

Scenic Analysis of Tuolumne Meadows

Yosemite National Park

2007



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INTRODUCTION

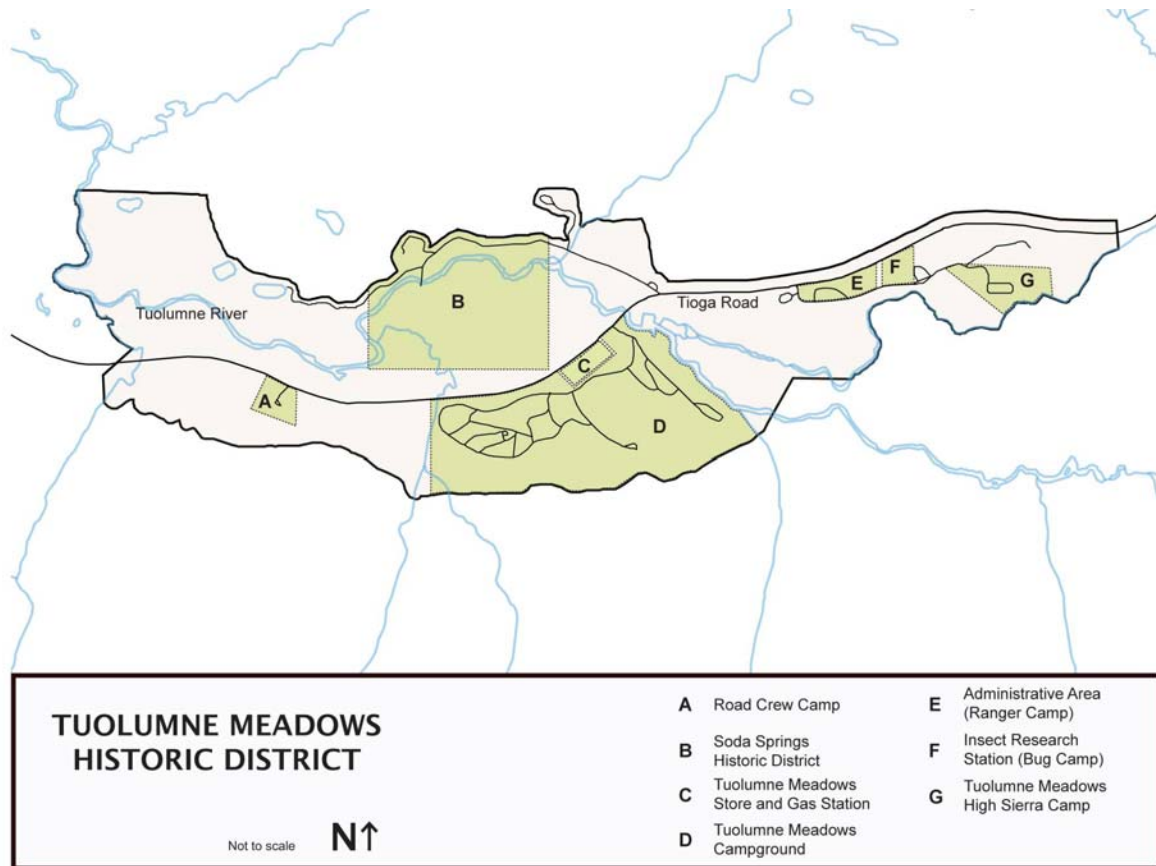
Thank you for taking the time to read the Scenic Analysis of Tuolumne Meadows. This document was prepared in 2007 as a part of a planning effort that would lead to the development of the Tuolumne River Plan. The purpose of this document is to identify a range of visually sensitive areas within the Tuolumne Meadows landscape and to recommend planning and design guidelines for the potential addition of new development to the meadows in the future. The targeted audiences of this analysis are the planning and design teams working on the 2007 Tuolumne River Plan and the facilities maintenance staff that is responsible for looking after the scenic resources within Tuolumne Meadows.

Context

At Yosemite National Park, the preservation and enhancement of visual scenic resources are an integral part of ongoing stewardship efforts. The scenic resources of Tuolumne Meadows in particular were recognized early on, as in this comment by John Muir in 1890:

“Along the river are a series of beautiful glacier meadows stretching, with but little interruption, from the lower end of the valley to its head, a distance of about twelve miles. These form charming sauntering grounds from which the glorious mountains may be enjoyed as they look down in divine serenity over the majestic swaths of forest that clothe their bases. Narrow strips of pine woods cross the meadow-carpet from side to side, and it is somewhat roughened here and there by groves, moraine boulders, and dead trees brought down from the heights by avalanches; but for miles and miles it is so smooth and level that a hundred horsemen may ride abreast over it.”: The Century Magazine, Vol. XL. September, 1890. No. 5

Preservation of scenic resources within Yosemite National Park is an identified management objective for the park (NPS Organic Act, National Historic Preservation Act, the Secretary of the Interior Standards, Yosemite General Management Plan etc.) In addition, studies, such as those conducted by landscape architects and psychologists Gregory Buyhoff, Terry Daniel, Ervin Zube and Rachel and Stephen Kaplan have been designed to quantify the psychological and physiological effects of aesthetically pleasing scenery. These studies have shown that exemplary scenic resources, like those found in Yosemite National Park, enhance human enjoyment, reduce stress and improve physiological health. (Landscape Aesthetics, 1995). Appropriate consideration and management of Yosemite’s scenic resources will ensure the continuation of these qualities within Yosemite National Park. Furthermore, all developed areas within Tuolumne Meadows fall within the designated Tuolumne Meadows Historic District (Figure 1) and must comply with the Secretary of the Interior’s Standards for the Treatment of Historic Properties.



Site Plan #1: Map showing existing development areas and the boundary of the Tuolumne Meadows Historic District (which is largely the same as the Wilderness Boundary). (YOSE 2007)

LANDSCAPE CHARACTER

The visual landscape character of Tuolumne Meadows is that of a natural subalpine meadow interspersed with stands of lodgepole pines. This predominantly open meadow provides for a remarkable series of visual experiences including unobstructed views of the craggy Sierran horizon line, watching dramatic weather formations roll in from the west and stargazing. Other scenic viewing opportunities within Tuolumne Meadows include views of the Tuolumne River and of native flora and fauna. In essence, the visual landscape character within Tuolumne Meadows is a composition of the natural and cultural features found within the viewshed. These include:

1. Landform Patterns
2. Water Characteristics
3. Vegetation Patterns
4. Cultural Features

Landform Patterns

The overall landform of the meadow is composed of a long and narrow U-Shaped valley which runs in an east-west direction. It is approximately a half-mile wide and two miles long. The smooth valley is bounded on the north and south sides by the undulating slopes of surrounding mountain peaks while the east and west sides are delineated by weathered granite domes. This dramatic landform provides the setting for a series of impressive views, highlighted by the long, grassy valley floor and the surrounding mountain peaks (Figure 2).



Figure 2. Tuolumne Meadows from the top of Lembert Dome. (YOSE 2006)

Watershed Characteristics

The Tuolumne River meanders through this low-lying valley before entering into the Grand Canyon of the Tuolumne. The river is wide and forms graceful curves and placid pools as it slowly winds through the herbaceous meadow. In some locations, granite bedrock has been exposed along the river's edge, which allows for the water to swirl around and wet the native granite rock. In other locations, the grassy meadow extends right up to the bank of the river. The river creates a soft line of color and texture through the meadow that can be seen from the ground and surrounding granite domes. (Figure 3).



Figure 3. View of Tuolumne Meadows from Pothole Dome. (YOSE 2006)

Vegetation Patterns

The vegetation pattern in the area is a subalpine meadow with upland lodgepole pines that weave in and out of the meadow's periphery. From a distance, the meadow mixture of forbs and grasses creates an appearance of a manicured field outlined by lodgepole pine trees. At the base of the meadow, pockets of lodgepole pines meander into the grassy meadow, creating islands of visual variety on the valley floor. These same trees frame points of interest and create an experience that hides and reveals the surrounding landscape. The trees around the edge of the meadow are often small as they expand out into the meadow matrix. Above the Tioga Road and in other upland locations, the forest stand is continuous and varies in age and size. Visual interest is created by the contrast of

the lighter colors of the meadow, the darker colors from the upland pine trees and the gray and white peaks of the domes that tower over the valley floor.

Cultural Features

In general, the cultural features within the Tuolumne landscape are subordinate to the natural features of the area. This hierarchy was achieved by the use of rustic architecture principles and construction techniques that emphasized natural lines, forms, colors, textures, and patterns. Because rustic structures were built to harmonize with their natural surroundings, they generally complement the natural character of the landscape. The cultural resources in the area can be broken down into two major groups, circulation and structures. Each plays an important role in the area and may be perceived as either complimenting or detracting from the Tuolumne landscape.

