

17. Clark Fork (Keeler-Wolf 1991b)



Figure 34—Clark Fork cRNA

Location

This candidate RNA is on the Stanislaus National Forest in Tuolumne County. The boundary includes all or portions of sects. 33 and 34, T7N, R20E, and sects. 3, 4, 5, 8, 9, 10, 15, 16, and 17 T6N, R20E MDBM (38°23'N., 119°48'W.), USGS Dardanelle and Dardanelle Cone quads (fig. 34). Ecological subsection – Upper Batholith and Volcanic Flows (M261Eh).

Target Element

White Fir (*Abies concolor*)

Distinctive Features

White Fir Forest: The entire range of white fir dominance is present. Stands of white fir include dense, young, even-aged groves dating back to fires approximately 90 years ago, mature mesic and rocky N. slope stands, and highly productive mature bottomland stands on alluvium.

Red Fir Forest: The area also contains good examples of red fir (*Abies magnifica*) forest ranging throughout its entire local elevational distribution. Patches of mountain hemlock (*Tsuga mertensiana*), lodgepole pine (*Pinus contorta* ssp. *murrayana*), and whitebark pine (*P. albicaulis*) occur in the subalpine zone along with large areas of subalpine dry meadow scree and talus communities.

Hydric Associations: These associations are well represented in the area, ranging from wet to dry subalpine and montane meadows and including mountain alder (*Alnus tenuifolia*) riparian thickets and patches of black cottonwood (*Populus trichocarpa*) and aspen (*P. tremuloides*) along the lower elevation creeks.

Ecological Diversity: Ecological diversity and integrity are high within the cRNA. Its value, beyond being a white fir study area, is substantial and is associated with its extension to the crests of the mountains within an area of low human impact.

Rare Flora: *Cryptantha crymophila*, a member of the CNPS List 4 (Skinner and Pavlik 1994), occurs on volcanic soils of the upper elevations in scree and open rocky meadows. This taxon is endemic to the mountains of Tuolumne and Alpine counties.

Physical Characteristics

The Clark Fork ecological survey area covers 2160 acres (874 ha); only 460 acres (186 ha) are proposed as a cRNA in the Forest Plan. The survey area occupies a portion of the N. slopes of the Bald Peak-Red Peak divide, separating the Clark Fork Drainage on the N. from the upper Middle Fork of the Stanislaus River Drainage to the S. All drainages in the cRNA empty into the W.-flowing Clark Fork. Overall topographic relief is substantial, ranging from about 6000 ft (1829 m) along the Clark Fork to 9836 ft (2998 m) atop the highest peak, a range of 3836 ft (1169.2 m).

The majority of the cRNA is underlain by Mesozoic granitics of the Sierra Nevada Batholith. Above 8500 ft (2591 m), the volcanic rocks of the Stanislaus formation dominate, forming a cap over the granitics. At Bald Peak the thickness

of this formation is more than 1000 ft (305 m). There is little metamorphism or transition between the two principal rock types. Both types may exhibit steep topography, but the volcanics are frequently more spectacular, with glacially carved cirque headwalls and strangely eroded badlands.

The cRNA probably receives an average annual precipitation between 50 and 60 inches (1270-1524 mm). The mean annual temperature at 6600 ft (2012 m) is approximately 44-46 °F (6.7-7.8 °C). Snow loads on steep slopes at the upper elevations commonly reach critical mass, and most ravines and drainage ways show evidence of recent avalanche scouring.

Association Types

Ten 10- x 10-m plots were sampled along a transect at 75-m intervals in four of the five major phases in the Sierran white fir forest.

Sierran White Fir Forest (84240): 603 acres (244 ha).

Alluvial Phase: This phase is located along the valley floor of the Clark Fork. It is characterized by a productive forest strongly dominated by white fir, but with scattered old Jeffrey pine (*Pinus jeffreyi*). The density of fallen trunks and snags of large Jeffrey pine here suggest that this forest was codominated by Jeffrey pine and white fir about 200 years ago. The relative increase of white fir over the last century may relate to low fire frequency, increasing warmth, and high precipitation 50-100 years ago. Site conditions include relatively deep alluvial soil with widely scattered boulders, level-to-gently-sloping terrain, and mesic soil moisture conditions. The alluvial stands have the highest basal area cover of any forest type in the survey area and the highest density of trees, saplings, and seedlings of any of the sampled forest types.

