Managing Data: A case study from the Minnesota Phenology Network

MnPN
Minnesota Phenology Network

Dec. 1st 2017

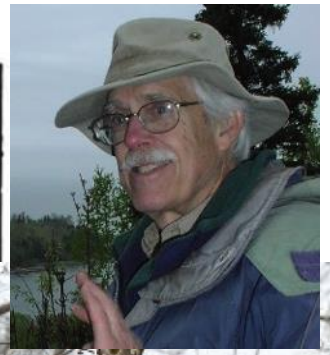
Rebecca Montgomery and Chris Buyarski

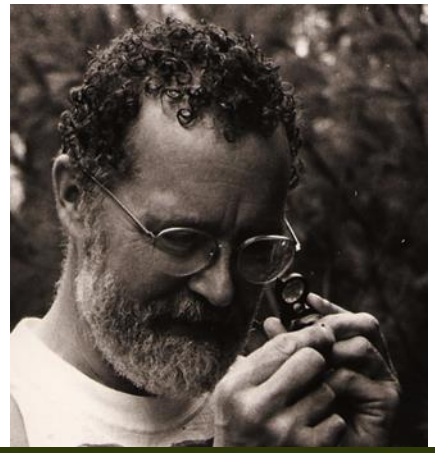


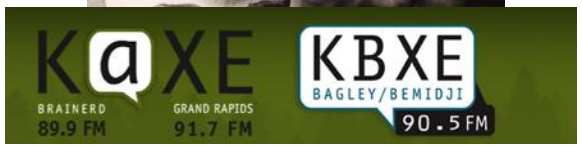
Photos: Creative commons, A. Stefanski, K. Oberhauser

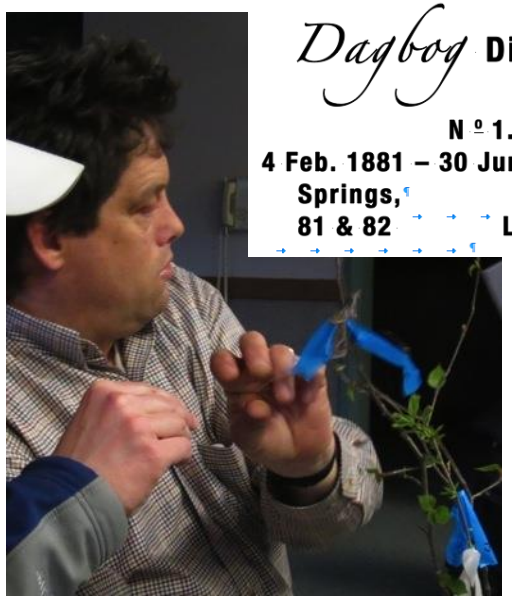
A wealth of data exist in Minnesota

ALEXANDER C. HODS
Professor
B.S. Massachusetts, 1928
M.S. Minnesota, 1931
Ph.D. Minnesota, 1935
Forest Entomology





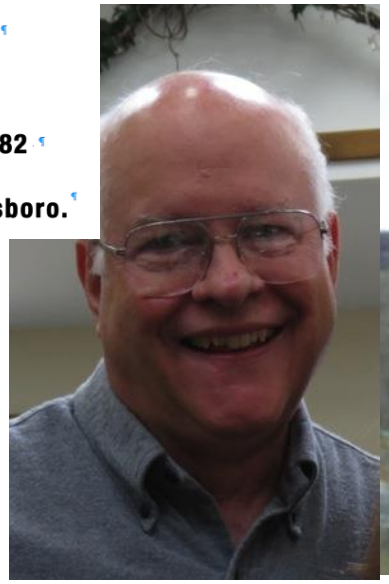


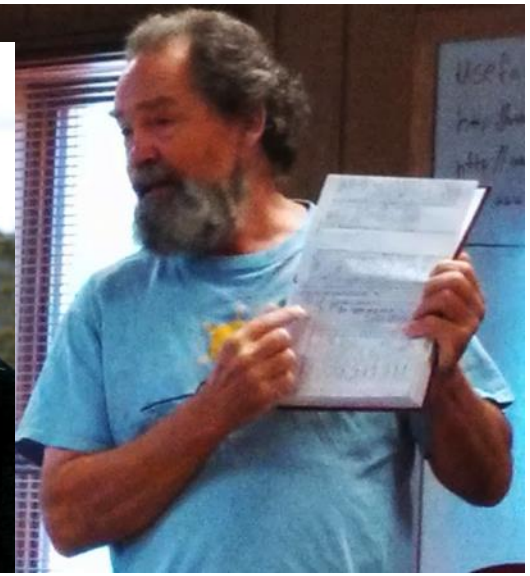


1881 – 2

Dagbog Diary

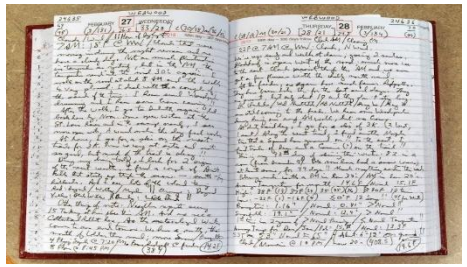
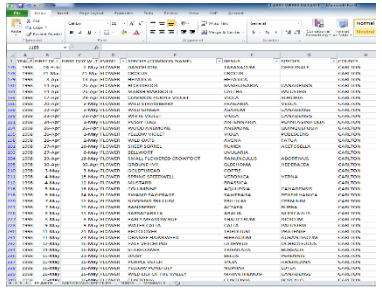
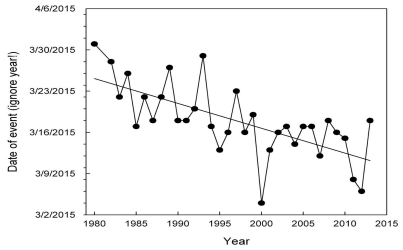
N º 1.
4 Feb. 1881 – 30 Juni 1882
Springs,
81 & 82 Lanesboro.





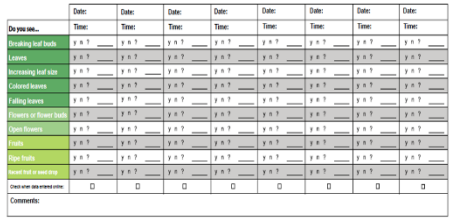
LCCMR Funding

- Two Objectives:
- 1. Digitize and analyze historical datasets

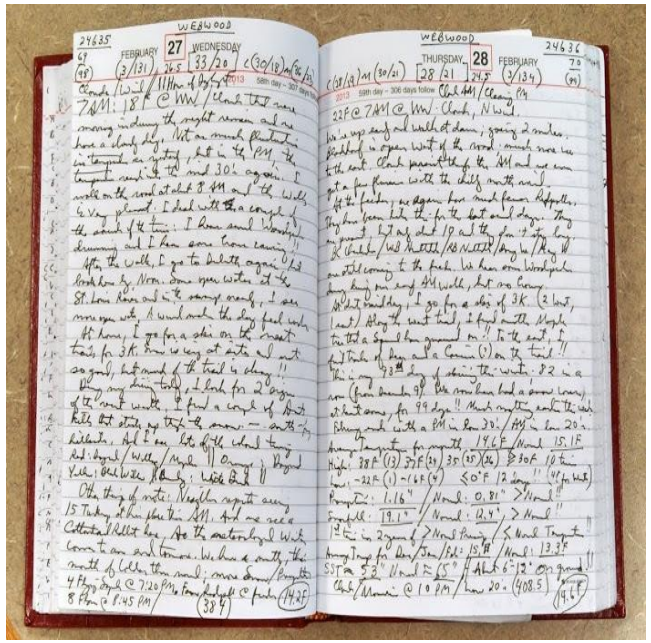

→

→


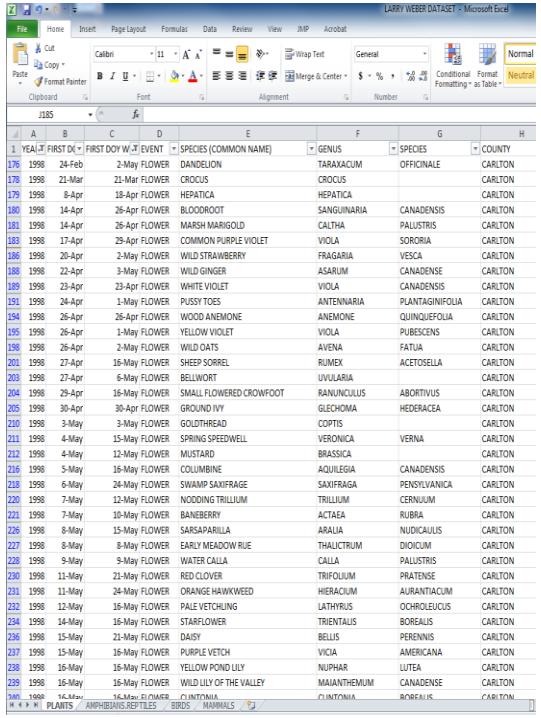
- 2. Recruit additional citizens to collect data using standardize methods.