Tioga Road and the old Great Sierra Wagon Road are the most dominant cultural features in the Tuolumne landscape. These circulation features can be seen within the foreground, middleground and background of views (Figure 11). These circulation routes can be seen in both aerial and ground views (Figure 4) and they create artificial edges that may detract from the natural viewshed. Their color and texture is different from the surrounding landscape and their existence may alter the meadow's natural vegetation patterns. Nevertheless, these circulation routes are a part of the cultural landscape and provide access to views in the Tuolumne Meadows area that would otherwise be inaccessible to most visitors (Figure 5). As such, their historic alignment, width, color and cross-section are important factors in how these circulation routes are visually perceived and understood.



Figure 4. Views of Tioga Road from Tuolumne Meadows. (YOSE 2006)



Figure 5. Views of Tuolumne Meadows from the edge of Tioga Road. (YOSE 2006)

Many of the structures within Tuolumne Meadows, including the developed areas such as Soda Springs, Road Crew Camp and the Tuolumne Meadows High Sierra Camp, create a visual contrast with the surrounding natural landscape. However, these structures were designed to impose a minimal degree of visual intrusion within the landscape and are generally regarded as visually pleasing. They were built with techniques and materials that emphasize the landscape over the built environment. When seen as an element of the middleground and background landscape, the structures are visually subdued and tend to blend into the landscape (Figure 6). In addition, these developed areas are generally screened from primary circulation routes by natural vegetation and landform. Finally, these structures evoke the history of the site, tying the user to the past and aiding in the understanding of how the landscape has been used. All new structures should strive to meet similar goals of harmonizing with the natural and cultural landscape of Tuolumne Meadows.



Figure 6. Middleground view of Parsons Memorial Lodge. (YOSE 2006)

VISIBILITY ZONES

Within the Tuolumne Meadows landscape, specific areas have variable levels of visibility based on the location of the observer and the associated vegetation and terrain in the area. To identify these areas, a Geographic Information Systems (GIS) model was constructed using existing data sets.¹ To create a visibility assessment model, 19 discrete view points were selected (Figure 7 and Appendix). Using the spatial analyst tool in ArcMap, the areas within the surrounding landscape that could be seen from the 19 view points were identified. The 19 view points were selected because they are the most common areas from which visitors experience the visual scenery of the Tuolumne Meadows landscape. The 19 view points include 12 points along the Tioga Road and 5 points along the Great Sierra Wagon Road (also known as the Soda Springs Trail). The 17 points along these two popular circulation corridors were generally placed at even quarter-mile intervals, however exceptions to these regular intervals were made to include popular viewpoints and destinations at the Elizabeth Lakes Trail Head, the Soda Springs Bridge, the Tioga Road Bridge, and the Dog Lake Parking Lot. Furthermore, two elevated viewpoints within the area were selected at the summits of Pothole Dome and Lembert Dome. The visible areas from the 19 view points were then overlaid to create a gradient of areas within the landscape that can be viewed from the least number of points to those that can be viewed from the greatest number of points. This analysis provided defined areas of visibility based on a rating from highly visible to non-visible.

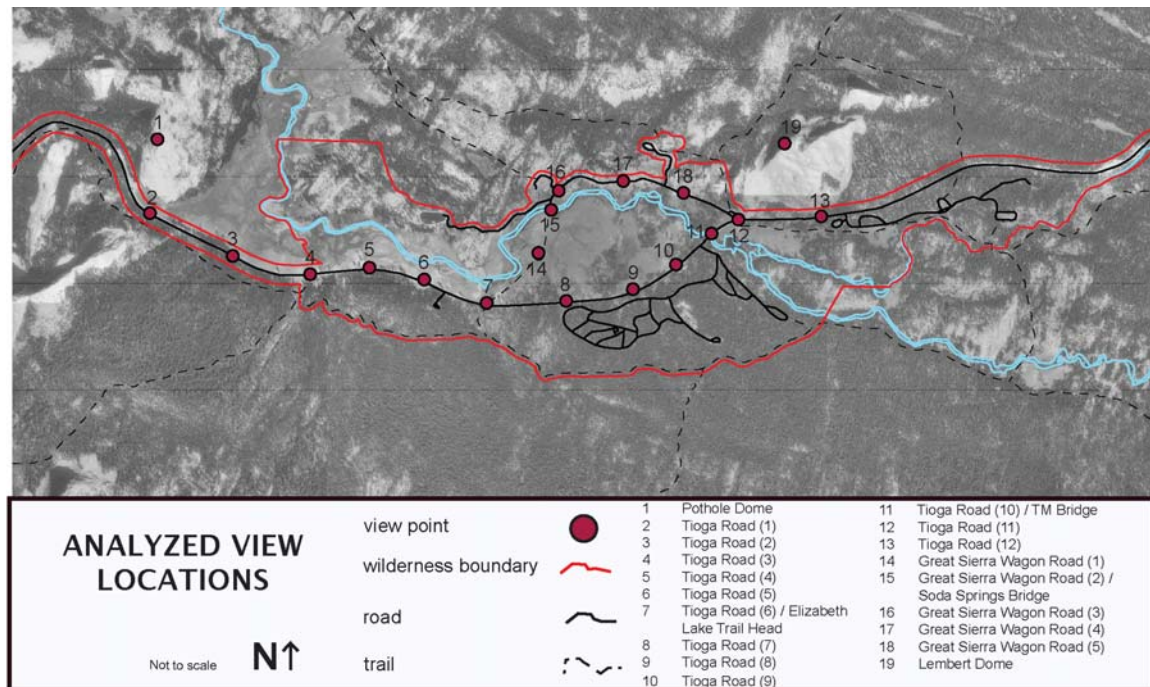


Figure 7. Locations of the view points that were analyzed to establish the Visibility Zones.

¹ Data sets that were used included the 2006 Tuolumne Meadows LIDAR dem, the Yosemite Roads layer, the Yosemite Trails layer, the Yosemite Hydro layer and the 100 foot Contour layer.

For the purposes of this analysis, Tuolumne Meadows has been divided into four visibility zones (Figure 8 and Appendix). Based on the number of viewpoints that an area is visible from, these four visibility zones are defined as non-visible, low visibility, moderate visibility and high visibility.

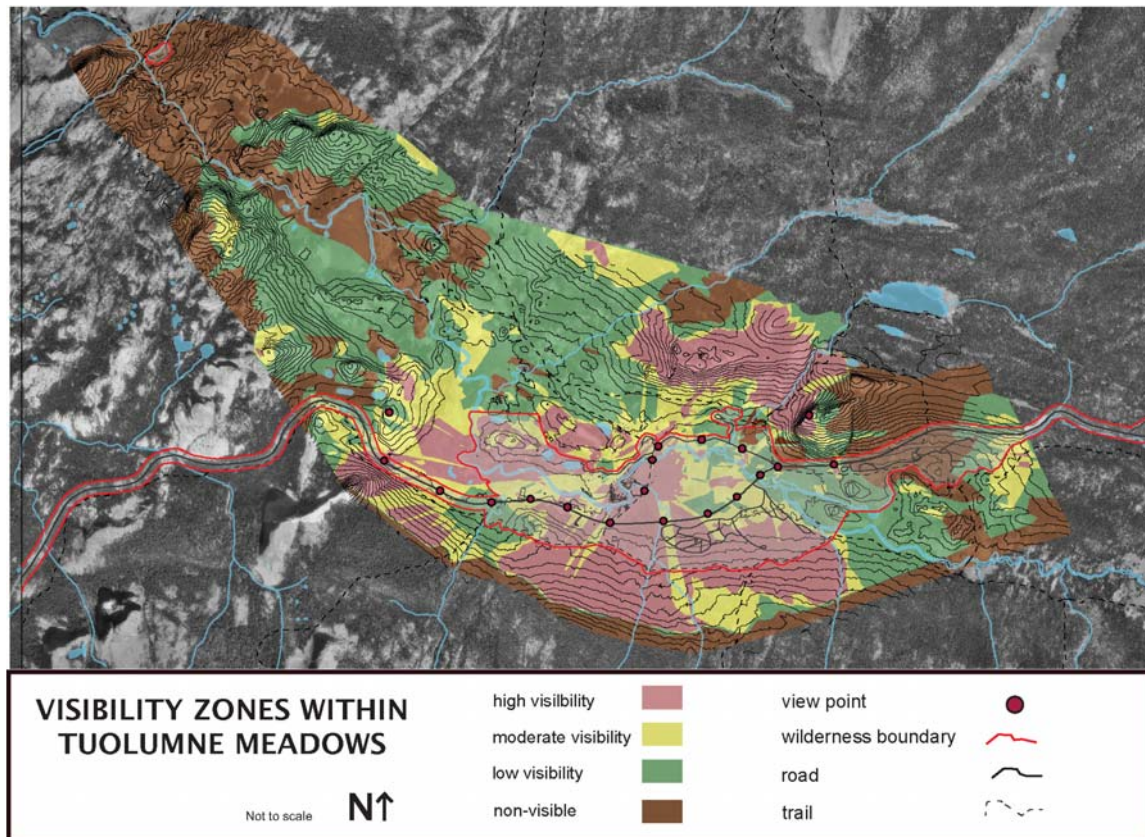


Figure 8. Visibility Zones within Tuolumne Meadows. (See appendix for a full scale map and for thumbnail maps of all the individual viewsheds)

Non-Visibility Zones

The non-visible zones are pockets or places within the landscape that are not seen by the observer from any of the 19 viewpoints. These areas may be good locations for structures or features that would otherwise detract from the scenic character of the area. Nevertheless, care should always be taken because these areas may be seen from other locations, higher vista points or from the air.

