

Overview of Toolik Field Station's Environmental Data Center (EDC)

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Genesis of the EDC

- Participants in 2004 workshop recommended (in order of priority)
 1. Collection of key baseline environmental data to provide a context for research
 2. Purchase, maintenance, scheduling of common-use scientific equipment
 3. Limited field assistance
- These tasks rolled together into EDC

Why collect environmental data?

- Baseline data are critical to detecting change
 - Multiple projects can use these data
 - Baseline data set the context for research, saves effort by individual projects
- Environmental monitoring is difficult to fund through grants
 - Most grants focused on hypothesis testing
 - Most grants are on a 3-year cycle → gaps in environmental record
- TFS data complements and extend data collected by Arctic LTER & other projects
 - Capability for shoulder season and winter measurements

Priorities for environmental variables

I. Fundamental environmental drivers:

- Climate data and lake temperature
- Active-layer depth, ice and snow cover

II. Variables changing in response to environmental change:

- Phenology of growth, reproduction, hibernation and migration patterns of plants and animals
- Species inventories (plants, birds, mammals)
- NDVI and trace gas flux
- Stream and lake chemistry

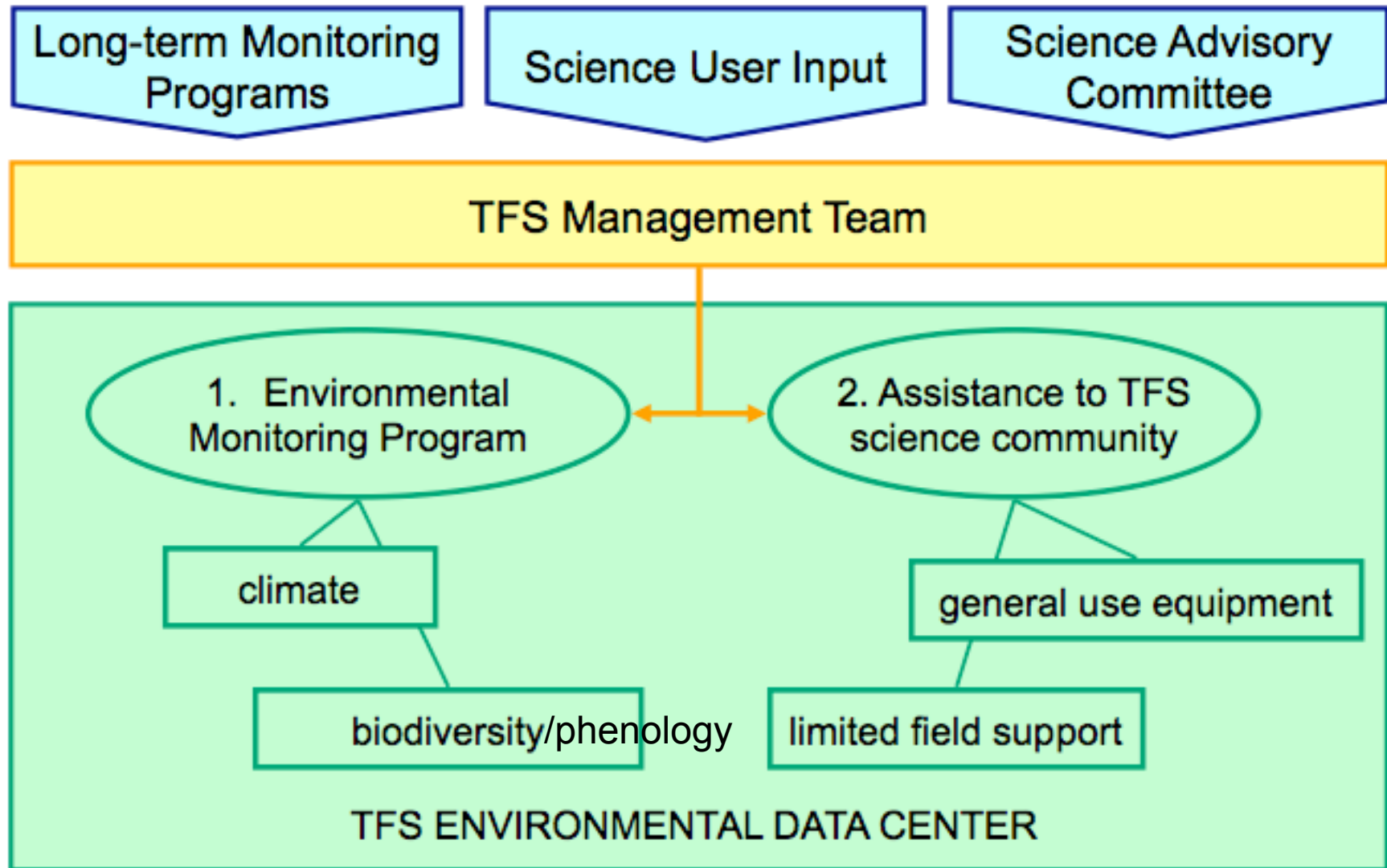
III. Data needed to fill gaps in present knowledge:

- Paleo-reconstruction of climate and vegetation history
- Additions to TFS herbarium and species inventories
- Stream profiles and bed temperatures

EDC history & staffing

- Christie Hauptert joined as first EDC technician in 2005
- Anja Kade & Jessie Cherry joined us in 2010 & 2011, after Christie left
 - We will be searching for a replacement for Anja, who has just joined ABR
- 2.25 part-time summer assistants (Seth, Aart, 1/4 of Jorge)
- All data available through our website (or on request)

Program structure



Comparison with Zackenberg monitoring model

ClimateBasis

- ★ Temperature
- ★ Pressure
- ★ Humidity
- ★ Radiation
- ★ Wind
- ★ Precipitation
- ★ Discharge
- ★ Water temperature
- ★ Conductivity
- River hydrology

GeoBasis

- ★ Snow and permafrost
- ★ Temperature
- ★ Active layer depth
- ★ Snow distribution
- Meteorological data
- Soil moisture
- ★ River water chemistry
- Suspended sediment
- ★ Carbon dioxide flux
- ★ NDVI

BioBasis

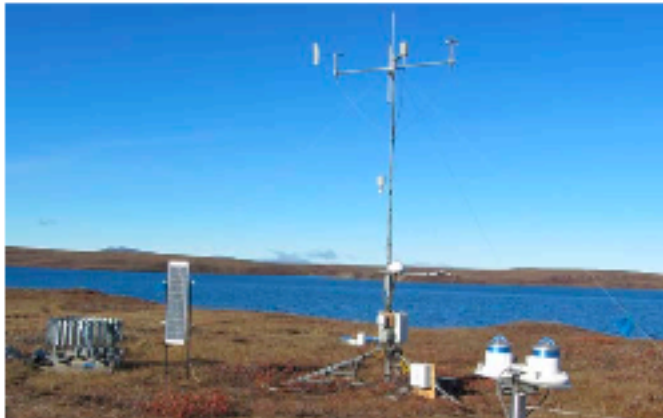
- ★ Plants
 - Species diversity and composition
 - NDVI and UV-B filters
- Arthropods
- ★ Bird diversity/territories
- Mammals
 - Casts and feces
 - Hare, lemming, fox and musk ox surveys
- ★ Random observations
- ★ Lake flora and fauna

★ Collected by Arctic LTER and other projects at TFS

★ Monitored by the EDC at TFS

★ Measured by both Arctic LTER and EDC

Meteorological station



- Main variables: air and soil temperature, relative humidity, barometric pressure, wind speed and direction, global solar and photosynthetic active radiation, precipitation and evaporation, lake temperature and water level
- Provisional data of past 15 days (not error checked)
- Query of historical data