→

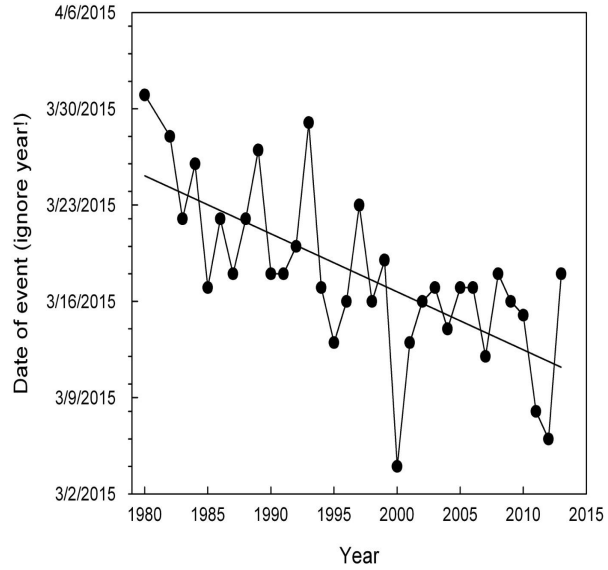


Digitize historical Datasets



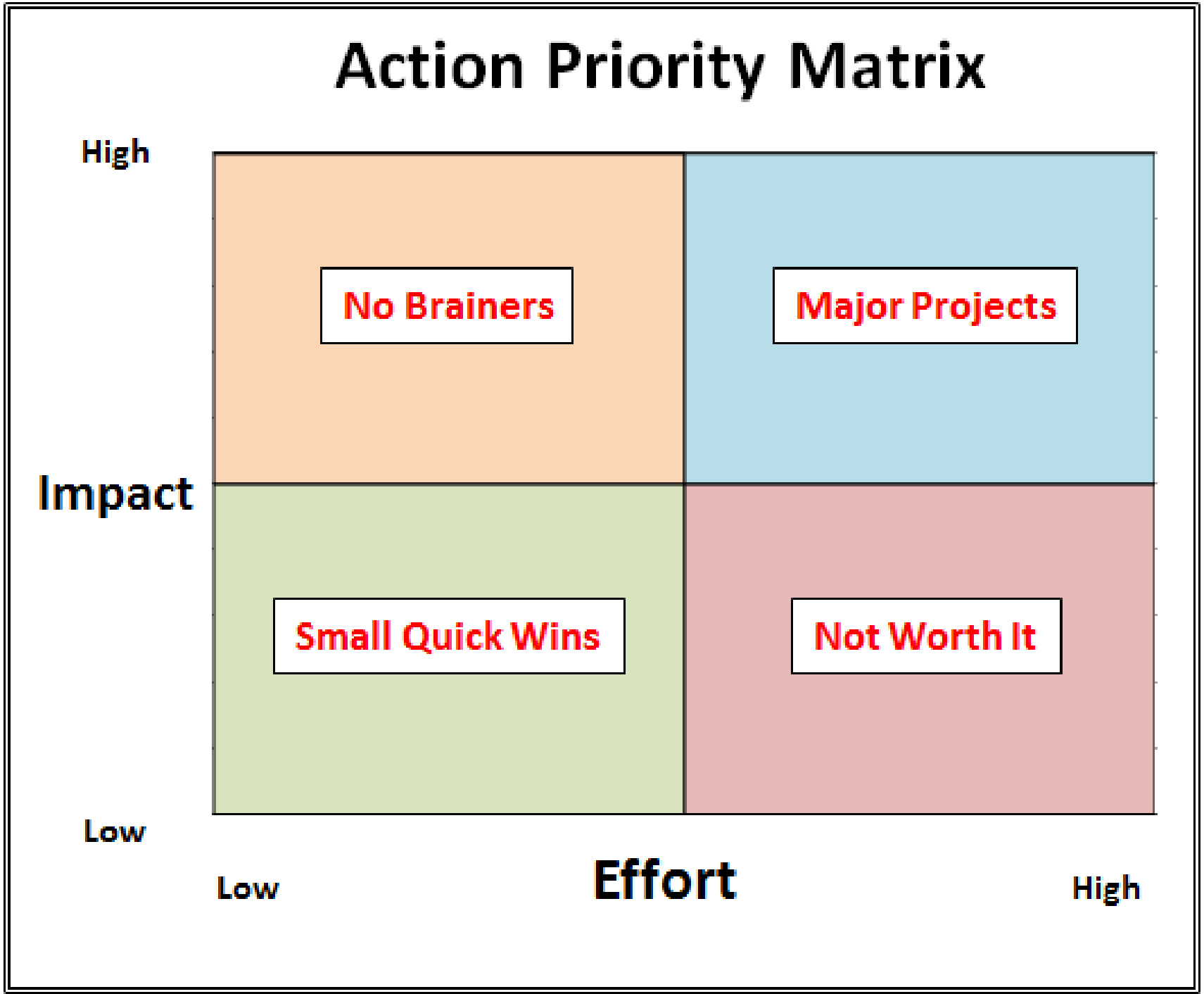


	A	B	C	D	E	F	G	H
1	YEAR	FIRST D(	FIRST DOY W	EVENT	SPECIES (COMMON NAME)	GENUS	SPECIES	COUNTY
176	1998	24-Feb	2-May	FLOWER	DANDELION	TARAXACUM	OFFICINALE	CARLTON
178	1998	21-Mar	21-Mar	FLOWER	CROCUS	CROCUS		CARLTON
179	1998	8-Apr	18-Apr	FLOWER	HEPATICA	HEPATICA		CARLTON
180	1998	14-Apr	26-Apr	FLOWER	BLOODROOT	SANGUINARIA	CANADENSIS	CARLTON
181	1998	14-Apr	26-Apr	FLOWER	MARSH MARIGOLD	CALTHA	PALUSTRIS	CARLTON
183	1998	17-Apr	29-Apr	FLOWER	COMMON PURPLE VIOLET	VIOLA	SORORIA	CARLTON
186	1998	26-Apr	2-May	FLOWER	WILD STRAWBERRY	FRAGARIA	VESCA	CARLTON
188	1998	22-Apr	3-May	FLOWER	WILD GINGER	ASARUM	CANADENSE	CARLTON
189	1998	23-Apr	23-Apr	FLOWER	WHITE VIOLET	VIOLA	CANADENSIS	CARLTON
191	1998	24-Apr	1-May	FLOWER	PUSSY TOES	ANTENNARIA	PLANTAGINIFOLIA	CARLTON
194	1998	26-Apr	26-Apr	FLOWER	WOOD ANEMONE	ANEMONE	QUINQUEFOLIA	CARLTON
195	1998	26-Apr	1-May	FLOWER	YELLOW VIOLET	VIOLA	PUBESCENS	CARLTON
198	1998	26-Apr	2-May	FLOWER	WILD OATS	AVENA	FATUA	CARLTON
201	1998	27-Apr	16-May	FLOWER	SHEEP SORREL	RUMEX	ACETOSELLA	CARLTON
203	1998	27-Apr	6-May	FLOWER	BELLWORT	UVULARIA		CARLTON
204	1998	29-Apr	16-May	FLOWER	SMALL FLOWERED CROWFOOT	RANUNCULUS	ABORTIVUS	CARLTON
205	1998	30-Apr	30-Apr	FLOWER	GROUND IVY	GLECHOMA	HEDERACEA	CARLTON
210	1998	3-May	3-May	FLOWER	GOLDTHREAD	COPTIS		CARLTON
211	1998	4-May	15-May	FLOWER	SPRING SPEEDWELL	VERONICA	VERNA	CARLTON
212	1998	4-May	12-May	FLOWER	MUSTARD	BRASSICA		CARLTON
216	1998	5-May	16-May	FLOWER	COLUMBINE	AQUILEGIA	CANADENSIS	CARLTON
218	1998	6-May	24-May	FLOWER	SWAMP SAXIFRAGE	SAXIFRAGA	PENSYLVANICA	CARLTON
220	1998	7-May	12-May	FLOWER	NODDING TRILLIUM	TRILLIUM	CERNUUM	CARLTON
221	1998	7-May	10-May	FLOWER	BANEBERRY	ACTAEA	RUBRA	CARLTON
226	1998	8-May	15-May	FLOWER	SARSAPARILLA	ARALIA	NUDICAULIS	CARLTON
227	1998	8-May	8-May	FLOWER	EARLY MEADOW RUE	THALICTRUM	DIOICUM	CARLTON
228	1998	9-May	9-May	FLOWER	WATER CALLA	CALLA	PALUSTRIS	CARLTON
230	1998	11-May	21-May	FLOWER	RED CLOVER	TRIFOLIUM	PRATENSE	CARLTON
231	1998	11-May	24-May	FLOWER	ORANGE HAWKWEED	HIERACIUM	AURANTIACUM	CARLTON
232	1998	12-May	16-May	FLOWER	PALE VETCHLING	LATHYRUS	OCHROLEUCUS	CARLTON
234	1998	14-May	16-May	FLOWER	STARFLOWER	TRIENTALIS	BOREALIS	CARLTON
236	1998	15-May	21-May	FLOWER	DAISY	BELLIS	PERENNIS	CARLTON
237	1998	15-May	16-May	FLOWER	PURPLE VETCH	VICIA	AMERICANA	CARLTON
238	1998	16-May	16-May	FLOWER	YELLOW POND LILY	NUPHAR	LUTEA	CARLTON
239	1998	16-May	16-May	FLOWER	WILD LILY OF THE VALLEY	MAIANTHEMUM	CANADENSE	CARLTON



ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

MnPN
Minnesota Phenology Network



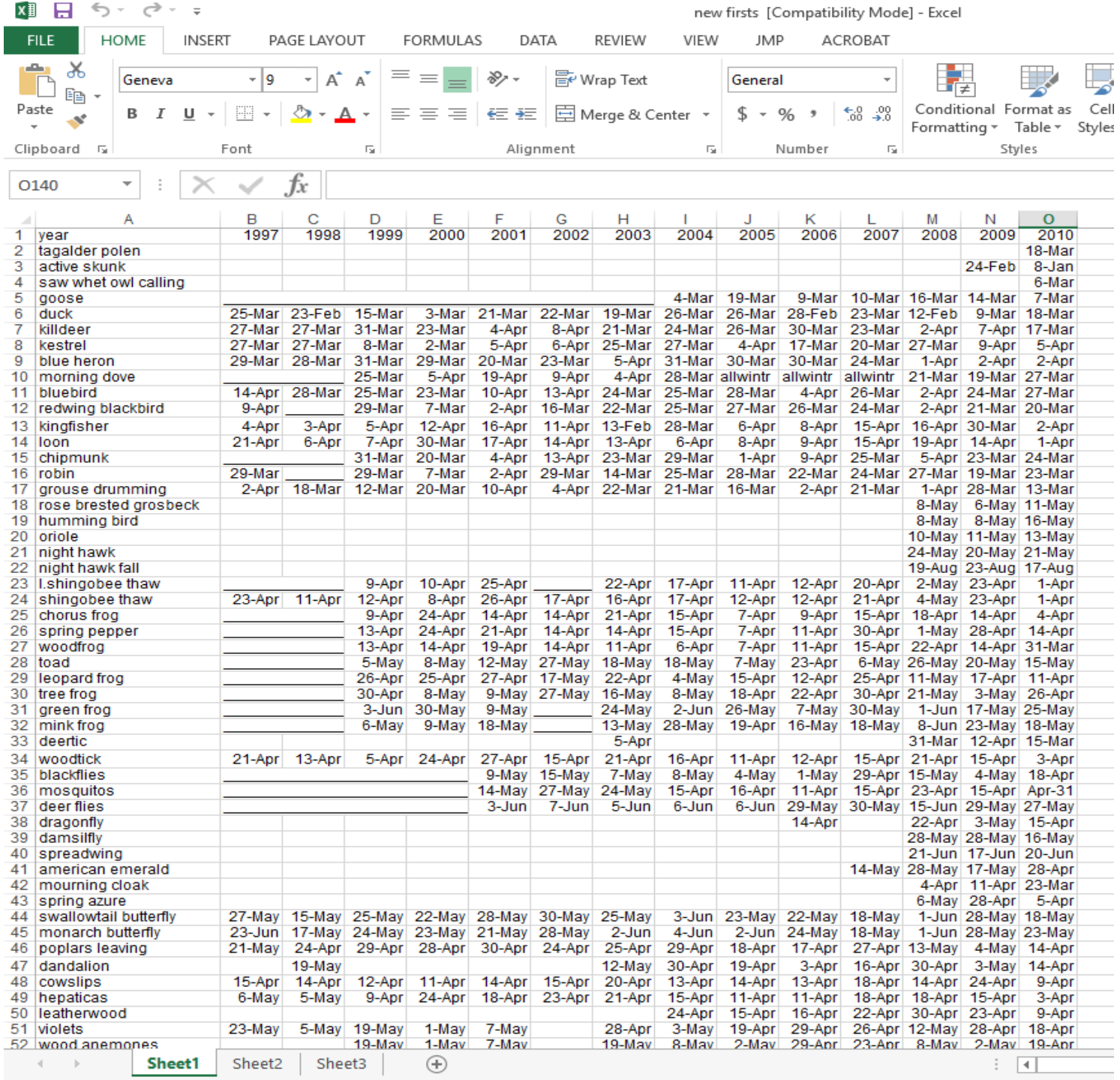
- Impact/Value Examples
  - # Species
  - # Locations
  - # Years
  - Data Collectors
    - Good data?

No Brainer!

TABLE 1. Some common spring phenological events recorded by Wildlife Managers 1987.

