

***Phacelia leonis* Inventory and Morphological Study**

March 1, 2013

Report by Wayne Rolle, Forest Botanist
Rogue River-Siskiyou National Forest

INTRODUCTION

In summer 2010, Rogue River-Siskiyou National Forest initiated a morphological study and a limited field inventory of the vascular plant *Phacelia leonis* J.T. Howell (also known as the Siskiyou phacelia) and several related annual phacelias. *Phacelia leonis* is a Forest Service Region 6 Sensitive species (Heritage rank G2, S1, ORBIC list 1). In California it has the recognized heritage rank of G2 S2.2 and is on CNPS list 1B.3. Funding was provided through our Interagency Special Status/Sensitive Species Program (ISSSSP). Oregon State University (OSU) Herbarium participated through a Challenge Cost Share Agreement. Dr. Richard Halse, OSU Herbarium Curator, our principal technical contact there, is a taxonomic expert of the family Hydrophyllaceae. Dr. Halse wrote a sub-section of this report and provided guidance throughout the project.

Objectives of the project, in order of priority, were to:

1. Clarify morphological features of both fresh and dried pressed specimens that can reliably be used to discriminate between *Phacelia leonis*, and *Phacelia peckii* in Oregon; and between *Phacelia leonis* and *Phacelia pringlei* on the California portion of our Forest.
2. Determine if previously-reported *Phacelia leonis* locations in Oregon were correctly identified and still exist.
3. Determine if *Phacelia leonis* is present in other potential habitat areas on the Oregon portion of Wild Rivers Ranger District.
4. Assess if conservation/protection measures are needed at *Phacelia leonis* occurrences on the Forest.
5. A secondary objective of the project was for FS botanists responsible for management of *Phacelia leonis* to gain a local expert's understanding of its identification among close relatives, its habitats, its local occurrences, and its management needs.

BACKGROUND

Phacelia leonis and the closely-related *Phacelia pringlei* are Californian Klamath Mountain endemic small annuals whose habitat is open stony ground in relatively sunny areas at moderate

to higher elevations. These are dry upland habitats but microsites where the phacelias grow are often vernal moist. There are previously-known occurrences of a small annual phacelia at four Siskiyou County locations on Klamath National Forest very near our Forest boundary. Herbarium specimens from these sites are invariably labeled as *P. leonis*. However, using available keys, our field botanists could not determine which of the two species was actually present at these sites. It is thought (still) that this same phacelia is likely to occur on our adjacent California lands in the East Fork Illinois River Watershed (Del Norte County).

The type specimen for *Phacelia leonis* was also presumably collected on Klamath N.F. (or perhaps on Rogue River-Siskiyou N.F.) near our Forest boundary and fairly near the state line; "Herb. Calif. Acad. Sci. No. 291857, collected on an open slope at the summit of the Siskiyou Mts. on the Takilma-Happy Camp road, Siskiyou Co., California, alt. 5,500 ft., July 6, 1939, by C. Leo Hitchcock and J.P. Martin, No. 5217. Dupl. In Herb. Univ. Wash." (Howell 1943). It should be noted that this road in its current location only reaches an elevation of 4800 ft. so it is very unclear where this location would be.

Before the field work for this project began, there had been two "verified" collections of *Phacelia leonis* in Oregon, both deposited at OSU herbarium, from two locations within 2 miles of the OR/CAL border. One was a 1997 collection by George Lewis at the west end of Weston Ridge. The other was a 2007 collection by myself at Portuguese Flat. Both were determined (or annotated) by Dr. Halse to be *Phacelia leonis*. However, field botanists examining both fresh and dried pressed individual plants from the Portuguese Flat location could not determine whether it was *Phacelia leonis* or *P. pringlei* using the taxonomic keys and descriptions in our regional floras.

Phacelia peckii is an Oregon annual phacelia from the southern Oregon Cascades in Jackson and Klamath counties. Some herbarium collections and reports of *Phacelia peckii* have also been confirmed from Oregon's Klamath Mountains Geologic Province, in Josephine County and perhaps adjacent Jackson and Douglas County. Some of these were initially determined to be, or reported as, *Phacelia leonis* or *Phacelia pringlei*. It is obvious that Oregon field botanists are having trouble distinguishing between all three species.

In California, *Phacelia leonis* is considered rare, *Phacelia pringlei* is not considered rare, and *Phacelia peckii* is not known to occur. In Oregon, *Phacelia leonis* is considered rare, *Phacelia peckii* is not considered rare, and *Phacelia pringlei* has not been verified to occur in the state.

