

Applegate's Milk-Vetch (*Astragalus applegatei*)

*The Story of One of
Oregon's Rarest Plants*

Ron Larson, USFWS



I appreciate the help of the following people:

- Ted Devore, Sue Malley, & Steve Metz - Collins Products, Klamath Falls
- Molly Morrison – The Nature Conservancy, Medford
- Leslie and Annie Sedlacek – Rock Bottom Ranch Nursery, Bonanza
- Bill Hancock - Klamath Falls Airport, Klamath Falls
- Lanny Fujishin - ODFW, Klamath Falls (now retired)
- Bob Meinke & Rebecca Currin - ODA, Corvallis
- Steve Sheehy – TNC Volunteer Steward, Klamath Falls
- Yasmine Akky – former USFWS intern
- Melissa Schroeder (TNC); Victoria Tenbrink (Klamath-Lake Land Trust); and Ellen Minichiello-Boles (USFWS volunteer)

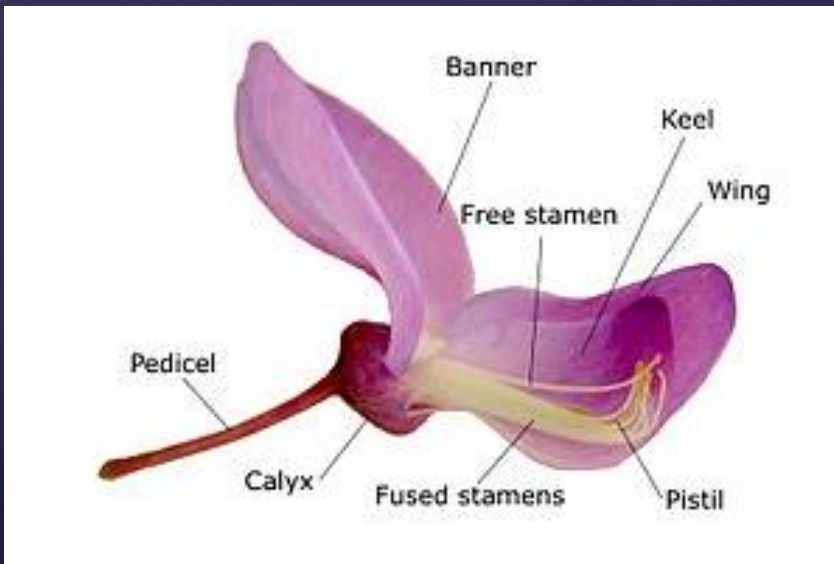
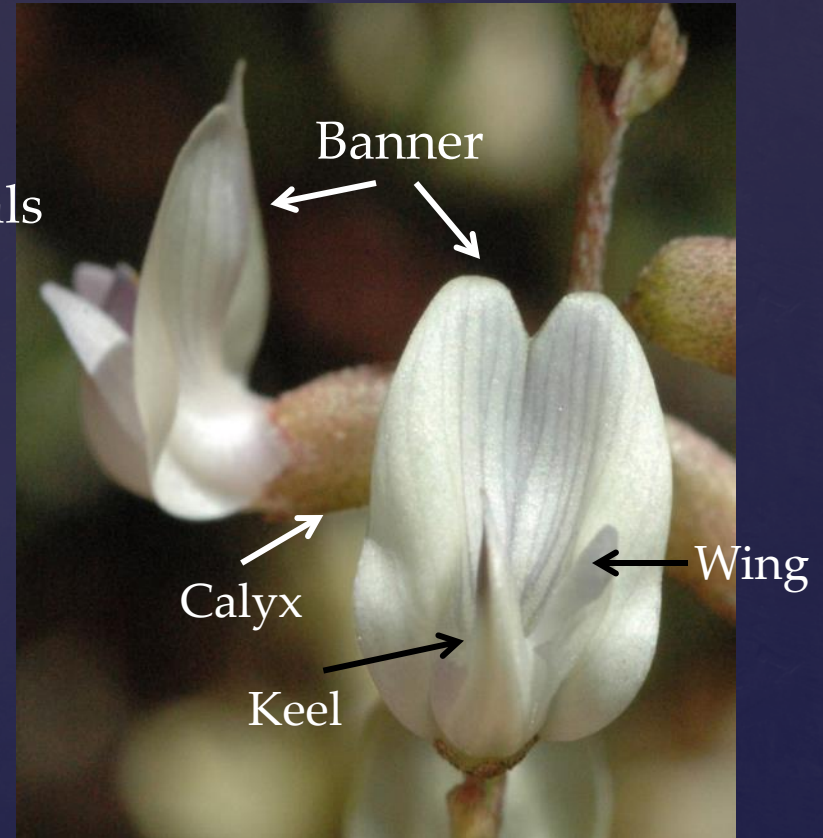
What's a milk-vetch?