Snow cover pictures from south end of Toolik Lake



19 April 2010



12 May 2010



17 May 2010



23 April 2010



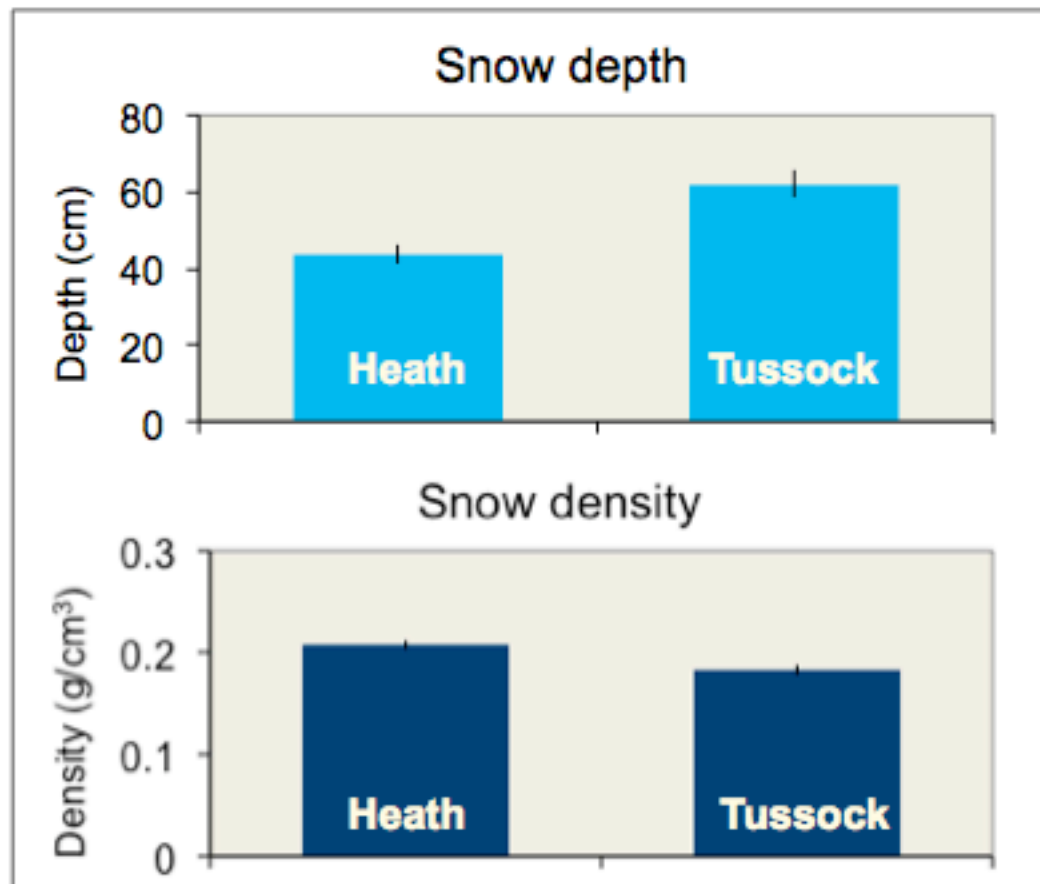
31 May 2010



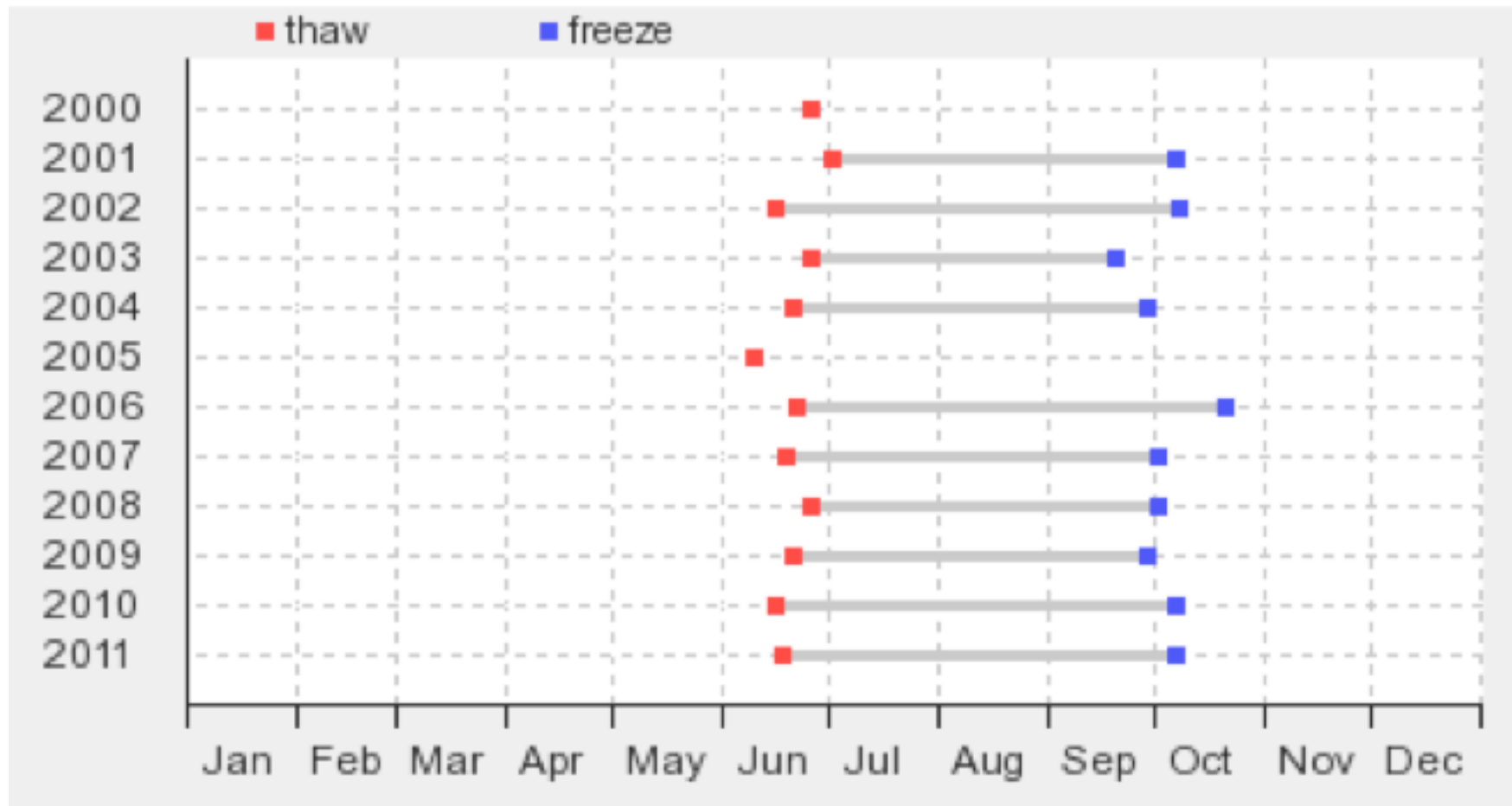
09 June 2010

Physical environment

Snow characteristics at phenology plots and within the image frame of heath and tussock time-lapse cameras



Physical environment



Toolik Lake thawing and freeze-up

8 October 2011

Home

Toolik Weather

Birds

Mammals

Plants

Plant Phenology

Virtual Herbarium

Naturalist Journal

Snow Cover Monitoring

General Use Equipment

About Us



Arctic LTER

Toolik Field Station

Institute of Arctic Biology

UAF Home

Toolik Field Station Virtual Herbarium

From Look-Up Table

Help

Genus: ANEMONE

Select Species: ANEMONE PARVIFLORA Michx.