EVENT	Cloquet	Mille-lacs	St. Cloud	Baud-ette	Morris	Carlos Avery	Bemidji	Grand Marais	Grand Rapids	Park Rapids	Karl-stad	Thief River Falls	Ely	Thief Lake	Glen-wood
First kestrel sighted	3-25	3-15	all winter	3-10	3-25	3-3	3-6	4-22	3-21	3-19	3-24	3-3	3-31	3-12	3-20
First great blue heron sighted	4-6	3-22	3-11	4-8	4-14	—	3-22	4-22	3-26	3-20	4-21	3-23	4-16	3-23	3-20
First robin sighted	3-17	3-6	2-22	3-21	3-17	3-8	3-21	3-24	3-21	3-21	3-19	3-20	3-21	3-18	3-5
First red-winged blackbird sighted	3-15	3-17	3-2	4-4	3-17	3-9	3-18	2-26	3-20	3-21	4-5	3-26	3-24	4-5	3-5
First killdeer sighted	3-17	3-20	3-12	3-29	3-25	3-19	3-27	3-22	3-21	3-23	3-25	3-23	3-27	—	3-12
First woodcock heard/sighted	3-22	3-19	3-31	4-10	—	3-16	4-8	3-23	3-16	3-23	3-23	4-1	3-24	4-8	—
First mallard sighted	3-26	3-15	all winter	4-4	all winter	all winter	4-1	all winter	4-4	3-20	3-23	3-21	4-4	3-21	3-12
First marsh hawk sighted	3-25	2-28	2-27	2-25	3-25	—	3-1	3-24	3-16	3-24	3-24	3-10	4-19	—	3-21
First Canada goose sighted	3-20	3-6	all winter	3-21	all winter	all winter	3-16	3-22	—	3-20	3-5	3-6	4-5	3-5	3-1
First meadowlark sighted	3-31	3-24	3-13	4-8	3-26	—	3-31	—	4-3	3-21	3-30	3-6	—	3-22	3-25
First goldeneye sighted	3-11	3-10	all winter	3-22	3-24	—	3-24	all winter	4-4	3-8	4-6	3-26	all winter	—	3-20
First loon sighted	4-10	4-17	3-28	—	—	—	4-9	4-12	4-11	4-7	—	—	4-18	—	4-5
First ruffed grouse drumming	3-31	3-19	3-15	4-6	—	—	4-17	3-26	3-7	3-19	—	4-7	3-29	4-10	—
All snow gone	4-2	3-21	1-31	4-4	3-17	3-3	3-22	4-13	—	3-17	3-21	4-6	4-16	4-7	3-9
First rain	3-23	3-19	—	3-23	3-17	—	3-16	3-23	3-23	3-21	3-22	3-30	3-23	—	3-23
First thunderstorm	4-20	3-20	3-21	5-16	4-20	—	—	4-26	—	4-2	—	—	4-26	—	3-23
Ice out of rivers	3-24	3-1	3-3	3-22	3-17	no ice	3-4	—	4-8	4-2	3-20	3-27	3-27	—	all winter
Ice out of lakes	4-12	—	3-28	4-13	3-25	3-18	4-15	4-7	4-15	4-8	4-15	—	4-12	4-16	3-25
Frost out of ground	4-10	—	3-20	—	3-21	3-19	3-24	—	—	—	—	—	—	—	4-15

Quick win!



new firsts [Compatibility Mode] - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW JMP ACROBAT

Geneva 9 Wrap Text General Conditional Formatting Format as Table Cell Styles

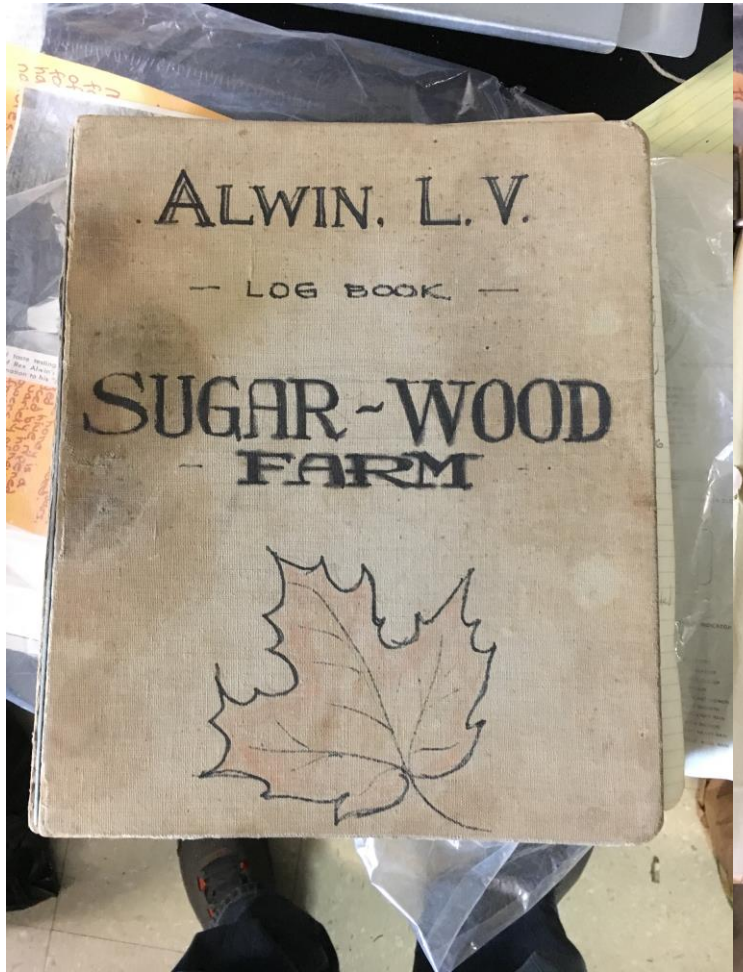
Paste Clipboard Font Alignment Number Styles

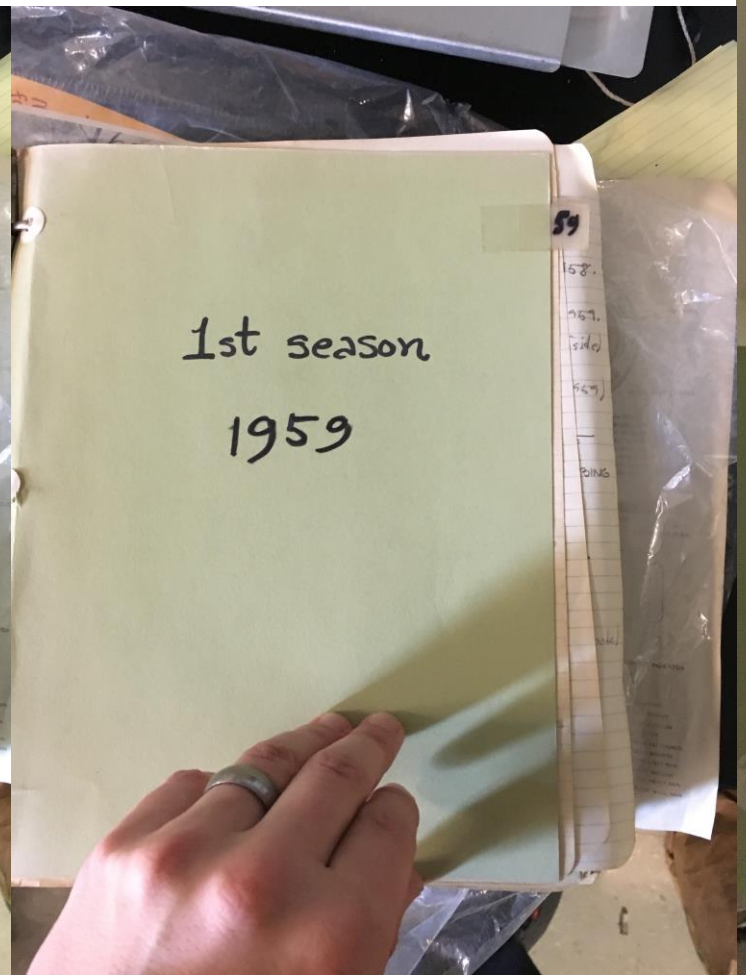
O140

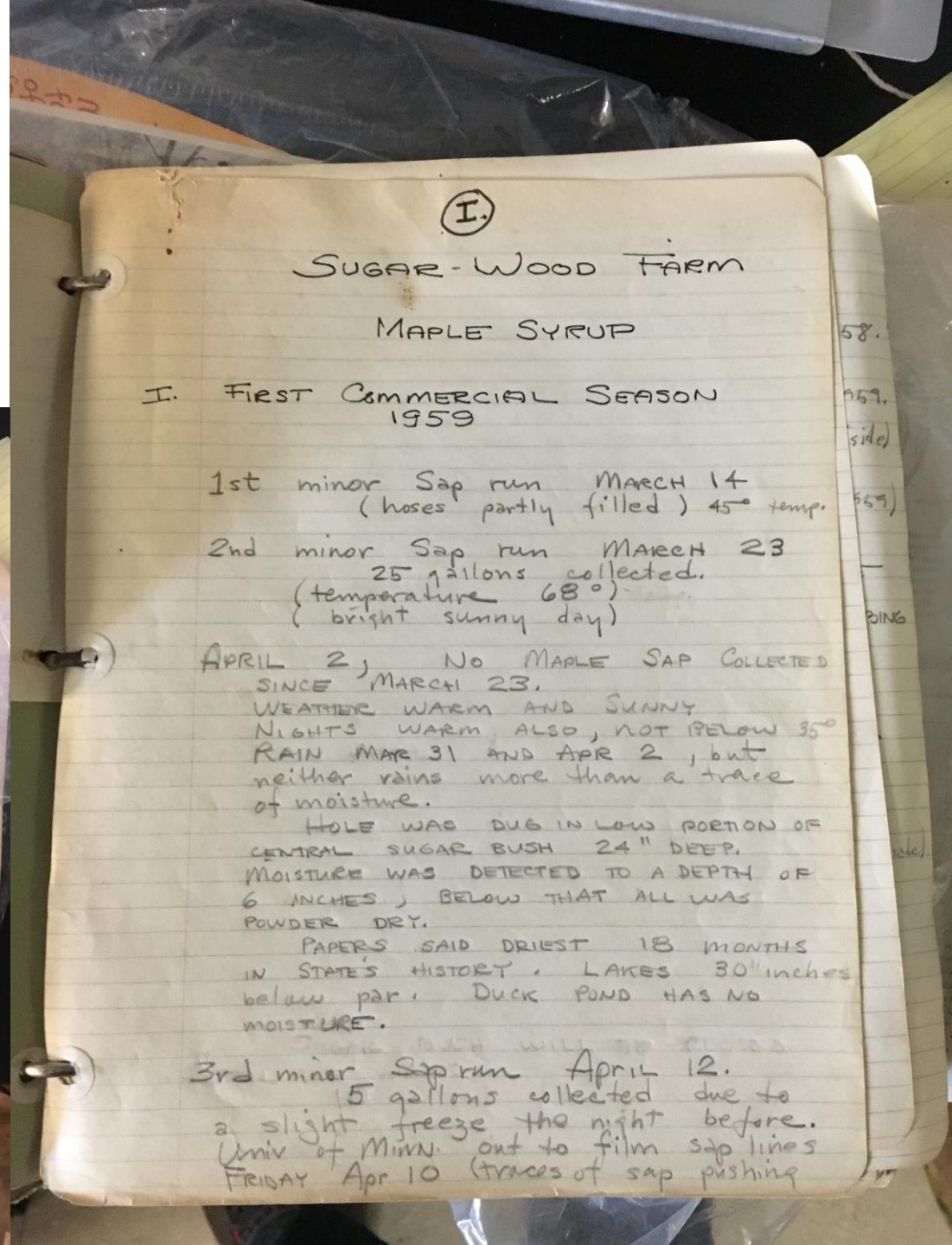
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
2	tagalder polen														18-Mar
3	active skunk													24-Feb	8-Jan
4	saw whet owl calling														6-Mar
5	goose								4-Mar	19-Mar	9-Mar	10-Mar	16-Mar	14-Mar	7-Mar
6	duck	25-Mar	23-Feb	15-Mar	3-Mar	21-Mar	22-Mar	19-Mar	26-Mar	26-Mar	28-Feb	23-Mar	12-Feb	9-Mar	18-Mar
7	killdeer	27-Mar	27-Mar	31-Mar	23-Mar	4-Apr	8-Apr	21-Mar	24-Mar	26-Mar	30-Mar	23-Mar	2-Apr	7-Apr	17-Mar
8	kestrel	27-Mar	27-Mar	8-Mar	2-Mar	5-Apr	6-Apr	25-Mar	27-Mar	4-Apr	17-Mar	20-Mar	27-Mar	9-Apr	5-Apr
9	blue heron	29-Mar	28-Mar	31-Mar	29-Mar	20-Mar	23-Mar	5-Apr	31-Mar	30-Mar	30-Mar	24-Mar	1-Apr	2-Apr	2-Apr
10	morning dove			25-Mar	5-Apr	19-Apr	9-Apr	4-Apr	28-Mar	allwintr	allwintr	allwintr	21-Mar	19-Mar	27-Mar
11	bluebird	14-Apr	28-Mar	25-Mar	23-Mar	10-Apr	13-Apr	24-Mar	25-Mar	28-Mar	4-Apr	26-Mar	2-Apr	24-Mar	27-Mar
12	redwing blackbird	9-Apr		29-Mar	7-Mar	2-Apr	16-Mar	22-Mar	25-Mar	27-Mar	26-Mar	24-Mar	2-Apr	21-Mar	20-Mar
13	kingfisher	4-Apr	3-Apr	5-Apr	12-Apr	16-Apr	11-Apr	13-Feb	28-Mar	6-Apr	8-Apr	15-Apr	16-Apr	30-Mar	2-Apr
14	loon	21-Apr	6-Apr	7-Apr	30-Mar	17-Apr	14-Apr	13-Apr	6-Apr	8-Apr	9-Apr	15-Apr	19-Apr	14-Apr	1-Apr
15	chipmunk			31-Mar	20-Mar	4-Apr	13-Apr	23-Mar	29-Mar	1-Apr	9-Apr	25-Mar	5-Apr	23-Mar	24-Mar
16	robin	29-Mar		29-Mar	7-Mar	2-Apr	29-Mar	14-Mar	25-Mar	28-Mar	22-Mar	24-Mar	27-Mar	19-Mar	23-Mar
17	grouse drumming	2-Apr	18-Mar	12-Mar	20-Mar	10-Apr	4-Apr	22-Mar	21-Mar	16-Mar	2-Apr	21-Mar	1-Apr	28-Mar	13-Mar
18	rose brested grosbeck												8-May	6-May	11-May
19	humming bird												8-May	8-May	16-May
20	oriole												10-May	11-May	13-May
21	night hawk												24-May	20-May	21-May
22	night hawk fall												19-Aug	23-Aug	17-Aug
23	l.shingobee thaw			9-Apr	10-Apr	25-Apr		22-Apr	17-Apr	11-Apr	12-Apr	20-Apr	2-May	23-Apr	1-Apr
24	shingobee thaw	23-Apr	11-Apr	12-Apr	8-Apr	26-Apr	17-Apr	16-Apr	17-Apr	12-Apr	12-Apr	21-Apr	4-May	23-Apr	1-Apr
25	chorus frog			9-Apr	24-Apr	14-Apr	14-Apr	21-Apr	15-Apr	7-Apr	9-Apr	15-Apr	18-Apr	14-Apr	4-Apr
26	spring pepper			13-Apr	24-Apr	21-Apr	14-Apr	14-Apr	15-Apr	7-Apr	11-Apr	30-Apr	1-May	28-Apr	14-Apr
27	woodfrog			13-Apr	14-Apr	19-Apr	14-Apr	11-Apr	6-Apr	7-Apr	11-Apr	15-Apr	22-Apr	14-Apr	31-Mar
28	toad			5-May	8-May	12-May	27-May	18-May	18-May	7-May	23-Apr	6-May	26-May	20-May	15-May
29	leopard frog			26-Apr	25-Apr	27-Apr	17-May	22-Apr	4-May	15-Apr	12-Apr	25-Apr	11-May	17-Apr	11-Apr
30	tree frog			30-Apr	8-May	9-May	27-May	16-May	8-May	18-Apr	22-Apr	30-Apr	21-May	3-May	26-Apr
31	green frog			3-Jun	30-May	9-May		24-May	2-Jun	26-May	7-May	30-May	1-Jun	17-May	25-May
32	mink frog			6-May	9-May	18-May		13-May	28-May	19-Apr	16-May	18-May	8-Jun	23-May	18-May
33	deertic							5-Apr					31-Mar	12-Apr	15-Mar
34	woodtick	21-Apr	13-Apr	5-Apr	24-Apr	27-Apr	15-Apr	21-Apr	16-Apr	11-Apr	12-Apr	15-Apr	21-Apr	15-Apr	3-Apr
35	blackflies					9-May	15-May	7-May	8-May	4-May	1-May	29-Apr	15-May	4-May	18-Apr
36	mosquitos					14-May	27-May	24-May	15-Apr	16-Apr	11-Apr	15-Apr	23-Apr	15-Apr	Apr-31
37	deer flies					3-Jun	7-Jun	5-Jun	6-Jun	6-Jun	29-May	30-May	15-Jun	29-May	27-May
38	dragonfly										14-Apr		22-Apr	3-May	15-Apr
39	damsilfly												28-May	28-May	16-May
40	spreadwing												21-Jun	17-Jun	20-Jun
41	american emerald											14-May	28-May	17-May	28-Apr
42	mourning cloak												4-Apr	11-Apr	23-Mar
43	spring azure												6-May	28-Apr	5-Apr
44	swallowtail butterfly	27-May	15-May	25-May	22-May	28-May	30-May	25-May	3-Jun	23-May	22-May	18-May	1-Jun	28-May	18-May
45	monarch butterfly	23-Jun	17-May	24-May	23-May	21-May	28-May	2-Jun	4-Jun	2-Jun	24-May	18-May	1-Jun	28-May	23-May
46	poplars leaving	21-May	24-Apr	29-Apr	28-Apr	30-Apr	24-Apr	25-Apr	29-Apr	18-Apr	17-Apr	27-Apr	13-May	4-May	14-Apr
47	dandalion		19-May					12-May	30-Apr	19-Apr	3-Apr	16-Apr	30-Apr	3-May	14-Apr
48	cowslips	15-Apr	14-Apr	12-Apr	11-Apr	14-Apr	15-Apr	20-Apr	13-Apr	14-Apr	13-Apr	18-Apr	14-Apr	24-Apr	9-Apr
49	hepaticas	6-May	5-May	9-Apr	24-Apr	18-Apr	23-Apr	21-Apr	15-Apr	11-Apr	11-Apr	18-Apr	18-Apr	15-Apr	3-Apr
50	leatherwood								24-Apr	15-Apr	16-Apr	22-Apr	30-Apr	23-Apr	9-Apr
51	violets	23-May	5-May	19-May	1-May	7-May		28-Apr	3-May	19-Apr	29-Apr	26-Apr	12-May	28-Apr	18-Apr
52	wood anemones			19-May	1-May	7-May		19-May	8-May	2-May	29-Apr	23-Apr	8-May	2-May	19-Apr