Low Visibility Zones

The low visibility zones are areas that can be seen by the observer from one to two viewpoints. This zone is relatively well suited as a possible location for new development and infrastructure as it would minimally interfere with the historic and contemporary aggregation and distribution of features within the natural and built environment. Within this zone, management actions and development should be camouflaged or screened from primary vista points and circulation routes.

Moderate Visibility Zones

The moderate visibility zones are areas that can be seen by the observer from 3-4 viewpoints. New development should be kept to a minimum within this zone. However, if development does occur in this area then existing vegetation should be used to screen the proposed infrastructure. In such cases detailed care should be taken to mitigate visual impacts. Within this zone, consideration should be given to the removal of encroaching lodgepole pines in order to preserve Tuolumne Meadows views and vistas.

High Visibility Zones

The very high visibility zones are those that can be seen by the observer from 5 to 15 viewpoints. These areas are often the peaks, domes and exposed rockslides that make up much of the horizon line. Due to the high visibility of these areas, it is difficult to disguise or minimize the visual impacts of management actions, development, or infrastructure. If construction of infrastructure in this area is unavoidable, detailed care should be taken to camouflage the object into the surrounding landscape. In addition, any silhouetting of new development above the horizon line in these areas should be avoided.

VIEW AND VISTA POINTS

The views and vistas within Tuolumne Meadows can be defined by their distance from the observer. These have been categorized into the immediate foreground, foreground, middleground and background. The immediate foreground is the distance from the observer to 300 feet. The foreground overlaps the immediate foreground zone and is the distance from the observer to one-half mile. The middleground is from one-half mile to 4 miles and the background is greater than four miles (Figure 9). Of these categories, the foreground and the immediate foreground are usually the most visually sensitive areas. From this distance, it can be difficult to disguise or blend certain types of development into the surrounding landscape.

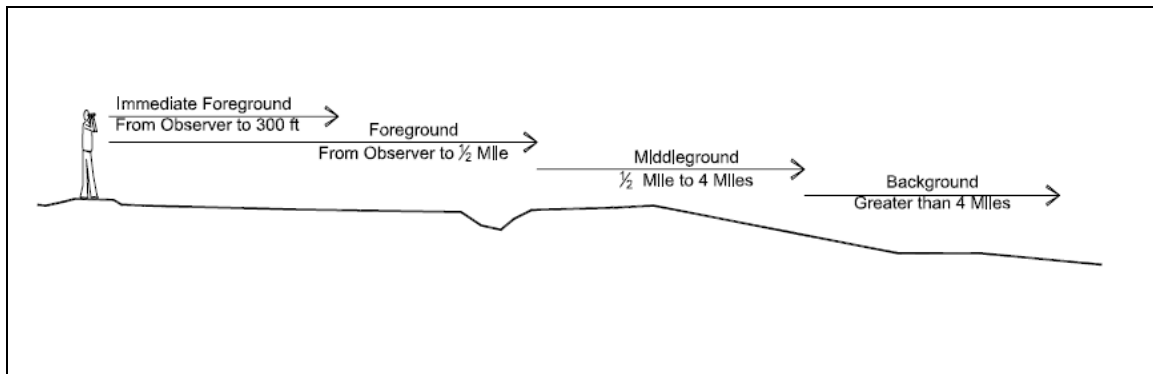


Figure 9. Immediate foreground, foreground, middleground, and background distances from the observer.

The open nature of the Tuolumne Meadows landscape provides a multitude of *view* and *vista* points. For the purposes of this document, a *view* is defined as an expansive or panoramic prospect of a broad range of vision while a *vista* is defined as the controlled prospect of a discrete, limited range of vision. These include both designed and incidental viewpoints. Although the total number of view and vista points within Tuolumne Meadows is very high, this area contains a certain number of iconic views and vistas that offer exceptional views of the surrounding landscape. These iconic views and vistas have been broken into linear view corridors and stationary vista points. Linear view corridors include roads and trails. Stationary vista points are discrete locations that offer composed views.

Linear View Corridors

Linear view corridors are those experienced while traveling along a trail or a road. Tuolumne Meadows has two major linear view corridors (Figure 10). Tioga Road is the first of these and is the major automobile circulation route for visitors. In addition, it is the primary means by which most visitors visually experience Tuolumne Meadows. The second is the old Great Sierra Wagon Road, which was largely decommissioned as a road and is now the primary trail that bisects the middle of Tuolumne Meadows. From this trail people experience Tuolumne Meadows at a relaxed pace as they walk, hike or ride horses across the meadow. Because of the high use of these linear view corridors, care

should be taken in the maintenance, manipulation, and reconstruction of these circulation routes. Deviation from the existing form, alignment, widths, cross-sections, colors, and patterns may detract from the visual and historic integrity of the area. Seemingly small modifications such as the addition of utilities and utility boxes or the repavement or patching of the road may have visual impacts to the landscape.

Stationary Vista Points

Stationary vista points are discrete locations that offer composed views. These vista points can be historic or modern in location and construction. Although there are many vista points within the Tuolumne Meadows viewshed, several are of superlative quality and have exceptional importance to the scenic integrity in the area. These include Pothole and Lembert Dome, Cathedral Lake Trailhead, Soda Springs Bridge, and the Tuolumne Meadows Bridge (Figure 10). These vista points and their associated views should be maintained and any new development should be done in a manner that maintains the scenic integrity of these landscapes.

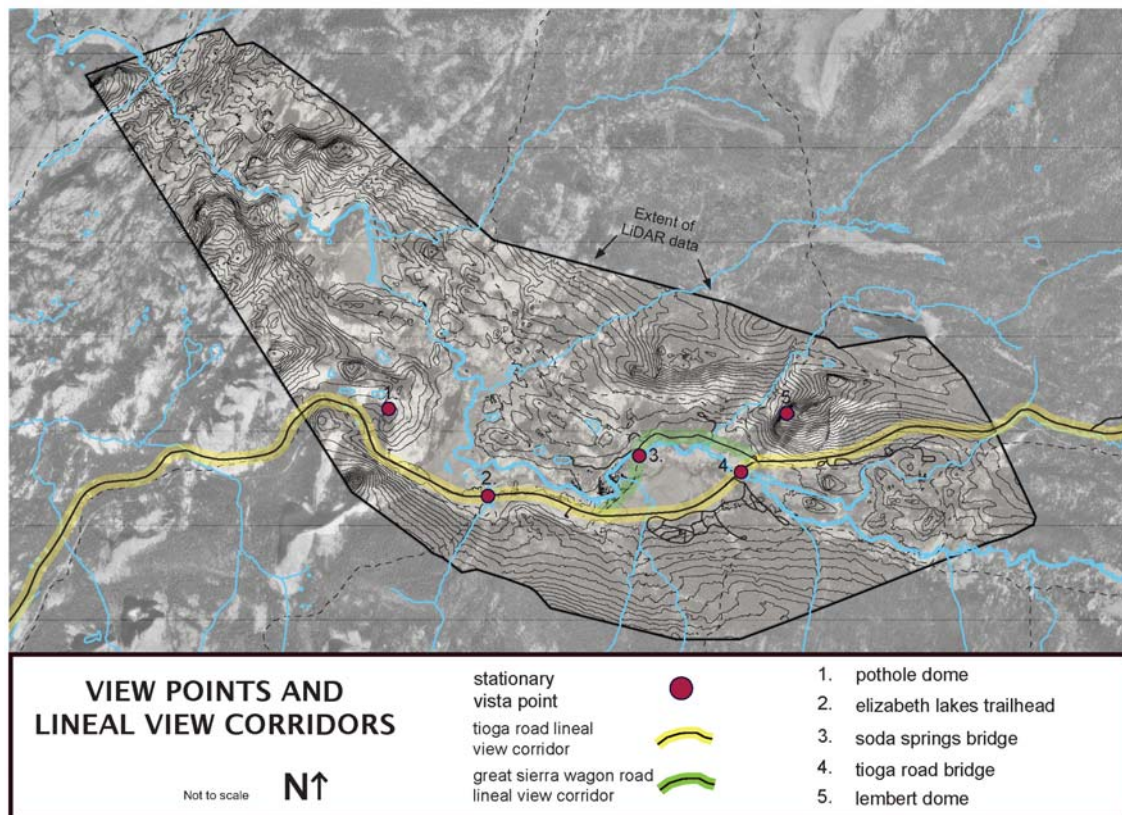


Figure 10. Exceptional vista points and linear view corridors within Tuolumne Meadows.