There has never been a regional flora published with dichotomous keys including all three of these annual phacelias. Kozloff's Plants of Western Oregon, Washington, and British Columbia (2005) does include all three species in a key, but the couplets contain misleading and incorrect information. The Flora of North America treatment of the Family Hydrophyllaceae (Vol. 15) has not been published yet, online or in book form. The last published taxonomic treatment focusing on a subset of the genus *Phacelia* that includes all three species discussed here was by J.T. Howell in the American Midland Naturalist (1945).

METHODS

I gathered reported location records and herbarium label data for representative occurrences of *Phacelia peckii*, *Phacelia leonis*, and *Phacelia pringlei* in Jackson, Josephine, Siskiyou, and Trinity Counties. I gathered ALL available location info for these three species that had ever been reported in Josephine County, Oregon, and in those parts of Siskiyou County, California within a few miles of our Forest.

Dr. Halse and I independently gathered available taxonomic literature and examined herbarium specimens at OSU and in the Medford BLM herbarium.

Stuart Osbrack, the Wild Rivers Ranger District botanist, and/or I conducted field visits to previously known or reported sites to attempt to relocate, as follows:

- All Josephine County sites where all three species had been reported or collected;
- Selected Jackson County sites of *Phacelia peckii*;
- Selected Siskiyou and Trinity County sites of *Phacelia pringlei* (and one *Phacelia greenei* site);
- Phacelia leonis* type locality and vicinity (as best we could determine);
- George Lewis's *Phacelia leonis* collecting location at the west end of Weston Ridge.

We took measurements, described field characters, took photographs and made voucher collections at locations where the taxa were found.

Dr. Halse compared measurements and morphological features of the 2010-collected dried pressed specimens (and of already-accessioned OSU herbarium sheets) to the measurements and features described for these species in the scientific literature.

Stuart Osbrack and I compared measurements and morphological features of the 2010-collected **fresh** specimens to those described for these species in regional floras and field guides.

I searched apparently suitable annual *Phacelia* habitat in Oregon west of Takilma on May 25, 2010. Stuart Osbrack searched potential Oregon habitat for *Phacelia leonis* in the Page Mountain area (July 2010) and Bear Camp Ridge (July 2010 and June 2011). Note that we did not search California potential habitat on our Forest, even though *Phacelia leonis* would more likely occur there than in the Oregon locations. This is because the conservation concern for *Phacelia leonis* is greater in Oregon and because work associated with the morphological study took precedence over additional searches of potential habitat.

During the course of investigation it became clear that there are two other annual phacelias of our region that occur sympatrically with, and are occasionally confused with, one or more of the three “focus” species. These are *Phacelia verna* of Douglas and Lane Counties, Oregon, and *Phacelia greenei* of Siskiyou and Trinity Counties, Oregon. Though not included in the original study proposal, and not as closely related phylogenetically, a decision was made to include information about them in this report as an aid to field botanists. Taxonomic literature, some location information, and anecdotal information were gathered for both species. No *Phacelia verna* locations were visited. One *Phacelia greenei* location was visited in the field and collections made.

RESULTS

Searches of the online database of the Oregon Plant Atlas <http://www.oregonflora.org/atlas.php> indicated herbarium specimens or reported occurrences of:

Phacelia leonis in Josephine County at Weston Ridge, Portuguese Flat, and (mis-identified) at King Mtn.;

Phacelia peckii in Josephine County on King Mtn., near Hellgate, between O'Brien and Cave Junction, and at Waldo (variously identified as *P. pringlei* and/or *P. leonis*, then annotated later as *P. peckii*);

Phacelia peckii in Jackson County at various locations in the Cascades.

Phacelia verna in Douglas County at various locations

Searches of the online database of the Consortium of California Herbaria <http://ucjeps.berkeley.edu/consortium/index.html> displayed herbarium specimens with the following location information:

Phacelia pringlei in Siskiyou and Trinity Counties, various sites in the Klamath Mtns.;

Phacelia leonis in Siskiyou, Trinity, and Del Norte Counties, various sites in the Klamath Mtns.;

Phacelia greenei in Siskiyou and Trinity Counties, various sites in the Klamath Mtns.

Visits to OSU herbarium and the Medford BLM herbarium yielded collections already documented in the online databases above, plus a *Phacelia leonis* collection from Young's Valley, Siskiyou County, California (near our Forest).

