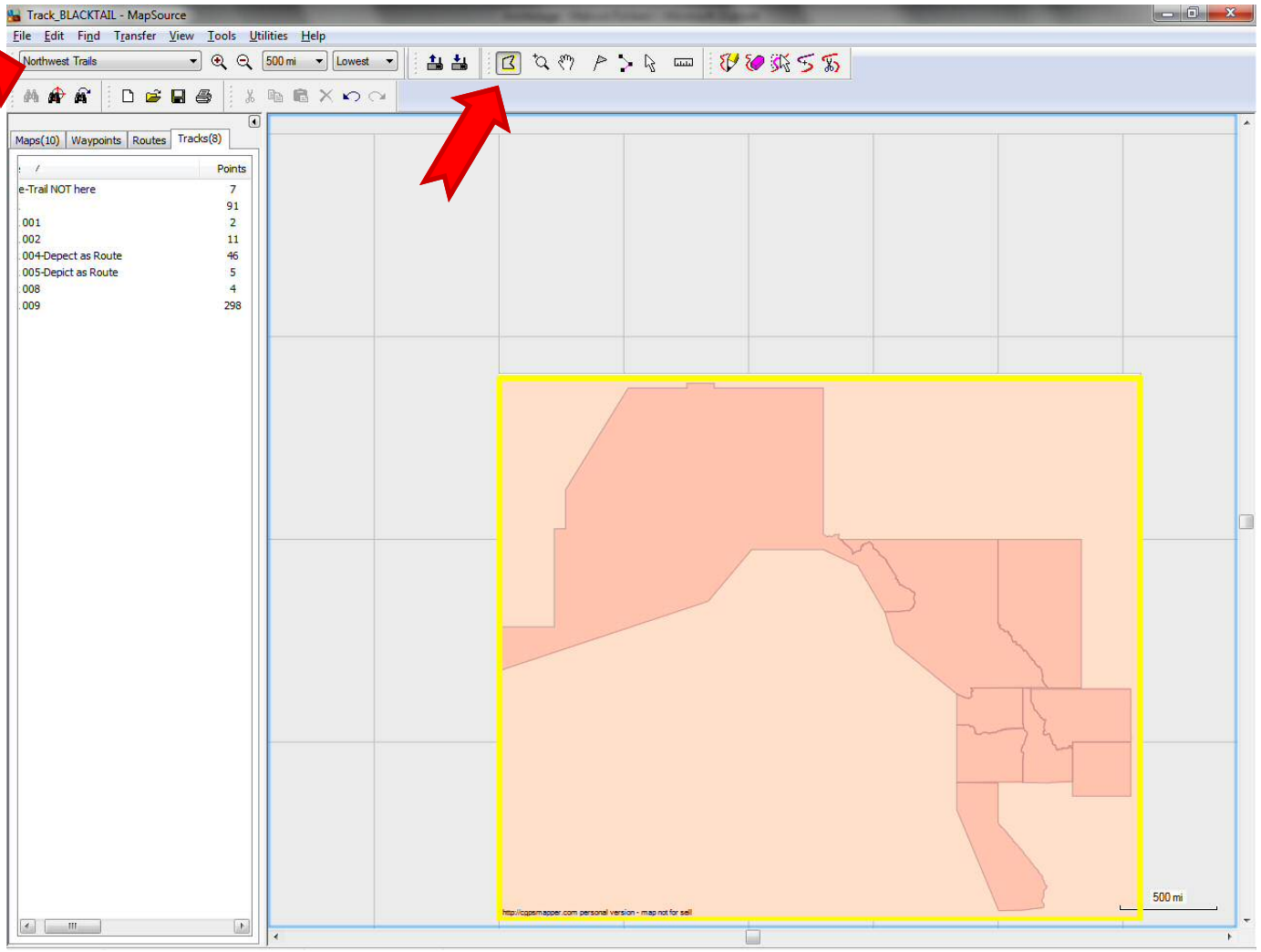
NW Trails Maps



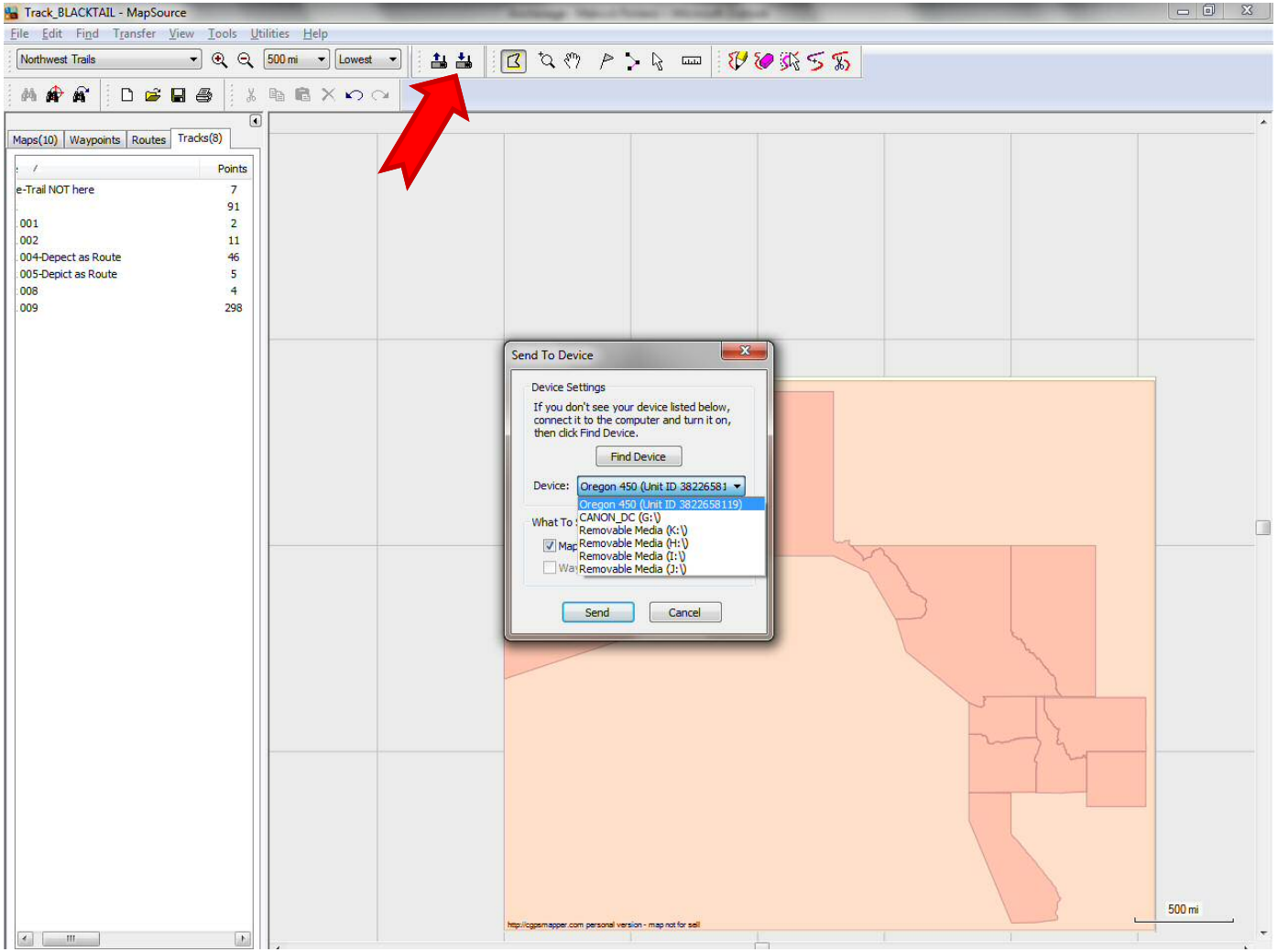
NW Trails Maps

- 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

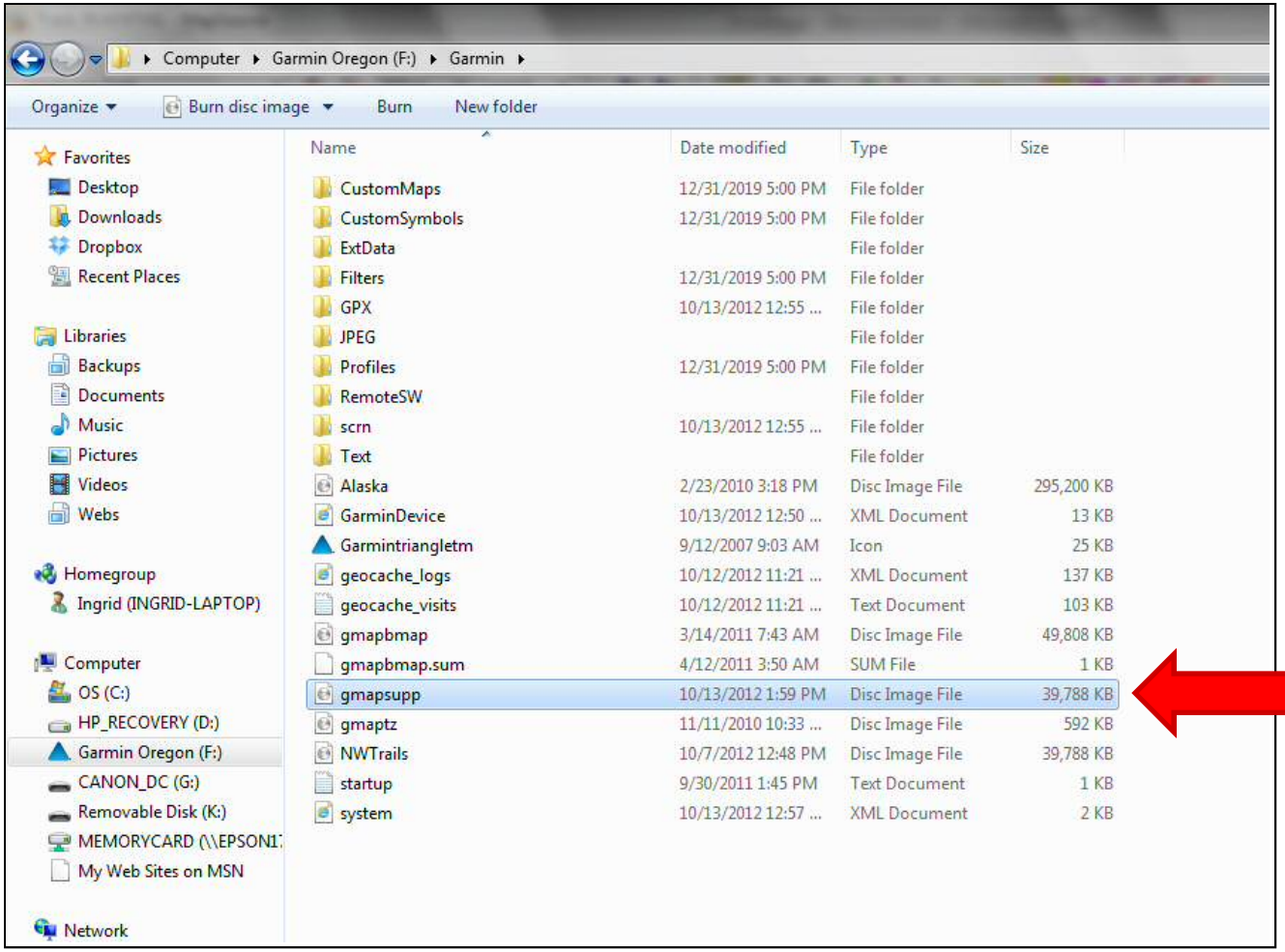


NW Trails Maps

- **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

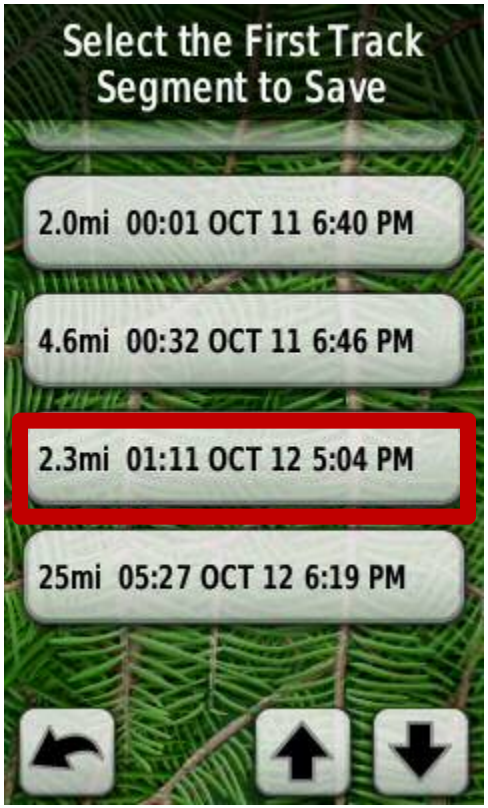
- The trails in NW Trails are recorded in the field by users, such as you
- To contribute to the project, consider recording trail track logs to add
- It is important to get clean tracks and remove extraneous portions as needed
- Submit new tracks via a webform located at www.switchbacks.com/upload/default.aspx

