GPS for Snowmobilers

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Copy of White Paper & Presentation

- Both this presentation and the white paper are available on the **www.TahoeSnowmobiling.org** website in pdf file format

What is a GPS?

- GPS stands for Global Positioning System
  - Where any receiver can determine its exact location on the surface of the earth
- Ideal proposed in 1960
- Full implemented by 1995
- 24 to 29 satellites are used
- 10 to 50 feet positional accuracy

Why **Snowmobilers** should always carry and use a GPS

- In case of an emergency
- In case you get lost
- Document your tracks
- Find your way around for the day

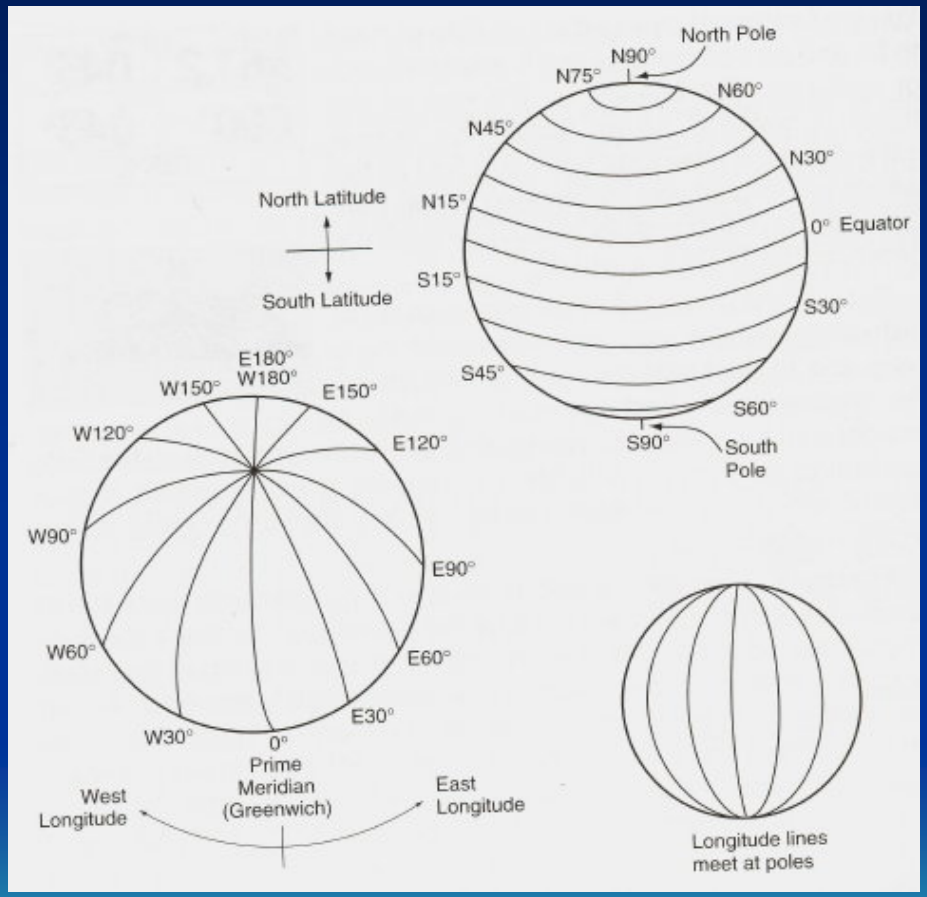
GPS Concepts

- #1 All circles are divided into 360 degrees
- #2 Each degree has 60 minutes and each minute has 60 seconds

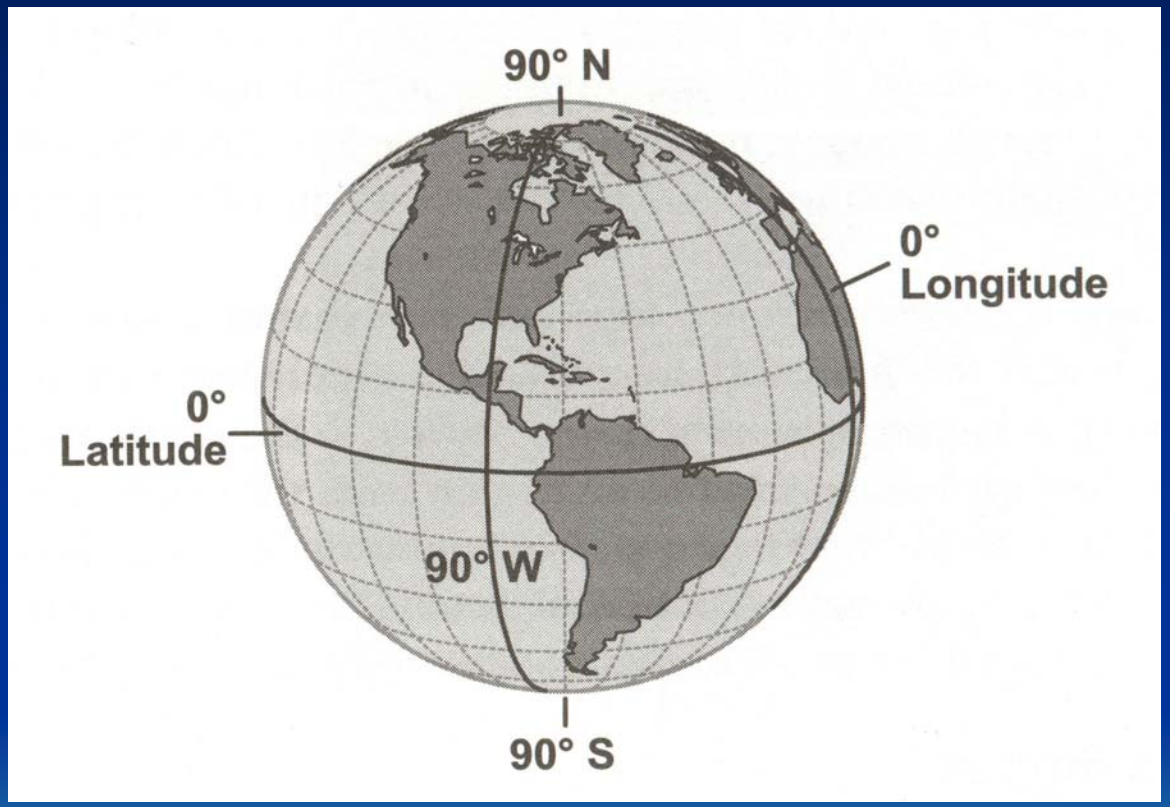
GPS Concepts (con't)