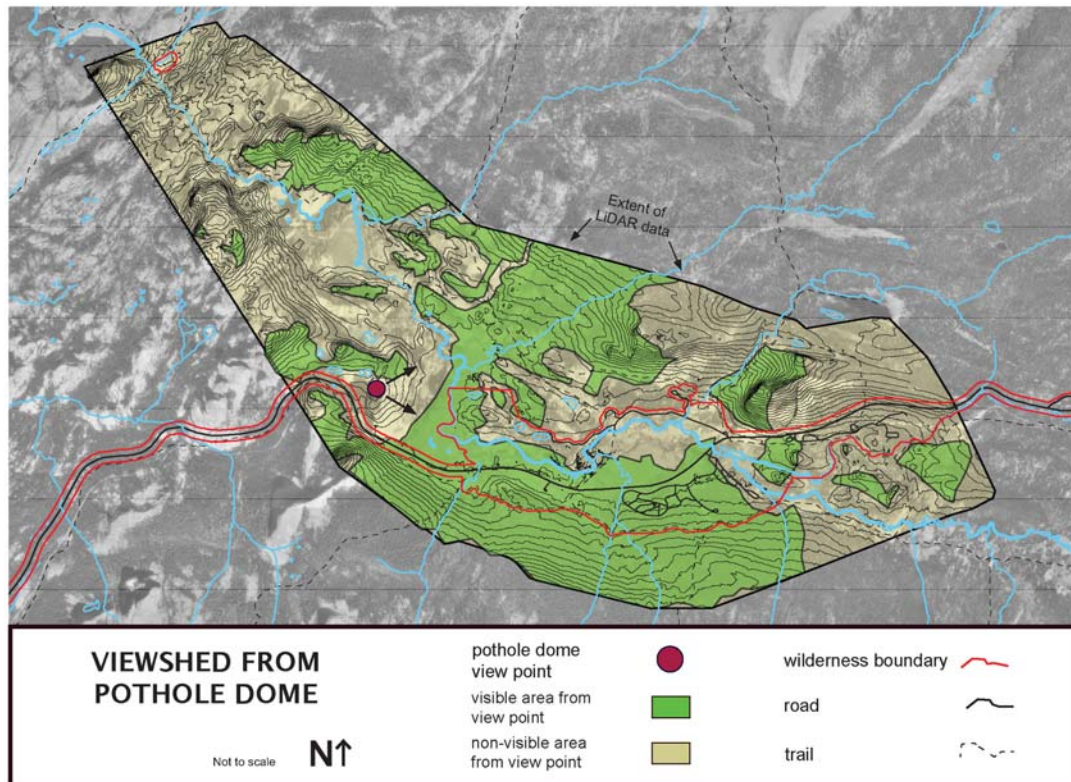


Figure 11. Visible area from summit of Pothole Dome.

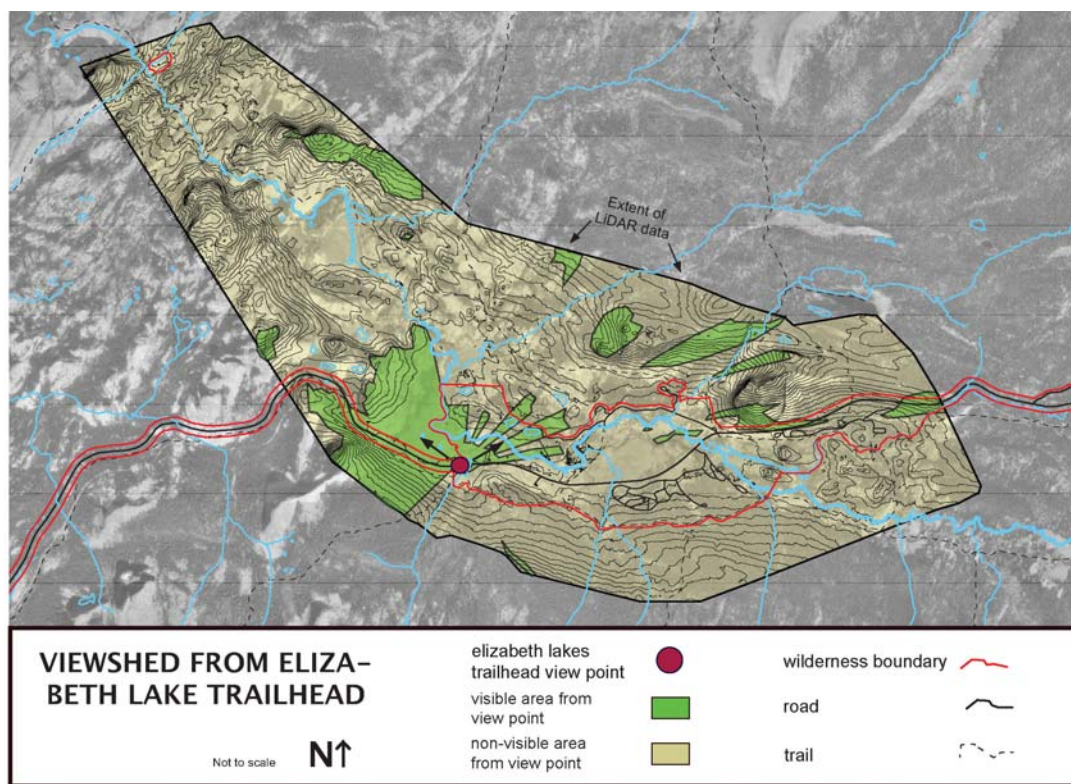


Figure 12. Visible area from the Elizabeth Lake Trailhead.

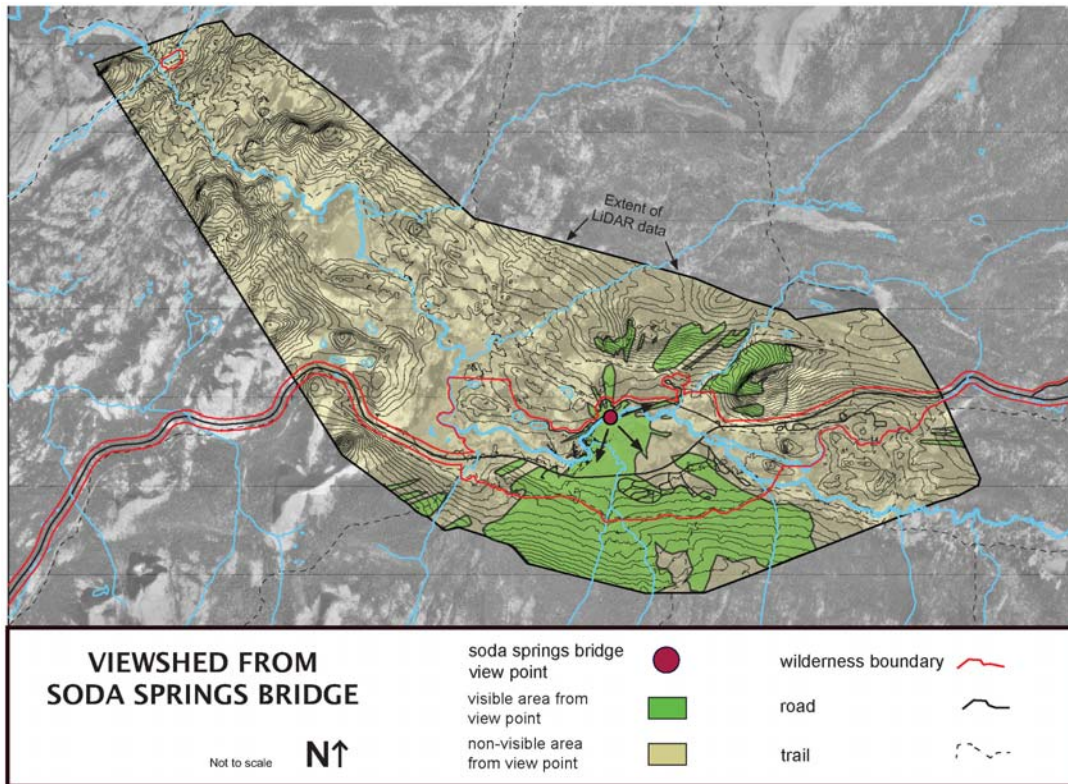


Figure 13. Visible area from the Soda Springs Bridge.