ANEMONE PARVIFLORA

Family: Ranunculaceae

Division: Magnoliophyta

Scientific Name: ANEMONE PARVIFLORA Michx.

Ranunculaceae

Alaska, U.S.A.

ANEMONE PARVIFLORA Michx.

PHILIP SMITH MOUNTAINS QUAD: Innavait Creek, 1 km northeast of the Institute of Northern Engineering trailer, Zone 6 7613548 mN 406891 mE; 68.6201 N, -149.2890 W, S-facing dry sideslope, common. Growing with VACCINIUM VITIS-IDAEA, SALIX PHLEBOPHYLLA and DRYAS OCTOPETALA. Elev. 869 m

Katrina Managan, Rachel Prunier, Amy Breen Carroll

1

07-Jun-01

Det. by Carolyn Parker (ALA), January 2002

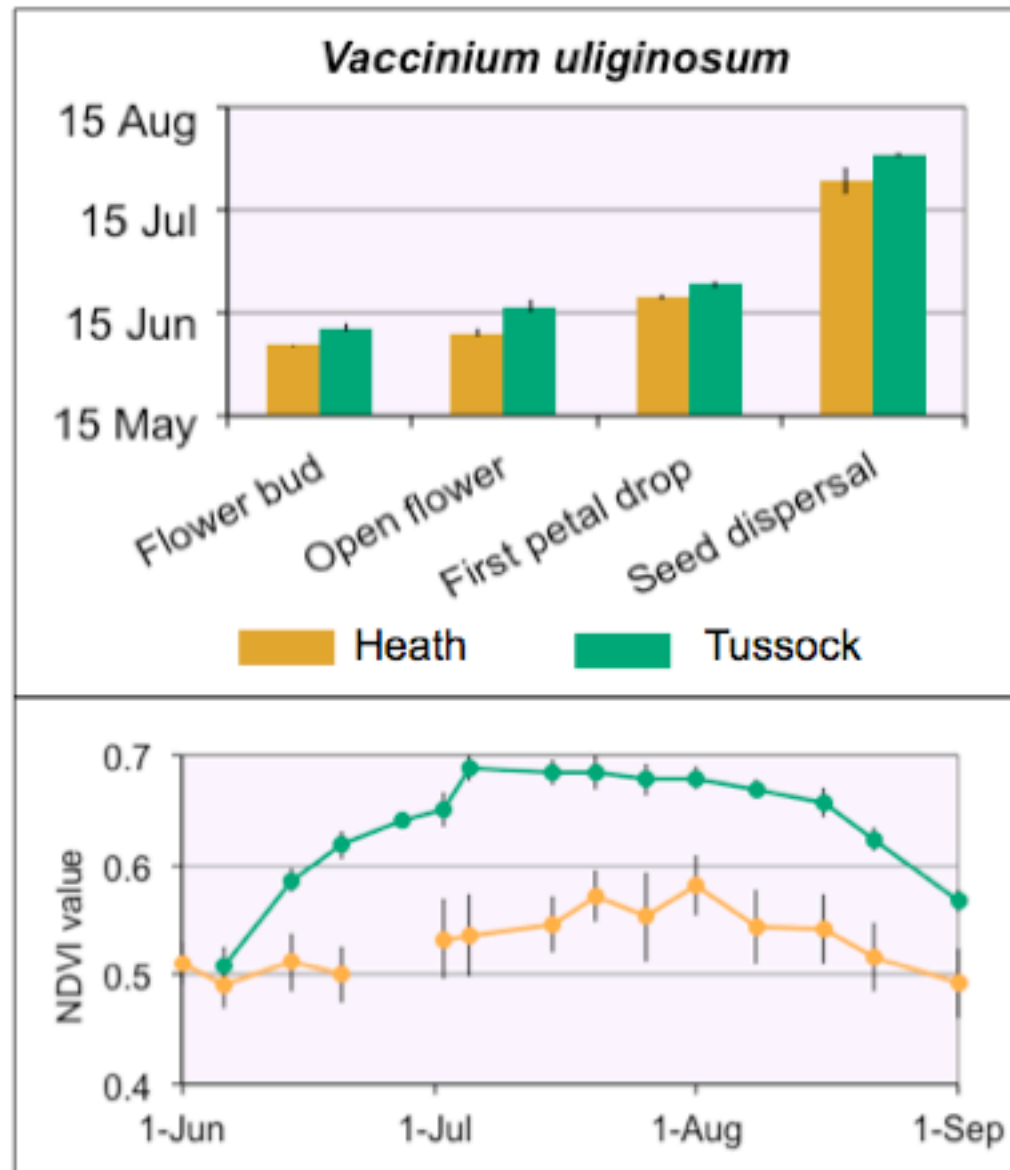
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TOOLIK FIELD STATION HERBARIUM
University of Alaska Fairbanks