- #3 For earth navigation, equator is the starting point for north / south navigation
  - Latitude is 0 to 90 deg N or S
- #4 For east / west navigation, Greenwich, England is the starting point
  - Longitude goes from 0 to 180 deg W or E
  - This line is know as Prime Meridian

Latitude & Longitude Lines



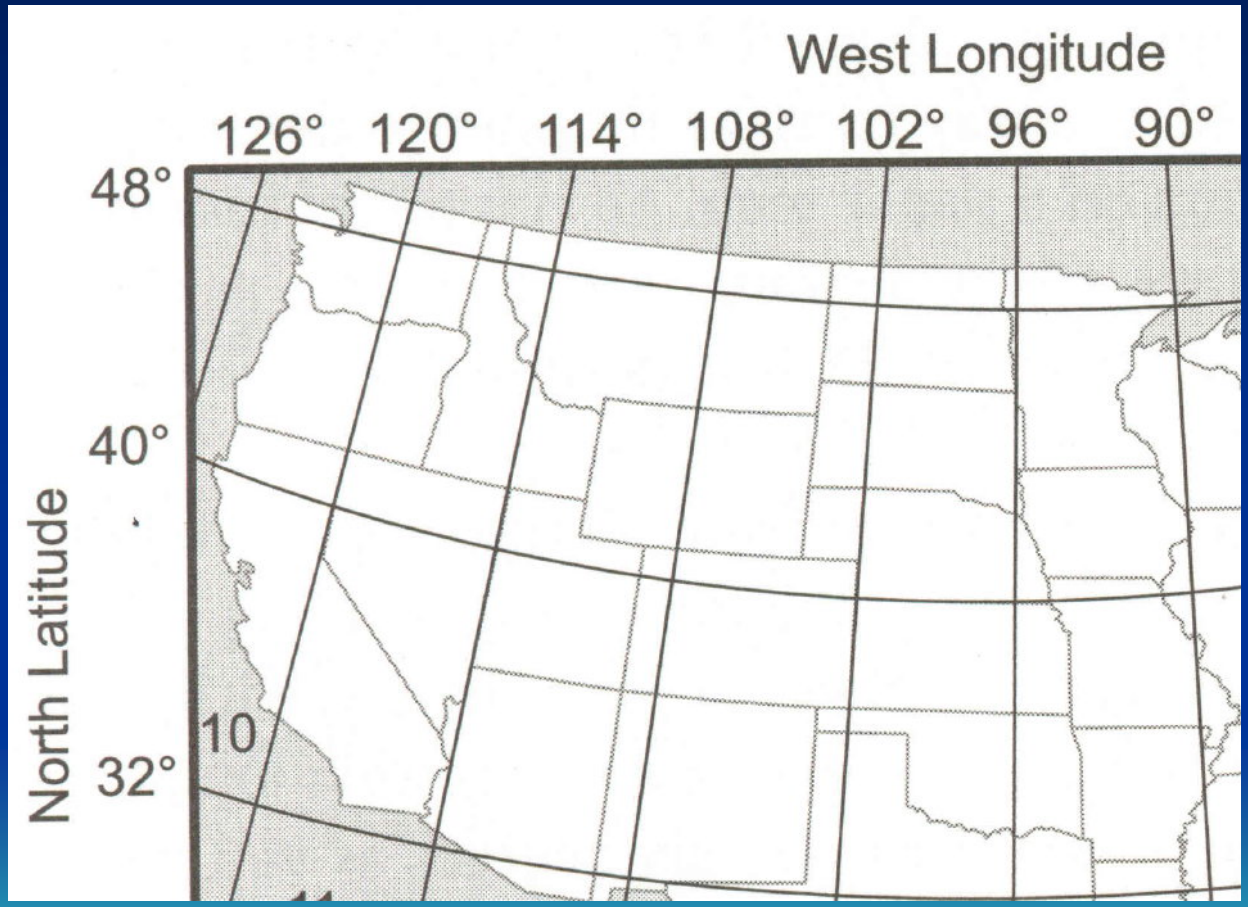
World of Latitude & Longitude



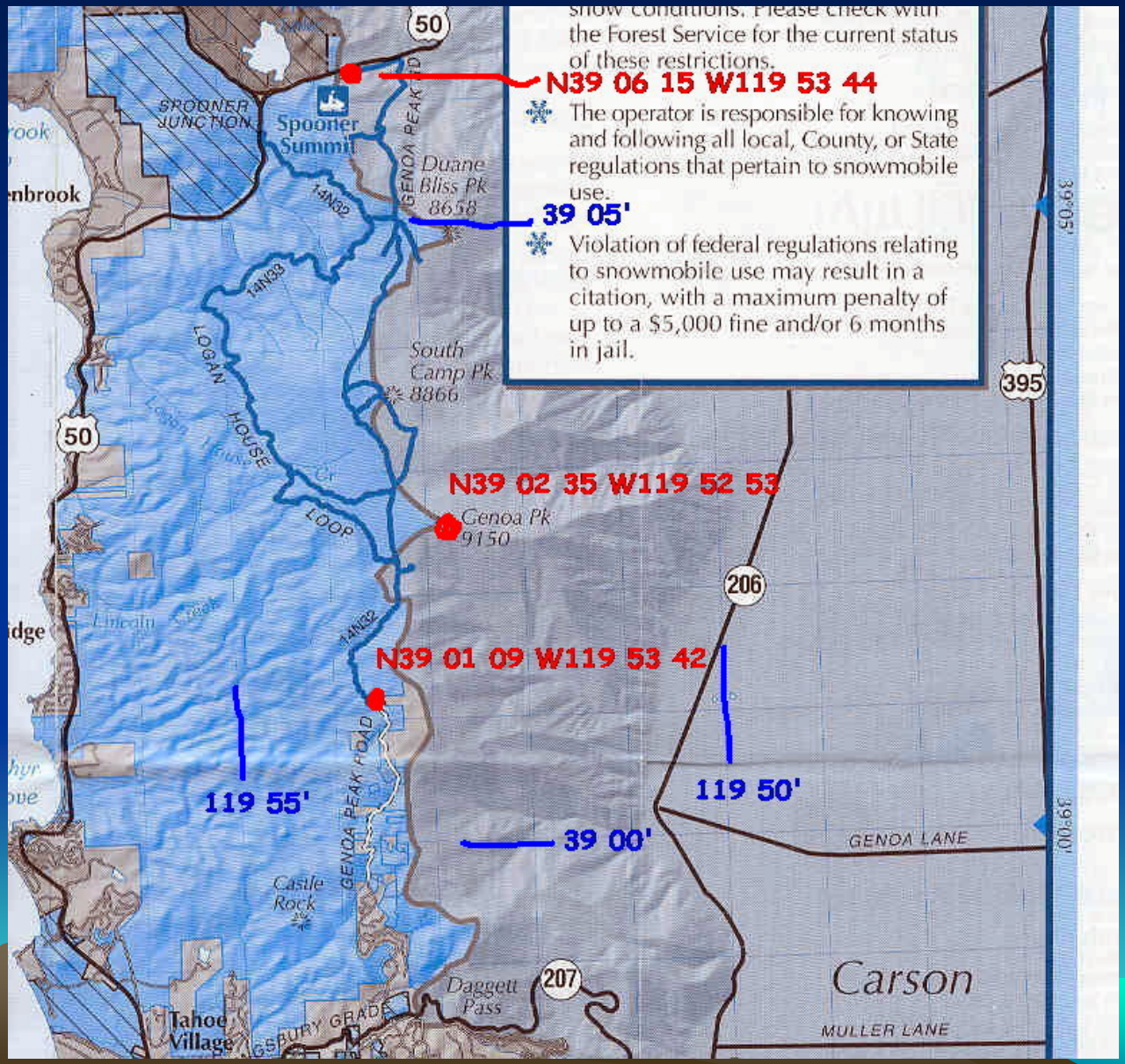
GPS Concepts (con't)

- #5 Calif/Nev due N/S boarder is 120 deg
  - In Calif, Long deg is 120 deg or more
  - In Nev, Long deg is 119 deg or less
- #6 In the middle of Lake Tahoe, the Calif/Nev boarder turns at 39 deg N