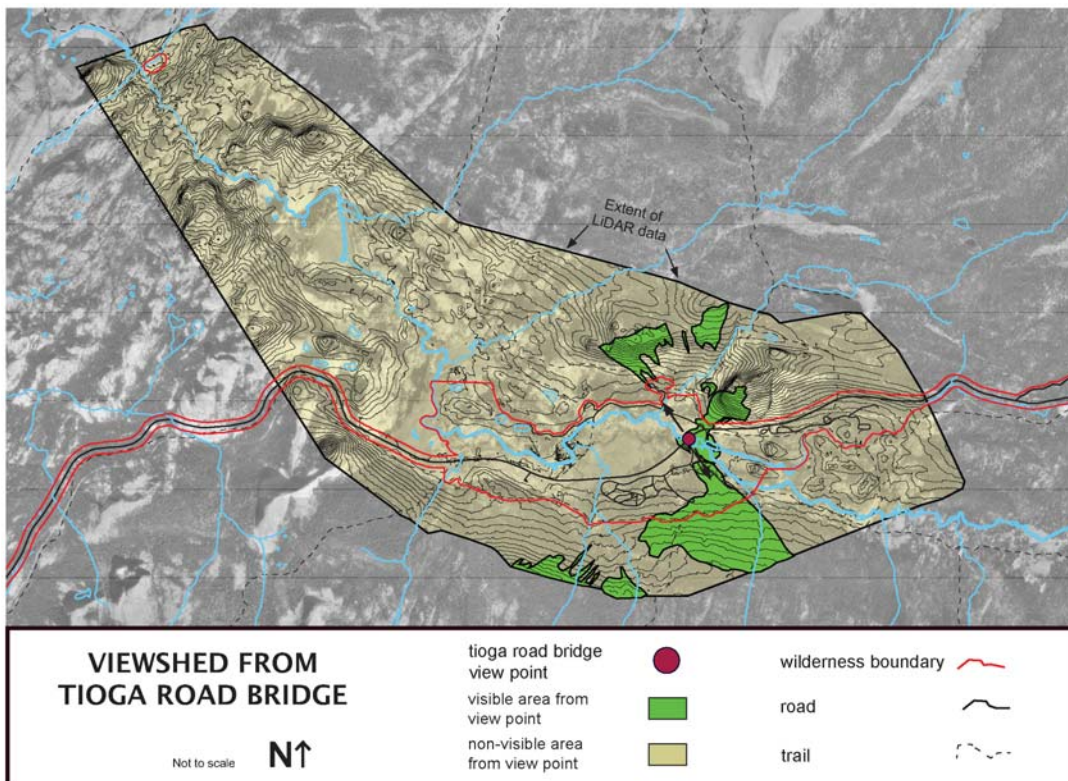


Figure 14. Visible area from the Tioga Road Bridge.

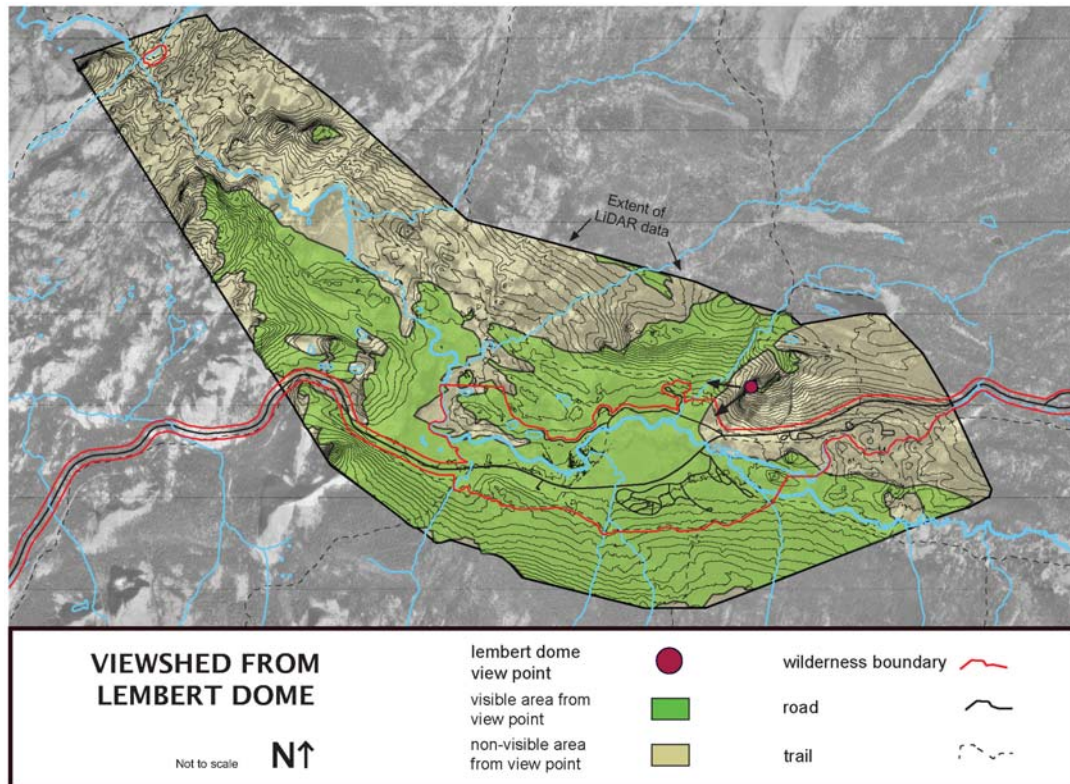


Figure 15. Visible area from summit of Lember Dome.

TREATMENT RECOMMENDATIONS

The following guidelines outline general courses of management to preserve the Tuolumne Meadow's scenic landscape; however, these general recommendations need to be carefully considered on a case-by-base basis. Furthermore, the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA) must be adhered to when proposing any modifications to the Tuolumne Meadows landscape and historic district. Recommendations are outlined in the contexts of both Vista Point locations and Visibility Zones.

Treatment Recommendations Common to All Visibility Zones

- No additions to the built environment shall occur within the designated Wilderness Area.
- All existing contributing features within the Tuolumne Meadows Historic District, including roads, trails, and structures, should be maintained in their rustic-style (Secretary of the Interior's Standards for the Treatment of Historic Properties should apply in the maintenance, repair and replacement-in-kind of cultural resources and historic fabric).
- If deemed necessary, any new development within the Tuolumne Meadows Historic District must be done in a manner that is compatible with the existing historic fabric but distinguishable from it.
- Site amenities such as benches, trashcans, bear boxes, and fences should be designed and sited to be as unobtrusive as possible within the natural and cultural landscape.
- Any built objects should be situated so their silhouette does *not* rise above the horizon line when seen from any of the selected view points.
- Repairs to utilities and construction of new utilities within the landscape should be unobtrusive.
- When trees are removed, all stumps should be flush cut.
- Stumps greater than 12 inches in diameter should have slashes cut into the top to speed deterioration.
- Particular care should be taken if any additions to the built environment occur within the foreground or immediate foreground of the viewpoints (see figure 8).
- Interpretive panels, signs, and monuments within the viewshed should be visually unobtrusive in terms of their scale, form, line, color and texture.

Treatment Recommendations for High Visibility Zones

- Infrastructure and other additions to the built environment should be avoided unless they are deemed absolutely necessary.

- Woody vegetation (particularly lodgepole pines) within this zone should be periodically thinned to preserve the open views of the meadows and the ecological vitality of the area.
- The hillside south of the Tioga Road (largely zoned as High Visibility) might be an appropriate location for some new infrastructure if the coniferous canopy cover of the hillside is undisturbed during construction (since this is largely what is seen from the viewpoints and travel corridors).

Treatment Recommendations for Moderate Visibility Zones

- Infrastructure and other additions to the built environment should only be considered if necessary and if there is not an adequate location available within the Low Visibility or Non-visible Zones.
- Infrastructure and other additions to the built environment within this zone should not obstruct the open views of the meadow and surrounding landscape and should occur along the meadow/upland forest ecotone² with tree cover as a backdrop. Furthermore if construction is necessary, built elements should be blended into the natural-appearing landscape by using naturalistic lines, materials, forms, colors, and textures.
- Woody vegetation (particularly lodgepole pines) within this zone should be periodically thinned to preserve the open views of the meadows and the ecological vitality of the area.