Checks of Wayne Rolle's collection books and the Rogue River-Siskiyou N.F. rare plant information files yielded collections already documented in the online databases above, plus *Phacelia leonis* collections at 1 mile east of Young's Valley and ¾ mile SW of Poker Flat, Siskiyou County, California and 1 mile north of Sanger Lake in Del Norte County, California (all three sites are near, but not on, our Forest).

Pertinent taxonomic literature provided by Dr. Halse and/or found online is:

- A taxonomic treatment of these and other related phacelias by John Thomas Howell (1945);
- The original description of *Phacelia leonis* by John Thomas Howell (1943);
- The original description of *Phacelia peckii* by John Thomas Howell (1944);
- An article about places some of these phacelias grow by John Thomas Howell (1953);
- Corolla venation patterns of these and other related phacelias by Gregory Lee (1986);

Online photos of these and other related phacelias were found at <http://calphotos.berkeley.edu/> and at <http://www.oregonflora.org/gallery.php>. Several photos from these websites (with credits given) as well as representative photos taken during the field work for this project are included in this report as Figures 1 through 16.

Previously known or reported sites where Wayne Rolle and/or Stuart Osbrack could **NOT** find annual phacelias during 2010 field visits were:

- Hellgate area in Josephine County (5/28/2010 visit)
- South of O'Brien in Josephine County (5/25/2010 visit)
- Waldo in Josephine County (5/25/2010 visit)
- Phacelia leonis* type locality "summit of the Siskiyou Mts. on the Takilma-Happy Camp road, Siskiyou Co.", and vicinity (7/1/2010 visit).

Previously known or reported sites where Wayne Rolle and/or Stuart Osbrack did find annual phacelias during 2010 field visits are described in the following subsection.

Summary of field measurements and field characteristics of fresh specimens of annual phacelia species present at visited locations:

Phacelia peckii in a scabland on the southeast side of Hyatt Reservoir, Jackson County, Oregon: Plants have glandular hairs throughout. No leaf divisions. Leaves broadly linear-lanceolate or oblanceolate. Lower leaves opposite. Lower pedicels fairly short, not much longer than the upper pedicels. There were not many in fruit here. On the flowers with corollas already fallen, there are usually two calyx lobes that are slightly shorter and more slender than the other 3. Corollas are about 5 mm long except when fully open (rotate) they are flattened to about 3 mm long. Corollas are about 9-10 mm broad when fully opened. Corollas glabrous inside. Styles divided to below the middle. Styles and stamens about 5 mm long. Both styles and filaments are hairy, the filaments a bit more so than the style branches.

Phacelia peckii on the Dead Indian Plateau, T38S, R3E, Sec 16, SE1/4 of the SE ¼, Jackson County, Oregon: Plants are more or less similar to the Hyatt Lake site except there are a fair percentage of plants with styles shorter than stamens. Stamens consistently 5 mm long but styles can be as short as 3mm, right next to flowers on the same plant that have 5 mm styles. Some fruiting individuals here. When in fruit, two calyx lobes are consistently shorter and more slender than the other 3 but it is not a dramatic difference. The shorter, more slender lobes are only 10-15% shorter than the other lobes.

Phacelia peckii at King Mountain in Northeastern Josephine County: Upright annual, short. Untoothed leaves. Leaves, stem, and calyx glandular-hairy with dark purple gland-tips. Linear leaves 5-22 mm long, opposite below inflorescence, alternate above. One mid-vein on leaves. Coiled inflorescences. Pedicels short, lower and upper about equal. Lower pedicels not elongate, about 1.5 mm. Sepals of unequal length in fruit; those closest to stem are shorter, not markedly so, difference = 1 mm or more. Corolla 4-5 mm long. Corolla 8 mm wide. Style branched to below middle. Style and stamens 3-4 mm. Filaments hairy. Style branches 2-3 mm long, glabrous. No translucent areas behind stamens. Short beaked hairy capsule.

Phacelia leonis at west end Weston Ridge in southern Josephine County, Oregon very near the California boundary: Plants glandular-hairy with dark gland-tips. Leaves 2-3 cm long. Pedicels 1mm (or greater). Lower and upper pedicels short, straight. Sepals unequal, shorter near stem (3mm) vs. longer (5mm). Corolla 3.5-4 mm long, 3-4 mm wide. Style parted below middle, glabrous, 2 mm long. Ovary hairy. Filaments sparsely hairy, 2.5 mm long. Seeds 6-8 per capsule.