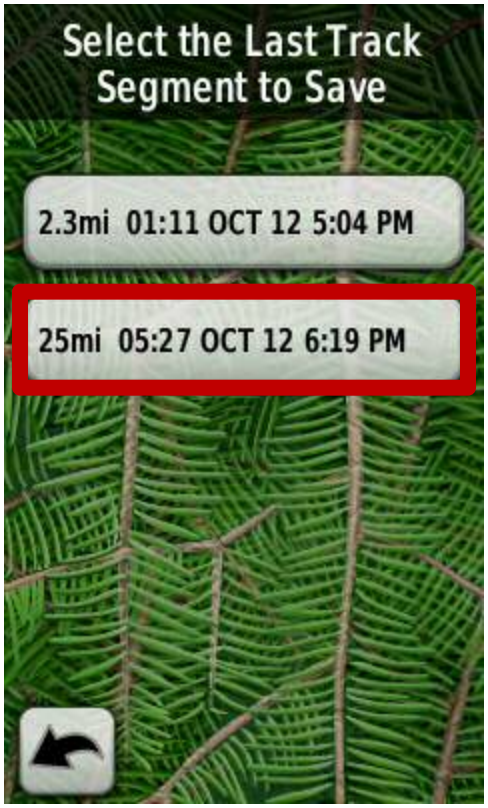
NW Trails Maps

- 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

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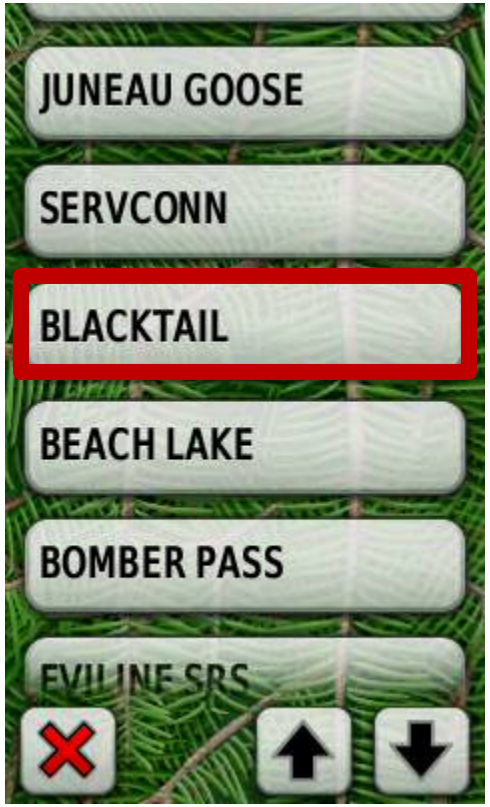

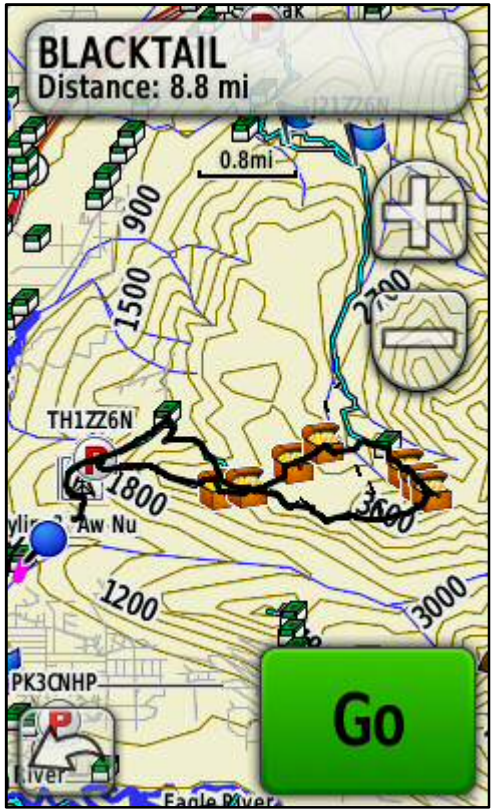

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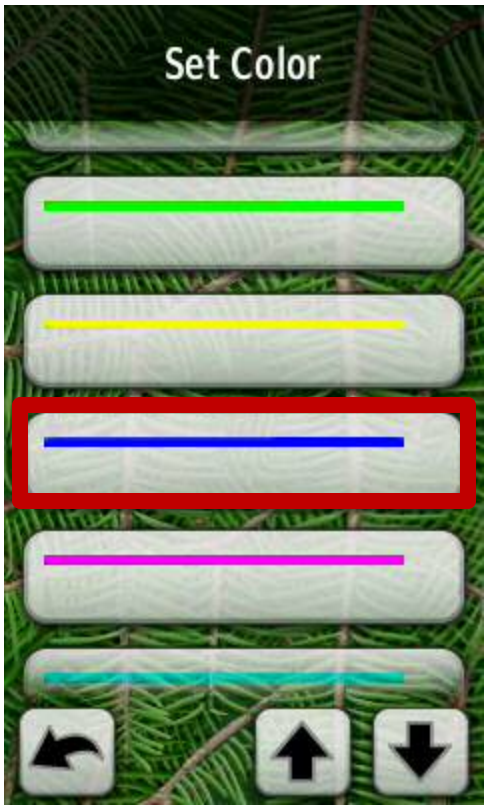

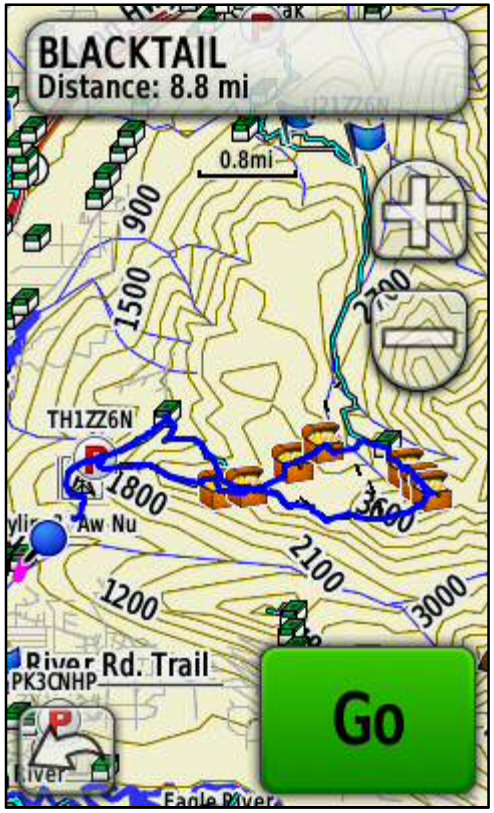

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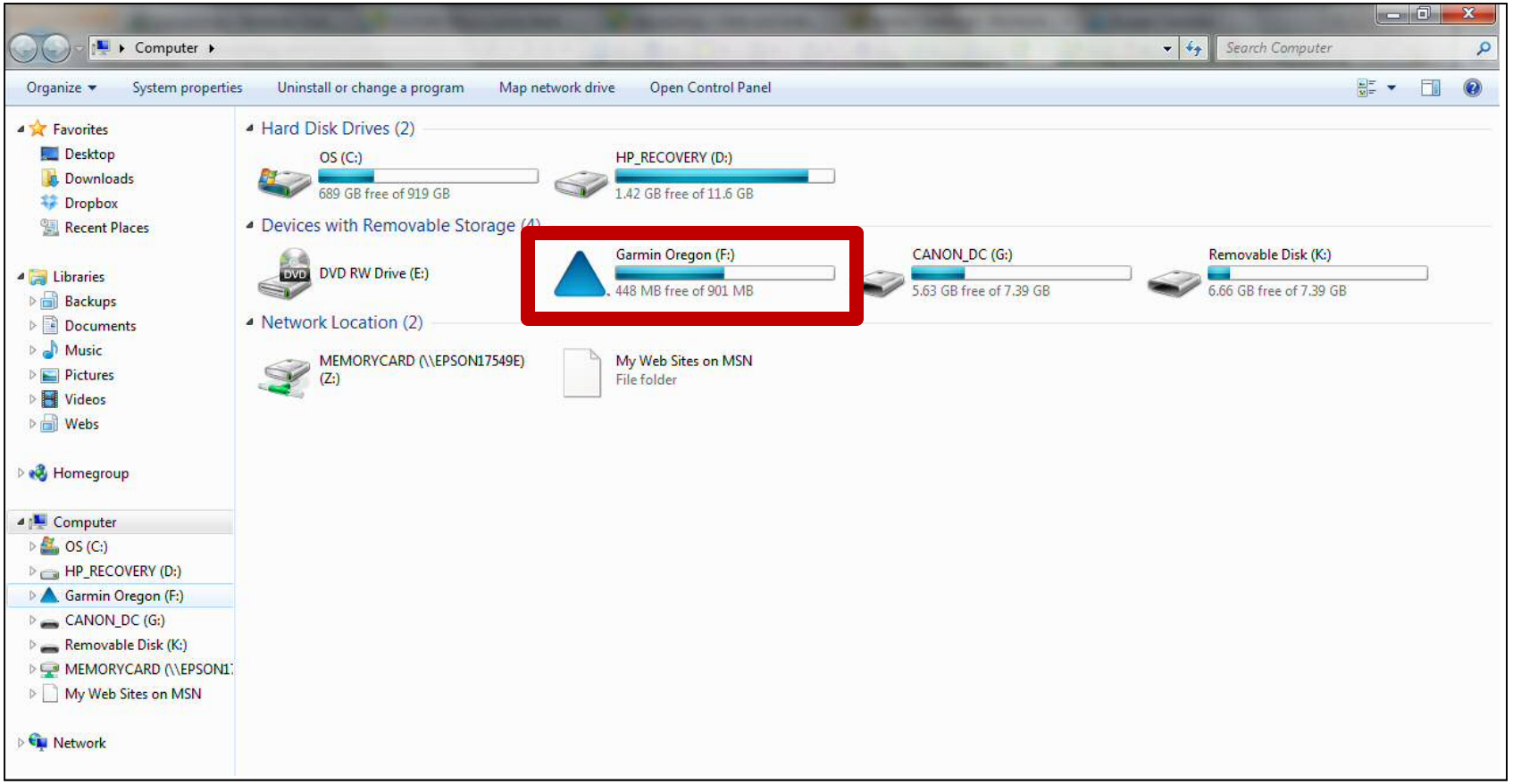