Treatment Recommendations for Low Visibility Zones

- Infrastructure and other additions to the built environment may be considered, as long as measures are taken to harmonize the construction with the surrounding landscape.
- New infrastructure and other additions to the built environment within this zone should minimize their obstruction to the open views of the meadow and surrounding landscape. Furthermore, if construction is necessary, built elements should be disguised in the natural-appearing landscape by using naturalistic lines, materials, forms, colors, and textures.
- If the removal of trees and vegetation is required for ecological and/or cultural reasons or to create space for infrastructure, thought should be given to preserving enough trees to mask new and existing infrastructure from sight lines.

Treatment Recommendations for Non-visibility Zones

- These areas may be appropriate locations for structures or features, especially ones that may not be easy to disguise in higher visibility areas.

² As defined by *The American Heritage Science Dictionary*, an ecotone is: a transitional zone between two ecological communities, as between a forest and grassland or a river and its estuary.

- Because “non-visible” areas may still be seen from other locations (higher vista points, aerial views, etc.), construction within these areas should still be carefully undertaken to harmonize any new structures with the existing landscape to the fullest extent possible.
- If the removal of trees and vegetation is required for ecological and/or cultural reasons or to create space for infrastructure, thought should be given to preserving enough trees to mask new and existing infrastructure from sight lines.

View and Vista Points (Linear View Corridors and Stationary Vista Points)

- Infrastructure and other additions to the built environment should be done in a manner that would minimize the impacts to the viewshed along the principle linear view corridors (the Tioga Road and the Great Sierra Wagon Road) and the vista points of exceptional scenic value (Pothole Dome, Elizabeth Lakes Trailhead, Soda Springs Bridge, Tioga Road Bridge and Lembert Dome).
- Particular care should be taken if any additions to the built environment occur within the foreground or immediate foreground of the linear view corridors or from the viewpoints of exceptional scenic value.
- Vertical elements that obstruct views from the linear view corridors should be avoided.
- If additional infrastructure is necessary, the resulting development should not detract from the viewshed as seen from the Tioga Road and the Great Sierra Wagon Road. This could be achieved by using scales, forms, lines, colors and textures compatible with the existing natural and cultural landscape.
- Existing non-historic utility boxes and associated infrastructure along the Tioga Road should be relocated or hidden to conform to the natural and historical character of the existing landscape.
- Vegetation along the linear view corridors should be periodically thinned to preserve the open views of the meadows.

APPENDIX

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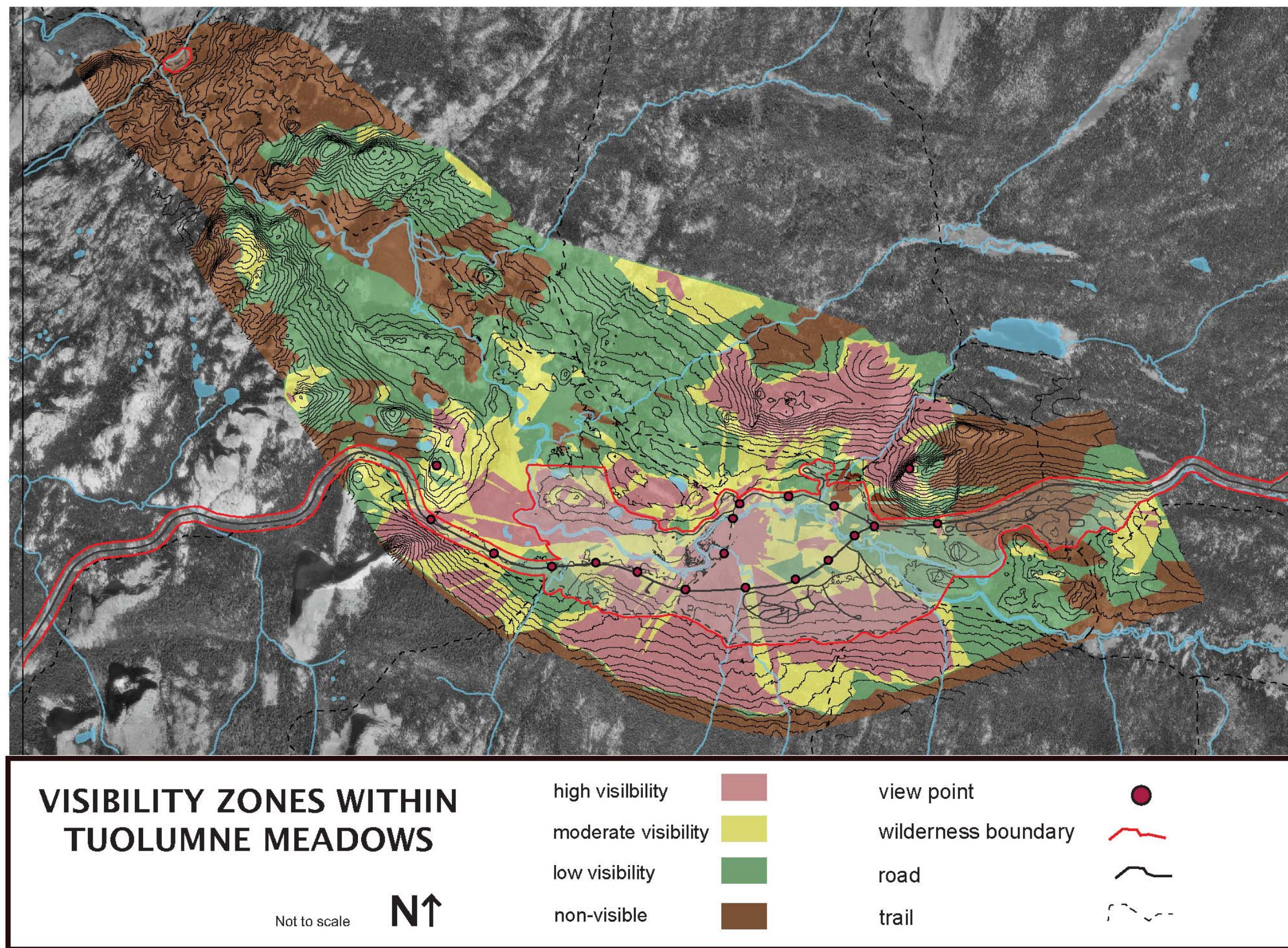
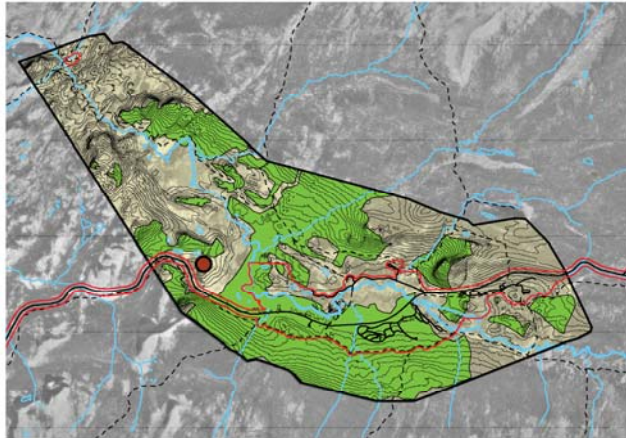



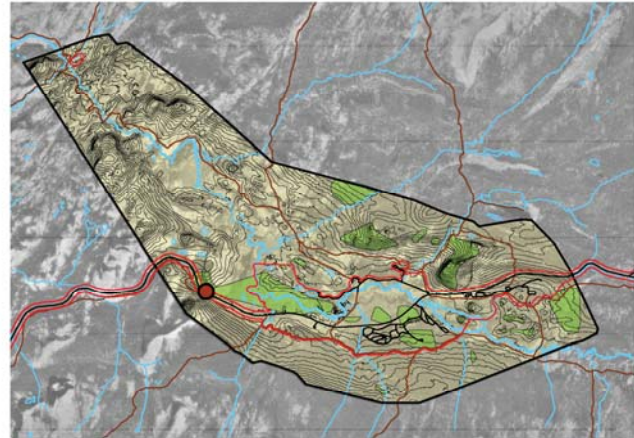
Figure 16. Visibility Zones within Tuolumne Meadows.