  - If north of LT, Lat is 39 deg or more
  - If south of LT, Lat is 38 deg or less

Western US Lat & Long



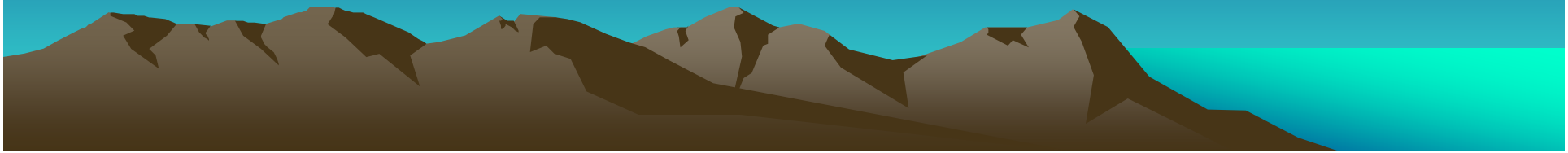
Some Spooner Summit Coordinates



GPS Concepts (con't)
#7: For the Lake Tahoe Region

- 1 deg of Latitude = 69.0 miles
- 1 min of Latitude = 6,070 ft or 1.15 mi
- 1 sec of Latitude = 100 ft

- 1 deg of Longitude = 53.8 miles
- 1 min of Longitude = 4,730 ft or 0.90 mi
- 1 sec of Longitude = 80 ft



GPS Concepts (con't)

- #8 For better positional accuracy, also display 10th of a second
  - each N/S 10^{th} of a sec is = 10 ft
  - each E/W 10^{th} of a sec is = 8 ft