Sheet1 Sheet2 Sheet3

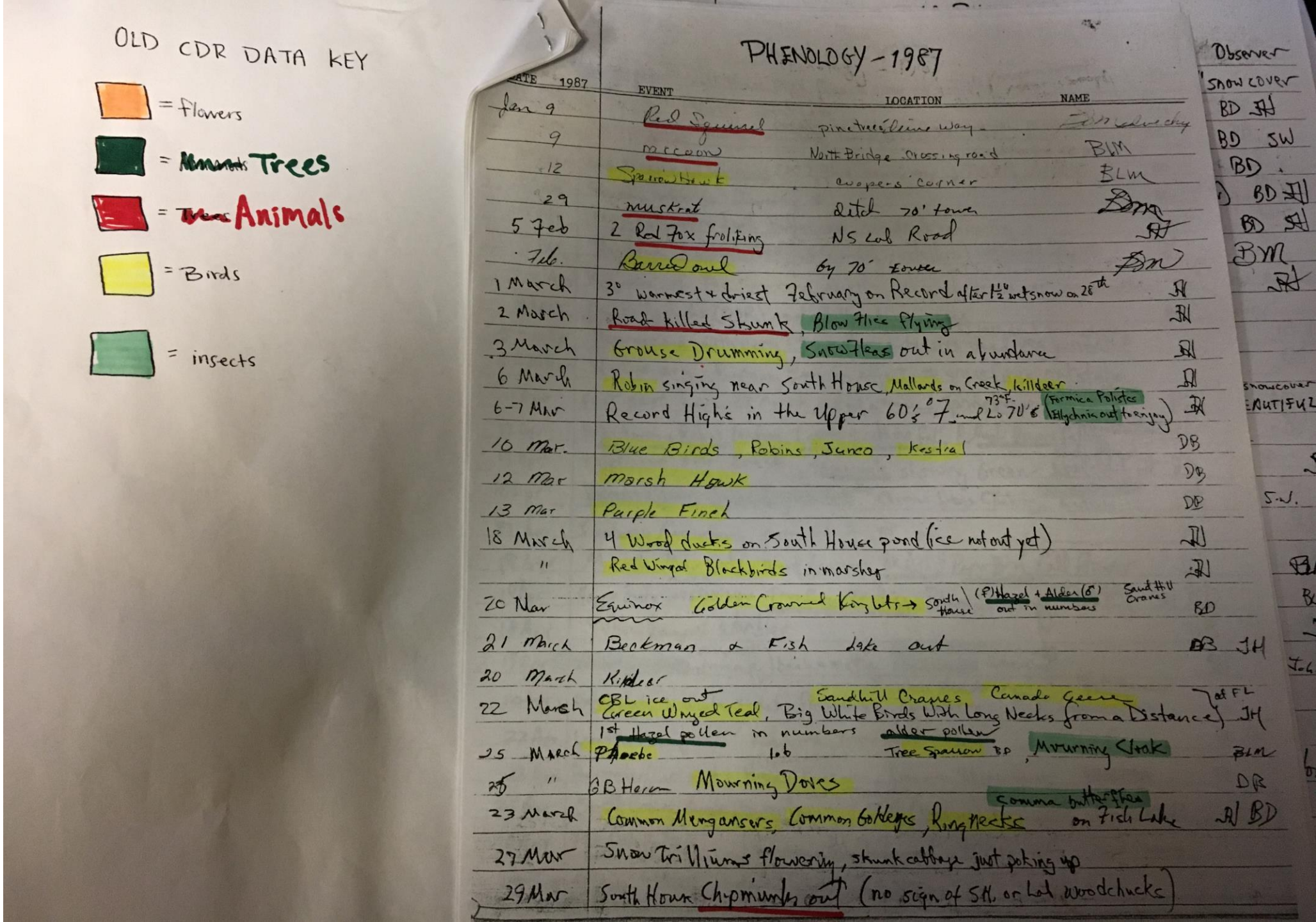
What about this?

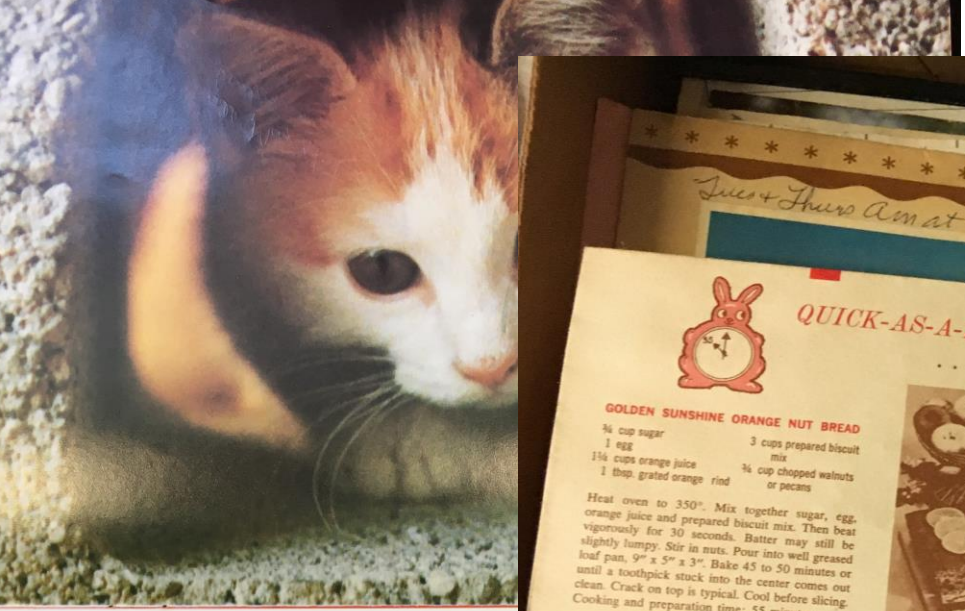






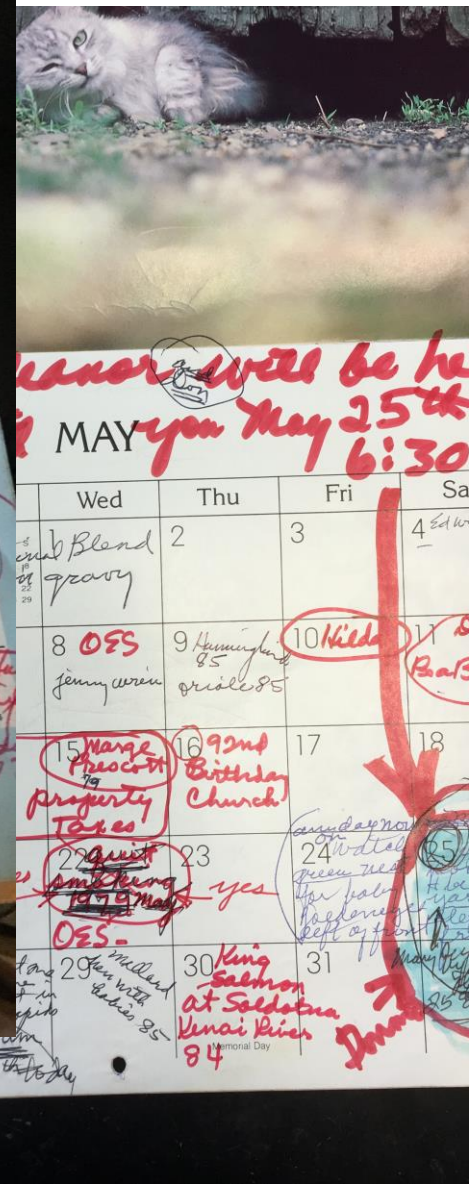
Or this?