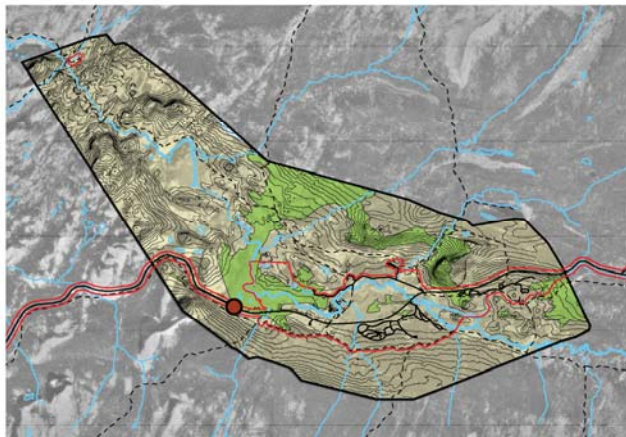
POTHOLE DOME
VIEW POINT

visible area: 
N↑




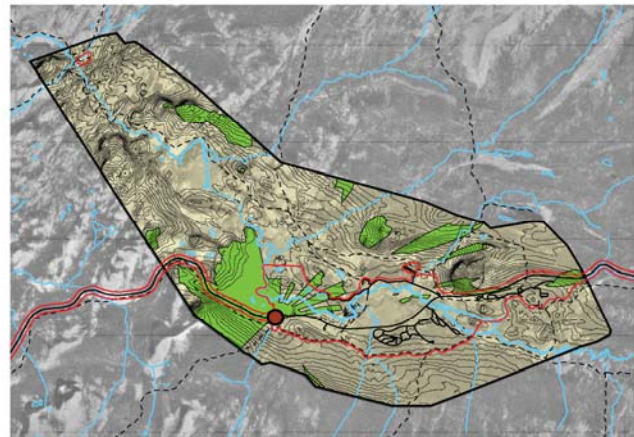
TIOGA ROAD
VIEW POINT 1

visible area: 
N↑




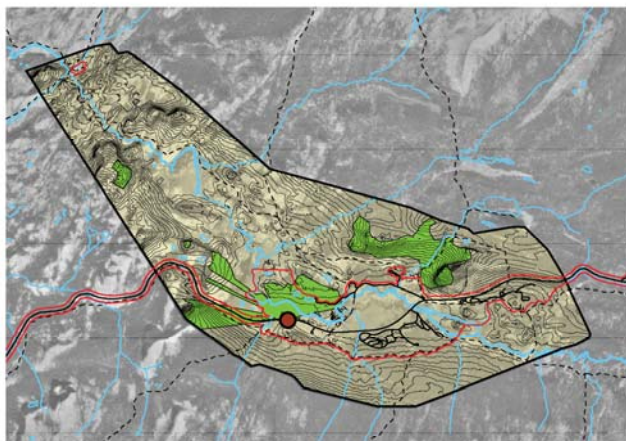
TIOGA ROAD
VIEW POINT 2

visible area: 
N↑




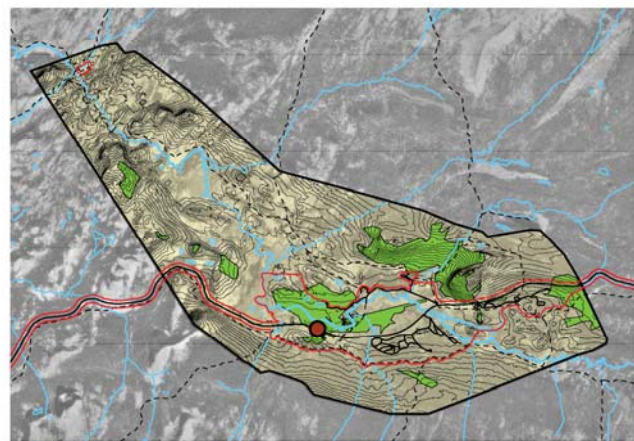
TIOGA ROAD VIEW POINT
3 (ELIZABETH LAKES)

visible area: 
N↑



TIOGA ROAD
VIEW POINT 4

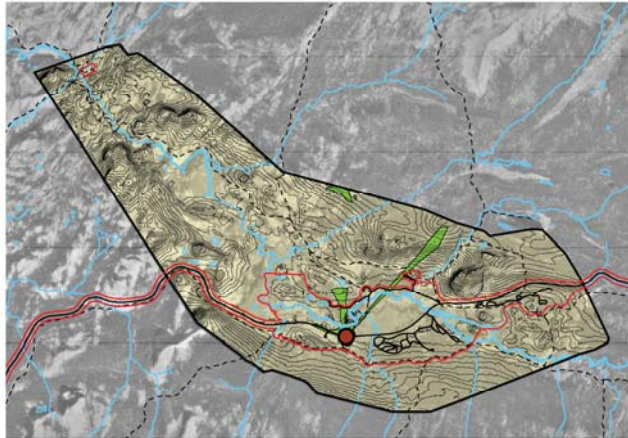
visible area: 
N↑




TIOGA ROAD
VIEW POINT 5

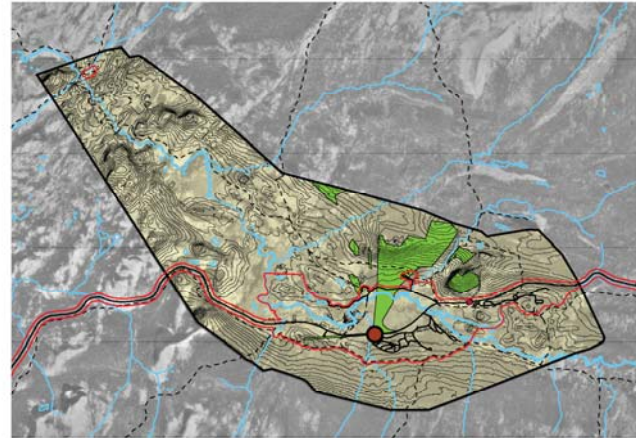
visible area: 
N↑

Figure 17. Visible areas from Tuolumne Meadows view points.




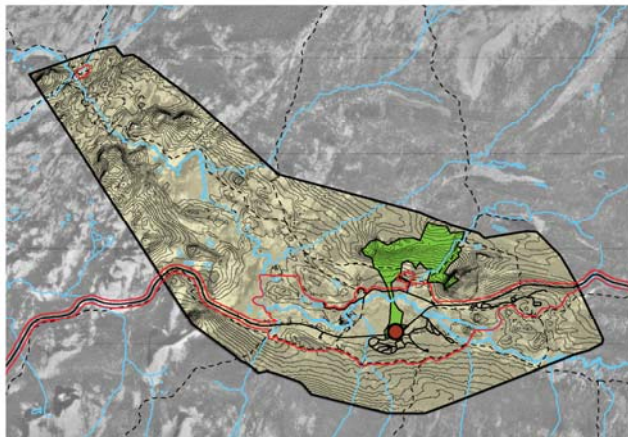
TIOGA ROAD
VIEW POINT 6

visible area:  N↑




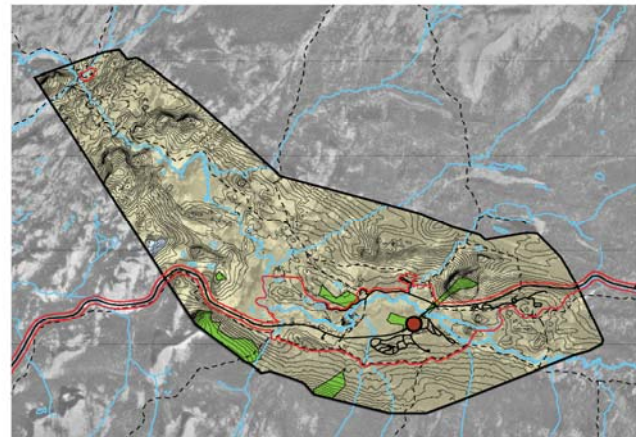
TIOGA ROAD
VIEW POINT 7

visible area:  N↑




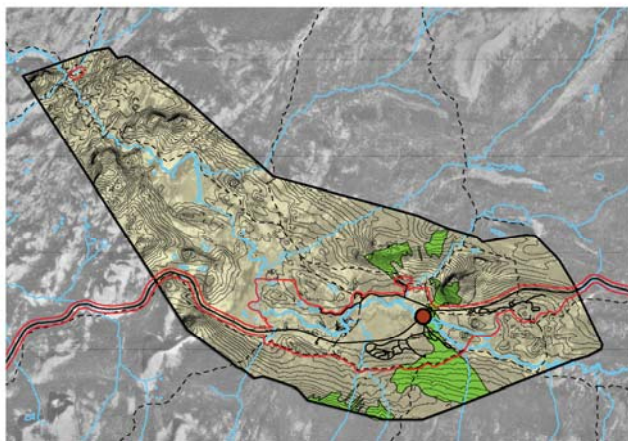
TIOGA ROAD
VIEW POINT 8

visible area:  N↑




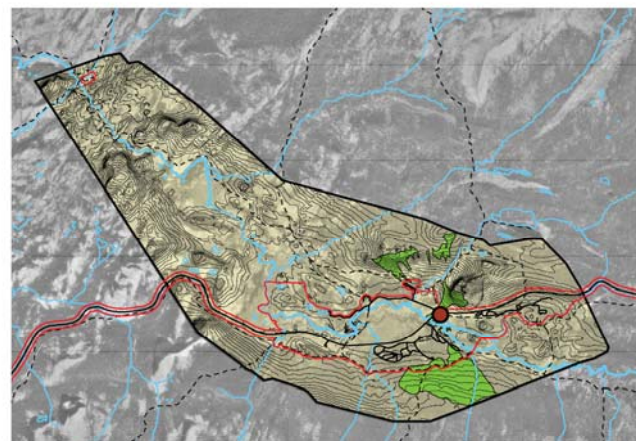
TIOGA ROAD
VIEW POINT 9

visible area:  N↑



TIOGA ROAD VIEW POINT
4 (TIOGA ROAD BRIDGE)