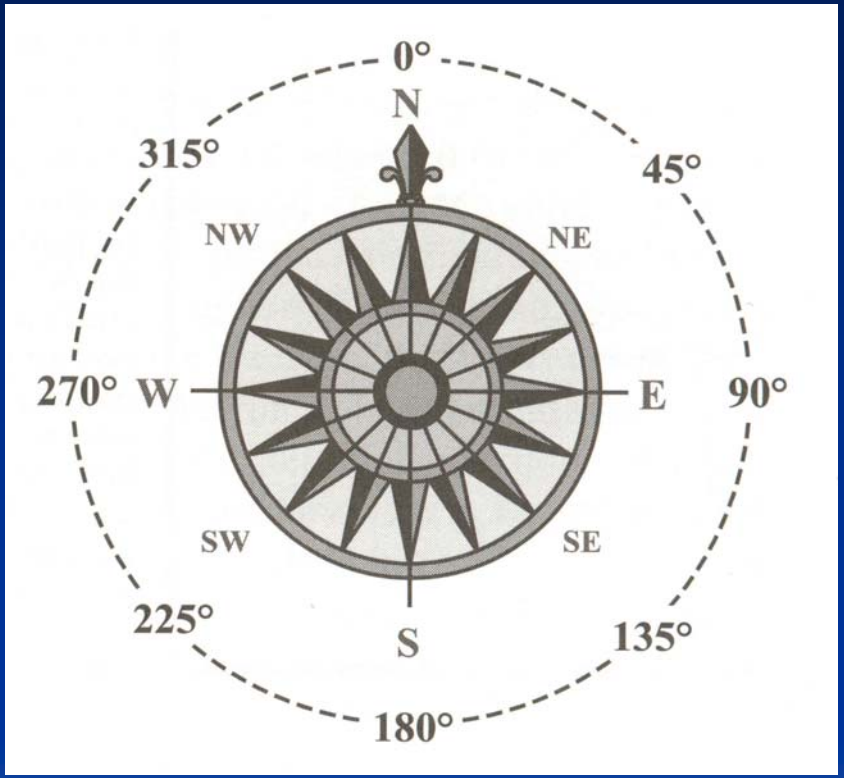
GPS Concepts (con't)

- When standing still
  - The 10^{th} of a second will change up to 4 to 5 - 10^{th} of a second
  - Due to moving satellites, signal strength, accuracy and other factors

GPS Concepts (con't)

- #9 Direction of travel is called **bearing**
  - True North is = 0 deg
  - Due east is = 90 deg
  - Due west is = 270 deg

Bearing / Compass



GPS Concepts (con't)

- #10 Features you should know how to use
  - Waypoint
  - Track
  - Route
  - GOTO waypoint
  - Datum & Lat/Long display units
  - True North
  - Latitude
  - Longitude

GPS Concepts (con't)

- #11 Things a GPS can do:
  - Display your location & elevation
  - Measure distance travel
  - Calculate distance & bearing to a w.p.
  - Mark your present location
  - Record your tracks
  - Display a map of where you are
  - Show a satellite page
  - Interface to a computer + more

GPS Concepts (con't)

#12: WAAS: Wide Area Augmentation System

- Gives GPS positional correction information
- Provides 5 times better accuracy
  - Within 10 feet, 95% of the time
- 2 Geo-synchronous satellites are used
- One above the Pacific ocean and one above the Atlantic ocean
- Used mainly to mark waypoints

GPS Tips

- #1 Carry a spare set of batteries
- #2 Turn **ON** your GPS at least once a month
- #3 Always MARK your starting location
- #4 Set datum to WGS84
- #5 Set coordinate display to Deg Min Sec
  - ddd mm ss.s
- #6 Know how to set the GOTO waypoint

GPS Tips (con't)

- #7 Practice, practice, practice
- #8 At lunch time, read some of your GPS screen functions
- #9 Once in a while, compare your GPS readings to the local map
- #10 Mount your GPS on the instrument panel

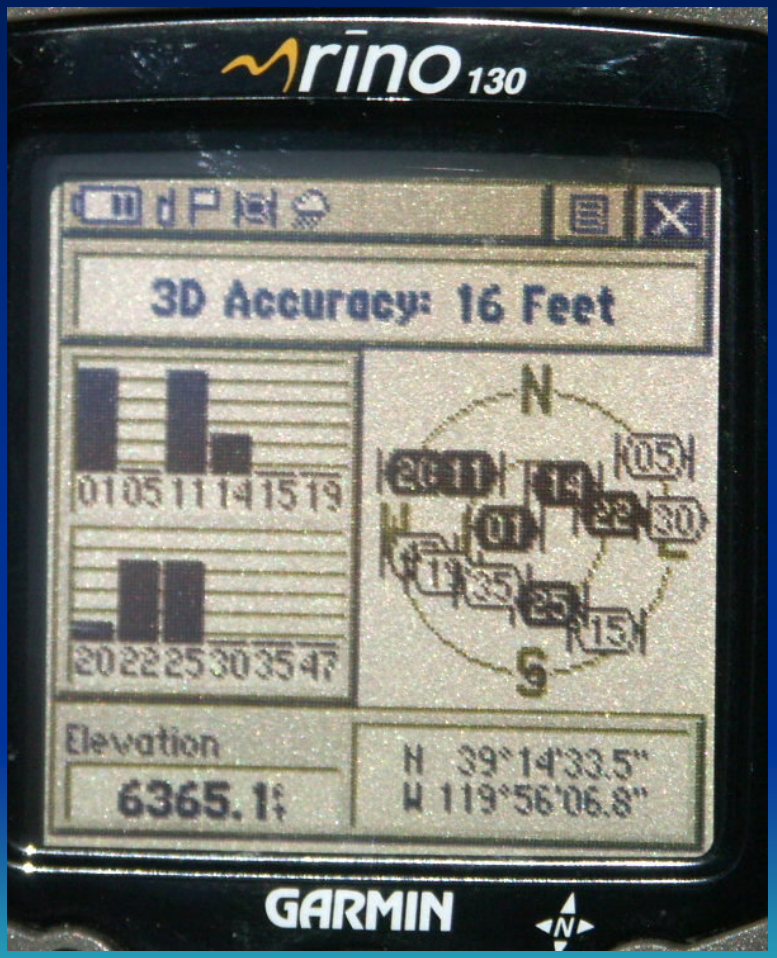
GPS Tips (con't)

