Appendix F. Vegetation and Substrate Classification and Descriptions

CLASSIFICATION METHODS

Introduction

Vegetation in the study area is diverse because of the wide geographic and elevational ranges encompassed and the variety of geologic and hydrologic conditions in the area. A habitat classification system was developed for identifying and mapping vegetation types that are the basic units of analysis and comparison in this EIR. The classification and maps were used to document past changes and predict future changes in type, structure, quality, function, and value of vegetation in the study area.

For this evaluation, vegetation in the study area is classified into a three-level hierarchy as described by Paysen et al. (1980). The highest level of the hierarchy, "formation", is determined by the dominant growth form of the dominant species (i.e., tree, shrub, or herb). The next level, "subformation", is based on vegetation structure and site hydrology (e.g., upland or riparian, wet or dry). Subformations include one or more "series", each defined by its dominant species.

The classification methods described below are applicable to 1940 and 1989 vegetation, although vegetation conditions and extent changed significantly during this period.

Geographic place names used in this text, including named lake-fringing wetlands, are described in Chapter 3C, "Vegetation". The scientific names of plant species cited below and in Chapter 3C are provided in Table F-1.

Classification Methods for Tributary Streams

Woody vegetation is the focus of the riparian impact assessment and thus is classified in greater detail than herbaceous vegetation along the streams. The classification is based on qualitative observations upstream and downstream of the diversion sites on the four tributary streams in 1990-1991 and a review of available literature (Taylor 1982, Jones & Stokes Associates 1993).

Existing vegetation was initially mapped from 1990 and 1987 aerial photographs onto detailed topographic maps (scale 1:1,200; contour interval 2 feet; from May 1991 aerial photographs). The draft maps were checked and corrected in the field during summer 1991, after which final maps were produced and planimetered. Prediversion vegetation was similarly mapped from 1929 and 1940 aerial photographs, but historical vegetation could not be field-checked directly. Remnants of prediversion vegetation were sometimes indicative of prediversion conditions.

Vegetation was mapped as polygons of uniform composition and condition. Composition was defined in terms of dominant woody species; condition was characterized in terms of canopy cover, canopy layering, overall vigor, and response to rewatering. Minimum polygon sizes were influenced by patch isolation and density. Isolated patches of dense vegetation were mapped in polygons as small as about 0.1 acre. Contiguous polygons of sparse vegetation were at least 0.3 acre in size. Methods used to characterize riparian vegetation condition are described further in the "Methods" section of Chapter 3C, "Vegetation".

Classification Methods for Lake-Fringing Wetlands

Lake-fringing wetlands were classified based on previous studies (e.g., Dummer and Colwell 1985, Hargis 1986) and field studies conducted for this evaluation. Reconnaissance surveys provided information on vegetation types and dominant species needed to develop a preliminary classification.

After a classification scheme was devised, the vegetation of the relicted lakebed below the 1940 highstand was mapped. Mapping was conducted in the field using 1:6,000-scale color aerial photographs taken on May 6, 1991. Over 95% of all mapped wetland vegetation polygons were verified in the field. Nonwetland series were mapped using a combination of field survey and aerial photograph interpretation.

Classification of lake-fringing wetlands at the subformation level in the herbaceous formation is critically important because each subformation reflects underlying hydrogeologic differences. Subformations are distinguished primarily based on the structure of the dominant species (e.g., emergent aquatic, terrestrial herbaceous perennial, or annual), a breakdown that reflects underlying differences in presence of surface water and the timing and duration of saturation of upper soil layers.

DESCRIPTIONS

Vegetation of tributary streams, the Mono Lake shoreline, and the Upper Owens River was classified into three formations, nine subformations, and 31 series. The classification is presented in Table

F-2, with dominant species listed by series. Several upland series found adjacent to or interspersed with riparian and wetland habitats are included in the classification.

Forest and Woodland Formation

The forest formation is dominated by trees (woody plants with one or a few main stems) that provide at least 10% areal cover. The canopy varies from dense with interlocking or overlapping trees (i.e., a forest), to sparse with mostly separate trees (i.e., a woodland). Forest and woodland vegetation in the study area is divided into riparian and upland subformations.

Riparian Forest and Woodland Subformation

This subformation includes three series that occur on the banks and floodplains of streams.