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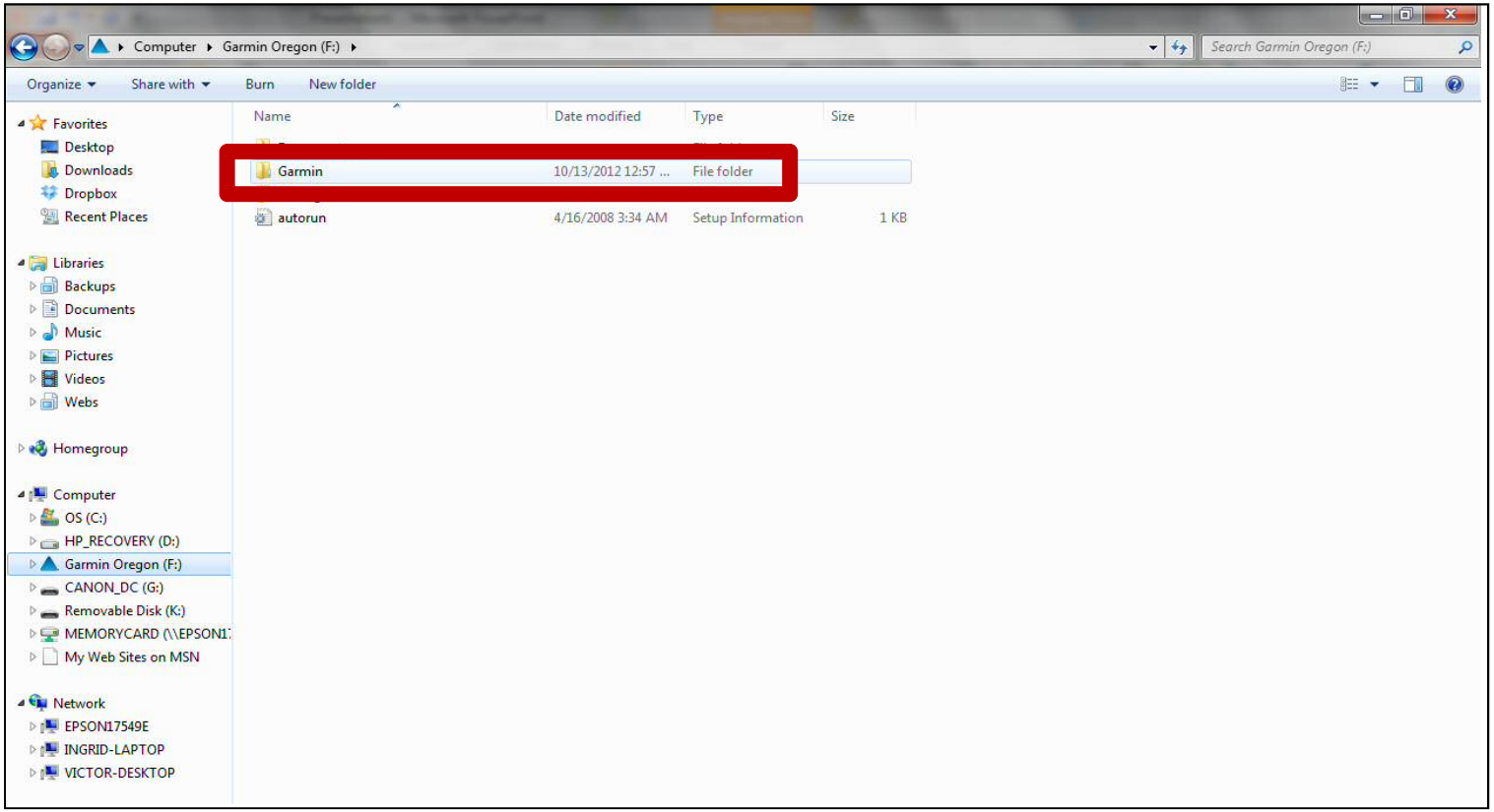

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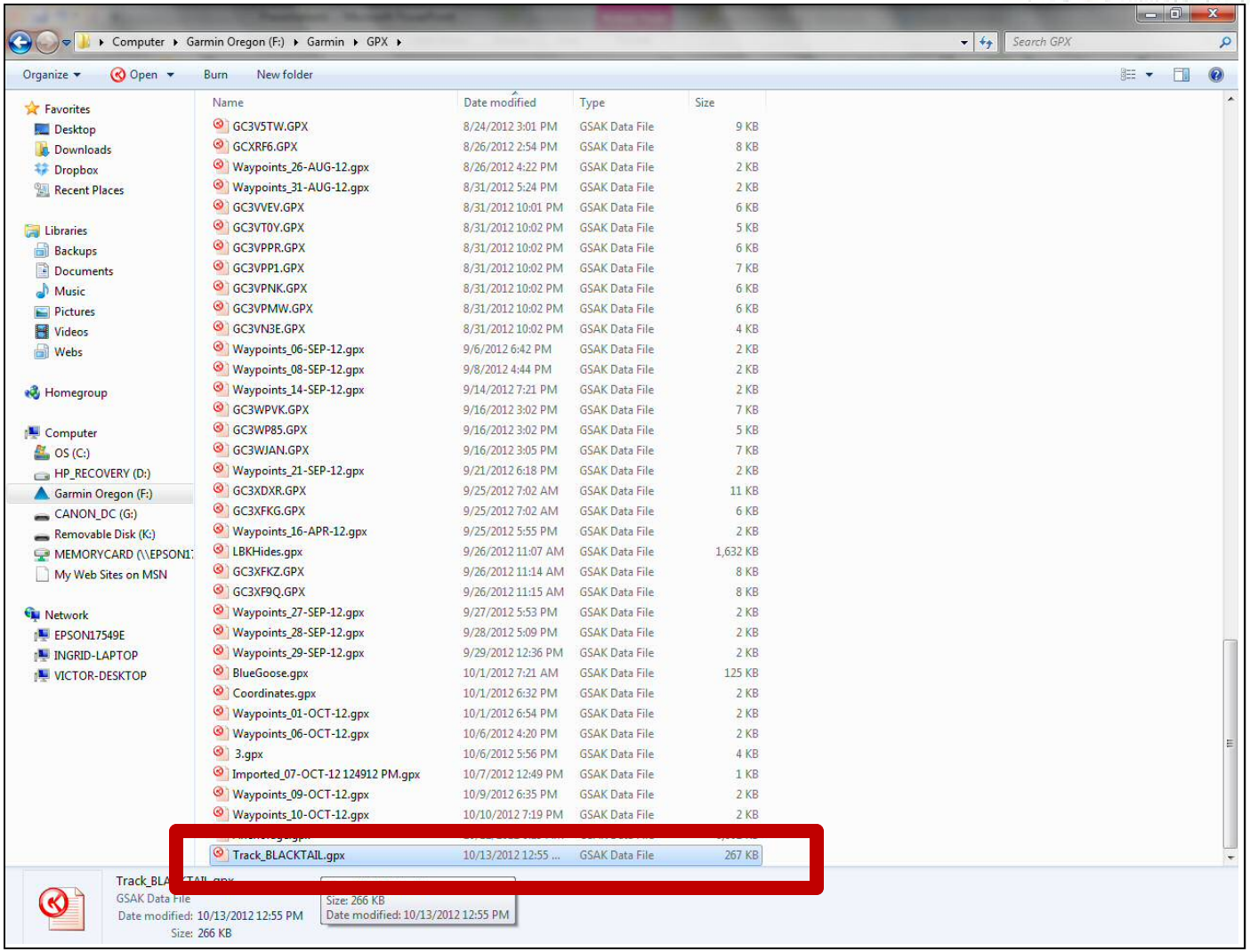

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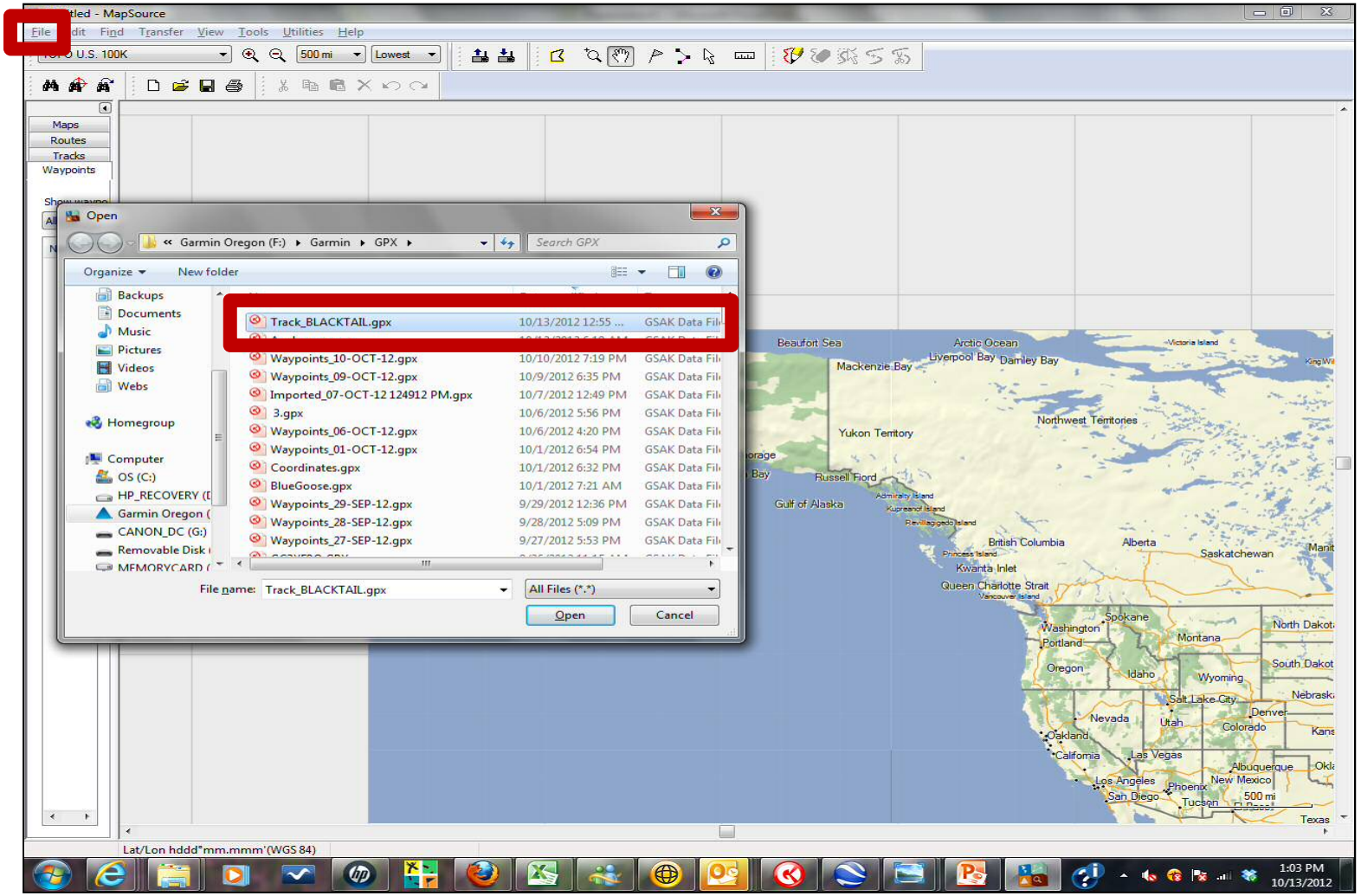

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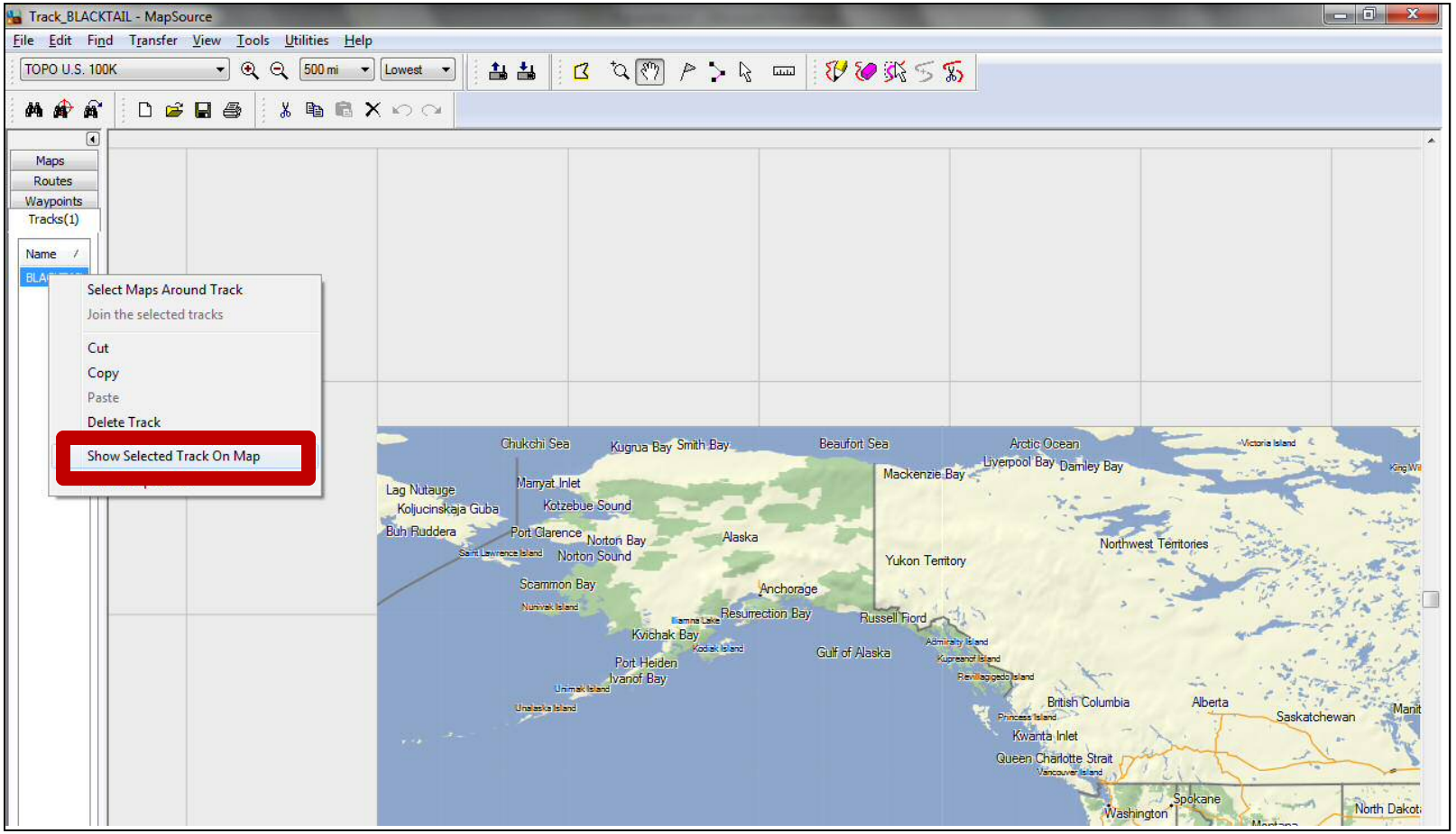

