BONANZA CREEK LTER OUTREACH 2015

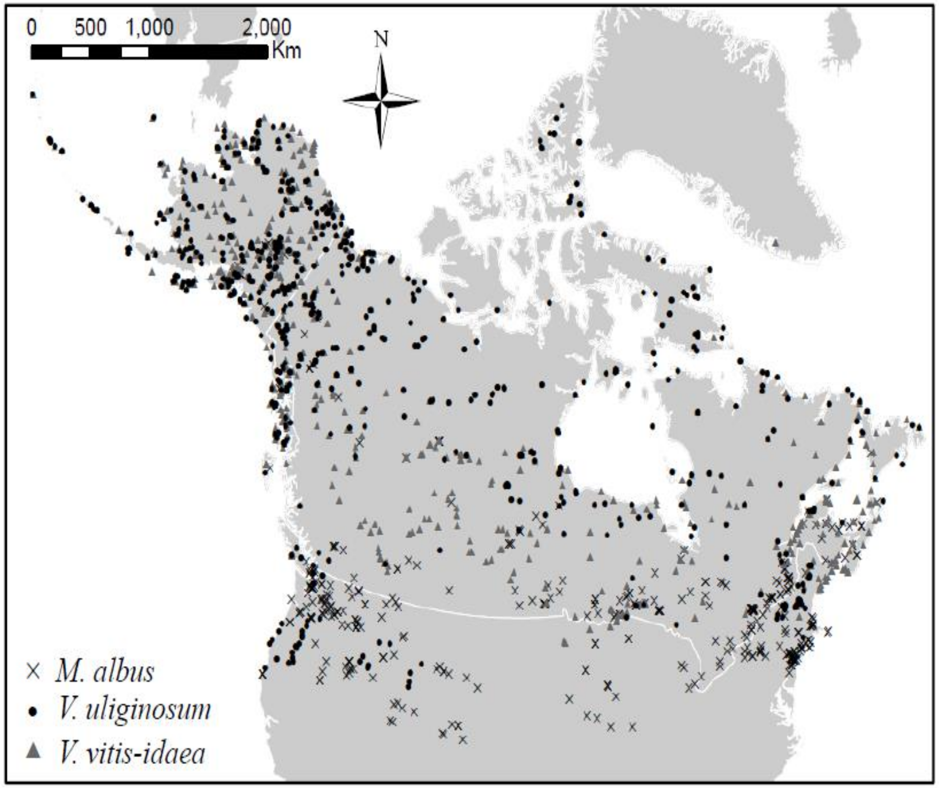
Christa Mulder & Katie Spellman

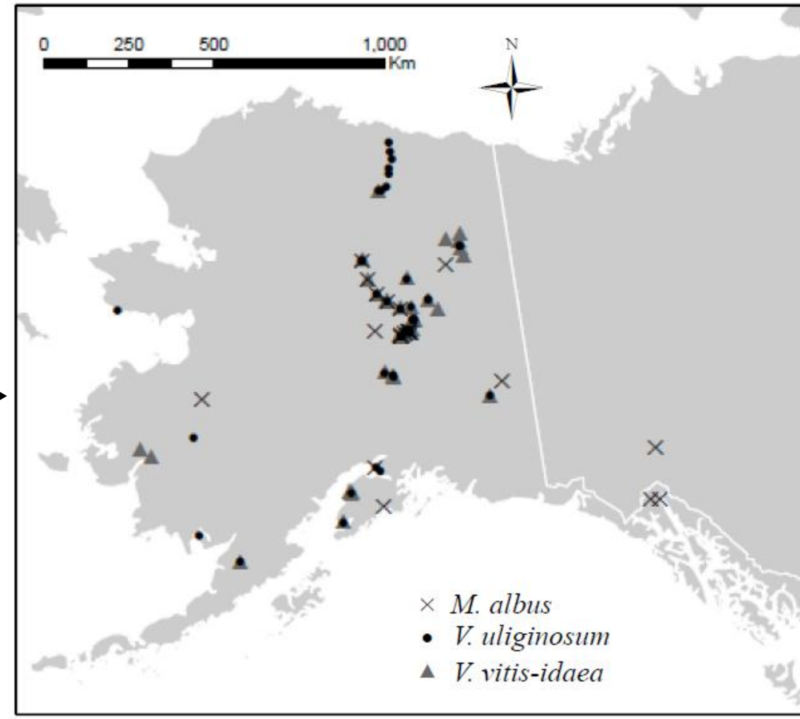
Outline

- Melibee Project as a model of Citizen Science
  - Using citizen science data to validate herbarium models
  - Melibee as an example of citizen science best practices
  - Melibee as an example of collaboration between universities, state agencies, and the public
- Project BrownDown
- Future directions for citizen science within LTER