Conifer-Broadleaf Series. This series is codominated by various combinations of pine, cottonwood, and aspen. Jeffrey pine and black cottonwood are most abundant on alluvial substrate. Lodgepole pine and aspen are most abundant on glacial till substrate. Willows are common in this series but may be restricted to streambanks in areas of dense conifer cover. Streambanks and floodplains support moderate to dense herbaceous vegetation, except where the topsoil has been eroded or where the shade is too heavy.

Cottonwood-WillowSeries. This series is dominated by black cottonwoods in the tree layer and coyote and arroyo willows in the shrub layer. Mountain rose may be codominant with willows in the shrub layer. Pines are usually absent, but a few scattered individuals may be present. Streambanks and floodplains support moderate to dense herbaceous vegetation, except where the topsoil has been eroded.

Aspen Series. This series is dominated by aspen. Aspens are usually tall trees, but some stands are short and shrubby. Willows, cottonwoods, and conifers are usually sparse or absent, except where aspen joins other vegetation types. Aspen is typically clonal, with many stems united by a common root system. Large stands may include several clones, while small stands may consist of a single clone. Aspens stands may be strictly riparian (along a stream) or occur at hillside seeps well above a stream or floodplain.

Upland Forest and Woodland Subformation

This subformation includes the following two series that occur in uplands outside the riparian zones.

Jeffrey Pine Series. This nonriparian community is dominated by Jeffrey pine, with a sparse understory of upland shrubs (usually sagebrush, bitterbrush, or rabbitbrush) and grasses (usually cheat grass, Indian rice grass, or squirreltail grass). This is the most common upland forest adjacent to riparian vegetation on the tributary streams.

Pinyon Pine Series. This nonriparian community is dominated by single-leaf pinyon trees and sagebrush and bitterbrush shrubs. This series is most common on dry canyon slopes high above the riparian zone but grows near the riparian zones in Lee Vining Canyon between Highway 120 and U.S. 395.

Scrub Formation

This formation is dominated by shrubs (woody plants with several main stems) that provide at least 10% cover. Trees may be present but generally provide less than 10% cover. Scrub vegetation in the study area is divided into a riparian and wetland subformation and upland subformations.

Riparian and Wetland Scrub Subformation

This subformation includes three series associated with tributary streams and the relicted lakebed of Mono Lake. Vegetation in this subformation depends on surface water or shallow groundwater and is considered wetland by the U.S. Fish and Wildlife Service (USFWS) (Cowardin et al. 1979).

Willow Scrub Series. This series is dominated by dense thickets of shrubby willows. One or more willow species contribute at least 50% of the canopy cover. Along tributary streams and the Upper Owens River, the distribution of willow species is controlled primarily by soil moisture. Coyote willow is the most drought-tolerant species and is commonly the only willow on irrigated pastures, hillside seeps, or floodplains away from the active low-flow channels. Arroyo willow and yellow willow are occasional to locally common on banks and bars along active stream channels. Geyer willow is locally abundant along sinuous, low-gradient stream reaches beside wet, sedge-series meadows. Mountain rose is typically interspersed among the willows but has less low cover than the willows. Cottonwood and aspen trees are absent, but scattered individuals or small clusters are occasionally present.

Willow scrub along the Mono Lake shoreline is dominated by mixed or pure stands of coyote, arroyo, and red willow interspersed with occasional mountain rose. It develops at springs and seep discharge points that are reliable sources of fresh water and where the soil has been most heavily leached.

Mixed Riparian Scrub Series. Mixed riparian scrub is a composite of two plant communities having similar hydrologic affinities. The rose community is dominated by dense thickets of mountain rose.

The buffalo berry community is dominated by stands of buffalo berry. Mountain rose usually occurs in the buffalo berry community. Willows, rabbitbrush, or sagebrush are often present in both communities but provide less than half of the woody cover. Cottonwoods, aspens, and conifers are rare or absent.

Great Basin Scrub Subformation

This subformation includes five upland scrub series. These series are the most prevalent vegetation types in lower portions of the study area and dominate all nonriparian and nonwetland areas along the streams and around Mono Lake.

Sagebrush Scrub Series. This series is dominated by basin sagebrush occasionally interspersed with some bitterbrush and desert peach. The herbaceous layer contains wild buckwheat, Indian rice grass, squirreltail grass, and many other native herbs.