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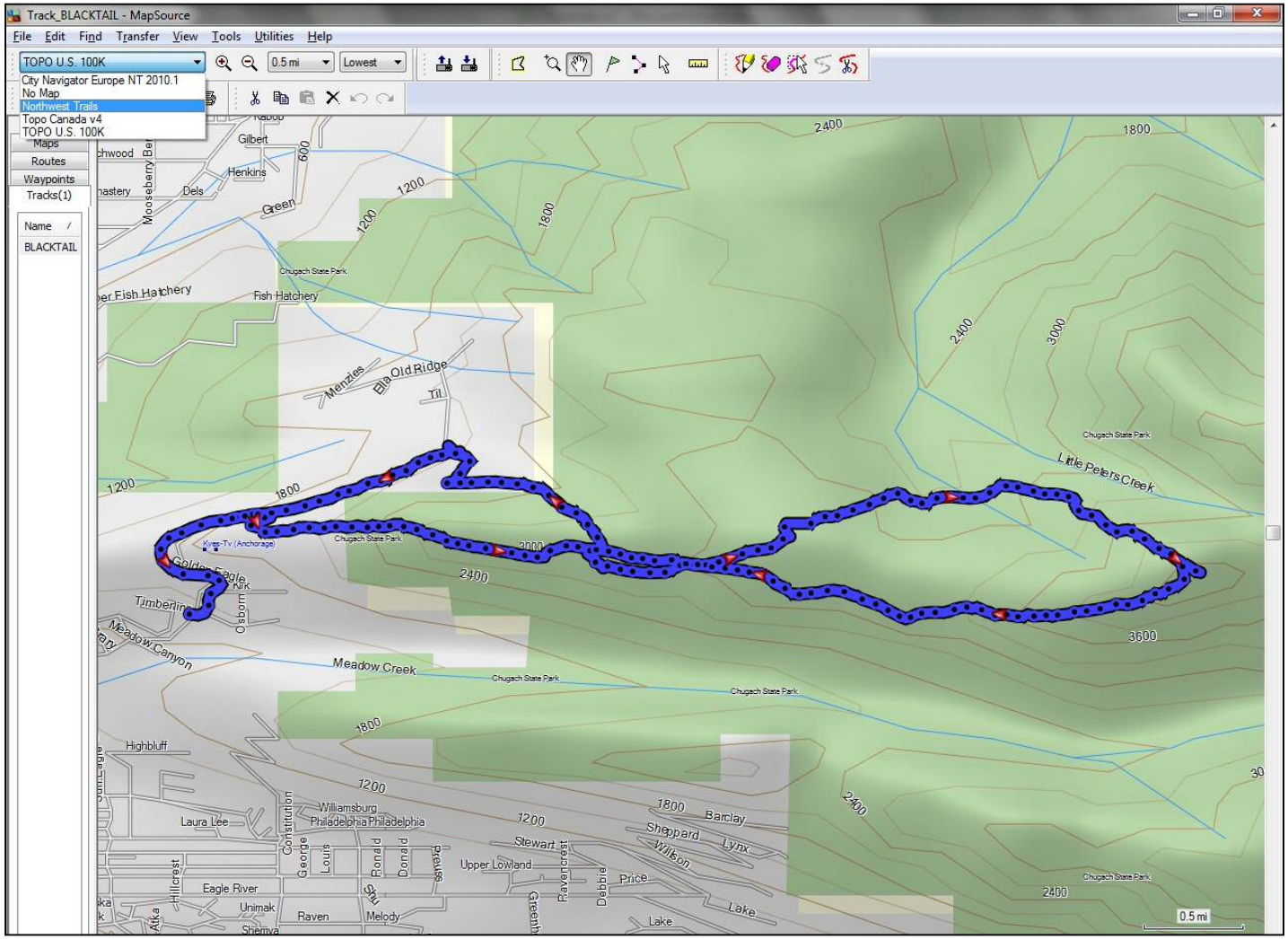

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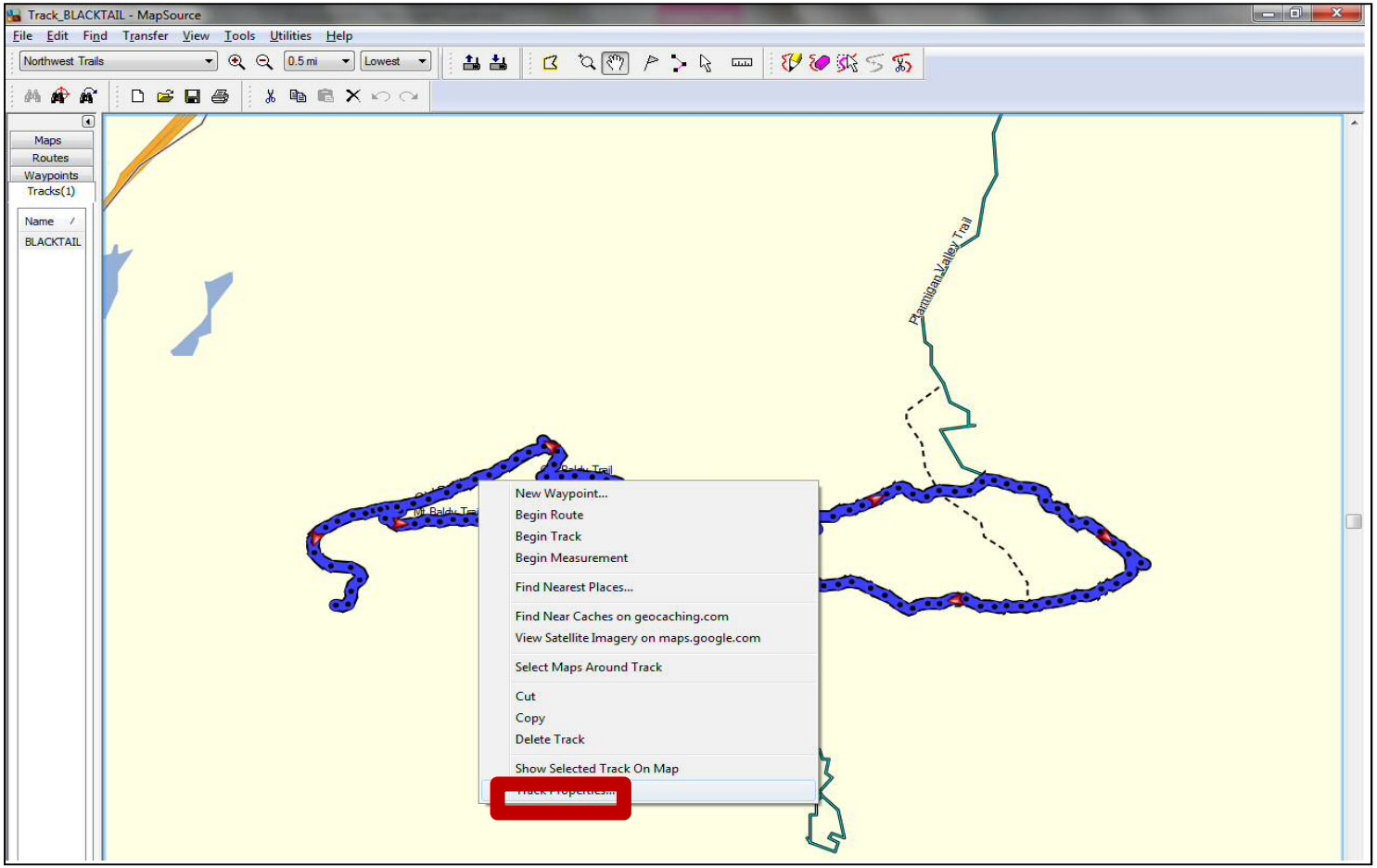

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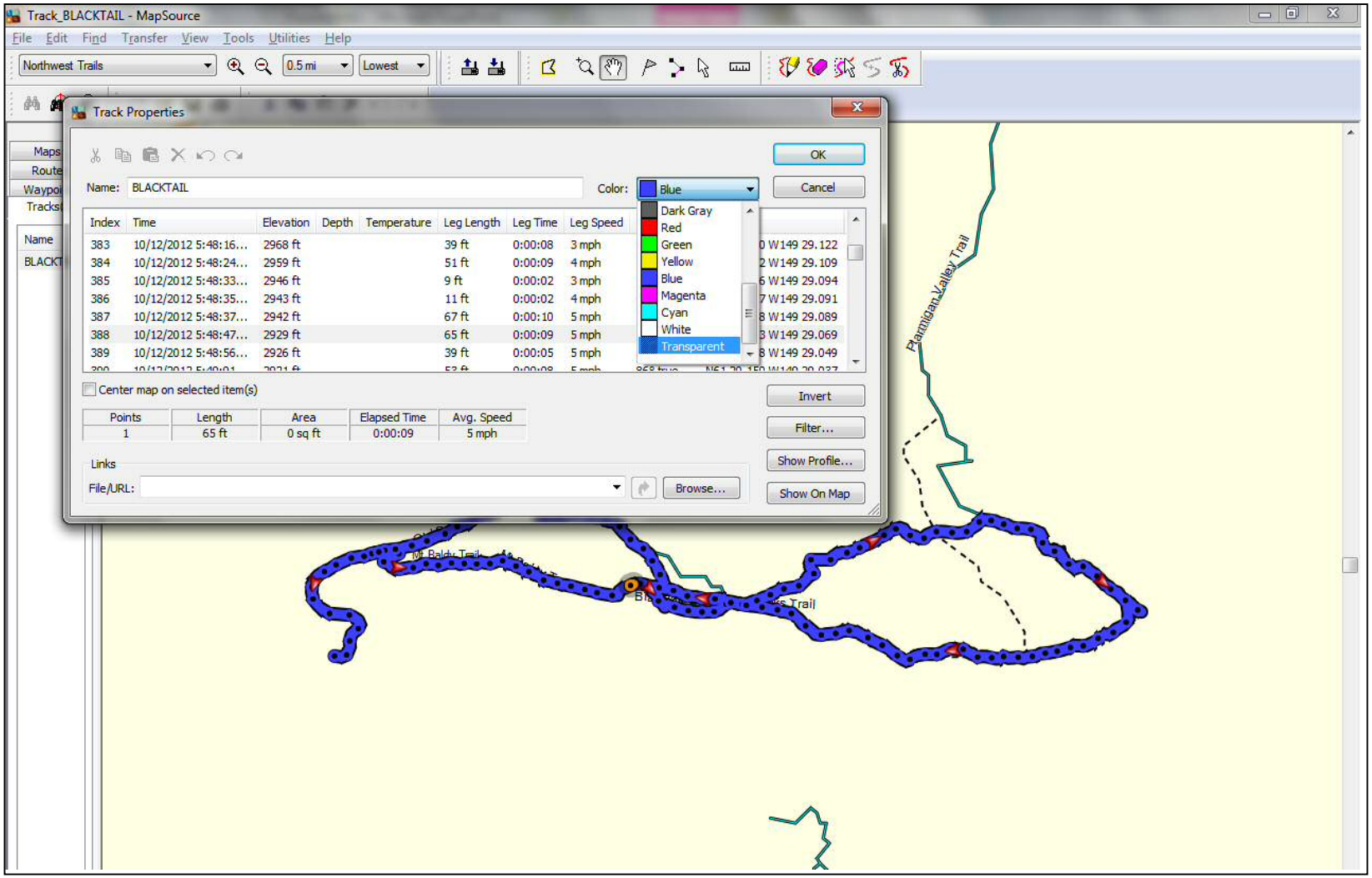