OLD CDR DATA KEY
= flowers
= Trees
= Animals
= Birds
= insects
PHENOLOGY - 1987
DATE 1987
EVENT
LOCATION
NAME
Observer
snow cover
Red Squirrel
pine trees/Pine Way
maccaw
North Bridge Crossing road
BLM
Sparrow Hawk
coopers corner
BLM
muskrat
ditch 70' tower
2 Red Fox frolicking
NS Lab Road
Barred owl
by 70' tower
1 March
3° warmest & driest February on Record after 1½" wet snow on 28th
2 March
Road killed Skunk, Blow flies flying
3 March
Grouse Drumming, Snowfleas out in abundance
6 March
Robin singing near South House, Mallards on Creek, killdeer
6-7 Mar
Record Highs in the Upper 60's 70's 73°F. (Formica Polistes Ethynnia out foraging)
10 Mar.
Blue Birds, Robins, Junco, Kestral
DB
12 Mar
Marsh Hawk
DB
13 Mar
Purple Finch
DB
18 March
4 Wood ducks on South House pond (ice not out yet)
"
Red Winged Blackbirds in marshes
20 Mar
Equinox Golden Crowned Kinglets → south
(F) Hazel + Alder (M) out in numbers
Sand Hill Cranes
BD
21 March
Beckman & Fish Lake out
JH
20 March
Killdeer
22 March
OBL ice out
Green Winged Teal, Big White Birds With Long Necks from a Distance
Sandhill Cranes
Canada Geese
at FL
JH
1st Hazel pollen in numbers
alder pollen
25 MARCH
Phoebe
Tree Sparrow BD
Mourning Cloak
BLM
"
GB Heron
Mourning Doves
DR
23 March
Common Mergansers, Common Goldeneyes, Ringnecks
comma butterflies on Fish Lake
JH BD
27 Mar
Snow Trilliums flowering, skunk cabbage just poking up
29 Mar
South House Chipmunks out (no sign of SH or Lot woodchucks)




APRIL
Mon
Tue
Wed
Secretary's Week Begins
Secretary's Day
MARCH 1985
MAY 1985


QUICK-AS-A-BUNNY
. . . Breads for Easter Morn
GOLDEN SUNSHINE ORANGE NUT BREAD
DOUGHNUTS TO DUNK
May 1972
SUN MON TUE WED THU FRI SAT
MAY 1975
SUN MON TUE WED THU FRI SAT
"WHERE SPORTSMEN SERVE SPORTSMEN"
RAPIDS TACKLE SHOP
COMPLETE ONE-STOP STORE
FISHING & RELOADING EQUIP. - HUNTING SUPPLIES - TEAM OUTFITTERS
216 N. Pokegama Ave. - Grand Rapids, Minn. - Ph. 326-5822


MAY
Wed
Thu
Fri

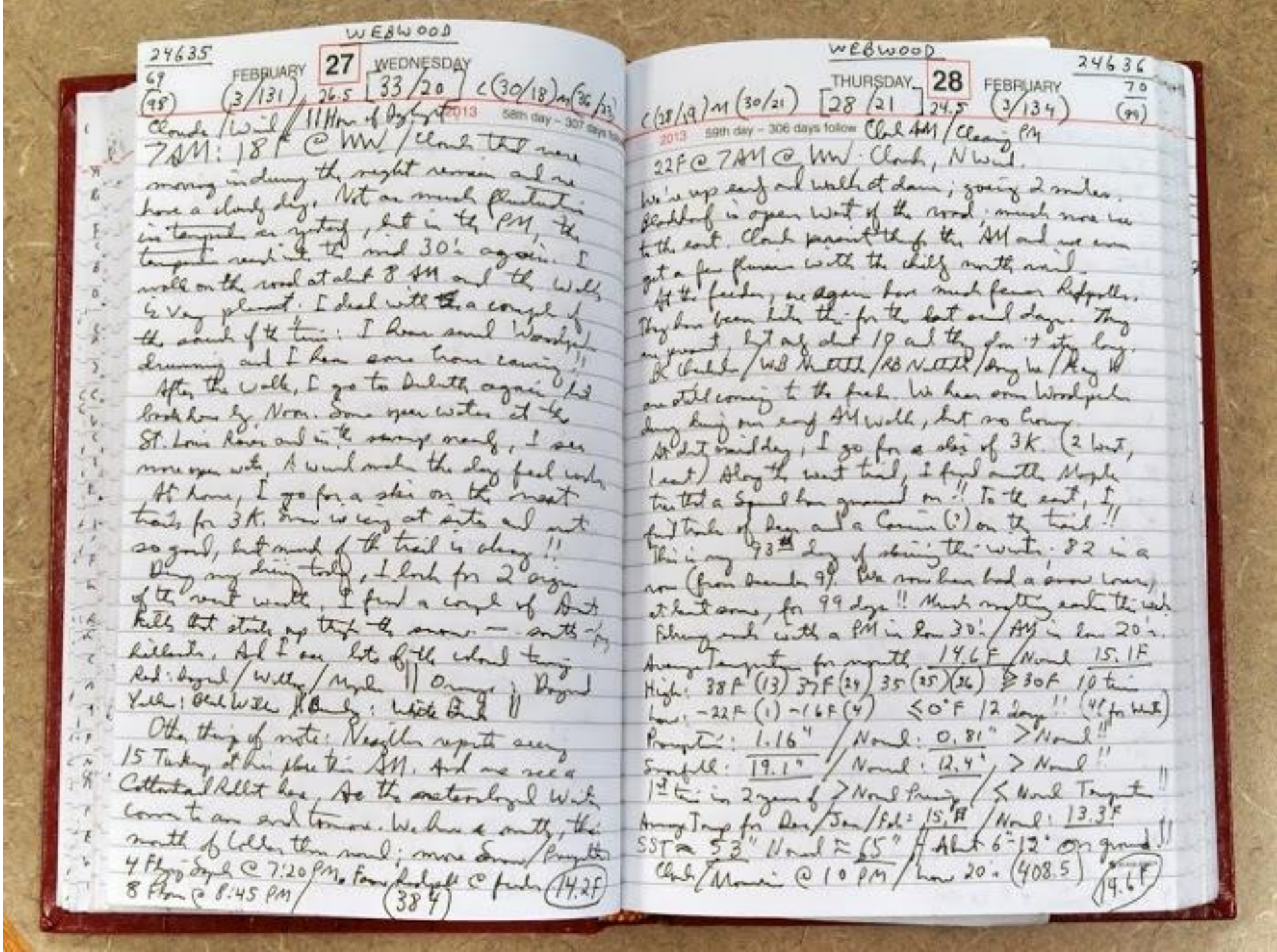
Or these?