⌘ Milk-vetches are characterized as:

- ⌘ Diverse genus of plants with 70 species in Oregon and 3,000 in Northern Hemisphere
- ⌘ Members of the pea/bean family Fabaceae
- ⌘ Flowers are pea-like with a rear banner and a forward-pointing keel
- ⌘ Leaves are opposite and numerous on vine-like stems
- ⌘ Seeds occur in pods that can be quite diverse in form and color
- ⌘ Many species are narrow endemics and thus are rare or imperiled
- ⌘ Pollinated by mason bees and other small native bees, or are self-pollinating
- ⌘ Once believed to increase milk production in goats
- ⌘ One species contains a neurotoxin causing locoism in livestock, thus the common name "locoweed"

Fabaceae Flower Morphology

- Flowers are zygomorphic (bilaterally symmetrical)
- Has 5 free petals and 5 fused sepals
- Upper petal forms a banner
- 2 petals form wings around 2 fused petals forming a keel
- Inside the keel are a single style and 10 stamens, 9 of which are fused



Wisteria flower morphology from Wikipedia

Examples of Klamath
Basin Milk-vetches



Astragalus lentiginosus



Astragalus purshii



Astragalus filipes

Oregon-listed milk-vetches

State Endangered

- Applegate's milk-vetch, *A. applegatei* (also Federally Endangered)
- Mulford's milk-vetch, *A. mulfordiae*

State Threatened

- Peck's milk-vetch, *A. peckii*
- Tygh Valley milk-vetch, *A. tyghensis*
- Lawrence's milk-vetch, *A. collinus* var. *laurentii*
- Sterile milk-vetch, *A. cusickii* var. *sterilis*
- John Day milk-vetch, *A. diaphanus* var. *diurnus*

Peck's milk-vetch,
Klamath Co. from
Oregon Flora
Project



Characteristics of Applegate's milk-vetch (ASAP)

- ⌘ Perennial herbaceous plant
- ⌘ Has a long or multiple tap root
- ⌘ Has many (up to 50 or more) stems 3 feet long that trail or climb
- ⌘ Has compound leaves 2-5 inches long, each with up to 10 smaller linear leaflets
- ⌘ Has many small white turning to lavender flowers on racemes (unbranched inflorescence)
- ⌘ Has small pods about ½ inch long and tiny (~2 mm) oval, black seeds
- ⌘ Occurs only near the former Klamath River floodplain between Klamath Falls and Keno
- ⌘ Tolerant of alkaline soils that are seasonally saturated or dry
- ⌘ Growth is dependent on mycorrhizal fungi associated with roots