Melibee data were used to validate herbarium models

The Melibee Project





Explained phenology by date, latitude, longitude, elevation, DTW, and island

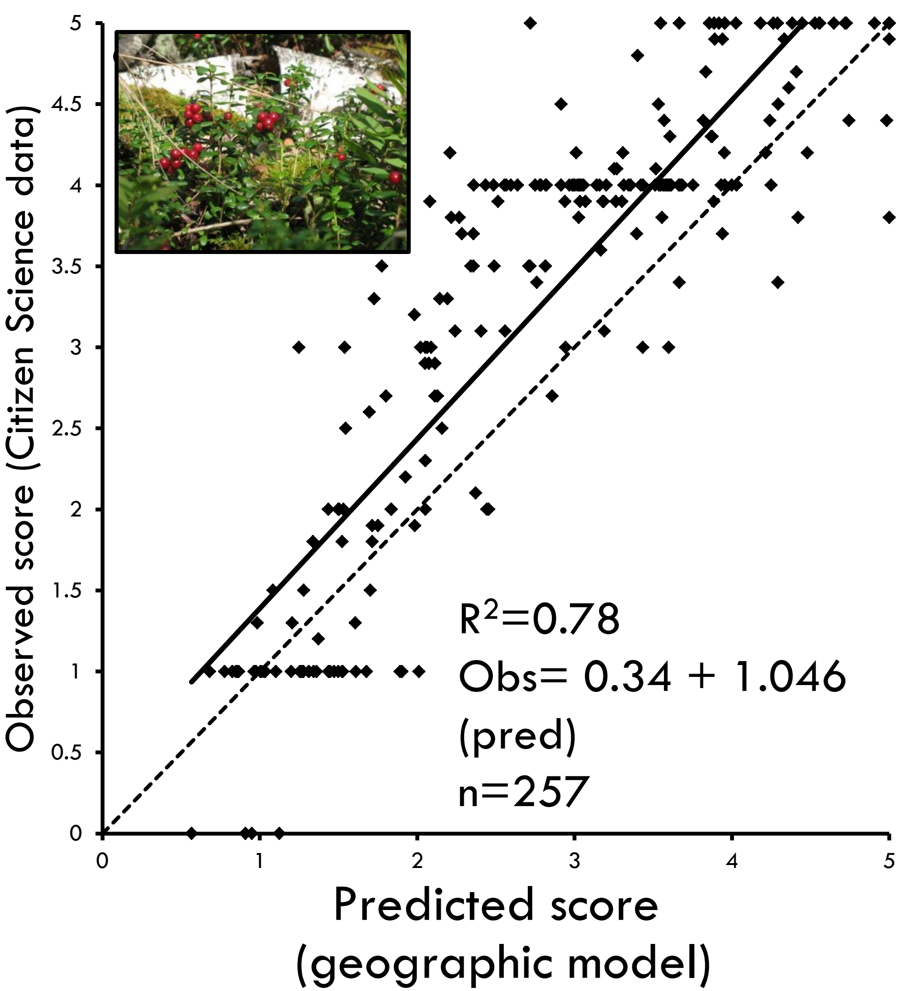
Vaccinium vitis-idaea: R^2=0.49

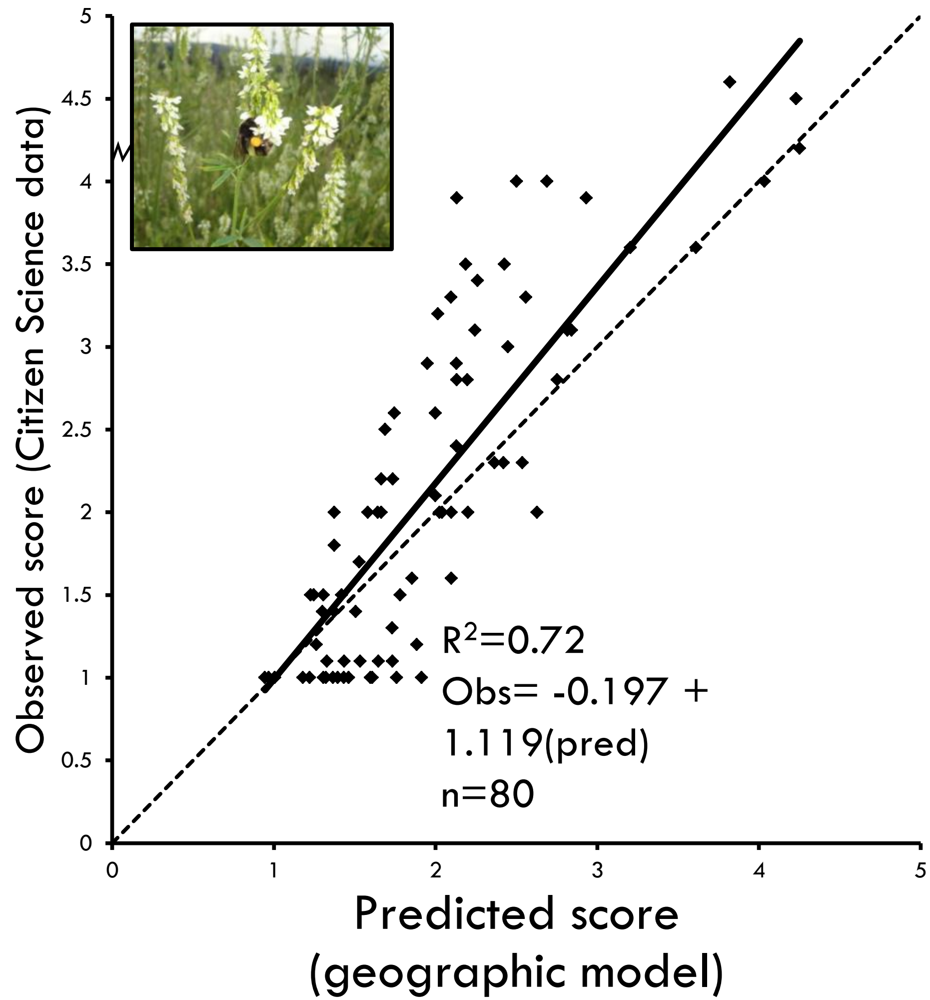
Vaccinium uliginosum: R^2=0.60

Melilotus albus: R^2=0.37

Results of model validation

The Melibee Project





Collaboration, interdisciplinary thinking, and communication: new approaches to K–12 ecology education

Stephanie V Bestelmeyer[1*], Monica M Elser[2], Katie V Spellman[3], Elena B Sparrow[3], Stephanie S Haan-Amato[1], and Anna Keener[1]

Ecologists often engage in global-scale research through partnerships among scientists from many disciplines. Such research projects require collaboration, interdisciplinary thinking, and strong communication skills. We