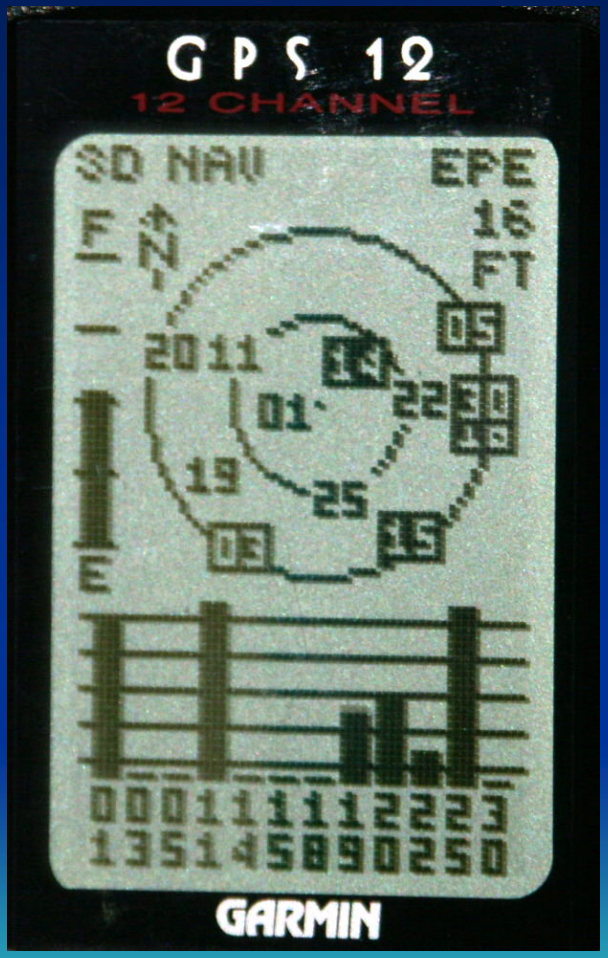
- #11 If you record your tracks, record every 0.02 miles, or every 100 feet
- #12 Read your GPS manual at the beginning of each snowmobile season
- #13 Be sure to carry a compass and a map of the area your are riding in

GPS Tips (con't)

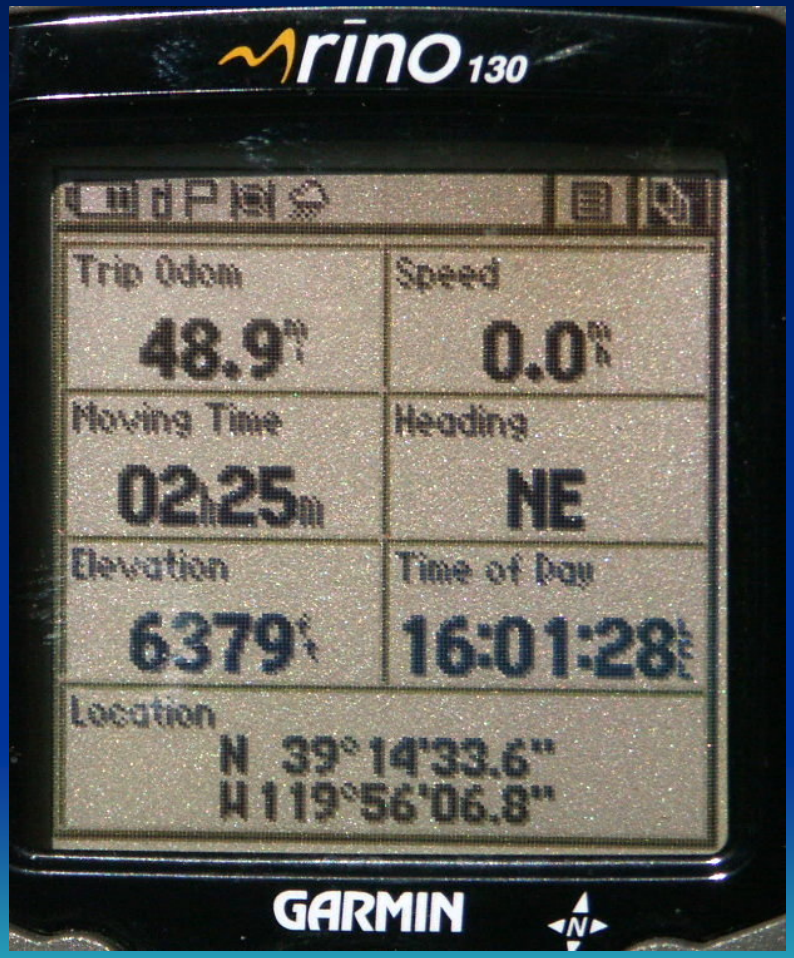
- #14 Ni-MH rechargeable batteries work fine
  - Remember to recharge the night before
  - One set should last 3 to 4 years
- #15 Always carry a cell phone
  - Be sure it is fully charged
  - Turn **OFF** during your ride to save battery power

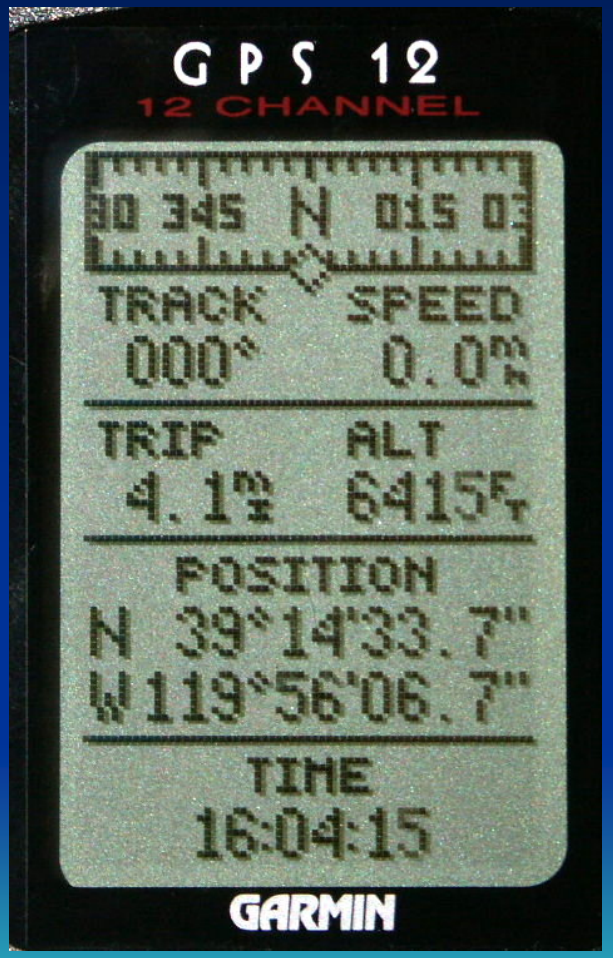
The GPS Satellite Page





What is your location?