Transitional Phase: A transitional zone between the alluvial stands and the upper slope successional stands is dominated by 65- to 80-year-old white fir within a matrix of montane chaparral. Soils are rocky with scattered boulders on mostly NW. exposures. Moisture conditions are more xeric and slopes steeper than in the alluvial type. The history of this transitional forest is different than that of the previous type, largely due to a fire that affected the area about 90 years ago. Monospecific stands of young white fir are in areas where the fire crowned extensively. Much of this forest also shows clear evidence of a seral stage of montane chaparral before the dominance of white fir. The steep, NW.-facing slopes still have a high percentage of *Quercus vaccinifolia*, *Arctostaphylos nevadensis*, and *Chrysolepis sempervirens* shrubs surviving in the understory (fig. 35), while the gently sloping areas have only skeletal remnants of the chaparral understory. Some of the largest, and probably oldest, trees in the white fir zone occur in this transitional forest, although they are widely scattered. These include white fir up to 72 inches (1.82 m) dbh, sugar pine (*Pinus lambertiana*) up to 60 inches (1.52 m) dbh, Jeffrey pine up to 50 inches (1.27 m) dbh, and incense-cedar (*Libocedrus decurrens*) up to 84 inches (2.13 m) dbh. Many of these larger trees show evidence of repeated ground fire, in contrast to the alluvial site, which has few fire-scarred trees. Understory species are sparse with very little cover, probably a result of the xeric, relatively shady understory with few openings and thick duff.

North Slope Phase: The steep N. aspect and rocky granitic soil of this phase tend to slow the growth of the dominant white fir. Sugar pine and Jeffrey pine are occasional members of the canopy, but they are less constant than in the transitional phase. Rare individuals of western white pine (*Pinus monticola*) and red fir occur, increasing in abundance above about 7000 ft (2156 m). Exposure and substrate probably account for the lower density and cover of trees here, while a high diversity of understory species relates to mesic understory conditions and light afforded by small rocky openings. The most common

shrubs and herbs here include *Quercus vaccinifolia*, *Symphoricarpos acutus*, *Acer glabrum* var. *torreyi*, *Hieracium albiflorum*, *Ribes roezlii*, *Erigeron breweri*, *Osmorhiza chilensis*, *Gilia leptalea*, *Phacelia racemosa*, *Thalictrum fendleri*, *Kelloggi agalioides*, and *Deschampsia elongata*.

Mixed Conifer Phase: This upper-elevation mixed conifer forest is typically dominated by Jeffrey pine on W.-facing exposures while white fir dominates on the NW.-facing slopes. Sugar pine and incense-cedar are most important in the canopy at lower elevations (< 6600 ft, 2012 m). Slopes average between 20 percent and 45 percent, and the soil is largely rocky and 20-30 inches deep. On the lower slopes in the most highly mixed stands, dominant sugar pine and Jeffrey pine are regularly more than 180 ft (55 m), with the tallest reaching 200 ft (61 m). The understory cover is relatively high, with scattered clumps of montane chaparral species dominating. Shrub and herb diversity is moderately low. Understory species most commonly include *Quercus vaccinifolia*, *Arctostaphylos nevadensis*, *Chrysolepis sempervirens*, *Ribes roezlii*, *Chaenactis douglasii*, *Stipa columbiana*, *Ceanothus cordulatus*, *Symphoricarpos acutus*, and *Apocynum pumilum*.

Successional Phase: This phase is dominated by young poles of white fir emerging through a varying cover of mixed montane chaparral. It is the result of extensive crown fire on much of the W.- and NW.-facing slopes between 6400 and 8000 ft (1950-2438 m). Few older trees survived this fire, which occurred approximately 90 years ago. Densities are variable, with high density clumps separated by rocky open areas dominated by *Arctostaphylos nevadensis* and *Quercus vaccinifolia*. Semi-shaded understories are dominated by *Chrysolepis sempervirens*. Herbs are sparse and include such species as *Penstemon laetus*, *Allium campanulatum*, *Arabis platysperma*, *A. holboellii* var. *retrofracta*, *Gayophytum* sp., *Eriogonum nudum*, and *Monardella odoratissima* ssp. *pallida*. The effects of the past crown fire reach up into the red fir forests above 8000 ft (2438 m) on some W.-facing slopes.

