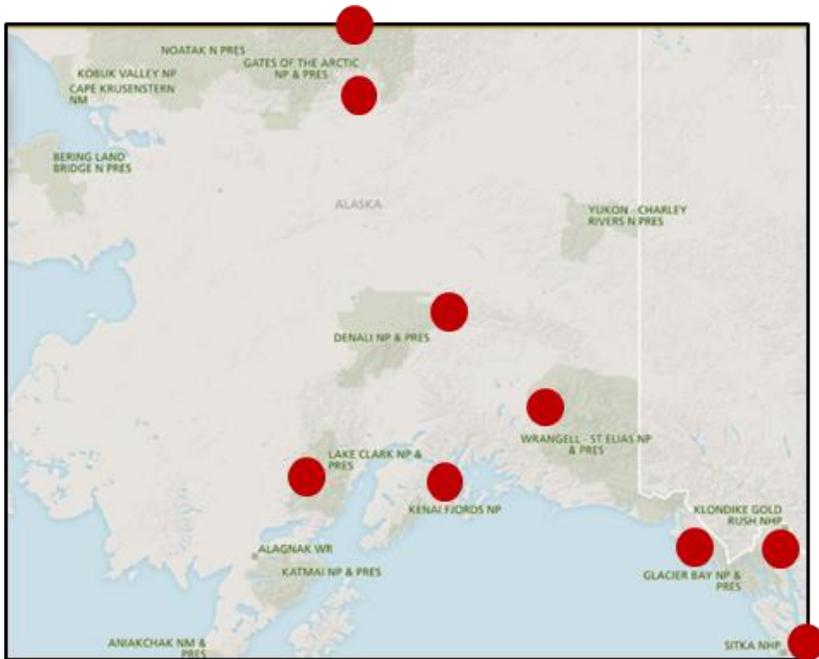


Plant Phenology and Pollinator Diversity Project—2019 Summary

Objectives: In 2019 and 2020 we are tracking the phenology (i.e., timing of annual life cycle events such as leaf out, flowering, seed set) of several common and widespread insect-pollinated plants in Alaska. How does phenology of a single plant species vary across latitudinal, elevational, and climatic gradients?

We are also collecting insect pollinators from each of these host plant species while in flower. How does pollinator diversity vary between plant species or across different environmental gradients?



A total of eight parks are participated in the study in 2019: Denali (DENA), Gates of the Arctic (GAAR), Glacier Bay (GLBA), Kenai Fjords (KEFJ), Klondike Goldrush (KLGO), Lake Clark (LACL), Sitka (SITK), and Wrangell-St. Elias (WRST). GAAR had two sites: Anaktuvuk Pass (GAAR-AKP) and Bettles (GAAR-BTT). The nine sites spanned over eleven degrees of latitude and 650 meters of elevation. Field work was carried out by NPS permanent and seasonal staff, interns, park partners, and citizen scientists.

PLANT PHENOLOGY

Eight host plant species were sampled: *Achillea millefolium* (common yarrow); *Chamerion angustifolium* (fireweed); *Heracleum maximum* (cow parsnip); *Rhododendron groenlandicum* (Bog Labrador tea); *Rhododendron tomentosum* (Northern Labrador tea); *Rosa acicularis* (prickly rose); *Taraxacum officinale* (common dandelion); and *Vaccinium vitis-idaea* (lingonberry).

Table below: Plant species sampled by each park in 2019.

	 Yarrow	 Fireweed	 Cow parsnip	 Bog Labrador tea	 Northern Labrador tea	 Prickly rose	 Dandelion	 Lingonberry
DENA	x	x		x		x	x	x
GAAR-AKP		x					x	
GAAR-BTT		x					x	x
GLBA	x	x					x	
KEFJ	x	x	x					
KLGO	x	x						
LACL		x			x	x		
SITK		x	x				x	
WRST		x		x				x

Plant phenology was monitored on individual plants between late April and early September. Fireweed was the only plant species to be monitored at all nine sites in eight parks.

