

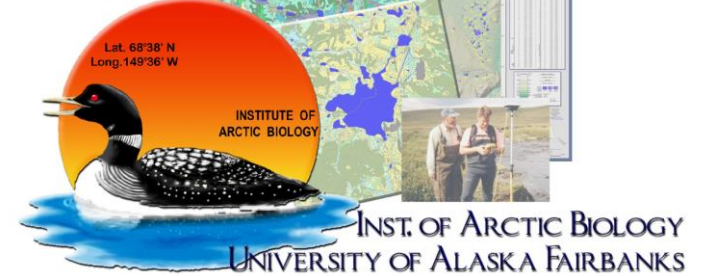
TOOLIK GIS REPORT

OCT 1, 2019 - SEPT 30, 2020

RANDY FULWEBER

TOOLIK FIELD STATION

GIS



OVERVIEW



- Staffing
- Highlights From 2020
- Website Usage & Metrics
- Improved Drone Platform & Sensors
- Spatial myToolik System
- Arctic Data Center Submission

STAFFING

- After 14 years with Toolik Field Station Jason Stuckey has moved on to new endeavors.
- Randy Fulweber will be taking the reigns of the GIS & RS department
 - Currently working on hiring a year-round junior analyst / field technician to help provide GIS & RS support
- We will continue to have summer season support from Jorge and possibly Rowan
- Continue to develop our intern program through programs at UAF.

REQUESTS FULFILLED



- 2016: 203 Requests from 39 Projects
- 2017: 224 Requests from 34 Projects
- 2018: 207 Requests from 33 Projects
- 2019: 197 Requests from 32 Projects
- 2020: 115 Requests from 23 Projects

WEBSITE USAGE - METRICS



Type	Unique Users	Files	Downloads
Maps	261	165 Maps	723
GIS Data	487	50 Files	2,768

PROJECT ASSISTANCE



■ Provided Assistance to 23 Research Groups

- UAS flights to 4 projects
- Site Selection to 3 projects
- GPS surveys to 4 projects
- Publication support to 2 projects
 - | Co-author
 - | Acknowledgement

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Global Change Biology

1 **Tundra wildfire triggers sustained lateral nutrient loss in Alaskan Arctic**

2 Benjamin W. Abbott¹, Adrian V. Rocha², Ariel Shogren³, Jay P. Zarnetske³, Frances Iannucci^{4,5},
3 William B. Bowden⁴, Samuel P. Bratsman¹, Leika Patch¹, Rachel Watts¹, Randy Fulweber⁶,
4 Rebecca J. Frei^{1,7}, Amanda M. Huebner¹, Sarah M. Ludwig⁸, Gregory T. Carling⁹, Jonathan A.
5 O'Donnell¹⁰

Open Access Article

Seasonal and Interannual Ground-Surface Displacement in Intact and Disturbed Tundra along the Dalton Highway on the North Slope, Alaska

by Go Iwahana ^{1,*} Robert C. Busey ¹ and Kazuyuki Saito ²

¹ International Arctic Research Center, University of Alaska Fairbanks, Fairbanks, AK 99775, USA

² Japan Agency for Marine-Earth Science and Technology, Yokohama 237-0061, Japan

* Author to whom correspondence should be addressed.

