

Evaluation of Commercial Pollinator Seed Mixes for Western Oregon

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Planting a wildflower seed mix is a great way to create habitat for native pollinators and honey bees, but choosing which seed mix to buy can be a daunting task, as there are many different mixes available on the commercial market that vary widely in price and species composition. To address this issue, in 2014 the Corvallis Plant Materials Center began a 3-year study evaluating seven different pollinator mixes for establishment and cover of planted species, bloom period and abundance, and pollinator visitation. The study consisted of non-replicated 20 x 50-ft plots. On September 23, 2014, Round 1 plots were hand broadcast seeded at a rate of 60 seeds/ft² and raked into a firm seedbed that was prepared by plowing followed by harrowing and rolling with a smooth roller. A second set of plots (Round 2) were seeded on October 8, 2015 using the same seedbed preparation and seeding rate. Current NRCS specifications for installing pollinator habitat recommend using a mix that includes at least three species from each bloom period: early, mid, and late season (Vaughan et al., 2013). For western Oregon, we defined early season bloom as February through April, mid-season as May through June, and late season as July through September. Plots were monitored bi-weekly for number of species blooming. Pollinator visitation was monitored by timed 7.5-minute counts of all floral visitors along two sets of two 50-ft transects (total of 15 minutes along 200 ft per plot). Visitation was monitored every four weeks during the bloom season. After three years of evaluation, we have found that the most important trait in a mix, for providing continuous bloom over multiple years to attract the most pollinators, is the right balance between annuals, short-lived perennials, and long-lived perennials. Annuals provide first year bloom and cover while the perennials are becoming established, but usually fall out completely by the third year. Short-lived perennials bloom heavily in the second year, usually re-seed, and continue to fill in bare areas in the planting. Long-lived perennials will continue to bloom every year and expand over time.

3-Year Trial Results

Table 1. Pollinator seed mixes included in the 3-year trial begun in fall 2014 at the Corvallis Plant Materials Center.

Vendor	Mix Name	No. Species	Oregon Natives*	Annuals*	Seeding Rate (lb per % ac)	Cost per % ac
American Meadows	Native Pacific Northwest Wildflower	18	10%	80%	3.3	\$233
Nature's Finest Seed	Northwest Wildflower Blend	17	0%	80%	1.8	\$91
Silver Falls Seed	West Cascade Wildflower Economy	17	70%	30%	2.3	\$162
Xerces Society	Pollinator Mix 2014	23	94%	25%	3.5	\$230
Silver Falls Seed	Native Pollinator Mix	18	65%	40%	3.8	\$218
Heritage Seedlings	Wetland Prairie Flowers 1	21	100%	40%	3.8	\$488
Heritage Seedlings	General Pollinator Mix	20	100%	20%	5.5	\$721

The standard "Xerces Pollinator Mix 2014" was developed for western Oregon by staff from the Corvallis PMC and the Xerces Society. It was designed to:

- provide a continuous bloom throughout the growing season (at least three flowering species in early, mid-, and late season),
- have a balance of annuals and perennials,
- provide a variety of flower shapes and sizes to accommodate different pollinators,
- be comprised of species that are readily available on the commercial seed market,
- be relatively low in cost.

We compared this to other commercially available wildflower or pollinator mixes for the Pacific Northwest that:

- did not include any invasive or noxious weeds,
- would likely provide abundant bloom throughout the season,
- had a balance of annuals and perennials.