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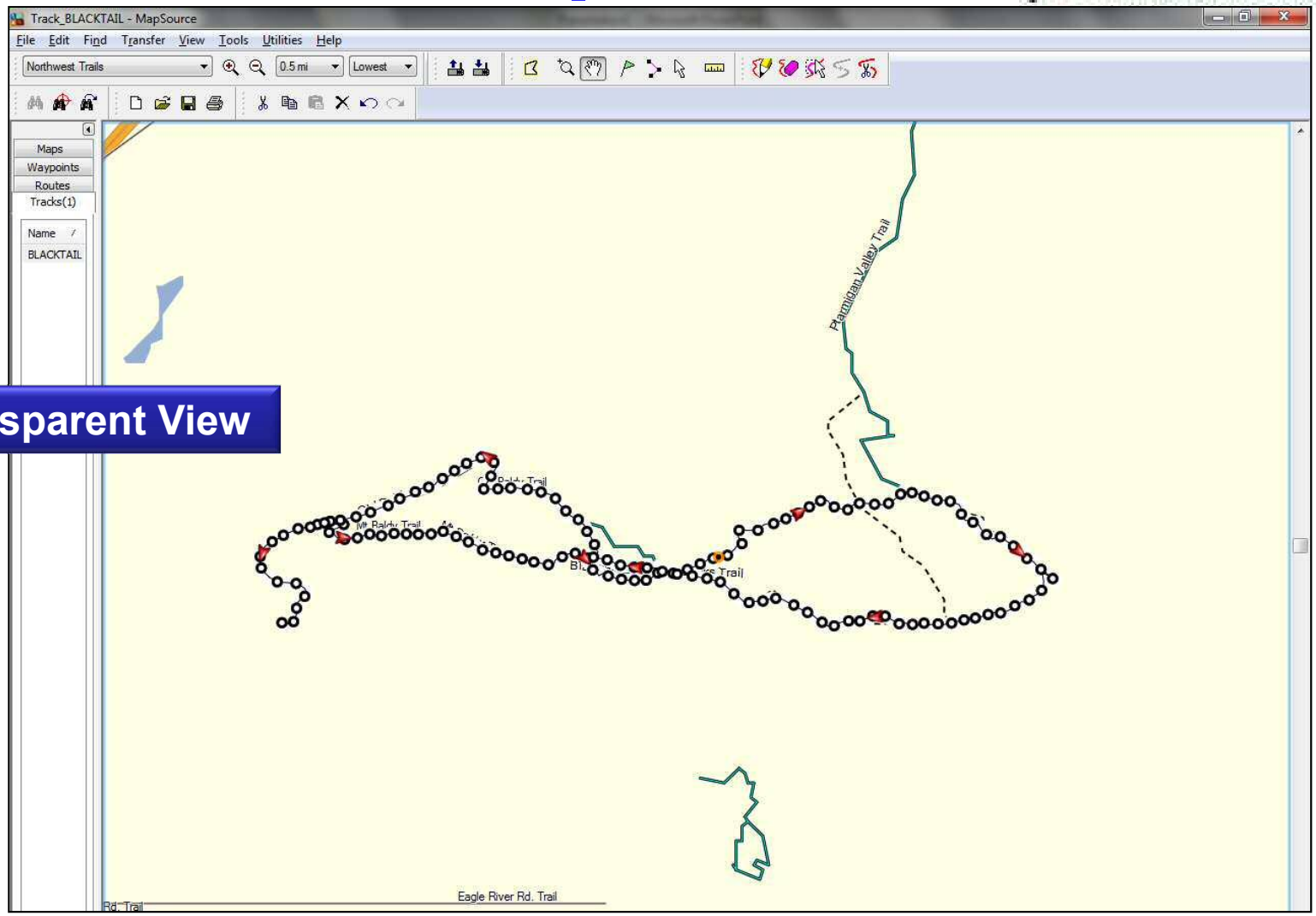
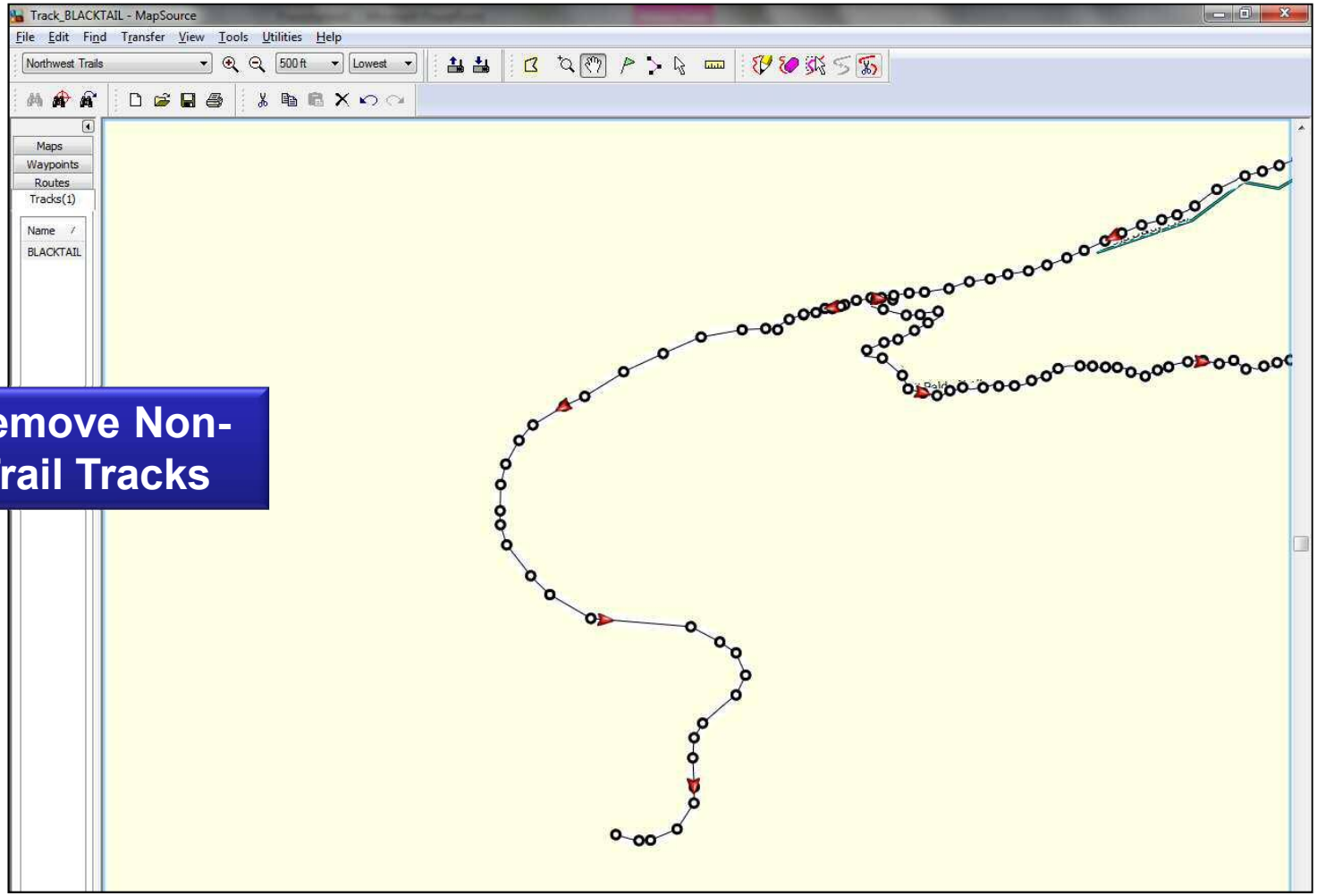