Mature Applegate's milk-vetch with
20 stems reaching over 1-foot in length

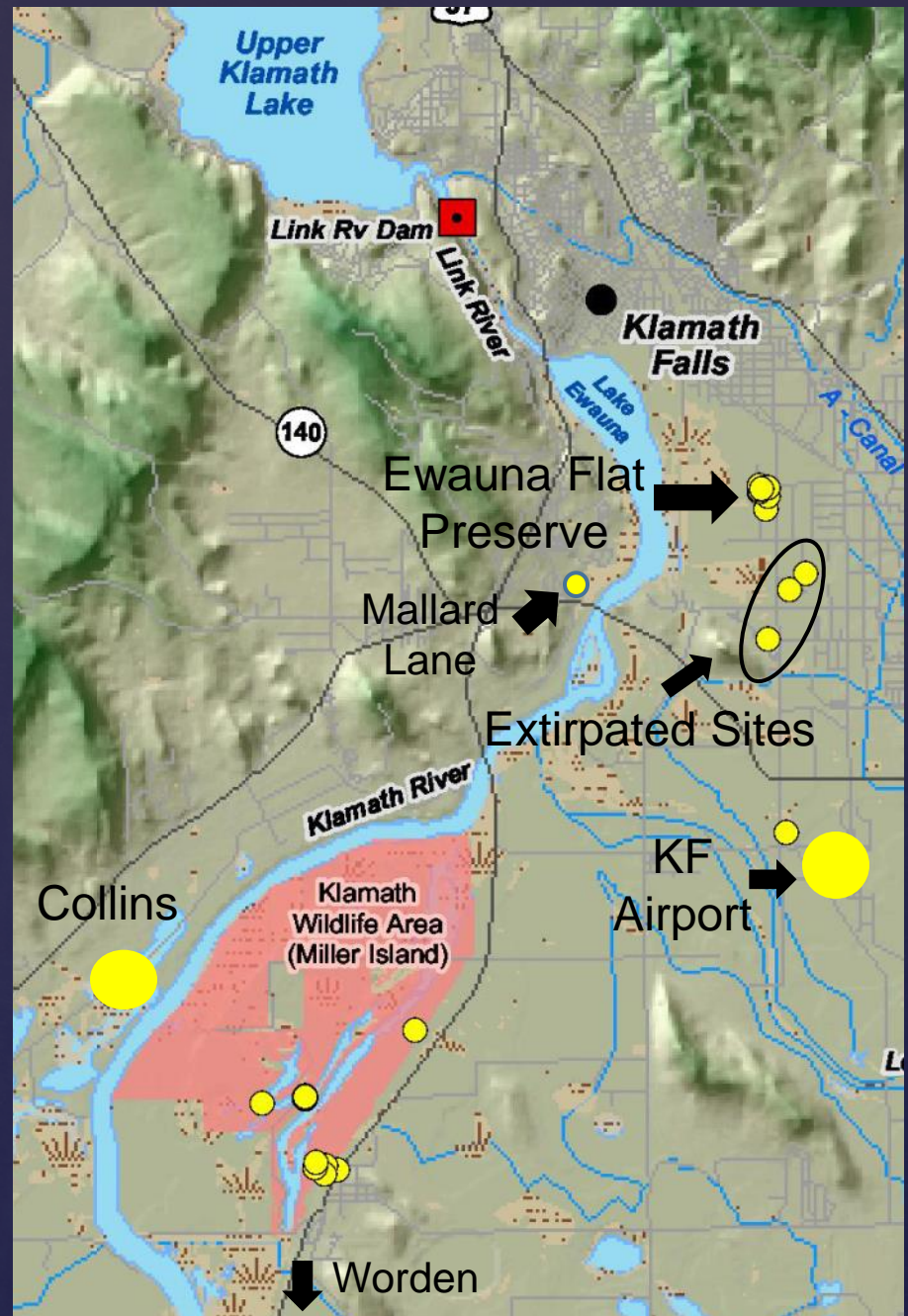


Applegate's milk-vetch - leaves and flowers



Applegate's milk-vetch – dried seed pods

Known locations of Applegate's milk-vetch populations



Aerial photo of
Klamath Falls
Airport showing
locations of
Applegate's milk-
vetch based on 2008
Surveys

(Note: main runway = 2
miles in length)

