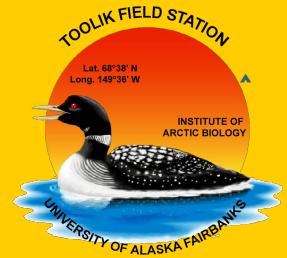


January 2023



# 2023 GIS Annual Report

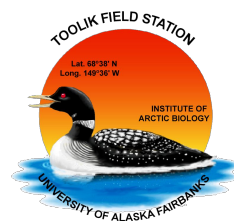
Oct. 1, 2022 - Sept. 30, 2023 Report  
Randy Fulweber

# Overview

- Staffing
- Website Usage Metrics
- Requests Fulfilled
- GIS Conference in Anchorage, AK
- Project Support Highlights
- Support for NGS' GPS on Benchmark Program
- Questions for the Committee



# Staffing



- In the process of hiring a replacement GIS & Remote Sensing Analyst (Full Time).
  - Rowan McPherson vacated the position May 2023.
  - During the summer, the analyst will serve as the GIS field office coordinator while at TFS with GIS Manager oversight.
- We expect Jorge Noguera to return as our temporary summer senior technician.



*Jorge Noguera packs our drone gear to a research site near Galbraith Lake.*



# Website Usage Metrics

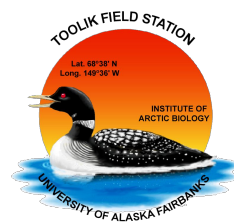


Rank	Webpage	Views	Users
1	GIS Equipment	1,034	899
2	GIS Data Download	789	607
3	GIS Homepage	642	444
4	Maps: Homepage	446	281
5	Maps: General	259	182
6	Interactive Mapping	227	145
7	Permits and Regulations	178	126
8	GIS Services	162	140
9	Online Maps	143	94
10	Satellite Imagery	136	117

# Requests Fulfilled

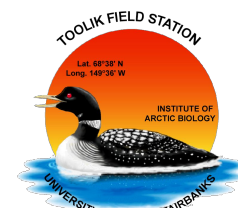
- 2019: 197 Requests from 32 Projects
- 2020: 115 Requests from 23 Projects
- 2021: 88 Requests from 50 Projects
- 2022: 110 Requests from 39 Projects
- 2023: 79 Requests from 36 Projects

The implementation of Toolik's SRS system has enabled ToolikGIS to consolidate work requests and more efficiently account for time spent working on requests. (Thank you, Amanda!!)



*Olivia Cronin-Golomb having a pretty good day conducting a GPS survey for the Hydrology of Watertracks and Gullies project.*

# GIS Conference in Anchorage, AK

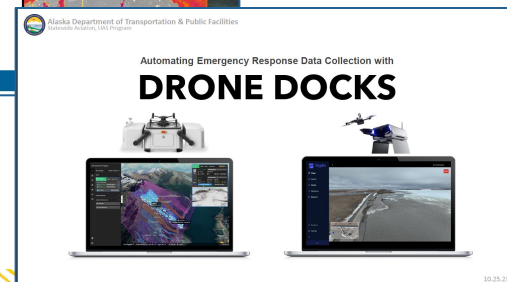
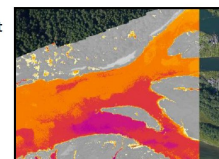


- Randy attended the Alaska GeoSummit Conference held in Anchorage, Alaska from Oct. 25-27, 2023.
- Conference attracted GIS and remote sensing professionals, educators, and students from government, industry, and research with a focus on Alaska's geospatial research, services, and future needs.
- Highlights from attended sessions include:
  - Emerging techniques (eg, satellite-derived bathymetry)
  - Updates on Alaska's geospatial infrastructure and data processing tools
  - Developments in analysis-ready Synthetic Aperture Radar datasets from the Alaska Satellite Facility (ASF) at UAF
  - Applications of thermal infrared (TIR) imagery in aquatic systems
  - AK DoT's 'Drone in a Box' program
- Interested in learning more? (And how could you not be?!) [Click here](#) to review titles and download presentations.



