NTS GIS Network- Meeting Minutes
Tuesday, March 19, 2019, 1:00 pm Mountain Time (12pm PT, 2pm CT, 3pm ET)

MEETING AGENDA

1. **Welcome & Introductions** (Ryan Cooper/Peter Bosnall/Kerry Shakarjian)

   Meeting Attendees:
   1. Ryan Abrahamsen, Terrain 360 (Presenter)
   2. Nicole Hill
   3. Elizabeth McCartney (USGS)
   4. Tiffany Stram (Ice Age Trail Alliance)
   5. Greg Matthews (USGS)
   6. Matthew Schulte
   7. David Fothergill
   8. Don Owen
   9. Mary Tano
   10. Rob Chohan
   11. Jorge Acevedo SEMO

2. **Announcements & Information from Audience**
   a. Natural Resources Management Act extends the existing Lewis and Clark NHT, reroutes a portion of the North Country NST
   b. NPS Director's Order 45 Reference Manual has been released
   c. [Registration is open for the biennial International Trails Symposium and Training Institute](#) in late April.

3. **Discussion Topic**

   Presenter: Ryan Abrahamsen, Terrain 360

   Using Geospatially Referenced Machine Learning for Invasive Species Detection in a 360° Virtual Tour.
   This presentation will cover Terrain 360's project utilizing Machine Learning to detect invasive species (Phragmites Australis) in geospatially referenced 360° images, crowd sourced imagery, and drone imagery. The presentation will also briefly showcase the 360° virtual tour of the Huron River, a national designated water trail.

   Notes:
   - 360 panoramic high resolution images similar to Google Street View
   - 360 Viewer used to map hiking and water trails
   - Backpacking camera unit to walk trails
   - Mapping tri-cycle to ride on paved trails - image QA/QC process is computerized/automated
   - Camera on boat - image QA/QC process is computerized/automated
   - Can do terrain lidar point cloud mapping on the boat as long as go straight - 50-60 miles a day
   - Geotagged images
   - Great management tool for trail managers
   - Extract more information from images using Amazon online storage image analyzing API to detect specific objects
     - Machine Learning Model to detect objects
   - Pollution in water (tires, styrofoam etc), invasive species, vandalism are some observed issues
     - How look for these things and tag automatically in imagery without using human power
     - Machine Learning Model
   - Started training the model to look for Phragmites invasive plant
   - Because images are geotagged, when the model detects the object in the image, the location is automatically known of that object
   - Can apply this concept to drone images with the machine learning and detected objects locations
   - Tool is available for public (add link)
   - Question asked: Any data get put into public domain? Not yet, but looking into it
   - Amazon web services used to store all the data

4. **Future Meeting Dates & Topics**
   a. **April 16, 2019** – Don Owen, PNTS, Gap Analysis on National Scenic and Historic Trails
   b. **May 21, 2019** – Matt Able, US Forest Service, Survey 123 app for trail maintenance
   c. **June 18, 2019** – Greg Matthews, USGS, increasing connectivity with the network of trails on public lands

We always welcome suggestions for additional topics for discussion or presentations. Please contact Ryan Cooper, Peter Bonsall, and/or Derek Nelson with your suggestions!

NTS GIS Email Address: ntsgis@nps.gov
NTS GIS Network Email List: ntsgis@webmail.itc.nps.gov
NTS GIS Network Website: http://pnts.org/new/national-trails-system-gis-network/

NTS GIS Network Mission:
We established the NTS GIS Network as a way to connect the diverse array of National Trails System staff and partners who use GIS systems and products in their work. One of our goals is to facilitate the sharing of information and tools that help us do our jobs more efficiently and innovatively. Because the national trails system is managed as a collaboration of agencies and partner organizations, the NTS GIS Network is open to anyone.