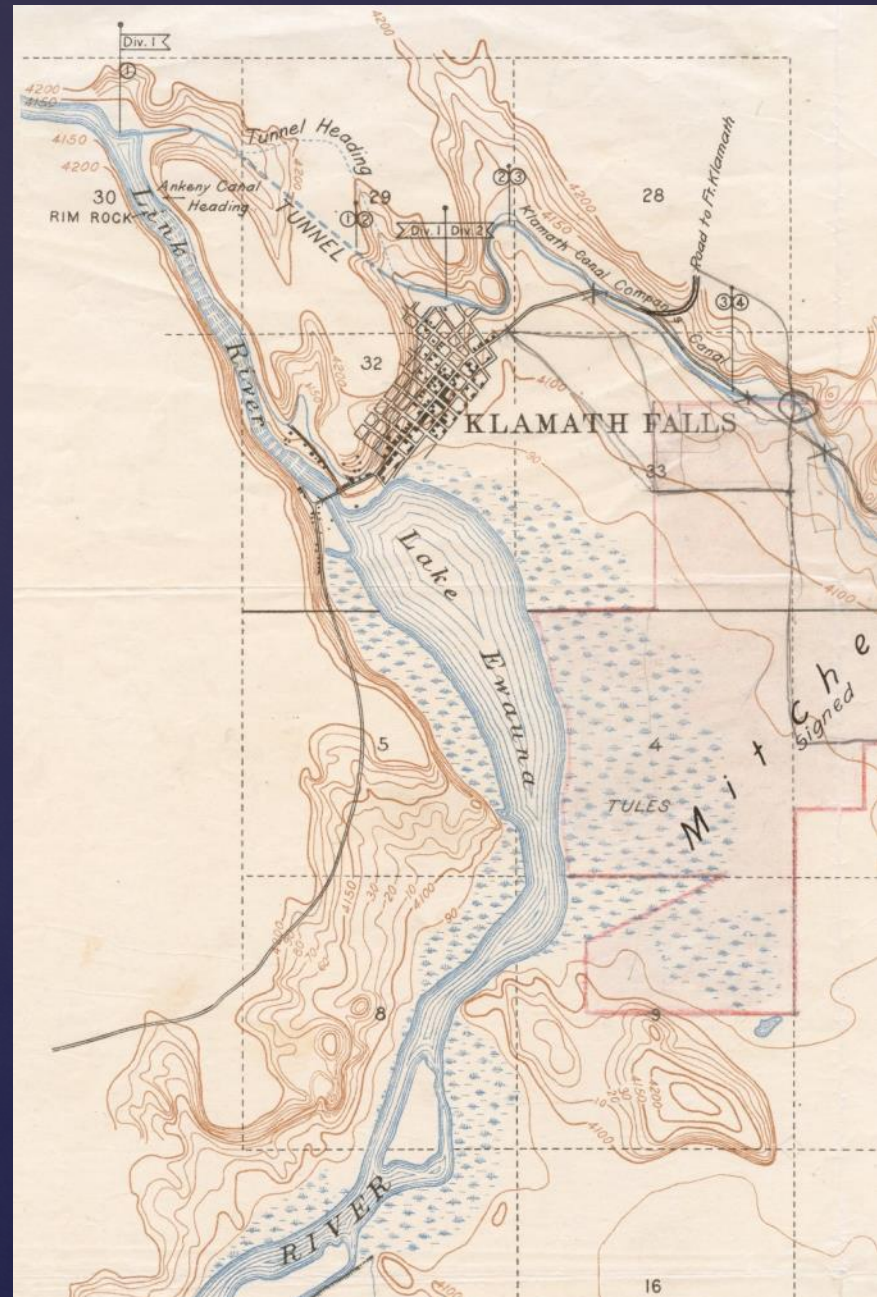


Location of Applegate's milk-vetch at Collins based on 2008 survey



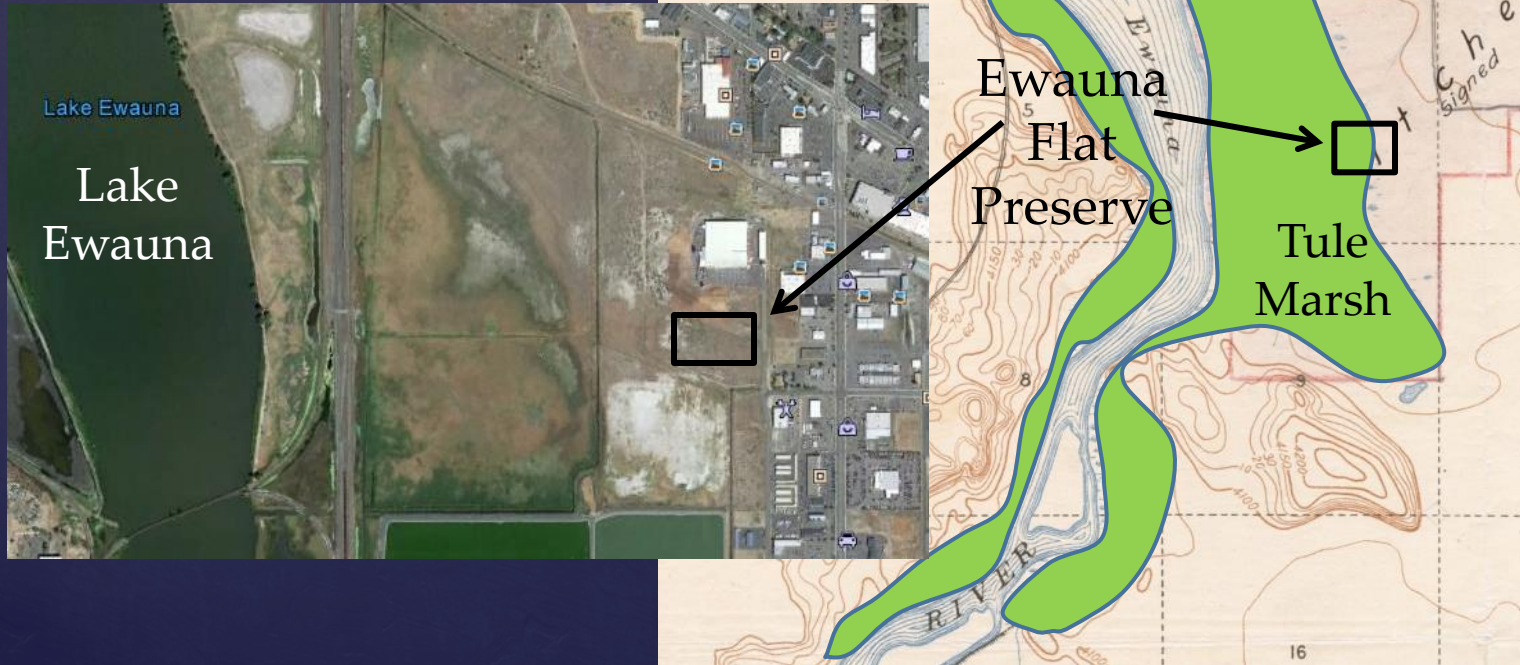
Most ASAP sites occur
near the former
floodplain of the
Klamath River

(1905 map of Lake Ewauna
showing extent of wetlands)



1905 map of Lake Ewauna showing extent of wetlands

Google Earth Image showing Ewauna Flat Preserve



Applegate's Milk-vetch Habitat

- Often dominated by rubber rabbitbrush (*Ericameria nauseosus*) and grasses such as squirreltail (*Elymus elymoides*) and salt grass (*Distichlis spicata*)
- Other native plants found in same habitat include:
 - Greasewood (*Sarcobattus vermiculatus*)
 - Lanceleaf goldenweed (*Pyrocoma lanceolata*)
 - Short-pod thelypodium (*T. brachycarpum*)
- Nonnatives include:
 - Sweet cover (*Melilotus* sp.)
 - Cheatgrass (*Bromus tectorum*)
 - Intermediate wheatgrass (*Elytrigia intermedia*)

Rubber
rabbitbrush
at Ewauna
Flat Preserve



Short-pod thelypodium
at Miller Island

Applegate's Milk-vetch Soils

Typically are:

- Poorly drained, being saturated in spring and dry in summer
- Usually are loamy (Henley-Poe-Laki soil series), often with high clay content making them sticky when wet and hard and cracked or friable when dry
- Have a light-gray color due to wet and dry cycles bringing calcium salts to the surface

Klamath
Falls
Airport



History of Applegate's Milk-Vetch Discovery

- ⌘ ASAP was described in 1936 by Morton Peck (1871-1959), professor of botany, Willamette University, who wrote "Manual of Higher Plants of Oregon" (1941)
- ⌘ ASAP named for Elmer Applegate, botanist, who lived in Klamath Falls and who worked at Crater Lake National Park
- ⌘ At the time of discovery, ASAP was known from only two sites located between Klamath Falls and Keno



