

Creating a Native California Meadow

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Landscaping with native plants is a passion and a natural outcome of our love of California's unique and beautiful flora. As one gets more involved with native plants, there is a desire to create a balanced, sustainable landscape reflecting the actual plant communities we treasure. Plants are more than objects with size, texture and color. They are interrelated and dynamic components in an ever-changing, succeeding landscape. Perhaps one of the most important landscape motifs is the open expanse. More often than not this expanse is the lawn, not exactly the plant community we have in mind to fulfill this important function in our home native landscapes. The logical evolution (or passionate rebellion) of the native plant gardener is the creation of the native meadow. The native meadow is more than a replacement for the lawn, it is the plant community that reflects California's natural openspace.

There are two grassland plant communities the gardener can use as a model to create a successful native meadow or grassland. These are the coastal prairie and the foothill grassland. For the gardener in the coastal valleys and mountains and the temperate Sierran mid-elevation mountain settings, the coastal prairie and foothill grasslands provide excellent blueprints for a successful native meadow landscape, whether it can be maintained green throughout the year or is dormant for a period in the summer and early fall. The native meadow brings with it a rich palette of perennial wildflowers. There is an overlap and inherent flexibility of these grassland communities and gardeners can achieve elements of both in coastal and inland environments.

For those of us who live in the hot central valley and desert regions of the state, the coastal prairie and foothill grassland models have limited application, especially in the face of the ubiquitous and pervasive warm season Bermuda grass (*Cynodon dactylon*). Any attempt to regreen a cool season meadow in the summer will encourage the spread of Bermuda grass. There are two basic alternatives: either design a purple needlegrass dominated meadow which is allowed to go dormant in the summer, or design a warm season, summer irrigated, meadow working primarily with blue grama (*Bouteloua gracilis*). Other native and not-so-native grasses that do well framing a blue grama meadow include deer grass (*Muhlenbergia rigens*), alkali sacaton (*Sporobolus airoides*), side-oats grama (*B. curtipendula*), little bluestem (*Andropogon scoparius*), and buffalograss (*Buchloe dactyloides*). While combining warm and cool season grass seems like a win-win combination in the mind's eye of a landscape architect, the reality is dismal. Cool season grasses out compete the warm season grasses in the cold wet winter and early spring and the warm season grasses smother the summer dormant cool season grasses in the late spring and summer.

The Coastal Prairie

The California coastal prairie is a mesic grassland; a mosaic of cool-season, native perennial grasses mixed with a rich assemblage of native perennial flowering plants. The signature bunchgrass of the coastal prairie is California oatgrass (*Danthonia californica*). California oatgrass is found from the windswept coastal prairies of San Luis Obispo County to the coastal terraces, valleys, and bald hills of California's north coast. A less husky form of oatgrass is also common in the mid-elevation wet meadows of the Sierra Nevada. Other meadow candidates associated with the coastal prairie are red fescue (*Festuca rubra*), thingrass (*Agrostis diegoensis*), tufted hairgrass (*Deschampsia holciformis*), and Pacific dune sedge (*Carex pansa*). The coastal prairie intergrades with the foothill grassland in central California where purple needlegrass (*Nassella pulchra*), junegrass (*Koeleria macrantha*), and Idaho fescue (*F. idahoensis roemerii*) are associated closely with the coastal prairie from Monterey to Point Arena.



A blend of Coastal Prairie and Foothill Grassland at Point Molate in San Francisco Bay

The Foothill Grassland

The foothill grassland is a cool-season bunchgrass grassland adapted to California's Mediterranean climate. Purple needlegrass is the most common native bunchgrass in California's vast foothill rangeland. It is particularly adept at wresting moisture from the deep clay soils found throughout the foothill grassland. In some of the lighter sandy soils of the coast range from Solano County to San Diego County, nodding needlegrass (*N. cernua*) is the dominant bunchgrass. The native bunchgrasses from the foothill grassland generally experience different degrees of summer dormancy. Foothill bunchgrasses like California oniongrass (*Melica californica*), squirreltail (*Elymus multisetus*), and one-sided bluegrass (*Poa secunda secunda*) are beautiful in their own right but experience obligate summer dormancy and can not be revived by extra irrigation. For this reason these grasses are not good candidates for the home native meadow landscape. Still, there is a good selection of native grasses and sedges from the foothill grassland province that are excellent components for a native meadow landscape. These plants include the needlegrasses, Idaho fescue, junegrass, foothill sedge (*C. tumulicola*) and slender sedge (*C. prae-gracilis*).