Vegetation monitoring



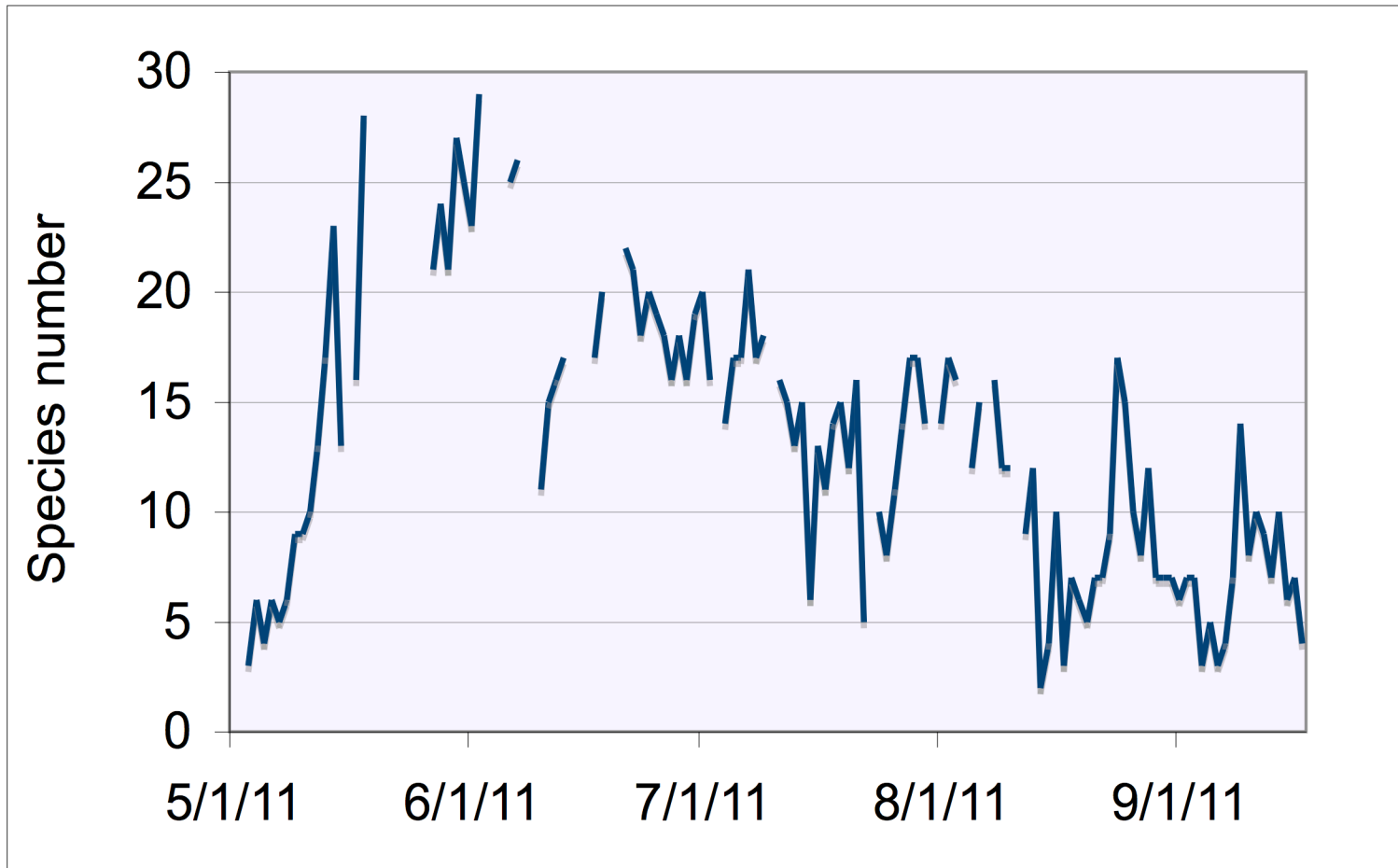
Plant phenology

- Monitoring of key phenological events such as timing of first leaves, flowers and seed dispersal
- Focus on species typical of moist acidic tussock and dry heath tundra