Recommend GPS Books

- **The GPS Handbook**
  - A Guide for the Outdoors
- **GPS Made Easy**
  - Using Global Positioning Systems in the Outdoors
- **Outdoor Navigation with GPS**

Website Links

- See the white paper for a list of website that can provide additional GPS information
- Also use Yahoo or Google search engines
  - For GPS books
  - For GPS receivers

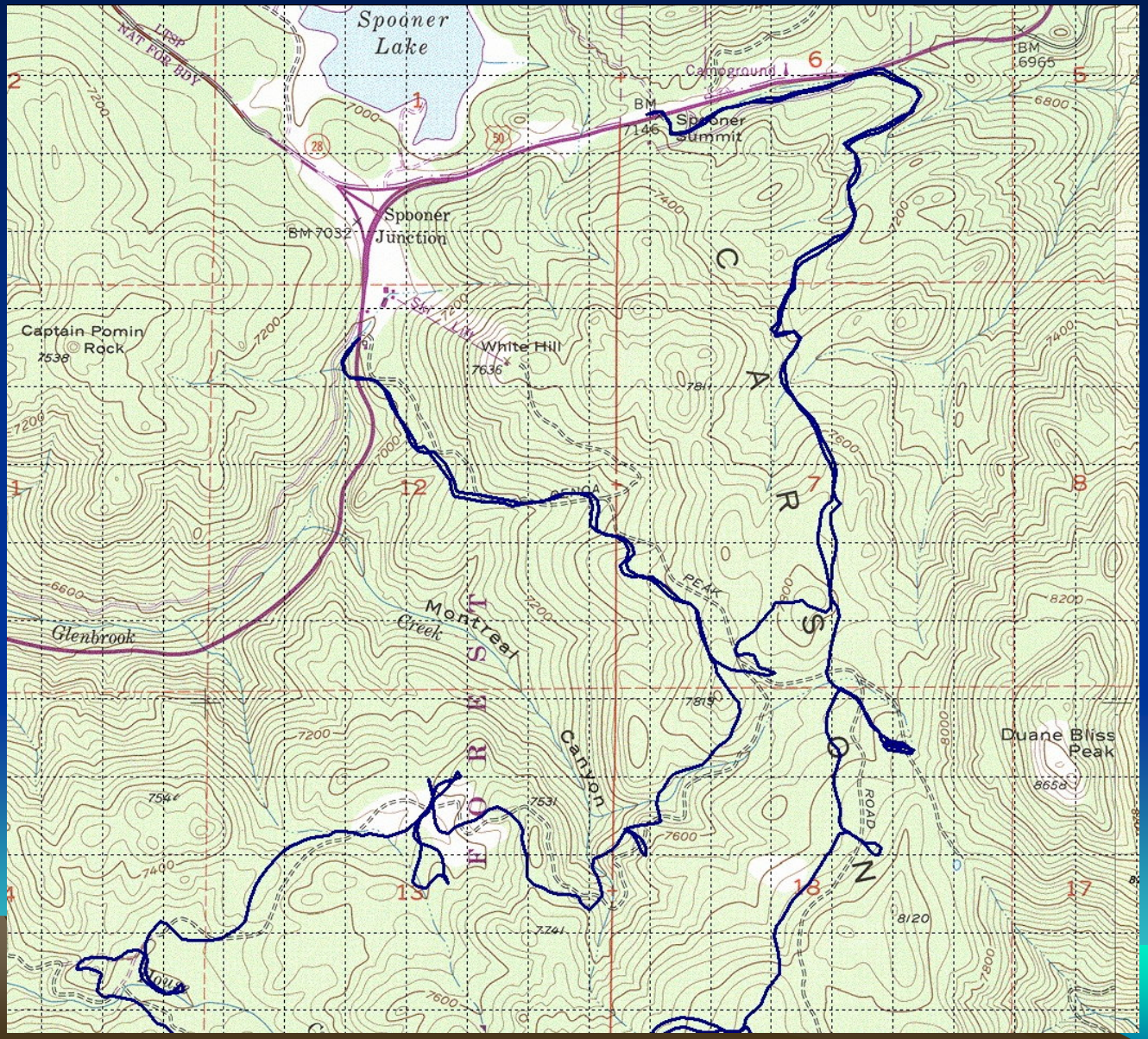
GPS + FRS Radios

- There is a family of combined functions
- There are two key combined benefits
- #1 You have one less electronic device to carry
- #2 When you talk, your position is broadcast to all the other radios
  - With map display, can see each other's location