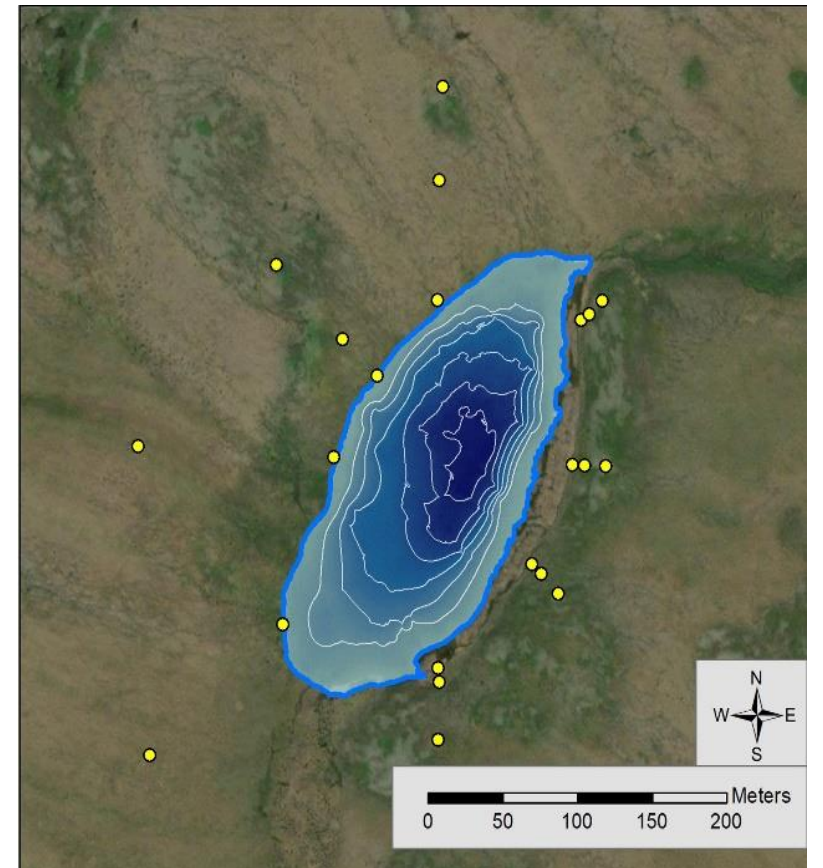
Land **2021**, *10*(1), 22; <https://doi.org/10.3390/land10010022>

Received: 30 November 2020 / Revised: 23 December 2020 / Accepted: 25 December 2020 / Published: 29 December 2020

(This article belongs to the Special Issue [Permafrost Landscape](#))

BATHYMETRY DATA CATALOG

- Four new lakes were added in 2020 for Eitan Shelef's new project
- The Bathymetry Data Catalog now has 70 lakes
- Lake bathymetry has been collected over the past 15 years in support of a number of different projects
- The Bathymetry Data Catalog is available on the TFS website and on the Arctic Data Center.



DRONE PLATFORM & SENSORS



- 2020 – Due to unforeseen events the drone became inoperable at the end of June. A rental drone was obtained and sent to Toolik at the beginning of Aug. (earliest date available) unfortunately missing much of the field season.
- Thanks to our drone insurance rental coverage + delays at the drone repair facility due to COVID + the drone rental company's rent-to-own program, we now have two fully functional drones with slightly different payloads: one Micasense multispectral camera and two RGB cameras.
- With two drones, we now have improved redundancy (backup!) and expanded capabilities.
- Both drones and respective payloads will be ready to go for 2021 field season!