advocate including these three practices as an integral part of ecology education at the kindergarten through 12th grade (K–12) level, as opposed to waiting until the graduate level. Current discourse about K–12 ecology education focuses on promoting lessons in which students learn science by conducting research rather than simply reading textbooks. Here, we present five models of K–12 ecology education programs that emphasize collaboration, interdisciplinary thinking, and communication within student research projects on the ecology of drylands and other ecosystems. Such practices not only provide additional skills for future ecologists but also prepare students for success in any career as well as for ecologically literate citizenship.

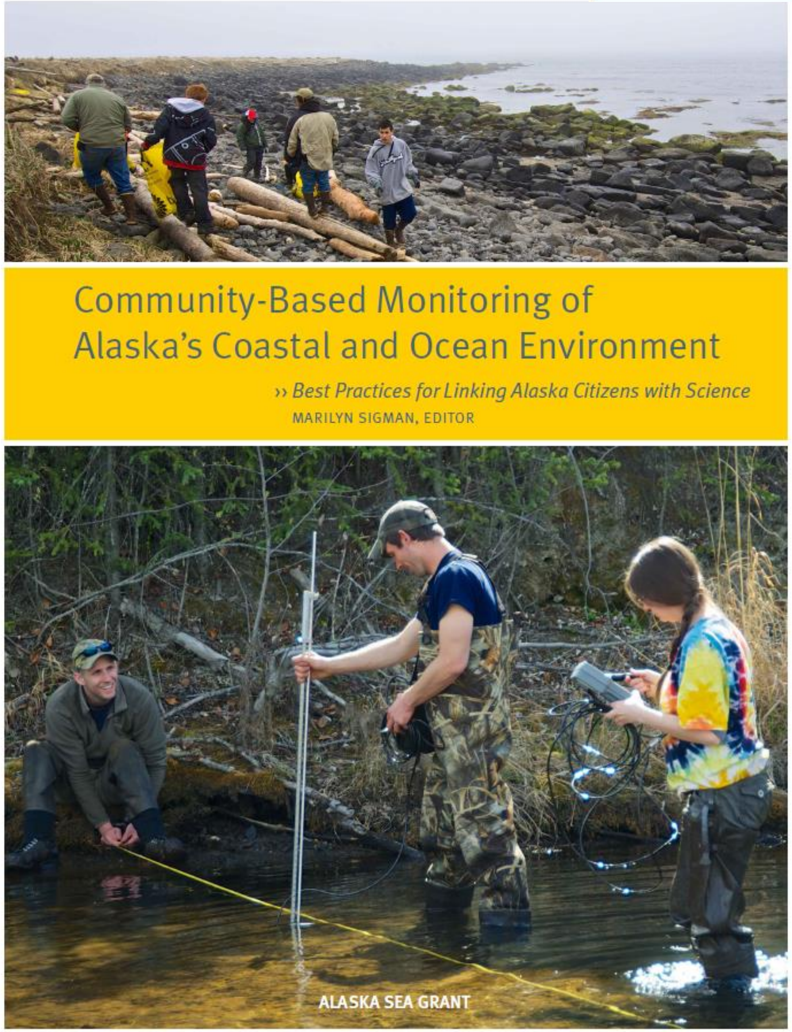
Front Ecol Environ 2015; 13(1): 37–43, doi:10.1890/140130