Morton Peck, 1936



Elmer Applegate, 1930

Recent History of Applegate's Milk-Vetch

- By 1980, ASAP was considered extinct until its rediscovered in 1983 by Jimmy Kagan, Oregon Natural Heritage Program
- ASAP was federally-listed as endangered in 1993 and listed later in Oregon
- At time of listing, ASAP was known only from one large population at TNC's Ewauna Flat Preserve and a smaller population at Miller Island
- In 1997, a small population was found along Hwy 97 at Worden by Nick Testa, ODOT botanist
- In 2004, PacifiCorp reported finding ASAP plants near the western shore of Keno Reservoir on property belonging to Collins Products
- In 2007, a large ASAP population was discovered at the Klamath Falls Airport

Reasons for Federal and State listing as Endangered:

- ⌘ Habitat loss and modification
- ⌘ Competition from nonnative plants
- ⌘ Herbivory and low seed production
- ⌘ Low seedling survival
- ⌘ Few populations putting ASAP at a high risk of extinction

Recovery Goals:

⌘ Remove risk of extinction by:

- ⌘ Increasing number of populations to six
- ⌘ Have at least 4,500 reproductive individuals in each population
- ⌘ Have diverse age classes so that population growth is evident

Current Status:

- ⌘ Known only from Klamath County
- ⌘ Three largest populations are Klamath Falls Airport, Collins, and Ewauna Flat Preserve, (in that order), with a total of ~ 30,000 plants
- ⌘ Only one large population of >5,000 plants is fully protected (TNC's Ewauna Flat Preserve)
- ⌘ Affected by competition from weeds (all sites), potentially from future development (airport and Collins), and lack for recruitment (especially Ewauna Flat Preserve); effects of climate change (especially droughts) could be adverse to all populations

Recovery Accomplishments:

- ⌘ Recovery plan completed in 1997
- ⌘ Census of most sites done in 2008 and 2013
- ⌘ Soils analysis completed in 2000
- ⌘ Seed collections and storage done
- ⌘ Relationship with mycorrhizal fungi determined (Barroetavena et al. 1998. Mycorrhiza 8: 117-119)
- ⌘ Greenhouse propagation successful by OSU and at Rock Bottom Ranch Nursery near Bonanza
- ⌘ Substantial new populations found at Collins Products (~10,000) and at the Klamath Falls Airport (~20,000 plants)
- ⌘ Three largest sites at Collins were fenced off from cattle grazing in 2008
- ⌘ Over 800 propagated plants have been out-planted at TNC's Ewauna Flat Preserve



Figure 1.

Top: Leslie and Annie, Rock Bottom Ranch Nursery, with ASAP in 4-inch pots, August 12, 2011.

Bottom ASAP seedlings in 4-inch pots, October 24, 2011. Note, diversity of plant sizes.



Figure 3.

Top: Roots of seeding ASAP showing nodules (arrow), October 4, 2012.

Bottom Left: Robust ASAP seedling in 1-gallon pot. Note large numbers of stems and leaves,

October 4, 2012.

Bottom Right: Root ball of same plant showing extensive roots at bottom and sides of soil mass,

Applegate's Milk-vetch Propagation at Rock Bottom Ranch Nursery

Out-planting at
TNC's Ewauna Flat
Preserve in
October 2012 and
November 2013

Example
of 1-
gallon-
size
seedling
selected
for
planting



Steve Sheehy, TNC Volunteer
Steward

What's next?

- ⌘ Continued monitoring of all sites including out-plantings
- ⌘ Reexamination of status every 5 years
- ⌘ Additional propagation and out-planting scheduled for 2014
- ⌘ Revise recovery goals based on new data
- ⌘ Work with Airport and Collins to protect plants and avoid/minimize adverse impacts
- ⌘ Reduce nonnative plant competition at Miller Island
- ⌘ Secure additional sites
- ⌘ Search for undiscovered populations, especially along the Klamath River SW of Collins

How can the Klamath Basin Native Plant Society Help with ASAP Recovery?

- Assist with 5-year census at one more sites
- Assist with monitoring of out-planting seedlings
- Assist with planting of propagated seedlings
- Assist with surveys for new sites
- Fund additional propagation at Rock Bottom Ranch Nursery
- Assist with seed collections (ODA permit needed)
- Assist with nonnative plant control
- Other assistance?

Thanks for your interest
and happy botanizing!