Phacelia pringlei above FS Road 40N08, 0.2 miles NE of Scott Mtn. summit, Siskiyou County, California: July 18, 2010. Stony serpentine barren slopes. 5500 ft. elevation. West Aspect. Most plants fruiting, at the end of their flowering period. Glandular-hairy but not smelly. Lower leaves opposite. Leaves linear or narrowly oblanceolate, narrowed at base but no clear division between blade and petiole. Pedicels short, more or less equal upper and lower, not elongate. Calyx divisions in fruit clearly unequal. Shorter calyx segments are 65-85% as long as the longer ones. This character is more pronounced on the more mature fruits. Corolla tube without any definite translucent area behind the stamens (the whole corolla is sort of translucent). Corollas are 3-4 mm long before fully open. They are 7-8 mm broad when fully open. Color is pale blue with a hint of lavender in the sun. They are pretty wide open when expanded, stamens exerted. Calyx segments 2.5 mm in flower and up to 4 mm in fruit. Stamens 3.5-4 mm long, sparsely hairy (retorsely long-scabrous). Styles sparsely hairy above and below the style branches, 4-5 mm long. Ovaries hairy. 3-4 well developed seeds in a capsule. Hard to tell how many were undeveloped, or how many chambers in a capsule.

Phacelia pringlei at Cabin Meadow, Siskiyou County, California: July 18, 2010. In serpentine soil with forbs and grasses. In full flowering stage here (It's higher in elevation and therefore phenologically somewhat earlier than the Scott Mtn. population). Straight line distance between the two populations = 7 miles. Plants are morphologically identical to the Scott Mtn. population in all respects so no measurements or description seems warranted.

Phacelia greenei north of Scott Mtn. summit, Siskiyou County, California: Corolla = lavender (fades to violet as corollas age). The yellowish color of the tube/throat area is distinctive and clearly demarked from the lavender or violet limb (this distinctive color and demarcation fades away in pressed specimens, so it's a field character only. Its leaves are broader than *P. pringlei*. It feels stickier than *P. pringlei*. Genevieve Walden (2010) told me that *Phacelia greenei* is "skunky-smelling" or "mephitic" when fresh. J.T. Howell (1953) calls it "malodorous". Sure enough, I easily discerned a distinctive unpleasant odor from any *Phacelia greenei* plants that weren't 100% crisped and brown. The unpleasant odor is not reliably detectable in dried pressed specimens. *Phacelia greenei* capsules under a microscope have 2-4 mature seeds with clearly space for 4 if all develop. ***P. pringlei* is present here and there is at least some overlap in microsite preferences of the two species.**

Dr. Halse examined and confirmed the identifications of all the 2010-collected pressed specimens from the above locations.

After taking part in re-visits to previously-known occurrences, Stu Osbrack searched potential Oregon habitat for *Phacelia leonis* in the Page Mountain area in July 2010 and Bear Camp Ridge (south of Waldo) in July 2010 and June 2011. Wayne Rolle searched apparently suitable Oregon habitat east of Takilma on 5/25/2010 for any of the three annual Phacelias that had been reported or collected at Waldo over the years. The quality of habitat found in these survey areas varied from poor to excellent. The timing (season) of these surveys varied from marginal to excellent in the judgement of the surveyors. NO ANNUAL PHACELIAS WERE FOUND IN ANY OF THESE SURVEYS OF POTENTIAL HABITAT. Survey details have been entered into the NRIS TESP/INVASIVES Survey module.

DISCUSSION

Based on his examination of our 2010-collected dried pressed specimens and other collections at his disposal, features described for these species in the scientific literature, and his personal experience with the genus *Phacelia*, Dr. Halse prepared the useful dichotomous key and species descriptions given below. Dr. Halse said this key and species descriptions is a revision or expansion of previous keys and descriptions by J.T. Howell (1945) and others. He did not find any characters or measures that contradict previously published keys and descriptions. *P. greenei* and *P. verna* were included at my request because these taxa are occasionally sympatric with *P. pringlei* or *P. peckii* or are sometimes confused with them.