Designing the Meadow

A native meadow can be established on almost any garden site that has a clay or loamy clay soil. There are several meadow types or motifs that can be derived from the coastal prairie and foothill grassland plant communities. These include the sedge-dominated stand, the oatgrass meadow, the tufted hairgrass meadow, the Idaho fescue meadow, the red fescue

meadow, the bentgrass meadow, and the needlegrass meadow. The sedge meadow makes a durable, evergreen, low-maintenance monoculture. The California oatgrass prairie meadow can be maintained as a low evergreen "turf" or allowed to develop into a hummocky grassland. A tufted hairgrass meadow is composed of large bunchgrasses adapted to wet soils and is best planted as a pure stand and irrigated periodically in the summer. Native perennial wildflowers are able to compete with tufted hairgrass if the bunches are spaced appropriately. The size of the tufted hairgrass bunches can be controlled by the choice of the ecotype and whether the stand is mowed periodically and at what height. As in nature, Idaho fescue is best presented as an attractive pure bunchgrass meadow feature. A little extra irrigation keeps Idaho fescue looking green longer. The spaces between the bunches allow room for some hardy native perennial wildflowers.

By combining the elements of both the coastal prairie and foothill grassland, the gardener can create pure stands with few flowers or an extremely diverse native meadow, showcasing the rich assemblage of native perennial flowering plants from these plant communities. Creating a meadow is a process. To guide this process, the gardener controls two important tools: irrigation and clipping height. When a meadow is planted to a mixed stand there is a competitive and complementary tension that balances itself out depending on the moisture regime and the level of mowing or clipping. Frequent watering tends to favor the spread of red fescue and thingrass, which in turn works against the establishment and spread of perennial flowering plants. Less irrigation moves the meadow more towards purple needlegrass, Idaho fescue, and junegrass allowing more opportunity for flowering perennials to become established in the spaces between the bunchgrasses. Close mowing tends to create a meadow with smaller bunches closer together and favors the creeping forms of perennial flowering plants and ultimately requires more irrigation. Higher mowing or clipping favors the perennial flowering plants and encourages a more natural looking bunchgrass display requiring less watering.

Preparing and Planting

Preparing the seedbed is probably the most important step in establishing a native meadow. Unlike a wildland restoration site, a home landscape is easier to prepare for planting. It is smaller, and the weed seed bank is usually known. Most important, the home gardener has time to prepare the site to assure reducing the weedy perennials and annual weed seed bank. Always make sure that the soil is not compacted and that it does not have an unnatural compacted layer or hardpan. Any hardpan layers should be broken up. Be sure to control exotic urban perennial rhizomatous grasses (Bermuda grass, Kikuyu grass, bentgrass, bluegrass, etc.) and noxious weeds like Bermuda buttercup (*Oxalis pes-caprae*), annual bluegrass (*Poa annua*), panic veldtgrass (*Ehrharta erecta*), etc. Always pre-irrigate the site once or twice to bring up weeds during the late summer and early fall. Rake the ground smooth, measure the area, and get ready to sow the seed.

Seeding in the late summer or early fall favors cool-season grasses. It is always best to have the site seeded and planted before Thanksgiving. Watch the weather to make sure an extended rainy period doesn't delay the seeding or time the seeding to coincide with rain. Seed by hand, methodically spreading the seed at the desired density. Bury the seed with a one quarter inch soil layer. Tiny seed should not be covered and can be allowed to work itself into the soil with the first irrigation. If the tiny seed is still visible, then a light cover of moistened peat can be used to cover it. The seed can often be gently raked into the soil to cover it with a thin layer. It may be easier and more precise to cover the seed with a light application of a turf

top-dressing or stockpiled soil carefully spread by shaking through a 1/8 inch screen. Roll the area with a lawn roller partially filled with water to ensure that the seed has firm contact with the soil. If seedling plugs are also being used for local meadow features, they should be planted prior to seeding. It is best not to sow seed where the plugs are being planted. Plug-planted areas of California oatgrass, Idaho fescue, or tufted hairgrass should definitely not be inter-seeded with red fescue or needlegrass. Water the seedbed with a fine spray by hand, making sure it is not soaked to the point of ponding or running off. Until germination it may be necessary to water every day or so. Seedlings should begin to appear after 10 to 14 days. Finally, control the broadleaf weeds and obvious annual grasses by hand weeding when they first emerge or are small.