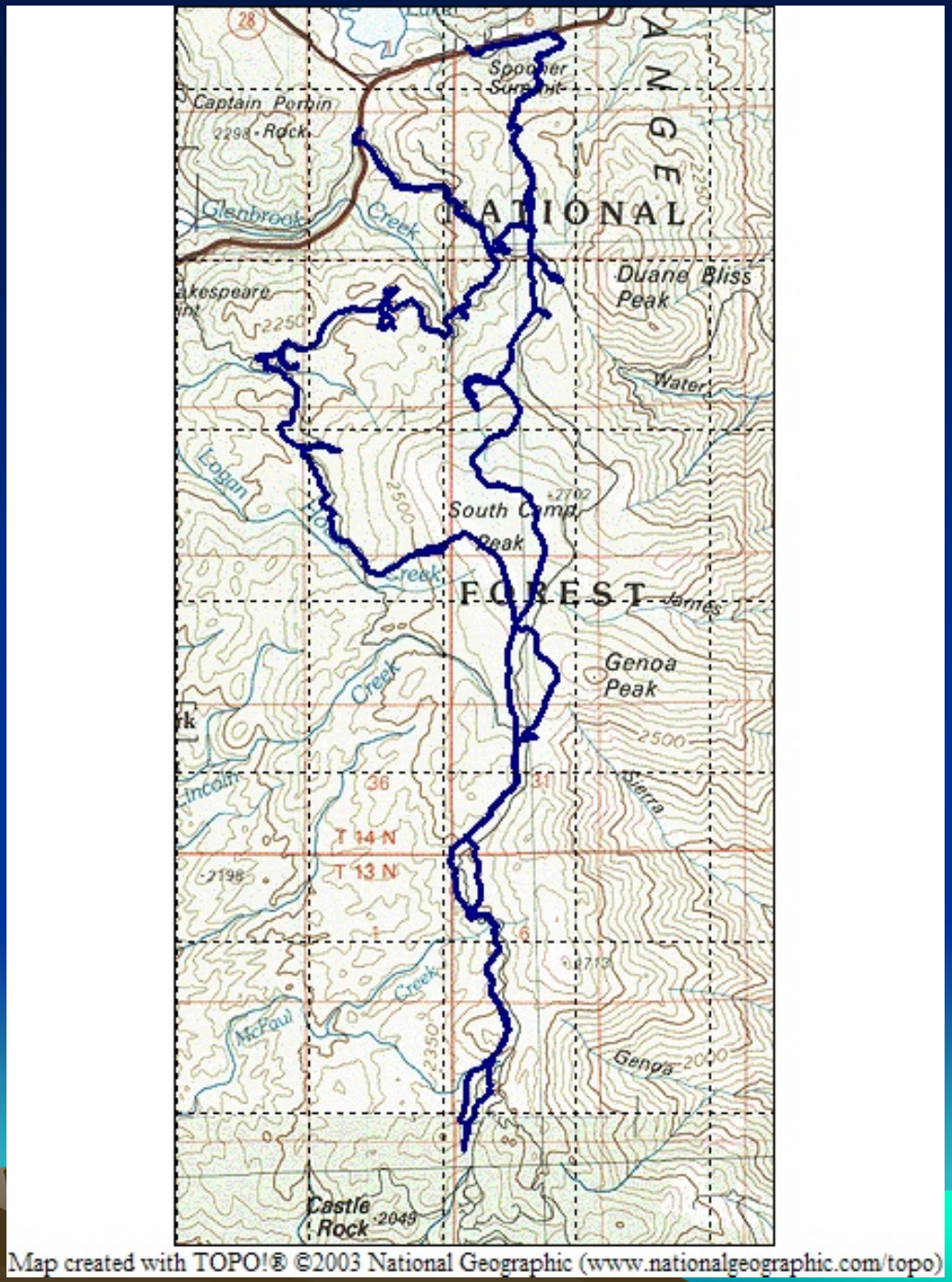
GPS on Instrument Panel

A GPS Mounting Bracket

Tracks @ Spooner Summit – 10 Sec Grid



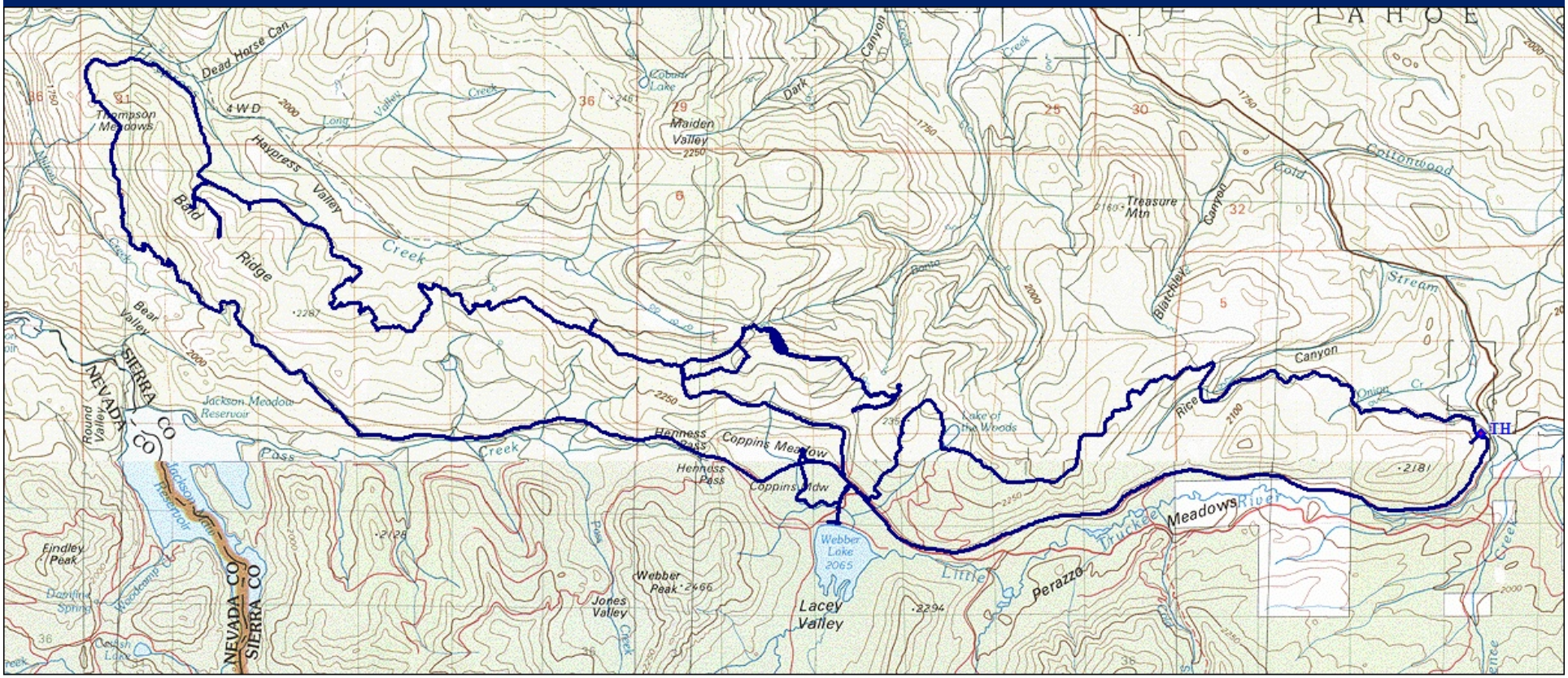
Tracks @ Spooner Summit – 1 min Grid



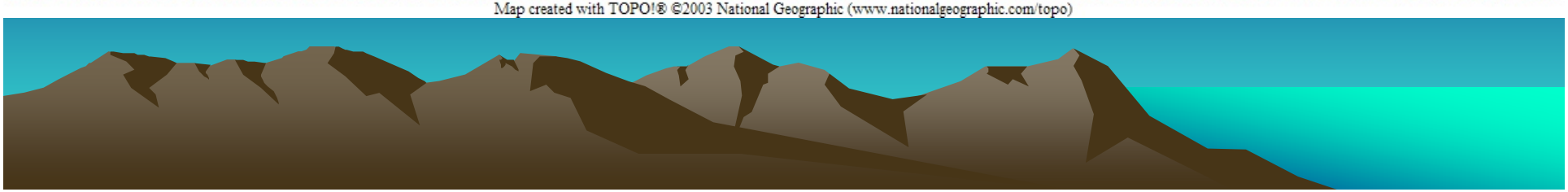
Google Earth & Tracks

- Google has a great program called “Earth”
- Can zoom in or out on any area
- Can rotate close to the horizon
- Can rotate to any direction, N, S, E or W
- Can plot your snowmobile tracks