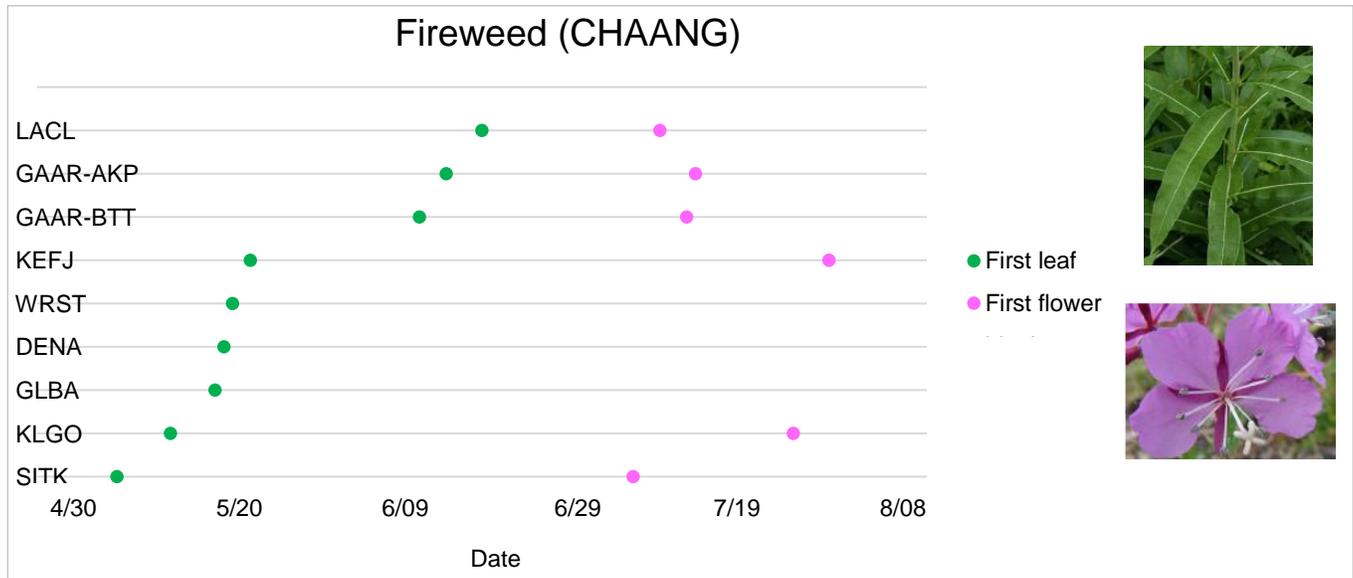


Figure above: Timing of first leaves and first flowers observed on fireweed across nine sites in eight parks. Note that for most parks (all except DENA and KLGO), first observations of plants likely began *after* first leaves appeared, and for some parks (KEFJ and KLGO), new plants were selected mid-season if old plants were not producing flower buds. For other parks (DENA, GLBA, WRST) no flowers were observed.

POLLINATOR DIVERSITY

A total of 1,876 arthropods were collected from flowers of eight plant species across all parks. Yarrow yielded by far the most pollinators (878), but many insects were also collected from fireweed (438), dandelion (312), and prickly rose (113).

Table below: Number of specimens in selected insect taxa collected on fireweed and yarrow in all parks. Fireweed was favored by bumble bees; flies were abundant on yarrow. Dash (-) indicates park did not sample this plant.

	 Bumble bees		 Other bees/wasps		 Beetles		 Flies		 True bugs et al.	
	Fireweed	Yarrow	Fireweed	Yarrow	Fireweed	Yarrow	Fireweed	Yarrow	Fireweed	Yarrow
DENA	14	0	1	1	4	6	8	29	6	7
GAAR-AKP	23	--	1	--	0	--	26	--	5	--
GAAR-BTT	1	--	4	--	0	--	33	--	24	--
GLBA	0	2	0	0	0	37	0	159	0	131
KEFJ	81	8	0	0	0	0	8	21	6	43
KLGO	58	3	20	0	0	0	26	38	25	337
LACL	22	--	7	--	0	--	2	--	2	--
SITK	1	--	0	--	0	--	0	--	3	--
WRST	0	--	0	--	0	--	5	--	2	--
Total	200	13	33	1	4	43	108	250	73	518

NEXT STEPS: An enthusiastic and successful effort by all parks in 2019 provided a strong foundation of knowledge on plant phenology and pollinator diversity across Alaska parks. An additional year of data gathering in 2020 will be crucial for refining protocols and building up our baseline knowledge.