Seeding Rates

To make sure the desired species are used and at the proper seeding rate, it is best not to purchase a premixed seed mix. This is most important when ordering the native Molate fescue ecotype, the coastal Californian Idaho fescue ecotype, and the proper ecotype of thingrass. It is important not to get a turf variety of red fescue or an exotic hard fescue or sheep fescue (*F. trachyphylla*, *F. ovina*) being substituted as an Idaho fescue. Purchase the individual species and plant them separately, even if they are being seeded together in the same area. Areas to be seeded separately for local meadow features like Idaho fescue or thingrass can be marked by using powdered chalk.

It is extremely important not to seed too heavily. A bunchgrass meadow requires space between the plants. Too dense a stand will defeat this effect and also make it difficult to interplant successfully with broadleaf perennial wildflowers in the future. Seeding rates for commercial "no mow" mixes of fineleaf fescues (*F. rubra* and *F. trachyphylla*) are greatly inflated (4 lbs./1,000 ft.²) to get a turf-like cover and drown out weedy competition. The desired number of single or combined species of seeds per square foot should be approximately 30 seeds total. This allows for seedling mortality, ensures that the plants are separated from each other, and minimizes the chances for competition between species. It also makes it easier to thin the stand later if necessary. Always determine the seeding rate by factoring in the seed purity and germ or pure live seed (PLS). The seeding rates can be easily determined by knowing the PLS and the number of seeds per pound of the species. As an example, there are approximately seven times as many seeds per pound of Molate fescue than purple needlegrass. To plant, say, an initial 50/50 mix of Molate fescue and purple needlegrass (approximately 15 seeds per square foot of each grass) 5 ounces of purple needlegrass and 0.7 ounce of Molate fescue need to be planted per 1,000 square feet of ground. For a pure stand of purple needlegrass, 10 ounces of seed per 1,000 square feet would be adequate. For Molate fescue, 1.5 ounces would cover 1,000 square feet.

Wildflowers

There is always a strong desire to seed a meadow with annual wildflowers "for color." Don't be tempted. Annual wildflowers are beautiful and provide that splash of color but they never last. In the process, the fast growing, ground hugging annual wildflowers mug the slow-to-establish seedlings of perennial grasses and the result is a dismal failure. Besides, profuse annual spring wildflowers are not often found in a dense or competitive perennial grassland or meadow plant community but perennial wildflowers abound. One short spring hike on San Bruno Mountain's flank attests to this fact. The wildflower show starts with milkmaids

(*Cardamine californica*), checker bloom (*Sidalcea malvoiflora*), blue dicks (*Dichelostemma capitatum*), rock cress (*Arabis blepharophylla*), golden violet (*Viola pedunculata*), footsteps-of-spring (*Sanicula*



Purple sanicle (*Sanicula bipinnatifida*) growing with red fescue, purple needlegrass and blue wildrye

arctopoides), purple sanicle (*S. bipinnatifida*), lomatium (*Lomatium* spp.), suncups (*Camissonia ovata*), buttercups (*Ranunculus californicus*), iris (*Iris douglasiana* and/or *longipetala*), and gradually transitions to yarrow (*Achillea millefolium*), mules ears (*Wyethia angustifolia*), goldenrod (*Solidago californica* and *S. spathulata*), gum plant (*Grindelia* spp.), golden aster (*Heterotheca sessiliflora*), onion (*Allium dichlamydeum*), seaside daisy (*Erigeron glaucus*), purple aster (*Aster chilensis*), pearly everlasting (*Anaphalis margaritacea*), cow clover (*Trifolium wormskioldii*), self-heal (*Prunella vulgaris*), crimson sage (*Salvia spathacea*), coyote mint (*Monardella villosa*), silver lupine (*Lupinus albifrons*), beach lupine (*L. chamissonis*), summer lupine (*L. formosus*), deerweed (*Lotus scoparius*), soaproot (*Chlorogalum pomeridianum*), blue-eye-grass (*Sisyrinchium bellum*), and the list goes on. The same genera exist in the dryer foothill grassland.

These beautiful flowering plants are not often found in the nursery or grown very successfully in native gardens. What these perennial wildflowers lack in a garden landscape is a context, a grassland – the meadow. The best analogy for establishing the perennial wildflowers is that of painting a canvas. Before an artist applies the paint to the canvas, the canvas must be sized to receive the paint. Seeding the grasses first is like sizing the canvas. It stabilizes the landscape so the color can be applied and stick. Give the meadow at least a year to establish and then start introducing the perennial flowers. The native meadow is a challenging canvas and an opportunity for the gardener to grow and display this rich flowering plant community.