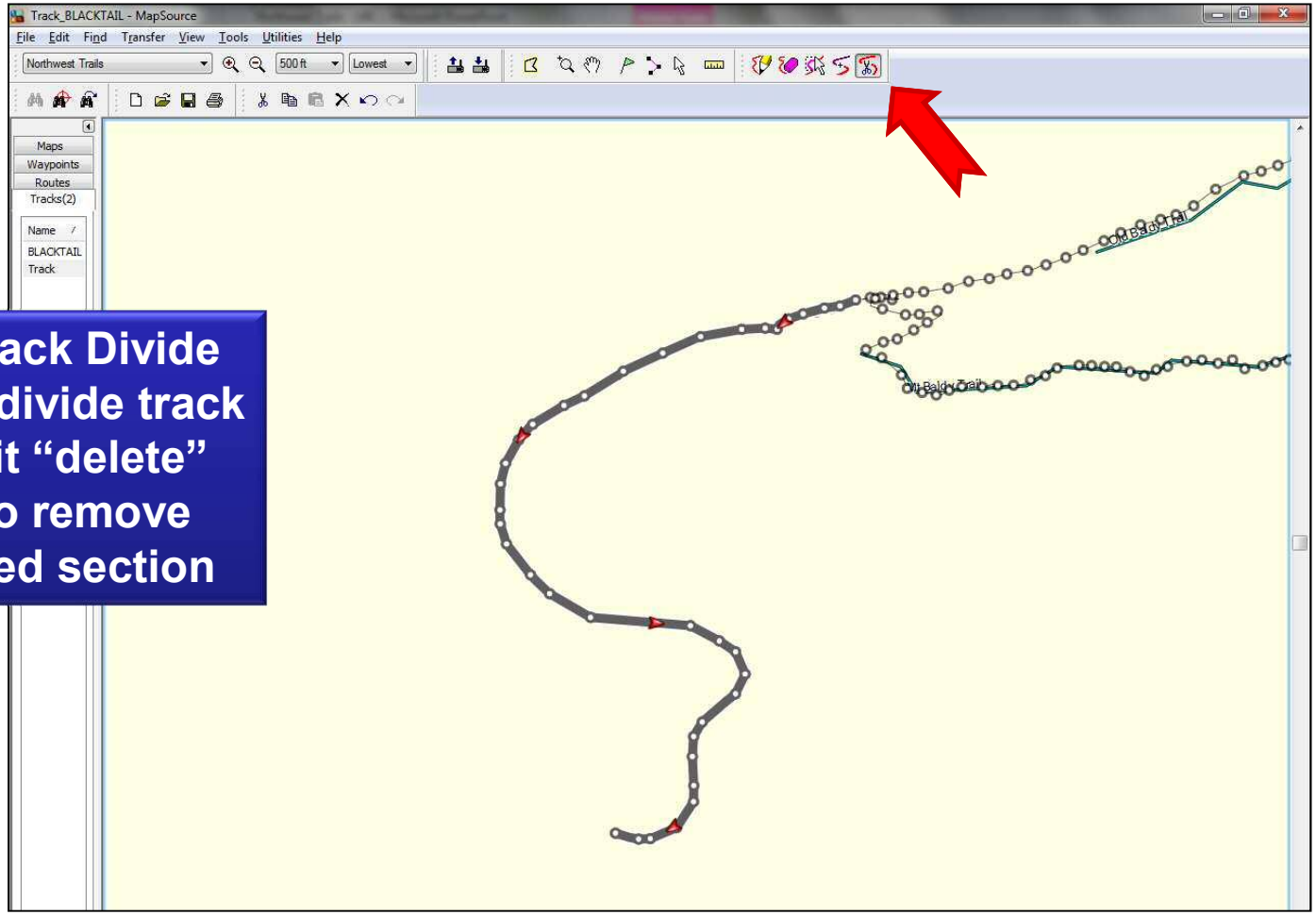
Transparent View

NW Trails Maps



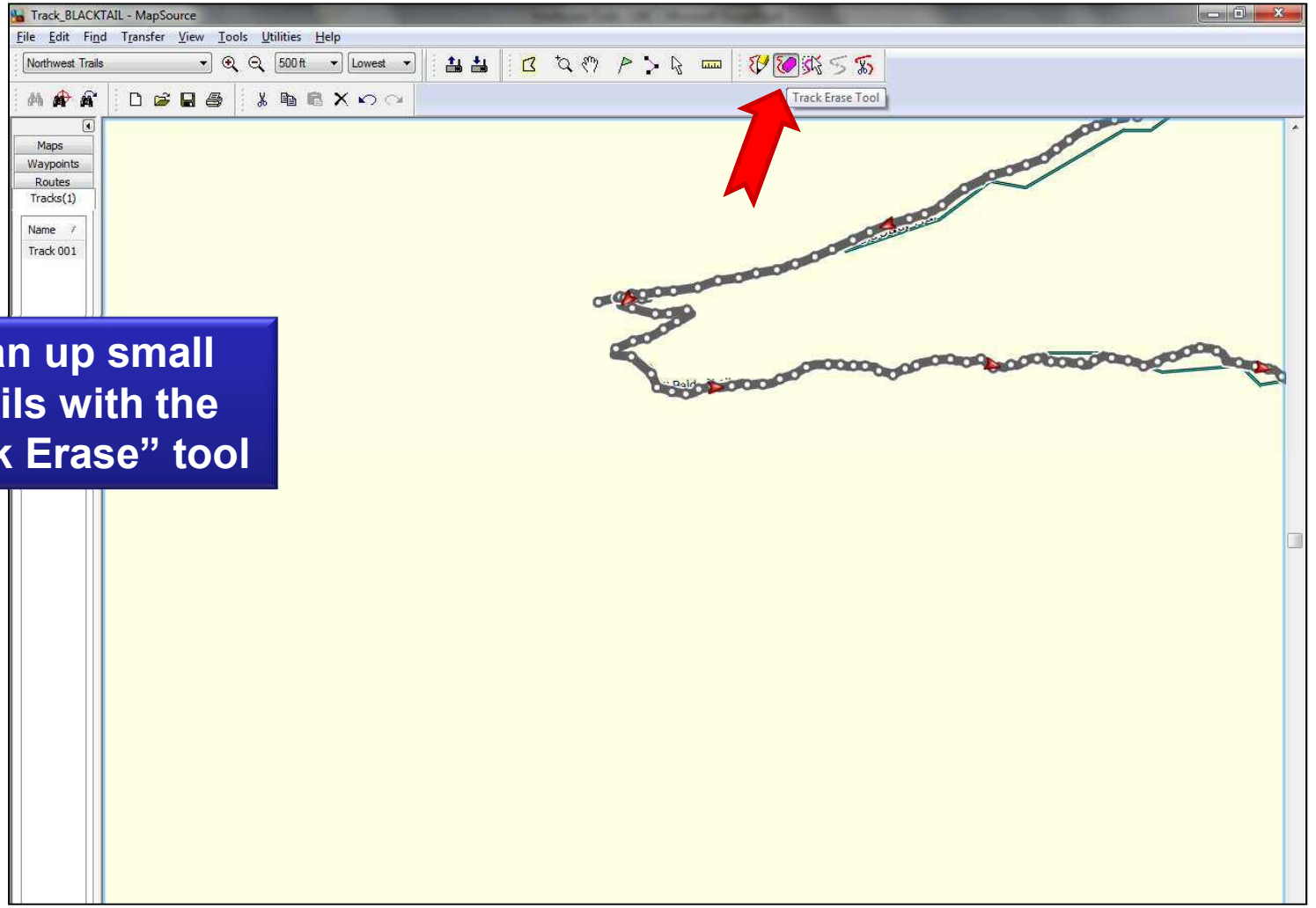
Remove Non-Trail Tracks

NW Trails Maps



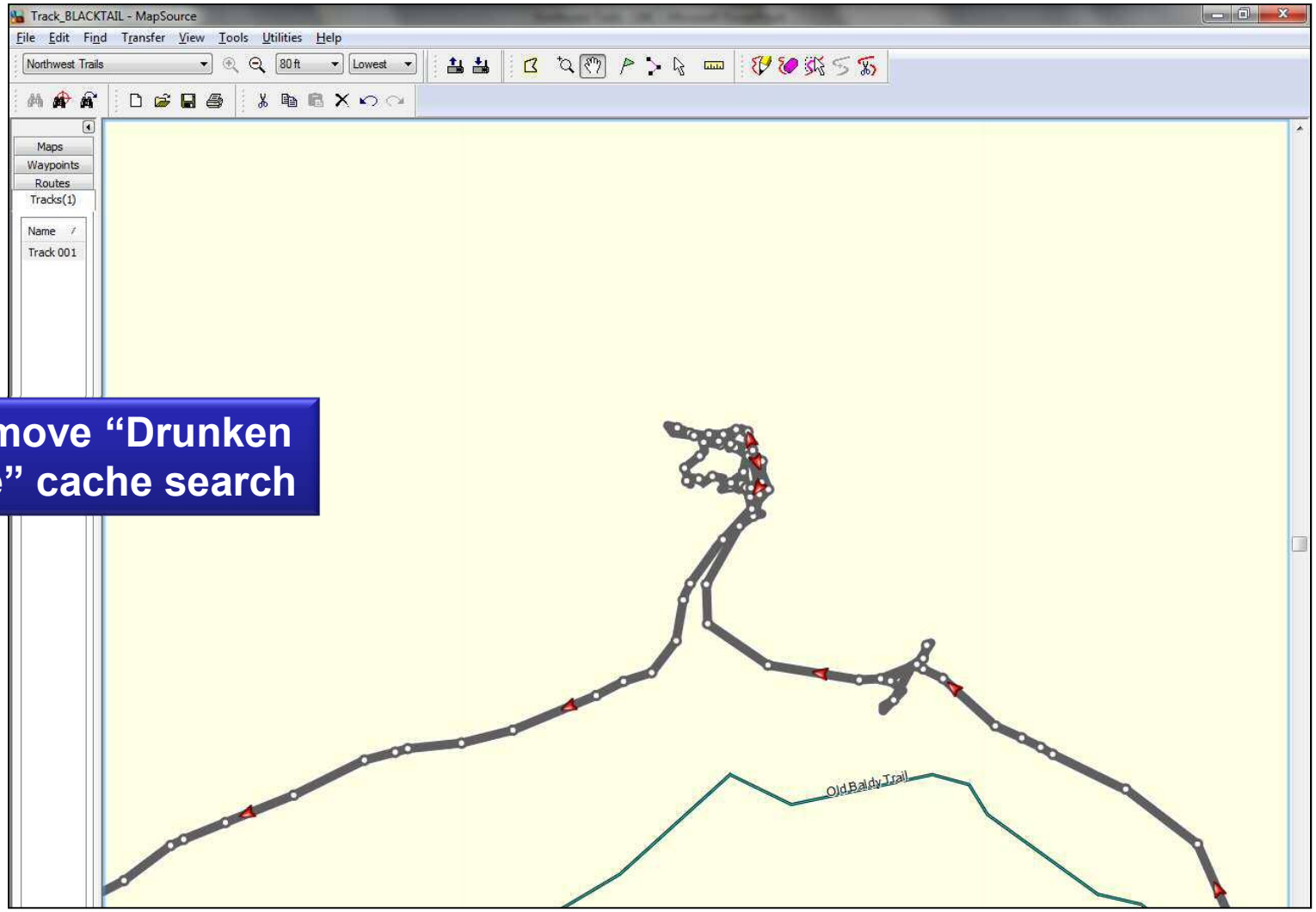
Use Track Divide Tool to divide track and hit "delete" key to remove selected section

NW Trails Maps



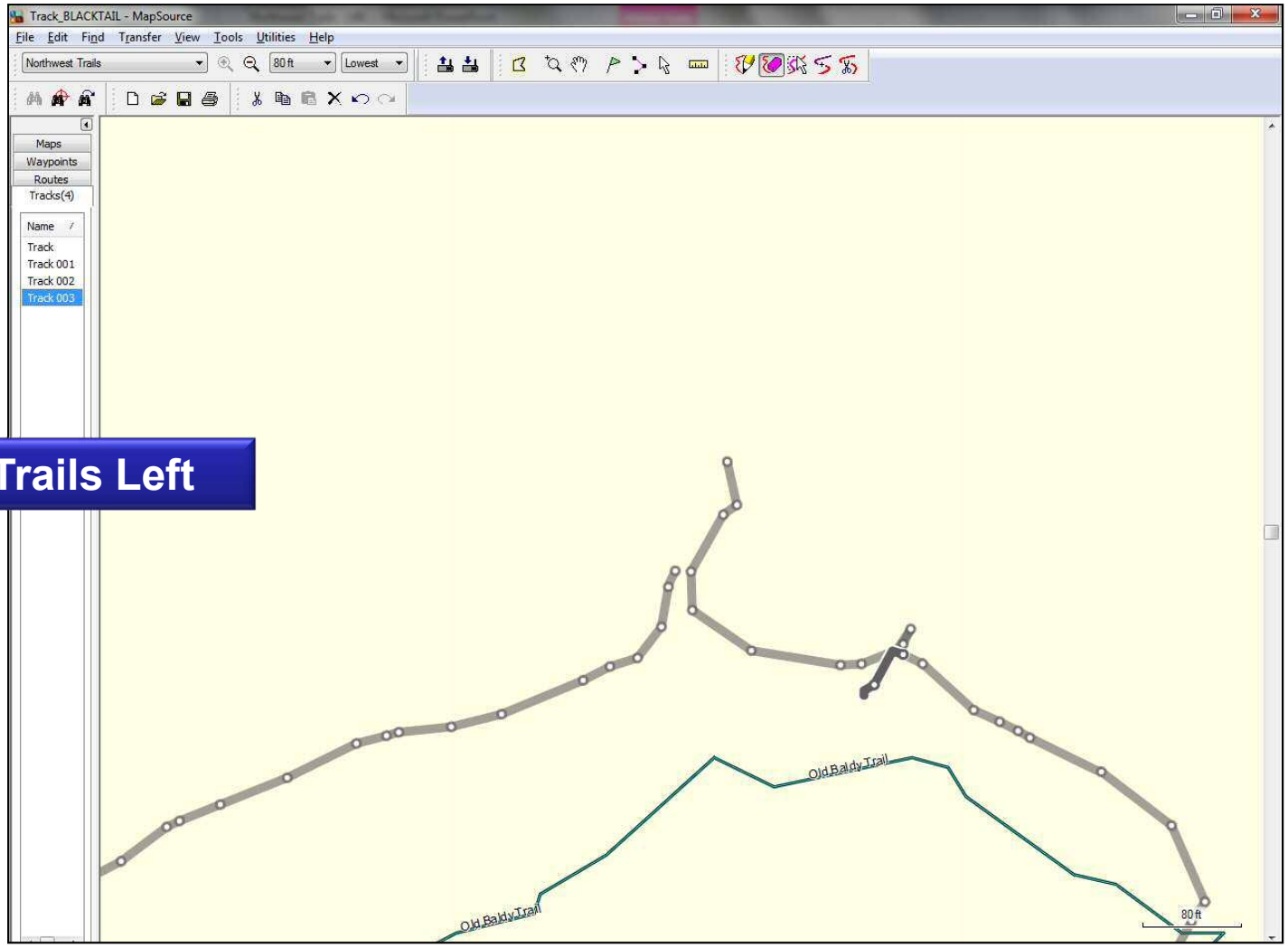
Clean up small details with the "Track Erase" tool