Bitterbrush Scrub Series. This series is dominated by bitterbrush heavily interspersed with basin sagebrush.

Rabbitbrush Scrub Series. The rabbitbrush scrub series is locally common at some meadow margins and below the historical high lake level of 6,428 feet. Rabbitbrush is represented in the study area by two species: *Chrysothamnus nauseosus* subsp. *albicaulis* frequents meadow margins, while subsp. *consimilis* dominates the relicted lakebed. On the lakebed, this series supports drought- and salinity-tolerant herbs, such as salt grass, Douglas sedge, and Baltic rush, in the herbaceous layer.

Greasewood Scrub Series. This series is an open-canopied scrub dominated by greasewood, occasionally interspersed with some rabbitbrush. It develops on saline-alkali soil of the relicted lakebed and often contains salt grass, Baltic rush, or Nevada bulrush as understory herbaceous species.

Hopsage Scrub Series. This series is dominated by hopsage interspersed with rabbitbrush and greasewood. It occurs only on Paoha Island above the 6,428-foot elevation contour.

Herbaceous Formation

This formation includes vegetation dominated by grasses, sedges, rushes, bulrushes, and forbs (broad-leaved herbs), with at least 10% total cover. Trees and shrubs may occur at locally dry sites and meadow margins but generally provide less than 10% cover.

The herbaceous formation in the study area includes five subformations and 18 series (Table F-2) distinguished by hydrology and vegetative structure. Marshes include vegetation that is emergent from ponded water. Wet meadows and alkali meadows are periodically flooded and have soil saturated at or

near the surface for extended periods during the summer growing season. Dry meadows are dominated by phreatophytes that tap shallow groundwater at depths that appear to be too great to sustain wet meadows or alkali meadows. Wet and dry meadows commonly intergrade along the tributary streams and in extensively irrigated areas such as Cain Ranch. The forb subformation includes both wetland and nonwetland vegetation dominated by broad-leaved forbs.

Marsh Subformation

Marshes are dominated by aquatic vegetation that grows emergent from water for most or all of the growing season. Some marshes along the Mono Lake shoreline were flooded in midsummer 1991 but were dry by early fall. Seasonal drying may be natural or related to the ongoing 6-year drought. Groeneveld (1991) documented depressed groundwater levels in piezometers installed in the lake-fringing wetlands. Stine (pers. comm.) reports lower spring activity associated with the drought at some locations. Marshes in the project area are classified into four series: tule, cattail, threesquare, and mixed.

Tule and Cattail Marsh Series. Tule marshes consist of pure or nearly pure swards of common tule. Cattail marshes are dominated by mixed or pure stands of narrow- and broad-leaved cattail. Both series occur in lake-fringing wetlands in relatively small patches at spring discharge points or in basins and shallow lagoons formed behind beach berms.

Threesquare Marsh Series. Threesquare marshes are dominated by pure stands of threesquare occasionally interspersed with Cooper's rush or common spike-rush.

Mixed Marsh Series. Mixed marshes are dominated by several species, including threesquare, Cooper's rush, common and Parish's spike-rush, common monkeyflower, and a variety of sedges (e.g., lesser-panicled sedge, Nebraska sedge, and beaked sedge). Mixed marshes often consist of subunits, each dominated by one or a few of the above species. Subunits were not separately recognized because they form an interwoven mosaic, and individual units lacked obvious hydrologic or edaphic differences.

Riparian Meadow and Pasture Subformation

Meadows in this subformation occur in the floodplains of streams, at hillside seeps or springs, and in irrigated areas. The vegetation is generally a dense turf dominated by perennial sedges, rushes, and grasses, intermixed with lesser amounts of forb cover. Species dominance varies along moisture gradients, and several vegetation series are commonly intermixed in a complex mosaic. Pastures that have been irrigated for many decades contain essentially the same vegetation series that occur in natural meadows.

Sedge Meadow Series. This series is dominated by beaked sedge, wooly sedge, clustered field sedge, or Nebraska sedge. These meadows are often saturated to the surface or shallowly flooded for extended periods. Scattered willows may occur in these meadows.

Rush Meadow Series. Meadows closer to the middle of the moisture gradient are dominated by Baltic rush, Nevada rush, Kentucky bluegrass, clustered field sedge, or Nebraska sedge. Scattered coyote willow or other willows may occur in these meadows. Other locally common species may include Missouri iris, Nevada bluegrass, dandelion, curly dock, sorrel, and other forbs.