BIG PROJECT

High Value

+

High Effort

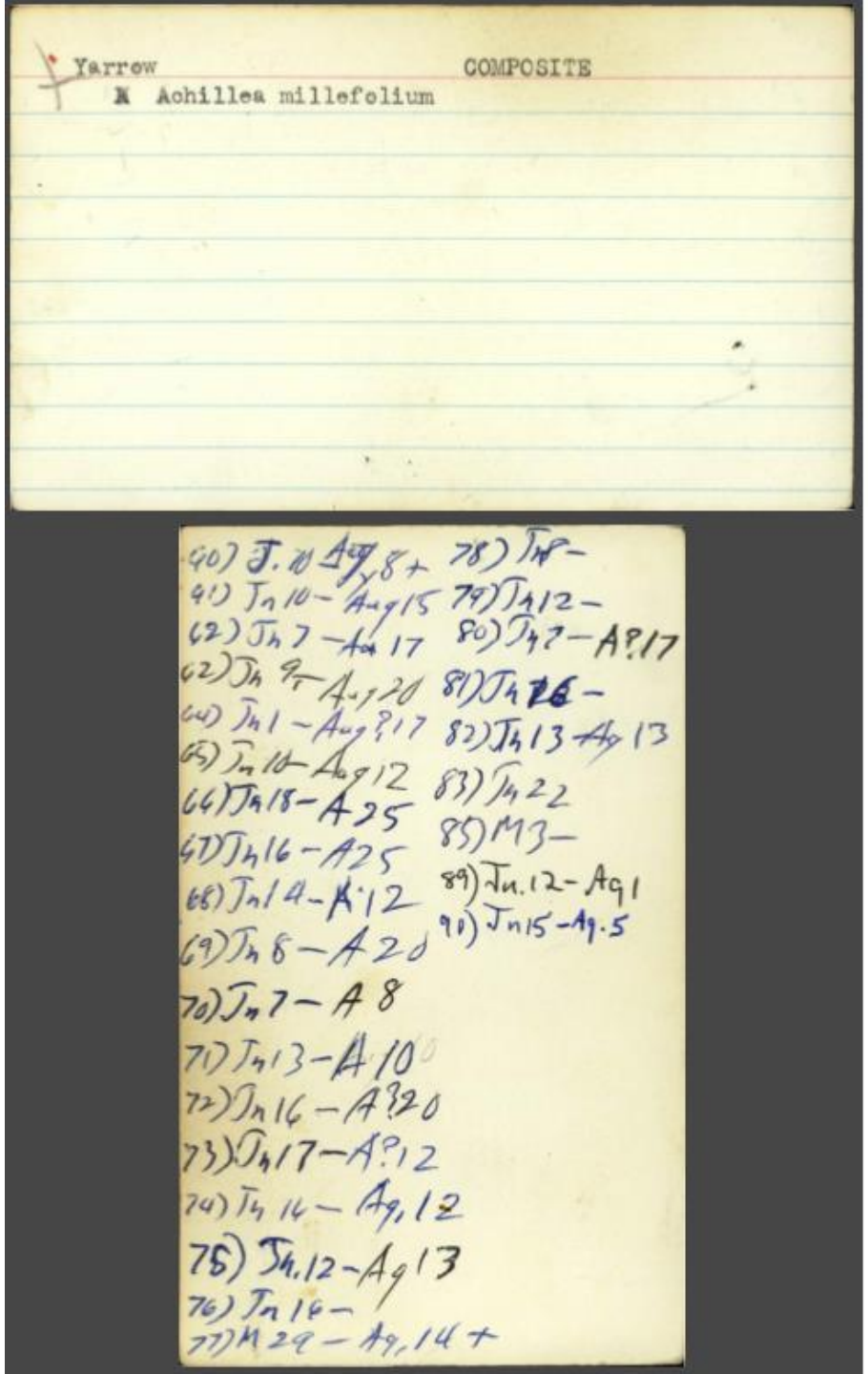


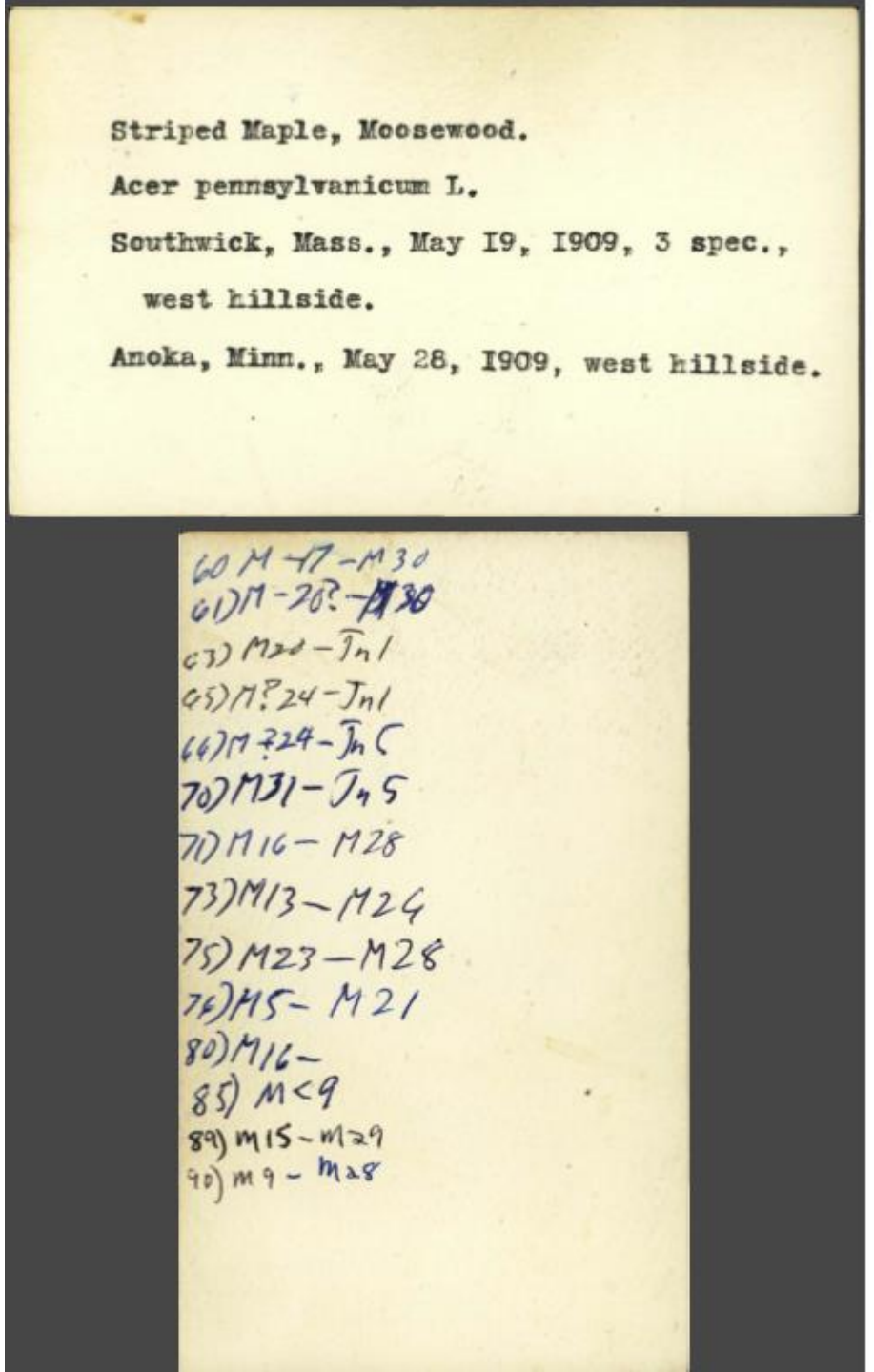
BIG PROJECT

High Value

+

High Effort





Example of a dataset

	A	B	C	D	E	F	G	H	I	J
1	YEAR	DAY	EVENT	SPECIES (COMMON NAME)	GENUS	SPECIES	COUNTY	LIFEFORM	DATASET	DOY
2	1980	31-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	90
3	1982	28-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	87
4	1983	22-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	81
5	1984	26-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	85
6	1985	17-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	76
7	1986	22-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	81
8	1987	18-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	77
9	1988	22-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	81
10	1989	27-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	86
11	1990	18-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	77
12	1991	18-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	77
13	1992	20-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	79
14	1993	29-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	88
15	1994	17-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	76
16	1995	13-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	72
17	1996	16-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	75
18	1997	23-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	82
19	1998	16-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	75
20	1999	19-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	78
21	2000	4-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	63
22	2001	13-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	72
23	2002	16-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	75
24	2003	17-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	76
25	2004	14-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	73
26	2005	17-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	76
27	2006	17-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	76
28	2007	12-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	71
29	2008	18-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	77
30	2009	16-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	75
31	2010	15-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	74
32	2011	8-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	67
33	2012	6-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	65
34	2013	18-Mar	ARRIVAL	SANDHILL CRANE	GRUS	CANADENSIS	SHERBURNE	BIRDS	5	77

Minnesota Phenology Network

Profiles

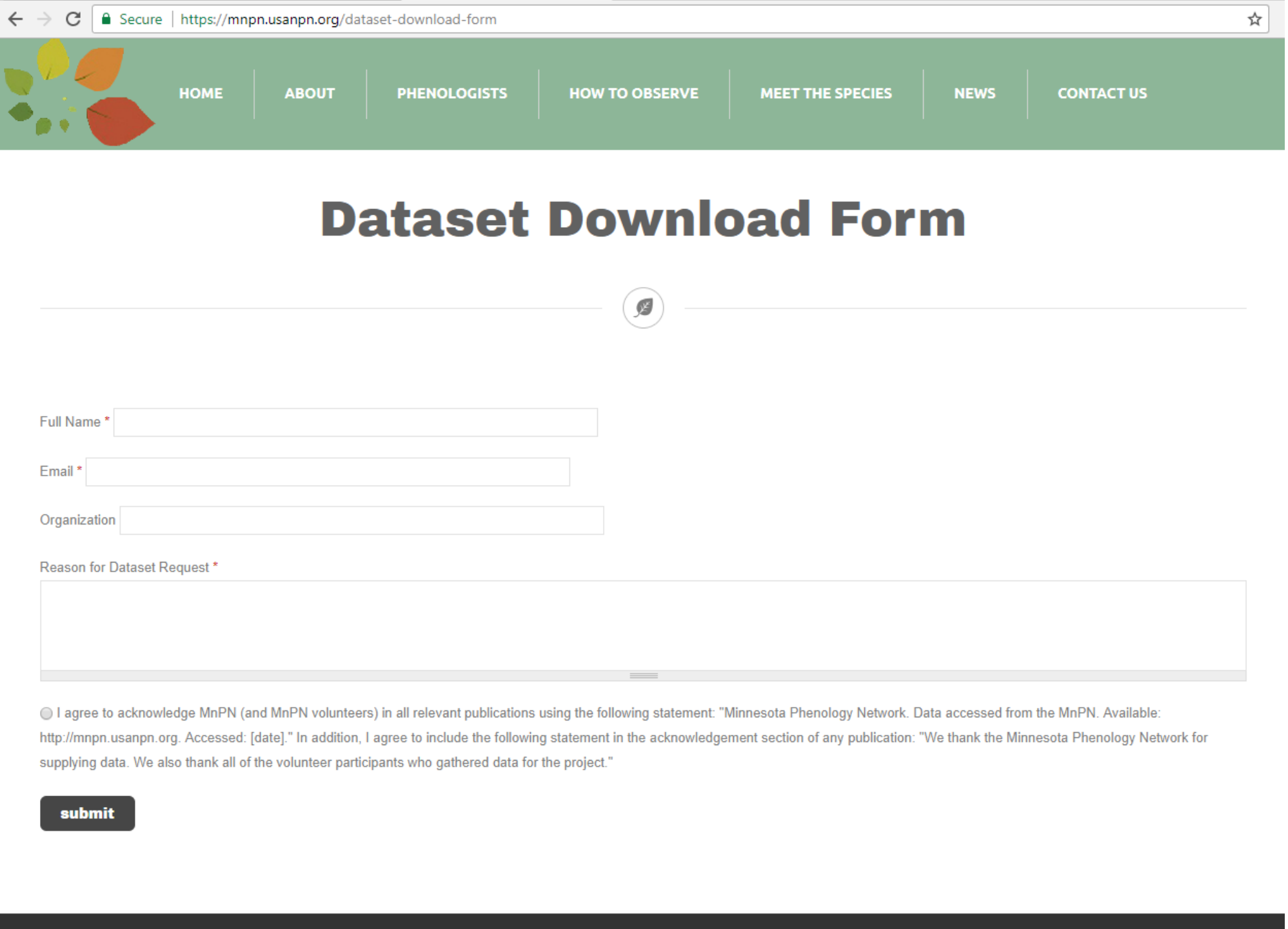
Meet the Minnesotans who have contributed their phenology notes, historical data sets and

Participate

Share your observations with fellow naturalists. Join Nature's Notebook to help

Datasets

Browse and visualize our datasets with our brand new data tools. Sort through various



- Acknowledgement agreement
- Sends an excel sheet of entire dataset

nature's notebook

Connecting People with Nature to Benefit Our Changing Planet

Logged in as rebeccam@umn.edu | Log out

MY OBSERVATION DECK

OBSERVE | EDUCATE | FOR GROUPS | MORE WAYS TO CONNECT

Nature's Notebook...

Nature's Notebook is a national, online program where amateur and professional naturalists regularly record observations of plants and animals to generate long-term data sets used for scientific discovery and decision-making.

TRACKING Seasonal CHANGES IN PLANTS AND ANIMALS

GO TO YOUR OBSERVATION DECK

Each Unique = 100,000 Records

You helped us reach our goal of 2.5 million records in 2017! Let's see how far past our goal we can reach this year!

Phenology refers to key seasonal changes in plants and animals from year to year—such as flowering, emergence of insects and migration of birds—especially their timing and relationship with weather and climate.

HOW TO PARTICIPATE IN THE PROGRAM

Become an observer in 3 steps:

1. Join the program
2. Set up your account
3. Go outside and observe!

BECOME AN OBSERVER

BIMONTHLY E-NEWSLETTER

First Name *

Email *

Home » Observation Deck

rebeccam@umn.edu's Observation Deck

My Phenology Calendar | Badges

Earn Badges by Contributing!

Hover over each badge for details.

Nectar Connector - You've earned this badge by observing one target Nectar Connectors species, in six separate weeks within the same year.

Observations

Enter your observations below or via smartphone. You can edit the sites, plants or animals you've selected anytime.

Sites

Native American Medicine Gardens

Native American Medicine Gard

Edit Site »

Add a New Native American Medicine Gardens Site »

Manage Users »

My Plants & Animals

red maple-1
northern red oak-1
eastern cottonwood-1
common milkweed-1
common milkweed-2
American plum-1
common sunflower-1
monarch

Add or Edit Plants »

Add or Edit Animals »

Sort Plants & Animals »

Print Field Datasheets »

Details for this Organism

red maple-1
red maple (Acer rubrum)
Wild? No
Gender? Both

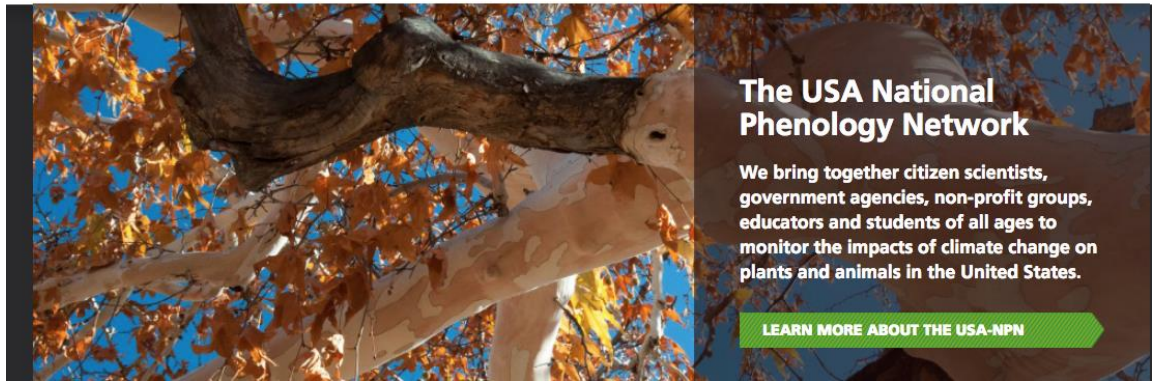
View Species Profile »

Print Field Datasheet »

Print Phenophase Definition Sheet »