Red Fir Forest (85310): 585 acres (237 ha). The red fir forest is well developed on both volcanic and granitic substrates from elevations as low as about 7000 ft (2134 m) on sheltered NE.-facing slopes to about 8800 ft (2682 m) on W.-facing ridges. White fir is a significant component of the lower-elevation red fir stands but quickly drops out within a few hundred vertical feet of the point where red fir canopy dominance begins. Western white pine is a constant low-density tree at low and mid-elevations, but it assumes greater importance at the upper elevations where small, nearly pure groves occur on both granitic and volcanic substrates between 8400 and 8800 ft (2560-2682 m). Both Jeffrey pine and Sierra juniper (*Juniperus occidentalis* ssp. *australis*) are of low importance in the red fir forest and are associated with rocky, xeric sites. Mountain hemlocks are present in small quantities, usually as small understory trees on high-elevation N. slopes. In general, red fir forests on granitic soils tend to be more open, with a higher representation of understory species than those on volcanics. Understory components of the granitic stands include *Arctostaphylos nevadensis*, *Quercus vaccinifolia*, and *Chrysolepis sempervirens*. *Acer glabrum* var. *torreyi* is common on steep, rocky N.-facing slopes. Herbs include *Chrysopsis breweri*, *Erigeron breweri*, *Haplopappus whitneyi*, *Stipa occidentalis*, *Poa nervosa*, *Stephanomeria lactucina*, *Senecio integerrimus*, *Juncus parryi*, and *Ivesia lycopodioides*.

Rock Outcrop Communities (91200): 231 acres (94 ha). Much of the upper elevation terrain of the study area is very steep and composed of colluvial deposits or bedrock outcrops of granitic or volcanic rock. The flora of these cliff and talus areas is of relatively low diversity and includes *Sedum obtusatum* ssp. *boreale*, *Cheilanthes gracillima*, *Eriogonum umbellatum* ssp. *stellatum*, *Ipomopsis aggregata*, *Agastache urticifolia*, *Leptodactylon pungens*, *Arenaria kingii*, and *Eriogonum marifolium*. Species such as *Astragalus lentiginosus* var. *ineptus*,

Polemonium pulcherrimum, *Eupatorium occidentale*, *Juncus parryi*, *Pellaea breweri*, *Melica stricta*, and *Erigeron compositus* appear to be strongly associated with volcanic outcrops.

Montane Chaparral (37510): 209 acres (85 ha). The montane chaparral may be either successional or edaphic climax. The successional types include those associated with white or red fir forests whose canopies were destroyed in the most recent extensive fires, about 90 years ago, and those associated with avalanche chutes. Edaphic climax chaparral occurs adjacent to granitic outcrops in small areas throughout the middle and lower elevations. Regardless of successional history, most montane chaparral in the area is similar in composition. *Quercus vaccinifolia* is the overall dominant, typically forming dense stands 3-5 ft (0.9-1.5 m) in height. Associated with this species are other shrubs such as *Ceanothus cordulatus*, *C. velutinus*, *Chrysolepis sempervirens*, and *Arctostaphylos nevadensis*. Other subordinate species include *Holodiscus boursieri*, *Prunus emarginata*, and *Ribes montigenum*. Herbaceous species are generally scarce.

Montane Riparian Scrub (63500): 206 acres (83 ha). Mountain alder and several species of willow (*Salix* spp.) form dense thickets associated with seeps, rivulets, and streams throughout the study area. Alder-dominated thickets are the most widespread; they are largely restricted to the granitic slopes of the lower and middle elevations. These alder runs typically line plunging ravines and narrow canyons that are frequently scoured by avalanches. Other shrubs associated with the mountain alder thickets include *Ribes nevadense*, *Cornus stolonifera*, and occasional *Salix ligulifolia*, *S. lutea*, and *S. scouleriana*. Beneath the canopy of 3- to 4-m tall shrubs is a lush layer of herbs and grasses. Mountain alder thickets are occasional at lower elevations on slopes not subjected to avalanches. Here they line low-gradient streams and seepy areas where they occasionally are joined by aspen and black cottonwood. At upper elevations, 8400-9000 ft (2560-2743 m), mountain alder is replaced by *Salix orestera*.