Douglas Sedge Meadow Series. The driest meadows are often dominated by drought-tolerant Douglas sedge. This series occurs at the margins of natural meadows, in pastures where irrigation has ceased, and where channel incision or gully erosion has caused water tables to drop.

Mixed Riparian Meadow and Pasture Series. This series is a cumulative category for meadows that includes two or more of the above series in a small area and vegetation transitional between these and other herbaceous series.

Wet Meadow Subformation

Meadows in this subformation occur along the western shore of Mono Lake. Soil of wet meadows is flooded by runoff during early summer and saturated to the surface by groundwater or flowing spring water for a significant portion of the growing season. These meadows are similar to the riparian meadows and pastures described above, but dominant species vary along salinity gradients and moisture gradients. Some wet meadows in the study area contain scattered willows.

Mixed Wet Meadow Series. Wet meadows support a diverse mixture of species characteristic of mid-elevation eastern Sierra meadows. Mixed wet meadows along the west shore of Mono Lake are dominated by beaked sedge, wooly sedge, clustered field sedge, and Nebraska sedge interspersed with a variety of grasses and forbs. Typical species include Nevada rush, Missouri iris, Kentucky bluegrass, alkali-marsh butterweed, basin goldenrod, small-flower Indian-paintbrush, rabbit's-foot grass, Nevada bluegrass, forget-me-not, willow-herb, helleborine, foxtail barley, Nuttall's alkali grass, and cut-leaf water parsnip.

Dry Meadow Subformation

Meadows in this subformation occur around the shores of Mono Lake. Dry meadows support herbaceous vegetation dominated by sparse to dense stands of grass, sedge, rush, and bulrush species. Dry meadows are never saturated at the soil surface for extended periods (i.e., for periods of 1 or more consecutive weeks) during the growing season but may temporarily flood or have soil saturated at or near the surface for short durations after heavy rainfall or briefly during peak snowmelt runoff.

Dry meadows are dominated by phreatophytes that draw on shallow groundwater too deep to sustain the types of wet meadow vegetation in the region. They develop on well-drained sand and gravel substrate. Groundwater supporting this vegetation may be from a zone of soil saturation (i.e., where free

water occupies all soil pore space), from the zone of capillary rise above the water table, or from soil moisture trapped from infiltrated rainfall and runoff. Groundwater may be available on a seasonal or year-round basis. Clayey lacustrine deposits observed 5-10 feet below dry meadows could serve as barriers to downward infiltration by trapping and storing seasonal rainfall on which the deep-rooted dry meadow species can draw. Dry meadows at these sites lacked any other apparent water source. Dry meadows can apparently withstand seasonal soil moisture deficits because the dominant species have adaptations for drought tolerance (i.e., small leaves, leathery epidermis, and deep roots).

Dry meadows have apparently replaced some wet meadows along the Mono Lake shoreline as springs and seeps have dried. Elsewhere on the relicted lakebed, they cover extensive areas around the dry edges of marshes and wet meadows. They also dominate areas between the major lake-fringing wetlands below the 6,390-foot-elevation contour and form a near-continuous band of sparse vegetation around the lakebed above the 6,390- to 6,400-foot elevation. In the latter instance, dry meadows often have a spotty to moderately dense rabbitbrush or greasewood overstory.

The dry meadow subformation includes four series associated with sites having different depths to groundwater or variations in frequency and duration of periodic flooding and near-surface soil saturation. The series, in order from wet to dry, are mixed, Baltic rush, Nevada bulrush, and salt grass.

Mixed Dry Meadow Series. Mixed dry meadows are generally observed in relatively mesic sites, often near wet or alkali meadows. They are dominated by salt grass, Baltic rush, Nevada bulrush, and Douglas sedge interspersed with forbs such as dandelion, bassia, tumbleweed, mentzelia, and mealy rosettes.

Baltic Rush, Nevada Bulrush, and Salt Grass Dry Meadow Series. These three series are each dominated by pure or near-pure stands of the species for which they are named. In most instances, each contains small amounts of the species found in mixed dry meadows. Salt grass is the most abundant dry meadow series around Mono Lake, reflecting its tolerance for saline-alkali soil (Prodgers and Inskeep 1991; Brotherson and Rushforth 1985, 1987), aggressive colonization capabilities (Brotherson and Rushforth 1985), and tolerance for seasonal aridity.