USA npn National Phenology Network *Taking the Pulse of Our Planet*

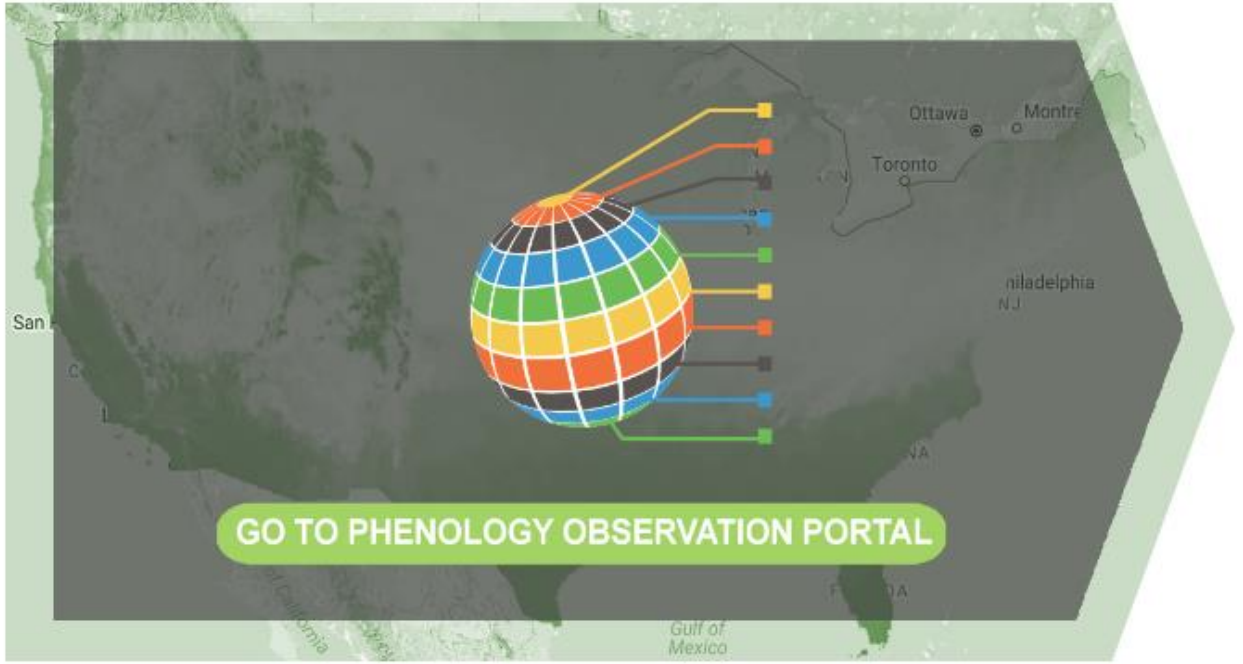
ABOUT US | PARTNER | DATA | PUBLICATIONS | NEWS AND EVENTS