Dichotomous key and species descriptions for selected annual phacelias, prepared by Dr. Richard Halse, based mostly on examinations of dried pressed specimens

- 1a. Calyx lobes more or less equal in fruit; ovules 1-2 per locule; seeds 1-4 per fruit
.....*P. greenei*
- 1b. calyx lobes generally unequal in fruit; ovules 3-many per locule; seeds generally 5 or more per fruit
 - 2a. Leaves ovate-lanceolate to ovate; filaments exserted, glabrous.....*P. verna*
 - 2b. Leaves linear to lanceolate or oblanceolate; filaments hairy to papillate or if glabrous not exserted
 - 3a. Stamens 1.7-2 mm long.....*P. leonis*
 - 3b. Stamens 3-5 mm long
 - 4a. Corolla 3-5 mm long; filaments papillate.....*P. pringlei*

4b. Corolla 5-6 mm long; filaments hairy.....*P. peckii*

Phacelia greenii J.T. Howell

Scott Valley Phacelia

Plants erect, 2-15 cm tall, hirsutulous, capitate glandular; leaves lowest opposite, entire, tapered to petiole, narrowly (ob)lanceolate, 8-30 mm long, 3-5 mm wide; flower: pedicel 1-2 mm; calyx lobes in flower 2-3 mm, in fruit 3-5 mm, equal to subequal; corolla more or less rotate, tube white to yellowish, limb violet to purple, 5-6 mm long, 7-9 mm broad; stamens 7-8 mm, papillate, exserted; style and branches 5-9 mm long, short hairy, parted about 2/3 of length; capsule 3-4 mm, more or less spheric, beaked, short-hairy; seeds 3-4, oblong, 1.5-3 mm long, surface pitted.

Phacelia leonis J.T. Howell

Siskiyou Phacelia

Plants erect, 2-15 cm tall, hirsutulous, capitate glandular; leaves lowest opposite, entire, tapered to petiole, linear to oblong, 5-30 mm long, 1-4 mm wide; flower: pedicel 1-2 mm; calyx lobes in flower 1-2.5 mm, in fruit 2-7 mm, very unequal; corolla campanulate, blue to lavender, 2-3 mm long, 2-5 mm broad; stamens 1.7-2 mm, glabrous to puberulent, included; style and branches ca. 2 mm, glabrous, parted about 2/3 of length or to the base; capsule 2.5-3.5 mm, more or less spheric, apiculate, hirsutulous near the top; seeds 6-9, subovate, 1-1.7 mm long, surface pitted.

Phacelia peckii J.T. Howell

Peck's Phacelia

Plants erect, 5-15 cm tall, hirsutulous, capitate glandular; leaves lowest opposite, entire, tapered to petiole, narrowly oblong to lanceolate, 10-30 mm long, 2-6 mm wide; flower: pedicel 1-3 (5) mm; calyx lobes in flower ca. 2 mm, in fruit 3-6 mm, strongly unequal; corolla rotate campanulate, violet to blue, 5-6 mm long, 7-9 mm broad; stamens ca. 5 mm, hairy, equal to corolla lobes to slightly exserted; style and branches 4-5 mm, hairy, parted 2/3 or more of its length; capsule ca. 4 mm, more or less spheric, sparsely hairy; seeds 8-11, subovate, 1-1.5 mm long, surface pitted.

Phacelia pringlei A. Gray

Pringle's Phacelia

Plants erect, 2-18 cm, glabrous to hirsutulous and capitate glandular; leaves lowest opposite, entire, tapered to petiole, 7-30 mm long, 1-5 mm wide; flower: pedicel 1-3 mm long; calyx lobes in flower 1-2 mm, in fruit 2-6 mm, more or less unequal, one usually much smaller than others; corolla more or less rotate, lavender, 3-5 mm long, 4-6 mm broad; stamens 3-4 mm, papillate, about equaling the corolla or slightly exserted; style and branches 3-4 mm, short hairy, parted about 2/3 of length or nearly to base; capsule 2.5-3.5 mm, more or less spheric, short hairy; seeds 3-8, more or less ovoid, 1.5-2 mm long, surface pitted.

Phacelia verna Howell

Umpqua Phacelia

Plants erect, 5-25 cm tall, hairy, sparsely glandular; leaves lowest opposite, entire or tooth, lower petiolate, petiole often winged, upper sessile, ovate-lanceolate to ovate, 10-30 mm long, 5-10 mm wide; flower: pedicel 1-3 mm; calyx lobes very unequal in flower, ca. 3-4 mm long, in fruit 5-7 mm long, very unequal; corolla campanulate, white or lavender, 5-7 mm long, 4-8 mm broad; stamens 6-6.5 mm, glabrous, exserted; style and branches 5-6 mm, hairy, cleft almost to base; capsule 3-5 mm, ovate to ovoid, hirsutulous; seeds 6-11, oblong to ovate, 1-1.5 mm long, surface pitted.