Alkali Meadow Subformation

Meadows in this subformation occur around Mono Lake on saline-alkali soil where groundwater saturates the soil surface throughout most or all of the summer-fall growing season. The high salt level in alkali meadows is attributable to their prior submergence in Mono Lake and inadequate leaching by freshwater after lake recession. Salinity also may be maintained by soil efflorescence, a process by which salt-laden groundwater is drawn upward by capillary action. The water potential gradient formed by evaporation from the soil surface and transpiration by plants continuously draws water upward. Salts concentrate at the surface as water evaporates or is absorbed by plants. A salt residue accumulates over time, forming a thick surface crust. In the extreme cases, such as along the north beach where groundwater

is extremely salty and contains phytotoxins, surface salt accumulations preclude vegetation (Rogers, Driess, and Groeneveld 1992). Elsewhere, less salty groundwater and freshwater flushing combine to leach salts below toxic levels.

The alkali meadow subformation in the study area contains four series: salt grass, Nevada bulrush, grassy, and mixed.

Salt Grass Alkali Meadow Series. Salt grass alkali meadows are characterized by dense, nearly pure salt grass turfs, with occasional species of the mixed alkali marsh series intermixed. This series is presently best developed on beach terraces near unvegetated playa shorelines around the northern and eastern shores of Mono Lake.

Nevada Bulrush Alkali Meadow Series. Extensive Nevada bulrush monocultures have established on low beach terraces near the lake-fringing playas along the northern and eastern shores. This series is best developed on gently sloped terraces immediately below seeps and springs emanating from beach berms. Unlike salt grass alkali meadows, the soil surface in these areas is leached by surface runoff, and thus the salt crust does not develop.

Grassy Alkali Meadows. Grassy alkali meadows support a mix of two or more perennial grasses to the near exclusion of forbs, rushes, or sedges. This series occupies low terraces above the unvegetated playa around the lakeshore. It develops as narrow bands on partially leached relicted lakebed around the west shore and forms large stands on the north shore at the DeChambeau Embayment, Bridgeport Creek, and Sierra escarpment wetlands. Typical dominants are foxtail barley, Nevada bluegrass, alkali muhley, Nuttall's alkali grass, and salt grass.

Mixed Alkali Meadow Series. Mixed alkali meadows consist of a diverse assemblage of halophytes dominated by several grass species and bulrush interspersed with a variety of forbs. This series is associated with a variety of sites with saline-alkali soil where soil efflorescence may predominate.

Typical dominants are Nevada bulrush, salt grass, foxtail barley, and alkali muhley. Other characteristic species include Cooper's rush, alkali bulrush, small-flowered Indian paintbrush, marsh and seaside arrowgrass, intermountain pyrrocoma, lesser-panicled sedge, Pursh and Torrey seepweed, Nevada blue-eyed grass, rabbit's-foot grass, and arrowscale.

Forb Subformation

The herbaceous subformation consists of series that are dominated by annual forbs. In the study area, the forb subformation includes both wetland and nonwetland series.

Nonwetland forb series occupy sites where the upper soil layers are not influenced by groundwater or concentrated surface runoff but often occur close to wetlands. Two nonwetland series are described

for the Mono Basin EIR: mixed dry forb and bassia. Many other nonwetland forb series also are present in Mono Basin and Long Valley.

Wetland forb series are associated with tributary streams on floodplains and associated springs. They lack mature woody vegetation and topsoil that is protected by a meadow turf. Two wetland series are described for this EIR: mixed wet forb and watercress. Many other wetland forb series also are present in Mono Basin and Long Valley.

Mixed Dry Forb Series. Mixed dry forb series develop on well-drained sands and gravels around Mono Lake that support a sparse, mostly annual vegetation of mentzelia, willow buckwheat, tumbleweed, bassia, mealy rosettes, and tequilia.

Bassia Series. This series is dominated by pure or nearly pure stands of bassia. It occupies well-drained, sandy alkali soil near alkali meadows or dry meadows.

Mixed Wet Forb Series. The mixed forb series is dominated by lupine, bouncing-bet, or sweet-clover. Rushes, grasses, and wormwood also are often numerous. This series has developed since rewatering occurred on gravel and cobble bars along the flood-scoured stream channels.