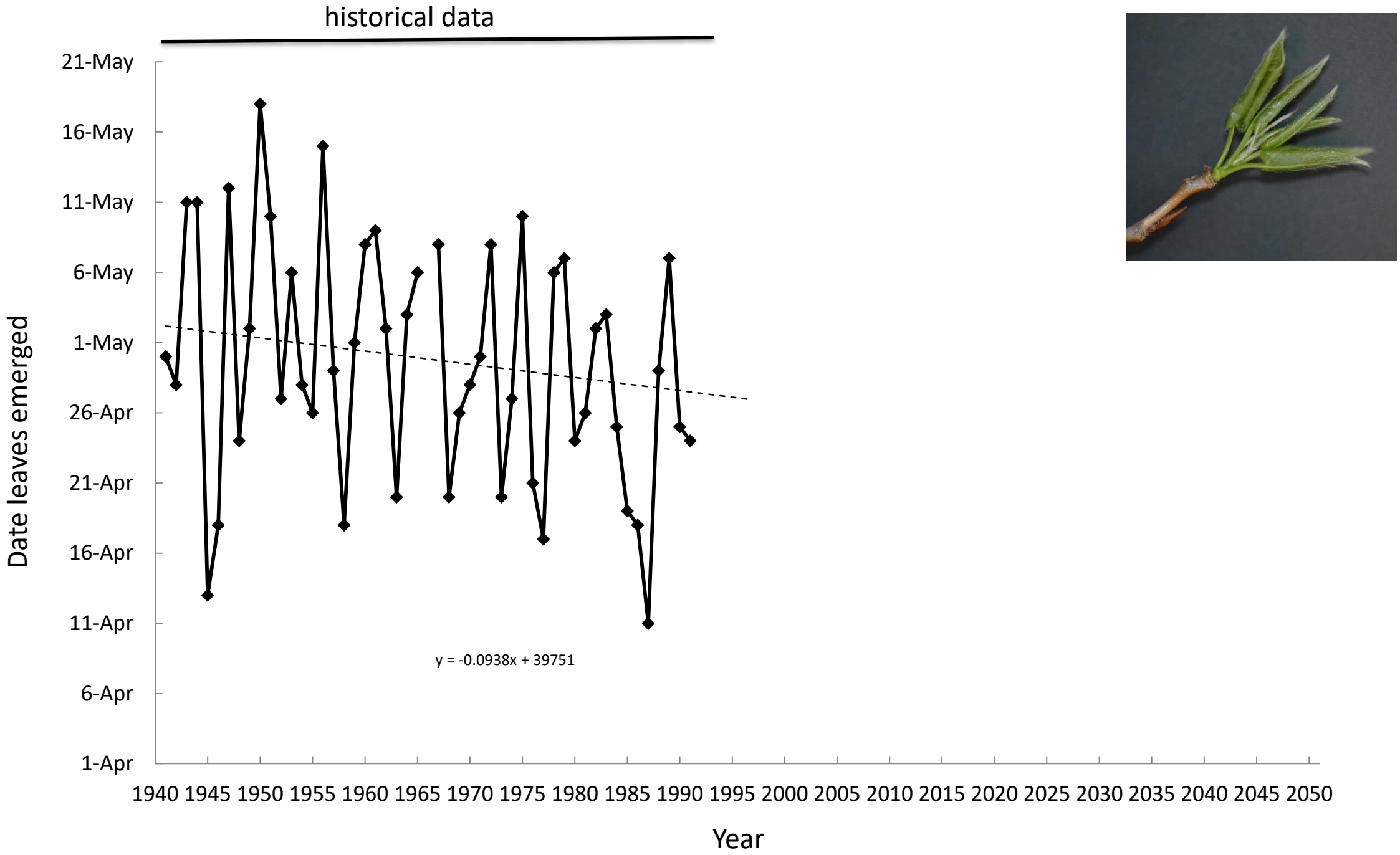
MnPN
Minnesota Phenology Network

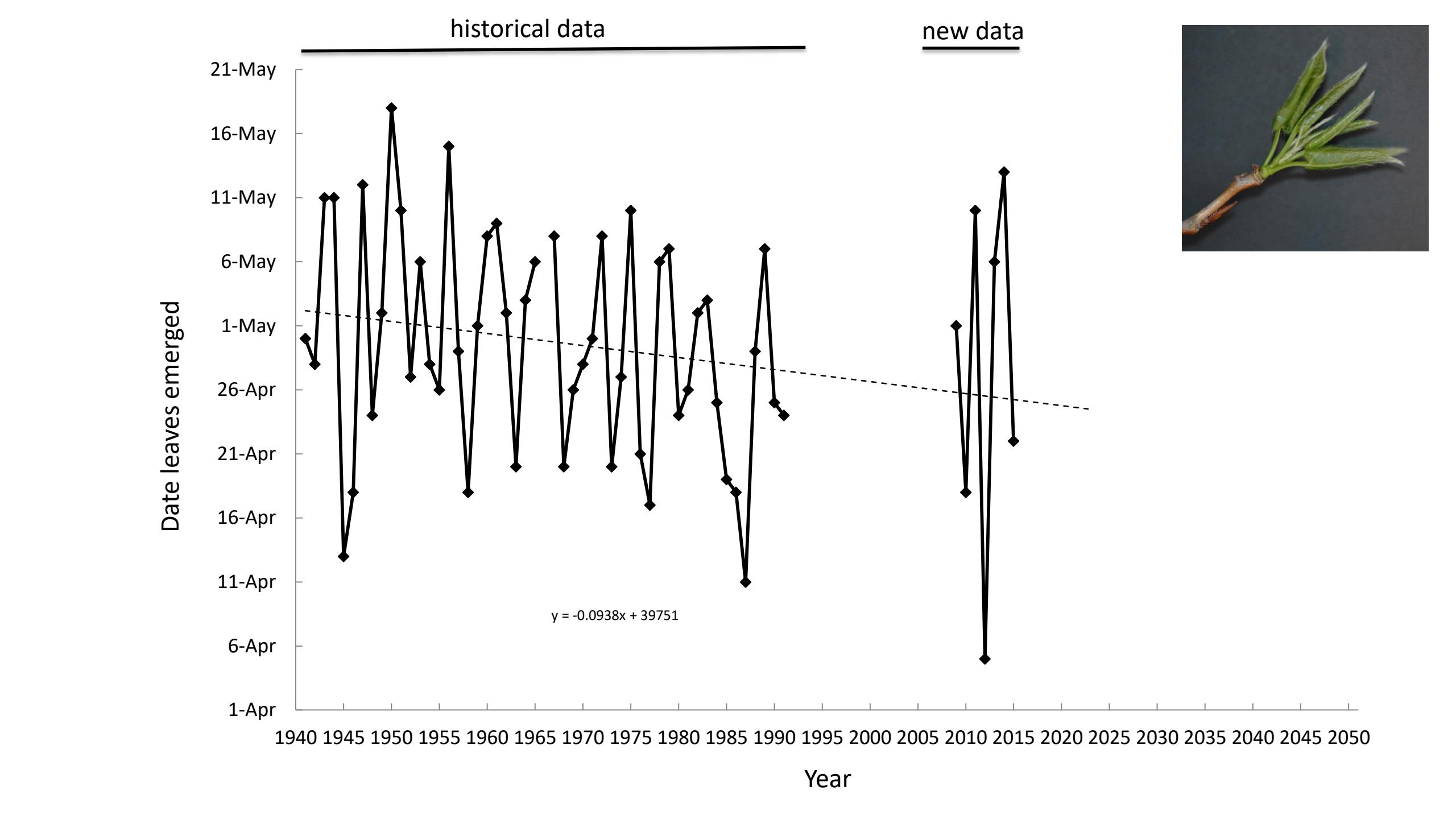
OBSERVATIONAL DATA

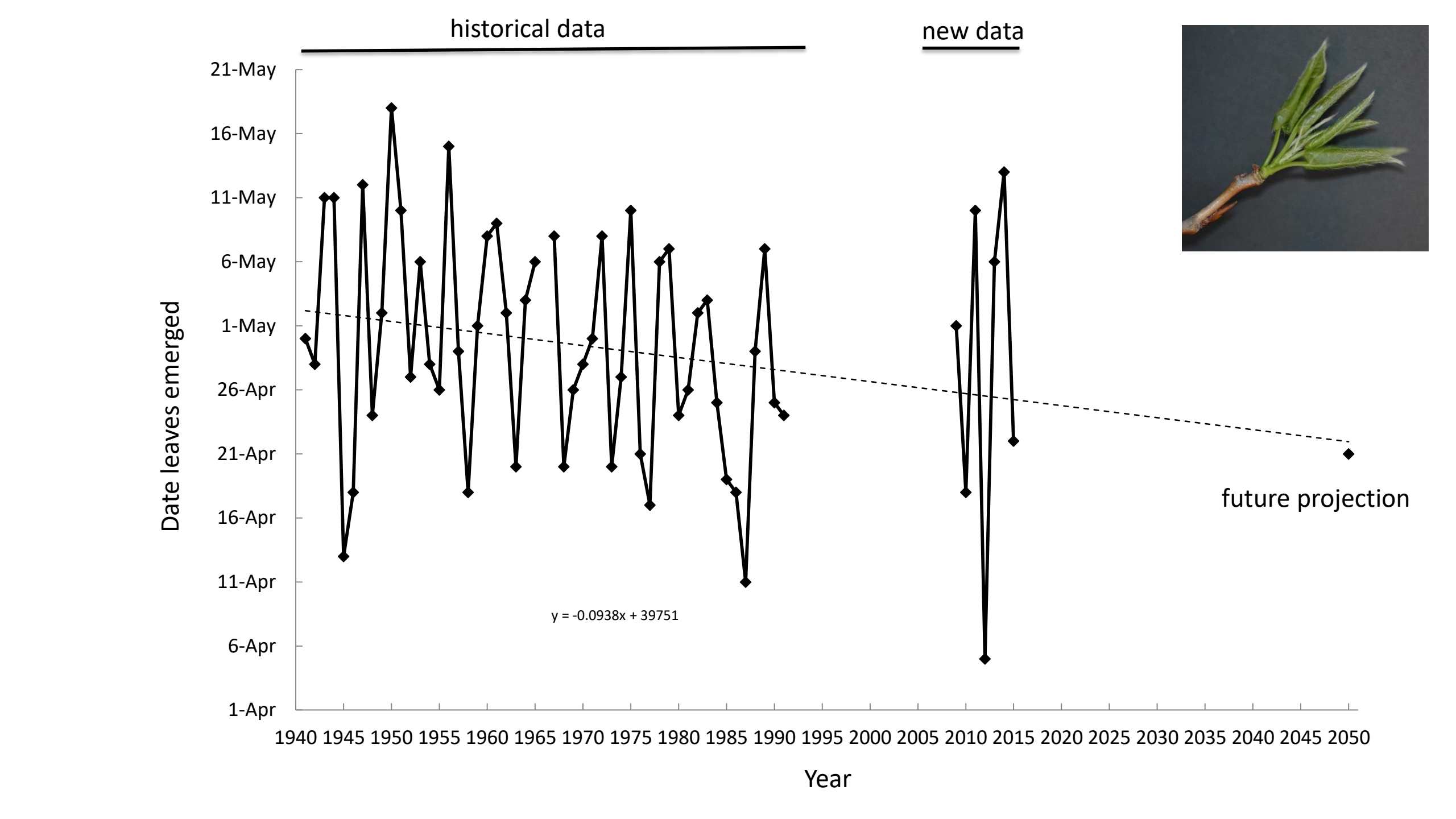
You are invited to download customized datasets of observational data from the National Phenology Database, which includes data collected via the Nature's Notebook phenology program (2009-present), and additional integrated datasets, such as historical lilac and honeysuckle data (1955-present). Filters are available to specify dates, regions, species and phenophases of interest.



FIND CURRENT SUMMARY METRICS OF THE DATA FOUND IN THE NATIONAL PHENOLOGY DATABASE ON THE USA-NPN DATA DASHBOARD.


historical data
21-May
16-May
11-May
6-May
1-May
26-Apr
21-Apr
16-Apr
11-Apr
6-Apr
1-Apr
Date leaves emerged
y = -0.0938x + 39751
1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050
Year


historical data
new data
21-May
16-May
11-May
6-May
1-May
26-Apr
21-Apr
16-Apr
11-Apr
6-Apr
1-Apr
Date leaves emerged
y = -0.0938x + 39751
1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050
Year

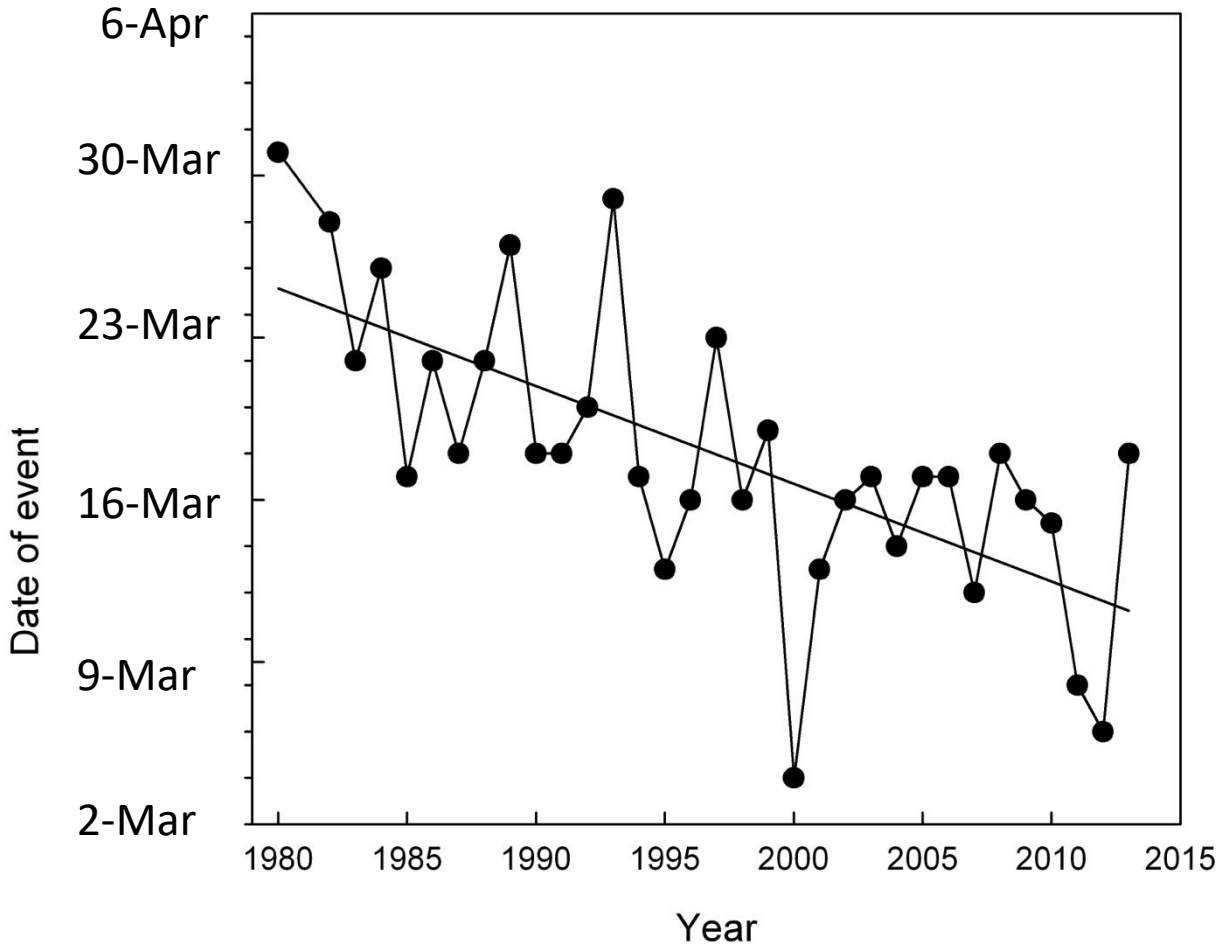

historical data
new data
21-May
16-May
11-May
6-May
1-May
26-Apr
21-Apr
16-Apr
11-Apr
6-Apr
1-Apr
Date leaves emerged
y = -0.0938x + 39751
future projection
1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050
Year

1,567

species/event combinations (e.g., pasque flower blooming)


16%

Sandhill Crane arrival

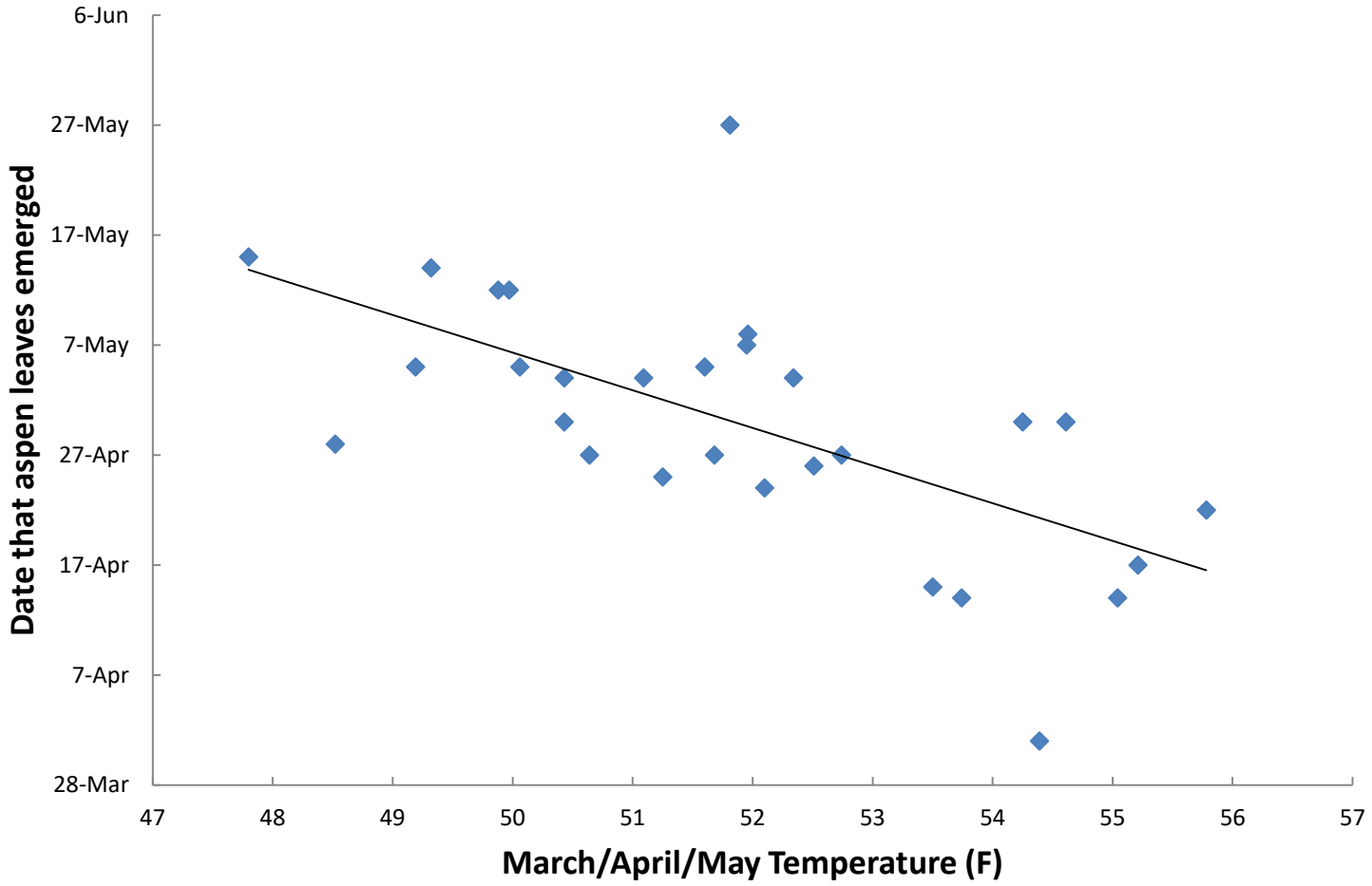


15 Days Earlier!!

Fall events 66% = later

Spring events 69% = earlier

warmer spring temperatures = earlier aspen leafing



Data summaries for phenology events

COUNTY	(Multiple Items)				
	Values				
Row Labels	Earliest	Average	Latest	#Obv	Stand-Dev
RED ELDERBERRY, LEAF BUDBREAK	4-Mar	31-Mar	20-Apr	51	10
SILVER MAPLE, FLOWERING	6-Mar	5-Apr	23-Apr	51	11
SKUNK CABBAGE, FLOWERING	13-Mar	6-Apr	22-Apr	34	9
SNOW TRILLIUM, FLOWERING	26-Mar	6-Apr	22-Apr	34	8
SHARP-LOBED HEPATICA, FLOWERING	27-Mar	9-Apr	24-Apr	33	7
AMERICAN ELM, FLOWERING	20-Mar	11-Apr	3-May	51	11
BLOODROOT, FLOWERING	31-Mar	13-Apr	28-Apr	32	7
FALSE RUE ANEMONE, FLOWERING	24-Mar	14-Apr	4-May	30	12
LILAC, LEAF BUDBREAK	23-Mar	14-Apr	4-May	51	11

Thanks

- Sam Graf and Stephan Carlson
- My lab present & past (esp. Claudia Nanninga, Karen Rice, Lindsay Hastings, Kris Moore, Paul Lanctot)
- Volunteers who entered historical data
- All the collaborators & data collectors
- Funding: LCCMR, MAES, NSF-LTER

ENVIRONMENT
AND NATURAL RESOURCES
TRUST FUND