## TIR FEATURES

- Measure Surface Water Temperatures over large extent
- Longitudinal profile
- Stream Temperature Gradient
- Significant Features
  - Seeps/springs
  - Hyporheic flow
  - Groundwater infiltration
- Cold-water refugia
- Point source pollution
- Tributaries
- TMDL



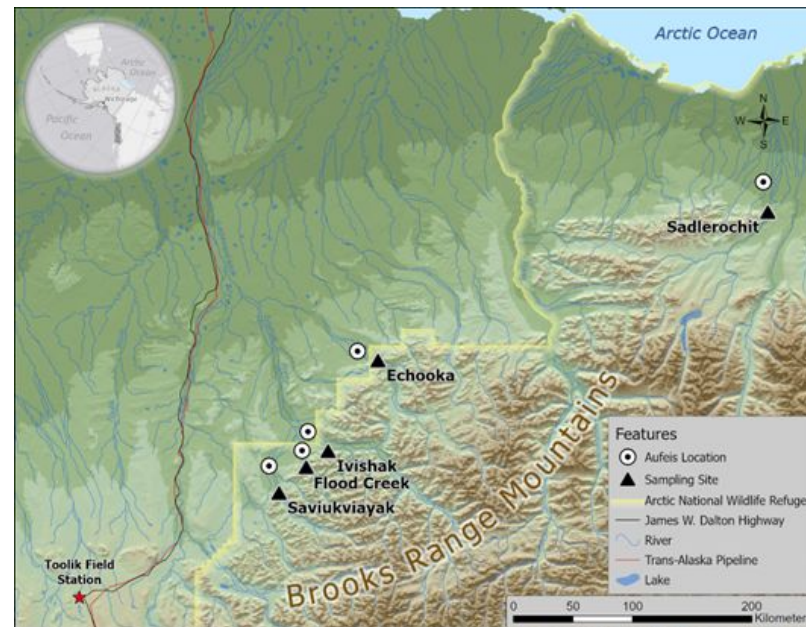


# Project Support Highlights

# Project Support Snapshot



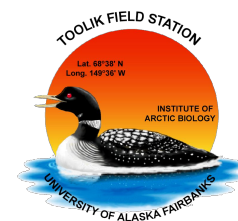
- Provided support to 36 research groups, PIs, students, and 1 helo coordinator!
  - Site selection support for 12 projects
  - UAS flights and processing for 16 projects
  - GPS surveys for 13 projects
  - Publication support (custom maps) for 2 projects:
    - Mariusz Galka: Plant population shifts during the late Holocene
    - Tori Herbert: Freeze or famine: the ecology of arctic springs



Custom map for Tori Herbert showing the location of Freeze or Famine research sites in relation to Toolik Field Station. Cartographer: Jorge Noguera.