Participants	Training for Successful Collaboration	Collaboration Strategies
• Ecologists • K12 educators & youth • Land managers • Interested individuals & families • Alaska Native tribal and traditional councils	• Scientific protocols • Collaborative problem solving • Invasive plant ecology & management • Communication & education approaches	• High quality email communication between ecologists and volunteers • Monitoring site visits by ecologists • Web-based portal to input, share & visualize data • Team gathering & newsletter

B[illegible]telmeyer, Elser, Spellman, Sparrow, et al. 2015, *Frontiers in Ecology and the Environment*

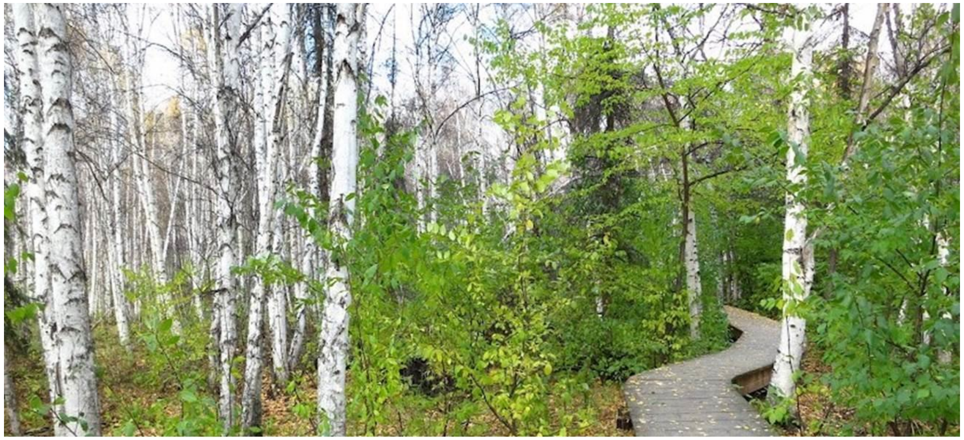
Melibee Project breaks out!

- The Melibee Project was used as a model to develop best practices for community-based monitoring programs (building partnerships, recruiting and training volunteers, evaluating outcomes, and knowing when to quit)
- The Melibee Project was included in the Atlas of Community-Based Monitoring and Traditional Knowledge in a Changing Arctic



A vacant phenological niche in Alaska?