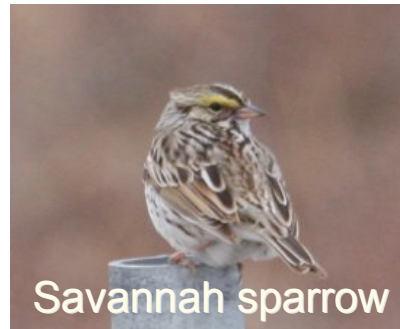
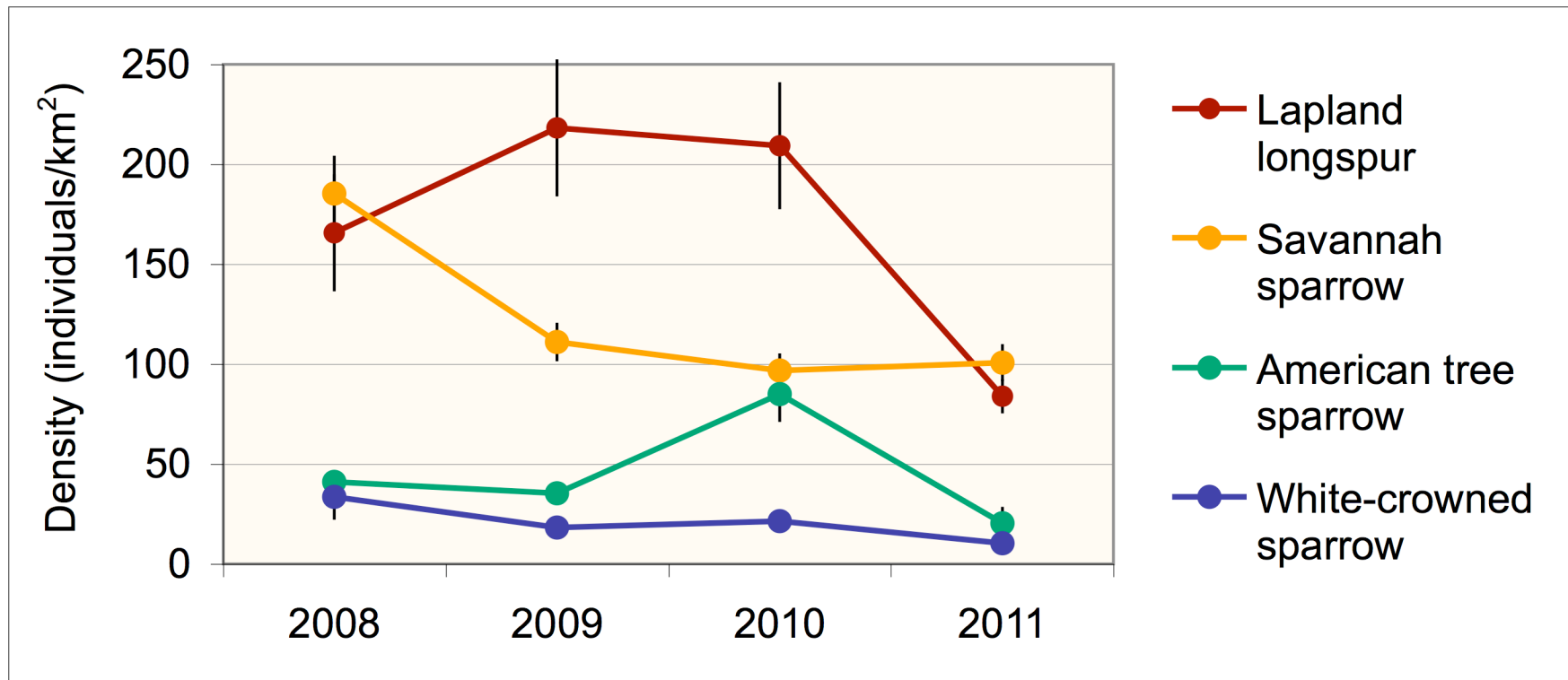
NDVI

- Record vegetation greening index at phenology plots

Daily sightings of bird species



Songbird density



All data available to public

- All data available through website or on request
- All parameters are defined, data have consistent organization, basic quality assurance, metadata
- Metadata published in Global Change Master Directory
- Data have been used in several publications already

All data available to public

- EDC web site gets quite a lot of use
 - Approximately 80,000 hits from May 2011 to July 30, 2012
 - Changed from StatCounter to Google Analytics in February of 2012, which provides more detailed information

Visitors Overview

Jan 1, 2012 - Jul 31, 2012

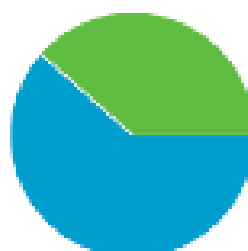
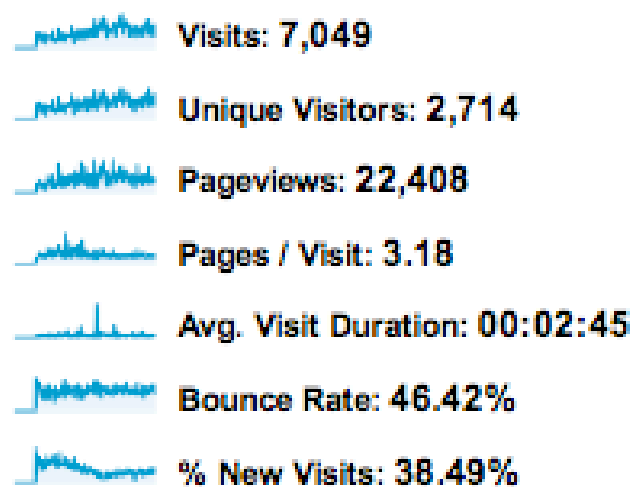
● % of visits: 100.00%