- Can mark specific way points

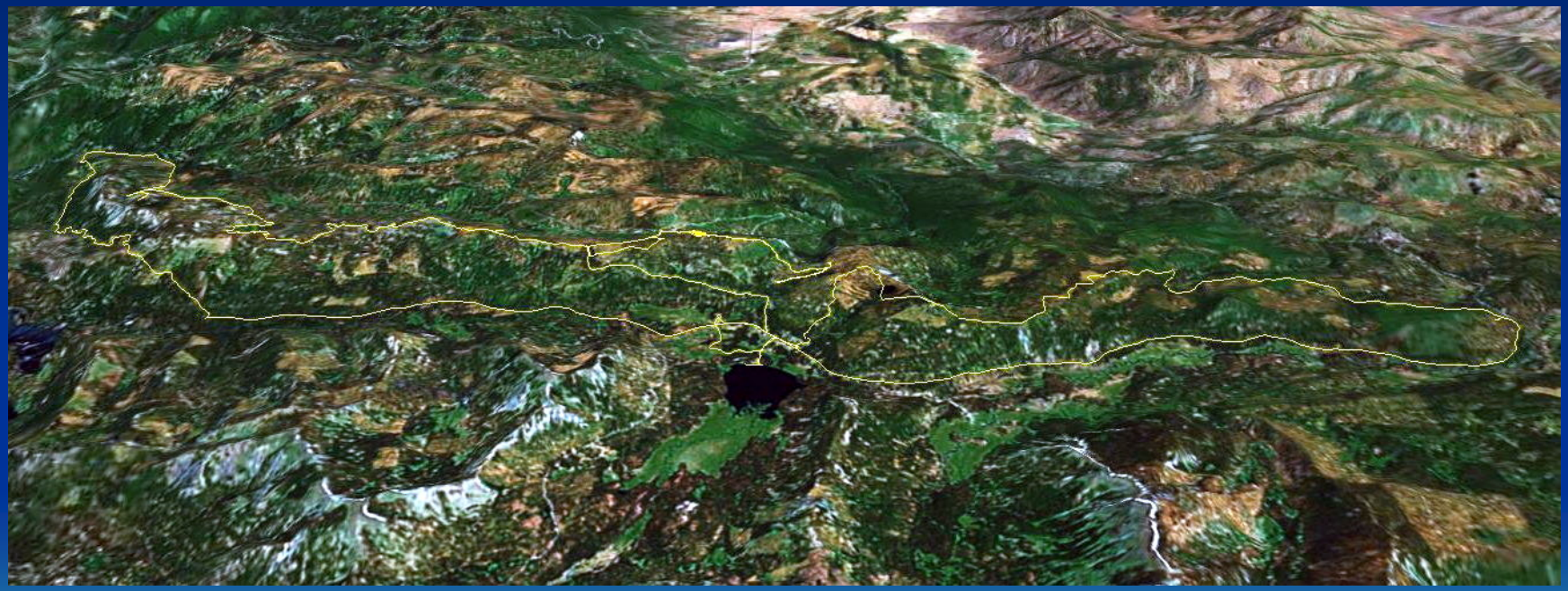
Tracks at Little Truckee Summit plotted on a Topo Map



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)



Same tracks at LTS plotted on Google Earth



Thanks for Coming

- Hope you enjoyed the presentation
- **Please remember:**

✓ Safety for you and your snowmobile buddies should be #1 priority

✓ Come back home alive so you can enjoy another snowmobile ride in the future