DJI Matrice M210 PPK Drone

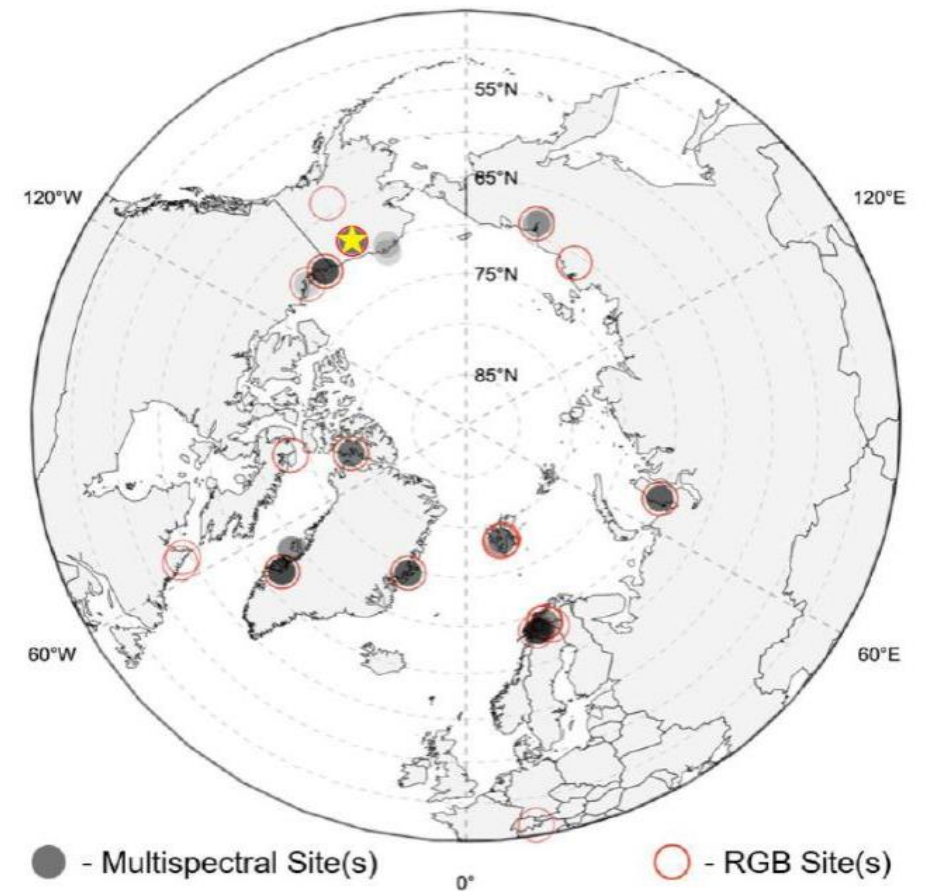


DJI Matrice M210 RTK Drone

BASELINE DATA AND COLLABORATION



- ARCSS (CALM) grids
 - Drone flights for Toolik and Imnaviat grids
 - RGB and multispectral imagery
 - Snow depth map
 - Drone and field measurements
- HiLDEN
 - High-Latitude Drone Ecology Network

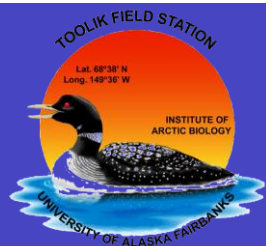


SPATIAL MYTOOLIK SYSTEM



- Online Mapping Web-Application
 - Search Historic & Current Toolik Research Projects
 - Location of Research Sites
 - Publications
 - Website Links to Project Data
 - Grant Numbers

SPATIAL MYTOOLIK SYSTEM



- Spatial MyToolik System is now live on the Toolik Website

The screenshots illustrate the Spatial MyToolik System interface. The top screenshot shows a project list with a map of Alaska. The middle screenshot shows a detailed view of a project with a metadata popup. The bottom screenshot shows a project description with an abstract and a 'Project Description' link circled in pink.

Project List

Effects of warming on shrub abundance and changing seasonality on migratory songbirds

Project PI: Boehman, Natalia
Institution: Columbia University
Grant Number: 2908444
Funding Source: National Science Foundation (NSF)
Dates: 2010 to 2014

Environmental DNA sampling and spatial modeling: wood frog range extent in northern Alaska

Project PI: Spangler, Merik
Institution: University of Alaska Fairbanks
Grant Number: NA
Funding Source: Institute of Arctic Biology
Dates: 2016 to 2018

Fire in the Arctic Landscape

Project PI: Dowden, V
Institution: Marine Biological Laboratory
Grant Number: 3423
Funding Source: National Science Foundation (NSF)
Dates: 2010 to 2012

Project Description

Effects of warming on shrub abundance and changing seasonality on migratory songbirds

Abstract As a consequence of global warming, arctic North America has been "greening" over the past several decades, with increases in relative abundance and size of shrubs documented in numerous locations. Much of the research on this topic examines how this shift toward more woody species affects element cycling, particularly carbon, with potential feedbacks to the atmosphere regionally and globally. To date, the response of higher trophic levels to such shifts in vegetation in the Arctic has not been well studied. One group that has been almost completely ignored is migratory songbirds; they have a complex relationship with shrubs that provide both shelter and food, both of which are directly affected by weather patterns. This research will characterize the interactions between tundra vegetation and migratory songbirds in habitats that differ in shrub dominance for five consecutive growing seasons. The team will 1) identify and characterize interactions between shrub dominance and weather to determine how these affect food and shelter availability on migratory songbirds; 2) examine how reproductive success of populations of two songbird species responds to variation in both shrub dominance and timing of spring snowmelt; and 3) measure how both vegetation in shrub dominance and timing of spring snowmelt affect composition and size of the entire songbird community. The multi-year approach will determine the degree to which interannual variation in weather explains the variation in the distribution of

[Project Description](#)

FUTURE DIRECTIONS –INTERACTIVE WEB MAPS



- GIS data and maps available to Toolik community straight from web browser
- Agencies and organizations making their data available near real time
 - Hydrological data
 - Weather radar and warnings
 - Wildfire locations