NW Trails Maps



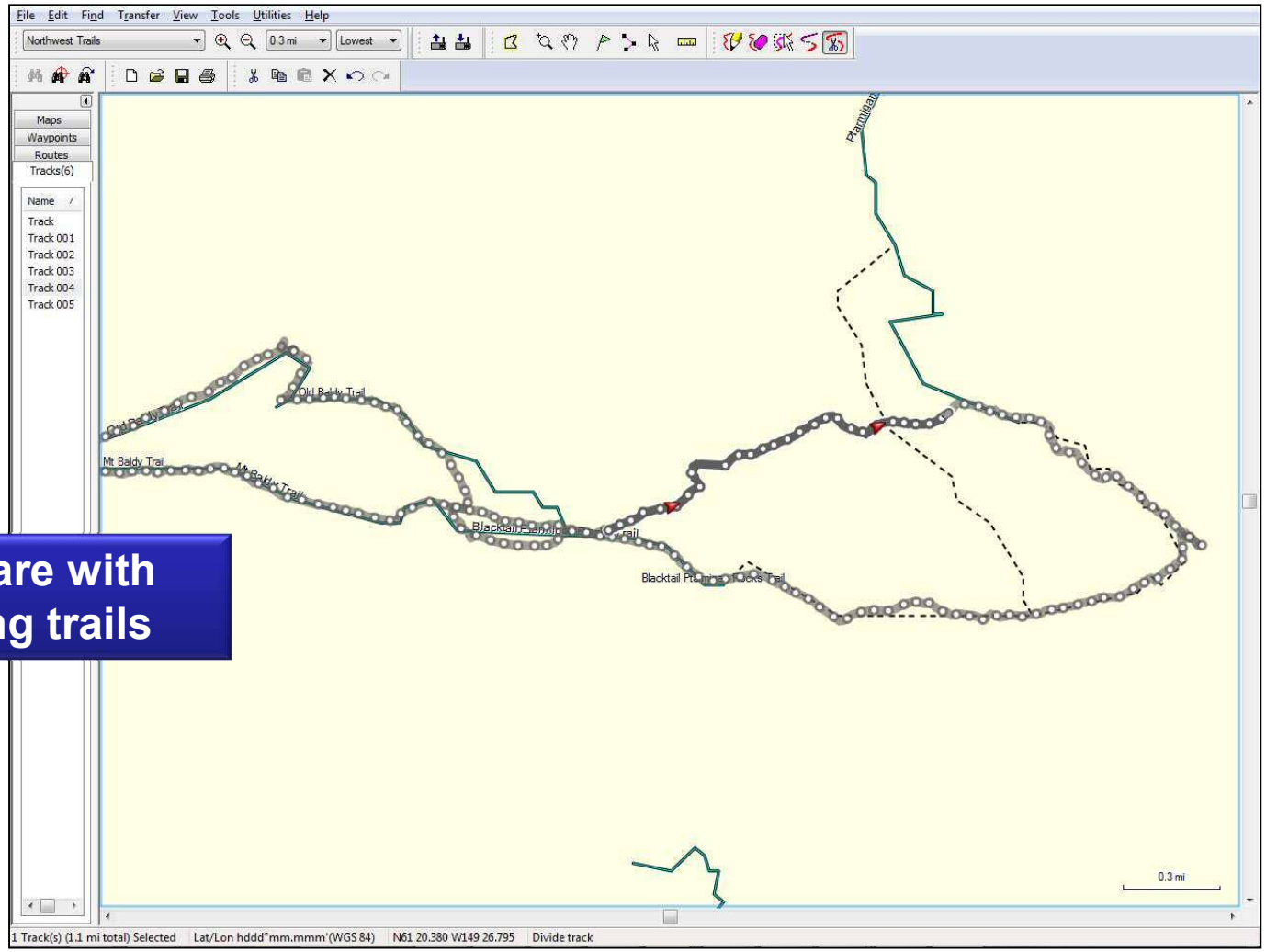
Remove "Drunken Bee" cache search

NW Trails Maps



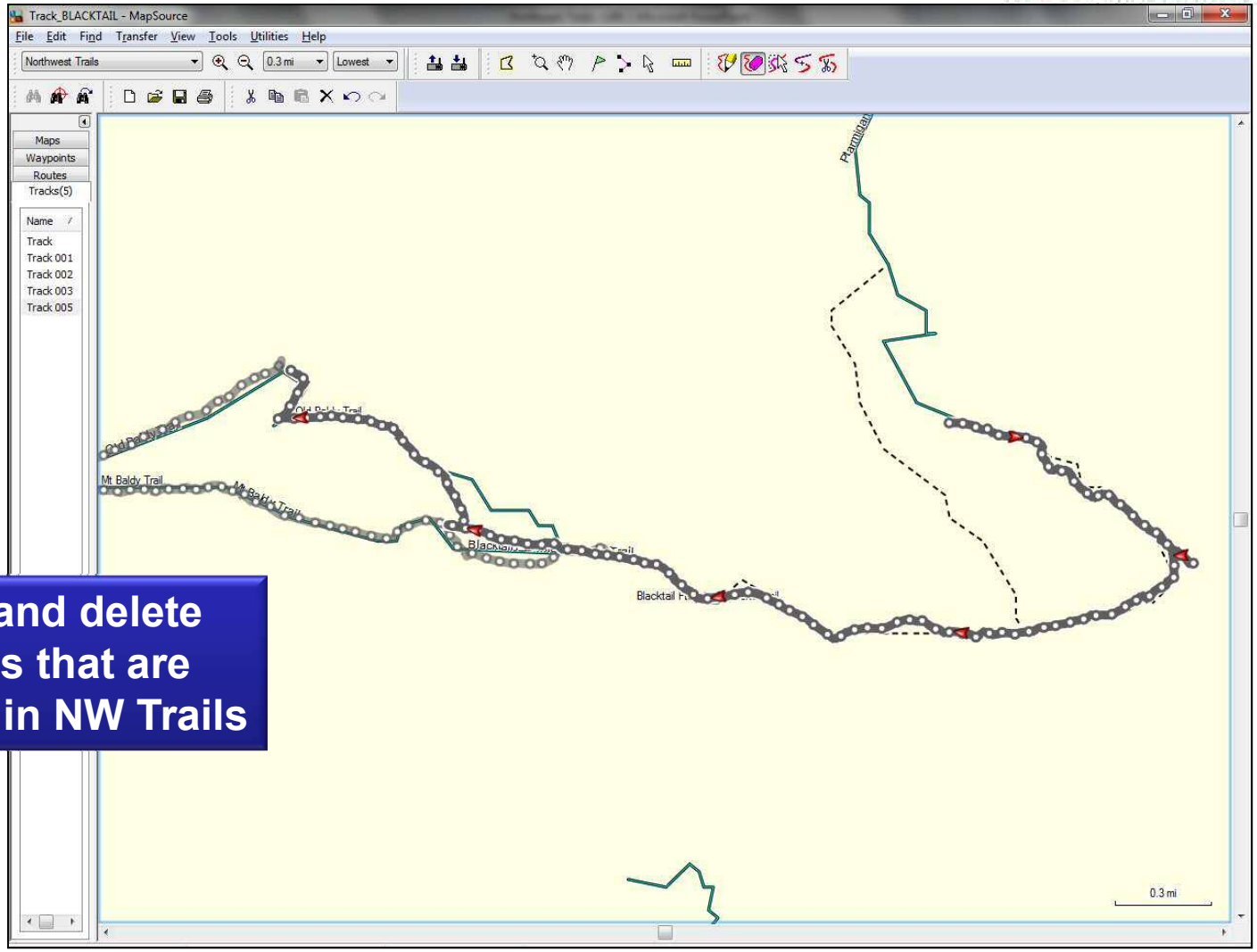
Only Trails Left

NW Trails Maps



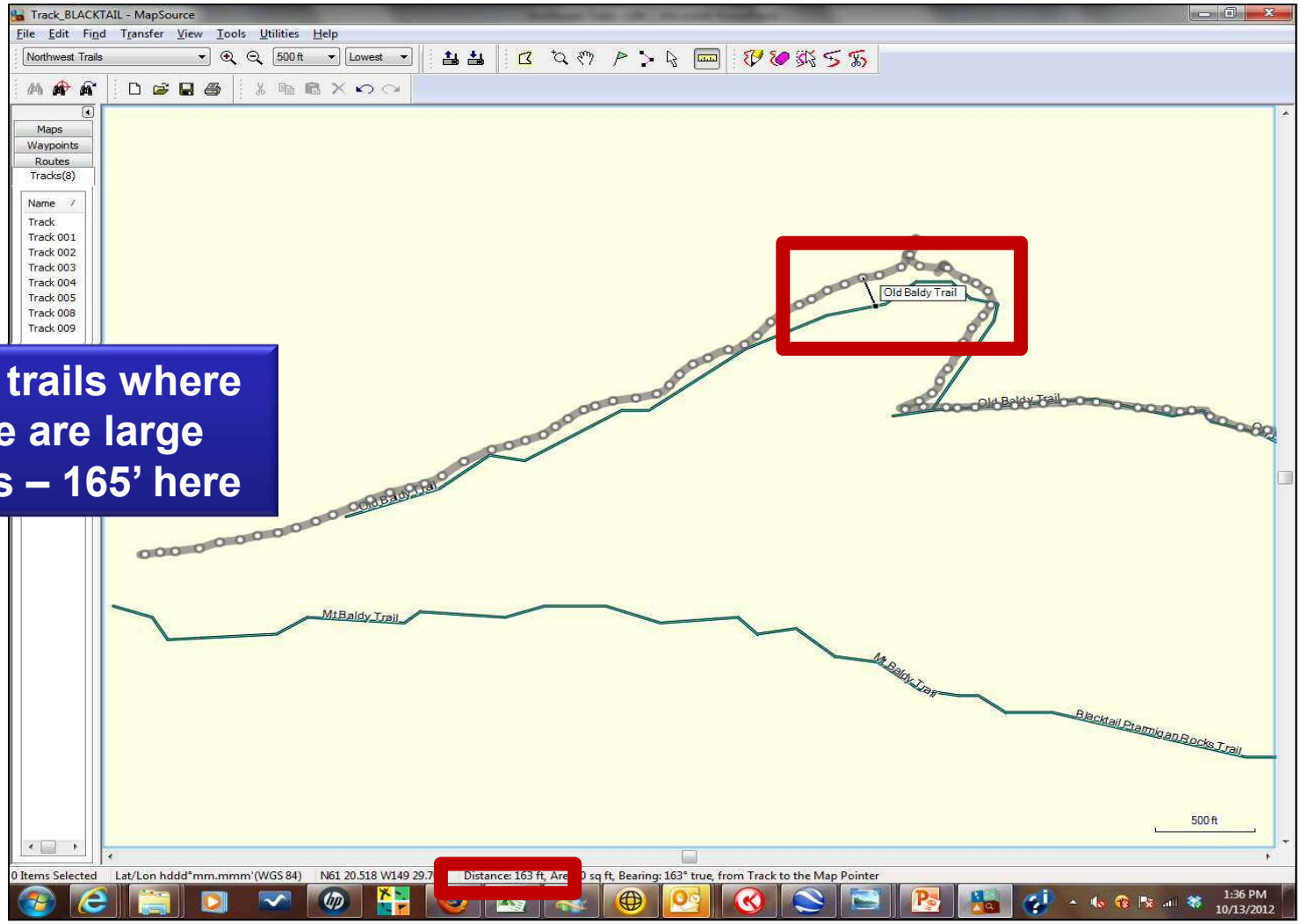
Compare with existing trails

NW Trails Maps



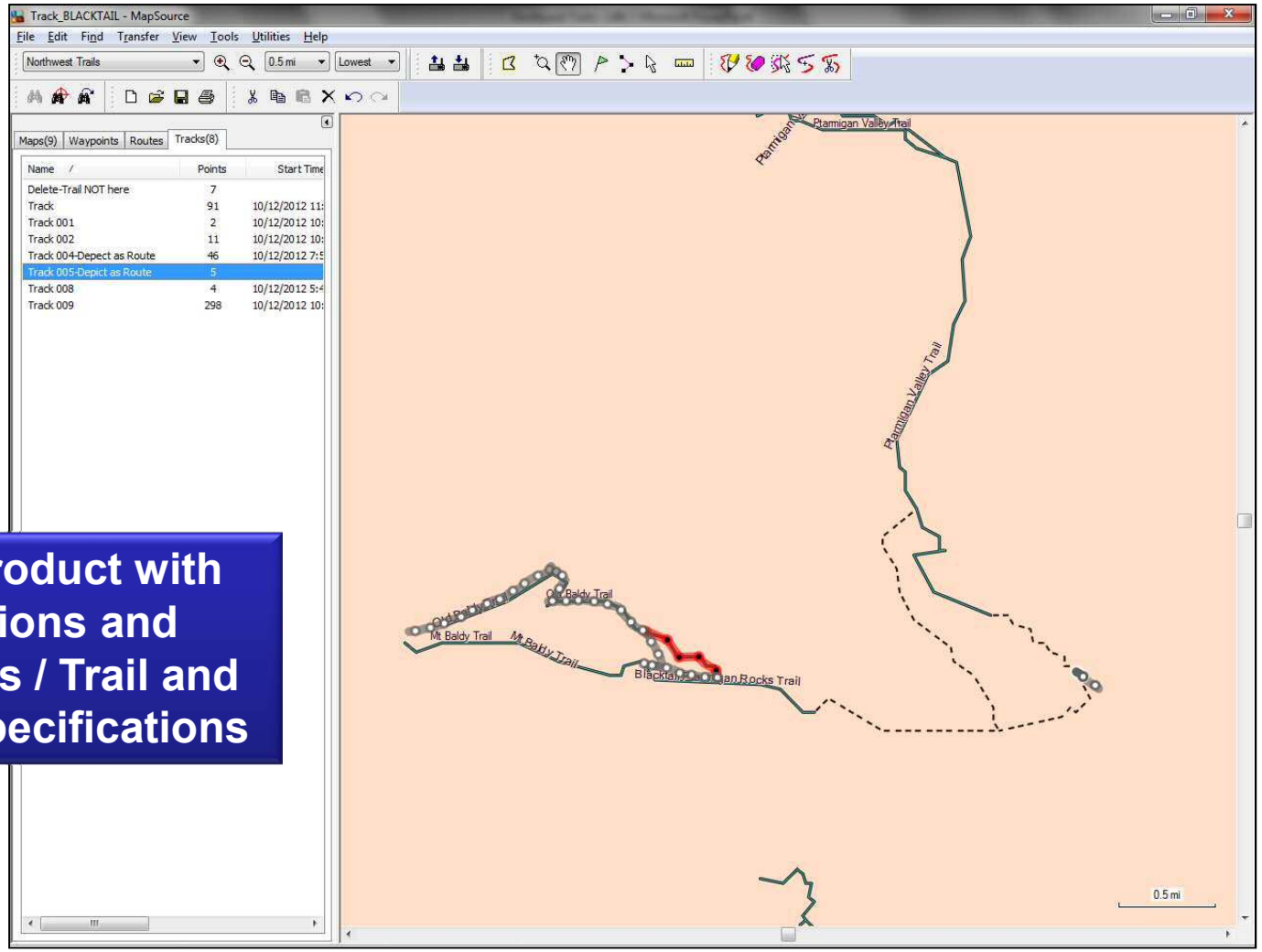
Snip and delete tracks that are already in NW Trails