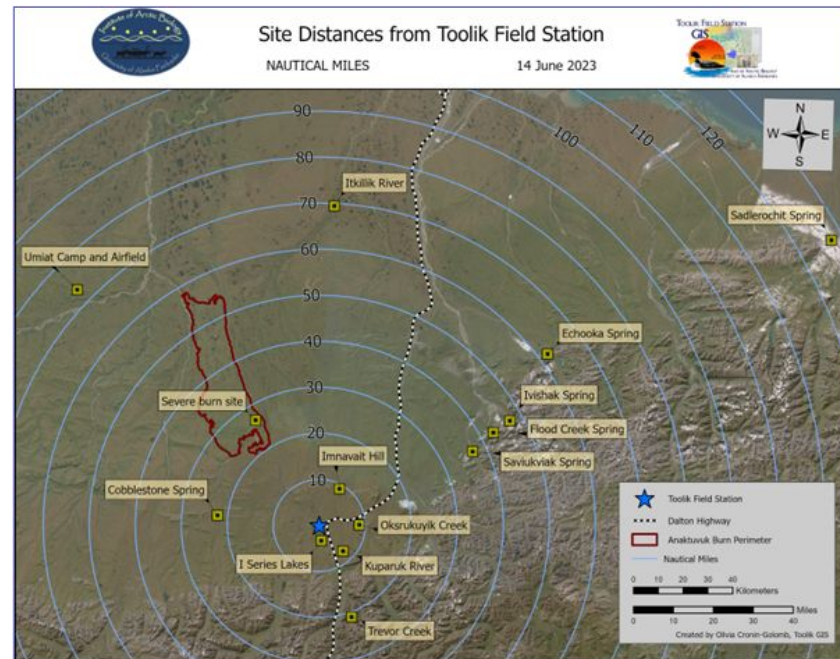


# Project Support: Helicopter Coordinator Map



- Helicopter coordinator requested a new map showing the location of select research sites and their approximate distances from TFS.
- Olivia Cronin-Golomb, GIS summer technician (2nd season), created a custom map and used our on-site plotter\* to print a large format map for the coordinator to hang on their wall for quick, easy reference.

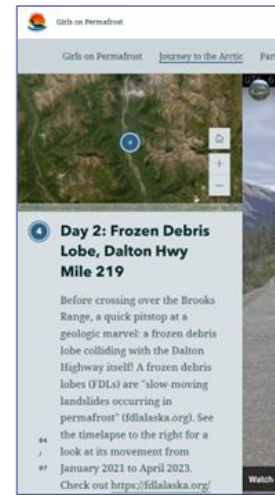
\*DYK: The GIS plotter located at the field station is available during the summer field season to scientists, contractors, and staff in need of large print outs.



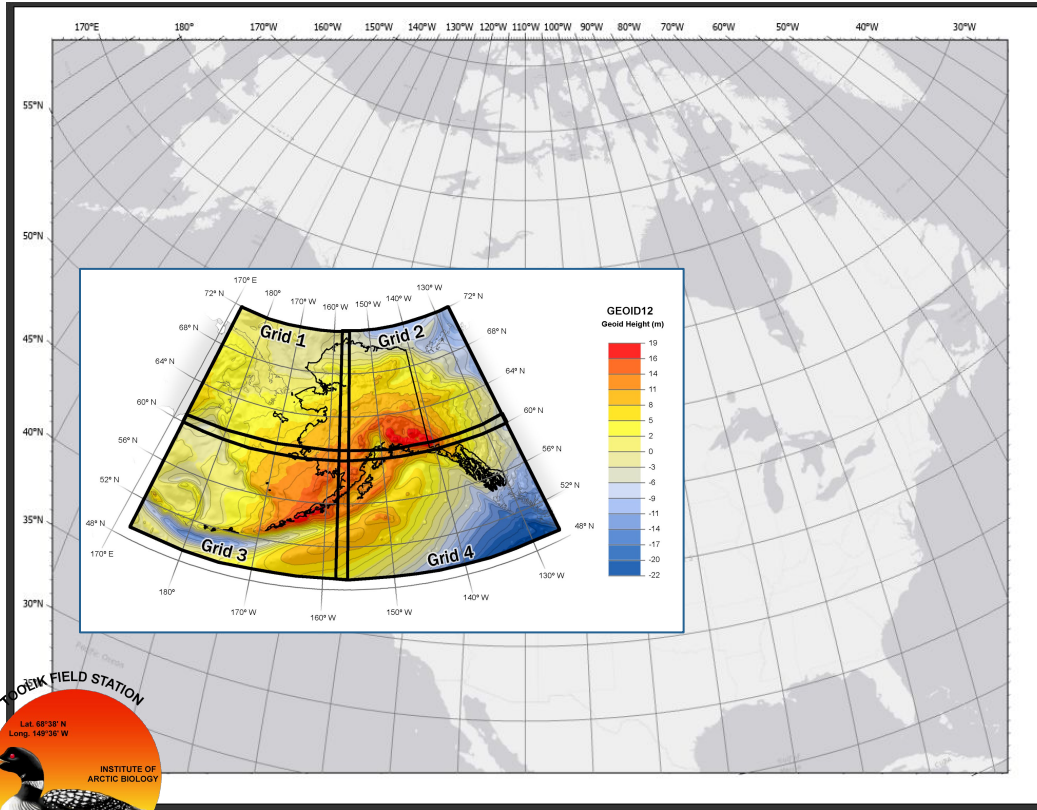
# Project Support: Girls on Permafrost Proposal