Meadow Management

In planting and managing a native meadow, it must always be kept in mind that California is primarily a Mediterranean environment and all meadows have seasons of growth, flowering, and dormancy. Native meadow grasses co-evolved with grazing animals and fire. Meadows inevitably will need to be clipped back or “cleaned up” at least once a year, primarily in the late summer and early fall. If the meadow is a pure stand of one particular grass then a lawn mower can be used. If the grasses are allowed to mature and grow tall and flower then caution needs to be exercised in the timing and mowing height. A good rule of thumb for mowing or cutting height is above 2 inches and sometimes between 4 to 6 inches with the bunchgrasses. Large bunchgrasses that get cut too low will take longer to rebound. Before one applies the mower or clippers it is always a good idea to rake the stand with a stiff metal rake removing the dead thatch and debris. This often is all that is needed to begin the rejuvenation process. After clipping back a meadow in the summer or fall, a deep irrigation will green up the stand much quicker.



Native meadow with Molate fescue, purple needlegrass and junegrass in Woodside, California

Native Meadow Grasses

To establish and manage a meadow, it is important to understand the nature and requirements of the primary native meadow grasses and sedges. The native perennial meadow grasses are competitive, long-lived plants and respond positively to supplemental irrigation and periodic cutting or mowing.

California Oatgrass (*Danthonia californica*). California oatgrass was once the premier prairie bunchgrass of the central and north coastal prairie, home to herds of elk chased by grizzly bears and humans. It has largely succumbed to overgrazing by sheep, grazing exclusion, and exotic annual and perennial grass competition. The best stands thrive with moderate cattle grazing or periodic mowing. Oatgrass is the most common grass along treaded paths on the coastal terraces, which otherwise are smothered by exotic grasses, such as bentgrasses (*Agrostis* sp.), velvetgrass (*Holcus lanatus*), sweet vernal grass (*Anthoxanthum odoratum*), and annual grasses and weeds. Oatgrass is one of the only perennial bunchgrasses with long-lived seed, and a stand can be rapidly revived from a latent seed bank with mowing, weeding, and clearing. An oatgrass meadow works best as a pure stand but will readily fill in along paths and in compacted areas with other meadow grasses. Unmowed, oatgrass is a sprawling dense bunchgrass 10 to 12 inches in height and 14 to 16 inches across. Mowed or grazed plants can form tight turf-like stands no more than a few inches high. Establishing an oatgrass meadow requires patience. Seed over a year old germinates faster than fresh seed. *Danthonia* establishes very slowly but is a persistent grower. Its roots can eventually reach down to 3 or 4 feet. Because of its deep roots, oatgrass does not require frequent irrigation. It thrives in rich, loamy, and clay soils and is well adapted to the home garden setting, and stays green year-long if it is cut back and receives extra moisture. A good oatgrass “turf” can be established by planting plugs 8 to 10 inches apart. For seeding a single species meadow, sow at 1.5 ounce per 1,000 square feet.

Red Fescue (*Festuca rubra*). Red fescue is a creeping fine-leaf grass common in the turf trade. In the landscape trade red fescue is now becoming a staple grass of the occasionally mowed naturalistic meadows used around golf courses, home developments, and maintained freeway interchanges. The native coastal red fescue is different from the turf varieties. It is the most winter-active grower of all the world’s red fescue ecotypes and thrives in full sun. There are many compact bluish ecotypes from the north coastal terraces of Sonoma and Mendocino Counties available in nurseries from divisions (Patrick’s Point, Jana’s Choice, Jughandle, etc.). An ecotype from Point Molate near Point Richmond is the best known seed-grown native variety available and has a well-earned reputation as a hearty and adaptable meadow grass. A mature Molate stand can reach heights of 12 to 14 inches. Molate fescue is extremely variable with many diverse forms, a virtual gold mine for the grass breeder or discerning gardener. There are green and blue ecotypes and both fast creeping forms and erect bunchy forms that spread sparingly from the base. It is surprisingly drought tolerant and develops a waxy coat on its leaves giving it a distinctive blue-gray color in the late spring as the stand begins to dry out. Best of all, the seed is plentiful and easy to establish. For seeding a single species meadow, sow at 1.5 ounce per 1,000 square feet.

Thingrass (*Agrostis diegoensis*). Thingrass is a native creeping bentgrass that spreads from underground rhizomes. The name *A. diegoensis* is used here rather than *A. pallens* with apologies to the Jepson Manual, which has made it very difficult to discern this valued coastal

ecotype (awned lemma, creeping rhizomes). It is found in California's coastal grasslands from southern California to Sonoma County primarily on east and north facing slopes and in woodland meadows and shady glades. Plants normally grow to 10 to 12 inches in height. Thingrass is an excellent component of the native meadow landscape and is closely associated with red fescue and junegrass. As a single species, thingrass forms a lush natural meadow in the sun or filtered shade. A vigorous creeper of thingrass from the Berkeley Hills is currently being produced for seed. Thingrass seed has moderate seedling vigor and a good stand can be established without the use of plugs. For seeding a single species meadow, sow at 0.5 ounce per 1,000 square feet.