NW Trails Maps



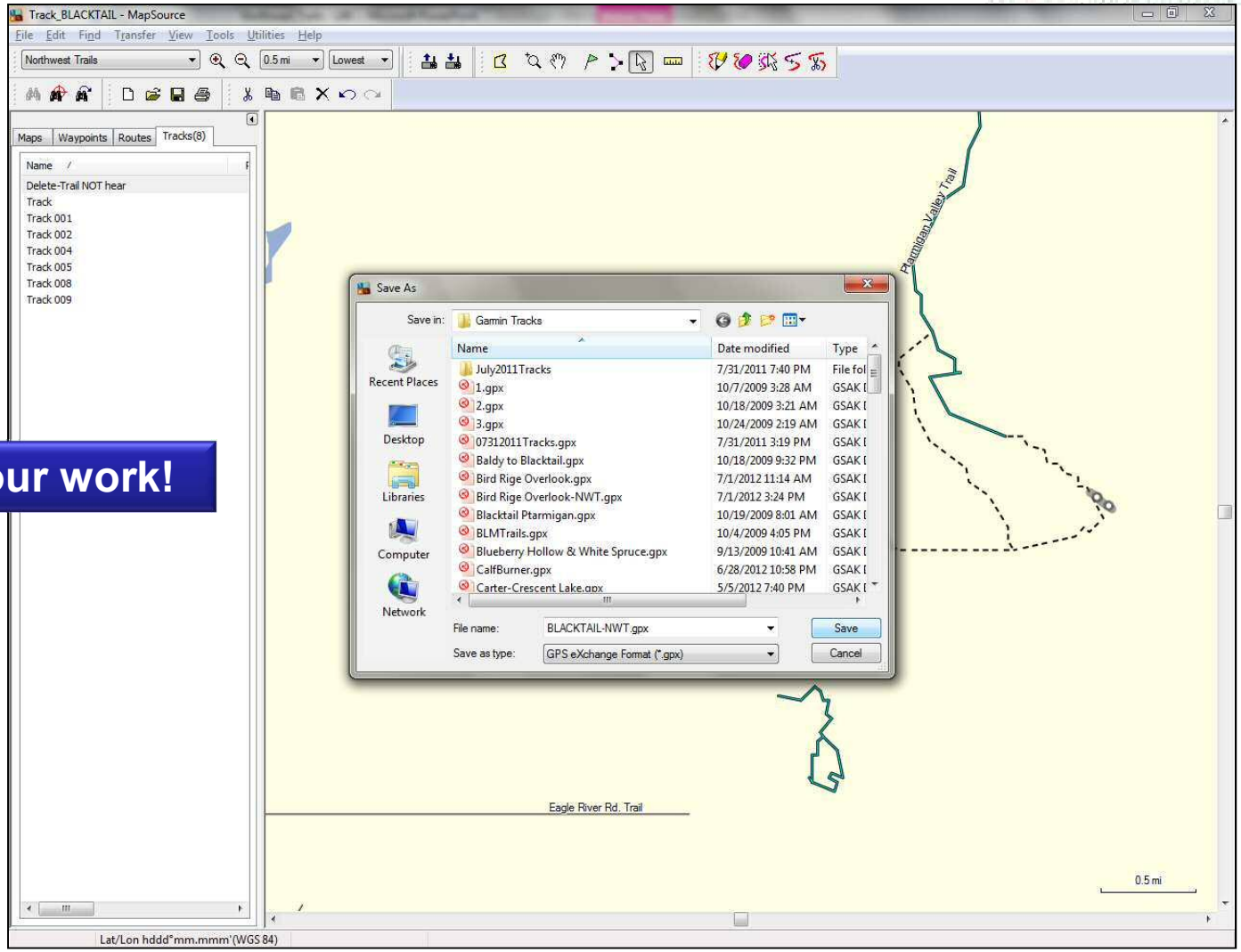
Leave trails where there are large offsets – 165' here

NW Trails Maps



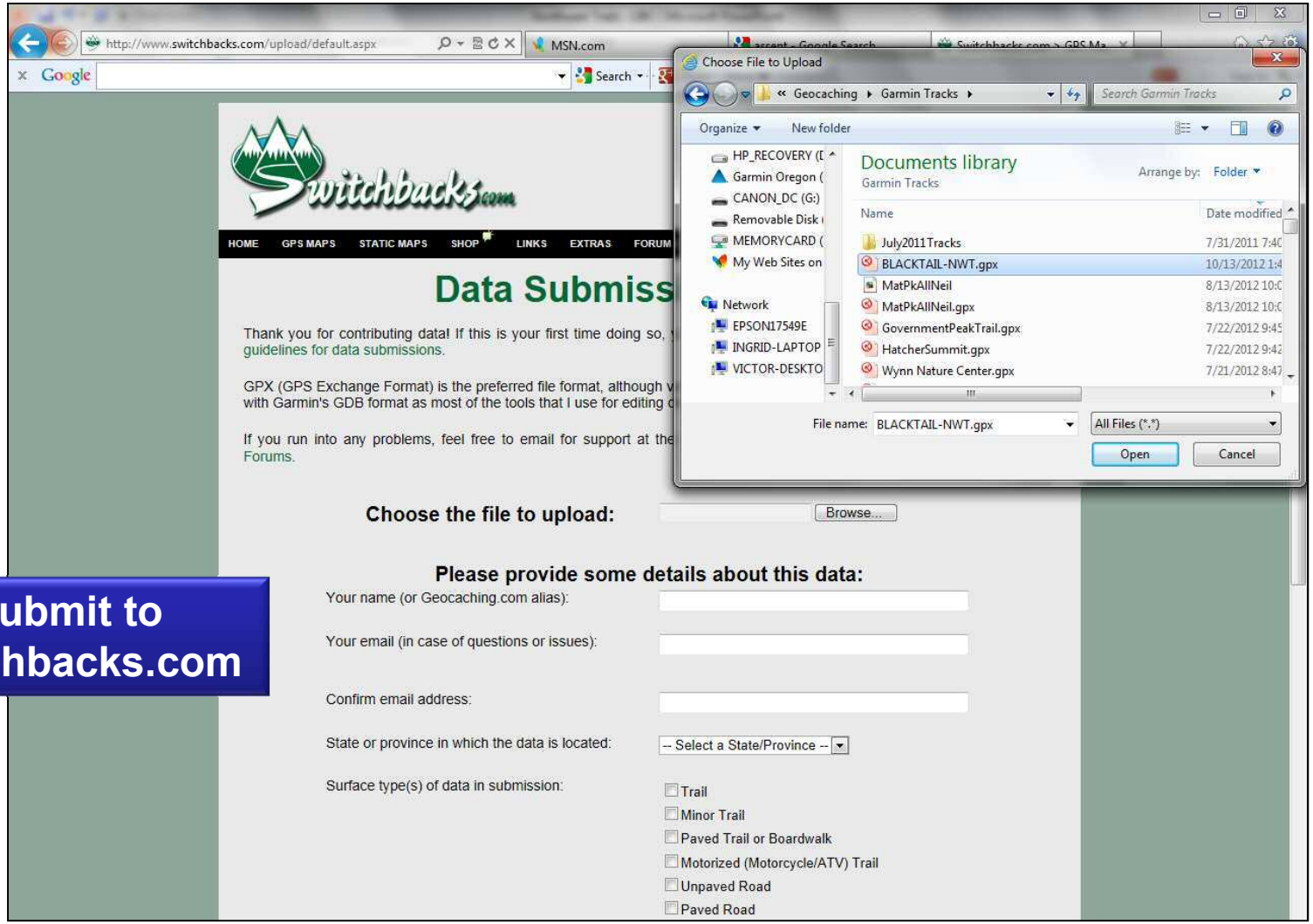
Final Product with Additions and Deletions / Trail and Route Specifications

NW Trails Maps



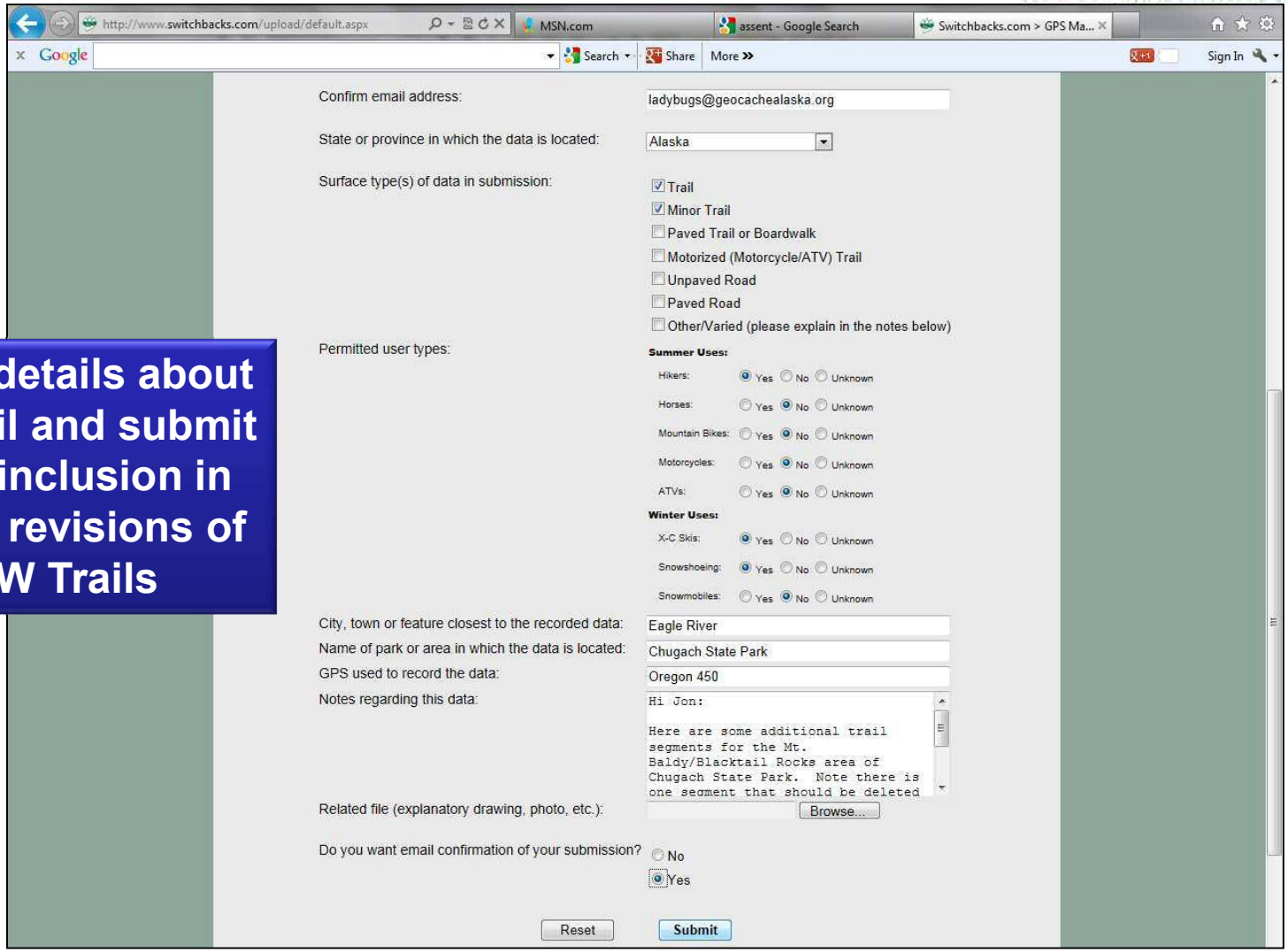
Save your work!

NW Trails Maps



Submit to Switchbacks.com

NW Trails Maps



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

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