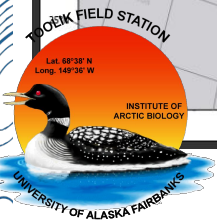
- Project Leadership: Ruby An, Kara Kornhauser, Haley Dunleavy.
- Potential outreach/education partnership between Toolik scientists and Inspiring Girls\* Expeditions Alaska.
- 12-day tuition-free, wilderness science expedition for 8-9 high school age girls / gender-expansive youth. The group will travel from Fairbanks to Toolik Field Station to work with scientists and artists to learn about and explore permafrost ecosystems in a changing Arctic.
- Mary Stack, GIS summer technician (1st season), created an online Story Map full of maps, graphics, videos, photos, and informative text as a novel way to provide project information to potential attendees and funding agencies.
- Take a full tour of the Story Map [here](#).



# NGS' GPS on Benchmark Program



- ▶ The National Geodetic Survey (NGS) is modernizing (updating) the National Spatial Reference System (NSRS)!
- ▶ This is big and exciting news for the geospatial community with impacts to many sectors of the economy and across all levels of government.
- ▶ The NSRS is a consistent coordinate system that defines latitude, longitude, height, scale, gravity, and compass-orientation throughout the United States.

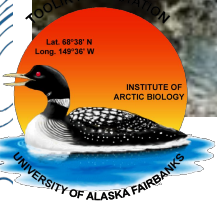


# NGS' GPS on Benchmark Program



- ▶ ToolikGIS ties our spatial data to the NSRS to help ensure our data aligns well spatially and temporally with spatial datasets available from other government agencies and research programs.
- ▶ A national network of over 1.5 million benchmarks often driven into the ground atop metal rods or embedded in rock form the backbone of the NSRS.
- ▶ This current nationwide update is a huge lift, and the NGS crowd-sourced the GPS data collection task primarily to those with high-accuracy GPS equipment.

*NGS benchmark embedded in a rock near Pump Station 4*

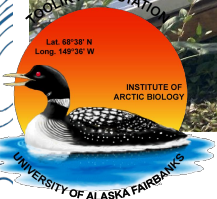


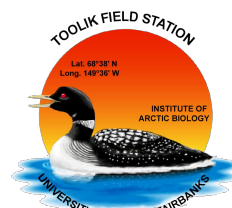
# NGS' GPS on Benchmark Program



- ▶ For summer 2023, GAGE/EarthScope (formerly UNAVCO) generously loaned ToolikGIS four high-accuracy GPS kits that we used to collect GPS data on benchmarks. (Thanks to Joe Pettit!)
- ▶ We submitted GPS data from 7 benchmarks located along the Dalton Highway within the Toolik Research Natural Area. NGS has approved and accepted all our data.
- ▶ Our data will improve NGS spatial data processing tools and the accuracy of the new NSRS within the Toolik RNA. Our contribution will benefit ToolikGIS, the research projects we support, and anyone who collects spatial data within the Toolik area and ties it to the new NSRS.

*Jorge and Mary set up a high accuracy GPS kit on a Toolik-area benchmark*





# Questions for the Committee

- Over the past 4 years, ToolikGIS has collected drone imagery throughout the Toolik RNA and in sporadic locations along the Dalton Highway from Galbraith Lake to Sagwon Hills in support of research projects.
- Q1: Should we make past and future drone image collections available to the wider research community, perhaps via the Arctic Data Center?
- Q2: If so, should we include an embargo period for imagery collected in support of graduate student projects? 3-5 years?