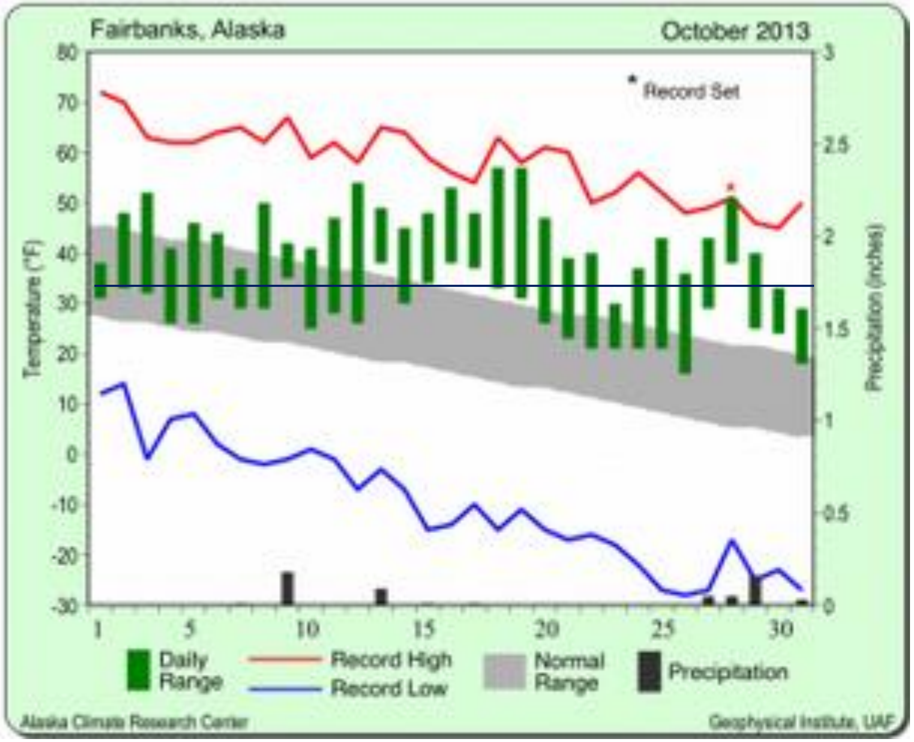
- The growing season in interior Alaska has increased by approx. 45% over the past 100 years
- This raises the potential for a "vacant" phenological niche in spring or in fall
- Preliminary data suggest that a fall vacant niche is most likely

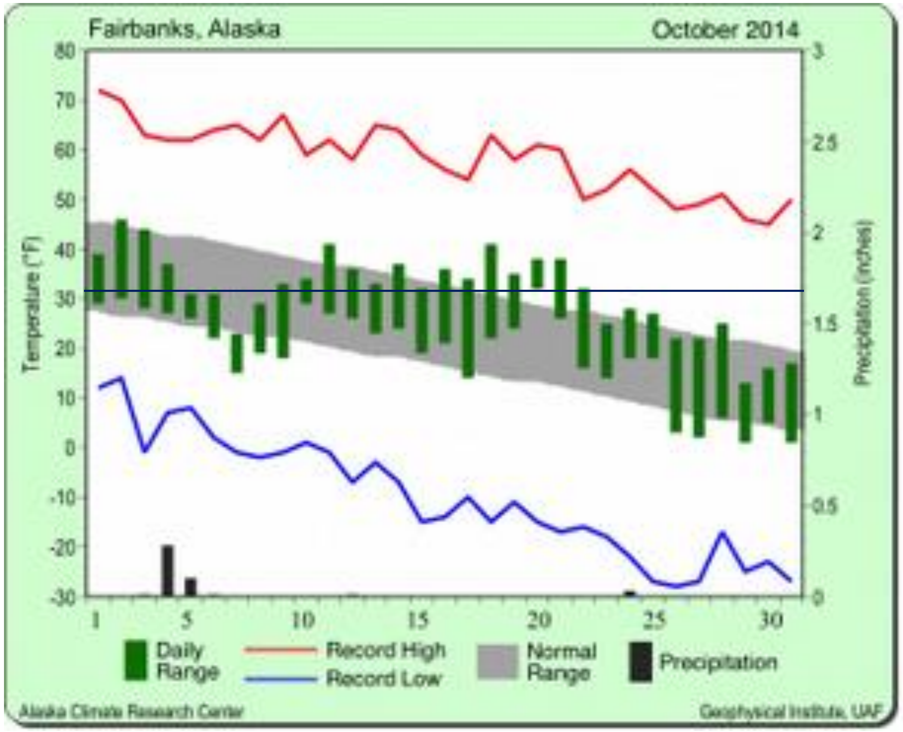


European bird cherry (*Prunus padus*) holds onto green leaves long after the native birch have lost all their leaves along the Creamer's Field Wildlife Refuge boreal forest trail. Photo by Katie Spellman.

The first frost of the year hits the University of Alaska Fairbanks Campus and bird vetch (*Vicia cracca*) is the only green plant remaining in the picture. Photo by Katie Spellman.