Tufted Hairgrass (*Deschampsia holciformis*). The California coastal form of tufted hairgrass is primarily associated with wet meadows and/or the rich prairie soils of the immediate coastal terraces from northern San Luis Obispo County to Mendocino County. It is a coarse, strict bunchgrass and grows primarily in pure stands. There are two or three varieties along the coast ranging from large erect forms, 18 to 20 inches in height, to sprawling decumbent forms, 8 to 12 inches high. The latter form has wider veined leaves and grows on the windswept first terrace of Jughandle State Reserve south of Fort Bragg. Because of its size and requirements, tufted hairgrass forms a cohesive "tufted hairgrass" meadow feature that tends to dominate other native perennial grasses and wildflowers. For this reason it is best planted as plugs between 8 to 16 inches apart. The farther apart they are planted the larger they get. For seeding a single-species meadow, sow at 0.5 ounce per 1,000 square feet.

Purple Needlegrass (*Nassella pulchra*). Purple needlegrass is a deep green, long-lived bunchgrass. It thrives on the sunny south facing slopes and plains of the foothill grassland. It is also tolerant of serpentine soils. Purple needlegrass grows from 18 to 24 inches in height and forms a deep root system 3 to 4 feet deep. It stays green into the early summer and gradually becomes dormant in mid to late summer. Cut or grazed plants are the first to put on fresh green growth in the fall whether it rains or not, tapping the moisture deep in the soil. Unlike oniongrass or pine bluegrass, purple needlegrass will stay green or regrow with extra summer irrigation. Purple needlegrass has good seedling vigor and can be seeded or planted by plugs. For a single species meadow, sow at 10 ounces per 1,000 square feet.

Idaho fescue (*F. idahoensis roemerii*). The coastal and valley form of Idaho fescue in California has recently been identified (a.k.a. Roemer's fescue) as a completely different form than the Idaho fescue of the Great Basin and prairies of eastern Oregon and Washington State. Idaho fescue is a dense, fine-leaved bunchgrass with blue and green forms. It normally grows from 18 to 24 inches in height. Idaho fescue thrives on serpentine soils and grows on loamy clay soils along the coast in San Mateo, Alameda, Marin, and Sonoma Counties. Extra moisture will keep it fresh, but eventually Idaho fescue needs a rest in the late summer and fall. Idaho fescue is found usually in pure stands on north or east facing slopes associated with thingrass, junegrass and a rich assortment of native perennial wildflowers. Idaho fescue has good seedling vigor and can be established by either seed or plugs. For seeding a single species meadow, sow at 2 ounces per 1,000 square feet.

Junegrass (*Koeleria macrantha*). Junegrass is a long-lived, perennial bunch-like grass that spreads with short underground rhizomes and has an erect ornamental flowering panicle. Junegrass is associated with woodland glades, grassland prairies, and rocky outcrops from sea

level to the highest mountains. Junegrass grows from 10 to 16 inches in height. It responds favorably to irrigation but eventually needs a late summer, early fall rest. Junegrass has tiny seeds and establishes slowly from seed. For a garden meadow, Junegrass is most practically established by plugs. For seeding a single species meadow, sow at 0.5 ounce per 1,000 square feet.



The rhizomatous Pacific Dune Sedge (*Carex pansa*) makes a durable evergreen meadow.

Pacific Dune Sedge (*Carex pansa*). The common name of this sedge aptly describes its habitat but not its unmatched meadow-forming characteristics. Pacific dune sedge is found in scattered locations in mesic back dunes of central California. It is a strong creeping sedge and forms a dense leafy cover 8 to 10 inches in height with no mowing. Dune sedge is well adapted to the garden setting. With adequate moisture it grows well in all kinds of soils, stays green year-long, thrives in sunny sites, and is heat tolerant. It germinates very slowly from seed but spreads quickly when planted as plugs 6 to 8 inches apart.

Slender Sedge (*C. praegracilis*). Slender sedge is very likely a taller, closely-related cousin to Pacific dune sedge. It inhabits mesic inland valley settings and grows up to 16 inches in height spreading at a slightly slower pace. Like the Pacific dune sedge, slender sedge is best established by plugs 6 to 8 inches apart.