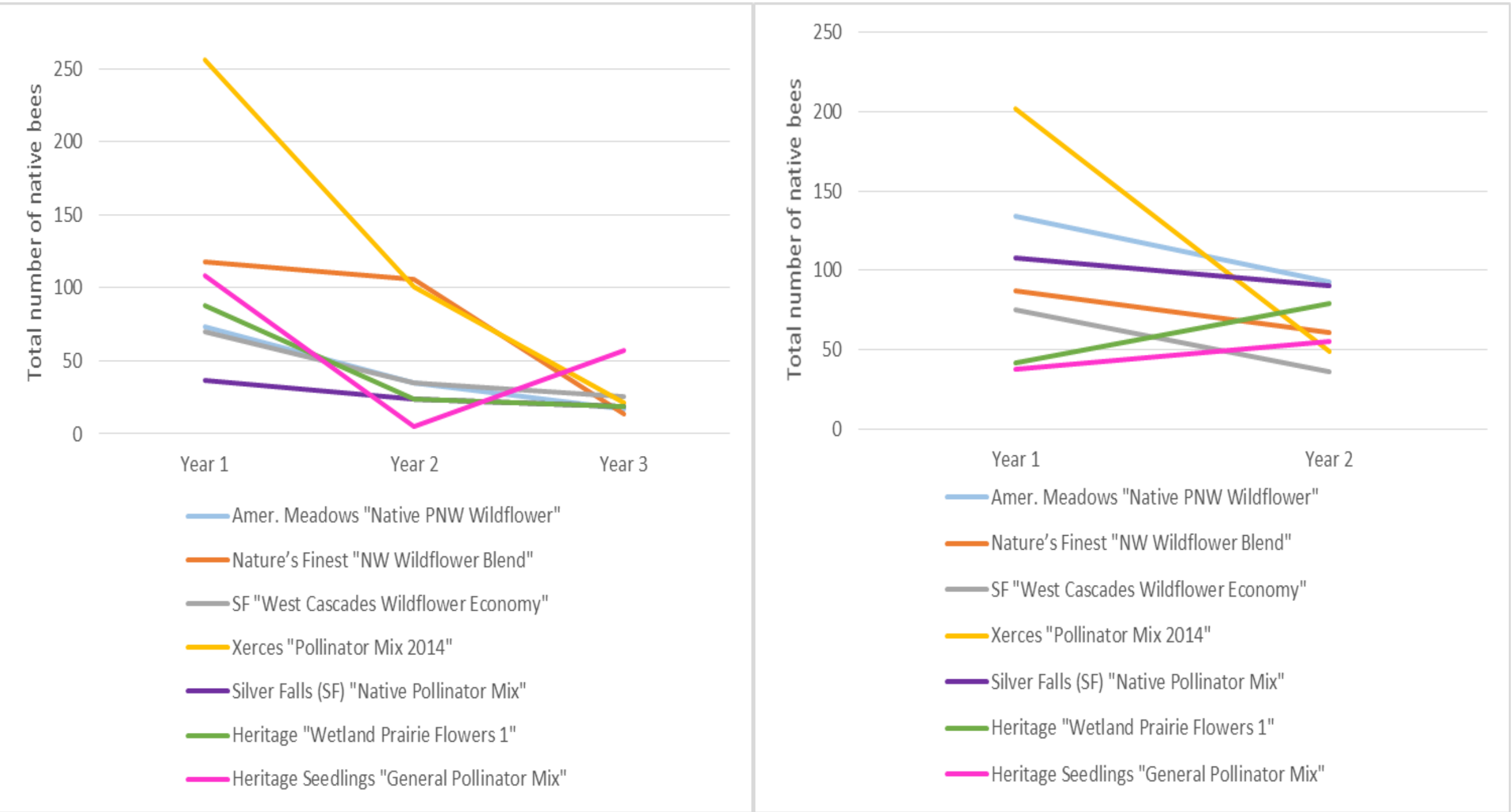
Table 2. Total number of species blooming per season (Early= February-April, Mid= May-June, Late=July-September). Red boxes indicate when a mix had less than three species blooming for that season, green boxes indicate when a mix had 3 or more species blooming for that season.