October 2013   October 2014





Comparison of native and non-native phenology in 2013 and 2014

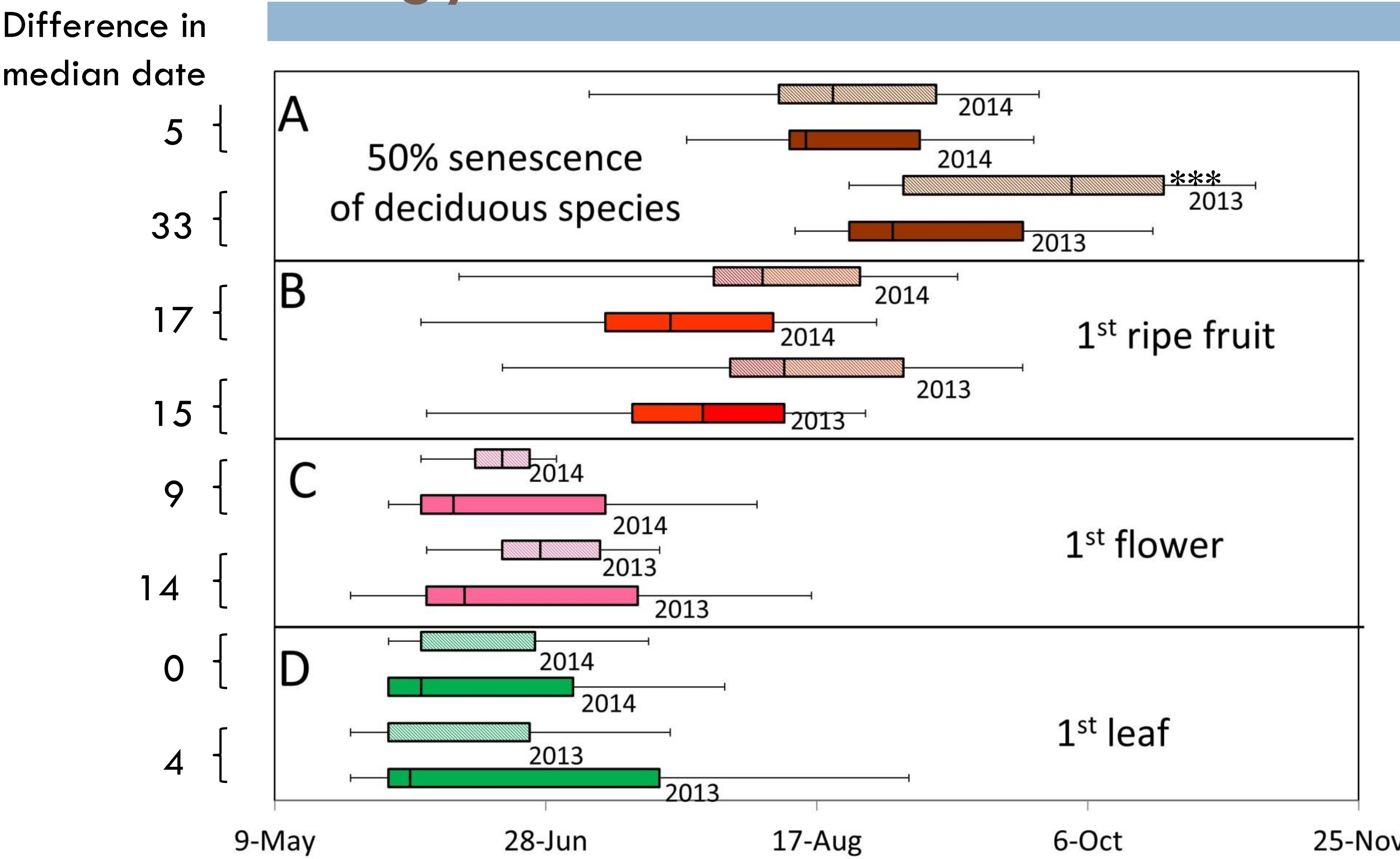
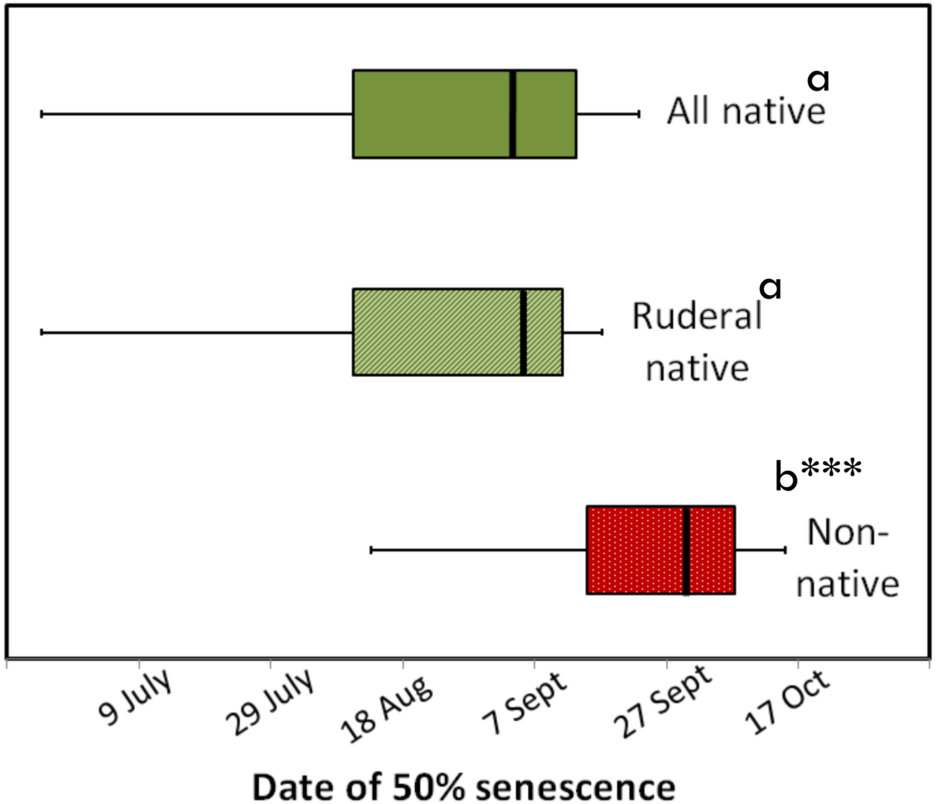
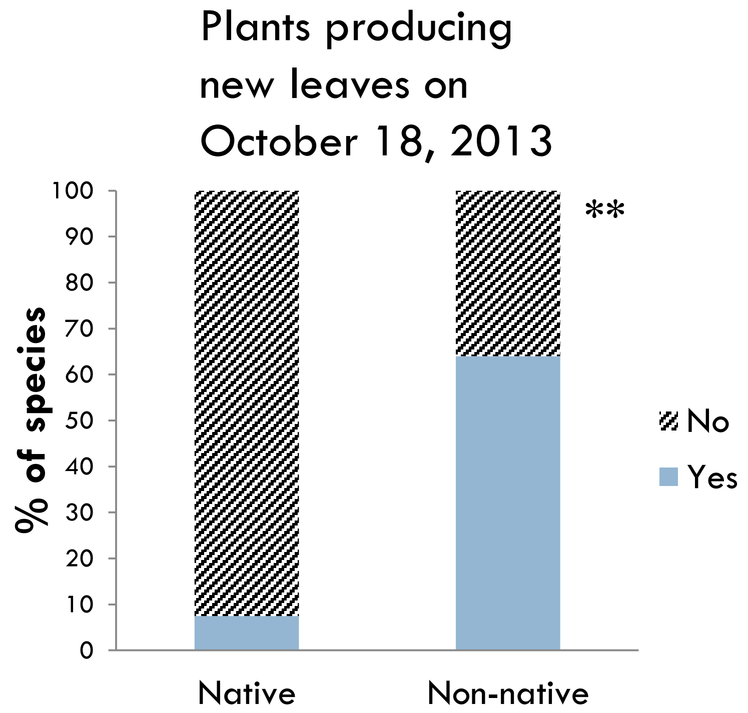