Watercress Series. This series formerly occurred at springs in the Rush Creek bottomlands that have been reduced or eliminated by reducing irrigation in Pumice Valley, at Cain Ranch, and in other areas.

Unvegetated Habitats

The study area includes 13 habitats that lack appreciable plant cover. Plant cover of "unvegetated" habitats is less than 2% of the land surface. These habitats are included because they encompass substantial acreages in the project area and because some are important to wildlife or have implications for other issues, such as air quality and visual resources.

Channels

Channels include the bed, and sometimes the banks, of the main low-flow channel in each tributary stream.

Floodplains

Floodplains include gravel bars, overflow channels, and other surfaces along the tributary streams that are periodically scoured by high flows or have topsoil that has been removed by severe flood events.

Unvegetated Uplands

Unvegetated uplands include roads, graded areas, buildings and parking lots, and sheep bedding areas along the tributary streams.

Alkali Lakebeds

Alkali lakebeds include some areas that were exposed during lake recession. They are characterized by a surface layer of salts deposited by efflorescence (see previous discussion). Wind can remove or precipitation and runoff during the wet season can temporarily dissolve the surface layer, which will reform during the next dry period, assuming groundwater conditions remain favorable. Not all areas mapped as alkali lakebed qualify as wetlands based on the USFWS definition (Cowardin et al. 1979). Although groundwater was likely near the surface at all alkali lakebed areas sometime in the past, it has since drained from some areas as the lake level has dropped.

Tufa

The tufa mapping unit is reserved for unvegetated tufa towers and tufa cemented beaches found at scattered sites around the lake.

Sand

The sand mapping unit is used for all unvegetated sand flats, except those composed of material eroded from Black Point. Sand is mapped around portions of the entire Mono Lake shoreline.

Black Point Sand

Black Point sand is used for beaches composed of sand eroded from Black Point. Black Point is eroded by Mono Lake when the lake rises to elevations above 6,400 feet. Long-shore drift carries these sands and deposits them in a band above the 6,400-foot-elevation contour around the northern margin of the lake from east of Black Point to Warm Springs.

Lagoon

Lagoons are internally drained depressions that pond water. A lagoon basin forms behind littoral embankments created by wave action and long-shore drift. Lagoons flood because their highly permeable embankments permit the near shore water table to infiltrate the berm and pond in the lagoon bottom. Most

lagoons receive fresh groundwater that is moving through shallow aquifers toward the lake from upslope catchments. Lagoons are too salty to support wetland vegetation. Although nearly absent during the point of reference, an extensive lagoon area existed before diversions began.

Large lagoons formed on the Lee Vining and Rush Creek deltas and in depressions in the sand dunes north of the lake. Smaller linear lagoons also formed at various locations around the shoreline where beach slopes were too steep to allow wider lagoons to form.

Lagoons in dune fields north of the lake ponded water before LADWP diversions. These lagoons were not present on the 1956 aerial photographs when the lake stood at 6,402 feet. They apparently cease ponding when the lake drops below 6,405 feet (Stine 1993). Diatom remains suggest that these lagoons were brackish, containing a mix of freshwater and saltwater (Stine 1993). The lagoons contain salt accumulations more than 2 feet deep, indicating extensive efflorescence of salts from underlying brackish saltwater and/or periods of brackish water inundation followed by evaporation.

Gravel

This category was used in lakeshore mapping for the unvegetated portions of the Lee Vining, Rush, and Wilson Creek deltas with gravel and cobble surfaces. This category includes some beachrock areas (i.e., tufa-encrusted gravel [Stine 1993]).

Developed

This category is used in lakeshore mapping for areas converted to pavement, buildings, or other developments.

Open Water

This category designates the unvegetated portions of ponds.

Negit Island

Negit Island is composed of dacite rock. Previously inundated portions of the island and its islets are encrusted with tufa and thus required a separate mapping category.

Barren Rock

Areas of exposed bedrock were mapped as barren rock.

Barren Basin

Barren basins are interdunal depressions where water from direct precipitation or surface runoff ponds. These ephemeral features are most common along the north shoreline above the historical highstand of 6,428 feet.

Beachrock

Cobble deposits on deltas and colluvial slopes below the Sierra Nevada develop a tufa coating under some circumstances. Tufa-coated cobbles are referred to as beachrock.

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