Overview

● Visits



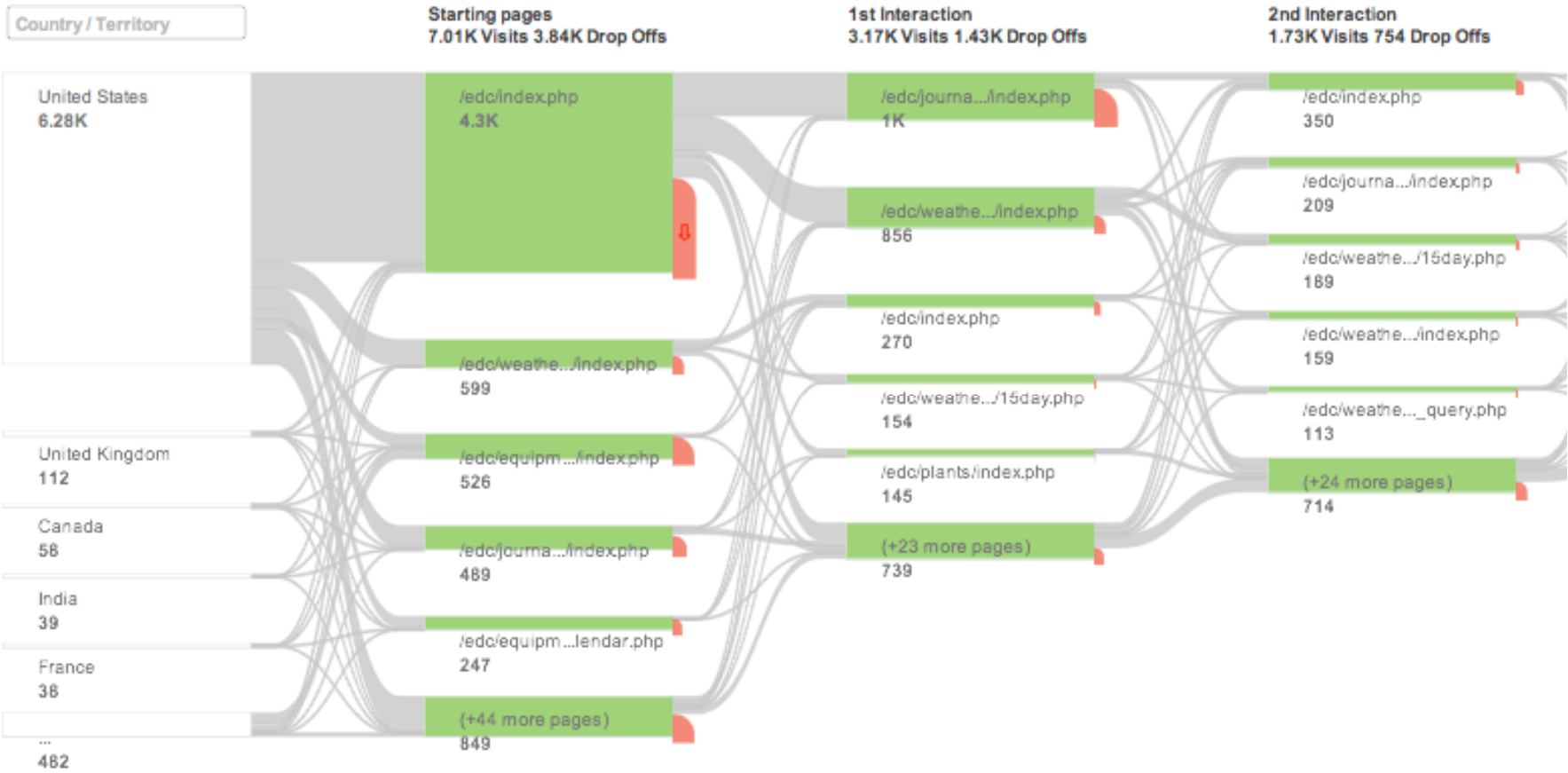
2,714 people visited this site



■ 61.51% Returning Visitor
4,335 Visits

■ 38.49% New Visitor
2,713 Visits

Visitors Flow



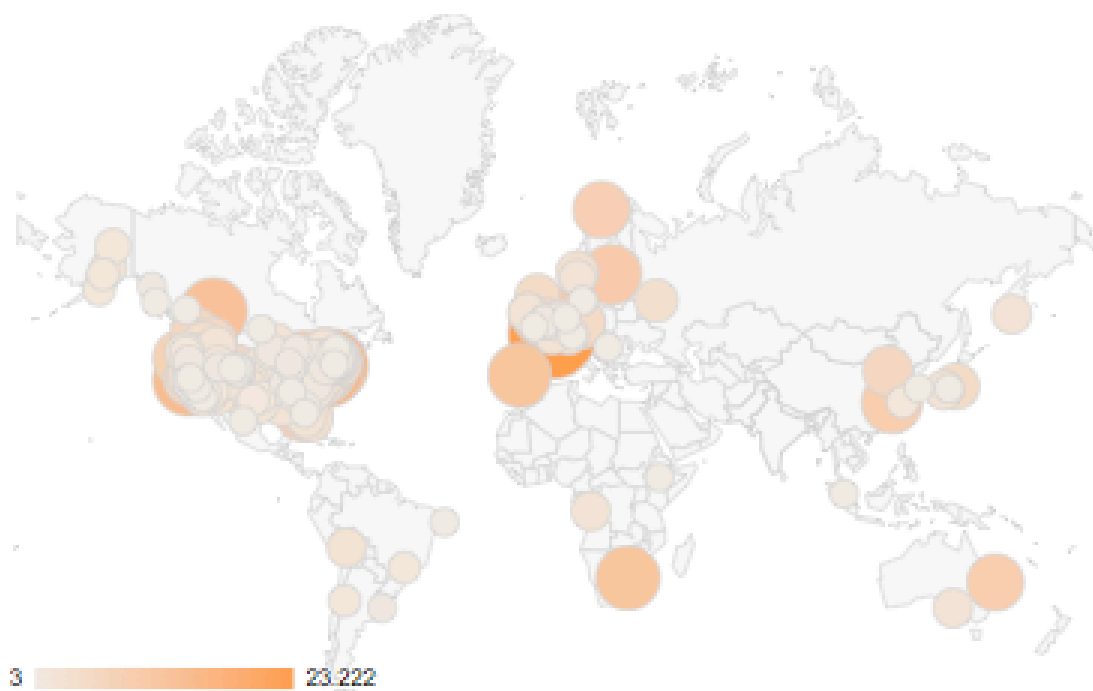
Location

Jan 1, 2012 - Jul 31, 2013

 % of visits: 100.00%

Map Overlay

Site Usage



Visits	Pages / Visit	Avg. Visit Duration	% New Visits	Bounce Rate
7,051	3.18	00:02:44	38.48%	46.42%
% of Total: 100.00% (7,051)	Site Avg: 3.18 (0.00%)	Site Avg: 00:02:44 (0.00%)	Site Avg: 38.48% (0.00%)	Site Avg: 46.42% (0.00%)

Field and laboratory equipment

EQUIPMENT

Autoclave

Balances

Centrifuge

Freeze dryer

Hydrolab profiler

Incubator: dry

Incubators: wet

Leaf area meters

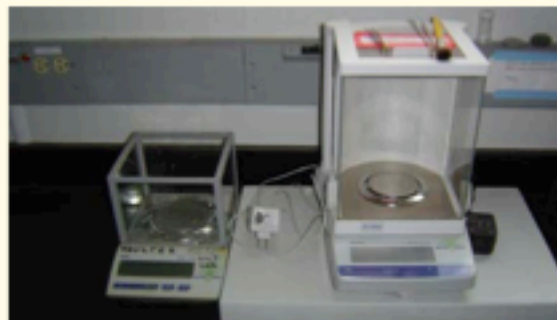
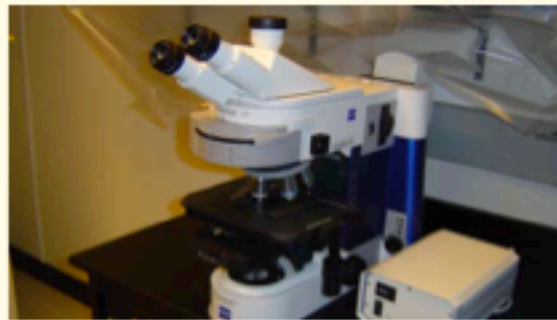
Microscopes

Muffle furnace

Scintill. counter

Shaker table

Unispec analyzer



Weekend course

“Introduction to the Arctic”



- 15 course participants (REUs, RAs, grad students)
- Explored arctic ecology through interactive lectures and hands-on lab activities
- Provided larger context for student projects and fostered work relationships among peers
- Received outstanding reviews from both students and supervisors

Toolik's EDC - the future

- Our goal is to ensure that continuous, consistent and good quality baseline data are available to set the context for research
 - EDC program has been valuable so far
 - Not anticipating a dramatic expansion
 - Plan to continue existing program
- Need to be flexible, complement what NEON, AON, LTER are doing
- Continue to provide common-use equipment, limited field assistance in shoulder seasons, outreach
- Eventually, it would be great to synthesize long-term monitoring records at TFS for publication
- Working group & plenary discussion on coordination of observations to gather input