Fig. 1. Phenology of 26 native (dark bars) and 11 non-native (light bars) plant species in Interior Alaska.

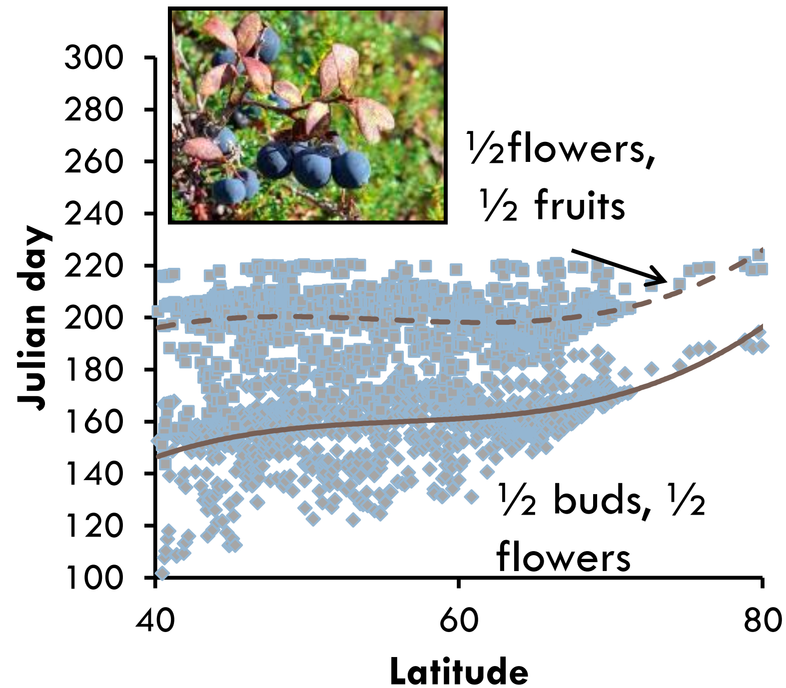
Do native plants senesce earlier in a late fall than non-native plants?





Do developmental rates change in the same way for all functional groups?

- From 1st flower to 1st ripe fruit:
  - All plants (N=46): 44 (2013) vs 45 (2014) days
  - Woody deciduous species (N=6): 46 (2013) vs 57 (2014) days
- Blueberries also increased developmental rates at higher latitudes
- Could this lead to <u>shorter</u> growth seasons for woody deciduous plants?



Project BrownDown

Main questions:

- Are non-native plants more able to use late falls than native plants?
- Does ability to use late falls differ between functional groups?
- Does ability to use late falls differ across latitudes?
- Do freezing events when plants are active functional groups differently?

Katie Spellman, REU student Katie Moeller, and USFWS Youth Corps intern Brendan McKinnon

Approach: selection of pairs of species

Plant Group	Non-Native Plants	Native Plants
A. Herbaceous Fabaceae (Pea Family)	• *Melilotus albus* (sweetclover) • *Vicia cracca* (bird vetch) • *Trifolium repens/hybridum* (clover) • *Medicago sativa* ssp. *falcata* (yellow alfalfa)	• *Hedysarum boreale/alpinum* (northern sweetvetch / eskimo potato) • *Oxytropis deflexa/Maydelliana* (locoweed) • *Astragalus alpinus* (alpine milkvetch) • *Lupinus arcticus/nootkatensis* (native lupine)
B. Woody N-Fixers	• *Caragana arborescens* (Siberian peashrub)	• *Alnus viridis/rubra/incana* (alder) • *Shepherdia canadensis* (buffaloberry)
C. Woody Rosaceae (Rose Family)	• *Prunus padus* (European bird cherry)	• *Rosa acicularis* (wild rose)
D. Herbaceous Asteraceae (Sunflower Family)	• *Taraxacum officinale* (non-native dandelion) • *Crepis tectorum* (narrowleaf hawksbeard) • *Leucanthemum vulgare* (oxeye daisy) • *Matricaria discoidea* (pineapple weed)	• *Taraxacum ceratophorum* (native dandelion) • *Solidago canadensis* (goldenrod) • *Eurybia sibirica* (Siberian aster)








Approach: selection of pairs of species

Plant Group	Non-Native Plants	Native Plants
E. Poaceae (Grass Family)	• *Phalaris aurundinaceae* (reed canarygrass)	• *Calamagrostis canadensis* (bluejoint grass)
F. Orobanchaceae (Broomrape Family)	• *Linaria vulgaris* (butter and eggs)	• *Castilleja caudata* (Alaska paintbrush) • *Rhinanthus borealis* (northern rattlebox)
G. Amaranthaceae (Amaranth Family)	• *Chenopodium album* (lambsquarters)	• *Chenopodium capitatum* (strawberry blite)
H. Evergreen or Wintergreen		• *Vaccinium vitis-idaea* (lowbush cranberry) • *Rhododendron (Ledum) spp.* (Labrador tea) • *Cornus canadensis* (dwarf dogwood) • *Pyrola grandiflora* (largeflowered wintergreen)






Participants to date: workshops

Pilot year (2014): 37 people

- 19 K-12 teachers
- 1 youth group leader
- 4 state / federal employees
- 13 others

K-12 program

- Trainings in 10 classrooms
- Grades 4-9
- One youth group (USFWS)

Future research directions

- Decomposition of different mixtures due to changes in leaf senescence
- Timing of fruit availability and use by migrant and resident birds and mammals



Katie Spellman's PhD defense

- Monday, 2 March at 9 am
- Butrovich 107