Useful field characteristics to discriminate between *Phacelia leonis*, *P. pringlei*, *P. greenei*, *P. peckii*, and *P. verna*

Field measurements and morphological characteristics of **fresh** specimens we found in our 2010 field visits did not correspond in all cases to those given by Dr. Halse above. **Table 1** displays each species' expected geographic range, field measurements, and relative placement in a range of field characters we found in **fresh** specimens at the locations visited in 2010. Table 1 should be useful for botanists trying to identify these annual phacelias in the field. Table 1 together with Dr. Halse's key and descriptions should allow botanists to discriminate among these annual phacelias in the future.

Threats to currently-known *Phacelia leonis* occurrences on Rogue River-Siskiyou N.F.:

At Portuguese Flat there are some impacts from Off-Road Vehicles (ORVs) and changes to hydrology from road-ditching, neither of which appear to be impacting the majority of the population at this time. An ancient gold-mining operation occurred here in the distant past (Don Belleville, personal communication) and it is likely that the site was disturbed by that activity. Portuguese Flat is flat open ground (uncommon in this area). So it is a natural place to stage fire suppression activities, park vehicles or heavy machinery, use as a log landing, etc. The ranger district will have to diligently avoid these activities here, and not authorize others to stage activities here.

On the west end of Weston Ridge, *Phacelia leonis* occurs in an area that shows no sign of past disturbance and is unlikely to be disturbed in the future.

REFERENCES

- Howell, J.T. 1943. *Phacelia leonis* J. T. Howell spec. nov. Leafl. West. Bot. Vol. 3, No. 9, p. 206.
- Howell, J.T. 1944. A New *Phacelia* from Southern Oregon (*Phacelia peckii*). Leafl. West. Bot. Vol. 4, No. 2, pp. 25-26.
- Howell, J.T. 1945. Studies in *Phacelia*- Revision of Species Related to *P. douglasii*, *P. linearis*, and *P. pringlei*. Am. Mid. Nat. Vol. 33, No. 2, pp. 460-494.
- Howell, J.T. 1953. Where *Phacelias* Grow. Leafl. West. Bot. Vol. 7, No. 1, pp. 13-14.
- Kozloff, E.N. 2005. Plants of Western Oregon, Washington, and British Columbia. Timber Press, p. 244.
- Lee, Gregory J. 1986. Systemic Studies in the *Phacelia humiles* Group (Hydrophyllaceae): Corolla Venation Patterns. Amer. J. Bot. 73(2), pp. 230-235.
- Walden, Genevieve. 7/16/2010. Personal communication (email) to Wayne Rolle.

Table 1: Useful field characteristics to discriminate between *Phacelia leonis*, *P. pringlei*, *P. greenei*, *P. peckii*, and *P. verna*