visible area:  N↑



TIOGA ROAD
VIEW POINT 11


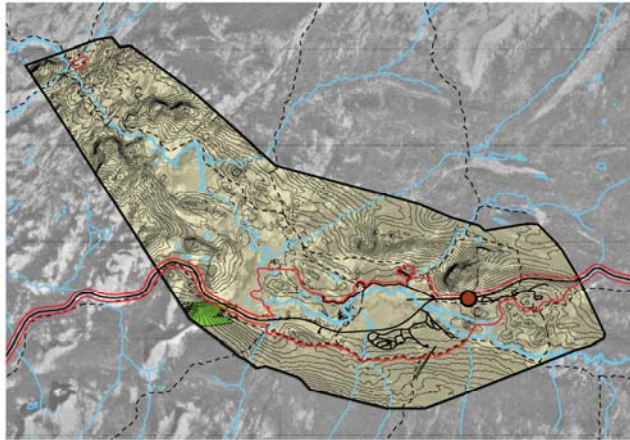

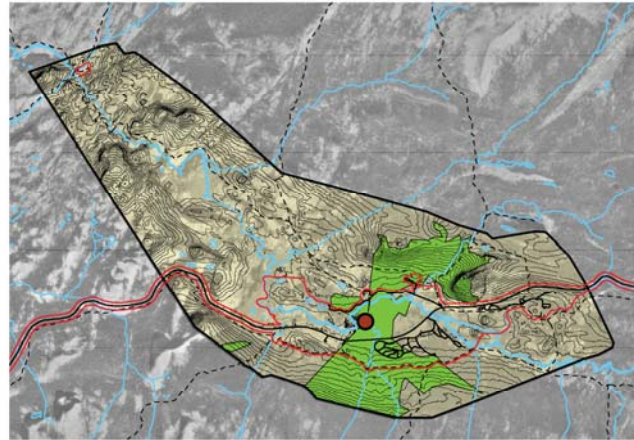
visible area:  N↑

Figure 18. Visible areas from Tuolumne Meadows view points.




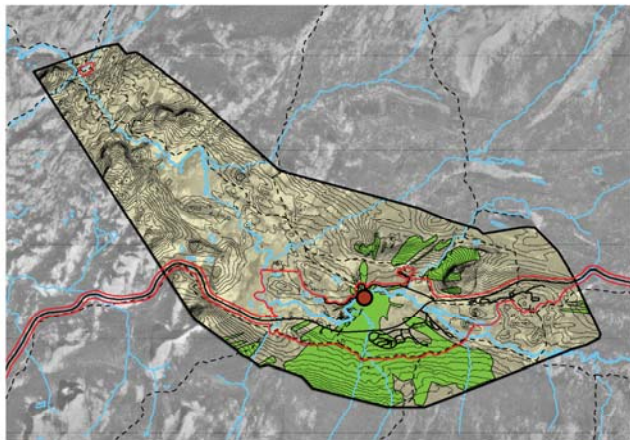
TIOGA ROAD
VIEW POINT 12

visible area: 
N↑




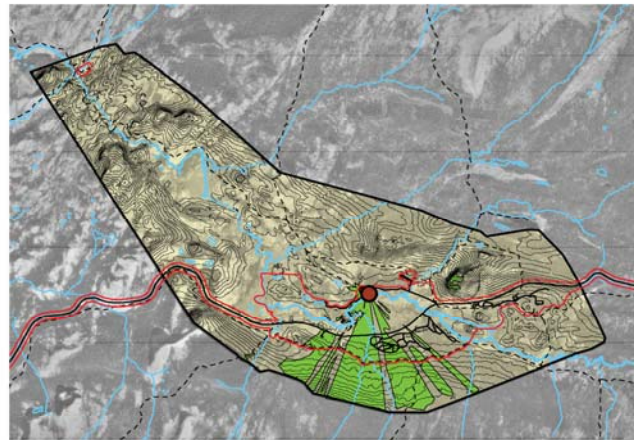
GREAT SIERRA WAGON
ROAD VIEW POINT 1

visible area: 
N↑




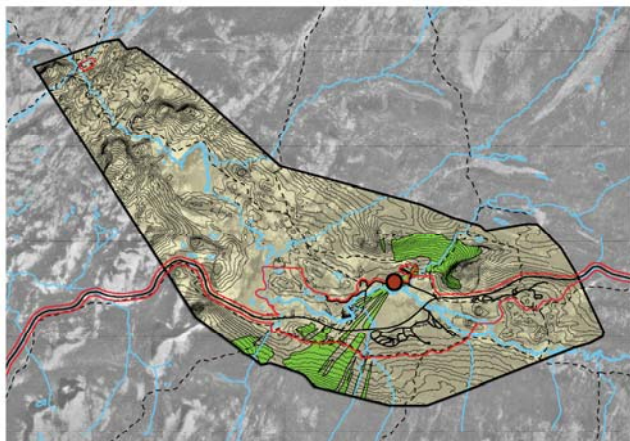
GREAT SIERRA WAGON
ROAD VIEW POINT 2
(SODA SPRINGS BRIDGE)

visible area: 
N↑




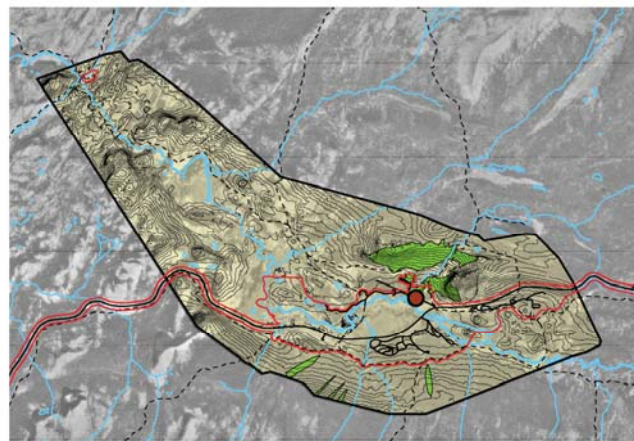
GREAT SIERRA WAGON
ROAD VIEW POINT 3

visible area: 
N↑



GREAT SIERRA WAGON
ROAD VIEW POINT 4

visible area: 
N↑



GREAT SIERRA WAGON
ROAD VIEW POINT 5


visible area: 
N↑

Figure 19. Visible areas from Tuolumne Meadows view points.

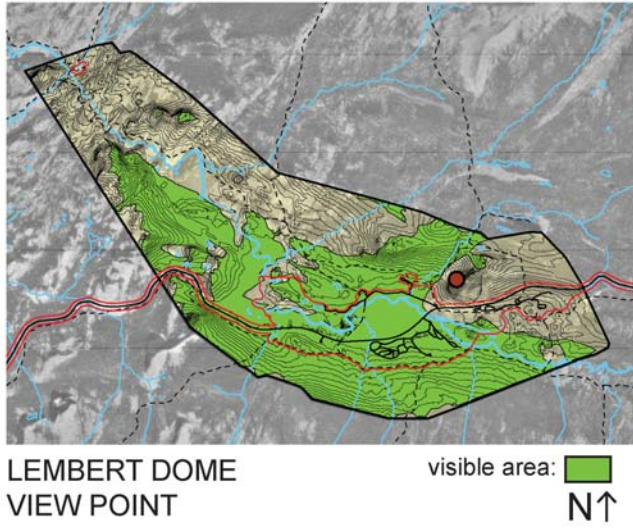


Figure 20. Visible areas from Tuolumne Meadows view points.