Round 1		Year 1			Year 2			Year 3		
Mix	Mix	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late
1	Amer. Meadows "Native PNW Wildflower"	4	7	4	2	3	3	4	5	1
2	Nature's Finest "NW Wildflower Blend"	2	4	3	2	3	2	2	2	1
3	SF "West Cascades Wildflower Economy"	3	8	2	1	2	1	2	3	1
4	Xerces "Pollinator Mix 2014"	4	8	3	4	7	5	5	9	4
5	Silver Falls (SF) "Native Pollinator Mix"	4	8	3	2	3	2	3	4	3
6	Heritage "Wetland Prairie Flowers 1"	1	7	3	1	4	4	3	7	5
7	Heritage Seedlings "General Pollinator Mix"	2	7	3	2	8	4	3	8	5

Round 2		Year 1			Year 2		
Mix	Mix	Early	Mid	Late	Early	Mid	Late
1	Amer. Meadows "Native PNW Wildflower"	5	10	8	4	7	3
2	Nature's Finest "NW Wildflower Blend"	3	7	6	3	7	6
3	SF "West Cascades Wildflower Economy"	3	7	6	4	7	1
4	Xerces "Pollinator Mix 2014"	3	7	4	4	9	3
5	Silver Falls (SF) "Native Pollinator Mix"	4	9	4	5	4	1
6	Heritage "Wetland Prairie Flowers 1"	5	11	4	5	9	5
7	Heritage Seedlings "General Pollinator Mix"	3	7	3	6	8	5

In Round 1, we saw low rates of establishment in many of the plots. Mixes from Heritage tended to have few annual species and more native perennial species, resulting in red boxes in year 1 and 2, but none in year 3 when the perennials finally began to bloom. Mixes 1, 2, and 3 had a diverse suite of annuals, but few of the Midwestern perennials in those mixes established in the plots, causing diversity to go down after Year 1. The Standard mix 4 had a good balance of bloom throughout the year, as well as maintaining diversity all three years. Round 2 had better establishment and most mixes were able to meet diversity requirements in Years 1 and 2, except the Silver Falls mixes that were dominated by riverbank lupine in year 2.

Figure 1. Total native bee counts in seven pollinator mixes from monthly monitoring for three years in the Round 1 plots (left) planted in 2014 and two years in the Round 2 plots (right) planted in 2015 at the Corvallis Plant Materials Center.



The "Xerces Pollinator mix 2014" had high native bee counts because of the abundant, season-long bloom. Most mixes showed a decline in native bee abundance after Year 1, usually due to the reduction in bloom of the annual species. The mixes sold by Heritage Seedlings were an exception because of the low levels of annuals and the high levels of perennials that began to bloom in Years 2 and 3.



Components of an Ideal Pollinator Mix

The following West Coast native species, which are commonly found in commercially available mixes, established reliably and attracted lots of pollinators. Look for these species as the backbone of a pollinator seed mix. Species native to the Midwestern states were included in some mixes, but rarely established in the plots.

25% Annuals: provide abundant and continuous first year bloom

- farewell to spring (*Clarkia amoena*)
- denseflower willowherb (*Epilobium densiflorum*)
- California poppy (*Eschscholzia californica*)
- Douglas' meadowfoam (*Limnanthes douglasii*)
- common madia (*Madia elegans*)
- Five spot (*Nemophila maculata*)
- baby blue eyes (*Nemophila menziesii*)
- lacy phacelia (*Phacelia tanacetifolia*)



50% Short-lived perennials: these "workhorses" provide the bulk of second year bloom and often re-seed, providing continuous bloom for many years

- common yarrow (*Achillea millefolium*)
- Puget Sound gumweed (*Grindelia integrifolia*)
- riverbank lupine (*Lupinus rivularis*), or other biennial lupine
- lance selfheal (*Prunella vulgaris* ssp. *lanceolata*)
- western buttercup (*Ranunculus occidentalis*)



25% Long-lived perennials: may bloom during second year, but typically reach maturity in third year, and bloom abundantly as they age

- Oregon sunshine (*Eriophyllum lanatum*)
- meadow checkerbloom (*Sidalcea campestris*)
- rose (dwarf) checkerbloom (*Sidalcea malviflora* ssp. *virgata*)
- Canada goldenrod (*Solidago canadensis*)
- Hall's aster (*Symphotrichum hallii*) or other West Coast native aster



MAY



JUNE



JULY



Figure 2. First year bloom abundance in Round 2 for Xerces Pollinator Mix (top) and Nature's Finest (bottom) during May (left), June (center), and July (right) 2016.

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