Dry Subalpine-Meadow (45220/91120): 135 acres (55 m). W.- and SW.-facing, moderately steep slopes on volcanic soil are dominated by a low-density herbaceous and subshrub cover. Herb density and diversity are greater than on adjacent granitic terrain or volcanic cliff and talus slopes, but because volcanics are at higher elevations than the granitics, it is difficult to separate the effects of climate and substrate on the vegetation. The subalpine steppe vegetation consists of the following herbs and subshrubs: *Anemone drummondii*, *Artemisia arbuscula*, *A. douglasiana*, *A. rothrockii*, *Castilleja breweri*, *Crepis acuminata*, *Cryptantha crymophila*, *Dicentra uniflora*, *Erigeron barbellatus*, *E. compositus*, *Erigonum ovalifolium* var. *nivale*, *E. umbellatum*, *E. wrightii* var. *subscaposum*, *Eriophyllum lanatum* var. *monoense*, *Geum canescens*, *Haplopappus acaulis*, *H. bloomeri*, *H. macronema*, *H. suffruticosus*, *Linum lewisii*, *Lomatium nevadense*, *Monardella odoratissima* ssp. *pallida*, *Orthocarpus copelandii*, *Penstemon bridgesii*, *Phacelia frigida*, *Phlox caespitosa* ssp. *ulvinata*, *Poa epilis*, *Ribes cereum*, *Senecio canus*, *Sitanion hystrix*, *Stipa occidentalis*, *Symphoricarpos vaccinoides*, *Thelypodium flexuosum*, and *Wyethia mollis*. Occasional trees of Sierra juniper (*Juniperus*

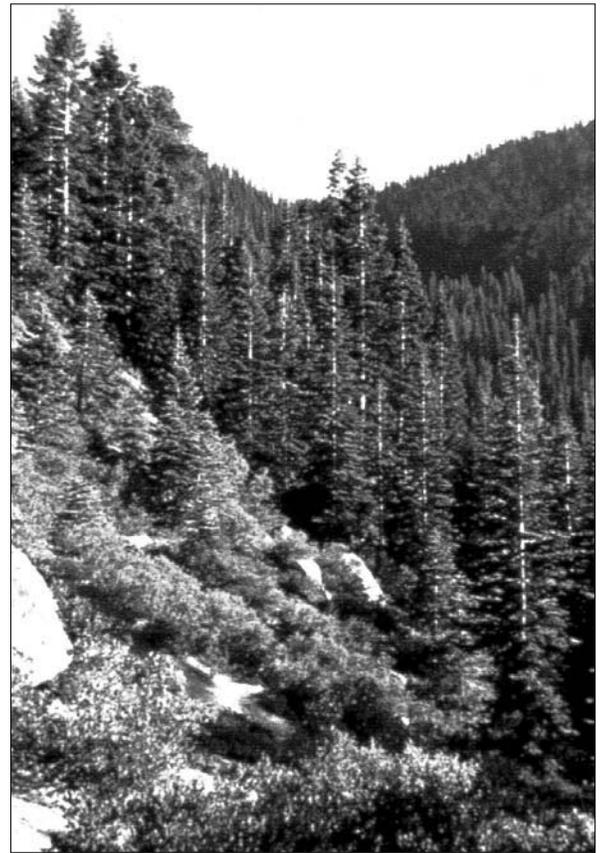


Figure 35—Clark Fork, successional white fir phase on WNW-facing slope ca. 6900 ft (2103 m), NE 1/4 sec. 8. Note rocky patch of *Quercus vaccinifolia*-dominated montane chaparral surrounded by even-aged 80-year-old white fir. (1989)

occidentalis var. *australis*), western white pine, whitebark pine, mountain hemlock, red fir, and lodgepole pine also occur; most are stunted as a result of the highly exposed locations and shallow soils.

Wet Subalpine-Alpine Meadows (45210): 6 acres (2.4 ha). The only sizable areas of nonshrubby vegetation with permanently wet to moist soil occur on volcanic substrates at high elevations. Several well-developed meadows occur in the subalpine zone. Each is dominated by a different set of species largely depending upon moisture availability. The most extensive wet meadows occur along the drainage immediately to the N. of Bald Peak. Dominant species include *Allium vallidum*, *Delphinium glauca*, *Calamagrostis canadensis*, *Carex jonesii*, *C. nebrascensis*, *Cardamine breweri*, and *Veratrum californicum*. Other meadows on SW.-facing slopes contain such species as *Aster foliaceus* var. *parryi*, *Dodecatheon alpinum*, *Mimulus primuloides* var. *pilosellus*, *Helenium hoopesii*, *Gentiana calycosa*, *Arnica mollis*, *Veratrum californicum*, *Carex abrupta*, *C. gymnoclada*, *C. illota*, *Phleum alpinum*, *Sphenosciadium capitellatum*, and *Epilobium hornemannii*.

Plant Diversity

Two hundred twenty-seven taxa of vascular plants are listed.

Conflicting Impacts

Despite proximity to the Clark Fork campground and horse camp, little recreational use is made of the cRNA. Cattle grazing has occurred in the past, and there are indications of previous overgrazing. There is no significant impact from any logging operation.