Taxon	Geographic Area	Corolla characteristics	Filament length, hairiness	Style length, hairiness	Hairs on stems, leaves, calyx	Leaf width	Calyx lobes in fruit	Notes
<i>Phacelia leonis</i>	Siskiyou, Trinity and Del Norte Counties, California and Josephine County, Oregon	3-4 mm long, 3-4 mm wide. Blue/violet with a hint of lavender. Campanulate.	2.5 mm, sparsely hairy	2 mm, glabrous (but ovary is hairy)	Plants glandular hairy with dark gland-tips	Linear to narrowly oblanceolate	unequal	Seeds 6-8 per capsule in Weston Ridge population 2010.
<i>Phacelia peckii</i>	Jackson, Josephine, (and perhaps Klamath and Douglas) Counties, Oregon	3-5 mm long, 8-10 mm wide. Widely campanulate to rotate. Blue or violet with white centers. Lavender tinges.	5 mm long, hairy	3-5 mm long, glabrous or more or less hairy	Plants glandular hairy. Dark gland-tips at least on serpentine.	Linear to oblanceolate	unequal	Josephine County (serpentine) plants somewhat smaller in all respects compared to Cascade plants.
<i>Phacelia pringlei</i>	Siskiyou and Trinity Counties, California	3-4 mm long, 7-8 mm wide. Pale blue, hint of lavender in the sun. Thin tissue, vaguely semi-translucent throughout. Flares wide with stamens exerted when fully expanded.	3.5-4 mm long, sparsely hairy.	4-5 mm long, sparsely hairy.	Glandular-hairy.	Linear to narrowly oblanceolate	unequal	Not known from western or northern Siskiyou County. Seeds 3-4 per capsule at Scott Mtn. Summit 2010
<i>Phacelia greenei</i>	Siskiyou and Trinity Counties, California	About the same size as <i>P. pringlei</i> . Lavender, fading to violet with age. Yellow tube/throat is distinctive and clearly demarked from the lavender or violet limb in fresh flowers. Corolla rotate, stamens exerted.	Not examined	Not examined	Glandular-hairy. Sticky when fresh.	Narrowly oblanceolate to lanceolate	More or less equal	Unpleasant odor in fresh specimens. Not known from western or northern Siskiyou County. Seeds 2-4 per capsule at Scott Mtn. Summit 2010
<i>Phacelia verna</i>	Douglas, Lane (and perhaps Coos) Counties, Oregon.	5-7 mm long, 4-8 mm wide, Campanulate, white or pale lavender or blue, Stamens exerted.	6 mm, glabrous	5-6 mm, hairy	Hairier than the other species, but only sparsely glandular	oblanceolate to ovate	unequal	<i>P. verna</i> not seen or studied during this project. "Field" characteristics given here are from available literature.

FIGURES

Photographs are by Wayne Rolle except where noted otherwise.

Figure 1: *Phacelia leonis* habitat on west end of Weston Ridge, Josephine County, Oregon during our 2010 field work. In general terms, open stony ground or “scabland” is typical habitat for all the annual phacelias discussed in this report. Microhabitats are often vernal moist.



Figure 2: *Phacelia leonis* on west end of Weston Ridge, Josephine County, Oregon during our 2010 field work.



Figure 3: *Phacelia leonis* on west end of Weston Ridge, Josephine County, Oregon during our 2010 field work.



Figure 4: *Phacelia leonis* on west end of Weston Ridge, Josephine County, Oregon during our 2010 field work.



Figure 5: *Phacelia leonis* on west end of Weston Ridge, Josephine County, Oregon during our 2010 field work.



Figure 6: *Phacelia pringlei* at Deadfall Lake, Trinity County, California, 2006, courtesy of Calphotos and photographer Aaron Schusteff. Note the flaring corolla and well-exserted stamens. This photo was selected from many available on the Calphotos website because the plant stature most accurately represents typical *Phacelia pringlei* plants in early flowering stage as seen at Cabin Meadow and near Scott Mountain Summit during our 2010 field work.



Figure 7: *Phacelia pringlei* in the vicinity of Scott Mtn. summit, Siskiyou County, California during our 2010 field work.



Figure 8: *Phacelia pringlei* in the vicinity of Scott Mtn. summit, Siskiyou County, California during our 2010 field work.



Figure 9: *Phacelia pringlei* in the vicinity of Scott Mtn. summit, Siskiyou County, California during our 2010 field work. Note the unequal sepal length on fruiting calyces. This character is shared by all the *Phacelias* in this report except *Phacelia greenei*.



Figure 10: *Phacelia greenei* near Scott Mountain Summit, Siskiyou County, California, 2012, courtesy of Calphotos, Sierra Pacific Industries and photographer Jessica O'brien.



© 2012 J. O'Brien, Sierra Pacific Ind.

Figure 11: *Phacelia greenei* near Scott Mountain Summit, Siskiyou County, California, 2011, courtesy of Calphotos and photographer Steve Matson. Note the sticky nature of the plant and (in fresh specimens) the abrupt color boundary between corolla throat and corolla limb.



Figure 12: *Phacelia peckii* east of Hyatt Reservoir, Jackson County, Oregon, during our 2010 field work.



Figure 13: *Phacelia peckii* east of Hyatt Reservoir, Jackson County, Oregon, during our 2010 field work.



Figure 14: *Phacelia peckii* on King Mountain in Northeastern Josephine County, Oregon during our 2010 field work.



Figure 15: *Phacelia verna* south of Oakridge, Lane County, Oregon, 2007, courtesy of the Oregon Flora Project and photographer Gerald D. Carr.



Figure 16: *Phacelia verna* south of Oakridge, Lane County, Oregon, 2007, courtesy of the Oregon Flora Project and photographer Gerald D. Carr.

